# FOREWORD

- This is Volume 1 of the 2010 PRIUS manual. There are four volumes to this manual. The sections included in each volume are indicated by black type in the Section Index. Use the Section Index of each volume to find the volume with the section you need.

- This manual applies to the models listed below. It covers all information in the previously issued Pub. No. RM1290U, and includes all production changes effective August, 2009 or later.

| | |
|---|---|
| Applicable models | ZVW30 series |

- Please note that the publications below have also been prepared as relevant service manuals for the components and system in these vehicles.

| Manual Name | Pub. No. |
|---|---|
| 2010 PRIUS Electrical Wiring Diagram | EM1291U |
| 2010 PRIUS New Car Features | NM1291U |

- All information in this manual is based on the latest product information at the time of publication. However, specifications and procedures are subject to change without notice. For the most current information available, refer to the Toyota Technical Information System (TIS) online at dealership locations or on the Internet at http://techinfo.toyota.com.

- If you find any failures in this manual, you are kindly requested to inform us by using the report form on the next page.

**TOYOTA MOTOR CORPORATION**

Copyright (C) 2009 TOYOTA MOTOR CORPORATION
All rights reserved. This book may not be reproduced or copied, in whole or in part, without the written permission of Toyota Motor Corporation.
First Printing: Aug. 11, 2009 01-090811-00

- Repair Manual Quality Report

Att.) Service Manager, Your Distributor

| Pub. No. | Issue Date |
| --- | --- |
| Name of Dealer | Name of Reporter |

Subject

Problem Description

Correction Proposal

# CAUTION

- This contents does not include all the necessary items about repair and service. This manual is made for the use of persons who have special techniques and certifications. If non-specialized or uncertified technicians perform repairs or service only using this manual or without proper equipment or tools, this may cause severe injury to you or other persons nearby and also cause damage to your customer's vehicle.
- In order to prevent dangerous operation and damage to your customer's vehicle, be sure to follow the instructions shown below.

- This contents must be read thoroughly. It is especially important to have a good understanding of all the contents written in the PRECAUTION of "INTRODUCTION" section.
- The service method written in this manual is very effective to perform repair and service. When performing the operations following the procedures using this manual, be sure to use tools specified and recommended. If using non-specified or tools other than recommended tools and service methods, be sure to confirm the safety of the technicians and that there is no possibility of causing personal injury or damage to the customer's vehicle before starting the operation.
- If part replacement is necessary, the part must be replaced with the same part number or equivalent part. Do not replace it with an inferior quality part.
- It is important to note that this manual contains various "Cautions" and "Notices" that must be carefully observed in order to reduce the risk of personal injury during service or repair, or reduce the possibility that improper service or repair may damage the vehicle or render it unsafe. It is also important to understand that these "Cautions" and "Notices" are not exaggerations and are possible hazardous consequences that might result from failure to follow these instructions.

# GENERAL INFORMATION

- A large number of ECU controlled systems are used in this vehicle. In general, ECU controlled systems are considered to be very intricate, requiring a high level of technical knowledge to troubleshoot. However, most problem checking procedures only involve inspecting the ECU controlled system circuits one by one. An adequate understanding of the system and a basic knowledge of electricity is enough to perform effective troubleshooting, accurate diagnosis and necessary repairs.
- (For using the Techstream*)

HINT:

*: The Techstream is the name for the diagnostic tester in North America.

- Before using the Techstream, read the operator's manual thoroughly.
- If the Techstream cannot communicate with the ECU controlled systems when connected to the DLC3 with the power switch on (IG) and the Techstream turned on, there is a problem on the vehicle side or the Techstream side.
    i. If communication is possible when the Techstream is connected to another vehicle, inspect the diagnosis data link line (bus (+) line), CANH and CANL lines, and the power circuits for the vehicle ECUs.
    ii. If communication is still not possible when the Techstream is connected to another vehicle, the problem is probably in the Techstream itself. Perform the Self Test procedure outlined in the Techstream operator's manual.

1. TROUBLESHOOTING PROCEDURES

- The troubleshooting procedures consist of diagnosis procedures for when a DTC is stored and diagnosis procedures for when no DTC is stored. The basic idea is explained in the following table.

| Procedure Type | Details | Troubleshooting Method |
|---|---|---|
| DTC Based Diagnosis | The diagnosis procedure is based on the DTC that is stored. | The malfunctioning part is identified based on the DTC detection conditions using a process of elimination.<br><br>The possible trouble areas are eliminated one-by-one by use of the Techstream and inspection of related parts. |
| Symptom Based Diagnosis<br><br>(No DTCs stored) | The diagnosis procedure is based on problem symptoms. | The malfunctioning part is identified based on the problem symptoms using a process of elimination.<br><br>The possible trouble areas are eliminated one-by-one by use of the Techstream and inspection of related parts. |

- Vehicle systems are complex and use many ECUs that are difficult to inspect independently. Therefore, a process of elimination is used, where components that can be inspected individually are inspected, and if no problems are found in these components, the related ECU is identified as the problem and replaced.
- It is extremely important to ask the customer about the environment and the conditions present when the problem occurred (Customer Problem Analysis). This makes it possible to simulate the conditions and

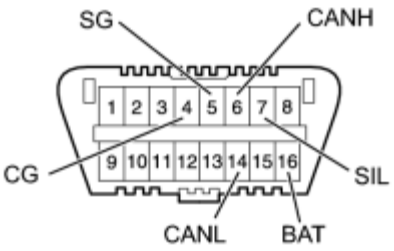
confirm the symptom. If the symptom cannot be confirmed or the DTC does not recur, the malfunctioning part may not be identified using the troubleshooting procedure, and the ECU for the related system may be replaced even though it is not defective. If this happens, the original problem will not be solved.

- In order to prevent endless expansion of troubleshooting procedures, the troubleshooting procedures are written with the assumption that multiple malfunctions do not occur simultaneously for a single problem symptom.
- To identify the malfunctioning part, troubleshooting procedures narrow down the target by separating components, ECUs and wire harnesses during the inspection. If the wire harness is identified as the cause of the problem, it is necessary to inspect not only the connections to components and ECUs but also all of the wire harness connectors between the component and the ECU.

2. DESCRIPTION

(a) Each system data and the Diagnostic Trouble Codes (DTCs) can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

3. CHECK DLC3




(a) The vehicle ECUs use ISO 15765-4 communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

| Symbol | Terminal No. | Name | Reference Terminal | Result | Condition |
|---|---|---|---|---|---|
| SIL | 7 | Bus "+" line | 5 - Signal ground | Pulse generation | During transmission |
| CG | 4 | Chassis ground | Body ground | 1 Ω or less | Always |
| SG | 5 | Signal ground | Body ground | 1 Ω or less | Always |
| BAT | 16 | Battery positive | Body ground | 11 to 14 V | Always |
| CANH | 6 | CAN "High" line | 14 - CANL | 54 to 69 Ω | Power switch off* |
| | | | Battery positive | 6 kΩ or higher | Power switch off* |
| | | | 4 - CG | 200 Ω or higher | Power switch off* |
| CANL | 14 | CAN "Low" line | Battery positive | 6 kΩ or higher | Power switch off* |
| | | | 4 - CG | 200 Ω or higher | Power switch off* |

NOTICE:

*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

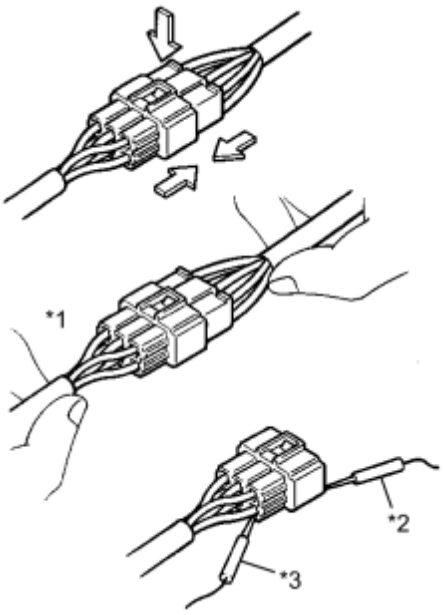
# ELECTRONIC CIRCUIT INSPECTION PROCEDURE

1. BASIC INSPECTION

(a) WHEN MEASURING RESISTANCE OF ELECTRONIC PARTS

(1) Unless otherwise stated, all resistance measurements are standard values measured at an ambient temperature of 20°C (68°F). Resistance measurements may be inaccurate if measured at high temperatures, i.e. immediately after the vehicle has been running. Measurements should be made after the engine has cooled down.

(b) HANDLING CONNECTORS




## Text in Illustration

| | |
|---|---|
| *1 | INCORRECT |
| *2 | INCORRECT |
| *3 | CORRECT |

(1) When disconnecting a connector, first squeeze the mating connector housing halves tightly together to release the lock, and then press the lock claw and separate the connector.

(2) When disconnecting a connector, do not pull on the harnesses. Grasp the connector directly and separate it.

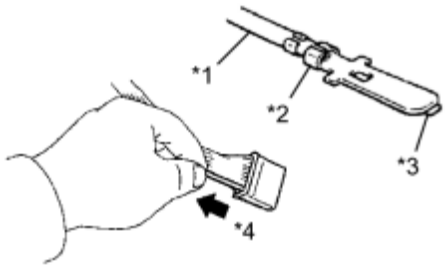
(3) Before connecting a connector, check that there are no deformations, damage, looseness or missing terminals.

(4) When connecting a connector, press firmly until it locks with a "click" sound.

(5) If checking a connector with a TOYOTA electrical tester, check the connector from the backside (harness side) using a mini test lead.

- As a waterproof connector cannot be checked from the backside, check it by connecting a sub-harness.
- Do not damage the terminals by moving the inserted tester needle.

(c) CHECKING CONNECTORS

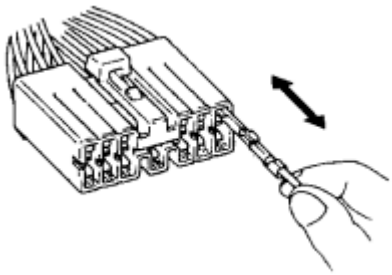



*Text in Illustration*

| | |
|---|---|
| *1 | Core Wire |
| *2 | Looseness of Crimping |
| *3 | Terminal Deformation |
| *4 | Pull Lightly |

(1) Checking when a connector is connected: Squeeze the connectors together to confirm that they are fully connected and locked.

(2) Checking when a connector is disconnected: Check by pulling the wire harness lightly from the backside of the connector. Look for unlatched terminals, missing terminals, loose crimps or broken conductor wires. Visually check for corrosion, metallic or foreign matter and water, and bent, rusted, overheated, contaminated or deformed terminals.



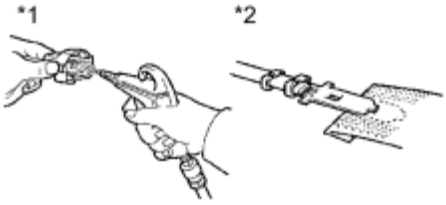
(3) Checking the contact pressure of the terminal: Prepare a spare male terminal. Insert it into a female terminal, and check for ample tension when inserting and after full engagement.

NOTICE:

When testing a gold-plated female terminal, always use a gold-plated male terminal.

(d) CONNECTOR TERMINAL REPAIR METHOD

# Text in Illustration




| | |
|---|---|
| *1 | CORRECT |
| *2 | INCORRECT |

(1) If there is any foreign matter on the terminal, clean the contact point with compressed air or a cloth. Never rub the contact point using sandpaper as the plating may come off.

(2) If there is abnormal contact pressure, replace the female terminal. If

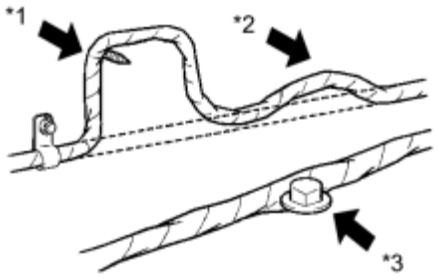
the male terminal is gold-plated (gold color), use a gold-plated female terminal; if it is silver-plated (silver color), use a silver-plated female terminal.

(3) Damaged, deformed or corroded terminals should be replaced. If the terminal does not lock into the housing, the housing may have to be replaced.

(e) WIRE HARNESS HANDLING

## Text in Illustration

| | |
|---|---|
| *1 | INCORRECT |
| *2 | INCORRECT |
| *3 | INCORRECT |




(1) If removing a wire harness, check the wiring and clamps before proceeding so that it can be restored in the same way.

(2) Never twist, pull or slacken the wire harness more than necessary.

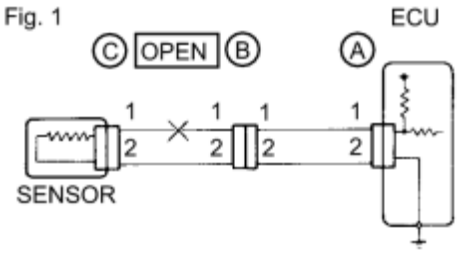
(3) The wire harness should never come into contact with any high temperature part, rotating, moving, vibrating or sharp-edged parts. Avoid contact with panel edges, screw tips and other sharp items.

(4) When installing parts, never pinch the wire harness.

(5) Never cut or break the cover of the wire harness. If it is cut or broken, repair it with insulating tape or replace the wire harness.

2. CHECK FOR OPEN CIRCUIT

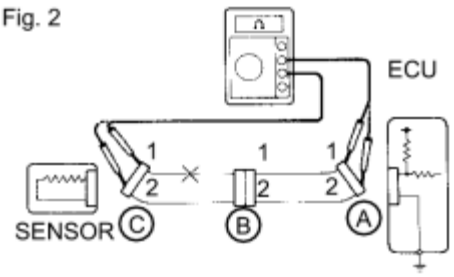
Fig. 1




(a) For an open circuit in the wire harness in Fig. 1, measure the resistance and voltage as follows:

(b) Check the resistance.

Fig. 2




(1) Disconnect connectors A and C and measure the resistance between the terminals of the connectors.

Standard Resistance (Fig. 2):

| Tester Connection | Specified Condition |
|---|---|
| Connector A terminal 1 - Connector C terminal 1 | 10 kΩ or higher |
| Connector A terminal 2 - Connector C terminal 2 | Below 1 Ω |

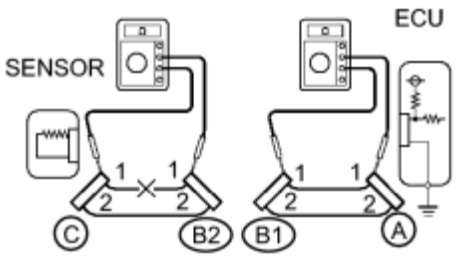
HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.

- If the results match the values specified above, an open circuit exists between terminal 1 of connector A and terminal 1 of connector C.

(2) Disconnect connector B and measure the resistance between the terminals of the connectors.

Fig. 3



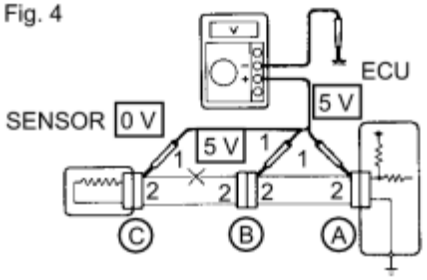

Standard Resistance (Fig. 3):

| Tester Connection | Specified Condition |
|---|---|
| Connector A terminal 1 - Connector B1 terminal 1 | Below 1 Ω |
| Connector B2 terminal 2 - Connector C terminal 2 | 10 kΩ or higher |

If the results match the values specified above, an open circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

(c) Check the voltage.

Fig. 4




(1) In a circuit in which voltage is applied to the ECU connector terminal, an open circuit can be checked by conducting a voltage check.

With each connector still connected, measure the voltage between body ground and the following terminals (in this order): 1) terminal 1 of connector A, 2) terminal 1 of connector B, and 3) terminal 1 of connector C.

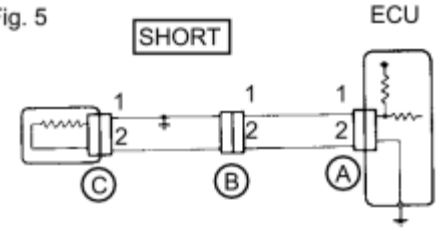
Standard Voltage (Fig. 4):

| Tester Connection | Specified Condition |
|---|---|
| Connector A terminal 1 - Body ground | 5 V |
| Connector B terminal 1 - Body ground | 5 V |
| Connector C terminal 1 - Body ground | Below 1 V |

If the results match the values specified above, an open circuit exists in the wire harness between terminal 1 of connector B and terminal 1 of connector C.

3. CHECK FOR SHORT CIRCUIT

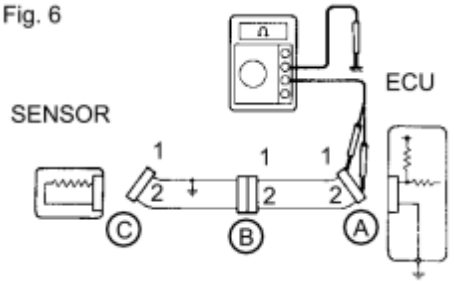
Fig. 5




(a) If a wire in the harness is shorted to ground (Fig. 5), locate the shorted section by measuring the resistance as follows:

(b) Check the resistance to body ground.

Fig. 6




(1) Disconnect connectors A and C and measure the resistance.

Standard Resistance (Fig. 6):

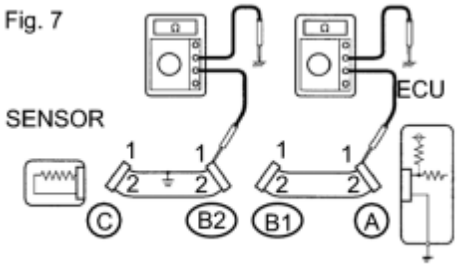
| Tester Connection | Specified Condition |
|---|---|
| Connector A terminal 1 - Body ground | Below 1 Ω |
| Connector A terminal 2 - Body ground | 10 kΩ or higher |

HINT:

Measure the resistance while lightly shaking the wire harness vertically and horizontally.

- If the results match the values specified above, a short circuit exists between terminal 1 of connector A and terminal 1 of connector C.

(2) Disconnect connector B and measure the resistance.




Standard Resistance (Fig. 7):

| Tester Connection | Specified Condition |
|---|---|
| Connector A terminal 1 - Body ground | 10 kΩ or higher |
| Connector B2 terminal 2 - Body ground | Below 1 Ω |

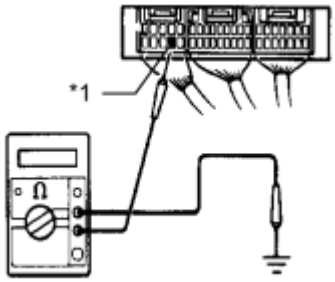
If the results match the values specified above, a short circuit exists between terminal 1 of connector B2 and terminal 1 of connector C.

4. CHECK AND REPLACE ECU

NOTICE:

- The connector should not be disconnected from the ECU. Perform the inspection from the backside of the connector on the wire harness side.
- When no measuring condition is specified, perform the inspection with the engine stopped and the power switch on (IG).
- Check that the connectors are fully seated. Check for loose, corroded or broken wires.

(a) First, check the ECU ground circuit. If it is faulty, repair it. If it is normal, the ECU could be faulty. Temporarily replace the ECU with a normally functioning one and check if the symptoms occur. If the trouble symptoms disappear, replace the original ECU.



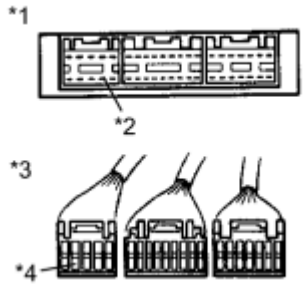

(1) Measure the resistance between the ECU ground terminal and body ground.

## Text in Illustration

| | |
|---|---|
| *1 | Ground |

Standard resistance:

Below 1 Ω




(2) Disconnect the ECU connector. Check the ground terminals on the ECU side and wire harness side for bent terminals, corrosion or foreign matter. Lastly, check the contact pressure of the female terminals.

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(ECU) |

| | |
|---|---|
| *2 | Ground |
| *3 | Front view of wire harness connector<br><br>(to ECU) |
| *4 | Ground |

# HOW TO PROCEED WITH TROUBLESHOOTING

1. OPERATION FLOW

HINT:

Perform troubleshooting in accordance with the procedure below. The following is an outline of basic troubleshooting procedure. Confirm the troubleshooting procedure for the circuit you are working on before beginning troubleshooting.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

(a) Ask the customer about the conditions and environment when the problem occurred.

NEXT

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | SYMPTOM CONFIRMATION AND DTC (AND FREEZE FRAME DATA) CHECK |

(a) Visually check the wire harnesses, connectors and fuses for open and short circuits.

(b) Warm up the engine to the normal operating temperature.

(c) Confirm the problem symptoms and conditions, and check for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is output | A |
| DTC is not output | B |

B GO TO STEP 6

A

| | |
|---|---|
| 5. | DTC CHART |

(a) Find the output DTC in the DTC chart. Look at the Trouble Area column for a list of potentially malfunctioning circuits and/or parts.

NEXT GO TO STEP 7

| | |
|---|---|
| 6. | PROBLEM SYMPTOMS CHART |

(a) Find the problem symptoms in the problem symptoms table. Look at the Suspected Area column for a list of potentially malfunctioning circuits and/or parts.

NEXT

| | |
|---|---|
| 7. | CIRCUIT INSPECTION OR PARTS INSPECTION |

(a) Identify the malfunctioning circuit or part.

NEXT

| | |
|---|---|
| 8. | ADJUST, REPAIR OR REPLACE |

(a) Adjust, repair or replace the malfunctioning circuit or parts.

NEXT

| | |
|---|---|
| 9. | CONFIRMATION TEST |

(a) After the adjustment, repairs or replacement of components, confirm that the malfunction no longer exists. If the malfunction does not recur, perform a confirmation test under the same conditions and in the same environment as when the malfunction first occurred.

NEXT **END**

2. CUSTOMER PROBLEM ANALYSIS

HINT:

- When troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.

- The following 5 items are important points for problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |

| | |
|---|---|
| Under what conditions? | Driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

3. SYMPTOM CONFIRMATION AND DIAGNOSTIC TROUBLE CODE

HINT:

The diagnostic system in this vehicle has various functions.

- The first function is the Diagnostic Trouble Code (DTC) check. A DTC is a code stored in the ECU memory whenever a malfunction in the signal circuits to the ECU occurs. In a DTC check, a previous malfunction's DTC can be checked by a technician during troubleshooting.

- Another function is the Input Signal Check, which checks if the signals from various switches are sent to the ECU correctly.

  By using these functions, the problem areas can be narrowed down and troubleshooting can be more effective. Diagnostic functions are incorporated in the following systems of this vehicle.

| System | Symptom Confirmation and Diagnostic Trouble Code | | | | |
|---|---|---|---|---|---|
| | DTC Check (Normal Mode) | DTC Check (Check Mode) | Sensor Check/Test Mode (Input Signal Check) | Data List | Active Test |
| SFI System (2ZR-FXE) | ○ | ○ | - | ○ | ○ |
| Hybrid Control System | ○ | - | - | ○ | ○ |
| Hybrid Battery System | ○ | - | - | ○ | ○ |
| Cruise Control System | ○ | - | - | ○ | ○ |
| Dynamic Radar Cruise Control System | ○ | - | - | ○ | ○ |
| Lane-Keeping Assist System | ○ | - | - | ○ | ○ |
| Electronic Shift Lever System | ○ | - | - | ○ | - |
| Tire Pressure Warning System | ○ | - | - | ○ | ○ |
| Electronically Controlled Brake System | ○ | - | ○ | ○ | ○ |
| Power Steering System (for Brushless Type Motor) | ○ | - | ○ | ○ | - |
| Power Steering System (for Brush Type Motor) | ○ | - | ○ | ○ | - |
| Audio and Visual System | ○ | - | - | - | - |
| Navigation System | ○ | - | - | - | - |
| Advanced Parking Guidance System | ○ | - | - | ○ | - |

| System | Symptom Confirmation and Diagnostic Trouble Code | | | | |
|---|---|---|---|---|---|
| | DTC Check (Normal Mode) | DTC Check (Check Mode) | Sensor Check/Test Mode (Input Signal Check) | Data List | Active Test |
| Rear View Monitor System (w/ Navigation System) | ○ | - | - | - | - |
| Rear View Monitor System (w/o Navigation System) | - | - | - | - | - |
| Garage Door Opener System | - | - | - | - | - |
| Safety Connect System | ○ | - | - | ○ | - |
| LIN Communication System | ○ | - | - | ○ | - |
| CAN Communication System | ○ | - | - | - | - |
| Power Door Lock Control System | - | - | - | ○ | ○ |
| Wireless Door Lock Control System | ○ | - | - | ○ | ○ |
| Smart Key System (for Entry Function) | ○ | - | - | ○ | ○ |
| Smart Key System (for Start Function) | - | - | - | ○ | ○ |
| Engine Immobilizer System | ○ | - | - | ○ | ○ |
| Lighting System (Interior) | - | - | - | ○ | ○ |
| Meter / Gauge System | ○ | - | - | ○ | ○ |
| Clock System | - | - | - | - | - |
| Airbag System | ○ | ○ | - | ○ | - |
| Occupant Classification System | ○ | - | - | ○ | - |
| Pre-Collision System | ○ | - | - | ○ | ○ |
| Front Power Seat Control System | - | - | - | - | - |
| Seat Heater System | - | - | - | - | - |
| Seat Belt Warning System | - | - | - | ○ | ○ |
| Air Conditioning System | ○ | - | - | ○ | ○ |
| Solar Ventilation System | - | - | - | ○ | - |
| Power Window Control System | ○ | - | - | ○ | ○ |
| Window Defogger System | - | - | - | ○ | ○ |
| Sliding Roof System | ○ | - | - | ○ | ○ |
| Power Mirror Control System | - | - | - | - | - |
| Wiper and Washer System | - | - | - | - | - |
| Lighting System (Exterior) | ○ | - | - | ○ | ○ |
| Horn System | - | - | - | - | - |

- In the DTC check, it is very important to determine whether the problem indicated by the DTC either: 1) still occurs, or 2) occurred in the past but has returned to normal. In addition, the DTC should be compared to the problem symptom to see if they are related. For this reason, DTCs should be checked before and after confirmation of symptoms (i.e., whether or not problem symptoms exist) to determine current system conditions, as shown in the flowchart below.

- Never skip the DTC check. Failing to check for DTCs, depending on the case, may result in unnecessary troubleshooting for systems operating normally or lead to repairs not related to the problem. Follow the procedure listed in the flowchart in the correct order.

- The following flowchart shows how to proceed with troubleshooting using the DTC check. Directions from the flowchart will indicate how to proceed either to DTC troubleshooting or to the troubleshooting of each problem symptom.

| | |
|---|---|
| 1. | DTC CHECK |

NEXT

| | |
|---|---|
| 2. | MAKE A NOTE OF DTC DISPLAYED AND THEN CLEAR MEMORY |

NEXT

| | |
|---|---|
| 3. | SYMPTOM CONFIRMATION |

Result:

| Result | Proceed to |
|---|---|
| No symptoms exist | A |
| Symptoms exist | B |

B ▶ GO TO STEP 5

A

| | |
|---|---|
| 4. | SIMULATION TEST USING SYMPTOM SIMULATION METHODS |

NEXT

| | |
|---|---|
| 5. | DTC CHECK |

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ TROUBLESHOOT FOR PROBLEM INDICATED BY DTC

A

| | |
|---|---|
| 6. | SYMPTOM CONFIRMATION |

Result:

| Result | Proceed to |
|---|---|
| No symptoms exist | A |
| Symptoms exist | B |

If a DTC was displayed in the initial DTC check, the problem may have occurred in a wire harness or connector in that circuit in the past. Check the wire harness and connectors.

B ▶ END
A ▶ **TROUBLESHOOT FOR EACH PROBLEM SYMPTOM**

The problem still occurs in a place other than the diagnostic circuit (the DTC displayed first is either for a past problem or a secondary problem).

4. SYMPTOM SIMULATION

HINT:

The most difficult case in troubleshooting is when no problem symptoms occur. In such a case, a thorough problem analysis must be carried out. A simulation of the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to important repairs being overlooked and mistakes or delays.

For example:

With a problem that only occurs when the engine is cold or as a result of vibration caused by the road during driving, the problem can never be determined if the symptoms are being checked on a stationary vehicle or a vehicle with a warmed-up engine. Vibration, heat or water penetration (moisture) is difficult to reproduce. The following symptom simulation tests are effective substitutes for the conditions and can be applied to a stationary vehicle. Important points in the symptom simulation test:

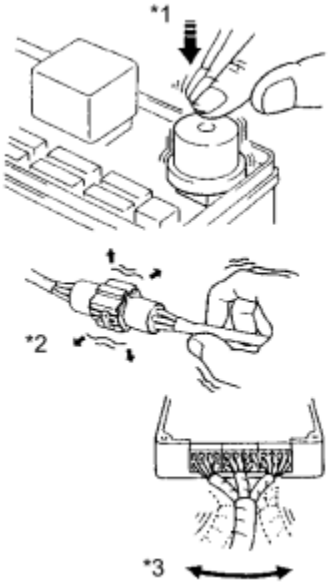
In the symptom simulation test, the problem symptoms as well as the problem area or parts must be confirmed. First, narrow down the possible problem circuits according to the symptoms. Then, connect the tester and carry out the symptom simulation test, judging whether the circuit being tested is defective or normal. Also, confirm the problem symptoms at the same time. Refer to Problem Symptoms Table for each system to narrow down the possible causes.

To reproduce DTCs, it is necessary to satisfy the respective DTC detection conditions.

(a) VIBRATION METHOD: When a malfunction seems to occur as a result of vibration.

# Text in Illustration

| | |
|---|---|
| *1 | Vibrate Slightly |
| *2 | Shake Slightly |




| | |
|---|---|
| *3 | Vibrate Slightly |

(1) PART AND SENSOR

Apply slight vibration with a finger to the part of the sensor suspected to be the cause of the problem, and check whether the malfunction occurs.

NOTICE:

Applying strong vibration to relays may open the relays.

(2) CONNECTORS

Slightly shake the connector vertically and horizontally.

(3) WIRE HARNESS

Slightly shake the wire harness vertically and horizontally.

HINT:

The connector joint and fulcrum of the vibration are the major areas that should be checked thoroughly.

(b) HEAT METHOD: When a malfunction seems to occur when the area in question is heated.

(1) Heat the component that is the possible cause of the malfunction with a hair dryer or similar device. Check if the malfunction occurs.

NOTICE:

- Do not heat components to more than 60°C (140°F). Exceeding this temperature may damage the components.
- Do not apply heat directly to parts in an ECU.

(c) WATER SPRINKLING METHOD: When a malfunction seems to occur on a rainy day or in high-humidity.

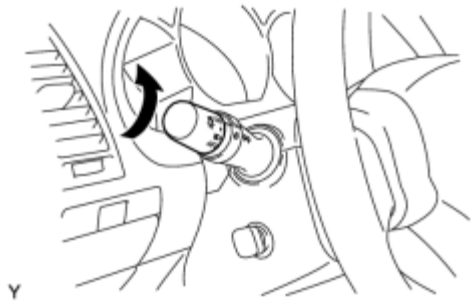
(1) Sprinkle water onto the vehicle and check if the malfunction occurs.



- Never sprinkle water directly into the engine compartment. Indirectly change the temperature and humidity by spraying water onto the front of the radiator.
- Never apply water directly onto the electronic components.

HINT:

If the vehicle has or had a water leak problem, the leak may have damaged the ECU or connections. Look for evidence of corrosion or short circuits. Proceed with caution during water tests.



(d) HIGH ELECTRICAL LOAD METHOD: When a malfunction seems to occur when the electrical load is high.

(1) Turn on the heater blower, headlights, rear window defogger and all other electrical loads. Check if the malfunction recurs.

5. DIAGNOSTIC TROUBLE CODE CHART

Look for output Diagnostic Trouble Codes (DTCs) (from the DTC checks) in the appropriate section's Diagnostic Trouble Code Chart. Use the chart to determine the trouble area and the proper inspection procedure. A description of each of the chart's columns is shown in the table below.

| Item | Description |
|---|---|
| DTC No. | Indicates the diagnostic trouble code. |
| Detection Item | Indicates the system or details of the problem. |
| Trouble Area | Indicates the suspected areas of the problem. |
| See page | Indicates the page where the inspection procedure for each circuit is to be found, or gives instruction for checking and repairs. |

6. PROBLEM SYMPTOMS TABLE

When no DTC is output but the problem still occurs, use the Problem Symptoms Table. The suspected areas (circuits or parts) for each problem symptom are shown in the table. The suspected areas are listed in order of probability. A description of each of the table columns is shown in the following table.

HINT:

In some cases, the problem is not detected by the diagnostic system even though a problem symptom occurs. It is possible that the problem occurs outside the detection range of the diagnostic system, or that the problem occurs in a completely different system.

| Item | Description |
|---|---|
| Symptom | - |
| Suspected Area | Indicates the circuit or part which needs to be checked. |
| See page | Indicates the page where the inspection procedure is located. |

7. INSPECTION

A description of the main points for inspection of suspected areas is shown in the following table.

| Item | Description |
|---|---|

| Item | Description |
|---|---|
| Description | The major role and operation of the circuit or system and its component parts are explained. |
| DTC No., DTC Detection Condition and Trouble Area | Indicates the diagnostic trouble codes, DTC detection conditions and suspected areas for a problem. |
| Wiring Diagram | This is a wiring diagram for the circuit or system.<br><br>This diagram can be used together with the Electrical Wiring Diagram to thoroughly understand the circuit.<br><br>Wire colors are indicated by alphabetical codes. B = Black, L = Blue, R = Red, BR = Brown, LG = Light Green, V = Violet, G = Green, O = Orange, W = White, GR = Gray, P = Pink, Y = Yellow, SB = Sky Blue<br><br>The first letter indicates the basic wire color and the second letter indicates the color of the stripe. |
| Inspection Procedure | This shows the procedure not only to determine whether the circuit is normal or abnormal, but also to determine whether the problem is located in the sensors, actuators, wire harness or ECU. |
| Illustration of the ECU connector during the check | The illustration shows whether the connector being checked is connected or disconnected.<br><br>The connections for an electrical tester are indicated by (+) or (-) after the terminal name.<br><br>For inspections between a connector and body ground, information about the ground is not shown in the illustration. |

# GENERAL INFORMATION

1. GENERAL DESCRIPTION

(a) This manual is written in accordance with SAE J2008.

(b) Repair operations can be separated mainly into the following 3 processes:

(1) Diagnosis

(2) Removing / Installing, Replacing, Disassembling / Reassembling, Checking and Adjusting

(3) Final Inspection

(c) The following procedure is omitted from this manual. However, this procedure must be performed.

(1) Use a jack or lift to perform operations.

(2) Clean all removed parts.

(3) Perform a visual check before and after performing any work.

2. INDEX

(a) An alphabetical INDEX section is provided at the end of the manual as a reference to help find the item to be repaired.

3. PREPARATION

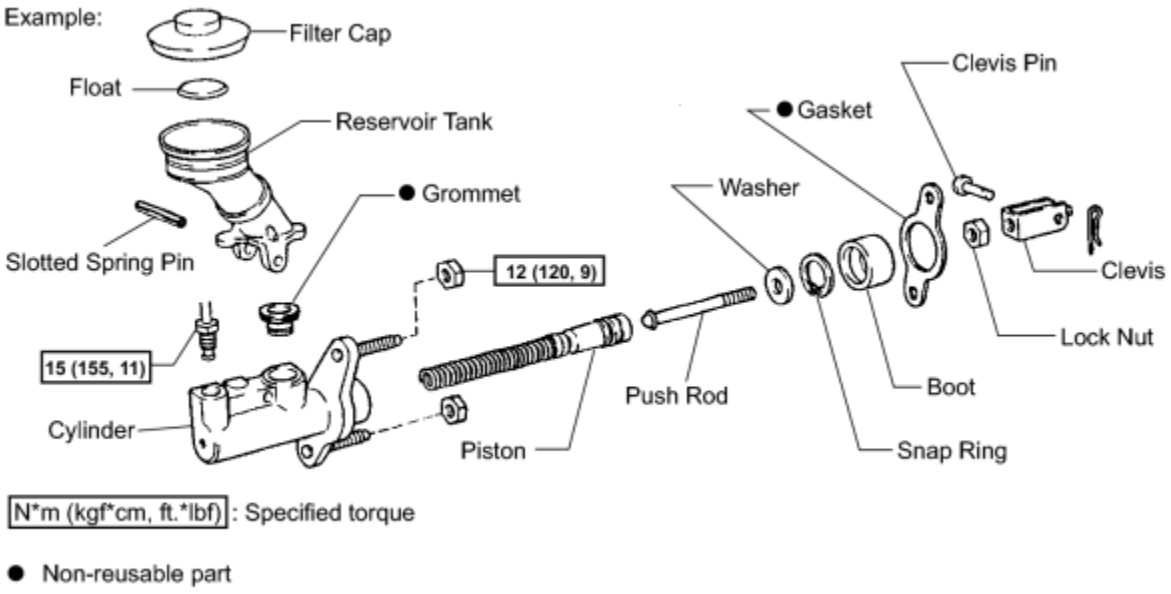
(a) Use of Special Service Tools (SST) and Special Service Materials (SSM) may be required, depending on the repair procedure. Be sure to use SST and SSM when they are required and follow the work procedure properly. A list of SST and SSM is in the "Preparation" section of this manual.

4. REPAIR PROCEDURES

(a) A component illustration is placed under the title where necessary.

(b) Non-reusable parts, grease application areas, precoated parts and torque specifications are noted in the component illustrations.

- The following illustration is an example.




(c) Torque specifications, grease application areas and non-reusable parts are emphasized in the procedures.

HINT:

There are cases where such information can only be explained by using an illustration. In these cases, torque, oil and other information are described in the illustration.

(d) Only items with key points are described in the text. What to do and other details are explained using illustrations next to the text. Both the text and illustrations are accompanied by standard values and notices.

| | |
|---|---|
| Illustration | What to do and where to do it |
| Task heading | What work will be performed |
| Explanation text | • How to perform the task<br>• Information such as specifications and warnings, which are written in boldface text |

(e) Illustrations of similar vehicle models are sometimes used. In these cases, minor details may be different from the actual vehicle.

(f) Procedures are presented in a step-by-step format.

5. SERVICE SPECIFICATIONS

(a) Specifications are presented in boldface text throughout the manual. The specifications are also found in the "Service Specifications" section for reference.

6. TERM DEFINITIONS

| | |
|---|---|
| CAUTION | Possibility of injury to you or other people. |

| | |
|---|---|
| NOTICE | Possibility of damage to components being repaired. |
| HINT | Provides additional information to help you perform repairs. |

7. INTERNATIONAL SYSTEM OF UNITS

(a) The units used in this manual comply with the International System of Units (SI UNIT) standard. Other units from the metric system and the English systems are also provided.

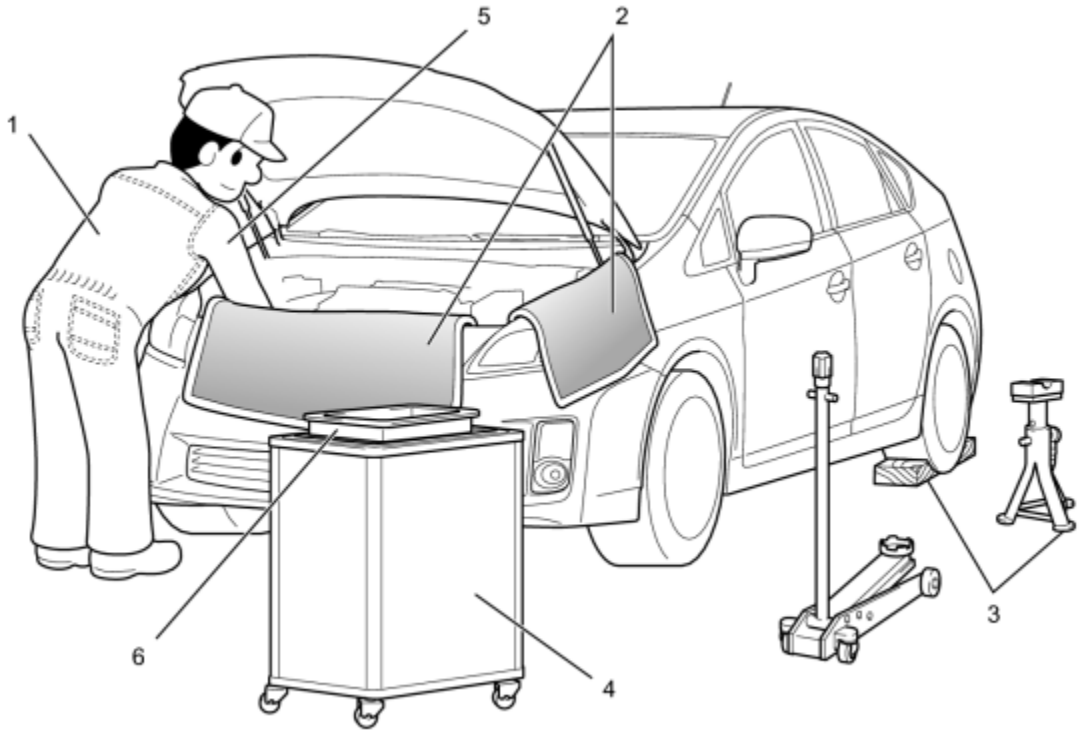
- Example:

Torque: **30 N·m (310 kgf·cm, 22ft·lbf)**

# PRECAUTION

1. BASIC REPAIR HINT

(a) HINTS ON OPERATIONS




c

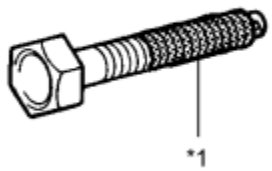
| | | |
|---|---|---|
| 1 | Attire | • Always wear a clean uniform.<br>• A hat and safety shoes must be worn. |
| 2 | Vehicle protection | Prepare a grille cover, fender cover, seat cover and floor mat before starting work. |
| 3 | Safety procedures | • When working with 2 or more persons, be sure to check the safety of one another.<br>• When working with the engine running, make sure to provide ventilation for exhaust fumes in the workshop.<br>• If working on high temperature, high pressure, rotating, moving, or vibrating parts, wear appropriate safety equipment and take extra care not to injure yourself or others.<br>• When jacking up the vehicle, be sure to support the specified locations with safety stands.<br>• When lifting up the vehicle, use appropriate safety equipment. |
| 4 | Preparation of tools and measuring equipment | Before starting work, prepare a tool stand, SST, measuring equipment, oil, and any replacement parts required. |
| 5 | Removal and installation, disassembly and | • Diagnose with a thorough understanding of proper procedures and of the reported problem. |

| | | |
|---|---|---|
| | assembly operations | • Before removing any parts, check the general condition of the assembly and for deformation and damage.<br>• If the procedure is complicated, take notes. For example, note the total number of electrical connections, bolts, or hoses removed. Add matchmarks to ensure reassembly of components in the original positions. Temporarily mark hoses and their fittings if needed.<br>• Clean and wash the removed parts if necessary and assemble them after a thorough check. |
| 6 | Removed parts | • Place the removed parts in a separate box to avoid mixing them up with new parts or contaminating the new parts.<br>• For non-reusable parts such as gaskets, O-rings and self-locking nuts, replace them with new ones as instructed in this manual.<br>• Retain the removed parts for customer inspection, if requested. |

(b) JACKING UP AND SUPPORTING VEHICLE

(1) Care must be taken when jacking up and supporting the vehicle. Be sure to lift and support the vehicle at the proper locations.

(c) PRECOATED PARTS




## Text in Illustration

| | |
|---|---|
| *1 | Seal Lock Adhesive |

(1) Precoated parts are bolts and nuts that are coated with seal lock adhesive at the factory.

(2) If a precoated part is retightened, loosened or moved in any way, it must be recoated with the specified adhesive.

(3) When reusing a precoated part, clean off the old adhesive and dry the part with compressed air. Then apply new seal lock adhesive appropriately to that part.

(4) Some seal lock agents harden slowly. You may have to wait for the seal lock adhesive to harden.

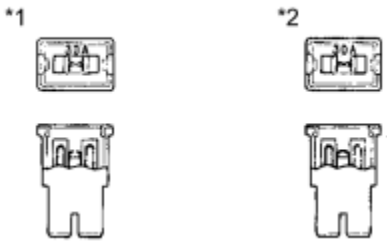
(d) GASKETS

(1) When necessary, use a sealer on gaskets to prevent leaks.

(e) BOLTS, NUTS AND SCREWS

(1) Carefully follow all the specifications for tightening torque. Always use a torque wrench.

(f) FUSES



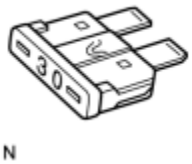
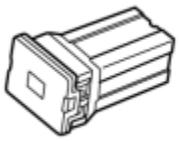
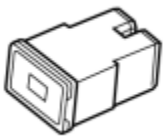

*Text in Illustration*

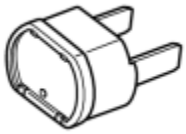
| | |
|---|---|
| *1 | INCORRECT |
| *2 | CORRECT |

(1) When inspecting a fuse, check that the wire of the fuse is not broken.

(2) If the wire of a fuse is broken, confirm that there are no shorts in its circuit.

(3) When a fuse is replaced, a fuse with the same amperage rating must be used.

| Illustration | Symbol | Part Name | Abbreviation |
|---|---|---|---|
|  |  | FUSE | FUSE |
|  |  | MEDIUM CURRENT FUSE | M-FUSE |
|  |  | HIGH CURRENT FUSE | H-FUSE |
| | | FUSIBLE LINK | FL |

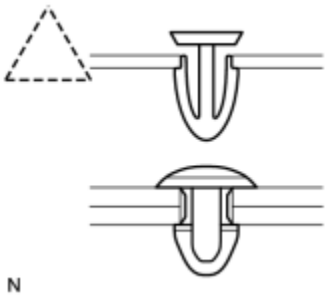
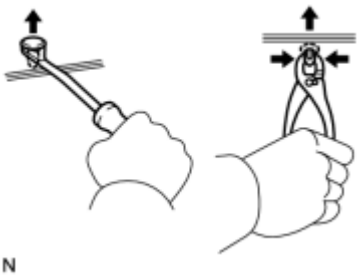
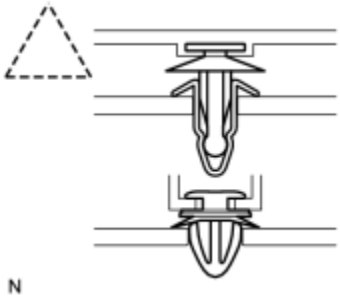
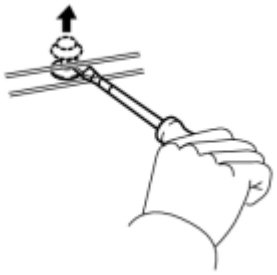
| Illustration | Symbol | Part Name | Abbreviation |
|---|---|---|---|
|  N |  N | | |
|  N |  N | CIRCUIT BREAKER | CB |

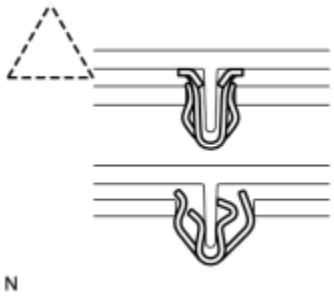
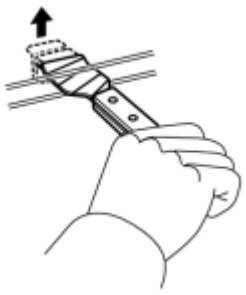
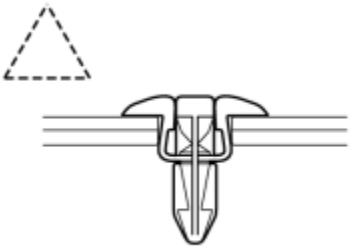
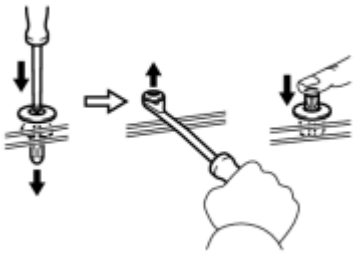
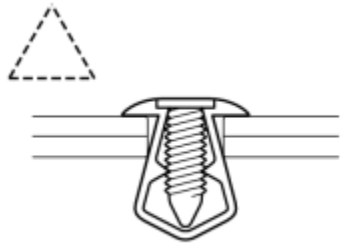
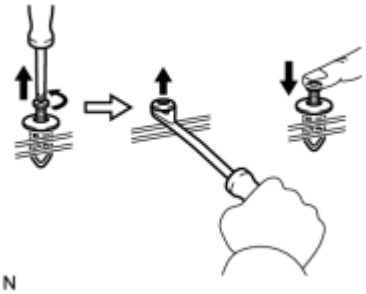
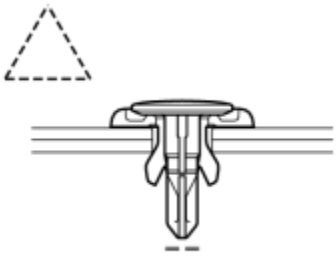
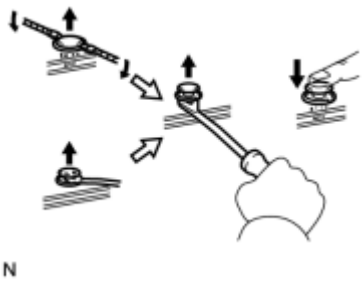
(g) CLIPS

(1) The removal and installation methods of typical clips used for vehicle body parts are shown in the table below.

HINT:

If clips are damaged during a procedure, always replace the damaged clips with new ones.

| Shape (Example) | Removal/Installation |
|---|---|
|  N |  N<br>Remove the clips with a clip remover or pliers. |
|  N |  N<br>Remove the clips with a clip remover or screwdriver. |

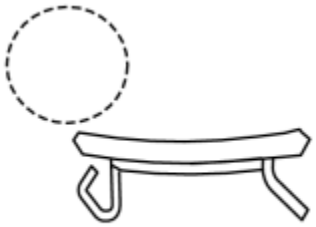
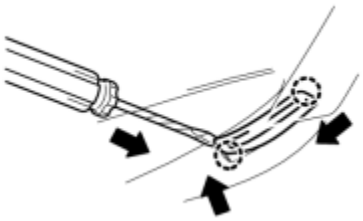
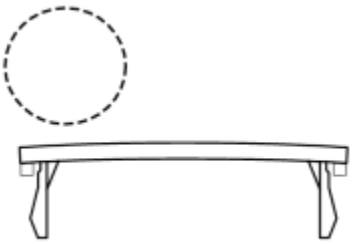
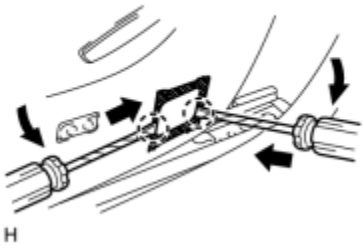
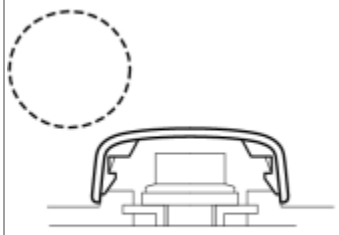
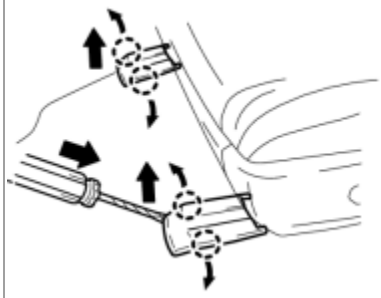
| Shape (Example) | Removal/Installation |
| --- | --- |
|  |  Remove the clips with a wide scraper to prevent panel damage. |
|  |  Remove the clips by pushing the center pin through and prying out the shell. |
|  |  Remove the clips by unscrewing the center pin and prying out the shell. |
|  |  Remove the clips by prying out the pin and then prying out the shell. |

(h) CLAWS

(1) The removal and installation methods of typical claws used for vehicle body parts are shown in the table below.

HINT:

If claws are damaged during a procedure, always replace the cap or cover that has damaged claws with a new one.

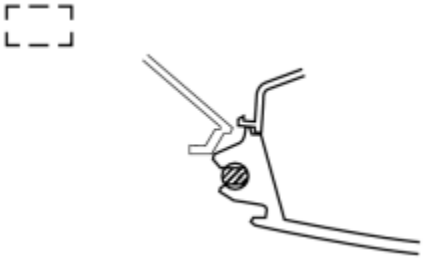
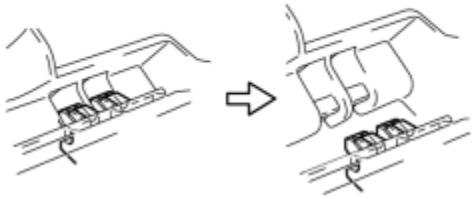
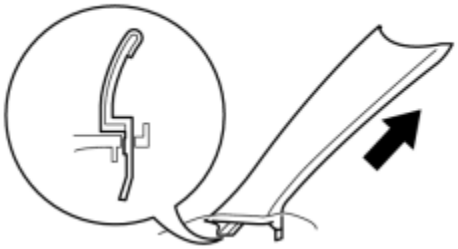
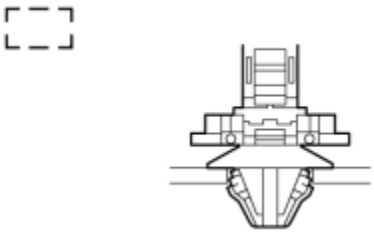
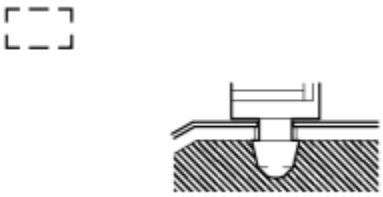
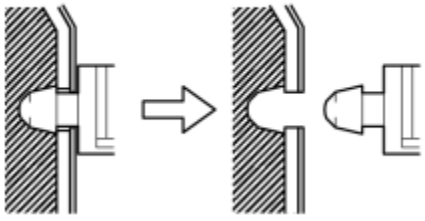
| Shape (Example) | Illustration | Procedure |
|---|---|---|
|  |  | Using a screwdriver, disengage the claws and remove the cap or cover. |
|  |  | Using a screwdriver, disengage the claws and remove the cap or cover. |
|  |  | Using a screwdriver, detach the claws and remove the cap or cover. |

(i) HINGES, GUIDES, CLAMPS, PINS, ETC.

(1) The removal and installation methods of typical hinges, guides, clamps and pins used for vehicle body parts are shown in the table below.

HINT:

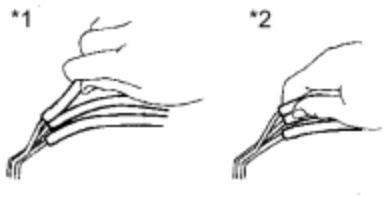
If clamps are damaged during a procedure, always replace the cap or cover that has damaged clamps with a new one.

| Shape (Example) | Removal/Installation |
| --- | --- |
|  | Pull away from the pins to disengage.<br>  |
|  | Disengage the pins by pulling.<br>  |
|  | Remove the clamps with pliers.<br>  |
|  | Disengage the pins by pulling.<br>  |

(j) REMOVAL AND INSTALLATION OF VACUUM HOSES

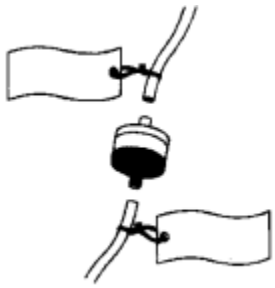
(1) To disconnect a vacuum hose, pull and twist it from the end of the hose. Do not pull it from the middle of the hose as this may damage the

hose.




## Text in Illustration

| | |
|---|---|
| *1 | INCORRECT |
| *2 | CORRECT |

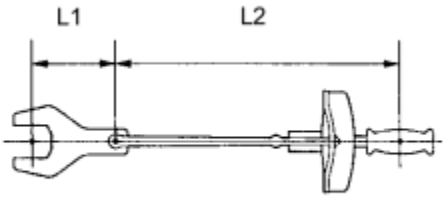


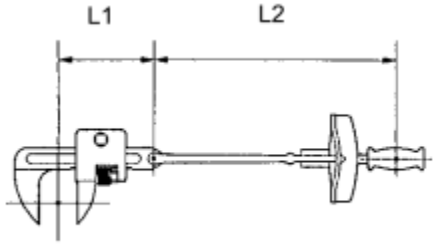
(2) When disconnecting vacuum hoses, use tags to identify where they should be reconnected.

(3) After completing any hose related repairs, double-check that the vacuum hoses are properly connected. The label under the hood shows the proper layout.

(4) When using a vacuum gauge, never force the hose onto a connector that is too large. If a hose has been stretched, air may leak. Use a step-down adapter if necessary.

(k) TORQUE WHEN USING TORQUE WRENCH WITH EXTENSION TOOL




(1) Use the formula below to calculate special torque values for situations where SST or an extension tool is combined with a torque wrench.

Formula

T' = (L2/(L1 + L2))*T

| | |
|---|---|
| T' | Reading of torque wrench {N*m (kgf*cm, ft.*lbf)} |
| T | Torque {N*m (kgf*cm, ft.*lbf)} |
| L1 | Length of SST or extension tool {cm (in.)} |

| | |
|---|---|
| L2 | Length of torque wrench {cm (in.)} |

NOTICE:

If an extension tool or SST is combined with a torque wrench and used to tighten to a torque specification in this manual, the actual torque will be excessive and parts will be damaged.

2. PRECAUTIONS FOR HIGH-VOLTAGE CIRCUIT INSPECTION AND SERVICE

CAUTION:

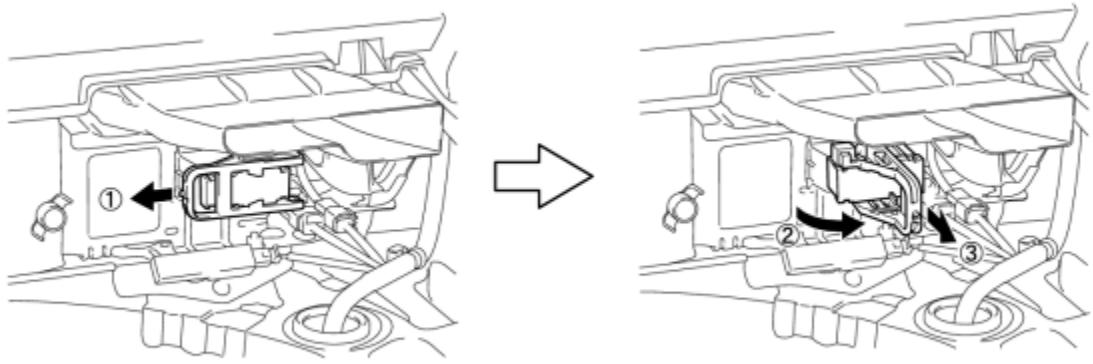
The vehicle has a hybrid system that operates at voltages up to 650 V. The hybrid system uses an HV battery that contains an electrolyte which is a strong alkali solution that includes potassium hydroxide. Be sure to follow the instructions in this manual to handle the system correctly. Failure to do so may result in serious injury or electrocution.

(a) Technicians must undergo special training to be able to service and inspect the high-voltage system.

(b) All high-voltage wire harnesses and connectors are colored orange. The HV battery and other high-voltage components have "High Voltage" caution labels. Do not carelessly touch these wires or components.

(c) When there is a problem with the wire harness or connector of a high-voltage circuit, repairs to the harness or connector should not be attempted. Replace damaged or malfunctioning high voltage cables or connectors.

(d) Before inspecting or servicing the high-voltage system, be sure to follow all safety measures, such as wearing insulated gloves and removing the service plug to prevent electrocution. Carry the removed service plug in your pocket to prevent other technicians from accidentally reconnecting it while you are servicing the vehicle.




c

NOTICE:

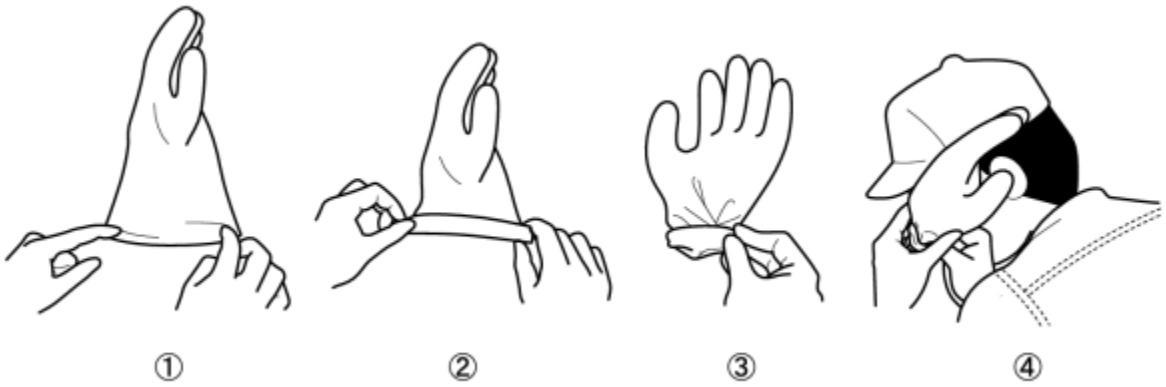
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(e) After removing the service plug, wait 10 minutes before touching any of the high-voltage connectors and terminals.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

(f) Before using insulated gloves, be sure to check them for cracks, tears and other types of damage by performing the following procedure.




T

1. Place the glove on its side.
2. Roll the opening up 2 or 3 times.
3. Fold the opening in half to close it.
4. Confirm that there are no air leaks.

(g) When servicing the vehicle, do not carry metal objects like mechanical pencils or rulers that can be dropped accidentally and cause a short circuit.

(h) Before touching a bare high-voltage terminal, wear insulated gloves and use a tester to make sure that the terminal voltage is 0 V.

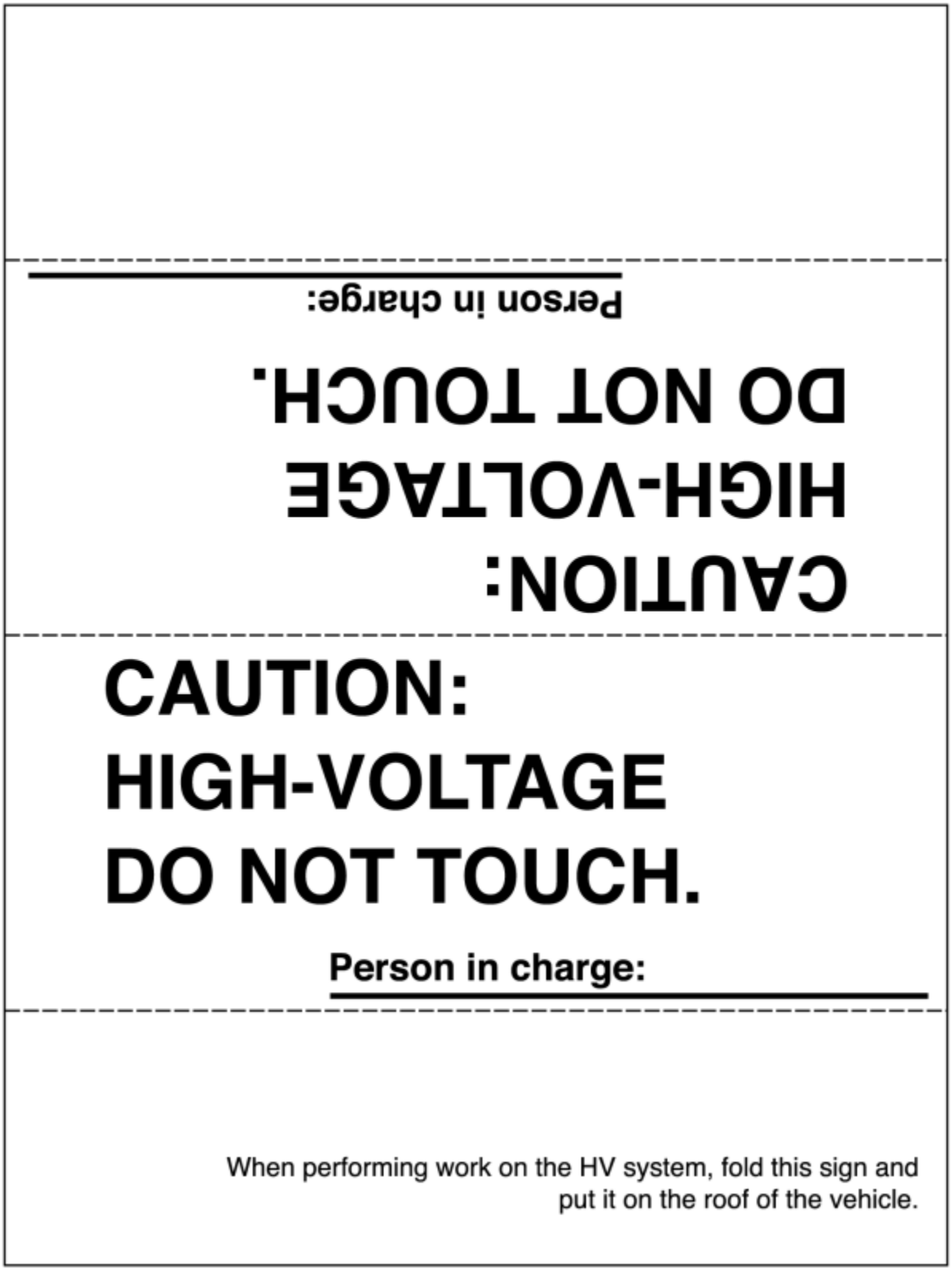


H

(i) After disconnecting or exposing a high-voltage connector or terminal, insulate it immediately using insulating tape.

(j) Bolts and nuts for high-voltage terminals should be tightened firmly to the specified torque. Both insufficient and excessive torque can cause failure.

(k) Use the "CAUTION: HIGH VOLTAGE DO NOT TOUCH" sign to notify other technicians that the high-voltage system is being inspected and/or repaired.




P

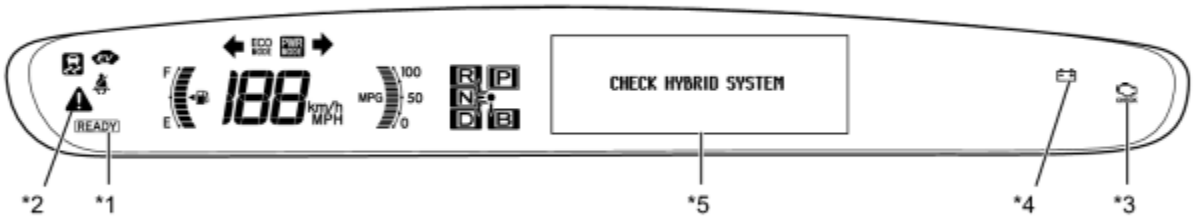
(l) After servicing the high-voltage system and before reinstalling the service plug, check again that you have not left a part or tool inside, that the high-voltage terminals are firmly tightened, and that the connectors are correctly connected.

(m) When installing hybrid system components such as the HV battery, make sure that the polarity of all connections is correct.

3. PRECAUTIONS TO BE OBSERVED WHEN INSPECTING OR SERVICING ENGINE COMPARTMENT

(a) The vehicle automatically turns the engine on and off when the READY light on the instrument panel is illuminated. To avoid injury, make sure that both the indicator on the power switch and the READY light on the meter are off.

4. ACTIONS TO BE TAKEN WHEN A WARNING LIGHT IS LIT




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | READY Light | *2 | Master Warning Light |
| *3 | MIL | *4 | Charge Warning Light |
| *5 | Multi-information Display | - | - |

(a) If one of the warning lights (2) to (4) illuminates, connect the Techstream to the DLC3 to check the DTCs (Diagnostic Trouble Codes). Then, refer to the applicable troubleshooting steps in this manual to inspect and repair the affected area. The foregoing actions are also required if the READY light does not illuminate when attempting to turn the power switch on (READY).

| Indicator Light | Vehicle Condition |
|---|---|
| (1) READY (TO DRIVE) | Illuminates when the power switch is turned on (READY), indicating that the vehicle is ready to be driven. |
| (2) Master Warning Light | The master warning light comes on or flashes to indicate that a warning is currently being displayed on the multi-information display. Depending on the warning, the buzzer may also sound. |

| Indicator Light | Vehicle Condition |
|---|---|
| | When any malfunction occurs in the hybrid system or hybrid battery system, the master warning light comes on or flashes along with a buzzer, and a warning, "CHECK HYBRID SYSTEM", is displayed on the multi-information display. |
| (3) MIL | Illuminates when there is a malfunction in the engine control system.<br><br>(Also illuminates when the power switch is turned on.) |
| (4) Charge Warning Light | Illuminates when there is a malfunction in the charging system.<br><br>(Be sure to check the DTC (Diagnostic Trouble Code) if this light illuminates together with the master warning light.) |

5. ACTIONS TO BE TAKEN WHEN BATTERIES ARE DISCHRGED

HINT:

The vehicle uses a 12 V auxiliary and a 201.6 V hybrid vehicle battery. Therefore, there are two recharging methods when the batteries are discharged.

(a) Perform this procedure when the auxiliary battery is fully discharged.

HINT:

The following problems indicate that the auxiliary battery is discharged:

- No display appears on the instrument panel when the power switch is turned on (IG).
- The hybrid system does not start.
- The headlights are dim.
- The sound from the horn is weak.
- Park (P) cannot be disengaged.

NOTICE:

Never use a quick charger.

(1) Engage the parking brake.

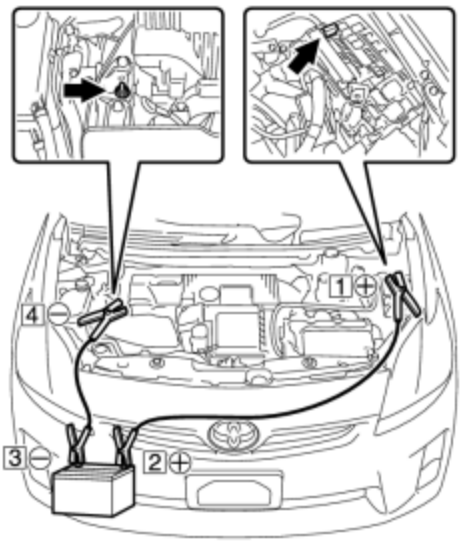
(2) Turn the power switch off and remove the key from the interior detection area.

(3) Using booster cables, connect the 12 V battery of the rescue vehicle and the auxiliary battery of the stalled vehicle as shown in the illustration.

HINT:

Use the booster terminal in the engine compartment.

| Connecting Sequence | Connecting Location |
|---|---|




| | |
|---|---|
| 1 | Positive booster terminal of stalled vehicle |
| 2 | Positive battery terminal of rescue vehicle |
| 3 | Negative battery terminal of rescue vehicle |
| 4 | Engine mounting insulator RH bolt |

c

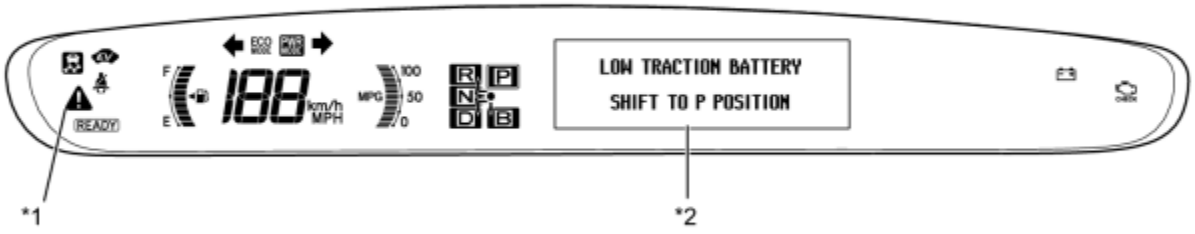
(4) Start the engine of the rescue vehicle and run the engine at a speed slightly higher than usual.

(5) Turn the power switch on (READY).

NOTICE:

Immediately disconnect the booster cables in the reverse order of connection after the hybrid system have started. Do not leave the booster cables connected because they are not designed for recharging purposes.

If the hybrid system fails to start and the HV battery warning illuminates, the HV battery may be discharged.




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Master Warning Light | *2 | Multi-information Display |

(b) When the hybrid vehicle battery is discharged:

(1) Using the THS charger, charge the hybrid vehicle battery.

HINT:

Perform this operation when the hybrid vehicle battery is discharged or low, or if Low Traction Battery is displayed and DTC P3000-388 or 389 is stored in the power management control ECU (HV CPU).

6. ACTIONS TO BE TAKEN FOR VEHICLES DAMAGED BY IMPACT

CAUTION:

The vehicle has a hybrid system that operates at voltages of up to 650 V. The hybrid system uses an HV battery that contains an electrolyte which is a strong alkali solution that includes potassium hydroxide. Be sure to follow the instructions in this manual to handle the system correctly. Failure to do so may result in serious injury or electrocution.

(a) Items to be prepared for the accident site

- Protective clothing (insulated gloves, rubber gloves, goggles, and safety shoes)
- Saturated boric acid solution 20 liter (21.1 US qts, 17.6 Imp.qts) (obtain 800 g (1.7 lb) of boric acid powder, put it into a container, and dissolve it in water)
- Red litmus paper
- ABC fire extinguisher (effective against both oil flames and electrical flames)
- A shop rag or piece of cloth (for wiping off the electrolyte)
- Insulating tape (for insulating cable)

- Electrical tester

(b) Actions to be taken at the accident site

CAUTION:

- Do not touch any bare cables that may have high-voltage. If a cable must be touched or if accidental contact is possible, wear insulated gloves and insulate the cable using insulating tape.
- If the vehicle catches on fire, use an ABC fire extinguisher to extinguish the fire. Trying to extinguish a fire using only a small amount of water can be more dangerous than effective. Use a substantial amount of water or wait for firefighters.
- Visually check the HV battery and the immediate area for any electrolyte leakage. Do not touch any leaked liquid because it could be highly alkaline electrolyte.
- Work on the vehicle only after the vehicle has been pulled out of the water.

(1) Check the vicinity of the hybrid vehicle battery for any leakage of the electrolyte.

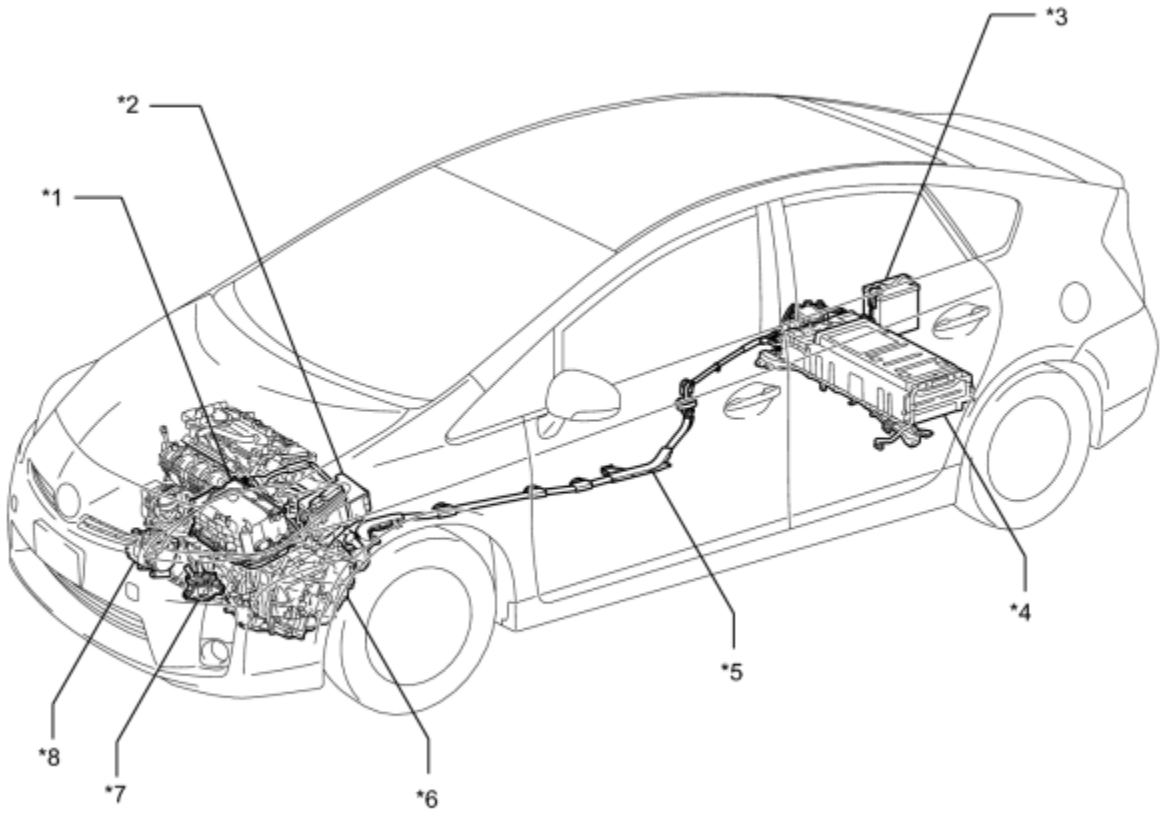
CAUTION:

Do not touch any leaked liquid because it could be highly alkaline electrolyte. Wear rubber gloves and goggles, neutralize the liquid with saturated boric acid solution, and then apply red litmus paper to the liquid. Check that the paper does not turn blue. Wipe the neutralized liquid with a shop rag or piece of cloth.

(2) If damage to any of the high-voltage components and cables is suspected, cut the high-voltage circuit using the following procedure.

CAUTION:

Be sure to wear insulated gloves, goggles, and safety shoes.




c

***Text in Illustration***

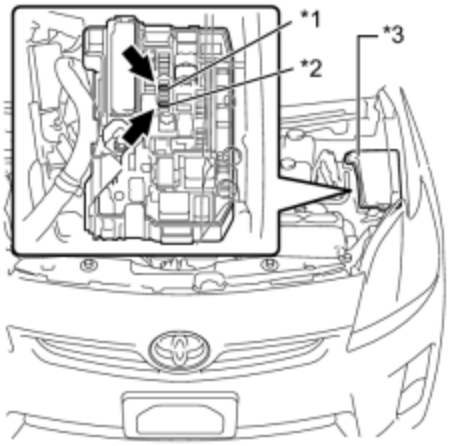
| | | | |
|---|---|---|---|
| *1 | Inverter with Converter Assembly | *2 | Engine Room Junction Block Assembly |
| *3 | Auxiliary Battery | *4 | HV battery Assembly |
| *5 | No. 3 Wire Frame | *6 | Hybrid Vehicle Transaxle Assembly |
| *7 | Water Pump with Motor Assembly | *8 | Compressor with Motor Assembly |

(3) Turn the power switch off.

# Text in Illustration

| | |
|---|---|
| *1 | AM2 Fuse |
| *2 | IGCT Fuse |
| *3 | Engine Room Junction Block Assembly |

HINT:




If the power switch cannot be turned off, remove the IGCT fuse and AM2 fuse from the engine room junction block assembly. Confirm that the READY light is off.

(4) Disconnect the cable from the negative terminal of the auxiliary battery.

(5) Wear insulated gloves, and then remove the service plug.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Moving the damaged vehicle

If any of the following conditions is met, tow the vehicle away using a tow truck.

- One or more of the high-voltage components and cables are damaged.
- Components related to driving, the transaxle, or the fuel system are damaged.
- The master warning light is on.
- The READY light does not come on when attempting to turn the power switch on (READY).

CAUTION:

Before towing the vehicle away using a tow truck, disconnect the cable from the negative (-) terminal of the auxiliary battery and remove the service plug.

NOTICE:

Perform the procedure below if the READY light turns off , or there are abnormal noises, unusual smells, or strong vibrations while driving:

(1) Park the vehicle in a safe place.

(2) Push the P position switch, and apply the parking brake.

(3) Turn the power switch off, and disconnect the cable from the negative (-) terminal of the auxiliary battery.

(4) Remove the service plug while wearing insulated gloves.

(d) Actions required after moving the damaged vehicle

(1) Procedure

If you see any liquid on the road surface, it could be highly alkaline electrolyte leakage.

Wear rubber gloves and goggles, neutralize the liquid with saturated boric acid solution, and then apply red litmus paper to the liquid. Check that the paper does not turn blue. Wipe the neutralized liquid with a shop rag or piece of cloth.

(e) Items to be prepared (when repairing a damaged vehicle)

- Protective clothing (insulated gloves, rubber gloves, goggles, and safety shoes)
- Saturated boric acid solution 20 liter (21.1 US qts, 17.6 Imp.qts) (obtain 800 g (1.7 lb) of boric acid powder, put it into a container, and dissolve it in water)
- Red litmus paper
- A shop rag or piece of cloth (for wiping off the electrolyte)
- Insulating tape (for insulating cables)
- Electrical tester

(f) Precautions to be observed when servicing a damaged vehicle

CAUTION:

Always follow instructions to ensure safety.

(1) Wear insulated or rubber gloves, goggles, and safety shoes.

(2) Check the HV battery and immediate area for any electrolyte leakage.

CAUTION:

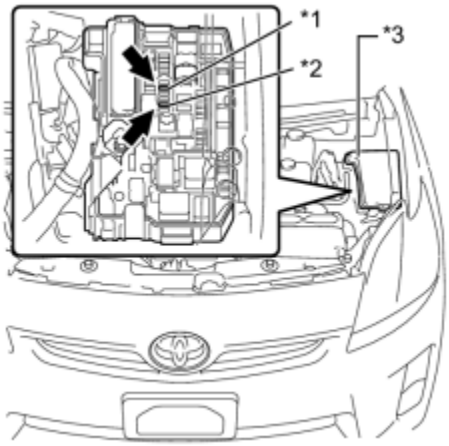
- Do not touch any leaked liquid because it could be highly alkaline electrolyte. Wear rubber gloves and goggles, neutralize the liquid with saturated boric acid solution, and then apply red litmus paper to the liquid. Check that the paper does not turn blue. Wipe the neutralized liquid with a shop rag or piece of cloth.
- If the electrolyte comes in contact with your skin, use a saturated boric acid solution or a large amount of water to wash it off. If the electrolyte comes in contact with an article of clothing, take it off immediately.
- If the electrolyte comes in contact with your eyes, call out loudly for help. Do not rub your eyes. Wash them immediately with a large amount of water and seek medical care.

(3) Do not touch any bare cables that could be high voltage cables. If a cable must be touched or if accidental contact is possible, follow the following instructions: 1) wear insulated gloves and goggles, 2) measure the voltage between the cable and body ground using an electrical tester, and 3) insulate the cable using insulating tape.

(4) If damage to any of the high-voltage components and cables is suspected, cut the high-voltage circuit using the procedure below.

CAUTION:

Do not touch any bare cables that may have high-voltage. If a cable must be touched or if accidental contact is possible, wear insulated gloves and insulate the cable using insulating tape.




(5) Turn the power switch off.

## Text in Illustration

| | |
|---|---|
| *1 | AM2 Fuse |
| *2 | IGCT Fuse |
| *3 | Engine Room Junction Block Assembly |

HINT:

If the power switch cannot be turned off, remove the IGCT fuse and AM2 fuse from the engine room junction block assembly. Confirm that the READY light is off.

(6) Disconnect the cable from the negative terminal of the auxiliary battery.

(7) Wear insulated gloves, and then remove the service plug.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(g) Precautions to be taken when disposing of the vehicle

(1) Disposing of HV battery

When scrapping the vehicle, remove the HV battery from the vehicle and return it to the location specified by the manufacturer. Any damaged HV battery should also be returned to the specified location.

CAUTION:

- After removing the HV battery, keep it away from water. Water may heat the battery, resulting in a fire.
- Accidents such as electric shocks could result if the vehicle and its HV battery are disposed of improperly or abandoned. Therefore, make sure to return any HV battery using the prescribed recovery route through a TOYOTA dealer.

(h) Precautions to be observed when towing

(1) Tow the damaged vehicle with its front and rear wheels lifted off the ground.

CAUTION:

Towing the damaged vehicle with its front wheels on the ground will cause the motor to generate electricity. This electricity could, depending on the nature of the damage, leak and cause a fire.

(i) Towing with the 4 wheels on the ground

CAUTION:

- If the vehicle needs to be towed using a rope with all 4 wheels on the ground, do not exceed 30 km/h (19 mph) and tow only for a short distance and then have the vehicle towed by a truck.
- Turn the power switch on (IG) and move the selector lever to N.
- If any abnormality is present in the damaged vehicle during towing, stop towing immediately.

HINT:

Neutral (N) cannot be selected if the auxiliary battery is disconnected.

7. FOR VEHICLES EQUIPPED WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

This vehicle is equipped with a Supplemental Restraint System (SRS).

CAUTION:

- Before performing pre-disposal deployment of any SRS component, review and closely follow all applicable environmental and hazardous material regulations. Pre-disposal deployment may be considered hazardous material treatment.
- Failure to carry out the service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing and lead to serious injury. Furthermore, if a mistake is made when servicing the SRS, it is possible that the SRS may fail to operate properly. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the following section carefully.

(a) GENERAL NOTICE

(1) As malfunctions of the SRS are difficult to confirm, the Diagnostic Trouble Codes (DTCs) become the most important source of information when troubleshooting. When troubleshooting the SRS, always check for DTCs before disconnecting the battery.

(2) Work must be started at least 90 seconds after the power switch is turned off and after the cable is disconnected from the negative (-) battery terminal.

The SRS is equipped with a back-up power source. If work is started within 90 seconds after turning the power switch off and disconnecting the cable from the negative (-) battery terminal, the SRS may deploy.

When the cable is disconnected from the negative (-) battery terminal, the clock and audio system memory will be cleared. Before starting work, make a note of the settings of each memory system. When work is finished, reset the clock and audio system as before.

CAUTION:

Never use a back-up power source (battery or other) to avoid clearing the system memory. The back-up power source may inadvertently power the SRS and cause it to deploy.

(3) If the vehicle has been involved in a minor collision where the SRS does not deploy, the steering pad, front passenger airbag assembly, knee airbag assembly, seat side airbag assembly, curtain shield airbag assembly and seat outer belt assembly should be inspected before further use of the vehicle.

(4) Never use SRS parts from another vehicle. When replacing parts, use new parts.

(5) Before repairs, remove the airbag sensor assemblies if impacts are likely to be applied to the sensor during repairs.

(6) Never disassemble and attempt to repair any airbag sensor assemblies or airbag assemblies.

1. Steering pad
2. Front passenger airbag assembly
3. Knee airbag assembly
4. Seat side airbag assembly
5. Curtain shield airbag assembly
6. Front seat outer belt assembly

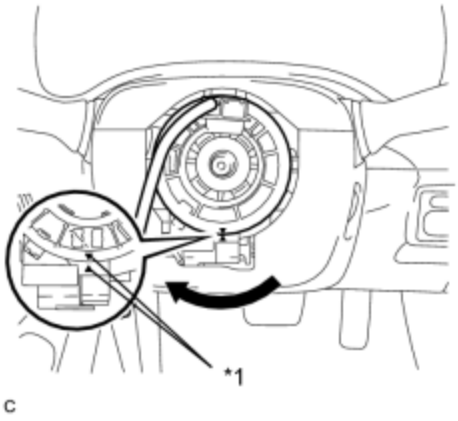
(7) Replace the airbag sensor assemblies and the airbag assemblies if: 1) damage has occurred from being dropped, or 2) cracks, dents or other defects in the case, bracket or connector are present.

(8) Do not directly expose the airbag sensor assemblies or airbag assemblies to hot air or flames.

(9) Use a voltmeter/ohmmeter with high impedance (minimum = 10 kΩ) for troubleshooting electrical circuits.

(10) Information labels are attached to the SRS components. Follow the instructions on the labels.

(11) After work on the SRS is completed, check the SRS warning light.




(b) SPIRAL CABLE

## Text in Illustration

| | |
|---|---|
| *1 | Alignment Mark |

(1) The steering wheel must be fitted correctly to the steering column with the spiral cable at the neutral position. Otherwise, cable damage and other problems may occur. Refer to the information about correct installation of the steering wheel INFO.

(c) STEERING PAD

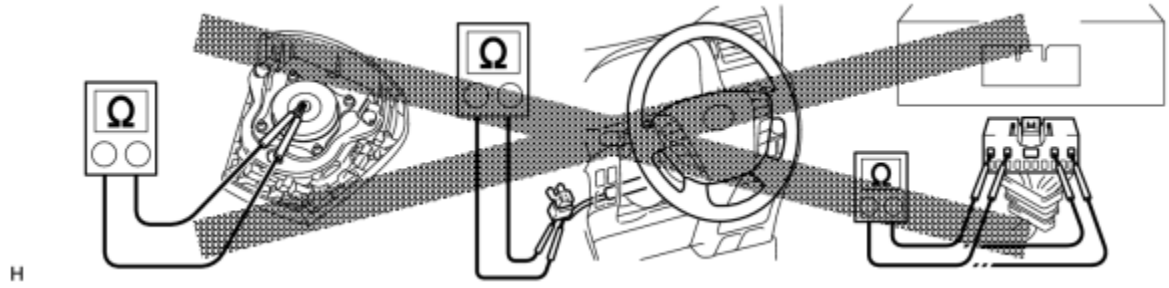
(1) Always place a removed or new steering pad with the surface facing upward as shown in the illustration. Placing the steering pad with the pad surface facing downward could cause a serious accident if the airbag deploys. Also, do not place anything on top of the steering pad.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | CORRECT | *2 | INCORRECT |

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.




(3) Grease or detergents of any kind should not be applied to the steering pad.

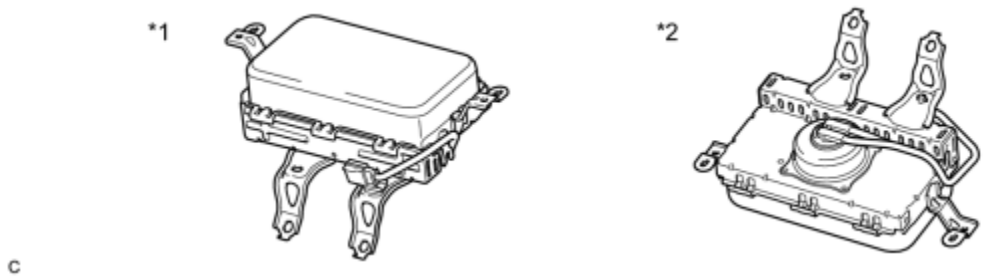
(4) Store the steering pad in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) Before using an electric welder anywhere on the vehicle, disconnect the center airbag sensor assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of the vehicle or the steering pad by itself, the airbag should be deployed using SST before disposal INFO. Deploy the airbag in a safe place away from electrical noise.

(d) FRONT PASSENGER AIRBAG ASSEMBLY

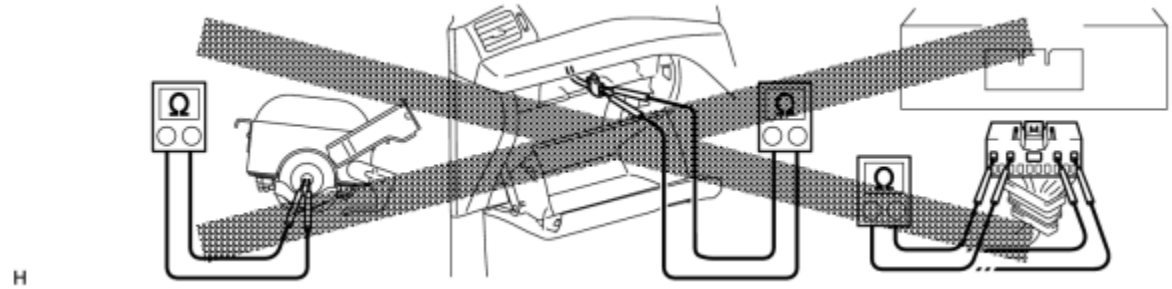
(1) Always place a removed or new front passenger airbag assembly with the pad surface facing upward as shown in the illustration. Placing the airbag assembly with the airbag deployment direction facing downward could cause a serious accident if the airbag deploys.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | CORRECT | *2 | INCORRECT |

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.




(3) Grease or detergents of any kind should not be applied to the front passenger airbag assembly.

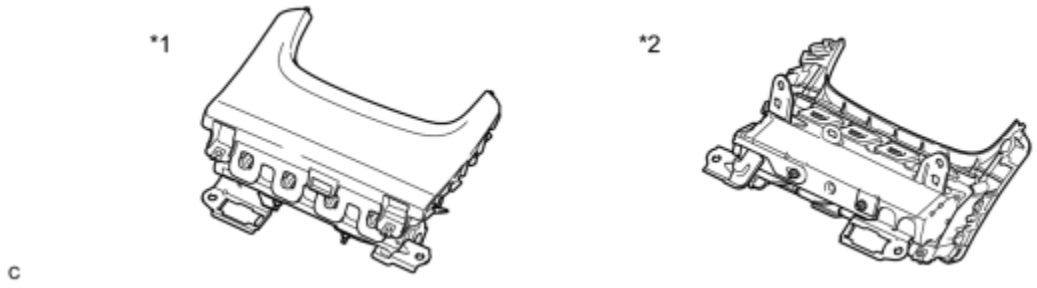
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) Before using an electric welder anywhere on the vehicle, disconnect the center airbag sensor assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of the vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal INFO. Deploy the airbag in a safe place away from electrical noise.

(e) KNEE AIRBAG ASSEMBLY

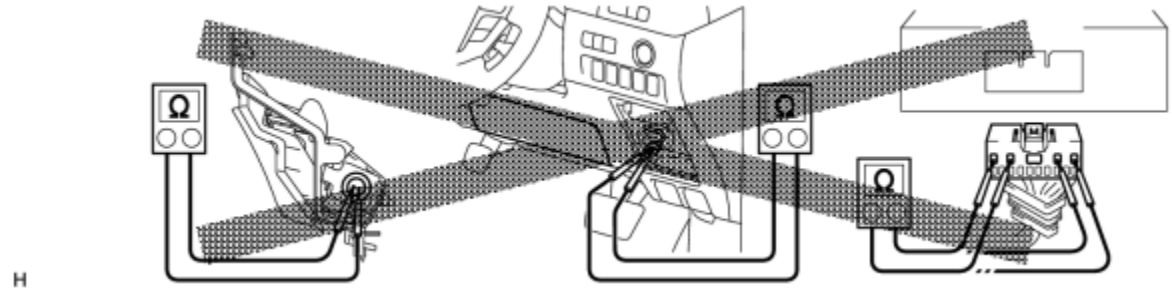
(1) Always place a removed or new knee airbag assembly with the airbag deployment direction facing upward as shown in the illustration. Placing the airbag assembly with the airbag deployment direction facing downward could cause a serious accident if the airbag deploys.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | CORRECT | *2 | INCORRECT |

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.




(3) Grease or detergents of any kind should not be applied to the knee airbag assembly.

(4) Store the knee airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

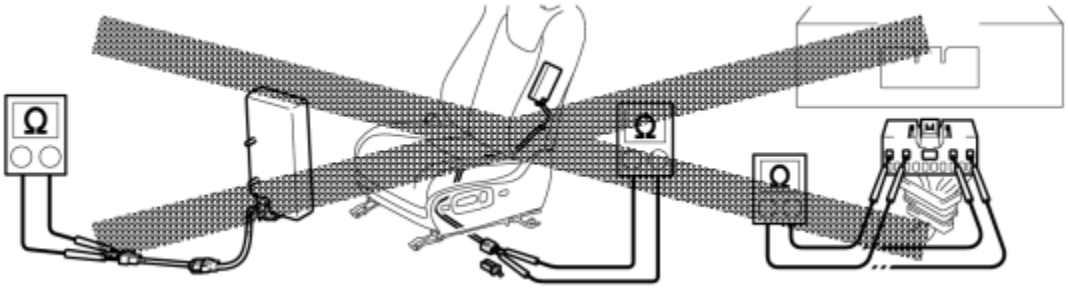
(5) Before using an electric welder anywhere on the vehicle, disconnect the center airbag sensor assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of a vehicle or knee airbag assembly unit by itself, the airbag should be deployed using SST before disposal INFO. Deploy the airbag in a safe place away from electrical noise.

(f) SEAT SIDE AIRBAG ASSEMBLY

(1) Always place a removed or new seat side airbag assembly with the airbag deployment direction facing upward.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.



T

(3) Grease or detergents of any kind should not be applied to the seat side airbag assembly.

(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) Before using an electric welder anywhere on the vehicle, disconnect the center airbag sensor assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal INFO. Deploy the airbag in a safe place away from electrical noise.

(g) CURTAIN SHIELD AIRBAG ASSEMBLY

(1) Always place a removed or new curtain shield airbag assembly in a clear plastic bag, and keep it in a safe place.




P

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | CORRECT | *2 | INCORRECT |
| *3 | Clear Plastic Bag | - | - |

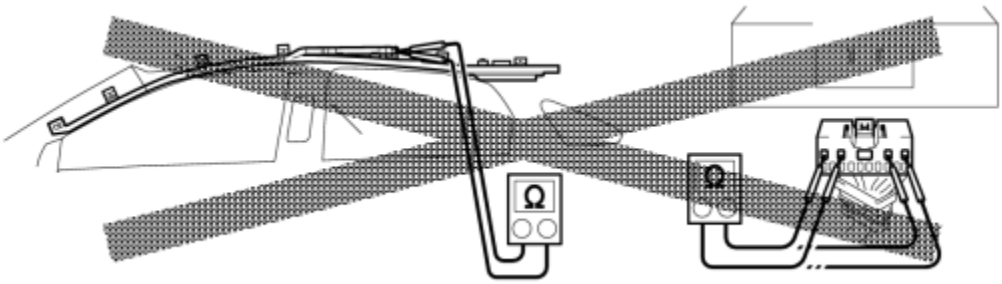
CAUTION:

The plastic bag should be disposed of after use.

NOTICE:

Never disassemble the curtain shield airbag assembly.

(2) Never measure the resistance of the airbag squib. This may cause the airbag to deploy, which could cause serious injury.



T

(3) Grease or detergents of any kind should not be applied to the curtain shield airbag assembly.

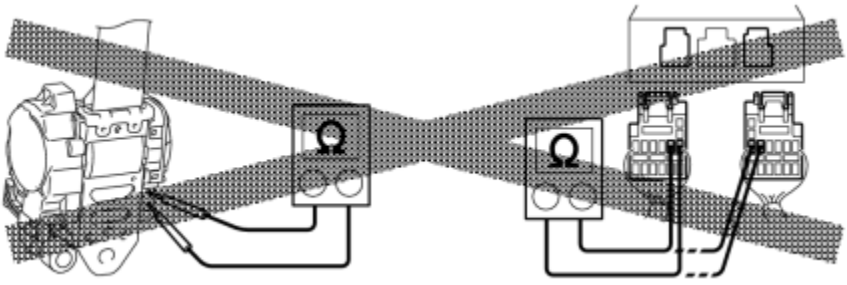
(4) Store the airbag assembly in an area where the ambient temperature is below 93°C (200°F), the humidity is not high and there is no electrical noise.

(5) Before using an electric welder anywhere on the vehicle, disconnect the center airbag sensor assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of a vehicle or the airbag assembly unit by itself, the airbag should be deployed using SST before disposal INFO. Deploy the airbag in a safe place away from electrical noise.

(h) FRONT SEAT OUTER BELT ASSEMBLY (SEAT BELT PRETENSIONER)

(1) Never measure the resistance of the front seat outer belt assembly. This may cause the pretensioner of the front seat outer belt assembly to activate, which could cause serious injury.



H

(2) Never disassemble the front seat outer belt assembly.

(3) Never install the front seat outer belt assembly on another vehicle.

(4) Store the front seat outer belt assembly in an area where the ambient temperature is below 80°C (176°F), the humidity is not high and there is no electrical noise.

(5) Before using an electric welder anywhere on the vehicle, disconnect the center airbag sensor assembly connectors. These connectors contain shorting springs. This feature reduces the possibility of the airbag deploying due to current entering the squib wiring.

(6) When disposing of a vehicle or the front seat outer belt assembly unit by itself, the front seat outer belt assembly should be activated before disposal INFO. Activate the front seat outer belt assembly in a safe place away from electrical noise.

(7) As the front seat outer belt assembly is hot after being activated, allow some time for it to cool down sufficiently before disposal. Never apply water to cool down the front seat outer belt assembly.

(8) Grease, detergents, oil or water should not be applied to the front seat outer belt assembly.

(i) CENTER AIRBAG SENSOR ASSEMBLY

(1) Never reuse a center airbag sensor assembly that has been involved in a collision where the SRS has deployed.

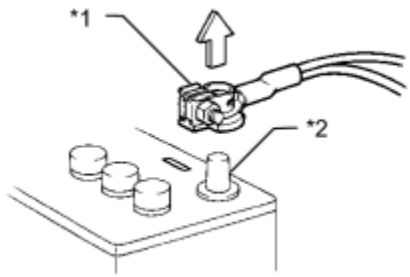
(2) The connectors to the center airbag sensor assembly should be connected or disconnected with the sensor installed to the vehicle. If the connectors are connected or disconnected while the center airbag sensor assembly is not installed, the SRS may activate.

(3) Work must be started at least 90 seconds after the power switch is turned off and the cable is disconnected from the negative (-) battery terminal, even if only loosening the bolts of the center airbag sensor assembly.

(j) WIRE HARNESS AND CONNECTOR

(1) All the connectors in the system are a standard yellow color. If an SRS wire harness has an open circuit or a connector is broken, replace it.

8. ELECTRONIC CONTROL




***Text in Illustration***

| | |
|---|---|
| *1 | Cable |
| *2 | Negative (-) Battery Terminal |

NOTICE:

- Certain systems need to be initialized after disconnecting and reconnecting the cable from the negative (-) battery terminal.
- When the auxiliary battery is replaced or the cable is disconnected from its negative (-) battery terminal, the ISC learning value will be initialized and symptoms as a loud rattle from the hybrid vehicle transaxle assembly may occur until ISC learning is performed. Therefore, perform ISC learning when the auxiliary battery is replaced or the cable is disconnected from the negative (-) terminal of the auxiliary battery INFO.

(a) DISCONNECTING AND RECONNECTING NEGATIVE BATTERY CABLE

(1) Before performing work on electronic components, disconnect the cable from the negative (-) battery terminal to prevent damage to the electrical system or components.

(2) When disconnecting the cable, turn the power switch and headlight switch off and loosen the cable nut completely. Perform these operations without twisting or prying the cable. Then, disconnect the cable.

(3) Clock settings, radio settings, audio system memory, DTCs and other data will be cleared when the cable is disconnected from the negative (-) battery terminal. Write down any necessary data before disconnecting the cable.

(b) HANDLING OF ELECTRONIC PARTS

## Text in Illustration

| | |
|---|---|
| *1 | INCORRECT |




(1) Do not open the cover or case of the ECU unless absolutely necessary. If the IC terminals are touched, the IC may be rendered inoperative by static electricity.

(2) Do not pull on the wires when disconnecting electronic connectors. Pull on the connector itself.

(3) Do not drop electronic components, such as sensors or relays. If they are dropped on a hard surface, they should be replaced.

(4) When cleaning the engine compartment with steam, protect the electronic components, air filter and emission-related components from water.

(5) Never use an impact wrench to remove or install temperature switches or temperature sensors.

(6) When measuring the resistance between terminals of a wire connector, insert the tester probe carefully to prevent the terminals from bending.

9. FOR VEHICLES EQUIPPED WITH REMOTE AIR CONDITIONING SYSTEM AND SOLAR VENTILATION SYSTEM

(a) Vehicles with the remote air conditioning system have the following risks that it is necessary to be aware of when performing repairs. Therefore, make sure to take care of the key (electrical transmitter) carefully so that the remote air conditioning system is not operated unexpectedly.

***Risks***

| |
|---|
| The electrical fan and other items in the engine compartment may operate resulting in various hazards. |
| The wipers may operate if the wiper switch is in the on position when the remote air conditioning system is activated. If this occurs, there is the potential for damage to the glass, wipers or injury. |
| When the light control switch is in the tail, head or AUTO position, the headlights may turn on. |
| Short circuits may occur if electrical inspections are being performed when the remote air conditioning system is turned on, because the IG circuit is powered at this time. |

CAUTION:

Failure to take proper care with the key (electrical transmitter) may cause the system to be accidentally operated. This can lead to an accident and damage to parts or a serious injury.

HINT:

- Make sure to store the key (electrical transmitter) in a box with the switch side facing up, and place the box where it can be monitored so that no one cannot operate the remote A/C switch.
- For operating condition of the remote air conditioning system, refer to System Description INFO.

(b) When performing repairs on vehicles with the solar ventilation system, turn the solar ventilation switch off.

CAUTION:

Depending on the environment around the vehicle, performing repairs with the solar ventilation switch on may cause the blower motor to operate unexpectedly, resulting in various hazards. This can lead to damage to parts or a serious injury.

10. REMOVAL AND INSTALLATION OF FUEL CONTROL PARTS

(a) PLACE FOR REMOVING AND INSTALLING FUEL SYSTEM PARTS

(1) Work in a location with good air ventilation that does not have welders, grinders, drills, electric motors, stoves, or any other ignition sources nearby.

(2) Never work in a pit or near a pit as fuel vapors will collect there.

(b) REMOVING AND INSTALLING FUEL SYSTEM PARTS

(1) Prepare a fire extinguisher before starting work.

(2) To prevent static electricity, install a ground wire between the fuel changer and vehicle, and do not spray the surrounding area with water. Be careful when performing work in this area, as the floor surface will become slippery. Do not clean up gasoline spills with water, as this may cause the gasoline to spread, and possibly create a fire hazard.

(3) Avoid using electric motors, work lights and other electric equipment that can cause sparks or high temperatures.

(4) Avoid using iron hammers as they may create sparks.

(5) Dispose of fuel-contaminated cloth separately using a fire resistant container.

11. REMOVAL AND INSTALLATION OF ENGINE INTAKE PARTS

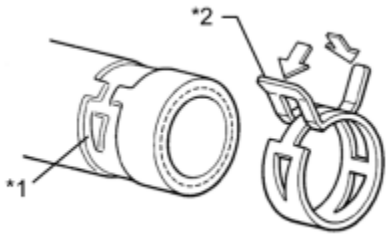



(a) If any metal particles enter intake system parts, this may damage the engine.

(b) When removing and installing intake system parts, cover the openings of the removed parts and engine openings. Use adhesive tape or other suitable materials.

(c) When installing intake system parts, check that no metal particles have entered the engine or installed parts.

12. HANDLING OF HOSE CLAMPS




## Text in Illustration

| | |
|---|---|
| *1 | Clamp Track |
| *2 | Spring Type Clamp |

(a) Before removing a hose, check the clamp position so that it can be reinstalled in the same position.

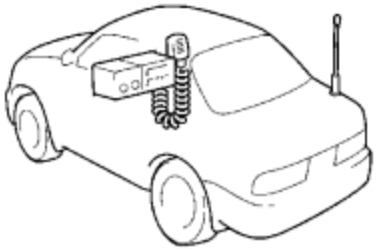
(b) Replace any deformed or dented clamps with new ones.

(c) When reusing a hose, attach the clamp on the clamp track portion of the hose.

(d) For a spring type clamp, it may be necessary to spread the tabs slightly after installation by pushing them in the direction of the arrows as shown in the illustration.

13. FOR VEHICLES EQUIPPED WITH MOBILE COMMUNICATION SYSTEMS

(a) Install an antenna as far away from the ECU and sensors of the vehicle electronic systems as possible.



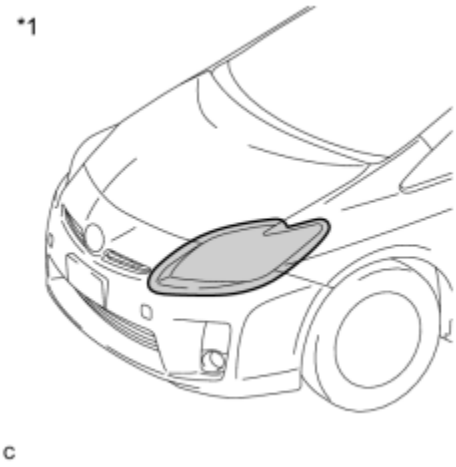
(b) Install an antenna and feeder at least 20 cm (7.87 in.) away from the ECU and sensors of the vehicle electronic systems. For details about ECU and sensor locations, refer to the section on the applicable components.

(c) Keep the antenna and feeder separate from other wiring as much as possible. This will prevent signals sent from the communication equipment from affecting vehicle equipment and vice versa.

(d) Check that the antenna and feeder are correctly adjusted.

(e) Do not install a high-powered mobile communication system.

14. HEADLIGHT INSPECTION OR MAINTENANCE




(a) When the headlights are illuminated, do not cover the headlights for 3 minutes or more.

## Text in Illustration

| | |
|---|---|
| *1 | Illumination for 3 minutes or more prohibited if covered |

NOTICE:

As the headlight outer lens is made of resin, the resulting heat created when covering the headlight for an extended period of time may deform the headlight.

15. FOR VEHICLES EQUIPPED WITH TRACTION CONTROL (TR(A)C) AND VEHICLE STABILITY CONTROL (VSC) SYSTEMS

(a) NOTICES FOR WHEN TESTING WITH DRUM TESTER

(1) When testing with a 2-wheel drum tester such as a speedometer tester, a combination speedometer and brake tester, or a chassis dynamometer, perform the following procedure to enter inspection mode and disable the TR(A)C and VSC systems INFO.

NOTICE:

- If the vehicle is tested in normal mode on the tester, TR(A)C and VSC operation may cause the vehicle to jump off of the tester.
- Secure the vehicle with chains for safety.

(b) NOTICES FOR VSC RELATED PROCEDURES

(1) For VSC related parts, adjustments are required after removal and installation. Therefore, perform removal and installation only when necessary.

(2) When performing VSC related procedures, be sure to strictly follow the preparation and completion procedures.

(3) When performing removal and installation or replacement of VSC related parts, first disconnect the cable from the negative (-) battery terminal.

16. WHEN INSPECTING VEHICLES

NOTICE:

When the vehicle is run in inspection mode for an operation such as a speedometer test, a DTC may be set. Therefore, if the warning light comes on, after canceling inspection mode, check for DTCs using the Techstream and clear the DTCs.

(a) VEHICLE CONDITIONS

(1) Before activating inspection mode, turn the air conditioning off, start the hybrid system with park (P) selected, and check that the engine stops within several seconds after starting (engine warm up check).

(2) Activate the appropriate inspection mode and inspect the vehicle INFO.

HINT:

Different types of inspection mode are available. One is Maintenance Mode, and the other is Certification Mode. The following table indicates the mode appropriate for each test item.

The shift state for each test is as follows:

| Test Item | Mode | Shift State |
|---|---|---|
| 1. Vehicle straight travelling test (side slip inspection) | Maintenance mode or normal mode | D |
| 2. Braking force test | Maintenance mode | N |
| 3. Speedometer test | Maintenance mode | D |
| 4. Exhaust gas test (idling) | Maintenance mode | P |
| 5. Headlight test | Maintenance mode or normal mode | P |

(3) Cancel inspection mode immediately after completion of inspection.

NOTICE:

Driving the vehicle without canceling inspection mode may damage the transaxle.

(b) WHEN USING A BRAKE TESTER

CAUTION:

Be sure to perform the test in maintenance mode.

NOTICE:

- A high-speed type brake tester cannot be used.
- Vehicle speed should be less than 0.5 km/h (0.3 mph).
- Follow all usage and safety procedures in the operator's manual for the brake tester.

(1) Place the wheels to be tested (front or rear) onto the rollers.

(2) Move the selector lever to N.

(3) Start the engine to allow normal brake booster operation.

(4) Operate the brakes to perform the test.

(c) WHEN USING A SPEEDOMETER TESTER

CAUTION:

Be sure to perform the test in maintenance mode.

NOTICE:

Do not perform rapid starting or quick acceleration on a speedometer tester. If rapid starting or quick acceleration is performed on a speedometer tester, damage may occur to the transaxle.

(1) Depress the accelerator pedal slowly and gradually accelerate the vehicle. Make a measurement.

(2) After the measurement, use the brakes to gradually decelerate the vehicle.

(d) WHEN USING A CHASSIS DYNAMOMETER

(1) Always set an appropriate load before starting the test.

NOTICE:

Sudden acceleration or deceleration of the vehicle on a chassis dynamometer under minimal load may damage the transaxle.

(e) WHEN USING AN ON-VEHICLE BALANCER

(1) Raise the vehicle until all 4 wheels are off the ground.

(2) Support the vehicle with safety stands at an appropriate height. Make sure that the vehicle does not lean in any direction, and that the tires are completely clear of the floor.

(3) Place the vibration pick-up unit into position for the wheel to be measured*1.

(4) Release the parking brake.

(5) Check that no dragging force exists when turning each wheel by hand.

(6) Put the wheel balancer in position.

(7) Wheel balance measurement should be done by using both the engine and the wheel balancer drive roller to spin the wheels.

HINT:

*1: Different on-vehicle wheel balancers have different requirements for mounting the vibration pick-up unit(s). Refer to the operator's manual for the wheel balancer to confirm requirements for use.

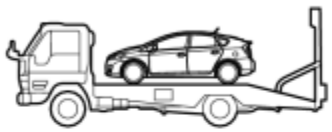
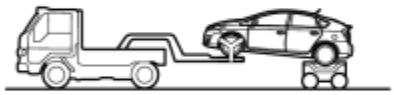
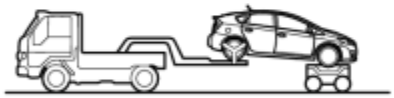
NOTICE:

- Be sure to perform the test in maintenance mode.
- Start the engine and then increase the vehicle speed gradually with drive (D) selected.
- Do not accelerate or decelerate suddenly.
- Deceleration should be done by braking gradually.
- Make sure that no one is standing in-line with the spinning wheels.
- Measurement should be done quickly.
- Confirm that the vehicle is securely immobilized.
- Follow all usage and safety procedures in the operator's manual for the wheel balancer.

17. WHEN TOWING VEHICLES

(a) Use one of the following methods to tow the vehicle.

(b) If the vehicle has trouble with the chassis or drive train, use method 1 (flatbed truck).

| Towing Method \ Conditions | Parking Brake | Shift State |
|---|---|---|
| 1. Flatbed Truck  | Applied | Any |
| 2. Wheel Lift Type Truck<br>From Front (using dollies)  <br>From Rear  | Applied | Any |
| 3. Wheel Lift Type Truck<br>From Front (not using dollies)  | Released | P |

NOTICE:

Do not use any towing method other than those shown above.

(c) If a tow truck is not available, in an emergency vehicle may be temporarily towed using a cable or chain secured to the emergency towing eyelet(s). This should only be attempted on hard surfaced roads for short distances below 30 km/h (19 mph).

A driver must be in the vehicle to steer and operate the brakes. The vehicle's wheels, drive train, axles, steering and brakes must be in good condition.

(1) Emergency towing procedure

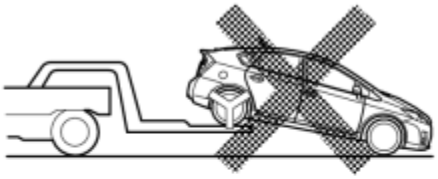
1. Turn the power switch on (IG).
2. Depress the brake pedal and move the selector lever to N.
3. Release the parking brake.
4. Release the brake pedal slowly.

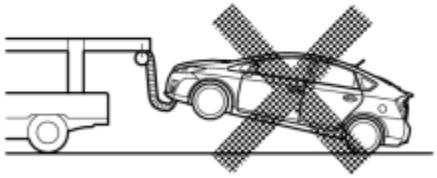
NOTICE:

- Use extreme caution when towing the vehicle.

  Avoid sudden starts or erratic driving maneuvers which place excessive stress on the emergency towing eyelet and the cables or chains.

- If the hybrid system is off, the power assist for the brakes and steering will not function, making steering and braking more difficult.





(d) The following towing methods shown below are dangerous and can damage the vehicle, so do not use them.

(1) Do not tow the vehicle with only front wheels on the ground.

(2) Do not use a sling-type towing method either from the front or rear.

NOTICE:

If these towing methods are used either from the front or rear, the following may occur.

- The drive train may overheat and be damaged.
- If a sling-type tow truck is used, damage may occur to the vehicle body.

18. FOR VEHICLES EQUIPPED WITH CATALYTIC CONVERTER

CAUTION:

If a large amount of unburned gasoline or gasoline vapors flow into the converter, it may cause converter overheating and create a fire hazard. To prevent this, observe the following precautions:

(a) Use only unleaded gasoline.

(b) Avoid performing unnecessary spark tests.

(1) Perform a spark test only when absolutely necessary. Perform this test as rapidly as possible with the injector connector disconnected.

(c) While testing, never race the engine unless instructed.

(d) Do not run the engine when the fuel tank is nearly empty. This may cause the engine to misfire and create an extra load on the converter.

# VEHICLE LIFT AND SUPPORT LOCATIONS

1. NOTICE ABOUT VEHICLE CONDITION WHEN RAISING VEHICLE

(a) The vehicle must be unloaded before jacking up or raising the vehicle. Never jack up or raise a heavily loaded vehicle.

(b) When removing any heavy components like the engine or transaxle, the vehicle center of gravity will shift. To stabilize the vehicle, place a balance weight in a location that will prevent the vehicle from rolling or shifting, or place a transmission jack under the appropriate jack position at the opposite end of the vehicle.

2. NOTICE FOR USING 4 POST LIFT

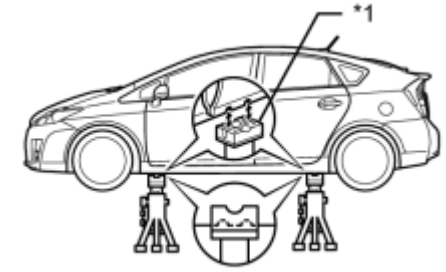
(a) Follow the safety procedures outlined in the lift's instruction manual.

(b) Do not damage the tires or wheels while driving onto the lift.

(c) Use wheel chocks to secure the vehicle.

3. NOTICE FOR USING JACK AND SAFETY STANDS

(a) Work on a level surface. Use wheel chocks at all times.




(b) Use safety stands with rubber attachments as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Rubber Attachment |

(c) Set the jack and safety stands exactly under the specified locations on the vehicle.

(d) Do not work on or leave the vehicle supported only by a jack. Be sure to support the vehicle with safety stands.

(e) When jacking up the vehicle, first release the parking brake and move the selector lever to N.

(f) When jacking up the entire vehicle:

(1) When jacking up the front wheels first, make sure wheel chocks are behind the rear wheels.

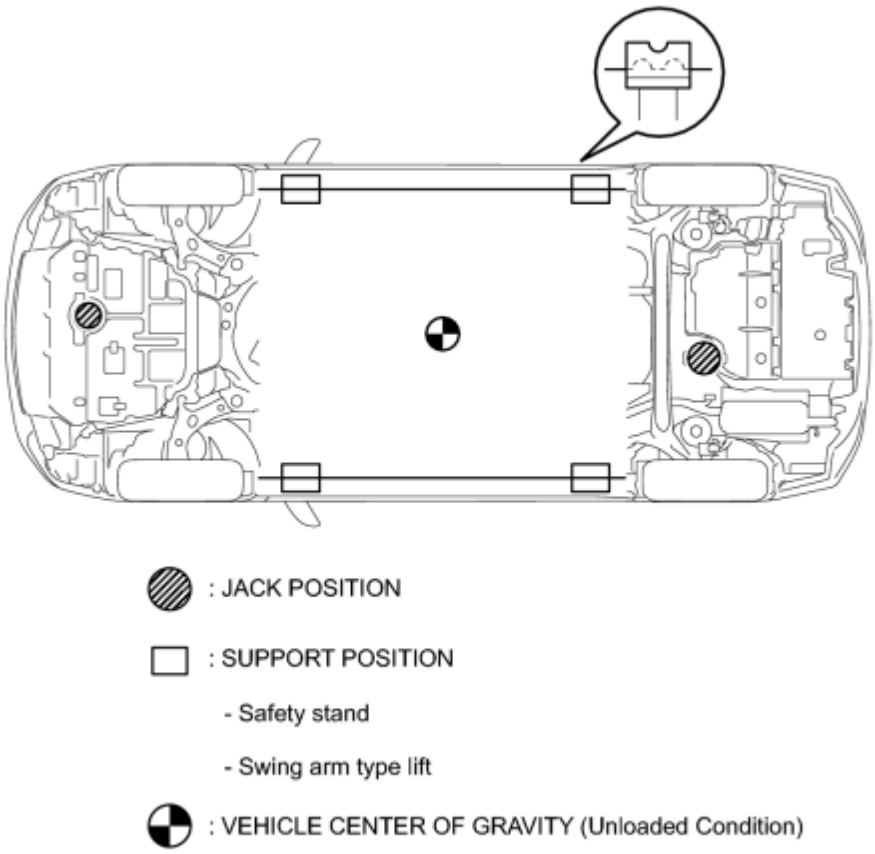
(2) When jacking up the rear wheels first, make sure wheel chocks are in front of the front wheels.

(g) When jacking up only the front or rear wheels of the vehicle:

(1) Before jacking up the front wheels, place wheel chocks on both sides of the rear wheels.

(2) Before jacking up the rear wheels, place wheel chocks on both sides of the front wheels.

(h) When lowering a vehicle that only has its front or rear wheels jacked up.




c

(1) Before lowering the front wheels, make sure wheel chocks are in front of the rear wheels.

(2) Before lowering the rear wheels, make sure wheel chocks are behind the front wheels.

4. NOTICE FOR USING A SWING ARM TYPE LIFT

(a) Follow the safety procedures outlined in the lift's instruction manual.

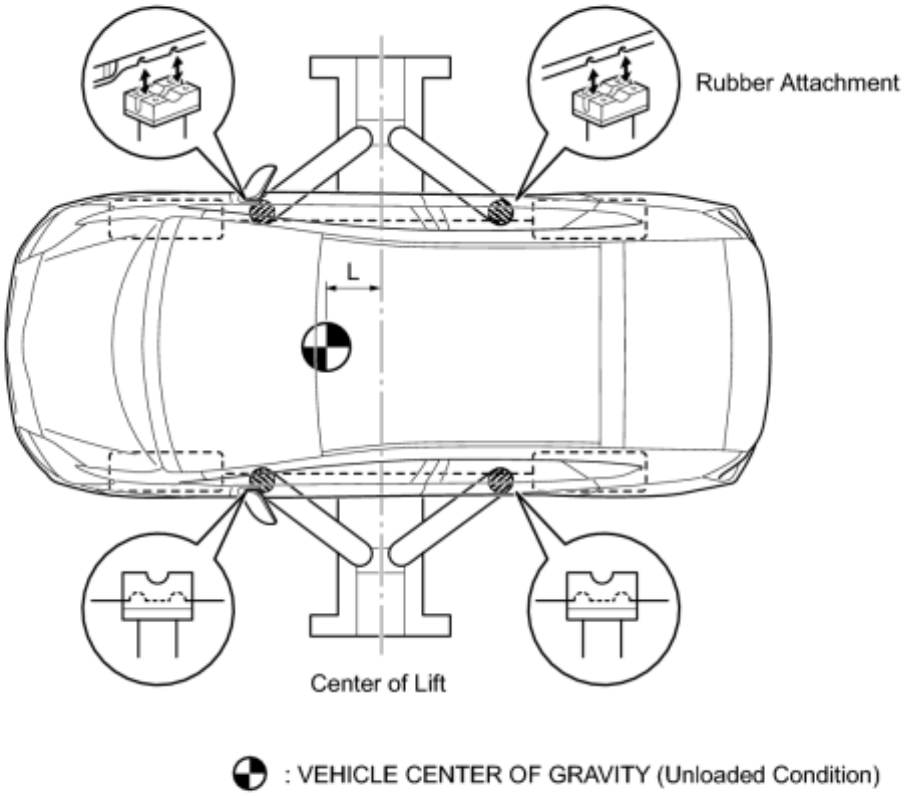
(b) Use swing arms equipped with rubber attachments as shown in the illustration.

(c) Position the vehicle so that its center of gravity is centered on the lift (length of "L" in the illustration should be as short as possible).

(d) Ensure that the rubber cushions or swing arms do not contact the body cladding or lower mouldings.

(e) Be sure to lock the swing arms before raising the vehicle (if equipped with arm locks).

(f) Use the lift to raise the vehicle until the tires are off the ground, then stop the lift and shake the front and rear of the vehicle to make sure that it is stable.




c

5. NOTICE FOR USING PLATE TYPE LIFT

(a) Follow the safety procedures outlined in the lift's instruction manual.

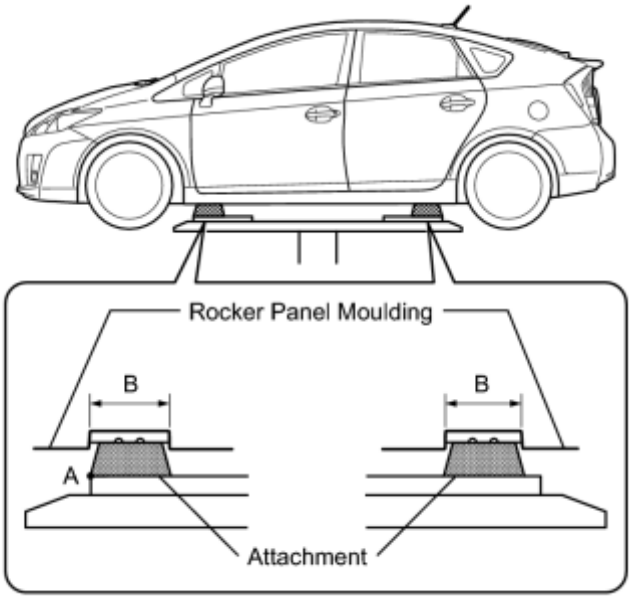
(b) Use plate lift attachments (rubber lifting blocks) on top of the plates.

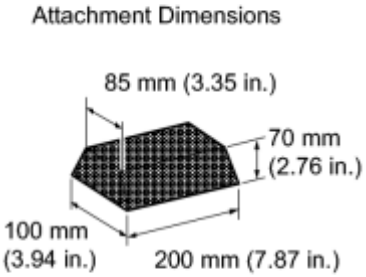
(c) Be sure to set the vehicle to the specified position described in the following chart and shown in the following illustration.

| | |
|---|---|
| Right and left set position | • Center the vehicle on the lift. |
| Front and rear set position | • Align the plate cushion ends with the lower ends of the attachments (A).<br>• Be sure to set the attachment to position (B) as shown in the illustration. |

(d) Ensure that the plate lift or rubber lifting blocks do not contact the body cladding or lower moldings.

(e) Use the lift to raise the vehicle until the tires are off the ground, then stop the lift and shake the front and rear of the vehicle to make sure that it is stable.




c

# CUSTOMIZE PARAMETERS

NOTICE:

- When the customer requests a change in a function, first make sure that the function can be customized.
- Be sure to make a note of the current settings before customizing.
- When troubleshooting a function, first make sure that the function is set to the default setting.

HINT:

The following items can be customized.

1. POWER DOOR LOCK CONTROL SYSTEM

***Door Lock***

| Display | Default | Content | Setting |
|---|---|---|---|
| Unlock Key Twice | ON | Function that unlocks only the driver door when the driver door key cylinder is turned to unlock once, and unlock all doors when it is turned to unlock twice. For the OFF setting, turning it once unlocks all doors. | ON or OFF |
| Auto Lock | OFF<br>ON* | Function that locks all doors when the vehicle speed reaches a certain level. | ON or OFF |
| Auto Lock/Shift | ON<br>OFF* | Function that locks all doors when the shift lever is moved from P to any position other than P while the engine is running and all doors are closed. | ON or OFF |
| Auto Unlock/Shift | ON | Function that unlocks all doors when the shift lever is moved to P from any position other than P while the power switch is on (IG). | ON or OFF |
| All Unlock/Open-Close | OFF | Function that unlocks the other doors when the driver door is opened within 10 seconds after the power switch is turned off. | ON or OFF |

- *: for Korea

***Illuminated Entry***

| Display | Default | Content | Setting |
|---|---|---|---|
| Lighting Time | 15 s | Function that changes the lighting time after closing all doors. (It will quickly fade out in case of turning the power switch from off to on (ACC) or (IG).) | 7.5 s, 15 s or 30 s |

2. WIRELESS DOOR LOCK CONTROL SYSTEM

***Wireless Door Lock Control System***

| Display (item) | Default | Function | Setting |
|---|---|---|---|
| Wireless Control | ON | Function that turns wireless door lock function on or off | ON or OFF |
| Hazard Answer | ON | When the doors are locked by wireless operation, the hazard | ON or OFF |

| Display (item) | Default | Function | Setting |
|---|---|---|---|
| Back | | warning lights flash once.<br><br>When the doors are unlocked by wireless operation, the hazard warning lights flash twice. | |
| Open Door Warning | ON | The buzzer sounds when lock is pressed when any of the doors are ajar. | ON or OFF |
| Unlock 2 Operation | ON | Function that unlocks driver door when unlock switch on transmitter is pressed once, and unlocks all doors when pressed twice. If setting is OFF, pressing unlock switch once makes all doors unlock. | ON or OFF |
| Panic Function | ON | Function to operate theft deterrent system by continuously pressing panic switch on transmitter for 0.8 seconds | ON or OFF |
| Auto Lock Time | 60 s*1 or 30 s*2 | Function that regulates the interval between unlocking and automatic relocking of doors | 30 s, 60 s or 120 s |
| Wireless Auto Lock | ON | This function turns the wireless auto lock function on or off. | ON or OFF |
| Wireless Buzzer Resp | ON | Wireless door lock buzzer response | ON or OFF |
| Wireless Buzzer Vol | Level7 | Wireless door lock buzzer volume | Level7, Level6, Level5, Level4, Level3, Level2, Level1 or Level0 |

- *1: except for Korea
- *2: for Korea

### *Illuminated Entry*

| Display | Default | Content | Setting |
|---|---|---|---|
| Lighting Time | 15 s | Changes the lighting time after closing all doors. (It will quickly fade out in case of turning the power switch from off to on (ACC or IG).) | 7.5 s, 15 s or 30 s |

3. SMART KEY SYSTEM (for Entry Function)

### *Smart Key / Access*

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Park Wait Time | 2.5 s | Function that sets waiting time to permit opening door after door is locked with entry lock function | 0.5 s, 1.5 s, 2.5 s or 5 s |
| Ignition Available Area | All | Function that switches the entry hybrid vehicle control system start detection area | Front or All*1 |
| Back Door Opening Operation*2 | Long | Function that opens the back door when the driver has the key and presses back door opener switch assembly (opener switch) | Long, Twice or OFF |

- *1: Weak radio waves will still be emitted from oscillators other than the front oscillator even when the "Front" customize setting is selected.

- *2: w/ Entry System Back Door Open Function

***Warning***

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Key Low Battery Warning | ON | Function that warns driver that the key battery is weak | ON or OFF |

4. ENTRY UNLOCK MODE SWITCHING* (SMART KEY SYSTEM (for Entry Function))

*: except for Korea and Mexico

(a) To change the vehicle entry unlock mode, make sure that the vehicle power is off and simultaneously push and hold the lock switch and another switch on the key for 5 seconds.

Driver door unlock default setting:

When the switches are pressed and held for 5 seconds, the entry door unlock mode changes to the mode that is not currently selected.

NOTICE:

After pressing and holding the switches for 5 seconds, wait 5 seconds before performing the same procedure again.

- Driver door unlock mode:

  When the driver door touch sensor is touched, only the driver door unlocks. When another touch sensor is touched, all doors unlock.*

  *: w/ Entry System Back Door Open Function

- All door unlock mode:

  When any touch sensor is touched, all doors unlock.

(b) The certification ECU (smart key ECU assembly) receives this signal from the door control receiver assembly and changes the smart key system to entry unlock mode.

(c) The certification ECU (smart key ECU assembly) sounds the buzzers of the wireless door lock buzzer assembly.

| Mode | Wireless Door Lock Buzzer Assembly |
|---|---|
| Driver Door<br><br>(Default) | Sounds 3 times |
| All Doors<br><br>(Customized) | Sounds 2 times |

HINT:

The procedure only changes entry unlock mode of the smart key system. It does not switch the unlocking of the wireless door lock control.

5. ELECTRICAL KEY CANCEL (SMART KEY SYSTEM (for Entry Function))

The electrical key cancel operation disables the following functions:

- Entry Unlock/Lock
- Entry Hybrid Vehicle Control System Start
- Entry System Back Door Open Function*

  *: w/ Entry System Back Door Open Function

- Electrical Key Lock-in Prevention
- Warning

(a) The operation procedure is as follows:

Precondition:

Power switch off, driver door closed and unlocked.

(1) Push the unlock switch of the key once.

(2) Open the driver door within 5 seconds.

(3) Push the unlock switch of the key twice within 5 seconds.

(4) Close and open the driver door twice within 30 seconds.

(Driver door: Close → Open → Close → Open)

(5) Push the unlock switch of the key twice within 5 seconds.

(6) Close and open the driver door within 30 seconds.

(Driver door: Close → Open)

(7) Close the driver door within 5 seconds.

When electrical key cancel is activated, the wireless door lock buzzer sounds twice.

To return to the original condition, perform the procedure again. When the original condition is returned, the wireless door lock buzzer sounds once.

6. SMART KEY SYSTEM (for Start Function)

***Smart Key / Access***

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Ignition Available Area (Entry | All | Function to choose the available area for electrical key | Front or |

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| ignition available area) | | to start the hybrid control system. | All* |

- *: Weak radio waves will still be emitted from oscillators other than the front oscillator even when the "Front" customize setting is selected.

7. CUSTOMIZING FUNCTION WITHOUT TECHSTREAM (SMART KEY SYSTEM (for Start Function))

Performing the following procedure disables the smart key system.

HINT:

To start the hybrid control system while the smart key system is disabled, follow the procedure for when the key battery is low INFO.

(a) The procedure to disable the smart key system is as follows:

HINT:

Repeating the following steps switches the smart key system status between activated and disabled.

Preconditions:

Power switch off, driver door closed and unlocked.

(1) Press the unlock switch of the key once.

(2) Open the driver door within 5 seconds after pressing the unlock switch of the key in the previous step.

(3) Repeat closing and opening of the driver door twice within 30 seconds after opening the driver door in the previous step.

(4) Press the unlock switch of the key twice within 30 seconds after the last closing of the driver door in the previous step.

(5) Close and then open the driver door within 30 seconds after pressing the unlock switch of the key twice in the previous step.

(6) Close the driver door within 5 seconds after opening the driver door in the previous step.

(7) Check that the wireless buzzer sounds once*1 or twice*2.

- *1: When the smart key system status is changed from activated to disabled.
- *2: When the smart key system status is changed from disabled to activated.

8. LIGHTING SYSTEM (LIGHTING INT)

### *Illuminated Entry*

| Tester Display | Default | Content | Setting |
|---|---|---|---|

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Lighting Time | 15 s | Changes the lighting time after closing all of the doors. (It will fade out immediately in case of turning the power switch from off to on (ACC or IG).) | 7.5 s, 15 s or 30 s |
| I/L when ACC OFF | ON | Lights up power switch illumination, front interior lights, rear interior light and footwell lights when the power switch is turned from on (ACC or IG) to off. | ON or OFF |
| I/L ON W/Door Key Unlock | ON | Lights up power switch illumination, front interior lights, rear interior light and footwell lights when doors are unlocked using a mechanical key or door control transmitter. | ON or OFF |
| Light Control | ON | Dims (ON setting) or turns off (OFF setting) the footwell lights under the following conditions:<br><br>Power switch on (IG), shift lever not in P, and all doors closed. | ON or OFF |
| Room Light when Aprchd | ON | Lights up the power switch illumination, front interior lights, rear interior light and footwell lights when a key enters any actuation area around the doors. | ON or OFF |
| Inside Foot Light | ON | Lights up the footwell lights when one of the following occurs: the power switch is turned on (IG), or any door is unlocked or opened. | ON or OFF |

9. METER / GAUGE SYSTEM

### *Warning*

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Key Remind Sound | Slow | Function to change the cycle of the key reminder buzzer | Normal, Fast or Slow |
| Driver Side Seatbelt Warning Buzzer*1 | ON | Function to turn on/off the seat belt warning buzzer | ON or OFF |
| Front Passenger Side Seatbelt Warning Buzzer*1 | ON | Function to turn on/off the seat belt warning buzzer | ON or OFF |
| Rear Seatbelt Warning Buzzer*2 | ON | Function to turn on/off the rear seat belt warning buzzer | ON or OFF |
| Reverse Buzzer | Continual | Function to change the type of the reverse warning buzzer | Single or Continual |

- *1: This setting is only valid for the buzzer which sounds at 20 km/h (12 mph) or more.
- *2: w/ Rear Seat Belt Warning

10. SEAT BELT WARNING SYSTEM

### *Combination Meter*

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Driver Side Seatbelt Warning Buzzer | ON | Function to sound the seat belt warning buzzer | ON / OFF |
| Front Passenger Side Seatbelt Warning | ON | Function to sound the seat belt warning | ON / |

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Buzzer | | buzzer | OFF |

HINT:

This setting is only valid when the vehicle is driven at 20 km/h (12 mph) or more.

11. AIR CONDITIONING SYSTEM

### *Air Conditioner*

| Display (Item) | Default | Content | Setting |
|---|---|---|---|
| Set Temperature Shift | Normal | Function to control with the shifted temperature against the displayed temperature. | +2 C, +1 C, Normal, -1 C or -2 C |
| Compressor Mode | Automatic | Function to automatically turn the A/C on by pressing the AUTO button when blower is on and the A/C is off. | Manual or Automatic |
| Air Inlet Mode | Automatic | Function to shift from INLET mode to RECIRCULATION mode when the A/C is turned on. | Manual or Automatic |
| Foot/DEF Auto Mode | ON | Function to automatically turn the airflow from FOOT/DEF on when AUTO mode is on. | OFF or ON |
| Foot/DEF Automatic Blow Up Function | ON | Function to automatically increase the blower level when the defroster is on. | OFF or ON |
| Ambient Temperature Shift | Normal | Function to control the shifted ambient temperature in relation to the displayed ambient temperature. | +3 C, +2 C, +1 C, Normal, -1 C, -2 C or -3 C |
| ECO MODE Cancel | OFF | Function to cancel the ECO mode drive when item is on. | OFF or ON |
| Noise and Vibration Reduction | OFF | Function to change speed of the compressor when item is on. | OFF or ON |
| Start Pre A/C*1 | Long1 | Function to set the activation operation method for the remote air conditioning system using the key (electrical transmitter). | 1 tim ON, 2 tim ON, Long1 or Long2 |
| Stop Pre A/C*1 | 2 tim ON | Function to set the stop operation method for the remote air conditioning system using the key (electrical transmitter). | 1 tim ON, 2 tim ON, Long1 or Long2 |

- *1: w/ Remote Air Conditioning System

12. LIGHTING SYSTEM (LIGHTING EXT)

### *Light Control*

| Display | Default | Content | Setting |
|---|---|---|---|
| Disp Ex ON Sen | Normal | Changes the ambient brightness level required to dim the lights such as the indicator lights of the combination meter, A/C indicator light and clock. | Light2, Light1, Normal, Dark1 or Dark2 |
| Disp Ex OFF Sen | Normal | Changes the ambient brightness level required to cancel the dimming of the lights such as the indicator lights of the | Light2, Light1, Normal, Dark1 or |

| Display | Default | Content | Setting |
|---|---|---|---|
| | | combination meter, A/C indicator light and clock. | Dark2 |
| Light Auto OFF Delay | 30 s | Keeps the headlights on for a certain period of time after turning the power switch off and closing all the doors with the low beam headlights on. | Off, 30 s, 60 s or 90 s |
| Sensitivity | Normal | Adjusts the sensitivity of the automatic light control system. | Light2, Light1, Normal, Dark1 or Dark2 |
| Response Time*1 | 0.1 s | Changes the delay timing of lighting the taillights when going into a tunnel when the light control switch is in the AUTO position | 0.1 s or 1.0 s |

- *1: for Korea

# INITIALIZATION

1. PROCEDURES NECESSARY WHEN BATTERY TERMINAL IS DISCONNECTED/RECONNECTED

| Necessary Procedures | Effect / Inoperative Function When Necessary Procedures are not Performed | See Page |
|---|---|---|
| Correct the steering angle neutral point | Advance parking guidance system | INFO |

NOTICE:

When the auxiliary battery is replaced or the cable is disconnected from its negative (-) battery terminal, the ISC learning value will be initialized and symptoms as a loud rattle from the hybrid vehicle transaxle assembly may occur until ISC learning is performed. Therefore, perform ISC learning when the auxiliary battery is replaced or the cable is disconnected from the negative (-) terminal of the auxiliary battery INFO.

2. PROCEDURES NECESSARY WHEN ECU OR OTHER PARTS ARE REPLACED

| Replacement Part | Necessary Procedure | Effect / Inoperative Function when Necessary Procedures are not Performed | See Page |
|---|---|---|---|
| Power management control ECU | Vehicle Identification Number (VIN) registration | MIL comes on | INFO |
| Millimeter wave radar sensor assembly | Adjust millimeter wave radar sensor assembly (Dynamic radar cruise control system) | • Dynamic radar cruise control system<br>• Pre-collision system | INFO |
| Lane recognition camera sensor assembly | Adjust lane recognition camera sensor assembly (Lane keeping assist system) | • Lane keeping assist system<br>• Pre-collision system | INFO |
| • Tire pressure warning ECU<br>• Tire pressure warning valve and transmitter | Code registration (Tire pressure warning system) | • When DTC detection conditions of "transmitter ID not received" DTC are met, TPWS indicator blinks for 1 minute, and then illuminates.<br>• Tire pressure warning function | INFO for initialization<br>INFO for registration |
| Brake booster with master cylinder (Skid control ECU, brake actuator or pressure sensor) | 1. Initialization and calibration of the linear solenoid valve<br>2. Yaw rate and acceleration sensor zero point calibration | • ABS warning light illumination<br>• Slip indicator light illumination<br>• Brake warning light / yellow (minor malfunction) illumination | INFO for initialization<br>INFO for calibration |

| Replacement Part | Necessary Procedure | Effect / Inoperative Function when Necessary Procedures are not Performed | See Page |
|---|---|---|---|
| | | • VSC disabled or malfunctioning | |
| • Brake pedal stroke sensor<br>• Brake pedal | 1. Clearing stored linear solenoid valve calibration data<br>2. Initialization and calibration of the linear solenoid valve | • ABS warning light illumination<br>• Slip indicator light illumination<br>• Brake warning light / yellow (minor malfunction) illumination<br>• VSC disabled or malfunctioning | |
| Yaw rate and acceleration sensor | 1. Clearing zero point calibration data<br>2. Yaw rate and acceleration sensor zero point calibration | • ABS warning light illumination<br>• Slip indicator light illumination<br>• Brake warning light / yellow (minor malfunction) illumination<br>• VSC disabled or malfunctioning | |
| Power steering ECU*1 | 1. Torque sensor zero point calibration<br>2. Assist map writing | • P/S warning light comes on<br>• EPS control | INFO |
| Steering column assembly (containing the torque sensor)*1 | Torque sensor zero point calibration | Steering effort is different between turning steering wheel to left and right | |
| Power steering ECU*2 | Rotation angle sensor initialization and torque sensor zero point calibration | • P/S warning light comes on<br>• EPS control | INFO |
| Steering column assembly*2 | Rotation angle sensor initialization and torque sensor zero point calibration | Steering effort is different between turning steering wheel to left and right | |
| Spiral with sensor cable sub-assembly | • Correct steering angle neutral point<br>• Steering angle setting | Advanced parking guidance system | INFO |
| Parking assist ECU | Parking assist ECU initialization | Advanced parking guidance system | |
| Suspension, tires, etc. | Height control sensor vehicle | Advanced parking guidance | |

| Replacement Part | Necessary Procedure | Effect / Inoperative Function when Necessary Procedures are not Performed | See Page |
|---|---|---|---|
| | height difference (Height set) | system | |
| Rear television camera | Rear television camera optical axis adjustment (Camera position setting) | Advanced parking guidance system | |
| Rear bumper cover | Rear bumper position setting | Advanced parking guidance system | |
| Rear height control sensor sub-assembly RH | • Height control sensor vehicle height difference (Height set)<br>• Rear television camera optical axis adjustment<br>• Perform headlight leveling ECU initialization | • Advanced parking guidance system<br>• Automatic leveling function | INFO for Advanced parking guidance system<br>INFO for lighting system |
| Inner rear view mirror assembly*3 | Re-registration of codes in the garage door opener system<br>• Register transmitter code<br>• Rolling code systems | Garage door opener system | INFO |
| DCM (Telematics Transceiver) | DCM activation | Safety connect system | INFO |
| • Certification ECU (smart key ECU assembly)<br>• ID code box (immobiliser code ECU)*4<br>• Transmission control ECU assembly<br>• Key | Code registration (Engine immobiliser system) | • Wireless door lock control system<br>• Smart key system<br>• Engine start | INFO |
| • Occupant classification ECU<br>• Front passenger seat | 1. Zero point calibration (Occupant classification system)<br>2. Sensitivity check (Occupant classification system) | • Occupant classification system<br>• Passenger airbag ON/OFF indicator<br>• Airbag system (Front passenger side)<br>• Seat belt warning system | INFO |

| Replacement Part | Necessary Procedure | Effect / Inoperative Function when Necessary Procedures are not Performed | See Page |
|---|---|---|---|
| | | (Front passenger side) | |
| • Power window regulator motor<br>• Door window regulator | Initialize power window control system | • Automatic door glass open/ close function<br>• Jam protection function<br>• Operation function after power switch is turned off | INFO |
| • Sliding roof ECU (sliding roof drive gear sub-assembly)<br>• Sliding roof glass<br>• Sliding roof housing | Initialize sliding roof ECU (pulse sensor initial position setting) | • Automatic open function of sliding roof<br>• Jam protection function<br>• Operation function after power switch is turned off | INFO |
| Headlight leveling ECU | Perform headlight leveling ECU initialization | Automatic leveling function | INFO |

- *1: for Brush Type Motor
- *2: for Brushless Type Motor
- *3: w/ Garage Door Opener System
- *4: w/ Automatic Light Control System

# INSPECTION MODE PROCEDURE

1. INSPECTION MODE

NOTICE:

When the vehicle is run in inspection mode for an operation such as a speedometer test, a DTC may be set. Therefore, if the warning light comes on, after canceling inspection mode, check for DTCs using the Techstream and clear the DTCs.

HINT:

If the engine is warmed up and the battery is charged, the engine of the vehicle will stop after the vehicle stops. For example, if the engine is required to run continuously even after the vehicle stops, such as for an ignition timing check, switch to maintenance mode.

(a) The following table shows the types of inspection mode that are available, their purpose and the control that occurs in each mode.

| Mode<br><br>(Display) | Purpose | Control |
|---|---|---|
| MAINTENANCE MODE<br><br>(2WD for measuring Exhaust Gas) | • Inspection of ignition timing etc. when performing engine maintenance, idle speed exhaust emissions testing (CO, HC), etc.<br>• Tests using a speedometer tester, two-wheel chassis dynamometer, etc. | • Keeps the engine idling when park (P) is selected<br>• Cancels traction control |
| CERTIFICATION MODE<br><br>(2WD for cutting TRC) | Tests using a speedometer tester, two-wheel chassis dynamometer, etc. | Cancels traction control |

(b) Vehicle conditions

(1) Before activating inspection mode, turn the air conditioning off, start the hybrid system with park (P) selected, and check that the engine stops within several seconds after starting (engine warm up check).

(2) Activate the appropriate inspection mode and inspect the vehicle. The shift state for each test is as follows:

| Test Item | Mode | Shift State |
|---|---|---|
| 1. Vehicle straight travelling test (side slip inspection) | Maintenance mode or normal mode | D |
| 2. Braking force test | Maintenance mode | N |
| 3. Speedometer test | Maintenance mode | D |
| 4. Exhaust gas test (idling) | Maintenance mode | P |
| 5. Headlight test | Maintenance mode or normal mode | P |

(3) Cancel inspection mode immediately after completion of inspection.

NOTICE:

Driving the vehicle without canceling inspection mode may damage the transaxle.

(c) Special notes for speedometer test

CAUTION:

Be sure to perform the test in maintenance mode.

NOTICE:

Do not perform rapid starting or quick acceleration on a speedometer tester. If rapid starting or quick acceleration is performed on a speedometer tester, damage may occur to the transaxle.

(1) Depress the accelerator pedal slowly and gradually accelerate the vehicle. Make a measurement.

(2) After the measurement, use the brakes to gradually decelerate the vehicle.

(d) Special notes for using a chassis dynamometer

(1) Always set an appropriate load before starting the test.

NOTICE:

Sudden acceleration or deceleration of the vehicle on a chassis dynamometer under minimal load may damage the transaxle.

(e) Activating maintenance mode (Not using the Techstream)

Perform the following steps from (1) through (4) in 60 seconds.

(1) Turn the power switch on (IG).

(2) Fully depress the accelerator pedal twice with park (P) selected.

(3) Fully depress the accelerator pedal twice with neutral (N) selected.

(4) Fully depress the accelerator pedal twice with park (P) selected.

(5) Check that "MAINTENANCE MODE" is displayed on the multi-information display.




(6) Start the engine by turning the power switch on (READY) while depressing the brake pedal.

HINT:

The idle speed in maintenance mode is approximately 1000 rpm with park (P) selected. The engine speed increases to 1500 rpm when the accelerator pedal is depressed midway with park (P) selected. When the accelerator pedal is depressed more than midway, or when the accelerator pedal is fully depressed, the engine speed increases to approximately 2500 rpm.

(f) Activating maintenance mode (Using the Techstream)

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter following menus: Powertrain / Hybrid Control / Utility / Inspection Mode - 2WD for measuring Exhaust Gas.




(5) Check that "MAINTENANCE MODE" is displayed on the multi-information display.

(6) Start the engine by turning the power switch on (READY) while depressing the brake pedal.

HINT:

The idle speed in maintenance mode is approximately 1000 rpm with park (P) selected. The engine speed increases to 1500 rpm when the accelerator pedal is depressed midway with park (P) selected. When the accelerator pedal is depressed more than midway, or when the accelerator pedal is fully depressed, the engine speed increases to approximately 2500 rpm.

(g) Activating certification mode (Not using the Techstream)

Perform the following steps from (1) through (4) in 60 seconds.

(1) Turn the power switch on (IG).

(2) Fully depress the accelerator pedal three times with park (P) selected.

(3) Fully depress the accelerator pedal three times with neutral (N) selected.

(4) Fully depress the accelerator pedal three times with park (P) selected.




(5) Check that "CERTIFICATION MODE" is displayed on the multi-information display.

(6) Start the engine by turning the power switch on (READY) while depressing the brake pedal.

(h) Activating certification mode (Using the Techstream)

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter following menus: Powertrain / Hybrid Control / Utility / Inspection Mode - 2WD for cutting TRC.




(5) Check that "CERTIFICATION MODE" is displayed on the multi-information display.

(6) Start the engine by turning the power switch on (READY) while depressing the brake pedal.

(i) Deactivating inspection mode

(1) Turn the power switch off. The HV system turns off simultaneously.

NOTICE:

- If a DTC is set during inspection mode, the master warning light will illuminate and a warning message will appear on the multi-information display.
- When the master warning light and the warning message illuminate during inspection mode, cancel inspection mode, and check for DTC(s).
- Driving the vehicle without canceling inspection mode may damage the transaxle.

# ABBREVIATIONS USED IN MANUAL

| Abbreviation | Meaning |
|---|---|
| ABS | Anti-lock Brake System |
| A/C | Air Conditioner |
| AC | Alternating Current |
| ACC | Accessory |
| ACIS | Acoustic Control Induction System |
| ACM | Active Control Engine Mount |
| ACSD | Automatic Cold Start Device |
| A.D.D | Automatic Disconnecting Differential |
| A/F | Air-Fuel Ratio |
| AHC | Active Height Control Suspension |
| ALR | Automatic Locking Retractor |
| ALT | Alternator |
| AMP | Amplifier |
| ANT | Antenna |
| APPROX. | Approximately |
| ASSY | Assembly |
| A/T, ATM | Automatic Transmission (Transaxle) |
| ATF | Automatic Transmission Fluid |
| AUTO | Automatic |
| AUX | Auxiliary |
| AVG | Average |
| AVS | Adaptive Variable Suspension |
| AWD | All Wheel Drive Vehicle |
| B+ | Battery Voltage |
| BA | Brake Assist |
| BACS | Boost Altitude Compensation System |
| BAT | Battery |
| BDC | Bottom Dead Center |
| B/L | Bi-Level |
| B/S | Bore-Stroke Ratio |
| BTDC | Before Top Dead Center |
| BVSV | Bimetallic Vacuum Switching Valve |
| CAN | Controller Area Network |
| CB | Circuit Breaker |
| CCo | Catalytic Converter for Oxidation |

| Abbreviation | Meaning |
|---|---|
| CCV | Canister Closed Valve |
| CD | Compact Disc |
| CF | Cornering Force |
| CG | Center of Gravity |
| CH | Channel |
| CKD | Complete Knock Down |
| COMB. | Combination |
| CPE | Coupe |
| CPS | Combustion Pressure Sensor |
| CPU | Central Processing Unit |
| CRS | Child Restraint System |
| CTR | Center |
| C/V | Check Valve |
| CV | Control Valve |
| CW | Curb Weight |
| DC | Direct Current |
| DEF | Defogger |
| DFL | Deflector |
| DIFF. | Differential |
| DIFF. LOCK | Differential Lock |
| D/INJ | Direct Injection |
| DLC | Data Link Connector |
| DLI | Distributorless Ignition |
| DOHC | Double Overhead Camshaft |
| DP | Dash Pot |
| DS | Dead Soak |
| DSP | Digital Signal Processor |
| DTC | Diagnostic Trouble Code |
| DVD | Digital Versatile Disc |
| EBD | Electric Brake Force Distribution |
| EC | Electrochromic |
| ECAM | Engine Control And Measurement System |
| ECD | Electronically Controlled Diesel |
| ECDY | Eddy Current Dynamometer |
| ECT | Electronic Controlled Automatic Transmission |
| ECU | Electronic Control Unit |
| ED | Electro-Deposited Coating |

| Abbreviation | Meaning |
|---|---|
| EDU | Electronic Driving Unit |
| EDIC | Electric Diesel Injection Control |
| EFI | Electronic Fuel Injection |
| E/G | Engine |
| EGR | Exhaust Gas Recirculation |
| EGR-VM | EGR-Vacuum Modulator |
| ELR | Emergency Locking Retractor |
| EPS | Electric Power Steering |
| ENG | Engine |
| ES | Easy & Smooth |
| ESA | Electronic Spark Advance |
| ETCS-i | Electronic Throttle Control System-intelligent |
| EVAP | Evaporative Emission Control |
| EVP | Evaporator |
| E-VRV | Electric Vacuum Regulating Valve |
| EX | Exhaust |
| FE | Fuel Economy |
| FF | Front-Engine-Front-Wheel-Drive |
| F/G | Fuel Gauge |
| FIPG | Formed In Place Gasket |
| FL | Fusible Link |
| F/P | Fuel Pump |
| FPU | Fuel Pressure Up |
| FR | Front |
| F/W | Flywheel |
| FW/D | Flywheel Damper |
| FWD | Front-Wheel-Drive |
| GAS | Gasoline |
| GND | Ground |
| GPS | Global Positioning System |
| GSA | Gear Shift Actuator |
| HAC | High Altitude Compensator |
| H/B | Hatchback |
| H-FUSE | High Current Fuse |
| HI | High |
| HID | High Intensity Discharge (Headlight) |
| HPU | Hydraulic Power Unit |

| Abbreviation | Meaning |
|---|---|
| HSG | Housing |
| HT | Hard Top |
| HV | Hybrid Vehicle |
| HWS | Heated Windshield System |
| IC | Integrated Circuit |
| IDI | Indirect Diesel Injection |
| IFS | Independent Front Suspension |
| IG | Ignition |
| IIA | Integrated Ignition Assembly |
| IN | Intake (Manifold, Valve) |
| INT | Intermittent |
| I/P | Instrument Panel |
| IRS | Independent Rear Suspension |
| ISC | Idle Speed Control |
| J/B | Junction Block |
| J/C | Junction Connector |
| KD | Kick-Down |
| LAN | Local Area Network |
| LB | Liftback |
| LCD | Liquid Crystal Display |
| LED | Light Emitting Diode |
| LH | Left-Hand |
| LHD | Left-Hand Drive |
| LIN | Local Interconnect Network |
| L/H/W | Length, Height, Width |
| LLC | Long-Life Coolant |
| LNG | Liquefied Natural Gas |
| LO | Low |
| LPG | Liquefied Petroleum Gas |
| LSD | Limited Slip Differential |
| LSP & BV | Load Sensing Proportioning and Bypass Valve |
| LSPV | Load Sensing Proportioning Valve |
| MAP | Manifold Absolute Pressure |
| MAX. | Maximum |
| MIC | Microphone |
| MIL | Malfunction Indicator Lamp |
| MIN. | Minimum |

| Abbreviation | Meaning |
|---|---|
| MG1 | Motor Generator No. 1 |
| MG2 | Motor Generator No. 2 |
| MMT | Multi-mode Manual Transmission |
| MP | Multipurpose |
| MPI | Multipoint Electronic Injection |
| MPX | Multiplex Communication System |
| M/T, MTM | Manual Transmission (Transaxle) |
| MT | Mount |
| MTG | Mounting |
| N | Neutral |
| NA | Natural Aspiration |
| NO. | Number |
| O2S | Oxygen Sensor |
| OC | Oxidation Catalyst |
| OCV | Oil Control Valve |
| O/D | Overdrive |
| OEM | Original Equipment Manufacturing |
| OHC | Overhead Camshaft |
| OHV | Overhead Valve |
| OPT | Option |
| ORVR | On-board Refilling Vapor Recovery |
| O/S | Oversize |
| P & BV | Proportioning and Bypass Valve |
| PBD | Power Back Door |
| PCS | Power Control System |
| PCV | Positive Crankcase Ventilation |
| PKB | Parking Brake |
| PPS | Progressive Power Steering |
| PROM | Programmable Read Only Memory |
| PS | Power Steering |
| PSD | Power Slide Door |
| PTC | Positive Temperature Coefficient |
| PTO | Power Take-Off |
| PZEV | Partial Zero Emission Vehicle |
| P/W | Power Window |
| R & P | Rack and Pinion |
| RAM | Random Access Memory |

| Abbreviation | Meaning |
|---|---|
| R/B | Relay Block |
| RBS | Recirculating Ball Type Steering |
| REAS | Relative Absorber System |
| R/F | Reinforcement |
| RFS | Rigid Front Suspension |
| RH | Right-Hand |
| RHD | Right-Hand Drive |
| RLY | Relay |
| ROM | Read Only Memory |
| RR | Rear |
| RRS | Rigid Rear Suspension |
| RSE | Rear Seat Entertainment |
| RWD | Rear-Wheel Drive |
| SC | Supercharger |
| SCV | Swirl Control Valve (for gasoline engine) |
| | Suction Control Valve (for diesel engine) |
| SDN | Sedan |
| SEN | Sensor |
| SICS | Starting Injection Control System |
| SOC | State Of Charge |
| SOHC | Single Overhead Camshaft |
| SPEC | Specification |
| SPI | Single Point Injection |
| SPV | Spill Control Valve |
| SRS | Supplemental Restraint System |
| SSM | Special Service Materials |
| SST | Special Service Tools |
| STD | Standard |
| STJ | Cold-Start Fuel Injection |
| SW | Switch |
| SYS | System |
| T/A | Transaxle |
| TACH | Tachometer |
| TBI | Throttle Body Electronic Fuel Injection |
| TC | Turbocharger |
| TCCS | TOYOTA Computer-Controlled System |
| TCM | Transmission Control Module |

| Abbreviation | Meaning |
|---|---|
| TCV | Timing Control Valve (for diesel engine) |
| | Tumble Control Valve (for gasoline engine) |
| TDC | Top Dead Center |
| TEMP. | Temperature |
| TFT | TOYOTA Free-Tronic |
| TIS | Total Information System for Vehicle Development |
| T/M | Transmission |
| TMC | TOYOTA Motor Corporation |
| TMMIN | PT. TOYOTA Motor Manufacturing Indonesia |
| TMMK | TOYOTA Motor Manufacturing Kentucky, Inc. |
| TMT | TOYOTA Motor Thailand Co. Ltd. |
| TRAC/TRC | Traction Control System |
| TURBO | Turbocharge |
| TVIP | TOYOTA Vehicle Intrusion Protection |
| TWC | Three-Way Catalyst |
| U/D | Underdrive |
| U/S | Undersize |
| VCV | Vacuum Control Valve |
| VDIM | Vehicle Dynamics Integrated Management |
| VENT | Ventilator |
| VIM | Vehicle Interface Module |
| VGRS | Variable Gear Ratio Steering |
| VIN | Vehicle Identification Number |
| VPS | Variable Power Steering |
| VSC | Vehicle Stability Control |
| VSV | Vacuum Switching Valve |
| VTV | Vacuum Transmitting Valve |
| VVT-i | Variable Valve Timing-intelligent |
| W/ | With |
| WGN | Wagon |
| W/H | Wire Harness |
| W/O | Without |
| 1ST | First |
| 2ND | Second |
| 2WD | Two Wheel Drive Vehicle (4 x 2) |
| 3RD | Third |
| 4TH | Fourth |

| Abbreviation | Meaning |
| --- | --- |
| 4WD | Four Wheel Drive Vehicle (4 x 4) |
| 4WS | Four Wheel Steering System |
| 5TH | Fifth |

# GLOSSARY OF SAE AND TOYOTA TERMS

This glossary lists all SAE-J1930 terms and abbreviations used in this manual in compliance with SAE recommendations, as well as their TOYOTA equivalents.

| SAE Abbreviation | SAE Term | TOYOTA Term ( )-Abbreviation |
|---|---|---|
| A/C | Air Conditioning | Air Conditioner |
| ACL | Air Cleaner | Air Cleaner, A/CL |
| AIR | Secondary Air Injection | Air Injection (AI) |
| AP | Accelerator Pedal | - |
| B+ | Battery Positive Voltage | +B, Battery Voltage |
| BARO | Barometric Pressure | HAC |
| CAC | Charge Air Cooler | Intercooler |
| CARB | Carburetor | Carburetor |
| CFI | Continuous Fuel Injection | - |
| CKP | Crankshaft Position | Crank Angle |
| CL | Closed Loop | Closed Loop |
| CMP | Camshaft Position | Cam Angle |
| CPP | Clutch Pedal Position | - |
| CTOX | Continuous Trap Oxidizer | - |
| CTP | Closed Throttle Position | LL ON, Idle ON |
| DFI | Direct Fuel Injection | Direct Injection (DI./INJ) |
| DI | Distributor Ignition | - |
| DLC3 | Data Link Connector 3 | OBD II Diagnostic Connector |
| DTC | Diagnostic Trouble Code | Diagnostic Trouble Code |
| DTM | Diagnostic Test Mode | - |
| ECL | Engine Coolant Level | - |
| ECM | Engine Control Module | Engine Electronic Control Unit (ECU) |
| ECT | Engine Coolant Temperature | Coolant Temperature, Water Temperature (THW) |
| EEPROM | Electrically Erasable Programmable Read Only Memory | Electrically Erasable Programmable Read Only Memory (EEPROM) |
| EFE | Early Fuel Evaporation | Cold Mixture Heater (CMH), Heat Control Valve (HCV) |
| EGR | Exhaust Gas Recirculation | Exhaust Gas Recirculation (EGR) |
| EI | Electronic Ignition | Distributorless Ignition (DLI) |
| EM | Engine Modification | Engine Modification (EM) |
| EPROM | Erasable Programmable Read Only Memory | Programmable Read Only Memory (PROM) |
| EVAP | Evaporative Emission | Evaporative Emission Control (EVAP) |

| SAE Abbreviation | SAE Term | TOYOTA Term ( )-Abbreviation |
|---|---|---|
| FC | Fan Control | - |
| FEEPROM | Flash Electrically Erasable Programmable Read Only Memory | - |
| FEPROM | Flash Erasable Programmable Read Only Memory | - |
| FF | Flexible Fuel | - |
| FP | Fuel Pump | Fuel Pump |
| GEN | Generator | Alternator |
| GND | Ground | Ground (GND) |
| HO2S | Heated Oxygen Sensor | Heated Oxygen Sensor ($HO_2S$) |
| IAC | Idle Air Control | Idle Speed Control (ISC) |
| IAT | Intake Air Temperature | Intake or Inlet Air Temperature |
| ICM | Ignition Control Module | - |
| IFI | Indirect Fuel Injection | Indirect Injection (IDL) |
| IFS | Inertia Fuel-Shutoff | - |
| ISC | Idle Speed Control | - |
| KS | Knock Sensor | Knock Sensor |
| MAF | Mass Airflow | Air Flow Meter |
| MAP | Manifold Absolute Pressure | Manifold Pressure Intake Vacuum |
| MC | Mixture Control | Electric Bleed Air Control Valve (EBCV)<br>Mixture Control Valve (MCV)<br>Electric Air Control Valve (EACV) |
| MDP | Manifold Differential Pressure | - |
| MFI | Multiport Fuel Injection | Electronic Fuel Injection (EFI) |
| MIL | Malfunction Indicator Lamp | Check Engine Light |
| MST | Manifold Surface Temperature | - |
| MVZ | Manifold Vacuum Zone | - |
| NVRAM | Non-Volatile Random Access Memory | - |
| O2S | Oxygen Sensor | Oxygen Sensor, $O_2$ Sensor ($O_2S$) |
| OBD | On-Board Diagnostic | On-Board Diagnostic System (OBD) |
| OC | Oxidation Catalytic Converter | Oxidation Catalytic Convert (OC), CCo |
| OL | Open Loop | Open Loop |
| PAIR | Pulsed Secondary Air Injection | Air Suction (AS) |
| PCM | Powertrain Control Module | - |
| PNP | Park/Neutral Position | - |

| SAE Abbreviation | SAE Term | TOYOTA Term ( )-Abbreviation |
|---|---|---|
| PROM | Programmable Read Only Memory | - |
| PSP | Power Steering Pressure | - |
| PTOX | Periodic Trap Oxidizer | Diesel Particulate Filter (DPF)<br><br>Diesel Particulate Trap (DPT) |
| RAM | Random Access Memory | Random Access Memory (RAM) |
| RM | Relay Module | - |
| ROM | Read Only Memory | Read Only Memory (ROM) |
| RPM | Engine Speed | Engine Speed |
| SC | Supercharger | Supercharger |
| SCB | Supercharger Bypass | E-ABV |
| SFI | Sequential Multiport Fuel Injection | Electronic Fuel Injection (EFI), Sequential Injection |
| SPL | Smoke Puff Limiter | - |
| SRI | Service Reminder Indicator | - |
| SRT | System Readiness Test | - |
| ST | Scan Tool | - |
| TB | Throttle Body | Throttle Body |
| TBI | Throttle Body Fuel Injection | Single Point Injection<br><br>Central Fuel Injection (Ci) |
| TC | Turbocharger | Turbocharger |
| TCC | Torque Converter Clutch | Torque Converter |
| TCM | Transmission Control Module | Transmission ECU, ECT ECU |
| TP | Throttle Position | Throttle Position |
| TR | Transmission Range | - |
| TVV | Thermal Vacuum Valve | Bimetallic Vacuum Switching Valve (BVSV)<br><br>Thermostatic Vacuum Switching Valve (TVSV) |
| TWC | Three-Way Catalytic Converter | Three-Way Catalytic (TWC)<br><br>Manifold Converter<br><br>$CC_{RO}$ |
| TWC+OC | Three-Way + Oxidation Catalytic Converter | $CC_R$ + CCo |
| VAF | Volume Airflow | Air Flow Meter |
| VR | Voltage Regulator | Voltage Regulator |
| VSS | Vehicle Speed Sensor | Vehicle Speed Sensor |

| SAE Abbreviation | SAE Term | TOYOTA Term ( )-Abbreviation |
|---|---|---|
| WOT | Wide Open Throttle | Full Throttle |
| WU-OC | Warm Up Oxidation Catalytic Converter | - |
| WU-TWC | Warm Up Three-Way Catalytic Converter | - |
| 3GR | Third Gear | - |
| 4GR | Fourth Gear | - |

# GENERAL MAINTENANCE

1. TIGHTEN BOLTS AND NUTS ON CHASSIS AND BODY

(a) If necessary, tighten the bolts and nuts on the chassis parts listed below.

- Front axle and suspension
- Drive train
- Rear axle and suspension
- Brake system
- Engine mounts
- Other chassis parts

(b) If necessary, tighten the bolts and nuts on the body parts listed below.

- Seat belt system
- Seats
- Doors and hood
- Body mounts
- Fuel tank
- Exhaust system
- Other body parts

2. REPLACE AIR CONDITIONING FILTER

(a) Remove the air conditioning filter 

.

(b) Visually inspect the surface of the air conditioning filter.

(c) If the air conditioning filter is contaminated with foreign matter, replace it.

3. ROAD TEST

(a) Check the engine and chassis for abnormal noises.

(b) Check that the vehicle does not wander or pull to one side.

(c) Check that the brakes work properly and do not drag.

4. BODY INSPECTION

(a) Check the body exterior for dents, scratches and rust.

(b) Check the underbody for rust and damage.

If necessary, replace the damaged part or repair the damaged area.

5. FINAL INSPECTION

(a) Check the operation of the body parts.

(1) Hood

- Auxiliary catch operates properly.
- Hood locks securely when closed.

(2) Front and rear doors

- Door locks operate properly.
- Doors close properly.

(3) Luggage compartment door

- Luggage compartment door opens and closes properly.

(4) Seats

- Seat adjusts easily and lock securely in any position.
- Front seatbacks lock securely in any position.
- Fold-down rear seatbacks lock securely.

(5) Be sure to deliver a clean car. Make sure to check the following:

- Steering wheel
- Shift lever knob
- All switches and knobs
- Door handles
- Seats

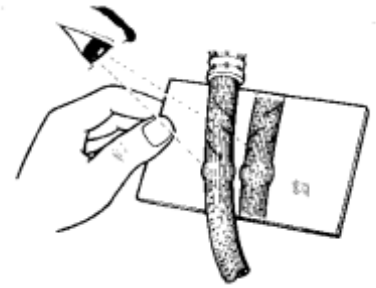
# GENERAL MAINTENANCE

1. INSPECT BRAKE LINE PIPES AND HOSES

HINT:

Work in a well-lighted area. Turn the front wheels fully to the right or left before beginning the inspection.

(a) Using a mirror, check the entire circumference and length of the brake lines and hoses for:



- Damage
- Wear
- Deformation
- Cracks
- Corrosion
- Leaks
- Bends
- Twists

(b) Check all clamps for tightness and check the connections for leakage.

(c) Check that the hoses and lines are not near sharp edges, moving parts or the exhaust system.

(d) Check that the lines are installed properly and pass through the center of the grommets.

2. INSPECT BRAKE PEDAL

(a) Check the brake pedal INFO.

3. INSPECT PARKING BRAKE

(a) Check the parking brake shoe clearance and parking brake pedal travel INFO.

(b) Check the parking brake cables to ensure that they are not deformed or binding.

4. INSPECT FRONT BRAKE

(a) Check the front brake pads and discs INFO.

5. INSPECT REAR BRAKE

(a) Check the rear brake pads and discs INFO.

6. INSPECT OR CHANGE BRAKE FLUID

(a) Inspect or change the brake fluid INFO.

Fluid:

SAE J1703 or FMVSS No. 116 DOT3

# GENERAL MAINTENANCE

1. INSPECT STEERING LINKAGE AND GEAR HOUSING

(a) Check the steering wheel free play INFO.

(b) Check the steering linkage for looseness or damage.

(1) Check that the tie rod ends do not have any play.

(2) Check that the dust seals and boots are not damaged.

(3) Check that the boot clamps are not loose.

(4) Check that the steering gear housing is not damaged.

2. INSPECT BALL JOINTS AND DUST COVERS

(a) Inspect the ball joints for looseness.

(1) Jack up the front of the vehicle and place wooden blocks with a height of 180 to 200 mm (7.09 to 7.87 in.) under the front tires.

(2) Lower the vehicle until the front coil spring has about half its ordinary load. Place stands under the vehicle for safety.

(3) Check that the front wheels are pointing straight ahead. Use wheel chocks on all 4 wheels.

(4) Using a lever, pry up the end of the lower arm. Check the amount of play.

Maximum ball joint vertical play:

0 mm (0 in.)

If there is any play, replace the ball joint.

(b) Check the dust cover for damage.

3. INSPECT DRIVE SHAFT BOOTS

(a) Check the drive shaft boots for loose clamps, cracks, grease leaks, kinks or damage.

4. INSPECT HV TRANSAXLE

(a) Visually check the transaxle for fluid leakage. If fluid is leaking, find the cause and repair it.

5. INSPECT FRONT AND REAR SUSPENSION

(a) Check the front and rear suspension.

| Suspension Type | See Procedure |
| --- | --- |
| Front Suspension | INFO |
| Rear Suspension | INFO |

# GENERAL MAINTENANCE

HINT:

Perform these procedures after the engine has cooled down.

1. REPLACE ENGINE OIL AND OIL FILTER

(a) Check the engine oil and oil filter INFO.

2. REPLACE ENGINE COOLANT

(a) Check the engine coolant INFO.

3. INSPECT SPARK PLUGS

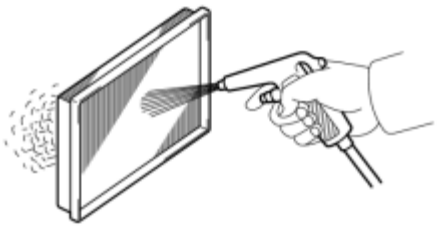
(a) Check the spark plugs INFO.

4. INSPECT BATTERY

(a) Check the battery INFO.

5. INSPECT AIR CLEANER FILTER ELEMENT

(a) Remove the air filter.



P

(b) Check that the air cleaner is not excessively dirty.

If the air cleaner is excessively dirty, replace the air cleaner filter element.

(c) If cleaning the air cleaner filter element, blow compressed air as shown in the illustration to clean it.

(d) Reinstall the air filter.

6. INSPECT EXHAUST PIPES AND MOUNTINGS

(a) Visually check the pipes, hangers and connections for severe corrosion, leaks or damage.

7. INSPECT FUEL TANK CAP GASKET

(a) Check the fuel tank cap gasket INFO.

8. INSPECT FUEL LINES, CONNECTIONS, FUEL TANK VAPOR VENT SYSTEM HOSES AND FUEL TANK BANDS

(a) Visually check the fuel lines and hoses for cracks, leaks, loose connections, or deformation.

(b) Check for tank band looseness or deformation.

9. INSPECT CHARCOAL CANISTER

(a) Check the charcoal canister 

.

# GENERAL MAINTENANCE

- These are maintenance and inspection items that are considered to be the owner's responsibility.

The owner can do them or they can have them done at a service center.

These items include those that should be checked on a daily basis, those that in most cases do not require special tools, and those that are considered to be reasonable for the owner to do.

General maintenance items and procedures are as follows:

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Determine the appropriate time to service the vehicle using either miles driven or time (months) elapsed, whichever reaches the specification first.
- Maintain similar intervals between periodic maintenance unless noted.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. LIGHTS

(a) Check that the headlights, stop lights, taillights, turn signal lights, and other lights illuminate or blink properly. Also, check if they have enough brightness.

(b) Check that the headlights are aimed properly.

3. WARNING LIGHTS AND BUZZERS

(a) Check that all the warning lights and buzzers are working.

4. HORNS

(a) Check if the horn is working correctly.

5. WINDSHIELD GLASS

(a) Check for scratches, pits or abrasions.

6. WINDSHIELD WIPER AND WASHER

(a) Check that the washers are aimed properly. Also, check that the washer fluid hits the center of the operating range of each wiper on the windshield.

(b) Check if the wipers streak. Replace the wiper if necessary.

7. WINDSHIELD DEFROSTER

(a) When the air conditioning is on the defroster setting, check that air comes out of the defroster outlets.

8. REAR VIEW MIRROR

(a) Check that the rear view mirror is securely mounted.

9. SUN VISORS

(a) Check that the sun visors move freely and are securely mounted.

10. STEERING WHEEL

(a) Check that the steering wheel has the proper amount of free play. Also check for steering difficulty and unusual noises INFO.

11. SEATS

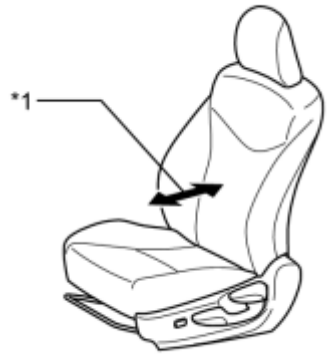
(a) Check that the seat adjusters, seatback recliner and other seat controls operate smoothly.

(b) Check that all the latches lock securely in all positions.

(c) Check that the locks hold securely in all positions.

(d) Check that the headrests move up and down smoothly and that the locks hold securely in all latched positions.

(e) Check power seat function




(1) Operate the lumbar support switch and check to make sure the seat function works:

- Lumbar support function (*1)

12. SEAT BELTS

(a) Check that the seat belt components, such as the buckles, retractors and anchors, operate properly and smoothly.

(b) Check that the belt webbing is not cut, frayed, worn or damaged.

13. ACCELERATOR PEDAL

(a) Check that the pedal operates smoothly. Check that the pedal does not have uneven resistance or stick in certain positions.

14. BRAKE PEDAL

(a) Check that the brake pedal operates smoothly.

(b) Check that the pedal has the proper reserve distance and free play INFO.

(c) Start the engine and check the brake booster function.

(d) Start the engine and check the brake system indicator.

15. BRAKES

(a) In a safe place, check that the vehicle does not pull or lead to the side when applying the brakes.

16. PARKING BRAKE

(a) Check that the parking brake pedal has the proper amount of travel INFO.

(b) On a slight grade, check that the parking brake alone can hold the vehicle in place.

17. HYBRID TRANSAXLE "PARK" MECHANISM

(a) Check the operation of the P position switch.

(b) Check that park (P) can be disengaged by operating the selector lever.

(c) With park (P) selected, release all brakes in an area that has a slight grade and check that the vehicle is stable.

# GENERAL MAINTENANCE

- These are maintenance and inspection items that are considered to be the owner's responsibility.

The owner can do them or they can have them done at a service center.

These items include those that should be checked on a daily basis, those that in most cases do not require special tools, and those that are considered to be reasonable for the owner to do.

General maintenance items and procedures are as follows:

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (months) elapsed, whichever reaches the specification first.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. TIRES

(a) Check the tire inflation pressure with a gauge. Make adjustments if necessary.

(b) Check the surfaces of the tires for cuts, damage or excessive wear.

3. WHEEL NUTS

(a) Check for nuts that are loose or missing. Tighten them if necessary.

4. TIRE ROTATION

(a) Check the maintenance schedule in the owner's manual supplement.

5. WINDSHIELD WIPER BLADES

(a) Check the blades for wear or cracks whenever they are unable to wipe the windshield clean. Replace them if necessary.

6. FLUID LEAKS

(a) Check under the vehicle for leaking fuel, oil, water and other fluids.

NOTICE:

If you smell fuel or notice any leaks, locate the cause and correct it.

7. DOORS AND ENGINE HOOD

(a) Check that all of the doors and the hood operate smoothly, and that all the latches lock securely.

(b) When the primary latch is released, check that the engine hood secondary latch prevents the hood from opening.

# GENERAL MAINTENANCE

- These are maintenance and inspection items that are considered to be the owner's responsibility.

The owner can do them or they can have them done at a service center.

These items include those that should be checked on a daily basis, those that in most cases do not require special tools, and those that are considered to be reasonable for the owner to do.

General maintenance items and procedures are as follows:

1. GENERAL NOTES

- Maintenance requirements vary depending on the country.
- Check the maintenance schedule in the owner's manual supplement.
- Following the maintenance schedule is mandatory.
- Determine the appropriate time to service the vehicle using either miles driven or time (months) elapsed, whichever reaches the specification first.
- Failing to check each vehicle part could lead to poor engine performance and increase exhaust emissions.

2. TIRES

(a) Check the tire inflation pressure with a gauge. Make adjustments if necessary.

(b) Check the surfaces of the tires for cuts, damage or excessive wear.

3. WHEEL NUTS

(a) Check for nuts that are loose or missing. Tighten them if necessary.

4. TIRE ROTATION

(a) Check the maintenance schedule in the owner's manual supplement.

5. WINDSHIELD WIPER BLADES

(a) Check the blades for wear or cracks whenever they are unable to wipe the windshield clean. Replace them if necessary.

6. FLUID LEAKS

(a) Check under the vehicle for leaking fuel, oil, water and other fluids.

NOTICE:

If you smell fuel or notice any leaks, locate the cause and correct it.

7. DOORS AND ENGINE HOOD

(a) Check that all of the doors and the hood operate smoothly, and that all the latches lock securely.

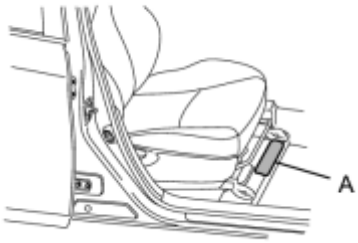
(b) When the primary latch is released, check that the engine hood secondary latch prevents the hood from opening.

# VEHICLE IDENTIFICATION AND SERIAL NUMBERS

1. VEHICLE IDENTIFICATION NUMBER




(a) The vehicle identification number is stamped on the vehicle body and on the certification label as shown in the illustration.

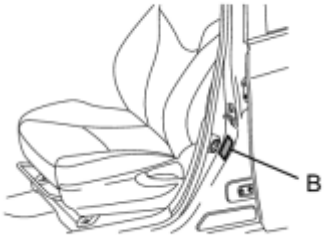



A:

Vehicle Identification Number

B:

Certification Label



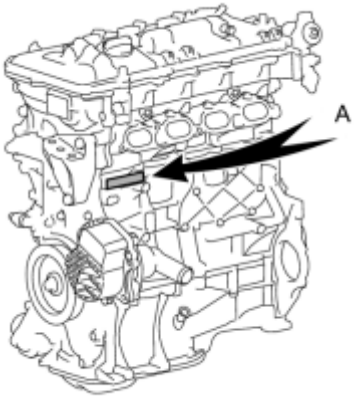

C

2. ENGINE SERIAL NUMBER AND TRANSAXLE SERIAL NUMBER

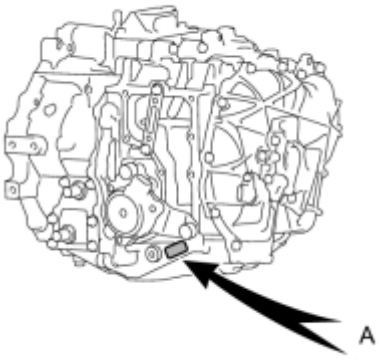
(a) The engine serial number is stamped on the cylinder block of the engine as shown in the illustration.

A:

2ZR-FXE Engine Serial Number




c




c

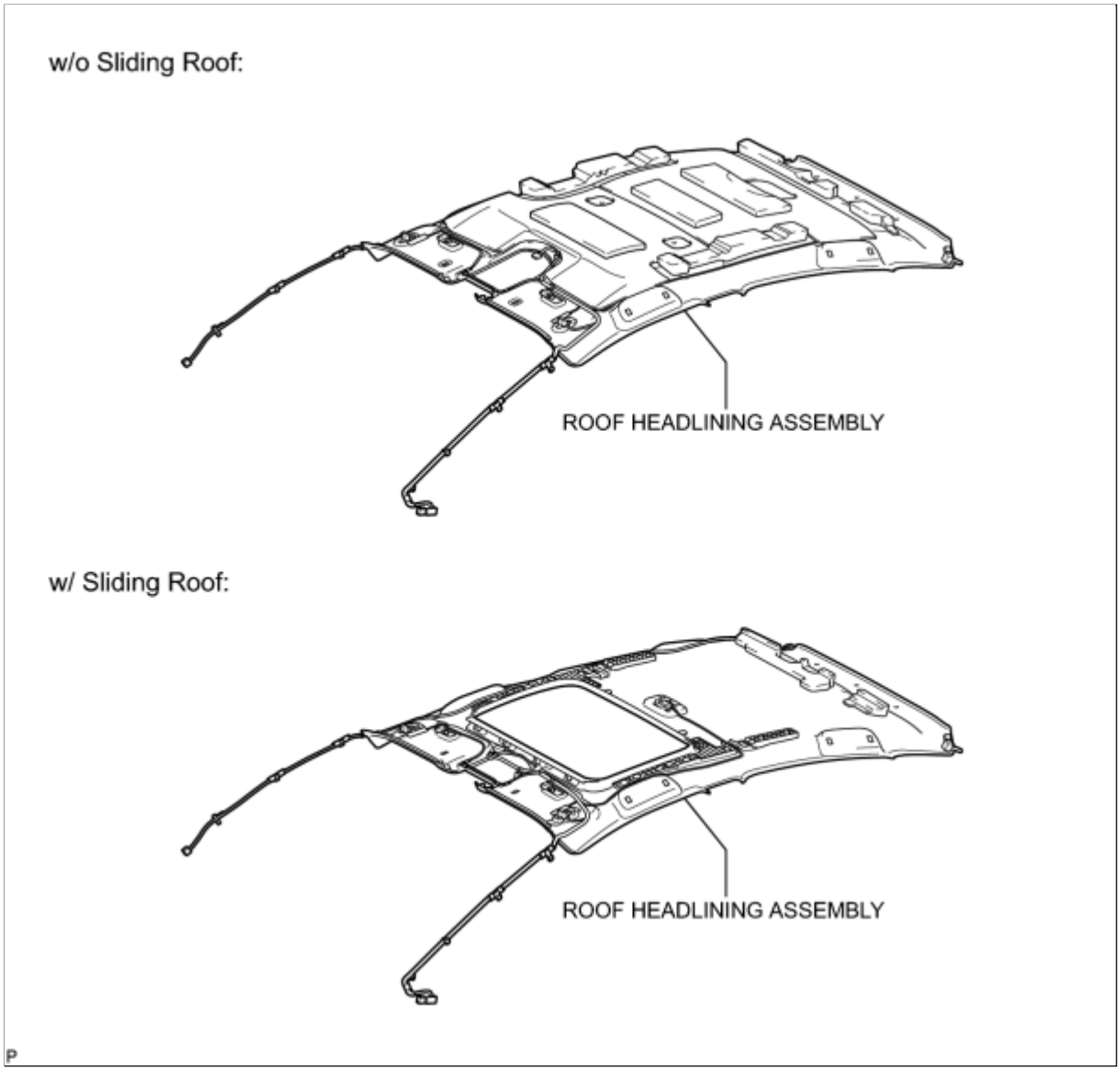
(b) The transaxle code is stamped on the case as shown in the illustration.

A:

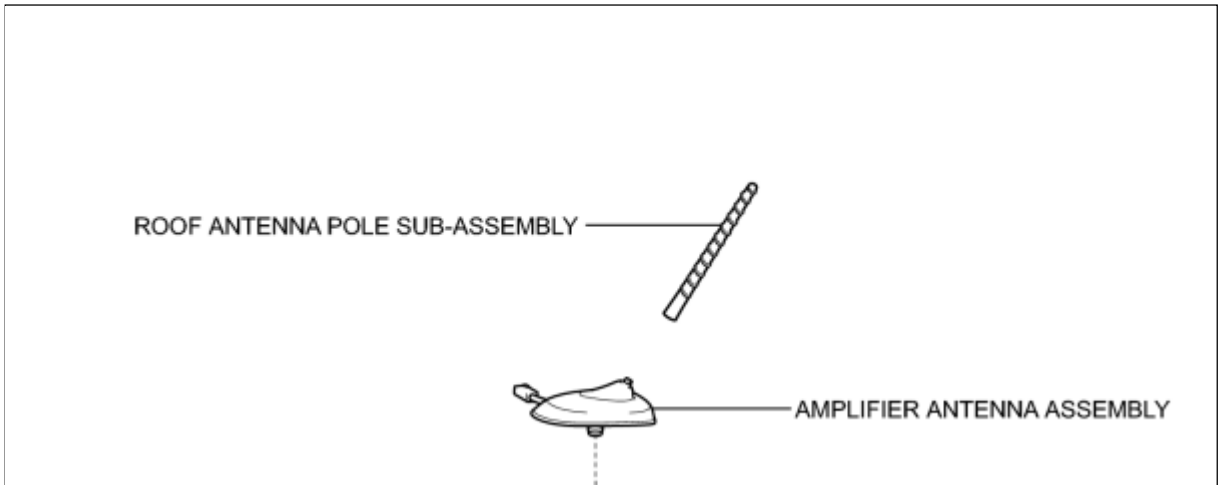
P410 Transaxle Code

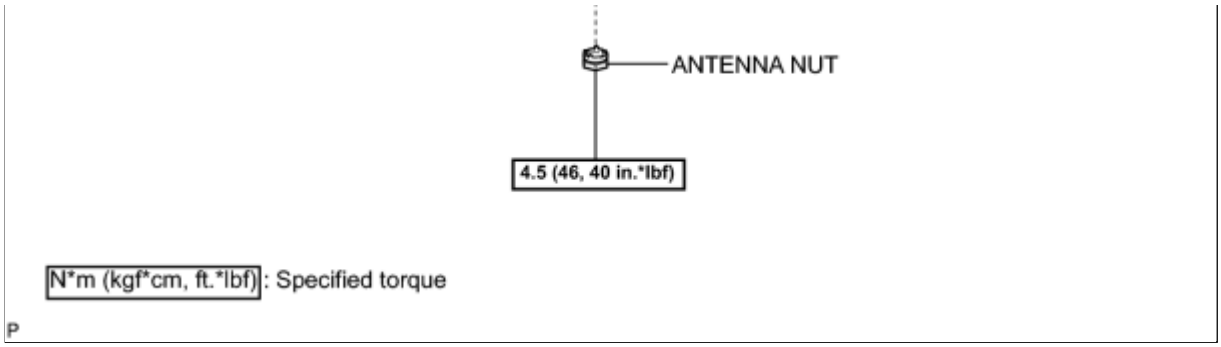
## COMPONENTS

## ILLUSTRATION



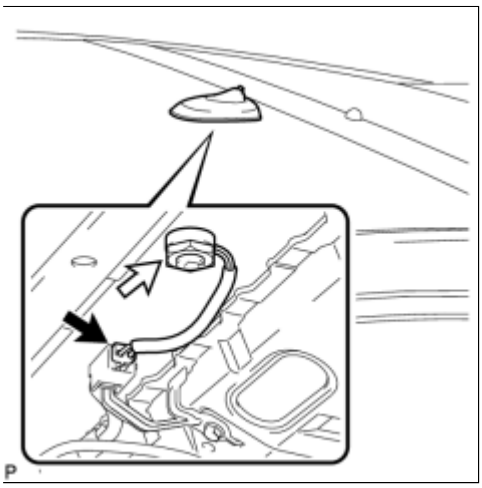

## ILLUSTRATION




ANTENNA NUT
4.5 (46, 40 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque
P

# INSTALLATION

## 1. INSTALL AMPLIFIER ANTENNA ASSEMBLY

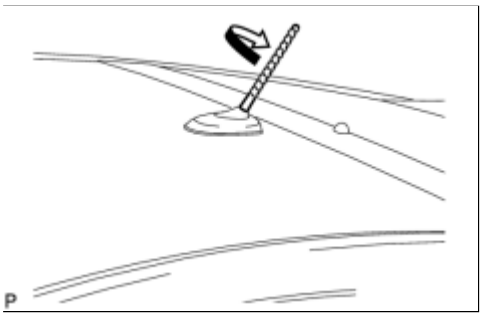


(a) Install the amplifier antenna assembly with the antenna nut.

**Torque: 4.5 N·m (46 kgf·cm, 40in·lbf)**

(b) Connect the 2 connectors.

## 2. INSTALL ROOF ANTENNA POLE SUB-ASSEMBLY



(a) Install the roof antenna pole sub-assembly as shown in the illustration.

## 3. INSTALL ROOF HEADLINING ASSEMBLY

**HINT:**

**Refer to the procedure from Install Roof Headlining Assembly** INFO **.**

| | | |
|---|---|---|
| **Last Modified:** 7-21-2009 | 5.6 A | **From:** 200904 |
| **Model Year:** 2010 | **Model:** Prius | **Doc ID:** RM000003W9I007X |
| **Title:** AUDIO / VIDEO: AMPLIFIER ANTENNA: REMOVAL (2010 Prius) | | |

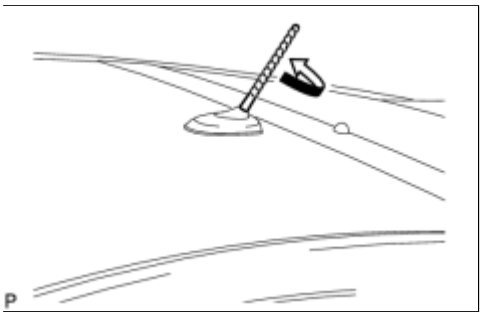
# REMOVAL

### 1. REMOVE ROOF HEADLINING ASSEMBLY

**HINT:**

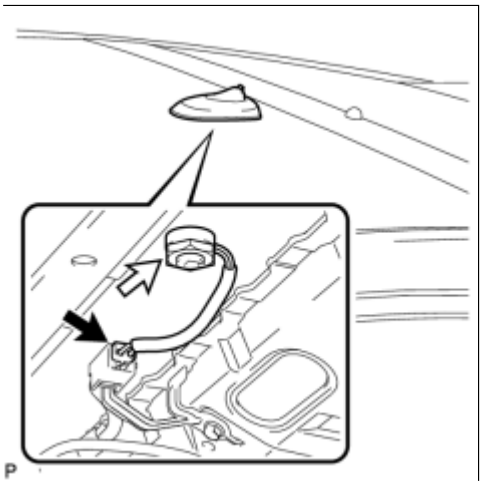
**Refer to the procedure up to Remove Roof Headlining Assembly** INFO **.**

### 2. REMOVE ROOF ANTENNA POLE SUB-ASSEMBLY



(a) Remove the roof antenna pole sub-assembly as shown in the illustration.

### 3. REMOVE AMPLIFIER ANTENNA ASSEMBLY



(a) Disconnect the 2 connectors.

(b) Remove the antenna nut and amplifier antenna assembly.

# DIAGNOSTIC TROUBLE CODE CHART

**Communication Diagnosis**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| 01-21 | ROM Error | Radio receiver assembly | INFO |
| 01-22 | RAM Error | Radio receiver assembly | INFO |
| 01-2E | EEPROM Error | Radio receiver assembly | INFO |
| 01-D5 | Absence of Registration Unit | 1. Power source circuit of the component shown by the sub-code<br>2. AVC-LAN circuit between the radio receiver assembly and component shown by the sub-code<br>3. Component shown by the sub-code | INFO |
| 01-D6 | No Master | 1. Radio receiver assembly power source circuit<br>2. Power source circuit of the component which has stored this code<br>3. AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>4. Component which has stored this code<br>5. Radio receiver assembly | INFO |
| 01-D7 | Connection Check Error | 1. Radio receiver assembly power source circuit<br>2. Power source circuit of the component which has stored this code<br>3. AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>4. Component which has stored this code<br>5. Radio receiver assembly | INFO |
| 01-D8 | No Response for Connection Check | 1. Power source circuit of the component shown by the sub-code<br>2. AVC-LAN circuit between the radio receiver assembly and component shown by the sub-code<br>3. Component shown by the sub-code | INFO |
| 01-D9 | Last Mode Error | 1. Power source circuit of the component shown by the sub-code<br>2. AVC-LAN circuit between the radio receiver assembly and component shown by the sub-code<br>3. Component shown by the sub-code | INFO |
| 01-DA | No Response Against ON / OFF Command | 1. Power source circuit of the component shown by the sub-code<br>2. AVC-LAN circuit between the radio receiver assembly and component shown by the sub-code<br>3. Component shown by the sub-code | INFO |
| 01-DB | Mode Status Error | 1. Power source circuit of the component shown by the sub-code<br>2. AVC-LAN circuit between the radio receiver assembly and component shown by the sub-code<br>3. Component shown by the sub-code | INFO |
| 01-DC | Transmission Error | If the same sub-code is stored in other components, check power source circuit and communication system of all components shown by sub-code | INFO |
| 01-DD | Master Reset | 1. Radio receiver assembly power source circuit<br>2. AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>3. Radio receiver assembly | INFO |

| | | | |
|---|---|---|---|
| | | 3. Radio receiver assembly<br>4. Component which has stored this code | |
| 01-DE | Slave Reset | 1. Power source circuit of the component shown by the sub-code<br>2. AVC-LAN circuit between the radio receiver assembly and component shown by the sub-code<br>3. Component shown by the sub-code | INFO |
| 01-DF | Master Error | 1. Radio receiver assembly power source circuit<br>2. AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>3. Radio receiver assembly<br>4. Component which has stored this code | INFO |
| 01-E0 | Registration Complete Indication Error | - | INFO |
| 01-E1 | Voice Processing Device ON Error | 1. Radio receiver assembly power source circuit<br>2. AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>3. Radio receiver assembly<br>4. Component which has stored this code | INFO |
| 01-E2 | ON / OFF Indication Parameter Error | Radio receiver assembly | INFO |
| 01-E3 | Registration Demand Transmission | - | INFO |
| 01-E4 | Multiple Frame Incomplete | - | INFO |
| 01-F2 | No Response from Diagnosis Memory Request | Stereo component amplifier assembly | INFO |
| 01-FF | No Response to Diagnosis Request | Stereo component amplifier assembly | INFO |

**Telephone**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| 57-10 | TEL ECU Malfunction (TEL) | Radio receiver assembly | INFO |
| 57-47 | Bluetooth Module Initialization Failed | Radio receiver assembly | INFO |

**Radio Unit**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| 60-10 | AM Tuner PLL does not Lock | Radio receiver assembly | INFO |
| 60-11 | FM Tuner PLL does not Lock | Radio receiver assembly | INFO |
| 60-42 | Tuner Power Source Error | Radio receiver assembly | INFO |
| 60-43 | AM Tuner Error | Radio receiver assembly | INFO |
| 60-44 | FM Tuner Error | Radio receiver assembly | INFO |
| 60-50 | Malfunction in Internal IC | Radio receiver assembly | INFO |

**CD Player**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| 62-10 | CD Player Mechanical Error | Radio receiver assembly | INFO |
| 62-11 | CD Insertion and Ejection Error | Radio receiver assembly | INFO |
| 62-12 | CD Reading Abnormal | Radio receiver assembly | INFO |
| 62-41 | Wrong Disc | 1. CD<br>2. Radio receiver assembly | INFO |
| 62-42 | Disc cannot be Read | 1. CD<br>2. Radio receiver assembly | INFO |
| 62-43 | CD-ROM Abnormal | 1. CD<br>2. Radio receiver assembly | INFO |
| 62-44 | CD Abnormal | Radio receiver assembly | INFO |
| 62-45 | Eject Error | Radio receiver assembly | INFO |
| 62-46 | Scratched / Reversed Disc | 1. CD<br>2. Radio receiver assembly | INFO |
| 62-47 | High Temperature | Radio receiver assembly | INFO |
| 62-48 | Excess Current | Radio receiver assembly | INFO |
| 62-50 | Tray Insertion / Ejection Error | Radio receiver assembly | INFO |
| 62-51 | Elevator Error | Radio receiver assembly | INFO |
| 62-52 | Clamp Error | Radio receiver assembly | INFO |
| 62-78 | DSP Error | - | INFO |
| 62-7D | Disc cannot be Played | 1. CD<br>2. Radio receiver assembly | INFO |
| 62-7E | No Playable Files | 1. CD<br>2. Radio receiver assembly | INFO |
| 62-7F | Copyright Protection Error | 1. CD<br>2. Radio receiver assembly | INFO |

**In-dash CD Changer**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| 63-10 | CD Changer Mechanical Error | Radio receiver assembly | INFO |
| 63-11 | CD Insertion and Ejection Error | Radio receiver assembly | INFO |
| 63-12 | CD Reading Abnormal | Radio receiver assembly | INFO |
| 63-41 | Wrong Disc | 1. CD<br>2. Radio receiver assembly | INFO |
| 63-42 | Disc cannot be Read | 1. CD<br>2. Radio receiver assembly | INFO |
| 63-43 | CD-ROM Abnormal | 1. CD | INFO |

| | | | |
|---|---|---|---|
| | | 2. Radio receiver assembly | |
| 63-44 | CD Abnormal | Radio receiver assembly | INFO |
| 63-45 | Eject Error | Radio receiver assembly | INFO |
| 63-46 | Scratched / Reversed Disc | 1. CD<br>2. Radio receiver assembly | INFO |
| 63-47 | High Temperature | Radio receiver assembly | INFO |
| 63-48 | Excess Current | Radio receiver assembly | INFO |
| 63-50 | Tray Insertion / Ejection Error | Radio receiver assembly | INFO |
| 63-51 | Elevator Error | Radio receiver assembly | INFO |
| 63-52 | Clamp Error | Radio receiver assembly | INFO |
| 63-78 | DSP Error | - | INFO |
| 63-7D | Disc cannot be Played | 1. CD<br>2. Radio receiver assembly | INFO |
| 63-7E | No Playable Files | 1. CD<br>2. Radio receiver assembly | INFO |
| 63-7F | Copyright Protection Error | 1. CD<br>2. Radio receiver assembly | INFO |

**XM Tuner**

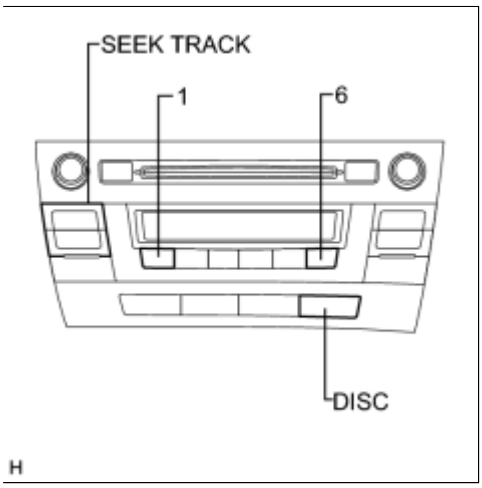
| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| C0-11 | Satellite Radio Tuner Internal Circuit Error 1 | Radio receiver assembly | INFO |
| C0-12 | Satellite Radio Tuner Internal Circuit Error 2 | Radio receiver assembly | INFO |
| C0-13 | Satellite Radio Tuner Internal Circuit Error 3 | Radio receiver assembly | INFO |
| C0-14 | Satellite Radio Tuner Internal Circuit Error 4 | Radio receiver assembly | INFO |
| C0-15 | Satellite Radio Tuner Internal Circuit Error 5 | Radio receiver assembly | INFO |
| C0-16 | Satellite Radio Tuner Internal Circuit Error 6 | Radio receiver assembly | INFO |
| C0-40 | Antenna not Connected | 1. Antenna cord<br>2. Amplifier antenna assembly (Satellite radio antenna)<br>3. Radio receiver assembly | INFO |
| C0-41 | Antenna Shorted | 1. Antenna cord<br>2. Amplifier antenna assembly (Satellite radio antenna)<br>3. Radio receiver assembly | INFO |

# DTC CHECK / CLEAR

**HINT:**

**If the system cannot enter diagnostic mode, inspect the AVC-LAN and all the components that are connected to the AVC-LAN for short circuits and repair or replace the malfunctioning part INFO .**

## 1. STARTING DIAGNOSTIC MODE




(a) Turn the power switch on (ACC).

(b) Turn off the audio system.

(c) While pressing preset switches "1" and "6" at the same time, press the "DISC" switch 3 times.

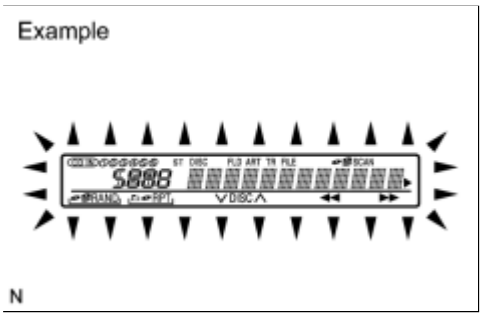
**HINT:**

**A beep is emitted 3 times and the diagnostic function is activated. The system enters all element illumination mode and switch check mode.**

## 2. ALL ELEMENT ILLUMINATION MODE AND SWITCH CHECK MODE

**HINT:**

**Illumination status of all switches and operations of the panel switches can be checked.**



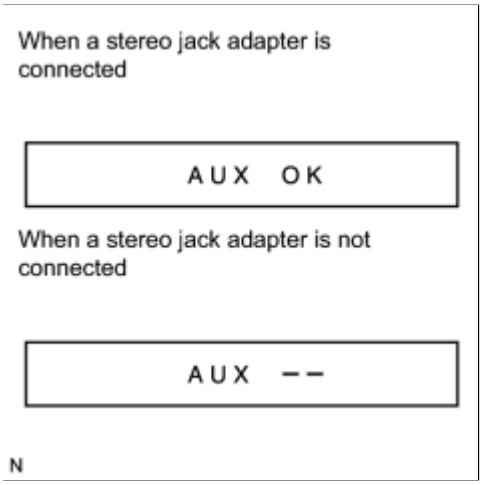

(a) Check that all elements are on.

(b) When pressing each panel switch, check that a beep is emitted.

**HINT:**

**Pressing the "SEEK TRACK UP" switch transfers the screen to the stereo jack adapter connection check screen. Check the operation of this switch by confirming the transfer of the screen.**

## 3. STEREO JACK ADAPTER CONNECTION CHECK MODE




(a) Press the "SEEK TRACK UP" switch.

(b) Check if the stereo jack adapter is recognized.

**HINT:**

- The radio receiver assembly displays "AUX OK" or "AUX ON" when it recognizes a connection to the stereo jack adapter.
- Vehicles that do not have a stereo jack adapter also have this function.
- This function is not to check connection status to an external device, but to check recognition of the stereo jack adapter.

### 4. SERVICE CHECK MODE

(a) Press the "SEEK TRACK UP" switch.

**HINT:**

**For details of service check mode, refer to following "6. Check DTC" and "7. DTC Clear/Recheck".**

### 5. FINISHING DIAGNOSTIC MODE

(a) Press the "DISC" switch for 2 seconds or more, or turn the power switch off.

### 6. CHECK DTC

**HINT:**

**Illustrations may differ from the actual vehicle depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle.**

(a) Reference

In system check mode, the system check and diagnostic memory check are performed, and the check results are displayed in ascending order of the component codes (physical address).

| TERM | MEANING |
|---|---|
| Component code (Physical address) | Three-digit code (in hexadecimal) is given to each device comprising AVC-LAN. Corresponding to its function, individual symbol is provided. |
| Logical address | Two-digit code (in hexadecimal) is given to each function and device unit in each device comprising AVC-LAN. |

(b) Service check result display

| DISPLAY | PREVIOUS TERM | MEANING | ACTION TO BE TAKEN |
|---|---|---|---|
| good | Good (normal) | No DTCs are detected in both "System Check Mode" and "Diagnostic Memory Mode". | - |
| nCon | No connection | The system recognized the component when it was registered, but the component gives no response to "Diagnostic Mode ON Request". | Check the power source circuit and the communication circuit of the component indicated by the component code (physical address). |
| ECHn | Exchange | One or more DTCs for "Exchange" are detected in either "System Check Mode" or "Diagnostic Memory Mode". | Go to the detailed information mode to check the trouble area referring to the DTC chart. |
| CHEC | Check | When no DTCs are detected for "Exchange", one or more DTCs for "Check" are detected in either "System Check Mode" or "Diagnostic Memory Mode". | Go to the detailed information mode to check the trouble area referring to the DTC chart. |
| OLd | Old version | Old DTC application is identified and DTC is detected in either "System Check Mode" or "Diagnostic Memory Mode". | - |
| nrES | No response | The device gives no response to any one of "System Check Mode ON Request", "System Check Result Request" and "Diagnostic Memory Request". | Check the power source circuit and the communication circuit of the component indicated by the component code (physical address). |

(c) Device name and physical address

| PHYSICAL ADDRESS NO. | NAME |
|---|---|
| 190 | Radio receiver assembly |
| 440 | Stereo component amplifier assembly |
| 1F1 | Satellite radio tuner |

(d) Service check mode

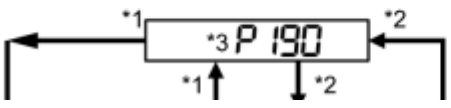
(1) Press the "SEEK TRACK" switch to see the check result of each component.

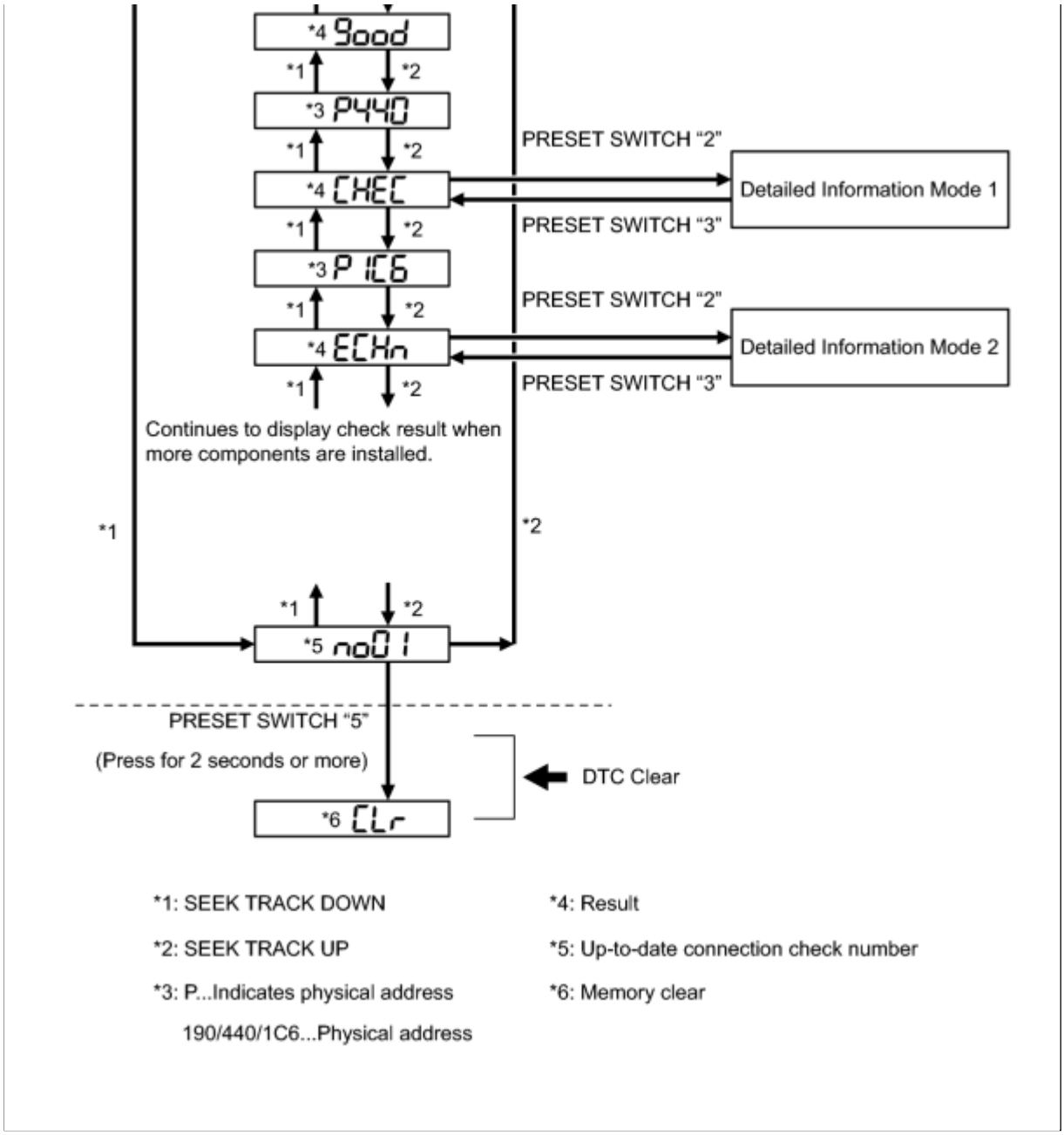
(2) The component code (physical address) is displayed first, and then the check result follows.

**HINT:**

- If all check results are "good", the system judges that no DTC exists.
- If preset switch "1" is pressed in service check mode, service check is performed again.
- This illustration is only an example and may differ for each optional part and output DTCs.

Service Check Mode






(e) Detailed information mode 1

**HINT:**

- "Detailed Information Mode 1" is displayed when there is no response to "System Check Result Request" and DTC is stored only in "Diagnostic Memory Request".
- The component device code (physical address) is displayed first, and then the check result follows.
- This illustration is only an example and may differ in cases such as for each optional part and output DTCs.

(1) Press preset switch "2" to go to "Detailed Information Mode 1".

(2) Press the "SEEK TRACK" switch to display the physical address and DTC of the component.

(3) Press the preset switch "3" to go to "Service Check Mode".

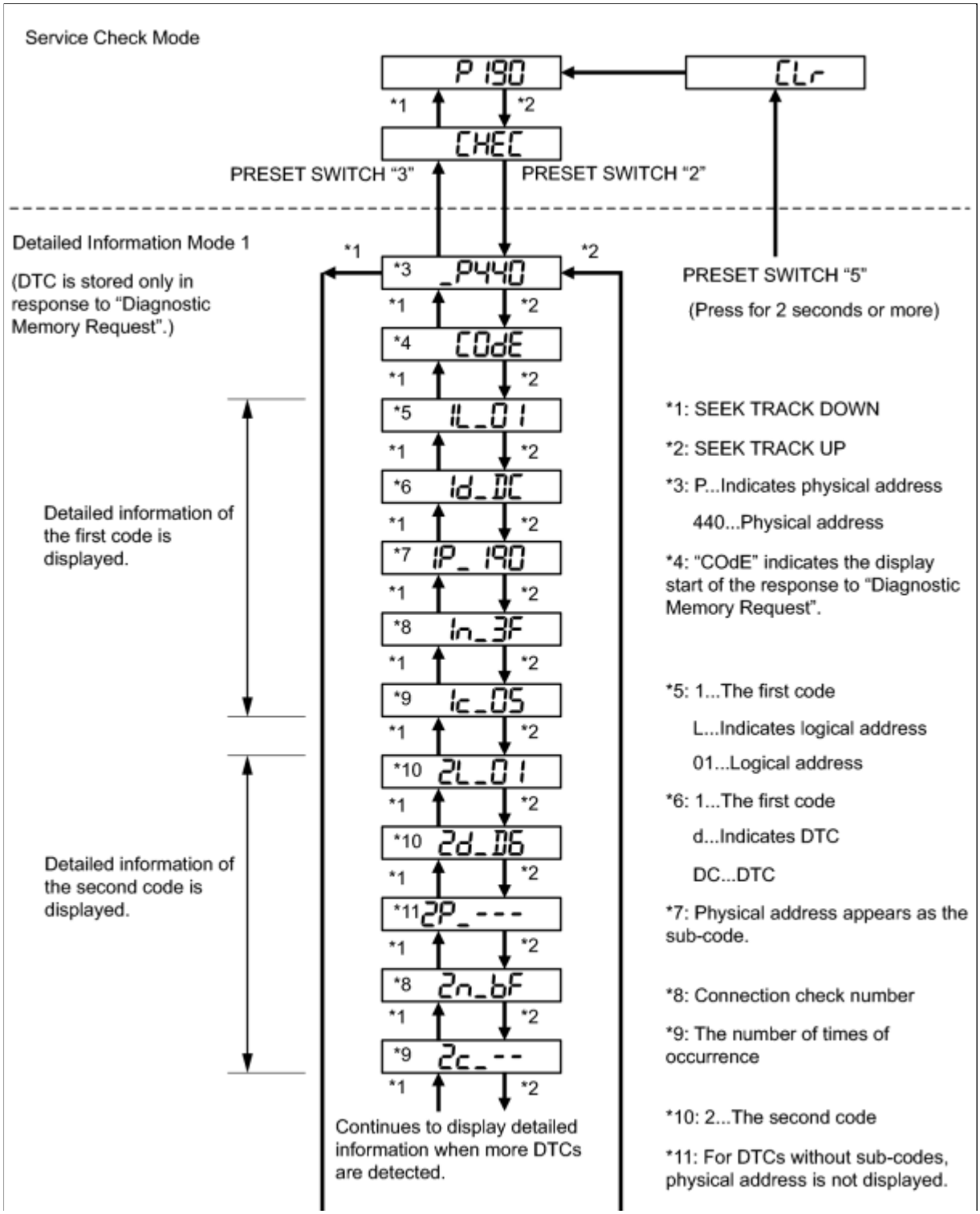
(4) Select between the displays of the responses to "System Check Result Request" and "Diagnostic Memory Request". In order to distinguish the information detected in "System Check Mode" and "Diagnostic Memory Mode" in "ECHn", "CHEC", and "OLd" in "Detailed Information Mode 1", refer to the following:

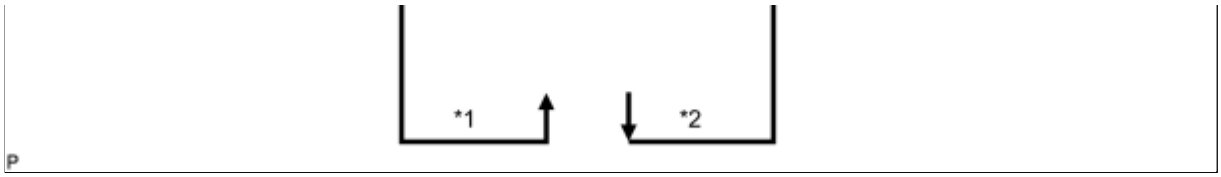
- "SyS" is displayed before the detailed codes detected as a result of "System Check Result Request" are displayed.
- "COdE" is displayed before the detailed codes detected as a result of "Diagnostic Memory Request"

are displayed.

**HINT:**

- The response to "System Check Result Request" is the current information given from each ECU as a result of the system check.
- The response to "Diagnostic Memory Request" contains the information received from each ECU or stored in each ECU in the past.
- The response to "Diagnostic Memory Request" is the output DTCs as a result of the diagnostic memory check or the DTCs received from each ECU.
- "System Check Result Request (SyS)" is displayed first, and then the logical address and DTC appear in order.
- "Diagnostic Memory Request (COdE)" is displayed first, and then the logical address, DTC, sub-code, connection check number, and the number of occurrence appear in order.






(f) Detailed information mode 2

**HINT:**

- "Detailed Information Mode 2" is displayed when DTCs are stored in responses to both "System Check Result Request" and "Diagnostic Memory Request".
- The component device code (physical address) is displayed first, and then the check result follows.
- This illustration is only an example and may differ in cases such as for each option part and output DTCs.

(1) Press preset switch "2" to go to "Detailed Information Mode 2".

(2) Press the "SEEK TRACK" switch to display the physical address and DTC of the component.

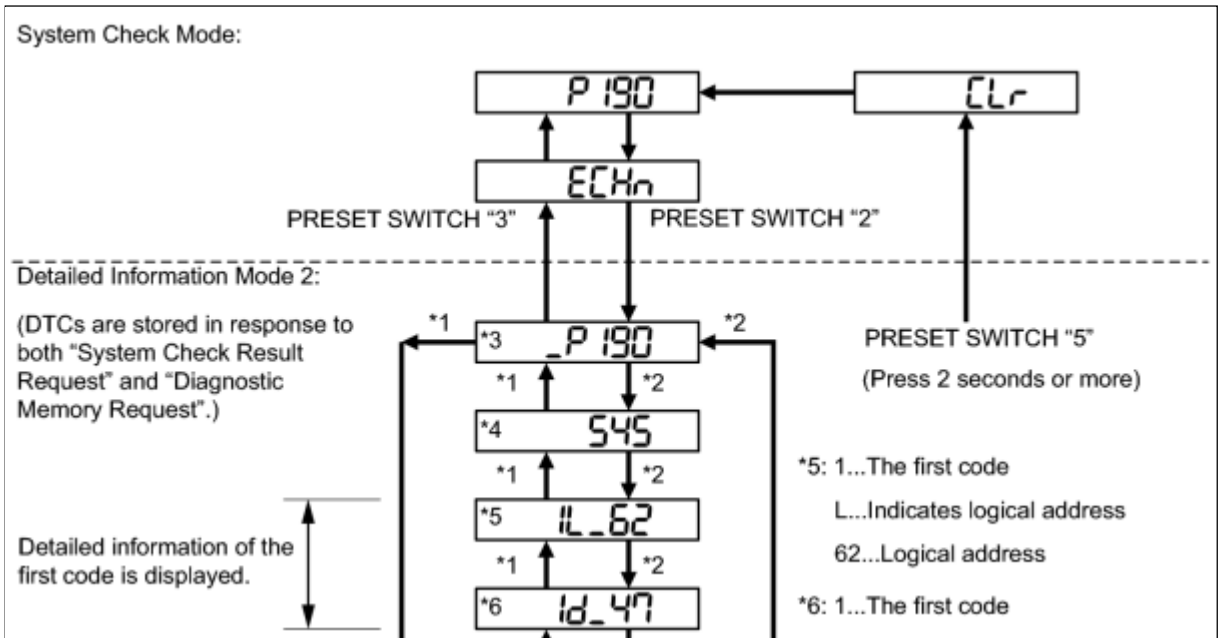
(3) Press preset switch "3" to go to "Service Check Mode".

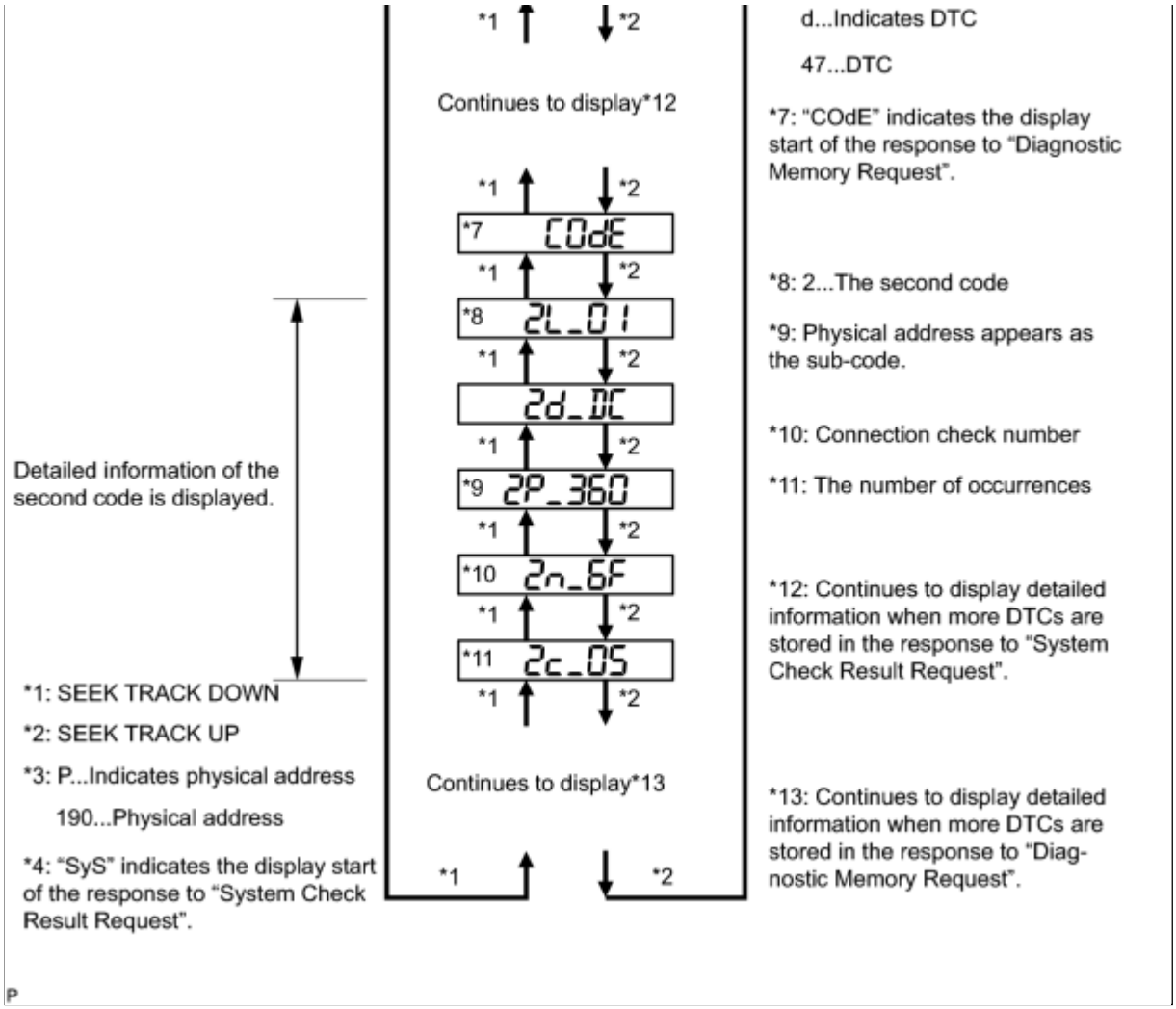
(4) Select between the displays of the responses to "System Check Result Request" and "Diagnostic Memory Request". In order to distinguish the information detected in "System Check Mode" and "Diagnostic Memory Mode" in "ECHn", "CHEC", and "OLd" in "Detailed Information Mode 2", refer to the following:

- "SyS" is displayed before the detailed codes detected as a result of "System Check Result Request" are displayed.
- "COdE" is displayed before the detailed codes detected as a result of "Diagnostic Memory Request" are displayed.

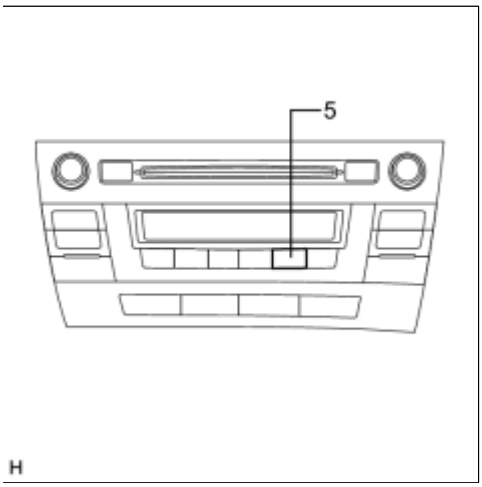
**HINT:**

- The response to "System Check Result Request" is the current information given from each ECU as a result of the system check.
- The response to "Diagnostic Memory Request" contains the information received from each ECU or stored in each ECU in the past.
- The response to "Diagnostic Memory Request" is the output DTCs as a result of the diagnostic memory check or the DTCs received from each ECU.
- "System Check Result Request (SyS)" is displayed first, and then the logical address and DTC appear in order.
- "Diagnostic Memory Request (COdE)" is displayed first, and then the logical address, DTC, sub-code, connection check number, and the number of occurrence appear in order.






## 7. DTC CLEAR / RECHECK




(a) Clearing All DTC Memory (when clearing all the memory of the previously detected DTCs)

(1) When preset switch "5" is pressed for 2 seconds or more during "Service Check Mode", the DTCs for all components are cleared. ("CLr" is displayed at this time.)

- A beep sound is emitted once when the DTC memory is completely cleared.
- When the DTC memory for all the components is cleared, only the component codes (physical address) are displayed.
- After the DTC memory is cleared, "Service Check Mode" is restored.

(b) Clearing the specified DTC Memory (when clearing the specified memory of the previously detected DTC)

(1) When preset switch "5" is pressed for 2 seconds or more during "Detailed Information Mode 1" or "Detailed Information Mode 2", the DTCs for the target component are cleared.

**HINT:**

- A beep sound is emitted once when the DTC memory is completely cleared.
- When the DTC memory is cleared, only the component code (physical address) is displayed for the target

component.

- After the DTC memory is cleared, the "Service Check Mode" is restored.
- To check DTCs, press preset switch "1" and perform the system check again.

(c) Press preset switch "1" to perform the service check again, and check that no DTCs are displayed for all the component codes (physical address).

# HOW TO PROCEED WITH TROUBLESHOOTING

**HINT:**

**Use the following procedure to troubleshoot the audio and visual system.**

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

**NEXT**

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

Standard Voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

**NEXT**

| | |
|---|---|
| 3. | BASIC INSPECTION |

(a) Turn the power switch on (IG).

(b) Check whether or not the radio receiver assembly turns on.

Result:

| RESULT | PROCEED TO |
|---|---|
| Radio receiver assembly turns on | A |
| Radio receiver assembly does not turn on | B |

**B** **Go to step 7**

**A**

| | |
|---|---|
| 4. | CONFIRM MODEL |

| | |
|---|---|
| 4. | CONFIRM MODEL |

Result:

| RESULT | PROCEED TO |
|---|---|
| for 8 Speakers | A |
| except for 8 Speakers | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| 5. | CHECK FOR DTC |

**HINT:**

**Refer to DTC Check / Clear** INFO .

(a) Check for DTCs and note any codes that are output.

(b) Clear the DTCs.

(c) Recheck for DTCs by simulating the operation indicated by the DTCs.

**HINT:**

- If the system cannot enter diagnostic mode, inspect the AVC-LAN and all the components that connect to the AVC-LAN for short circuits and repair or replace the malfunctioning part.
- Even if the symptom malfunction is not confirmed, check the DTCs. This is because the system stores history DTCs.
- Check and clear history DTCs. Then recheck for DTCs.

  Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is output again | A |
| DTC is not output | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| | |

| | |
|---|---|
| 6. | DIAGNOSTIC TROUBLE CODE CHART |

**HINT:**

**Refer to Diagnostic Trouble Code Chart** INFO .

**NEXT** ▶ **Go to step 9**

| | |
|---|---|
| 7. | PROBLEM SYMPTOMS TABLE |

**HINT:**

**Refer to Problem Symptoms Table** INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

**B** ▶ **Go to step 9**

**A** ▼

| | |
|---|---|
| 8. | OVERALL ANALYSIS AND TROUBLESHOOTING |

**HINT:**

**Refer to Terminals of ECU** INFO .

**NEXT** ▼

| | |
|---|---|
| 9. | ADJUST, REPAIR OR REPLACE |

**NEXT**

| | |
|---|---|
| 10. | CONFIRMATION TEST |

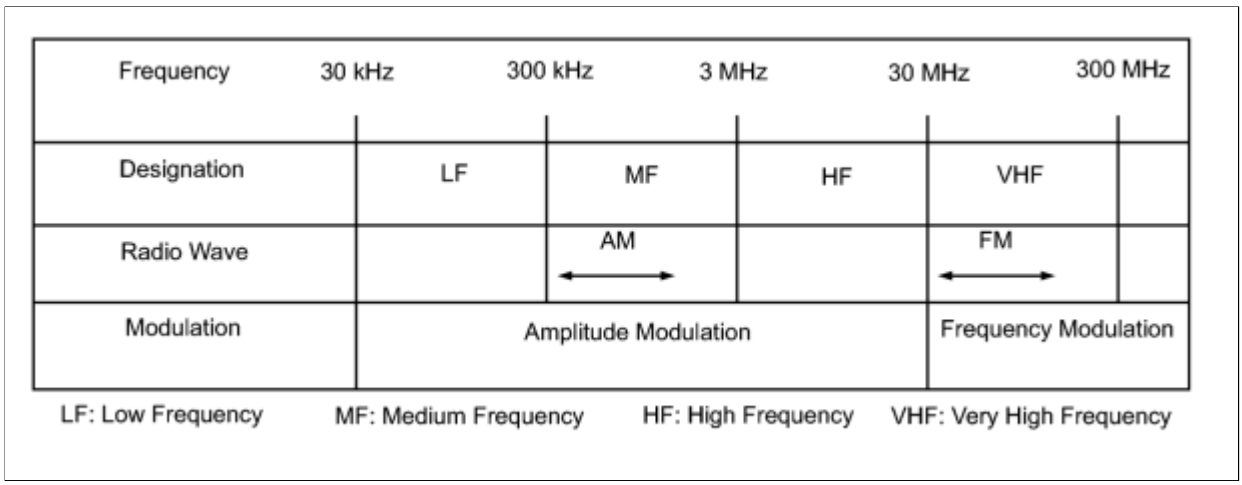
NEXT END

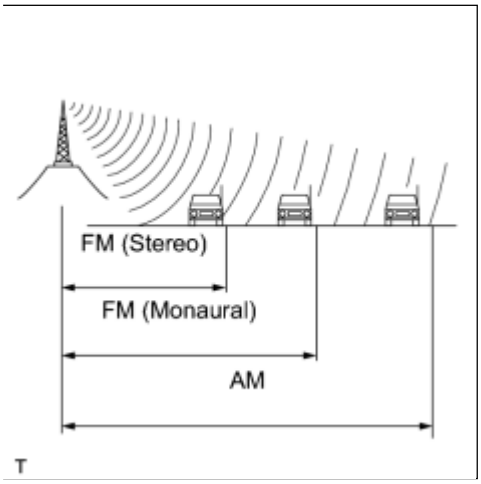
# IDENTIFICATION OF NOISE SOURCE

## 1. RADIO DESCRIPTION

(a) Radio frequency band

(1) Radio broadcasts use the radio frequency bands shown in the table below.



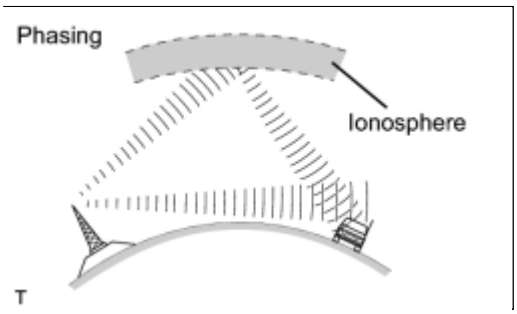

(b) Service area

(1) The service areas of AM and FM broadcasts are vastly different. Sometimes an AM broadcast can be received very clearly but an FM stereo cannot. FM stereo has the smallest service area, and is prone to pick up static and other types of interference such as noise.

(c) Radio reception problems

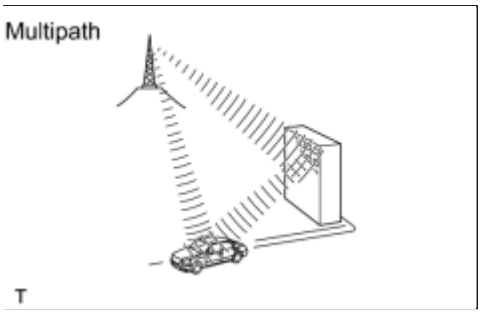
**HINT:**

**In addition to static, other problems such as "phasing", "multipath" and "fade out" exist. These problems are not caused by electrical noise, but by the radio signal propagation method itself.**



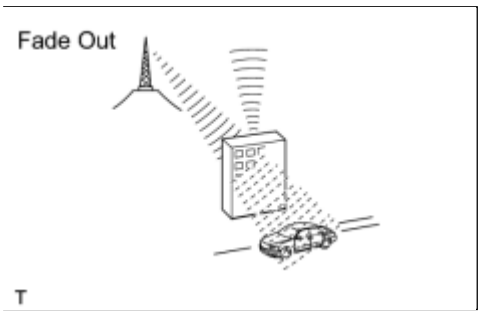

(1) Phasing

AM broadcasts are susceptible to electrical interference and another kind of interference called phasing. Occurring only at night, phasing is the interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off the ionosphere and the other signal is received directly from the transmitter.




(2) Multipath

Multipath is a type of interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off buildings or mountains and the other signal is received directly from the transmitter.




(3) Fade out

Fade out is caused by objects (buildings, mountains and other such large obstacles) that deflect away part of a signal, resulting in a weaker signal when the object is between the transmitter and vehicle. High frequency radio waves, such as FM broadcasts, are easily deflected by obstructions. Low frequency radio waves, such as AM broadcasts, are less likely to deflect.

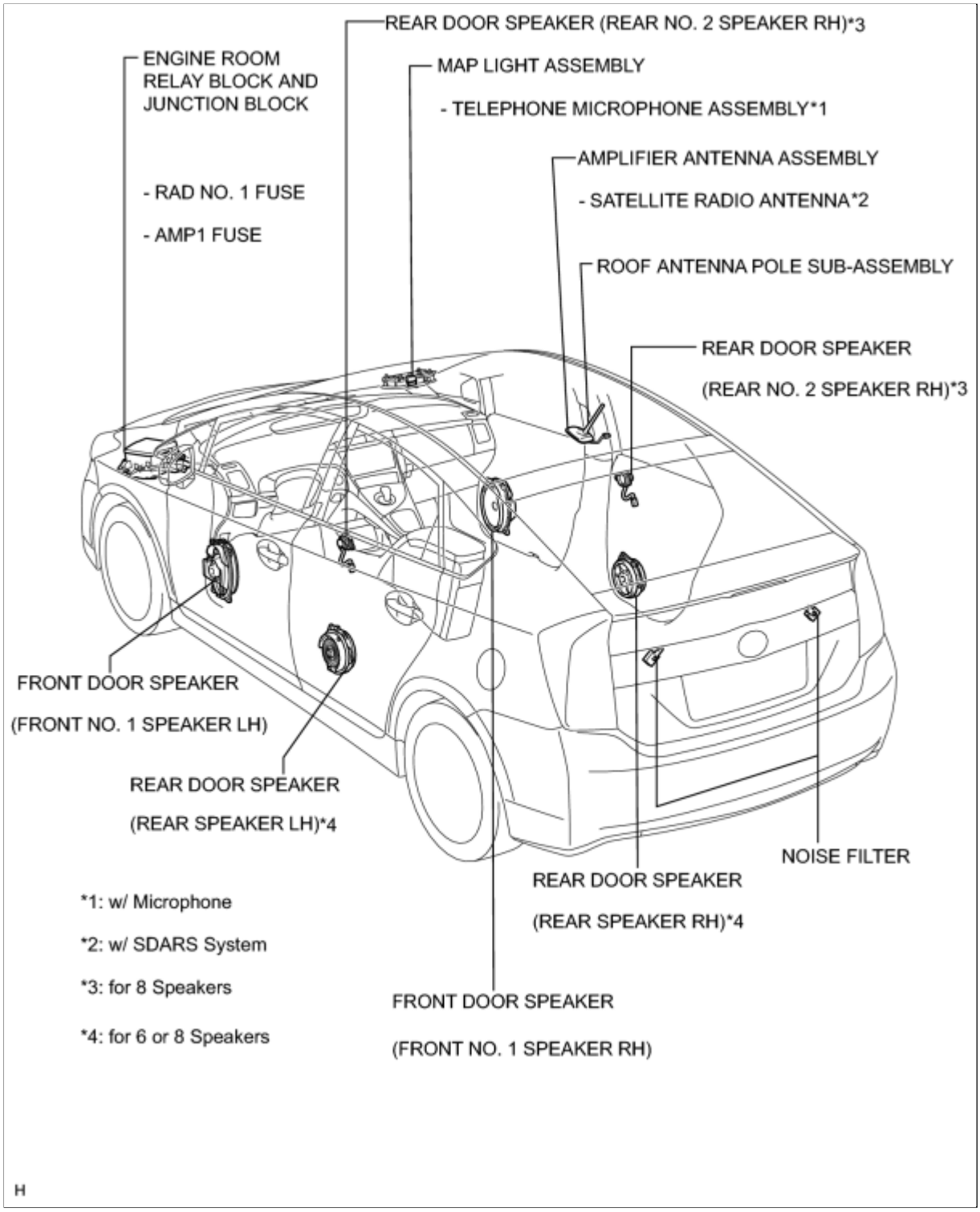
(d) Noise problem

Technicians must have a clear understanding about each customer's noise complaint. Use the following table to diagnose noise problems.

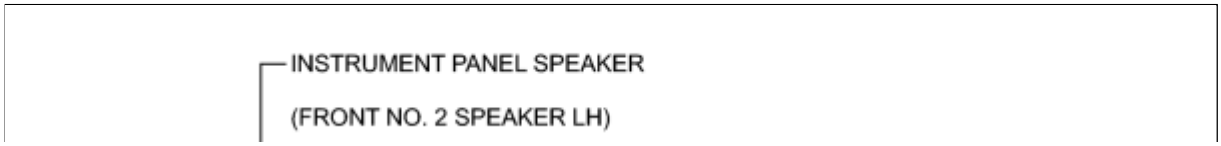
| RADIO FREQUENCY | NOISE OCCURRENCE CONDITION | PRESUMABLE CAUSE |
|---|---|---|
| AM | Noise occurs in a specified area | Foreign noise |
| AM | Noise occurs when listening to an intermittent broadcast | An identical program transmitted from multiple towers can cause noise where the signals overlap |
| AM | Noise occurs only at night | Signal phasing |
| FM | Noise occurs while driving in a specified area | Multipath resulting from a change in FM frequency |

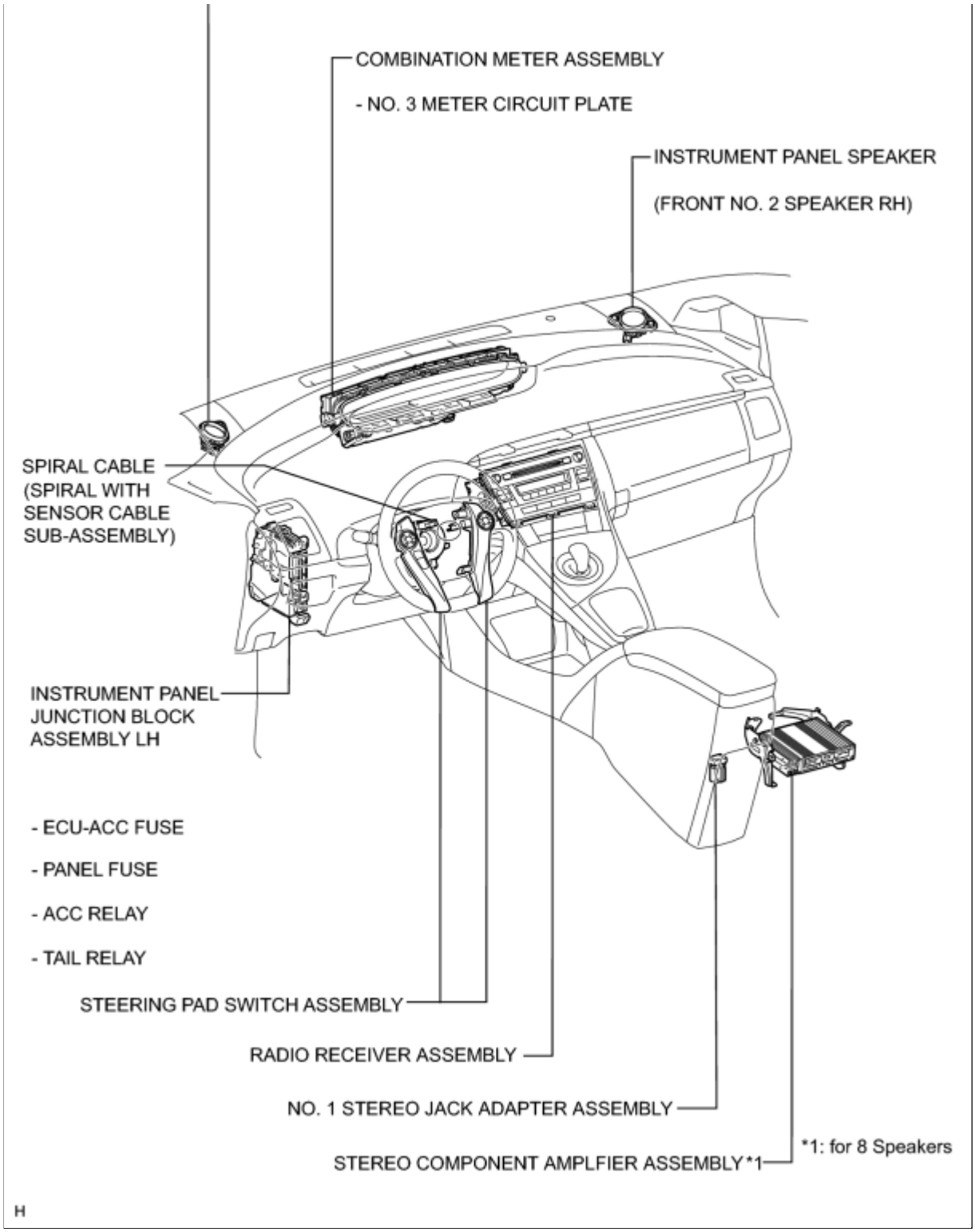
## PARTS LOCATION

## ILLUSTRATION




## ILLUSTRATION




COMBINATION METER ASSEMBLY
- NO. 3 METER CIRCUIT PLATE
INSTRUMENT PANEL SPEAKER
(FRONT NO. 2 SPEAKER RH)
SPIRAL CABLE
(SPIRAL WITH
SENSOR CABLE
SUB-ASSEMBLY)
INSTRUMENT PANEL
JUNCTION BLOCK
ASSEMBLY LH
- ECU-ACC FUSE
- PANEL FUSE
- ACC RELAY
- TAIL RELAY
STEERING PAD SWITCH ASSEMBLY
RADIO RECEIVER ASSEMBLY
NO. 1 STEREO JACK ADAPTER ASSEMBLY
STEREO COMPONENT AMPLFIER ASSEMBLY *1
*1: for 8 Speakers
H

# PRECAUTION

## 1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE (-) BATTERY TERMINAL

**NOTICE:**

**When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the terminal is reconnected.**

| SYSTEM NAME | SEE PROCEDURE |
|---|---|
| Advanced Parking Guidance System | INFO |

# PROBLEM SYMPTOMS TABLE

**HINT:**

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**Audio Function**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Pressing power switch does not turn on system.*1 | Proceed to "Pressing Power Switch does not Turn on System" | INFO |
| | Radio receiver power source circuit | INFO |
| | AVC-LAN circuit | INFO |
| | Radio receiver assembly | INFO |
| Pressing power switch does not turn on system.*2 | Proceed to "Pressing Power Switch does not Turn on System" | INFO |
| | Radio receiver power source circuit | INFO |
| | Radio receiver assembly | INFO |
| Panel switch does not function.*1 | Steering pad switch circuit | INFO |
| | AVC-LAN circuit | INFO |
| | Radio receiver assembly | INFO |
| Panel switch does not function.*2 | Steering pad switch circuit | INFO |
| | Radio receiver assembly | INFO |
| No sound can be heard from speakers. (Audio is mute.)*1 | Radio receiver power source circuit | INFO |
| | Proceed to "No Sound can be Heard from Speakers" | INFO |
| | Stereo component amplifier power source circuit | INFO |
| | Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Component Amplifier" | INFO |
| | Speaker circuit | INFO |
| | Proceed to "Mute Signal Circuit between Radio Receiver and Stereo Component Amplifier" | INFO |
| | Stereo component amplifier assembly | INFO |
| | Radio receiver assembly | INFO |
| No sound can be heard from speakers. (Audio is mute.)*2 | Radio receiver power source circuit | INFO |
| | Proceed to "No Sound can be Heard from Speakers" | INFO |
| | Speaker circuit | INFO |

| | | |
|---|---|---|
| | Radio receiver assembly | INFO |
| Sound quality is bad in all modes. (Volume is too low.)*1 | Proceed to "Poor Sound Quality in All Modes (Low Volume)" | INFO |
| | Speaker circuit | INFO |
| | Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Component Amplifier" | INFO |
| | Proceed to "Mute Signal Circuit between Radio Receiver and Stereo Component Amplifier" | INFO |
| | Stereo component amplifier assembly | INFO |
| | Radio receiver assembly | INFO |
| Sound quality is bad in all modes. (Volume is too low.)*2 | Proceed to "Poor Sound Quality in All Modes (Low Volume)" | INFO |
| | Speaker circuit | INFO |
| | Radio receiver assembly | INFO |
| ASL does not function.*1 | Proceed to "Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter" | INFO |
| ASL does not function.*2 | Proceed to "Vehicle Speed Signal Circuit between Radio Receiver and Combination Meter" | INFO |
| External device sound cannot be heard or sound quality is bad. (Stereo jack is used.)*3 | Radio receiver power source circuit | INFO |
| | Proceed to "Sound Signal Circuit between Radio Receiver and Stereo Jack Adapter" | INFO |
| | No. 1 stereo jack adapter assembly | INFO |
| | Radio receiver assembly | INFO |
| Abnormal noise occurs.*1 | Proceed to "Noise occurs" | INFO |
| | Noise filter | INFO |
| | Stereo component amplifier assembly | INFO |
| | Radio receiver assembly | INFO |
| Abnormal noise occurs.*2 | Proceed to "Noise occurs" | INFO |
| | Noise filter | INFO |
| | Radio receiver assembly | INFO |
| Radio broadcast cannot be received or poor reception. | Proceed to "Radio Broadcast cannot be Received or Poor Reception" | INFO |
| CD cannot be inserted/played or CD is ejected right after insertion. | Radio receiver power source circuit | INFO |
| | Proceed to "CD cannot be Inserted / Played or CD is Ejected Right After Insertion" | INFO |
| CD cannot be ejected. | Radio receiver power source circuit | INFO |
| | Proceed to "CD cannot be Ejected" | INFO |

| | | |
|---|---|---|
| Sound quality is bad only when CD is played. (Volume is too low.) | Proceed to "Sound Quality is Bad Only when CD is Played (Volume is Too Low)" | INFO |
| CD sound skips. | Proceed to "CD Sound Skips" | INFO |
| Radio receiver cannot be illuminated at night. | Illumination circuit | INFO |
| | Radio receiver assembly | INFO |

**Steering Pad Switch Function**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Audio system cannot be operated with steering pad switch. | Steering pad switch circuit | INFO |
| | Radio receiver assembly | INFO |
| Steering pad switch cannot be illuminated at night. | Illumination circuit | INFO |
| | Radio receiver assembly | INFO |

**"Bluetooth" Function*4**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Bluetooth is inoperative. | Proceed to "Microphone Circuit between Microphone and Radio Receiver" | INFO |
| | Telephone microphone assembly*5 | INFO |
| | Telephone microphone assembly*6 | INFO |
| | Radio receiver assembly | INFO |
| Cellular phone registration failure, phone directory transfer failure. | Proceed to "Cellular Phone Registration Failure, Phone Directory Transfer Failure" | INFO |
| Cellular phone cannot send/receive. | Proceed to "Cellular Phone cannot Send/Receive" | INFO |
| | Steering pad switch circuit | INFO |
| | Radio receiver assembly | INFO |
| Cellular phone cannot call in a certain place. | Proceed to "Cannot Call in a Certain Place" | INFO |
| Other callers voice cannot be heard, is too quiet, or distorted. | Proceed to "The Other Callers Voice cannot be Heard, is too Quiet, or Distorted" | INFO |
| | Proceed to "Cellular Phone Voice Circuit between Radio Receiver and Stereo Component Amplifier" | INFO |
| | Telephone microphone assembly*5 | INFO |
| | Telephone microphone assembly*6 | INFO |
| | Radio receiver assembly | INFO |
| Other caller cannot hear your voice, or your | Proceed to "The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted" | INFO |
| | Proceed to "Microphone Circuit between Microphone and Radio Receiver" | INFO |

| | | |
|---|---|---|
| Other caller cannot hear your voice, or your voice is too quiet or distorted. | Telephone microphone assembly*5 | INFO |
| | Telephone microphone assembly*6 | INFO |
| | Radio receiver assembly | INFO |

**SDARS system Function*7**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Satellite radio broadcast cannot be received or reception is bad. | Proceed to "Satellite Radio Broadcast cannot be Received" | INFO |
| | Radio receiver assembly | INFO |
| Pay-type satellite radio broadcast cannot be received. | Proceed to "Satellite Radio Broadcast cannot be Received" | INFO |
| | Radio receiver assembly | INFO |
| Satellite radio broadcast cannot be selected or after selecting broadcast, broadcast cannot be add into memory. | Proceed to "Satellite Radio Broadcast cannot be Received" | INFO |
| | Proceed to "Satellite Radio Broadcast cannot be Selected or After Selecting Broadcast, Broadcast cannot be Added into Memory" | INFO |
| | Radio receiver assembly | INFO |

*1: for 8 Speakers
*2: except for 8 Speakers
*3: w/ Stereo Jack Adapter
*4: w/ Microphone
*5: w/ Sliding Roof
*6: w/o Sliding Roof
*7: w/ SDARS System

# SYSTEM DESCRIPTION

## 1. DISC PLAYER OUTLINE

(a) A CD player uses a laser pickup to read digital signals recorded on CDs. By converting the digital signals to analog, music and other content can be played.

**CAUTION:**

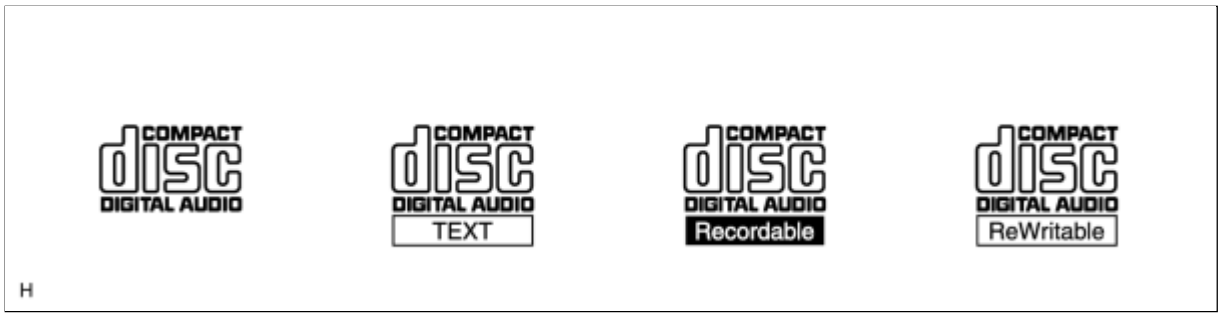
**Do not look directly at the laser pickup because the CD player uses an invisible laser beam. Be sure to operate the player only as instructed.**

**NOTICE:**

- Do not disassemble any part of the CD player.
- Do not apply oil to the CD player.
- Do not insert anything but a CD into the CD player.

(b) Usable discs

(1) The CD player can only play audio CDs, CD-Rs (CD-Recordable) and CD-RWs (CD-ReWritable) that have any of the following marks:




(c) Precautions for use of discs

**NOTICE:**

- Copy-protected CDs cannot be played.
- CD-Rs and CD-RWs may not be played depending on the recording conditions or characteristics of the discs, or due to damage, dirt or deterioration caused by leaving the discs in the cabin for a long time.
- Unfinalized CD-Rs and CD-RWs cannot be played.
- Keep the discs away from dirt. Be careful not to damage the discs or leave your fingerprints on them.
- Hold discs by the outer edge and center hole with the label side up.
- Leaving the disc exposed halfway out of the slot for a long time after pressing the disc eject button may cause deformation of the disc, making the disc unusable.
- If discs have adhesive tape, stickers, CD-R labels or any traces of such labels attached, the discs may not be ejected or player malfunctions may result.
- Keep the discs away from direct sunlight. (Exposure to direct sunlight may cause deformation of the disc, making the disc unusable.)
- Do not use odd-shaped CDs because these may cause player malfunctions.
- Do not use discs whose recording portion is transparent or translucent because they may not be inserted, ejected or played normally.

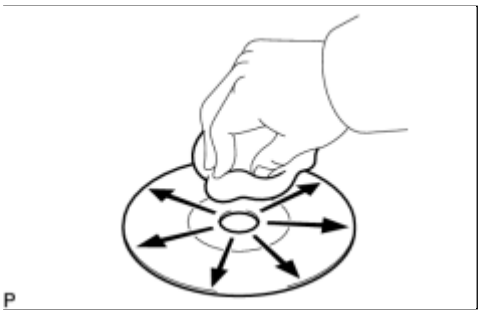
**HINT:**

- When it is cold or it is raining, if the windows mist up, mist and condensation may form in the player. In such cases, the CD sound may skip or stop in the middle of play. Ventilate or dehumidify the cabin for a while before using the player.
- The CD sound may skip if the player experiences strong vibrations when the vehicle is driven on rough road or similar uneven surface(s).

(d) Cleaning

**NOTICE:**

**Do not use a lens cleaner because it may cause a malfunction in the pickup portion of the player.**




(1) If dirt is on the disc surface, wipe it clean with a soft dry cloth such as an eyeglass cleaner for plastic lenses from the inside to the outside in a radial direction.

- Pressing on the disc by hand or rubbing the disc with a hard cloth may scratch the disc surface.
- Use of solvent such as a record spray, antistatic agent, alcohol, benzine and thinner, or a chemical cloth may cause damage to the disc, making the disc unusable.

## 2. MP3/WMA OUTLINE

(a) Playable MP3 file standards

| | |
|---|---|
| Compatible standard | MP3 (MPEG1 LAYER3, MPEG2 LSF LAYER3) |
| Compatible sampling frequency | • MPEG1 LAYER3: 32, 44.1, 48 (kHz)<br>• MPEG2 LSF LAYER3: 16, 22.05, 24 (kHz) |
| Compatible bit rate | • MPEG1 LAYER3: 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 (kbps)<br>• MPEG2 LSF LAYER3: 64, 80, 96, 112, 128, 144, 160 (kbps)<br>• Compatible with VBR |
| Compatible channel mode | Stereo, joint stereo, dual channel, monaural |

(b) Playable WMA file standards

| | |
|---|---|
| Compatible standard | WMA Ver. 7, 8 and 9 |
| Compatible sampling frequency | 32, 44.1, 48 (kHz) |
| Compatible bit rate (Only compatible with 2-channel playback) | • Ver. 7, 8: CBR48, 64, 80, 96, 128, 160, 192 (kbps)<br>• Ver. 9: CBR48, 64, 80, 96, 128, 160, 192, 256, 320 (kbps) |

(c) ID3 tag and WMA tag

(1) Additional textual information called ID3 tag can be input to MP3 files. Information such as song titles and artist names can be stored.

**HINT:**

**This player is compatible with the ID3 tags of ID3 Ver. 1.0 and 1.1, and ID3 Ver. 2.2 and 2.3. (Number of characters complies with ID3 Ver. 1.0 and 1.1.)**

(2) Additional textual information called WMA tag can be input to WMA files. Information such as song titles and artist names can be stored.

(d) Usable media

(1) Only CD-ROMs, CD-Rs (CD-Recordable) and CD-RWs (CD-ReWritable) can be used to play MP3/WMA files.

**NOTICE:**

- CD-Rs and CD-RWs are more easily affected by a hot and humid environment than discs used for normal audio

- CD-Rs and CD-RWs are more easily affected by a hot and humid environment than discs used for normal audio CDs. For this reason, some CD-Rs and CD-RWs do not play.
- If there are fingerprints or scratches on a disc, the disc may not play or the CD sound may skip.
- Some CD-Rs and CD-RWs may deteriorate if they are left in the cabin for a long time.
- Keep CD-Rs and CD-RWs in an opaque case.

(e) Usable media format

(1) Usable media format

| | |
|---|---|
| Disc format | CD-ROM Mode 1, CD-ROM XA Mode 2 Form1 |
| File format | ISO9660 Level 1 and Level 2 (Joliet, Romeo) |

**HINT:**

- As for MP3/WMA files written in any unlisted format, the contents of the files may not play normally or the file names or folder names may not display correctly.
- This player is compatible with multi-session discs and can play CD-Rs and CD-RWs on which MP3/WMA files are added. However, only the first session can be played.
- Discs whose first session includes both music data and MP3 or WMA format data cannot be played.

(2) Standard and restrictions

| | |
|---|---|
| Maximum directory levels | 8 levels |
| Maximum number of characters for a folder name/file name | 32 characters |
| Maximum number of folders | 192 (Including empty folders route folders, and folders that do not contain MP3/WMA files) |
| Maximum number of files in a disc | 255 (Including non-MP3/WMA files) |

(f) File names

(1) Only files with an extension of ".mp3" or ".wma" can be recognized and played as MP3 or WMA files.

(2) Save MP3 or WMA files with an extension of ".mp3" or ".wma".

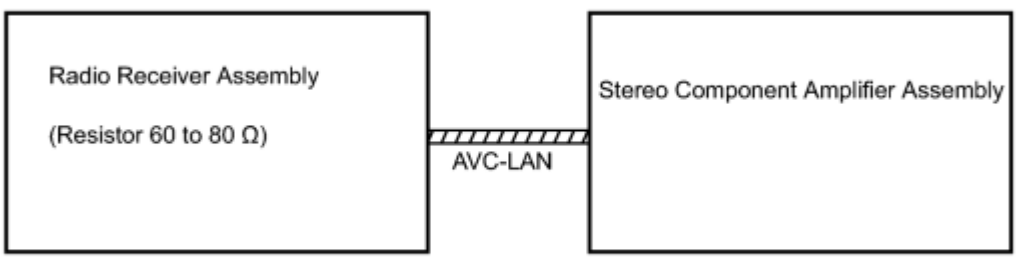
**NOTICE:**

**If non-MP3 or non-WMA files are saved with an extension of ".mp3" or ".wma", those files may be wrongly recognized as MP3 or WMA files and played. A loud noise may occur and damage to the speakers may result.**

### 3. AVC-LAN DESCRIPTION

(a) What is AVC-LAN?

Example



AVC-LAN, an abbreviation for Audio Visual Communication Local Area Network, is a united standard developed by the manufacturers in affiliation with Toyota Motor Corporation. This standard pertains to audio and visual signals as well as switch and communication signals.

(b) Purpose

Recently, car audio systems have rapidly developed and the functions have vastly changed. The conventional car audio system is being integrated with multi-media interfaces similar to those in navigation systems. At the same time, customers are demanding higher quality from their audio systems. This is merely an overview of the standardization background. The specific purposes are as follows:

(1) To solve sound problems etc. caused by using components of different manufacturers through signal standardization.

(2) To allow each manufacturer to concentrate on developing products they do best. From this, reasonably priced products can be produced.

**HINT:**

- If a short to +B or short to ground is detected in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.
- If the audio system has a navigation system installed, the multi-display unit acts as the master unit. If the navigation system is not installed, the audio head unit acts as the master unit instead. If the navigation receiver assembly is installed, it is the master unit.
- The radio receiver assembly contains a resistor that is necessary to enable communication on the different AVC-LAN circuits.
- The car audio system with an AVC-LAN circuit has a diagnostic function.
- Each component has a specified number (3-digit) called a physical address. Each function has a number (2-digit) called a logical address.

### 4. COMMUNICATION SYSTEM OUTLINE

(a) Components of the audio system communicate with each other via the AVC-LAN.

(b) The master component of the AVC-LAN is a radio receiver assembly with a 60 to 80 Ω resistor. This is essential for communication.

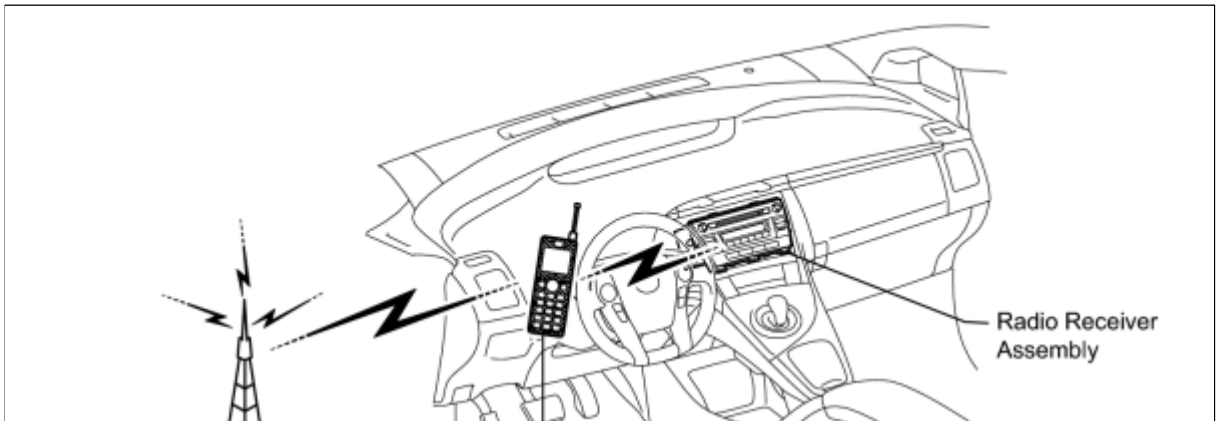
(c) If a short circuit or open circuit occurs in the AVC-LAN circuit, communication is interrupted and the audio system will stop functioning.

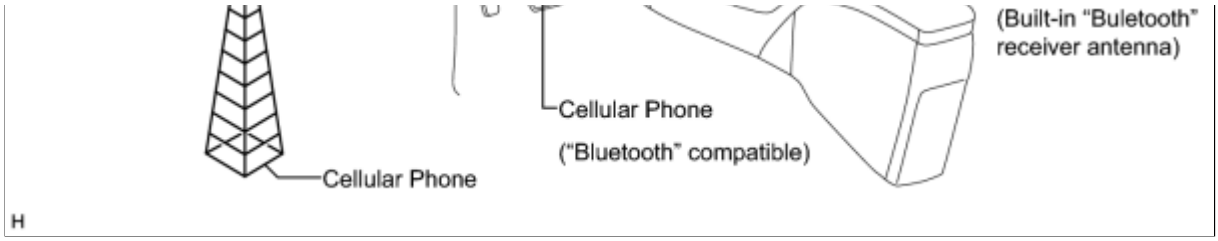
### 5. DIAGNOSTIC FUNCTION OUTLINE

(a) The audio system has a diagnostic function (the result is indicated on the master unit).

(b) A 3-digit hexadecimal component code (physical address) is allocated to each component on the AVC-LAN. Using this code, the component in the diagnostic function can be displayed.

### 6. "BLUETOOTH" OUTLINE






(a) "Bluetooth" is a trademark owned by Bluetooth SIG. Inc.

(b) "Bluetooth" is a new wireless connection technology that uses the 2.4 GHz frequency band.

**HINT:**

**The communication performance of "Bluetooth" may vary depending on obstructions or radio wave conditions between communication devices, electromagnetic radiation, communication device sensitivity or antenna capacity.**

(c) Hands-free function

(1) The "Bluetooth" built-in radio receiver and a "Bluetooth" compatible cellular phone*1 can be connected using a "Bluetooth" wireless connection. This enables use of the hands-free function on the cellular phone even the phone may be in a pocket or bag. For this reason, it is not necessary to use a connector or cable to connect the cellular phone.

*1: Some versions of "Bluetooth" compatible cellular phones may not function.

### 7. ASL (Automatic Sound Levelizer) FUNCTION OUTLINE

(a) The Automatic Sound Levelizer (ASL) function automatically adjusts the sound data in order to enable to hear the clear sound from the audio system even when vehicle noise increases (as vehicle noise increases, the volume is turned up etc.). Vehicle speed signals are received from the combination meter assembly and used for the ASL.

### 8. RBDS FUNCTION OUTLINE (BROADCAST IN NORTH AMERICA ONLY)

The Radio Broadcast Data System (RBDS) is broadcast through conventional FM radio broadcasts. Even if a vehicle changes locations, the same information can be received from several FM stations without breaks. Information such as song names, traffic information, broadcast station names, etc. can be received.

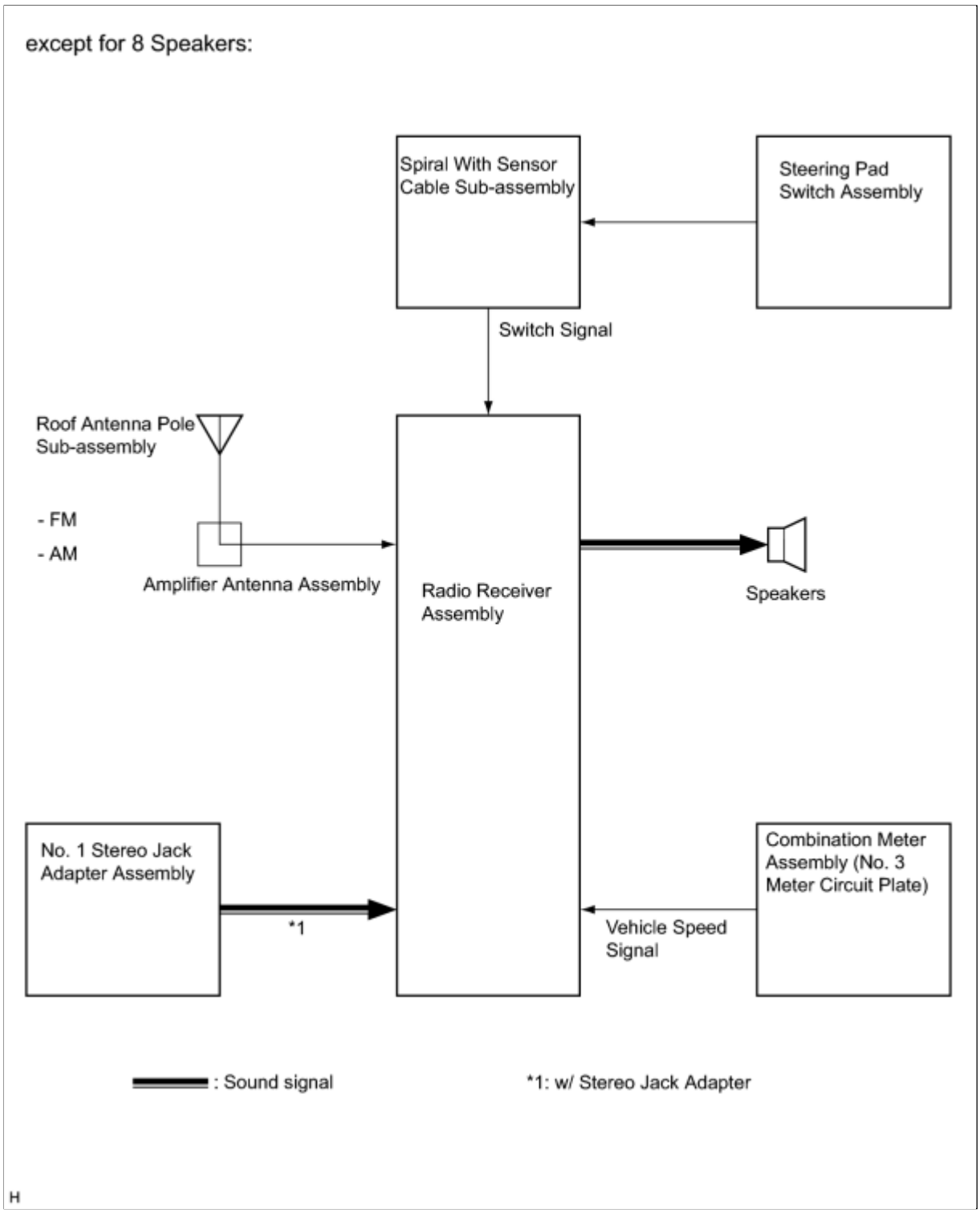
### 9. SDARS SYSTEM FUNCTION OUTLINE (BROADCAST IN NORTH AMERICA ONLY)

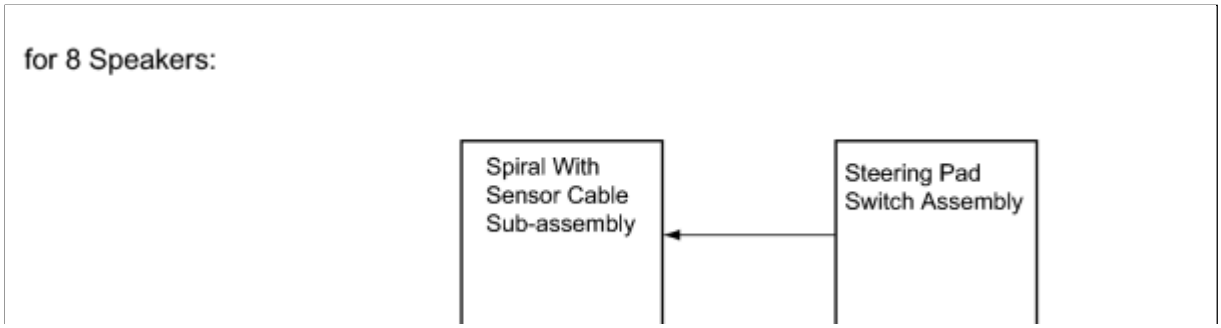
Satellite Digital Audio Radio Service (SDARS) is a satellite digital radio broadcast provided by Sirius XM Radio Inc. The broadcast (pay-type) is performed through satellites and terrestrial repeater networks. Several unique channels are available, and even if a vehicle changes locations, the same information can be received without breaks. Information such as song names, broadcast station names, etc. can be received.

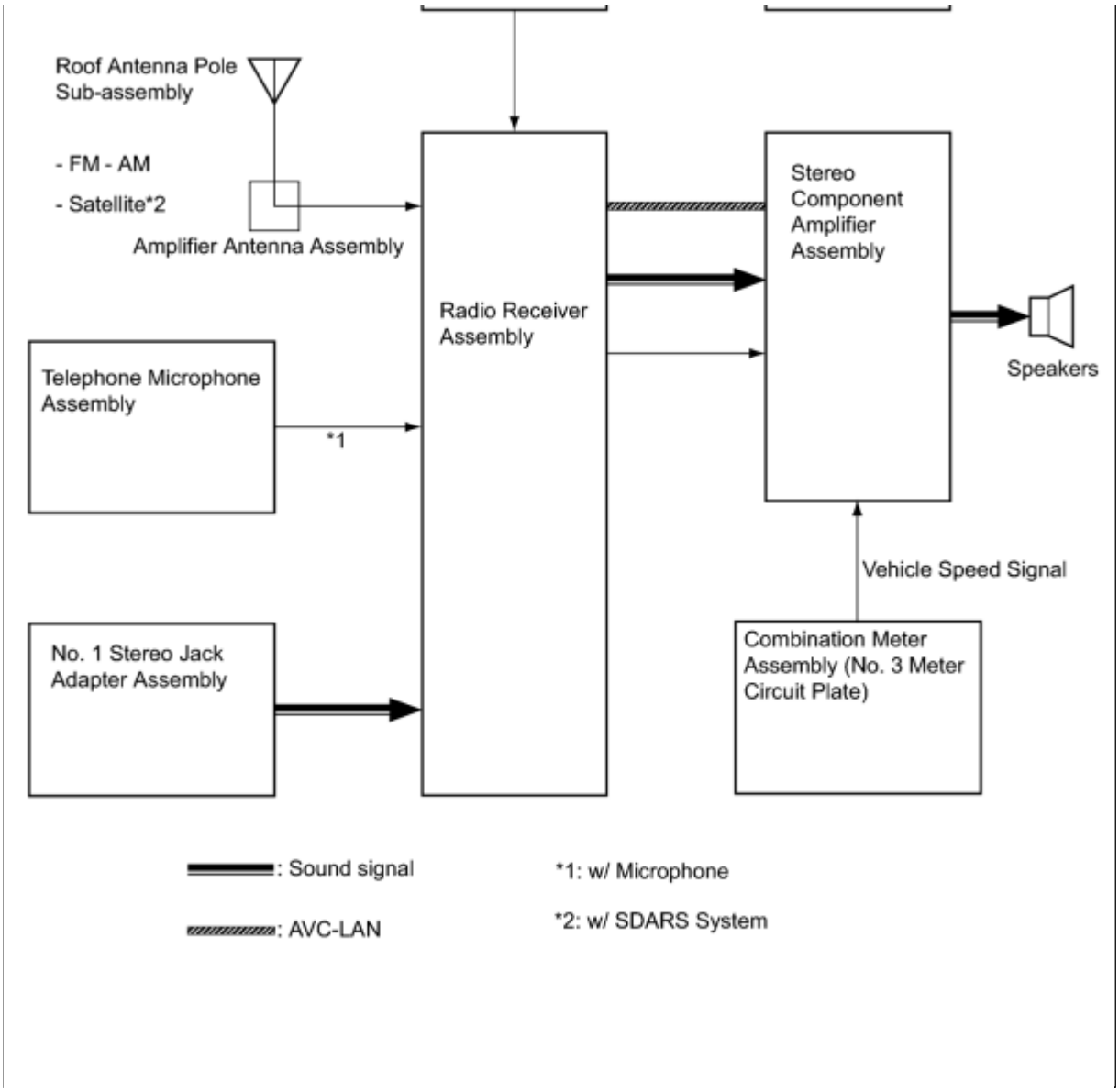
**NOTICE:**

**To receive an audio-visual pay-type broadcasts, the customer must enter into a pay-type contract with XM Satellite Radio Inc. After entering into a contract, registration of an 8-digit XM Radio ID is required. Also, if parts are replaced, the XM Radio ID must be reregistered.**

# SYSTEM DIAGRAM

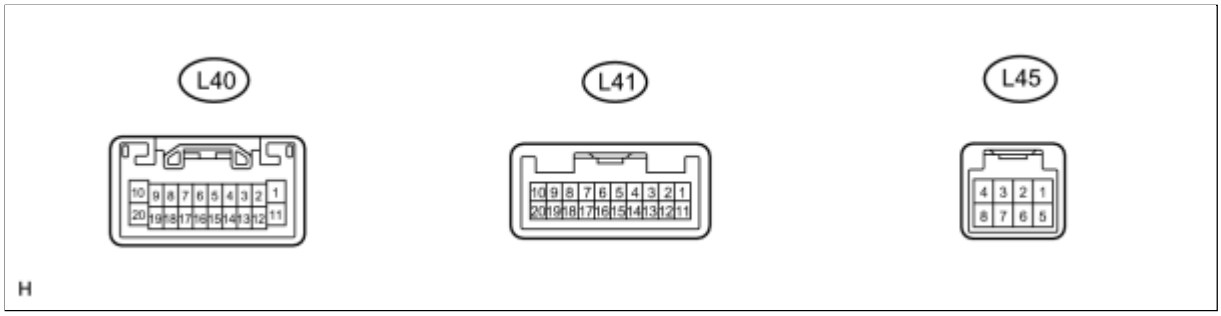



Roof Antenna Pole Sub-assembly
- FM - AM
- Satellite*2
Amplifier Antenna Assembly
Radio Receiver Assembly
Stereo Component Amplifier Assembly
Speakers
Telephone Microphone Assembly
*1
Vehicle Speed Signal
No. 1 Stereo Jack Adapter Assembly
Combination Meter Assembly (No. 3 Meter Circuit Plate)
: Sound signal
: AVC-LAN
*1: w/ Microphone
*2: w/ SDARS System

# TERMINALS OF ECU

## 1. RADIO RECEIVER ASSEMBLY (for 8 Speakers)



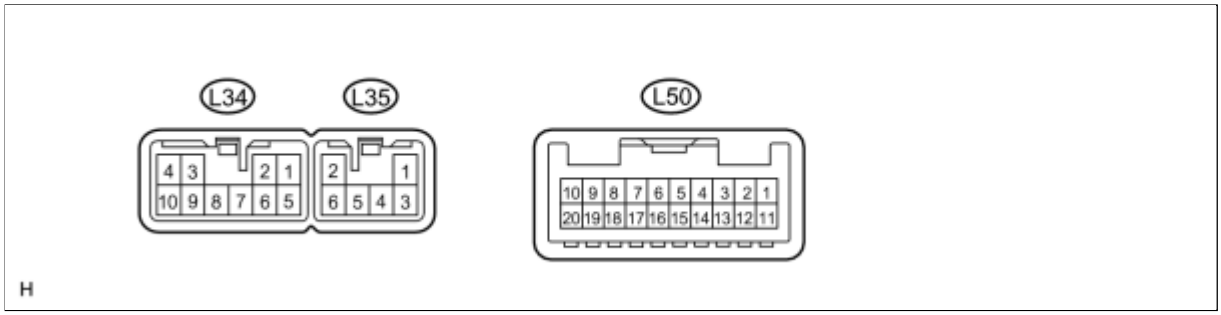

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFICATION |
|---|---|---|---|---|
| L40-1 (B) - L40-20 (GND) | SB - BR | Battery | Power switch off | 11 to 14 V |
| L40-2 (ILL+) - L40-20 (GND) | G - BR | Illumination signal | Light control switch off | Below 1 V |
| L40-2 (ILL+) - L40-20 (GND) | G - BR | Illumination signal | Light control switch tail | 11 to 14 V |
| L40-5 (ATX+) | G | AVC-LAN communication signal | - | - |
| L40-7 (MUTE) - L40-20 (GND) | B - BR | MUTE signal | Audio system playing mode | Above 2.5 V |
| L40-7 (MUTE) - L40-20 (GND) | B - BR | MUTE signal | Audio system changing mode | Below 0.5 V |
| L40-8 (R+) - L40-20 (GND) | G - BR | Sound signal (Right) | Audio system playing mode | A waveform synchronized with sounds is output |
| L40-9 (L+) - L40-20 (GND) | R - BR | Sound signal (Left) | Audio system playing mode | A waveform synchronized with sounds is output |
| L40-10 (SLD) - Body ground | Shield - Body ground | Shield ground | Always | Below 1 V |
| L40-11 (ACC) - L40-20 (GND) | GR - BR | Accessory (ON) | Power switch off | Below 1 V |
| L40-11 (ACC) - L40-20 (GND) | GR - BR | Accessory (ON) | Power switch on (ACC) | 11 to 14 V |
| L40-12 (ILL-) - L40-20 (GND) | W-B - BR | Illumination (rheostat) signal | Light control switch off | Below 1 V |
| L40-12 (ILL-) - L40-20 (GND) | W-B - BR | Illumination (rheostat) signal | Light control switch tail | Pulse generation |
| L40-13 (ANT) - L40-20 (GND) | BE - BR | Power source of antenna | Radio switch on and AM or FM | 8 V or higher |
| L40-15 (ATX-) | R | AVC-LAN communication signal | - | - |
| L40-18 (R-) - L40-20 (GND) | B - BR | Sound signal (Right) | Audio system playing mode | A waveform synchronized with sounds is output |

| | | | | |
|---|---|---|---|---|
| L40-19 (L-) - L40-20 (GND) | W - BR | Sound signal (Left) | Audio system playing mode | A waveform synchronized with sounds is output |
| L40-20 (GND) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L41-6 (SWG) - L40-20 (GND) | P - BR | Steering pad switch ground | Always | Below 1 V |
| L41-7 (SW1) - L40-20 (GND) | R - BR | Steering pad switch signal | Steering pad switch not operated | 3.28 to 3.5 V |
| L41-7 (SW1) - L40-20 (GND) | R - BR | Steering pad switch signal | Seek+ switch pushed | Below 0.8 V |
| L41-7 (SW1) - L40-20 (GND) | R - BR | Steering pad switch signal | Seek- switch pushed | 0.9 to 1.3 V |
| L41-7 (SW1) - L40-20 (GND) | R - BR | Steering pad switch signal | Volume+ switch pushed | 1.65 to 1.9 V |
| L41-7 (SW1) - L40-20 (GND) | R - BR | Steering pad switch signal | Volume- switch pushed | 2.45 to 2.6 V |
| L41-8 (SW2) - L40-20 (GND) | G - BR | Steering pad switch signal | Steering pad switch not operated | 3.28 to 3.5 V |
| L41-8 (SW2) - L40-20 (GND) | G - BR | Steering pad switch signal | MODE switch pushed | Below 0.8 V |
| L41-8 (SW2) - L40-20 (GND)*1 | G - BR | Steering pad switch signal | On hook switch pushed | 0.9 to 1.3 V |
| L41-8 (SW2) - L40-20 (GND)*1 | G - BR | Steering pad switch signal | Off hook switch pushed | 1.65 to 1.9 V |
| L41-8 (SW2) - L40-20 (GND)*1 | G - BR | Steering pad switch signal | Voice switch pushed | 2.45 to 2.6 V |
| L41-11 (IVO+) - L40-20 (GND) | Y - BR | Voice signal | "Bluetooth" hands-free voice signal received | A waveform synchronized with sounds is output |
| L41-12 (IVO-) - L40-20 (GND) | BR - BR | Voice signal | "Bluetooth" hands-free voice signal received | A waveform synchronized with sounds is output |
| L41-13 (SLD) - Body ground | Shield - Body ground | Shield ground | Always | Below 1 V |
| L41-15 (ARI) - L40-20 (GND) | B - BR | Sound signal (Right) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L41-16 (ASGN) - L40-20 (GND) | W - BR | Shield ground | Always | Below 1 V |
| L41-17 (ALI ) - L40-20 (GND) | R - BR | Sound signal (Left) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L41-18 (AGND) - Body ground | Shield - Body ground | Shield ground | Always | Below 1 V |
| L41-19 (AUXI) - L40-20 (GND) | W - BR | External device connection detection signal | External device connected | Below 1 V |
| L45-1 (SNS2) - L40-20 (GND)*1 | B - BR | Microphone connection detection signal | Always | Below 1 V |

| | | | | |
|---|---|---|---|---|
| L45-2 (MIN+) - L40-20 (GND)*1 | B - BR | Microphone voice signal | "Bluetooth" hands-free function on | A waveform synchronized with sounds is output |
| L45-3 (MACC) - L40-20 (GND)*1 | R - BR | Microphone amplifier power supply | Power switch off | Below 1 V |
| L45-3 (MACC) - L40-20 (GND)*1 | R - BR | Microphone amplifier power supply | Power switch on (IG) | 4 to 6 V |
| L45-5 (MIN-) - L40-20 (GND)*1 | W - BR | Microphone voice signal | "Bluetooth" hands-free function on | A waveform synchronized with sounds is output |
| L45-6 (SGND) - Body ground*1 | Shield - Body ground | Shield ground | Always | Below 1 V |

*1: w/ Microphone

### 2. RADIO RECEIVER (except for 8 Speakers)



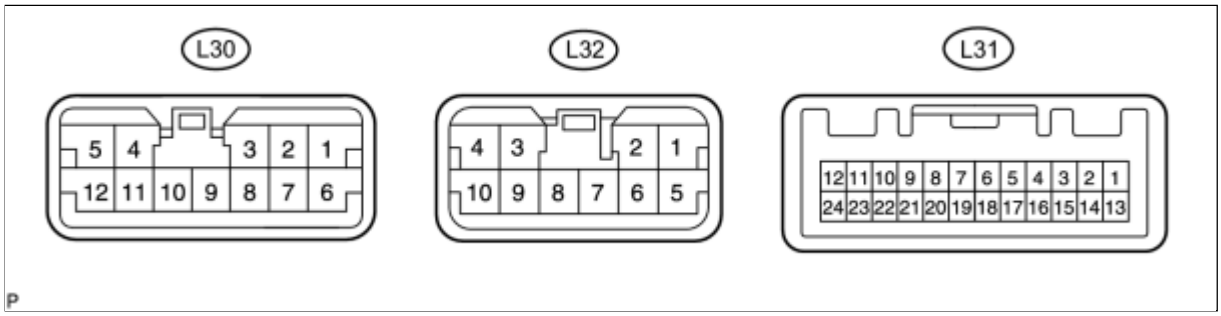

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFICATION |
|---|---|---|---|---|
| L34-1 (FR+) - L34-7 (GND) | LG - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L34-2 (FL+) - L34-7 (GND) | P - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L34-3 (ACC) - L34-7 (GND) | GR - BR | Accessory (ON) | Power switch off | Below 1 V |
| L34-3 (ACC) - L34-7 (GND) | GR - BR | Accessory (ON) | Power switch on (ACC) | 11 to 14 V |
| L34-4 (B) - L34-7 (GND) | SB - BR | Battery | Power switch off | 11 to 14 V |
| L34-5 (FR-) - L34-7 (GND) | L - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L34-6 (FL-) - L34-7 (GND) | V - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L34-7 (GND) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L34-8 (ANT) - L34-7 (GND) | BE - BR | Power source of antenna | Radio switch on and AM or FM | 8 V or higher |
| L34-10 (ILL+) - L34-7 (GND) | G - BR | Illumination signal | Light control switch off | Below 1 V |
| L34-10 (ILL+) - | | | Light control switch tail or | |

| | | | | |
|---|---|---|---|---|
| L34-10 (ILL+) - L34-7 (GND) | G - BR | Illumination signal | Light control switch tail or head | 11 to 14 V |
| L35-1 (RR+) - L34-7 (GND)*1 | R - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L35-2 (RL+) - L34-7 (GND)*1 | B - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L35-3 (RR-) - L34-7 (GND)*1 | W - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L35-5 (ILL-) - L34-7 (GND) | W-B - BR | Illumination (rheostat) signal | Light control switch off | Below 1 V |
| L35-5 (ILL-) - L34-7 (GND) | W-B - BR | Illumination (rheostat) signal | Light control switch tail or head | Pulse generation |
| L35-6 (RL-) - L34-7 (GND)*1 | Y - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L50-3 (SPD) - L34-7 (GND) | V - BR | Speed signal from combination meter | Power switch on (IG) Driver wheels turned slowly | Pulse generation |
| L50-6 (SWG) - L34-7 (GND) | R - BR | Steering pad switch ground | Always | Below 1 V |
| L50-7 (SW1) - L34-7 (GND) | R - BR | Steering pad switch signal | Steering pad switch not operated | 4.5 to 5.5 V |
| L50-7 (SW1) - L34-7 (GND) | R - BR | Steering pad switch signal | Seek+ switch pushed | Below 0.5 V |
| L50-7 (SW1) - L34-7 (GND) | R - BR | Steering pad switch signal | Seek- switch pushed | 0.86 to 0.95 V |
| L50-7 (SW1) - L34-7 (GND) | R - BR | Steering pad switch signal | Volume+ switch pused | 1.91 to 2.01 V |
| L50-7 (SW1) - L34-7 (GND) | R - BR | Steering pad switch signal | Volume- switch pushed | 3.23 to 3.57 V |
| L50-8 (SW2) - L34-7 (GND) | G - BR | Steering pad switch signal | Steering pad switch not operated | 4.5 to 5.5 V |
| L50-8 (SW2) - L34-7 (GND) | G - BR | Steering pad switch signal | MODE switch pushed | Below 0.5 V |
| L50-15 (ARI) - L34-7 (GND)*2 | B - BR | Sound signal (Right) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L50-16 (ASGN) - L34-7 (GND)*2 | W - BR | Shield ground | Always | Below 1 V |
| L50-17 (ALI) - L34-7 (GND)*2 | R - BR | Sound signal (Left) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L50-18 (AGND) - Body ground*2 | Shield - Body ground | Shield ground | Always | Below 1 V |
| L50-19 (AUXI) - L34-7 (GND)*2 | W - BR | External device connection detection signal | External device connected | Below 1 V |

*1: for 6 Speakers

*2: w/ Stereo Jack Adapter

### 3. STEREO COMPONENT AMPLIFIER ASSEMBLY (for 8 Speakers)




| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFICATION |
|---|---|---|---|---|
| L31-1 (MUTE) - L30-6 (GND) | B - BR | Mute signal from radio receiver assembly | Audio system playing | Above 2.5 V |
| L31-1 (MUTE) - L30-6 (GND) | B - BR | Mute signal from radio receiver assembly | Audio system changing sources | Below 0.5 V |
| L31-2 (L-) - L30-6 (GND) | W - BR | Sound signal (Left) | Audio system playing | A waveform synchronized with sounds is output |
| L31-3 (L+) - L30-6 (GND) | R - BR | Sound signal (Left) | Audio system playing | A waveform synchronized with sounds is output |
| L31-4 (R-) - L30-6 (GND) | B - BR | Sound signal (Right) | Audio system playing | A waveform synchronized with sounds is output |
| L31-5 (R+) - L30-6 (GND) | G - BR | Sound signal (Right) | Audio system playing | A waveform synchronized with sounds is output |
| L31-7 (TX-) | R | AVC-LAN communication signal | - | - |
| L31-8 (TX+) | G | AVC-LAN communication signal | - | - |
| L31-11 (SPD) - L30-6 (GND) | V - BR | Speed signal from combination mete assembly | Power switch on (IG) Drive wheels turned slowly | Pulse generation |
| L31-12 (ACC) - L30-6 (GND) | GR - BR | Accessory (ON) | Power switch off | Below 1 V |
| L31-12 (ACC) - L30-6 (GND) | GR - BR | Accessory (ON) | Power switch on (ACC) | 11 to 14 V |
| L31-22 (INT-) - L30-6 (GND) | BR - BR | Voice signal | "Bluetooth" hands-free voice signal transmitted | A waveform synchronized with sounds is output |
| L31-23 (INT+) - L30-6 (GND) | Y - BR | Voice signal | "Bluetooth" hands-free voice signal transmitted | A waveform synchronized with sounds is output |
| L32-1 (+B) - L30-6 (GND) | R - BR | Battery | Power switch off | 11 to 14 V |
| L32-2 (WFR+) - L30-6 (GND) | LG - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L32-3 (RL+) - | B - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized |

| | | | | |
|---|---|---|---|---|
| L30-6 (GND) | B - BR | Sound signal (Rear Right) | Audio system playing | with sounds is output |
| L32-4 (RR-) - L30-6 (GND) | W - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-5 (+B2) - L30-6 (GND) | B - BR | Battery | Power switch off | 11 to 14 V |
| L32-6 (WFR-) - L30-6 (GND) | L - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L32-7 (WFL-) - L30-6 (GND) | V - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-8 (WFL+) - L30-6 (GND) | P - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-9 (RL-) - L30-6 (GND) | Y - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-10 (RR+) - L30-6 (GND) | R - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-1 (FL-) - L30-6 (GND) | V - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L30-2 (FL+) - L30-6 (GND) | P - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L30-3 (FR-) - L30-6 (GND) | LG - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-4 (TWR+) - L30-6 (GND) | R - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-5 (TWL+) - L30-6 (GND) | B - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L30-6 (GND) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L30-7(GND2) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L30-9 (FR+) - L30-6 (GND) | LG - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-10 (TWR-) - L30-6 (GND) | W - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-12 (TWL-) - L30-6 (GND) | Y - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |

| | | |
|---|---|---|
| **DTC** | **01-21** | **ROM Error** |

| | | |
|---|---|---|
| **DTC** | **01-22** | **RAM Error** |

| | | |
|---|---|---|
| **DTC** | **01-2E** | **EEPROM Error** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-21 | A ROM malfunction exists. | Radio receiver assembly |
| 01-22 | A RAM malfunction exists. | |
| 01-2E | A checksum malfunction exists. | |

## INSPECTION PROCEDURE

**HINT:**

**After the inspection is completed, clear the DTCs.**

## PROCEDURE

| | |
|---|---|
| **1.** | **REPLACE RADIO RECEIVER ASSEMBLY** |

(a) Replace the radio receiver assembly INFO .

NEXT END

| | | |
|---|---|---|
| **DTC** | **01-D5** | **Absence of Registration Unit** |

| | | |
|---|---|---|
| **DTC** | **01-D8** | **No Response for Connection Check** |

| | | |
|---|---|---|
| **DTC** | **01-D9** | **Last Mode Error** |

| | | |
|---|---|---|
| **DTC** | **01-DA** | **No Response Against ON / OFF Command** |

| | | |
|---|---|---|
| **DTC** | **01-DB** | **Mode Status Error** |

| | | |
|---|---|---|
| **DTC** | **01-DE** | **Slave Reset** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-D5 *1, *3 | A device indicated by the sub-code is (was) disconnected from the system while the power switch on (IG) or (ACC). The communication condition with the device that the DTC shows cannot be obtained when the engine starts. | • Power source circuit of the component shown by the sub-code<br>• AVC-LAN circuit between the radio receiver assembly and component shown by the sub-code<br>• Component shown by the sub-code |
| 01-D8 *2, *3 | The device indicated by the sub-code is (was) disconnected from the system after the engine starts. | |
| 01-D9 *1, *3 | The device that had functioned before the engine stopped is (was) disconnected from the system while the power switch on (IG) or (ACC). | |
| 01-DA *3 | No response is identified when changing mode. Sound and image do not change by switch operation. | |
| 01-DB *1, *3 | A dual alarm is detected. | |
| 01-DE *3, *4 | A slave device has been disconnected after the engine starts. | |

**HINT:**

- *1: Even if no fault is present, this DTC may be stored depending on the battery condition or engine start voltage.
- *2: If the power connector is disconnected after the engine starts, this DTC is stored after 180 seconds.
- *3: If the device is reported as not existing during verification, check the power source circuit and AVC-LAN circuit for the device.

for the device.

- *4: This DTC may be stored if the engine is started and the power switch start again.

**NOTICE:**

- Before starting troubleshooting, be sure to clear the DTCs stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.
- The radio receiver assembly is the master unit.
- Be sure to clear and recheck for the DTCs after the inspection is completed to confirm that no DTCs are output.

## INSPECTION PROCEDURE

**NOTICE:**

**Be sure to read Description before performing the following procedure.**

## PROCEDURE

| | |
|---|---|
| 1. | CHECK "RADIO RECEIVER COMMUNICATION ERROR" IN FLOW CHART |

**HINT:**

**Refer to Radio Receiver Communication Error** INFO .

NEXT ▶ END

| | | |
|---|---|---|
| **DTC** | **01-D6** | **No Master** |

| | | |
|---|---|---|
| **DTC** | **01-D7** | **Connection Check Error** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-D6*1 | Either condition is met:<br>• The device that stores (stored) the DTC has (had) been disconnected while the power switch on (IG) or (ACC).<br>• The master device has (had) been disconnected when this DTC is stored. | • Radio receiver assembly power source circuit<br>• Power source circuit of the component which has stored this code<br>• AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>• Component which has stored this code<br>• Radio receiver assembly |
| 01-D7*2 | Either condition is met:<br>• The device that stored the code has (had) been disconnected after the engine starts (started).<br>• The master device has (had) been disconnected when this DTC is (was) stored. | |

**HINT:**

- *1: Even if no fault is present, this DTC may be stored depending on the battery condition or engine start voltage.
- *2: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the power switch on (IG) or (ACC), this DTC is stored.

**NOTICE:**

- Before starting troubleshooting, be sure to clear the DTCs stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.
- The radio receiver assembly is the master unit.
- Be sure to clear and recheck for the DTCs after the inspection is completed to confirm that no DTCs are output.

## INSPECTION PROCEDURE

**NOTICE:**

**Be sure to read Description before performing the following procedure.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK RADIO RECEIVER ASSEMBLY POWER SOURCE CIRCUIT** |

**HINT:**

**Refer to Radio Receiver Power Source Circuit** INFO

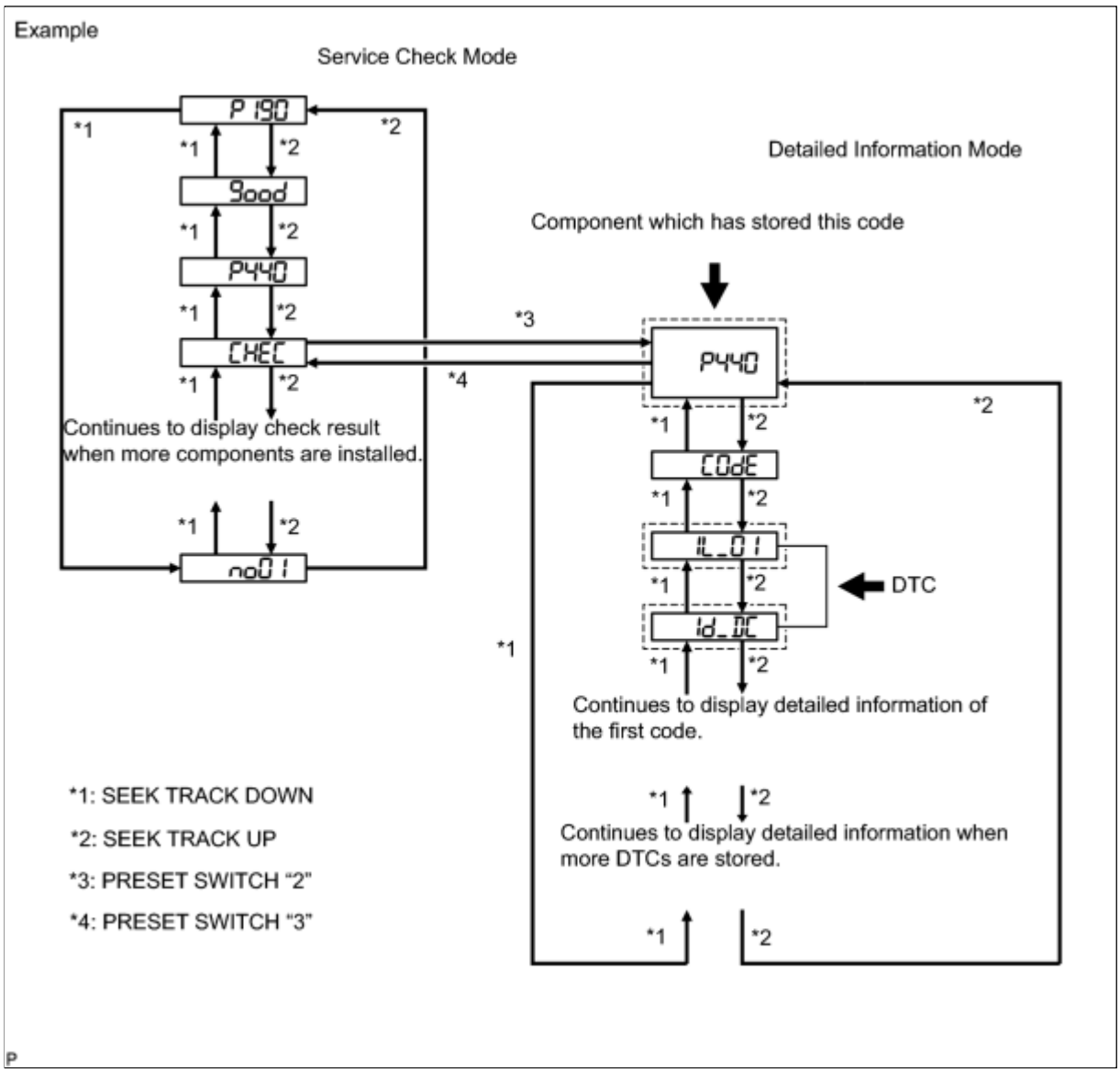
Refer to Radio Receiver Power Source Circuit .

If the power source circuit is operating normally, proceed to the next step.

**NEXT**

| | |
|---|---|
| **2.** | **IDENTIFY COMPONENT WHICH HAS STORED THIS CODE** |

(a) Enter diagnostic mode.




(b) Press preset switch "2" to change the mode to "Detailed Information Mode".

(c) Identify the component which has stored this code.

**Component Table**

| COMPONENT | PHYSICAL ADDRESS |
|---|---|

| COMPONENT | PHYSICAL ADDRESS |
|---|---|
| Stereo component amplifier assembly | 440 |
| Satellite radio tuner | 1F1 |

**HINT:**

- "P440" set by the stereo component amplifier assembly shown in the preceding illustration as an example.
- For details of the DTC display, refer to DTC Check/Clear INFO .

**NEXT**

| | |
|---|---|
| **3.** | **CHECK COMPONENT SHOWN BY SUB-CODE** |

(a) Select the component shown by the sub-code.

**HINT:**

**The satellite radio tuner is built into the radio receiver assembly. If there is a problem between the satellite radio tuner and radio receiver assembly, replace the radio receiver assembly.**

**Component Table**

| COMPONENT | PROCEED TO |
|---|---|
| Except satellite radio tuner | A |
| Satellite radio tuner (1F1) | B |

**B** **REPLACE RADIO RECEIVER ASSEMBLY**

**A**

| | |
|---|---|
| **4.** | **CHECK POWER SOURCE CIRCUIT OF COMPONENT WHICH HAS STORED THIS CODE** |

(a) Inspect the power source circuit of the component which has stored this code.

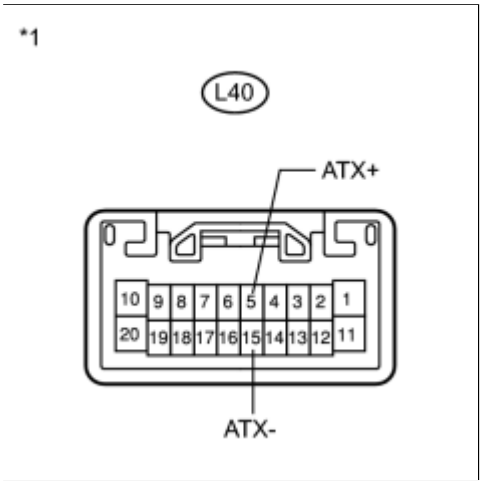
If the power source circuit is operating normally, proceed to the next step.

**Component Table**

| COMPONENT | PROCEED TO |
|---|---|
| Stereo component amplifier assembly | Stereo component amplifier power source circuit INFO |

**NEXT**

| | |
|---|---|
| **5.** | **INSPECT RADIO RECEIVER ASSEMBLY** |




(a) Disconnect the radio receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-5 (ATX+) - L40-15 (ATX-) | Always | 60 to 80 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Radio Receiver Assembly) |

**NG** ▶ **REPLACE RADIO RECEIVER ASSEMBLY**

**OK**

| | |
|---|---|
| **6.** | **CHECK HARNESS AND CONNECTOR** |

**HINT:**

**For details of the connectors, refer to Terminals of ECU** INFO **.**

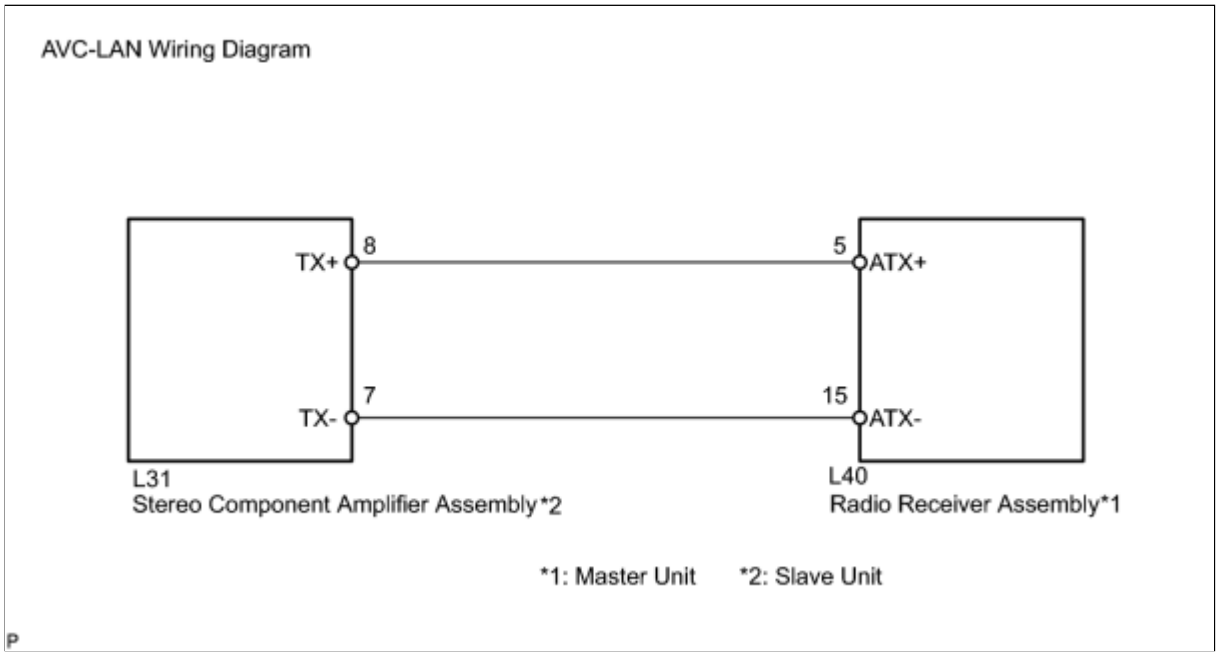
(a) Referring to the following AVC-LAN wiring diagram, check the AVC-LAN circuit between the radio receiver assembly and component which has stored this code.

(1) Disconnect all connectors between the radio receiver assembly and component which has stored this code.

(2) Check for an open or short in the AVC-LAN circuit between the radio receiver assembly and component which has stored this code.

OK:

There is no open or short circuit.




**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **7.** | **REPLACE COMPONENT WHICH HAS STORED THIS CODE** |

(a) Replace the component which has stored this code with a known good one.

**NEXT** ▼

| | |
|---|---|
| **8.** | **CLEAR DTC** |

(a) Clear the DTCs [INFO].

NEXT

| | |
|---|---|
| 9. | **RECHECK FOR DTC** |

(a) Recheck for DTCs and check if the same problem occurs again.

OK:

Malfunction disappears.

**NG** ▶ **REPLACE RADIO RECEIVER ASSEMBLY**

**OK** ▶ **END**

| DTC | 01-DC | Transmission Error |
|---|---|---|

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-DC *1 | Transmission to component shown by sub-code failed (Detecting this DTC does not always mean actual failure). | If the same sub-code is stored in other components, check power source circuit and communication system of all components shown by sub-code |

**HINT:**

***1: If the power switch is turned off after idling for 60 seconds, this DTC may be stored when the engine is started again.**

**NOTICE:**

- Before starting troubleshooting, be sure to clear the DTCs stored due to the reason described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.
- The radio receiver assembly is the master unit.
- Be sure to clear and recheck for the DTCs after the inspection is completed to confirm that no DTCs are output.

## INSPECTION PROCEDURE

**NOTICE:**

**Be sure to read Description before performing the following procedure.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK FOR DTC OF OTHER COMPONENTS** |

(a) Check if the component shown by the sub-code is displayed in the check result of the other components.

(1) Check if DTC 01-DC is output for the other components.

(2) If DTC 01-DC is output for any other components, check if the same physical address is displayed.

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC 01-DC is output and the same physical address is displayed | A |
| DTC 01-DC is not output or the same physical address is not displayed | B |

**HINT:**

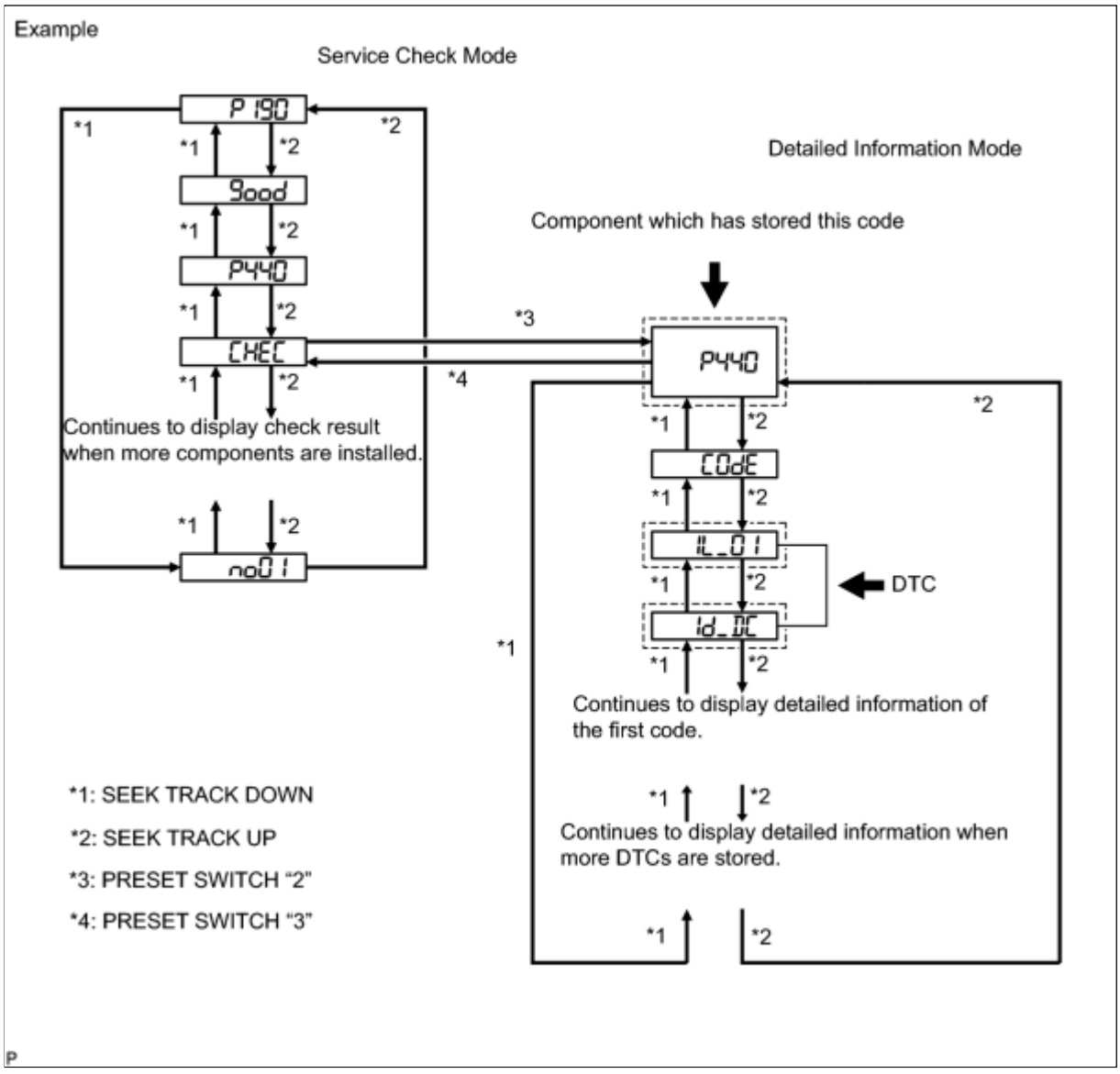
**For the list of the components shown by sub-codes, refer to the table in step 2.**

**B ▶ CLEAR DTC**

A

| | |
|---|---|
| 2. | IDENTIFY COMPONENT WHICH HAS STORED THIS CODE |

(a) Enter diagnostic mode.




(b) Press preset switch "2" to change the mode to "Detailed Information Mode".

(c) Identify the component which has stored this code.

**Component Table**

| COMPONENT | PHYSICAL ADDRESS |
|---|---|
| Stereo component amplifier assembly | 440 |
| Satellite radio tuner | 151 |

| | |
|---|---|
| Satellite radio tuner | 1F1 |
| Radio receiver assembly | 190 |

**HINT:**

- "P440" set by the stereo component amplifier assembly is shown in the preceding illustration as an example.
- For details of the DTC display, refer to DTC Check/Clear INFO .

**NEXT**

| | |
|---|---|
| **3.** | **CHECK COMPONENT WHICH HAS STORED THIS CODE** |

(a) Select the component which has stored this code.

**Component Table**

| COMPONENT | PROCEED TO |
|---|---|
| Stereo component amplifier assembly | Stereo component amplifier communication error INFO |
| Satellite radio tuner | Satellite radio tuner communication error INFO |
| Radio receiver assembly | Radio receiver communication error INFO |

**NEXT** **END**

| | |
|---|---|
| **4.** | **CLEAR DTC** |

(a) Clear the DTCs INFO .

**HINT:**

**If DTC 01-DC is output for only one component, this may not indicate a malfunction.**

**NEXT**

| | |
|---|---|
| **5.** | **RECHECK FOR DTC** |

(a) Recheck for DTCs and check if the same trouble occurs again.

OK:

Malfunction disappears.

**NG** ▶ **CHECK COMPONENT WHICH HAS STORED THIS CODE**

**OK** ▶ **END**

| | |
|---|---|
| **6.** | **CHECK COMPONENT WHICH HAS STORED THIS CODE** |

(a) Select the component which has stored this code.

**Component Table**

| COMPONENT | PROCEED TO |
|---|---|
| Stereo component amplifier assembly | Stereo component amplifier communication error INFO |
| Satellite radio tuner | Satellite radio tuner communication error INFO |
| Radio receiver assembly | Radio receiver communication error INFO |

**NEXT** ▶ **END**

| | | |
|---|---|---|
| **DTC** | **01-DD** | **Master Reset** |

| | | |
|---|---|---|
| **DTC** | **01-E1** | **Voice Processing Device ON Error** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-DD *1 | The device that should be the master has been disconnected after the engine starts. | • Radio receiver assembly power source circuit<br>• AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>• Radio receiver assembly<br>• Component which has stored this code |
| 01-E1 *2 | The AMP device stores that the AMP output does not function even while the source device operates. | |

**HINT:**

- *1: If the power switch is turned off after idling for 60 seconds, this DTC may be stored when the engine is started again.
- *2: Even if no fault is present, this DTC may be stored depending on the battery condition or engine start voltage.

**NOTICE:**

- Before starting troubleshooting, be sure to clear the DTCs stored due to the reasons described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.
- The radio receiver assembly is the master unit.
- Be sure to clear and recheck for the DTCs after the inspection is completed to confirm that no DTCs are output.

## INSPECTION PROCEDURE

**NOTICE:**

**Be sure to read Description before performing the following procedure.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK RADIO RECEIVER POWER SOURCE CIRCUIT** |

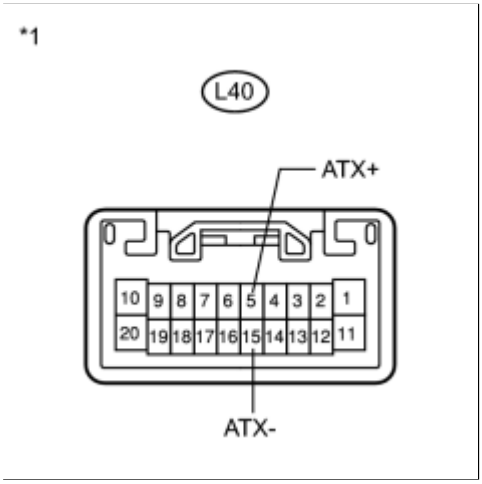
**HINT:**

**Refer to Radio Receiver Power Source Circuit** INFO .

If the power source circuit is operating normally, proceed to the next step.

**NEXT**

| | |
|---|---|
| **2.** | **INSPECT RADIO RECEIVER ASSEMBLY** |




(a) Disconnect the radio receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-5 (ATX+) - L40-15 (ATX-) | Always | 60 to 80 Ω |

**Text in Illustration**

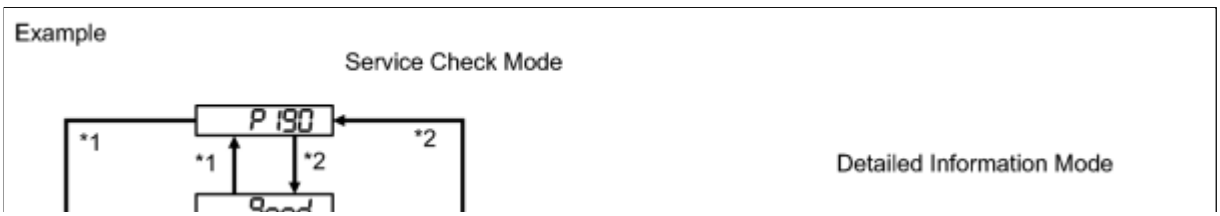
| | |
|---|---|
| *1 | Component without harness connected<br>(Radio Receiver Assembly) |

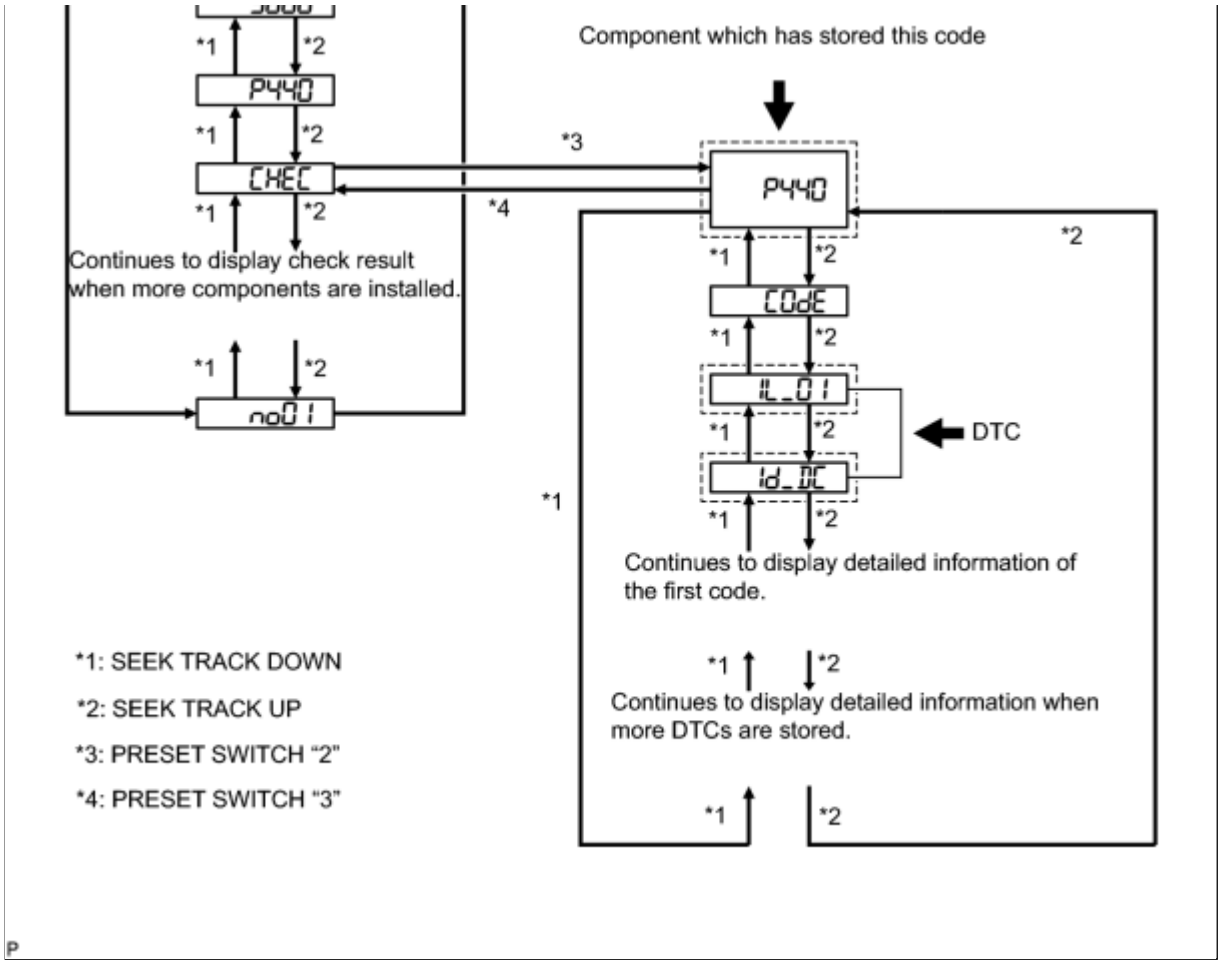
**NG** ▶ **REPLACE RADIO RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **3.** | **IDENTIFY COMPONENT WHICH HAS STORED THIS CODE** |

(a) Enter diagnostic mode.






(b) Press preset switch "2" to change the mode to "Detailed Information Mode".

(c) Identify the component which has stored this code.

**Component Table**

| COMPONENT | PHYSICAL ADDRESS |
|---|---|
| Stereo component amplifier assembly | 440 |
| Satellite radio tuner | 1F1 |
| Radio receiver assembly | 190 |

**HINT:**

- "P440" set by the stereo component amplifier assembly is shown in the preceding illustration as an example.
- For details of the DTC display, refer to DTC Check/Clear INFO .

**NEXT**

| | |
|---|---|
| **4.** | **CHECK COMPONENT SHOWN BY SUB-CODE** |

(a) Select the component shown by the sub-code.

**HINT:**

**The satellite radio tuner is built into the radio receiver assembly. If there is a problem between the satellite radio tuner and radio receiver assembly, replace the radio receiver assembly.**

**Component Table**

| COMPONENT | PROCEED TO |
|---|---|
| Except satellite radio tuner | A |
| Satellite radio tuner (1F1) | B |

**B** **REPLACE RADIO RECEIVER ASSEMBLY**

**A**

| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR** |

**HINT:**

**For details of the connectors, refer to Terminals of ECU** INFO .

(a) Referring to the following AVC-LAN wiring diagram, check the AVC-LAN circuit between the radio receiver assembly and component which has stored this code.

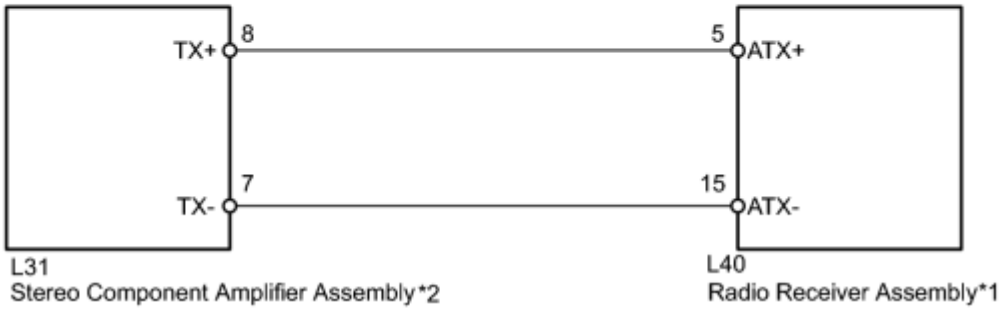
(1) Disconnect all connectors between the radio receiver assembly and component which has stored this code.

(2) Check for an open or short in the AVC-LAN circuit between the radio receiver assembly and component which has stored this code.

OK:

There is no open or short circuit.

AVC-LAN Wiring Diagram



| | |
|---|---|
| | *1: Master Unit *2: Slave Unit |
| P | |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**
▼

| | |
|---|---|
| **6.** | **REPLACE RADIO RECEIVER ASSEMBLY** |

(a) Replace the radio receiver assembly with a known good one.

**NEXT**
▼

| | |
|---|---|
| **7.** | **CLEAR DTC** |

(a) Clear the DTCs INFO .

**NEXT**
▼

| | |
|---|---|
| **8.** | **RECHECK FOR DTC** |

(a) Recheck for DTCs and check if the same problem occurs again.

OK:
Malfunction disappears.

**NG** ▶ **REPLACE COMPONENT WHICH HAS STORED THIS CODE**

**OK** ▶ **END**

| DTC | 01-DF | Master Error |
|---|---|---|

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-DF *1 | The device with a display fails and the master unit is switched to the audio device.<br>Also when a communication error between the sub-master unit (audio) and master unit occurs, this DTC is stored. | • Radio receiver assembly power source circuit<br>• AVC-LAN circuit between the radio receiver assembly and component which has stored this code<br>• Radio receiver assembly<br>• Component which has stored this code |

**HINT:**

***1: When 210 seconds have elapsed after disconnecting the power supply connector of the master component with the power switch on (IG) or (ACC), this DTC is stored.**

**NOTICE:**

- Before starting troubleshooting, be sure to clear the DTCs stored due to the reason described in the HINT above. Then, check for DTCs and troubleshoot according to the output DTCs.
- The radio receiver assembly is the master unit.
- Be sure to clear and recheck for the DTCs after the inspection is completed to confirm that no DTCs are output.

## INSPECTION PROCEDURE

**NOTICE:**

**Be sure to read Description before performing the following procedure.**

## PROCEDURE

| | |
|---|---|
| 1. | CHECK RADIO RECEIVER POWER SOURCE CIRCUIT |

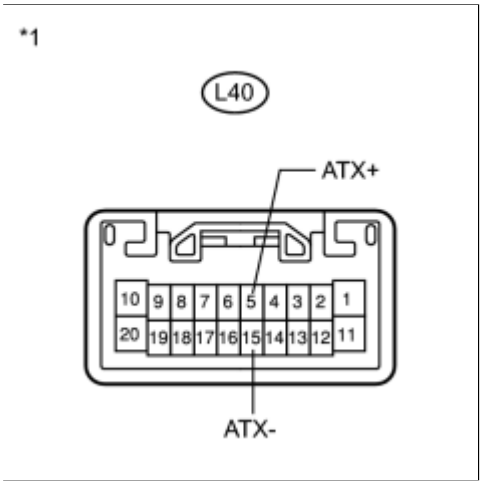
**HINT:**

**Refer to Radio Receiver Power Source Circuit** INFO **.**

If the power source circuit is operating normally, proceed to the next step.

**NEXT**

| | |
|---|---|
| 2. | INSPECT RADIO RECEIVER ASSEMBLY |




(a) Disconnect the radio receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-5 (ATX+) - L40-15 (ATX-) | Always | 60 to 80 Ω |

**Text in Illustration**

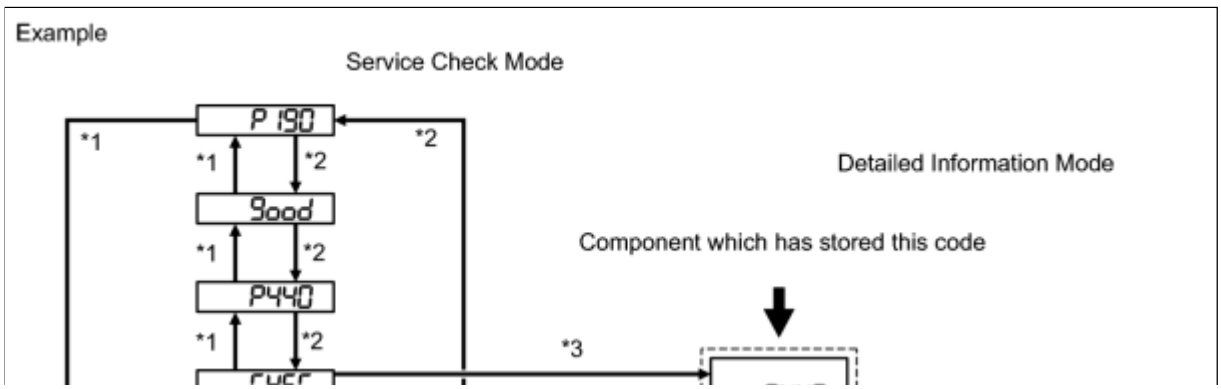
| | |
|---|---|
| *1 | Component without harness connected<br>(Radio Receiver Assembly) |

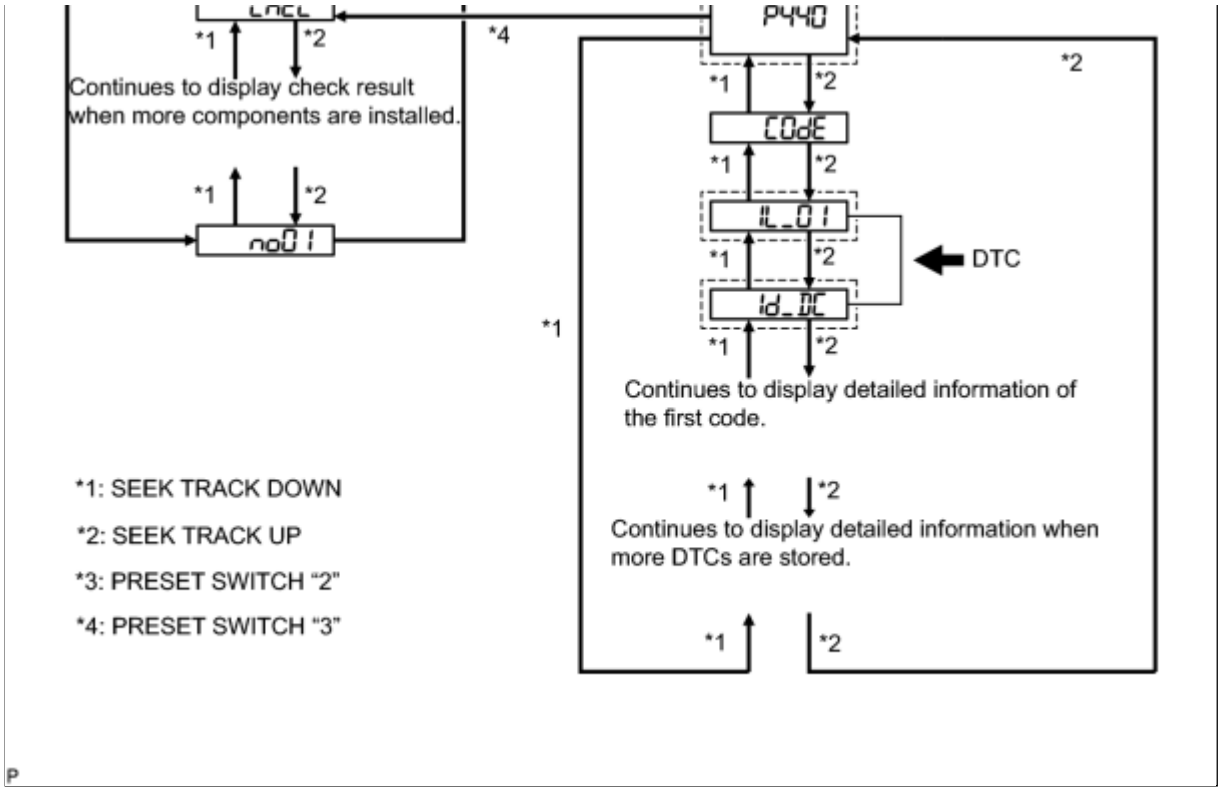
**NG** ▶ **REPLACE RADIO RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **3.** | **IDENTIFY COMPONENT WHICH HAS STORED THIS CODE** |

(a) Enter diagnostic mode.






(b) Press preset switch "2" to change the mode to "Detailed Information Mode".

(c) Identify the component which has stored this code.

**Component Table**

| COMPONENT | PHYSICAL ADDRESS |
|---|---|
| Stereo component amplifier assembly | 440 |
| Satellite radio tuner | 1F1 |
| Radio receiver assembly | 190 |

**HINT:**

- "P440" set by the stereo component amplifier assembly is shown in the preceding illustration as an example.
- For details of the DTC display, refer to DTC Check/Clear INFO .

**NEXT**

| | |
|---|---|
| **4.** | **CHECK COMPONENT SHOWN BY SUB-CODE** |

(a) Select the component shown by the sub-code.

**HINT:**

**The satellite radio tuner is built into the radio receiver assembly. If there is a problem between the satellite radio tuner and radio receiver assembly, replace the radio receiver assembly.**

tuner and radio receiver assembly, replace the radio receiver assembly.

**Component Table**

| COMPONENT | PROCEED TO |
|---|---|
| Except satellite radio tuner | A |
| Satellite radio tuner (1F1) | B |

**B** **REPLACE RADIO RECEIVER ASSEMBLY**

**A**

| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR** |

**HINT:**

**For details of the connectors, refer to Terminals of ECU** INFO .

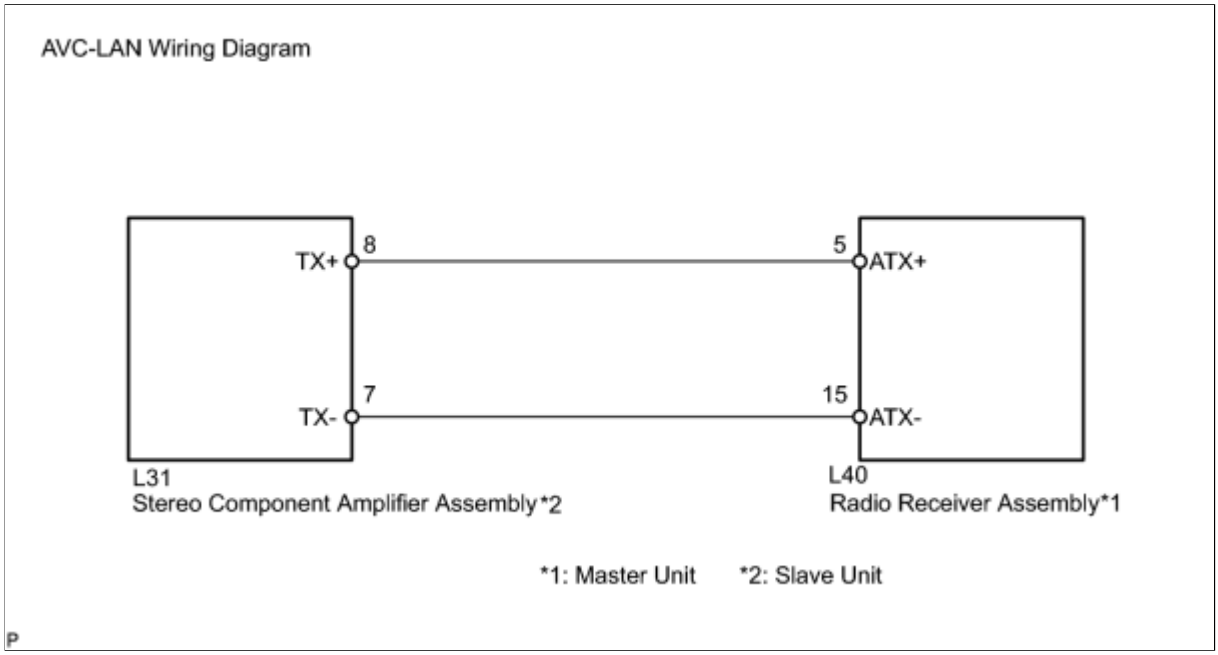
(a) Referring to the following AVC-LAN wiring diagram, check the AVC-LAN circuit between the radio receiver assembly and component which has stored this code.

(1) Disconnect all connectors between the radio receiver assembly and component which has stored this code.

(2) Check for an open or short in the AVC-LAN circuit between the radio receiver assembly and component which has stored this code.

OK:

There is no open or short circuit.




**NG** **REPAIR OR REPLACE HARNESS OR CONNECTOR**

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

**OK**

| | |
|---|---|
| **6.** | **REPLACE RADIO RECEIVER ASSEMBLY** |

(a) Replace the radio receiver assembly with a known good one.

**NEXT**

| | |
|---|---|
| **7.** | **CLEAR DTC** |

(a) Clear the DTCs INFO .

**NEXT**

| | |
|---|---|
| **8.** | **RECHECK FOR DTC** |

(a) Recheck for DTCs and check if the same problem occurs again.

OK:

Malfunction disappears.

**NG** ▶ **REPLACE COMPONENT WHICH HAS STORED THIS CODE**

**OK** ▶ **END**

| | | |
|---|---|---|
| **DTC** | **01-E0** | **Registration Complete Indication Error** |

| | | |
|---|---|---|
| **DTC** | **01-E3** | **Registration Demand Transmission** |

| | | |
|---|---|---|
| **DTC** | **01-E4** | **Multiple Frame Incomplete** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-E0 | "Registration complete" signal from the master device cannot be received. | - |
| 01-E3 | Either condition is met:<br>• The registration demand signal from the slave device is output.<br>• The registration demand signal is output by receiving connection confirmation signal from the sub-master device. | - |
| 01-E4 | The multiple frame transmission is incomplete. | - |

**HINT:**

**Even if no fault is present, these DTCs may be stored depending on the battery condition or engine start voltage.**

## INSPECTION PROCEDURE

**HINT:**

**After the inspection is completed, clear the DTCs. These DTCs do not indicate a malfunction.**

| | | |
|---|---|---|
| **DTC** | **01-E2** | **ON / OFF Indication Parameter Error** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-E2 | The command for ON/OFF control from the master device has a problem. | Radio receiver assembly |

## INSPECTION PROCEDURE

**HINT:**

**After the inspection is completed, clear the DTCs.**

## PROCEDURE

| | |
|---|---|
| **1.** | **REPLACE RADIO RECEIVER ASSEMBLY** |

(a) Replace the radio receiver assembly INFO .

NEXT END

| | | |
|---|---|---|
| **DTC** | **01-F2** | **No Response from Diagnosis Memory Request** |

| | | |
|---|---|---|
| **DTC** | **01-FF** | **No Response to Diagnosis Request** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 01-F2 | Any reply to a system inspection instruction, system inspection result request or diagnosis memory request could not be completed within a designated time. | Stereo component amplifier assembly |
| 01-FF | No response to a diagnosis request | |

## INSPECTION PROCEDURE

**HINT:**

**After the inspection is completed, clear the DTCs.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CLEAR DTC** |

(a) Clear the DTCs INFO .

**NEXT**

| | |
|---|---|
| **2.** | **RECHECK FOR DTC** |

(a) Recheck for DTCs and check if the same trouble occurs again.

OK:

Malfunction disappears.

**NG** ▶ **REPLACE STEREO COMPONENT AMPLIFIER ASSEMBLY**

**OK** ▶ **END**

| | | |
|---|---|---|
| **DTC** | **57-10** | **TEL ECU Malfunction (TEL)** |

| | | |
|---|---|---|
| **DTC** | **57-47** | **Bluetooth Module Initialization Failed** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 57-10 | "Bluetooh" module malfunction | Radio receiver assembly |
| 57-47 | • "Bluetooth" module is not installed.<br>• Problem with "Bluetooth" module<br>• Problem in communication line to "Bluetooth" module | |

## INSPECTION PROCEDURE

**HINT:**

**After the inspection is completed, clear the DTCs.**

## PROCEDURE

| | |
|---|---|
| **1.** | **REPLACE RADIO RECEIVER ASSEMBLY** |

(a) Replace the radio receiver assembly INFO .

NEXT END

| | | |
|---|---|---|
| **DTC** | **60-10** | **AM Tuner PLL does not Lock** |

| | | |
|---|---|---|
| **DTC** | **60-11** | **FM Tuner PLL does not Lock** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 60-10 | The AM tuner PLL (phase locked loop) synchronization is impossible. | Radio receiver assembly |
| 60-11 | The FM tuner PLL (phase locked loop) synchronization is impossible. | |

## INSPECTION PROCEDURE

**HINT:**

**After the inspection is completed, clear the DTCs.**

## PROCEDURE

| | |
|---|---|
| **1.** | **REPLACE RADIO RECEIVER ASSEMBLY** |

(a) Replace the radio receiver assembly INFO .

NEXT END

| | | |
|---|---|---|
| **DTC** | **60-42** | **Tuner Power Source Error** |

| | | |
|---|---|---|
| **DTC** | **60-43** | **AM Tuner Error** |

| | | |
|---|---|---|
| **DTC** | **60-44** | **FM Tuner Error** |

| | | |
|---|---|---|
| **DTC** | **60-50** | **Malfunction in Internal IC** |

## DESCRIPTION

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| 60-42 | The power source of the tuner is abnormal. | Radio receiver assembly |
| 60-43 | The AM tuner is abnormal. | |
| 60-44 | The FM tuner is abnormal. | |
| 60-50 | A problem occurs in the IC inside the tuner unit and radio reception is not normal. | |

## INSPECTION PROCEDURE

**HINT:**

**After the inspection is completed, clear the DTCs.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CLEAR DTC** |

(a) Clear the DTCs INFO .

**NEXT**

| | |
|---|---|
| **2.** | **RECHECK FOR DTC** |

(a) Recheck for DTCs and check if the same trouble occurs again.

**HINT:**

**If DTCs are detected frequently, replace the radio receiver assembly.**

OK:

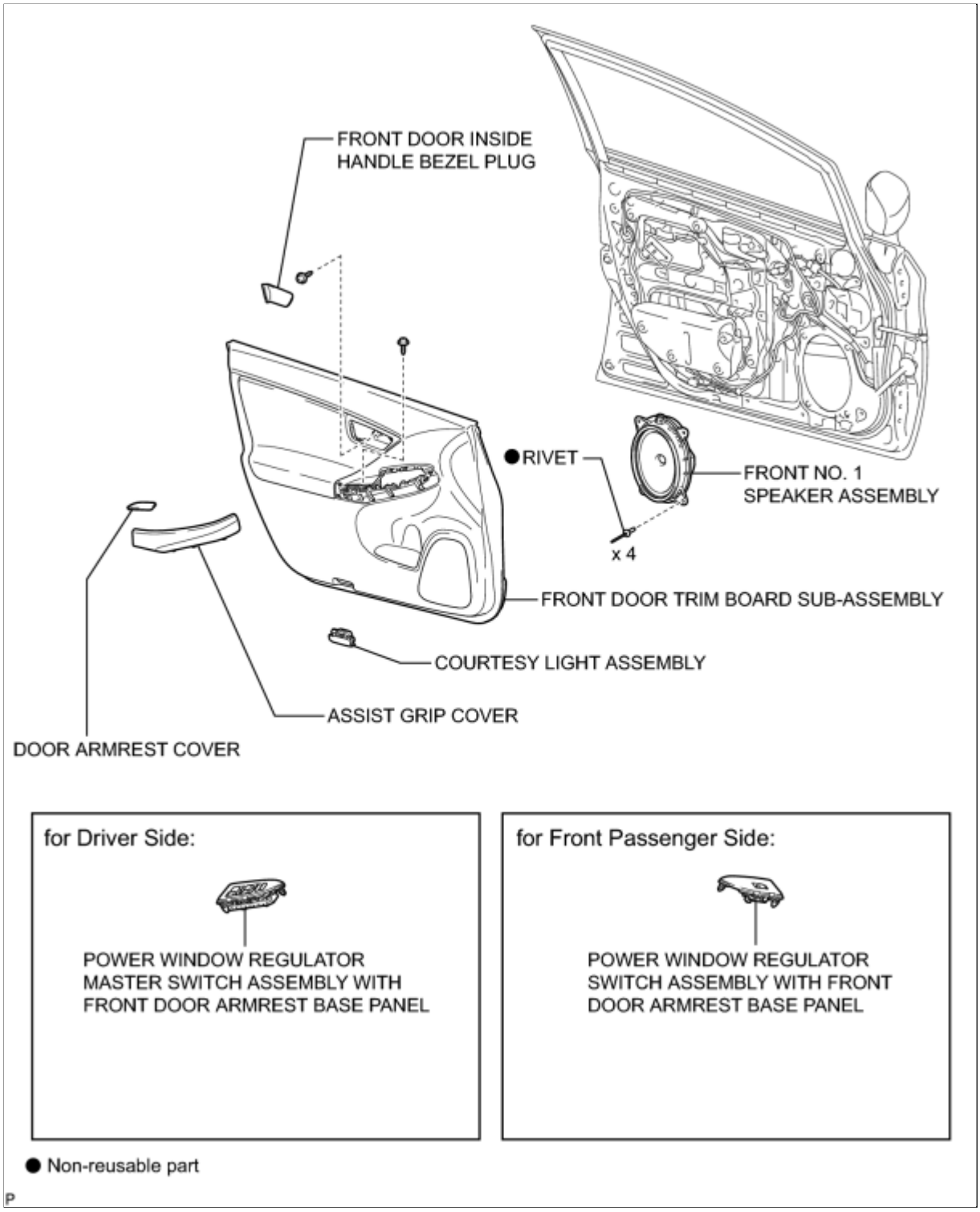
Malfunction disappears.

**NG** ▶ **REPLACE RADIO RECEIVER ASSEMBLY**

**OK** ▶ **END**

## COMPONENTS

## ILLUSTRATION



# INSPECTION

### 1. INSPECT FRONT NO. 1 SPEAKER

(a) With the speaker installed, check that there is no looseness or other abnormalities.

(b) Check that there is no foreign matter in the speaker, no tears on the speaker's cone part or other abnormalities.

(c) Measure the resistance of the speaker.

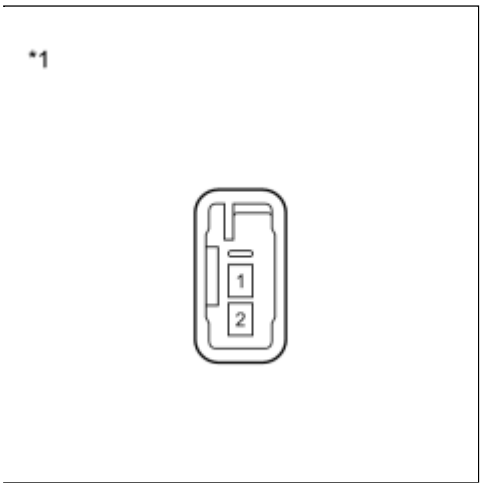
Standard Resistance (except for 8 Speakers):

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 - 2 | Always | 3.2 to 4.8 Ω |

Standard Resistance (for 8 Speakers):

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 - 2 | Always | 1.4 to 2.2 Ω |

If the result is not as specified, replace the speaker assembly.



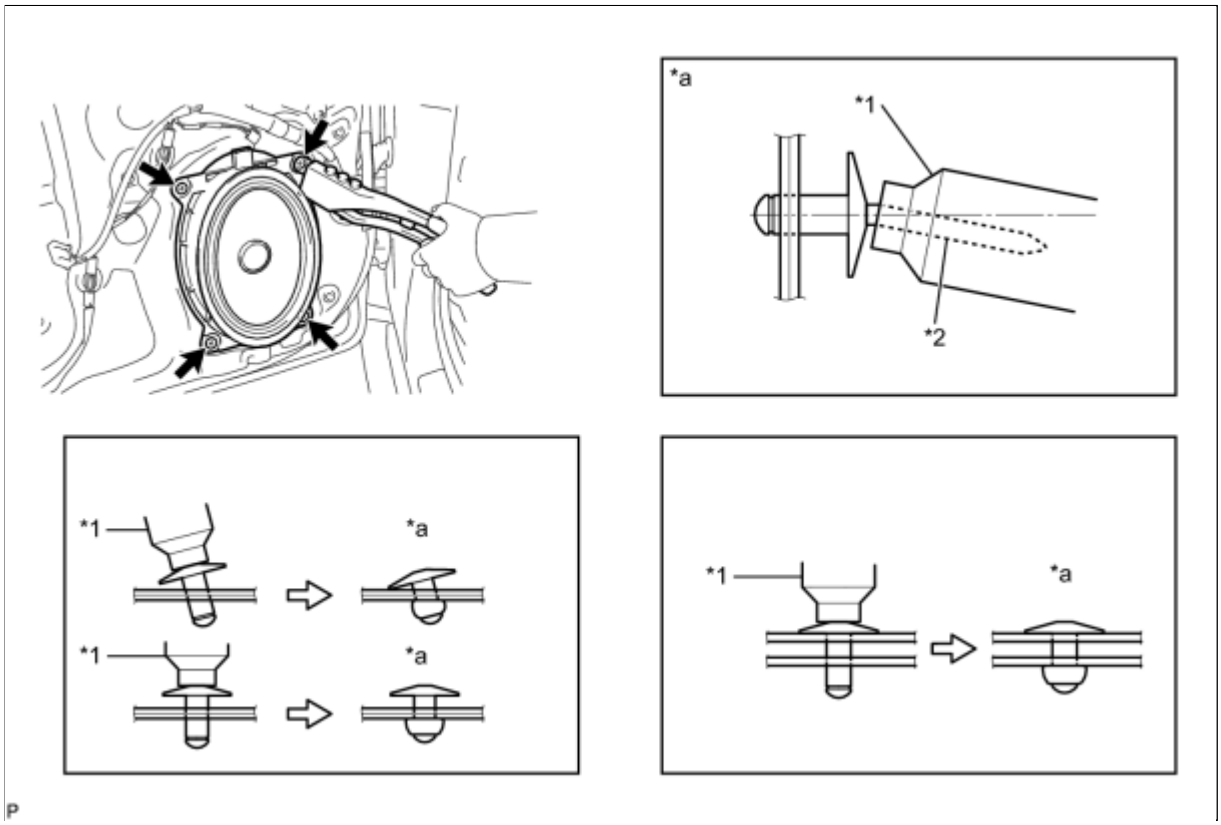

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Front No. 1 Speaker) |

# INSTALLATION

### 1. INSTALL FRONT NO. 1 SPEAKER ASSEMBLY

(a) Using an air riveter or a hand riveter, install the front No. 1 speaker assembly with 4 new rivets.




**Text in Illustration**

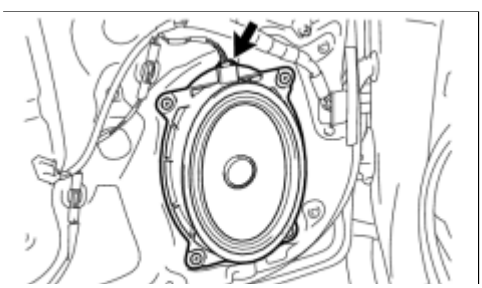
| | | | |
|---|---|---|---|
| *1 | Riveter | *2 | Mandrel |
| *a | INCORRECT | - | - |

**NOTICE:**

- Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.
- Confirm that the rivet is seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any clearance between the rivet head and moulding.
- Do not leave any clearance between the moulding and door frame. Firmly hold the 2 items together while installing the rivet.

**HINT:**

**If the rivet cannot be cut, pull it once and cut it.**



(b) Connect the connector.



2. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

3. INSTALL COURTESY LIGHT ASSEMBLY INFO

4. INSTALL DOOR ARMREST COVER INFO

5. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

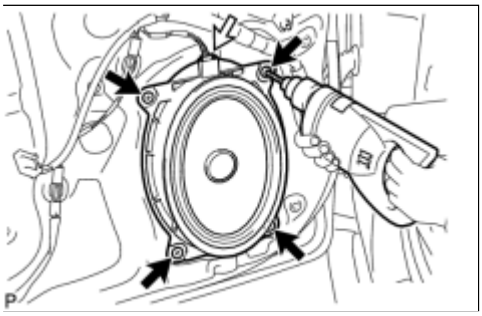
6. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

7. INSTALL ASSIST GRIP COVER INFO

8. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

# REMOVAL

1. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO
2. REMOVE ASSIST GRIP COVER INFO
3. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO
4. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO
5. REMOVE DOOR ARMREST COVER INFO
6. REMOVE COURTESY LIGHT ASSEMBLY INFO
7. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO
8. REMOVE FRONT NO. 1 SPEAKER ASSEMBLY



(a) Disconnect the connector.

(b) Using a drill bit with a diameter of less than 4 mm (0.158 in.), drill out the 4 rivet heads and remove the front No. 1 speaker assembly.

**NOTICE:**

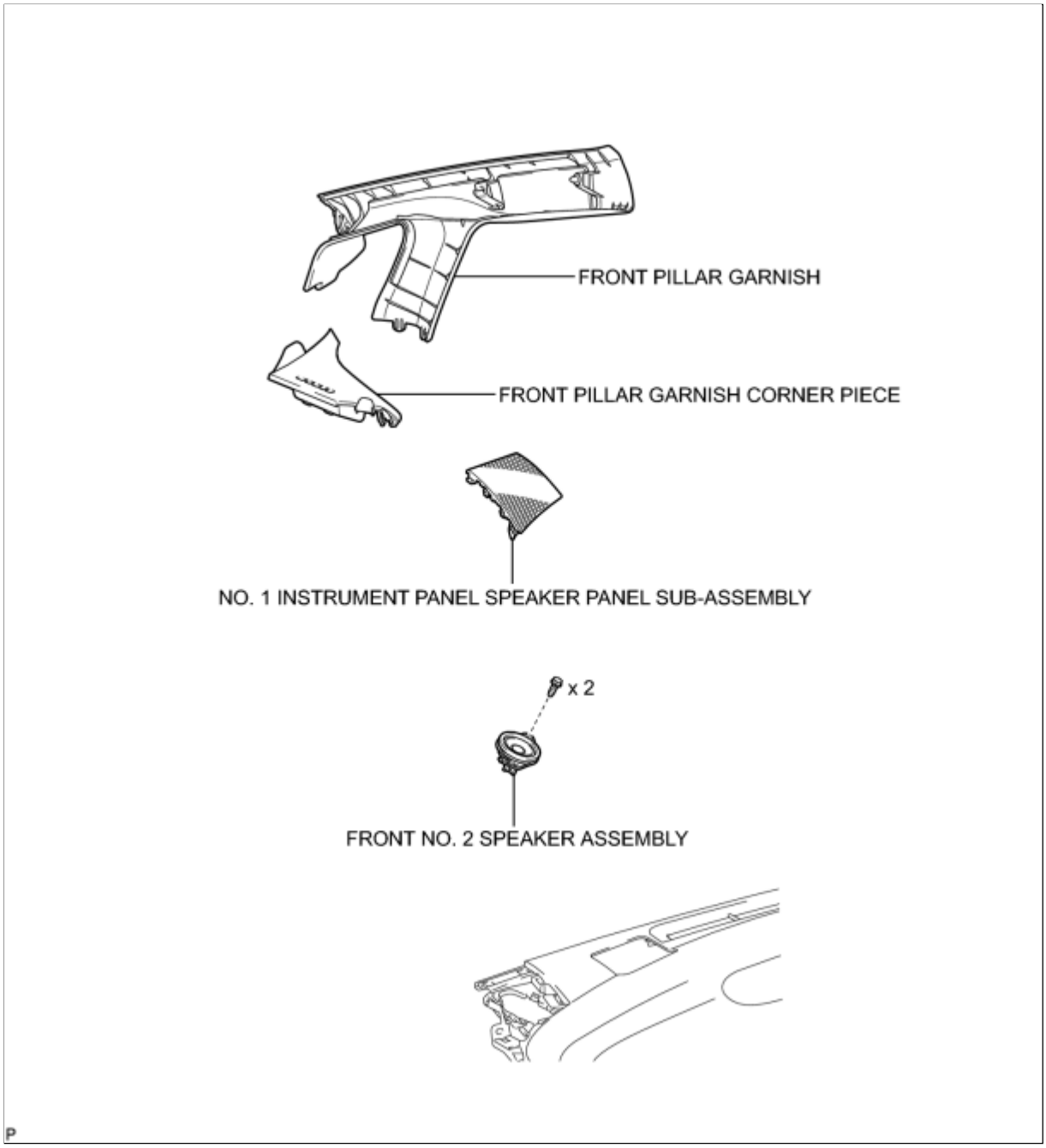
- Do not touch the cone part of the speaker.
- Do not drill the rivet at an angle as this will cause damage to the drill and drill hole. Line up the drill and rivet, and carefully drill out the rivet head.
- Be careful as the cut rivet will be very hot.

(c) Continue drilling and push out the remaining rivet fragments.

(d) Using a vacuum cleaner, remove the rivet fragments and shavings from the inside of the door.

## COMPONENTS

## ILLUSTRATION



# INSPECTION

### 1. INSPECT FRONT NO. 2 SPEAKER (except for 8 Speakers)

(a) With the speaker installed, check that there is no looseness or other abnormalities.

(b) Check that there is no foreign matter in the speaker, no tears on the speaker's cone part or other abnormalities.

(c) When there is a possibility that either the right or left speaker is malfunctioning, interchange the speakers and perform an inspection. If the malfunction disappears after interchanging the speakers, replace the malfunctioning speaker.

**HINT:**

**Connect all connectors to the speakers when performing an inspection. If the result is not as specified, replace the speaker assembly.**

### 2. INSPECT FRONT NO. 2 SPEAKER (for 8 Speakers)

(a) With the speaker installed, check that there is no looseness or other abnormalities.

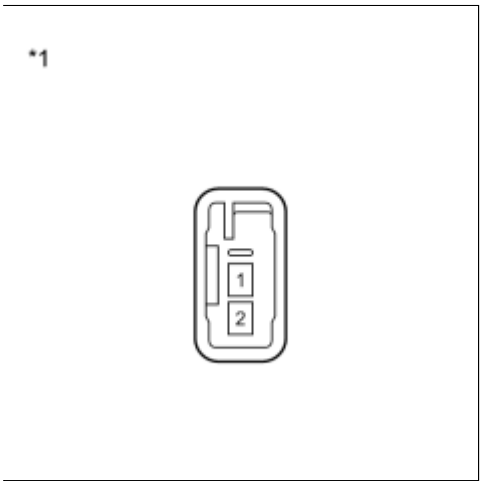
(b) Check that there is no foreign matter in the speaker, no tears on the speaker's cone part or other abnormalities.

(c) Measure the resistance of the speaker.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 - 2 | Always | 1.5 to 2.5 Ω |

If the result is not as specified, replace the speaker assembly.

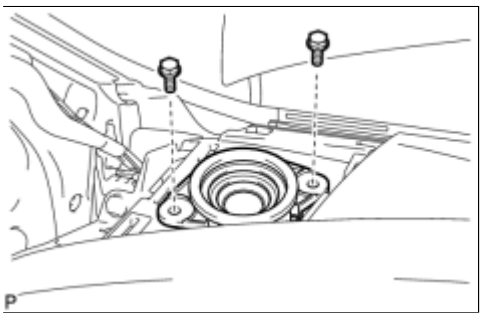



## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Front No. 2 Speaker) |

# INSTALLATION

### 1. INSTALL FRONT NO. 2 SPEAKER ASSEMBLY



(a) Connect the connector.

(b) Install the front No. 2 speaker assembly with the 2 bolts.

### 2. INSTALL NO. 1 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY INFO

### 3. INSTALL FRONT PILLAR GARNISH CORNER PIECE INFO

### 4. INSTALL FRONT PILLAR GARNISH INFO

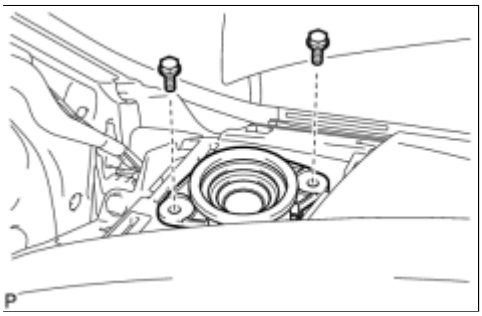
# REMOVAL

**1. REMOVE FRONT PILLAR GARNISH** INFO

**2. REMOVE FRONT PILLAR GARNISH CORNER PIECE** INFO

**3. REMOVE NO. 1 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY** INFO

**4. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY**



(a) Remove the 2 bolts.

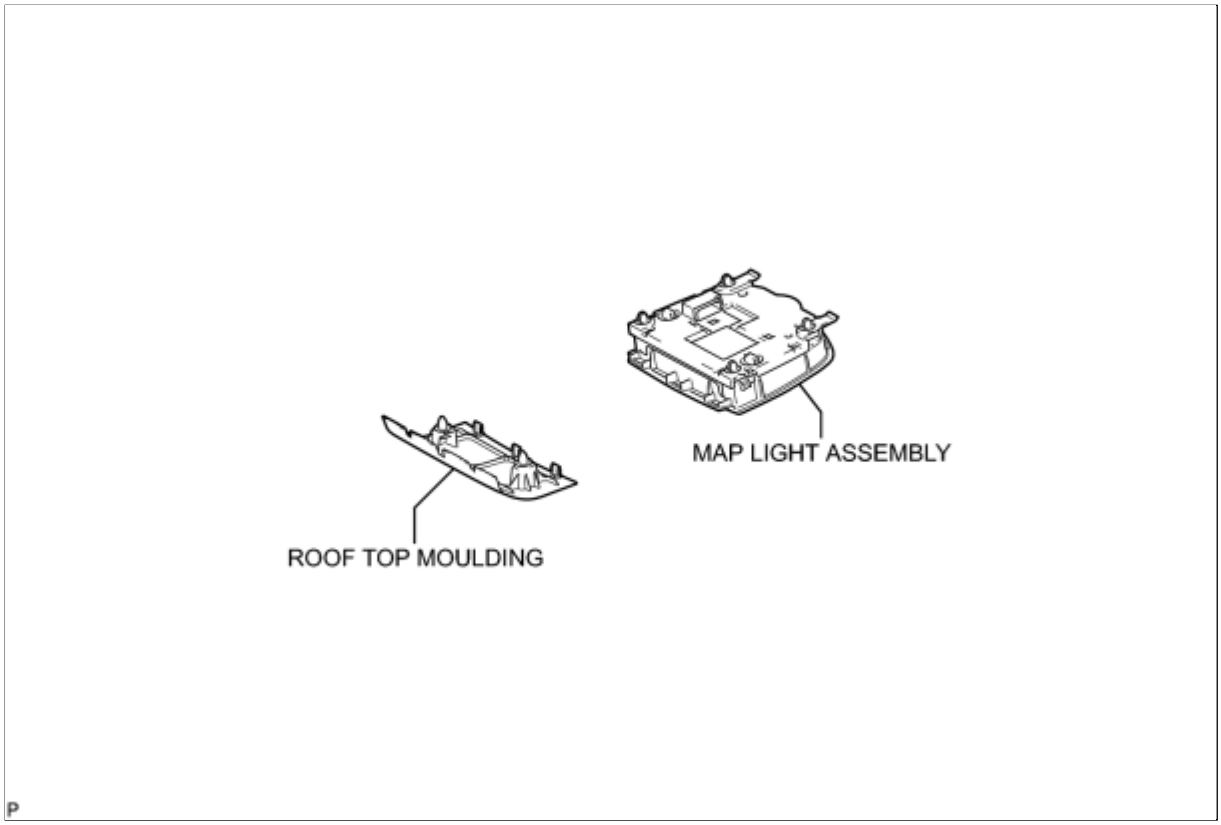
(b) Disconnect the connector and remove the front No. 2 speaker assembly.

**NOTICE:**

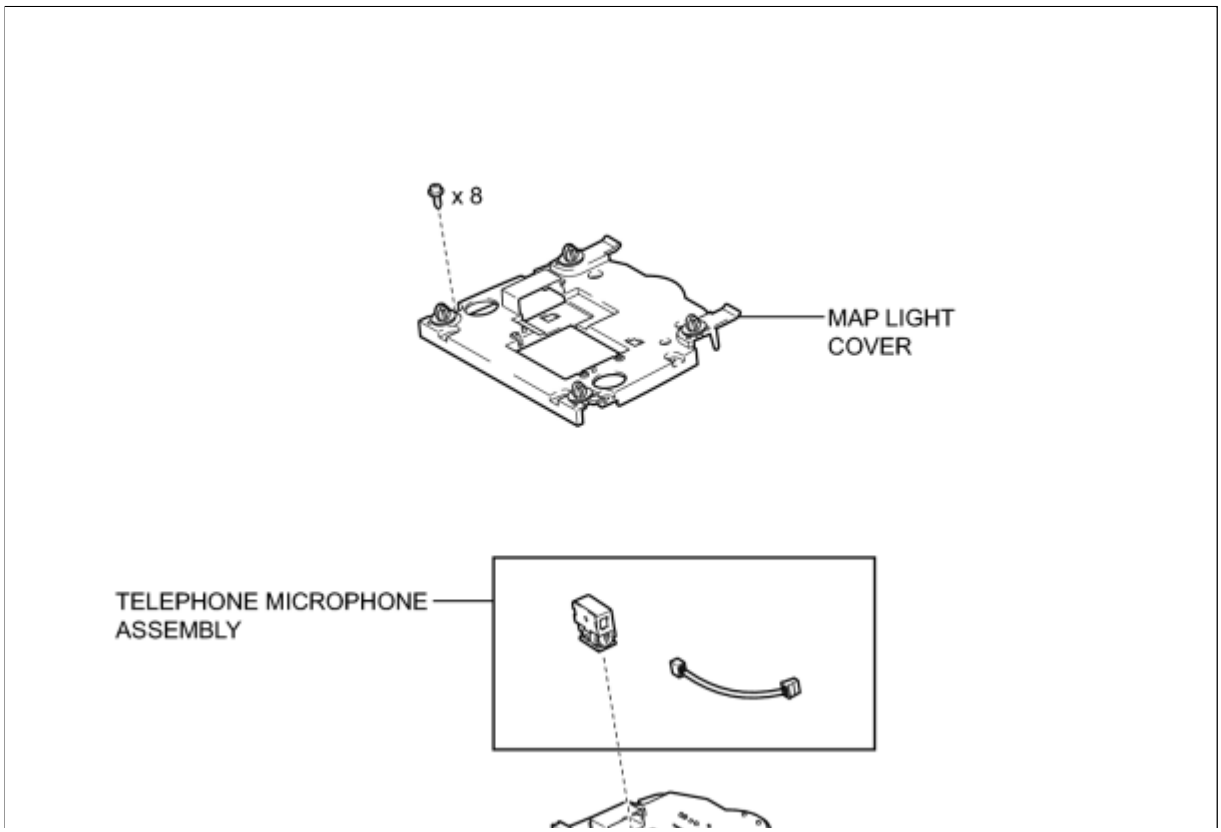
**Do not touch the cone part of the speaker.**

## COMPONENTS

## ILLUSTRATION




## ILLUSTRATION

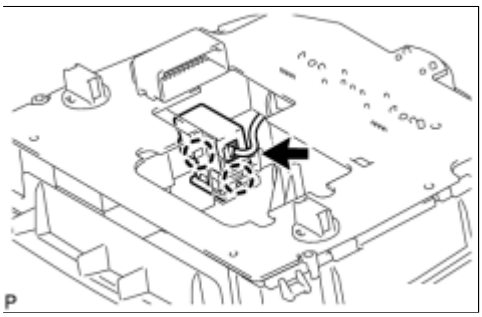




P

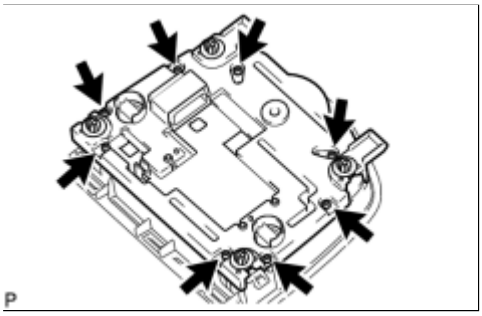
# INSTALLATION

### 1. INSTALL TELEPHONE MICROPHONE ASSEMBLY



(a) Engage the 2 claws to install the telephone microphone assembly.

(b) Connect the connector.



(c) Install the map light cover with the 8 screws.

### 2. INSTALL MAP LIGHT ASSEMBLY INFO

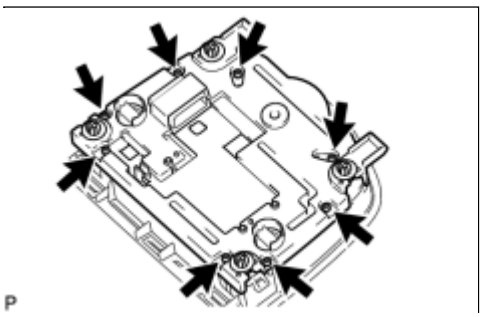
### 3. INSTALL ROOF TOP MOULDING INFO

# REMOVAL

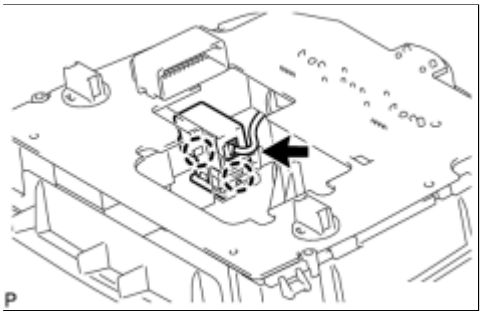
**1. REMOVE ROOF TOP MOULDING** INFO

**2. REMOVE MAP LIGHT ASSEMBLY** INFO

**3. REMOVE TELEPHONE MICROPHONE ASSEMBLY**



(a) Remove the 8 screws and map light cover.

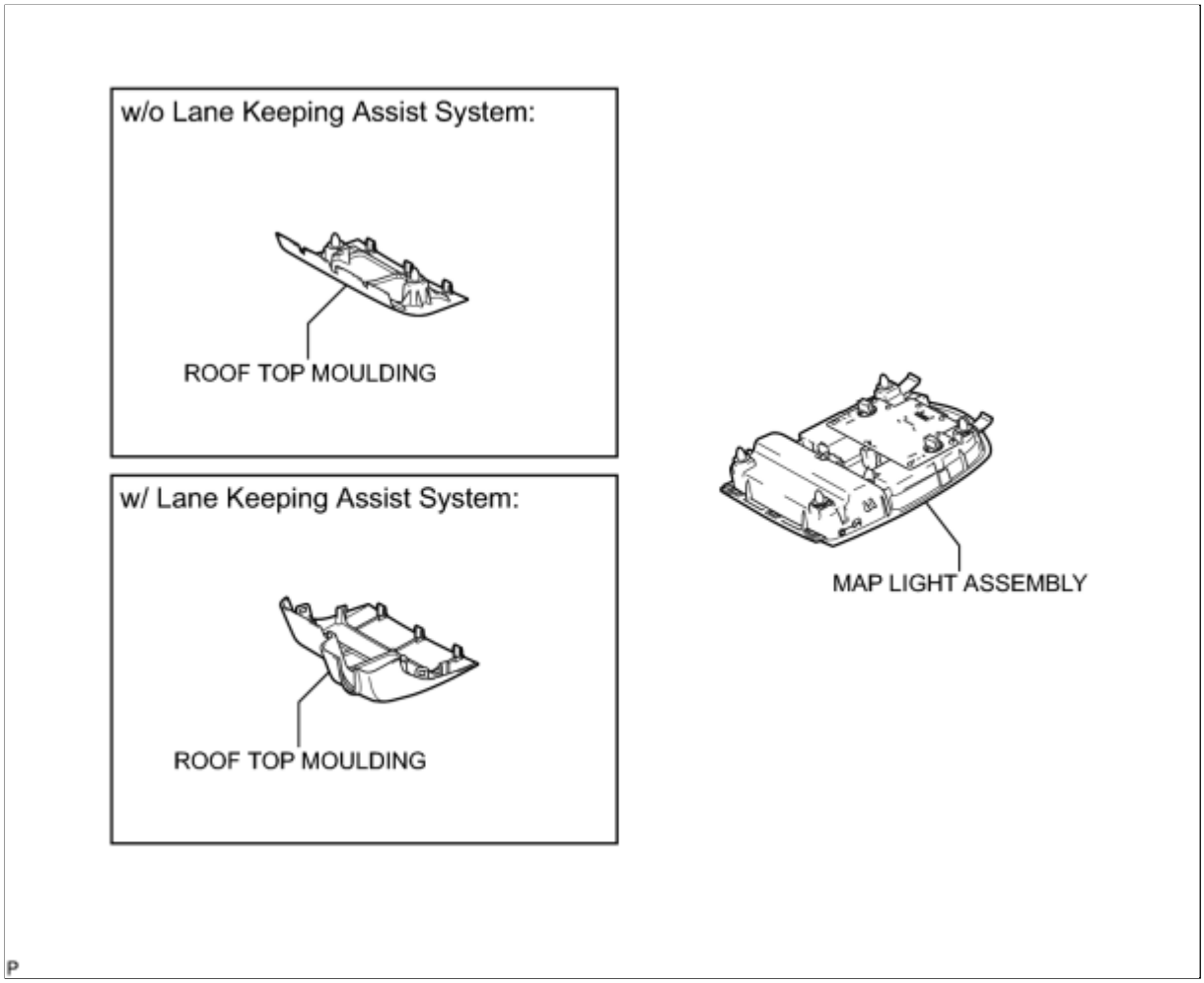


(b) Disconnect the connector.

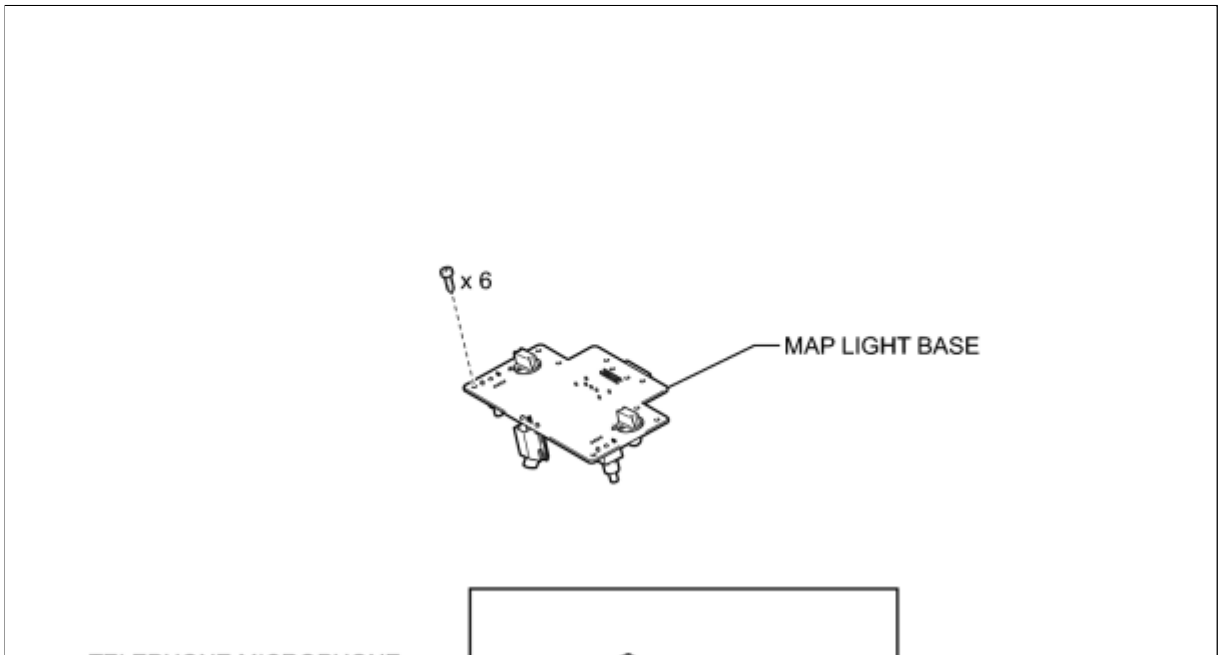
(c) Disengage the 2 claws and remove the telephone microphone assembly.

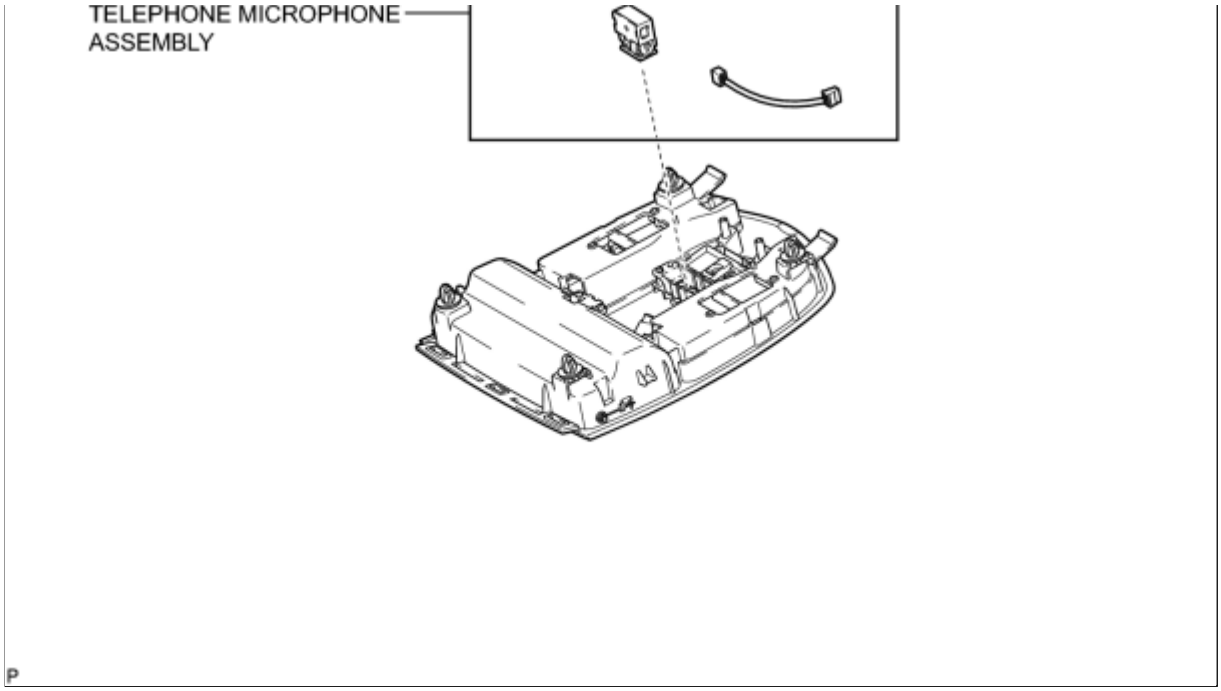
## COMPONENTS

## ILLUSTRATION



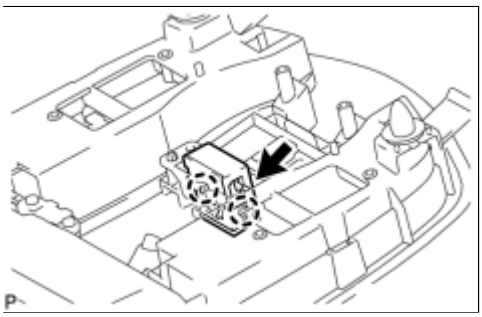

## ILLUSTRATION




TELEPHONE MICROPHONE ASSEMBLY
P

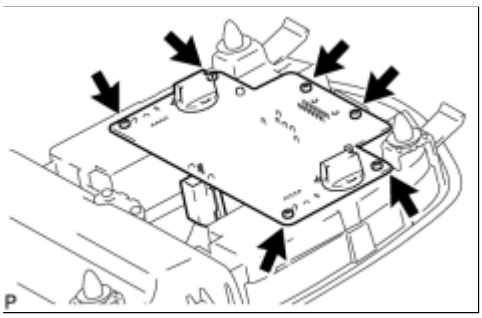
# INSTALLATION

### 1. INSTALL TELEPHONE MICROPHONE ASSEMBLY



(a) Engage the 2 claws to install the telephone microphone assembly.

(b) Connect the connector.



(c) Install the map light base with the 6 screws.

### 2. INSTALL MAP LIGHT ASSEMBLY INFO

### 3. INSTALL ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

### 4. INSTALL ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

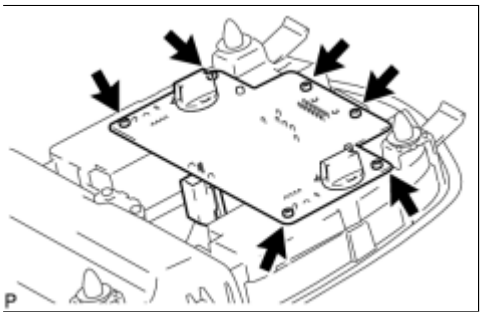
# REMOVAL

**1. REMOVE ROOF TOP MOULDING (w/o Lane Keeping Assist System)** INFO

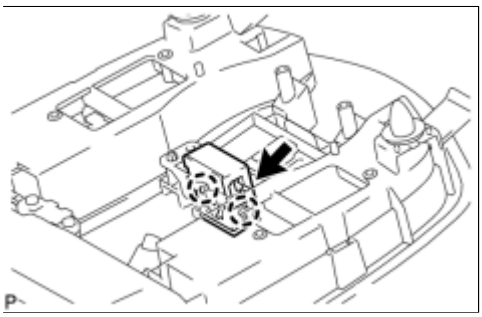
**2. REMOVE ROOF TOP MOULDING (w/ Lane Keeping Assist System)** INFO

**3. REMOVE MAP LIGHT ASSEMBLY** INFO

**4. REMOVE TELEPHONE MICROPHONE ASSEMBLY**



(a) Remove the 6 screws and map light base.

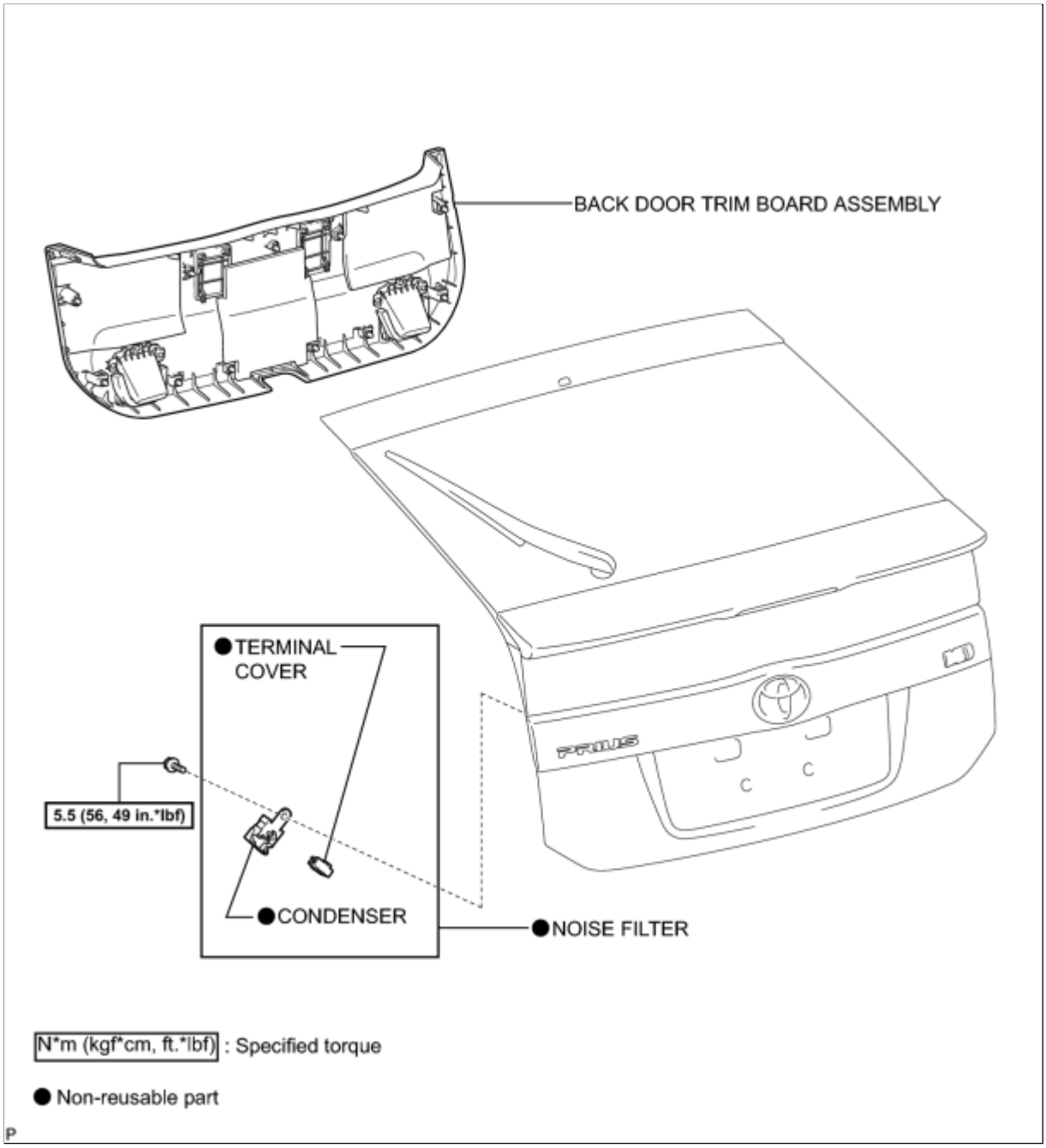


(b) Disconnect the connector.

(c) Disengage the 2 claws and remove the telephone microphone assembly.

## COMPONENTS

## ILLUSTRATION



# INSPECTION

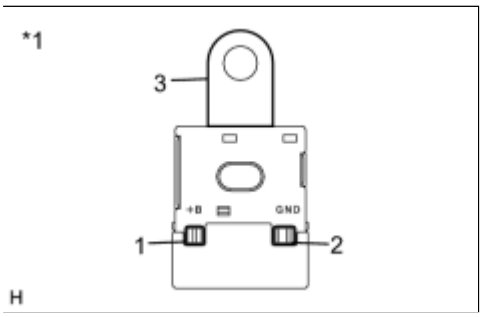
### 1. INSPECT NOISE FILTER

(a) With the noise filter installed, check that there is no looseness or other abnormalities.

(b) Remove the noise filter.

(c) Measure the resistance of the noise filter according to the value(s) in the table below.

Standard Resistance:



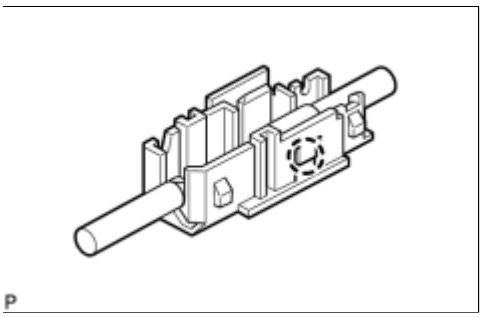

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 (+B) - 2 (GND) | Always | 10 kΩ or higher |
| 2 (GND) - 3 | Always | Below 1 Ω |

## Text in Illustration

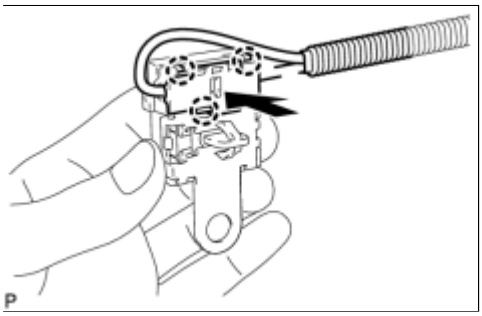
| | |
|---|---|
| *1 | Noise Filter |

# INSTALLATION

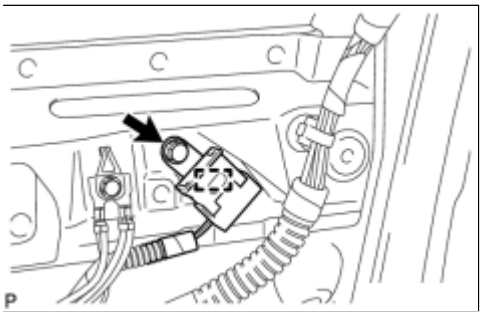
### 1. INSTALL NOISE FILTER



(a) Engage the claw to install a new terminal cover to the wire harness.



(b) Engage the 3 claws to install the new terminal cover with wire harness to a new condenser.



(c) Engage the clamp to temporarily install a new noise filter with wire harness to the back door.

(d) Install the new radio setting condenser with the bolt.

**Torque: 5.5 N·m (56 kgf·cm, 49in·lbf)**

### 2. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

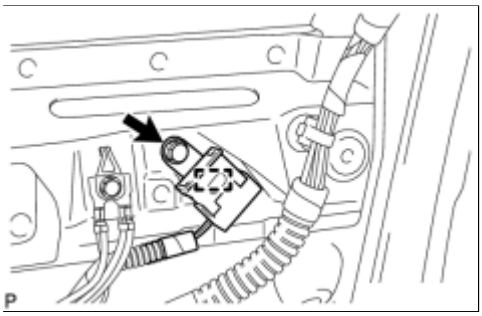
# REMOVAL

### 1. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

### 2. REMOVE NOISE FILTER

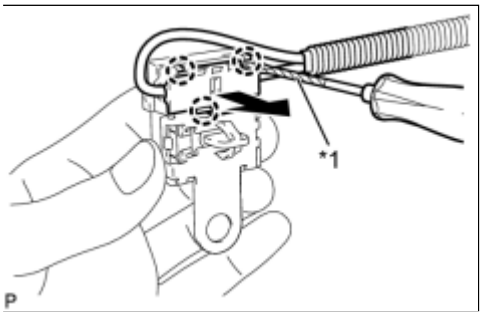
**NOTICE:**

**When the terminal cover is removed, the noise filter must be replaced because the terminal cover and condenser are supplied as a set.**



(a) Remove the bolt.

(b) Disengage the clamp and disconnect the noise filter with wire harness from the vehicle body.

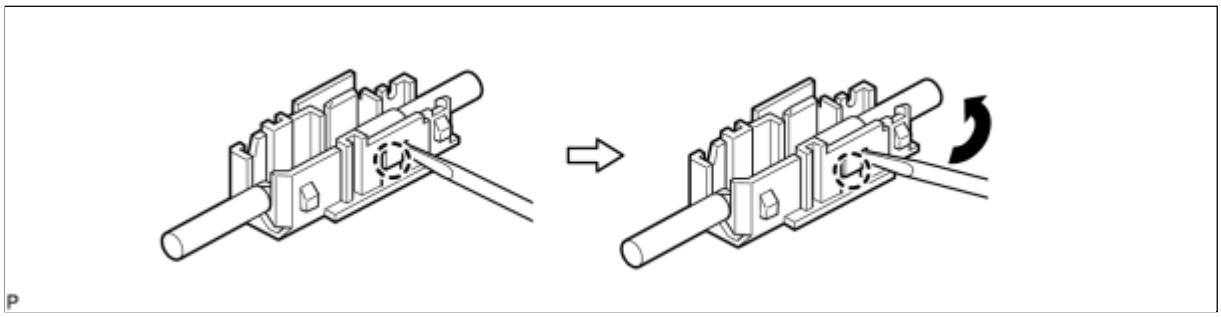



(c) Using a screwdriver with its tip wrapped with protective tape, disengage the 3 claws and remove the terminal cover with wire harness from the condenser.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

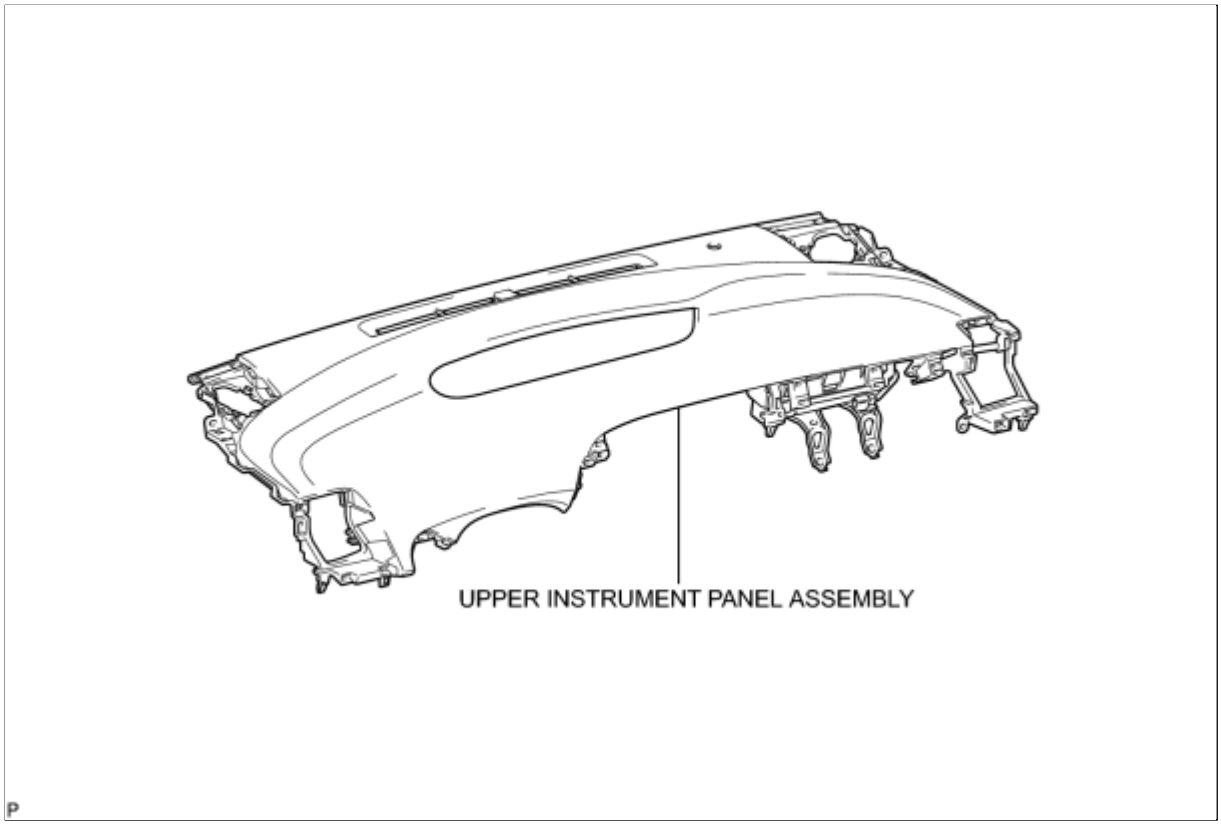
(d) Using a screwdriver, bend back and break off the claw as shown in the illustration.



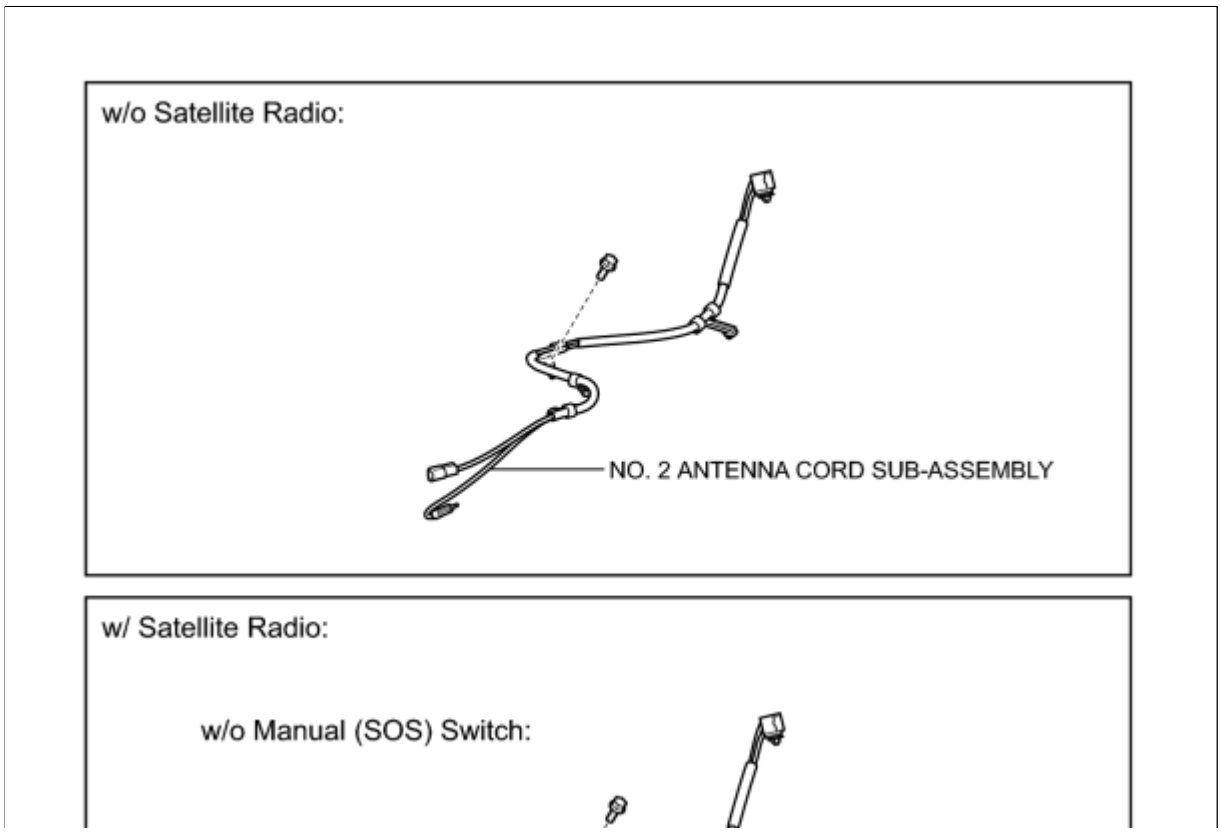
(e) Remove the terminal cover from the wire harness.

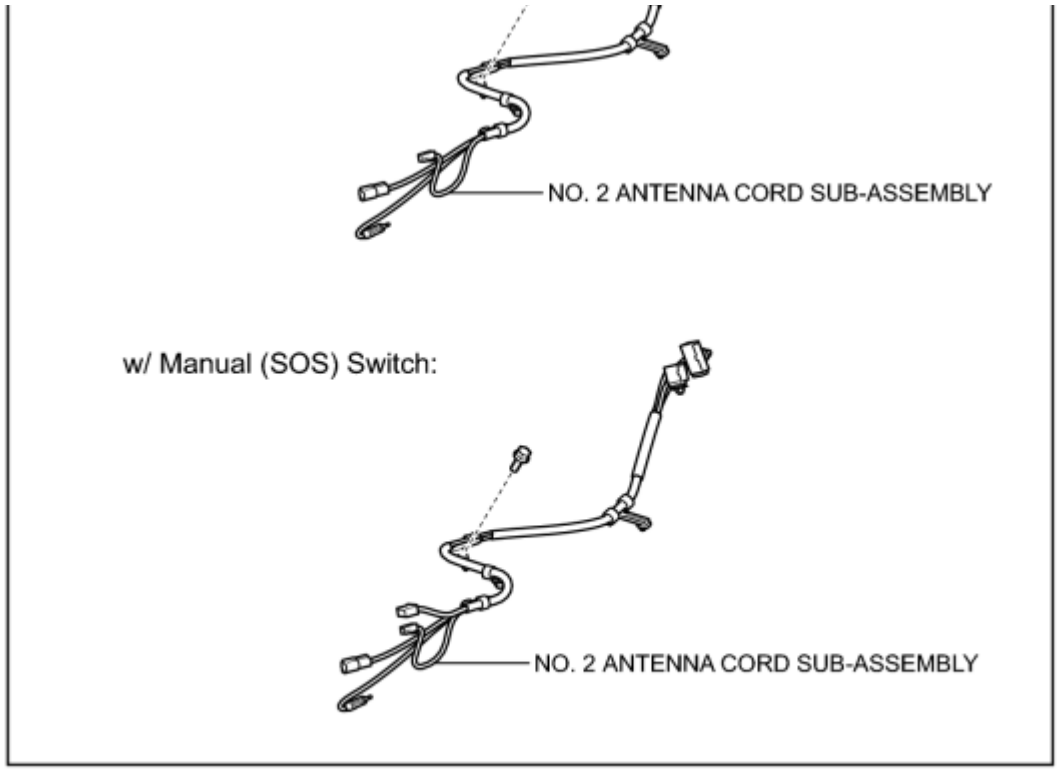
## COMPONENTS

## ILLUSTRATION



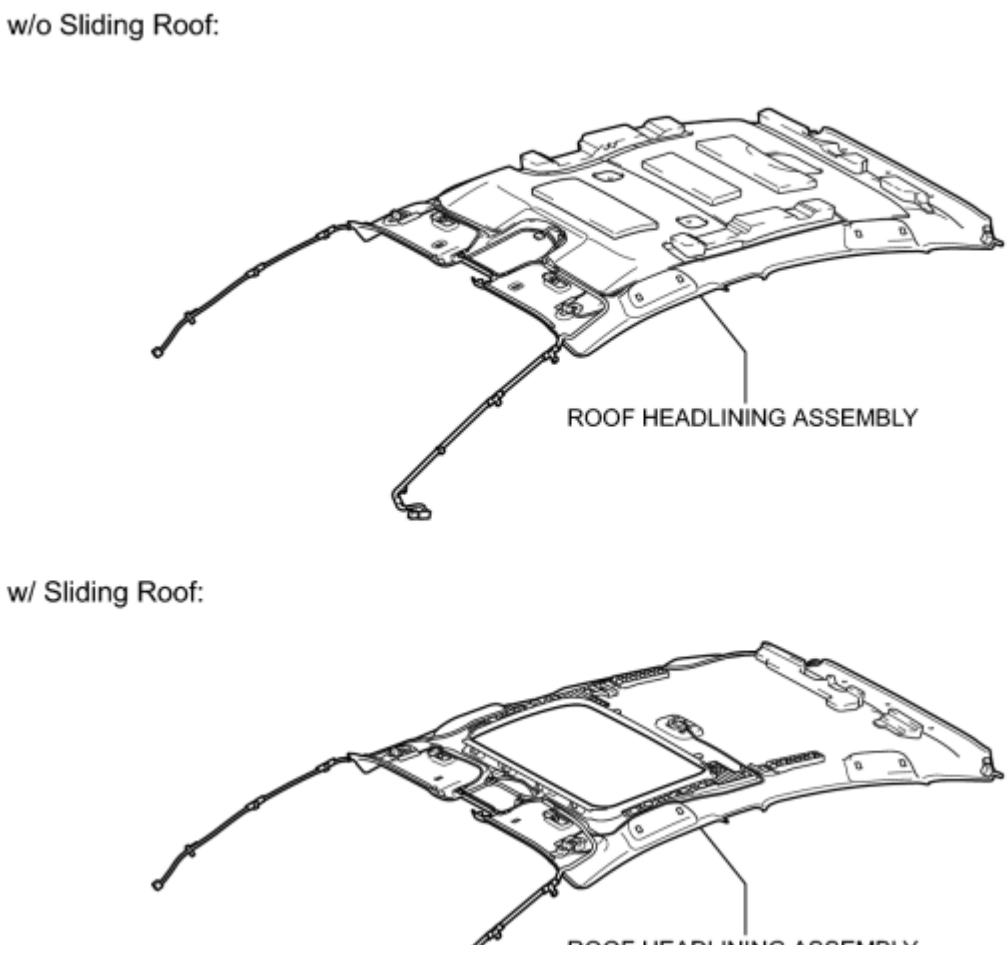

## ILLUSTRATION





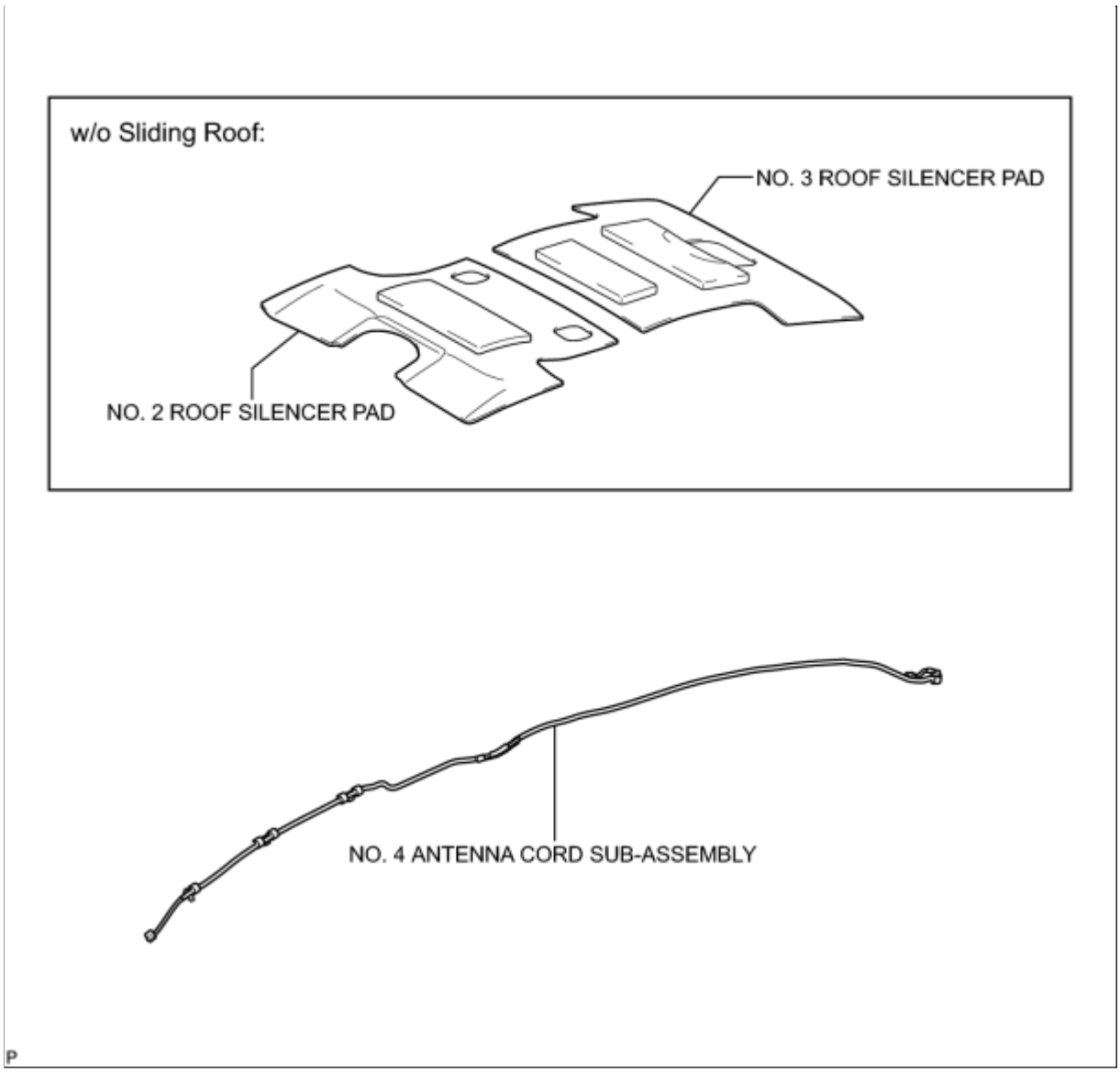

P

## ILLUSTRATION

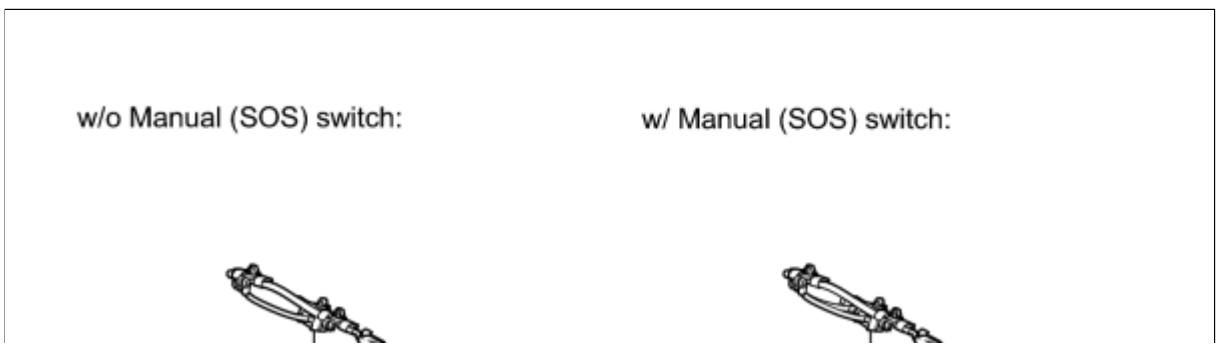





## ILLUSTRATION



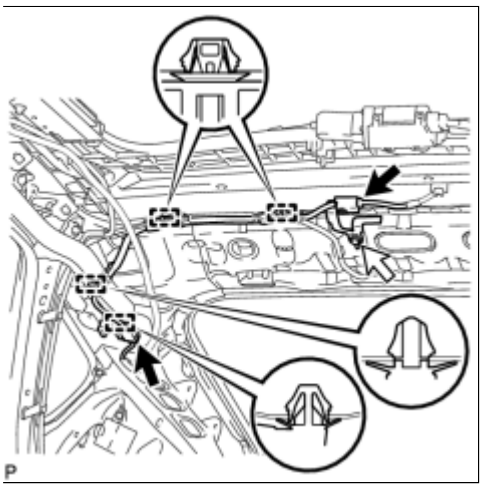

## ILLUSTRATION




NO. 5 ANTENNA CORD SUB-ASSEMBLY
NO. 5 ANTENNA CORD SUB-ASSEMBLY
P

# INSTALLATION

### 1. INSTALL NO. 5 ANTENNA CORD SUB-ASSEMBLY (w/o Manual (SOS) Switch)

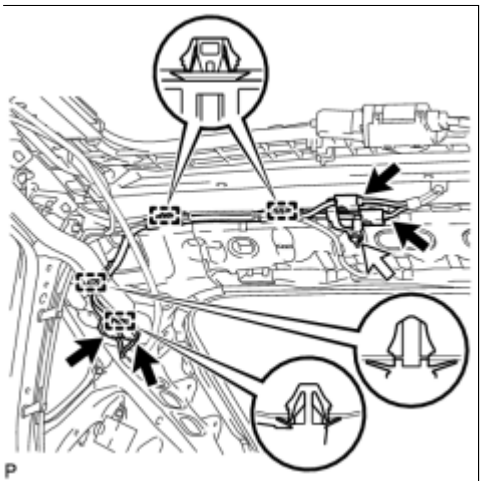



(a) Engage the 4 clamps.

(b) Install the No. 5 antenna cord sub-assembly with the bolt.

(c) Connect the 2 connectors.

### 2. INSTALL NO. 5 ANTENNA CORD SUB-ASSEMBLY (w/ Manual (SOS) Switch)




(a) Engage the 4 clamps.

(b) Install the No. 5 antenna cord sub-assembly with the bolt.

(c) Connect the 4 connectors.

### 3. INSTALL NO. 4 ANTENNA CORD SUB-ASSEMBLY

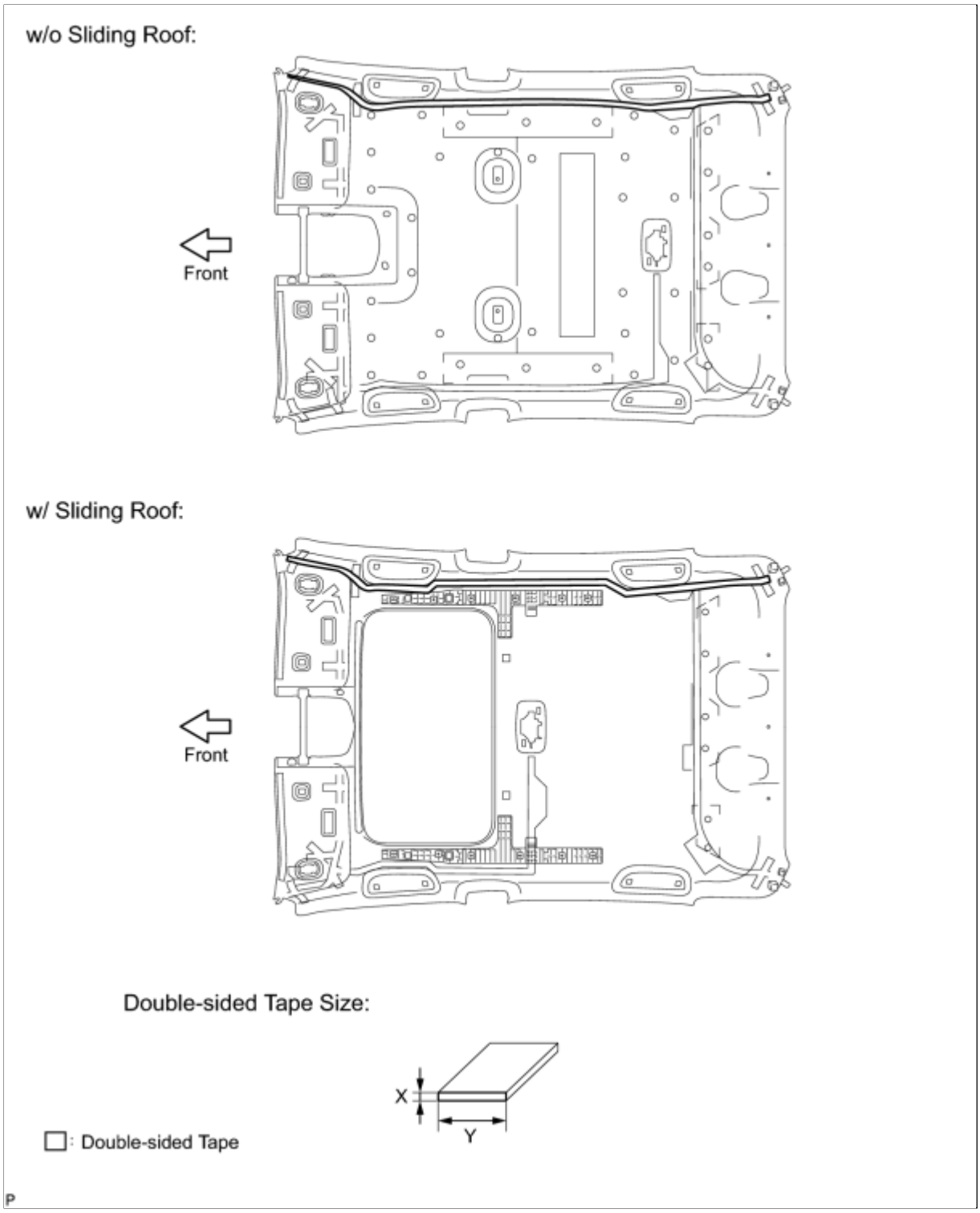
**HINT:**

**Double-sided tape and tape are not available as supply parts. If the tape still has enough adhesion to secure the roof headlining and antenna cord, reuse it. If the roof headlining has been replaced with a new one, or if the tape and/or the double-sided tape is no longer sticky, apply new tape following the procedure below.**

If the double-sided tape cannot be reused:

(a) Peel off the release paper from one side of new double-sided tape and apply the new double-sided tape to the position indicated in the illustration. Be careful not to touch the adhesive surface.

position indicated in the illustration. Be careful not to touch the adhesive surface.




| AREA | DIMENSION |
|---|---|
| X | 1.0 mm (0.0394 in.) |
| Y | 10.0 mm (0.394 in.) |

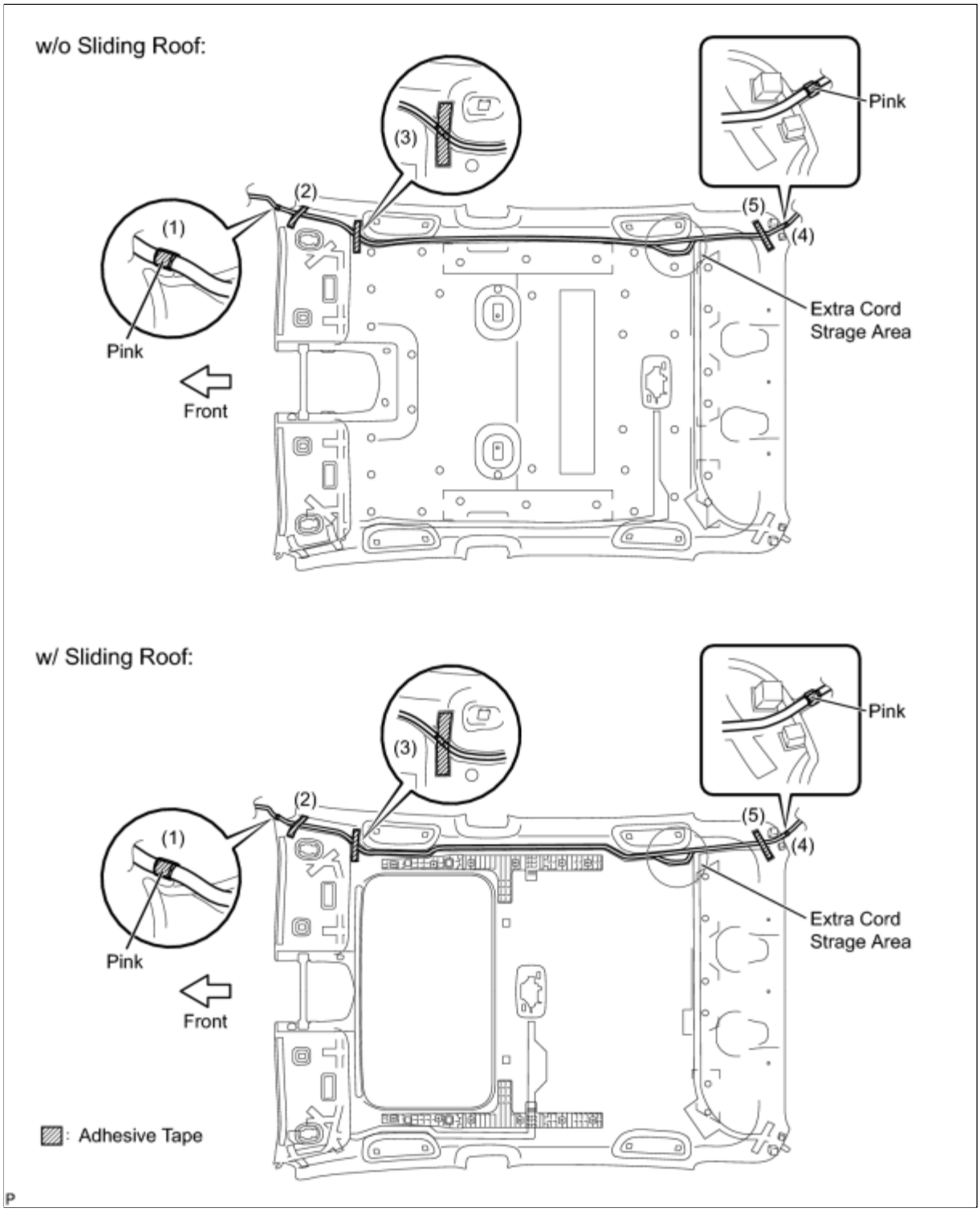
**NOTICE:**

**Be sure to apply the double-sided tape carefully so that the tape will not be misaligned or come off.**

(b) Peel off the release paper from the double-sided tape. Be careful not to touch the adhesive surface.

(c) Align the vehicle front side marking (pink) on the No. 4 antenna cord sub-assembly with the vehicle front side tab

on the roof headlining, and wrap the tape over the antenna cord to install it. (1)




**HINT:**

**If the tape cannot be reused, packing tape can be used as a substitute.**

(d) Temporarily install the front side of the No. 4 antenna cord sub-assembly (2) with the adhesive tape.

(e) Temporarily install the front side of the No. 4 antenna cord sub-assembly (3) with the adhesive tape.

(f) Temporarily install the No. 4 antenna cord sub-assembly by placing it on the double-sided tape from the front of the vehicle to the point just before the extra cord storage area.

(g) Align the vehicle rear marking (pink) on the No. 4 antenna cord sub-assembly with the tape attachment location

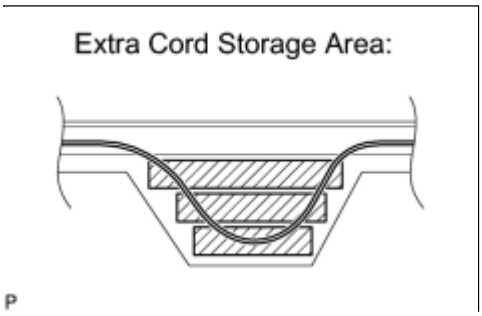
(scribe line) of the roof headlining, and wrap the tape over the antenna cord to install it. (4)

**HINT:**

**If the tape cannot be reused, packing tape can be used as a substitute.**

(h) Temporarily install the rear side of the No. 4 antenna cord sub-assembly (5) with the adhesive tape.

(i) Temporarily install the No. 4 antenna cord sub-assembly by placing it on the double-sided tape from the rear of the vehicle to the point just before the extra cord storage area.




(j) Using double-sided tape, place any excess No. 4 antenna cord sub-assembly in the extra cord storage area to finish installing the antenna cord.

**HINT:**

**Attach 3 pieces of double-sided tape to the extra cord storage area as shown in the illustration.**

### 4. INSTALL NO. 3 ROOF SILENCER PAD (w/o Sliding Roof) INFO

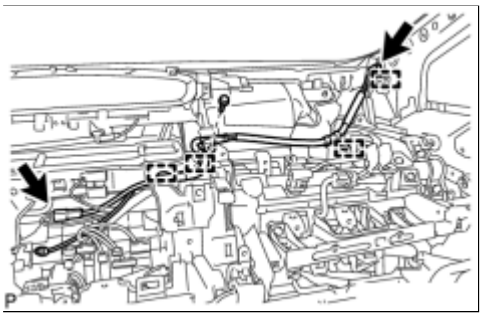
### 5. INSTALL NO. 2 ROOF SILENCER PAD (w/o Sliding Roof) INFO

### 6. INSTALL ROOF HEADLINING ASSEMBLY

**HINT:**

**Refer to the procedure from Install Roof Headlining Assembly** INFO **.**

### 7. INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/o Satellite Radio)



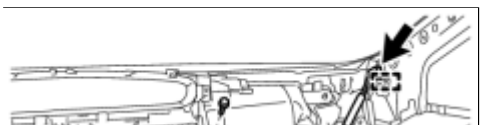

(a) Engage the 4 clamps.

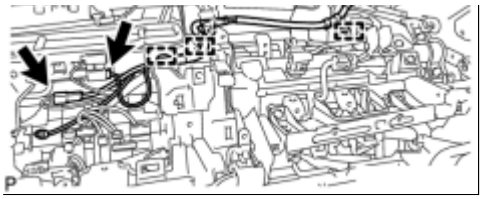
(b) Install the No. 2 antenna cord sub-assembly with the bolt.

(c) Connect the 2 connectors.

### 8. INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/ Satellite Radio)

(a) w/o Manual (SOS) Switch:



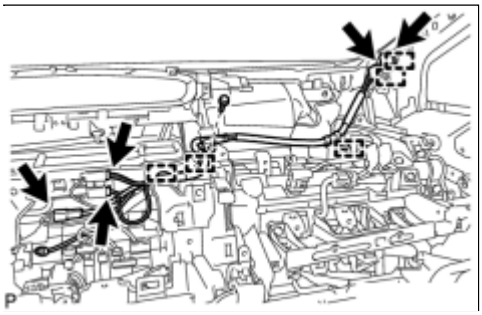


(1) Engage the 4 clamps.

(2) Install the No. 2 antenna cord sub-assembly with the bolt.

(3) Connect the 3 connectors.

(b) w/ Manual (SOS) Switch:



(1) Engage the 5 clamps.

(2) Install the No. 2 antenna cord sub-assembly with the bolt.

(3) Connect the 5 connectors.

### 9. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

**HINT:**

**Refer to the procedure from Install Upper Instrument Panel Assembly** INFO **.**

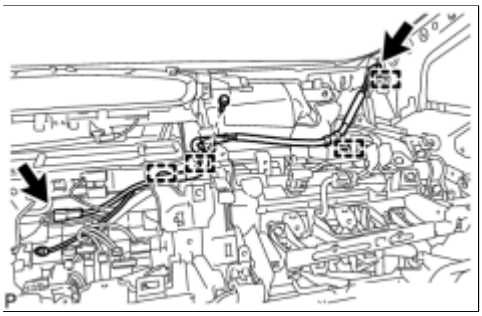
# REMOVAL

### 1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

**HINT:**

**Refer to the procedure up to Remove Upper Instrument Panel Assembly** INFO .

### 2. REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/o Satellite Radio)

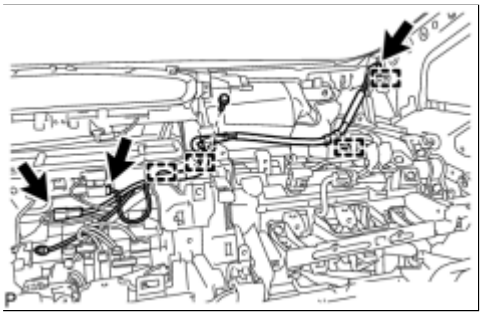


(a) Disconnect the 2 connectors.

(b) Remove the bolt.

(c) Disengage the 4 clamps and remove the No. 2 antenna cord sub-assembly.

### 3. REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/ Satellite Radio)

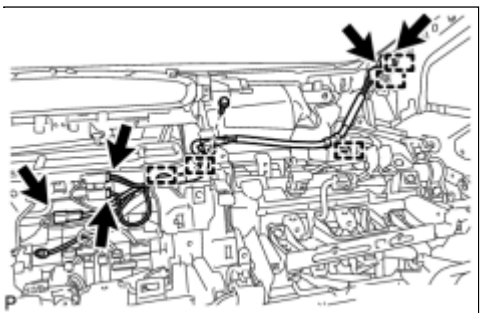


(a) w/o Manual (SOS) Switch:

(1) Disconnect the 3 connectors.

(2) Remove the bolt.

(3) Disengage the 4 clamps and remove the No. 2 antenna cord sub-assembly.



(b) w/ Manual (SOS) Switch:

(1) Disconnect the 5 connectors.

(2) Remove the bolt.

(3) Disengage the 5 clamps and remove the No. 2 antenna cord sub-assembly.

### 4. REMOVE ROOF HEADLINING ASSEMBLY

**HINT:**

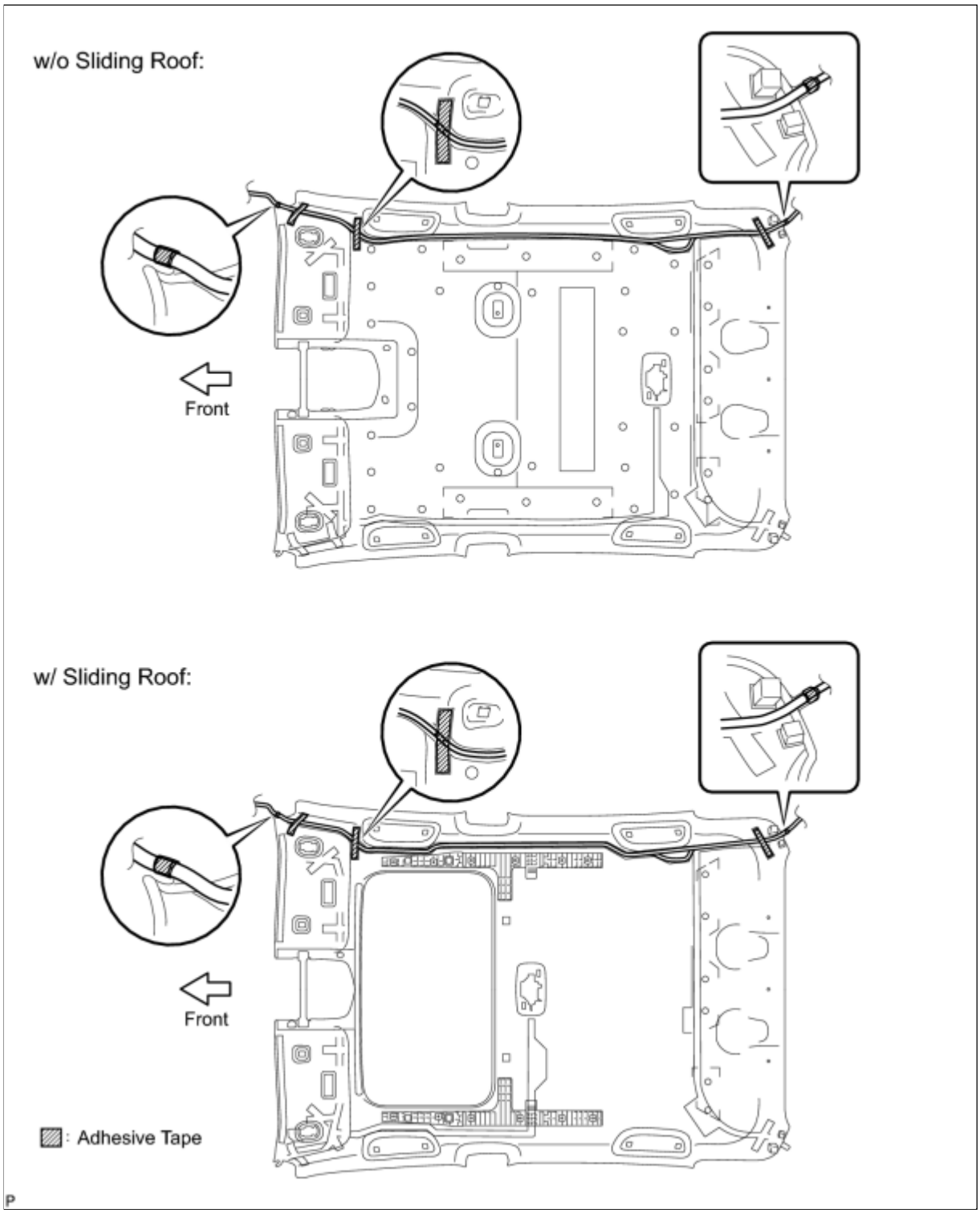
**Refer to the procedure up to Remove Roof Headlining Assembly** INFO .

**5. REMOVE NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)** INFO

**6. REMOVE NO. 3 ROOF SILENCER PAD (w/o Sliding Roof)** INFO

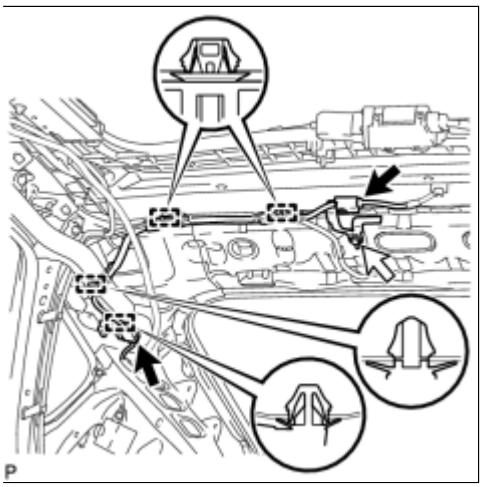
**7. REMOVE NO. 4 ANTENNA CORD SUB-ASSEMBLY**

(a) Peel the strips of the tape used to secure the antenna cord only to the extent that allows removal of the antenna cord.




(b) Remove the No. 4 antenna cord sub-assembly.

**8. REMOVE NO. 5 ANTENNA CORD SUB-ASSEMBLY (w/o Manual (SOS) Switch)**

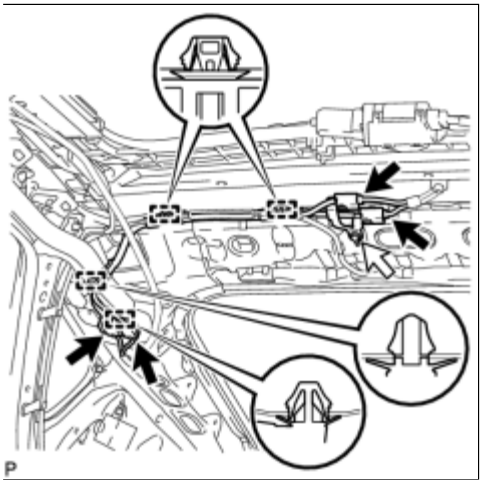


(a) Disconnect the 2 connectors.

(b) Remove the bolt.

(c) Disengage the 4 clamps and remove the No. 5 antenna cord sub-assembly.

**9. REMOVE NO. 5 ANTENNA CORD SUB-ASSEMBLY (w/ Manual (SOS) Switch)**



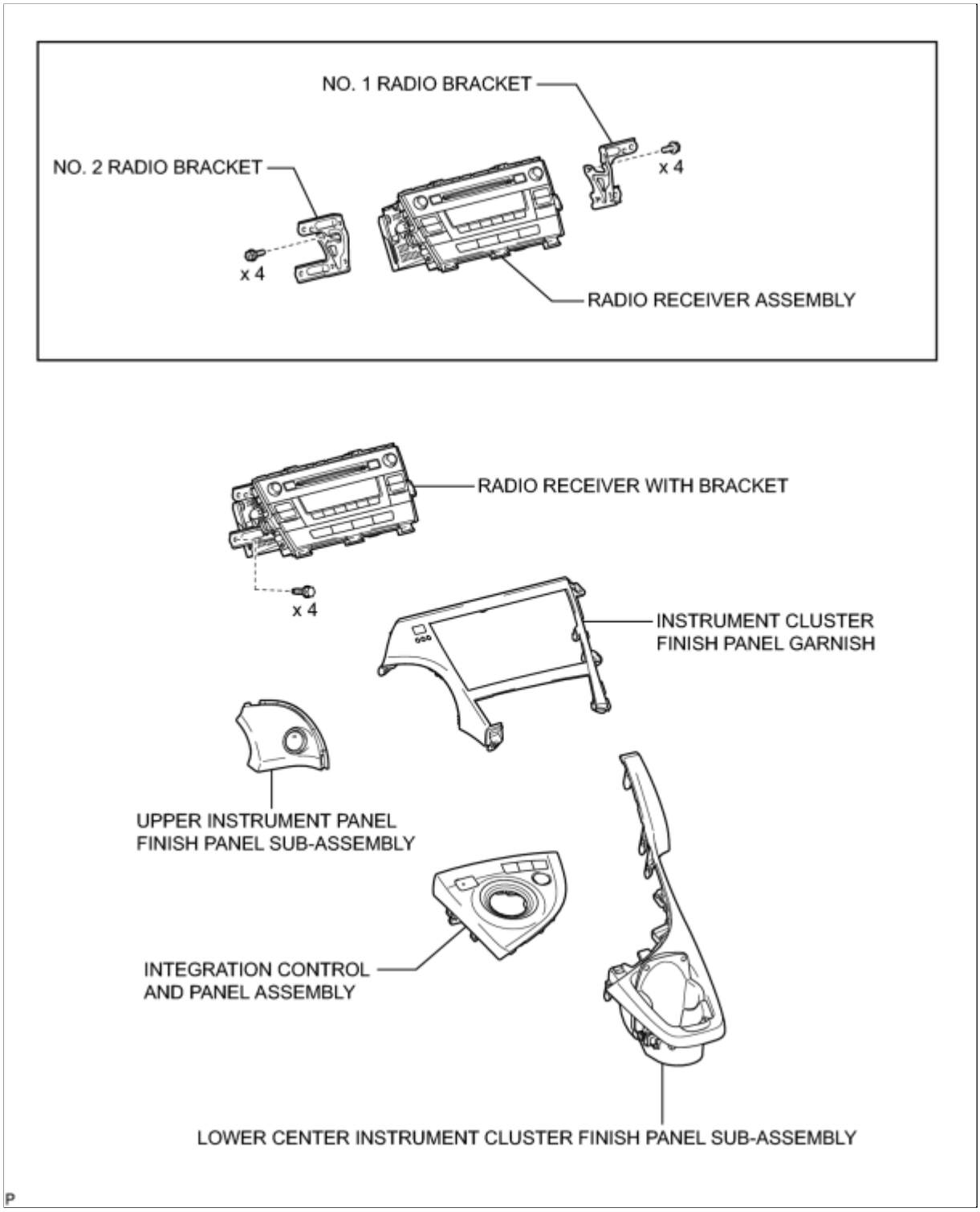
(a) Disconnect the 4 connectors.

(b) Remove the bolt.

(c) Disengage the 4 clamps and remove the No. 5 antenna cord sub-assembly.

## COMPONENTS

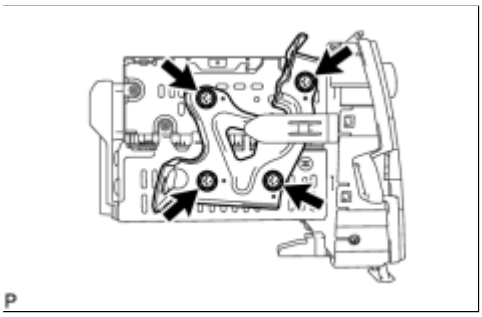
## ILLUSTRATION



# INSTALLATION

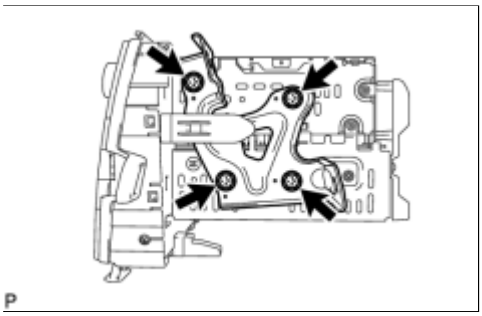
### 1. INSTALL RADIO RECEIVER ASSEMBLY

### 2. INSTALL NO. 2 RADIO BRACKET



(a) Install the No. 2 radio bracket with the 4 bolts.

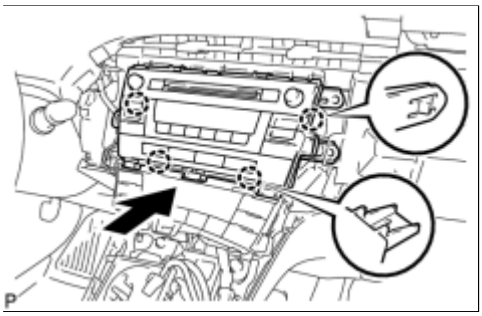
### 3. INSTALL NO. 1 RADIO BRACKET



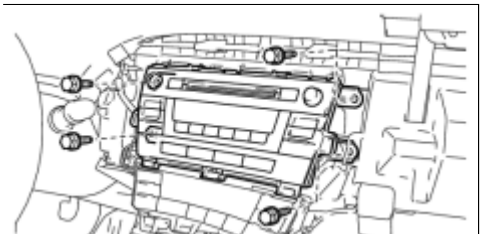
(a) Install the No. 1 radio bracket with the 4 bolts.

### 4. INSTALL RADIO RECEIVER WITH BRACKET

(a) Connect each connector.



(b) Engage the 4 claws as shown in the illustration.



(c) Install the radio receiver with bracket with the 4 bolts.



**5. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY** INFO

**6. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH** INFO

**7. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY** INFO

**8. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY** INFO

# REMOVAL

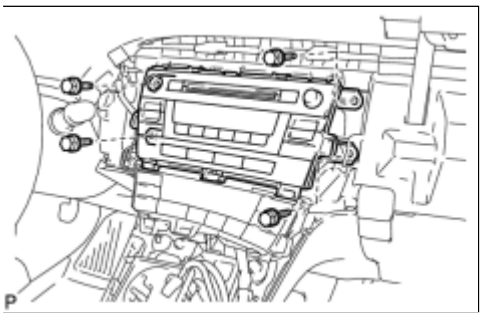
**1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY** INFO

**2. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY** INFO

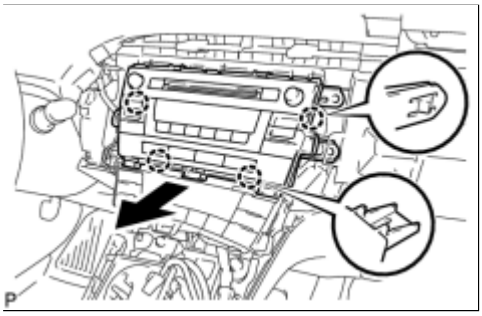
**3. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH** INFO

**4. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY** INFO

**5. REMOVE RADIO RECEIVER WITH BRACKET**



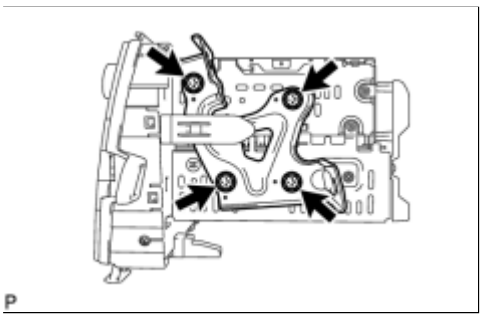
(a) Remove the 4 bolts.



(b) Disengage the 4 claws as shown in the illustration.

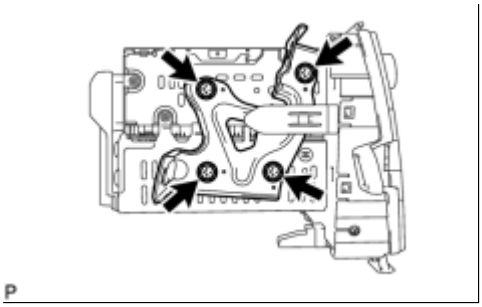
(c) Disconnect each connector and remove the radio receiver with bracket.

**6. REMOVE NO. 1 RADIO BRACKET**



(a) Remove the 4 bolts and No. 1 radio bracket.

**7. REMOVE NO. 2 RADIO BRACKET**

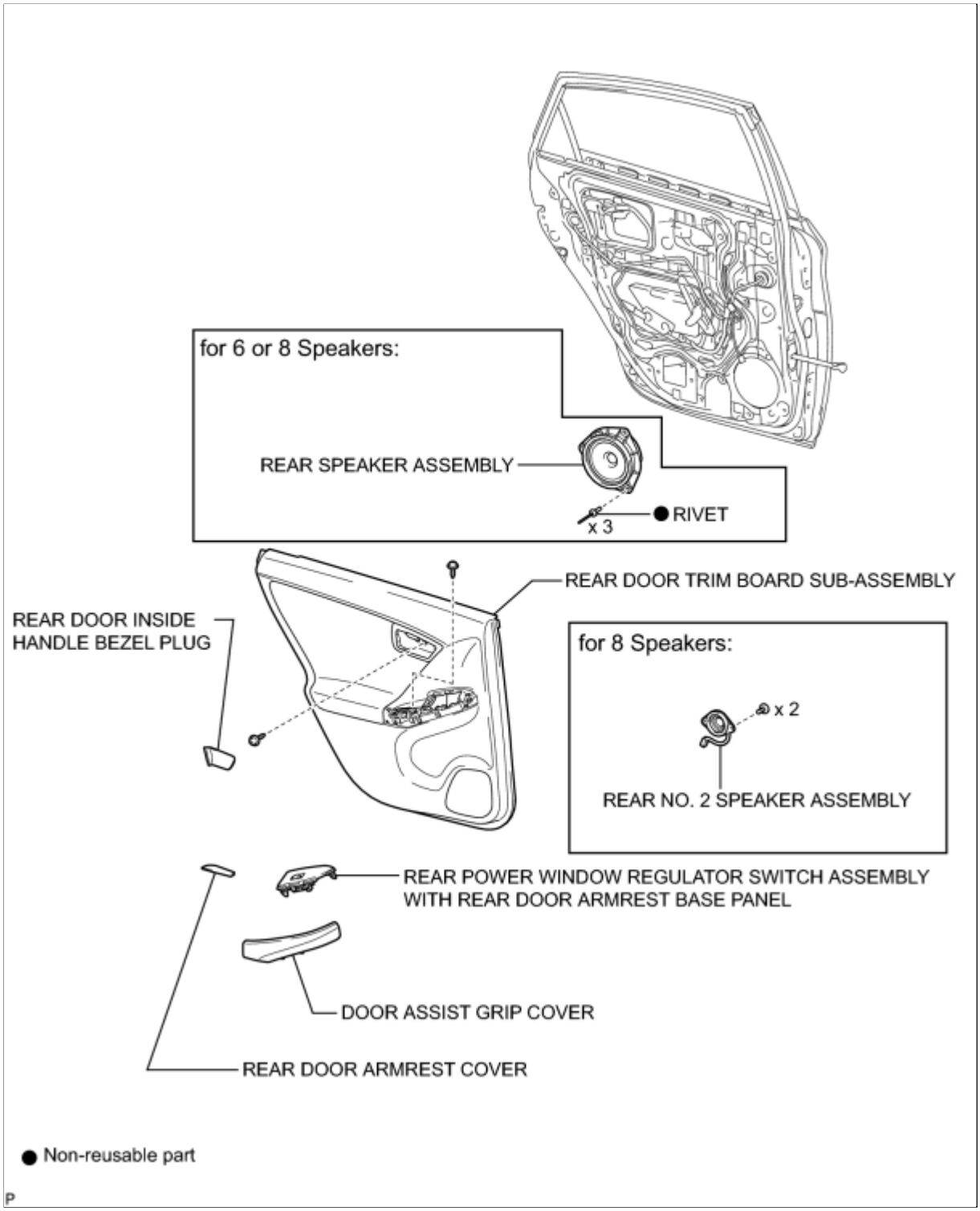



(a) Remove the 4 bolts and No. 2 radio bracket.

**8. REMOVE RADIO RECEIVER ASSEMBLY**

## COMPONENTS

## ILLUSTRATION

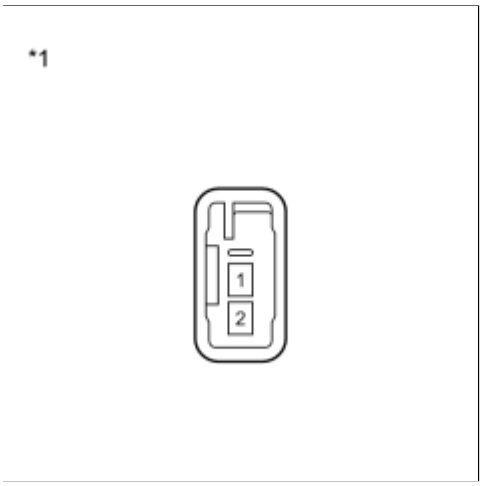


# INSPECTION

### 1. INSPECT REAR SPEAKER

Measure the resistance of the speaker.

Standard Resistance (for 6 Speakers):




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 - 2 | Always | 3.2 to 4.8 Ω |

Standard Resistance (for 8 Speakers):

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 - 2 | Always | 1.5 to 2.2 Ω |

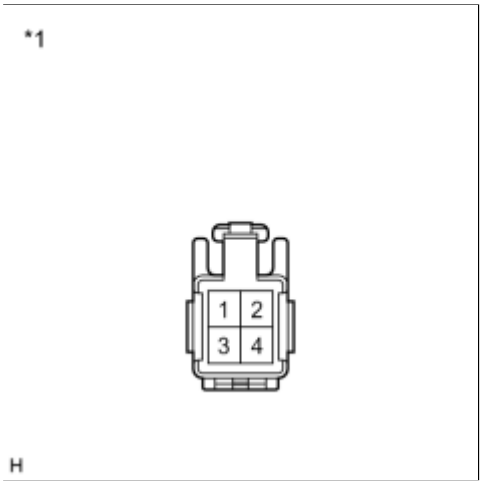
If the result is not as specified, replace the speaker assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear Speaker) |

### 2. INSPECT REAR NO. 2 SPEAKER (for 8 Speakers)

Measure the resistance of the speaker.




Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 - 2 | Always | 1.5 to 2.5 Ω |

If the result is not as specified, replace the speaker assembly.

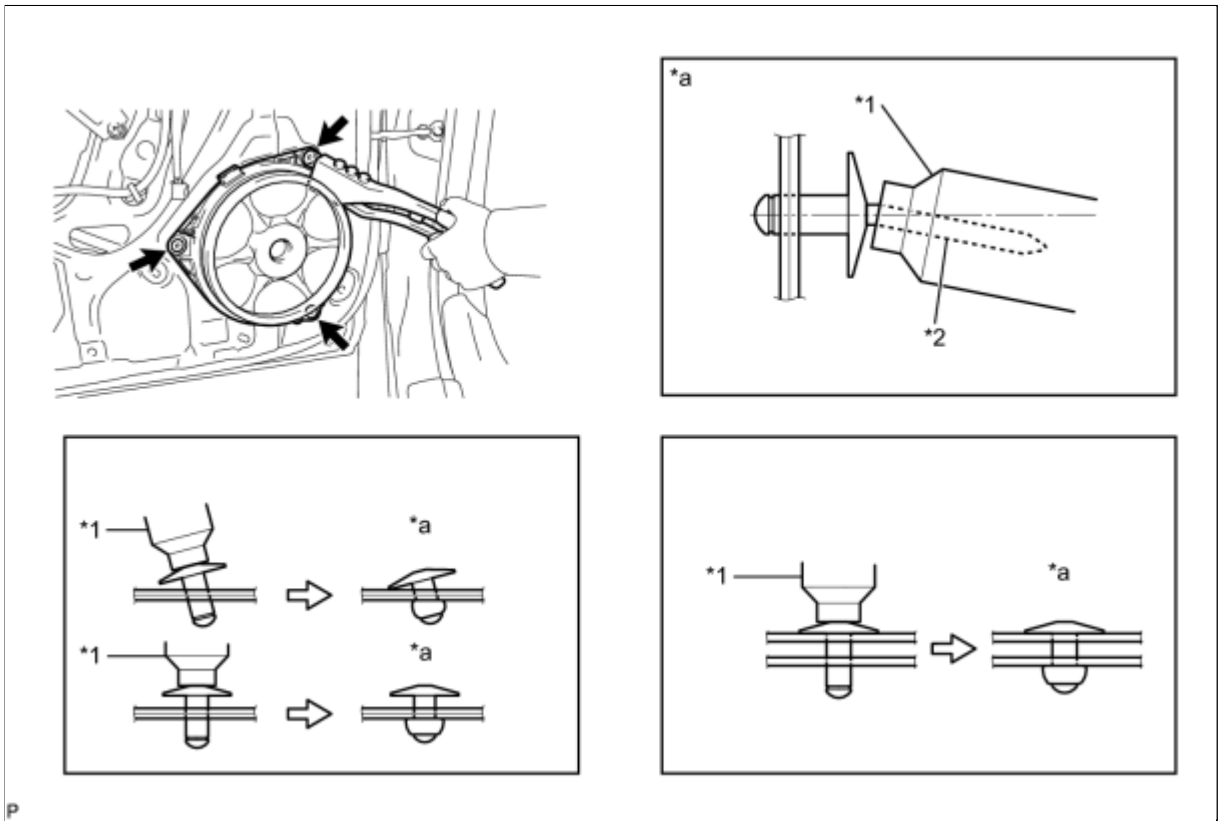
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear No. 2 Speaker) |

# INSTALLATION

### 1. INSTALL REAR SPEAKER ASSEMBLY (for 6 or 8 Speakers)

(a) Using an air riveter or a hand riveter, install the rear speaker assembly with 3 new rivets.




**Text in Illustration**

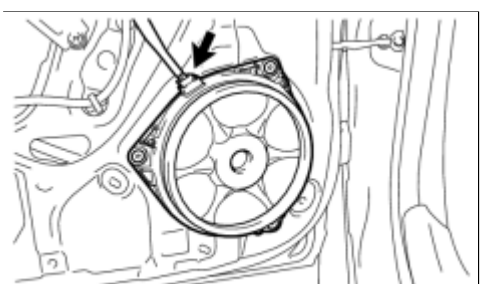
| | | | |
|---|---|---|---|
| *1 | Riveter | *2 | Mandrel |
| *a | INCORRECT | - | - |

**NOTICE:**

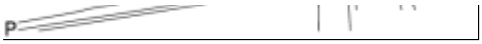
- Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.
- Confirm that the rivet is seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any clearance between the rivet head and moulding.
- Do not leave any clearance between the moulding and door frame. Firmly hold the 2 items together while installing the rivet.

**HINT:**

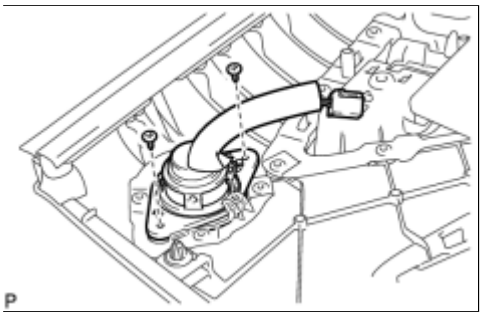
**If the rivet cannot be cut, pull it once and cut it.**



(b) Connect the connector.



**2. INSTALL REAR NO. 2 SPEAKER ASSEMBLY (for 8 Speakers)**



(a) Install the rear No. 2 speaker assembly with the 2 screws.

**3. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY** INFO

**4. INSTALL REAR DOOR ARMREST COVER** INFO

**5. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL** INFO

**6. INSTALL DOOR ASSIST GRIP COVER** INFO

**7. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG** INFO

# REMOVAL

**1. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG** INFO

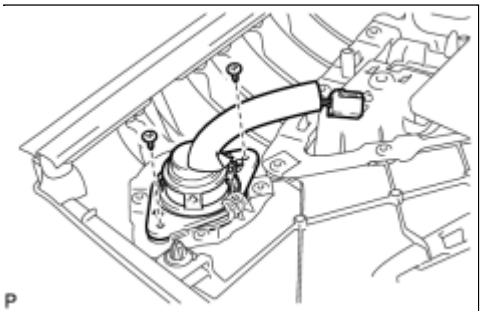
**2. REMOVE DOOR ASSIST GRIP COVER** INFO

**3. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL** INFO

**4. REMOVE REAR DOOR ARMREST COVER** INFO

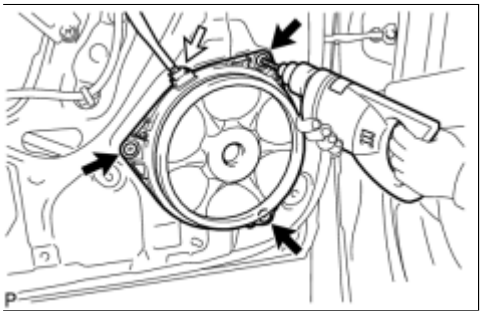
**5. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY** INFO

**6. REMOVE REAR NO. 2 SPEAKER ASSEMBLY (for 8 Speakers)**



(a) Remove the 2 screws and rear No. 2 speaker assembly.

**7. REMOVE REAR SPEAKER ASSEMBLY (for 6 or 8 Speakers)**



(a) Disconnect the connector.

(b) Using a drill bit with a diameter of less than 4 mm (0.158 in.), drill out the 3 rivet heads and remove the rear speaker assembly.

**NOTICE:**

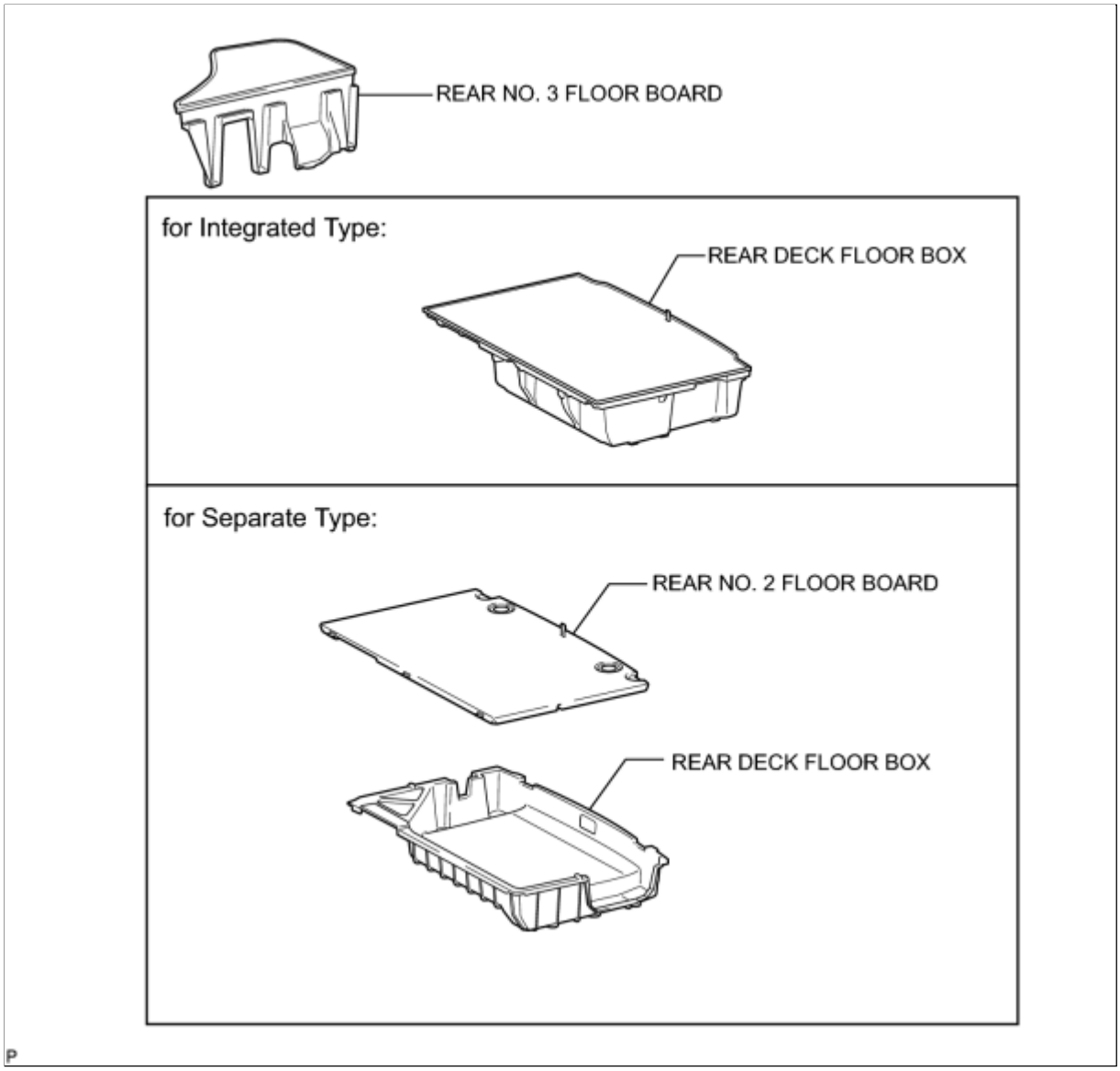
- Do not touch the cone part of the speaker.
- Do not drill the rivet at an angle as this will cause damage to the drill and drill hole. Line up the drill and rivet, and carefully drill out the rivet head.
- Be careful as the cut rivet will be very hot.

(c) Continue drilling and push out the remaining rivet fragments.

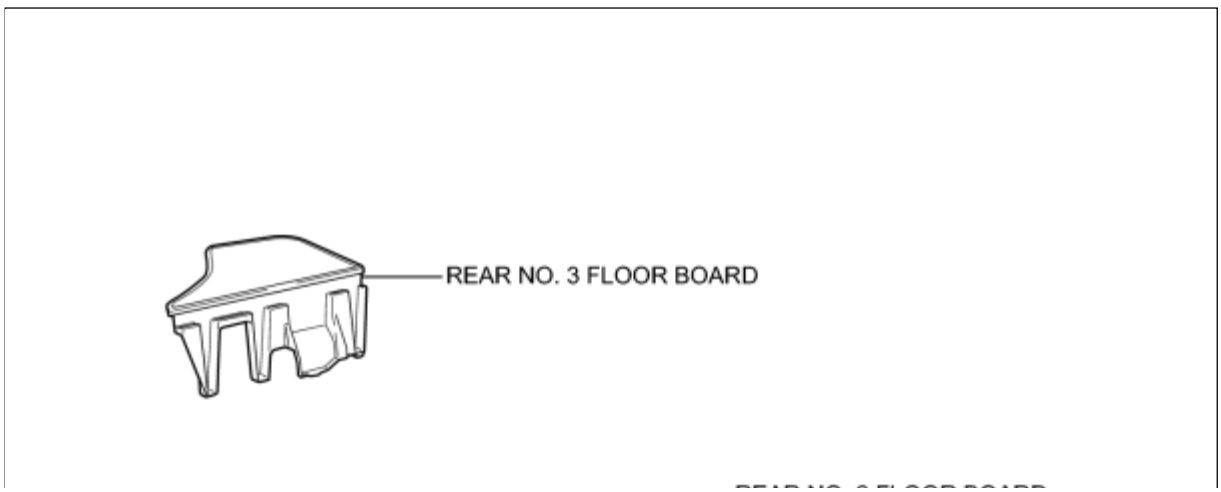
(d) Using a vacuum cleaner, remove the rivet fragments and shavings from the inside of the door.

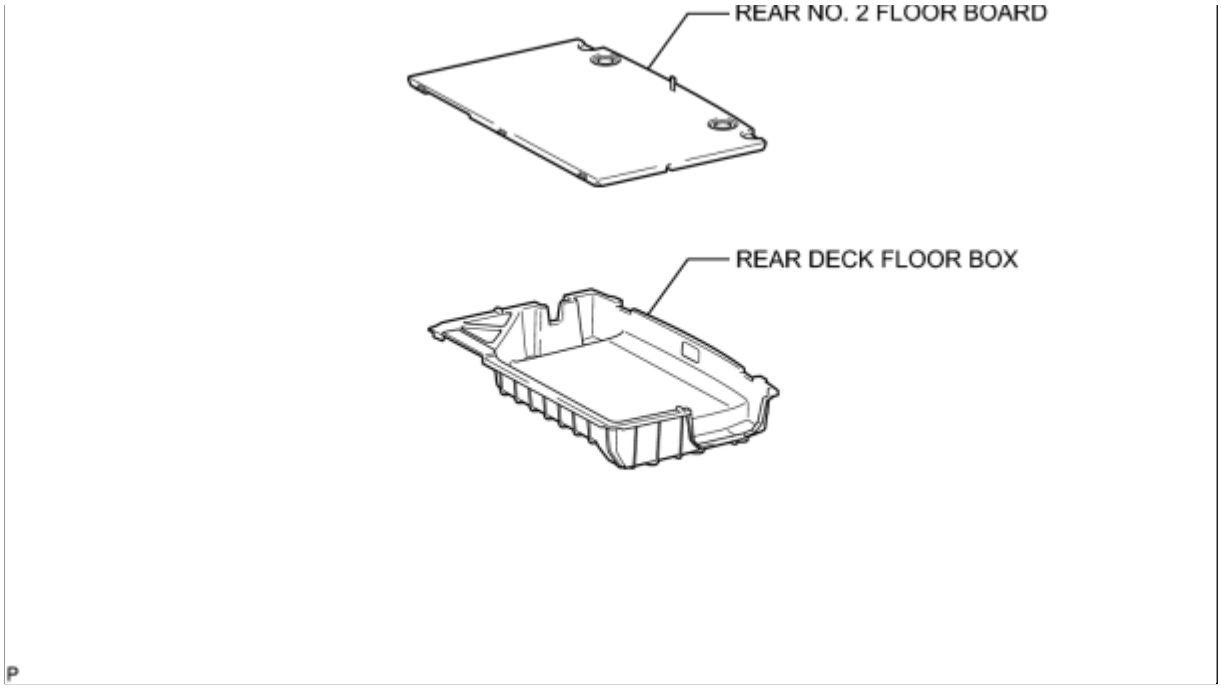
## COMPONENTS

## ILLUSTRATION

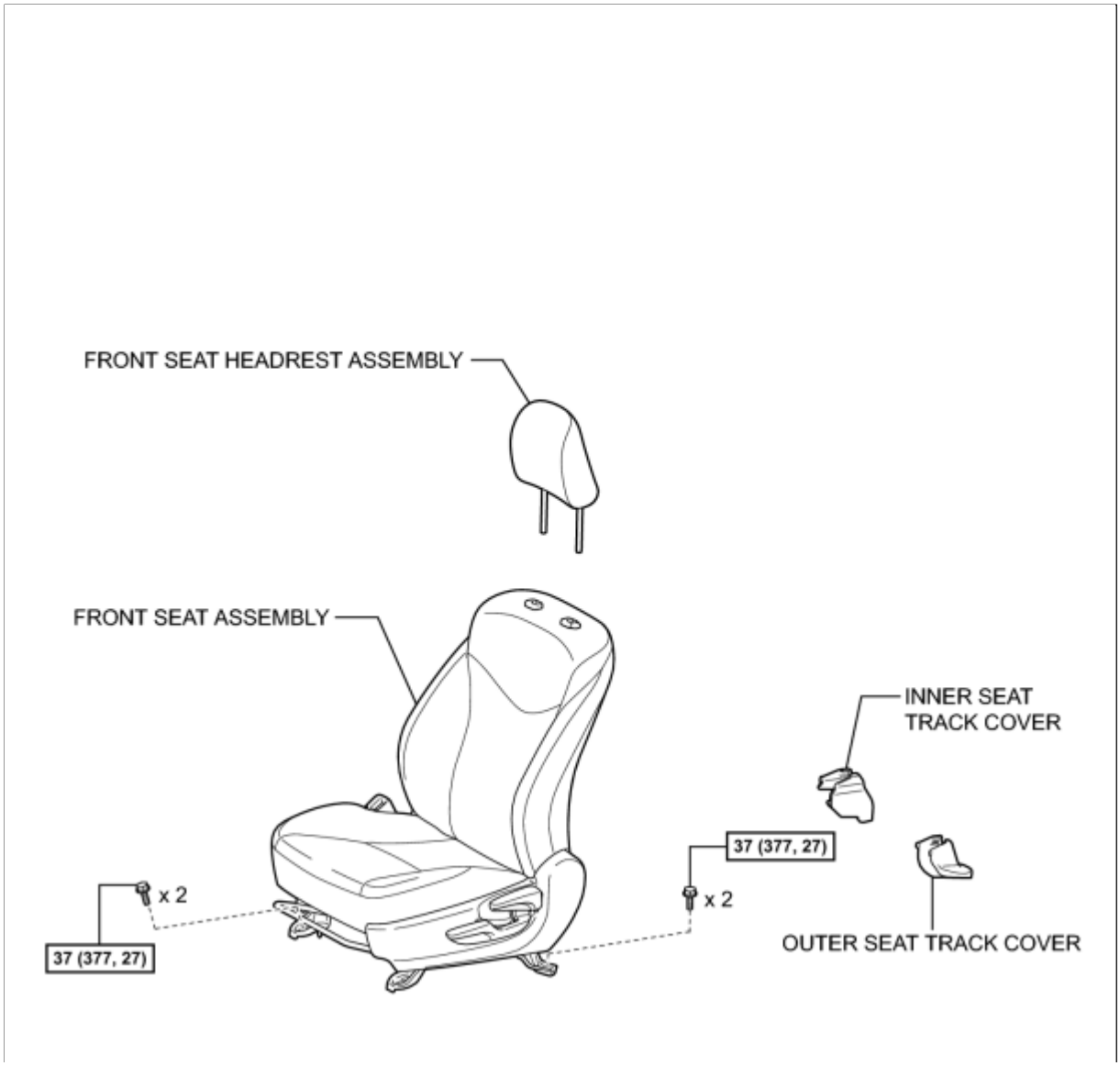



## ILLUSTRATION





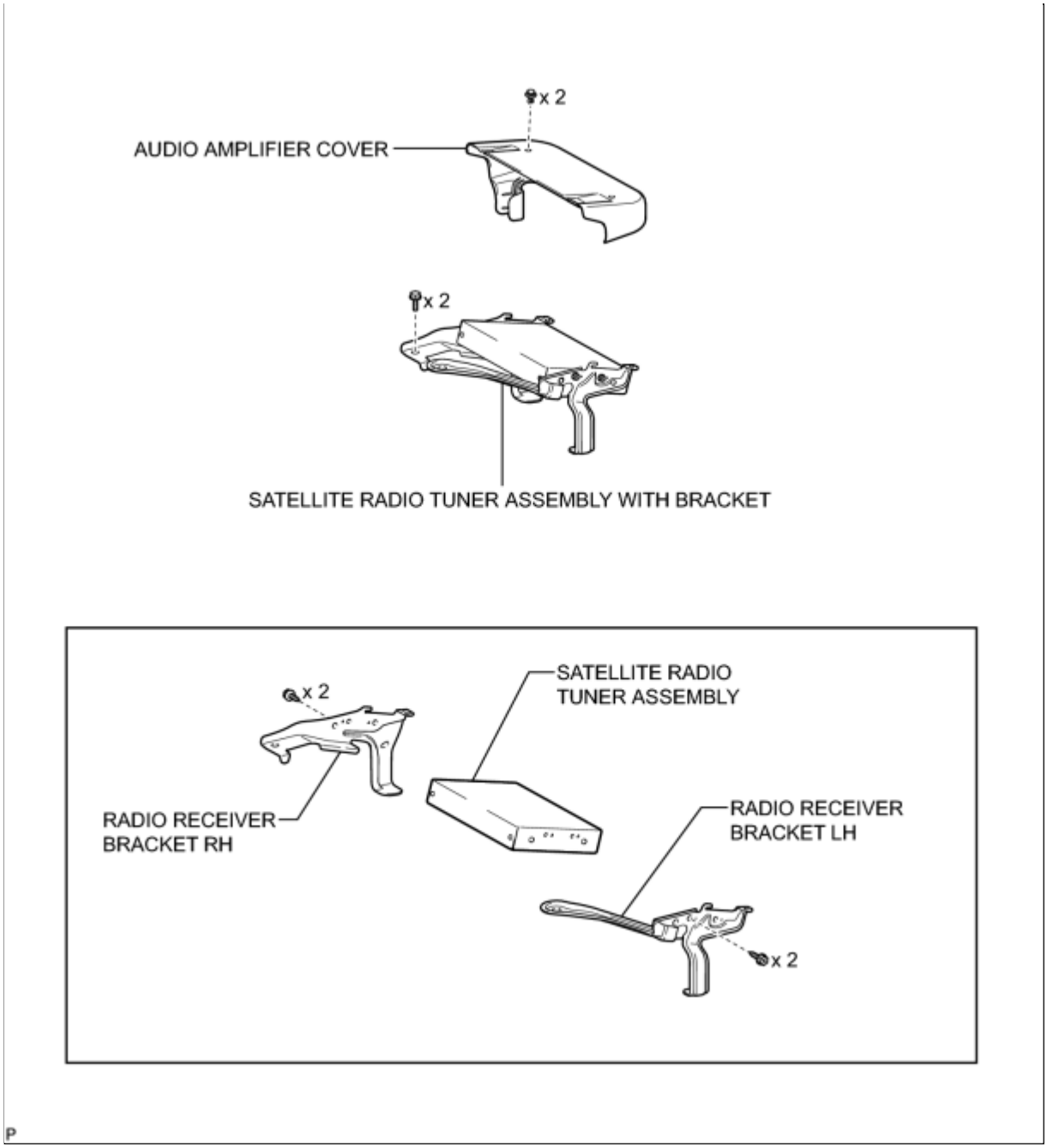

## ILLUSTRATION



N*m (kgf*cm, ft.*lbf): Specified torque

P

## ILLUSTRATION

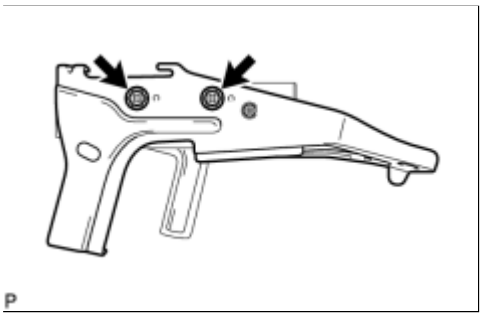



P

# INSTALLATION

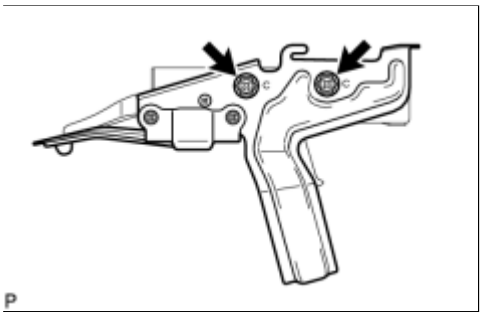
### 1. INSTALL SATELLITE RADIO TUNER ASSEMBLY

### 2. INSTALL RADIO RECEIVER BRACKET RH



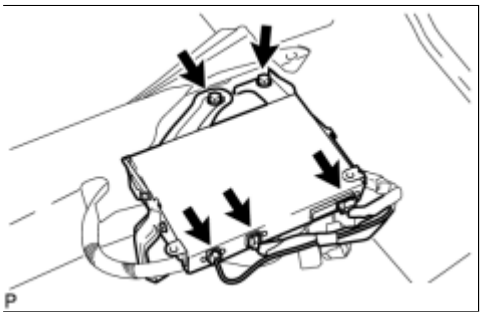

(a) Install the radio receiver bracket RH with the 2 screws.

### 3. INSTALL RADIO RECEIVER BRACKET LH




(a) Install the radio receiver bracket LH with the 2 screws.

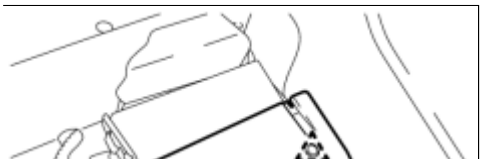
### 4. INSTALL SATELLITE RADIO TUNER ASSEMBLY WITH BRACKET



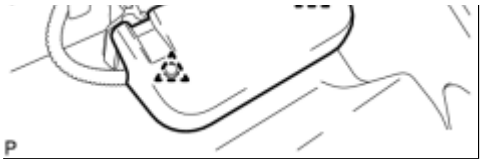

(a) Install the satellite radio tuner assembly with bracket with the 2 bolts.

(b) Connect the 3 connectors.

### 5. INSTALL AUDIO AMPLIFIER COVER



(a) Install the audio amplifier cover with the 2 clips.




**6. INSTALL FRONT SEAT ASSEMBLY** INFO

**7. INSTALL INNER SEAT TRACK COVER** INFO

**8. INSTALL OUTER SEAT TRACK COVER** INFO

**9. INSTALL FRONT SEAT HEADREST ASSEMBLY** INFO

**10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL**

**NOTICE:**

**When disconnecting the cable, some systems need to be initialized after the cable is reconnected** INFO **.**

**11. INSTALL REAR NO. 3 FLOOR BOARD** INFO

**12. INSTALL REAR DECK FLOOR BOX** INFO

**13. INSTALL REAR NO. 2 FLOOR BOARD** INFO

# REMOVAL

**NOTICE:**

**After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.**

**1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

**CAUTION:**

**Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.**

**NOTICE:**

**When disconnecting the cable, some systems need to be initialized after the cable is reconnected** INFO **.**

**2. REMOVE REAR NO. 2 FLOOR BOARD** INFO

**3. REMOVE REAR DECK FLOOR BOX** INFO

**4. REMOVE REAR NO. 3 FLOOR BOARD** INFO

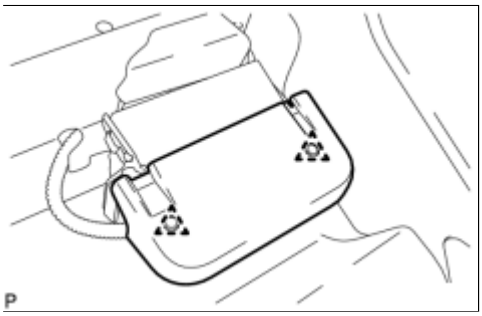
**5. REMOVE FRONT SEAT HEADREST ASSEMBLY** INFO

**6. REMOVE OUTER SEAT TRACK COVER** INFO

**7. REMOVE INNER SEAT TRACK COVER** INFO

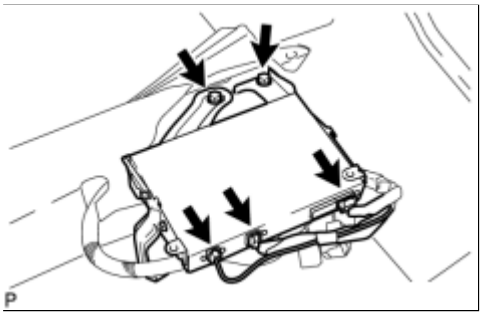
**8. REMOVE FRONT SEAT ASSEMBLY** INFO

**9. REMOVE AUDIO AMPLIFIER COVER**



(a) Using a clip remover, remove the 2 clips and audio amplifier cover.

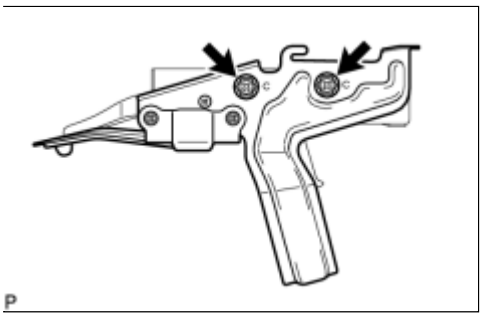
**10. REMOVE SATELLITE RADIO TUNER ASSEMBLY WITH BRACKET**



(a) Disconnect the 3 connectors.

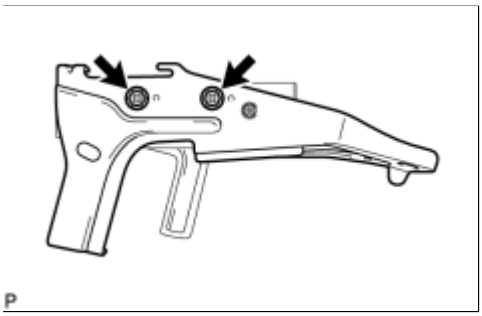
(b) Remove the 2 bolts and satellite radio tuner assembly with bracket.

### 11. REMOVE RADIO RECEIVER BRACKET LH




(a) Remove the 2 screws and radio receiver bracket LH.

### 12. REMOVE RADIO RECEIVER BRACKET RH

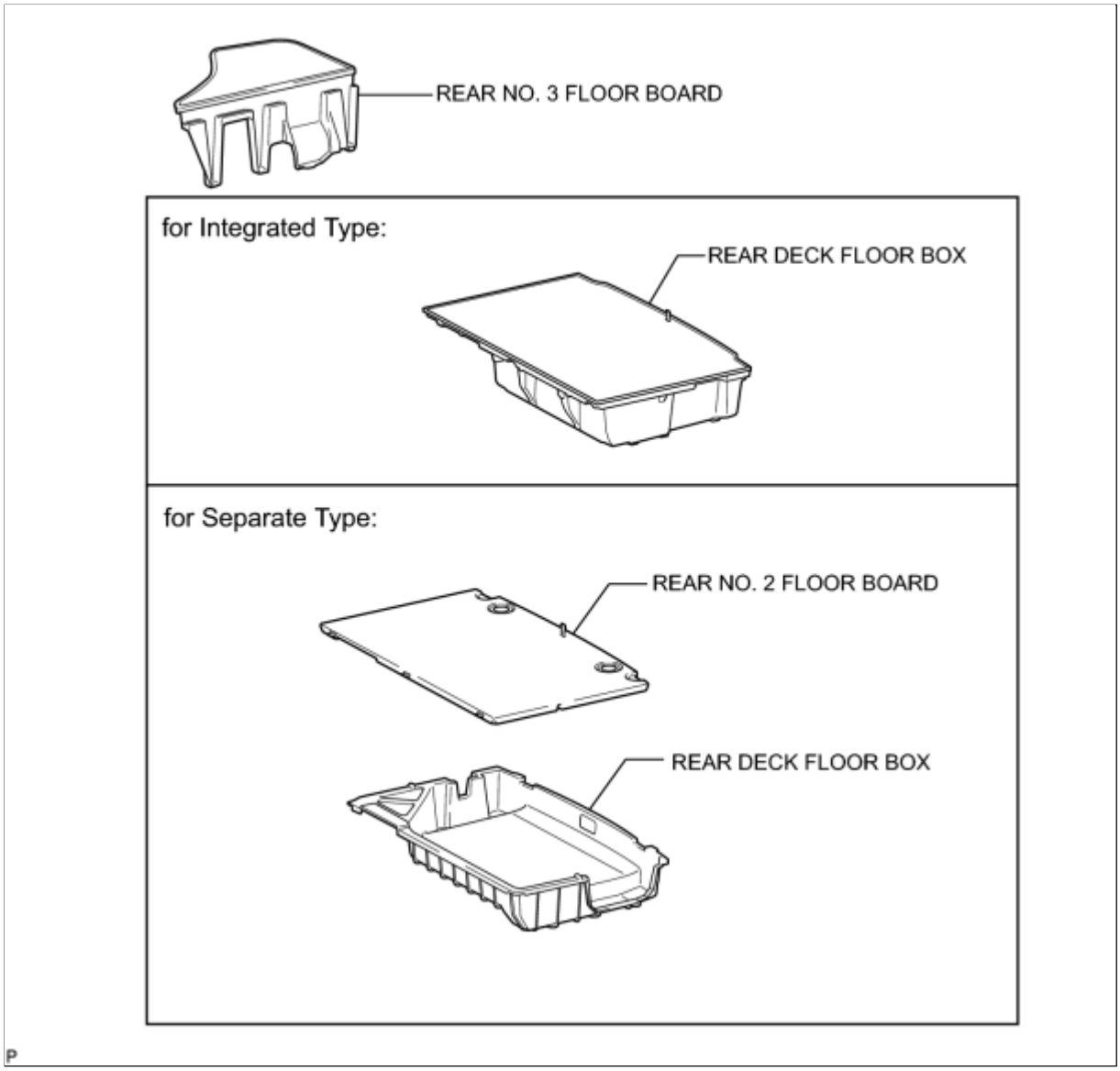



(a) Remove the 2 screws and radio receiver bracket RH.

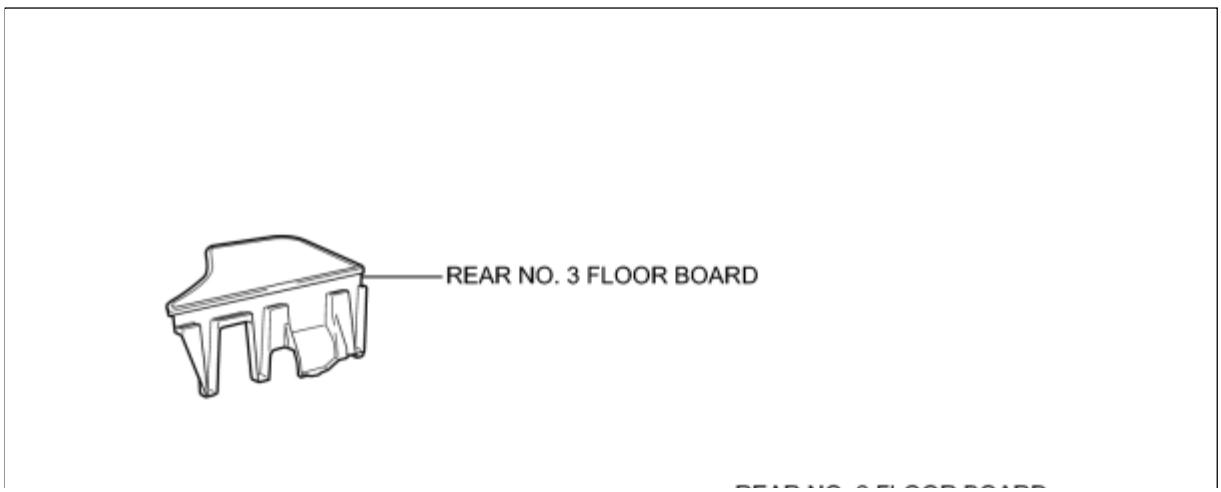
### 13. REMOVE SATELLITE RADIO TUNER ASSEMBLY

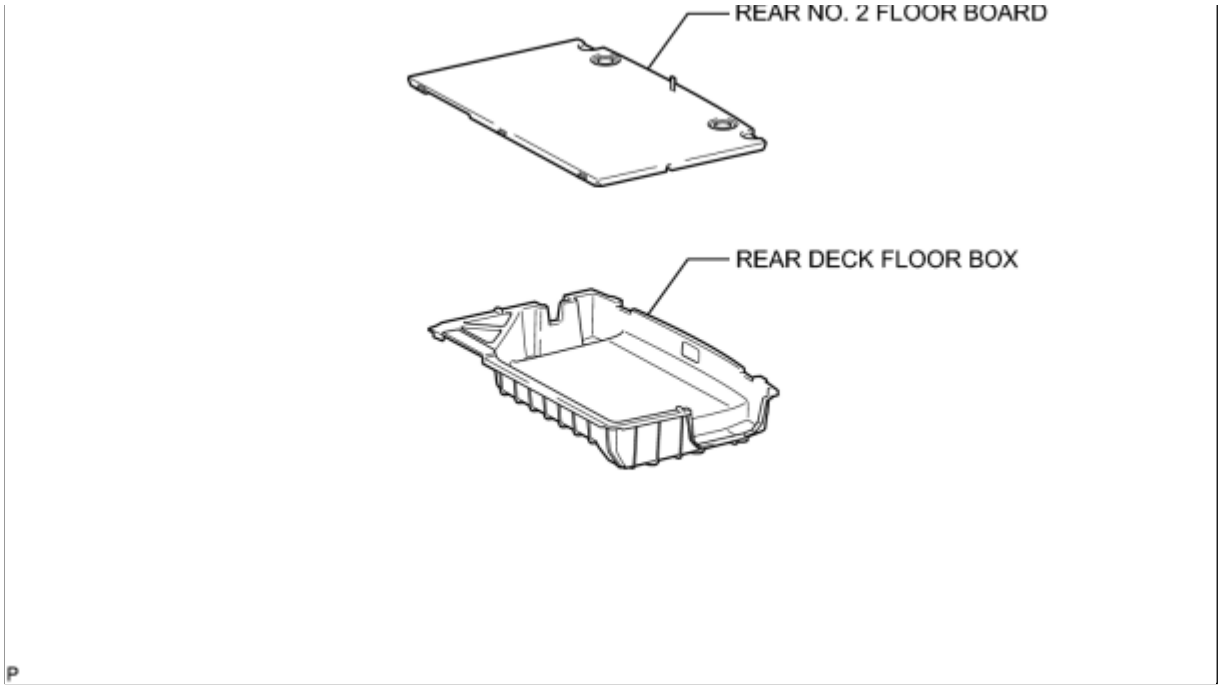
## COMPONENTS

## ILLUSTRATION



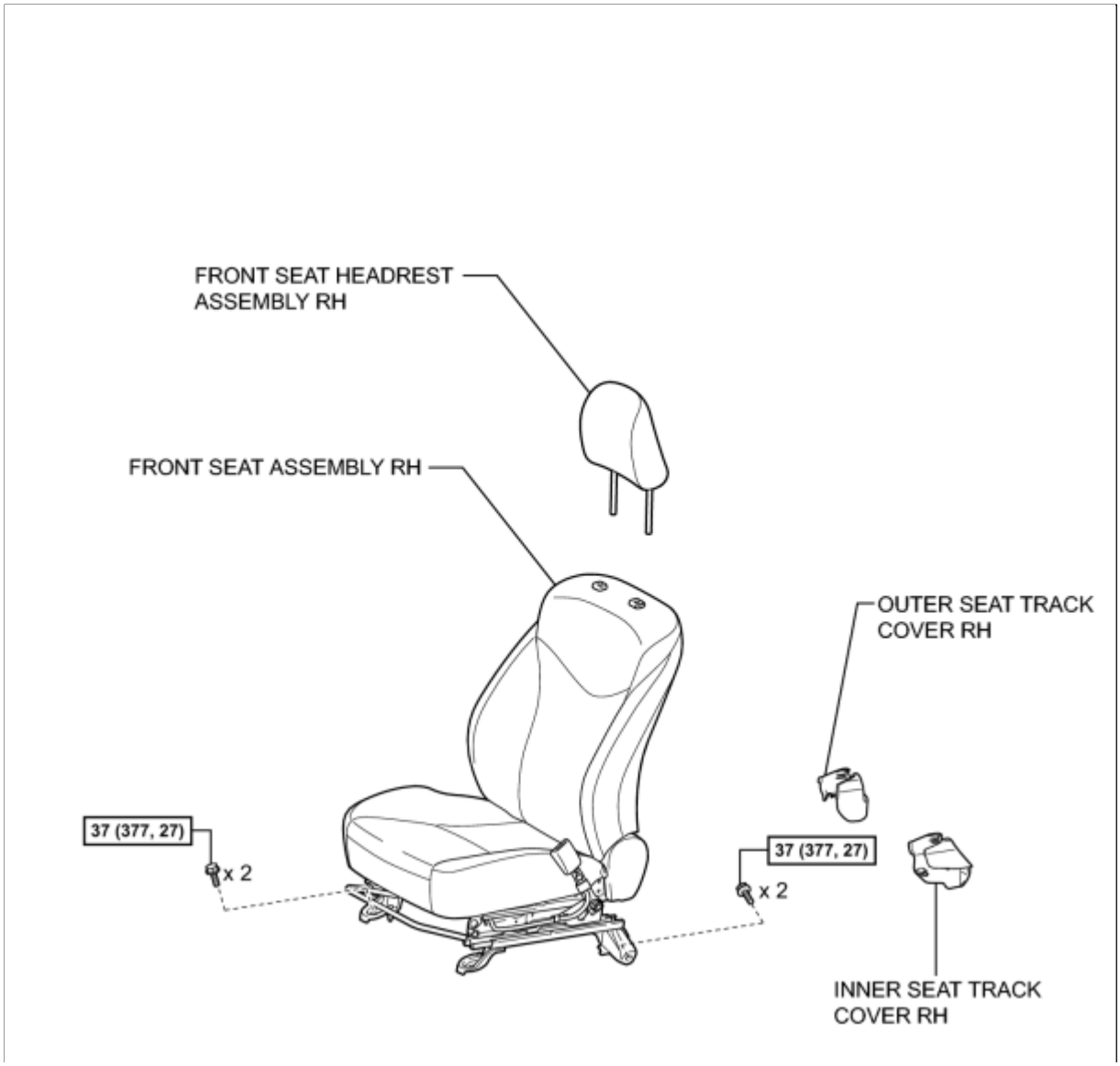

## ILLUSTRATION






P

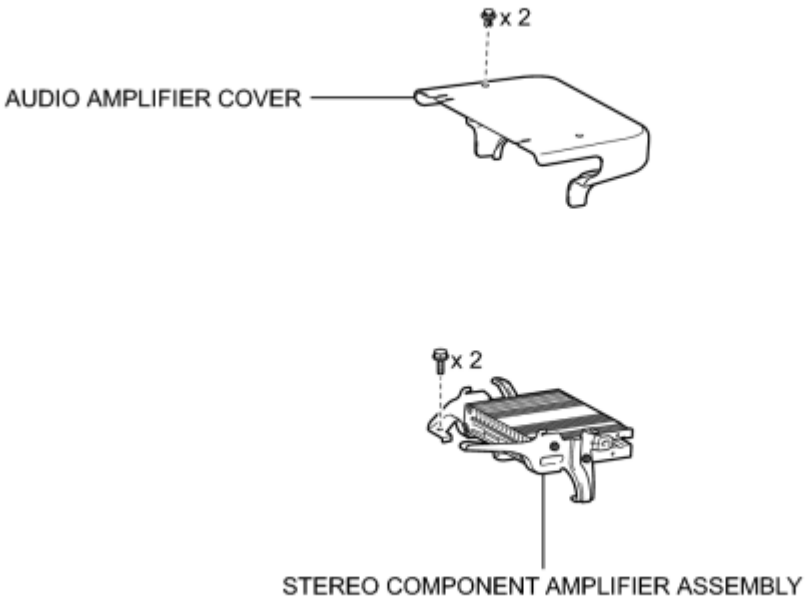
## ILLUSTRATION



N*m (kgf*cm, ft.*lbf): Specified torque

P

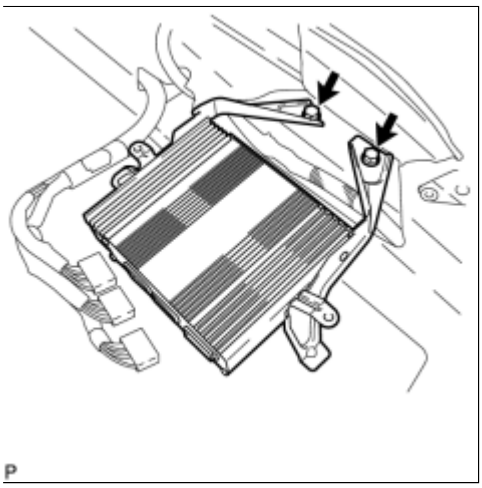
## ILLUSTRATION



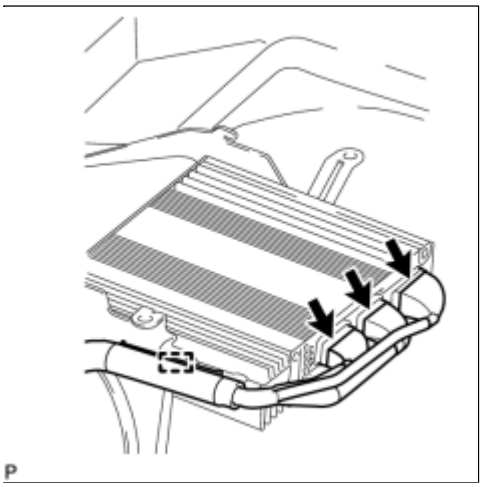

P

# INSTALLATION

### 1. INSTALL STEREO COMPONENT AMPLIFIER ASSEMBLY



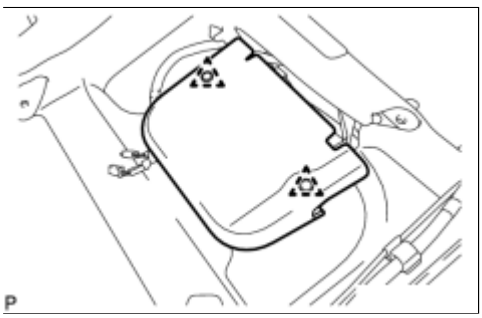
(a) Install the stereo component amplifier assembly with the 2 bolts.



(b) Engage the clamp and connect the wire harness.

(c) Connect the 3 connectors.

### 2. INSTALL AUDIO AMPLIFIER COVER



(a) Install the audio amplifier cover with the 2 clips.

### 3. INSTALL FRONT SEAT ASSEMBLY RH

HINT:

**HINT:**

**Use the same procedure for the RH side and LH side** INFO .

### 4. ZERO POINT CALIBRATION AND SENSITIVITY CHECK

**HINT:**

**Perform zero point calibration and sensitivity check** INFO .

### 5. INSTALL INNER SEAT TRACK COVER RH

**HINT:**

**Use the same procedure for the RH side and LH side** INFO .

### 6. INSTALL OUTER SEAT TRACK COVER RH

**HINT:**

**Use the same procedure for the RH side and LH side** INFO .

### 7. INSTALL FRONT SEAT HEADREST ASSEMBLY RH

**HINT:**

**Use the same procedure for the RH side and LH side** INFO .

### 8. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

**NOTICE:**

**When disconnecting the cable, some systems need to be initialized after the cable is reconnected** INFO .

### 9. INSTALL REAR NO. 3 FLOOR BOARD INFO

### 10. INSTALL REAR DECK FLOOR BOX INFO

### 11. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

### 12. INSPECT FRONT SEAT ASSEMBLY INFO

### 13. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO .

# REMOVAL

**1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type)** INFO

**2. REMOVE REAR DECK FLOOR BOX** INFO

**3. REMOVE REAR NO. 3 FLOOR BOARD** INFO

**4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL**

**CAUTION:**

**Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.**

**NOTICE:**

**When disconnecting the cable, some systems need to be initialized after the cable is reconnected** INFO **.**

**5. REMOVE FRONT SEAT HEADREST ASSEMBLY RH**

**HINT:**

**Use the same procedure for the RH side and LH side** INFO **.**

**6. REMOVE OUTER SEAT TRACK COVER RH**

**HINT:**

**Use the same procedure for the RH side and LH side** INFO **.**

**7. REMOVE INNER SEAT TRACK COVER RH**

**HINT:**

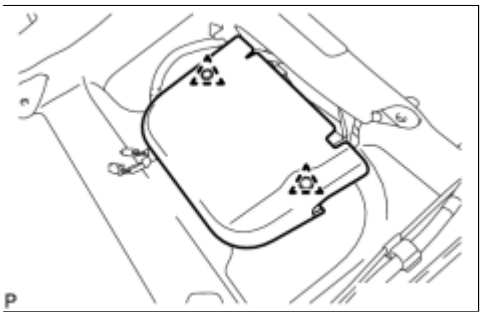
**Use the same procedure for the RH side and LH side** INFO **.**

**8. REMOVE FRONT SEAT ASSEMBLY RH**

**HINT:**

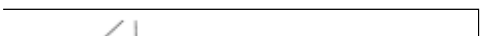
**Use the same procedure for the RH side and LH side** INFO **.**

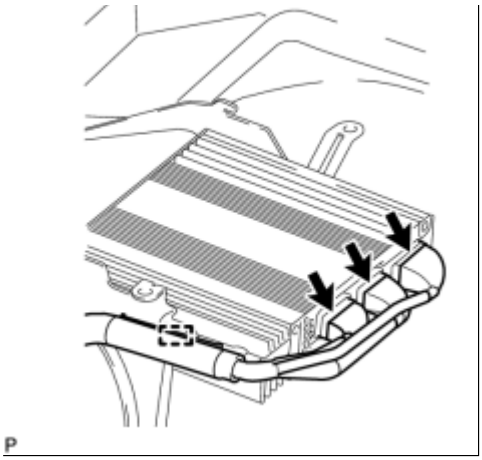
**9. REMOVE AUDIO AMPLIFIER COVER**



(a) Using a clip remover, remove the 2 clips and audio amplifier cover.

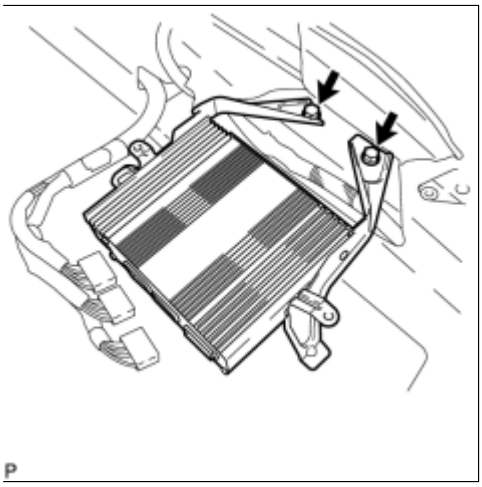
**10. REMOVE STEREO COMPONENT AMPLIFIER ASSEMBLY**






(a) Disconnect the 3 connectors.

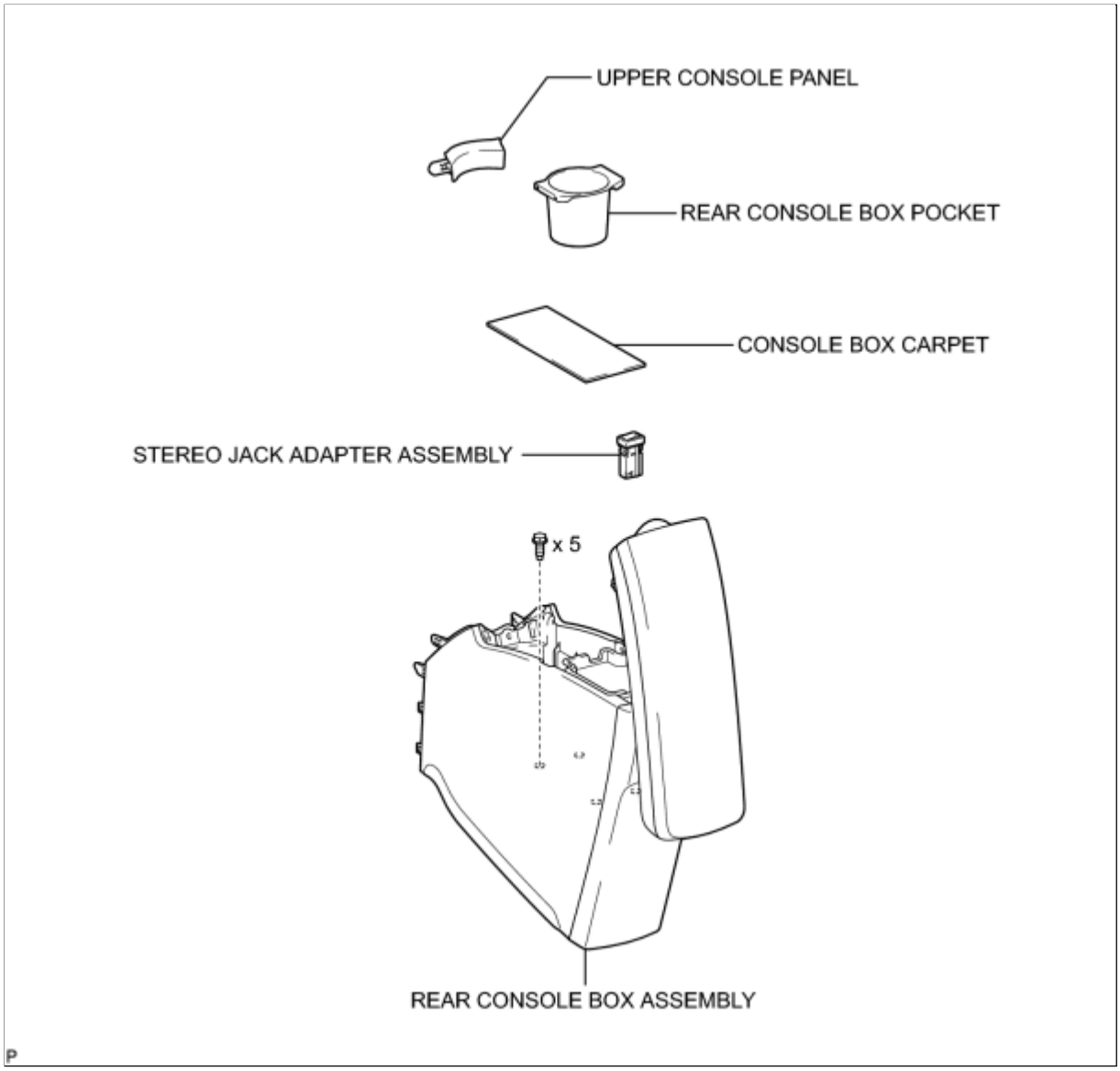
(b) Disengage the clamp and disconnect the wire harness.




(c) Remove the 2 bolts and stereo component amplifier assembly.

## COMPONENTS

## ILLUSTRATION



# INSTALLATION

### 1. INSTALL STEREO JACK ADAPTER ASSEMBLY




(a) Engage the 2 claws to install the stereo jack adapter assembly.

(b) Connect the connector.

### 2. INSTALL REAR CONSOLE BOX ASSEMBLY INFO

### 3. INSTALL CONSOLE BOX CARPET INFO

### 4. INSTALL UPPER CONSOLE PANEL INFO

### 5. INSTALL REAR CONSOLE BOX POCKET INFO

# REMOVAL

**1. REMOVE REAR CONSOLE BOX POCKET** INFO

**2. REMOVE UPPER CONSOLE PANEL** INFO

**3. REMOVE CONSOLE BOX CARPET** INFO

**4. REMOVE REAR CONSOLE BOX ASSEMBLY** INFO

**5. REMOVE STEREO JACK ADAPTER ASSEMBLY**

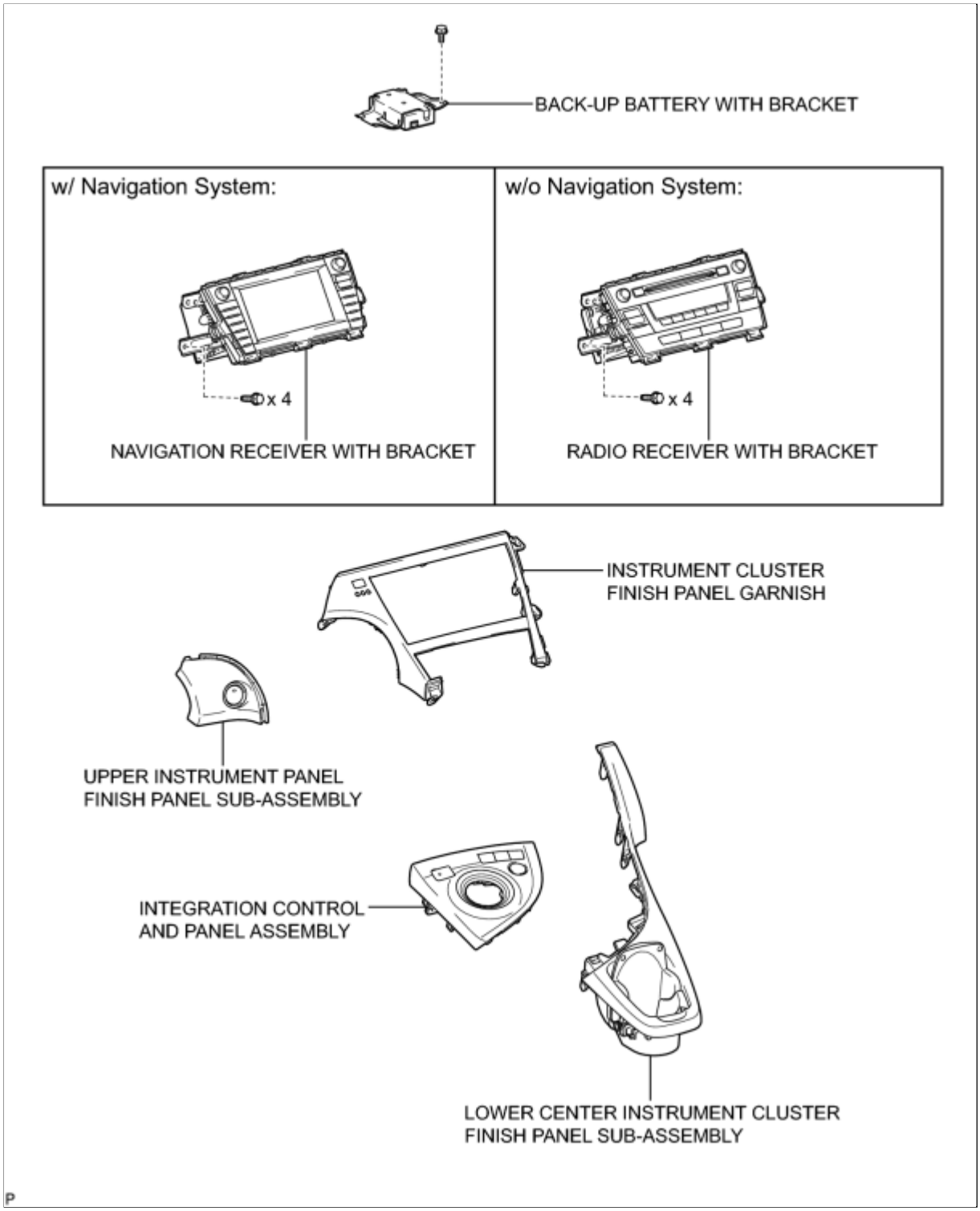



(a) Disconnect the connector.

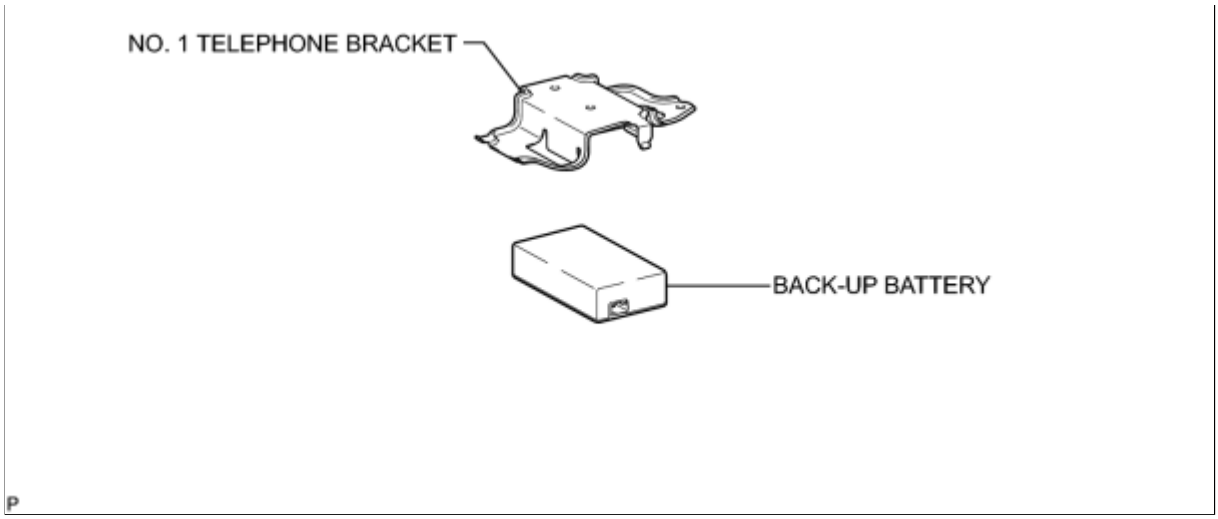
(b) Disengage the 2 claws and remove the stereo jack adapter assembly.

## COMPONENTS

## ILLUSTRATION



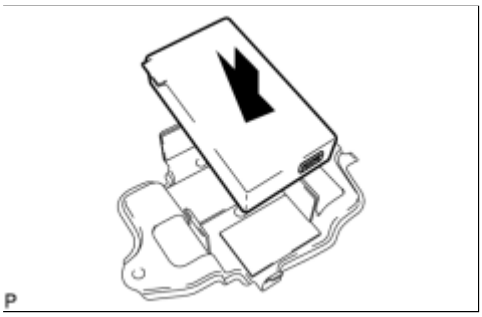

## ILLUSTRATION


NO. 1 TELEPHONE BRACKET
BACK-UP BATTERY
P

# INSTALLATION

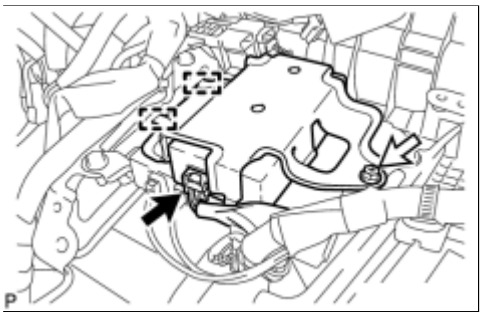
**1. INSTALL NO. 1 TELEPHONE BRACKET**

**2. INSTALL BACK-UP BATTERY**




(a) Install the back-up battery to the No. 1 telephone bracket as shown in the illustration.

**3. INSTALL BACK-UP BATTERY WITH BRACKET**




(a) Engage the 2 guides.

(b) Install the back-up battery with bracket with the bolt.

(c) Connect the connector.

**4. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System)** INFO

**5. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System)** INFO

**6. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY** INFO

**7. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH** INFO

**8. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY** INFO

**9. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY** INFO

# REMOVAL

**1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY** INFO

**2. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY** INFO

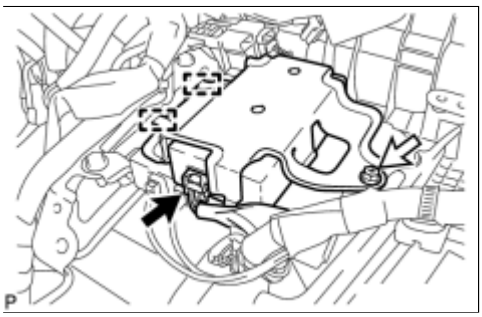
**3. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH** INFO

**4. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY** INFO

**5. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System)** INFO

**6. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System)** INFO

**7. REMOVE BACK-UP BATTERY WITH BRACKET**

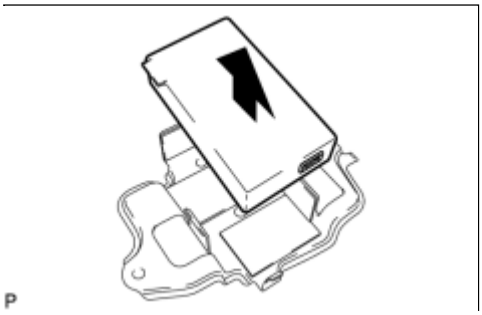


(a) Disconnect the connector.

(b) Remove the bolt.

(c) Disengage the 2 guides and remove the back-up battery with bracket

**8. REMOVE BACK-UP BATTERY**

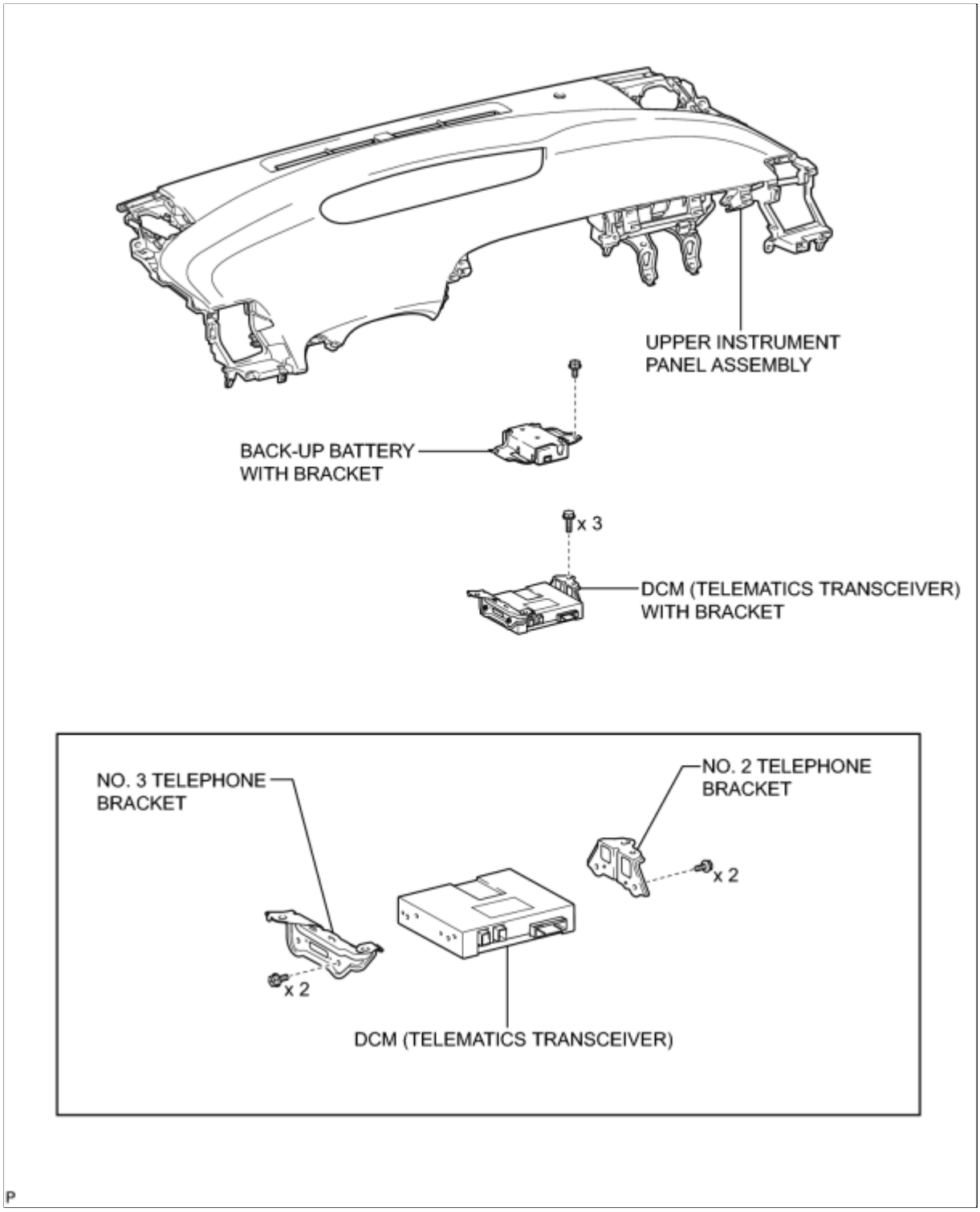


(a) Remove the back-up battery from the No. 1 telephone bracket as shown in the illustration.

**9. REMOVE NO. 1 TELEPHONE BRACKET**

## COMPONENTS

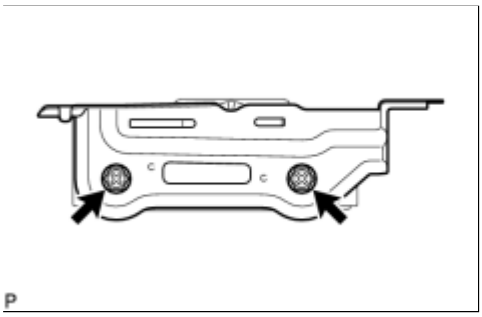
## ILLUSTRATION



# INSTALLATION

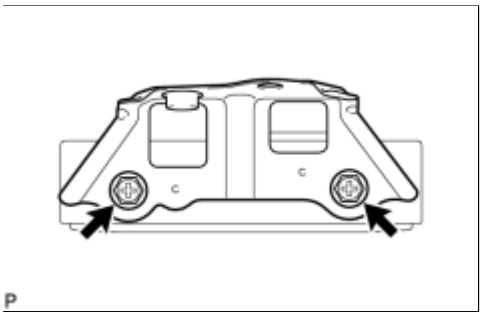
### 1. INSTALL DCM (TELEMATICS TRANSCEIVER)

### 2. INSTALL NO. 3 TELEPHONE BRACKET



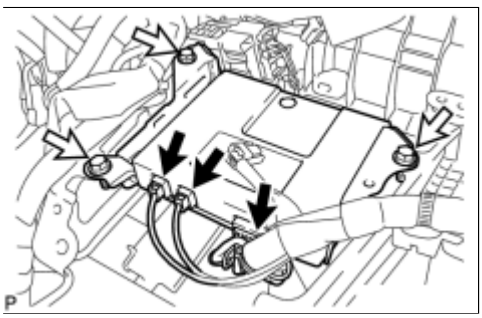

(a) Install the No. 3 telephone bracket with the 2 screws.

### 3. INSTALL NO. 2 TELEPHONE BRACKET




(a) Install the No. 2 telephone bracket with the 2 screws.

### 4. INSTALL DCM (TELEMATICS TRANSCEIVER) WITH BRACKET




(a) Install the DCM (telematics transceiver) with bracket with the 3 bolts.

(b) Connect the 3 connectors.

### 5. INSTALL BACK-UP BATTERY WITH BRACKET INFO

### 6. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

**HINT:**

**Refer to the procedure from Install Upper Instrument Panel Assembly INFO .**

### 7. DCM ACTIVATION

**7. DCM ACTIVATION**

(a) When replacing the DCM (telematics transceiver), perform DCM activation INFO .

# REMOVAL

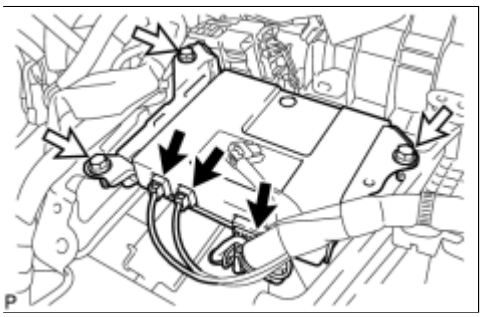
### 1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

**HINT:**

**Refer to the procedure up to Remove Upper Instrument Panel Assembly** INFO .

### 2. REMOVE BACK-UP BATTERY WITH BRACKET INFO

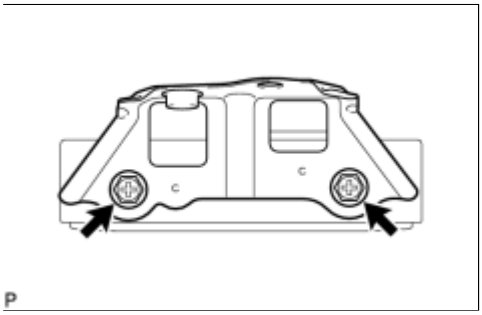
### 3. REMOVE DCM (TELEMATICS TRANSCEIVER) WITH BRACKET



(a) Disconnect the 3 connectors.

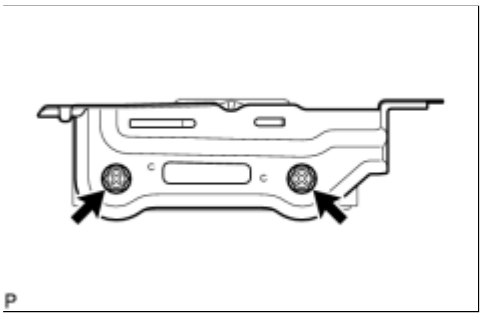
(b) Remove the 3 bolts and DCM (telematics transceiver) with bracket.

### 4. REMOVE NO. 2 TELEPHONE BRACKET



(a) Remove the 2 screws and No. 2 telephone bracket.

### 5. REMOVE NO. 3 TELEPHONE BRACKET

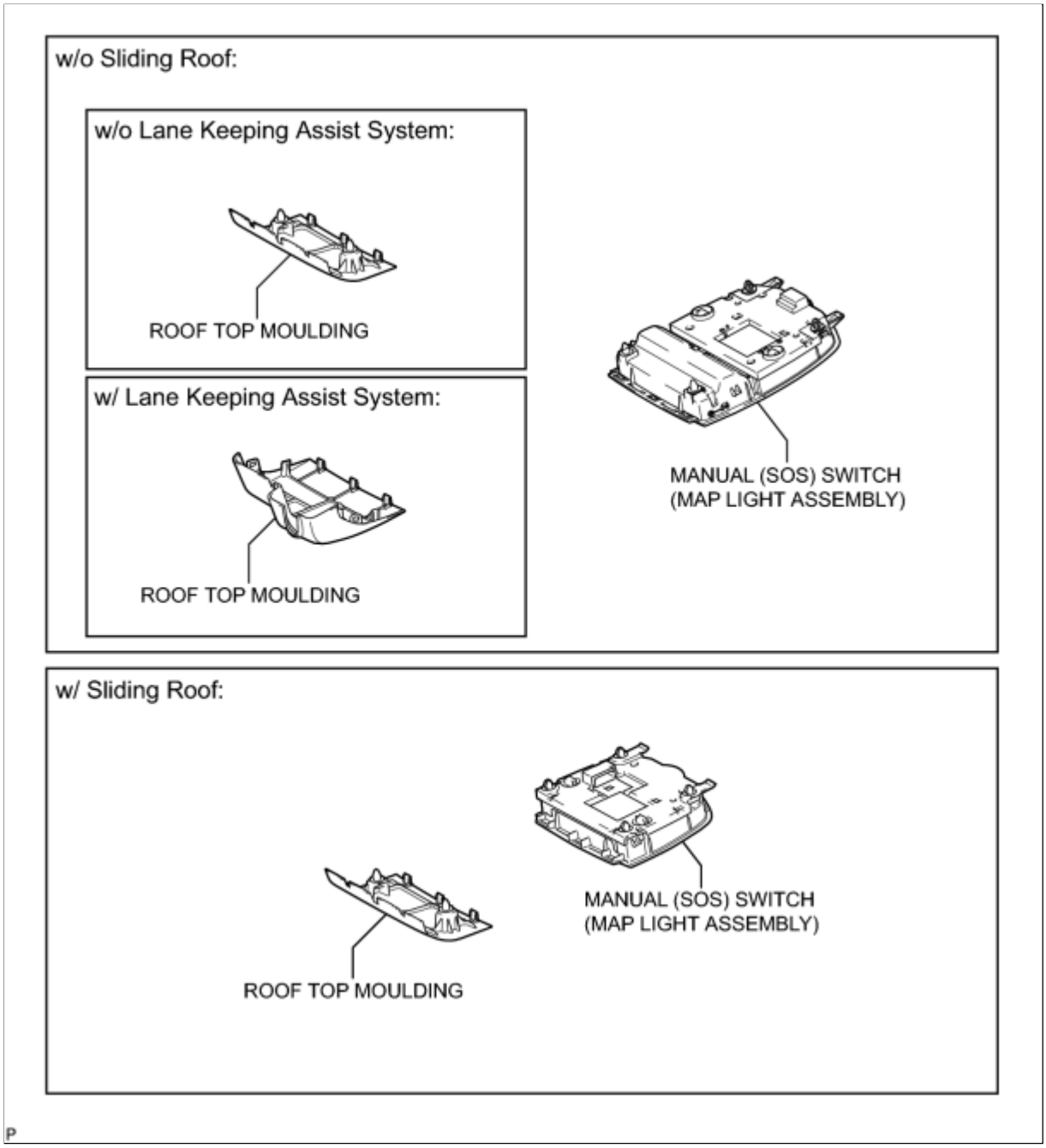


(a) Remove the 2 screws and No. 3 telephone bracket.

### 6. REMOVE DCM (TELEMATICS TRANSCEIVER)

## COMPONENTS

## ILLUSTRATION



# INSTALLATION

1. INSTALL MANUAL (SOS) SWITCH (MAP LIGHT ASSEMBLY) (w/o Sliding Roof) INFO
2. INSTALL MANUAL (SOS) SWITCH (MAP LIGHT ASSEMBLY) (w/ Sliding Roof) INFO
3. INSTALL ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO
4. INSTALL ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

# REMOVAL

1. REMOVE ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO
2. REMOVE ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO
3. REMOVE MANUAL (SOS) SWITCH (MAP LIGHT ASSEMBLY) (w/o Sliding Roof) INFO
4. REMOVE MANUAL (SOS) SWITCH (MAP LIGHT ASSEMBLY) (w/ Sliding Roof) INFO

# PRECAUTION

### 1. WHEN AUTOMATIC COLLISION NOTIFICATION HAS ACTIVATED

(a) Perform "ACN CALL END" with Techstream to terminate ACN (Automatic Collision Notification) with the call center INFO .

(b) The BUB (Back-Up Battery) must be replaced.

### 2. WHEN DISCONNECTING CONNECTORS FROM TELEMATICS DATA COMMUNICATION MODULE (DCM (TELEMATICS TRANSCEIVER))

(a) The power switch must be off.

### 3. WHEN REPLACING THE DCM (TELEMATICS TRANSCEIVER)

(a) After installing a new DCM (Telematics Transceiver), perform "DCM ACTIVATION" with the Techstream INFO . This allows the Telematics service provider to register the new DCM (Telematics Transceiver) and to delete the old DCM (Telematics Transceiver) information from their database.

**NOTICE:**

**Do not swap the DCM (Telematics Transceiver) with one from another vehicle.**

### 4. WHEN UNABLE TO CONTACT WITH CALL CENTER BUT NO DTC

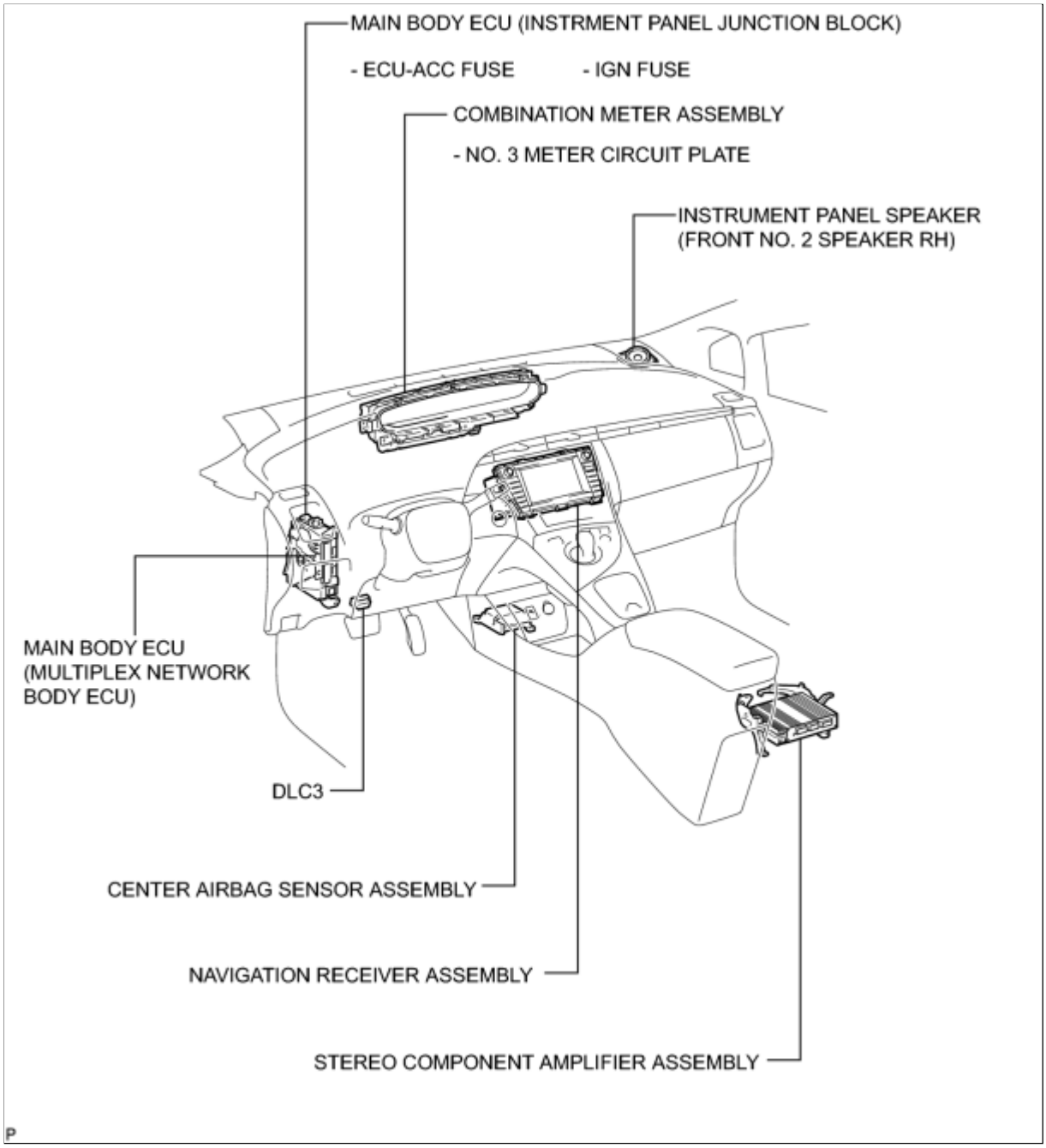
(a) This may occur when the cellular signal strength was very weak. Check "DCM OPERATION HISTORY" with the Techstream INFO .

### 5. WHEN DIAGNOSING DCM (TELEMATICS TRANSCEIVER)

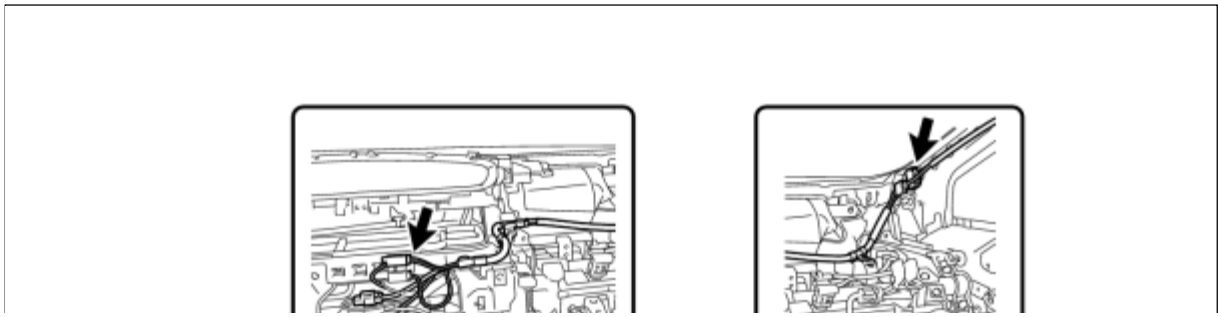
(a) While attempting to diagnose the DCM (Telematics Transceiver), do not use a DCM (Telematics Transceiver) from another vehicle. Each DCM (Telematics Transceiver) is registered to a specific VIN and should not be tested in another vehicle.

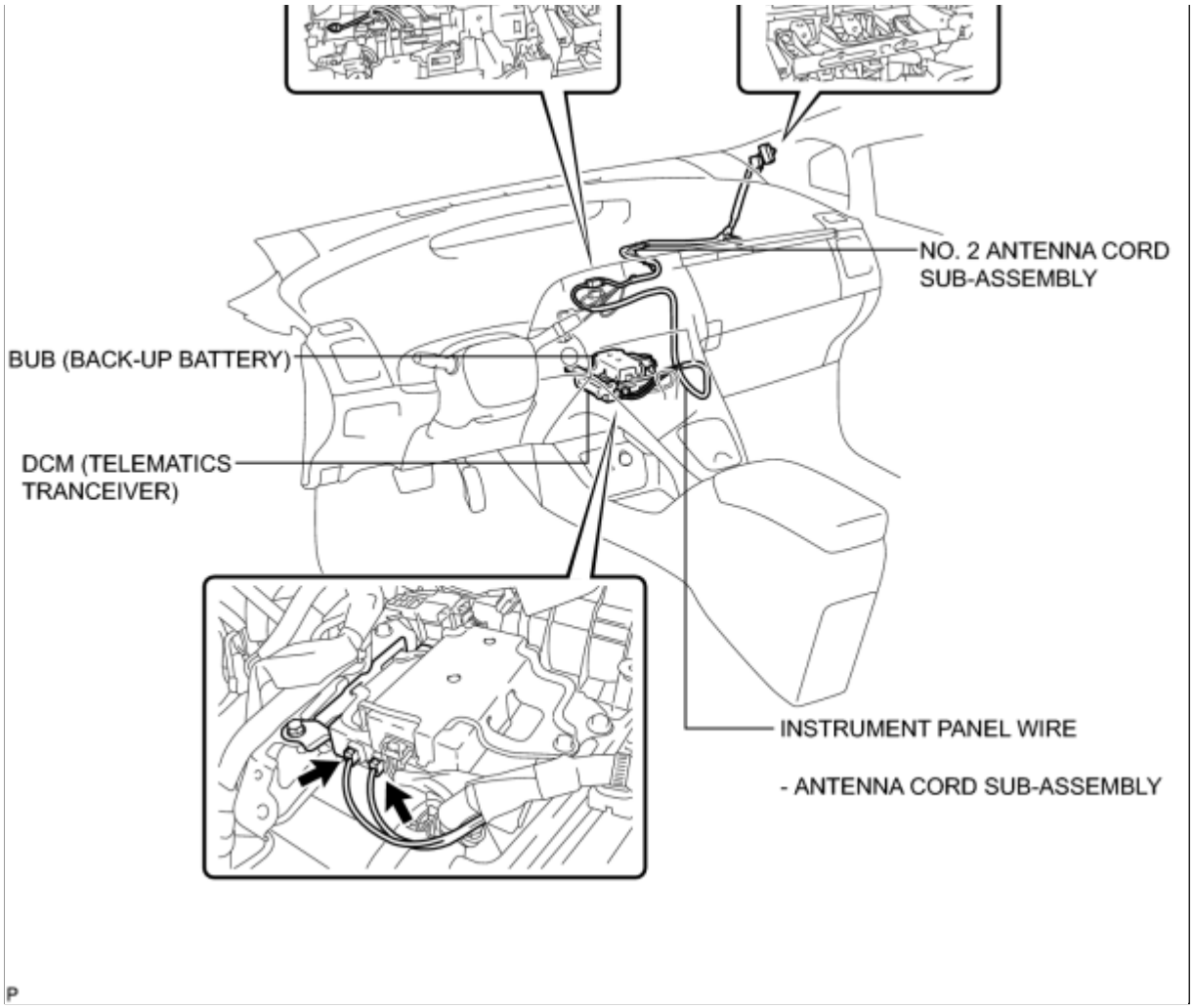
## PARTS LOCATION

## ILLUSTRATION

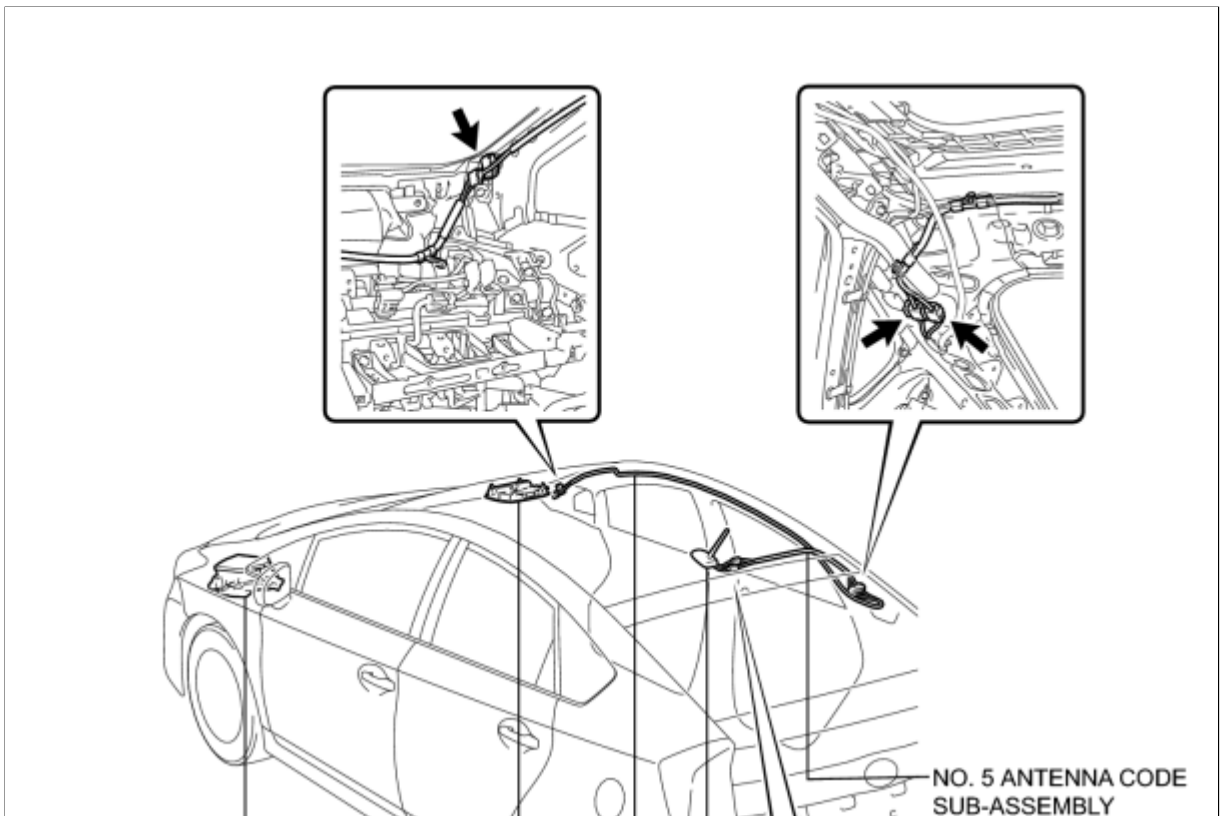


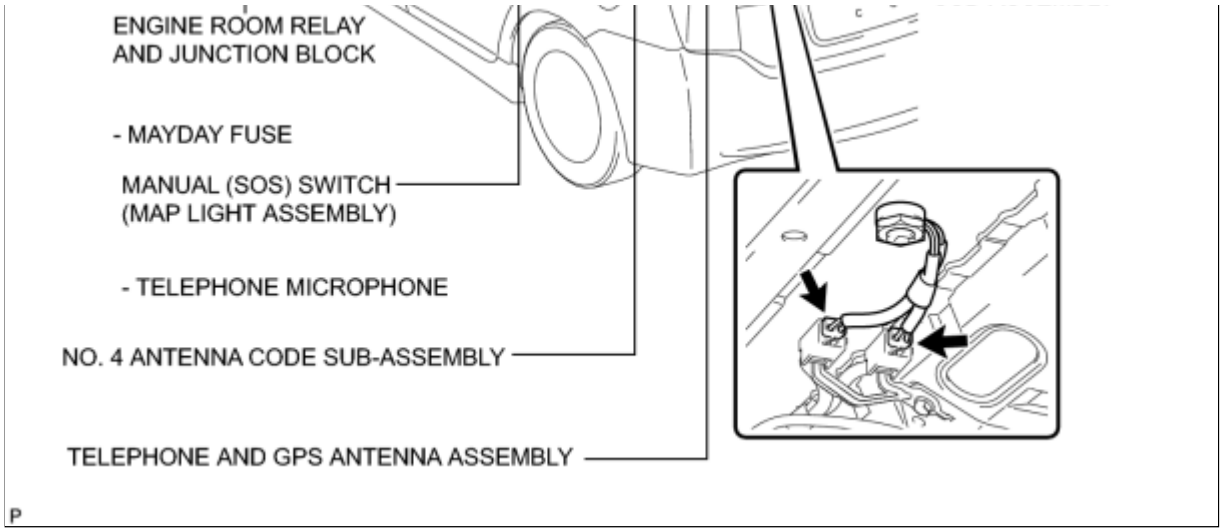

## ILLUSTRATION



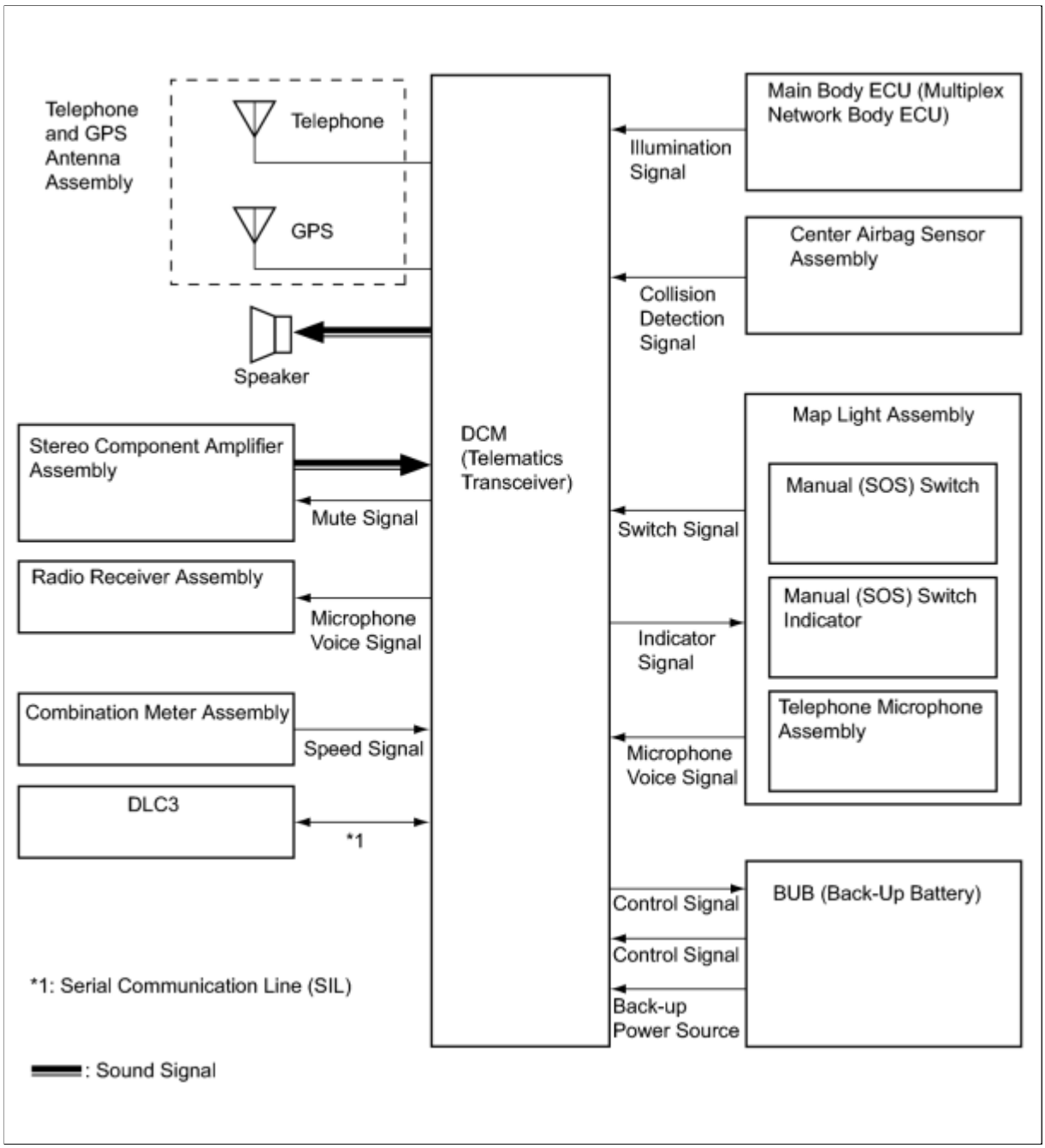



## ILLUSTRATION




ENGINE ROOM RELAY
AND JUNCTION BLOCK
- MAYDAY FUSE
MANUAL (SOS) SWITCH
(MAP LIGHT ASSEMBLY)
- TELEPHONE MICROPHONE
NO. 4 ANTENNA CODE SUB-ASSEMBLY
TELEPHONE AND GPS ANTENNA ASSEMBLY
P

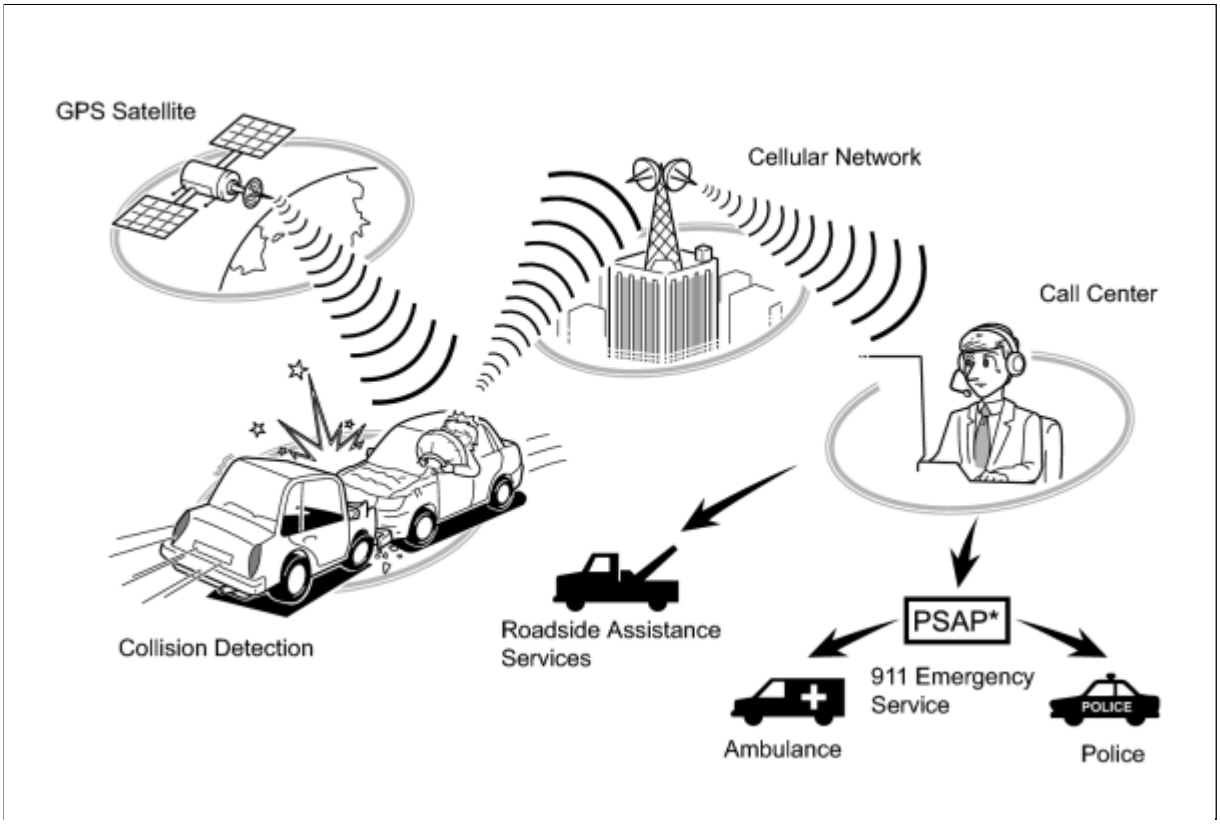
# SYSTEM DIAGRAM



# SYSTEM DESCRIPTION

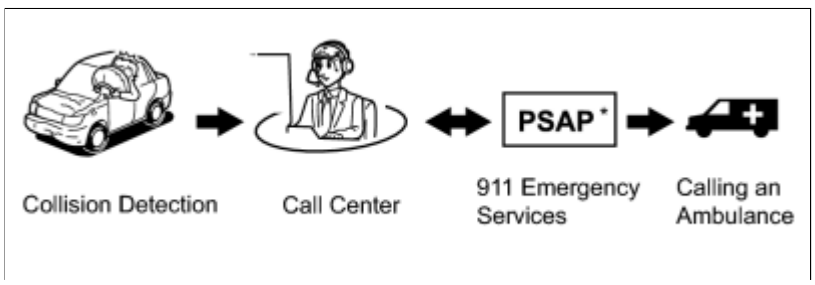
## 1. DESCRIPTION

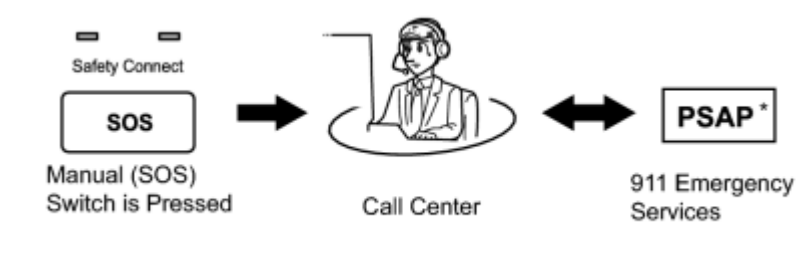
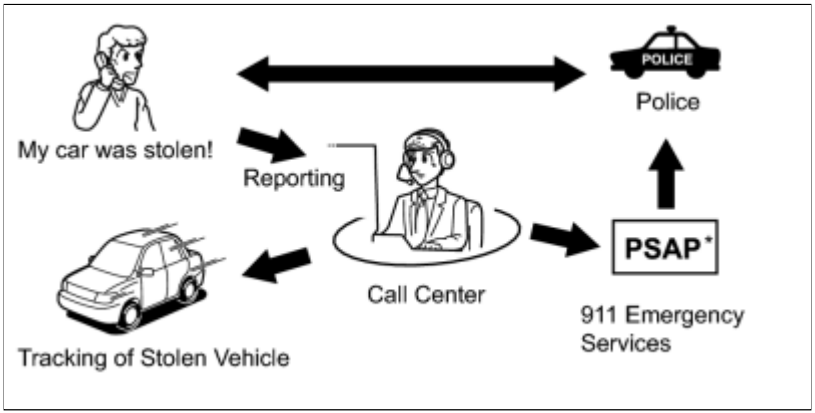
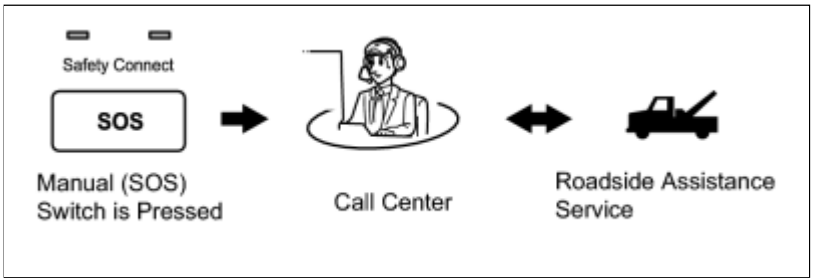
(a) Safety Connect performs ACN (Automatic Collision Notification), manual emergency calling, stolen vehicle tracking and roadside assistance service, by audio and data communications between the vehicle and call center through a cellular phone network. As shown in the illustration, when a collision is detected, the vehicle sends its location calculated based on GPS signals and the identification of DCM (Telematics Transceiver) to a call center. After the necessary information has been gathered, the call center will relay this information to emergency services.




*: Public Safety Answering Point

## 2. SYSTEM FUNCTION

| FUNCTION | OUTLINE |
|---|---|
| ACN (Automatic Collision Notification) | When a collision is detected, the vehicle connects to the call center automatically and reports the vehicle location and vehicle information by data communication. The operator will connect to the vehicle and communicate with the occupant. Even if the occupant does not answer, the operator can notify emergency services.   |
| | After pressing the manual (SOS) switch, the occupant can talk to an operator from the call center to seek assistance. |

| | |
|---|---|
| Manual Emergency Call | seek assistance.<br>  |
| Stolen Vehicle Locator | After the vehicle has been reported stolen to the police, the customer can contact the call center to begin the stolen vehicle locator process. The operator locates this vehicle by GPS and provides information to the police.<br>  |
| Roadside Assistance Service | Pressing the manual (SOS) switch will contact the call center, and a wide range of help, such as towing, flat tire, fuel delivery, etc, Can be provided.<br>  |

*: Public Safety Answering Point

**HINT:**

**The shape of the manual (SOS) switch shown in the illustration is an example, and may differ from that of an actual vehicle.**

### 3. VOICE GUIDANCE FUNCTION

**HINT:**

**The system plays back the following voice prompts in the situations shown.**

| VOICE PROMPT | USAGE CONDITION |
|---|---|
| Safety Connect failure detected, please contact your dealer. | When system detects LED failure (Red only), and another DTC is set. Message is played once at each power switch on (IG) until the problem is fixed. |

| | |
|---|---|
| | on (IG) until the problem is fixed. |
| Connecting to the Call Center. | DCM Activation start. |
| Safety Connect Activation failed. | DCM Activation fails for some reason. |
| Safety Connect Activation complete. | DCM Activation completed successfully. |
| Please make sure you are in an area with good cellular coverage and try again.<br>If you continue to receive this message, contact your dealer. | Follows Activation Sequence. |
| Unable to Connect to the Call Center. | - |
| Impact detected. | When DCM (Telematics Transceiver) receives collision detection signal. |
| Connecting to the Emergency Call Center. | Call initiated to call center. |
| Unable to Connect to the Emergency Call Center. | DCM (Telematics Transceiver) cannot connect to Emergency Call Center for some reason |
| To cancel, please press the button again. | To end the call manually. |
| Emergency call cancelled. | Confirmation the call has been canceled. |
| The system will try again. | Could not connect to call center. |
| Welcome to Safety Connect. | This voice prompt is short version for activation. |
| To activate, please press the button again within 5 seconds. | This voice prompt is instruction for activation. |
| Safety Connect is not initialized. | Reserve for activation. |
| Safety Connect is not active. | When DCM (Telematics Transceiver) is in Deactive mode. |
| For information on setting up a new subscription or to initialize a subscription you've already set up, please press the button again within 5 seconds. | When DCM (Telematics Transceiver) is in Deactive mode. |

### 4. BUB (BACK-UP BATTERY) OUTLINE

(a) The BUB (Back-Up Battery) is a non-rechargeable battery.

(b) When ACN (Automatic Collision Notification) occurs, the BUB (Back-Up Battery) provides power to the DCM (Telematics Transceiver).

**NOTICE:**

- After ACN is performed, the BUB (Back-Up Battery) must be replaced.
- The BUB (Back-Up Battery) must not be replaced while an ACN call is in progress.

**HINT:**

**When a Manual Emergency Call is made, the BUB (Back-Up Battery) is not used as the power source.**

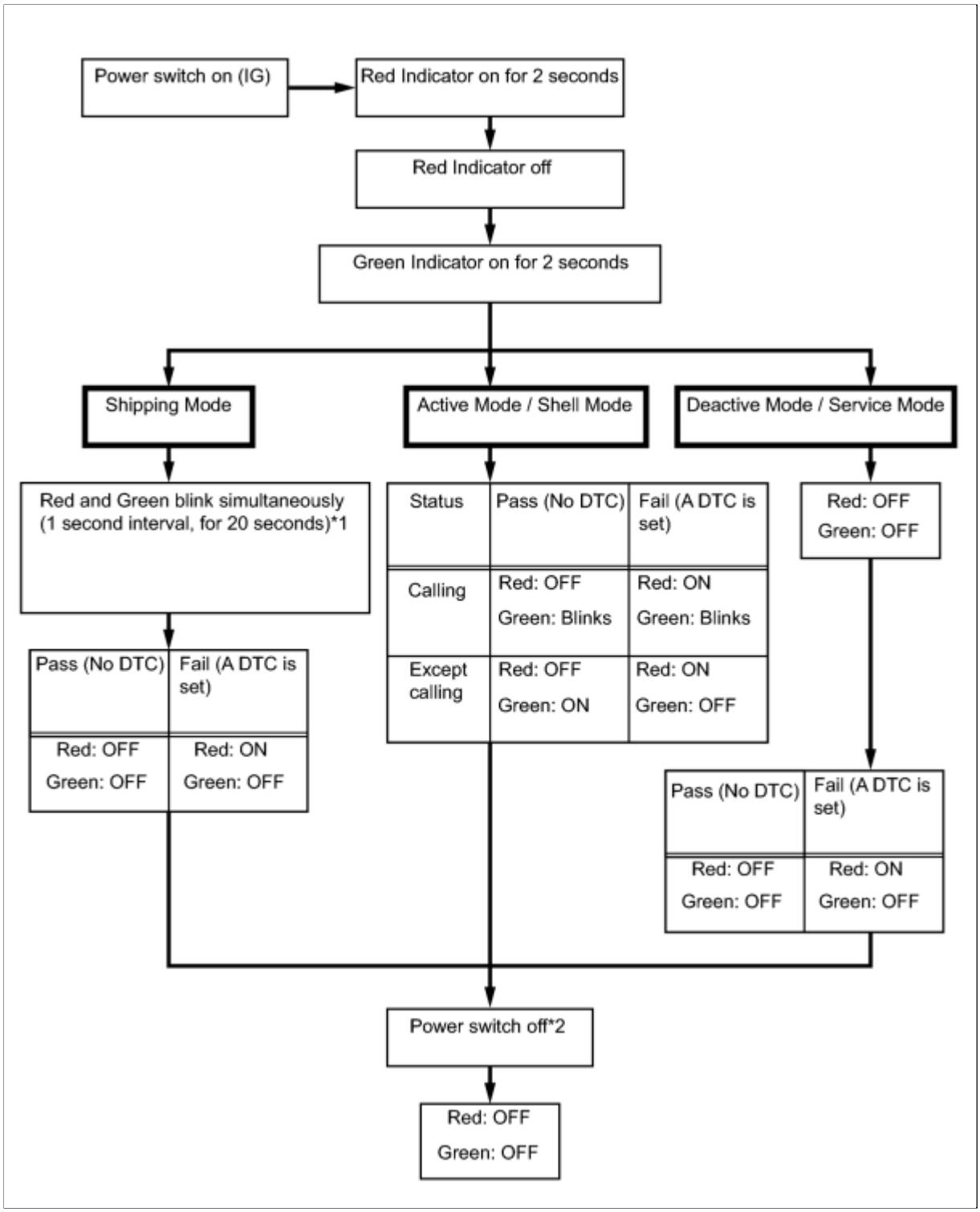
(c) When it is time to replace the BUB (Back-Up Battery), the manual (SOS) switch red indicator will come on. The DCM (Telematics Transceiver) will also store a DTC.

### 5. INDICATOR CONTROL FUNCTION DURING DCM (TELEMATICS TRANSCEIVER) SELF CHECK MODE

**HINT:**

**Every time after the power switch is turned on (IG), the DCM (Telematics Transceiver) will enter into a self check mode. The manual (SOS) switch red indicator will illuminate for 2 seconds and then turn off and then the manual**

**(SOS) switch green indicator will illuminate and will stay on throughout normal operation. The following chart indicates the possible scenarios.**




- *1: System will automatically switch to shell mode if auto activation is successful.
- *2: If a call is in progress during power switch off, the call will continue and LED function will not change.

### 6. SWITCHING THE CONTRACT MODES

| CONTRACT MODES | DESCRIPTION |
|---|---|
| Shipping Mode | This mode is the mode the DCM (Telematics Transceiver) is in from the factory and during shipping. In this mode, when power switch is turned on (IG), the system will automatically attempt to activate |

| | |
|---|---|
| Shipping Mode | In this mode, when power switch is turned on (IG), the system will automatically attempt to activate into shell mode. |
| Shell Mode | This mode begins after vehicle has been automatically activated (into shell mode) after arriving at port or leaving the manufacturing plant line.<br>ACN and stolen vehicle locator are available. |
| Active Mode | This mode begins when the owner's information is provided to telematics and customer signs contract for Safety Connect system.<br>All functions of Safety Connect system are available. |
| Service Mode | This mode applies to a service part DCM (Telematics Transceiver) that has not been activated after replacing DCM (Telematics Transceiver) in vehicle.<br>DCM (Telematics Transceiver) has no associated phone numbers. |
| Deactive Mode | The mode occurs when Safety Connect subscription has been cancelled. |

# HOW TO PROCEED WITH TROUBLESHOOTING

**HINT:**

- Use the following to troubleshoot the Safety Connect system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

**NEXT**

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS CHECK AND SYMPTOM CHECK |

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

**NEXT**

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the auxiliary battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the auxiliary battery before proceeding to the next step.

**NEXT**

| | |
|---|---|
| **4.** | **VERIFY CUSTOMER SUBSCRIPTION IS ACTIVE** |

(a) Enter the VIN into Vehicle Inquiry on Techstream and verify subscription type and expiration date.

**NEXT**

| | |
|---|---|
| **5.** | **PERFORM HEALTH CHECK** |

(a) Perform "Health Check" and check for current DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| No DTC is present. | A |
| DTC is present. | B |
| PRL update required. | C |

**B** ▶ INFO **GO TO DIAGNOSTIC TROUBLE CODE CHART**

**C** ▶ INFO **PERFORM PRL UPDATE**

**A**

| | |
|---|---|
| **6.** | **PROBLEM SYMPTOMS TABLE** |

(a) Refer to Problem Symptoms Table INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Fault is not listed in Problem Symptoms Table. | A |

| | |
|---|---|
| Fault is listed in Problem Symptoms Table. | B |

**HINT:**

**If the symptom does not reoccur and no DTC is output, attempt to reproduce the symptoms** INFO **.**

**B** ▶ **Go to step 8**

**A** ▼

| | |
|---|---|
| **7.** | **OVERALL ANALYSIS AND TROUBLESHOOTING*** |

(a) Refer to Terminals of ECU INFO .

(b) Refer to Data List/Active Test INFO .

**NEXT** ▼

| | |
|---|---|
| **8.** | **REPAIR OR REPLACE** |

(a) Check if the DCM (Telematics Transceiver) has been replaced.

Result:

| RESULT | PROCEED TO |
|---|---|
| The DCM (Telematics Transceiver) has been replaced. | A |
| The DCM (Telematics Transceiver) has not been replaced. | B |

**B** ▶ **Go to step 10**

**A** ▼

| | |
|---|---|
| **9.** | **PERFORM DCM ACTIVATION** |

(a) Perform " DCM ACTIVATION" INFO .

**NEXT**

| | |
|---|---|
| **10.** | **CONFIRMATION TEST** |

**NEXT** **END**

# DCM OPERATION HISTORY

## 1. DCM OPERATION HISTORY

This function shows the telematics network status when the DCM (Telematics Transceiver) was operated. Use this when no DTC is present but this telematics system was unable to connect to the call center. This symptom may occur if cell phone signal strength was very weak.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

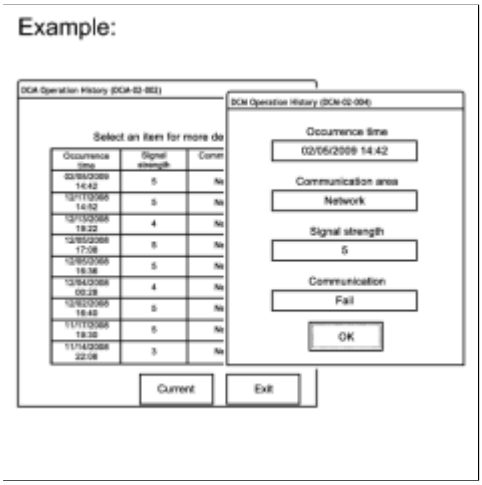
(d) Choose "Telematics" from the System Selection Menu, and then click "Utility".

(e) Click "DCM Operation History" on the Utility Selection Menu.

(f) Follow the instructions on the Techstream.

- "Occurrence time" indicates date of the DCM (Telematics Transceiver) operation.
- "Communication area" indicates which communication network was used: Network (Verizon) or Roaming.
- "Signal strength" indicates the strength of the cellular signal received by the vehicle: 0 (no signal) to 5 (strong).
- "Communication" indicates connecting to the call center: Success or Fail.

Example:




| RESULT | DESCRIPTION |
|---|---|
| Success(Navigation) | A call successfully made using a navigation telematics function (Destination Assist) |
| Success(SOS) | A call successfully made using the manual (SOS) switch. |
| Fail* | A call that was unsuccessful. |

**NOTICE:**

***: A failure can also be caused by manually ending an SOS call, and does not necessarily indicate a device malfunction.**

# DCM ACTIVATION

## 1. DCM ACTIVATION

This function should be used to activate the DCM (Telematics Transceiver) after a new DCM (Telematics Transceiver) has been installed. During the DCM Activation process, Techstream automatically provides the telematics service provider with the new DCM (Telematics Transceiver) information and deletes the old DCM (Telematics Transceiver) information associated with the vehicle. The DCM (Telematics Transceiver) that was replaced should be returned to the parts department.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Choose "Telematics" from the System Selection Menu, and then click "Utility".

(e) Click "DCM Service" on the Utility Selection Menu.

Example:




(f) Choose "Activate DCM" and then click "Next" on the DCM Service Utility.

(g) Follow the instructions on the Techstream.

**HINT:**

- If PRL is not latest version, utility will notify a PRL update must be performed before DCM Activation can be completed.
- If a fault occurs during DCM Activation, a specific fault message will be displayed with procedure guidelines.
- The manual (SOS) switch green indicator will turn on if activation is successful.

| FAULT CODE | REASON |
|---|---|
| 20 | System timeout. |
| 61 | DCM (Telematics Transceiver) has been identified as a previously used part. |
| 62 | VIN is not recognized by telematics provider. |
| 63 | DCM (Telematics Transceiver) already associated with a vehicle. Use another authorized service part. |
| 64 | DCM (Telematics Transceiver) is not recognized. |
| 66 | DCM (Telematics Transceiver) is not a service part. Use only authorized service part. |
| 67 | Unable to activate at this time. |

**HINT:**

**If one these fault codes is present, follow the procedure indicated in the following list.**

- Fault 20: Try DCM Activation again.
- Fault 61: Replace the DCM (Telematics Transceiver) with a new service part and perform DCM Activation.
- Fault 62*: Verify VIN is correct on ECM. Run Vehicle Inquiry and verify VIN.
- Fault 63: Replace the DCM (Telematics Transceiver) with a new service part and perform DCM Activation.
- Fault 64*: Verify that the DCM (Telematics Transceiver) is a new service part.
- Fault 66*: Replace the DCM (Telematics Transceiver) with a new service part and perform DCM Activation.
- Fault 67: Try DCM Activation again. If the fault occurs again, wait and try again later.

***: As the fault could also be caused by a problem in communicating with the call center, before replacing the DCM, check with the call center to determine it there is a database or communication problem.**

**(Call Center number for TOYOTA vehicle: 800-331-4331)**

(h) Push the manual (SOS) switch to call an operator and confirm that the DCM (Telematics Transceiver) is activated.

# HEALTH CHECK

## 1. HEALTH CHECK

Using the Techstream to perform a Health Check provides the technician with an overall view of vehicle status including telematics. Health Check will provide DCM (Telematics Transceiver) software version, PRL version, and applicable DTCs and fault codes related to telematics.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Click "Health Check".

| FAULT CODE | REASON |
|---|---|
| 62 | VIN is not recognized by telematics provider. |
| 64 | DCM (Telematics Transceiver) is not recognized. |
| 65 | VIN mismatch with DCM (Telematics Transceiver). |

**HINT:**

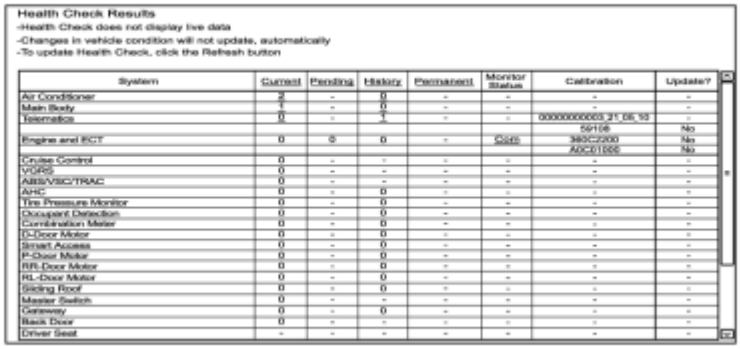
- If Health Check results in a telematics issue, a specific Fault Code will be displayed.
- If a fault code occurs, follow the procedure.
- Fault 62*: Press the manual (SOS) switch and inform operator of error message.
- Fault 64: Press the manual (SOS) switch and inform operator of error message.
- Fault 65*: Contact the call center and request that they correct the DCM/VIN registration information in their database. (Call Center number for TOYOTA vehicle: 800-331-4331)

**HINT:**

***: Verify VIN is correct in ECM. Run Vehicle Inquiry on Techstream and verify VIN is correct.**

(e) Data is displayed under "Telematics".

Example:



# ACN CALL END

## 1. ACN CALL END

This function terminates the ACN (Automatic Collision Notification) to the telematics provider. After a collision in which the DCM receives "Collision Detection Signal", the vehicle will send the emergency call notification to the telematics provider until the ACN call end utility has been run, or the BUB (Back-Up Battery) (if equipped) depleted. Use the ACN Call End utility to stop the ACN call.

**NOTICE:**

**The BUB (Back-Up Battery) must not be replaced while an ACN call is in progress.**

**HINT:**

**After ACN call end utility has been completed, BUB (Back-Up Battery) must be replaced.**

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Choose "Telematics" from the System Selection Menu, and then click "Utility".

(e) Click "DCM Service" on the Utility Selection Menu.

Example:




(f) Choose "ACN call end" and then click "Next" on the DCM Service Utility.

(g) Follow the instructions by Techstream.

# PROBLEM SYMPTOMS TABLE

**HINT:**

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**Voice Guidance**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| "Safety Connect failure detected, please contact your dealer" message is played. | Refer to HEALTH CHECK. | INFO |
| | Diagnostic Trouble Code Chart.<br>(Red indicator has failed and cannot indicate a failure.) | INFO |
| "Safety Connect Activation Failed" message is played. | Contact Telematics Service Provider to verify any network problems.<br>(Call Center number for TOYOTA vehicles: 800-331-4331) | - |
| | Wait for a while, then move to a different location and retry (try to find a location with better signal reception). | - |
| | Refer to HEALTH CHECK. | INFO |
| | Diagnostic Trouble Code Chart. | INFO |
| "Unable to Connect the Emergency Call Center" or "Unable to Connect to the Call Center" message is played. | Contact Telematics Service Provider to verify any network problems.<br>(Call Center number for TOYOTA vehicles: 800-331-4331) | - |
| | Wait for a while, then move to a different location and retry (try to find a location with better signal reception). | - |
| | Perform Vehicle Inquiry on Techstream and verify subscription status. | - |
| | Refer to UNABLE TO CONNECT TO CALL CENTER. | INFO |
| "Safety Connect is not active" message is played. | Perform Vehicle Inquiry on Techstream and verify subscription status. | - |
| | Explain to the customer that the system is in deactive mode, and confirm whether or not they would like to change to active mode. | - |

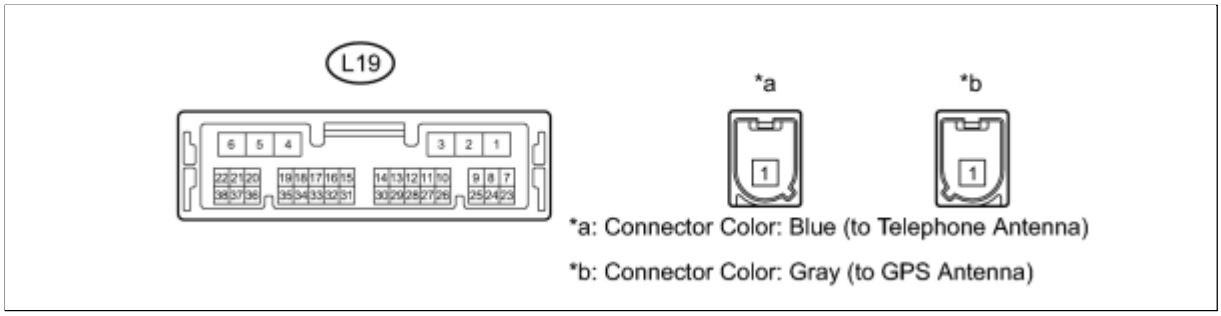
**Indicator Condition**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Green indicator abnormal (Remains OFF) | Contact Telematics Service Provider to verify any network problems.<br>(Call Center number for TOYOTA vehicles: 800-331-4331) | - |
| | Refer to DCM POWER SOURCE CIRCUIT | INFO |
| | Refer to GREEN INDICATOR REMAINS OFF | INFO |
| Red indicator abnormal (Remains ON) | Refer to RED INDICATOR REMAINS ON | INFO |

| | | |
|---|---|---|
| Red indicator abnormal (Remains ON) | Refer to RED INDICATOR REMAINS ON | |
| Green and red indicators abnormal (Remains OFF) | Contact Telematics Service Provider to verify any network problems.<br>(Call Center number for TOYOTA vehicles: 800-331-4331) | - |
| | Refer to GREEN AND RED INDICATORS DO NOT COME ON WHEN IG-ON | INFO |
| | Refer to DCM POWER SOURCE CIRCUIT | INFO |
| | DCM (Telematics Transceiver) | INFO |
| Green and red indicators blink simultaneously | Refer to GREEN AND RED INDICATORS BLINK SIMULTANEOUSLY | INFO |

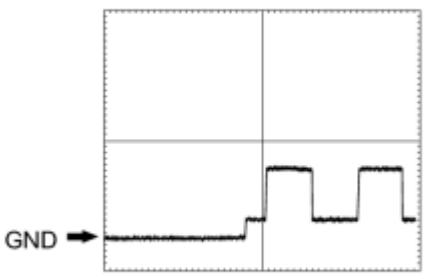
# TERMINALS OF ECU

## 1. CHECK DCM (TELEMATICS TRANSCEIVER)




| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| L19-1 (+B) - L19-4 (E) | SB - BR | Vehicle battery power supply | Power switch off | 11 to 14 V |
| L19-2 (SPI+) - L19-4 (E) | LG - BR | Sound signal | Audio system is playing | A waveform synchronized with sound is output |
| L19-3 (SPI-) - L19-4 (E) | L - BR | Sound signal | Audio system is playing | A waveform synchronized with sound is output |
| L19-4 (E) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L19-5 (SPO+) - L19-4 (E) | LG - BR | Sound signal | Audio system is playing, or Emergency call mode | A waveform synchronized with sound is output |
| L19-6 (SPO-) - L19-4 (E) | L - BR | Sound signal | Audio system is playing, or Emergency call mode | A waveform synchronized with sound is output |
| L19-7 (IG2) - L19-4 (E) | L - BR | IG power supply | Power switch on (IG) | 11 to 14 V |
| | | | Power switch off | Below 1 V |
| L19-8 (ACC) - L19-4 (E) | GR - BR | ACC power supply | Power switch on (ACC) | 11 to 14 V |
| | | | Power switch off | Below 1 V |
| L19-9 (SLED) - L19-4 (E) | G - BR | Manual (SOS) switch illumination signal | Power switch on (ACC) | 11 to 14 V |
| | | | Power switch off | Below 1 V |
| L19-10 (SPDP) - L19-4 (E) | V - BR | Vehicle speed signal | See "Vehicle Signal Check Mode" INFO | - |
| L19-11 (IND1) - L19-4 (E) | B - BR | Manual (SOS) switch red indicator illumination signal | For 2 seconds after turning the Power switch on (ACC) | 1 to 8.5 V |
| | | | Power switch off | Below 1 V |
| L19-12 (IND2) - L19-4 (E) | P - BR | Manual (SOS) switch green indicator illumination signal | For 2 seconds after turning the Power switch on (ACC) | 1 to 8.5 V |
| | | | Power switch off | Below 1 V |
| L19-13 (BBI-) | L | BUB (Back-Up Battery) power supply | - | - |
| L19-17 (MUTE) - L19-4 (E) | G - BR | Mute signal | Audio system is playing | 3.5 V or higher |
| | | | Emergency call mode | Below 1 V |

| | | | | |
|---|---|---|---|---|
| | | | Emergency call mode | Below 1 V |
| L19-18 (MCO+) - L19-4 (E) | B - BR | Sent microphone voice signal | See "Microphone & Voice Recognition Check" INFO | - |
| L19-19 (MCO-) - L19-4 (E) | W - BR | Sent microphone voice signal | See "Microphone & Voice Recognition Check" INFO | - |
| L19-20 (CTR1) | BE | BUB (Back-Up Battery) control line | - | - |
| L19-21 (CTR2) | BR | BUB (Back-Up Battery) control line | - | - |
| L19-23 (ILL+) - L19-4 (E) | G - BR | Illumination signal | Light control switch off | Below 1 V |
| | | | Light control switch tail or ON | 11 to 14 V |
| L19-24 (GSW) - L19-4 (E) | R - BR | Collision detection signal | Power switch on (IG) | Pulse generation (Refer to waveform 1) |
| L19-25 (SIL) | P | Serial communication signal | - | - |
| L19-26 (SIG-) - L19-4 (E) | W - BR | Ground | Always | Below 1 V |
| L19-27 (SIG1) - L19-4 (E) | R - BR | Manual (SOS) switch condition signal | Manual (SOS) switch not pressed | 1.5 to 2.0 V |
| | | | Manual (SOS) switch pressed | 0.5 to 0.7 V |
| L19-30 (BBI+) | Y | BUB (Back-Up Battery) power supply | - | - |
| L19-32 (SGND) - L19-4 (E) | Shield - BR | Shield ground | Always | Below 1 V |
| L19-33 (MCVD) - L19-4 (E) | R - BR | Telephone microphone assembly power supply | Power switch off | Below 1 V |
| | | | Power switch on (IG) | 4 to 6 V |
| L19-34 (MCI+) - L19-4 (E) | B - BR | Receive microphone voice signal | See "Microphone & Voice Recognition Check" INFO | - |
| L19-35 (MCI-) - L19-4 (E) | W - BR | Receive microphone voice signal | See "Microphone & Voice Recognition Check" INFO | - |




(a) Oscilloscope waveform:

(1) Waveform 1

| ITEM | CONDITION |
|---|---|
| Tester connection | L19-24 (GSW) - L19-4 (E) |
| Tool setting | 5.0 V/DIV., 20 ms/DIV. |
| Vehicle condition | Power switch on (IG) |

**2. CHECK DISPLAY AND NAVIGATION MODULE DISPLAY** INFO

**3. CHECK STEREO COMPONENT AMPLIFIER ASSEMBLY** INFO



# DIAGNOSIS SYSTEM

## 1. DESCRIPTION

(a) The DCM (Telematics Transceiver) controls the vehicle Safety Connect system functions. Safety Connect system data and Diagnostic Trouble Codes (DTCs) can be read through the vehicle Data Link Connector 3 (DLC3). In some cases, a malfunction may be occurring in the Safety Connect system. When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

## 2. CHECK DLC3

(a) Check the DLC3 INFO .

## 3. INSPECT BATTERY VOLTAGE

(a) Measure the auxiliary battery voltage with the power switch off.

Standard Voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the auxiliary battery.

## 4. CHECK INDICATOR

(a) When a malfunction is detected in the Safety Connect system, the manual (SOS) switch red indicator on the manual (SOS) switch illuminates to inform the driver of the malfunction INFO .

# DTC CHECK / CLEAR

### 1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Telematics / Trouble Codes.

(e) Check the details of the DTC(s) 

.

### 2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Telematics / Trouble Codes.

(e) Clear the DTCs.

# PRL UPDATE

## 1. PRL UPDATE

This function updates the PRL (Preferred Roaming List) of the DCM (Telematics Transceiver). The PRL is a large set of phone numbers the DCM (Telematics Transceiver) can utilize to make an emergency call when outside (roaming) the telematics service area. The PRL update utility could be used in the following scenarios:

- PRL update is required after "Health Check"
- DCM Activation Utility requires a PRL update before activation

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Click "Health Check".

(e) Verify if updates are available for the currently installed PRL version (Yes or No).

(f) If "Yes" is listed, click it. A TIS webpage will open with Calibration Search Results.

(g) Click on the latest service bulletin (TSB) link.

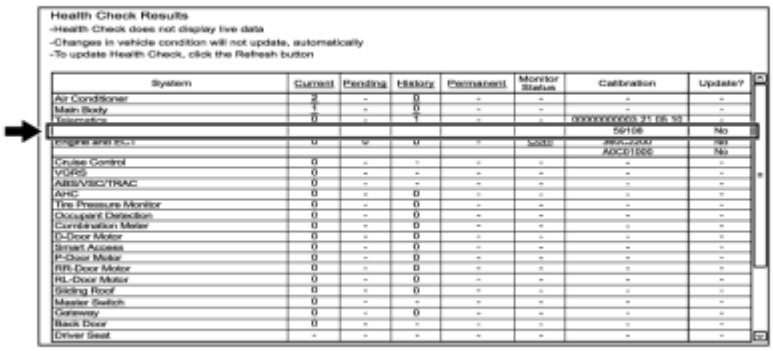
(h) Save the file (.CUW) from the TSB.

(i) Exit from the Techstream application.

(j) Run the file to launch Calibration Update Wizard (CUW).

(k) Follow the CUW steps.

Example:



# DATA LIST / ACTIVE TEST

## 1. DATA LIST

**HINT:**

**Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.**

**NOTICE:**

**In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.**

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Telematics / Data List.

(e) According to the display on the Techstream, read the "Data List".

**Telematics (DCM (Telematics Transceiver))**

| TESTER DISPLAY | MEASUREMENT ITEM/RANGE | NORMAL CONDITION | DIAGNOSTIC NOTE |
|---|---|---|---|
| Emergency Switch | Manual (SOS) switch / OFF or ON | OFF: Manual (SOS) switch not pressed | - |
| | | ON: Manual (SOS) switch pressed | - |
| Current Com Back-Up Battery | BUB (Back-Up Battery) installation history / with or without | with: BUB (Back-Up Battery) was connected at some point (does not guarantee that BUB (Back-Up Battery) is currently connected) | - |
| | | without: This DCM (telematics transceiver) has no record of a BUB (Back-Up Battery) ever being connected | - |

# DIAGNOSTIC TROUBLE CODE CHART

**HINT:**

**If a trouble code is stored during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.**

**DCM (Telematics Transceiver)**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| B1570 | Manual (SOS) Switch Red Indicator Malfunction | 1. Map light assembly<br>2. Wire harness or connector<br>3. DCM (Telematics Transceiver) | INFO |
| B1571 | Manual (SOS) Switch Green Indicator Malfunction | 1. Map light assembly<br>2. Wire harness or connector<br>3. DCM (Telematics Transceiver) | INFO |
| B1572 | Telephone Microphone Error | 1. Wire harness or connector<br>2. Telephone microphone assembly<br>3. Map light assembly<br>4. DCM (Telematics Transceiver) | INFO |
| B1573 | Short in Telephone Antenna Circuit | 1. DCM (Telematics Transceiver)<br>2. Telephone and GPS antenna assembly<br>3. Wire harness or connector (Telephone and GPS antenna cord) | INFO |
| B15CB | Telematics Transceiver Antenna Disconnected | 1. DCM (Telematics Transceiver)<br>2. Telephone and GPS antenna assembly<br>3. Wire harness or connector (Telephone and GPS antenna cord) | INFO |
| B1583 | GPS Signal Unreceived | 1. Telephone and GPS antenna assembly<br>2. DCM (Telematics Transceiver) | INFO |
| B15A8 | Telematics Transceiver Malfunction | DCM (Telematics Transceiver) | INFO |
| B15C0 | Short in GPS Antenna | 1. DCM (Telematics Transceiver)<br>2. Wire harness or connector (Telephone and GPS antenna cord)<br>3. Telephone and GPS antenna assembly | INFO |
| B15C1 | Open in GPS Antenna | 1. DCM (Telematics Transceiver)<br>2. Wire harness or connector (Telephone and GPS antenna cord)<br>3. Telephone and GPS antenna assembly | INFO |
| B15C4 | Airbag Signal Malfunction/Not Input | 1. Airbag system<br>2. Wire harness or connector<br>3. Center airbag sensor assembly<br>4. DCM (Telematics Transceiver) | INFO |
| B15C5 | Manual Button Malfunction | 1. DCM (Telematics Transceiver)<br>2. Map light assembly<br>3. Wire harness or connector | INFO |
| B15CC | Backup Battery Failure | 1. Wire harness or connector<br>2. BUB (Back-Up Battery) | INFO |

| | | | |
|---|---|---|---|
| | | 3. DCM (Telematics Transceiver) | |
| B15EC | Backup Battery Degradation | BUB (Back-Up Battery) | INFO |

| DTC | B1570 | Manual (SOS) Switch Red Indicator Malfunction |
|---|---|---|

## DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects an open or short in the manual (SOS) switch red indicator circuit of the manual (SOS) switch.

The manual (SOS) switch red indicator illuminates for 2 seconds and goes off when the power switch is turned on (IG). If a malfunction in the Safety Connect system is detected, the manual (SOS) switch red indicator will illuminate.

However, the manual (SOS) switch red indicator may not illuminate when this DTC is set.

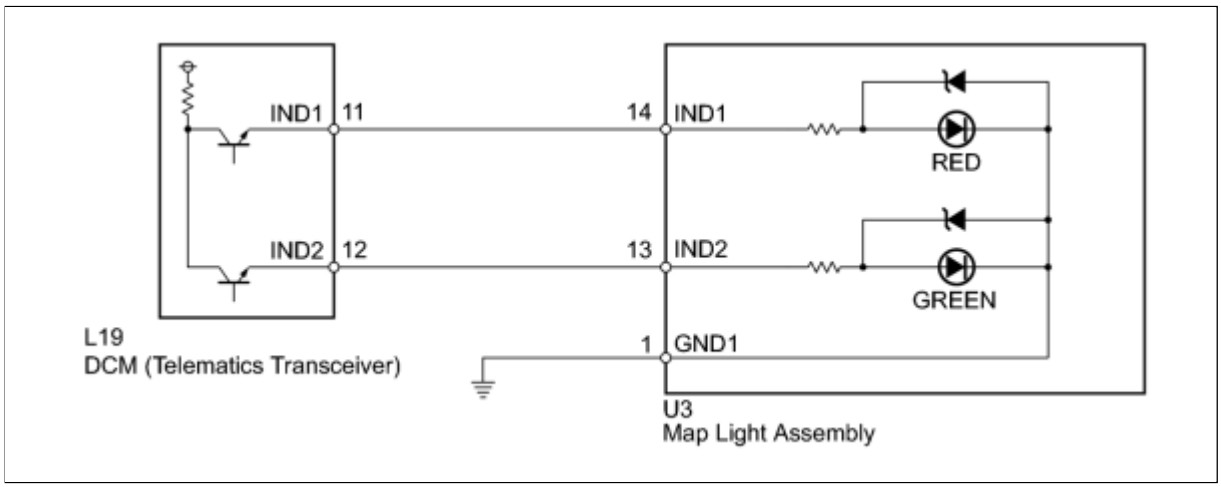
**HINT:**

**The manual (SOS) switch red indicator will not operate to indicate another DTC is set, therefore a voice guidance will be heard.**

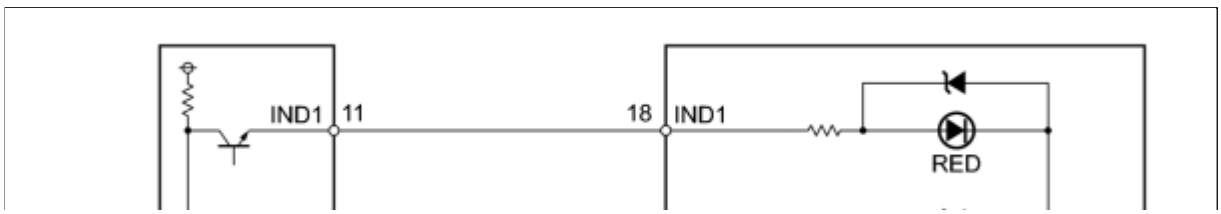
| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1570 | Current for manual (SOS) switch red indicator reaches malfunction criteria for 10 seconds when power switch is on (IG). | • Map light assembly<br>• Wire harness or connector<br>• DCM (Telematics Transceiver) |

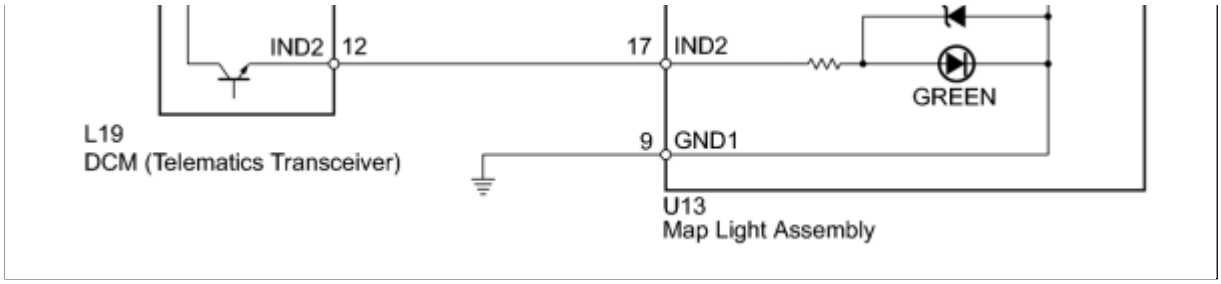
## WIRING DIAGRAM

**1. w/o Sliding Roof**




**2. w/ Sliding Roof**






## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC B1570 and B1571 are output | A |
| DTC B1570 is output<br>(DTC B1571 is not output) | B |

B ▶ INSPECT MAP LIGHT ASSEMBLY (MANUAL (SOS) SWITCH RED INDICATOR CONDITION)

A ▼

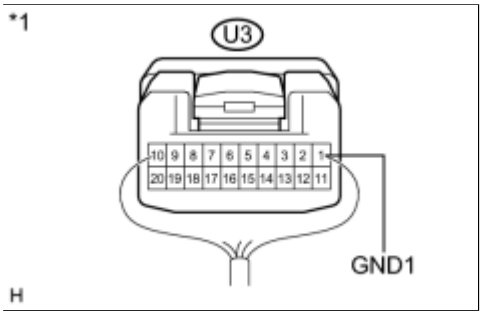
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MAP LIGHT ASSEMBLY - BODY GROUND) |

(a) Remove the map light assembly but do not disconnect the connectors INFO .

(b) w/o Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.

below...




Standard Resistance:

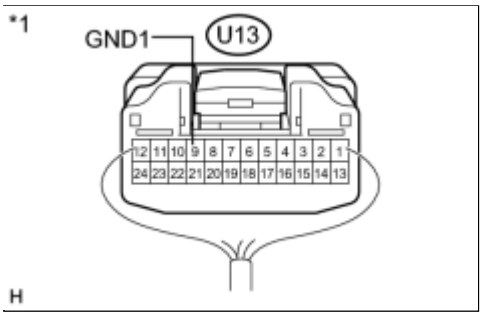
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U3-1 (GND1) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

(c) w/ Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U13-9 (GND1) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT MAP LIGHT ASSEMBLY (RED INDICATOR)** |

(a) Disconnect the U3*1 or U13*2 map light assembly connector.

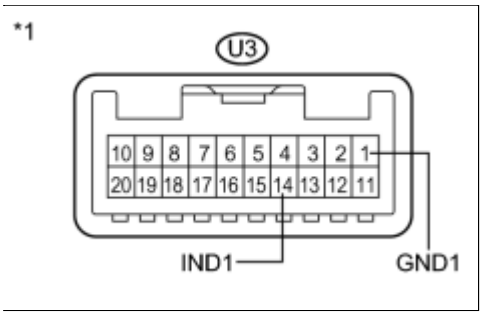
- *1: w/o Sliding Roof
- *2: w/ Sliding Roof

(b) Connect 2 dry-cell batteries (1.5 V each) in series.

(c) w/o Sliding Roof:

(1) Connect the positive (+) lead to terminal U3-14 (IND1) and the negative (-) lead to terminal U3-1 (GND1) of the map light assembly connectors.

assembly connectors.




(2) Check if the illumination for the manual (SOS) switch red indicator comes on.

OK:

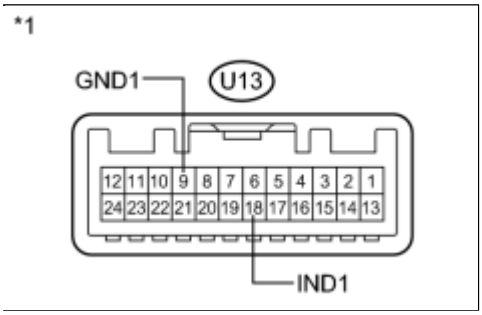
Red indicator comes on.

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected (Map Light Assembly) |

(d) w/ Sliding Roof:

(1) Connect the positive (+) lead to terminal U13-18 (IND1) and the negative (-) lead to terminal U13-9 (GND1) of the map light assembly connectors.




(2) Check if the illumination for the manual (SOS) switch red indicator comes on.

OK:

Red indicator comes on.

## Text in Illustration

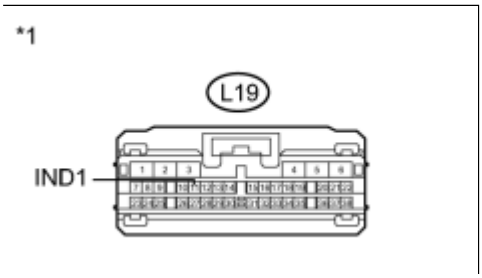
| | |
|---|---|
| *1 | Component without harness connected (Map Light Assembly) |

**NG** ▶ **REPLACE MAP LIGHT ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - MAP LIGHT ASSEMBLY)** |

(a) Disconnect the L19 DCM (Telematics Transceiver) connector.




(b) w/o Sliding Roof:

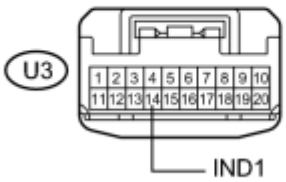
(1) Measure the resistance according to the value(s) in the table below .

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-11 (IND1) - U3-14 (IND1) | Always | Below 1 Ω |

| | | |
|---|---|---|
| L19-11 (IND1) - U3-14 (IND1) | Always | Below 1 Ω |

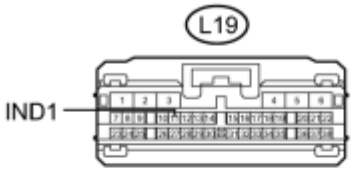
*2



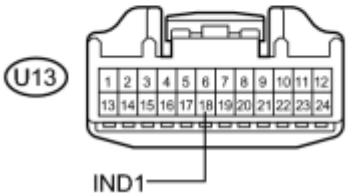

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector (to Map Light Assembly) |

*1




*2




(c) w/ Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below .

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-11 (IND1) - U13-18 (IND1) | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector (to Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **5.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| | |
|---|---|
| **6.** | **INSPECT MAP LIGHT ASSEMBLY (MANUAL (SOS) SWITCH RED INDICATOR CONDITION)** |

(a) Confirm the red indicator status after the power switch on (IG) INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Red indicator remains off. | A |
| Red indicator remains on. | B |

B ▶ REPLACE DCM (TELEMATICS TRANSCEIVER)

A ▼

| 7. | INSPECT MAP LIGHT ASSEMBLY (RED INDICATOR INPUT VOLTAGE) |
|---|---|

(a) Remove the map light assembly but do not disconnect the connectors INFO .

(b) w/o Sliding Roof:

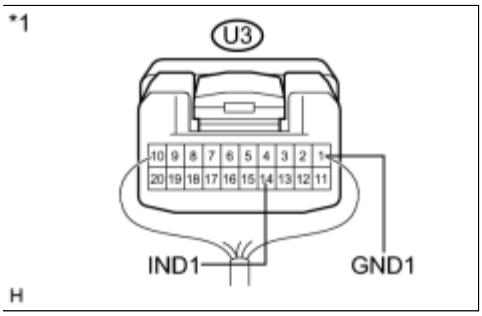
(1) Connect the positive lead of a voltmeter to terminal U3-14 (IND1), and the negative lead to terminal U3-1 (GND1).

(2) Measure the voltage.

Standard:

1.0 to 8.5 V for 2 seconds after the power switch is on (IG).

0 V when the power switch is off.




## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected (Map Light Assembly) |

(c) w/ Sliding Roof:

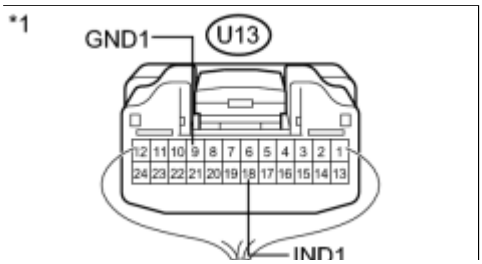
(1) Connect the positive lead of a voltmeter to terminal U13-18 (IND1), and the negative lead to terminal U13-9 (GND1).

(2) Measure the voltage.

Standard:

1.0 to 8.5 V for 2 seconds after the power switch is on (IG).

0 V when the power switch is off.




## Text in Illustration

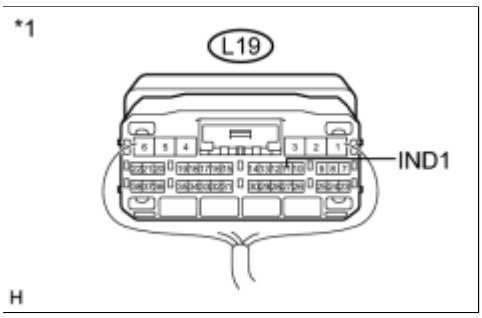



| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

**NG** ▶ **INSPECT DCM (TELEMATICS TRANSCEIVER) (RED INDICATOR OUTPUT VOLTAGE)**

**OK** ▶ **REPLACE MAP LIGHT ASSEMBLY**

| | |
|---|---|
| **8.** | **INSPECT DCM (TELEMATICS TRANSCEIVER) (RED INDICATOR OUTPUT VOLTAGE)** |




(a) Remove the DCM (Telematics Transceiver) but do not disconnect the connectors INFO .

(b) Connect the positive lead of a voltmeter to terminal L19-11 (IND1), and the negative lead to body ground.

(c) Measure the voltage.

Standard:

1.0 to 8.5 V for 2 seconds after the power switch is on (IG).

0 V when the power switch is off.

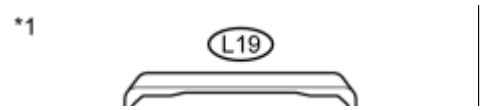
**Text in Illustration**

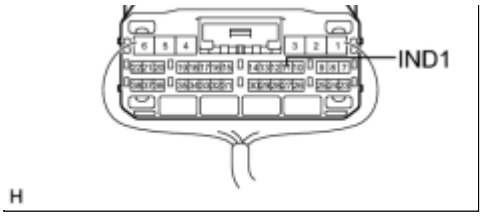
| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

**NG** ▶ **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - BODY GROUND)**

**OK** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| **9.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - BODY GROUND)** |






(a) Remove the DCM (Telematics Transceiver) but do not disconnect the connectors INFO .

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-11 (IND1) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **10.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| DTC | B1571 | Manual (SOS) Switch Green Indicator Malfunction |
|---|---|---|

## DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects an open or short in the manual (SOS) switch green indicator circuit of the manual (SOS) switch. The manual (SOS) switch green indicator illuminates after the power switch is turned on (IG).

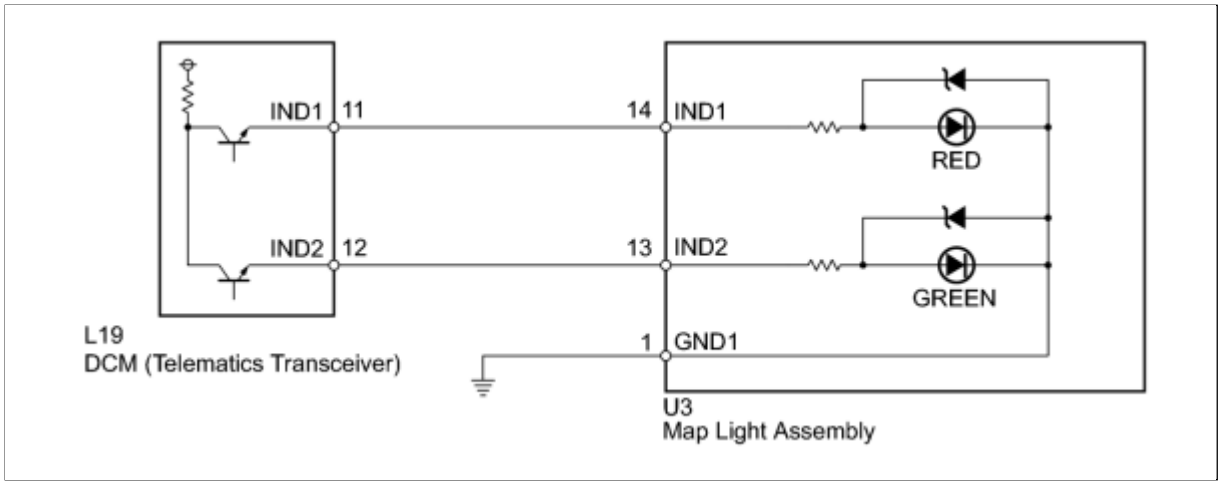
If the Safety Connect system is not active, the manual (SOS) switch green indicator will turn off.

If the Safety Connect system is active, the manual (SOS) switch green indicator will blink while communicating with call center.

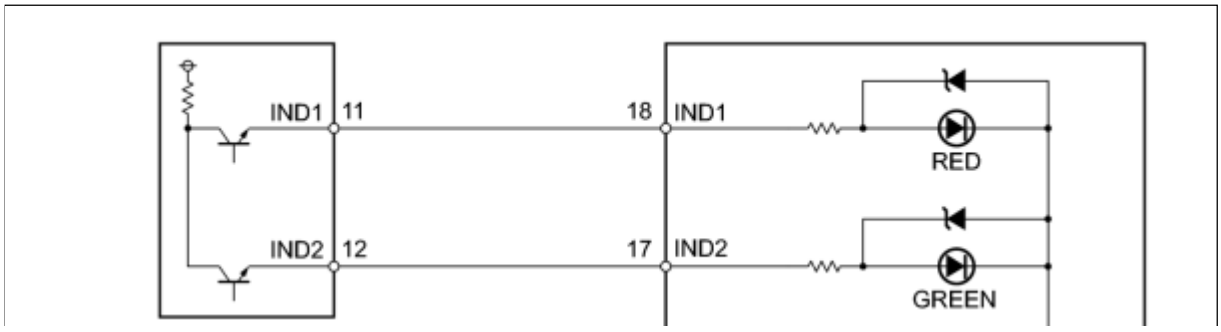
| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1571 | Current for manual (SOS) switch green indicator reaches malfunction criteria for 10 seconds when power switch is on (IG). | • Map light assembly<br>• Wire harness or connector<br>• DCM (Telematics Transceiver) |

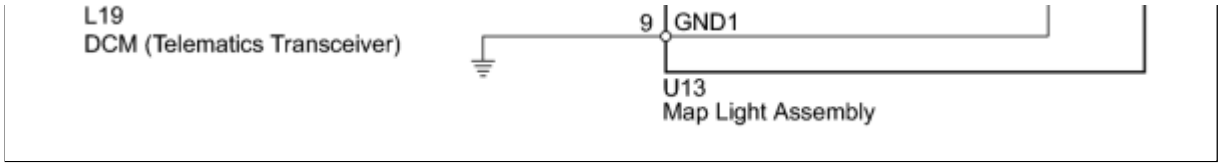
## WIRING DIAGRAM

**1. w/o Sliding Roof**




**2. w/ Sliding Roof**






## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC B1570 and B1571 are output | A |
| DTC B1571 is output<br>(DTC B1570 is not output) | B |

B ▶ INSPECT MAP LIGHT ASSEMBLY (MANUAL (SOS) SWITCH GREEN INDICATOR CONDITION)

A ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MAP LIGHT ASSEMBLY - BODY GROUND) |

(a) Remove the map light assembly but do not disconnect the connectors INFO .

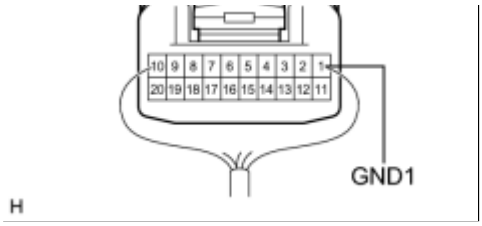
(b) w/o Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U3-1 (GND1) - Body ground | Always | Below 1 Ω |

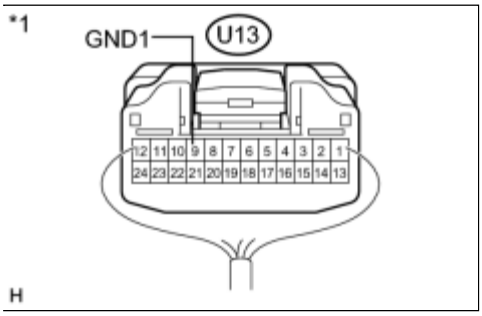
## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected (Map Light Assembly) |

(c) w/ Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U13-9 (GND1) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected (Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

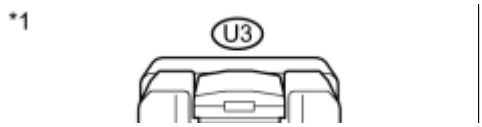
**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT MAP LIGHT ASSEMBLY (GREEN INDICATOR)** |

(a) Disconnect the U3*1 or U13*2 map light assembly connector.

- *1: w/o Sliding Roof
- *2: w/ Sliding Roof

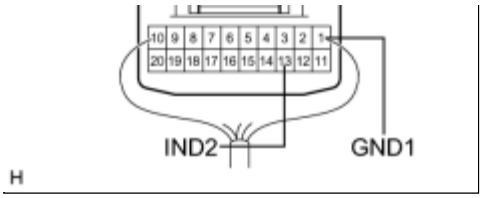
(b) Connect 2 dry-cell batteries (1.5 V each) in series.




(c) w/o Sliding Roof:

(1) Connect the positive (+) lead to terminal U3-13 (IND2) and the negative (-) lead to terminal U3-1 (GND1) of the map light assembly connectors.

(2) Check if the illumination for the manual (SOS) switch red indicator comes on.




OK:

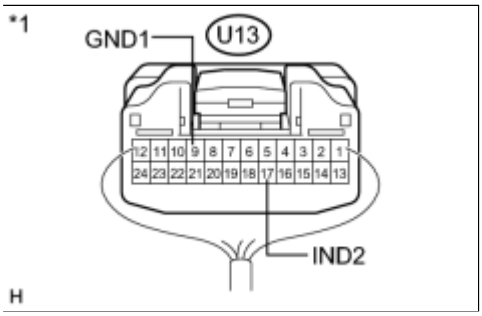
Red indicator comes on.

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Map Light Assembly) |

(d) w/ Sliding Roof:

(1) Connect the positive (+) lead to terminal U13-17 (IND2) and the negative (-) lead to terminal U13-9 (GND1) of the map light assembly connectors.




(2) Check if the illumination for the manual (SOS) switch red indicator comes on.

OK:

Red indicator comes on.

## Text in Illustration

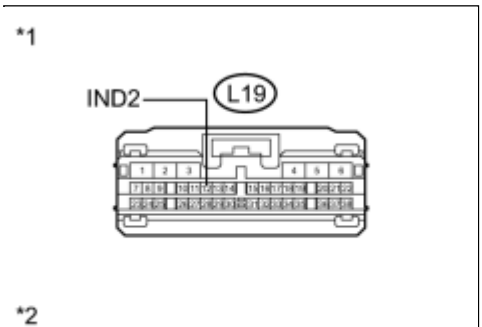
| | |
|---|---|
| *1 | Component without harness connected<br>(Map Light Assembly) |

**NG** ▶ **REPLACE MAP LIGHT ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - MAP LIGHT ASSEMBLY)** |

(a) Disconnect the L19 DCM (Telematics Transceiver) connector.



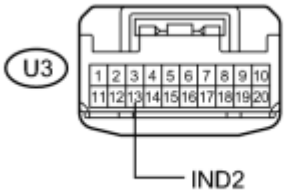

(b) w/o Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below .

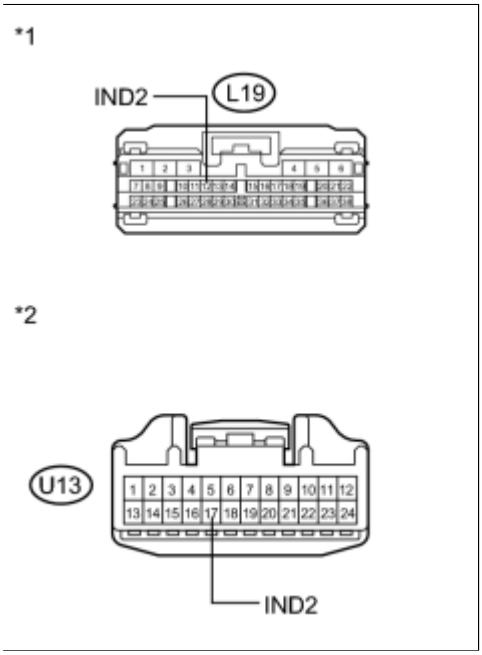
Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-12 (IND2) - U3-13 (IND2) | Always | Below 1 Ω |

## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector (to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector (to Map Light Assembly) |




(c) w/ Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below .

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-12 (IND2) - U13-17 (IND2) | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector (to Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **5.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| | |
|---|---|
| **6.** | **INSPECT MAP LIGHT ASSEMBLY (MANUAL (SOS) SWITCH GREEN INDICATOR CONDITION)** |

(a) Confirm the green indicator status after the power switch on (IG) INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Green indicator remains off. | A |
| Green indicator remains on. | B |

**B** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**A** ▼

| 7. | INSPECT MAP LIGHT ASSEMBLY (GREEN INDICATOR INPUT VOLTAGE) |
|---|---|

(a) Remove the map light assembly but do not disconnect the connectors INFO .

(b) w/o Sliding Roof:

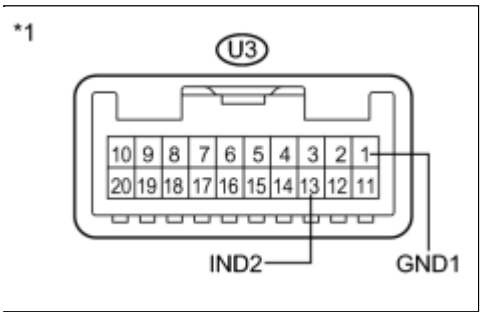
(1) Connect the positive lead of a voltmeter to terminal U3-13 (IND2), and the negative lead to terminal U3-1 (GND1).

(2) Measure the voltage.

Standard:

1.0 to 8.5 V for 2 seconds after the power switch is on (IG).

0 V when the power switch is off.




## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

(c) w/ Sliding Roof:

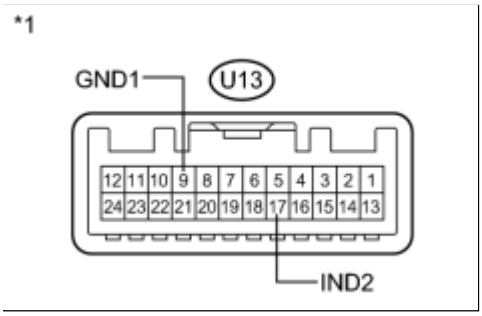
(1) Connect the positive lead of a voltmeter to terminal U13-17 (IND2), and the negative lead to terminal U13-9 (GND1).

(2) Measure the voltage.

Standard:

1.0 to 8.5 V for 2 seconds after the power switch is on (IG).

0 V when the power switch is off.



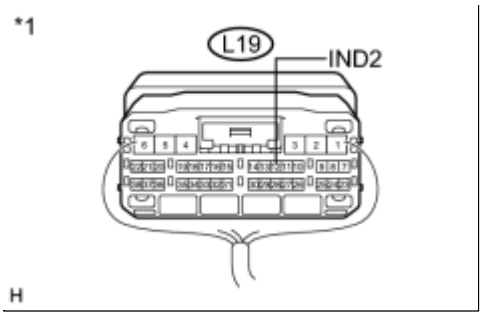

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

**NG** ▶ **INSPECT DCM (TELEMATICS TRANSCEIVER) (GREEN INDICATOR OUTPUT VOLTAGE)**

**OK** ▶ **REPLACE MAP LIGHT ASSEMBLY**

| | |
|---|---|
| **8.** | **INSPECT DCM (TELEMATICS TRANSCEIVER) (GREEN INDICATOR OUTPUT VOLTAGE)** |




(a) Remove the DCM (Telematics Transceiver) but do not disconnect the connectors INFO .

(b) Connect the positive lead of a voltmeter to terminal L19-12 (IND2), and the negative lead to body ground.

(c) Measure the voltage.

Standard:

1.0 to 8.5 V for 2 seconds after the power switch is on (IG) and red indicator has turned off.

0 V when the power switch is off.

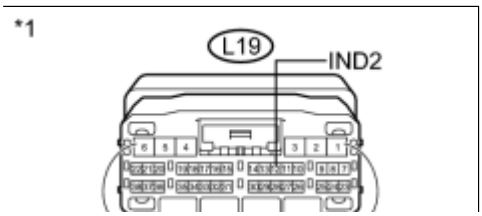
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

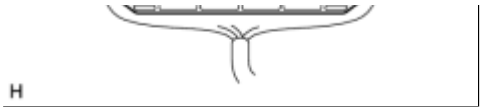
**NG** ▶ **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - BODY GROUND)**

**OK** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| **9.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - BODY GROUND)** |




(a) Remove the DCM (Telematics Transceiver) but do not disconnect the connectors INFO .




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-12 (IND2) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **10.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| DTC | B1572 | Telephone Microphone Error |
|---|---|---|

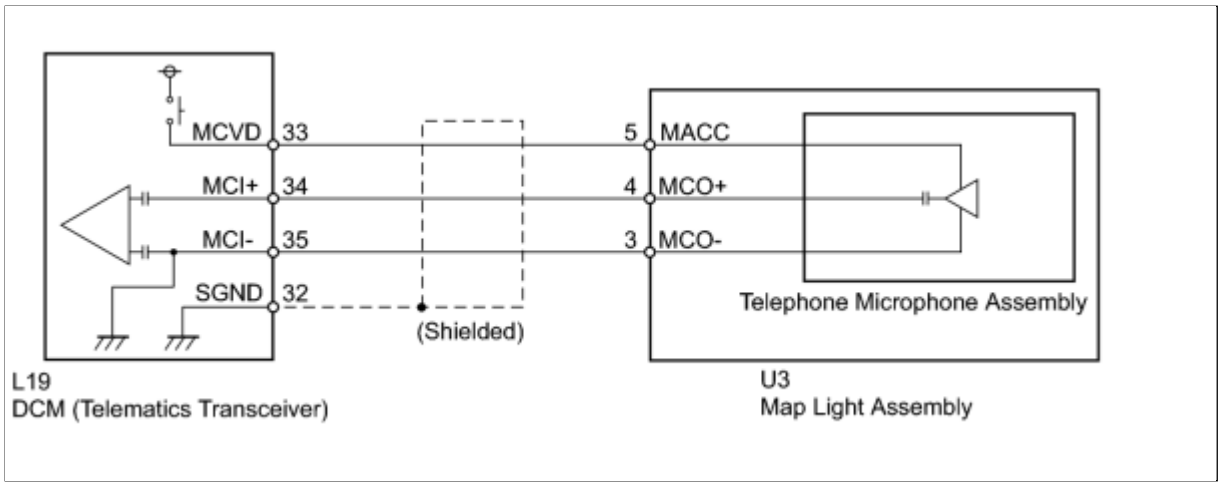
## DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects a malfunction in the telephone microphone assembly circuit.

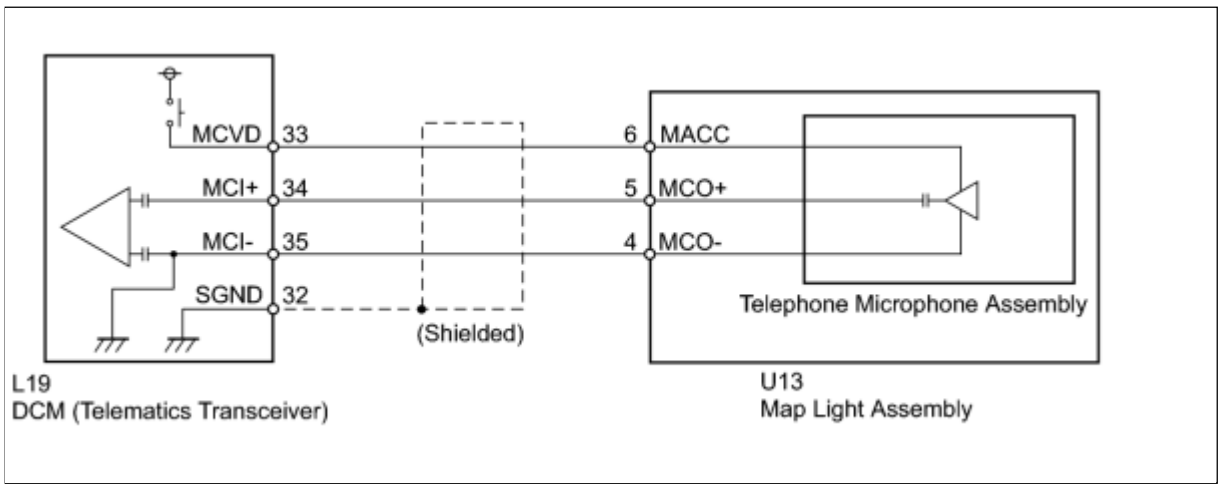
| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1572 | Current of MCVD reaches malfunction criteria for 10 seconds while power switch is on (IG). | • Wire harness or connector<br>• Telephone microphone assembly<br>• Map light assembly<br>• DCM (Telematics Transceiver) |

## WIRING DIAGRAM

**1. w/o Sliding Roof:**




**2. w/ Sliding Roof:**



## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC B1572 is output | A |
| DTC B1572 is not output | B |

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 2. | INSPECT MAP LIGHT ASSEMBLY (TELEPHONE MICROPHONE POWER SOURCE) |

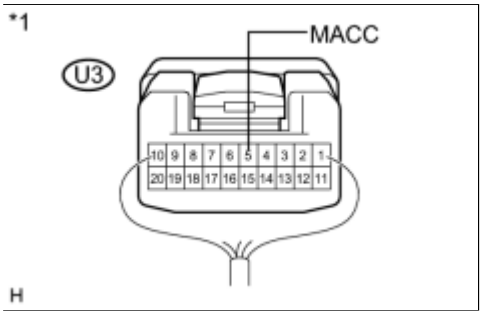
(a) Remove the map light assembly but do not disconnect the connectors INFO .

(b) w/o Sliding Roof:

(1) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U3-5 (MACC) - Body ground | Power switch on (ACC) | 4 to 6 V |



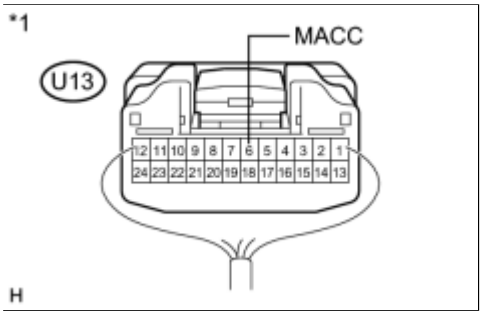

### Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

(c) w/ Sliding Roof:

(1) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U13-6 (MACC) - Body ground | Power switch on (ACC) | 4 to 6 V |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

**NG** ▶ **INSPECT DCM (TELEMATICS TRANSCEIVER) (TELEPHONE MICROPHONE POWER SOURCE)**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - MAP LIGHT ASSEMBLY)** |

(a) Disconnect the L19 DCM (Telematics Transceiver) connector.

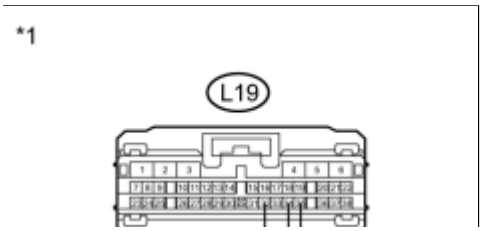
(b) Disconnect the U3*1 or U13*2 map light assembly connector.

- *1: w/o Sliding Roof
- *2: w/ Sliding Roof

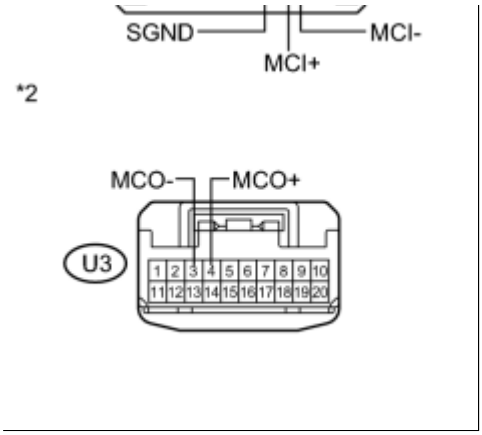
(c) w/o Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below .

Standard Resistance:




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-34 (MCI+) - U3-4 (MCO+) | Always | Below 1 Ω |
| L19-35 (MCI-) - U3-3 (MCO-) | Always | Below 1 Ω |




| | | |
|---|---|---|
| L19-34 (MCI+) - Body ground | Always | 10 kΩ or higher |
| L19-35 (MCI-) - Body ground | Always | 10 kΩ or higher |
| L19-32 (SGND) - Body ground | Always | 10 kΩ or higher |

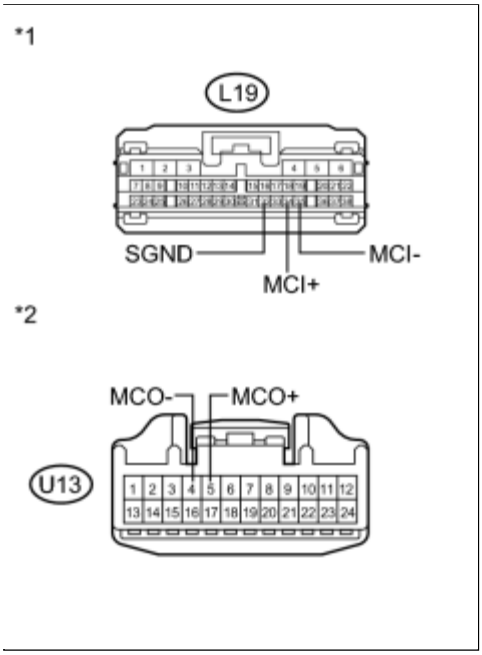
## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector (to Map Light Assembly) |

(d) w/ Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below .

Standard Resistance:




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-34 (MCI+) - U13-5 (MCO+) | Always | Below 1 Ω |
| L19-35 (MCI-) - U13-4 (MCO-) | Always | Below 1 Ω |
| L19-34 (MCI+) - Body ground | Always | 10 kΩ or higher |
| L19-35 (MCI-) - Body ground | Always | 10 kΩ or higher |
| L19-32 (SGND) - Body ground | Always | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector (to Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **4.** | **REPLACE TELEPHONE MICROPHONE ASSEMBLY** |

(a) Replace the telephone microphone assembly with a normal one and check if the same problem occurs.

(d) Replace the telephone microphone assembly with a normal one and check if the same problem occurs again (INFO for w/o Sliding Roof, INFO for w/ Sliding Roof).

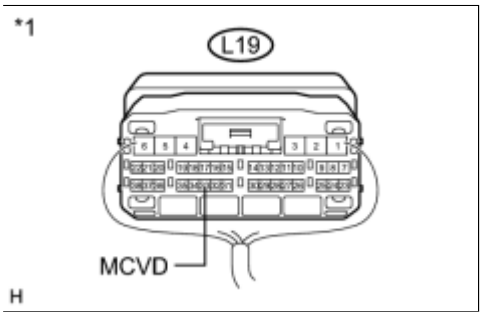
OK:

The system returns to normal.

**NG** ▶ **REPLACE MAP LIGHT ASSEMBLY**

**OK** ▶ **END**

| | |
|---|---|
| **5.** | **INSPECT DCM (TELEMATICS TRANSCEIVER) (TELEPHONE MICROPHONE POWER SOURCE)** |




(a) Remove the DCM (Telematics Transceiver) but do not disconnect the connectors (INFO).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-33 (MCVD) - Body ground | Power switch on (ACC) | 4 to 6 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

**NG** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**OK** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| **6.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) (INFO).

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| | | |
|---|---|---|
| **DTC** | **B1573** | **Short in Telephone Antenna Circuit** |

| | | |
|---|---|---|
| **DTC** | **B15CB** | **Telematics Transceiver Antenna Disconnected** |

# DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects an open or a short in the telephone and GPS antenna circuit. The DCM (Telematics Transceiver) oscillates and receives 824 - 894 MHz or 1850 - 1990 MHz radio-frequency through the telephone and GPS antenna assembly.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1573 | Telephone and GPS antenna assembly impedance is lower than malfunction criterion for 10 seconds when power switch is on (IG).<br>(Short circuit) | • DCM (Telematics Transceiver)<br>• Telephone and GPS antenna assembly<br>• Wire harness or connector (Telephone and GPS antenna cord) |
| B15CB | Telephone and GPS antenna assembly impedance is higher than malfunction criterion for 10 seconds when power switch is on (IG).<br>(Open circuit) | |

**HINT:**

**Refer to "PARTS LOCATION" for the installation location of telephone and GPS antenna cord** INFO .

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

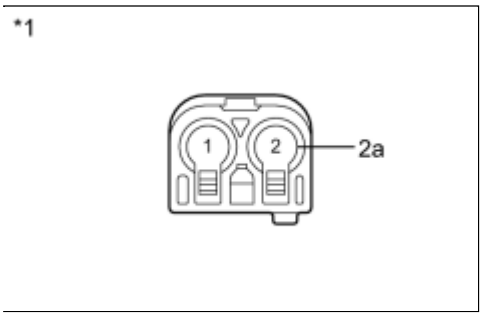
| RESULT | PROCEED TO |
|---|---|
| DTC B1573 or B15CB is output | A |
| DTC B1573 or B15CB is not output | B |

B ▶ **CHECK FOR INTERMITTENT PROBLEMS**

**A**

▼

| | |
|---|---|
| **2.** | **INSPECT TELEPHONE AND GPS ANTENNA ASSEMBLY** |




(a) Disconnect the telephone and GPS antenna assembly connector from the telephone and GPS antenna cord (No. 5 antenna cord sub-assembly).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 2 - 2a | Always | 4 to 11 kΩ |

**Text in Illustration**

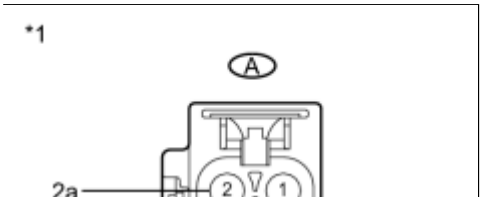
| | |
|---|---|
| *1 | Telephone and GPS Antenna Assembly |

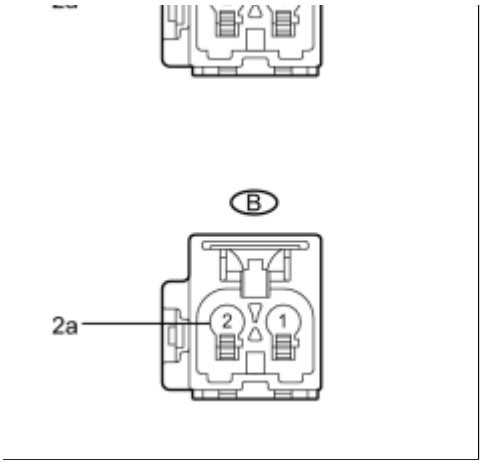
NG ▶ **REPLACE TELEPHONE AND GPS ANTENNA ASSEMBLY**

**OK**

▼

| | |
|---|---|
| **3.** | **INSPECT TELEPHONE AND GPS ANTENNA CORDS (NO. 5 ANTENNA CORD SUB-ASSEMBLY)** |






(a) Disconnect the telephone and GPS antenna cord (No. 5 antenna cord sub-assembly) connector from the telephone and GPS antenna cord (No. 4 antenna cord sub-assembly).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| A-2 - B-2 | Always | Below 1 Ω |
| A-2a - B-2a | Always | Below 1 Ω |
| A-2 - Body ground | Always | 10 kΩ or higher |
| A-2a - Body ground | Always | 10 kΩ or higher |

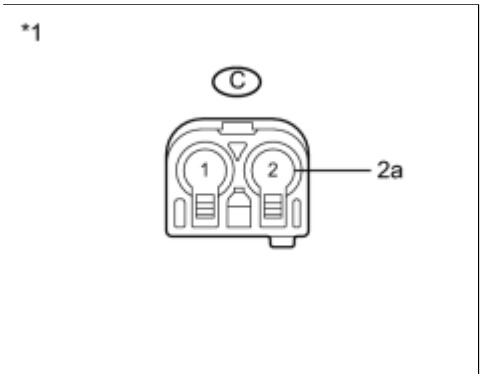
**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (No. 5 Antenna Cord Sub-assembly) |

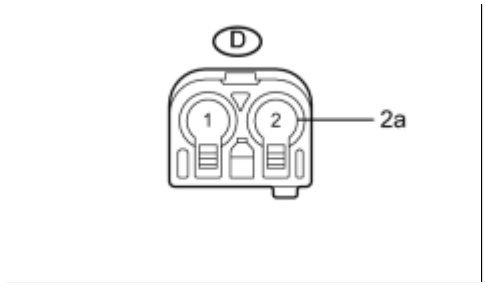
**NG** ▶ **REPLACE TELEPHONE AND GPS ANTENNA CORD (NO. 5 ANTENNA CORD SUB-ASSEMBLY)**

**OK** ▼

| | |
|---|---|
| **4.** | **INSPECT TELEPHONE AND GPS ANTENNA CORDS (NO. 4 ANTENNA CORD SUB-ASSEMBLY)** |




(a) Disconnect the telephone and GPS antenna cord (No. 4 antenna cord sub-assembly) connector from the telephone and GPS antenna cord (No. 2 antenna cord sub-assembly).




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| C-2 - D-2 | Always | Below 1 Ω |
| C-2a - D-2a | Always | Below 1 Ω |
| C-2 - Body ground | Always | 10 kΩ or higher |
| C-2a - Body ground | Always | 10 kΩ or higher |

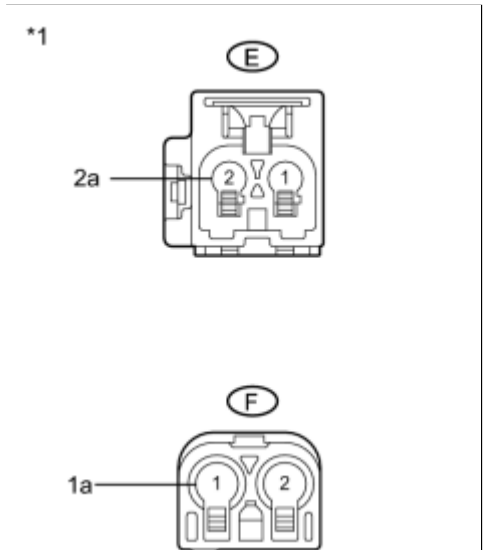
**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (No. 4 Antenna Cord Sub-assembly) |

**NG** ▶ **REPLACE TELEPHONE AND GPS ANTENNA CORD (NO. 4 ANTENNA CORD SUB-ASSEMBLY)**

**OK** ▼

| | |
|---|---|
| **5.** | **INSPECT TELEPHONE AND GPS ANTENNA CORDS (NO. 2 ANTENNA CORD SUB-ASSEMBLY)** |




(a) Disconnect the telephone and GPS antenna cord (No. 2 antenna cord sub-assembly) connector from the instrument panel wire (antenna cord sub-assembly).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| E-2 - F-1 | Always | Below 1 Ω |
| E-2a - F-1a | Always | Below 1 Ω |
| E-2 - Body ground | Always | 10 kΩ or higher |
| E-2a - Body ground | Always | 10 kΩ or higher |

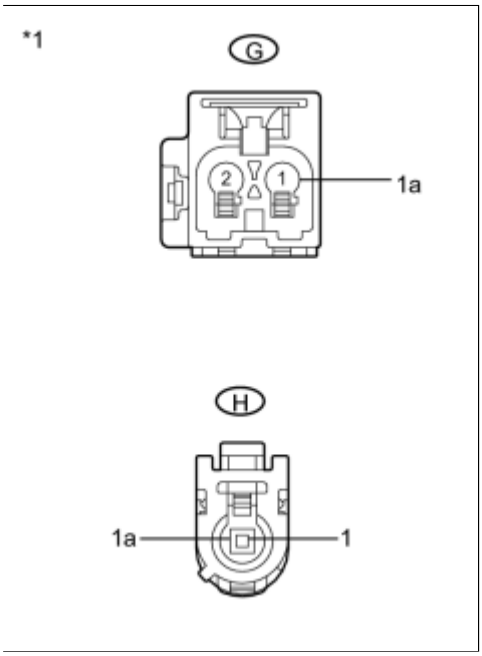
**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (No. 2 Antenna Cord Sub-assembly) |

**NG** ▶ **REPLACE TELEPHONE AND GPS ANTENNA CORD (NO. 2 ANTENNA CORD SUB-ASSEMBLY)**

**OK** ▼

| | |
|---|---|
| **6.** | **INSPECT TELEPHONE AND GPS ANTENNA CORDS (INSTRUMENT PANEL WIRE)** |




(a) Disconnect the instrument panel wire (antenna cord sub-assembly) cord connector from the DCM (Telematics Transceiver).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| G-1 - H-1 | Always | Below 1 Ω |
| G-1a - H-1a | Always | Below 1 Ω |
| G-1 - Body ground | Always | 10 kΩ or higher |
| G-1a - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (Instrument Panel Wire) |

**NG** ▶ **REPLACE INSTRUMENT PANEL WIRE (ANTENNA CORD SUB-ASSEMBLY)**

**OK** ▼

| | |
|---|---|
| **7.** | **REPLACE TELEPHONE AND GPS ANTENNA ASSEMBLY** |

(a) Replace the telephone and GPS antenna assembly with a normal one and check if the same problem occurs again INFO .

OK:

The system returns to normal.

**NG** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**OK** ▶ **END**

| | |
|---|---|
| **8.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| DTC | B1583 | GPS Signal Unreceived |
|---|---|---|

## DESCRIPTION

If GPS satellite signals cannot be acquired for 10 consecutive miles, this DTC is set.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1583 | GPS signal is not received for 10 miles | • Telephone and GPS antenna assembly<br>• DCM (Telematics Transceiver) |

## INSPECTION PROCEDURE

**HINT:**

**If either DTC B15C0 or B15C1 is output at the same time, perform troubleshooting for DTC B15C0 or B15C1 first.**

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK TELEPHONE AND GPS ANTENNA ASSEMBLY** |

(a) Check that there are no problems with the telephone and GPS antenna assembly.

OK:

The antenna is not excessively dirty, and there are no objects blocking signal reception.

**NG** ▶ **REMOVE FOREIGN OBJECT**

**OK** ▼

| | |
|---|---|
| 2. | **REPLACE TELEPHONE AND GPS ANTENNA ASSEMBLY** |

(a) Replace the telephone and GPS antenna assembly INFO .

**NEXT** ▼

| | |
|---|---|
| 3. | **CLEAR DTC** |

(a) Clear the DTC INFO .

**NEXT**

| | |
|---|---|
| **4.** | **CHECK DTC** |

(a) Drive the vehicle for at least 15 miles, manual (SOS) switch red indicator will illuminate at approximately 10 miles if problem still exists.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG) and wait for 10 seconds.

(e) Turn the Techstream on.

(f) Perform "HEALTH CHECK" and check for current DTCs INFO .

**HINT:**

**Basically turning power switch off will clear the current DTC until vehicle is driven about 10 miles again with the issue.**

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC B1583 is output | A |
| DTC B1583 is not output | B |

**B** **END**

**A**

| | |
|---|---|
| **5.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

NEXT PERFORM DCM ACTIVATION

| | | |
|---|---|---|
| **DTC** | **B15A8** | **Telematics Transceiver Malfunction** |

## DESCRIPTION

This DTC is set when an error in the EEPROM or PLL IC is detected on the DCM (Telematics Transceiver) self-check. The EEPROM (Electrically Erasable Programmable Read-Only Memory) stores the various data to operate the Safety Connect system. The PLL IC (Phase-Locked Loop Integrated Circuit) oscillates telephone radio frequency.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15A8 | Error in EEPROM or PLL IC is detected. | DCM (Telematics Transceiver) |

## INSPECTION PROCEDURE

**NOTICE:**

**Regardless of whether DTC B15A8 has been output as a present or history DTC, the DCM (Telematics Transceiver) should be replaced.**

## PROCEDURE

| | |
|---|---|
| **1.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** **PERFORM DCM ACTIVATION**

| | | |
|---|---|---|
| **DTC** | **B15C0** | **Short in GPS Antenna** |

| | | |
|---|---|---|
| **DTC** | **B15C1** | **Open in GPS Antenna** |

## DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects an open or a short in the telephone and GPS antenna circuit. The DCM (Telematics Transceiver) receives 1574.42 - 1576.42 MHz radio frequency signal from satellites through the telephone and GPS antenna assembly. The cable is a 50 Ω coaxial cable.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15C0 | Current for telephone and GPS antenna assembly is more than malfunction criterion for 10 seconds when power switch is on (IG).<br>(Short circuit) | • DCM (Telematics Transceiver)<br>• Wire harness or connector (Telephone and GPS antenna cord)<br>• Telephone and GPS antenna assembly |
| B15C1 | Current for telephone and GPS antenna assembly is less than malfunction criterion for 10 seconds when power switch is on (IG).<br>(Open circuit) | |

**HINT:**

**Refer to "PARTS LOCATION" for the installation location of telephone and GPS antenna cord** INFO .

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

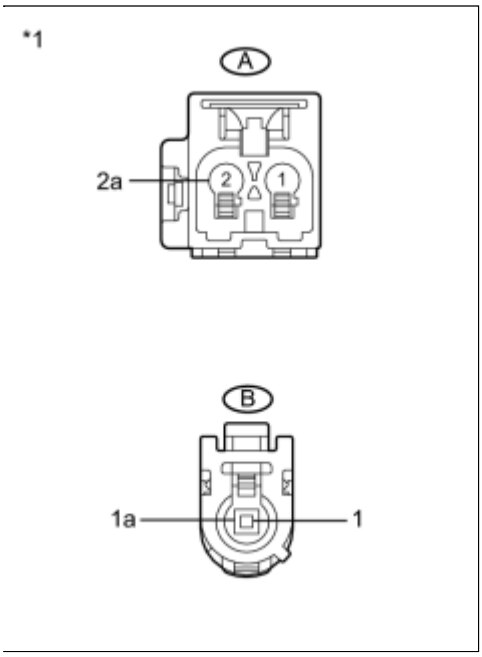
Result:

| RESULT | PROCEED TO |
|---|---|
| DTC B15C0 or B15C1 is output | A |
| DTC B15C0 or B15C1 is not output | B |

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 2. | INSPECT TELEPHONE AND GPS ANTENNA CORDS (INSTRUMENT PANEL WIRE) |




(a) Disconnect the instrument panel wire (antenna cord sub-assembly) connector from the DCM (Telematics Transceiver).

(b) Disconnect the instrument panel wire (antenna cord sub-assembly) connector from the No. 2 antenna cord sub-assembly (antenna cord sub-assembly).

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| A-2 - B-1 | Always | Below 1 Ω |
| A-2a - B-1a | Always | Below 1 Ω |
| A-2 - Body ground | Always | 10 kΩ or higher |
| A-2a - Body ground | Always | 10 kΩ or higher |

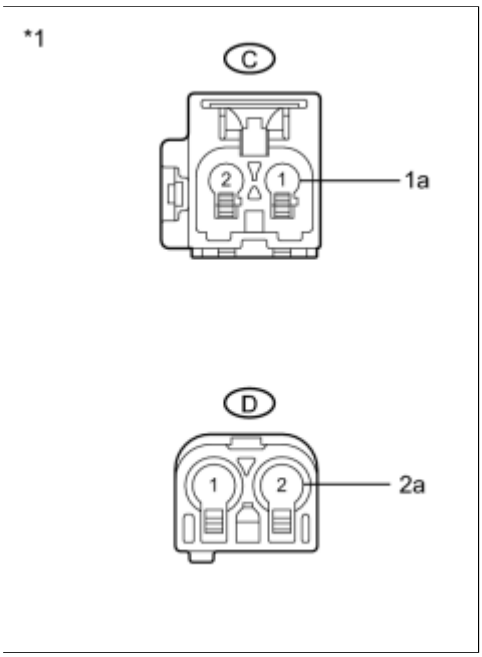
**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (Instrument Panel Wire) |

NG REPLACE INSTRUMENT PANEL WIRE (ANTENNA CORD SUB-ASSEMBLY)

**OK**

| | |
|---|---|
| **3.** | **INSPECT TELEPHONE AND GPS ANTENNA CORDS (NO. 2 ANTENNA CORD SUB-ASSEMBLY)** |




(a) Disconnect the telephone and GPS antenna cord (No. 2 antenna cord sub-assembly) connector from the telephone and GPS antenna cord (No. 4 antenna cord sub-assembly).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| C-1 - D-2 | Always | Below 1 Ω |
| C-1a - D-2a | Always | Below 1 Ω |
| C-1 - Body ground | Always | 10 kΩ or higher |
| C-1a - Body ground | Always | 10 kΩ or higher |

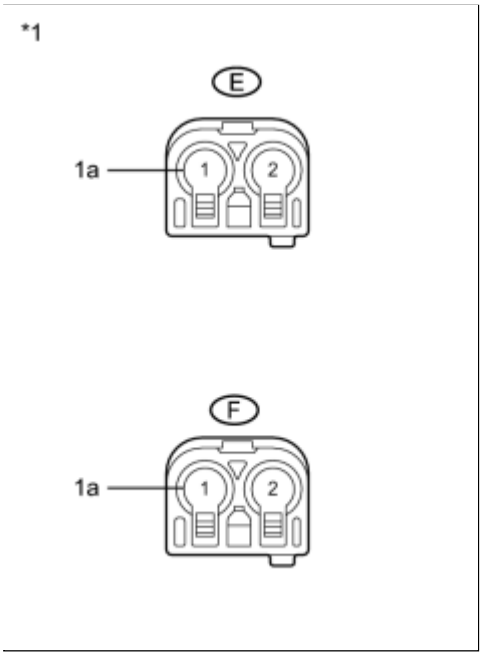
**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (No. 2 Antenna Cord Sub-assembly) |

**NG** ▶ **REPLACE TELEPHONE AND GPS ANTENNA CORD (NO. 2 ANTENNA CORD SUB-ASSEMBLY)**

**OK**

| | |
|---|---|
| **4.** | **INSPECT TELEPHONE AND GPS ANTENNA CORDS (NO. 4 ANTENNA CORD SUB-ASSEMBLY)** |




(a) Disconnect the telephone and GPS antenna cord (No. 4 antenna cord sub-assembly) connector from the telephone and GPS antenna cord (No. 5 antenna cord sub-assembly).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| E-1 - F-1 | Always | Below 1 Ω |
| E-1a - F-1a | Always | Below 1 Ω |
| E-1 - Body ground | Always | 10 kΩ or higher |
| E-1a - Body ground | Always | 10 kΩ or higher |

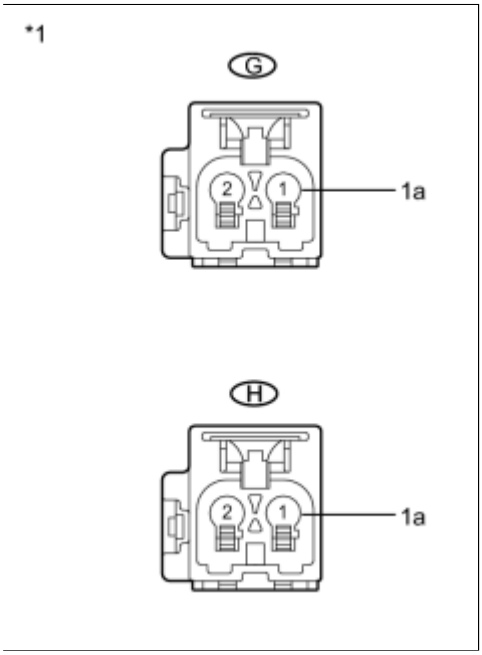
**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (No. 4 Antenna Cord Sub-assembly) |

**NG** ▶ **REPLACE TELEPHONE AND GPS ANTENNA CORD (NO. 4 ANTENNA CORD SUB-ASSEMBLY)**

**OK** ▼

| | |
|---|---|
| **5.** | **INSPECT TELEPHONE AND GPS ANTENNA CORDS (NO. 5 ANTENNA CORD SUB-ASSEMBLY)** |




(a) Disconnect the telephone and GPS antenna cord (No. 5 antenna cord sub-assembly) connector from the telephone and GPS antenna assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| G-1 - H-1 | Always | Below 1 Ω |
| G-1a - H-1a | Always | Below 1 Ω |
| G-1 - Body ground | Always | 10 kΩ or higher |
| G-1a - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Telephone and GPS Antenna Cord (No. 5 Antenna Cord Sub-assembly) |

**NG** ▶ **REPLACE TELEPHONE AND GPS ANTENNA CORD (NO. 5 ANTENNA CORD SUB-ASSEMBLY)**

**OK** ▼

| | |
|---|---|
| **6.** | **REPLACE TELEPHONE AND GPS ANTENNA ASSEMBLY** |

(a) Replace the telephone and GPS antenna assembly with a normal one and check if the same problem occurs again INFO .

OK:

The system returns to normal

The system returns to normal.

**NG** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**OK** ▶ **END**

| | |
|---|---|
| **7.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

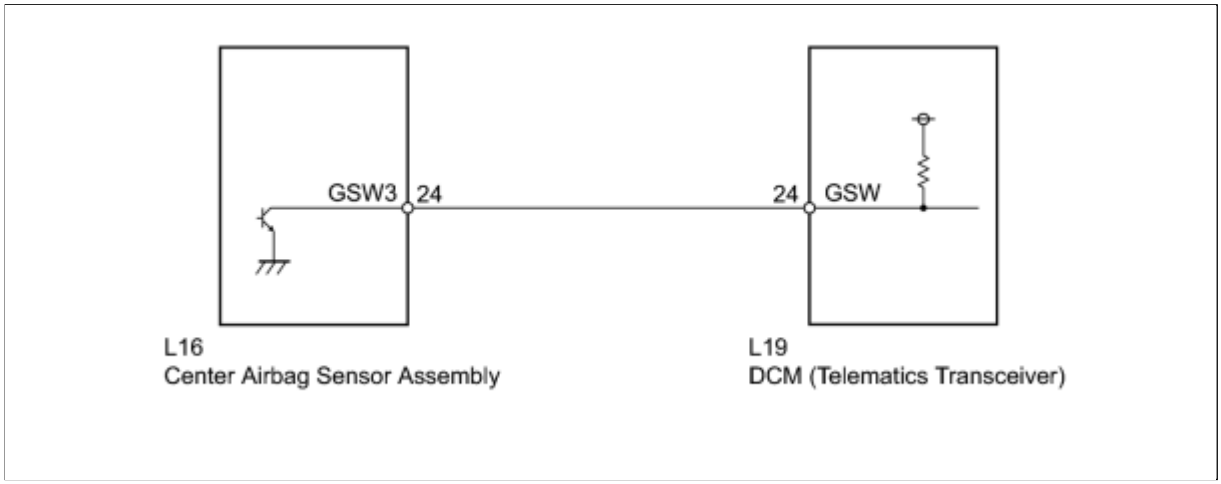
| DTC | B15C4 | Airbag Signal Malfunction/Not Input |
|---|---|---|

## DESCRIPTION

If the DCM (Telematics Transceiver) detects an error in communication between the DCM (Telematics Transceiver) and the center airbag sensor assembly as a result of the DCM (Telematics Transceiver) self check, this DTC will be set.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15C4 | DCM (Telematics Transceiver) detects an error in signals from center airbag sensor assembly when power switch is on (IG). | • Airbag system<br>• Wire harness or connector<br>• Center airbag sensor assembly<br>• DCM (Telematics Transceiver) |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| 1. | CHECK DTC (AIRBAG SYSTEM) |
|---|---|

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Check the DTC of "AIRBAG SYSTEM" INFO .

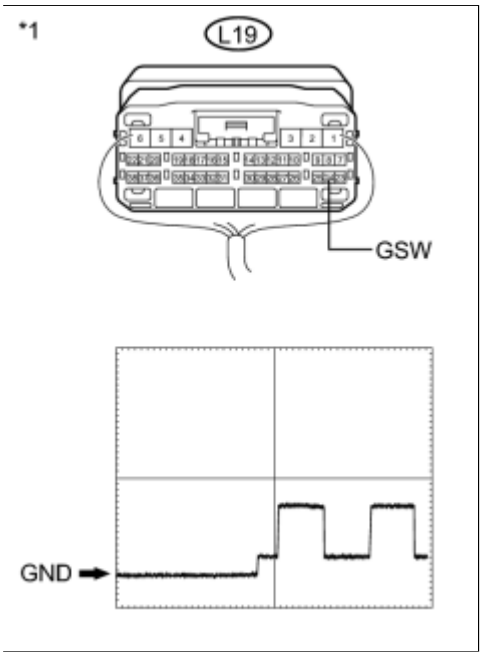
Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** ▶ **GO TO AIRBAG SYSTEM**

**A** ▼

| | |
|---|---|
| **2.** | **INSPECT DCM (TELEMATICS TRANSCEIVER) (GSW SIGNAL)** |




(a) Remove the DCM (Telematics Transceiver) but do not disconnect the connectors INFO .

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-24 (GSW) - Body ground | Power switch on (IG) | 6.5 to 8.5 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

Result:

| RESULT | PROCEED TO |
|---|---|
| 8.5 V or higher | A |
| Below 6.5 V | B |
| 6.5 V to 8.5 V | C |

**Reference Waveform**

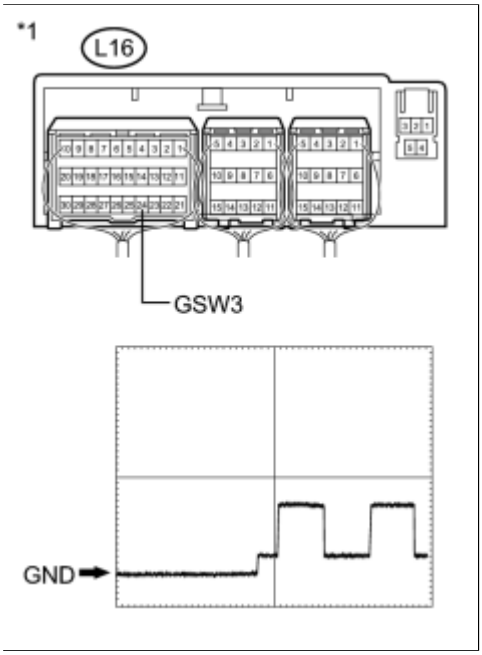
| ITEM | CONDITION |
|---|---|
| Tester connection | L19-24 (GSW) - Body ground |
| Tool setting | 5.0 V/DIV., 20 ms/DIV. |
| Vehicle condition | Power switch on (IG) |

**C** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**B** ▶ **CHECK HARNESS AND CONNECTOR (FOR SHORT CIRCUIT)**

**A** ▼

| | |
|---|---|
| **3.** | **CHECK HARNESS AND CONNECTOR (FOR OPEN CIRCUIT)** |




(a) Remove the center airbag sensor assembly but do not disconnect the connectors INFO

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L16-24 (GSW3) - Body ground | Power switch on (IG) | 8.5 V or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Center Airbag Sensor Assembly) |

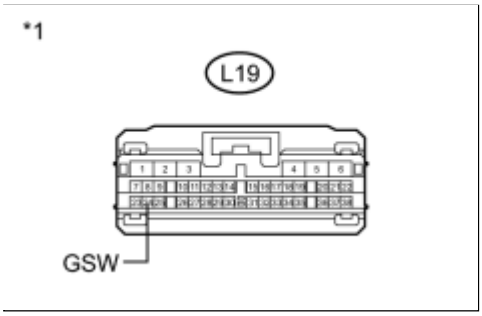
**Reference Waveform**

| ITEM | CONDITION |
|---|---|
| Tester connection | L16-24 (GSW3) - Body ground |
| Tool setting | 5.0 V/DIV., 20 ms/DIV. |
| Vehicle condition | Power switch on (IG) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (FOR SHORT CIRCUIT)** |




(a) Disconnect the L19 DCM (Telematics Transceiver) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-24 (GSW) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connected<br>(DCM (Telematics Transceiver)) |

**NG** ▶ **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - CENTER AIRBAG SENSOR ASSEMBLY)**

**OK**

| | |
|---|---|
| **5.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

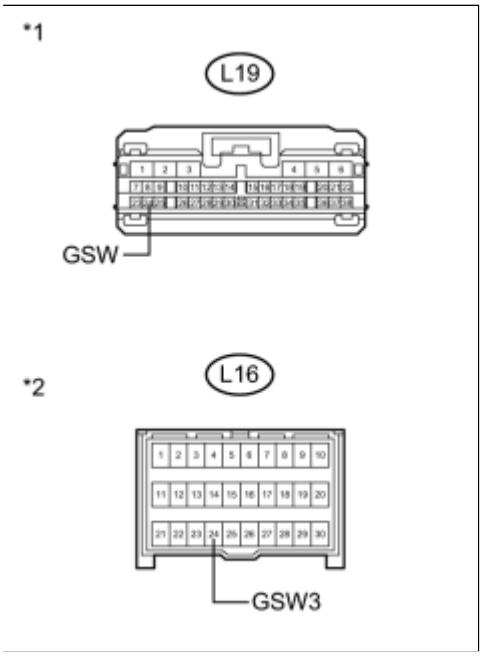
(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** **PERFORM DCM ACTIVATION**

| | |
|---|---|
| **6.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - CENTER AIRBAG SENSOR ASSEMBLY)** |




(a) Disconnect the L19 DCM (Telematics Transceiver) connector.

(b) Disconnect the L16 center airbag sensor connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-24 (GSW) - L16-24 (GSW3) | Always | Below 1 Ω |
| L19-24 (GSW) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector<br>(to Center Airbag Sensor Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

| DTC | B15C5 | Manual Button Malfunction |
|---|---|---|

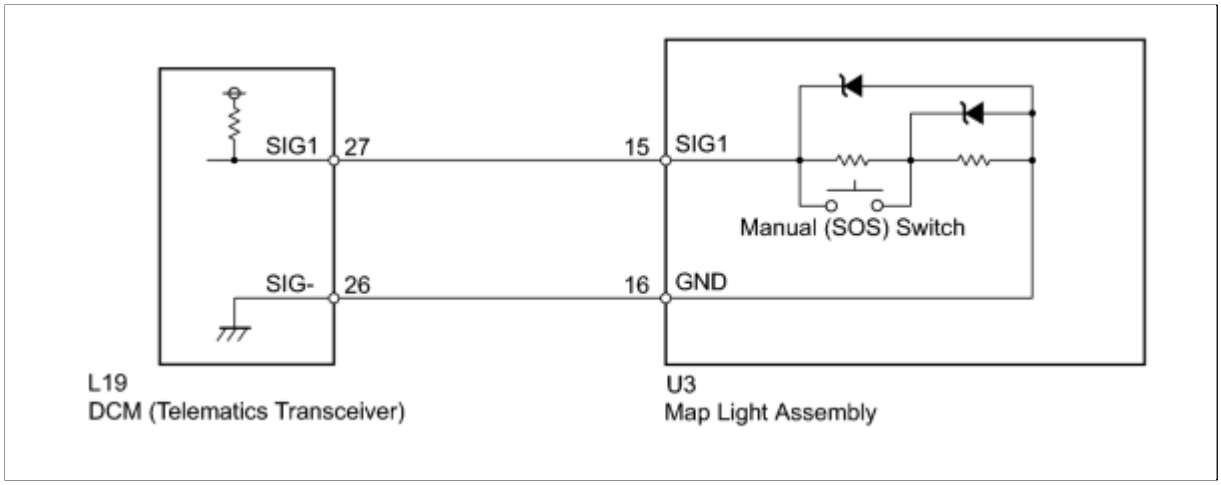
## DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects an open or short circuit in the manual (SOS) switch.

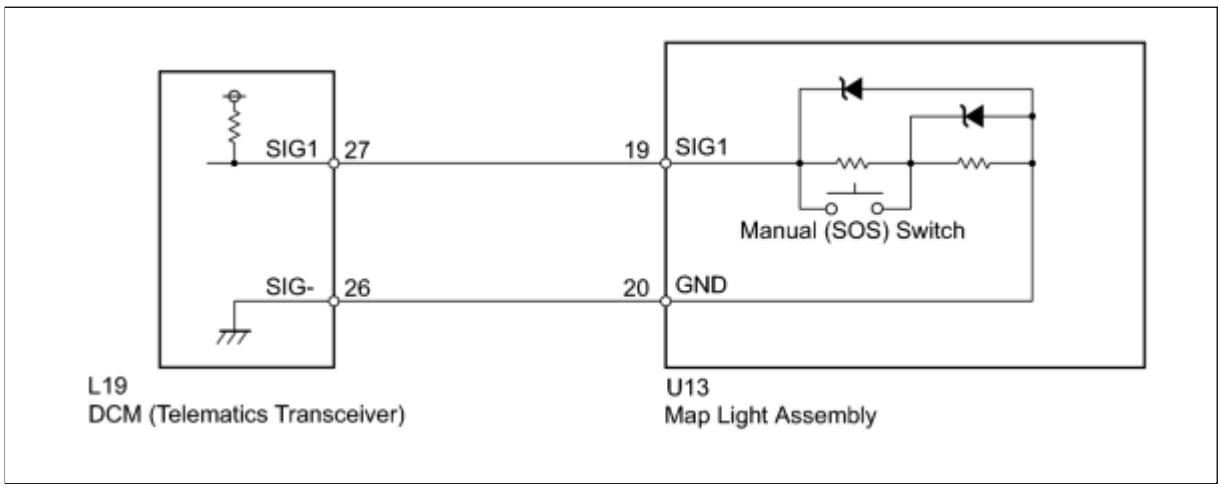
| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15C5 | Open or short circuit in manual (SOS) switch is detected. | • DCM (Telematics Transceiver)<br>• Map light assembly<br>• Wire harness or connector |

## WIRING DIAGRAM

**1. w/o Sliding Roof:**




**2. w/ Sliding Roof:**




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (MANUAL (SOS) SWITCH OPERATION) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Telematics / Data List.

(f) Check that the manual (SOS) switch condition observed on the Techstream changes according to manual (SOS) switch operation.

**Telematics (DCM (Telematics Transceiver)**

| TESTER DISPLAY | MEASUREMENT ITEM/RANGE | NORMAL CONDITION | DIAGNOSTIC NOTE |
|---|---|---|---|
| Emergency Switch | Manual (SOS) switch / OFF or ON | OFF: Manual (SOS) switch not pressed | - |
| | | ON: Manual (SOS) switch pressed | - |

Result:

| RESULT | PROCEED TO |
|---|---|
| Techstream display changes when turning the manual (SOS) switch ON/OFF. | A |
| Techstream display does not change when turning the manual (SOS) switch ON/OFF. | B |

B ▶ INSPECT DCM (TELEMATICS TRANSCEIVER) (SIG1 VOLTAGE)

A ▼

| | |
|---|---|
| 2. | REPLACE DCM (TELEMATICS TRANSCEIVER) |

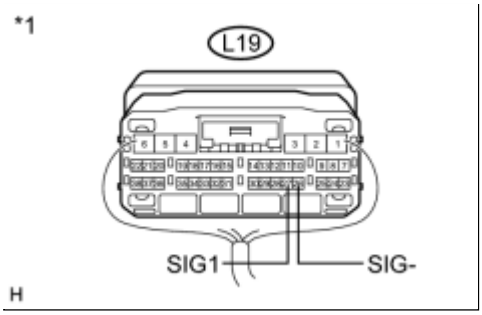
(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

NEXT ▶ PERFORM DCM ACTIVATION

| | |
|---|---|
| 3. | **INSPECT DCM (TELEMATICS TRANSCEIVER) (SIG1 VOLTAGE)** |




(a) Remove the DCM (Telematics Transceiver) but do not disconnect the connectors INFO .

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-27 (SIG1) - L19-26 (SIG-) | Power switch on (IG), manual (SOS) switch not pressed | 1.5 to 2.0 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected (DCM (Telematics Transceiver)) |

NG ▶ **INSPECT MAP LIGHT ASSEMBLY (MANUAL (SOS) SWITCH)**

**OK** ▼

| | |
|---|---|
| 4. | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

NEXT ▶ **PERFORM DCM ACTIVATION**

| | |
|---|---|
| 5. | **INSPECT MAP LIGHT ASSEMBLY (MANUAL (SOS) SWITCH)** |

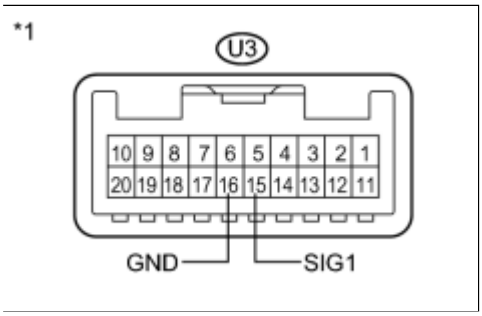
(a) Disconnect the U3*1 or U13*2 map light assembly connector.

- *1: w/o Sliding Roof
- *2: w/ Sliding Roof

(b) w/o Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U3-15 (SIG1) - U3-16 (GND) | Manual (SOS) switch not pressed | 410 to 414 Ω |
| U3-15 (SIG1) - U3-16 (GND) | Manual (SOS) switch pressed | 81 to 83 Ω |

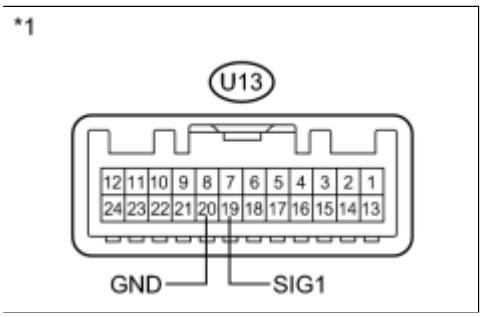
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected (Map Light Assembly) |

(c) w/ Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U13-19 (SIG1) - U13-20 (GND) | Manual (SOS) switch not pressed | 410 to 414 Ω |
| U13-19 (SIG1) - U13-20 (GND) | Manual (SOS) switch pressed | 81 to 83 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected (Map Light Assembly) |

**NG** ▶ **REPLACE MAP LIGHT ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **6.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - MAP LIGHT ASSEMBLY)** |

(a) Disconnect the L19 DCM (Telematics Transceiver) connector.

(b) Disconnect the U3*1 or U13*2 map light assembly connector.

- *1: w/o Sliding Roof
- *2: w/ Sliding Roof

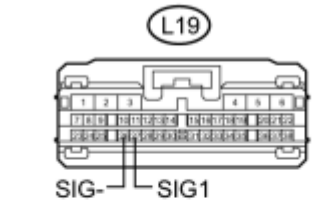
(c) w/o Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.

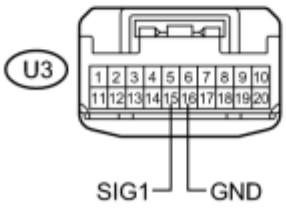
Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-27 (SIG1) - U3-15 (SIG1) | Always | Below 1 Ω |
| L19-26 (SIG-) - U3-16 (GND) | Always | Below 1 Ω |
| L19-27 (SIG1) - Body ground | Always | 10 kΩ or higher |
| L19-26 (SIG-) - Body ground | Always | 10 kΩ or higher |

*1




*2




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

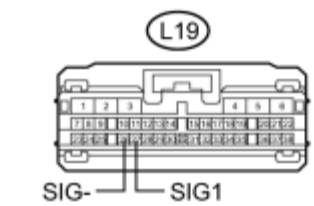
(d) w/ Sliding Roof:

(1) Measure the resistance according to the value(s) in the table below.

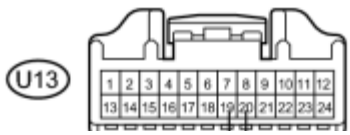
Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-27 (SIG1) - U13-19 (SIG1) | Always | Below 1 Ω |
| L19-26 (SIG-) - U13-20 (GND) | Always | Below 1 Ω |
| L19-27 (SIG1) - Body ground | Always | 10 kΩ or higher |
| L19-26 (SIG-) - Body ground | Always | 10 kΩ or higher |

*1




*2




## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **7.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| DTC | B15CC | Backup Battery Failure |
|---|---|---|

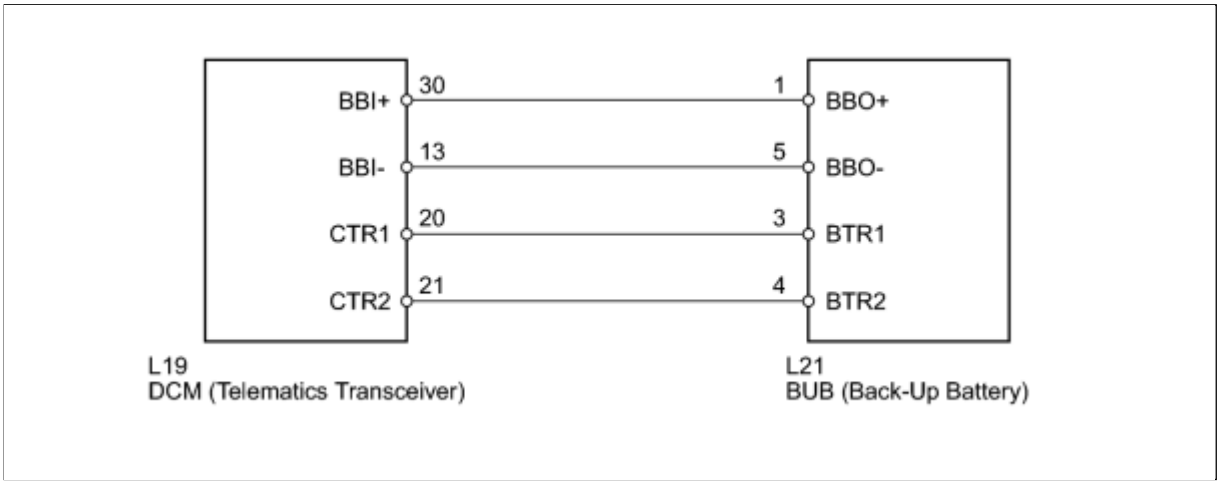
## DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects one of the following:

- Open or short in the BUB (Back-Up Battery) circuit.
- The BUB (Back-Up Battery) voltage drops or the BUB (Back-Up Battery) malfunctions.
- The BUB (Back-Up Battery) temperature is (temporarily) high.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15CC | BUB (Back-Up Battery) malfunction | • Wire harness or connector<br>• BUB (Back-Up Battery)<br>• DCM (Telematics Transceiver) |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| 1. | CHECK DTC |
|---|---|

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

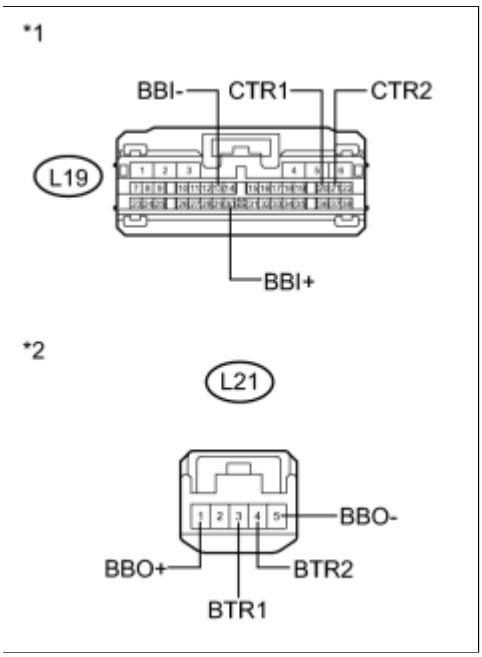
Result:

| RESULT | PROCEED TO |
|---|---|
| DTC B15CC is output | A |
| DTC B15CC is not output | B |

**B** **CHECK FOR INTERMITTENT PROBLEMS**

**A**

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - BUB (BACK-UP BATTERY))** |




(a) Disconnect the L19 DCM (Telematics Transceiver) connector.

(b) Disconnect the L21 BUB (Back-Up Battery) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-30 (BBI+) - L21-1 (BBO+) | Always | Below 1 Ω |
| L19-13 (BBI-) - L21-5 (BBO-) | Always | Below 1 Ω |
| L19-20 (CTR1) - L21-3 (BTR1) | Always | Below 1 Ω |
| L19-21 (CTR2) - L21-4 (BTR2) | Always | Below 1 Ω |
| L19-30 (BBI+) - Body ground | Always | 10 kΩ or higher |
| L19-13 (BBI-) - Body ground | Always | 10 kΩ or higher |

| | | |
|---|---|---|
| L19-20 (CTR1) - Body ground | Always | 10 kΩ or higher |
| L19-21 (CTR2) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector<br>(to BUB (Back-Up Battery)) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**
▼

| | |
|---|---|
| **3.** | **REPLACE BUB (BACK-UP BATTERY)** |

(a) Replace the BUB (Back-Up Battery) with a normal one and check if the same problem occurs again INFO .

**NOTICE:**

**The BUB (Back-Up Battery) must not be replaced while an ACN call is in progress.**

**NEXT**
▼

| | |
|---|---|
| **4.** | **CLEAR DTC** |

(a) Clear the DTC INFO .

**NEXT**
▼

| | |
|---|---|
| **5.** | **RECHECK DTC** |

(a) Recheck for DTCs and check if the same trouble occurs again INFO .

OK:

OK:

No DTC is output.

**NG** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**OK** ▶ **END**

| | |
|---|---|
| **6.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** ▶ **PERFORM DCM ACTIVATION**

| DTC | B15EC | Backup Battery Degradation |
|---|---|---|

## DESCRIPTION

This DTC is set when the DCM (Telematics Transceiver) detects either of the following conditions.

- The BUB (Back-Up Battery) charge level becomes less than the criteria.
- Automatic Collision Notification (ACN) occurred.

When this DTC is set, the BUB (Back-Up Battery) must be replaced.

BUB (Back-Up Battery) degradation DTC B15EC is not reported in deactive mode.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15EC | BUB (Back-Up Battery) is deteriorated. | BUB (Back-Up Battery) |

## INSPECTION PROCEDURE

**NOTICE:**

- If this DTC is set, be certain to replace the BUB (Back-Up Battery) with a new one.
- After the BUB (Back-Up Battery) is replaced, it is necessary to clear this DTC.
- The BUB (Back-Up Battery) must not be replaced while an ACN call is in progress.

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs 

.

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC B15EC is output | A |
| DTC B15EC is not output | B |

**B** ▶ **CHECK FOR INTERMITTENT PROBLEMS**

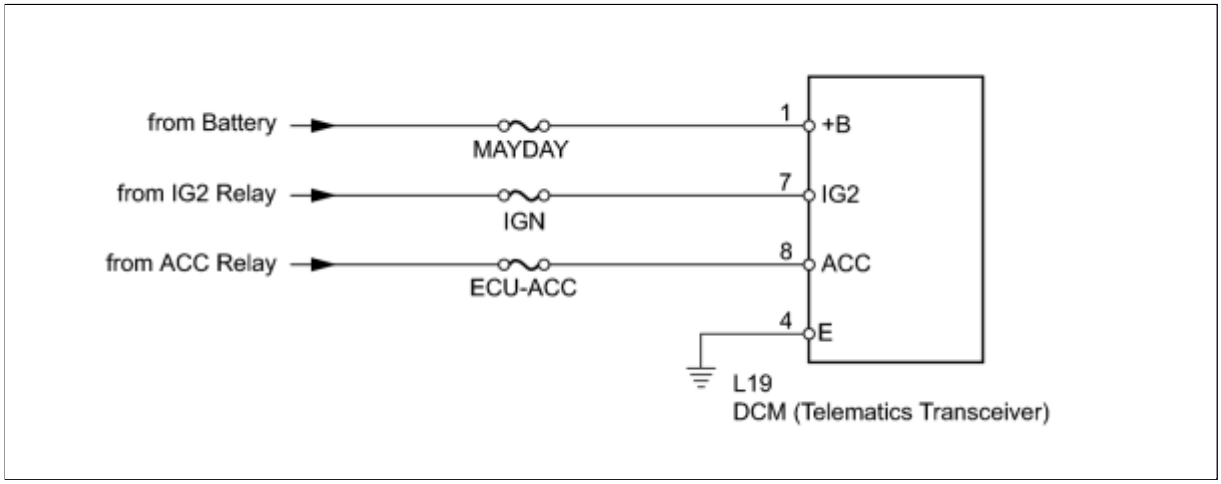
**A** ▶ **REPLACE BUB (BACK-UP BATTERY)**

**DCM POWER SOURCE CIRCUIT**

## DESCRIPTION

This is the power source circuit to operate the DCM (Telematics Transceiver).

## WIRING DIAGRAM



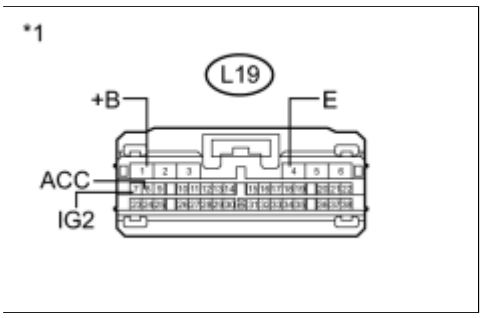

## INSPECTION PROCEDURE

**NOTICE:**

**Inspect the fuses for circuits related to this system before performing the following inspection procedure.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - BATTERY AND BODY GROUND)** |




(a) Disconnect the L19 DCM (Telematics Transceiver) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-4 (E) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-1 (+B) - L19-4 (E) | Power switch off | 11 to 14 V |
| L19-7 (IG2) - L19-4 (E) | Power switch on (IG) | 11 to 14 V |
| L19-8 (ACC) - L19-4 (E) | Power switch on (ACC) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**GREEN AND RED INDICATORS BLINK SIMULTANEOUSLY**

## DESCRIPTION

After the power switch on (IG), the DCM (Telematics Transceiver) will enter into a self check mode. The manual (SOS) switch red indicator will illuminate for 2 seconds and turn off followed by the manual (SOS) switch green indicator illuminating and remaining on under normal operation.

If both indicators illuminate and begin to blink simultaneously, this indicates that the DCM (Telematics Transceiver) is in "Shipping Mode." If no DTCs are present, both the green and red indicators will turn off after blinking. The activation sequence must be performed.

**HINT:**

**In shipping mode, the system will attempt to activate to shell mode automatically at each power switch on (IG).**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHANGE SUBSCRIPTION MODE |

(a) Turn the power switch on (IG).

(b) Push the manual (SOS) switch.

(c) The vehicle will issue a voice prompt: "Safety Connect is not initialized. To activate, please press the button again within 5 seconds."

(d) Push the manual (SOS) switch and a beep will be emitted.

(e) That telematics service provider will send an End Call command and the manual (SOS) switch green indicator will illuminate.

(f) A voice prompt will state: "Activation Complete" (This may take up to 3 minutes)

(g) Turn the power switch off.

**NEXT**

| | |
|---|---|
| 2. | CHECK SUBSCRIPTION MODE |

(a) Turn the power switch on (IG).

(b) Confirm the manual (SOS) switch red indicator illuminates for 2 seconds and turns off and the manual (SOS) switch green indicator illuminates and remains on 

.

NEXT END

**GREEN AND RED INDICATORS DO NOT COME ON WHEN IG-ON**

## DESCRIPTION

If the red and green indicators fail to illuminate after the power switch on (IG), the vehicle does not recognize the DCM (Telematics Transceiver). The DCM (Telematics Transceiver) connectors may have been disconnected or the DCM (Telematics Transceiver) is malfunctioning.

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **HEALTH CHECK** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "Health Check" using the Techstream and check that Telematics (Safety Connect) is listed on "Health Check Result" INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| "Telematics" is displayed on the Techstream | A |
| "Telematics" is not displayed on the Techstream | B |

**B** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**A** ▼

| | |
|---|---|
| 2. | **CHECK DTC** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Check current DTC and history DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** ▶ **GO TO DIAGNOSTIC TROUBLE CODE CHART**

**A** ▶ **CHECK FOR INTERMITTENT PROBLEMS**

**GREEN INDICATOR REMAINS OFF**

## DESCRIPTION

After the power switch on (IG), the DCM (Telematics Transceiver) will enter into a self check mode. The manual (SOS) switch red indicator will illuminate for 2 seconds and turn off followed by the manual (SOS) switch green indicator illuminating and remaining on under normal operation. If neither the red nor green indicators remain on, verification of the subscription should be performed.

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CONFIRM GREEN INDICATOR COMES ON** |

(a) After the power switched on (IG) and the manual (SOS) switch red indicator has come on for 2 seconds, confirm that the manual (SOS) switch green indicator comes on for 2 seconds.

OK:

Green indicator comes on.

**NG** ▶ **CHECK DTC**

**OK** ▼

| | |
|---|---|
| 2. | **CONFIRM SUBSCRIPTION MODE** |

(a) Confirm the indicator status at 5 seconds after power switch on (IG).

Result:

| RESULT | PROCEED TO |
|---|---|
| Green indicator remains on | A |
| Green indicator remains off | B |
| Red and Green indicators both flash (1 second intervals, for 20 seconds) | C |

**HINT:**

**If red and green indicator are flashing, the system is in shipping mode, so the system should be changed to either active mode or deactive mode.**

**C** ▶ **CHANGE SUBSCRIPTION MODE**

B ▶ INPUT VIN WITH TECHSTREAM

A ▶ CHECK FOR INTERMITTENT PROBLEMS

| 3. | INPUT VIN WITH TECHSTREAM |
|---|---|

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Select "Vehicle Inquiry" and input VIN.

NEXT ▼

| 4. | CONFIRM SUBSCRIPTION MODE |
|---|---|

(a) Confirm the indicator status at 5 seconds after the power switch on (IG).

Result:

| RESULT | PROCEED TO |
|---|---|
| Green indicator remains on | A |
| Green indicator remains off | B |

B ▶ REPLACE DCM (TELEMATICS TRANSCEIVER)

A ▶ END

| 5. | REPLACE DCM (TELEMATICS TRANSCEIVER) |
|---|---|

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

NEXT ▶ PERFORM DCM ACTIVATION

| | |
|---|---|
| **6.** | **CHECK DTC** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** **GO TO DIAGNOSTIC TROUBLE CODE CHART**

**A**

| | |
|---|---|
| **7.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** **PERFORM DCM ACTIVATION**

**RED INDICATOR REMAINS ON**

## DESCRIPTION

When the red indicator remains on, this means that the DCM (Telematics Transceiver) has detected a malfunction in the Safety Connect system and set a DTC.

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK DTC** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** **GO TO DIAGNOSTIC TROUBLE CODE CHART**

**A**

| | |
|---|---|
| 2. | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.
- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

**NEXT** **PERFORM DCM ACTIVATION**

**UNABLE TO CONNECT TO CALL CENTER**

## DESCRIPTION

This may occur when the intensity of telephone radio frequency was very weak, PRL updates are required, or the Safety Connect system has a malfunction and a DTC is set.

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK COMMUNICATION SERVICE CONDITION** |

(a) Move the vehicle.

(1) If the vehicle is outside the communication service area, move the vehicle to a communication service area, wait for a while and perform the operation again.

OK:

Same problem does not occur.

**NG** ▶ **CHECK DTC**

**OK** ▶ **END**

| | |
|---|---|
| 2. | **CHECK DTC** |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and wait for 10 seconds.

(d) Turn the Techstream on.

(e) Perform "HEALTH CHECK" and check for current DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** ▶ **GO TO DIAGNOSTIC TROUBLE CODE CHART**

**A** ▼

| | |
|---|---|
| **3.** | **CHECK PRL UPDATE** |

(a) Check for PRL update INFO .

(b) Check if the same problem occurs again.

OK:

Same problem does not occur.

**NG** ▶ **CHECK DCM OPERATION HISTORY**

**OK** ▶ **END**

| | |
|---|---|
| **4.** | **CHECK DCM OPERATION HISTORY** |

(a) Check "DCM OPERATION HISTORY" INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Signal strength is weak (0 or 1) | A |
| Communication indicates "Fail" | |
| No problems with signal strength or communication | B |

**HINT:**

**If there was a communication problem in the past but the communications are working correctly now, it is possible that the source of the problem was temporary radio interference, or the vehicle may have been outside the service area.**

**B** ▶ **END**

**A** ▼

| | |
|---|---|
| **5.** | **REPLACE DCM (TELEMATICS TRANSCEIVER)** |

(a) Replace the DCM (Telematics Transceiver) INFO .

**NOTICE:**

- The power switch must be off.

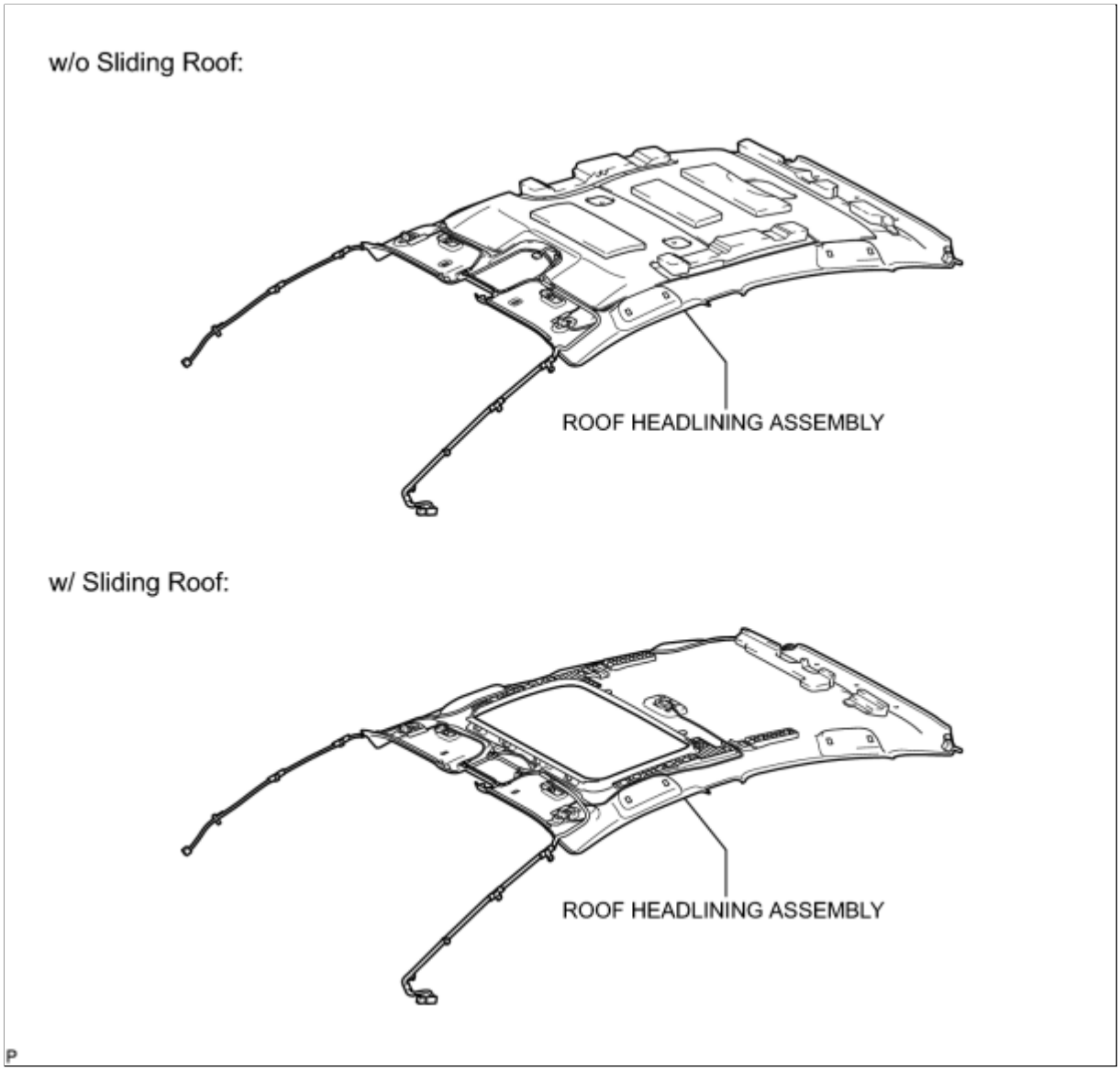
.

- Do not swap the DCM (Telematics Transceiver) with one from another vehicle.

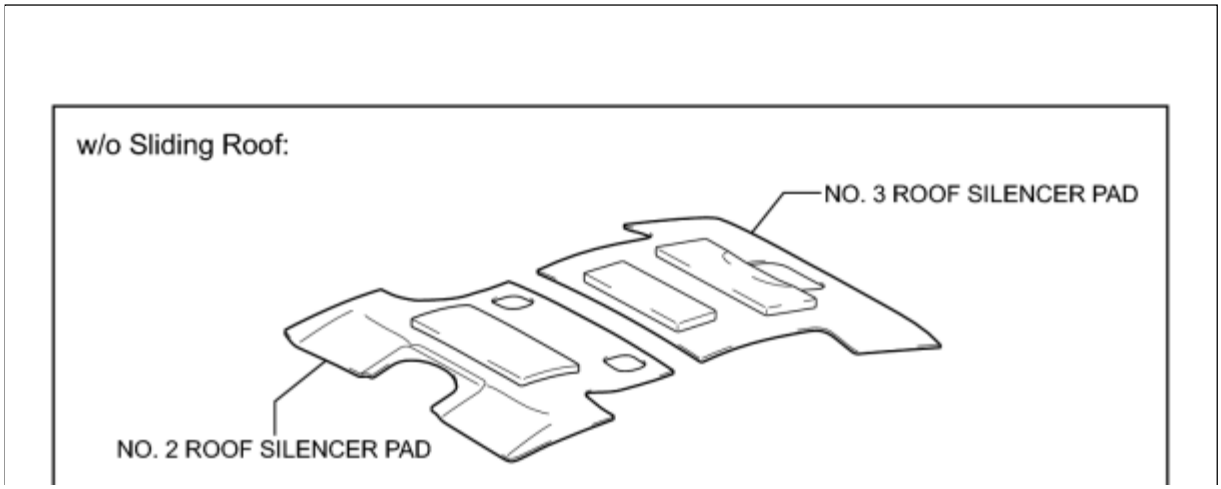
NEXT PERFORM DCM ACTIVATION

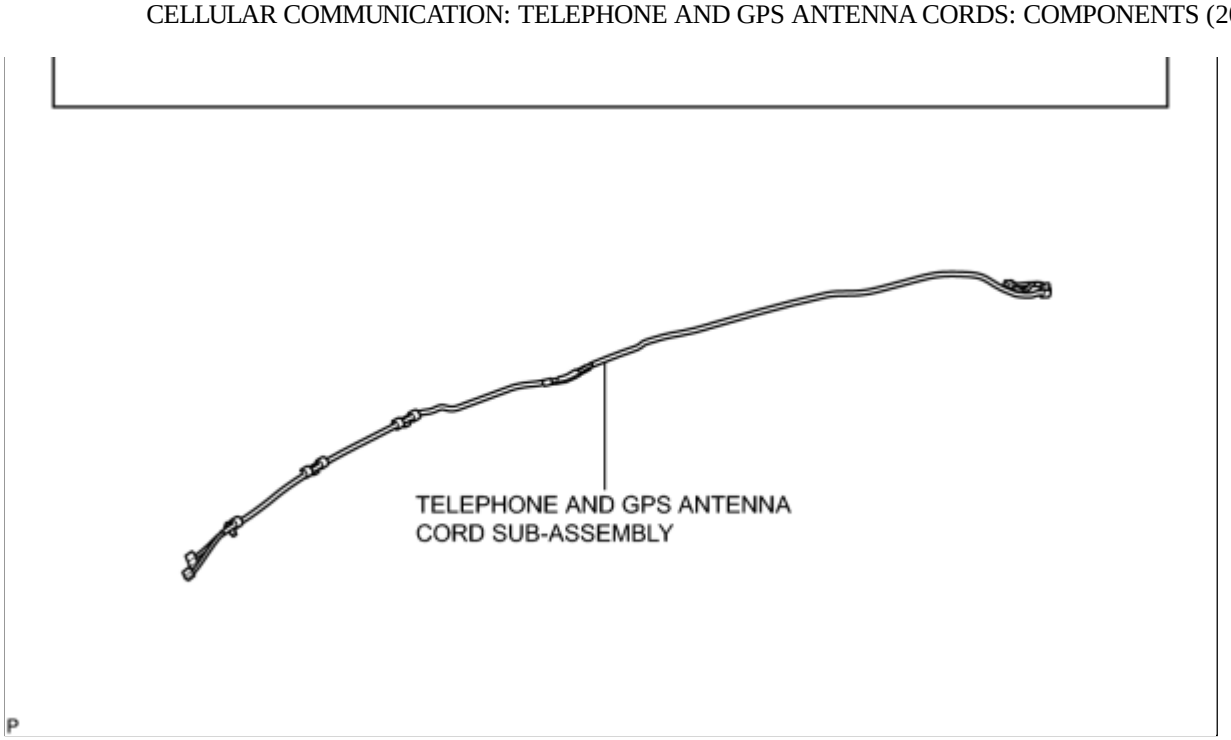
## COMPONENTS

## ILLUSTRATION




## ILLUSTRATION




TELEPHONE AND GPS ANTENNA
CORD SUB-ASSEMBLY
P

# REMOVAL

## 1. REMOVE ROOF HEADLINING ASSEMBLY

**HINT:**

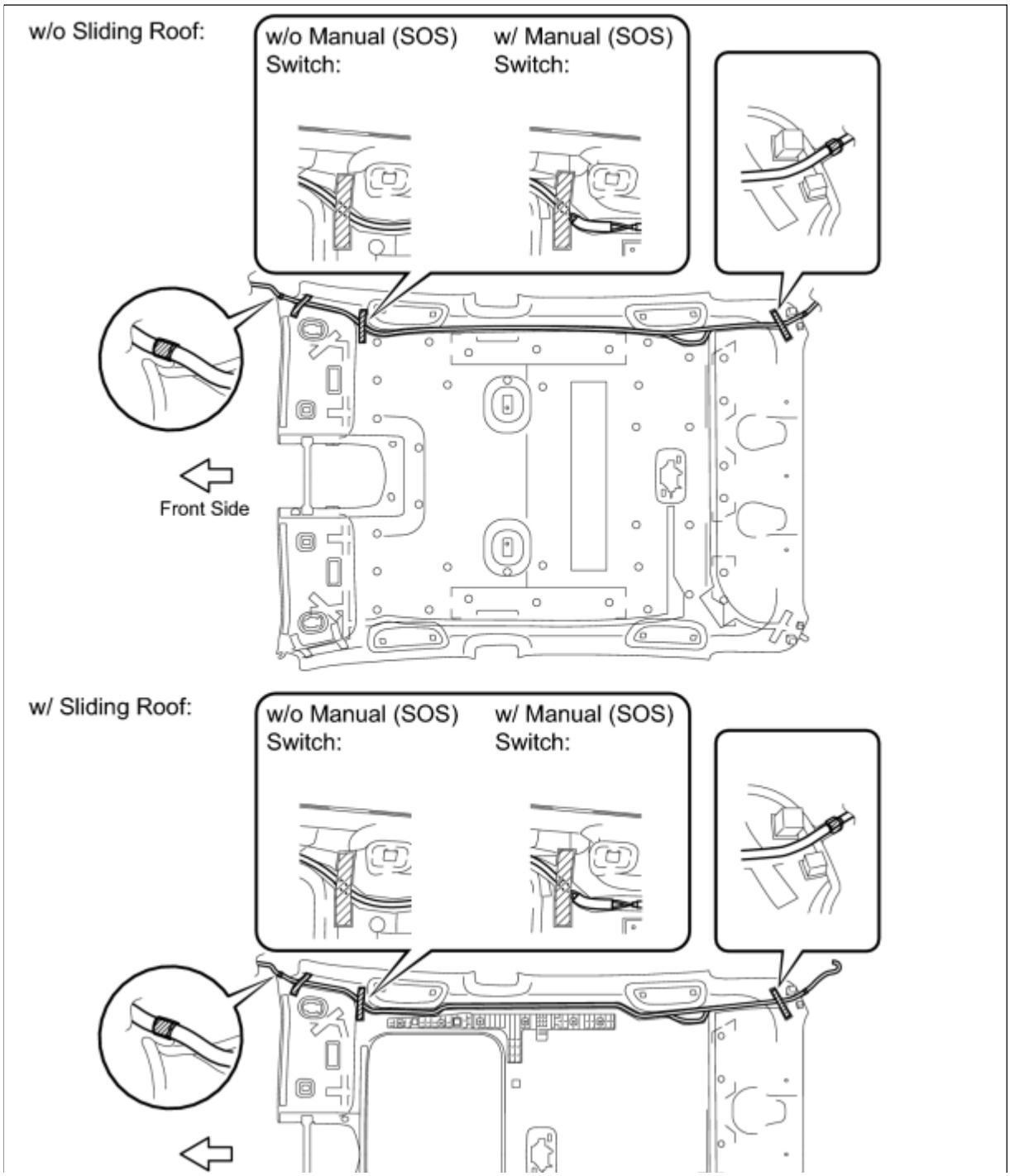
**Refer to the procedure up to Remove Roof Headlining Assembly** INFO .

## 2. REMOVE NO. 2 ROOF SILENCER PAD (w/o Sliding Roof) INFO

## 3. REMOVE NO. 3 ROOF SILENCER PAD (w/o Sliding Roof) INFO

## 4. REMOVE TELEPHONE AND GPS ANTENNA CORD SUB-ASSEMBLY

(a) Peel the strips of the tape used to secure the antenna cord only to the extent that allows removal of the antenna cord.






(b) Remove the telephone and GPS antenna cord sub-assembly.

# INSTALLATION

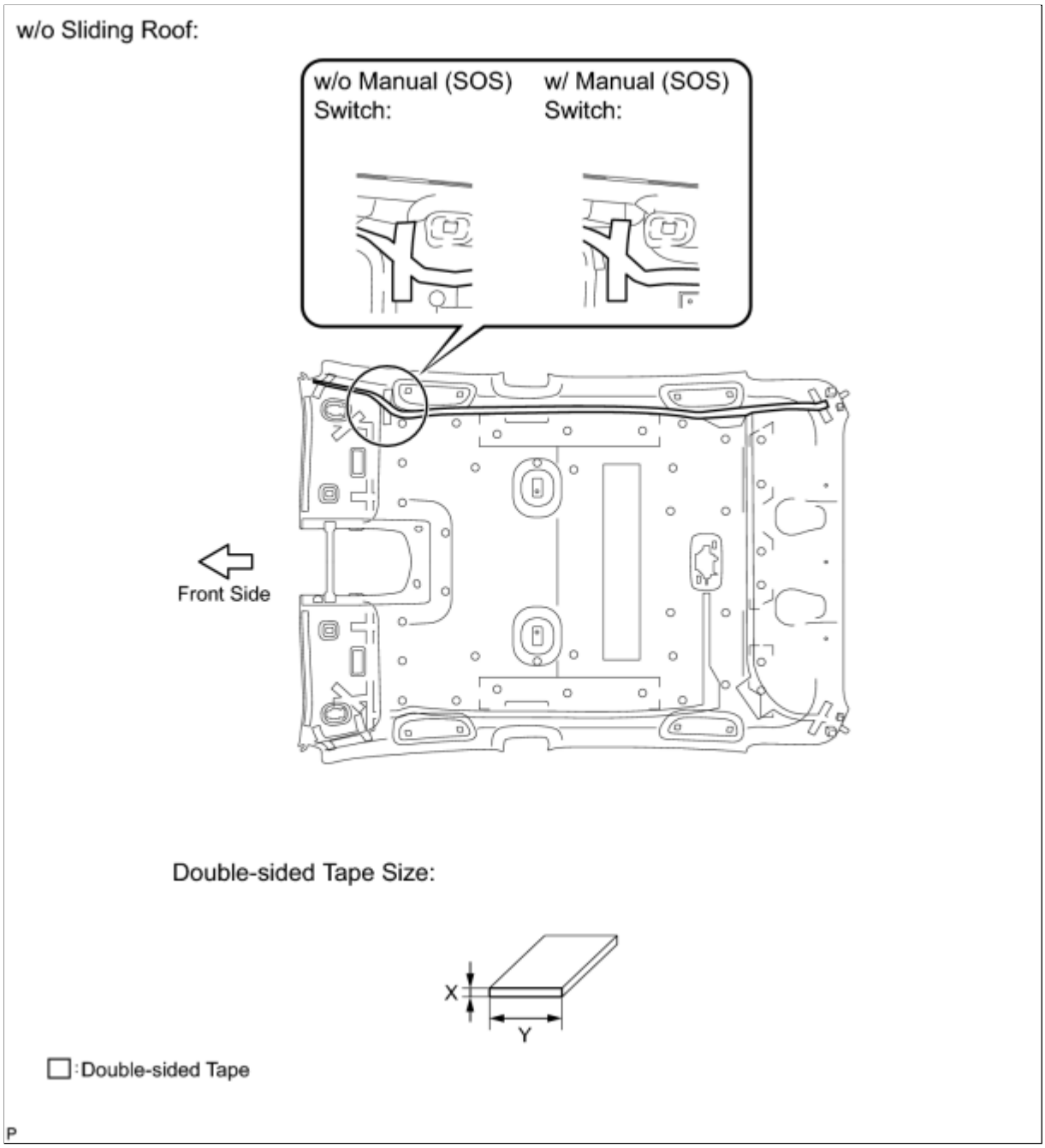
## 1. INSTALL TELEPHONE AND GPS ANTENNA CORD SUB-ASSEMBLY

**HINT:**

**Double-sided tape and tape are not available as supply parts. If the tape still has enough adhesion to secure the roof headlining and antenna cord, reuse it. If the roof headlining has been replaced with a new one, or if the tape and/or the double-sided tape is no longer sticky, apply new tape following the procedure below.**

If the double-sided tape cannot be reused:

(a) Peel off the release paper from one side of new double-sided tape and apply the new double-sided tape to the position indicated in the illustration. Be careful not to touch the adhesive surface.

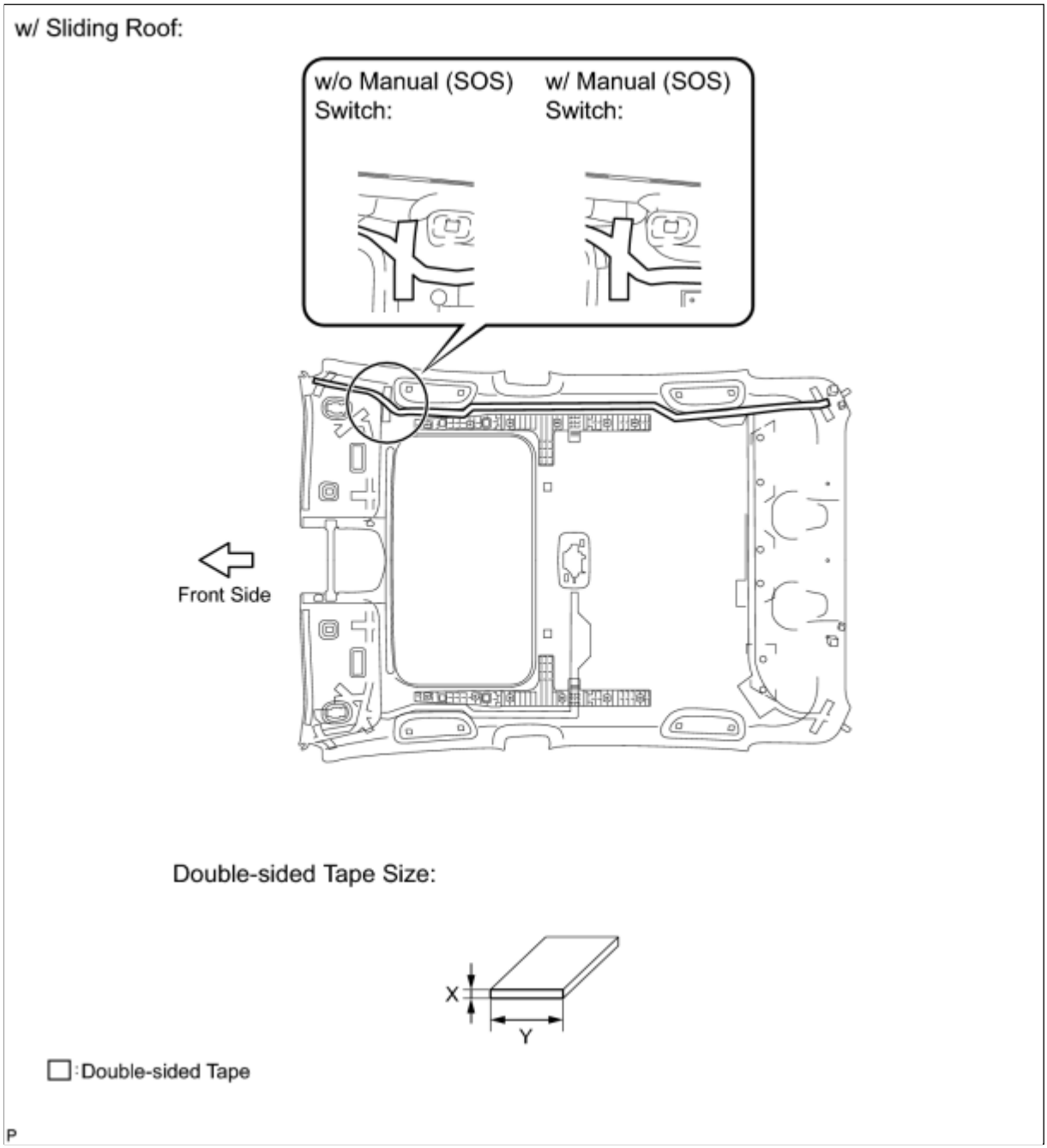



| AREA | DIMENSION |
|---|---|
| X | 1.0 mm (0.0394 in.) |

| | |
|---|---|
| Y | 10.0 mm (0.394 in.) |

**NOTICE:**

**Be sure to apply the double-sided tape carefully so that the tape will not be misaligned or come off.**




| AREA | DIMENSION |
|---|---|
| X | 1.0 mm (0.0394 in.) |
| Y | 10.0 mm (0.394 in.) |

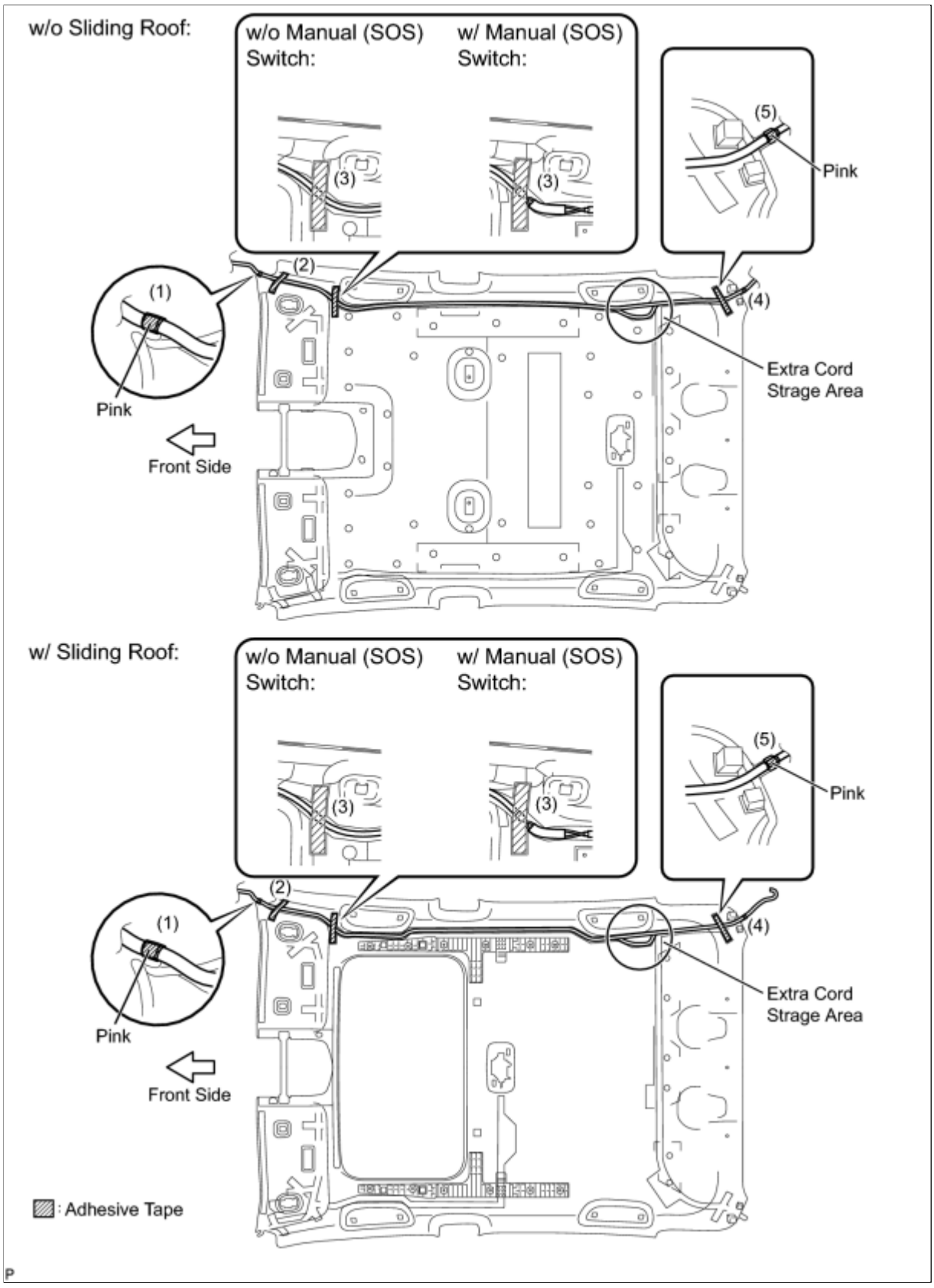
**NOTICE:**

**Be sure to apply the double-sided tape carefully so that the tape will not be misaligned or come off.**

(b) Peel off the release paper from the double-sided tape. Be careful not to touch the adhesive surface.

(c) Align the vehicle front side marking (pink) on the telephone and GPS antenna cord sub-assembly with the vehicle

front side tab on the roof headlining, and wrap the tape over the antenna cord to install it. (1)




**HINT:**

**If the tape cannot be reused, packing tape can be used as a substitute.**

(d) Temporarily install the front side of the telephone and GPS antenna cord sub-assembly (2) with the adhesive tape.

(e) Temporarily install the front side of the telephone and GPS antenna cord sub-assembly (3) with the adhesive tape.

(f) Temporarily install the telephone and GPS antenna cord sub-assembly by placing it on the double-sided tape from the front of the vehicle to the point just before the extra cord storage area.

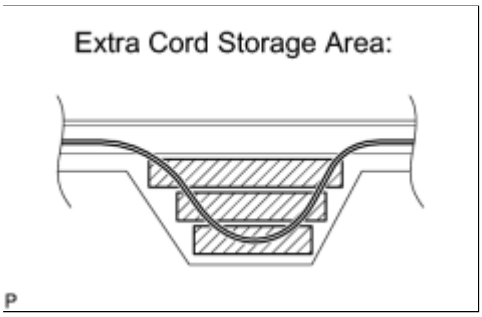
(g) Align the vehicle rear marking (pink) on the telephone and GPS antenna cord sub-assembly with the tape attachment location (scribe line) of the roof headlining, and wrap the tape over the antenna cord to install it. (4)

**HINT:**

**If the tape cannot be reused, packing tape can be used as a substitute.**

(h) Temporarily install the rear side of the telephone and GPS antenna cord sub-assembly (5) with the adhesive tape.

(i) Temporarily install the telephone and GPS antenna cord sub-assembly by placing it on the double-sided tape from the rear of the vehicle to the point just before the extra cord storage area.




(j) Using double-sided tape, place any excess telephone and GPS antenna cord sub-assembly in the extra cord storage area to finish installing the antenna cord.

**HINT:**

**Attach 3 pieces of double-sided tape to the extra cord storage area as shown in the illustration.**

**2. INSTALL NO. 3 ROOF SILENCER PAD (w/o Sliding Roof)** INFO

**3. INSTALL NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)** INFO

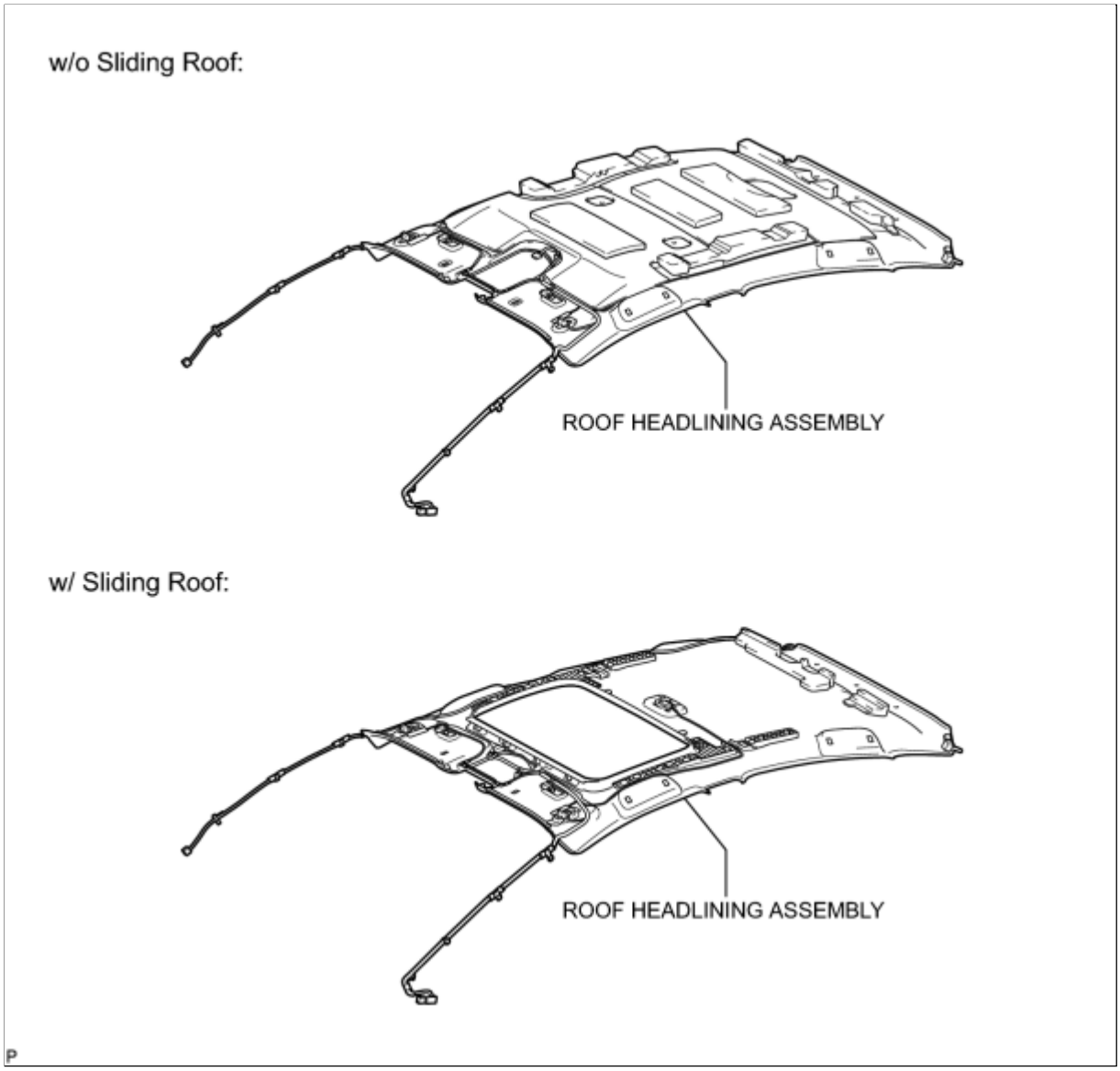
**4. INSTALL ROOF HEADLINING ASSEMBLY**

**HINT:**

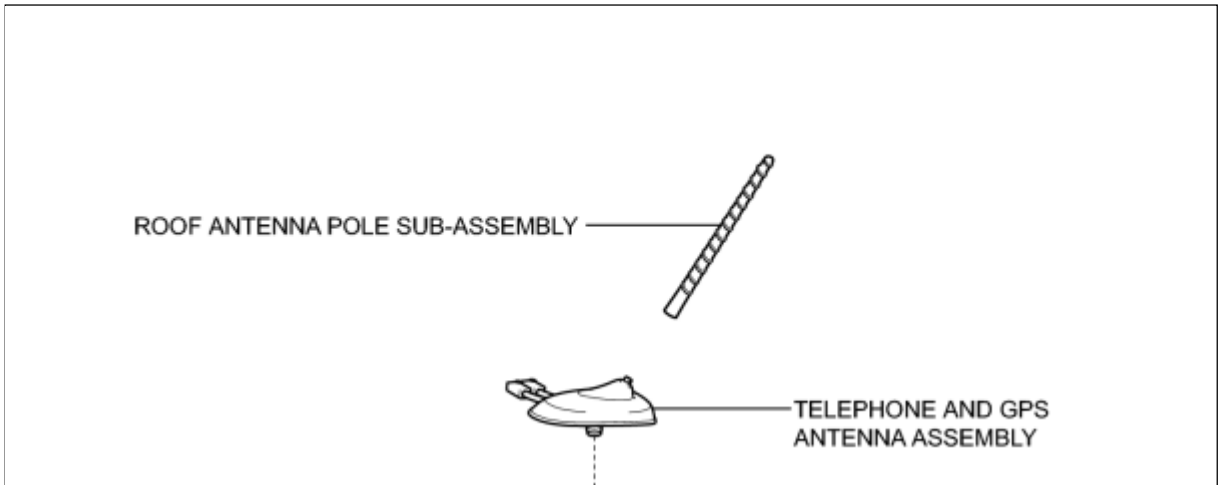
**Refer to the procedure from Install Roof Headlining Assembly** INFO **.**

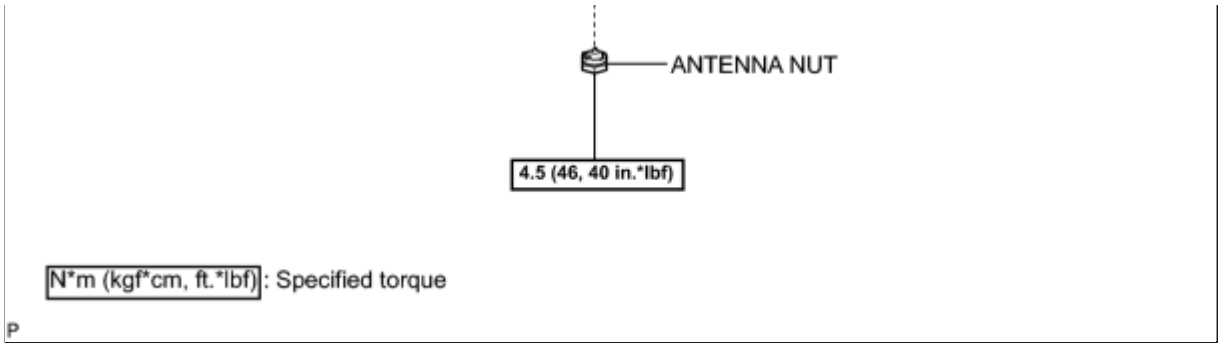
## COMPONENTS

## ILLUSTRATION




## ILLUSTRATION




ANTENNA NUT
4.5 (46, 40 in.*lbf)
N*m (kgf*cm, ft.*lbf): Specified torque
P

# REMOVAL

### 1. REMOVE ROOF HEADLINING ASSEMBLY

**HINT:**

**Refer to the procedure up to Remove Roof Headlining Assembly** INFO **.**

### 2. REMOVE ROOF ANTENNA POLE SUB-ASSEMBLY INFO

### 3. REMOVE TELEPHONE AND GPS ANTENNA ASSEMBLY

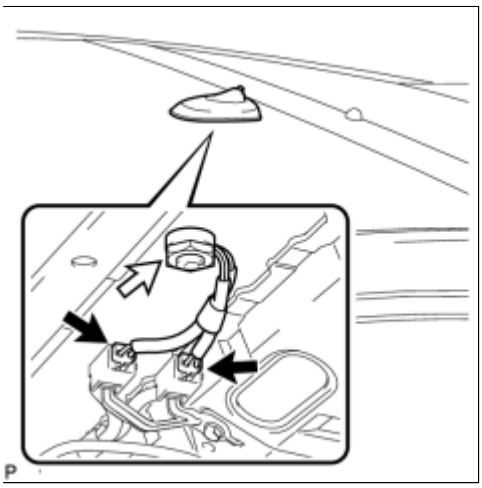


(a) Disconnect the 2 connectors.

(b) Remove the antenna nut and telephone and GPS antenna assembly.

# INSTALLATION

## 1. INSTALL TELEPHONE AND GPS ANTENNA ASSEMBLY



(a) Install the telephone and GPS antenna assembly with the antenna nut.

**Torque: 4.5 N·m (46 kgf·cm, 40in·lbf)**

(b) Connect the 2 connectors.

## 2. INSTALL ROOF ANTENNA POLE SUB-ASSEMBLY INFO

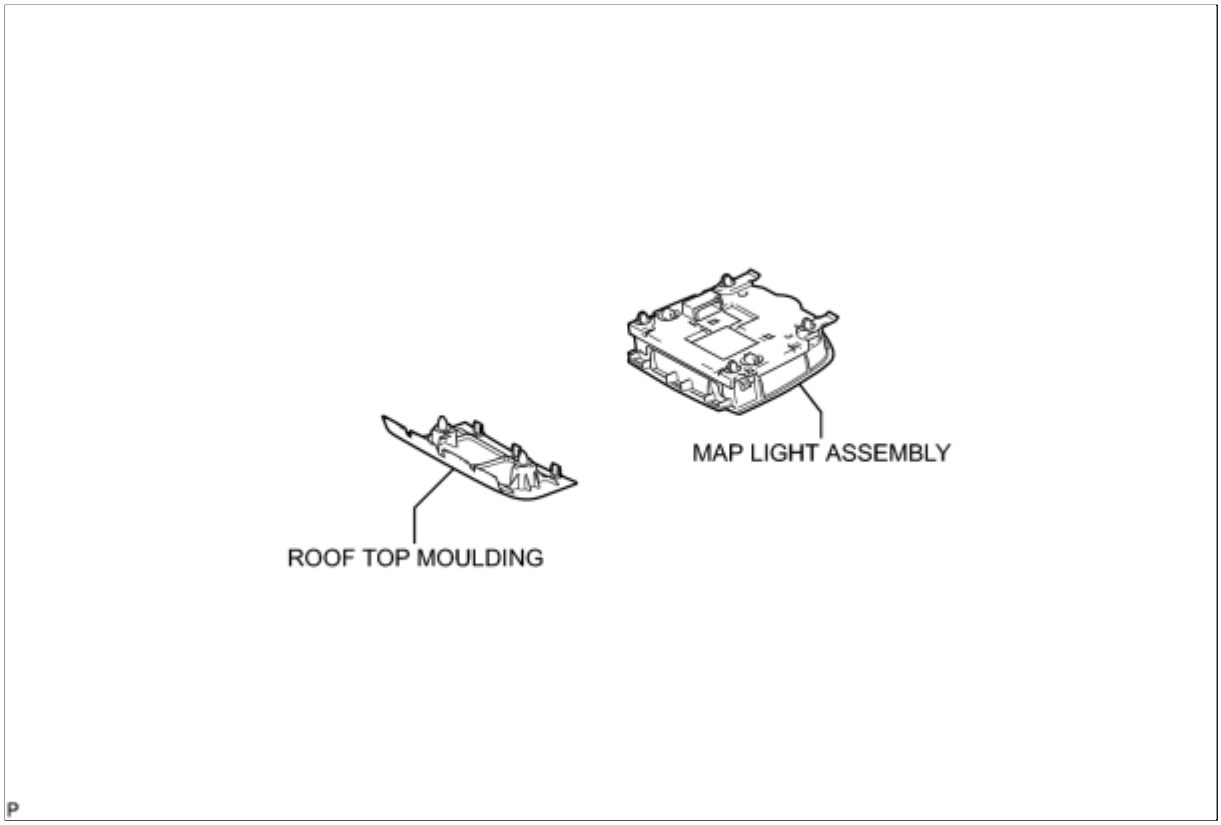
## 3. INSTALL ROOF HEADLINING ASSEMBLY

**HINT:**

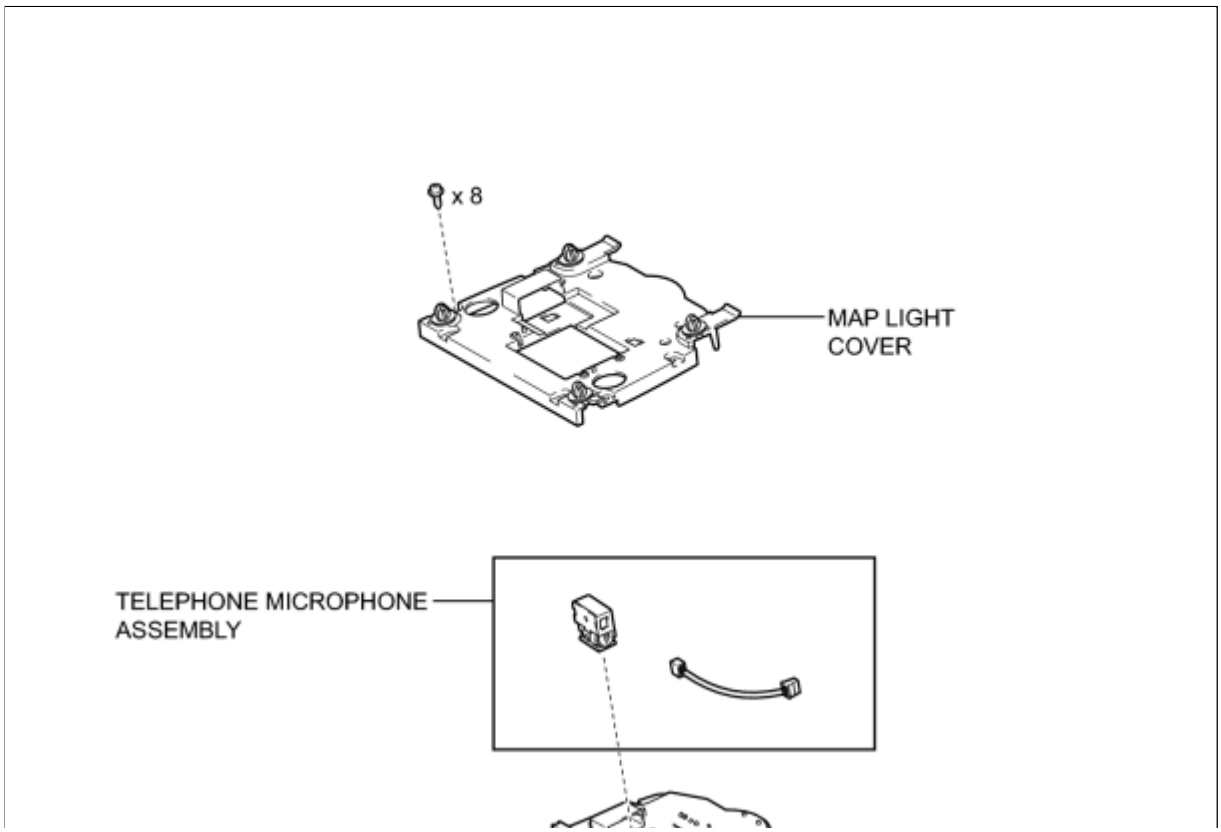
**Refer to the procedure from Install Roof Headlining Assembly INFO .**

## COMPONENTS

## ILLUSTRATION




## ILLUSTRATION





P

# REMOVAL

1. REMOVE ROOF TOP MOULDING INFO

2. REMOVE MAP LIGHT ASSEMBLY INFO

3. REMOVE TELEPHONE MICROPHONE ASSEMBLY INFO

# INSTALLATION

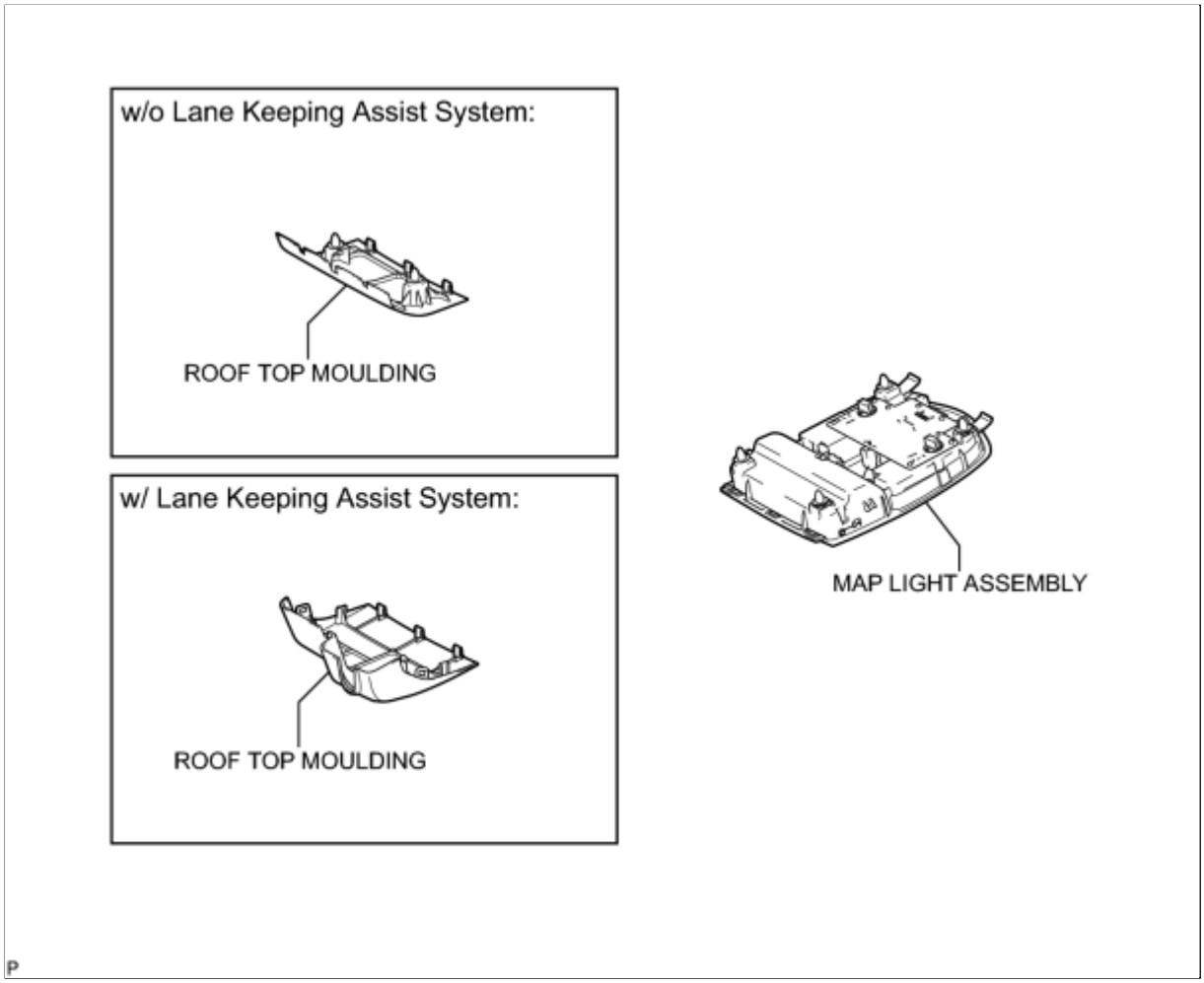
1. INSTALL TELEPHONE MICROPHONE ASSEMBLY INFO

2. INSTALL MAP LIGHT ASSEMBLY INFO

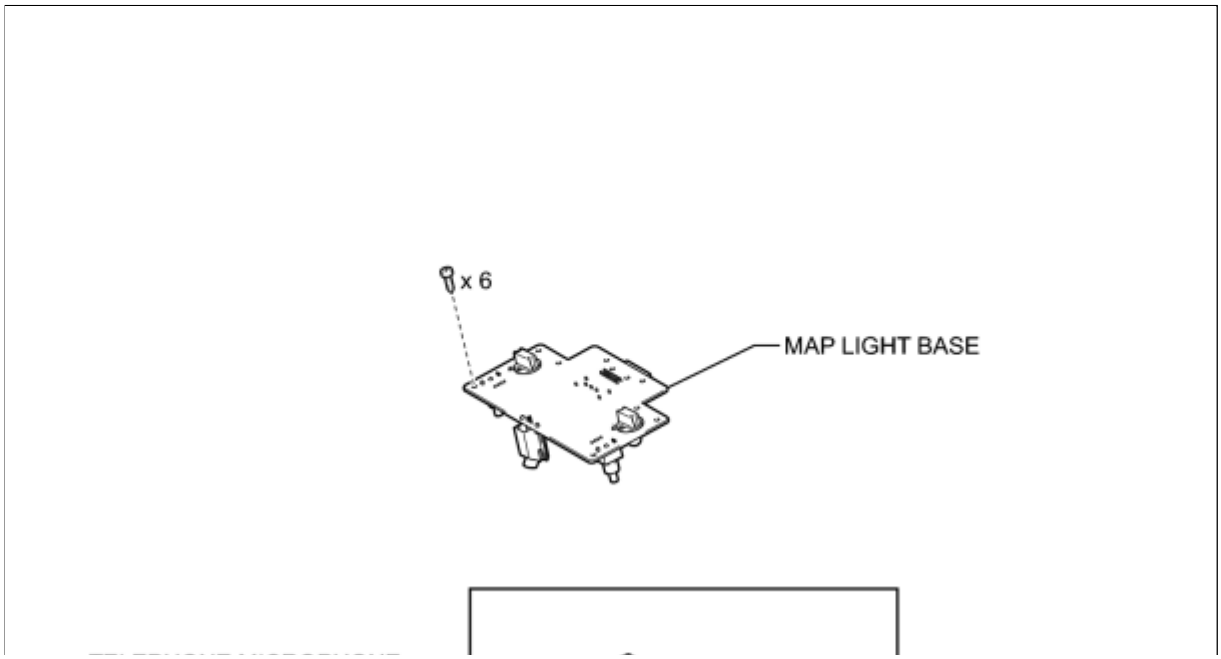
3. INSTALL ROOF TOP MOULDING INFO

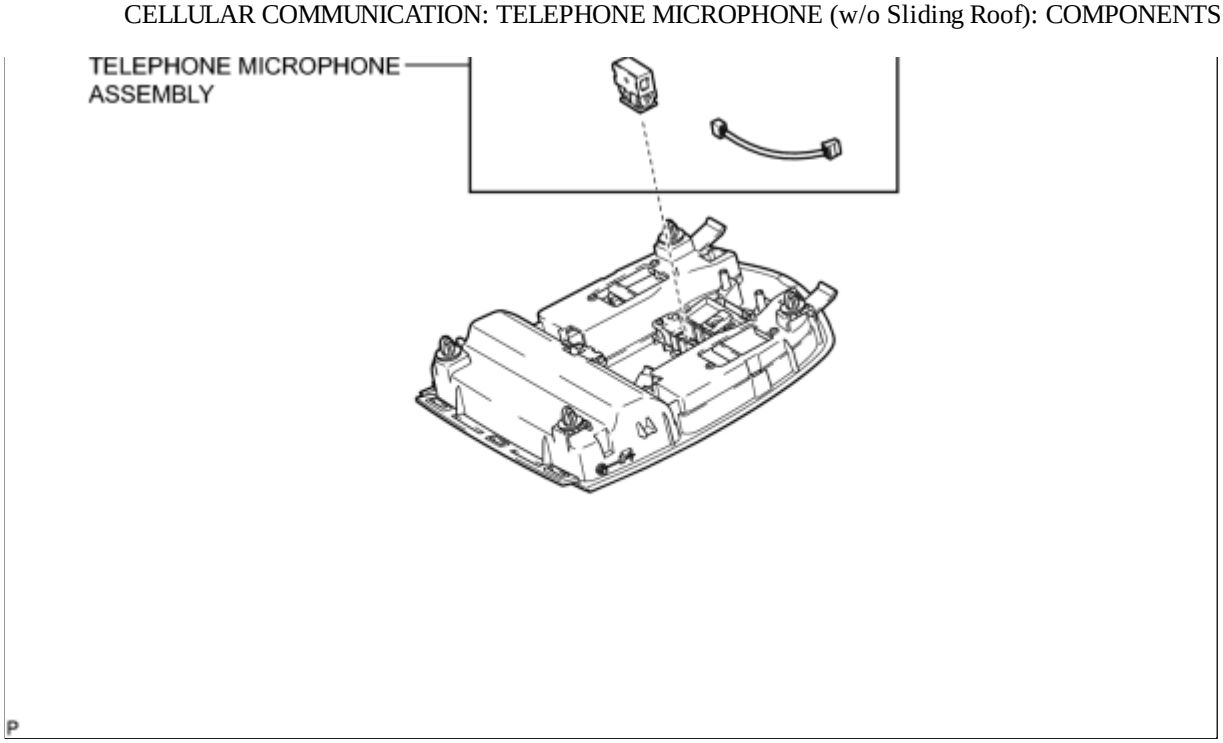
## COMPONENTS

## ILLUSTRATION




## ILLUSTRATION




TELEPHONE MICROPHONE ASSEMBLY

# REMOVAL

1. REMOVE ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO
2. REMOVE ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO
3. REMOVE MAP LIGHT ASSEMBLY INFO
4. REMOVE TELEPHONE MICROPHONE ASSEMBLY INFO



# INSTALLATION

1. INSTALL TELEPHONE MICROPHONE ASSEMBLY INFO

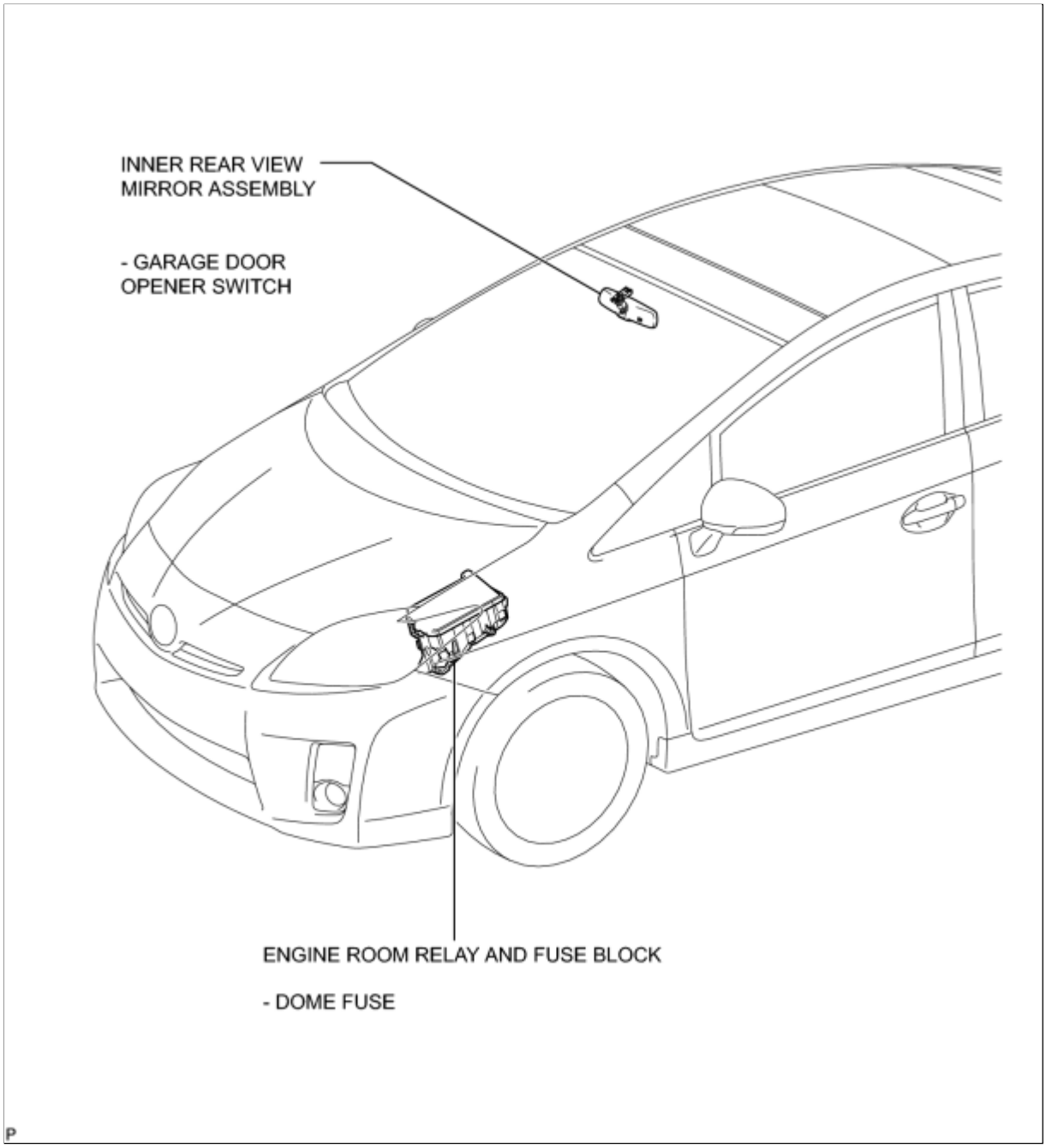
2. INSTALL MAP LIGHT ASSEMBLY INFO

3. INSTALL ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

4. INSTALL ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

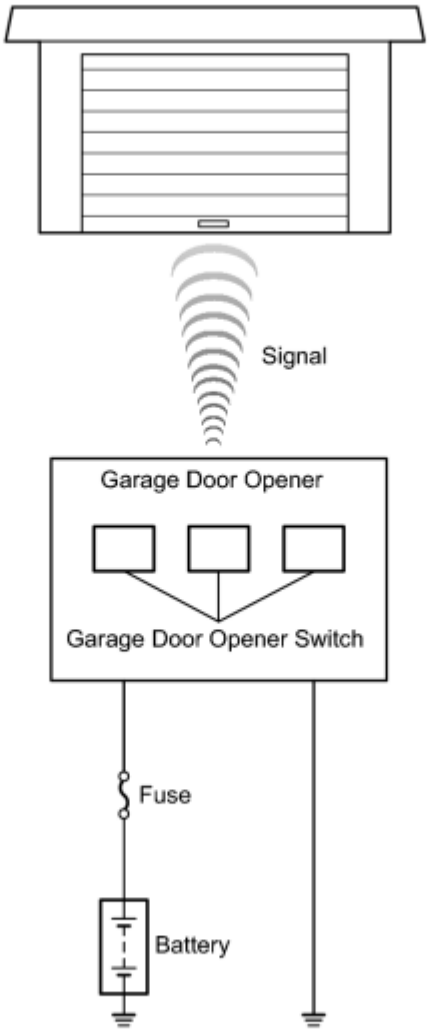
## PARTS LOCATION

## ILLUSTRATION



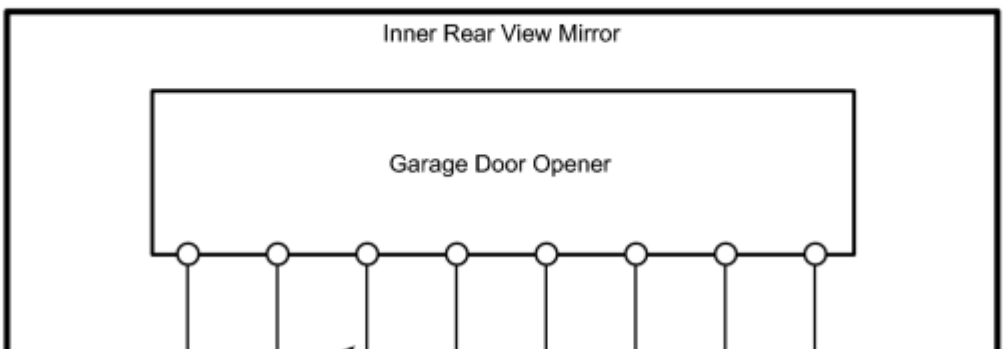
# SYSTEM DIAGRAM

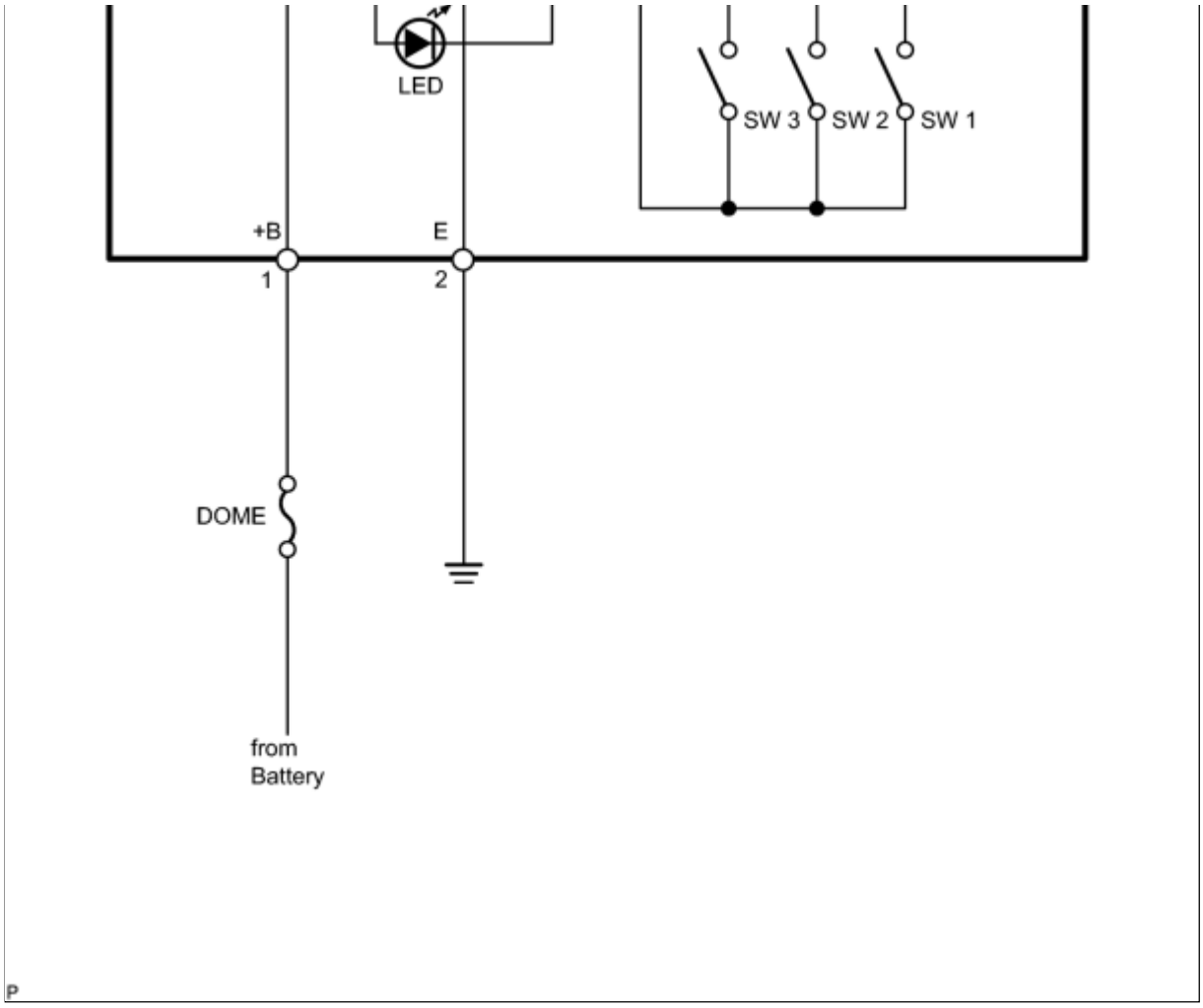
Image:




P

Wiring Diagram:




LED
SW 3
SW 2
SW 1
+B
1
E
2
DOME
from
Battery
P

# REGISTRATION

## 1. REGISTER TRANSMITTER CODE

**HINT:**

- The vehicle garage door opener system records transmitter codes for systems such as garage doors, gates, door locks, home lighting systems, security systems or other transmitter-code based systems.
- The garage door opener system is built into the inner rear view mirror assembly. If the inner rear view mirror assembly is replaced, transmitter codes previously registered in the garage door opener system must be re-registered.
- Ensure that the customer is aware that existing codes may be cleared from the garage door opener system while performing diagnosis of the system. All remotes required to reprogram the system should be made available at the time of inspection or repair of the garage door opener system.

(a) Re-registration of codes in the garage door opener system (registration mode)

**CAUTION:**

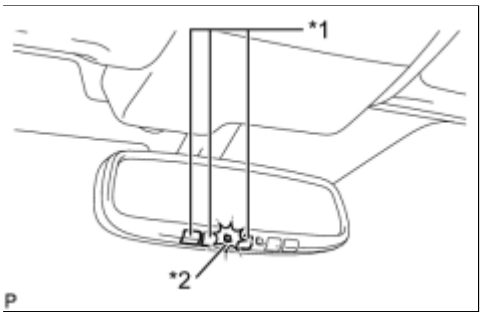
- When programming a garage door opener system, a garage door or other device may be operated. To prevent injury or damage, it is necessary to make sure that people and objects are out of the way of the garage door or other devices.
- Before beginning programming of the garage door opener system, turn off the power switch and remove the key from the vehicle.
- The garage door opener system cannot be used with openers that:

  (1) Were manufactured before April 1, 1982.

  (2) Do not meet Federal Safety Standards (for example, garage doors without a jam protection function).

**HINT:**

- A maximum of 3 transmitter codes can be registered with the garage door opener system. It is possible to register 1 handheld transmitter code (original transmitter) for each of the 3 garage door opener system switches.
- Disconnecting the vehicle battery will not clear the transmitter codes registered in the garage door opener system.
- An attempt to overwrite a previously registered code may fail. In this case, the previously registered handheld transmitter code will not be cleared.
- To successfully program the garage door opener system, it may be necessary to replace the handheld transmitter battery before programming.




(1) Step 1:

Select one of the garage door opener system switches to program.

### Text in Illustration

| | |
|---|---|
| *1 | Garage Door Opener Switch |
| *2 | LED |

(2) Step 2:

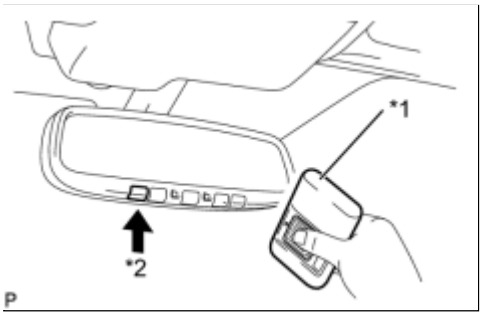
Press and hold the selected switch for 20 seconds. The garage door opener system will enter registration mode. Continue to hold this switch during steps 3 and 4.

**HINT:**

**The garage door opener system LED should stay on while holding the selected switch for the 20-second period. After entering registration mode, the LED will flash approximately once per second (1 Hz). This indicates that the garage door opener system has entered registration mode and is listening for a code from a handheld transmitter.**

(3) Step 3:

After the garage door opener system has entered registration mode, bring the original handheld transmitter within 2 to 3 cm (within 1 in.) of the garage door opener system. Press and hold the switch on the handheld transmitter. If the flashing speed of the garage door opener system LED changes from the slow speed to a faster speed, proceed to step 4.




## Text in Illustration

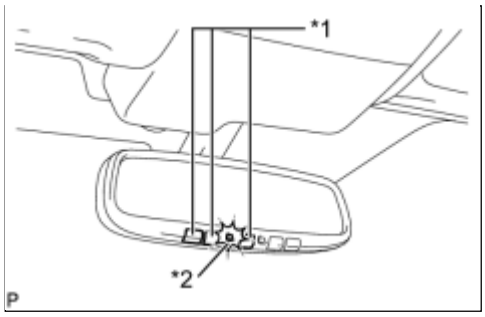
| | |
|---|---|
| *1 | Handheld Transmitter |
| *2 | Press |

**HINT:**

**Some handheld transmitters stop transmitting after 1 to 2 seconds. In this case, continue to hold the selected garage door opener system switch while pressing the handheld transmitter switch for 2 seconds at a time. Repeat the cycle of pressing and releasing the transmitter switch while monitoring for a change of the flashing speed of the garage door opener system LED.**

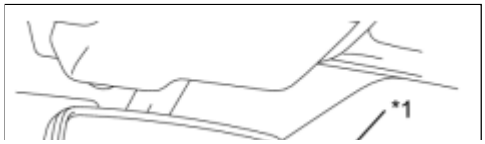
(4) Step 4:

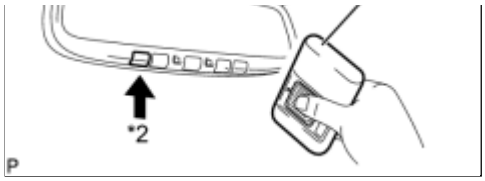
When the LED begins to flash more rapidly, release both switches. This indicates that the garage door opener system has been successfully programmed. If the garage door opener system fails to program, review all hints before trying the programming process again.




**Text in Illustration**

| | |
|---|---|
| *1 | Garage Door Opener Switch |
| *2 | LED |






**Text in Illustration**

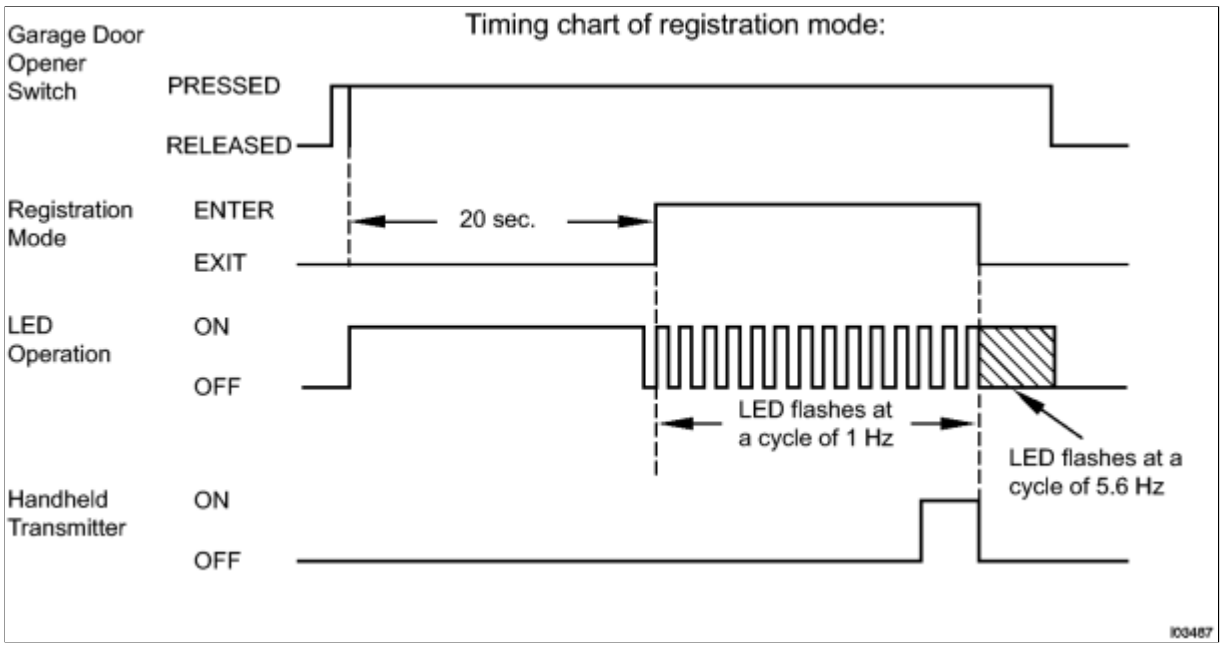
| | |
|---|---|
| *1 | Handheld Transmitter |
| *2 | Press |

**HINT:**

- If transmitter registration fails:

  (1) The battery in the handheld transmitter may be weak or need to be replaced.

  (2) The handheld transmitter and opener device to be registered may not be compatible with the vehicle garage door opener system.
- After entering garage door opener system registration mode, registration of the handheld transmitter code must be completed within 100 seconds. If 100 seconds have elapsed, the garage door opener system will enter low power mode.
- For first time programming, it may be necessary to press and hold the 2 outer switches until the garage door opener system LED begins to flash rapidly. The length of time that it is necessary to hold the switches in this case should be approximately 20 seconds.
- In some cases, the garage door opener system LED may flash slowly (once per second (1 Hz)) as soon as the selected garage door opener system switch is pressed. This indicates that the system is ready or "listening" for a code from a handheld transmitter. Continue to hold the switch and proceed from step 3 (above).

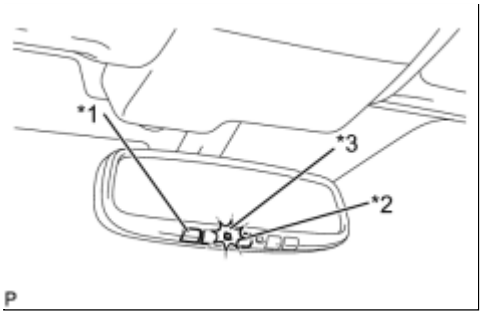



(b) Clearing transmitter codes in the garage door opener system (clear mode)

## Text in Illustration

| | |
|---|---|
| *1 | Switch 1 |

| | |
|---|---|
| 1 | Switch 1 |
| *2 | Switch 3 |
| *3 | LED |




**HINT:**

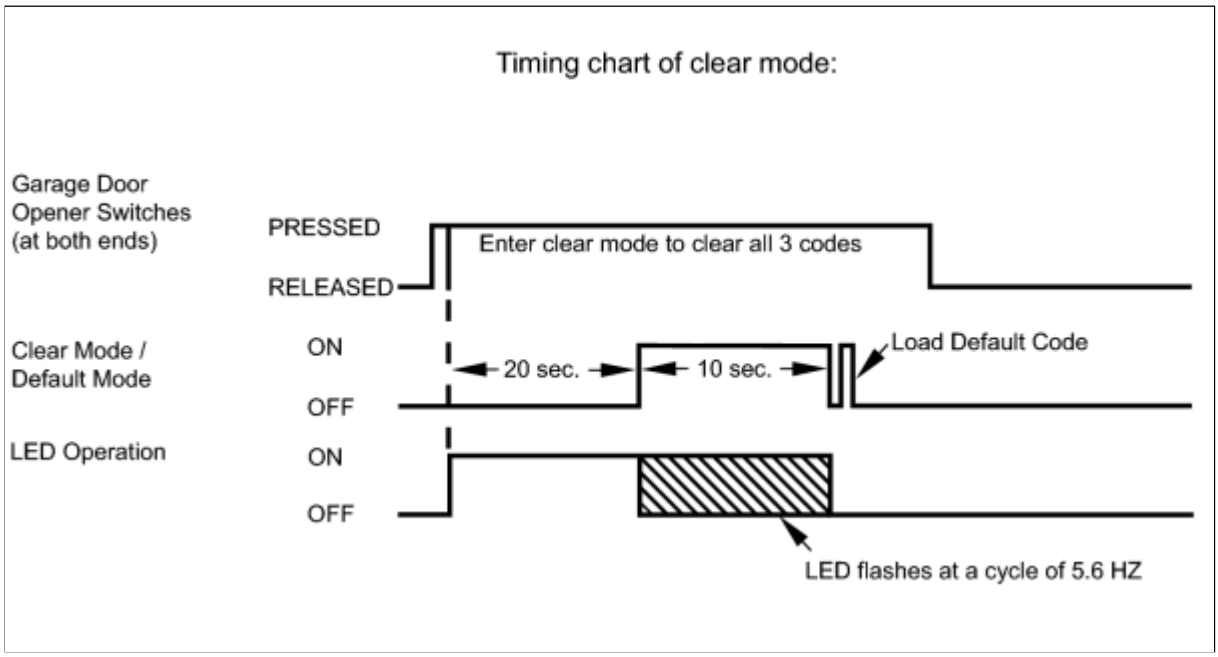
**All 3 codes registered in the garage door opener system will be cleared. No option exists for clearing only 1 transmitter code.**

**(1) Press and hold the left and right switches of the garage door opener system for 20 seconds. The LED will begin to flash approximately 5 times per second (5.6 Hz). This indicates that the codes contained in the vehicle garage door opener system have been cleared. Releasing the switches ends clear mode.**

- If the switches are released within 10 seconds after the transmitter codes have been cleared, the system will enter registration mode immediately the next time a garage door opener system switch is pressed.
- If the switches are held for 10 seconds or more after the transmitter codes have been cleared, default codes will be set to the 3 switches of the garage door opener system. These default codes may in some cases be used for training an opener device that uses rolling codes.

(c) Low power mode:

(1) If the garage door opener switch is stuck or held for 100 seconds or more while in registration mode, the garage door opener system will enter low power mode to economize on power consumption. When the garage door opener system has entered low power mode, the LED turns off. When the garage door opener system switch is released, low power mode will end.



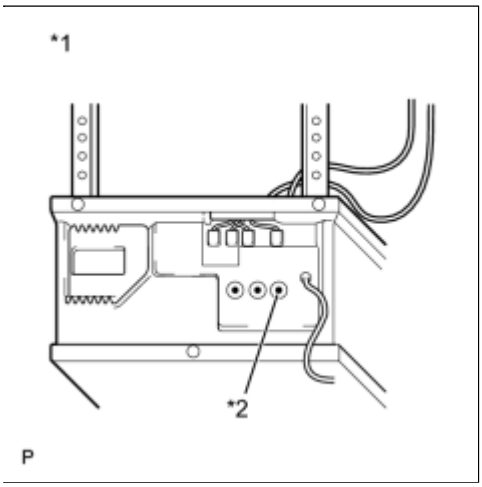

## 2. ROLLING CODE SYSTEMS

(a) If the handheld transmitter for the opener device (customer's garage door) being programmed uses a rolling code, it may be necessary to

"train" the garage door opener device.

## Text in Illustration

| | |
|---|---|
| *1 | Example |
| *2 | Training Button |




- "Train" refers to causing the opener device (customer's ceiling mounted garage door opener) to recognize a non-rolling code.
- The steps required to "train" an opener device may vary depending on the model, type, age, and manufacturer of the device.

(1) Locate the training button on the opener device.

(2) Press the training button.

(3) Within 30 seconds, press and release the programmed garage door opener system switch twice. Some opener devices may require the garage door opener system switch to be pressed 3 times.

(4) The vehicle garage door opener system should now operate the opener device.

**HINT:**

**Opener device refers to a device such as a ceiling mounted garage door opener, which is located at the customer's residence. It is necessary to read the instructions for the customer's opener device, to allow the above procedure to be performed safely and successfully. The customer should be aware that performing this procedure will result in a lowered level of security for the customer's opener device.**

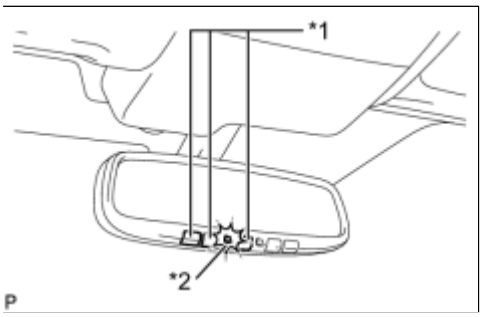
# SYSTEM DESCRIPTION

## 1. DESCRIPTION

(a) A maximum of 3 codes for transmitter-code based systems such as garage doors, gates and entry gates can be registered to the vehicle garage door opener system. These stored codes can then be used to activate the transmitter controlled systems. It will not be necessary to keep the original handheld transmitters in the vehicle.

# ON-VEHICLE INSPECTION

## 1. INSPECT GARAGE DOOR OPENER




(a) To inspect the garage door opener system, press each switch and check that the LED illuminates as illustrated. If one or more of the switches do not cause the LED to illuminate, confirm that the fuse and the wiring to the garage door opener system unit are normal. If the fuse and wiring are normal, and the LED does not illuminate, replace the garage door opener system unit (inner rear view mirror assembly).

### Text in Illustration

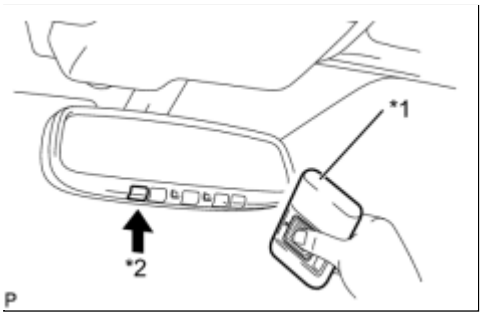
| | |
|---|---|
| *1 | Garage Door Opener Switch |
| *2 | LED |

## 2. INSPECT GARAGE DOOR OPENER REGISTRATION AND TRANSMITTING

**HINT:**

**Use the KENT-MOORE "HomeLink" tester, and the KENT-MOORE handheld transmitter for this test. First clear the customer's transmitter codes, and then register the code of the KENT-MOORE handheld transmitter to the garage door opener system.**

(a) Check if the code of the KENT-MOORE handheld transmitter was successfully registered.




### Text in Illustration

| | |
|---|---|
| *1 | Handheld Transmitter |
| *2 | Press |

**HINT:**

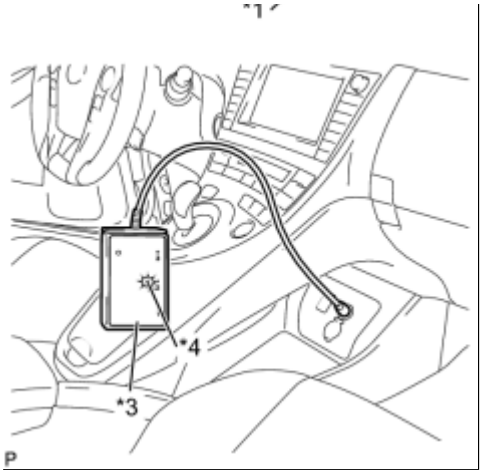
**If the code of the KENT-MOORE handheld transmitter cannot be registered, replace the garage door opener system unit.**




(b) Press the garage door opener switch that was used to copy the signal from the handheld transmitter. Check if the green LED of the "HomeLink" tester illuminates.

### Text in Illustration

| | |
|---|---|
| *1 | Handheld Transmitter |




| | |
|---|---|
| *2 | Press |
| *3 | "HomeLink" Tester |
| *4 | Green LED |

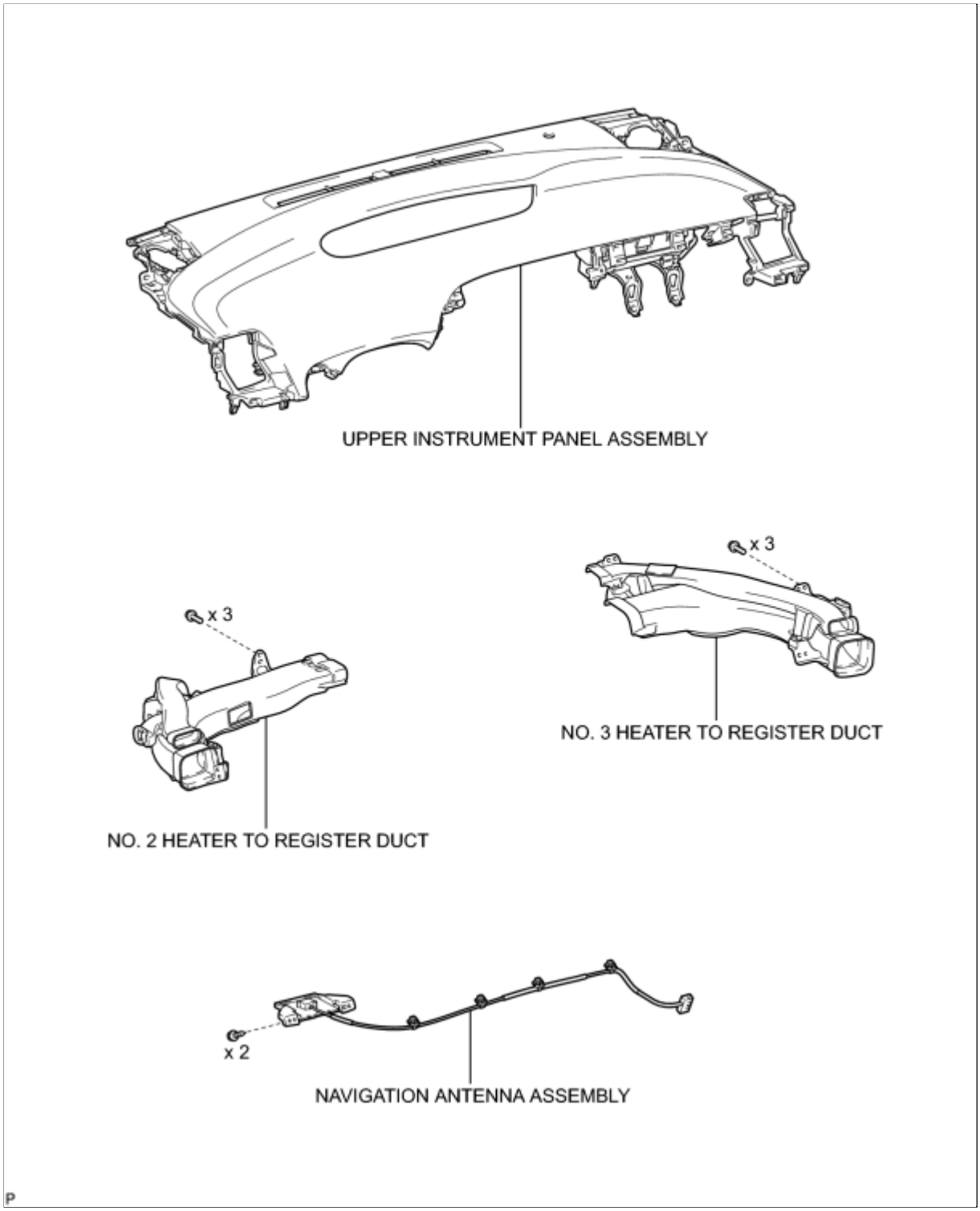
**HINT:**

**If the green LED does not illuminate, replace the garage door opener system unit that is located in the roof console box assembly.**

(c) When the inspection is complete, re-register the customer's handheld transmitter codes.

## COMPONENTS

## ILLUSTRATION



# REMOVAL

### 1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

**HINT:**

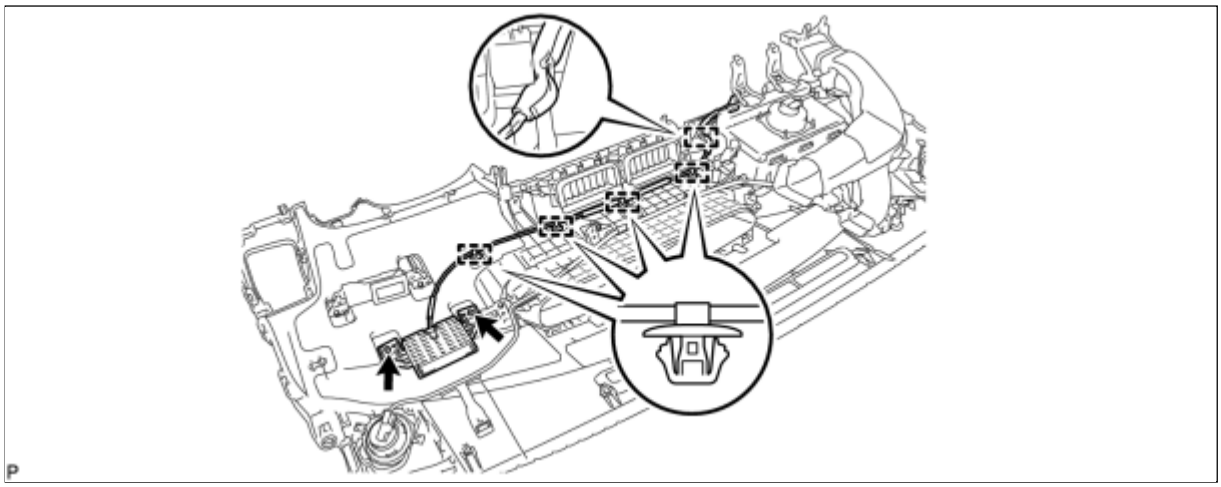
**Refer to the procedure up to Remove Upper Instrument Panel Assembly** INFO .

### 2. REMOVE NO. 3 HEATER TO REGISTER DUCT INFO

### 3. REMOVE NO. 2 HEATER TO REGISTER DUCT INFO

### 4. REMOVE NAVIGATION ANTENNA ASSEMBLY

(a) Disengage the 5 clamps.

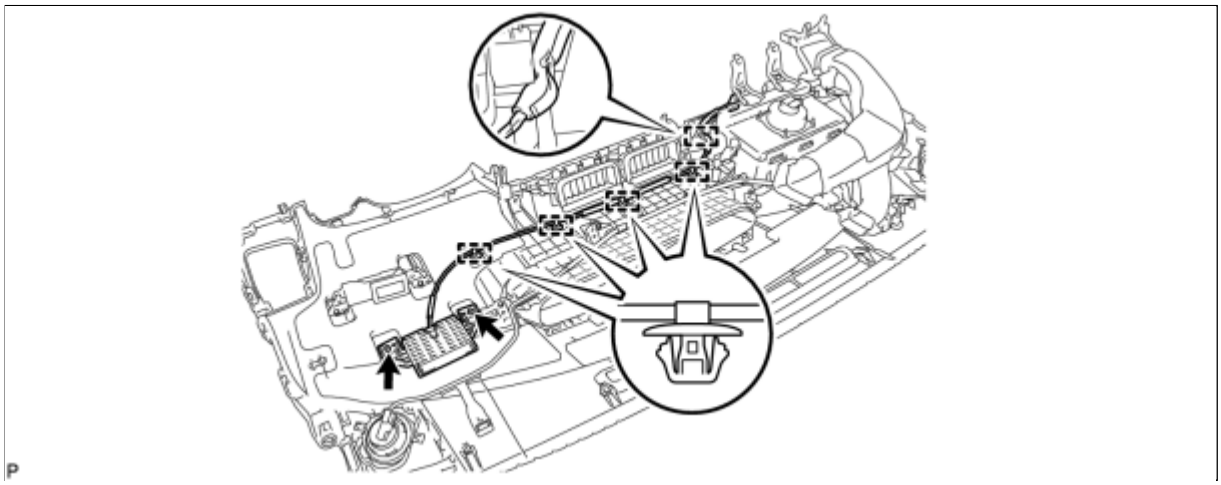


(b) Remove the 2 screws and navigation antenna assembly.

# INSTALLATION

### 1. INSTALL NAVIGATION ANTENNA ASSEMBLY

(a) Install the navigation antenna assembly with the 2 screws.



(b) Engage the 5 clamps.

### 2. INSTALL NO. 2 HEATER TO REGISTER DUCT INFO

### 3. INSTALL NO. 3 HEATER TO REGISTER DUCT INFO

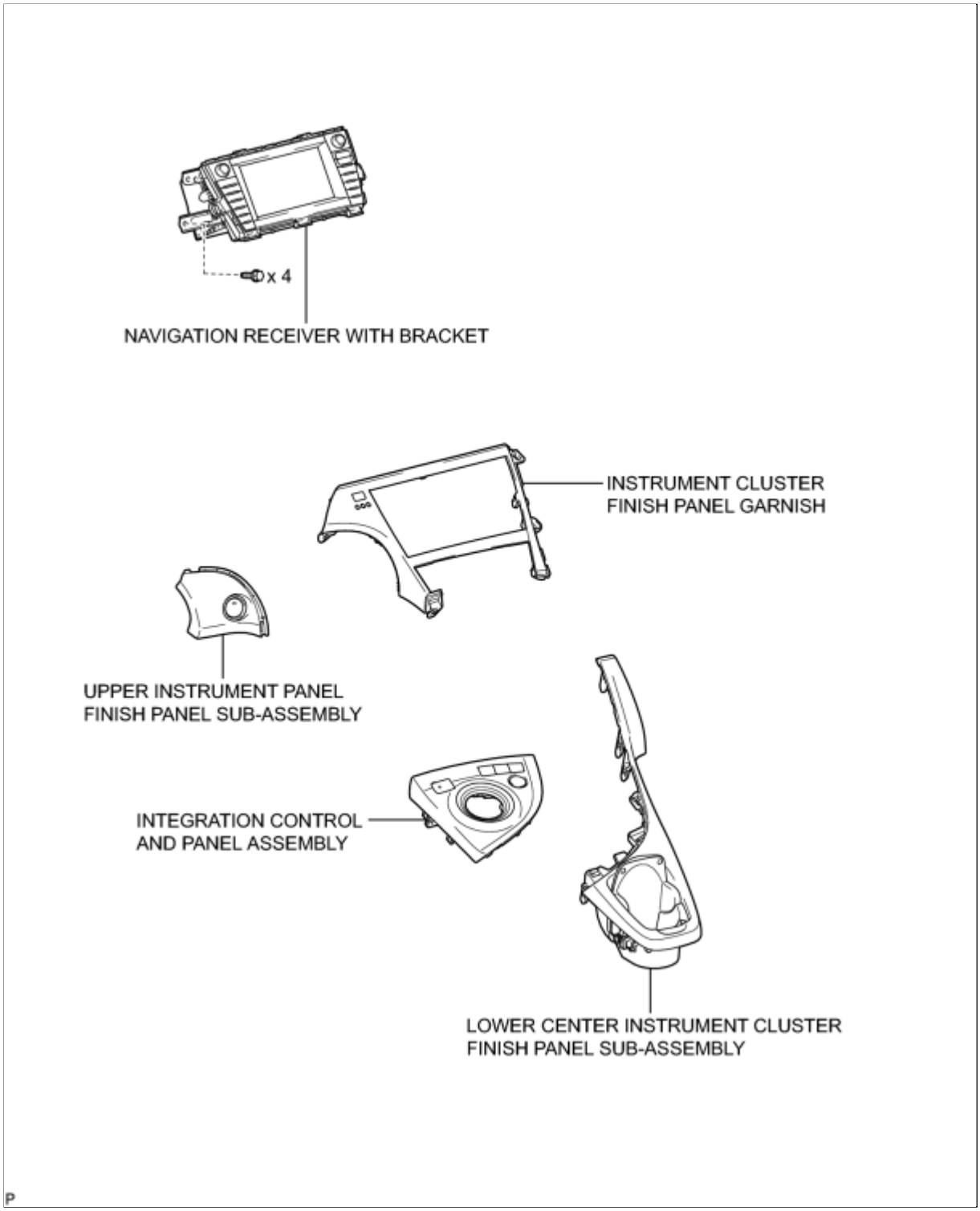
### 4. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

**HINT:**

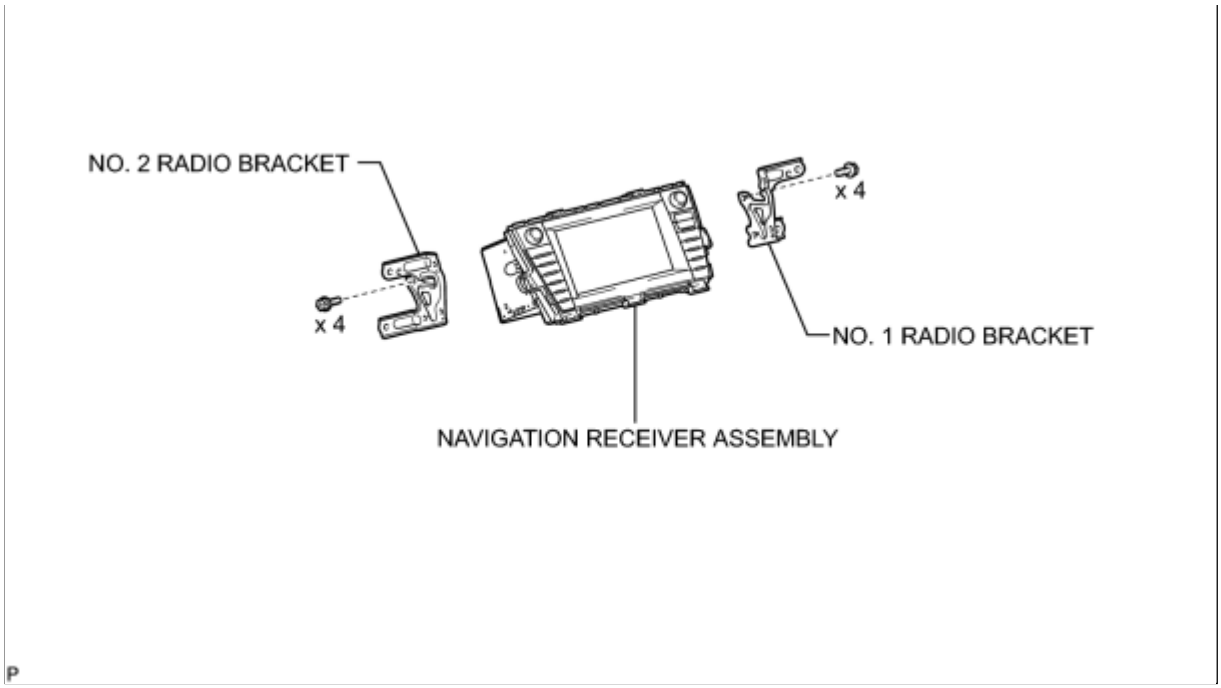
**Refer to the procedure from Upper Instrument Panel Assembly INFO .**

## COMPONENTS

## ILLUSTRATION



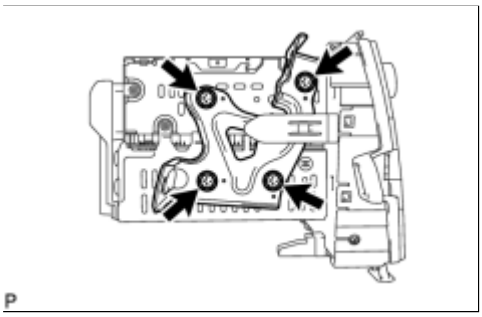

## ILLUSTRATION


NO. 2 RADIO BRACKET
x 4
x 4
NO. 1 RADIO BRACKET
NAVIGATION RECEIVER ASSEMBLY
P

# INSTALLATION

### 1. INSTALL NAVIGATION RECEIVER ASSEMBLY

### 2. INSTALL NO. 2 RADIO BRACKET



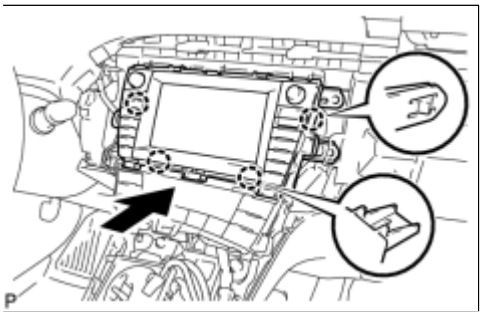
(a) Install the No. 2 radio bracket with the 4 screws.

### 3. INSTALL NO. 1 RADIO BRACKET

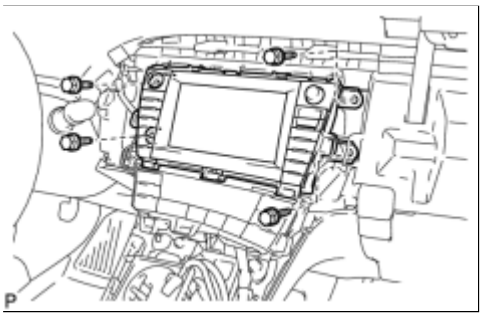
**HINT:**

**Use the same procedure as for the No. 2 radio bracket.**

### 4. INSTALL NAVIGATION RECEIVER WITH BRACKET



(a) Engage the 4 claws and temporarily install the navigation receiver with bracket as shown in the illustration.



(b) Install the navigation receiver with bracket with the 4 bolts.

### 5. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

### 6. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

### 7. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

**8. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY** INFO

**9. INSERT MAP DISC**

# REMOVAL

### 1. EJECT MAP DISC

(a) Turn the power switch on (ACC).

(b) Push the "INFO" button.

(c) Touch "Map Data" on the navigation screen.

(d) Touch "EJECT DVD" on the navigation screen to eject the map disc.

(e) Turn the power switch off.

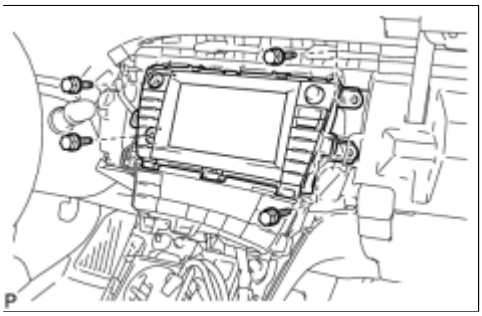
### 2. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

### 3. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

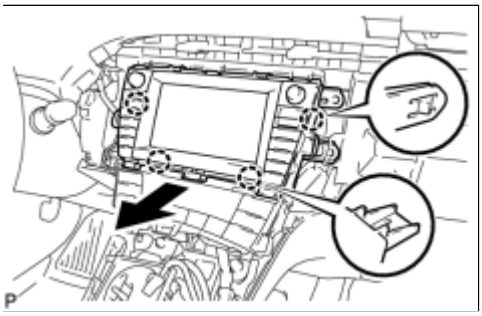
### 4. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

### 5. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

### 6. REMOVE NAVIGATION RECEIVER WITH BRACKET



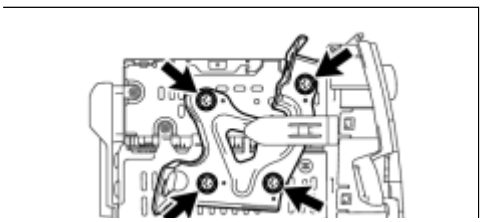
(a) Remove the 4 bolts.



(b) Disengage the 4 claws and remove the navigation receiver with bracket as shown in the illustration.

(c) Disconnect each connector.

### 7. REMOVE NO. 2 RADIO BRACKET



(a) Remove the 4 screws and No. 2 radio bracket.




### 8. REMOVE NO. 1 RADIO BRACKET

**HINT:**

**Use the same procedure as for the No. 2 radio bracket.**

### 9. REMOVE NAVIGATION RECEIVER ASSEMBLY

# PRECAUTION

## 1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

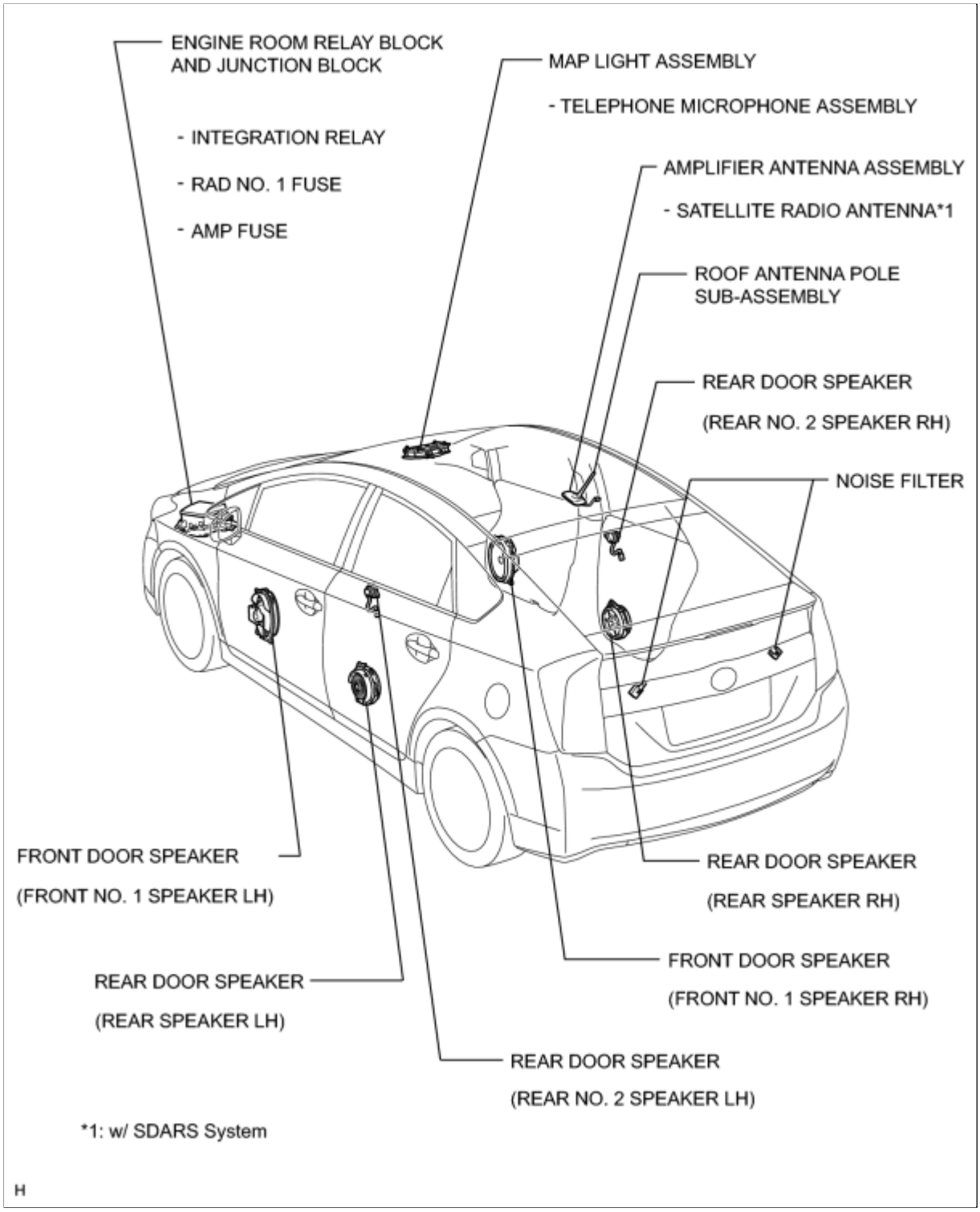
**NOTICE:**

**When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the terminal is reconnected.**

| SYSTEM NAME | SEE PROCEDURE |
|---|---|
| Advanced Parking Guidance System | INFO |

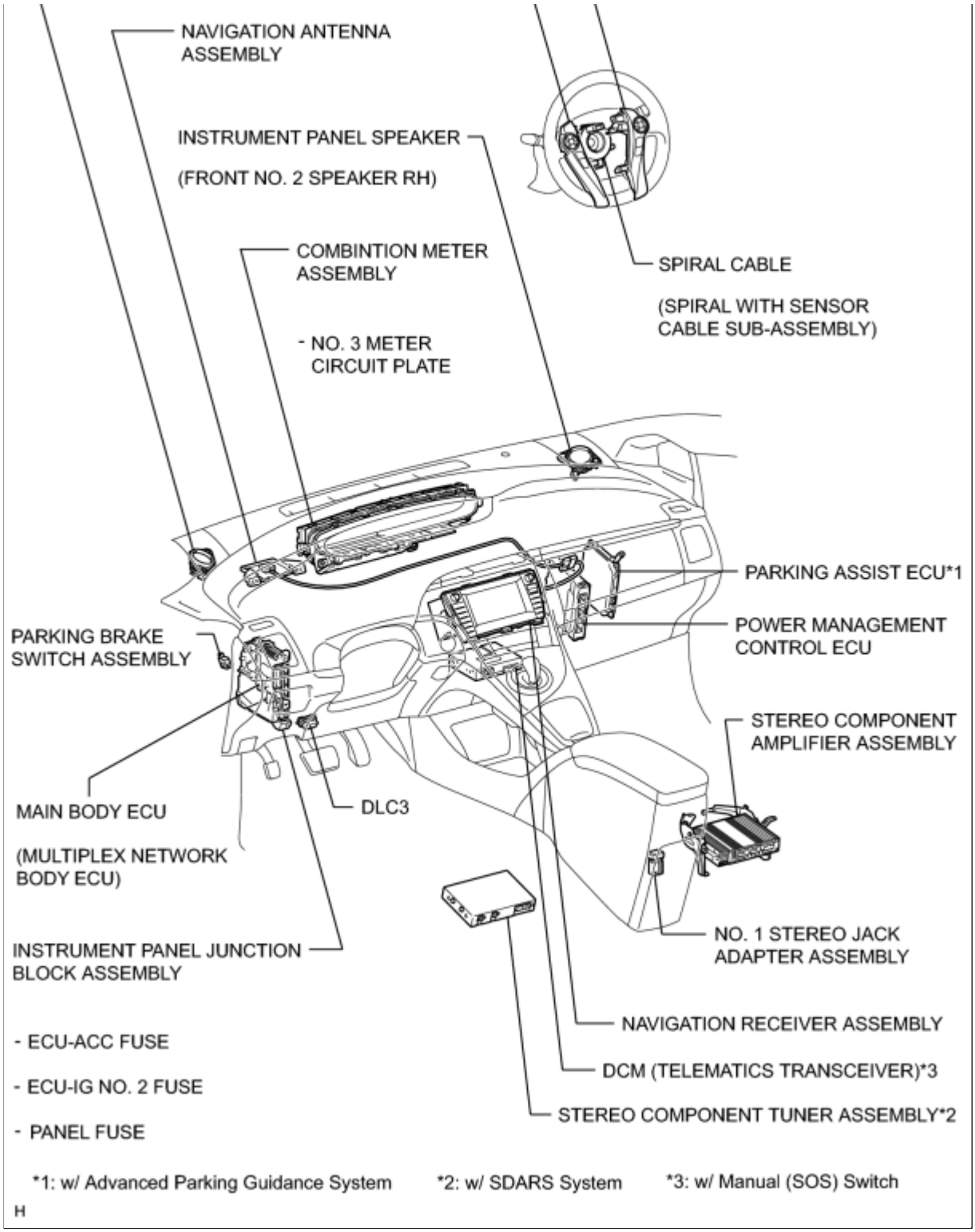
## PARTS LOCATION

## ILLUSTRATION



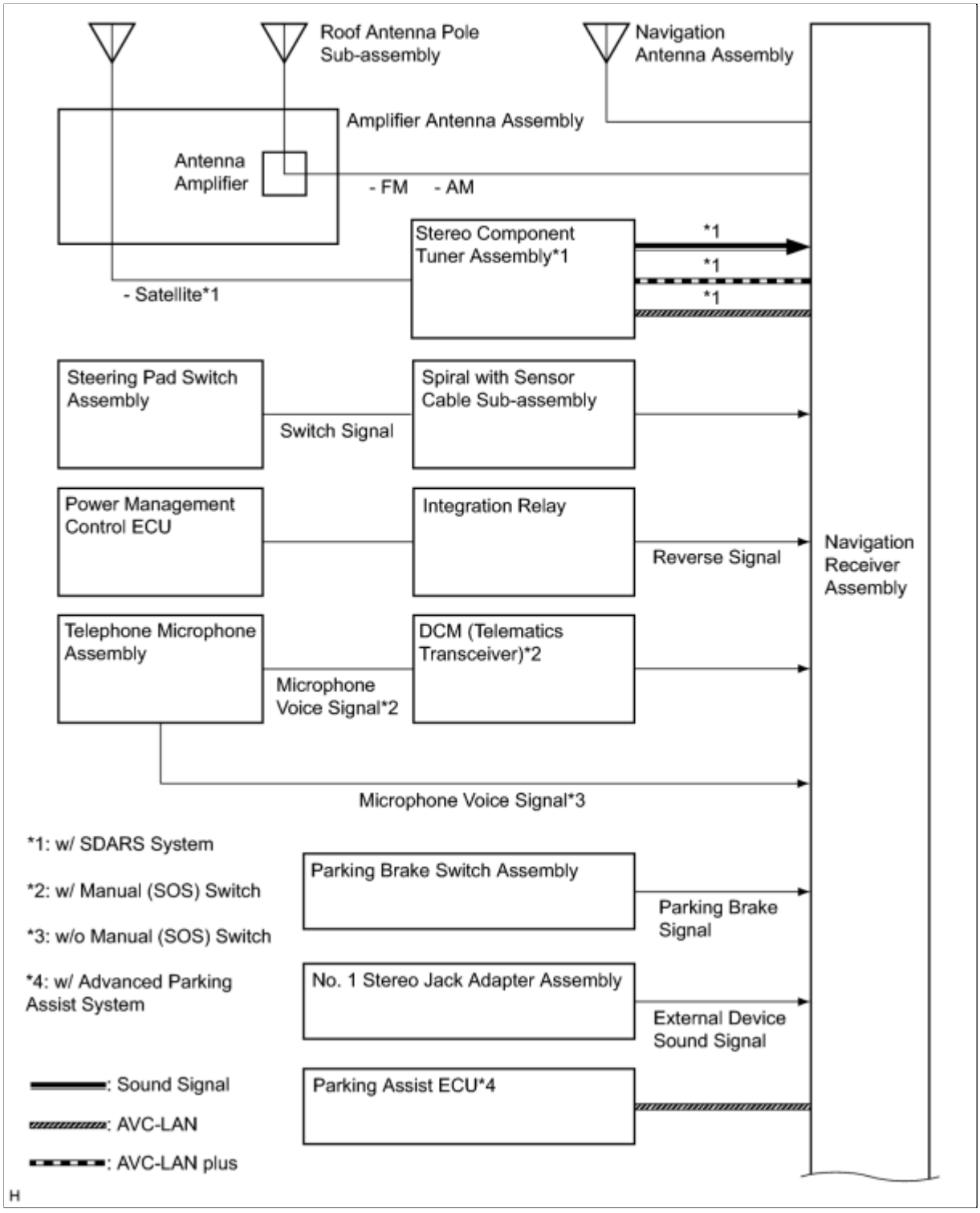

## ILLUSTRATION

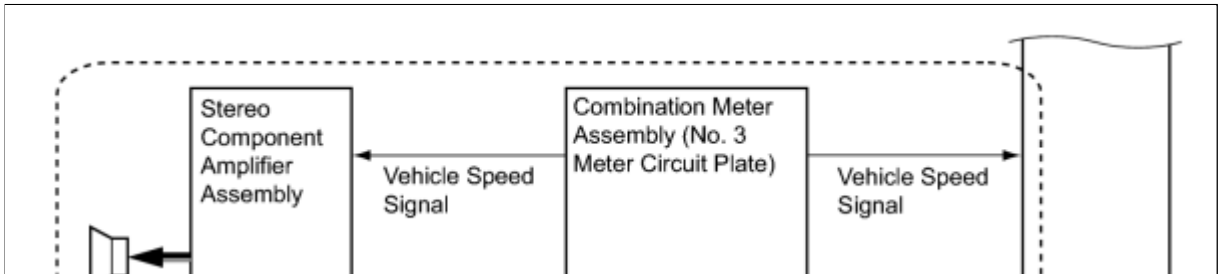


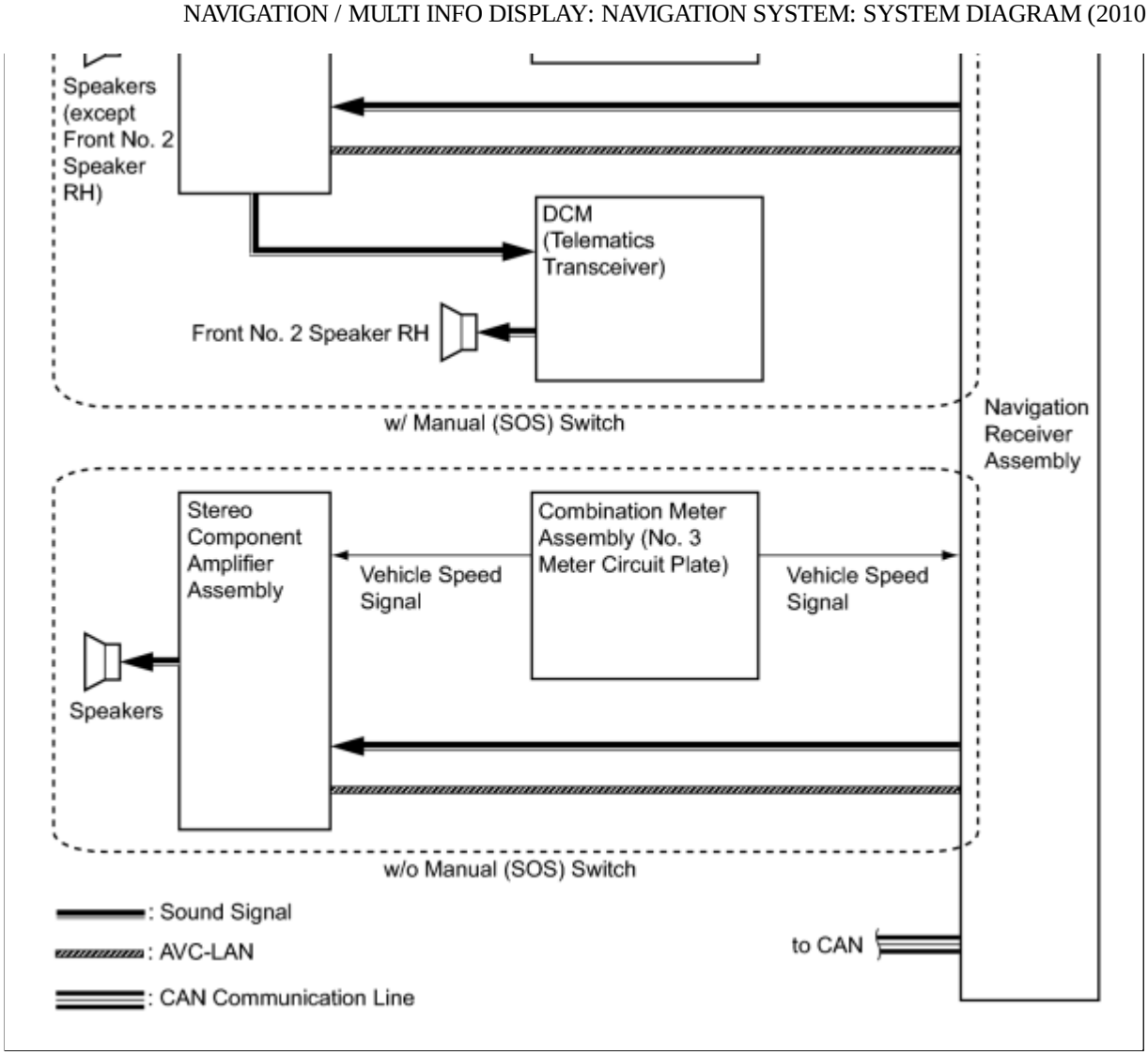

NAVIGATION ANTENNA ASSEMBLY
INSTRUMENT PANEL SPEAKER
(FRONT NO. 2 SPEAKER RH)
COMBINTION METER ASSEMBLY
- NO. 3 METER CIRCUIT PLATE
SPIRAL CABLE
(SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY)
PARKING ASSIST ECU*1
POWER MANAGEMENT CONTROL ECU
PARKING BRAKE SWITCH ASSEMBLY
STEREO COMPONENT AMPLIFIER ASSEMBLY
MAIN BODY ECU
(MULTIPLEX NETWORK BODY ECU)
DLC3
INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY
NO. 1 STEREO JACK ADAPTER ASSEMBLY
NAVIGATION RECEIVER ASSEMBLY
- ECU-ACC FUSE
- ECU-IG NO. 2 FUSE
- PANEL FUSE
DCM (TELEMATICS TRANSCEIVER)*3
STEREO COMPONENT TUNER ASSEMBLY*2
*1: w/ Advanced Parking Guidance System
*2: w/ SDARS System
*3: w/ Manual (SOS) Switch
H

# SYSTEM DIAGRAM

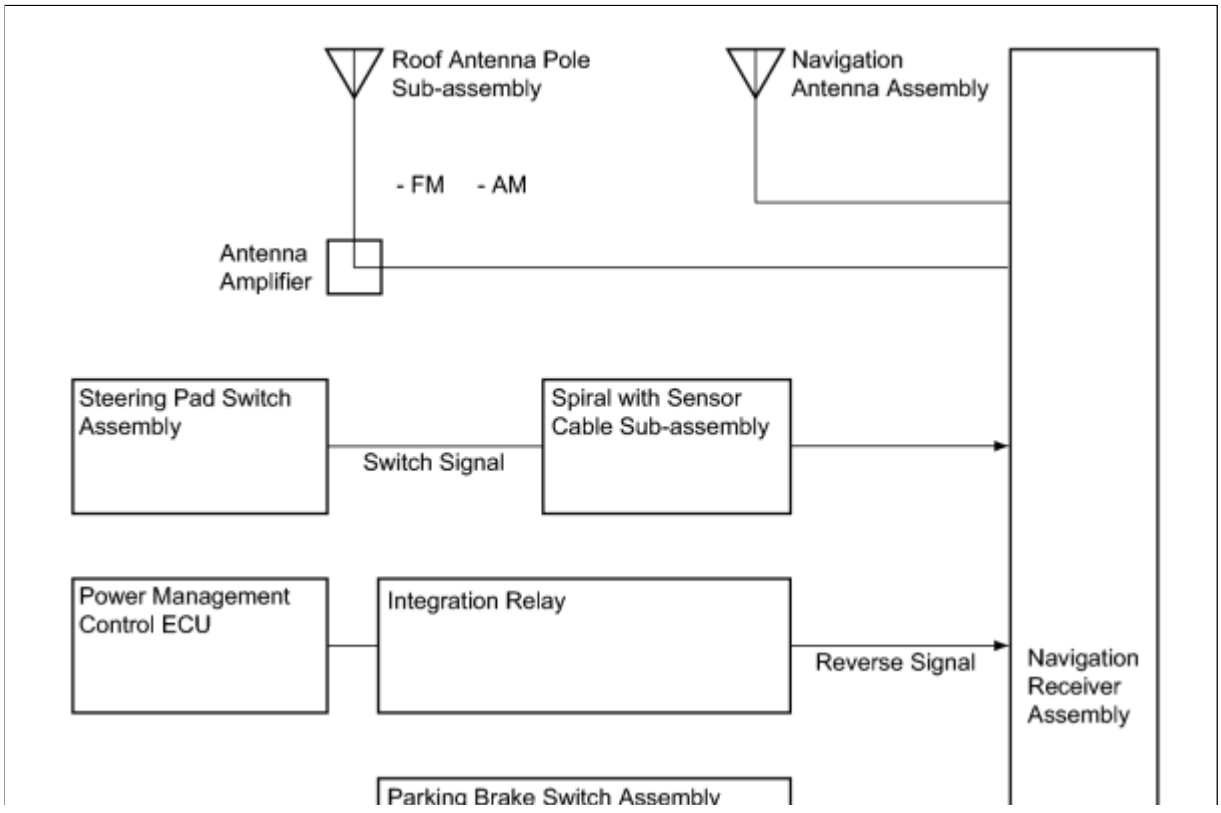
### 1. w/ "Bluetooth" Audio System

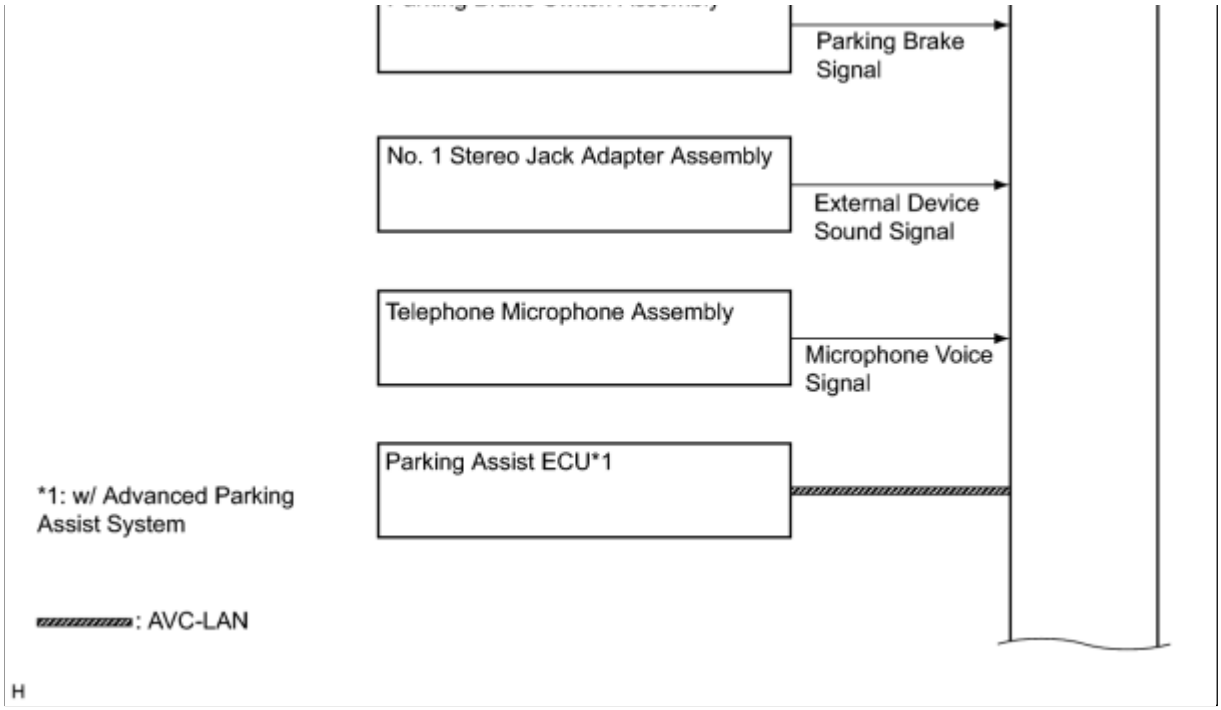


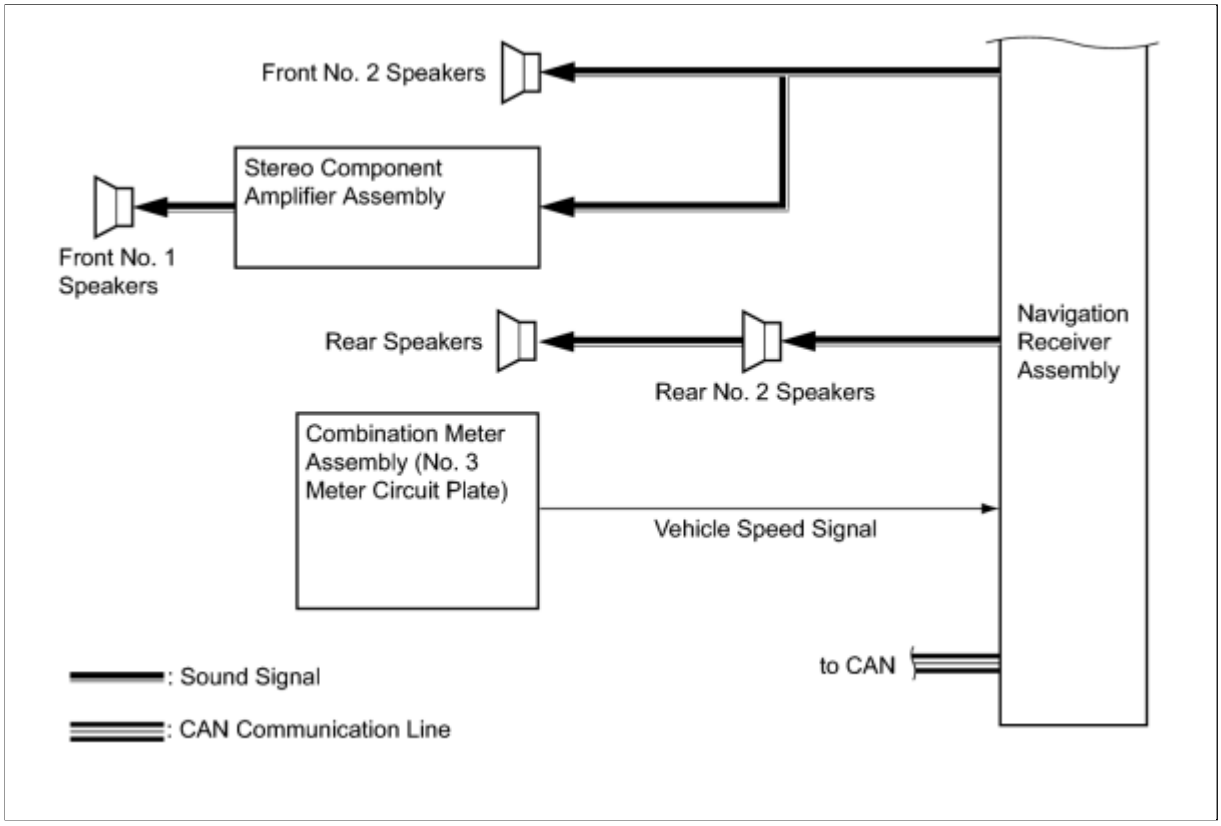






**2. w/o "Bluetooth" Audio System**



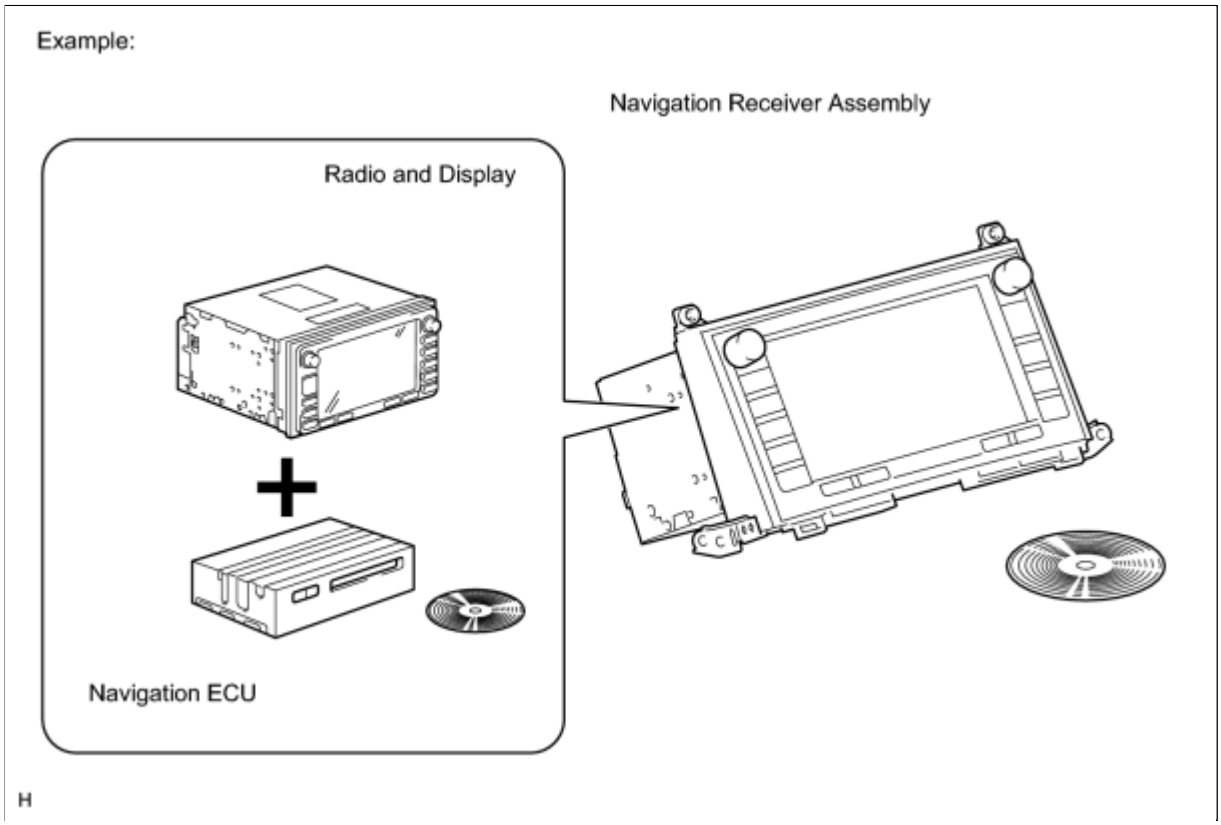

Parking Brake Signal
No. 1 Stereo Jack Adapter Assembly
External Device Sound Signal
Telephone Microphone Assembly
Microphone Voice Signal
Parking Assist ECU*1
*1: w/ Advanced Parking Assist System
: AVC-LAN
H


Front No. 2 Speakers
Stereo Component Amplifier Assembly
Front No. 1 Speakers
Rear Speakers
Rear No. 2 Speakers
Navigation Receiver Assembly
Combination Meter Assembly (No. 3 Meter Circuit Plate)
Vehicle Speed Signal
to CAN
: Sound Signal
: CAN Communication Line

# SYSTEM DESCRIPTION

## 1. NAVIGATION RECEIVER ASSEMBLY OUTLINE

(a) Conventionally, 2 separate devices, a "radio and display" and a "navigation ECU" are used. This model has adopted a type that combines these devices into a single unit.

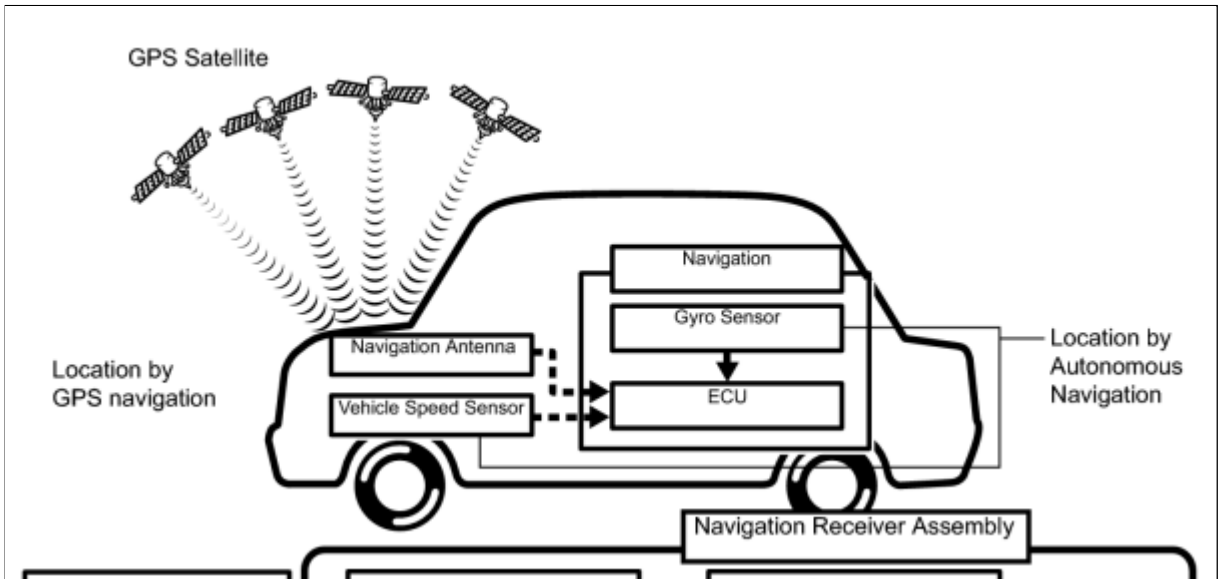


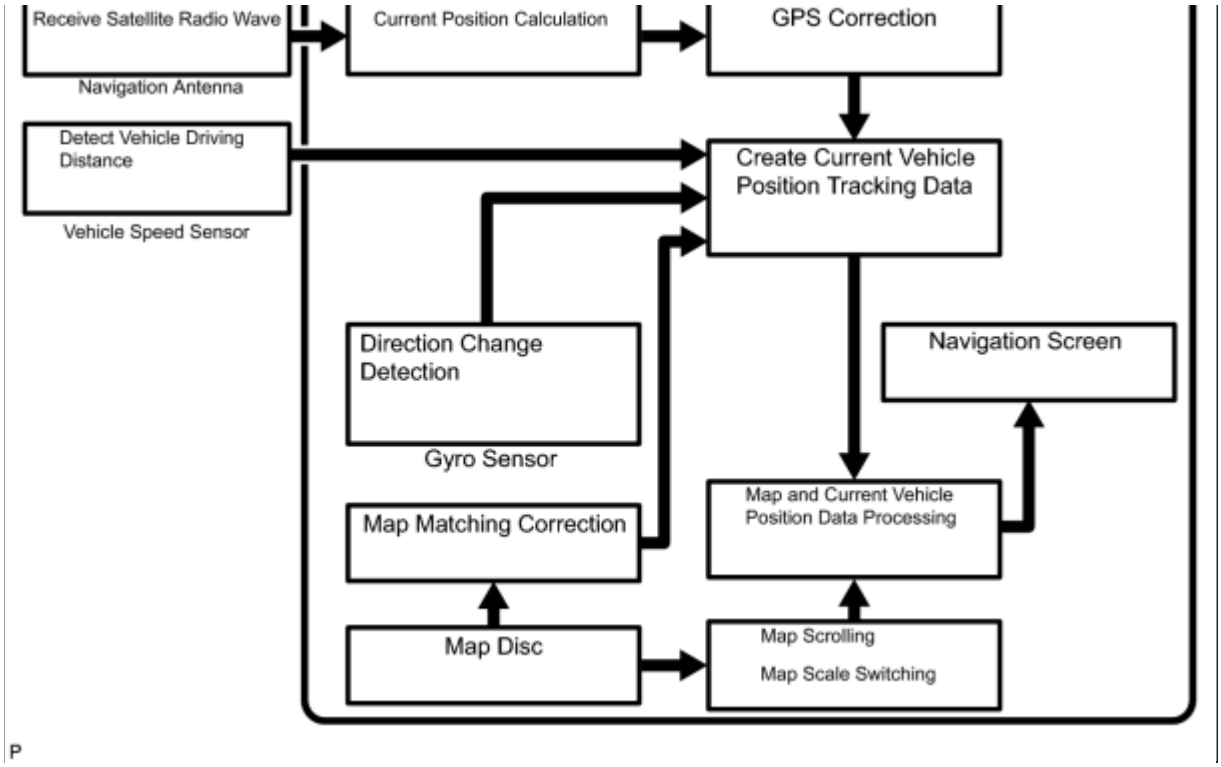

## 2. NAVIGATION SYSTEM OUTLINE

(a) Vehicle position tracking methods

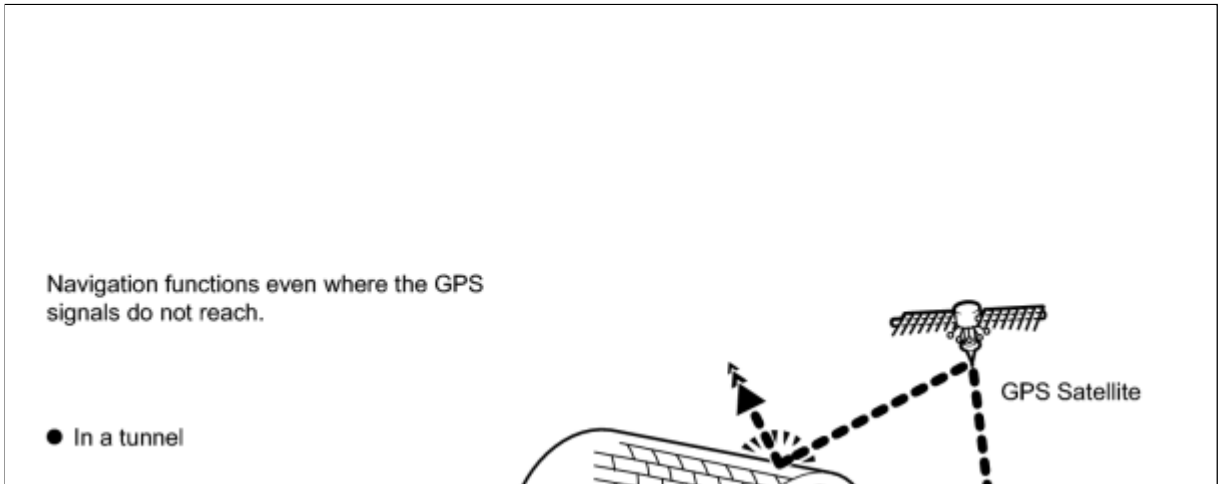
It is essential that the navigation system correctly tracks the current vehicle position and displays it on the map. There are 2 methods to track the current vehicle position: autonomous (dead reckoning) and GPS* (satellite) navigation. Both navigation methods are used in conjunction with each other.

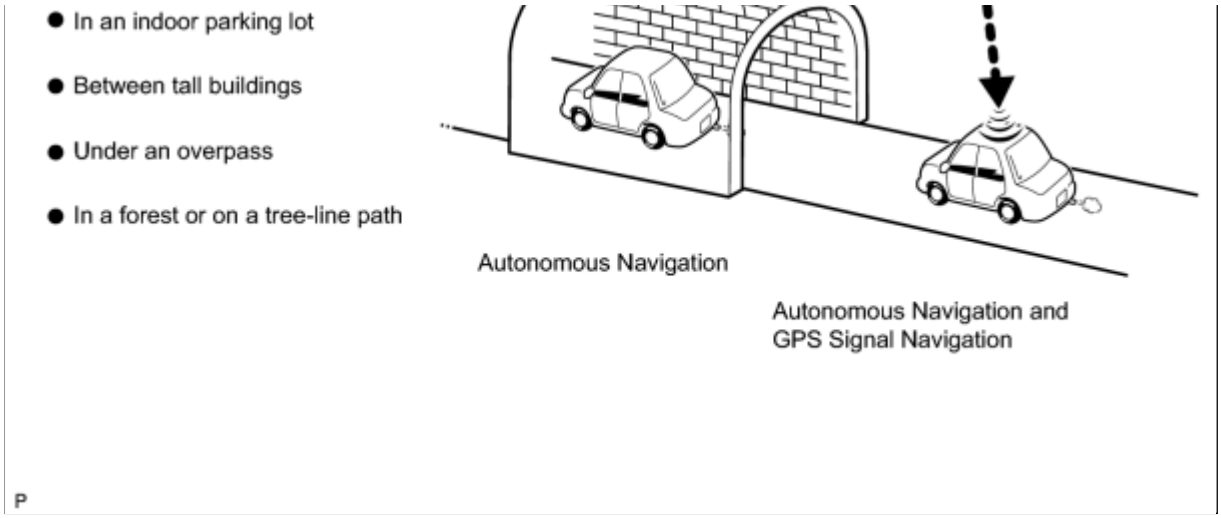
*GPS (Global Positioning System)






| OPERATION | DESCRIPTION |
|---|---|
| Vehicle Position Calculation | The navigation receiver assembly calculates the current vehicle position (direction and current position) using the direction deviation signal from the gyro sensor and running distance signal from the vehicle speed sensor and creates the driving route. |
| Map Display Processing | The navigation receiver assembly processes the vehicle position data, vehicle running track and map data from the map disc. |
| Map Matching | The map data from the map disc is compared to the vehicle position and running track data. Then, the vehicle position is matched with the nearest road. |
| GPS Correction | The vehicle position is matched to the position measured by GPS. Then, the GPS measurement position data is compared with the vehicle position and running track data. If the position is very different, the GPS measurement position is used. |
| Distance Correction | The running distance signal from the vehicle speed sensor includes the error caused by tire wear and slippage between the tires and road surface. Distance correction is performed to account for this. The navigation receiver assembly automatically offsets the running distance signal to make up for the difference between it and the distance data of the map. The offset is automatically updated. |






**HINT:**

**The combination of autonomous and GPS navigation makes it possible to display the vehicle position even when the vehicle is in places where the GPS cannot receive a signal. When only autonomous navigation is used, however, the mapping accuracy may slightly decrease.**

(b) Autonomous navigation

This method determines the relative vehicle position based on the running track determined by the gyro located in the navigation receiver assembly and the vehicle speed sensor signal.

(1) Gyro sensor

Used to calculate the direction by detecting angular velocity. It is located in the navigation receiver assembly.

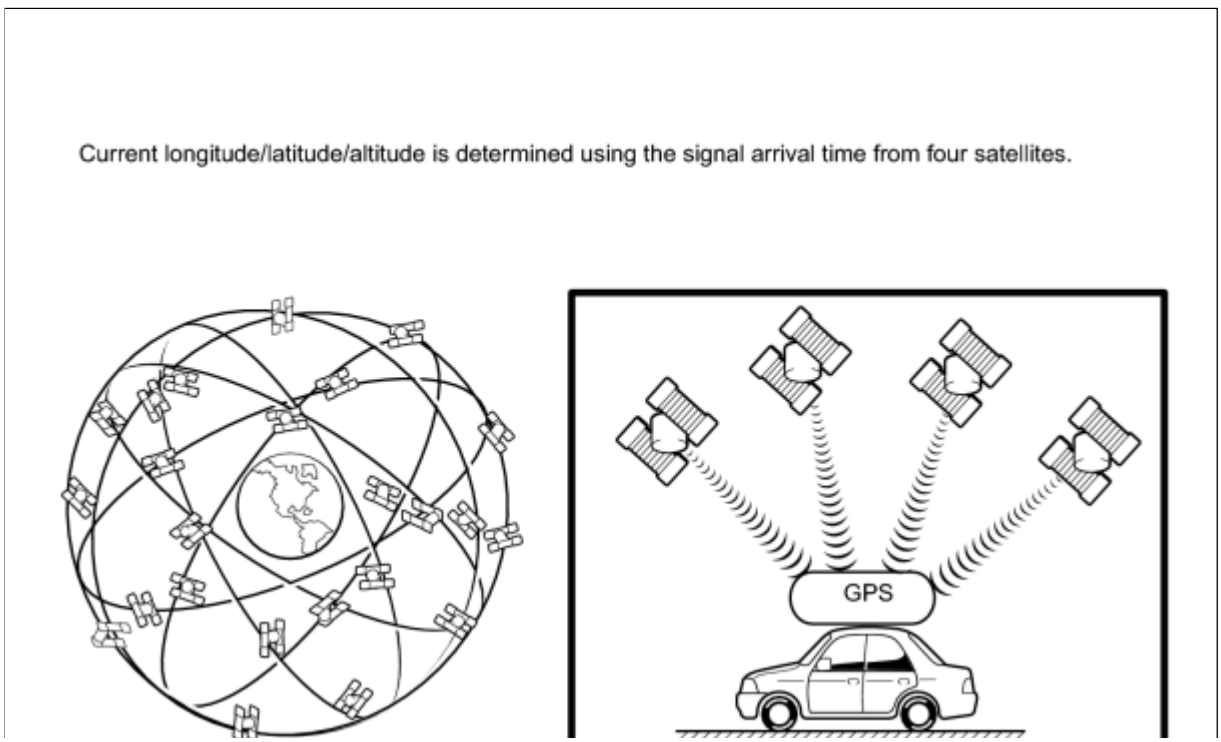
(2) Vehicle speed sensor signal

Used to calculate the vehicle running distance.

(c) GPS* navigation (Satellite navigation)

This method detects the absolute vehicle position using radio waves from GPS satellites.

*GPS satellites were launched by the U.S. Department of Defense for military purposes.

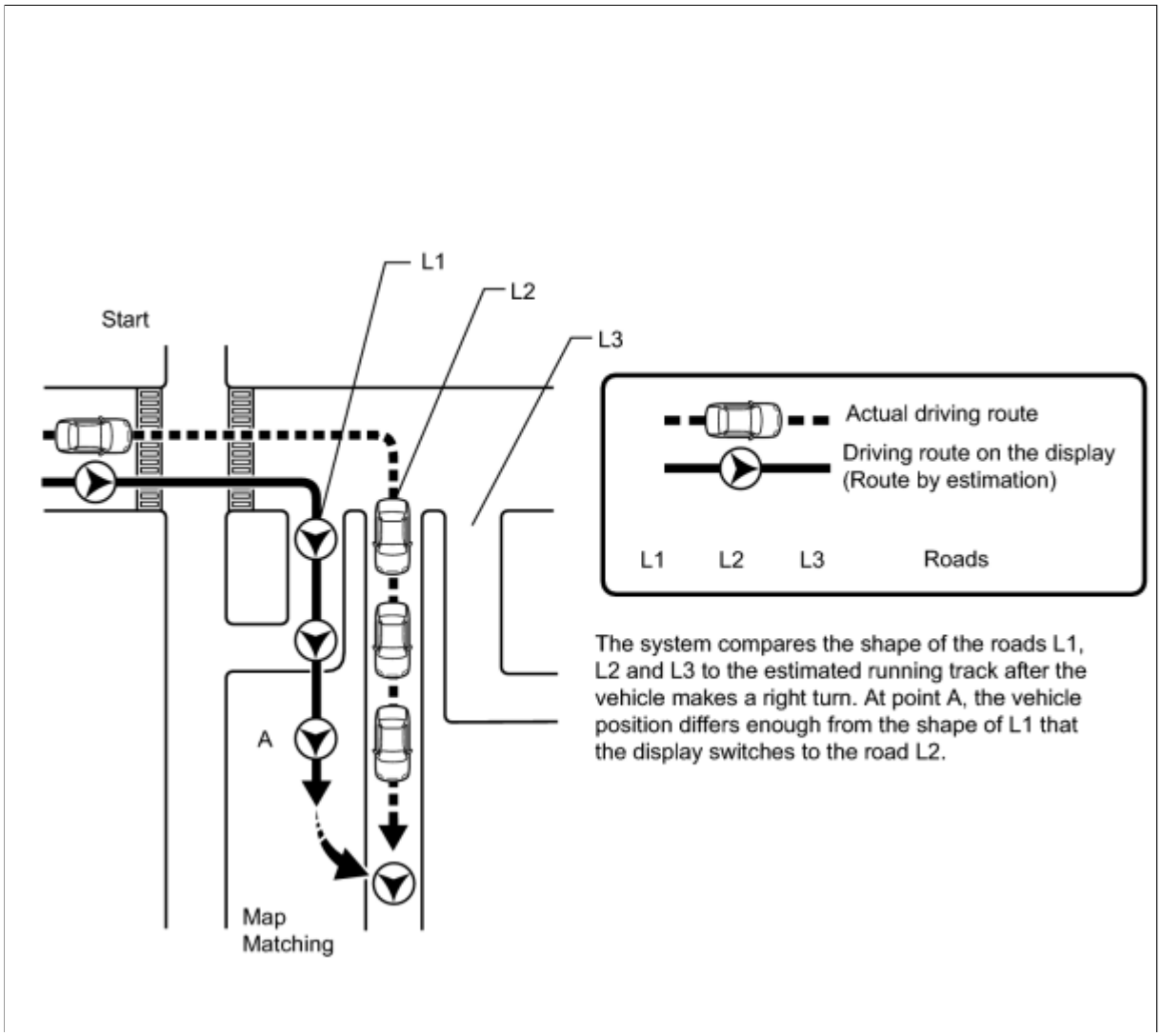




| NUMBER OF SATELLITES | MEASUREMENT | DESCRIPTION |
|---|---|---|
| 2 or less | Measurement is impossible | Vehicle position cannot be obtained because the number of satellites is not enough. |
| 3 | 2-dimensional measurement is possible | Vehicle position is obtained based on the current longitude and latitude. (This is less precise than 3-dimensional measurement.) |
| 4 | 3-dimensional measurement is possible | Vehicle position is obtained based on the current longitude, latitude and altitude. |

(d) Map matching

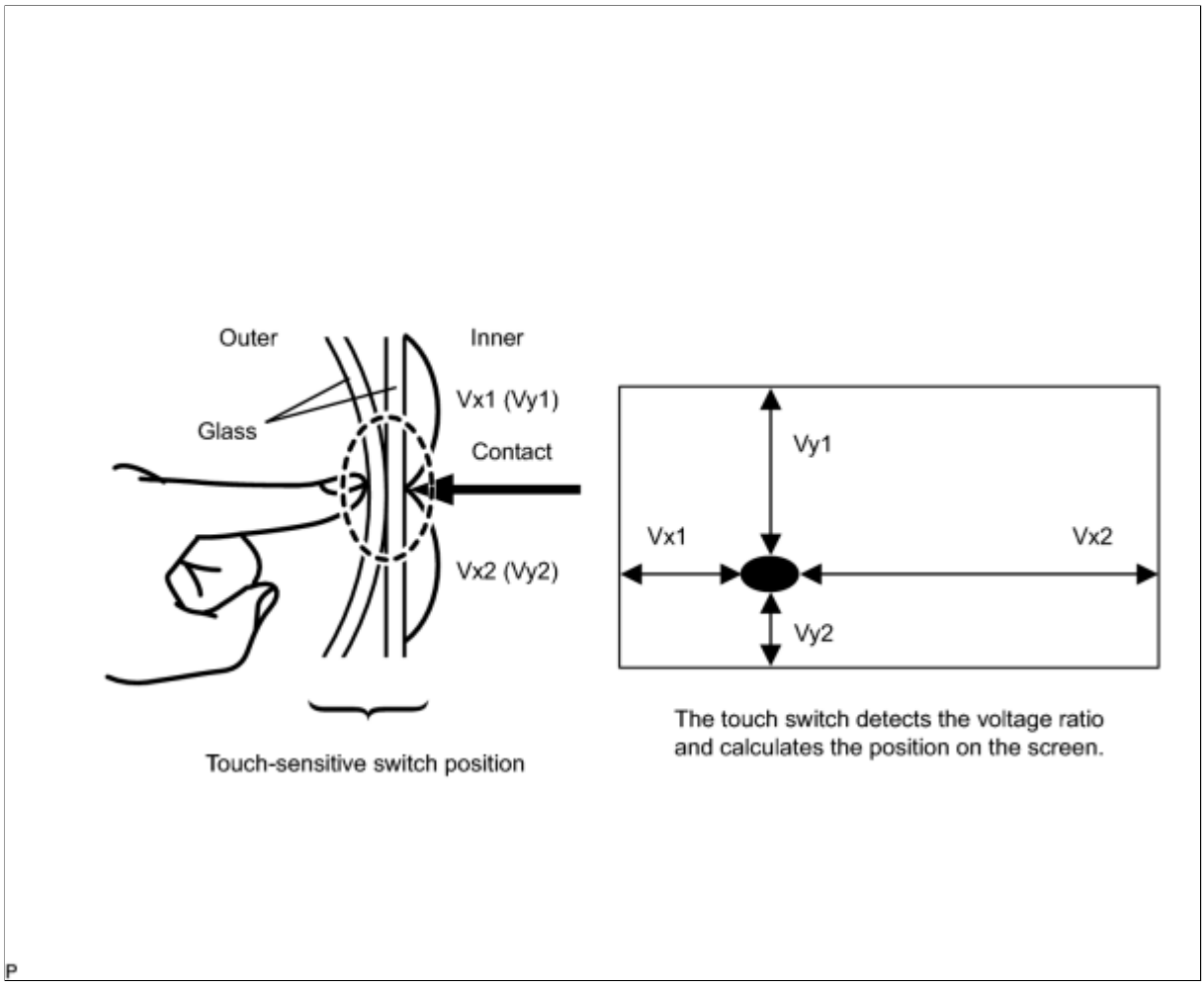
The current driving route is calculated by autonomous navigation (according to the gyro sensor and vehicle speed sensor) and GPS navigation. This information is then compared with possible road shapes from the map data in the map disc and the vehicle position is set onto the most appropriate road.



P

(e) Touch switch

Touch switches are touch-sensitive (interactive) switches operated by touching the screen. When a switch is pressed, the outer glass bends in to contact the inner glass at the pressed position. By doing this, the voltage ratio is measured and the pressed position is detected.




P

### 3. DVD (DIGITAL VERSATILE DISC) PLAYER OUTLINE (for navigation map)

(a) The navigation receiver assembly (built-in navigation ECU) uses a laser pickup to read the digital signals recorded on a DVD.

**CAUTION:**

**Do not look directly at the laser pickup because the navigation receiver assembly (built-in navigation ECU) uses an invisible laser beam.**

**Be sure to operate the navigation system only as instructed.**

**NOTICE:**

- Do not disassemble any part of the navigation receiver assembly (built-in navigation ECU).
- Do not apply oil to the navigation receiver assembly (built-in navigation ECU).
- Do not insert anything but a DVD into the navigation receiver assembly (built-in navigation ECU).

## 4. DVD (Digital Versatile Disc) PLAYER OUTLINE (for DVD Player Model)

(a) The DVD player can only play DVD videos that have any of the following marks:




(1) Precaution for use of discs

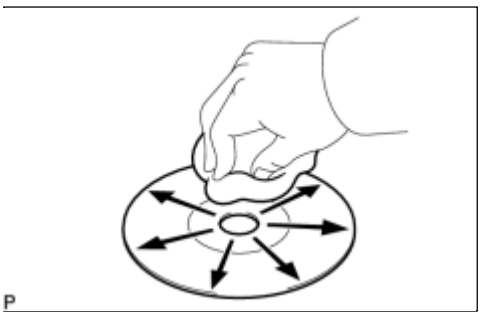
**NOTICE:**

- PAL or SECAM color television standard discs cannot be played (only NTSC discs can be played).
- Keep the discs away from dirt. Be careful not to damage the discs or leave fingerprints on them.
- Hold discs by the outer edge and center hole with the label side up.
- Leaving the disc exposed halfway out of the slot for a long time after pressing the disc eject button may cause deformation of the disc, making the disc unusable.
- Do not use odd-shaped CDs because these may cause player malfunctions.
- Do not use discs whose recording portion is transparent or translucent because they may not be inserted, ejected or played normally.
- DualDiscs that mate DVD recorded material on one side with CD digital audio material on the other cannot be played.

(b) Cleaning

**NOTICE:**

**Do not use a lens cleaner because it may cause a malfunction in the pickup portion of the player.**




(1) If dirt is on the disc surface, wipe it clean with a soft dry cloth such as an eyeglass cleaner for plastic lenses from the inside to the outside in a radial direction.

- Pressing on the disc by hand or rubbing the disc with a hard cloth may scratch the disc surface.
- Use of solvent such as a record spray, antistatic agent, alcohol, benzine and thinner or a chemical cloth may cause damage to the disc, making the disc unusable.

## 5. CD (COMPACT DISC) PLAYER OUTLINE

(a) A compact disc player uses a laser pickup to read digital signals recorded on a compact disc (CD). By converting the digital signals to analog, it can play music and audio.

**CAUTION:**

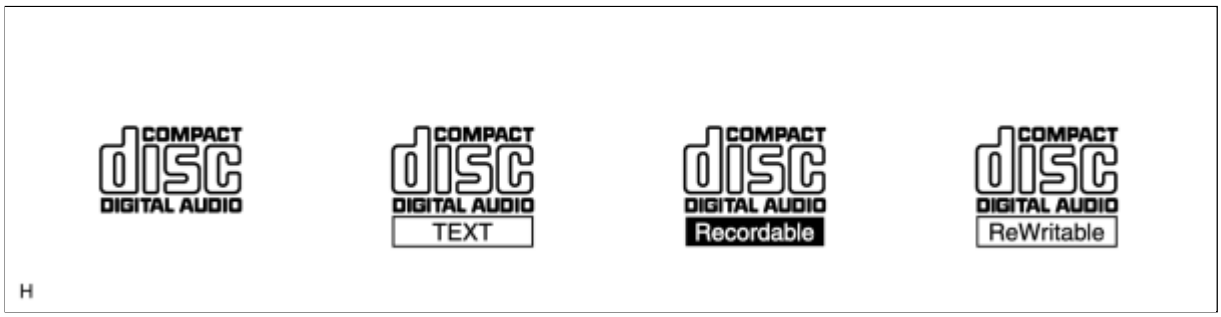
**Do not look directly at the laser pickup because the CD player uses an invisible laser beam. Be sure to operate the player only as instructed.**

**NOTICE:**

- Do not disassemble any part of the CD player.
- Do not apply oil to the CD player.
- Do not insert anything but a CD into the CD player.

(b) Usable discs

(1) This player can play only audio CDs, CD-Rs (CD-Recordable) and CD-RWs (CD-ReWritable) that have any of the following marks:




(c) Precautions for use of discs

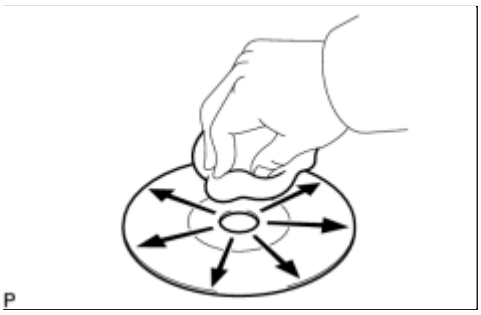
**NOTICE:**

- Copy-protected CDs cannot be played.
- CD-Rs and CD-RWs may not be played depending on the recording conditions or characteristics of the discs, or due to damage, dirt or deterioration caused by leaving the discs in the cabin for a long time.
- Unfinalized CD-Rs and CD-RWs cannot be played.
- DualDiscs that mate DVD recorded material on one side with CD digital audio material on the other cannot be played.
- Keep the discs away from dirt. Be careful not to damage the discs or leave your fingerprints on them.
- Hold discs by the outer edge and center hole with the label side up.
- Leaving the disc exposed halfway out of the slot for a long time after pressing the disc eject button may cause deformation of the disc, making the disc unusable.
- If discs have adhesive tape, stickers, CD labels or any traces of such labels attached, the discs may not be ejected or player malfunctions may result.
- Keep the discs away from direct sunlight. (Exposure to direct sunlight may cause deformation of the disc, making the disc unusable.)
- Do not use odd-shaped CDs because these may cause player malfunctions.
- Do not use discs whose recording portion is transparent or translucent because they may not be inserted, ejected or played normally.

**HINT:**

- When it is cold or it is raining, if the windows mist up, mist and condensation may form in the player. In such cases, the CD may skip or stop in the middle of play. Ventilate or dehumidify the cabin for a while before using the player.
- The CD may skip if the player experiences strong vibrations when the vehicle is driven on rough roads or similar uneven surface(s).

(d) Cleaning




**NOTICE:**

**Do not use a lens cleaner because it may cause a malfunction in the pickup portion of the player.**

(1) If dirt is on the disc surface, wipe it clean with a soft dry cloth such as an eyeglass cleaner for plastic lenses from the inside to the outside in a radial direction.

- Pressing on the disc by hand or rubbing the disc with a hard cloth may scratch the disc surface.
- Use of solvent such as a record spray, antistatic agent, alcohol, benzine and thinner or a chemical cloth may cause damage to the disc, making the disc unusable.

### 6. MP3/WMA OUTLINE

(a) Playable MP3 file standards

| | |
|---|---|
| Compatible standard | MP3 (MPEG1 LAYER3, MPEG2 LSF LAYER3) |
| Compatible sampling frequency | • MPEG1 LAYER3: 32, 44.1, 48 (kHz)<br>• MPEG2 LSF LAYER3: 16, 22.05, 24 (kHz) |
| Compatible bit rate | • MPEG1 LAYER3: 64, 80, 96, 112, 128, 160, 192, 224, 256, 320 (kbps)<br>• MPEG2 LSF LAYER3: 64, 80, 96, 112, 128, 144, 160 (kbps)<br>• Compatible with VBR |
| Compatible channel mode | Stereo, joint stereo, dual channel, monaural |

(b) Playable WMA file standards

| | |
|---|---|
| Compatible standard | WMA Ver. 7, 8, and 9 |
| Compatible sampling frequency | 32, 44.1, 48 (kHz) |
| Compatible bit rate (Only compatible with 2-channel playback) | • Ver. 7, 8: CBR48, 64, 80, 96, 128, 160, 192 (kbps)<br>• Ver. 9: CBR48, 64, 80, 96, 128, 160, 192, 256, 320 (kbps) |

(c) ID3 tag and WMA tag

(1) Additional textual information called ID3 tag can be input to MP3 files. Information such as song titles and artist names can be stored.

**HINT:**

**This player is compatible with the ID3 tags of ID3 Ver. 1.0 and 1.1, and ID3 Ver. 2.2 and 2.3. (Number of characters complies with ID3 Ver. 1.0 and 1.1.)**

(2) Additional textual information called WMA tag can be input to WMA files. Information such as song titles and artist names can be stored.

(d) Usable media

(1) Only CD-ROMs, CD-Rs (CD-Recordable) and CD-RWs (CD-ReWritable) can be used to play MP3/WMA files.

**NOTICE:**

- CD-Rs and CD-RWs are more easily affected by a hot and humid environment than discs used for normal audio CDs. For this reason, some CD-Rs and CD-RWs do not play.
- If there are fingerprints or scratches on a disc, the disc may not play or the CD may skip.
- Some CD-Rs and CD-RWs may deteriorate if they are left in the cabin for a long time.
- Keep CD-Rs and CD-RWs in an opaque case.

(e) Usable media format

(1) Usable media format

| | |
|---|---|
| Disc format | CD-ROM Mode 1, CD-ROM XA Mode 2 Form 1 |
| File format | ISO9660 Level 1 and Level 2 (Joliet, Romeo) |

**HINT:**

- As for MP3/WMA files written in any unlisted format, the contents of the files may not be played normally or the file names or folder names may not be displayed correctly.
- This player is compatible with multi-session discs and can play CD-Rs and CD-RWs on which MP3/WMA files are added. However, only the first session can be played.
- Discs whose first session includes both music data and MP3 or WMA format data cannot be played.

(2) Standard and restrictions

| | |
|---|---|
| Maximum directory levels | 8 levels |
| Maximum number of characters for a folder name/file name | 32 characters |
| Maximum number of folders | 192 (Including empty folders, route folders, and folders that do not contain MP3/WMA files) |
| Maximum number of files in a disc | 255 (Including non-MP3/WMA files) |

(f) File names

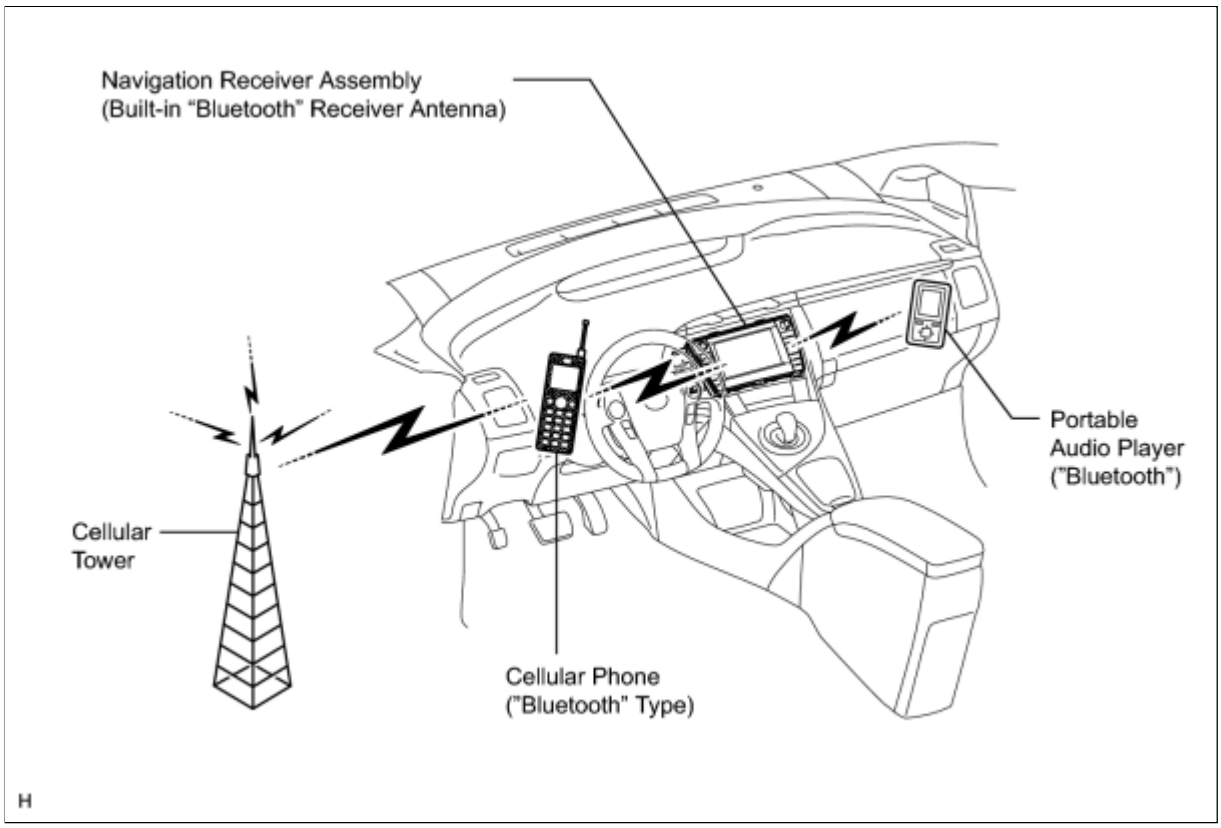
(1) Only files with an extension of ".mp3" or ".wma" can be recognized and played as MP3 or WMA files.

(2) Save MP3 or WMA files with an extension of ".mp3" or ".wma".

**NOTICE:**

**If saving non-MP3 or non-WMA files with an extension of ".mp3" or ".wma", those files are wrongly recognized as MP3 or WMA files and played. A loud noise may occur and damage to the speaker may result.**

### 7. "Bluetooth" OUTLINE




(a) "Bluetooth" is a trademark owned by Bluetooth SIG. Inc.

(b) "Bluetooth" is a wireless connection technology that uses the 2.4 GHz frequency band.

**HINT:**

**The communication performance of "Bluetooth" may vary depending on obstructions or radio wave conditions between communication devices, electromagnetic radiation, communication device sensitivity or antenna capacity.**

(c) Hands-free function

(1) The "Bluetooth" built-in navigation receiver assembly and a "Bluetooth" compatible cellular phone*1 can be connected using a "Bluetooth" wireless connection. This enables use of the hands-free function on the cellular phone even the phone may be in a pocket or bag. For this reason, it is not necessary to use a connector or cable to connect the cellular phone.

*1: Some versions of "Bluetooth" compatible cellular phones may not function.

(d) "Bluetooth" audio function (w/ "Bluetooth" Audio System)

(1) The "Bluetooth" built-in navigation receiver assembly and a "Bluetooth" compatible portable audio player*2 can be connected using a "Bluetooth" wireless connection. This enables files stored in the portable audio player to be heard from the vehicle speakers. In addition, operations such as play/stop can be performed directly from the navigation receiver assembly.

*2: Some versions of "Bluetooth" compatible audio players may not be able to operate the "Bluetooth" function, or music may play, but functions available using the navigation receiver assembly may be limited.

(2) Available "Bluetooth" audio devices

| | |
|---|---|
| Required "Bluetooth" specifications | Ver. 1.1 or higher (Recommended: Ver. 2.0+EDR or higher) |
| Compatible profiles | • A2DP (Advanced Audio Distribution Profile) Ver. 1.0 or higher<br>• AVRCP (Audio/Video Remote Control Profile) Ver. 1.0 or higher (Recommended: Ver. 1.3 or higher) |
| Maximum number of audio devices that can be registered | 2 |

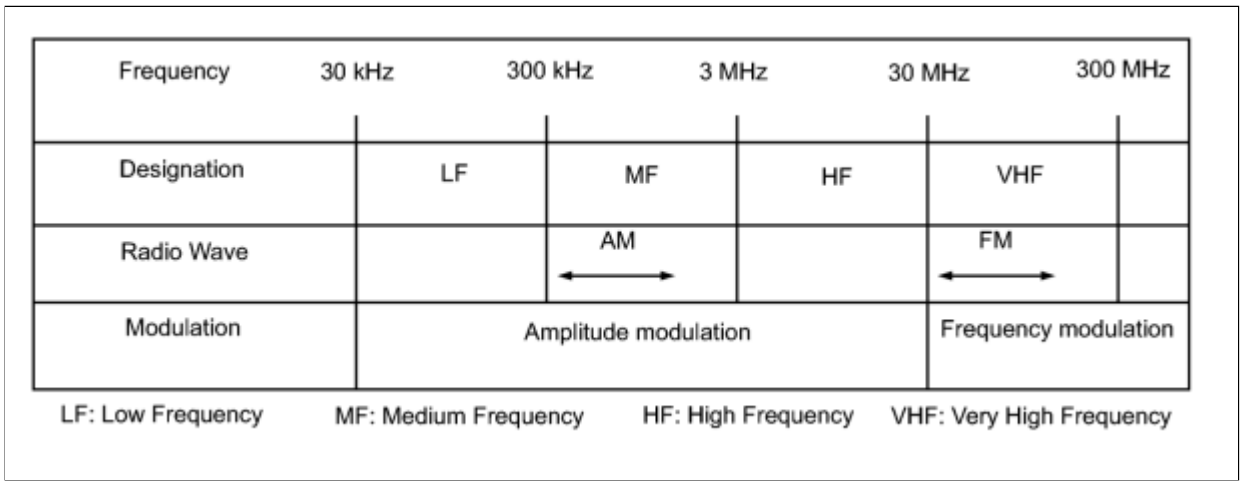
**HINT:**

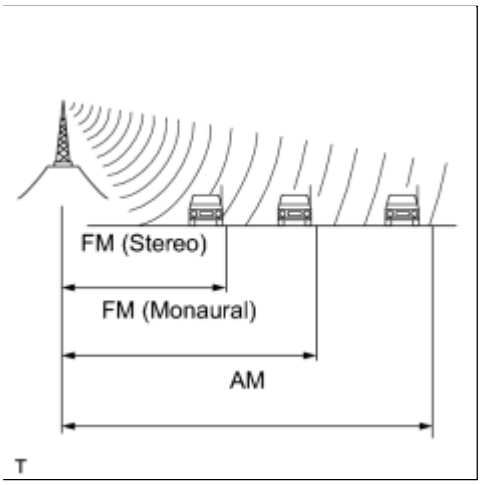
**The amount of remaining battery charge displayed on the navigation receiver assembly may be different from that of the portable player.**

## 8. RADIO DESCRIPTION

(a) Radio frequency band

(1) Radio broadcasts use the radio frequency bands shown in the table below.





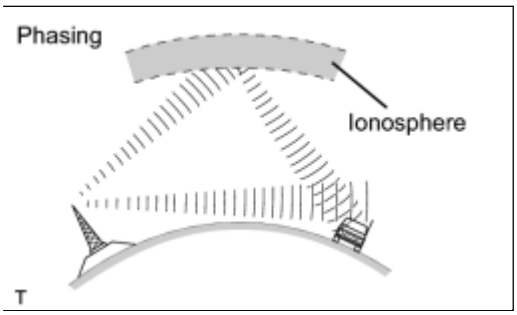

(b) Service area

(1) The service areas of AM and FM broadcasts are vastly different. Sometimes an AM broadcast can be received very clearly but an FM stereo cannot. FM stereo has the smallest service area, and is prone to pick up static and other types of interference such as noise.

(c) Radio reception problems

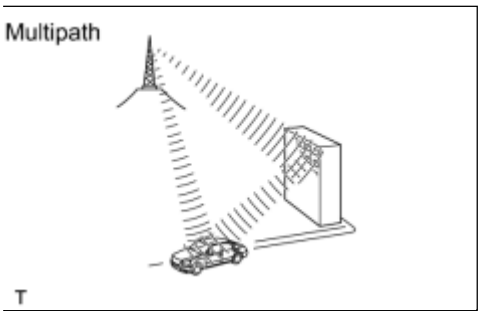
**HINT:**

**In addition to static, other problems such as "phasing", "multipath" and "fade out" exist. These problems are not caused by electrical noise, but by the radio signal propagation method itself.**



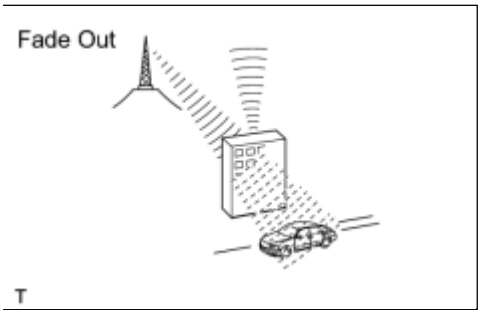

(1) Phasing

AM broadcasts are susceptible to electrical interference and another kind of interference called phasing. Occurring only at night, phasing is the interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off the ionosphere and the other signal is received directly from the transmitter.




(2) Multipath

Multipath is a type of interference created when a vehicle receives 2 radio wave signals from the same transmitter. One signal is reflected off buildings or mountains and the other signal is received directly from the transmitter.




(3) Fade out

Fade out is caused by objects (buildings, mountains and other such large obstacles) that deflect away part of a signal, resulting in a weaker signal when the object is between the transmitter and vehicle. High frequency radio waves, such as FM broadcasts, are easily deflected by obstructions. Low frequency radio waves, such as AM broadcasts, are less likely to deflect.

(d) Noise problem

Technicians must have a clear understanding about each customer's noise complaint. Use the following table to diagnose noise problems.

| RADIO FREQUENCY | NOISE OCCURRENCE CONDITION | PRESUMABLE CAUSE |
|---|---|---|
| AM | Noise occurs in a specified area | Foreign noise |
| AM | Noise occurs when listening to an intermittent broadcast | An identical program transmitted from multiple towers can cause noise where the signals overlap |
| AM | Noise occurs only at night | Signal phasing |
| FM | Noise occurs while driving in a specified area | Multipath noise resulting from a change in FM frequency |

## 9. RBDS FUNCTION OUTLINE (BROADCAST IN NORTH AMERICA ONLY)

The Radio Broadcast Data System (RBDS) is broadcast through conventional FM radio broadcasts. Information such as song names, traffic information, broadcast station names, etc. can be received.

## 10. SDARS SYSTEM FUNCTION OUTLINE (BROADCAST IN NORTH AMERICA ONLY)

Satellite Digital Audio Radio Service (SDARS) is a satellite digital radio broadcast provided by Sirius XM Radio Inc. The broadcast (pay-type) is performed through satellites and terrestrial repeater networks. Several unique channels are available, and even if a vehicle changes locations, the same information can be received without breaks. Information such as song names, broadcast station names, etc. can be received. Also, traffic information can be received and displayed on the navigation screen.

**NOTICE:**

**To receive an audio-visual pay-type broadcasts, the customer must enter into a pay-type contract with XM Satellite Radio Inc. After entering into a contract, registration of the XM Radio ID is required. Also, if parts are replaced, the XM Radio ID must be re-registered.**

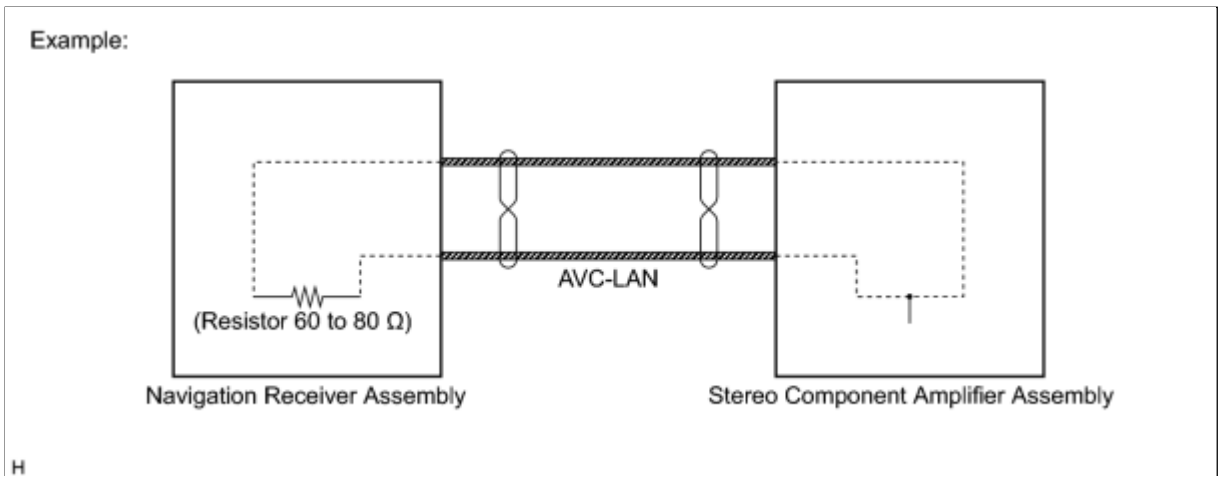
## 11. AUTOMATIC SOUND LEVELIZER (ASL) FUNCTION OUTLINE

(a) The Automatic Sound Levelizer (ASL) function automatically adjusts the sound volume in order to enable clear audio quality even when vehicle noise increases (as vehicle noise increases, the volume is turned up, etc.).

Vehicle speed signals are received from the combination meter assembly and used for the ASL control.

## 12. COMMUNICATION SYSTEM

(a) AVC-LAN Outline



(1) Components of the navigation system communicate with each other via the AVC-LAN.

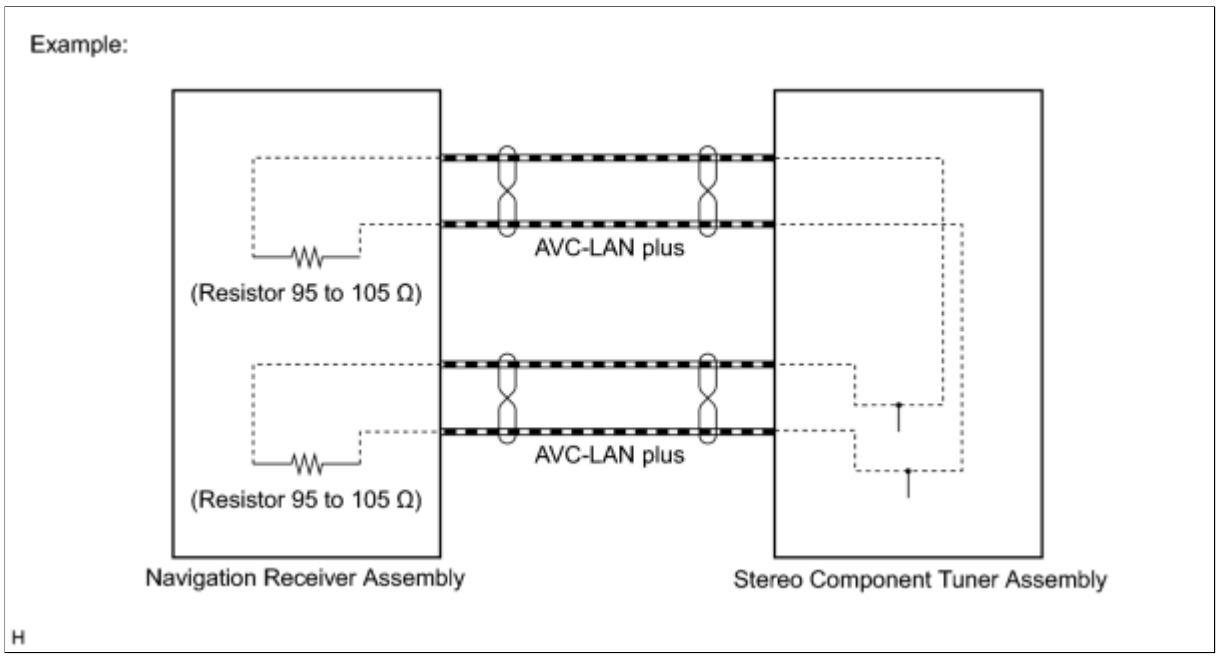
(2) The AVC-LAN uses a twisted pair of wires for its communication lines.

(3) The master unit of the AVC-LAN is the navigation receiver assembly.

**HINT:**

- The navigation receiver assembly has enough resistance (60 to 80 Ω) necessary for communication.
- If a short or open circuit occurs in the AVC-LAN circuit, communication is interrupted and system will not operate normally.

(b) AVC-LAN plus Outline




(1) Navigation system components communicate with each other via the AVC-LAN plus.

(2) The AVC-LAN plus uses two twisted pairs of cables for its communication lines.

(3) The master unit of the AVC-LAN plus is the navigation receiver assembly.

**HINT:**

- The navigation receiver assembly has enough resistance (95 to 105 Ω) necessary for communication.
- If a short or open circuit occurs in the AVC-LAN plus circuit, communication will be interrupted and the system will not operate normally.

### 13. DIAGNOSTIC FUNCTION OUTLINE

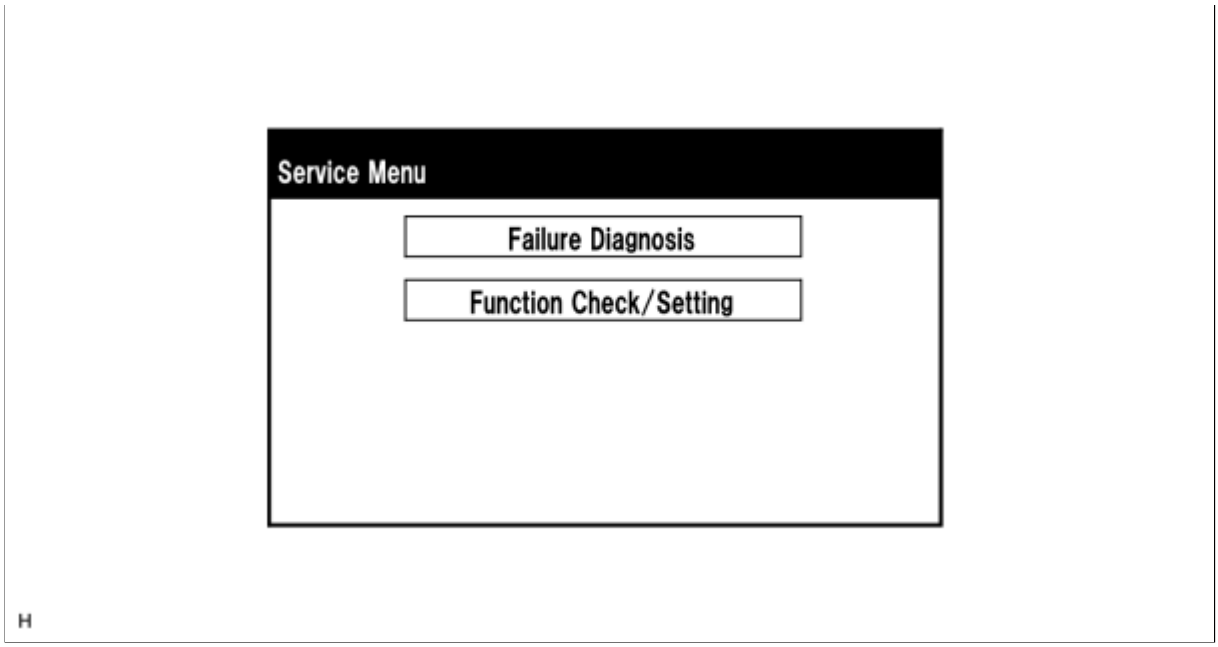
(a) The navigation system has a diagnostic function (the result will be displayed on the master unit or the Techstream).

### 14. DIAGNOSIS DISPLAY DETAILED DESCRIPTION

**HINT:**

- This section contains a detailed description of displays in diagnostic mode.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

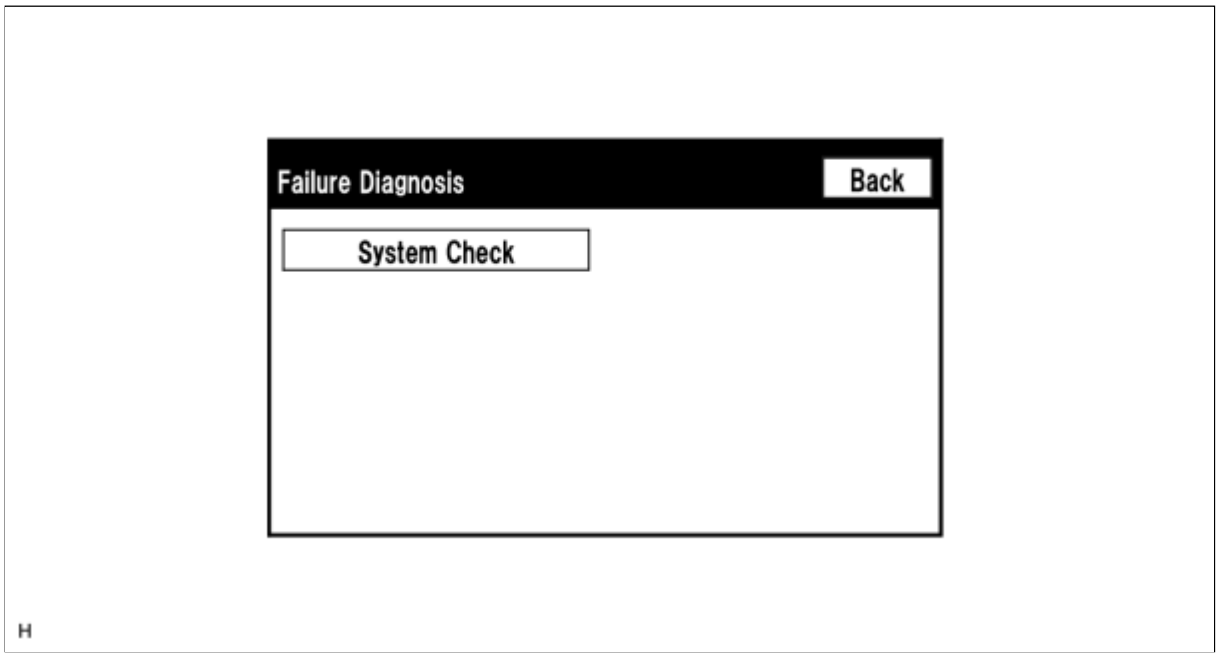
(a) Service Menu Screen




**HINT:**

**Each item is grayed out or not displayed based on the device settings.**

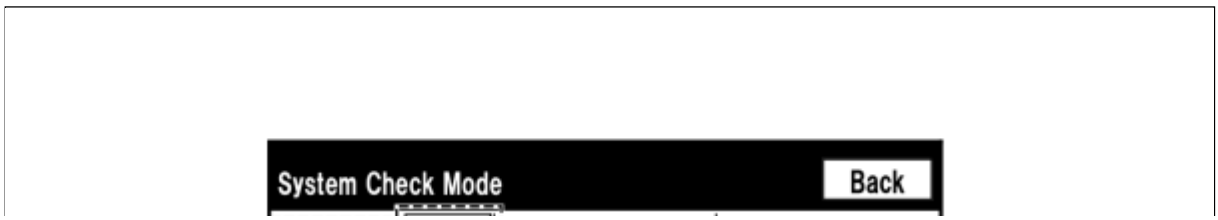
(b) Failure Diagnosis Screen

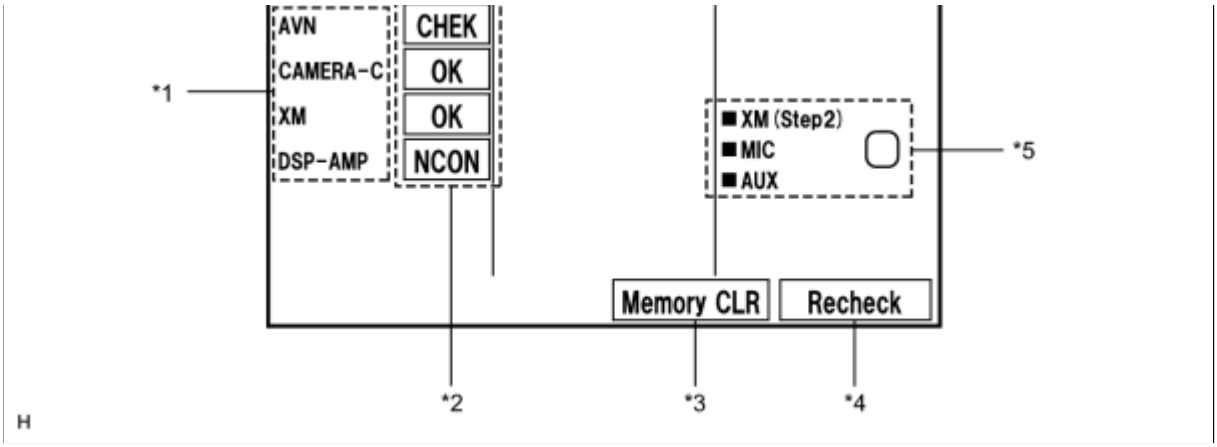



**HINT:**

**Each item is grayed out or not displayed based on the device settings.**

(1) System Check Mode Screen






*1: Device Name List No. 1

**HINT:**

- Device Name List No. 1 displays some of the devices that make up the navigation system.
- The names of the components from Device Name List No. 1 are shown in the following table.

| NAME | COMPONENT | CONNECTION METHOD |
|---|---|---|
| AVN | Navigation receiver assembly | - |
| CAMERA-C | Parking assist ECU | Communication line for AVC-LAN |
| XM | Stereo component tuner assembly | Communication line for AVC-LAN |
| DSP-AMP | Stereo component amplifier assembly | Communication line for AVC-LAN |

*2: Check Result

**HINT:**

**Result codes for all devices are displayed.**

| RESULT | MEANING | ACTION |
|---|---|---|
| OK | The device does not respond with a DTC. | - |
| EXCH | The device responds with a "replace"-type DTC. | Look up the DTC in "Unit Check Mode" and replace the device. |
| CHEK | The device responds with a "check"-type DTC. | Look up the DTC in "Unit Check Mode". |
| NCON | The device was previously present, but does not respond in diagnostic mode. | - Check power supply wire harness of the device.<br>- Check the AVC-LAN of the device. |
| NRES | The device responds in diagnostic mode, but gives no DTC information. | - Check power supply wire harness of the device.<br>- Check the AVC-LAN of the device. |

*3: Memory Clear

**HINT:**

- Present and history DTCs and registered connected device names are cleared.
- Press the "Memory CLR" switch for 3 seconds.

*4: Recheck

**HINT:**

- A system check will be performed again after the memory is cleared.
- The "Recheck" switch will dim during a system check.

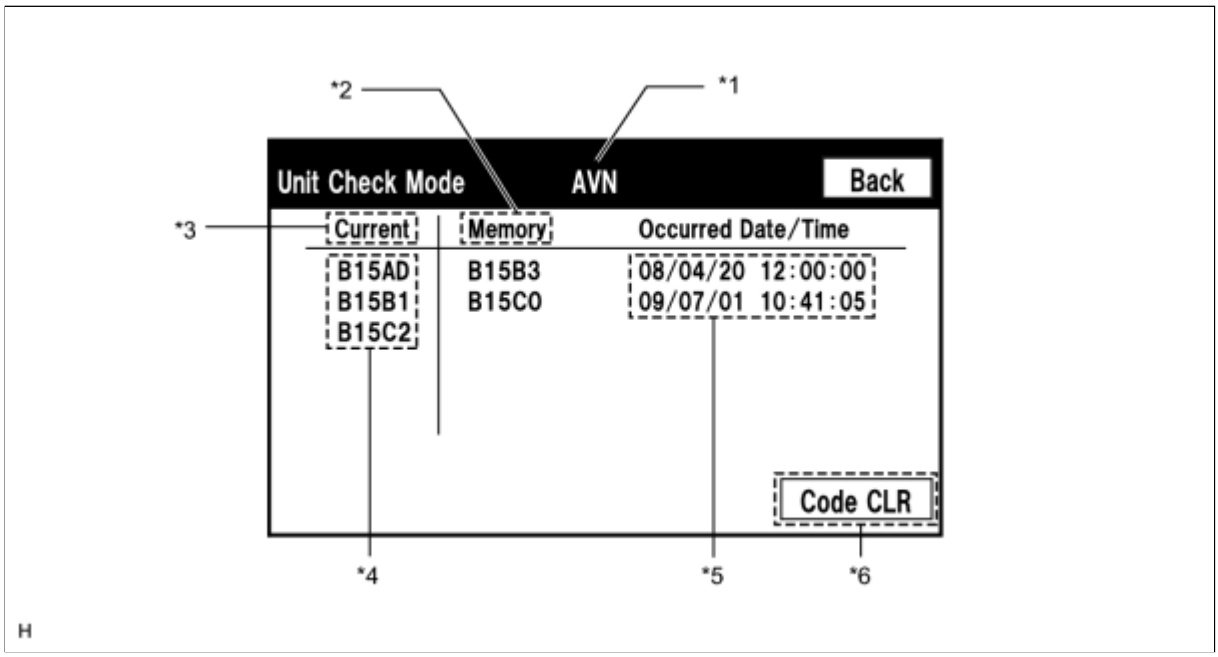
*5: Device Name List No. 2

**HINT:**

- Device Name List No. 2 displays some of the devices that make up the navigation system.
- The names of the components from Device Name List No. 2 are shown in the following table.

| NAME | COMPONENT | CONNECTION METHOD |
|---|---|---|
| XM (Step2) | Stereo component tuner assembly | Communication line for AVC-LAN plus |
| MIC | Telephone microphone assembly | Vehicle wire harness |
| AUX | No. 1 stereo jack adapter assembly | Vehicle wire harness |

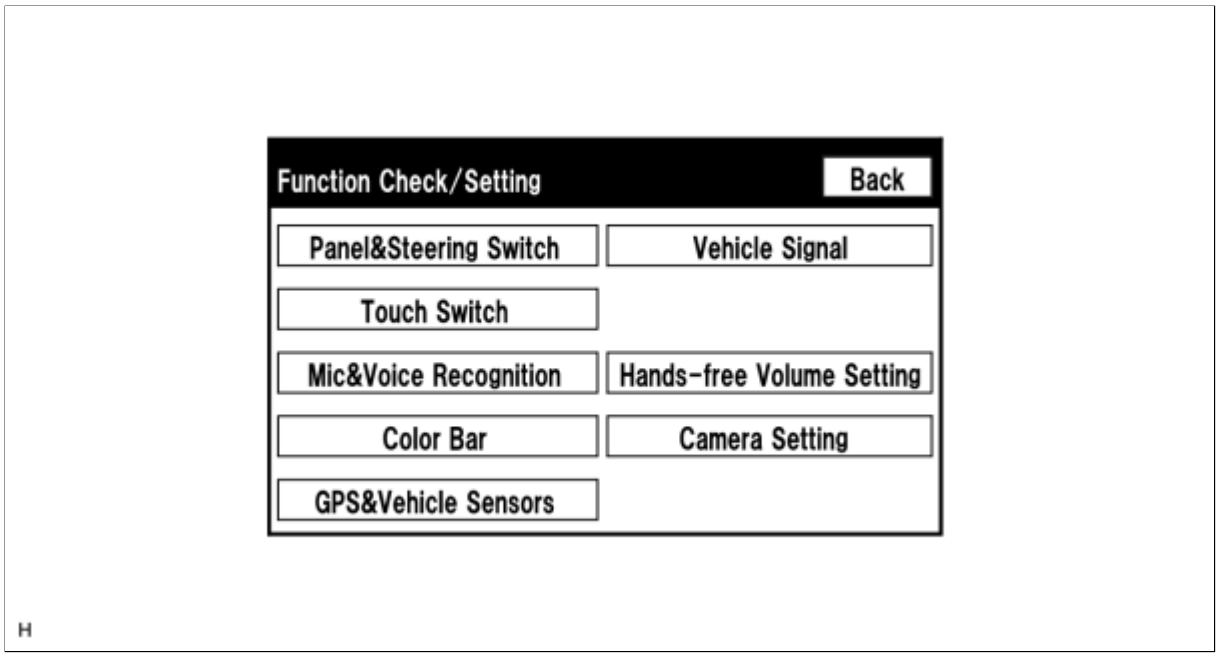
(2) Unit Check Mode Screen




**Screen Description**

| DISPLAY | CONTENT |
|---|---|
| *1: Device name | Target device |
| *2: History DTC | Diagnostic memory results and stored DTCs are displayed. |
| *3: Present DTC | DTCs output in the service check are displayed. |
| *4: DTC | DTC (Diagnostic Trouble Code) |
| *5: Timestamp | The time and date of history DTCs are displayed. (The year is displayed in 2-digit format.) |
| *6: Diagnosis clear switch | Pushing this switch for 3 seconds clears the diagnostic memory data of the target device. (Both response to diagnostic system check result and the displayed data are cleared.) |

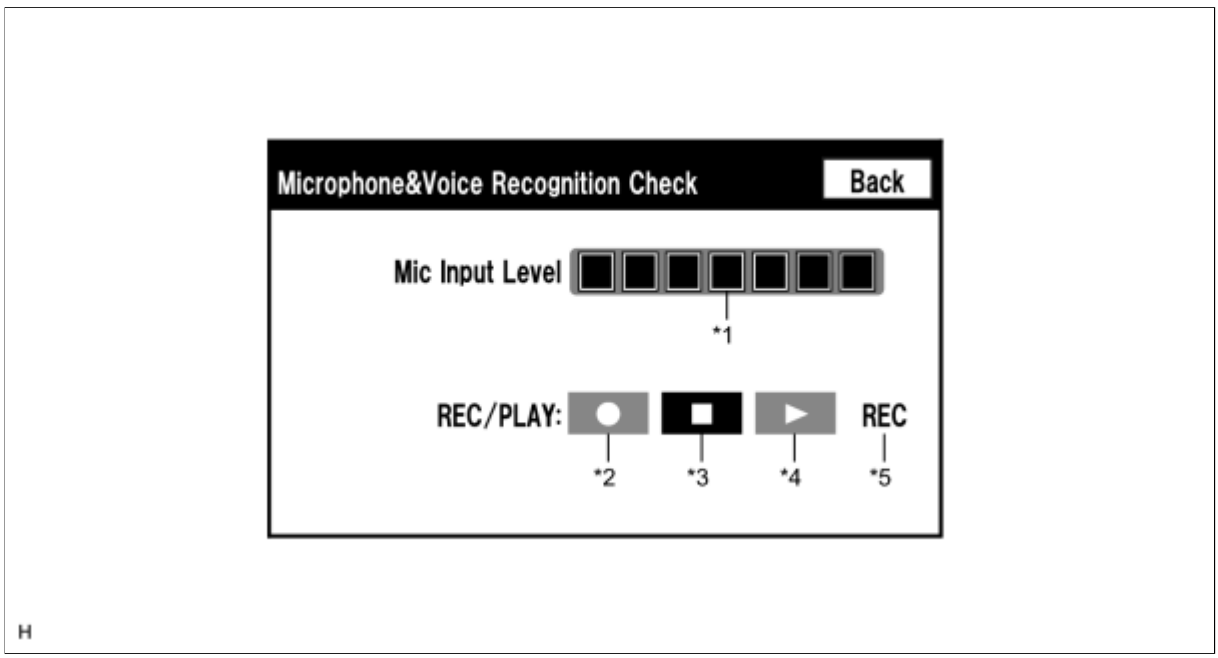
(c) Function Check/Setting Screen




**HINT:**

**Each item is grayed out or not displayed based on the device settings.**

(1) Microphone & Voice Recognition Check Screen




**Screen Description**

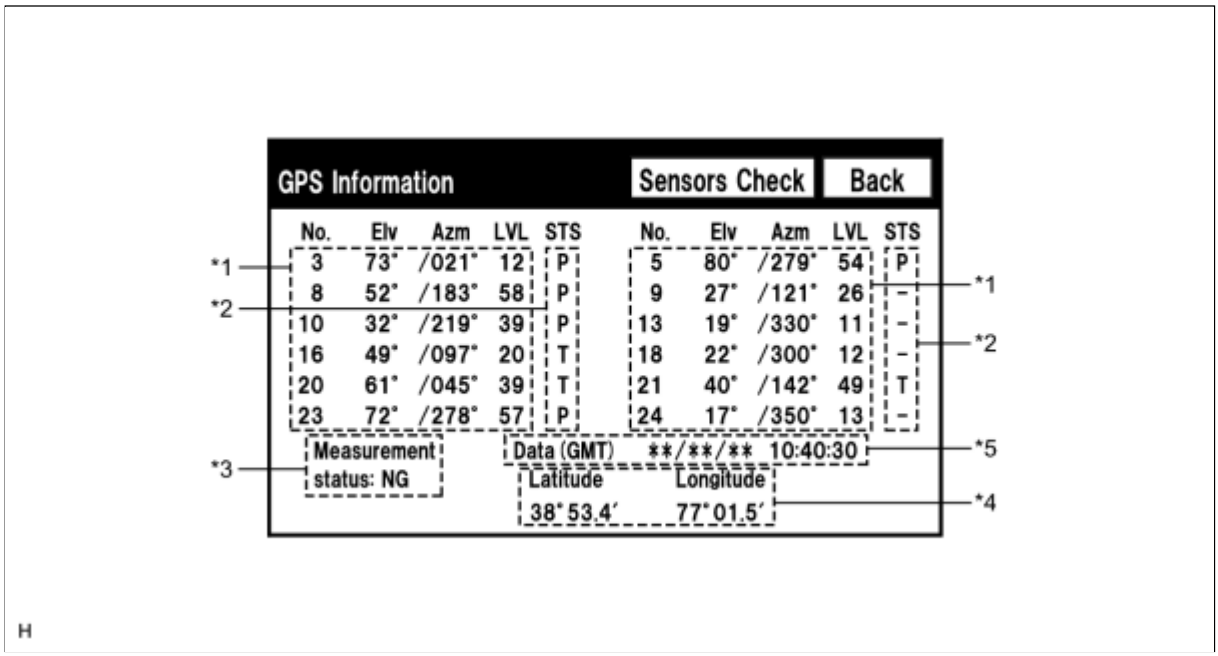
| DISPLAY | CONTENT |
|---|---|
| *1: Microphone input level meter | Monitors the microphone input level every 0.1 sec. and displays the results in 8 different levels. |
| *2: Recording switch | Starts recording. |
| *3: Stop switch | Stops recording and playing. |
| *4: Play switch | Plays the recorded voice. |

| | |
|---|---|
| *5: Recording indicator | Comes on while recording. |

**HINT:**

- The microphone is active at all times when this screen is displayed.
- While recording or playing, the switches other than the stop switch cannot be pushed.
- When no recording is present, the play switch cannot be pushed.
- Recording will stop after 5 seconds or when the stop switch is pushed.

(2) GPS Information Screen




*1: Satellite information

Information from a maximum of 12 satellites is displayed on the screen. This information includes the target GPS satellite number, elevation angle, direction and signal level.

*2: Receiving condition

**Screen Description**

| DISPLAY | CONTENT |
|---|---|
| T | The system is receiving a GPS signal, but is not using it for location. |
| P | The system is using the GPS signal for location. |
| - | The system cannot receive a GPS signal. |

*3: Measurement information

**Screen Description**

| DISPLAY | CONTENT |
|---|---|
| 2D | 2-dimensional location method is being used. |
| 3D | 3-dimensional location method is being used. |
| NG | Location data cannot be used. |
| Error | Reception error has occurred. |

| | |
|---|---|
| - | Any other state. |

*4: Position information

**Screen Description**

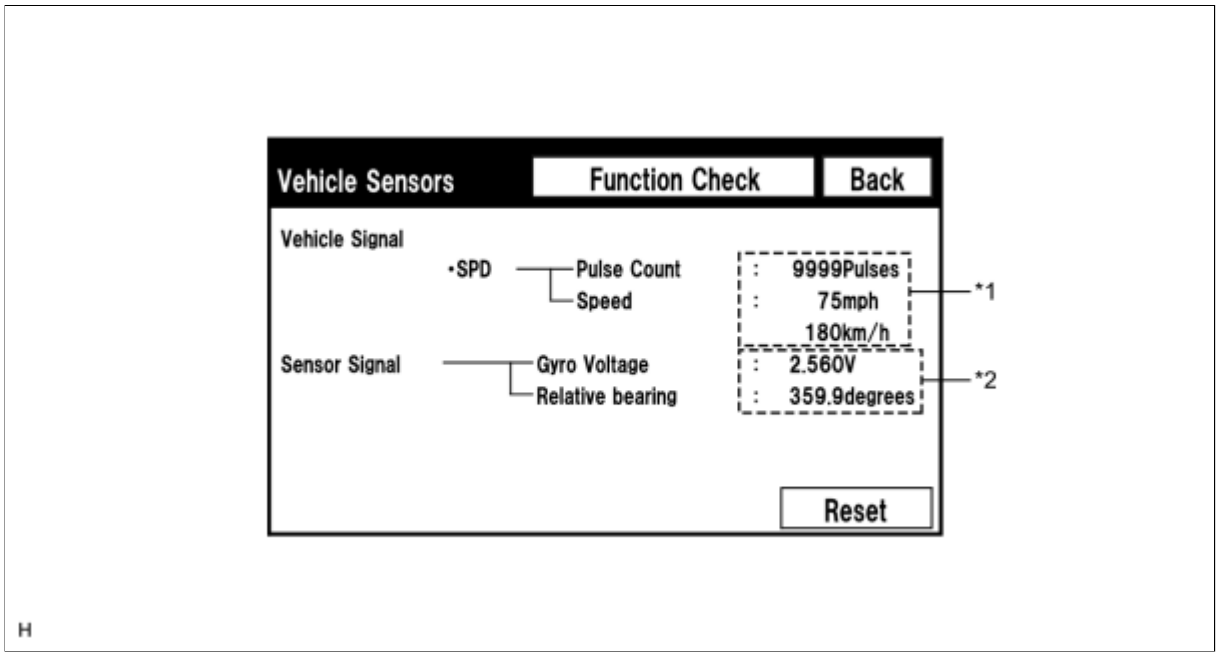
| DISPLAY | CONTENT |
|---|---|
| Position | Latitude and longitude information on the current position is displayed. |

*5: Date information

**Screen Description**

| DISPLAY | CONTENT |
|---|---|
| Date | The date/time information obtained from GPS signal is displayed in Greenwich Mean Time (GMT). |

(3) Vehicle Sensors Screen




**Vehicle Signal**

| DISPLAY | CONTENT |
|---|---|
| *1: SPD | SPD signal condition is displayed. |

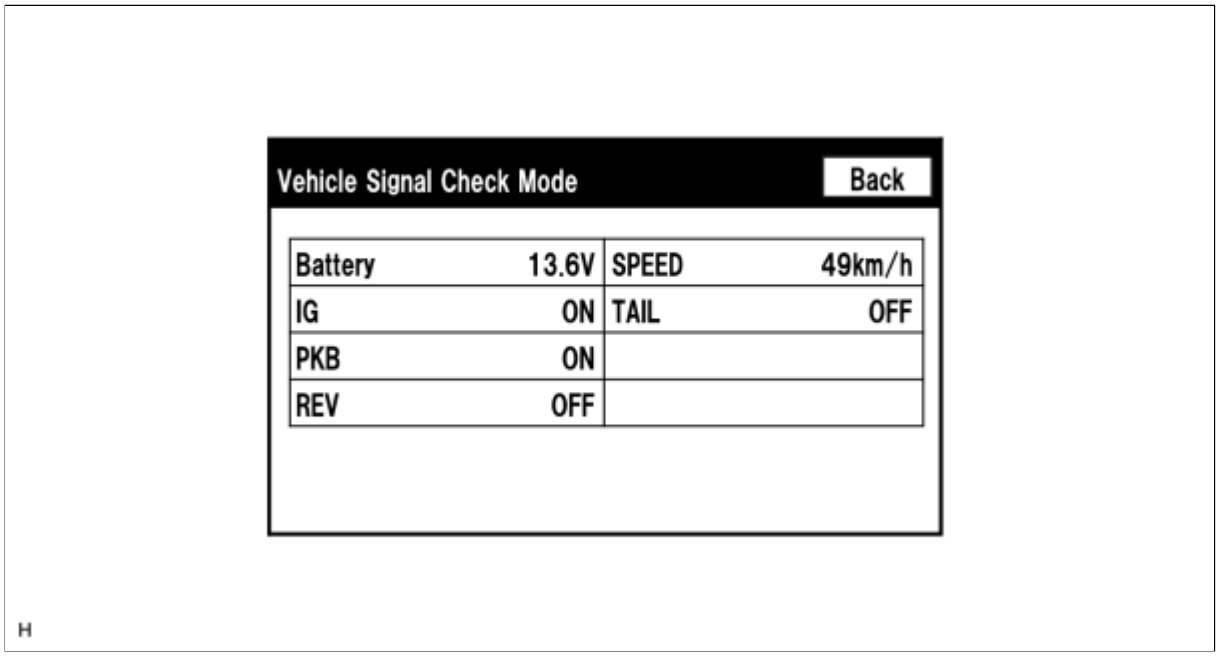
**Sensor Signal**

| DISPLAY | CONTENT |
|---|---|
| *2: Gyro sensor | Gyro sensor output condition is displayed. |

**HINT:**

**Signals are updated once per second only when vehicle sensor signals are changed.**

(4) Vehicle Signal Check Mode Screen




**Screen Description**

| DISPLAY | CONTENT |
|---|---|
| Battery | Battery voltage is displayed. |
| IG | Power switch ON/OFF state is displayed. |
| PKB | Parking brake ON/OFF state is displayed. |
| REV | Reverse signal ON/OFF state is displayed. |
| SPEED | Vehicle speed is displayed in km/h. |
| TAIL | Tail signal (Light control switch) ON/OFF state is displayed. |

**HINT:**

- Only items sending vehicle signals will be displayed.
- This screen is updated once per second when input signals to the vehicle are changed.

# HOW TO PROCEED WITH TROUBLESHOOTING

**HINT:**

- Use the following procedure to troubleshoot the navigation system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

**NEXT**

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

**NEXT**

| | |
|---|---|
| 3. | DIAGNOSTIC QUESTIONING AND SYMPTOM CONFIRMATION |

(a) Ask the customer about symptoms and confirm malfunctions.

Result:

| RESULT | PROCEED TO |
|---|---|
| Other symptoms. | A |
| The screen displays nothing. | B |

**B** **Go to step 6**

**A**

| | |
|---|---|
| **4.** | **OPERATION CHECK** |

(a) Refer to Check System Normal Condition INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Symptom is not normal operation. | A |
| Symptom is normal operation. | B |

**B** ▶ **SYMPTOM IS NORMAL OPERATION**

**A** ▼

| | |
|---|---|
| **5.** | **CHECK CAN COMMUNICATION SYSTEM*** |

(a) Check for DTC output INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| CAN DTC is not output. | A |
| CAN DTC is output. | B |

**B** ▶ INFO **GO TO CAN COMMUNICATION SYSTEM**

**A** ▼

| | |
|---|---|
| **6.** | **CHECK FOR DTC*** |

(a) Refer to DTC Check/Clear INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is output. | A |

| | |
|---|---|
| DTC is not output. | B |

**B** ▶ **Go to step 10**

**A**

| | |
|---|---|
| **7.** | **DTC CLEAR*** |

(a) Refer to DTC Check/Clear INFO .

**HINT:**

**The present DTCs may not indicate actual malfunctions depending on the vehicle operating conditions.**

**NEXT**

| | |
|---|---|
| **8.** | **RECHECK FOR DTC*** |

(a) Refer to DTC Check/Clear INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is output. | A |
| DTC is not output. | B |

**HINT:**

- Even if the malfunction symptom is not confirmed, check for DTCs. This is because the system stores history DTCs.
- Check the DTCs and inspect the area code indicates.

**B** ▶ **Go to step 10**

**A**

| 9. | DIAGNOSTIC TROUBLE CODE CHART |
|---|---|

(a) Find the output code in Diagnostic Trouble Code Chart INFO .

**NEXT** ▶ **Go to step 12**

| 10. | PROBLEM SYMPTOMS TABLE |
|---|---|

(a) Refer to Problem Symptoms Table INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Fault is not listed in Problem Symptoms Table. | A |
| Fault is listed in Problem Symptoms Table. | B |

**HINT:**

**If the symptom does not recur and no DTC is output, perform the symptom reproduction method INFO .**

**B** ▶ **Go to step 12**

**A** ▼

| 11. | PERFORM TROUBLESHOOTING BASED ON MALFUNCTION SYMPTOM |
|---|---|

(a) Refer to Terminals of ECU INFO .

**NEXT** ▼

| 12. | CHECK CIRCUIT |
|---|---|

(a) Adjust, repair or replace as necessary.

NEXT

| | |
|---|---|
| 13. | RECHECK FOR DIAGNOSTIC TROUBLE CODE |

**HINT:**

**After clearing the DTCs, recheck for DTCs.**

NEXT

| | |
|---|---|
| 14. | PERFORM CONFIRMATION TEST |

NEXT END

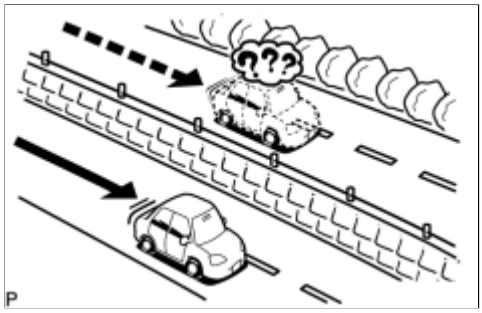
# OPERATION CHECK

## 1. CHECK SYSTEM NORMAL CONDITION

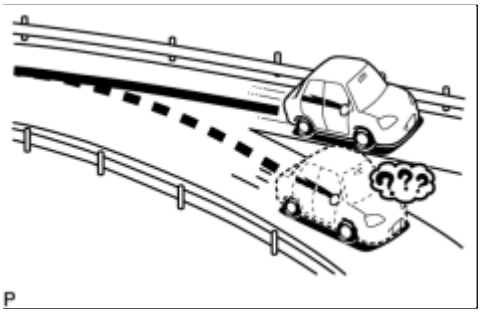
(a) If the symptom is applicable to any of the following, it is intended behavior, and not a malfunction.

| SYMPTOM | ANSWER |
|---|---|
| A longer route than expected is chosen. | Depending on the road conditions, the navigation receiver assembly may determine that a longer route is quicker. |
| Even when distance priority is high, the shortest route is not shown. | Some routes may not be advised due to safety concerns. |
| When the vehicle is put into motion immediately after the hybrid system starts, the navigation system deviates from the current position. | If the vehicle starts before the navigation system activates, the system may not react. |
| When running on certain types of roads, especially new roads, the vehicle position deviates from the current position. | When the vehicle is driving on new roads not available on the hard disk drive, the system attempts to match it to another nearby road, causing the position mark to deviate. |

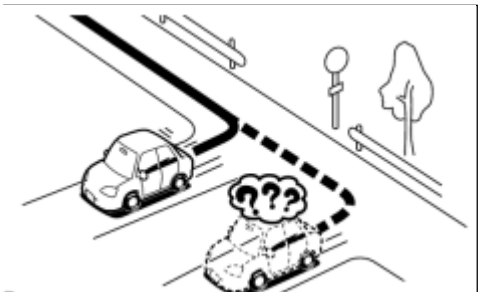
(b) The following symptoms are not malfunctions, but are caused by errors inherent in the GPS, gyro sensor, speed sensor or navigation receiver assembly.



(1) The current position mark may be displayed on a nearby parallel road.

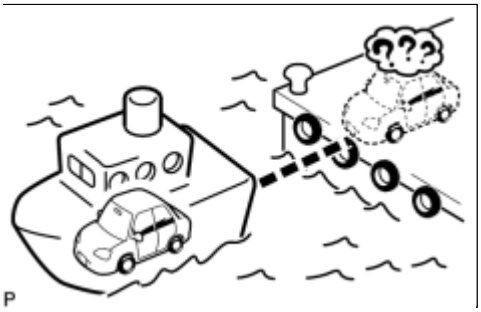


(2) Immediately after a fork in the road, the current vehicle position mark may be displayed on the wrong road.



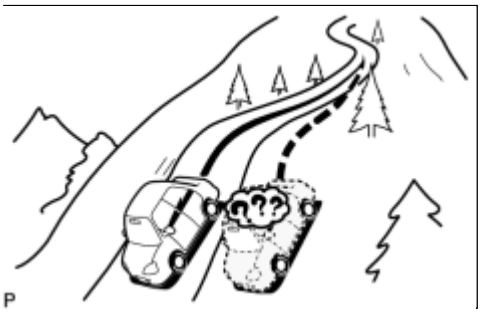
(3) When the vehicle turns right or left at an intersection, the current vehicle position mark may be displayed on a nearby parallel road.

P



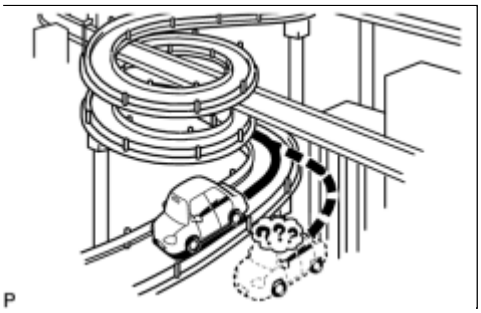
P

(4) When the vehicle is carried, such as on a ferry, and the vehicle itself is not running, the current vehicle position mark may be displayed in the position where the vehicle was until a measurement can be performed by GPS.



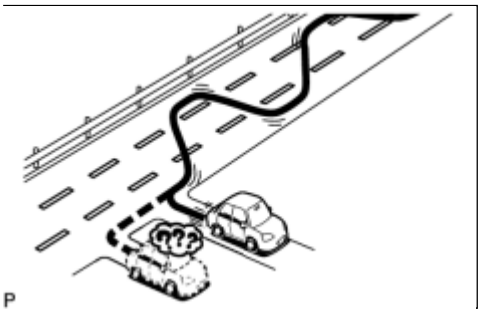
P

(5) When the vehicle travels on a steep hill, the current vehicle position mark may deviate from the correct position.



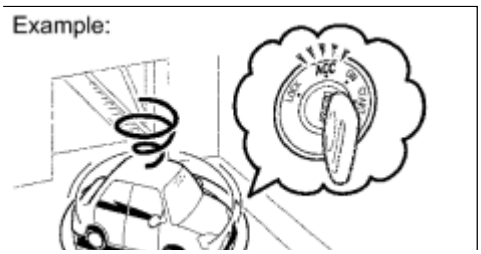
P

(6) When the vehicle makes a continuous turn (e.g. 360, 720, 1080 degrees), the current vehicle position mark may deviate from the correct position.



P

(7) When the vehicle moves erratically, such as constant lane changes, the current vehicle position mark may deviate from the correct position.



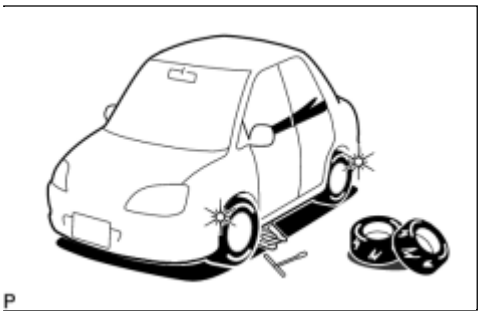

(8) When the power switch is turned on (ACC or IG) on a turntable before parking, the current vehicle position mark may not indicate the correct direction. The same will occur when the vehicle comes out of the parking garage.







(9) When the vehicle travels on a snowy road or a mountain path with the chains installed or using a spare tire, the current vehicle position mark may deviate from the correct position.




(10) When the tires are changed, the current vehicle position mark may deviate from the correct position.

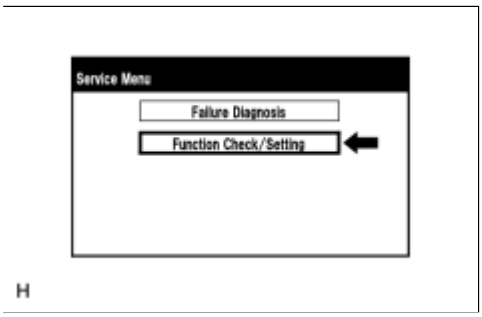
- A change in tire diameter may cause a speed sensor error.
- Performing "tire change" in calibration mode will allow the system to correct the current vehicle position faster.

### 2. CHECK PANEL & STEERING SWITCH

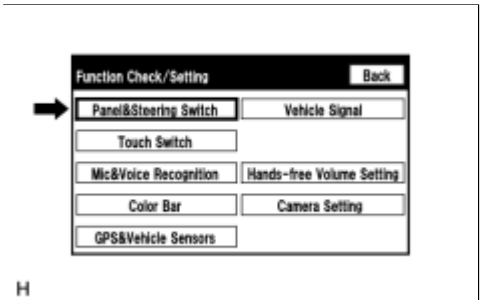
**HINT:**

- The navigation receiver assembly panel switches and steering switch are checked in the following procedure.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

(a) Enter diagnostic mode INFO .




(b) Select "Function Check/Setting" from the "Service Menu" screen.

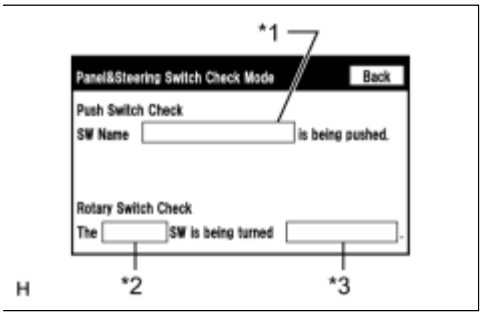



(c) Select "Panel & Steering Switch" from the "Function Check/Setting" screen.

(d) Panel & Steering Switch Check Mode

(1) Operate each switch and check that the switch names and condition are correctly displayed.

## Screen Description



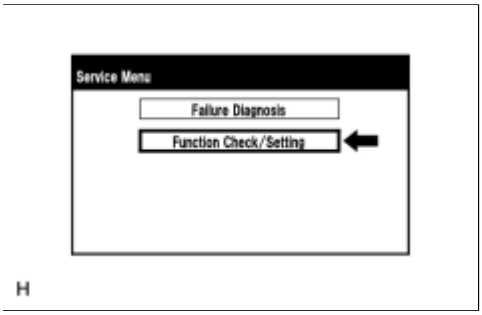

| DISPLAY | CONTENT |
|---|---|
| *1: Push switch name | • Name of the pressed switch is displayed.<br>• If more than one switch is pressed, "MULTIPLE" will be displayed. |
| *2: Rotary switch name | Name of the rotary switch is displayed. |
| *3: Rotary switch direction | Direction of the rotary switch is displayed. |

### 3. CHECK TOUCH SWITCH

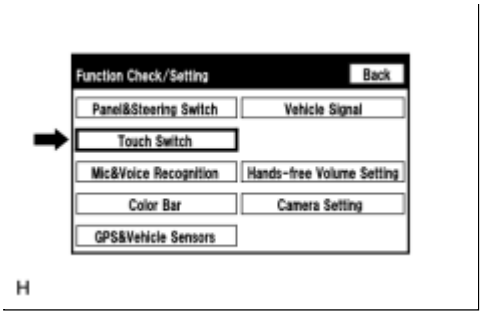
**HINT:**

- The touch switches on the screen are checked in the following procedure.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

(a) Enter diagnostic mode INFO .

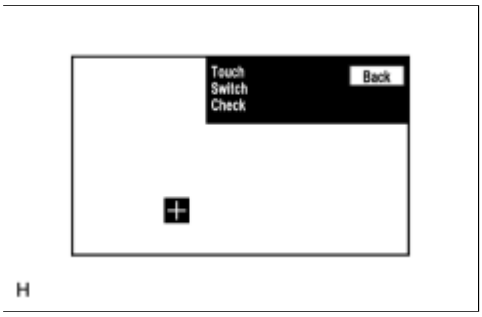



(b) Select "Function Check/Setting" from the "Service Menu" screen.




(c) Select "Touch Switch" from the "Function Check/Setting" screen.

(d) Touch Switch Check




(1) Touch the display anywhere in the open area to perform the check when the "Touch Switch Check" screen is displayed.

- A "+" mark is displayed where the display is touched.
- The "+" mark remains on the display even after the finger is removed.

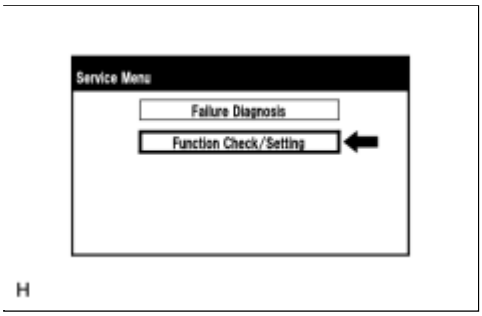
### 4. CHECK MIC & VOICE RECOGNITION

**HINT:**

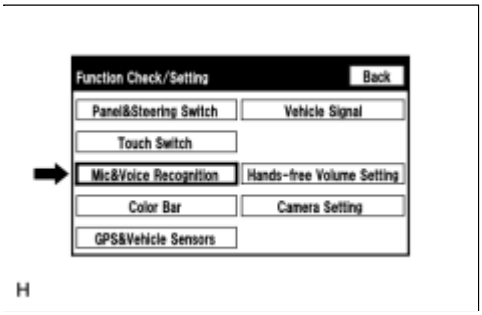
- The microphone and microphone input level are checked in the following procedure.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

(a) Enter diagnostic mode 

.

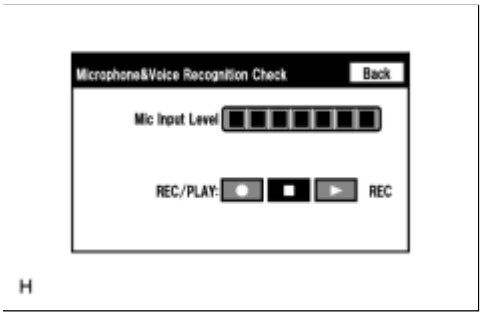



(b) Select "Function Check/Setting" from the "Service Menu" screen.




(c) Select "Mic & Voice Recognition" from the "Function Check/Setting" screen.

(d) Microphone & Voice Recognition Check




(1) When speaking into the microphone, check that the microphone input level meter changes according to the input level.

(2) Push the recording switch and perform voice recording.

(3) Check that the recording indicator remains on while recording and that the recording can be played normally.

**HINT:**

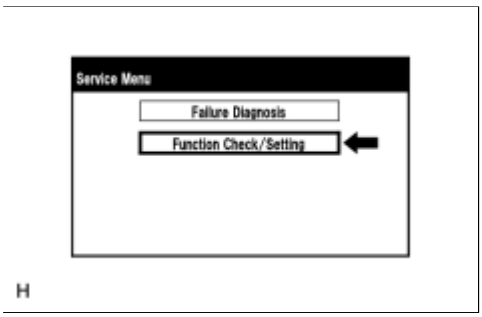
- For details of this function, refer to Diagnosis Display Detailed Description in System Description INFO .
- This function is controlled by the navigation receiver assembly (built-in navigation ECU).

### 5. CHECK COLOR BAR

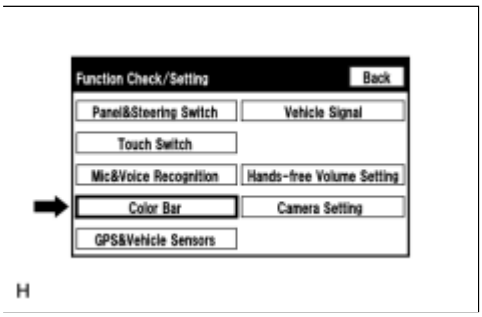
**HINT:**

- The display color on the screen is checked in the following procedure.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

(a) Enter diagnostic mode INFO .

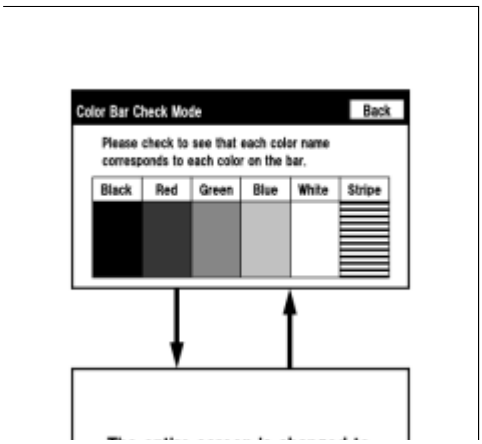



(b) Select "Function Check/Setting" from the "Service Menu" screen.

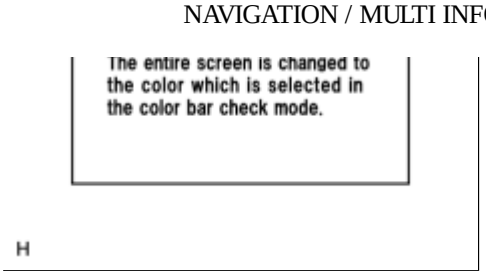



(c) Select "Color Bar" from the "Function Check/Setting" screen.

(d) Color Bar Check Mode




(1) Select a color bar from the "Color Bar Check Mode" screen.




(2) Check the display color.

**HINT:**

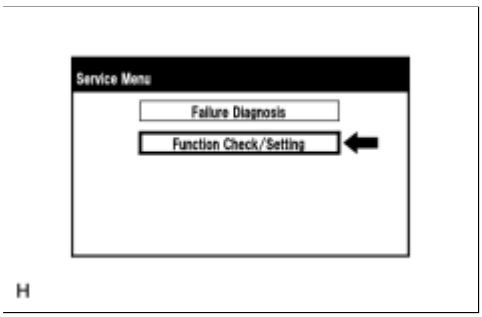
- The entire screen turns to the color or stripe selected.
- Touching the display will return to the "Color Bar Check" screen.

## 6. CHECK GPS & VEHICLE SENSORS

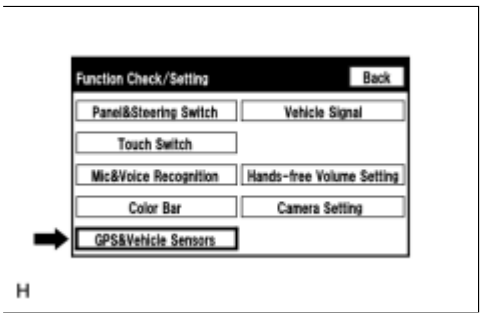
**HINT:**

- GPS information, vehicle signals and sensor signals are checked in the following procedure.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

(a) Enter diagnostic mode INFO .

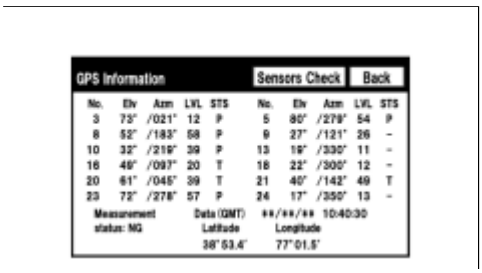



(b) Select "Function Check/Setting" from the "Service Menu" screen.




(c) Select "GPS & Vehicle Sensors" from the "Function Check/Setting" screen.

(d) GPS information



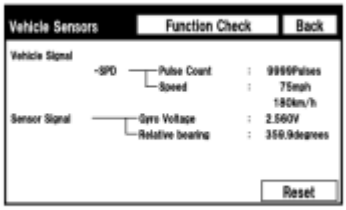

(1) When the "GPS Information" screen is displayed, check the GPS conditions.

- This screen is updated once per second when input signals to the vehicle are changed.
- For details of this function, refer to Diagnosis Display Detailed Description in System Description INFO .

H

(e) Select "Sensors Check" from the "GPS information" screen.

(f) Vehicle Sensors




H

(1) Check all the signals and sensors when vehicle signal information is displayed.

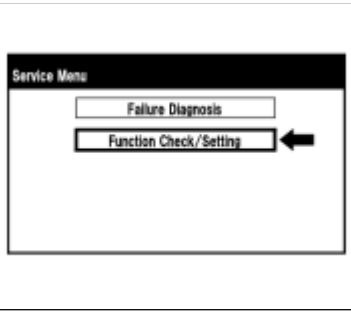
- This screen is updated once per second when input signals to the vehicle are changed.
- This screen displays vehicle signals input to the navigation receiver assembly (built-in navigation ECU).
- For details of this function, refer to Diagnosis Display Detailed Description in System Description INFO .

## 7. CHECK VEHICLE SIGNAL

**HINT:**

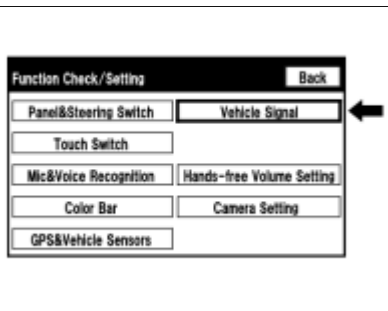
- Vehicle signals received by the navigation receiver assembly are checked in the following procedure.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

(a) Enter diagnostic mode INFO .




H

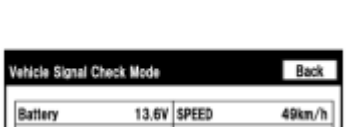
(b) Select "Function Check/Setting" from the "Service Menu" screen.




H

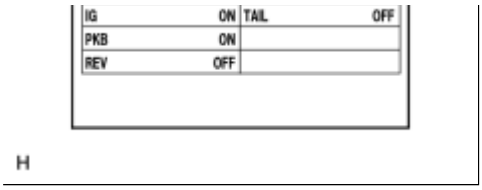
(c) Select "Vehicle Signal" from the "Function Check/Setting" screen.

(d) Vehicle Signal Check Mode




(1) When the "Vehicle Signal Check Mode" screen is displayed, check all the vehicle signal conditions.

- Only conditions having inputs are displayed.



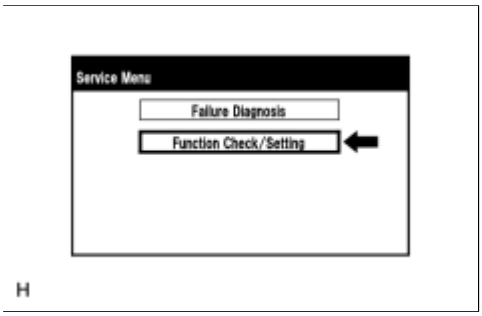

- This screen displays vehicle signals input to the navigation receiver assembly (built-in navigation ECU).
- For details of this function, refer to Diagnosis Display Detailed Description in System Description INFO .

### 8. CHECK HANDS-FREE VOLUME SETTING

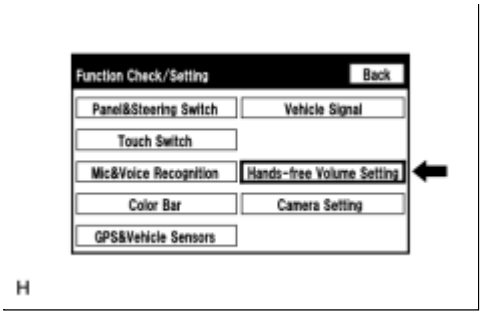
**HINT:**

- The hands-free volume of a "Bluetooth" compatible phone can be adjusted using the following procedure.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

(a) Enter diagnostic mode INFO .



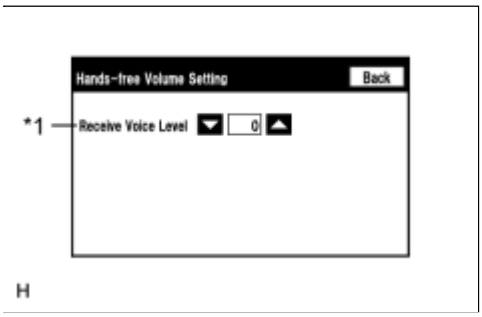

(b) Select "Function Check/Setting" from the "Service Menu" screen.




(c) Select "Hands-free Volume Setting" from the "Function Check/Setting" screen.

(d) Hands-free Volume Setting

(1) Check the hands-free volume level.




## Screen Description

| DISPLAY | CONTENT |
|---|---|
| *1: Receive voice level adjustment | Setting possible for the voice level received from "Bluetooth" compatible phones. |

**NOTICE:**

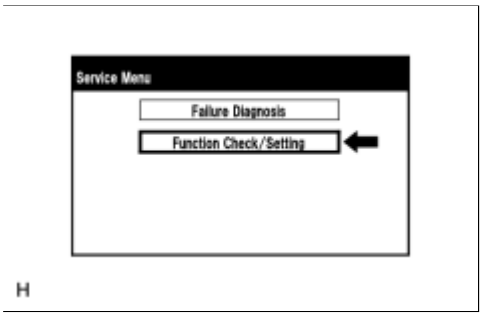
**Sound quality may deteriorate when the receive voice level is changed more than necessary. For this reason, check that the receive voice quality is still acceptable after changing this setting.**

### 9. CHECK CAMERA SETTING (W/ ADVANCED PARKING GUIDANCE SYSTEM)

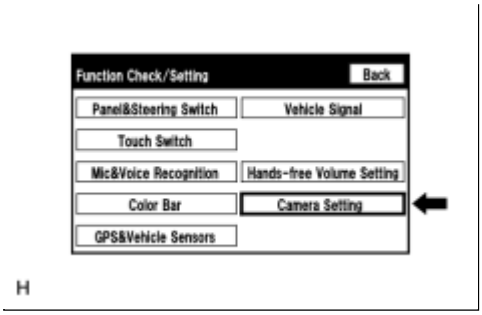
**HINT:**

- It is possible to make adjustments and check the signals received by the parking assist ECU.
- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.

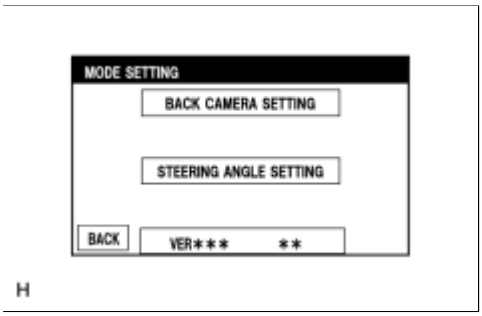
(a) Enter diagnostic mode INFO .




(b) Select "Function Check/Setting" from the "Service Menu" screen.




(c) Select "Camera Setting" from the "Function Check/Setting" screen.




(d) MODE SETTING

**HINT:**

**Refer to the advanced parking guidance system for further information** INFO .

# PROBLEM SYMPTOMS TABLE

**HINT:**

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**Display Function**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Pressing PWR switch does not turn on system. | Proceed to "Pressing Power Switch does not Turn on System" | INFO |
| | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Black screen (No image appears on navigation/audio screen.) | Proceed to "Black Screen" | INFO |
| | Proceed to "Illumination Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Illumination for panel switch does not come on with tail switch on. | Proceed to "Illumination for Panel Switch does not Come on with Tail Switch ON" | INFO |
| | Proceed to "Illumination Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Display does not dim (does not change to night screen) with tail switch on. | Check if the light control rheostat knob position is not on the cancel position. | - |
| | Proceed to "Display does not Dim when Light Control Switch is Turned ON" | INFO |
| | Proceed to "Illumination Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Power does not turn off. (Screen remains on.) | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Panel switches do not function. | Proceed to "Panel Switches do not Function" | INFO |
| | Proceed to "Steering Pad Switch Circuit" | INFO |
| | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Touch panel switch does not function. | Proceed to "Touch Panel Switch does not Function" | INFO |
| | Proceed to "Steering Pad Switch Circuit" | INFO |
| | Proceed to "Navigation Receiver Assembly Power | INFO |

| | | |
|---|---|---|
| | Source Circuit" | |
| | Navigation receiver assembly | INFO |
| Display panel does not open, tilt, or tilts improperly. | Proceed to "Display Panel does not Open, Tilt or Tilts Improperly" | INFO |
| | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Screen is distorted. | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Screen flicker or color distortion | Proceed to "Screen Flicker or Color Distortion" | INFO |
| | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Navigation function switches can be operated while vehicle is running. | Navigation receiver assembly | INFO |

**Audio Function**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| No sound can be heard from speakers. (Audio is mute.) | Proceed to "No Sound can be Heard from Speakers" | INFO |
| | Proceed to "Stereo Component Amplifier Power Source Circuit" | INFO |
| | Proceed to "Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Tuner Assembly"*1 | INFO |
| | Proceed to "Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Amplifier"*2 | INFO |
| | Proceed to "Mute Signal Circuit between Stereo Component Amplifier and Telematics Transceiver"*3 | INFO |
| | Proceed to "Sound Signal Circuit between Navigation Receiver Assembly and Stereo Component Amplifier"*2 | INFO |
| | Proceed to "Speaker circuit" | INFO |
| | Stereo component amplifier assembly | INFO |
| | DCM (telematics transceiver)*3 | INFO |
| | Navigation receiver assembly | INFO |
| Radio broadcast cannot be received or poor reception. | Proceed to "Radio Broadcast cannot be Received or Poor Reception" | INFO |
| CD cannot be inserted/played or CD is ejected right after insertion. | Proceed to "CD cannot be Inserted / Played or CD is Ejected Right After Insertion" | INFO |
| CD cannot be ejected. | Proceed to "CD cannot be Ejected" | INFO |

| | | |
|---|---|---|
| CD sound skips. | Proceed to "CD Sound Skips" | INFO |
| Abnormal noise occurs. | Proceed to "Noise Occurs" | INFO |
| Poor sound quality in all modes (low volume). | Proceed to "Poor Sound Quality in All Modes (Low Volume)" | INFO |
| | Proceed to "Stereo Component Amplifier Power Source Circuit" | INFO |
| | Proceed to "Speaker circuit" | INFO |
| | Proceed to "Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Tuner Assembly"*1 | INFO |
| | Proceed to "Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Amplifier"*2 | INFO |
| | Proceed to "Mute Signal Circuit between Stereo Component Amplifier and Telematics Transceiver"*3 | INFO |
| | Proceed to "Sound Signal Circuit between Navigation Receiver Assembly and Stereo Component Amplifier"*2 | INFO |
| | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Stereo component amplifier assembly | INFO |
| | DCM (telematics transceiver)*3 | INFO |
| | Navigation receiver assembly | INFO |
| Satellite radio sound cannot be heard or sound quality is bad.*1 | Proceed to "Sound Signal Circuit between Navigation Receiver Assembly and Stereo Component Tuner Assembly" | INFO |
| | Proceed to "Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Tuner Assembly" | INFO |
| | Navigation receiver assembly | INFO |
| | Stereo component tuner assembly | INFO |
| External device sound cannot be heard or sound quality is bad. (Stereo jack is used.) | Proceed to "Sound Signal Circuit between Navigation Receiver Assembly and Stereo Jack Adapter" | INFO |
| | No. 1 stereo jack adapter assembly | INFO |
| | Navigation receiver assembly | INFO |
| ASL does not function. | Check that the ASL function is on | - |
| | Proceed to "Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter"*2 | INFO |
| | Navigation receiver assembly | INFO |

**Navigation Function**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Map disc cannot be inserted. | Proceed to "Map Disc cannot be Inserted" | INFO |
| | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |

| | | |
|---|---|---|
| | Navigation receiver assembly | INFO |
| Map disc cannot be ejected. | Proceed to "Navigation Receiver Assembly Power Source Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Vehicle position mark deviates. | Proceed to "Vehicle Position Mark Deviates Greatly" | INFO |
| | Navigation antenna assembly | INFO |
| | Navigation receiver assembly | INFO |
| Cursor or map rotates when vehicle is stopped. | Proceed to "Cursor or Map Rotates when Vehicle Stopped" | INFO |
| | Navigation receiver assembly | INFO |
| Vehicle position mark is not updated. | Proceed to "Vehicle Position Mark is not Updated" | INFO |
| | Map disc | - |
| | Navigation receiver assembly | INFO |
| Current position display does not appear. | Proceed to "Current Position Display does not Appear" | INFO |
| | Map disc | - |
| | Navigation antenna assembly | INFO |
| | Navigation receiver assembly | INFO |
| GPS mark is not displayed. | Proceed to "GPS Mark is not Displayed" | INFO |
| | Navigation antenna assembly | INFO |
| | Navigation receiver assembly | INFO |
| Voice guidance does not function. | Proceed to "Voice Guidance does not Function" | INFO |
| | Proceed to "Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Amplifier"*2 | INFO |
| | Proceed to "Mute Signal Circuit between Stereo Component Amplifier and Telematics Transceiver"*3 | INFO |
| | Proceed to "Navigation Voice Circuit"*2 | INFO |
| | Proceed to "Speaker Circuit" | INFO |
| | Map disc | - |
| | Navigation receiver assembly | INFO |
| | DCM (telematics transceiver)*3 | INFO |
| | Stereo component amplifier assembly | INFO |
| | Proceed to "Map Display Incomplete" | INFO |

| | | |
|---|---|---|
| Map display is incomplete. | Map disc | - |
| | Navigation receiver assembly | INFO |
| Route cannot be calculated. | Proceed to "Route cannot be Calculated" | INFO |
| | Map disc | - |
| | Navigation receiver assembly | INFO |
| Map screen turns white or blue. (GPS receiving status is displayed normally, and switches and own vehicle position mark are also displayed normally.) | Change map scale to smallest (a scale that shows a large area) | - |
| | Map disc | - |
| | Navigation receiver assembly | INFO |
| Voice menu screen is not displayed. | Proceed to "Steering Pad Switch Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Voice recognition is difficult. | Proceed to "Voice Recognition Difficulty" | INFO |
| | Proceed to "Microphone Circuit between Microphone and Navigation Receiver Assembly" | INFO |
| | DCM (telematics transceiver)*3 | INFO |
| | Navigation receiver assembly | INFO |
| Voice is not recognized. | Proceed to "Voice is not Recognized" | INFO |
| | Proceed to "Microphone Circuit between Microphone and Navigation Receiver Assembly" | INFO |
| | Proceed to "Steering Pad switch Circuit" | INFO |
| | DCM (telematics transceiver)*3 | INFO |
| | Navigation receiver assembly | INFO |
| Reverse signal does not change in vehicle signal check mode. | Proceed to "Reverse Signal Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| "MIC" is not displayed on system check mode screen. | Proceed to "Microphone Circuit between Microphone and Navigation Receiver Assembly" | INFO |
| | Navigation receiver assembly | INFO |
| "AUX" is not displayed on system check mode screen. | Proceed to "Sound Signal Circuit between Navigation Receiver Assembly and Stereo Jack Adapter" | INFO |
| | Navigation receiver assembly | INFO |

**Steering Pad Switch Function**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| System cannot be operated by steering pad switch. | Proceed to "Steering Pad Switch Circuit" | INFO |
| | Navigation receiver assembly | INFO |

| | | |
|---|---|---|
| Illumination for steering pad switch does not come on with tail switch on. | Proceed to "Illumination Circuit" | INFO |
| | Navigation receiver assembly | INFO |

**"Bluetooth" Hands-free Function**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Bluetooth inoperative | Proceed to "Microphone Circuit between Microphone and Navigation Receiver Assembly" | INFO |
| | DCM (telematics transceiver)*3 | INFO |
| | Navigation receiver assembly | INFO |
| Cellular phone registration failure, phone directory transfer failure | Proceed to "Cellular Phone Registration Failure, Phone Directory Transfer Failure" | INFO |
| Cellular phone cannot send/receive. | Proceed to "Cellular Phone cannot Send/Receive" | INFO |
| | Proceed to "Steering Pad Switch Circuit" | INFO |
| | Navigation receiver assembly | INFO |
| Celluar phone cannot call in a certain place. | Proceed to "Cannot Call in a Certain Place" | INFO |
| The other caller's voice cannot be heard, is too quiet, or distorted. | Proceed to "The Other Caller's Voice cannot be Heard, is too Quiet, or Distorted" | INFO |
| | Proceed to "Navigation Voice Circuit"*2 | INFO |
| | Stereo component amplifier assembly | INFO |
| | Navigation receiver assembly | INFO |
| The other caller cannot hear your voice, or your voice is too quiet or distorted. | Proceed to "The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted" | INFO |
| | Proceed to "Microphone Circuit between Microphone and Navigation Receiver Assembly" | INFO |
| | DCM (telematics transceiver)*3 | |
| | Navigation receiver assembly | INFO |

**"Bluetooth" Audio Function*2**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Portable player cannot be registered. | Proceed to "Portable Player cannot be Registered" | INFO |
| | Navigation receiver assembly | INFO |
| Portable player cannot be connected manually/automatically. | Proceed to "Portable Player cannot be Registered" | INFO |
| | Proceed to "Portable Player cannot be Connected Manually/Automatically" | INFO |
| | Navigation receiver assembly | INFO |

| | | |
|---|---|---|
| Cellular phone with portable audio function cannot be recognized as "Bluetooth" audio device even when connected using "Bluetooth". | Proceed to "Portable Player cannot be Registered" | INFO |
| | Proceed to "Portable Player cannot be Connected Manually/Automatically" | INFO |
| | Navigation receiver assembly | INFO |
| Sound of portable player cannot be heard from speakers, or sound is low. | Proceed to "Sound of Portable Player cannot be Heard from Speakers or Sound is Low" | INFO |
| | Navigation receiver assembly | INFO |
| Portable player does not play even after "Bluetooth" audio mode is selected. | Proceed to "Does not Play even after Bluetooth Audio Mode is Selected" | INFO |
| | Navigation receiver assembly | INFO |
| Portable player does not play. | Proceed to "Does not Play even after Bluetooth Audio Mode is Selected" | INFO |
| | Navigation receiver assembly | INFO |
| Track information such as track number, track name and elapsed play time is not displayed. | Proceed to "Portable Player cannot be Operated Using In-vehicle Device or Track Information is not Displayed on In-vehicle Device" | INFO |
| | Navigation receiver assembly | INFO |
| Operation switches for portable player such as play, pause, repeat, random and scan are not displayed. | Proceed to "Portable Player cannot be Operated Using In-vehicle Device or Track Information is not Displayed on In-vehicle Device" | INFO |
| | Navigation receiver assembly | INFO |
| Battery condition of portable player is not displayed. | Proceed to "Portable Player cannot be Operated Using In-vehicle Device or Track Information is not Displayed on In-vehicle Device" | INFO |
| | Navigation receiver assembly | INFO |
| "Bluetooth" signal condition is not displayed. | Proceed to "Portable Player cannot be Operated Using In-vehicle Device or Track Information is not Displayed on In-vehicle Device" | INFO |
| | Navigation receiver assembly | INFO |
| Portable player cannot pause, select file, fast forward, fast rewind, play at random or scan. | Proceed to "Portable Player cannot be Operated Using In-vehicle Device or Track Information is not Displayed on In-vehicle Device" | INFO |
| | Navigation receiver assembly | INFO |
| Noise occurs or sound skips when portable player plays. | Proceed to "Noise Occurs or Sound Skips when Portable Player Plays" | INFO |
| | Navigation receiver assembly | INFO |
| Registered device cannot be deleted. | Proceed to "Registered Device cannot be Deleted" | INFO |
| | Navigation receiver assembly | INFO |

**SDARS System Function*1**

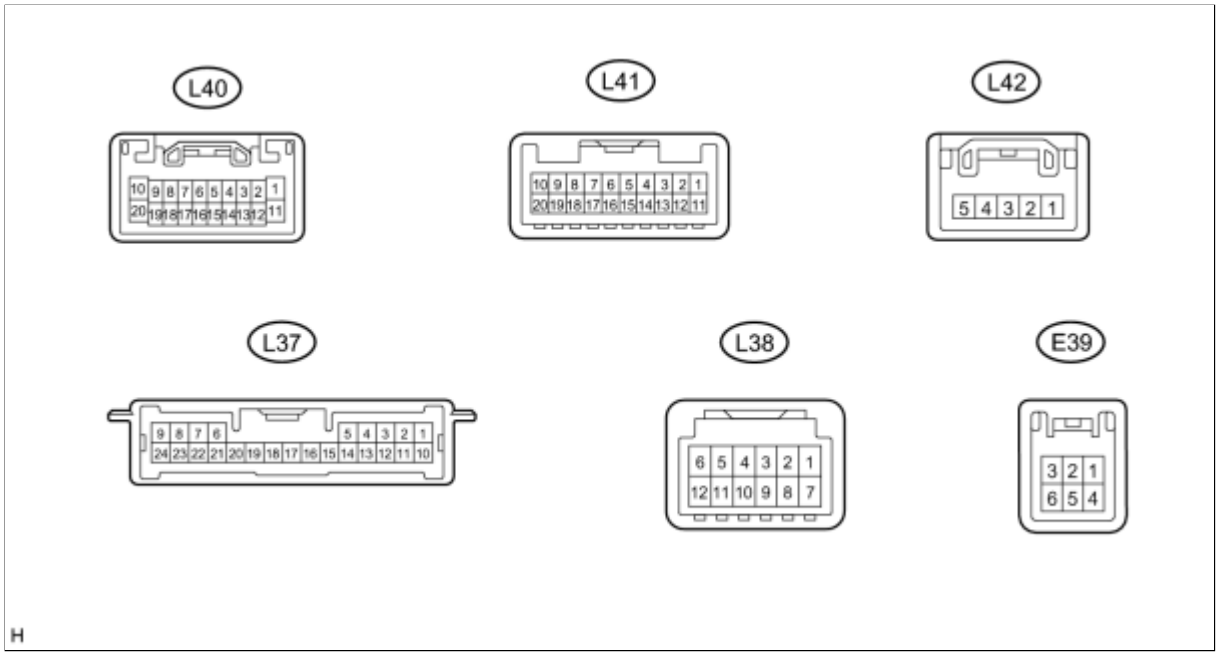
| SYMPTOM | SUSPECTED AREA | SEE |
|---|---|---|

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Satellite radio broadcast cannot be received or reception is bad. | Proceed to "Satellite Radio Broadcast cannot be Received" | INFO |
| | Stereo component tuner assembly | INFO |
| | Navigation receiver assembly | INFO |
| Satellite radio cannot receive pay type broadcasts. | Proceed to "Satellite Radio Broadcast cannot be Received" | INFO |
| | Stereo component tuner assembly | INFO |
| | Navigation receiver assembly | INFO |
| Satellite radio broadcast cannot be selected or after selecting broadcast, broadcast cannot be added into memory. | Proceed to "Satellite Radio Broadcast cannot be Received" | INFO |
| | Proceed to "Satellite Radio Broadcast cannot be Selected or After Selecting Broadcast, Broadcast cannot be Added into Memory" | INFO |
| | Stereo component tuner assembly | INFO |
| | Navigation receiver assembly | INFO |
| Traffic information is not displayed. | Proceed to "Traffic Information is not Displayed" | INFO |
| | Stereo component tuner assembly | INFO |
| | Navigation receiver assembly | INFO |
| "XM Nav Traffic" mark is not displayed. | Proceed to "Traffic Information is not Displayed" | INFO |
| | Stereo component tuner assembly | INFO |
| | Navigation receiver assembly | INFO |

*1: w/ SDARS System
*2: w/ "Bluetooth" Audio System
*3: w/ Manual (SOS) Switch

# TERMINALS OF ECU

### 1. NAVIGATION RECEIVER ASSEMBLY (w/ "Bluetooth" Audio System)




| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| L40-1 (B) - L40-20 (GND) | SB - BR | Battery | Power switch off | 11 to 14 V |
| L40-2 (ILL+) - L40-20 (GND) | G - BR | Illumination signal | Power switch on (IG)<br>Light control switch off → tail or on | Below 1 V → 11 to 14 V |
| L40-5 (ATX+) | G | AVC-LAN communication signal | - | - |
| L40-7 (MUTE) - L40-20 (GND) | B - BR | Mute signal | Audio system playing → Changing | Above 3.5 V → Below 1 V |
| L40-8 (R+) - L40-20 (GND) | G - BR | Sound signal (Right) | Audio system playing | A waveform synchronized with sounds is output |
| L40-9 (L+) - L40-20 (GND) | R - BR | Sound signal (Left) | Audio system playing | A waveform synchronized with sounds is output |
| L40-10 (SLD) - Body ground | Shield - Body ground | Shield ground | Always | Below 1 V |
| L40-11 (ACC) - L40-20 (GND) | GR - BR | Accessory (ON) | Power switch on (ACC) | 11 to 14 V |
| | | | Power switch off | Below 1 V |
| L40-12 (ILL-) - L40-20 (GND) | W-B - BR | Illumination signal | Power switch on (IG)<br>Light control switch off → tail or on<br>(Light intensity not max. or min.) | Below 1 V → Pulse generation |
| L40-13 (ANT) - L40-20 (GND) | BE - BR | Power source of antenna | Power switch on (IG)<br>Radio switch on and AM or FM | 8 V or higher |
| L40-15 (ATX-) | R | AVC-LAN communication signal | - | - |

| | | | | |
|---|---|---|---|---|
| L40-18 (R-) - L40-20 (GND) | B - BR | Sound signal (Right) | Audio system playing | A waveform synchronized with sounds is output |
| L40-19 (L-) - L40-20 (GND) | W - BR | Sound signal (Left) | Audio system playing | A waveform synchronized with sounds is output |
| L40-20 (GND) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L41-6 (SWG) - Body ground | P - Body ground | Steering pad switch signal | Always | Below 1 V |
| L41-7 (SW1) - L41-6 (SWG) | R - P | Steering pad switch signal | No switch pushed → MODE switch pushed → ON HOOK switch pushed → OFF HOOK switch pushed → VOICE switch pushed | 4.44 to 5.43 V → 0.45 to 0.65 V → 1.19 to 1.49 V → 2.09 to 2.54 V → 3.2 to 3.88 V |
| L41-8 (SW2) - L41-6 (SWG) | G - P | Steering pad switch signal | No switch is pushed → SEEK+ switch pushed → SEEK- switch pushed → VOL+ switch pushed → VOL- switch pushed | 4.44 to 5.43 V → 0.45 to 0.65 V → 1.19 to 1.49 V → 2.09 to 2.54 V → 3.2 to 3.88 V |
| L41-9 (TX1+)*1 | LG | AVC-LAN communication signal | - | - |
| L41-10 (TX1-)*1 | P | AVC-LAN communication signal | - | - |
| L41-11 (IVO+) - L40-20 (GND) | Y - BR | Voice guidance signal | Voice guidance transmitting | A waveform synchronized with sounds is output |
| L41-12 (IVO-) - L40-20 (GND) | BR - BR | Voice guidance signal | Voice guidance transmitting | A waveform synchronized with sounds is output |
| L41-13 (SLD) - Body ground | Shield - Body ground | Voice sound signal shield ground | Always | Below 1 V |
| L41-15 (ARI) - L41-16 (ASGN) | B - W | Sound signal (Right) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L41-16 (ASGN) - L40-20 (GND) | W - BR | Sound signal ground | Always | Below 1 V |
| L41-17 (ALI) - L41-16 (ASGN) | R - W | Sound signal (Left) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L41-18 (AGND) - Body ground | Shield - Body ground | Shield ground | Always | Below 1 V |
| L41-19 (AUXI) - L40-20 (GND) | W - BR | External device connection detection signal | External device connected | Below 1 V |
| L42-1 (PKB) - L40-20 (GND) | R - BR | Parking brake signal | See "Vehicle Signal Check Mode" in Operation Check INFO | - |
| L42-2 (IG) - L40-20 (GND) | B - BR | Power source (IG) | Power switch on (IG) | 11 to 14 V |
| | | | Power switch off | Below 1 V |
| L42-3 (SPD) - L40-20 (GND) | V - BR | Speed signal from combination meter assembly | See "Vehicle Signal Check Mode" in Operation Check INFO | - |

| | | | | |
|---|---|---|---|---|
| L42-5 (REV) - L40-20 (GND) | P - BR | Reverse signal | See "Vehicle Signal Check Mode" in Operation Check INFO | - |
| L37-2 (CANH) | G | CAN communication signal | - | - |
| L37-3 (CANL) | W | CAN communication signal | - | - |
| L37-5 (SNS2) - L40-20 (GND) | B - BR | Microphone connection detection signal | Always | Below 1 V |
| L37-17 (MACC) - L40-20 (GND)*3 | R - BR | Telephone microphone assembly power supply | Power switch off → on (IG) | Below 1 V → 5 V |
| L37-18 (SGND) - L40-20 (GND) | Shield - BR | Shield ground | Always | Below 1 V |
| L37-19 (MIN+) - L40-20 (GND) | B - BR | Microphone voice signal | See "Microphone & Voice Recognition Check" in Operation Check INFO | - |
| L37-20 (MIN-) - Body ground | W - Body ground | Microphone voice signal | See "Microphone & Voice Recognition Check" in Operation Check INFO | - |
| L37-21 (CGND) - Body ground*2 | Shield - Body ground | Shield ground | Always | Below 1 V |
| L37-22 (V+) - L40-20 (GND)*2 | R - BR | Television camera image signal | Power switch on (IG)<br>Shift lever in R<br>Camera lens not covered, displaying an image | Pulse generation (Refer to waveform 1) |
| | | | Power switch on (IG)<br>Shift lever in R<br>Camera lens covered, blacking out screen | Pulse generation (Refer to waveform 2) |
| L37-23 (V-) - L40-20 (GND)*2 | B - BR | Ground | Always | Below 1 V |
| L37-24 (CA+) - L40-20 (GND)*2 | W - BR | Television camera power supply | Power switch on (IG)<br>Shift lever in R | 5.5 to 7 V |
| L38-1 (CSLD) - Body ground | Shield - Body ground | Shield ground | Always | Below 1 V |
| L38-2 (CDR+) - L40-20 (GND) | R - BR | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |
| L38-3 (CDR-) - L40-20 (GND) | W - BR | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |
| L38-4 (CDL+) - L40-20 (GND) | G - BR | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |

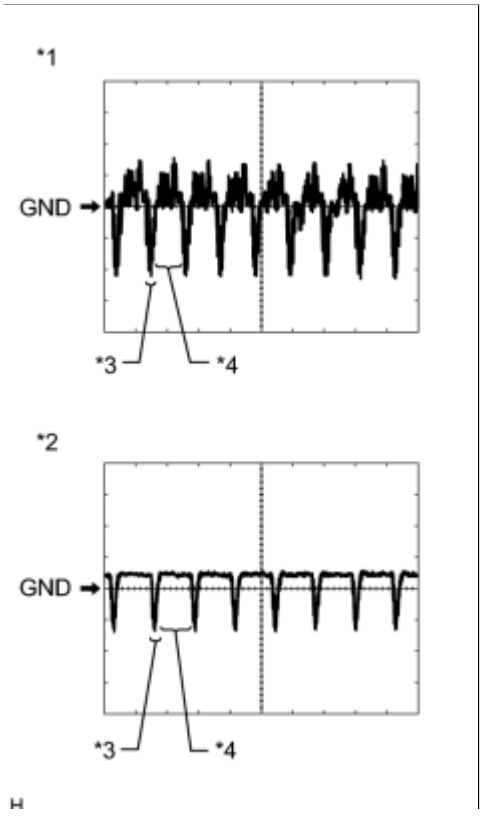
| | | | | |
|---|---|---|---|---|
| L38-5 (CDL-) - L40-20 (GND) | B - BR | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |
| L38-6 (MUTE) - L40-20 (GND) | G - BR | Mute signal | Satellite radio playing → Source changed | Above 3.5 V → Below 1 V |
| L38-9 (TXM+) | W | AVC-LAN communication signal | - | - |
| L38-10 (TXM-) | B | AVC-LAN communication signal | - | - |
| E39-2 (TXO+) | L | AVC-LAN plus communication signal | - | - |
| E39-3 (TXI+) | G | AVC-LAN plus communication signal | - | - |
| E39-5 (TXO-) | W | AVC-LAN plus communication signal | - | - |
| E39-6 (TXI-) | R | AVC-LAN plus communication signal | - | - |

*1: w/ Advanced Parking Guidance System
*2: w/ Rear View Monitor System
*3: w/o Manual (SOS) Switch

(a) Reference (Oscilloscope waveform):

(1) Waveform 1 (camera lens not covered, displaying an image)

| ITEM | CONTENT |
|---|---|
| Measurement terminal | L37-22 (V+) - L40-20 (GND) |
| Measurement setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |




**HINT:**

**The video waveform changes according to the image that the television camera assembly projects.**

(2) Waveform 2 (camera lens is covered, blacking out the screen)

| ITEM | CONTENT |
|---|---|
| Measurement terminal | L37-22 (V+) - L40-20 (GND) |
| Measurement setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

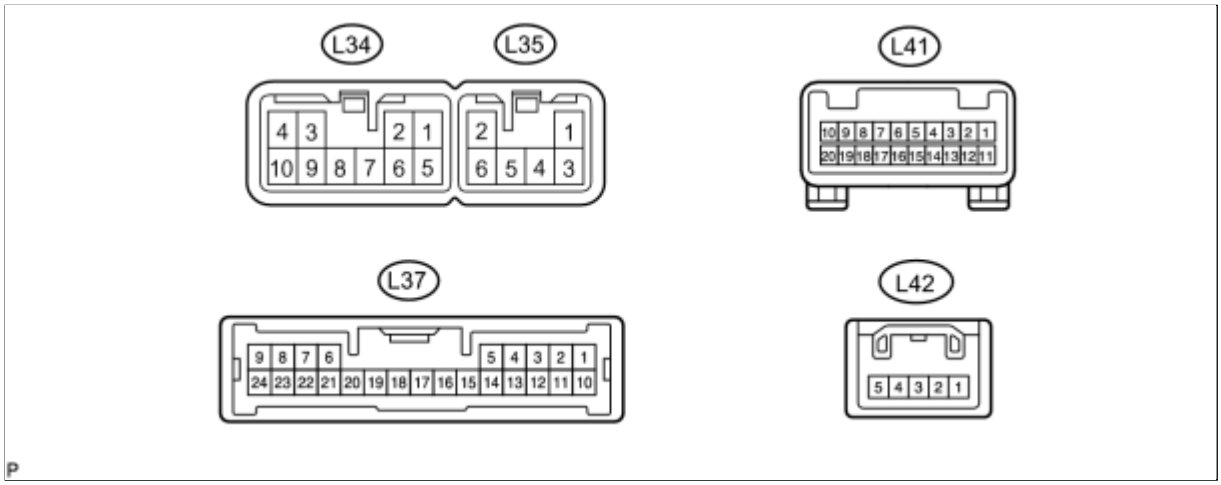
**HINT:**

**The video waveform changes according to the image from the television camera assembly.**

## Text in Illustration

| | |
|---|---|
| *1 | Waveform 1 (camera lens not covered, displaying an image) |
| *2 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *3 | Synchronization Signal |
| *4 | Video Waveform |

**2. NAVIGATION RECEIVER ASSEMBLY (w/o "Bluetooth" Audio System)**

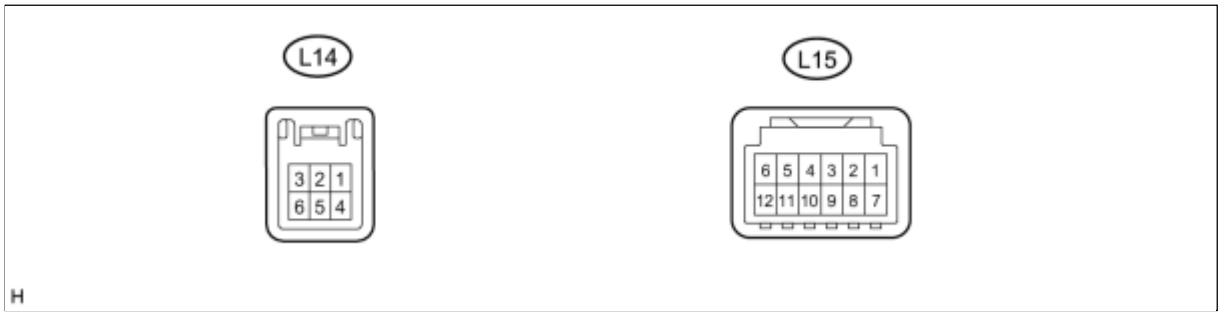



| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFICATION |
|---|---|---|---|---|
| L42-1 (PKB) - L34-7 (GND) | R - BR | Parking brake signal | See "Vehicle Signal Check" INFO | - |
| L42-2 (IG) - L34-7 (GND) | B - BR | Power source (IG) | Power switch off | Below 1 V |
| L42-2 (IG) - L34-7 (GND) | B - BR | Power source (IG) | Power switch on (IG) | 11 to 14 V |
| L42-3 (SPD) - L34-7 (GND) | V - BR | Speed signal from combination meter | See "Vehicle Signal Check" INFO | - |
| L42-5 (REV) - L34-7 (GND) | P - BR | Reverse signal | See "Vehicle Signal Check" INFO | - |
| L34-1 (FR+) - L34-7 (GND) | LG - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L34-2 (FL+) - L34-7 (GND) | P - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L34-3 (ACC) - L34-7 (GND) | GR - BR | Accessory (ON) | Power switch off | Below 1 V |
| L34-3 (ACC) - L34-7 (GND) | GR - BR | Accessory (ON) | Power switch on (ACC) | 11 to 14 V |
| L34-4 (B) - L34-7 (GND) | SB - BR | Battery | Power switch off | 11 to 14 V |
| L34-5 (FR-) - | | Sound signal (Front | | A waveform synchronized |

| | | | | |
|---|---|---|---|---|
| L34-7 (GND) | L - BR | Right) | Audio system playing | with sounds is output |
| L34-6 (FL-) - L34-7 (GND) | V - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L34-7 (GND) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L34-8 (ANT) - L34-7 (GND) | BE - BR | Power source of antenna | Radio switch ON and AM or FM | 11 to 14 V |
| L34-9 (AMP) - L34-7 (GND) | W - BR | Power source (IG) | Power switch off → on (IG) | Below 1 V → 11 to 14 V |
| L34-10 (ILL+) - L34-7 (GND) | G - BR | Illumination signal | Light control switch off → tail or head | Below 1 V → 11 to 14 V |
| L35-1 (RR+) - L34-7 (GND) | R - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L35-2 (RL+) - L34-7 (GND) | B - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L35-3 (RR-) - L34-7 (GND) | W - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L35-5 (ILL-) - L34-7 (GND) | W-B - BR | Illumination signal | Power switch on (IG), Light control switch off → tail or on (Light intensity no max. or min.) | Below 1 V → Pulse generation |
| L35-6 (RL-) - L34-7 (GND) | Y - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L37-2 (CANH) | G | CAN communication signal | - | - |
| L37-3 (CANL) | W | CAN communication signal | - | - |
| L37-5 (SNS2) - L34-7 (GND) | B - BR | Microphone connection detection signal | Always | Below 0.1 V |
| L37-17 (MACC) - L34-7 (GND) | R - BR | Telephone microphone assembly power supply | Power switch off → on (IG) | Below 1 V → 5 V |
| L37-18 (SGND) - L34-7 (GND) | Shield - BR | Shield ground | Always | Below 1 V |
| L37-19 (MIN+) - L34-7 (GND) | B - BR | Microphone voice signal | See "Microphone&Voice Recognition Check" INFO | - |
| L37-20 (MIN-) - Body ground | W - Body ground | Microphone voice signal | See "Microphone&Voice Recognition Check" INFO | - |
| L41-6 (SWG) - Body ground | P - Body ground | Steering pad switch ground | Always | Below 1 V |
| L41-7 (SW1) - L41-6 (SWG) | R - P | Steering pad switch signal | No switch pushed → Seek+ switch pushed → Seek- switch pushed → Volume+ switch pushed → Volume- switch pushed | 4.5 to 5.5 V → Below 0.5 V → 0.86 to 0.95 V → 1.91 to 2.01 V → 3.23 to 3.57 V |

| | | | | |
|---|---|---|---|---|
| | | | switch pushed | |
| L41-8 (SW2) - L41-6 (SWG) | G - P | Steering pad switch signal | No switch pushed → MODE switch pushed → On Hook switch pushed → Off Hook switch pushed → Voice switch pushed | 4.5 to 5.5 V → Below 0.5 V → 0.86 to 0.95 V → 1.91 to 2.01 V → 3.23 to 3.57 V |
| L41-9 (TX1+) | LG | AVC-LAN communication signal | - | - |
| L41-10 (TX1-) | P | AVC-LAN communication signal | - | - |
| L41-15 (ARI) - L41-16 (ASGN) | B - W | Sound signal (Right) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L41-16 (ASGN) - L34-7 (GND) | W - BR | Sound signal ground | Always | Below 1 V |
| L41-17 (ALI) - L41-16 (ASGN) | R - W | Sound signal (Left) | External device playing (When stereo jack used) | A waveform synchronized with sounds is output |
| L41-18 (AGND) - Body ground | Shield - Body ground | Shield ground | Always | Below 1 V |
| L41-19 (AUXI) - L34-7 (GND) | W - BR | External device connection detection signal | External device connected | Below 1 V |

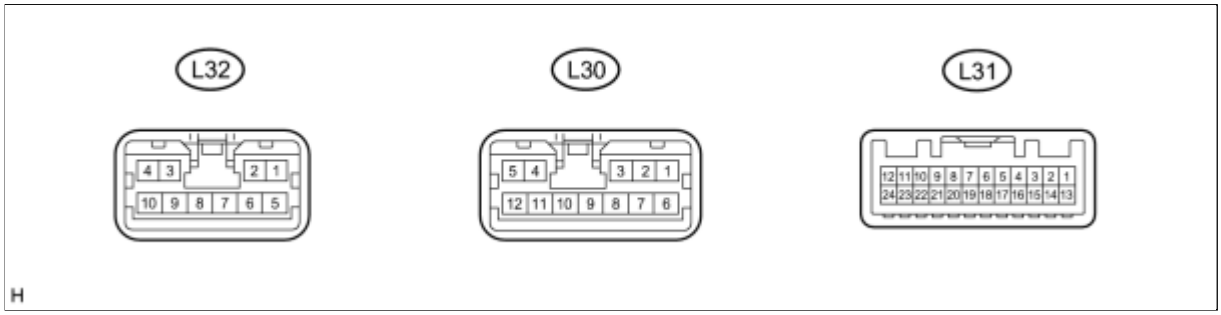
### 3. STEREO COMPONENT TUNER ASSEMBLY (w/ SDARS System)




| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| L14-2 (TXO+) | G | AVC-LAN plus communication signal | - | - |
| L14-3 (TXI+) | L | AVC-LAN plus communication signal | - | - |
| L14-5 (TXO-) | R | AVC-LAN plus communication signal | - | - |
| L14-6 (TXI-) | W | AVC-LAN plus communication signal | - | - |

| | | | | |
|---|---|---|---|---|
| L15-2 (FRO+) - L15-7 (GND) | R - W-B | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |
| L15-3 (FRO-) - L15-7 (GND) | W - W-B | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |
| L15-4 (FLO+) - L15-7 (GND) | G - W-B | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |
| L15-5 (FLO-) - L15-7 (GND) | B - W-B | Satellite radio sound signal | Satellite radio playing | A waveform synchronized with sounds is output |
| L15-6 (MUTE) - L15-7 (GND) | G - W-B | Mute signal | Satellite radio playing → Source changed | Above 3.5 V → Below 1 V |
| L15-7 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 V |
| L15-9 (TX+) | W | AVC-LAN communication signal | - | - |
| L15-10 (TX-) | B | AVC-LAN communication signal | - | - |
| L15-11 (ACC) - L15-7 (GND) | GR - W-B | Accessory (ON) | Power switch on (ACC) | 11 to 14 V |
| | | | Power switch off | Below 1 V |
| L15-12 (+B) - L15-7 (GND) | SB - W-B | Battery | Power switch off | 11 to 14 V |

### 4. STEREO COMPONENT AMPLIFIER ASSEMBLY (w/ "Bluetooth" Audio System)



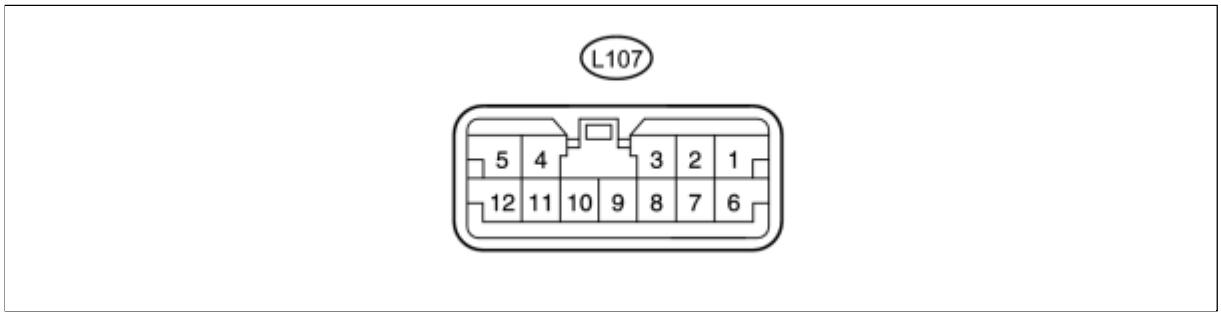

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFICATION |
|---|---|---|---|---|
| L32-1 (+B) - L30-6 (GND) | R - BR | Battery | Power switch off | 11 to 14 V |
| L32-2 (WFR+) - L30-6 (GND) | LG - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L32-3 (RL+) - L30-6 (GND) | B - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-4 (RR-) - L30-6 (GND) | W - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L32-5 (+B2) - | B - BR | Battery | Power switch off | 11 to 14 V |

| | | | | |
|---|---|---|---|---|
| L30-6 (GND) | | | | |
| L32-6 (WFR-) - L30-6 (GND) | L - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L32-7 (WFL-) - L30-6 (GND) | V - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-8 (WFL+) - L30-6 (GND) | P - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-9 (RL-) - L30-6 (GND) | Y - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L32-10 (RR+) - L30-6 (GND) | R - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-1 (FL-) - L30-6 (GND) | V - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L30-2 (FL+) - L30-6 (GND) | P - BR | Sound signal (Front Left) | Audio system playing | A waveform synchronized with sounds is output |
| L30-3 (FR-) - L30-6 (GND) | L - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-4 (TWR+) - L30-6 (GND) | R - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-5 (TWL+) - L30-6 (GND) | B - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L30-6 (GND) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L30-7 (GND2) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L30-9 (FR+) - L30-6 (GND) | LG - BR | Sound signal (Front Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-10 (TWR-) - L30-6 (GND) | W - BR | Sound signal (Rear Right) | Audio system playing | A waveform synchronized with sounds is output |
| L30-12 (TWL-) - L30-6 (GND) | Y - BR | Sound signal (Rear Left) | Audio system playing | A waveform synchronized with sounds is output |
| L31-1 (MUTE) - L30-6 (GND) | B - BR | Mute signal from radio receiver assembly | Audio system playing | Above 2.5 V |
| L31-2 (L-) - L30-6 (GND) | W - BR | Sound signal (Left) | Audio system playing | A waveform synchronized with |

| | | | | |
|---|---|---|---|---|
| L30-6 (GND) | | | | sounds is input |
| L31-3 (L+) - L30-6 (GND) | R - BR | Sound signal (Left) | Audio system playing | A waveform synchronized with sounds is input |
| L31-4 (R-) - L30-6 (GND) | B - BR | Sound signal (Right) | Audio system playing | A waveform synchronized with sounds is input |
| L31-5 (R+) - L30-6 (GND) | G - BR | Sound signal (Right) | Audio system playing | A waveform synchronized with sounds is input |
| L31-7 (TX-) | R | AVC-LAN communication signal | - | - |
| L31-8 (TX+) | G | AVC-LAN communication signal | - | - |
| L31-11 (SPD) - L30-6 (GND) | V - BR | Speed signal from combination meter assembly | Power switch on (IG)<br>Drive wheels turned slowly | Pulse generation |
| L31-12 (ACC) - L30-6 (GND) | GR - BR | Accessory (ON) | Power switch on (ACC) | 11to 14 V |
| | | | Power switch off | Below 1 V |
| L31-22 (INT-) - L30-6 (GND) | BR - BR | Voice signal | Voice guidance is provided | A waveform synchronized with sounds is output |
| L31-23 (INT+) - L30-6 (GND) | Y - BR | Voice signal | Voice guidance is provided | A waveform synchronized with sounds is output |
| L31-24 (TMUT) - L30-6 (GND)*1 | G - BR | Mute signal | Power switch on (ACC), audio system playing → Manual (SOS) switch on, Emergency call mode | Above 3.5 V → Below 1 V |

*1: w/ Manual (SOS) Switch

### 5. STEREO COMPONENT AMPLIFIER ASSEMBLY (w/o "Bluetooth" Audio System)




| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| L107-1 (RL+) - L107-10 (GND) | P - BR | Sound input signal (Front left) | Audio system playing | A waveform synchronized with sounds is output |
| L107-2 (RR+) - L107-10 (GND) | LG - BR | Sound input signal (Front right) | Audio system playing | A waveform synchronized with sounds is output |

| | | | | |
|---|---|---|---|---|
| L107-12 (ACC) - L107-10 (GND) | GR - BR | Accessory (ON) | Power switch off → on (ACC) | Below 1 V → 11 to 14 V |
| L107-5 (+B) - L107-10 (GND) | R - BR | Battery | Always | 11 to 14 V |
| L107-7 (RR-) - L107-10 (GND) | L - BR | Sound input signal (Front right) | Audio system playing | A waveform synchronized with sounds is output |
| L107-6 (RL-) - L107-10 (GND) | V - BR | Sound input signal (Front left) | Audio system playing | A waveform synchronized with sounds is output |
| L107-10 (GND) - Body ground | BR - Body ground | Ground | Always | Below 1 V |
| L107-9 (AMP+) - L107-10 (GND) | W - BR | Power source (IG) | Power switch off → on (IG) | Below 1 V → 11 to 14 V |
| L107-8 (WFR-) - L107-10 (GND) | L - BR | Sound signal (Front right) | Audio system playing | A waveform synchronized with sounds is output |
| L107-4 (WFL+) - L107-10 (GND) | P - BR | Sound signal (Front left) | Audio system playing | A waveform synchronized with sounds is output |
| L107-3 (WFR+) - L107-10 (GND) | LG - BR | Sound signal (Front right) | Audio system playing | A waveform synchronized with sounds is output |
| L107-11 (WFL-) - L107-10 (GND) | V - BR | Sound signal (Front left) | Audio system playing | A waveform synchronized with sounds is output |

**6. PARKING ASSIST ECU (w/ Advanced Parking Guidance System)** INFO

**7. DCM (TELEMATICS TRANSCEIVER) (w/ Manual (SOS) Switch)** INFO

# DTC CHECK / CLEAR

## 1. CHECK DTC (CHECK USING TECHSTREAM)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Navigation System / Trouble Codes.

(e) Check for DTC(s) and freeze frame data, and then write them down.

(f) Check the details of the DTC(s) INFO .

## 2. CLEAR DTC (CHECK USING TECHSTREAM)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Navigation System / Trouble Codes.

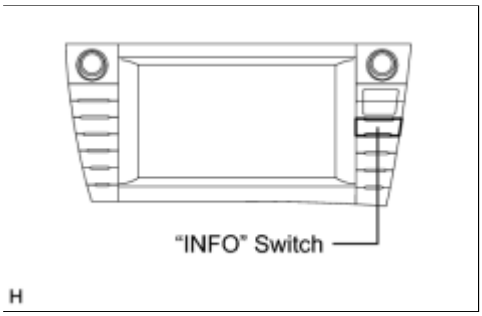
(e) Clear the DTCs.

## 3. START DIAGNOSTIC MODE

**HINT:**

- Illustrations may differ from the actual vehicle screen depending on the device settings and options. Therefore, some detailed areas may not be shown exactly the same as on the actual vehicle screen.
- To help find the malfunction when the system can not change to diagnostic mode, check for DTCs using the Techstream.
- After the power switch is turned on (IG), check that the map is displayed before starting diagnostic mode. Otherwise, some items cannot be checked.

(a) There are 2 methods to start diagnostic mode. Start the mode by using either of them.




(b) Method 1

(1) Start the hybrid system.

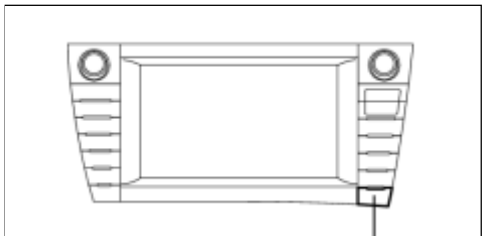
(2) While pressing and holding the "INFO" switch, operate the light control switch: off → Turn on → Turn off → Turn on → Turn off → Turn on → Turn off.

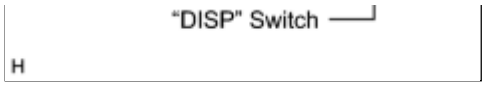
(3) Diagnostic mode starts and the "Service Menu" screen will be displayed. Service inspection starts automatically and the result will be displayed.

(c) Method 2

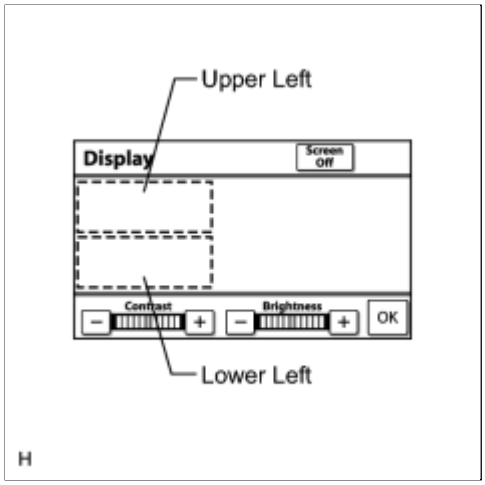
(1) Start the hybrid system.

(2) Press the "DISP" switch.






(3) From the display quality adjustment screen, touch the corners of the screen in the following order: Upper left → Lower left → Upper left → Lower left → Upper left → Lower left.

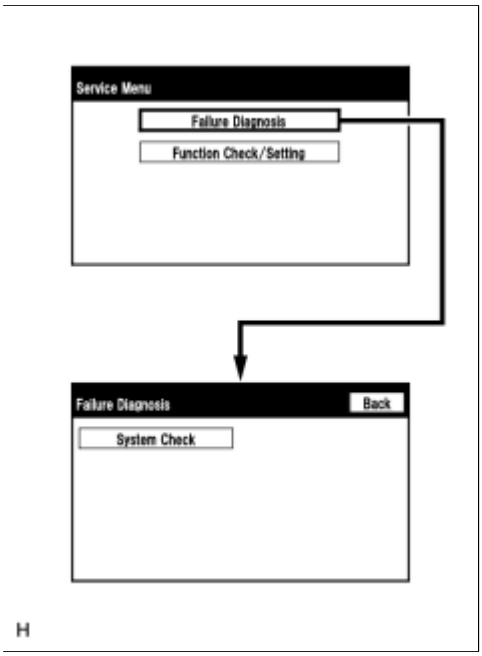



(4) Diagnostic mode starts and the "Service Menu" screen will be displayed.

### 4. FINISH DIAGNOSTIC MODE

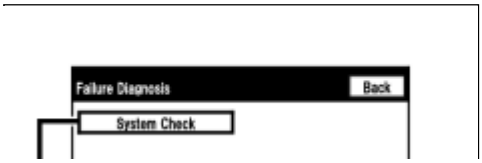
(a) Turn the power switch off.

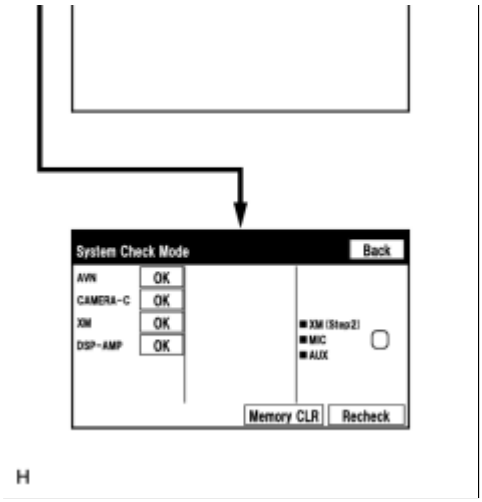
### 5. FAILURE DIAGNOSIS




(a) The "Failure Diagnosis" screen will be displayed by pressing the "Failure Diagnosis" switch on the "Service Menu" screen.

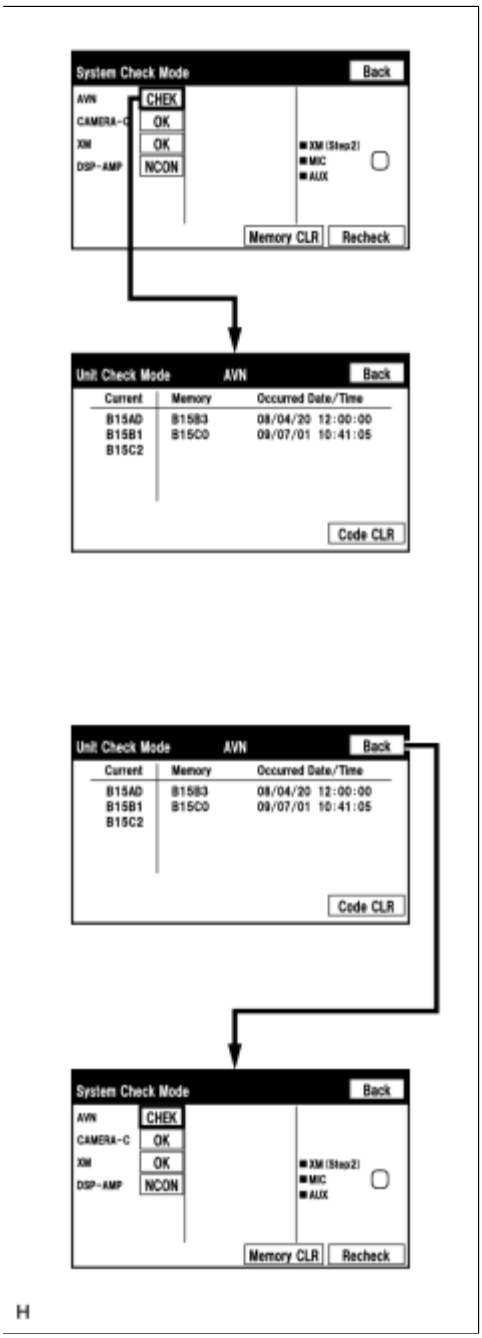
### 6. SYSTEM CHECK






(a) The "System Check Mode" screen will be displayed by pressing the "System Check" switch on the "Failure Diagnosis" screen.

## 7. CHECK DTC (CHECK USING SYSTEM CHECK MODE SCREEN)




(a) Read the system check result.

(1) If the check result is "EXCH" or "CHEK", touch the displayed check result to view the results on the "Unit Check Mode" screen and record them.

- When all results are "OK", this means that no DTCs are present.
- When proceeding to view the results of another device, press the "Back" switch to return to the "System Check Mode" screen. Repeat the step above to view the results of other devices.

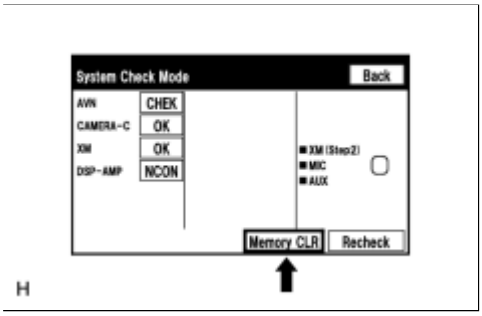
(2) Check the details of the DTC(s) INFO .

**NOTICE:**

**The navigation system outputs DTCs for the following system. When DTCs other than the codes in Diagnostic Trouble Code Chart for the navigation system are output, refer to Diagnostic Trouble Code Chart for the system.**

| SYSTEM | PROCEED TO |
|---|---|
| Advanced parking guidance system (w/ Advanced parking guidance system) | INFO |

## 8. DTC CLEAR / RECHECK (CLEAR USING SYSTEM CHECK MODE SCREEN)



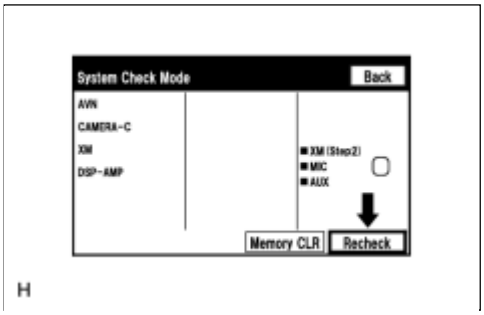

(a) Clear DTC

(1) Press the "Memory CLR" switch for 3 seconds.

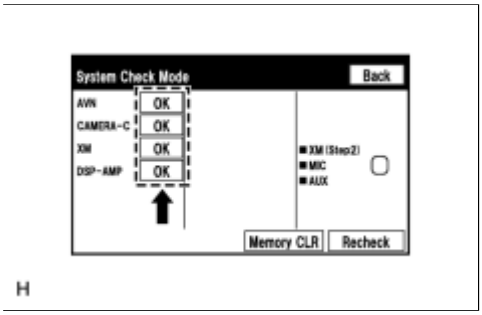
(2) Confirm that the check results are cleared.

- To clear the DTC for a specific device, clear the DTC using the "Unit Check Mode" screen.
- When clearing a DTC using the "Unit Check Mode" screen, press the "Code CLR" switch for 3 seconds.

(b) Recheck




(1) Press the "Recheck" switch.




(2) Confirm that all diagnostic codes are "OK" when the check results are displayed. If a code other than "OK" is displayed, troubleshoot again.

**HINT:**

**When a DTC was cleared using the "Unit Check Mode" screen, press the "Back" switch to return to the "System Check Mode" screen and perform this operation.**

# DIAGNOSTIC TROUBLE CODE CHART

**Navigation System**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| B1561 | XM Tuner Disconnected (Command Line) | 1. Stereo component tuner assembly power source circuit<br>2. AVC-LAN circuit between navigation receiver assembly and stereo component tuner assembly<br>3. Navigation receiver assembly<br>4. Stereo component tuner assembly | INFO |
| B1562 | XM Tuner Disconnected (Burst Mode) | 1. AVC-LAN plus circuit between display and navigation assembly and stereo component tuner assembly<br>2. Stereo component tuner assembly<br>3. Navigation receiver assembly | INFO |
| B1582 | Map Disk Reading Malfunction | 1. Map disc<br>2. Navigation receiver assembly | INFO |
| B1593 | No Response from Stereo Component Amplifier | 1. Stereo component amplifier assembly power source circuit<br>2. AVC-LAN circuit between navigation receiver assembly and stereo component amplifier assembly<br>3. Navigation receiver assembly<br>4. Stereo component amplifier assembly | INFO |
| B159F | No Response from XM Tuner | 1. Stereo component tuner assembly power source circuit<br>2. AVC-LAN circuit between navigation receiver assembly and stereo component tuner assembly<br>3. Navigation receiver assembly<br>4. Stereo component tuner assembly | INFO |
| B15A0 | LAN Master Malfunction | Navigation receiver assembly | INFO |
| B15A3 | Stereo Component Amplifier Malfunction | Stereo component amplifier assembly | INFO |
| B15AD | Navigation Processor Malfunction | Navigation receiver assembly | INFO |
| B15B0 | Display Screen Malfunction | Navigation receiver assembly | INFO |
| B15B3 | Radio Tuner Malfunction | Navigation receiver assembly | INFO |
| B15B7 | Bluetooth Module Malfunction | Navigation receiver assembly | INFO |
| B15BA | XM Tuner Malfunction | Stereo component tuner assembly | INFO |
| B15C0 | Short in GPS Antenna | 1. Wire harness<br>2. Navigation antenna assembly<br>3. Navigation receiver assembly | INFO |
| B15C1 | Open in GPS Antenna | 1. Wire harness<br>2. Navigation antenna assembly<br>3. Navigation receiver assembly | INFO |
| B15C2 | Speed Signal Malfunction | 1. Combination meter assembly (No. 3 meter circuit plate)<br>2. Wire harness or connector<br>3. No. 4 junction block<br>4. No. 3 junction block | INFO |

| | | | |
|---|---|---|---|
| | | 5. Navigation receiver assembly | |
| B15D3 | Stereo Component Amplifier Disconnected | 1. Stereo component amplifier assembly power source circuit<br>2. AVC-LAN circuit between navigation receiver assembly and stereo component amplifier assembly<br>3. Navigation receiver assembly<br>4. Stereo component amplifier assembly | INFO |
| B15D8 | Monitor Disconnected | 1. Parking assist ECU power source circuit<br>2. AVC-LAN circuit between navigation receiver assembly and parking assist ECU<br>3. Parking assist ECU<br>4. Navigation receiver assembly | INFO |
| B15E1 | Media Malfunction | 1. CD<br>2. Navigation receiver assembly | INFO |
| B15FE | XM Tuner Antenna Disconnected | 1. Amplifier antenna assembly (satellite radio antenna)<br>2. Stereo component tuner assembly | INFO |
| B15FF | XM Tuner Antenna Short | 1. Amplifier antenna assembly (satellite radio antenna)<br>2. Stereo component tuner assembly | INFO |
| U0073 | Control Module Communication Bus OFF | CAN communication system | INFO |

| | | |
|---|---|---|
| **DTC** | **B1561** | **XM Tuner Disconnected (Command Line)** |

| | | |
|---|---|---|
| **DTC** | **B159F** | **No Response from XM Tuner** |

# DESCRIPTION

The navigation receiver assembly and stereo component tuner assembly are connected by the AVC-LAN communication line.

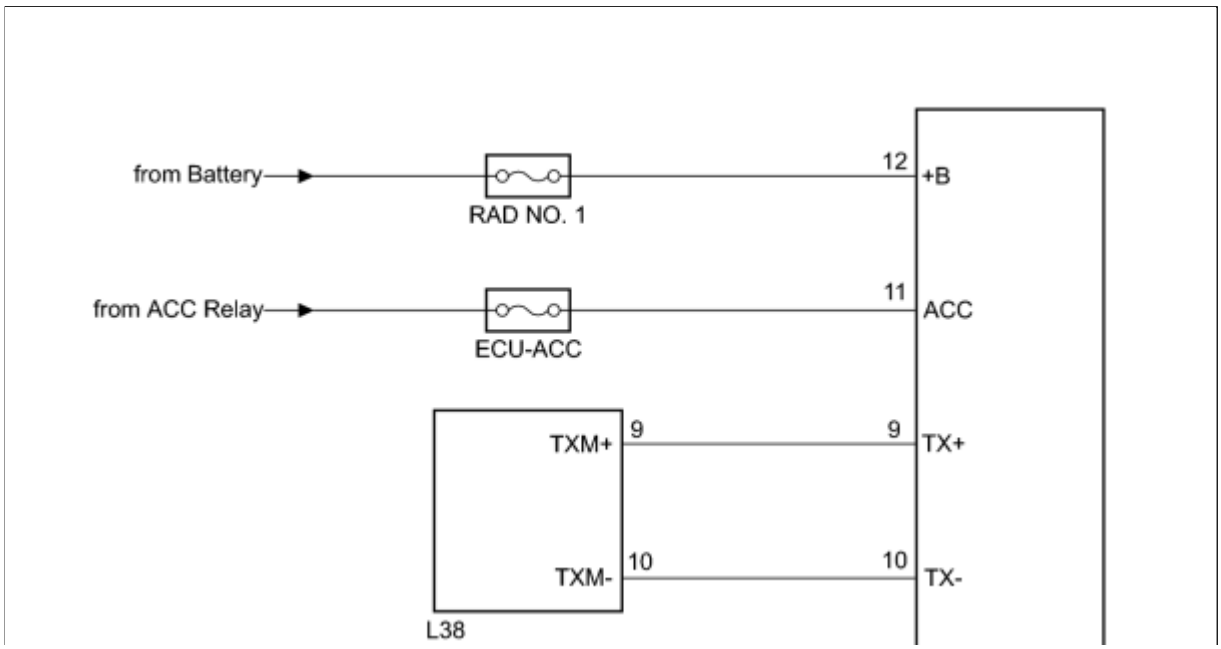
When an AVC-LAN communication error occurs between the navigation receiver assembly and stereo component tuner assembly, these DTCs will be stored.

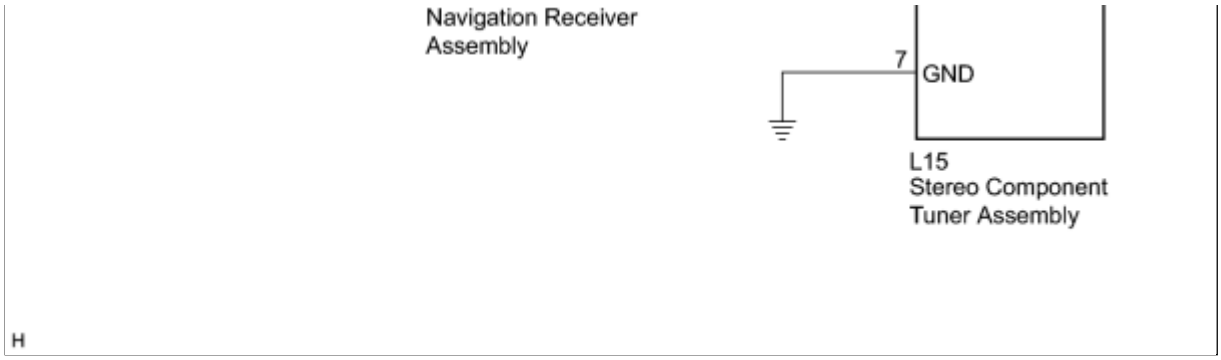
| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1561*1 | Stereo component tuner assembly is not/was not connected while the power switch is turned on (ACC or IG). | • Stereo component tuner assembly power source circuit<br>• AVC-LAN circuit between navigation receiver assembly and stereo component tuner assembly<br>• Navigation receiver assembly<br>• Stereo component tuner assembly |
| B159F | Within the time-out period, there was no response from the stereo component tuner assembly to the following requests from the master unit:<br>• System inspection request<br>• System inspection result request<br>• Diagnostic memory request | |

**HINT:**

- *1: Even if no fault is present, this DTC may be stored depending on the battery condition or hybrid system start voltage.
- The navigation receiver assembly is the master unit.

# WIRING DIAGRAM






## INSPECTION PROCEDURE

**NOTICE:**

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK OPTIONAL COMPONENTS (INCLUDING ASSOCIATED WIRING)** |

(a) Check for optional components

(1) Check that optional components (including associated wiring) which generate radio waves are not installed.

Result:

| RESULT | PROCEED TO |
|---|---|
| Optional components (including associated wiring) are installed. | A |
| Optional components (including associated wiring) are not installed. | B |

**HINT:**

- Electrical noise from radio waves generated by optional components or the wiring for those components may affect AVC-LAN communication.
- These DTCs may be stored when an AVC-LAN communication error occurs due to electrical noise.

**B** ▶ **CHECK DTC**

**A** ▼

| | |
|---|---|
| 2. | **REMOVE OPTIONAL COMPONENTS (INCLUDING ASSOCIATED WIRING)** |

(a) Remove optional components (including associated wiring).

**NOTICE:**

**Do not remove optional components or associated wiring without the permission of the customer.**

**NEXT**

| | |
|---|---|
| **3.** | **CHECK DTC** |

(a) Clear the DTCs INFO .

(b) Recheck for DTCs and check if the same DTC is output again.

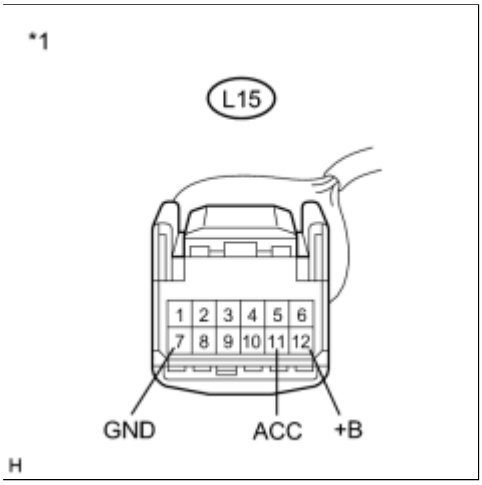
OK:

No DTCs are output.

**NG** ▶ **CHECK HARNESS AND CONNECTOR (STEREO COMPONENT TUNER ASSEMBLY POWER SOURCE)**

**OK** ▶ **END**

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (STEREO COMPONENT TUNER ASSEMBLY POWER SOURCE)** |




(a) Disconnect the L15 stereo component tuner assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L15-7 (GND) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L15-12 (+B) - L15-7 (GND) | Power switch off | 11 to 14 V |
| L15-11 (ACC) - L15-7 (GND) | Power switch on (ACC) | 11 to 14 V |

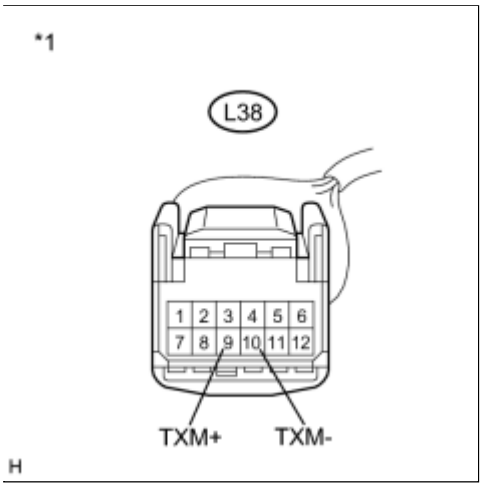
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Tuner Assembly) |

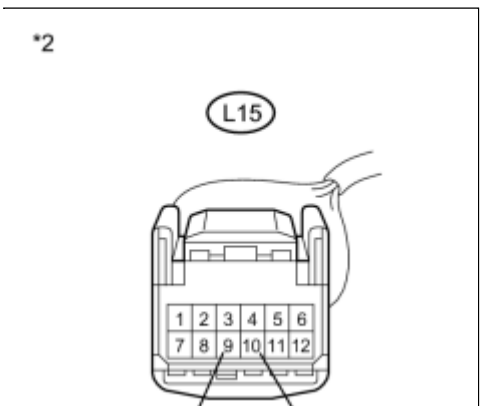
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

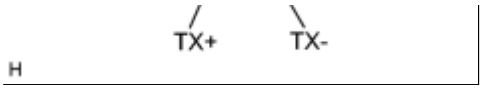
| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT TUNER)** |




(a) Disconnect the L38 navigation receiver assembly connector.




(b) Disconnect the L15 stereo component tuner assembly connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L38-9 (TXM+) - L15-9 (TX+) | Always | Below 1 Ω |
| L38-10 (TXM-) - L15-10 (TX-) | Always | Below 1 Ω |
| L38-9 (TXM+) - Body ground | Always | 10 kΩ or higher |
| L38-10 (TXM-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Tuner Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **6.** | **REPLACE STEREO COMPONENT TUNER ASSEMBLY** |

(a) Replace the stereo component tuner assembly INFO .

(b) Clear the DTCs INFO .

(c) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **END**

| DTC | B1562 | XM Tuner Disconnected (Burst Mode) |
|---|---|---|

## DESCRIPTION

The navigation receiver assembly and stereo component tuner assembly are connected by the AVC-LAN plus communication lines.

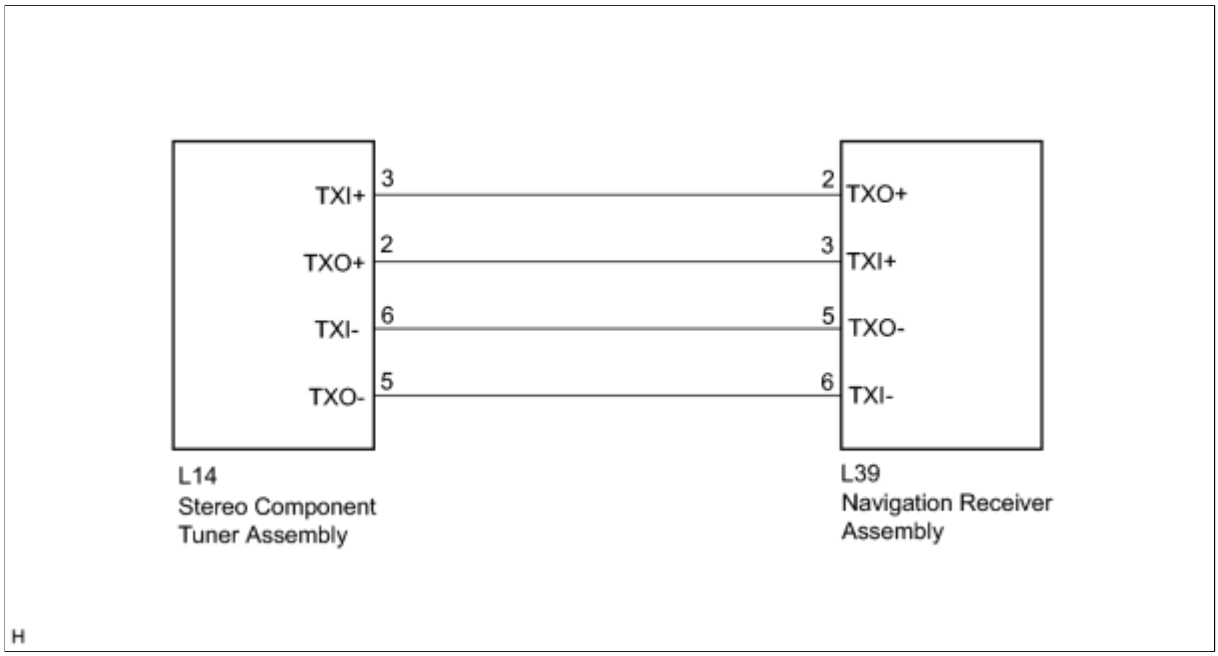
When an AVC-LAN plus communication error occurs between the navigation receiver assembly and stereo component tuner assembly, this DTC will be stored.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1562 | When the master unit deletes the satellite radio tuner from the system components device list due to an AVC-LAN plus communication error. | • AVC-LAN plus circuit between display and navigation assembly and stereo component tuner assembly<br>• Stereo component tuner assembly<br>• Navigation receiver assembly |

**HINT:**

**The navigation receiver assembly is the master unit.**

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

**After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.**

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK DTC** |

(a) Clear the DTC INFO .

(b) Recheck for DTCs and check if the same DTC is output again.

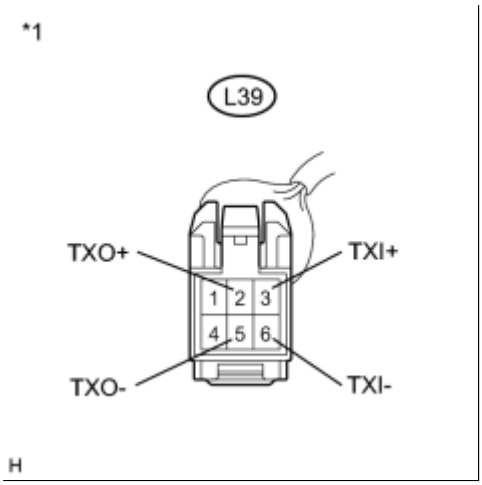
OK:

No DTCs are output.

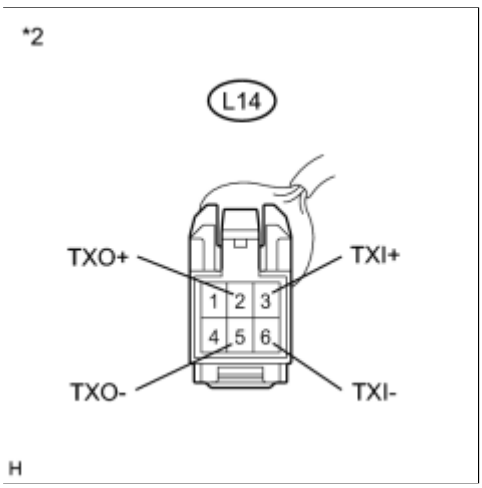
**NG** ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT TUNER)**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 2. | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT TUNER)** |




(a) Disconnect the L39 navigation receiver assembly connector.




(b) Disconnect the L14 stereo component tuner assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L39-2 (TXO+) - L14-3 (TXI+) | Always | Below 1 Ω |
| L39-3 (TXI+) - L14-2 (TXO+) | Always | Below 1 Ω |
| L39-5 (TXO-) - L14-6 (TXI-) | Always | Below 1 Ω |
| L39-6 (TXI-) - L14-5 (TXO-) | Always | Below 1 Ω |
| L39-2 (TXO+) - Body ground | Always | 10 kΩ or higher |
| L39-3 (TXI+) - Body ground | Always | 10 kΩ or higher |
| L39-5 (TXO-) - Body ground | Always | 10 kΩ or higher |
| L39-6 (TXI-) - Body ground | Always | 10 kΩ or higher |

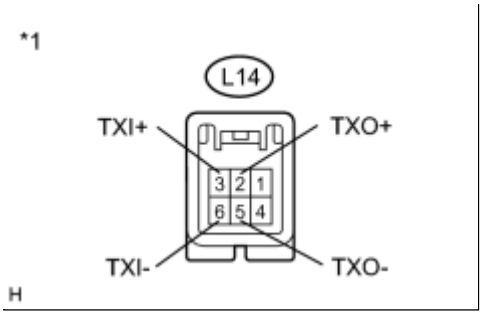
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Tuner Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**
▼

| | |
|---|---|
| **3.** | **INSPECT STEREO COMPONENT TUNER ASSEMBLY** |




(a) Disconnect the L14 stereo component tuner assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L14-2 (TXO+) - L14-3 (TXI+) | Always | Below 1 Ω |
| L14-5 (TXO-) - L14-6 (TXI-) | Always | Below 1 Ω |

**Text in Illustration**

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Stereo Component Tuner Assembly) |

**NG** ▶ **REPLACE STEREO COMPONENT TUNER ASSEMBLY**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

| DTC | B1582 | Map Disk Reading Malfunction |
|---|---|---|

## DESCRIPTION

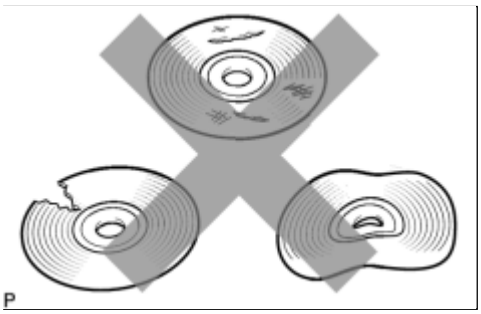
This DTC is stored when the navigation receiver assembly cannot read the map disc.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1582 | • Player error<br>• Scratches or dirt on the disc<br>• Access to an invalid address due to software error | • Map disc<br>• Navigation receiver assembly |

## INSPECTION PROCEDURE

## PROCEDURE

| 1. | CHECK MAP DISC |
|---|---|



(a) Check that the map disc is not deformed or cracked.

OK:

No deformations or cracks on the map disc

**NG** ▶ **REPLACE MAP DISC**

**OK**
▼

| 2. | DISC CLEANING |
|---|---|



(a) Disc cleaning

(1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.

**NOTICE:**




**Do not use a conventional record cleaner or anti-static preservative.**

**NEXT**

| | |
|---|---|
| **3.** | **CHECK DTC** |

(a) Clear the DTC INFO .

(b) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE MAP DISC**

**OK** ▶ **END**

| | |
|---|---|
| **4.** | **REPLACE MAP DISC** |

(a) Replace the map disc.

(b) Clear the DTC INFO .

(c) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **END**

| | | |
|---|---|---|
| **DTC** | **B1593** | **No Response from Stereo Component Amplifier** |

| | | |
|---|---|---|
| **DTC** | **B15D3** | **Stereo Component Amplifier Disconnected** |

## DESCRIPTION

The navigation receiver assembly and stereo component amplifier assembly are connected by the AVC-LAN communication line.

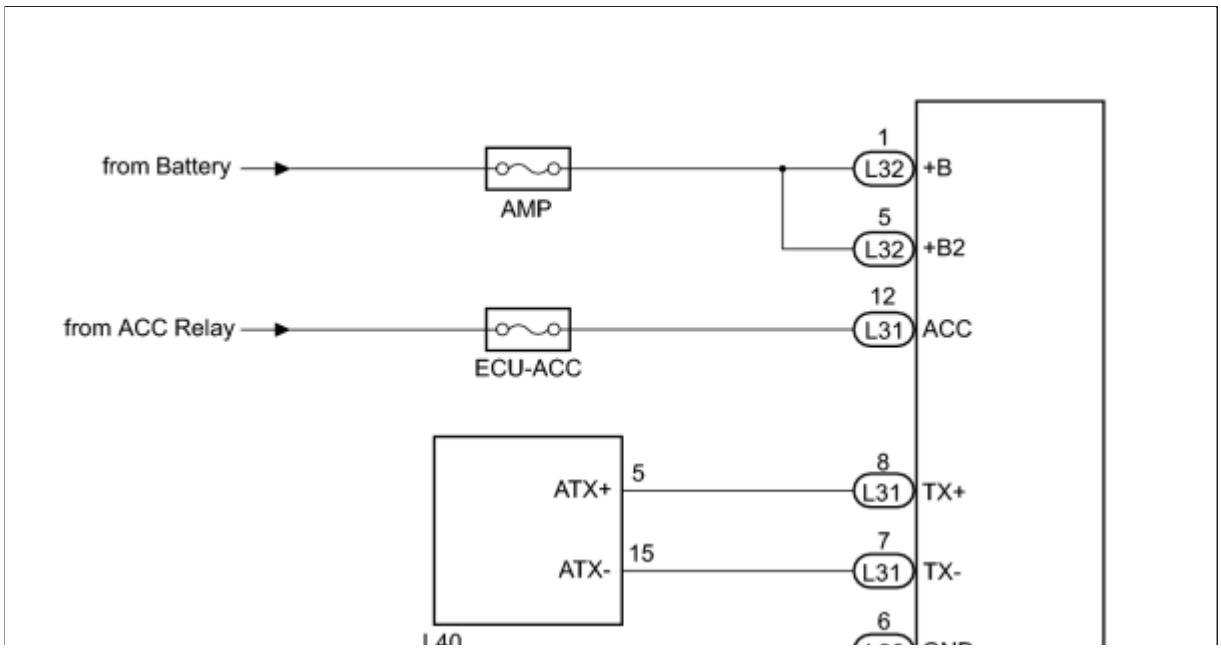
When an AVC-LAN communication error occurs between the navigation receiver assembly and stereo component amplifier assembly, these DTCs will be stored.

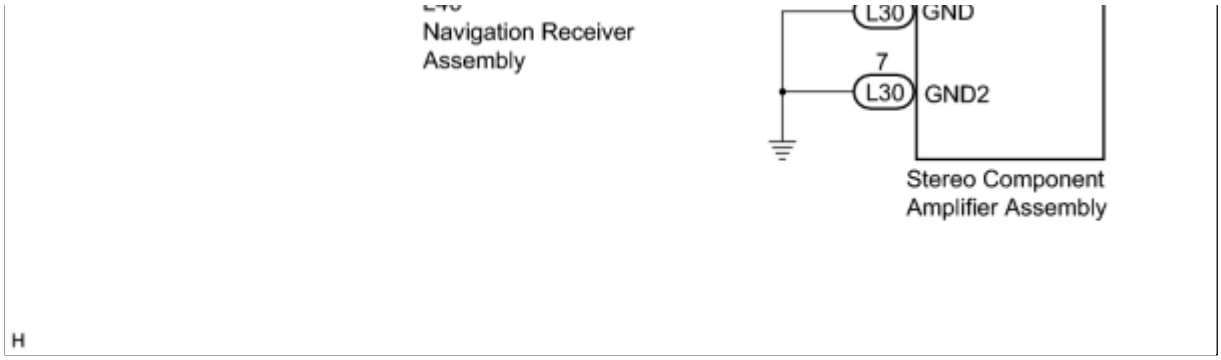
| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1593 | Within the time-out period, there was no response from the stereo component amplifier assembly to the following requests from the master unit:<br>• System inspection request<br>• System inspection result request<br>• Diagnostic memory request | • Stereo component amplifier assembly power source circuit<br>• AVC-LAN circuit between navigation receiver assembly and stereo component amplifier assembly<br>• Navigation receiver assembly<br>• Stereo component amplifier assembly |
| B15D3*1 | Stereo component amplifier assembly is/was not connected while the power switch is turned on (ACC or IG). | |

**HINT:**

- *1: Even if no fault is present, this DTC may be stored depending on the battery condition or hybrid system start voltage.
- The navigation receiver assembly is the master unit.

## WIRING DIAGRAM






## INSPECTION PROCEDURE

**NOTICE:**

**Inspect the fuses for circuits related to this system before performing the following inspection procedure.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK OPTIONAL COMPONENTS (INCLUDING ASSOCIATED WIRING)** |

(a) Check for optional components

(1) Check that optional components (including associated wiring) which generate radio waves are not installed.

Result:

| RESULT | PROCEED TO |
|---|---|
| Optional components (including associated wiring) are installed. | A |
| Optional components (including associated wiring) are not installed. | B |

**HINT:**

- Electrical noise from radio waves generated by optional components or the wiring for those components may affect AVC-LAN communication.
- These DTCs may be stored when an AVC-LAN communication error occurs due to electrical noise.

**B** ▶ **CHECK DTC**

**A** ▼

| | |
|---|---|
| **2.** | **REMOVE OPTIONAL COMPONENTS (INCLUDING ASSOCIATED WIRING)** |

(a) Remove optional components (including associated wiring).

**NOTICE:**

**NOTICE:**

**Do not remove optional components or associated wiring without the permission of the customer.**

**NEXT**

| | |
|---|---|
| **3.** | **CHECK DTC** |

(a) Clear the DTCs [INFO] .

(b) Recheck for DTCs and check if the same DTC is output again.

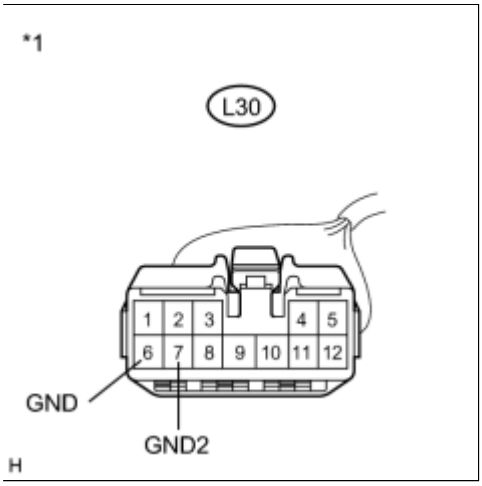
OK:

No DTCs are output.

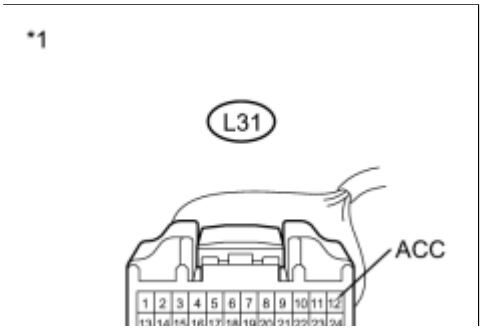
**NG** ▶ **CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER ASSEMBLY POWER SOURCE)**

**OK** ▶ **END**

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER ASSEMBLY POWER SOURCE)** |



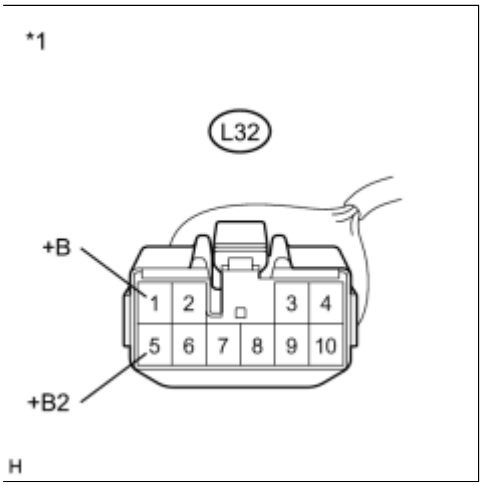

(a) Disconnect the L30 stereo component amplifier assembly connector.




(b) Disconnect the L31 stereo component amplifier assembly connector.



H




(c) Disconnect the L32 stereo component amplifier assembly connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L30-6 (GND) - Body ground | Always | Below 1 Ω |
| L30-7 (GND2) - Body ground | Always | Below 1 Ω |

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L32-1 (+B) - L30-6 (GND) | Power switch off | 11 to 14 V |
| L32-5 (+B2) - E30-6 (GND) | Power switch off | 11 to 14 V |
| L31-12 (ACC) - L30-6 (GND) | Power switch on (ACC) | 11 to 14 V |

**Text in Illustration**

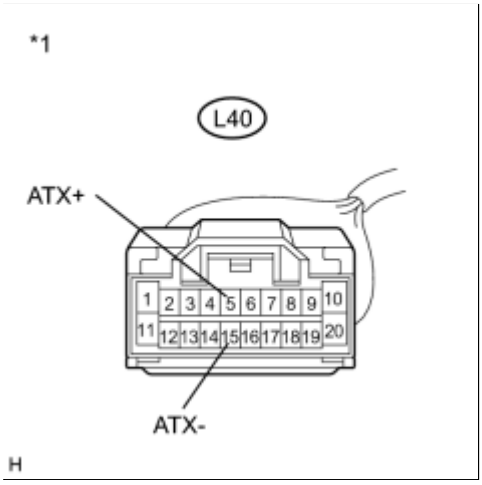
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

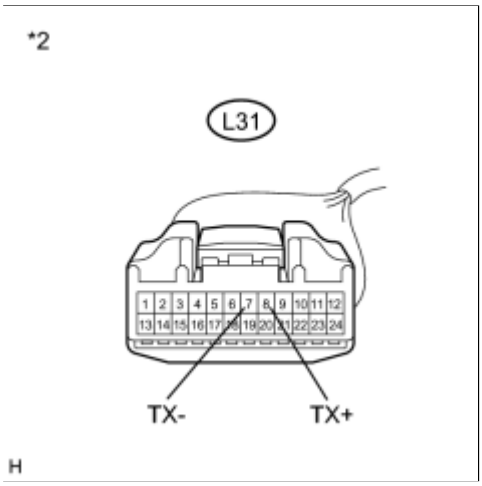
**OK** ▼

| | |
|---|---|
| | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT** |

| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT AMPLIFIER)** |




(a) Disconnect the L40 navigation receiver assembly connector.




(b) Disconnect the L31 stereo component amplifier assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-5 (ATX+) - L31-8 (TX+) | Always | Below 1 Ω |
| L40-15 (ATX-) - L31-7 (TX-) | Always | Below 1 Ω |
| L40-5 (ATX+) - Body ground | Always | 10 kΩ or higher |
| L40-15 (ATX-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

REPAIR OR REPLACE HARNESS OR CONNECTOR

**OK**

| | |
|---|---|
| **6.** | **REPLACE STEREO COMPONENT AMPLIFIER ASSEMBLY** |

(a) Replace the stereo component amplifier assembly INFO .

(b) Clear the DTCs INFO .

(c) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **END**

| | | |
|---|---|---|
| **DTC** | **B15A0** | **LAN Master Malfunction** |

| | | |
|---|---|---|
| **DTC** | **B15AD** | **Navigation Processor Malfunction** |

| | | |
|---|---|---|
| **DTC** | **B15B0** | **Display Screen Malfunction** |

| | | |
|---|---|---|
| **DTC** | **B15B3** | **Radio Tuner Malfunction** |

| | | |
|---|---|---|
| **DTC** | **B15B7** | **Bluetooth Module Malfunction** |

## DESCRIPTION

These DTCs are stored when a malfunction occurs in the navigation receiver assembly.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15A0 | When either condition below is met:<br>• Bus malfunction<br>• EEPROM error | Navigation receiver assembly |
| B15AD | When either condition below is met:<br>• A short to ground, short to +B or open occurs in the gyro signal circuit<br>• Gyro sensor malfunction | |
| B15B0 | Picture circuit (TFT unit) malfunction | |
| B15B3 | When one of the conditions below is met:<br>• AM tuner PLL is unlocked<br>• FM tuner PLL is unlocked<br>• Tuner malfunction | |
| B15B7 | "Bluetooth" module malfunction | |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC** |

(a) Clear the DTCs 

.

(b) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| **DTC** | **B15A3** | **Stereo Component Amplifier Malfunction** |

## DESCRIPTION

This DTC is stored when a malfunction occurs in the stereo component amplifier assembly.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15A3 | EEPROM error | Stereo component amplifier assembly |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC** |

(a) Clear the DTC 

.

(b) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE STEREO COMPONENT AMPLIFIER ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| **DTC** | **B15BA** | **XM Tuner Malfunction** |

## DESCRIPTION

This DTC is stored when a malfunction occurs in the stereo component tuner assembly.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15BA | When either condition below is met:<br>• Internal IC malfunction<br>• Stereo component tuner assembly malfunction | Stereo component tuner assembly |

## INSPECTION PROCEDURE

**NOTICE:**

**After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC** |

(a) Clear the DTC 

.

(b) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE STEREO COMPONENT TUNER ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| **DTC** | **B15C0** | **Short in GPS Antenna** |

| | | |
|---|---|---|
| **DTC** | **B15C1** | **Open in GPS Antenna** |

## DESCRIPTION

These DTCs are stored when a malfunction occurs in the navigation antenna assembly.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15C0 | Navigation antenna error | • Wire harness<br>• Navigation antenna assembly<br>• Navigation receiver assembly |
| B15C1 | Error of the power source to the navigation antenna | |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK CONNECTION OF ANTENNA CABLE** |

(a) Check if the navigation antenna cable is securely connected to the navigation receiver assembly.

OK:

GPS antenna cable is securely connected.

**NG** ▶ **SECURELY CONNECT NAVIGATION ANTENNA CABLE**

**OK** ▼

| | |
|---|---|
| **2.** | **REPLACE NAVIGATION ANTENNA ASSEMBLY** |

(a) Replace the navigation antenna assembly with a known good one and check if the same problem occurs again INFO .

(1) Clear the DTCs INFO .

(2) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **END**

| DTC | B15C2 | Speed Signal Malfunction |
|---|---|---|

## DESCRIPTION

The navigation receiver assembly receives a vehicle speed signal from the combination meter assembly (No. 3 meter circuit plate) and information from the navigation antenna, and then adjusts vehicle position.

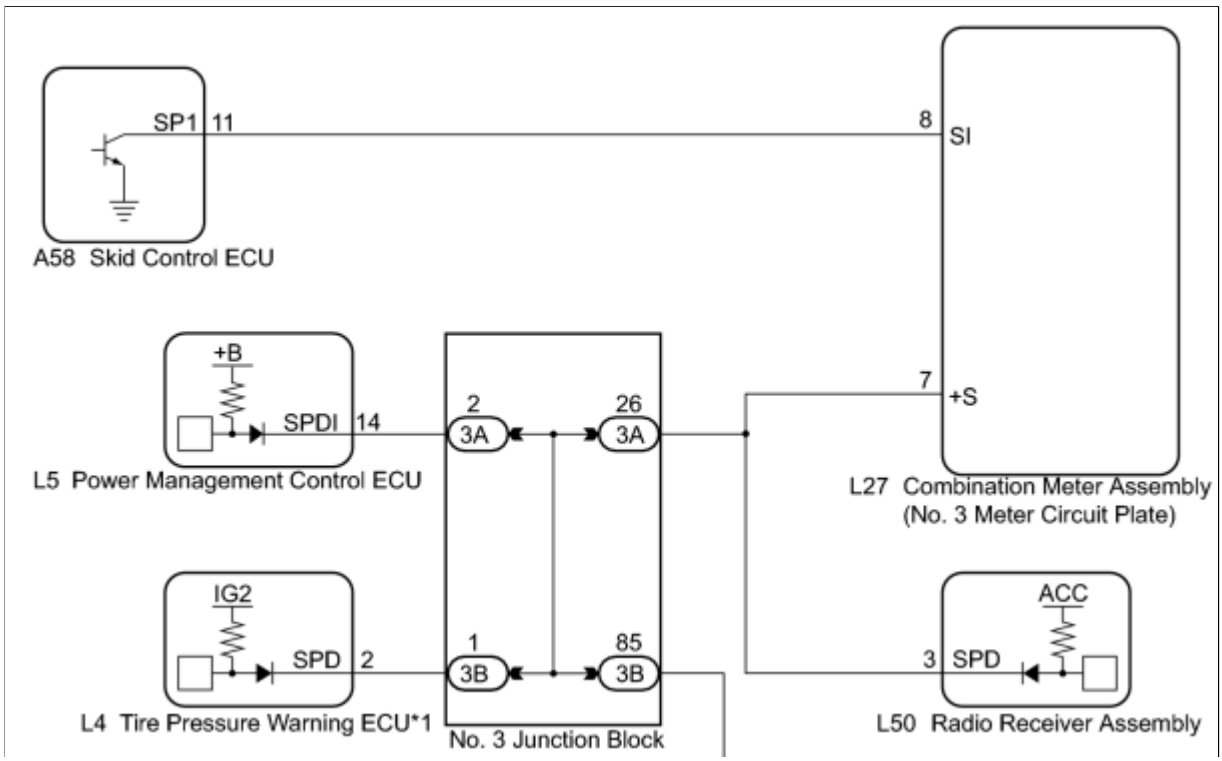
The navigation receiver assembly stores this DTC when the difference between the speed information that the navigation antenna receives and the SPD pulse received from the combination meter assembly (No. 3 meter circuit plate) becomes large.

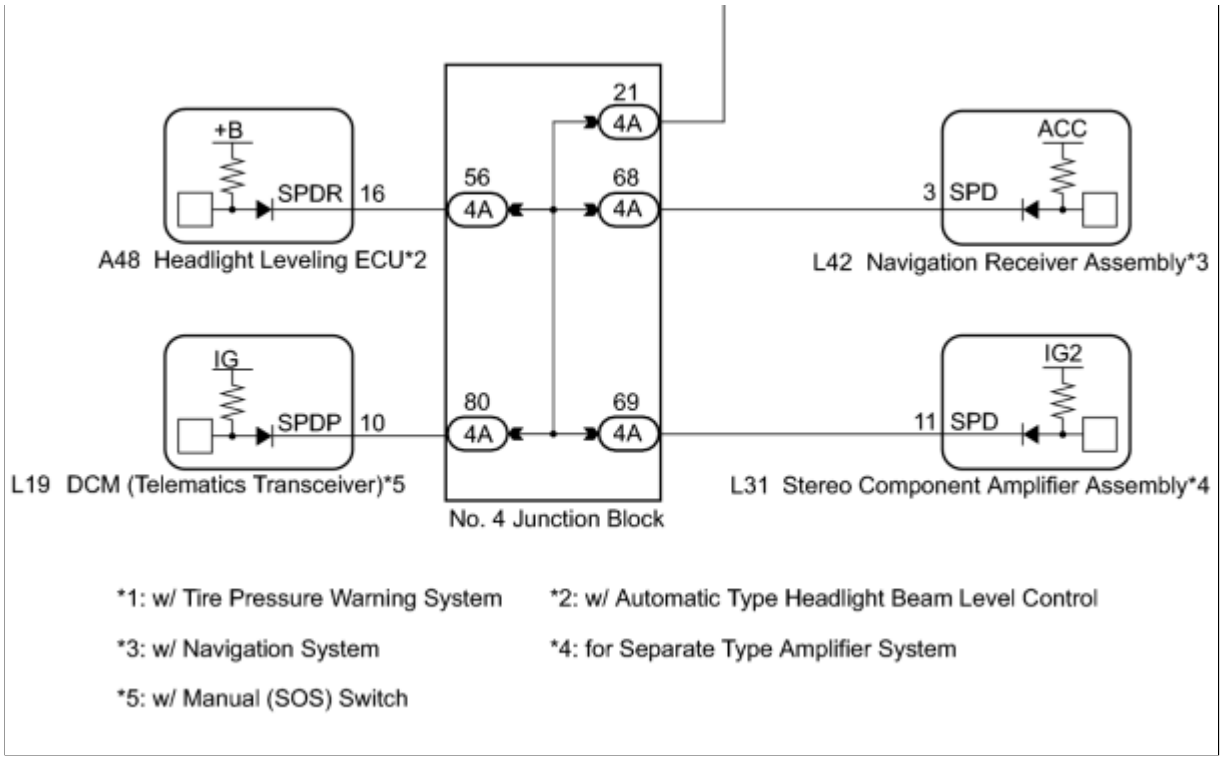
**HINT:**

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter assembly (No. 3 meter circuit plate). The signal is changed to a pulse signal at the transistor in the combination meter assembly (No. 3 meter circuit plate). Each ECU controls the respective systems based on the pulse signal.
- If a short occurs in any of the ECUs or in the wire harness connected to an ECU, all systems in the diagram below will not operate normally.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15C2 | A difference between the GPS speed and SPD pulse is detected. | • Combination meter assembly (No. 3 meter circuit plate)<br>• Wire harness or connector<br>• No. 4 junction block<br>• No. 3 junction block<br>• Navigation receiver assembly |

## WIRING DIAGRAM

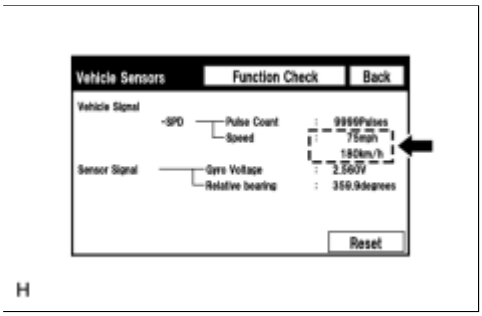





## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK VEHICLE SENSOR (OPERATION CHECK) |




(a) Enter the "Vehicle Sensors" screen. Refer to Check GPS & Vehicle Sensors in Operation Check INFO .

(b) While driving the vehicle, compare the "SPD" indicator to the reading on the speedometer. Check if these readings are almost equal.

**HINT:**

**The meter ECU receives the vehicle speed signal from the skid control ECU via CAN communication. Therefore, perform the following inspection referring to values on the Data List of the skid control ECU because it is the source of the vehicle speed signal.**

OK:

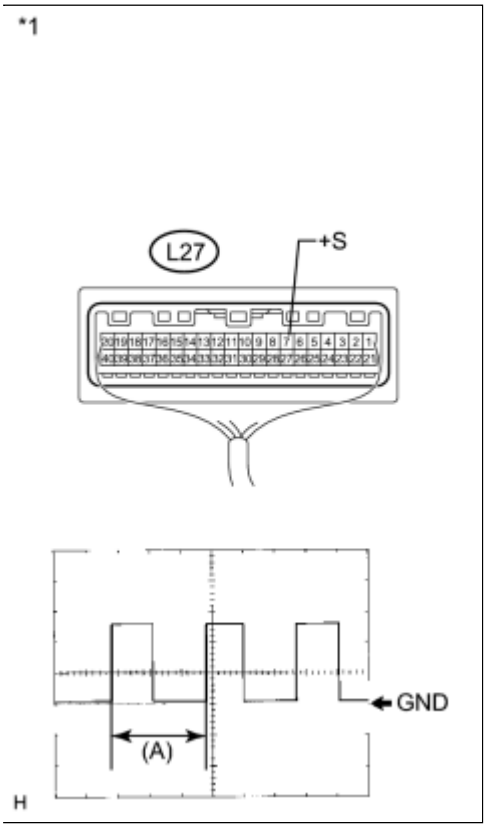
Vehicle speed displayed on the "Vehicle Sensors" screen is almost the same as the actual vehicle speed measured using the Techstream INFO .

NG ▶ INSPECT COMBINATION METER ASSEMBLY (NO. 3

NG ▶ METER CIRCUIT PLATE OUTPUT WAVEFORM)

OK ▶ REPLACE NAVIGATION RECEIVER ASSEMBLY

| | |
|---|---|
| 2. | INSPECT COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE OUTPUT WAVEFORM) |




(a) Check the output waveform.

(1) Remove the combination meter assembly with the connector(s) still connected.

(2) Connect an oscilloscope to terminal L27-7 (+S) and body ground.

(3) Turn the power switch on (IG).

(4) Turn a wheel slowly.

(5) Check the signal waveform according to the condition(s) in the table below.

| ITEM | CONDITION |
|---|---|
| Measurement terminal | L27-7 (+S) - Body ground |
| Tool setting | 5 V/DIV., 20 ms./DIV. |
| Vehicle condition | Wheel being rotated |

OK:

The waveform is similar to that shown in the illustration.

**HINT:**

**When the system is functioning normally, one wheel revolution generates 4 pulses. As the vehicle speed increases, the width indicated by (A) in the illustration narrows.**

**Text in Illustration**

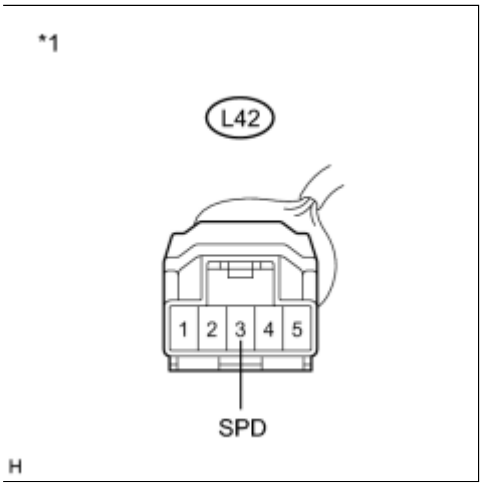
| | |
|---|---|
| *1 | Component with harness connected<br>(Combination Meter Assembly) |

NG ▶ GO TO METER / GAUGE SYSTEM

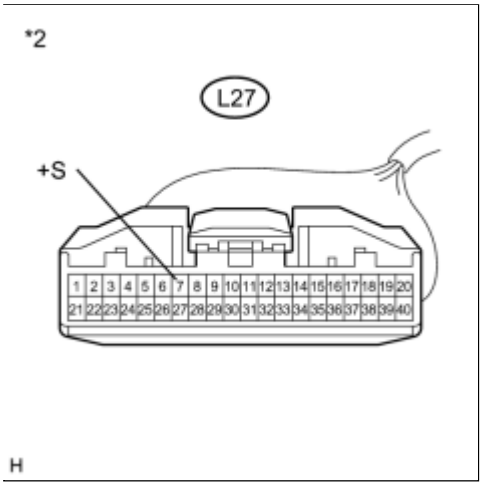
OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - COMBINATION METER ASSEMBLY) |

| | |
|---|---|
| | METER ASSEMBLY) |




(a) Disconnect the L42 navigation receiver assembly connector.




(b) Disconnect the L27 combination meter assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L42-3 (SPD) - L27-7 (+S) | Always | Below 1 Ω |

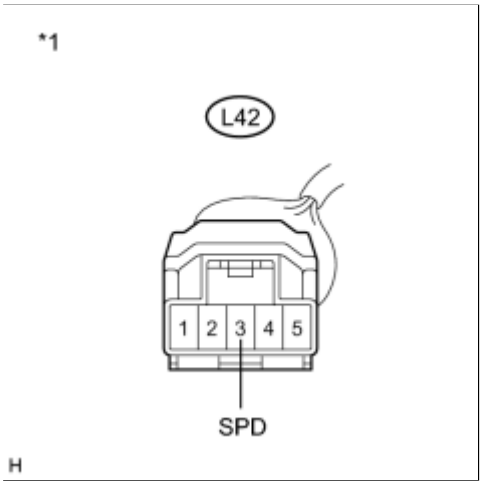
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Combination Meter Assembly) |

**NG** ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - NO. 4 JUNCTION CONNECTOR)**

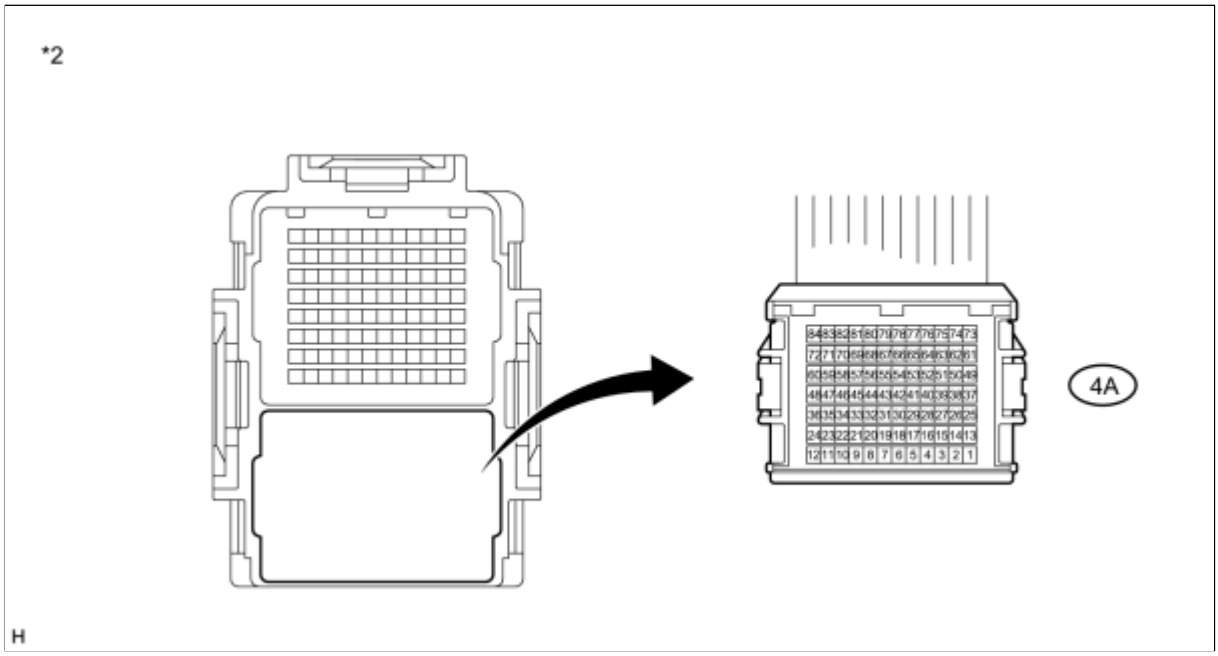
**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - NO. 4 JUNCTION CONNECTOR)** |




(a) Disconnect the L42 navigation receiver assembly connector.

(b) Disconnect the 4A No. 4 junction block connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L42-3 (SPD) - 4A-68 | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector |

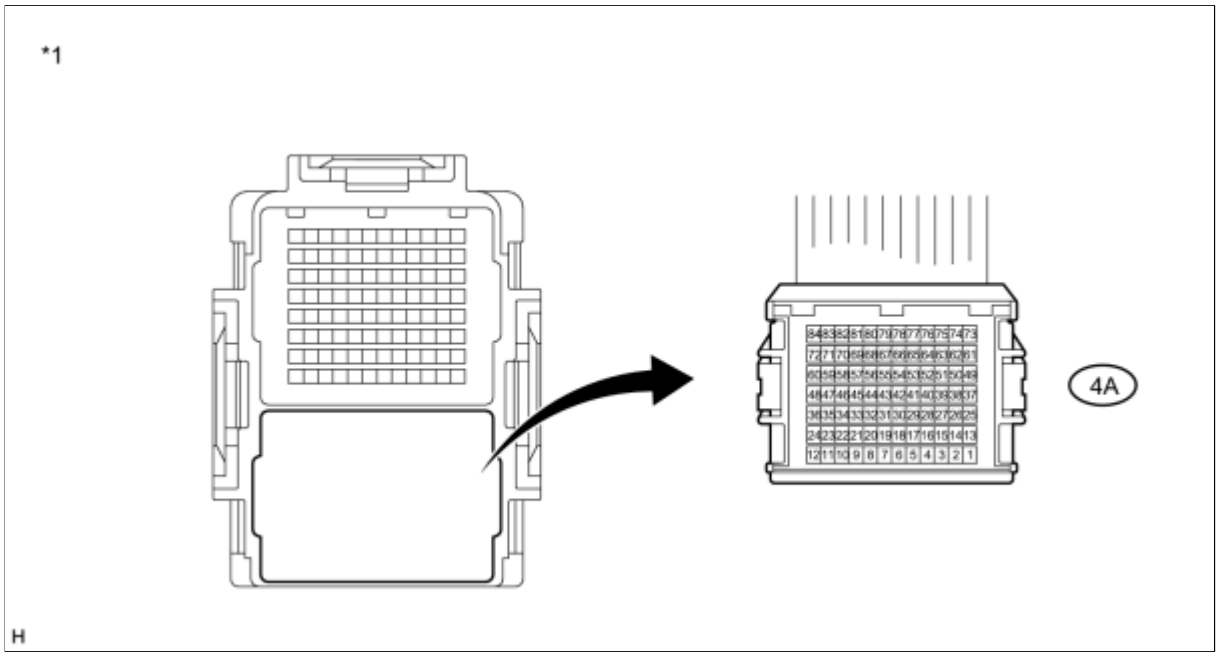
| | |
|---|---|
| | (to No. 4 Junction Block) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - NO. 4 JUNCTION CONNECTOR)**

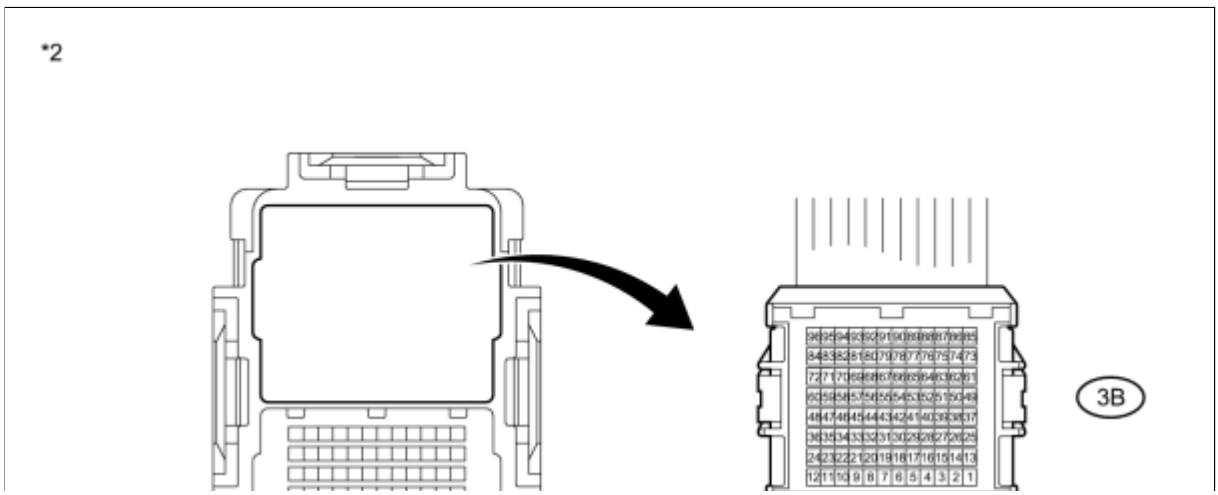
**OK** ▼

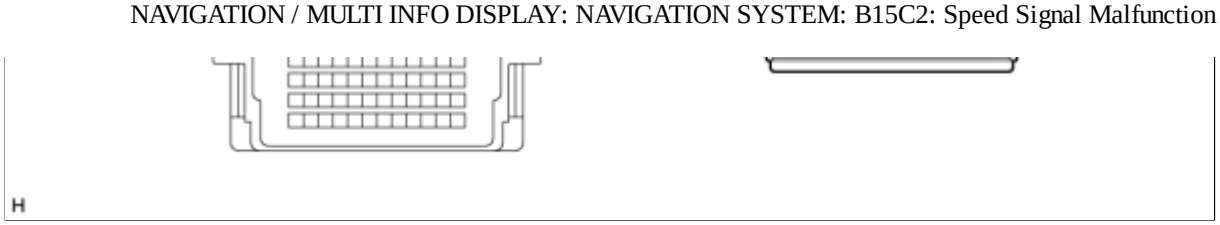
| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR (No. 4 JUNCTION CONNECTOR - NO. 3 JUNCTION CONNECTOR)** |

(a) Disconnect the 4A No. 4 junction block connector.




(b) Disconnect the 3B No. 3 junction block connector.






(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 4A-21 - 3B-85 | Always | Below 1 Ω |

**Text in Illustration**

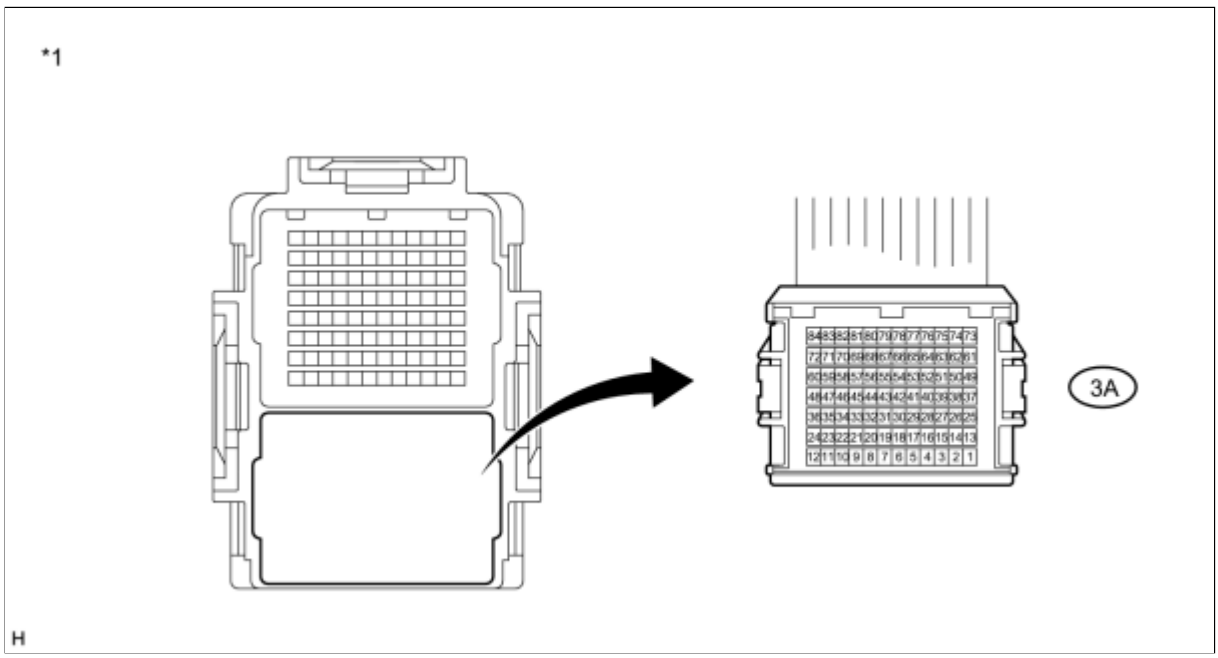
| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector (to No. 4 Junction Block) | *2 | Front view of wire harness connector (to No. 3 Junction Block) |

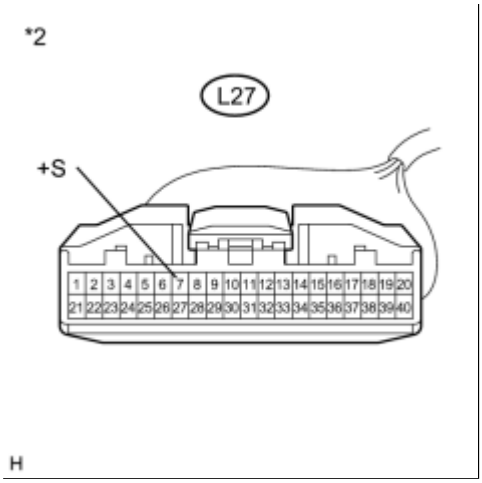
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (NO. 4 JUNCTION CONNECTOR - NO. 3 JUNCTION CONNECTOR)**

**OK** ▼

| | |
|---|---|
| **6.** | **CHECK HARNESS AND CONNECTOR (NO. 3 JUNCTION CONNECTOR - COMBINATION METER ASSEMBLY)** |

(a) Disconnect the 3A No. 3 junction block connector.






(b) Disconnect the L27 combination meter assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 3A-26 - L27-7 (+S) | Always | Below 1 Ω |

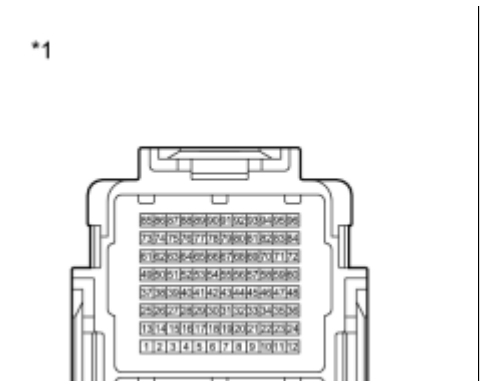
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to No. 3 Junction Block) |
| *2 | Front view of wire harness connector<br>(to Combination Meter Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (NO. 3 JUNCTION CONNECTOR - COMBINATION METER ASSEMBLY)**

**OK** ▼

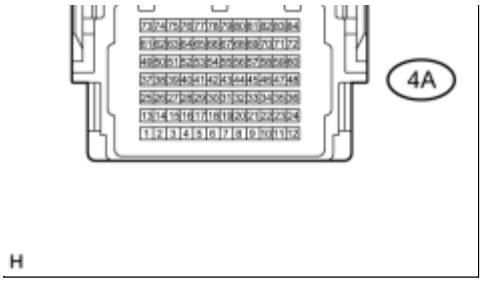
| | |
|---|---|
| **7.** | **REPLACE NO. 4 JUNCTION BLOCK** |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|




| | | |
|---|---|---|
| 4A-68 - 4A-21 | Always | Below 1 Ω |

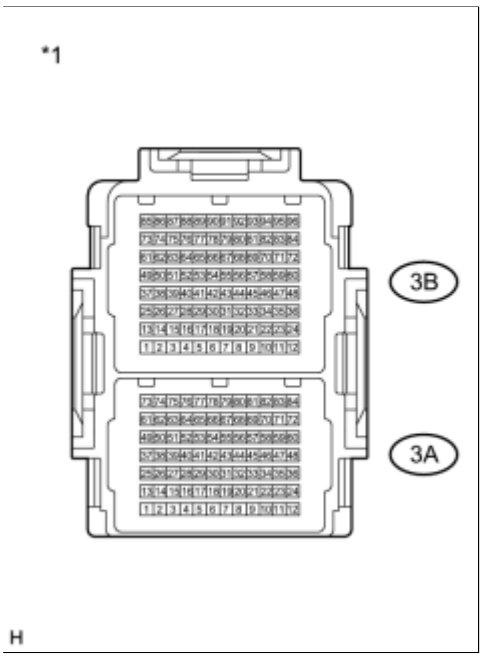
**Text in Illustration**

| | |
|---|---|
| *1 | No. 4 Junction Block |

**NG** ▶ **REPLACE NO. 4 JUNCTION BLOCK**

**OK** ▼

| | |
|---|---|
| **8.** | **REPLACE NO. 3 JUNCTION BLOCK** |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 3A-26 - 3B-85 | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | No. 3 Junction Block |

**NG** ▶ **REPLACE NO. 3 JUNCTION BLOCK**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

| | | |
|---|---|---|
| **DTC** | **B15D8** | **Monitor Disconnected** |

## DESCRIPTION

The navigation receiver assembly and parking assist ECU are connected by the AVC-LAN communication line.

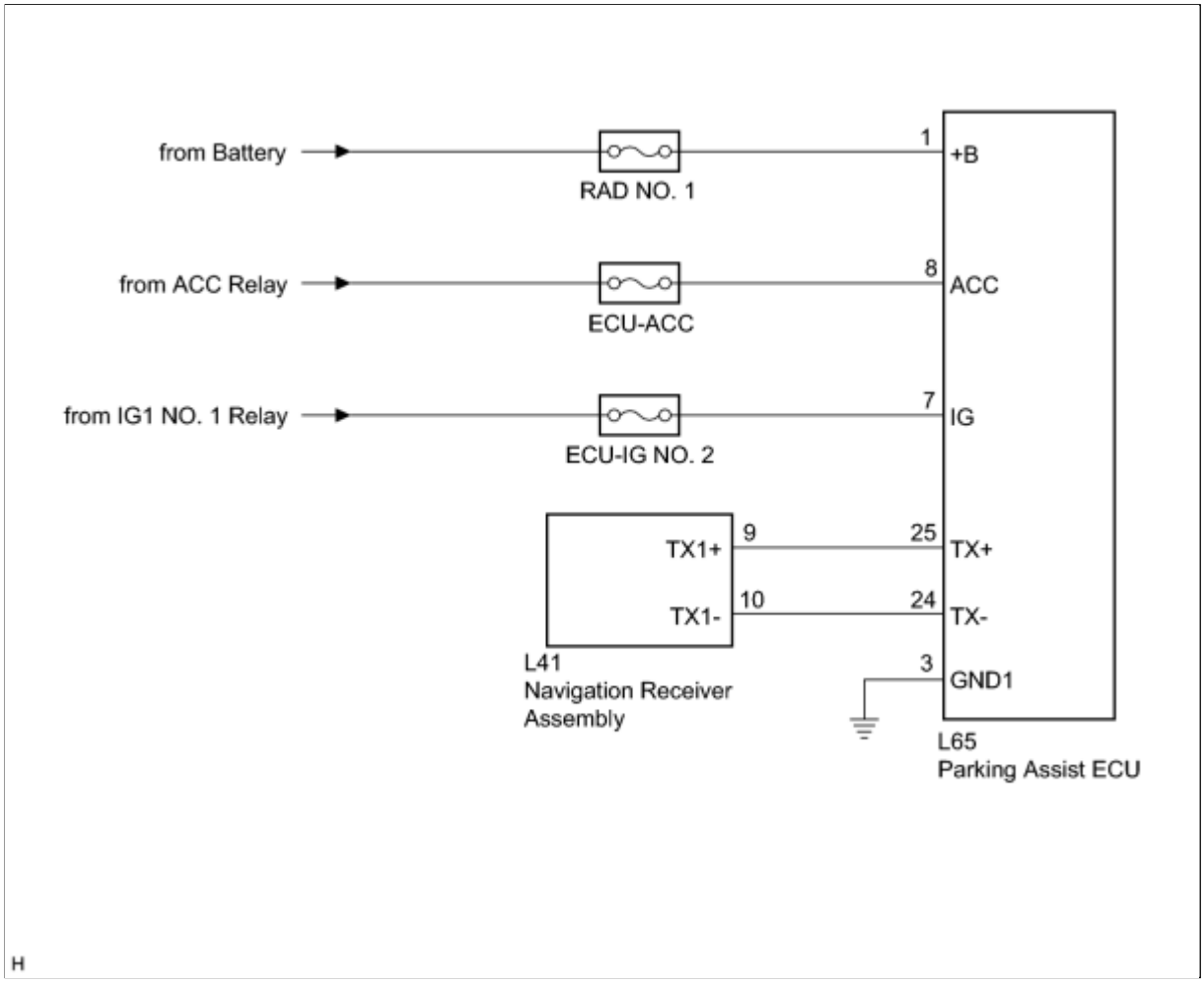
When an AVC-LAN communication error occurs between the navigation receiver assembly and parking assist ECU, this DTC will be stored.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15D8 | Parking assist ECU is not/was not connected while the power switch is turned to on (ACC or IG). | • Parking assist ECU power source circuit<br>• AVC-LAN circuit between navigation receiver assembly and parking assist ECU<br>• Parking assist ECU<br>• Navigation receiver assembly |

**HINT:**

**The navigation receiver assembly is the master unit.**

## WIRING DIAGRAM



## INSPECTION PROCEDURE

**NOTICE:**

**Inspect the fuses for circuits related to this system before performing the following inspection procedure.**

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK OPTIONAL COMPONENTS (INCLUDING ASSOCIATED WIRING)** |

(a) Check for optional components.

(1) Check that optional components (including associated wiring) which generate radio waves are not installed.

Result:

| RESULT | PROCEED TO |
|---|---|
| Optional components (including associated wiring) are installed. | A |
| Optional components (including associated wiring) are not installed. | B |

**HINT:**

- Electrical noise from radio waves generated by optional components or the wiring for those components may affect AVC-LAN communication.
- This DTC may be stored when an AVC-LAN communication error occurs due to electrical noise.

**B** ▶ **CHECK DTC**

**A**

▼

| | |
|---|---|
| 2. | **REMOVE OPTIONAL COMPONENTS (INCLUDING ASSOCIATED WIRING)** |

(a) Remove optional components (including associated wiring).

**NOTICE:**

**Do not remove optional components or associated wiring without the permission of the customer.**

**NEXT**

▼

| | |
|---|---|
| 3. | **CHECK DTC** |

| | |
|---|---|
| 3. | CHECK DTC |

(a) Clear the DTCs INFO .

(b) Recheck for DTCs and check if the same DTC is output again.

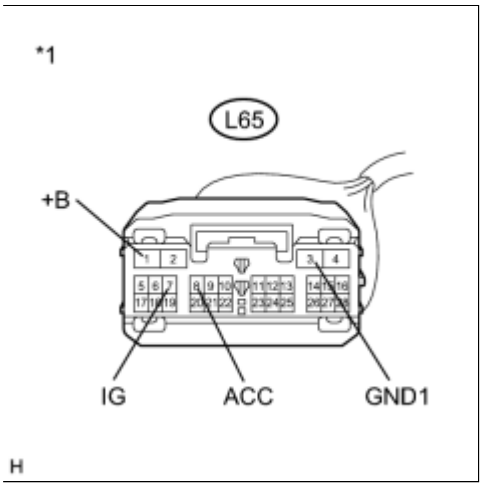
OK:

No DTCs are output.

NG ▶ CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU POWER SOURCE)

OK ▶ END

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU POWER SOURCE) |




(a) Disconnect the L65 parking assist ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-3 (GND1) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-1 (+B) - L65-3 (GND1) | Power switch off | 11 to 14 V |
| L65-7 (IG) - L65-3 (GND1) | Power switch on (IG) | 11 to 14 V |
| L65-8 (ACC) - L65-3 (GND1) | Power switch on (ACC) | 11 to 14 V |

**Text in Illustration**

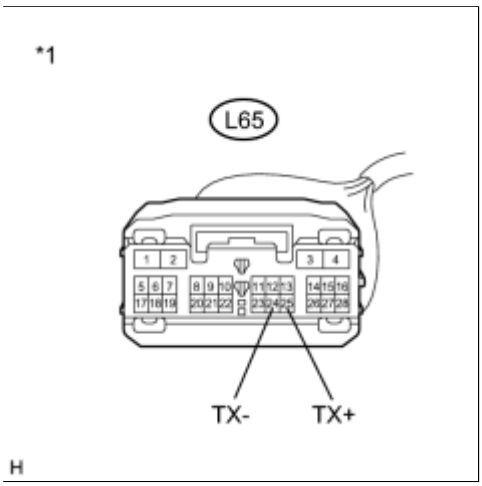
| | |
|---|---|
| | Front view of wire harness connector |

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Parking Assist ECU) |

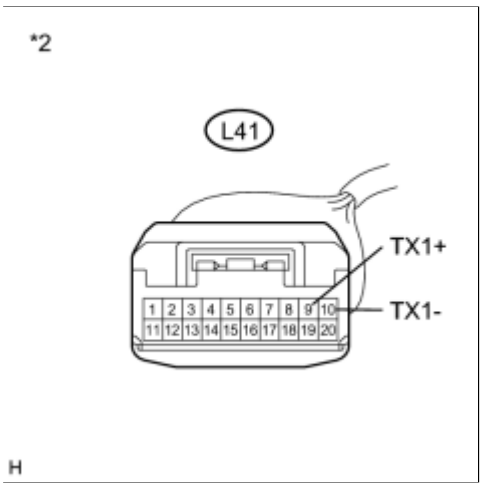
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU - NAVIGATION RECEIVER ASSEMBLY)** |




(a) Disconnect the L65 parking assist ECU connector.




(b) Disconnect the L41 navigation receiver assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-25 (TX+) - L41-9 (TX1+) | Always | Below 1 Ω |
| L65-24 (TX-) - L41-10 (TX1-) | Always | Below 1 Ω |
| L65-25 (TX+) - Body ground | Always | 10 kΩ or higher |

| | | |
|---|---|---|
| L65-25 (TX+) - Body ground | Always | 10 kΩ or higher |
| L65-24 (TX-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Parking Assist ECU) |
| *2 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **6.** | **REPLACE PARKING ASSIST ECU** |

(a) Replace the parking assist ECU [INFO] .

(b) Clear the DTCs [INFO] .

(c) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **END**

| DTC | B15E1 | Media Malfunction |
|---|---|---|

## DESCRIPTION

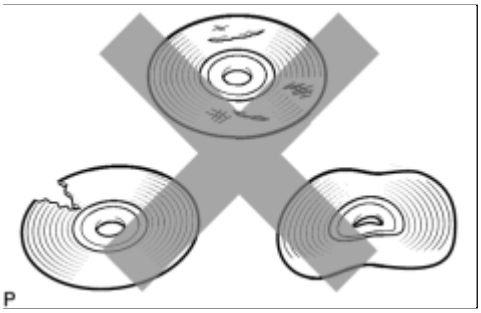
This DTC is stored when the navigation receiver assembly cannot read the media.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15E1 | When one of the conditions below is met:<br>• An unsuitable disc is inserted.<br>• The disc cannot be read.<br>• The disc cannot be read because of dirt or scratches.<br>• The disc cannot be read because it is inserted upside down.<br>• The disc cannot be read because a high or low temperature is detected.<br>• Internal power supply abnormality<br>• There are no playable files.<br>• The disc contains unreadable copy-protected content. | • CD<br>• Navigation receiver assembly |

## INSPECTION PROCEDURE

## PROCEDURE

| 1. | CHECK DISC |
|---|---|



(a) Check that the disc is not deformed or cracked.

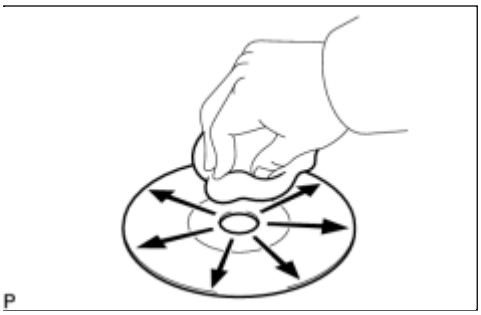
OK:

No deformation or cracks on the disc

**NG** ▶ **CHANGE DISC**

**OK** ▼

| 2. | DISC CLEANING |
|---|---|




(a) Disc cleaning

(1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.

**NOTICE:**

**Do not use a conventional record cleaner or anti-static preservative.**

**NEXT**

| | |
|---|---|
| **3.** | **REPLACE DISC WITH ANOTHER AND RECHECK** |

(a) Replace the disc with another and recheck.

(b) Clear the DTC INFO .

(c) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **END**

| | | |
|---|---|---|
| **DTC** | **B15FE** | **XM Tuner Antenna Disconnected** |

| | | |
|---|---|---|
| **DTC** | **B15FF** | **XM Tuner Antenna Short** |

## DESCRIPTION

These DTCs are stored when a malfunction occurs in the amplifier antenna assembly (satellite radio antenna) which is connected to the stereo component tuner assembly.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B15FE | The satellite radio antenna is not connected. | • Amplifier antenna assembly (satellite radio antenna)<br>• Stereo component tuner assembly |
| B15FF | A short occurs in the satellite radio antenna. | |

## INSPECTION PROCEDURE

**NOTICE:**

**After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK CONNECTION OF ANTENNA CABLE** |

(a) Check if the satellite radio antenna cable is securely connected to the stereo component tuner assembly.

OK:

Satellite radio antenna cable is securely connected.

**NG** ▶ **SECURELY CONNECT SATELLITE RADIO ANTENNA CABLE**

**OK**

▼

| | |
|---|---|
| **2.** | **REPLACE AMPLIFIER ANTENNA ASSEMBLY (SATELLITE RADIO ANTENNA)** |

(a) Replace the amplifier antenna assembly (satellite radio antenna) INFO .

(b) Clear the DTCs INFO .

(c) Recheck for DTCs and check if the same DTC is output again.

OK:

OK:

No DTCs are output.

**NG** ▶ **REPLACE STEREO COMPONENT TUNER ASSEMBLY**

**OK** ▶ **END**

| | | |
|---|---|---|
| **DTC** | **U0073** | **Control Module Communication Bus OFF** |

## DESCRIPTION

This DTC is stored when a malfunction occurs in the CAN communication circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| U0073 | CAN bus connection error | CAN communication system |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC** |

(a) Clear the DTC 

.

(b) Recheck for DTCs and check if the same DTC is output again.

OK:

No DTCs are output.

**NG** ▶ **GO TO CAN COMMUNICATION SYSTEM**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

**Satellite Radio Broadcast cannot be Received**

## INSPECTION PROCEDURE

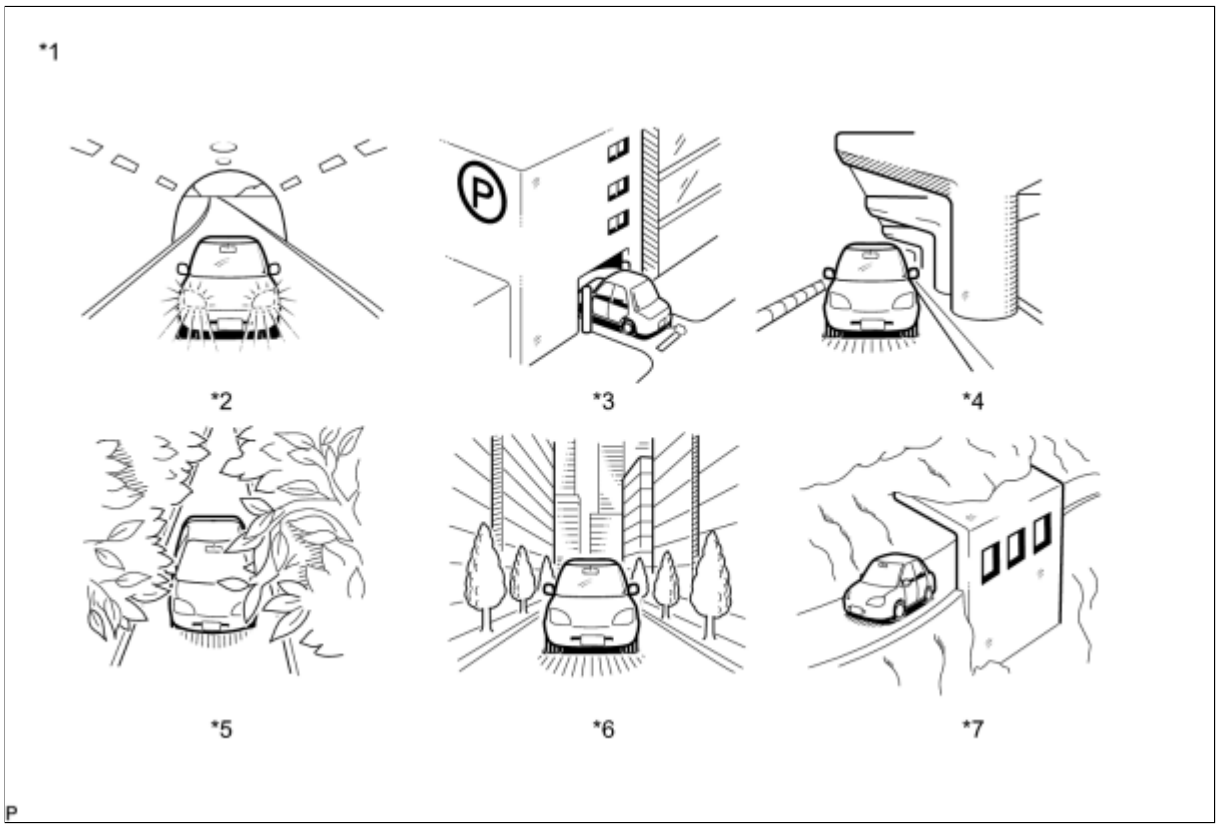
**NOTICE:**

- Some satellite radio broadcasts require payment. A contract must be made between a satellite radio service and the user. If the contract expires, it will not be possible to listen to the broadcast.
- After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.

## PROCEDURE

| | |
|---|---|
| 1. | CHECK SURROUNDINGS |

(a) Check if the vehicle is in an environment where reception is difficult due to something blocking the area above the vehicle.




**HINT:**

**If the area above the vehicle is blocked, such as when in a building or tunnel, reception may not be possible.**

OK:

Area above vehicle is not blocked.

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Example | *2 | In a tunnel |

| | | | |
|---|---|---|---|
| *3 | In a building | *4 | Under an overpass |
| *5 | On a forest or tree-lined path | *6 | Between tall buildings |
| *7 | Under a cliff or overhang | - | - |

**NG** ▶ **END (MOVE VEHICLE TO LOCATION WHERE RECEPTION IS BETTER)**

**OK** ▼

| | |
|---|---|
| **2.** | **CHECK STEREO COMPONENT TUNER ASSEMBLY** |

(a) Check if CH001 (free broadcast) can be received.

OK:

CH001 can be received.

**NG** ▶ **CHECK DISPLAY**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK DISPLAY SETTING** |

(a) Check the display content.

Result:

| RESULT | PROCEED TO |
|---|---|
| "UPDATING" is displayed | A |
| "-----" is displayed | B |
| None of the displays above are shown | C |

**C** ▶ **CHECK DISPLAY**

**B** ▶ **THERE IS NO SONG/PROGRAM TITLE OR ARTIST NAME/FEATURE ASSOCIATED WITH CHANNEL AT THAT TIME**

**A** ▼

| 4. | CHECK CONTRACT CONDITIONS |
|---|---|

(a) Check if the pay-type contract has been extended, or if the contract period has ended.

OK:

Pay-type contract is valid.

NG ▶ **TO RECEIVE PAY-TYPE BROADCASTS, CONTRACT MUST BE MADE WITH SATELLITE RADIO SERVICE**

**OK** ▼

| 5. | PERFORM ACTIVATION REFRESH |
|---|---|

(a) Perform activation refresh by referring to the satellite radio service web site (http://www.xmradio.com/refresh/).

OK:

Malfunction disappears.

**HINT:**

**The XM radio ID that is necessary to perform activation refresh can be displayed when CH000 is selected on the satellite radio.**

NG ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

OK ▶ **END**

| 6. | CHECK DISPLAY |
|---|---|

(a) Check the display content.

**Result**

| RESULT | PROCEED TO |
|---|---|
| "ANTENNA" is displayed | A |
| "NO SIGNAL" is displayed | B |
| "LOADING" is displayed | B |
| "OFF AIR" is displayed | C |
| After "---" is displayed, display automatically switches to CH001 | D |

| | |
|---|---|
| After "---" is displayed, display automatically switches to CH001 | D |
| None of the displays above are shown | E |

**E** ▶ **CONFIRM CURRENTLY SELECTED CHANNEL**

**D** ▶ **CHANNEL BROADCAST HAS ENDED (CONFIRM WITH RADIO STATION)**

**C** ▶ **CHANNEL IS CURRENTLY NOT BEING BROADCAST. BROADCAST CAN BE LISTENED TO OR VIEWED WHEN IT IS BACK ON AIR (CONFIRM WITH RADIO STATION)**

**B** ▶ **END (MOVE VEHICLE TO LOCATION WHERE RECEPTION IS BETTER)**

**A** ▼

| | |
|---|---|
| **7.** | **CHECK CONNECTION OF ANTENNA CABLE** |

(a) Check if the satellite radio antenna cable is securely connected to the stereo component tuner assembly.

OK:

Satellite radio antenna cable is securely connected.

**NG** ▶ **SECURELY CONNECT SATELLITE RADIO ANTENNA CABLE**

**OK** ▶ **REPLACE AMPLIFIER ANTENNA ASSEMBLY (SATELLITE RADIO ANTENNA)**

| | |
|---|---|
| **8.** | **CONFIRM CURRENTLY SELECTED CHANNEL** |

(a) Confirm if CH000 is currently selected.

OK:

CH000 is selected.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **END (CH000 HAS NO SOUND. SELECT ANOTHER CHANNEL.)**

**Traffic Information is not Displayed**

## INSPECTION PROCEDURE

**NOTICE:**

- Traffic information requires payment. An XM nav traffic contract must be made between the satellite radio service and the user. If the contract expires, traffic information will not be available.
- Traffic information does not apply to all roads, only main roads. For the latest information on coverage areas, contact the satellite radio service.
- After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK DISPLAY** |

(a) Check the traffic information screen.

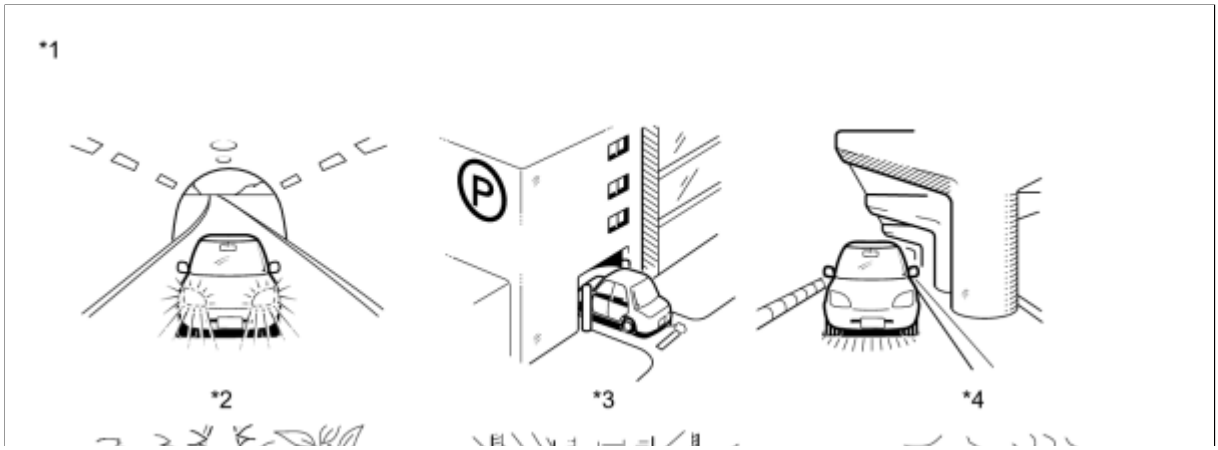
Result:

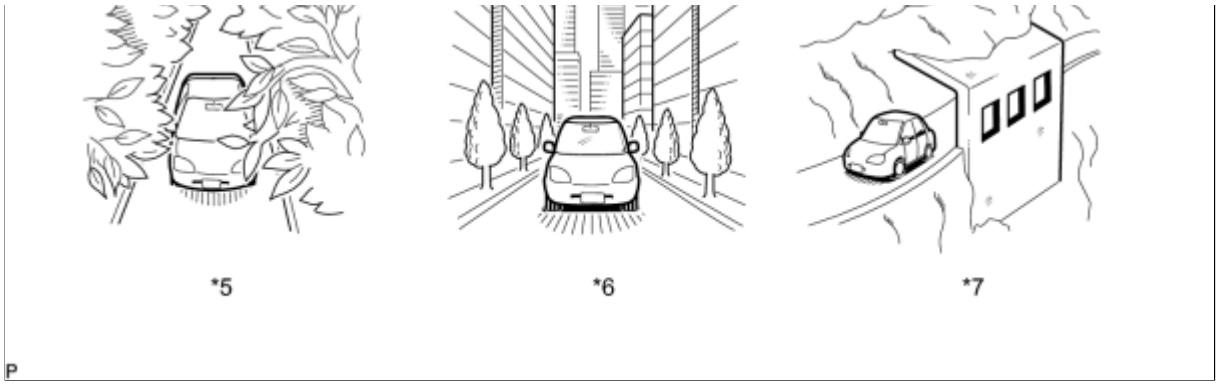
| RESULT | PROCEED TO |
|---|---|
| Traffic information is not displayed | A |
| Traffic information is displayed but is not updated | B |

**B** ▶ **CHECK SURROUNDINGS**

**A** ▼

| | |
|---|---|
| 2. | **CHECK SURROUNDINGS** |






(a) Check if the vehicle is in an environment where reception is difficult due to something blocking the area above the vehicle.

**HINT:**

**If the area above the vehicle is blocked, such as when in a building or tunnel, reception may not be possible.**

OK:

Area above vehicle is not blocked.

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Example | *2 | In a tunnel |
| *3 | In a building | *4 | Under an overpass |
| *5 | On a forest or tree-lined path | *6 | Between tall buildings |
| *7 | Under a cliff or overhang | - | - |

**NG** ▶ **END (MOVE VEHICLE TO LOCATION WHERE RECEPTION IS BETTER)**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK COVERAGE AREA** |

(a) Check that your current position is within the traffic information coverage area.

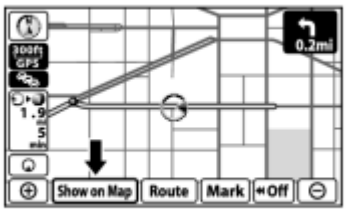
OK:

Vehicle is within coverage area.

**NG** ▶ **MOVE TO WITHIN COVERAGE AREA (FOR LATEST COVERAGE AREA, CONFIRM WITH RADIO STATION)**

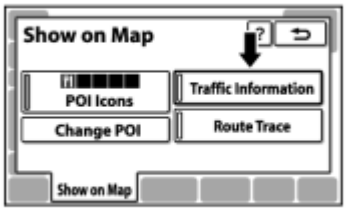
**OK** ▼

| 4. | CHECK SETTINGS OF TRAFFIC INFORMATION |
|---|---|




H

(a) Press "Show on Map".




H

(b) Check if "Traffic Information" is on.

OK:

"Traffic Information" is on.

**NG** ▶ **TURN "Traffic Information" ON**

**OK** ▼

| 5. | CHECK CONTRACT CONDITIONS |
|---|---|

(a) Check if the "XM Nav Traffic Premium Package" contract has been extended, or if the contract period has ended.

OK:

Contract is valid.

**NG** ▶ **TO RECEIVE TRAFFIC INFORMATION, CONTRACT MUST BE MADE WITH SATELLITE RADIO SERVICE**

**OK** ▼

| 6. | PERFORM ACTIVATION REFRESH |
|---|---|

(a) Perform activation refresh by referring to the satellite radio service web site (http://www.xmradio.com/refresh/).

**HINT:**

**The XM radio ID that is necessary to perform activation refresh can be displayed when CH000 is selected on the satellite radio.**

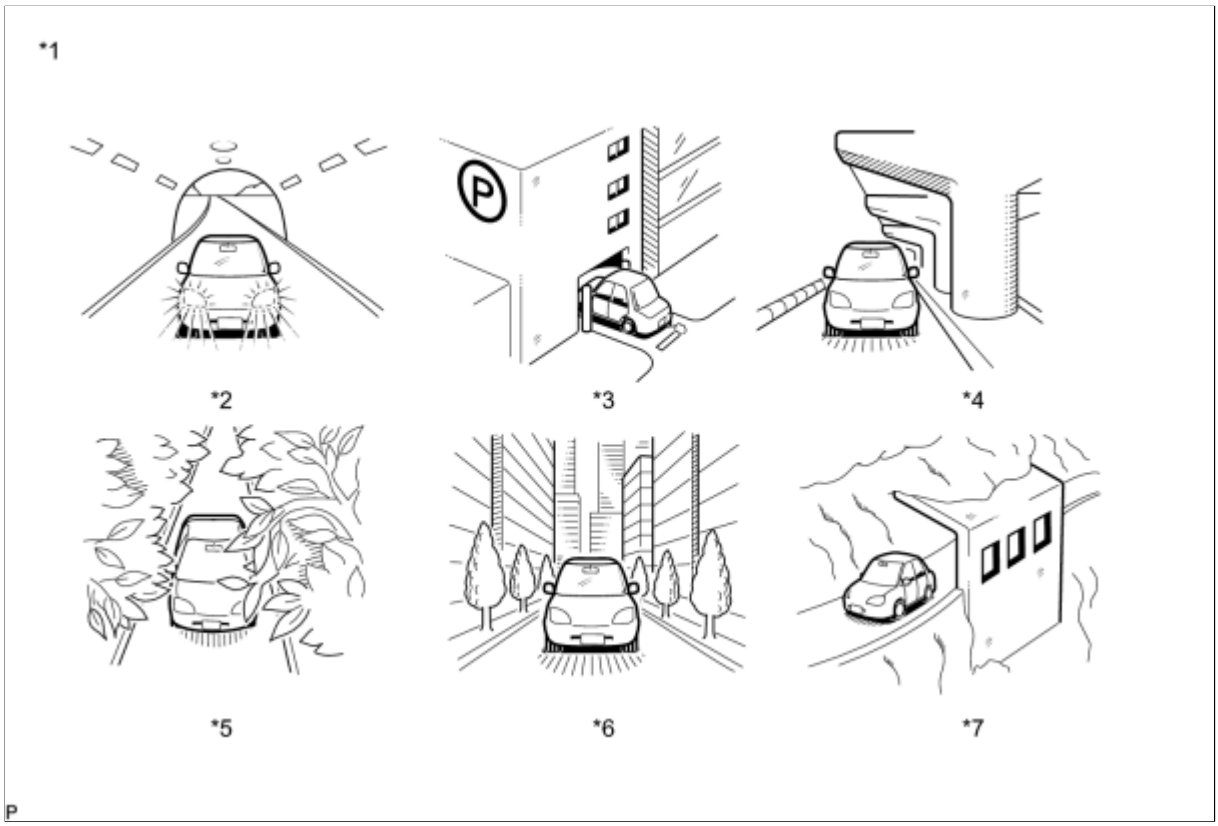
OK:

Malfunction disappears.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **END**

| | |
|---|---|
| **7.** | **CHECK SURROUNDINGS** |




(a) Check if the vehicle is in an environment where reception is difficult due to something blocking the area above the vehicle.

**HINT:**

**If the area above the vehicle is blocked, such as when in a building or tunnel, reception may not be possible.**

OK:

Area above vehicle is not blocked.

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Example | *2 | In a tunnel |

| | | | |
|---|---|---|---|
| *3 | In a building | *4 | Under an overpass |
| *5 | On a forest or tree-lined path | *6 | Between tall buildings |
| *7 | Under a cliff or overhang | - | - |

**NG** ▶ **END (MOVE VEHICLE TO LOCATION WHERE RECEPTION IS BETTER)**

**OK** ▼

| | |
|---|---|
| **8.** | **CHECK COVERAGE AREA** |

(a) Check if the area on the display that does not match actual traffic conditions is within the XM Nav Traffic coverage area.

Result:

| RESULT | PROCEED TO |
|---|---|
| Area that does not match is within coverage area. | A |
| Area that does not match is not within coverage area. | B |

**B** ▶ **END (TRAFFIC INFORMATION IS NOT DISPLAYED BECAUSE AREA IS NOT IN COVERAGE AREA)**

**A** ▼

| | |
|---|---|
| **9.** | **CHECK CONTRACT CONDITIONS** |

(a) Check if the "XM Nav Traffic Premium Package" contract has been extended, or if the contract period has ended.

OK:

Contract is valid.

**NG** ▶ **TO RECEIVE TRAFFIC INFORMATION, CONTRACT MUST BE MADE WITH SATELLITE RADIO SERVICE**

**OK** ▼

| 10. | PERFORM ACTIVATION REFRESH |
|---|---|

(a) Perform activation refresh by referring to the satellite radio service web site (http://www.xmradio.com/refresh/).

OK:

Malfunction disappears.

**NG** ▶ **CHECK DISPLAY AGAIN**

**OK** ▶ **END**

| 11. | CHECK DISPLAY AGAIN |
|---|---|

(a) Wait for 2.5 minutes, and check again if the actual traffic conditions match the display.

OK:

Actual traffic conditions match display.

**NG** ▶ **CHECK DISPLAY AGAIN**

**OK** ▶ **END (NAVTEQ HAS UPDATED DATA OF TRAFFIC CONDITIONS)**

| 12. | CHECK DISPLAY AGAIN |
|---|---|

(a) After 30 minutes have passed, check if all traffic information disappears.

**HINT:**

**After traffic information updates have stopped, the navigation system continues displaying traffic information for a maximum of 30 minutes.**

Result:

| RESULT | PROCEED TO |
|---|---|
| All traffic information disappears. | A |
| Some traffic information is wrong. | B |
| Actual traffic conditions match display. | C |

**C** ▶ **NAVTEQ HAS UPDATED DATA OF TRAFFIC CONDITIONS**

**B** ▶ **NAVTEQ MAY NOT BE PROVIDING DATA VERSION OF CERTAIN TRAFFIC INFORMATION (DATA ERROR, PROBLEM, ETC.)**

▶ **END (MOVE VEHICLE TO LOCATION WHERE RECEPTION IS**

A **END (MOVE VEHICLE TO LOCATION WHERE RECEPTION IS BETTER)**

**Noise Occurs**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **NOISE CONDITION** |

(a) Check from which direction the noise comes (front left or right, or rear left or right).

(1) Check from which direction the noise comes.

OK:

The location of the noise source can be determined.

**NG** ▶ **CHECK NOISE CONDITIONS**

**OK** ▼

| | |
|---|---|
| 2. | **CHECK SPEAKERS** |

(a) Check the installation conditions of the speaker units that are located near the noise source and that there are no cracks, scratches, deformation or other failures.

Result:

| RESULT | PROCEED TO |
|---|---|
| No malfunction is found | A |
| A speaker is installed incorrectly | B |
| Foreign objects are in the speaker | C |
| A speaker cone paper is broken | D |

**D** ▶ **REPLACE SPEAKER**

**C** ▶ **REMOVE FOREIGN OBJECT**

**B** ▶ **REINSTALL SPEAKER**

**A** ▼

| 3. | CHECK NOISE CONDITIONS |
|---|---|

(a) Check the noise condition.

**HINT:**

**The radio has a noise prevention function to reduce noise when listening to the radio. If a loud noise occurs, check whether the ground at the antenna mounting base and the noise prevention unit are installed and wired correctly.**

| CONDITION UNDER WHICH NOISE OCCURS | NOISE SOURCE |
|---|---|
| Noise increases when the accelerator pedal is depressed, but stops when the hybrid system is stopped. | Generator |
| Noise occurs during A/C or heater operation. | Blower motor |
| Noise occurs when the horn switch is pressed and released or when pressed and held. | Horn |
| Noise occurs synchronously with the turn signal blinking pattern. | Flasher |
| Noise occurs during window washer operation. | Washer |
| Noise occurs during wiper operation. | Wiper |
| Noise occurs when the brake pedal is depressed. | Stop light switch |
| Others | Static electricity |

**HINT:**

- In the left column of the table, find the situation that matches the customer's complaint. Then, in the right column, find the part that is causing the noise. Check the respective noise filter.
- To save time and avoid a misdiagnosis, first make sure that the noise is not coming from outside the vehicle.
- Troubleshoot noises in descending order of loudness.
- Setting the radio to a frequency where no signal is received may make recognition of the noise problem easier.

OK:

The noise source cannot be determined.

**NG** ▶ **REPAIR OR REPLACE NOISE SOURCE**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**Pressing Power Switch does not Turn on System**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CABIN** |

(a) Check that conditions in the cabin are not likely to cause condensation.

**HINT:**

**This problem occurs if the cabin is humid and the temperature rapidly changes. This condition may produce condensation, resulting in a short circuit.**

OK:
Condensation is not likely to occur.

**NG** ▶ **DRY CABIN AND RECHECK CONDITIONS**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**



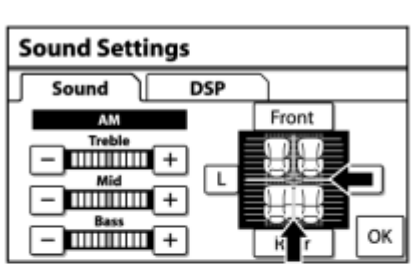
**No Sound can be Heard from Speakers**

## INSPECTION PROCEDURE

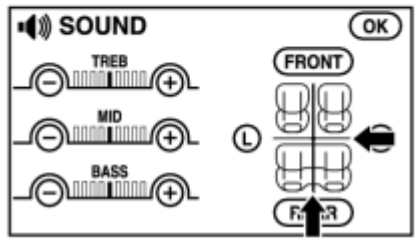
## PROCEDURE

| | |
|---|---|
| 1. | CHECK AUDIO SETTINGS |

*1




*2




(a) Enter the sound quality adjustment screen.

(b) Set volume, fader and balance to the initial values and check that sound is normal.

OK:

Audio system returns to normal.

**HINT:**

**Sound quality adjustment measures vary according to the type of the amplifier.**

**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **END**

**CD cannot be Ejected**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK OPERATION** |

(a) Press the disc eject switch of the navigation receiver assembly for 5 seconds or more and check that the CD is ejected.

OK:

CD is ejected.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| 2. | **REPLACE CD WITH ANOTHER AND RECHECK** |

(a) Insert another CD and check if it is ejected.

OK:

CD is ejected.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **CD WAS FAULTY**

**CD cannot be Inserted / Played or CD is Ejected Right After Insertion**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK IF A PROPER CD IS INSERTED |

(a) Make sure that the CD is an audio CD or a CD with an MP3 or WMA file, and that it is not deformed, flawed, stained, deteriorated or otherwise defective.

OK:

CD is normal.

**HINT:**

- Translucent or uniquely-shaped CDs cannot be played.
- Commercial audio CDs can be played.
- CD-DA files on CD-ROMs, CD-Rs and CD-RWs can be played.
- MP3 and WMA files on CD-ROMs, CD-Rs and CD-RWs can be played.
- For details on playable CDs, refer to the Owner's Manual.

**NG** ▶ **CD IS FAULTY**

**OK** ▼

| | |
|---|---|
| 2. | CHECK THAT CD IS INSERTED PROPERLY |

(a) Check whether or not the CD is inserted upside down.

OK:

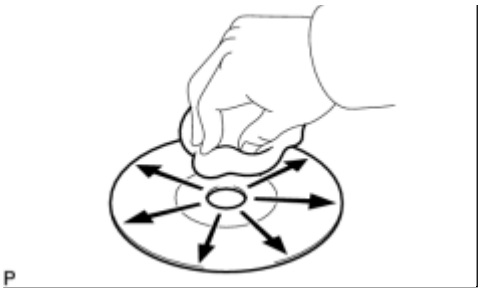
CD is properly inserted.

**NG** ▶ **SET CD PROPERLY**

**OK** ▼

| | |
|---|---|
| 3. | CLEAN CD AND RECHECK |

(a) Disc cleaning




(1) If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.

OK:

Malfunction disappears.

**NOTICE:**

**Do not use a conventional record cleaner or anti-static preservative.**

**NG** ▶ **CHECK OPERATION WITH ANOTHER CD**

**OK** ▶ **END (CD WAS DIRTY)**

| 4. | CHECK OPERATION WITH ANOTHER CD |
|---|---|

(a) Check using another CD.

(1) Check if the problem recurs using another CD.

OK:

The problem does not occur.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

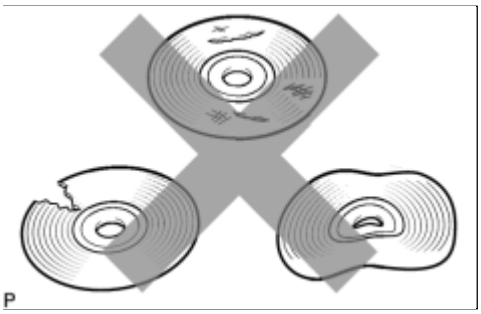
**OK** ▶ **CD WAS FAULTY**

**CD Sound Skips**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CD** |



(a) Check that the CD is not deformed or cracked.

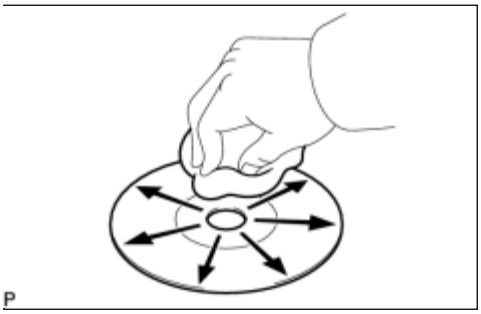
OK:

No deformation or cracks on the CD

**NG** ▶ **CD IS FAULTY**

**OK** ▼

| | |
|---|---|
| 2. | **CHECK CD** |



(a) Check the CD.

OK:

The CD is clean.

**NOTICE:**

**Do not use a conventional record cleaner or anti-static preservative.**

**HINT:**

**If dirt is on the CD surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.**

**NG** ▶ **CLEAN CD**

**OK** ▼

| | |
|---|---|
| 3. | CHECK OPERATION WITH ANOTHER CD |

(a) Check using another CD.

(1) Check if the problem recurs using another CD.

OK:

The problem does not occur.

NG ▶ CHECK NAVIGATION RECEIVER ASSEMBLY

OK ▶ CD WAS FAULTY

| | |
|---|---|
| 4. | CHECK NAVIGATION RECEIVER ASSEMBLY |

(a) Check the navigation receiver assembly installation condition.

(1) Check that the navigation receiver assembly is properly installed.

OK:

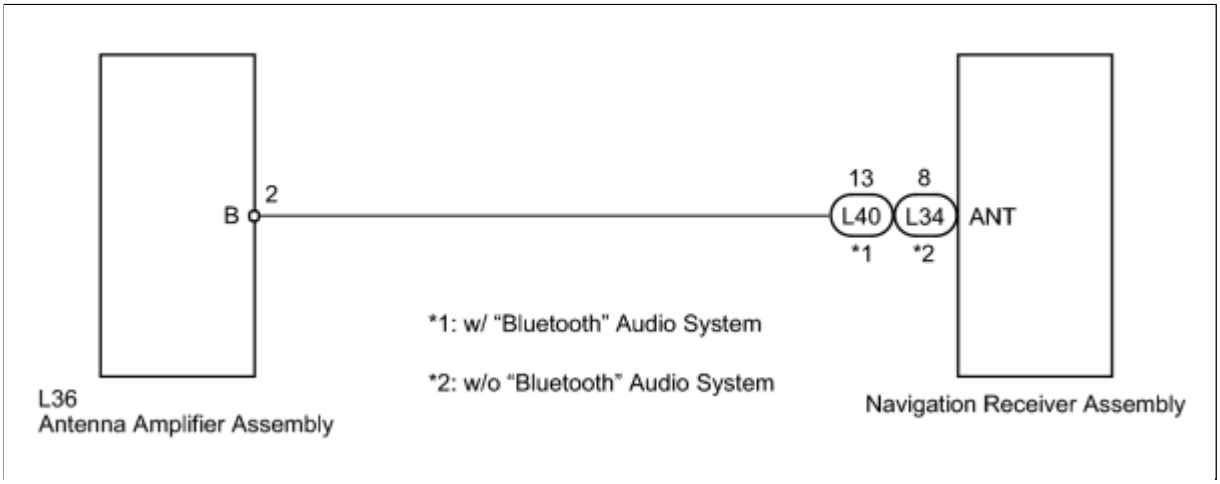
The navigation receiver assembly is properly installed.

NG ▶ REINSTALL NAVIGATION RECEIVER ASSEMBLY PROPERLY

OK ▶ REPLACE NAVIGATION RECEIVER ASSEMBLY

**Radio Broadcast cannot be Received or Poor Reception**

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK NAVIGATION RECEIVER ASSEMBLY** |

(a) Check the radio automatic station search function.

(1) Check the radio automatic station search function by activating it.

Result:

| RESULT | PROCEED TO |
|---|---|
| Automatic station search function does not stop | A |
| Automatic station search function stops on a station | B |

**B** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**A** ▼

| | |
|---|---|
| 2. | **CHECK OPTIONAL COMPONENTS** |

(a) Check optional components (sun-shade film, telephone antenna, etc.).

(1) Check if any optional components that may decrease reception capacity, such as sunshade film or a telephone antenna, are installed.

Result:

| RESULT | PROCEED TO |
|---|---|
| Optional components are installed | A |
| Optional components are not installed | B |

**NOTICE:**

**Do not remove optional components without the permission of the customer.**

**B** ▶ **CHECK RADIO ANTENNA**

**A** ▶ **REMOVE OPTIONAL COMPONENTS AND CHECK AGAIN (SEE NOTICE ABOVE)**

| | |
|---|---|
| **3.** | **CHECK RADIO ANTENNA** |

(a) Preparation for check

(1) Remove the roof antenna pole sub-assembly from the amplifier antenna assembly.

(b) Check for noise

(1) Turn the power switch on (ACC) with the navigation receiver assembly connector connected.

(2) Turn the radio on and tune into AM mode.

(3) Place a screwdriver, thin wire, or other metal object on the amplifier antenna threaded installation portion for the roof antenna pole sub-assembly and check that noise can be heard from the speakers.

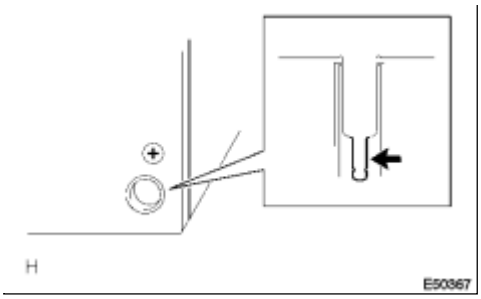
Result:

| RESULT | PROCEED TO |
|---|---|
| Noise does not occur | A |
| Noise occurs | B |

**B** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**A** ▼

| | |
|---|---|
| **4.** | **CHECK NAVIGATION RECEIVER ASSEMBLY** |




(a) Preparation for check

(1) Remove the antenna plug from the navigation receiver assembly.

(b) Check for noise

(1) Turn the power switch on (ACC) with the navigation receiver assembly connector connected.

(2) Turn the radio on and tune into AM mode.

(3) Place a screwdriver, thin wire, or other metal object on the navigation receiver assembly antenna jack and check that noise can be heard from the speaker.

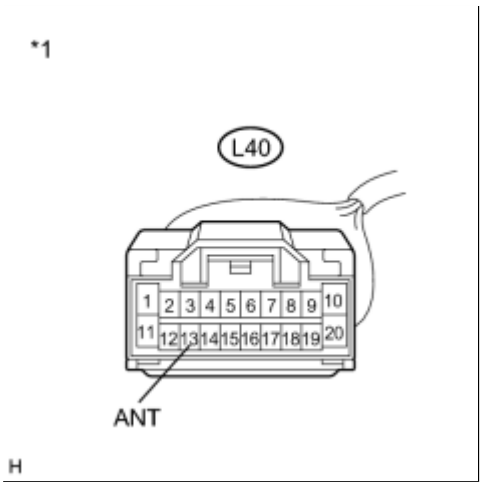
OK:

Noise occurs.

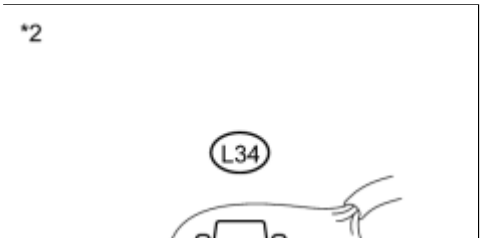
**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

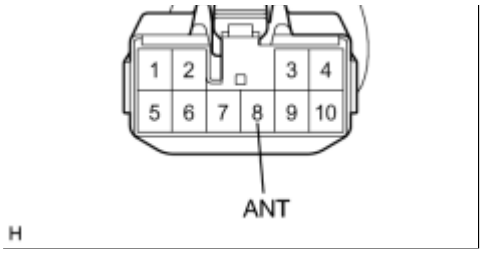
| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - ANTENNA AMPLIFIER ASSEMBLY)** |



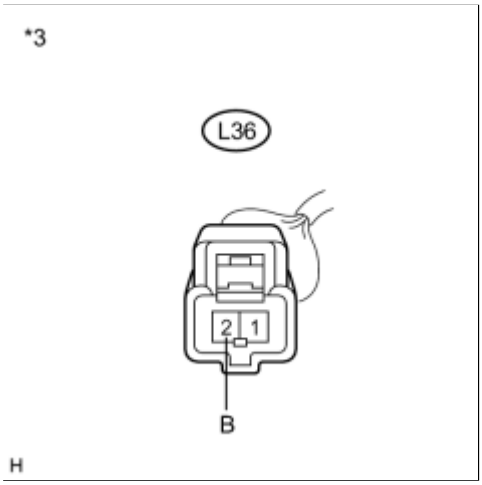

(a) Disconnect the L40 navigation receiver assembly connector (w/ "Bluetooth" Audio System).




(b) Disconnect the L34 navigation receiver assembly connector (w/o




"Bluetooth" Audio System).




(c) Disconnect the L36 antenna amplifier assembly connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-13 (ANT) - L36-2 (B)*4 | Always | Below 1 Ω |
| L40-13 (ANT) - Body ground*4 | Always | 10 kΩ or higher |
| L34-8 (ANT) - L36-2 (B)*5 | Always | Below 1 Ω |
| L34-8 (ANT) - Body ground*5 | Always | 10 kΩ or higher |

**Text in Illustration**

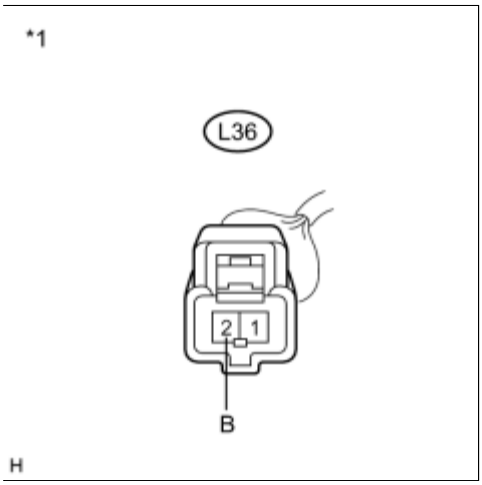
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly)*4 |
| *2 | Front view of wire harness connector<br>(to Navigation Receiver Assembly)*5 |
| *3 | Front view of wire harness connector<br>(to Antenna Amplifier Assembly) |

*4: w/ "Bluetooth" Audio System
*5: w/o "Bluetooth" Audio System

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **6.** | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |




(a) Reconnect the L40*2 or L34*3 navigation receiver assembly connector.

(b) Disconnect the L36 antenna amplifier assembly connector.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L36-2 (B) - Body ground | Power switch on (IG)<br>Radio switch on | 8 V or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Antenna Amplifier Assembly) |

*2: w/ "Bluetooth" Audio System
*3: w/o "Bluetooth" Audio System

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **7.** | **CHECK ANTENNA CORD** |

(a) Remove the antenna plug of the navigation receiver assembly and antenna.

(b) Measure the resistance between the antenna and navigation receiver assembly to check for an open circuit in the antenna cord.

Standard Resistance:

Below 1 Ω

(c) Measure the resistance between the antenna cord and body ground to check for a short circuit in the antenna cord.

Standard Resistance:

10 kΩ or higher

**NG** ▶ **REPLACE ANTENNA CORD**

**OK** ▼

| | |
|---|---|
| **8.** | **REPLACE AMPLIFIER ANTENNA ASSEMBLY** |

(a) Replace the amplifier antenna assembly and check if radio broadcasts can be received normally INFO .

OK:

Radio broadcasts can be received.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **NORMAL OPERATION**

**Illumination for Panel Switch does not Come on with Tail Switch ON**

## INSPECTION PROCEDURE

## PROCEDURE

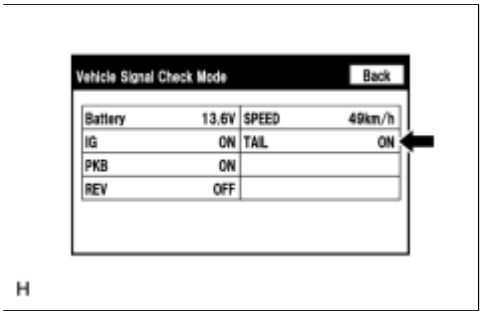
| | |
|---|---|
| 1. | CHECK VEHICLE SIGNAL (OPERATION CHECK) |

(a) Enter the "Vehicle Signal Check Mode" screen. Refer to Check Vehicle Signal in Operation Check INFO .

(b) Check that the display changes between ON and OFF according to the light control switch operation.

OK:

| LIGHT CONTROL SWITCH | DISPLAY |
|---|---|
| tail or on | ON |
| off | OFF |




**HINT:**

**This display is updated once per second. As a result, it is normal for the display to lag behind the actual switch operation.**

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

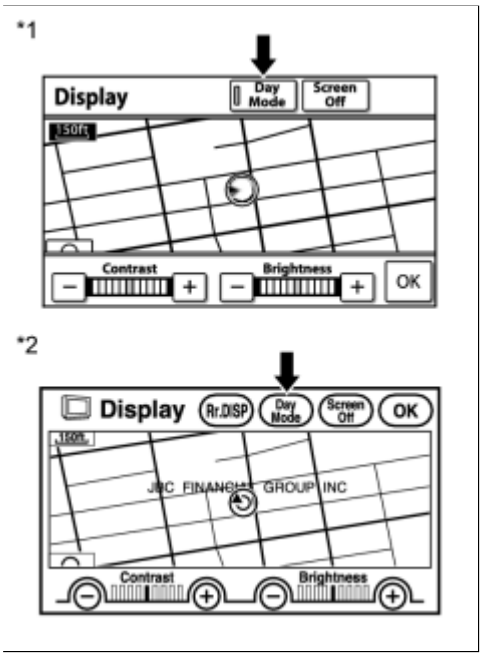
**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Display does not Dim when Light Control Switch is Turned ON**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK IMAGE QUALITY SETTING** |




(a) Enter the display quality adjustment screen.

(b) Turn the light control switch to the tail position.

(c) Check if "Day Mode" on the display quality adjustment screen is on.

Result:

| RESULT | PROCEED TO |
|---|---|
| "Day Mode" is on | A |
| "Day Mode" is off | B |

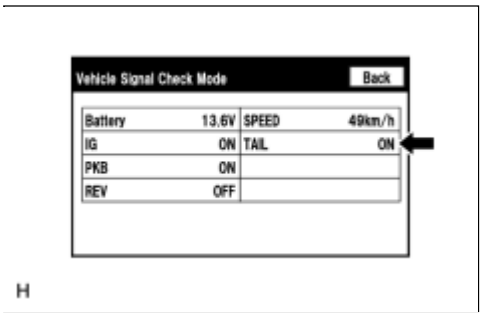
**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**B** ▶ **CHECK VEHICLE SIGNAL (OPERATION CHECK)**

**A** ▶ **TURN "Day Mode" SETTING OFF**

| 2. | CHECK VEHICLE SIGNAL (OPERATION CHECK) |
|---|---|




(a) Enter the "Vehicle Signal Check Mode" screen. Refer to Check Vehicle Signal in Operation Check INFO .

(b) Check that the display changes between ON and OFF according to the light control switch operation.

OK:

| LIGHT CONTROL SWITCH | DISPLAY |
|---|---|
| tail or on | ON |
| off | OFF |

**HINT:**

**The display is updated once per second. It is normal for the display to lag behind the actual switch operation.**

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Panel Switches do not Function**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK PANEL SWITCH |

(a) Check for foreign matter around the switches that might prevent operation.

OK:

No foreign matter is found.

NG ▶ REMOVE ANY FOREIGN MATTER FOUND

OK ▼

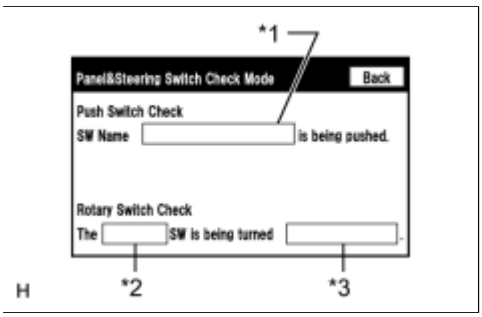
| | |
|---|---|
| 2. | CHECK PANEL SWITCH (OPERATION CHECK) |

(a) Enter the "Panel & Steering Switch Check Mode" screen. Refer to Check Panel & Steering Switch in Operation Check INFO .

(b) Operate the abnormal switch and check if the switch name and status are correctly displayed.

OK:

The switch name and status are correctly displayed as operated.




### Text in Illustration

| | |
|---|---|
| *1 | Name of switch being pushed |
| *2 | Rotary switch name |
| *3 | Rotary switch direction |

NG ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

OK ▶ REPLACE NAVIGATION RECEIVER

**RECEIVER ASSEMBLY**

**Touch Panel Switch does not Function**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DISPLAY (FOREIGN MATTER) |

(a) Check if there is any foreign matter caught between the display and exterior frame of the display.

OK:

No foreign matter is caught between the display and exterior frame of the display.

**HINT:**

**If there is foreign matter between the display and exterior frame of the display, the touch panel will remain pressed, preventing touch switch operation.**

**NG** ▶ **REMOVE FOREIGN MATTER**

**OK** ▼

| | |
|---|---|
| 2. | CHECK TOUCH PANEL |

(a) Check for foreign matter on the display.

OK:

The display is clean.

**NG** ▶ **CLEAN DISPLAY AND RECHECK TOUCH PANEL**

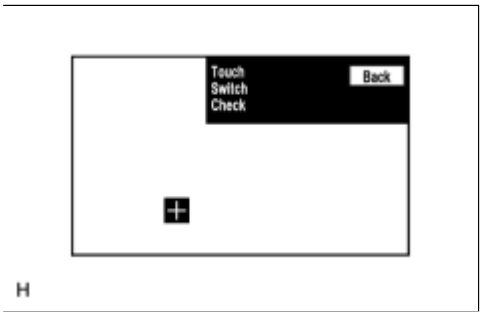
**OK** ▼

| | |
|---|---|
| 3. | CHECK TOUCH SWITCH (OPERATION CHECK) |

(a) Enter the "Touch Switch Check" screen. Refer to Check Touch Switch in Operation Check 

.

(b) Touch the display in the area where the switch malfunction




occurs.

OK:

A "+" mark appears at the touched position.

NG ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

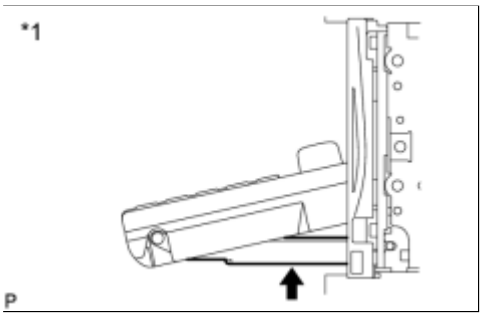
OK ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Display Panel does not Open, Tilt or Tilts Improperly**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK NAVIGATION RECEIVER ASSEMBLY |




(a) Check for foreign matter or obstructions caught in the moving parts of the panel.

OK:

No obstruction or foreign matter is found.

**Text in Illustration**

| | |
|---|---|
| *1 | Example |

**NG** ▶ **REMOVE ANY OBSTRUCTION OR FOREIGN MATTER**

**OK** ▼

| | |
|---|---|
| 2. | CHECK OPERATION |

(a) Check if the navigation and audio systems function properly.

OK:

Navigation and audio systems function properly.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

| | | |
|---|---|---|
| **Last Modified:** 7-21-2009 | 5.6 J | **From:** 200904 |
| **Model Year:** 2010 | **Model:** Prius | **Doc ID:** RM000000POJ056X |
| **Title:** NAVIGATION / MULTI INFO DISPLAY: NAVIGATION SYSTEM: Screen Flicker or Color Distortion (2010 Prius) | | |

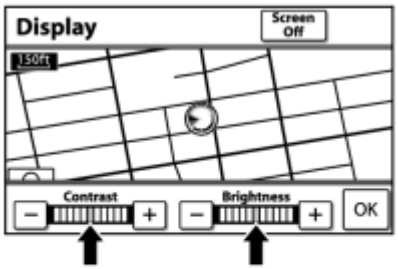
**Screen Flicker or Color Distortion**

# INSPECTION PROCEDURE

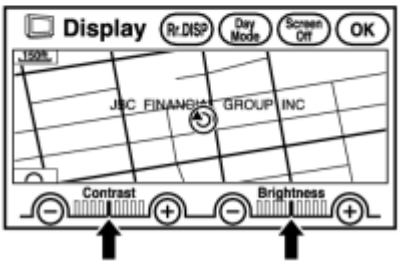
# PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DISPLAY SETTING** |

*1




*2




(a) Enter the display quality adjustment screen.

(b) Reset display settings (contrast, brightness) and check that the screen appears normal.

OK:

The display returns to normal.

**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **CHECK CABIN**

**OK** ▶ **END**

| | |
|---|---|
| 2. | CHECK CABIN |

(a) Check that the cabin temperature is higher than -20°C (-4°F).

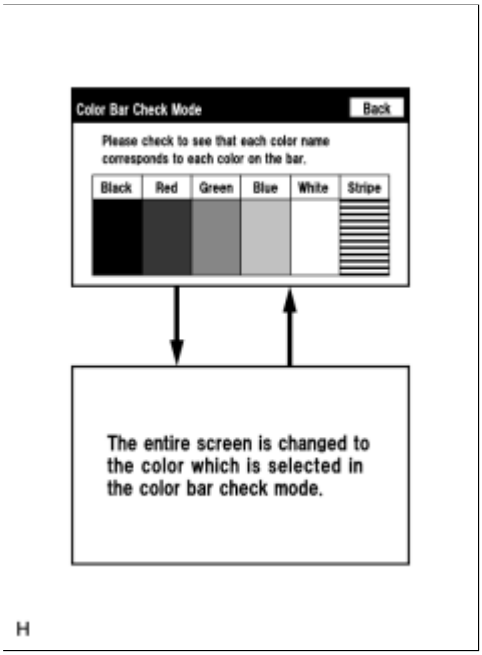
OK:

The cabin temperature is higher than -20°C (-4°F).

NG ▶ HEAT CABIN AND RECHECK TEMPERATURE

OK ▼

| | |
|---|---|
| 3. | CHECK COLOR BAR (OPERATION CHECK) |




(a) Enter the "Color Bar Check Mode" screen. Refer to Check Color Bar in Operation Check INFO .

(b) Check that the color bars match the displayed names.

OK:

Color bars match the displayed names.

NG ▶ REPLACE NAVIGATION RECEIVER ASSEMBLY

OK ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

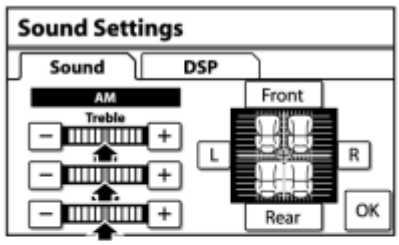
**Poor Sound Quality in All Modes (Low Volume)**

## INSPECTION PROCEDURE

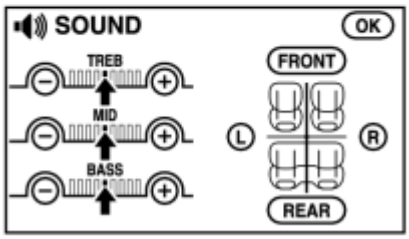
## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK AUDIO SETTINGS** |

*1




*2




(a) Enter the sound quality adjustment screen.

(b) Set "BASS", "MID" and "TREB" to the initial values and check that sound is normal.

OK:

Malfunction disappears.

**HINT:**

**Sound quality adjustment measures vary according to the type of the amplifier.**

**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **COMPARE WITH ANOTHER VEHICLE OF SAME MODEL**

**OK** ▶ **END**

| | |
|---|---|
| **2.** | **COMPARE WITH ANOTHER VEHICLE OF SAME MODEL** |

(a) Compare with another vehicle of the same model.

(1) Compare with another vehicle of the same model which does not have trouble to see if there is any difference in the sound quality.

OK:

No difference is found.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **END**

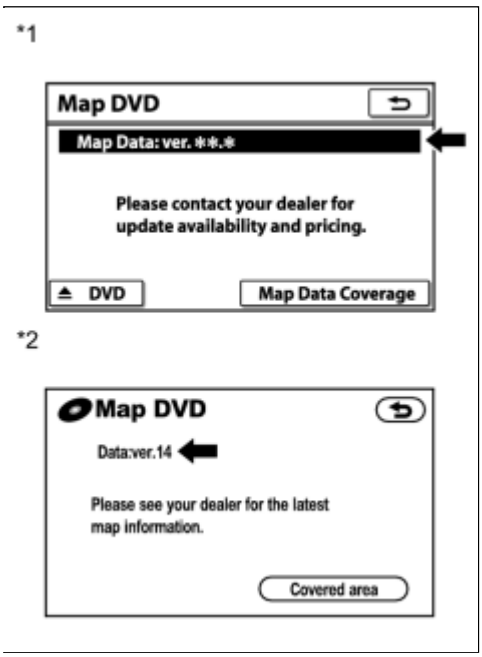
**Map Disc cannot be Inserted**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK NAVIGATION RECEIVER ASSEMBLY |

(a) Enter the map data information screen.




(b) Check if a disc is inserted into the map disc slot.

(1) Check if the map data version is displayed.

OK:

The map data version is displayed.

**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **CHECK MAP DISC**

**OK** ▶ **END (EJECT DISC)**

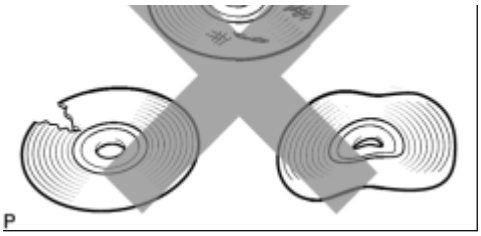
| | |
|---|---|
| 2. | CHECK MAP DISC |

(a) Check that the map disc is not deformed or cracked.

OK:

No deformations or cracks on the map disc






NG ▶ REPLACE MAP DISC

OK ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

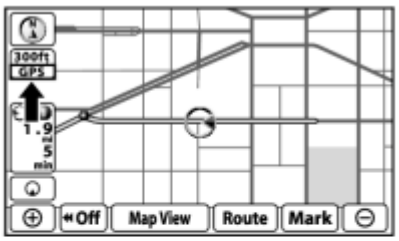
**Vehicle Position Mark Deviates Greatly**

## INSPECTION PROCEDURE

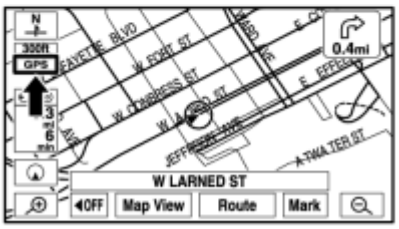
## PROCEDURE

| | |
|---|---|
| 1. | CHECK GPS MARK |

*1




*2




(a) Check that the GPS mark is displayed.

OK:

GPS mark is displayed.

**Text in Illustration**

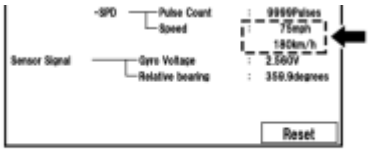
| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **GO TO "GPS MARK IS NOT DISPLAYED" IN PROBLEM SYMPTOMS TABLE**

**OK** ▼

| | |
|---|---|
| 2. | CHECK VEHICLE SENSOR (OPERATION CHECK) |






H

(a) Enter the "Vehicle Sensors" screen. Refer to Check GPS & Vehicle Sensors in Operation Check INFO .

(b) While driving the vehicle, compare the "Speed" indicator to the reading on the speedometer. Check that these readings are almost equal.

OK:

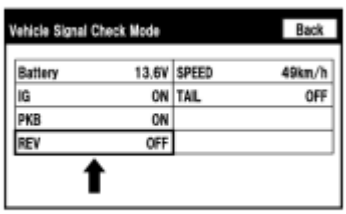
The readings are almost equal.

**NG** ▶ **CHECK DTC OUTPUT**

**OK** ▼

| 3. | CHECK VEHICLE SIGNAL (OPERATION CHECK) |
|---|---|

(a) Enter the "Vehicle Signal Check Mode" screen. Refer to Check Vehicle Signal in Operation Check INFO .




H

(b) Check that the display changes between ON and OFF according to the shift lever operation.

OK:

| SHIFT LEVER POSITION | DISPLAY |
|---|---|
| Except R | OFF |
| R | ON |

**HINT:**

**The display is updated once per second. It is normal for the display to lag behind the actual switch operation.**

**NG** ▶ **GO TO "REVERSE SIGNAL DOES NOT CHANGE IN VEHICLE SIGNAL CHECK MODE" IN PROBLEM SYMPTOMS TABLE**

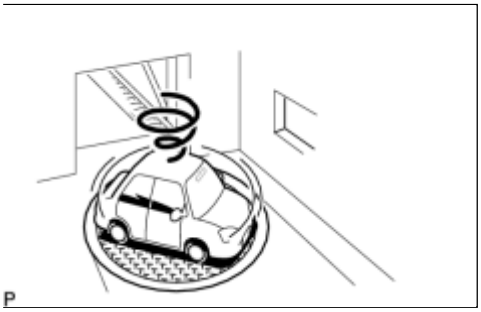
**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**Cursor or Map Rotates when Vehicle Stopped**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK CONDITION |




(a) Check with the customer if the vehicle has been turned by a turntable.

OK:

Vehicle has not been turned by turntable.

**HINT:**

**If the vehicle is turned on a turntable with the power switch on (IG), the system may store the angular velocity. As a result, the vehicle position cursor may deviate.**

**NG** ▶ **TURN POWER SWITCH TO ON (IG) WHEN VEHICLE IS COMPLETELY STOPPED**

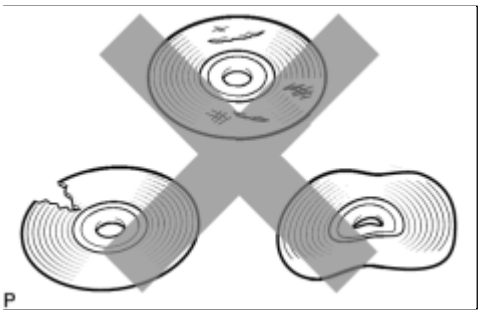
**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**Vehicle Position Mark is not Updated**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK MAP DISC |




(a) Check that the map disc is not deformed or cracked.

OK:

No deformations or cracks on the map disc

NG ▶ REPLACE MAP DISC

OK ▼

| | |
|---|---|
| 2. | CHECK NAVIGATION DISPLAY |

(a) Check if touch scrolling can be performed on the map display.

OK:

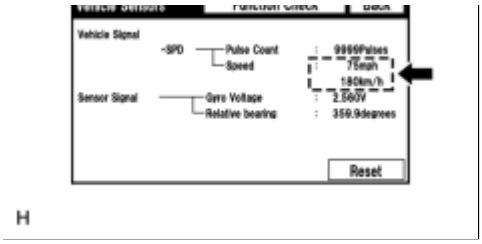
Touch scrolling can be performed.

NG ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

OK ▼

| | |
|---|---|
| 3. | CHECK VEHICLE SENSOR (OPERATION CHECK) |






(a) Enter the "Vehicle Sensors" screen. Refer to Check GPS & Vehicle Sensors in Operation Check INFO .

(b) While driving the vehicle, compare the "Speed" indicator to the reading on the speedometer. Check if these readings are almost equal.

OK:

The readings are almost equal.

**NG** ▶ **CHECK DTC OUTPUT**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

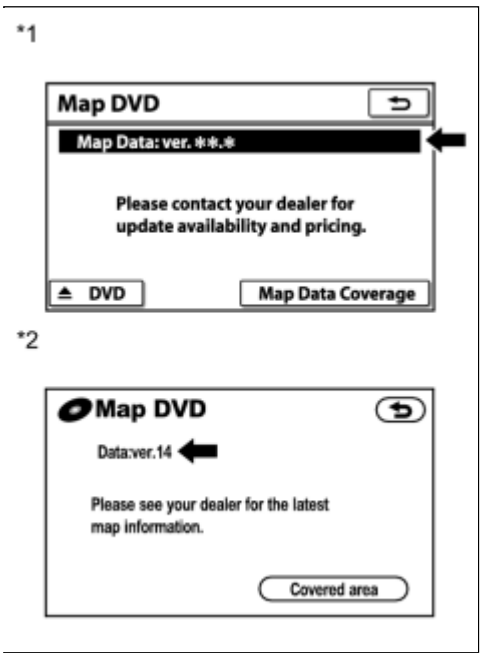
**Current Position Display does not Appear**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK NAVIGATION RECEIVER ASSEMBLY |

(a) Enter the map data information screen.




(b) Check if a disc is inserted into the map disc slot.

(1) Check if the map data version is displayed.

OK:

The map data version is displayed.

**Text in Illustration**

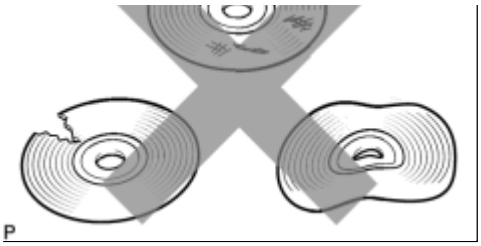
| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **INSERT MAP DISC IN MAP DISC SLOT**

**OK** ▼

| | |
|---|---|
| 2. | CHECK MAP DISC |






(a) Check that the map disc is not deformed or cracked.

OK:

No deformations or cracks on the map disc

**NG** ▶ **REPLACE MAP DISC**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**GPS Mark is not Displayed**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CABIN** |

(a) Check the cabin for any object that might interrupt radio reception on the instrument panel. If such an object exists, remove it and check if the GPS mark reappears.

**HINT:**

**The GPS uses extremely faint radio waves originating from satellites. If the signal is interrupted by obstructions or other radio waves, the GPS may not be able to properly receive the signal.**

OK:

The GPS mark appears.

**NG** ▶ **CHECK SURROUNDINGS**

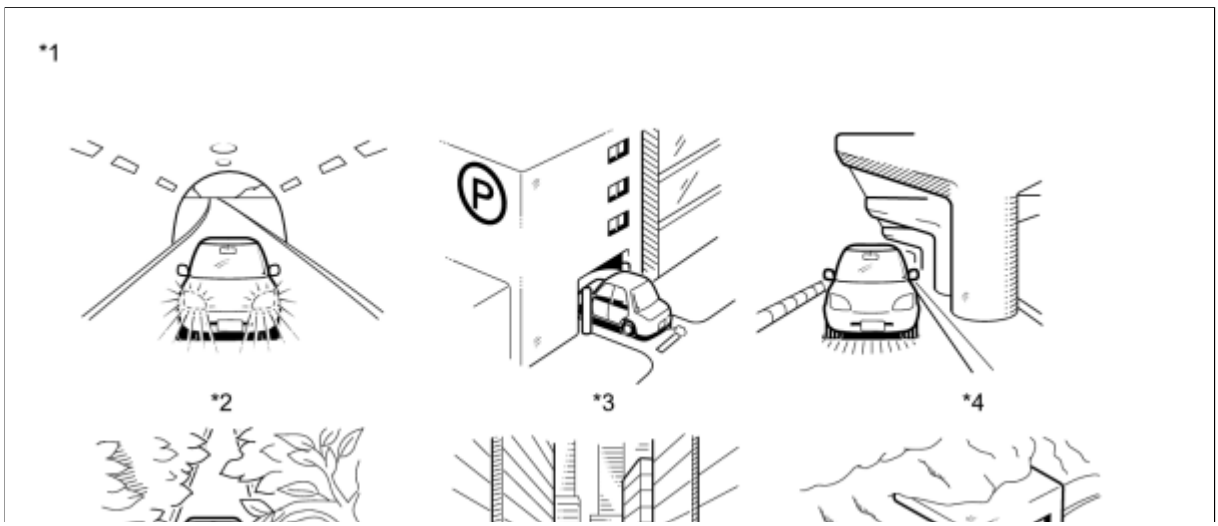
**OK** ▶ **NORMAL OPERATION**

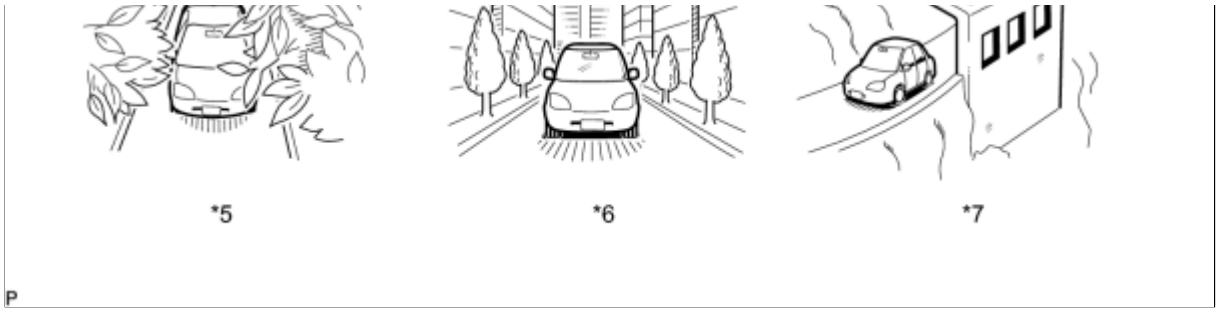
| | |
|---|---|
| 2. | **CHECK SURROUNDINGS** |

(a) Check if the vehicle is in a location where GPS signal reception is poor. If the vehicle is in such a place, relocate the vehicle and check if the GPS mark reappears.

**HINT:**

**The GPS uses 24 satellites in 6 orbits. At any point in time, 4 satellites should be able to pinpoint your vehicle. However, GPS signals may not reach the vehicle due to influence from the surroundings, vehicle direction and time. For examples, see the following illustration.**






OK:

The GPS mark is displayed.

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Example | *2 | In a tunnel |
| *3 | In a building | *4 | Under an overpass |
| *5 | On a forest or tree-lined path | *6 | Between tall buildings |
| *7 | Under a cliff or overhang | - | - |

**NG** ▶ **CHECK GPS INFORMATION (OPERATION CHECK)**

**OK** ▶ **SYSTEM RETURNS TO NORMAL**

| | |
|---|---|
| **3.** | **CHECK GPS INFORMATION (OPERATION CHECK)** |

(a) Enter the "GPS Information" screen. Refer to Check GPS & Vehicle Sensors in Operation Check INFO .

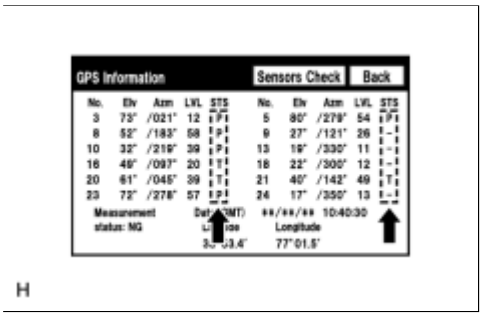
(b) Check how many of the following codes appear in the "STS" column.

**HINT:**

**T or P appears.**

OK:

At least 3 codes appear.




**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

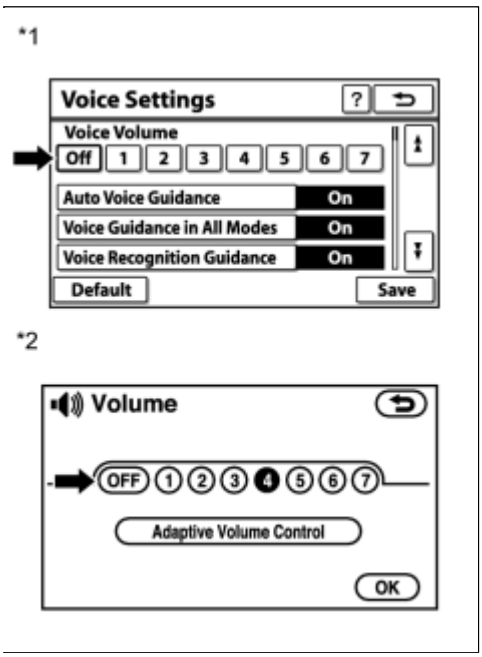
**Voice Guidance does not Function**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK NAVIGATION SETTING** |

(a) Display the "Voice Settings" or "Volume" screen.




(b) Check that "Off" or "OFF" is not selected.

OK:

"Off" or "OFF" is not selected.

**Text in Illustration**

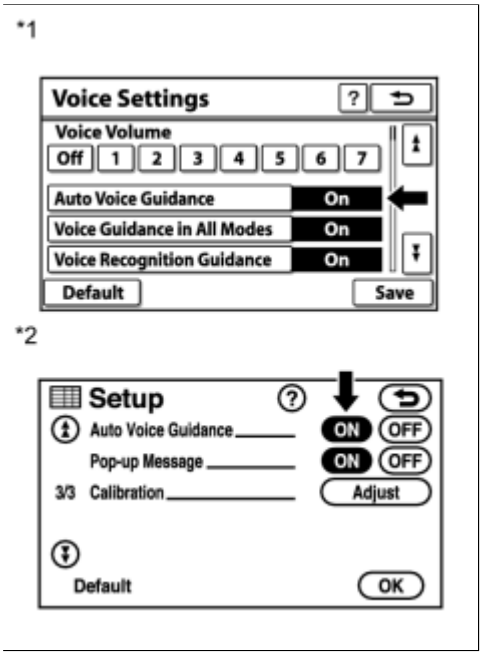
| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **SELECT VOICE VOLUME SETTING OTHER THAN "Off" OR "OFF"**

**OK** ▼

| | |
|---|---|
| **2.** | **CHECK NAVIGATION SETTING** |

(a) Display the "Voice Settings" or "Setup" screen.




(b) Check that "Auto Voice Guidance" is not "Off" or "OFF".

OK:

"Auto Voice Guidance" is not "Off" or "OFF".

**Text in Illustration**

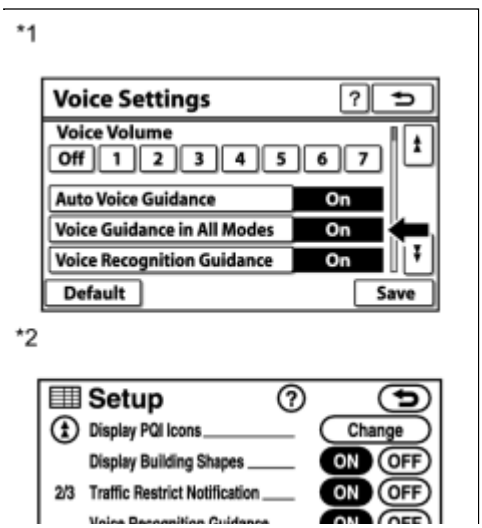
| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **TURN AUTO VOICE GUIDANCE "On" OR "ON"**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK NAVIGATION SETTING** |

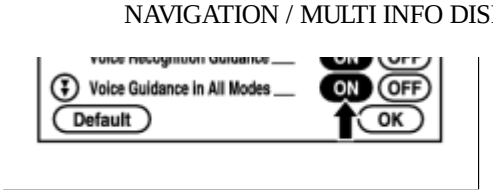
(a) Display the "Voice Settings" or "Setup" screen.




(b) Check that "Voice Guidance in All Modes" is not "Off" or "OFF".

OK:

"Voice Guidance in All Modes" is not "Off" or "OFF".



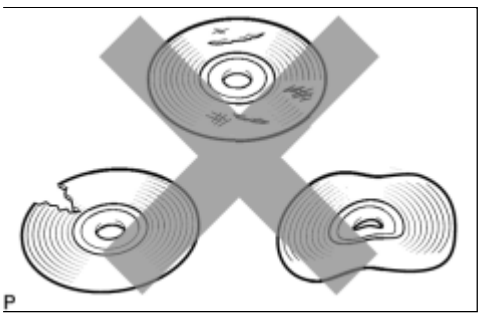

**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK MAP DISC** |




(a) Check that the map disc is not deformed or cracked.

OK:

No deformations or cracks on the map disc

**NG** ▶ **REPLACE MAP DISC**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK AUDIO FUNCTION** |

(a) Check that audio sound can be heard from the driver side speaker.

OK:

Audio sound can be heard.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

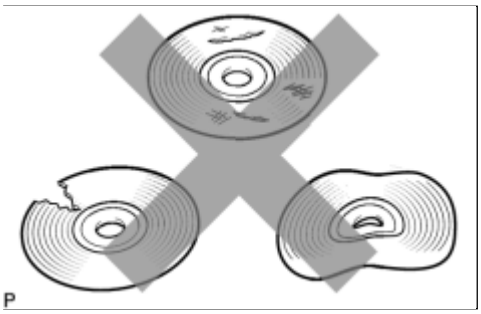
**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Map Display Incomplete**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK MAP DISC** |




(a) Check that the map disc is not deformed or cracked.

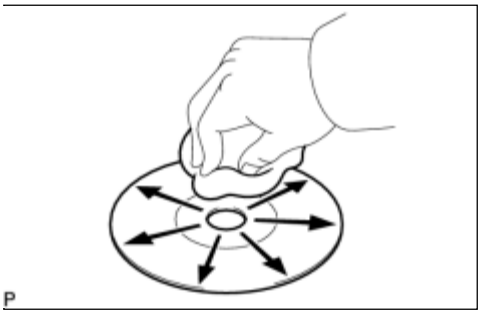
OK:

No deformations or cracks on the map disc

**NG** ▶ **REPLACE MAP DISC**

**OK** ▼

| | |
|---|---|
| 2. | **CHECK MAP DISC** |




(a) Check for dirt on the map disc surface.

OK:

No dirt is on the map disc surface.

**NOTICE:**

**Do not use a conventional record cleaner or anti-static preservative.**

**HINT:**

**If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.**

**NG** ▶ **CLEAN MAP DISC**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK NAVIGATION DISPLAY** |

(a) Check that displays other than the navigation display are complete.

OK:

No other incomplete displays are found.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

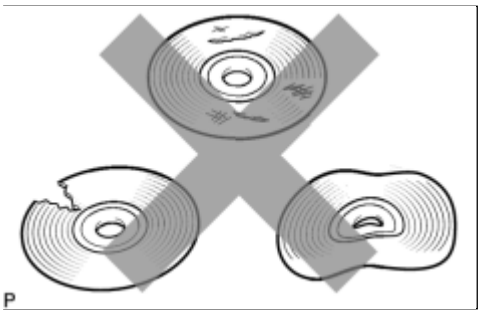
**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| |
|---|
| **Route cannot be Calculated** |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK MAP DISC** |



(a) Check that the map disc is not deformed or cracked.

OK:

No deformations or cracks on the map disc

**NG** ▶ **REPLACE MAP DISC**

**OK** ▼

| | |
|---|---|
| **2.** | **SET DESTINATION** |

(a) Set another destination and check if the system can calculate the route correctly.

OK:

Route can be correctly calculated.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **NORMAL OPERATION**

**Voice Recognition Difficulty**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CONDITION** |

(a) Check if the system voice recognition level is low when recognizing a particular voice.

Result:

| RESULT | PROCEED TO |
|---|---|
| System voice recognition level is low with any voice. | A |
| System voice recognition level is low only for a particular voice. | B |

**HINT:**

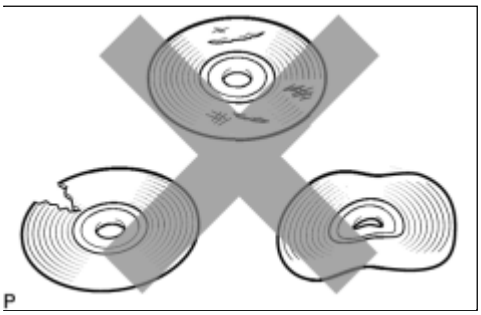
**System voice recognition level varies depending on voice and pronunciation. This is not a malfunction.**

**B** ▶ **END**

**A**

▼

| | |
|---|---|
| 2. | **CHECK MAP DISC** |



(a) Check that the map disc is not deformed or cracked.

OK:

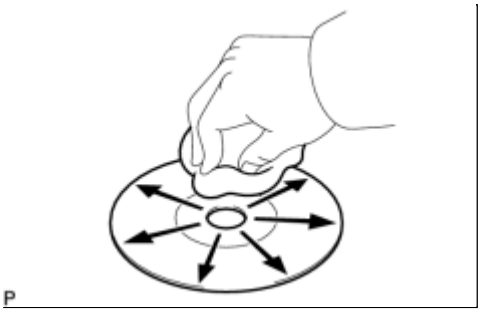
No deformations or cracks on the map disc

**NG** ▶ **REPLACE MAP DISC**

**OK**

▼

| 3. | CHECK MAP DISC |
|---|---|




(a) Check for dirt on the map disc surface.

OK:

No dirt is on the map disc surface.

**NOTICE:**

**Do not use a conventional record cleaner or anti-static preservative.**

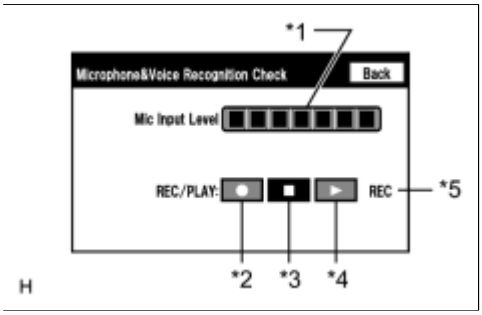
**HINT:**

**If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.**

**NG** ▶ **CLEAN MAP DISC**

**OK** ▼

| 4. | CHECK MICROPHONE AND VOICE RECOGNITION (OPERATION CHECK) |
|---|---|




(a) Enter the "Microphone & Voice Recognition Check" screen. Refer to Check Mic & Voice Recognition in Operation Check INFO .

(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.

(c) Push the recording switch and perform voice recording.

**HINT:**

- Select the recording switch with the blower motor of the air conditioning system stopped. If an outlet of the air conditioning system is facing the microphone, noise may be recorded.
- Voice can be recorded up to 5 seconds.

(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally without noise or distortion.

OK:

All check results are normal.

**Text in Illustration**

| | |
|---|---|
| *1 | Microphone Input Level Meter |
| *2 | Recording Switch |
| *3 | Stop Switch |
| *4 | Play Switch |
| *5 | Recording Indicator |

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **END**

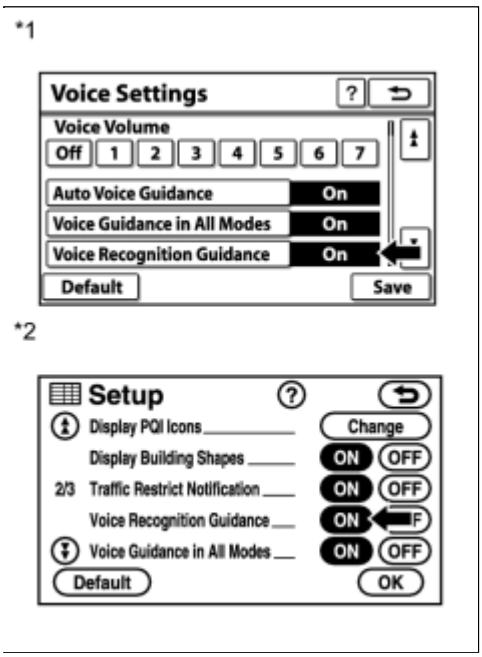
**Voice is not Recognized**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK NAVIGATION SETTING |

(a) Display the "Voice Settings" or "Setup" screen.




(b) Check that "Voice Recognition Guidance" is not "Off" or "OFF".

OK:

"Voice Recognition Guidance" is not "Off" or "OFF".

**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

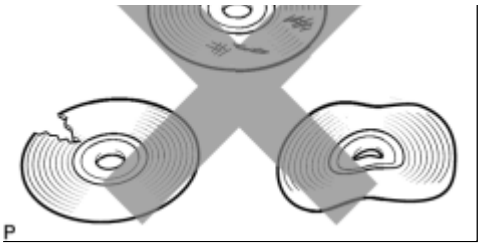
**NG** ▶ **TURN VOICE RECOGNITION GUIDANCE "On" OR "ON"**

**OK**

▼

| | |
|---|---|
| 2. | CHECK MAP DISC |






(a) Check that the map disc is not deformed or cracked.

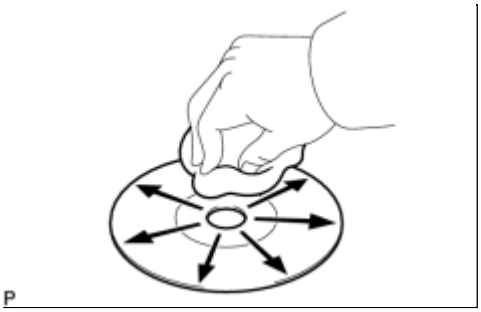
OK:

No deformations or cracks on the map disc

**NG** ▶ **REPLACE MAP DISC**

**OK** ▼

| 3. | CHECK MAP DISC |
|---|---|




(a) Check for dirt on the map disc surface.

OK:

No dirt is on the map disc surface.

**NOTICE:**

**Do not use a conventional record cleaner or anti-static preservative.**

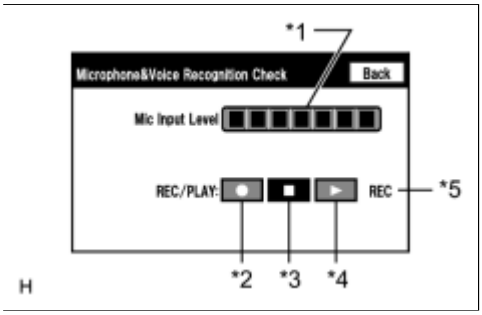
**HINT:**

**If dirt is on the disc surface, wipe it clean with a soft cloth from the inside to the outside in a radial direction.**

**NG** ▶ **CLEAN MAP DISC**

**OK** ▼

| 4. | CHECK MICROPHONE AND VOICE RECOGNITION (OPERATION CHECK) |
|---|---|




(a) Enter the "Microphone & Voice Recognition Check" screen. Refer to Check Mic & Voice Recognition in Operation Check INFO .

(b) When voice is input into the microphone, check that the microphone input level meter changes

(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.

(c) Push the recording switch and perform voice recording.

**HINT:**

- Select the recording switch with the blower motor of the air conditioning system stopped. If an outlet of the air conditioning system is facing the microphone, noise may be recorded.
- Voice can be recorded up to 5 seconds.

(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally without noise or distortion.

OK:

All check results are normal.

**Text in Illustration**

| | |
|---|---|
| *1 | Microphone Input Level Meter |
| *2 | Recording Switch |
| *3 | Stop Switch |
| *4 | Play Switch |
| *5 | Recording Indicator |

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Cellular Phone Registration Failure, Phone Directory Transfer Failure**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CURRENT CONDITIONS** |

(a) Proceed to the next step according to the table below.

Result:

| RESULT | PROCEED TO |
|---|---|
| Another "Bluetooth" compatible cellular phone is present. | A |
| Another "Bluetooth" compatible vehicle is present. | B |
| None of the above | C |

**C** ▶ **CHECK CELLULAR PHONE**

**B** ▶ **CHECK USING ANOTHER "Bluetooth" COMPATIBLE VEHICLE**

**A** ▼

| | |
|---|---|
| 2. | **CHECK USING ANOTHER CELLULAR PHONE** |

(a) Check if the system functions using another "Bluetooth" compatible cellular phone.

**HINT:**

- Confirm that either the same or a different version of another "Bluetooth" compatible cellular phone complies with the system.
- Depending on the version, some "Bluetooth" compatible cellular phones cannot be used.

OK:

The system functions.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **USE A "Bluetooth" COMPATIBLE CELLULAR PHONE**

| | |
|---|---|
| 3. | **CHECK USING ANOTHER "Bluetooth" COMPATIBLE VEHICLE** |

| | |
|---|---|

(a) Register the cellular phone with another vehicle and check if the system functions normally.

**HINT:**

**Depending on the version, some "Bluetooth" compatible cellular phones cannot be used.**

OK:
The system functions.

**NG** ▶ **REPAIR OR REPLACE CELLULAR PHONE**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

| | |
|---|---|
| **4.** | **CHECK CELLULAR PHONE** |

(a) Check if the cellular phone is "Bluetooth" compatible.

**HINT:**

**Some versions of "Bluetooth" compatible cellular phones may not function.**

OK:
The phone is "Bluetooth" compatible.

**NG** ▶ **USE A "Bluetooth" COMPATIBLE CELLULAR PHONE**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK CELLULAR PHONE** |

(a) Check if a call can be made from the cellular phone.

**HINT:**

**When the battery is low, registration or directory transfer cannot be done.**

OK:
A call can be made from the cellular phone.

**NG** ▶ **REPAIR OR REPLACE CELLULAR PHONE**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Cellular Phone cannot Send / Receive**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK "Bluetooth" SETTINGS** |

(a) Check if the "Bluetooth" settings are correct.

OK:

"Bluetooth" settings are correct.

**NG** ▶ **SET SETTINGS CORRECTLY**

**OK** ▼

| | |
|---|---|
| 2. | **CHECK CELLULAR PHONE** |

(a) Check if the cellular phone is "Bluetooth" compatible.

**HINT:**

**Some versions of "Bluetooth" compatible cellular phones may not function.**

OK:

The phone is "Bluetooth" compatible.

**NG** ▶ **END (ONLY A "Bluetooth" COMPATIBLE CELLULAR PHONE CAN BE USED)**

**OK** ▼

| | |
|---|---|
| 3. | **CHECK SETTINGS** |

(a) Check the cellular phone functions.

**HINT:**

**The cellular phone is unable to call under any of the following conditions:**

- The cellular phone is locked

- The cellular phone is locked.
- The directory is being transferred.
- The line is crossed.
- Outside service range
- The power is off.
- The cellular phone is not connected to "Bluetooth" ("BT" is displayed while connected).

OK:

None of the above conditions exist.

**NG** ▶ **SET CORRECTLY**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK CELLULAR PHONE** |

(a) Check if the cellular phone can make a call.

**HINT:**

**When the battery is low, calls cannot be made or received.**

OK:

Cellular phone can make a call.

**NG** ▶ **REPAIR OR REPLACE CELLULAR PHONE**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK RECEPTION** |

(a) Set the cellular phone so that it can receive calls.

(b) Place the cellular phone close to the navigation receiver assembly.

(c) Check if the cellular phone has reception according to the navigation receiver assembly.

OK:

The cellular phone has reception.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**Cannot Call in a Certain Place**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK SURROUNDING CONDITIONS |

(a) Check if the cellular phone can make calls in a certain place.

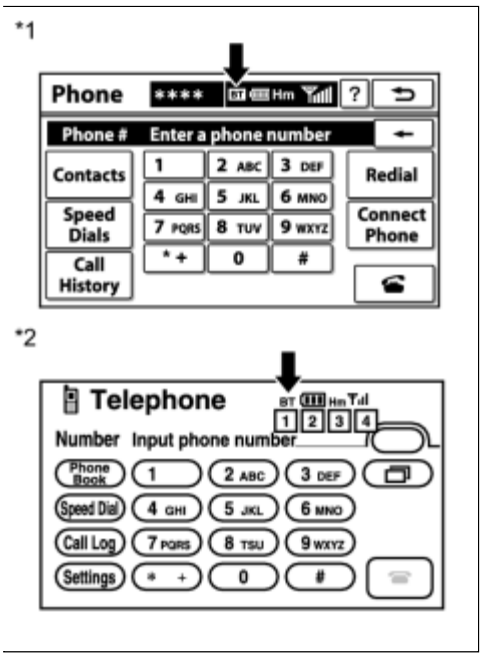
OK:

It can make calls.

**NG** ▶ **END (CELLULAR PHONES CAN ONLY FUNCTION IN CELLULAR SERVICE AREAS)**

**OK** ▼

| | |
|---|---|
| 2. | CHECK RECEPTION |




(a) Display the "Phone" or "Telephone" screen and check the "Bluetooth" connection indicator ("BT" indicator).

Result:

| RESULT | PROCEED TO |
|---|---|
| "BT" indicator color is yellow. | A |
| "BT" indicator color is blue. | B |
| No connection mark is displayed | C |

**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

C ▶ SELECT A REGISTERED CELLULAR PHONE OR REGISTER A "Bluetooth" COMPATIBLE PHONE

B ▶ REPLACE NAVIGATION RECEIVER ASSEMBLY

A ▶ MOVE CELLULAR PHONE TO A LOCATION WHERE "BT" MARK TURNS BLUE

**The Other Caller's Voice cannot be Heard, is too Quiet, or Distorted**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK CELLULAR PHONE |

(a) Check if the voice on the other side can be heard using a cellular phone.

OK:

Voice can be heard.

NG ▶ REPAIR OR REPLACE CELLULAR PHONE

OK ▼

| | |
|---|---|
| 2. | CHECK NAVIGATION SYSTEM |

(a) Check that navigation sound can be heard from the front speaker.

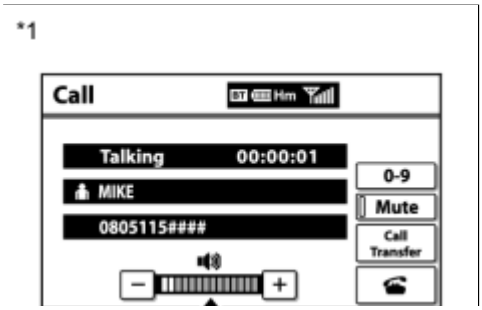
OK:

Sound can be heard from the navigation system.

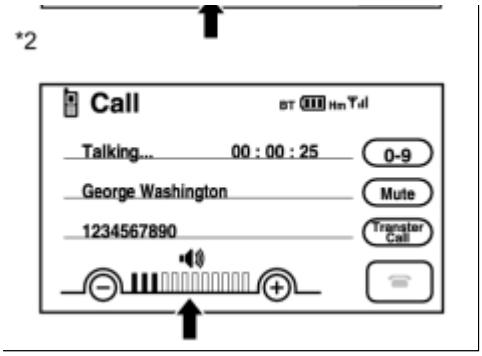
NG ▶ GO TO "VOICE GUIDANCE DOES NOT FUNCTION" IN PROBLEM SYMPTOMS TABLE

OK ▼

| | |
|---|---|
| 3. | CHECK SETTINGS |




(a) Check if the volume level is set to low on the "Call" screen.




OK:

The level is not set to low.

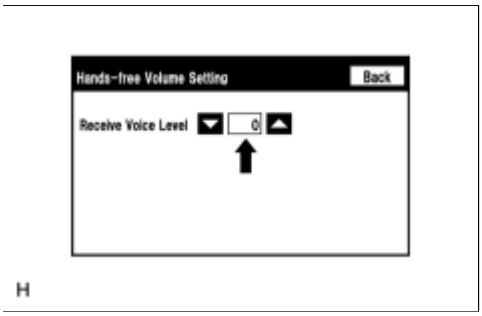
**Text in Illustration**

| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **SET VOLUME TO HIGH**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK SETTINGS (OPERATION CHECK)** |




(a) Enter the "Hands-free Volume Setting" screen. Refer to Check Hands-free Volume Setting in Operation Check INFO .

(b) Check if the Receive Voice Level is set to "0".

**HINT:**

**The Receive Voice Level can be set to 11 different levels, -5 to +5, with a 3 dB difference.**

(c) Check if the Receive Voice Level is set to the minimum or maximum level.

**HINT:**

**When the Receive Voice Level is set to the minimum or maximum level, the sound may be distorted.**

OK:

The Receive Voice Level is set to "0".

**NG** ▶ **SET RECEIVE VOICE LEVEL TO "0"**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN**

**PROBLEM SYMPTOMS TABLE**

**The Other Caller cannot Hear Your Voice, or Your Voice is too Quiet or Distorted**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CELLULAR PHONE** |

(a) Check if the other caller can hear your voice correctly.

OK:

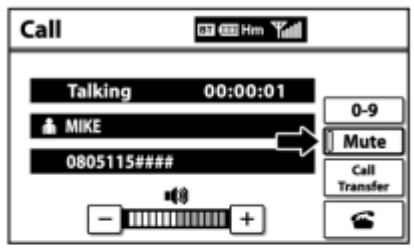
Your voice can be heard correctly.

**NG** ▶ **REPLACE CELLULAR PHONE**

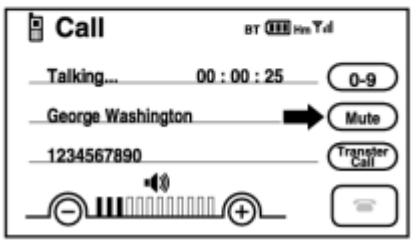
**OK** ▼

| | |
|---|---|
| 2. | **CHECK SETTINGS** |

*1




*2




(a) Check if the Mute switch is set to on.

OK:

Mute switch is not set to on.

**Text in Illustration**

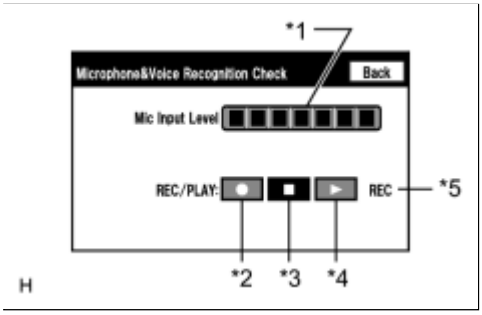
| | |
|---|---|
| *1 | Example (w/ "Bluetooth" Audio System) |
| *2 | Example (w/o "Bluetooth" Audio System) |

**NG** ▶ **TURN MUTE SWITCH OFF**

NG ▶ TURN MUTE SWITCH OFF

**OK** ▼

| 3. | CHECK MICROPHONE AND VOICE RECOGNITION (OPERATION CHECK) |
|---|---|




(a) Enter the "Microphone & Voice Recognition Check" screen. Refer to Check Mic & Voice Recognition in Operation Check INFO .

(b) When voice is input into the microphone, check that the microphone input level meter changes according to the input voice.

(c) Push the recording switch and perform voice recording.

**HINT:**

- Select the recording switch with the blower motor of the air conditioning system stopped. If an outlet of the air conditioning system is facing the microphone, noise may be recorded.
- Voice can be recorded up to 5 seconds.

(d) Check that the recording indicator remains on while recording and that the recorded voice is played normally without noise or distortion.

OK:

All check results are normal.

**Text in Illustration**

| | |
|---|---|
| *1 | Microphone Input Level Meter |
| *2 | Recording Switch |
| *3 | Stop Switch |
| *4 | Play Switch |
| *5 | Recording Indicator |

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Sound of Portable Player cannot be Heard from Speakers or Sound is Low**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK PORTABLE PLAYER SETTINGS |

(a) Check the portable player settings.

(1) Check that the volume is not set to "0".

(2) Check that the mute is off.

(b) Check that the sound of the portable player can be heard from the speakers.

OK:

Sound of the portable player can be heard from the speakers.

NG ▶ CHECK AUDIO SETTINGS

OK ▶ END

| | |
|---|---|
| 2. | CHECK AUDIO SETTINGS |

(a) Check the audio settings.

(1) Check that the volume is not set to "0".

(b) Check that the sound of the portable player can be heard from the speakers.

OK:

Sound of the portable player can be heard from the speakers.

NG ▶ CHECK USING ANOTHER "Bluetooth" AUDIO COMPATIBLE VEHICLE OF SAME MODEL

OK ▶ END

| | |
|---|---|
| 3. | CHECK USING ANOTHER "Bluetooth" AUDIO COMPATIBLE VEHICLE OF SAME MODEL |

(a) Check that the sound of the portable player can be heard from the speakers on another "Bluetooth" audio compatible vehicle of the same model.

OK:

Sound of the portable player can be heard from the speakers.

NG ▶ MALFUNCTION IN PORTABLE PLAYER

MALFUNCTION IN PORTABLE PLAYER

OK ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

**Does not Play even after Bluetooth Audio Mode is Selected**

## INSPECTION PROCEDURE

**HINT:**

**Even if the portable player can play audio content, it may not be able to play via the in-vehicle device. This does not necessarily indicate a malfunction of the in-vehicle device.**

## PROCEDURE

| | |
|---|---|
| 1. | CHECK OPERATION |

(a) Check if the portable player operates normally.

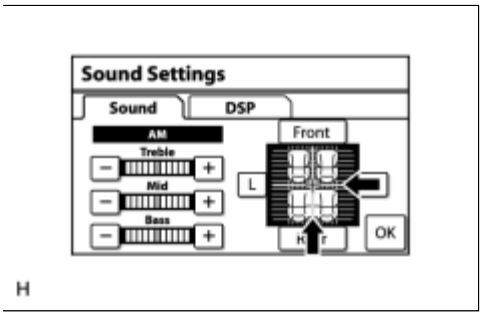
OK:

The portable player operates normally.

NG ▶ MALFUNCTION IN PORTABLE PLAYER

OK ▼

| | |
|---|---|
| 2. | CHECK AUDIO SETTINGS |




H

(a) Enter the "Sound Settings" screen by pressing the "Sound" switch on the audio display.

(b) Set volume, fader and balance to the initial values and check that sound is normal.

OK:

Audio system returns to normal.

**HINT:**

**Sound quality adjustment measures vary according to the type of the amplifier.**

NG ▶ REPLACE NAVIGATION RECEIVER ASSEMBLY

OK

OK

| | |
|---|---|
| 3. | CHECK USING ANOTHER "Bluetooth" AUDIO COMPATIBLE VEHICLE OF SAME MODEL |

(a) Check if the "Bluetooth" audio player plays normally on another "Bluetooth" audio compatible vehicle of the same model.

OK:

"Bluetooth" audio plays normally.

NG ▶ MALFUNCTION IN PORTABLE PLAYER

OK ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

**Noise Occurs or Sound Skips when Portable Player Plays**

## INSPECTION PROCEDURE

**HINT:**

- Perform this check with the portable player volume set at an appropriate level.
- Make sure there are no obstructions between the portable player and navigation receiver assembly that may block signals, and that the portable player and radio receiver assembly are not excessively far apart.
- Make sure devices other than the navigation receiver assembly are not connected to the portable player.
- Make sure there is no interference from a wireless LAN, etc.

## PROCEDURE

| | |
|---|---|
| 1. | CHECK USING ANOTHER "Bluetooth" AUDIO COMPATIBLE VEHICLE OF SAME MODEL |

(a) Check that the same problem does not occur in the sound heard from the speakers on another "Bluetooth" audio compatible vehicle of the same model.

OK:

The same problem does not occur in the sound heard from the speakers.

NG ▶ MALFUNCTION IN PORTABLE PLAYER

OK ▼

| | |
|---|---|
| 2. | REMOVE ADDITIONAL DEVICES WHICH USE RADIO WAVES |

(a) Remove additional devices which use radio waves.

(b) Play the portable player and check that the same problem does not occur in the sound heard from the speakers.

OK:

The same problem does not occur in the sound heard from the speakers.

NG ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

OK ▶ END

**Portable Player cannot be Connected Manually / Automatically**

## INSPECTION PROCEDURE

**HINT:**

**Some versions of "Bluetooth" compatible audio players may not function, or the function may be limited using the navigation receiver assembly, even if the portable audio player itself can play files** INFO **.**

## PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTED DEVICE SETTINGS |




(a) Display the "Select Portable Player" screen and check if the portable player is registered as a connected device.

**NOTICE:**

**If a cellular phone is used as a portable player, it must be registered independently from the registration that is performed for the hands-free system.**

**HINT:**

**Only 2 portable players can be registered.**

Result:

| RESULT | PROCEED TO |
|---|---|
| The portable player is registered as a connected device. | A |
| The portable player is not registered as a connected device. | B |

**B** ▶ **REGISTER PORTABLE PLAYER AS CONNECTED DEVICE**

**A** ▼

| | |
|---|---|
| 2. | CHECK SYMPTOMS |

(a) Check the connection condition between the portable player and navigation receiver assembly.

### The portable player cannot be connected under any of the following conditions:

- The portable player is connected to another device.
- The portable player is connected to the navigation receiver assembly using the hands-free function.
- The navigation receiver assembly has cleared the portable player registration.

- The portable player is off.

Result:

| RESULT | PROCEED TO |
|---|---|
| The portable player cannot be connected manually. | A |
| The portable player cannot connect automatically. | B |

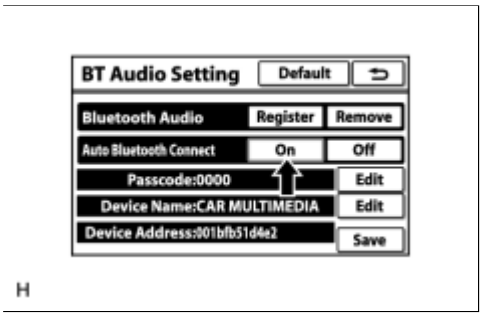
**B** ▶ **CHECK PORTABLE PLAYER STATUS**

**A**

▼

| 3. | CHECK AUTOMATIC CONNECTION SETTINGS |
|---|---|

(a) Display the "BT Audio Setting" screen and check automatic connection settings of the "Bluetooth" audio.




(1) Check if "On" is displayed for "Auto Bluetooth Connect" on the "BT Audio Setting" screen.

OK:

"On" is displayed for "Auto Bluetooth Connect".

**NG** ▶ **CHANGE AUTO BLUETOOTH CONNECT TO "On"**

**OK**

▼

| 4. | CHECK PORTABLE PLAYER STATUS |
|---|---|

(a) Check the status of the portable player.

(1) Check that the portable player is in standby mode.

(2) Check that the portable player is not connected to another device (headphones etc.).

OK:

The portable player is in standby mode and not connected to another device (headphones etc.).

**NG** ▶ **CHANGE PORTABLE PLAYER TO STANDBY MODE AND**

NG ▶ **DISCONNECT OTHER DEVICES (HEADPHONES etc.)**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK USING ANOTHER "Bluetooth" AUDIO COMPATIBLE VEHICLE OF SAME MODEL** |

(a) Check if the portable player can be connected manually/automatically on another "Bluetooth" audio compatible vehicle of the same model.

OK:

The portable player can be connected manually/automatically.

**NG** ▶ **PORTABLE PLAYER IS NOT COMPATIBLE**

**OK** ▼

| | |
|---|---|
| **6.** | **REMOVE ADDITIONAL DEVICES WHICH USE RADIO WAVES** |

(a) Remove additional devices which use radio waves.

(b) Check if the portable player can be connected manually/automatically.

OK:

The portable player can be connected manually/automatically.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **END**

**Registered Device cannot be Deleted**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **DELETE OPERATION** |

(a) Check if a registered portable player can be deleted normally.

OK:

Registered portable player can be deleted normally.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **END**

**Portable Player cannot be Registered**

## INSPECTION PROCEDURE

**HINT:**

**Some versions of "Bluetooth" compatible audio players may not function, or the function may be limited using the navigation receiver assembly, even if the portable audio player itself can play files**  **.**

## PROCEDURE

| | |
|---|---|
| 1. | CHECK THAT PORTABLE PLAYER IS "Bluetooth" AUDIO COMPATIBLE |

(a) Check if the portable player is "Bluetooth" audio compatible.

Result:

| RESULT | PROCEED TO |
|---|---|
| The portable player is "Bluetooth" audio compatible. | A |
| The portable player is not "Bluetooth" audio compatible. | B |

**B** ▶ **USE A "Bluetooth" AUDIO COMPATIBLE PORTABLE PLAYER**

**A** ▼

| | |
|---|---|
| 2. | CHECK CONNECTION PROCEDURE OF CONNECTED DEVICE |

(a) Referring to the owner's manual, correctly register the portable player.

(b) Check that the portable player has been registered as a connected device.

### The portable player cannot be registered under any of the following conditions:

- The A2DP (Advanced Audio Distribution Profile) is not used when registering a cellular phone.
- A different portable player registration remains in the navigation receiver assembly.
- A different navigation receiver assembly registration remains in the portable player.
- The portable player is off.

OK:

The portable player has been registered as a connected device.

**NG** ▶ **CHECK USING ANOTHER "Bluetooth" AUDIO COMPATIBLE VEHICLE OF SAME MODEL**

OK ▶ END

| | |
|---|---|
| 3. | CHECK USING ANOTHER "Bluetooth" AUDIO COMPATIBLE VEHICLE OF SAME MODEL |

(a) Check if the portable player can be registered normally on another "Bluetooth" audio compatible vehicle of the same model.

OK:

The portable player can be registered.

NG ▶ MALFUNCTION IN PORTABLE PLAYER

OK ▼

| | |
|---|---|
| 4. | REMOVE ADDITIONAL DEVICES WHICH USE RADIO WAVES |

(a) Remove additional devices which use radio waves.

(b) Check that the portable player can be registered as a connected device.

OK:

The portable player can be registered.

NG ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

OK ▶ END

**Black Screen**

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DISPLAY SETTING |

(a) Check that the display is not in "Screen OFF" mode.

OK:

The display setting is not in "Screen OFF" mode.

NG ▶ CHANGE SCREEN TO "SCREEN ON" MODE

OK ▼

| | |
|---|---|
| 2. | CHECK IMAGE QUALITY SETTING |

(a) Check that the screen color quality can be set.

OK:

Setting is possible.

NG ▶ CHECK CABIN

OK ▶ PRESS PANEL SWITCH "DISPLAY" AND SET SCREEN COLOR QUALITY TO NORMAL

| | |
|---|---|
| 3. | CHECK CABIN |

(a) Check that condensation is not likely to occur in the cabin, and that the temperature is not high or extremely low in the cabin.

**HINT:**

- A humid cabin and a rapid change in temperature may lead to condensation. Condensation in the cabin may cause a short circuit.
- The appropriate cabin temperature is 20 to 30°C (68 to 86°F).

OK:

Condensation is not likely being produced and the temperature is not high or extremely low.

NG ▶ SET CABIN TO APPROPRIATE TEMPERATURE

| | |
|---|---|
| OK | PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE |

**Steering Pad Switch Circuit**

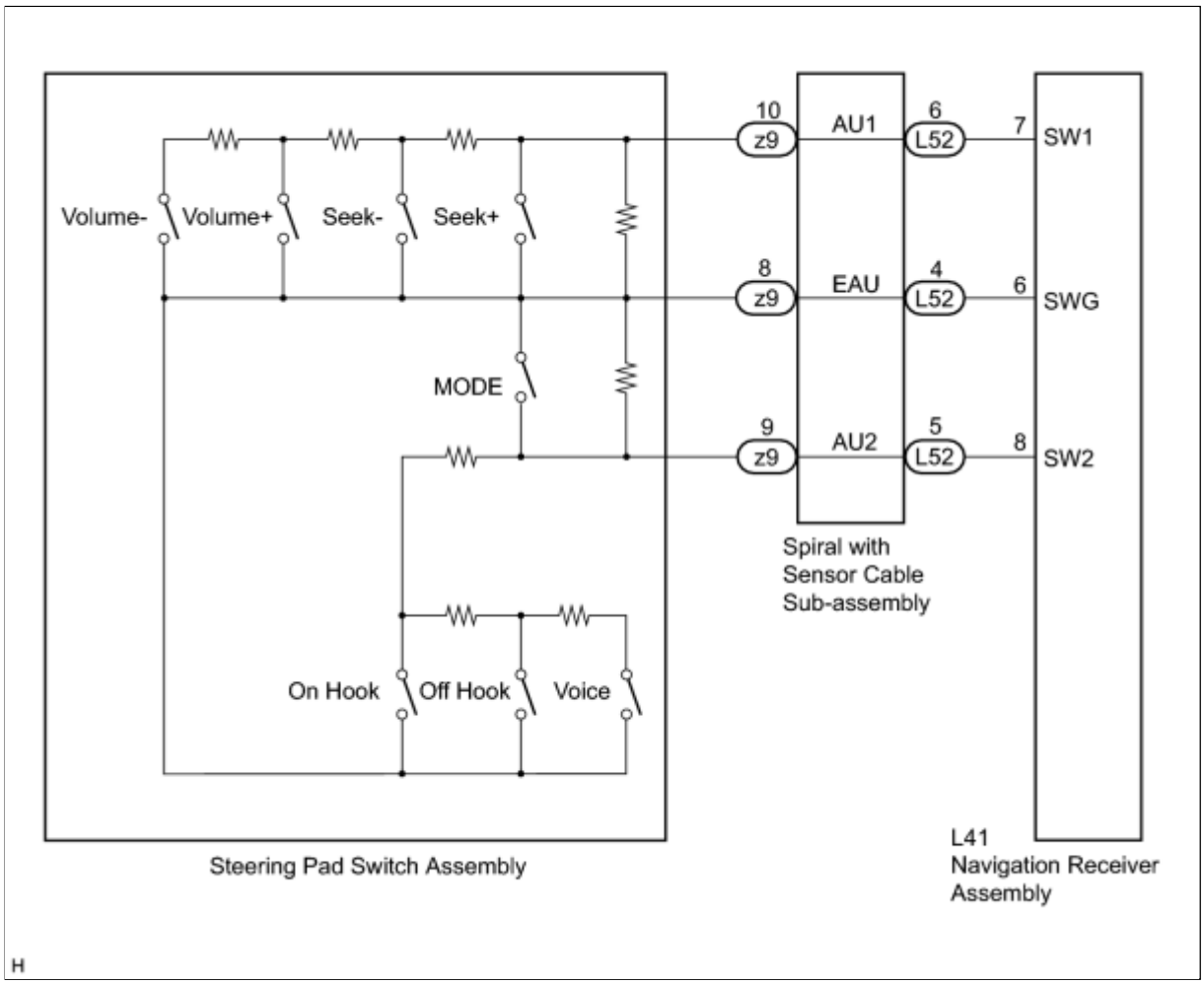
## DESCRIPTION

This circuit sends an operation signal from the steering pad switch assembly to the navigation receiver assembly.

If there is an open in the circuit, the navigation system cannot be operated using the steering pad switch assembly.

If there is a short in the circuit, the resulting condition is the same as to if the switch were continuously pressed. Therefore, the navigation receiver assembly cannot be operated using the steering pad switch assembly, and the navigation receiver assembly itself cannot function.

## WIRING DIAGRAM



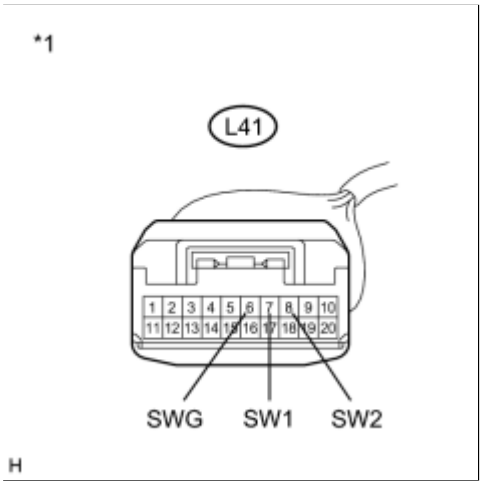

## INSPECTION PROCEDURE

**NOTICE:**

**The vehicle is equipped with an SRS (Supplemental Restraint System). Before servicing (including removal or installation of parts), be sure to read the precaution for Supplemental Restraint System INFO .**

## PROCEDURE

| | |
|---|---|
| 1. | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |




(a) Disconnect the L41 navigation receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L41-7 (SW1) - L41-6 (SWG) | No switch pushed | 95 to 105 kΩ |
| L41-7 (SW1) - L41-6 (SWG) | Seek+ switch pushed | Below 2.5 Ω |
| L41-7 (SW1) - L41-6 (SWG) | Seek- switch pushed | 323 to 335 Ω |
| L41-7 (SW1) - L41-6 (SWG) | Volume+ switch pushed | 980 to 1020 Ω |
| L41-7 (SW1) - L41-6 (SWG) | Volume- switch pushed | 3048 to 3172 Ω |
| L41-8 (SW2) - L41-6 (SWG) | No switch pushed | 95 to 105 kΩ |
| L41-8 (SW2) - L41-6 (SWG) | MODE switch pushed | Below 2.5 Ω |
| L41-8 (SW2) - L41-6 (SWG) | Voice switch pushed | 3048 to 3172 Ω |
| L41-8 (SW2) - L41-6 (SWG) | On Hook switch pushed | 323 to 335 Ω |
| L41-8 (SW2) - L41-6 (SWG) | Off Hook switch pushed | 980 to 1020 Ω |

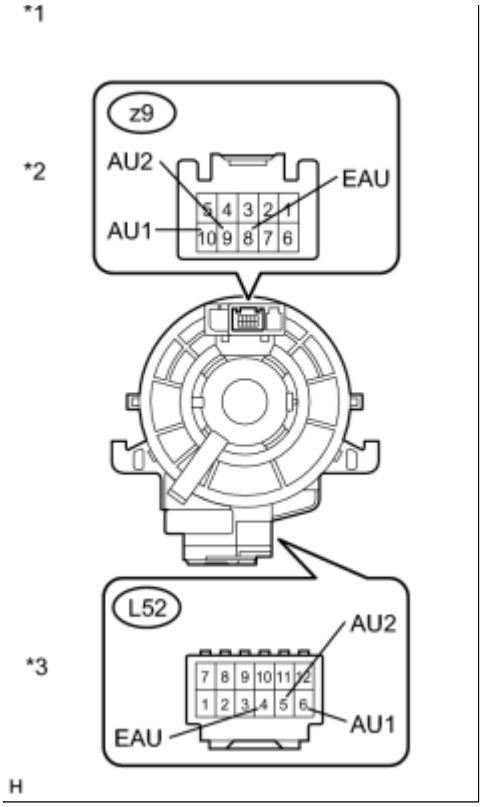
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |

**NG** ▶ **INSPECT SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **2.** | **INSPECT SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY** |




(a) Disconnect the steering pad switch assembly and spiral with sensor cable sub-assembly connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| z9-8 (EAU) - L52-4 (EAU) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-10 (AU1) - L52-6 (AU1) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-9 (AU2) - L52-5 (AU2) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |

**NOTICE:**

**The spiral with sensor cable sub-assembly is an important part of the SRS airbag system. Incorrect removal or installation of the spiral with sensor cable sub-assembly may prevent the airbag from deploying. Refer to the pages shown in the brackets.**

**HINT:**

- Removal INFO
- Installation INFO

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Spiral with Sensor Cable Sub-assembly) |

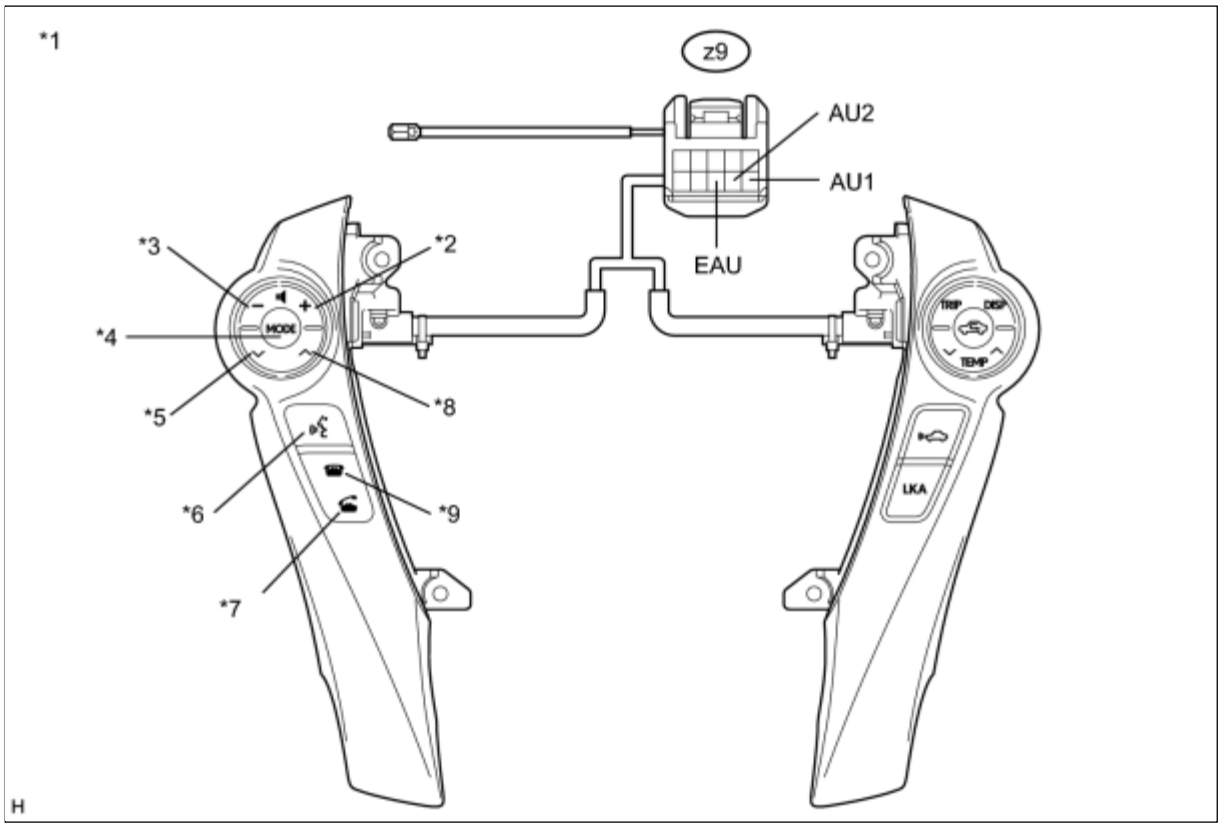
| | |
|---|---|
| *2 | Steering Pad Switch Assembly Side |
| *3 | Vehicle Side |

**NG** ▶ **REPLACE SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT STEERING PAD SWITCH ASSEMBLY** |

(a) Disconnect the z9 steering pad switch assembly connector.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | SWITCH CONDITION | SPECIFIED CONDITION |
|---|---|---|
| z9-10 (AU1) - z9-8 (EAU) | No switch pushed | 95 to 105 kΩ |
| z9-10 (AU1) - z9-8 (EAU) | Seek+ switch pushed | Below 2.5 Ω |
| z9-10 (AU1) - z9-8 (EAU) | Seek- switch pushed | 323 to 335 Ω |
| z9-10 (AU1) - z9-8 (EAU) | Volume+ switch pushed | 980 to 1020 Ω |
| z9-10 (AU1) - z9-8 (EAU) | Volume- switch pushed | 3048 to 3172 Ω |

| | | |
|---|---|---|
| z9-9 (AU2) - z9-8 (EAU) | No switch pushed | 95 to 105 kΩ |
| z9-9 (AU2) - z9-8 (EAU) | MODE switch pushed | Below 2.5 Ω |
| z9-9 (AU2) - z9-8 (EAU) | Voice switch pushed | 3048 to 3172 Ω |
| z9-9 (AU2) - z9-8 (EAU) | On Hook switch pushed | 323 to 335 Ω |
| z9-9 (AU2) - z9-8 (EAU) | Off Hook switch pushed | 980 to 1020 Ω |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br>(Steering Pad Switch Assembly) | *2 | Volume+ |
| *3 | Volume- | *4 | MODE |
| *5 | Seek- | *6 | Voice Switch |
| *7 | Off Hook | *8 | Seek+ |
| *9 | On Hook | - | - |

**NG** ▶ **REPLACE STEERING PAD SWITCH ASSEMBLY**

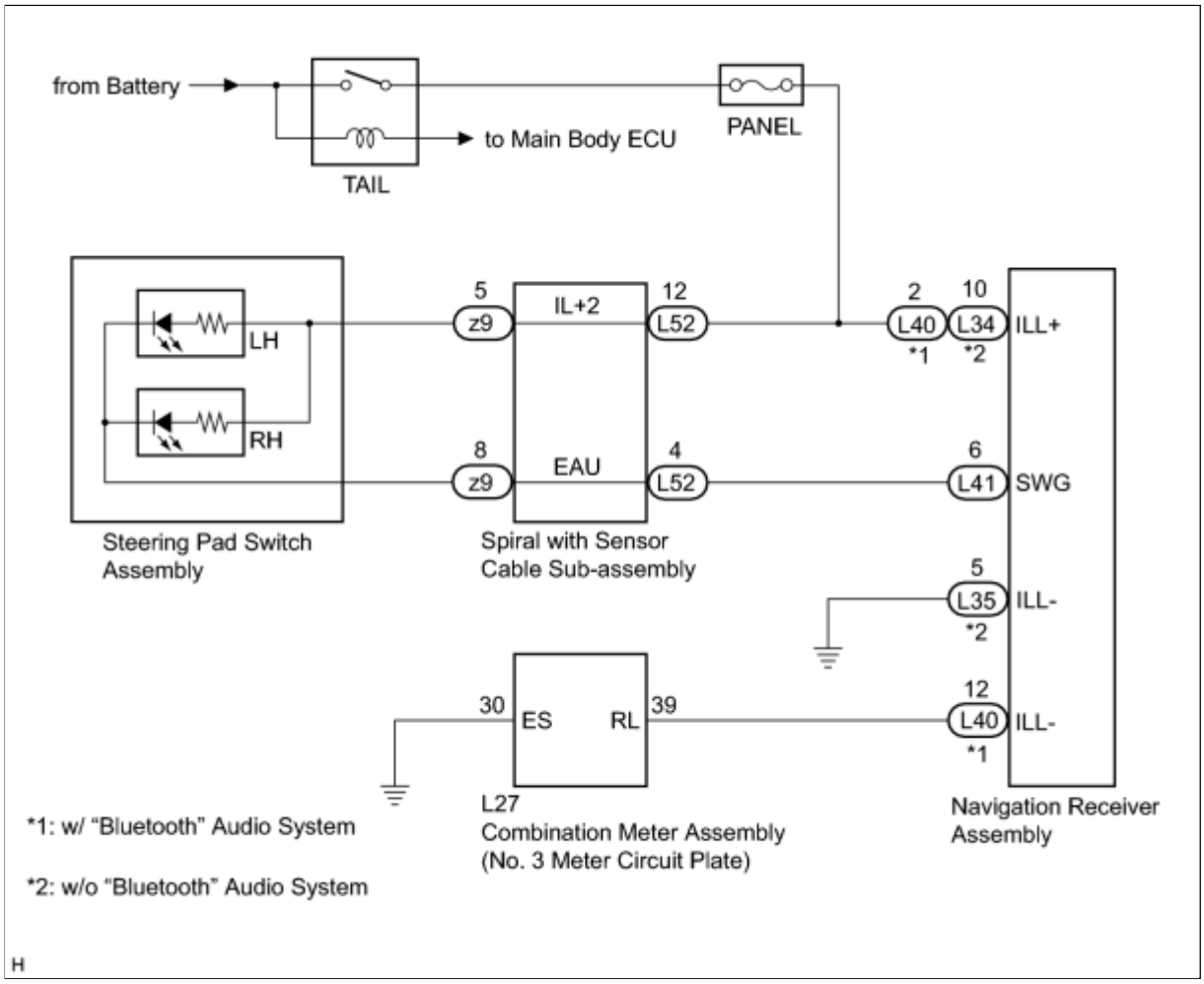
**OK** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (NAVIGATION RECEIVER - SPIRAL WITH SENSOR CABLE)**

**Illumination Circuit**

## DESCRIPTION

Power is supplied to the navigation receiver assembly and steering pad switch illumination when the light control switch is in the tail or head position.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- The vehicle is equipped with an SRS (Supplemental Restraint System). Before servicing (including removal or installation of parts), be sure to read the precaution for Supplemental Restraint System INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK ILLUMINATION** |

(a) Check if the illumination for the navigation receiver assembly, steering pad switch assembly, glove box

(a) Check if the illumination for the navigation receiver assembly, steering pad switch assembly, glove box or others (hazard switch, transmission control switch, etc.) comes on when the light control switch is turned to the tail or head position.

Result:

| RESULT | PROCEED TO |
|---|---|
| Illumination comes on for all components except steering pad switch assembly. | A |
| Illumination comes on for all components except navigation receiver assembly. | B |
| Illumination comes on for all components except navigation receiver assembly and steering pad switch assembly.<br>(w/ "Bluetooth" Audio System) | C |
| Illumination comes on for all components except navigation receiver assembly and steering pad switch assembly.<br>(w/o "Bluetooth" Audio System) | D |
| No illumination comes on (navigation receiver assembly, steering pad switch assembly, hazard switch, glove box, etc.). | E |

**E** ▶ **GO TO LIGHTING SYSTEM**

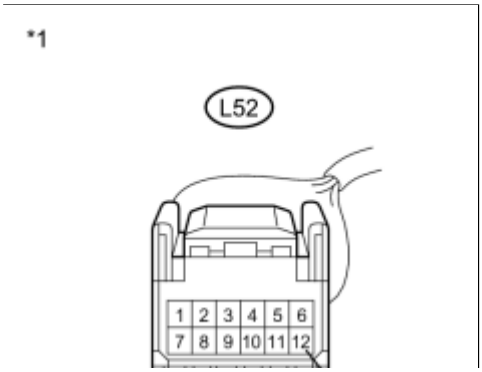
**D** ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - BODY GROUND)**

**C** ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - COMBINATION METER ASSEMBLY)**

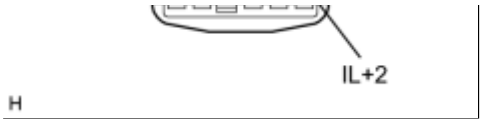
**B** ▶ **CHECK HARNESS AND CONNECTOR (BATTERY - NAVIGATION RECEIVER ASSEMBLY)**

**A** ▼

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (BATTERY - SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY)** |




(a) Disconnect the L52 spiral with sensor cable sub-assembly connector.




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L52-12 (IL+2) - Body ground | Light control switch in tail or head | 11 to 14 V |

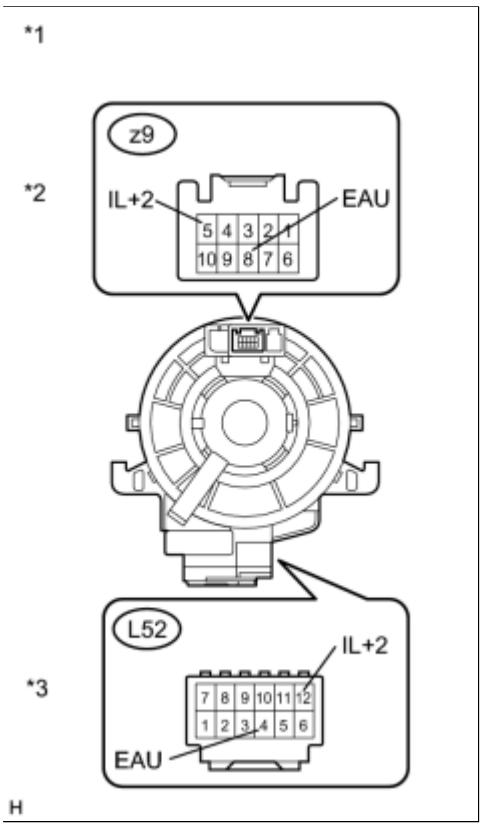
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Spiral with Sensor Cable Sub-assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY** |




(a) Disconnect the steering pad switch assembly and spiral with sensor cable sub-assembly connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| z9-8 (EAU) - L52-4 (EAU) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-5 (IL+2) - L52-12 (IL+2) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |

**NOTICE:**

**The spiral with sensor cable sub-assembly is an important part of the SRS airbag system. Incorrect removal or installation of the spiral with sensor cable sub-assembly may prevent the airbag from deploying. Refer to the pages shown in the brackets.**

**HINT:**

- Removal INFO
- Installation INFO

**Text in Illustration**

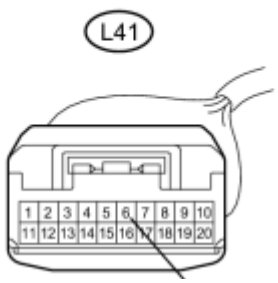
| | |
|---|---|
| *1 | Component without harness connected<br>(Spiral with Sensor Cable Sub-assembly) |
| *2 | Steering Pad Switch Assembly Side |
| *3 | Vehicle Side |

**NG** ▶ **REPLACE SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY**

**OK** ▼

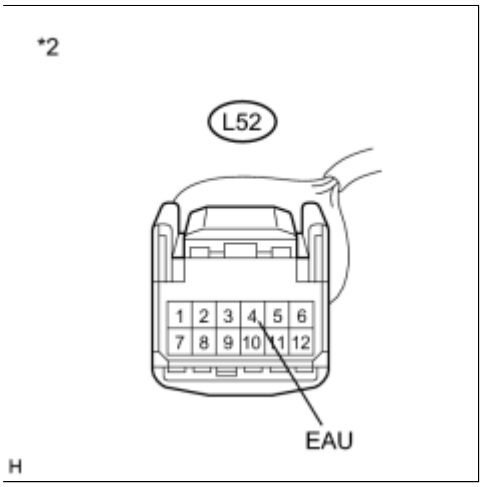
| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE - NAVIGATION RECEIVER)** |

*1




(a) Disconnect the L41 navigation receiver assembly.




(b) Disconnect the L52 spiral with sensor cable sub-assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L41-6 (SWG) - L52-4 (EAU) | Always | Below 1 Ω |
| L41-6 (SWG) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Spiral with Sensor Cable Sub-assembly) |

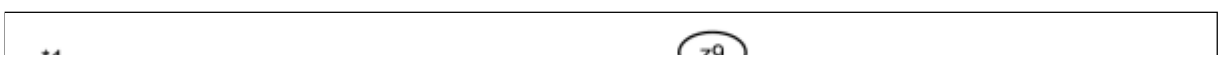
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

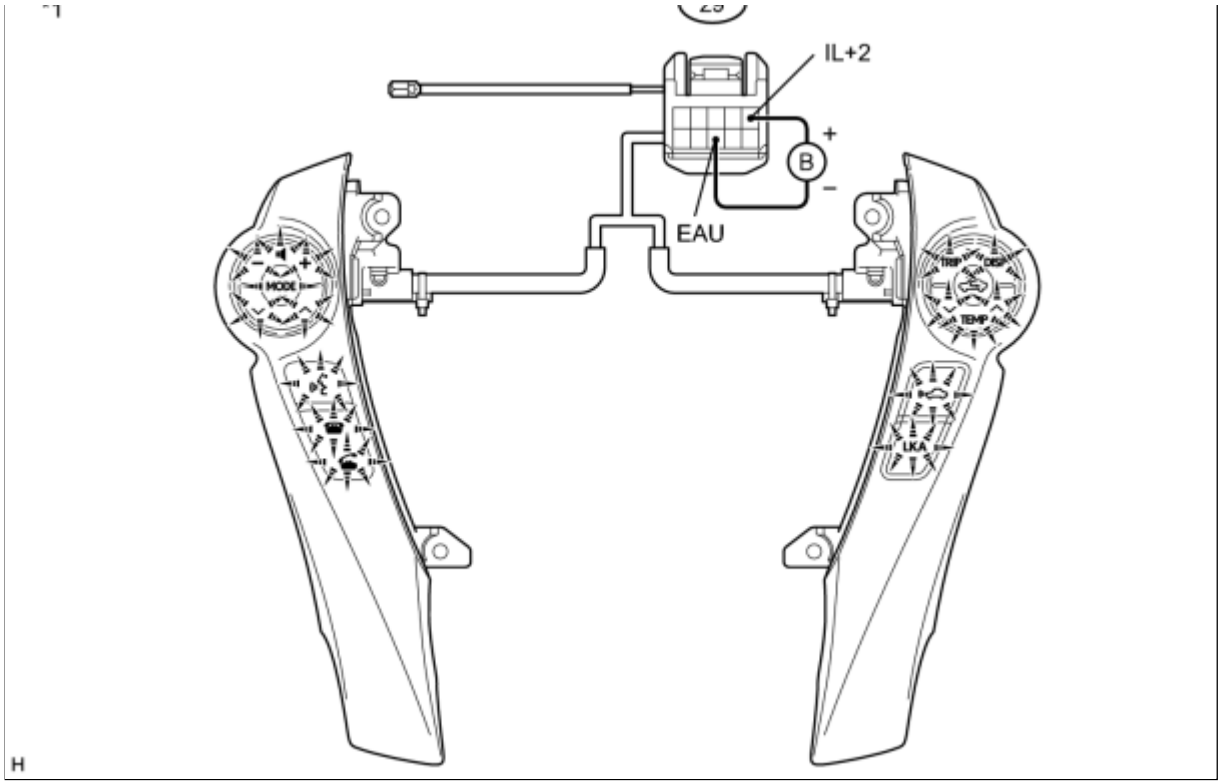
**OK**
▼

| | |
|---|---|
| **5.** | **INSPECT STEERING PAD SWITCH ASSEMBLY** |

(a) Disconnect the z9 steering pad switch assembly connector.

(b) Connect a positive (+) lead from the battery to terminal IL+2 and a negative (-) lead to terminal EAU of the steering pad switch assembly connector.






(c) Check if the illumination for the steering pad switch comes on.

OK:

Illumination for the steering pad switch comes on.

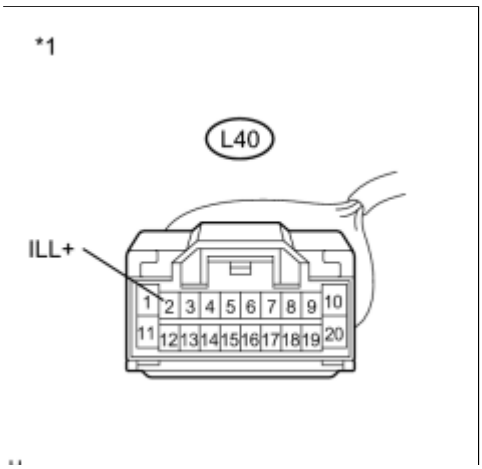
**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br>(Steering Pad Switch Assembly) | - | - |

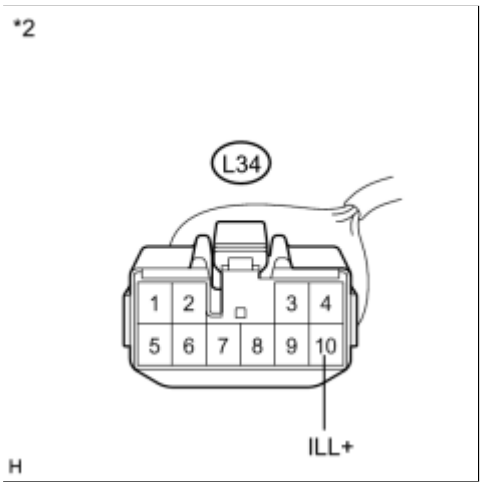
**NG** ▶ **REPLACE STEERING PAD SWITCH ASSEMBLY**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **6.** | **CHECK HARNESS AND CONNECTOR (BATTERY - NAVIGATION RECEIVER ASSEMBLY)** |




(a) Disconnect the L40 navigation receiver assembly connector (w/ "Bluetooth" Audio System).




(b) Disconnect the L34 navigation receiver assembly connector (w/o "Bluetooth" Audio System).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-2 (ILL+) - Body ground*3 | Light control switch in tail or head | 11 to 14 V |
| L34-10 (ILL+) - Body ground*4 | Light control switch in tail or head | 11 to 14 V |

**Text in Illustration**

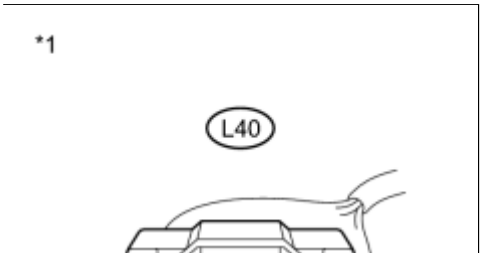
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly)*3 |
| *2 | Front view of wire harness connector<br>(to Navigation Receiver Assembly)*4 |

*3: w/ "Bluetooth" Audio System
*4: w/o "Bluetooth" Audio System

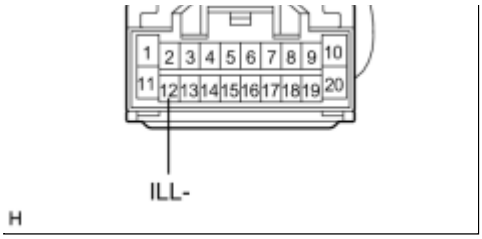
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

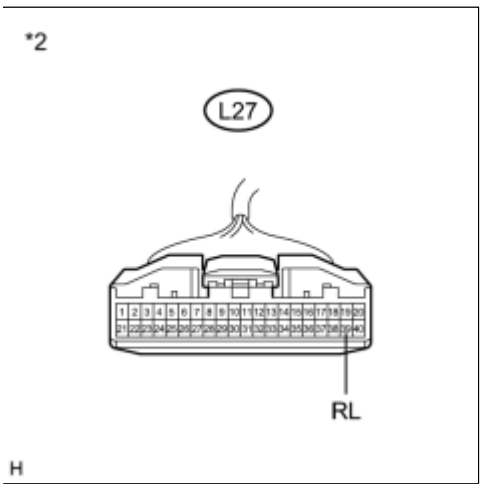
**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **7.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - COMBINATION METER ASSEMBLY)** |




(a) Disconnect the L40 navigation receiver assembly connector.




(b) Disconnect the L27 combination meter assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-12 (ILL-) - L27-39 (RL) | Always | Below 1 Ω |
| L40-12 (ILL-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Combination Meter Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **GO TO METER / GAUGE SYSTEM**

| | |
|---|---|
| **8.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - BODY GROUND)** |






(a) Disconnect the L35 navigation receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L35-5 (ILL-) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

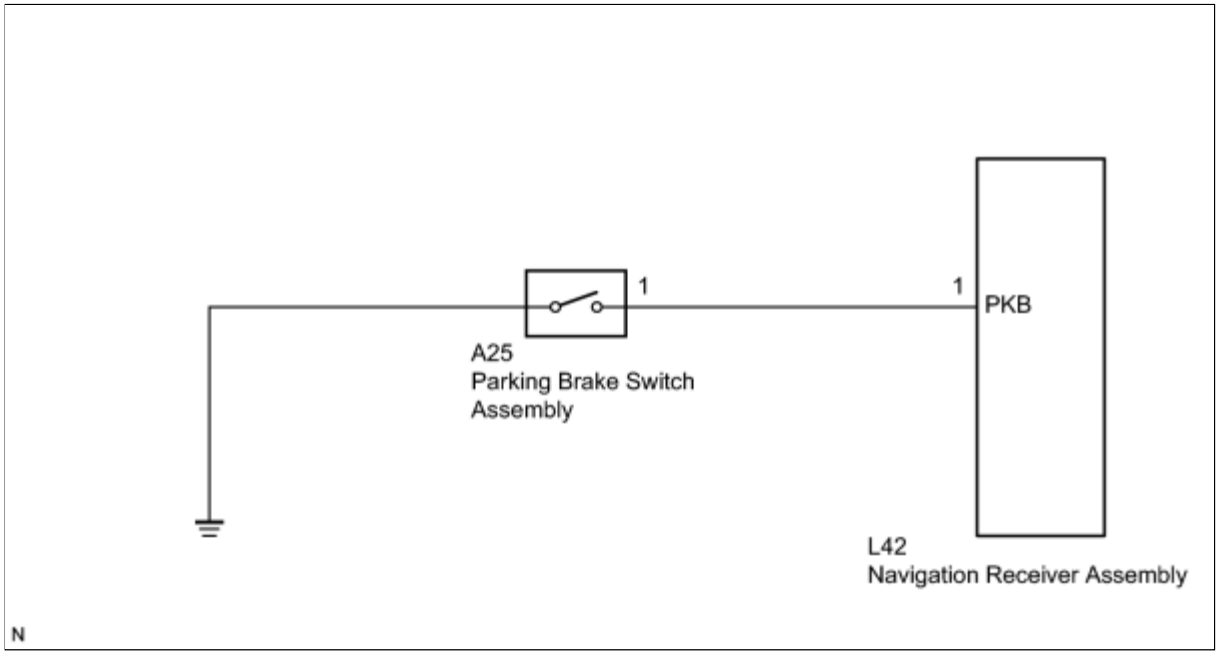
**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**Parking Brake Switch Circuit**

## DESCRIPTION

This circuit is from the parking brake switch assembly to the navigation receiver assembly.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK BRAKE WARNING LIGHT |

(a) Check that the brake warning light comes on when the parking brake is applied and goes off when it is released.

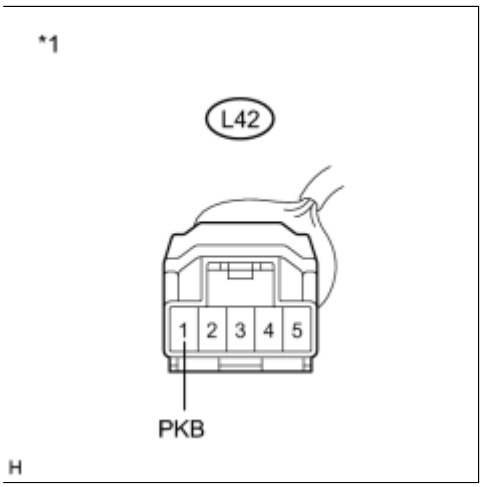
OK:

The brake warning light operates as specified above.

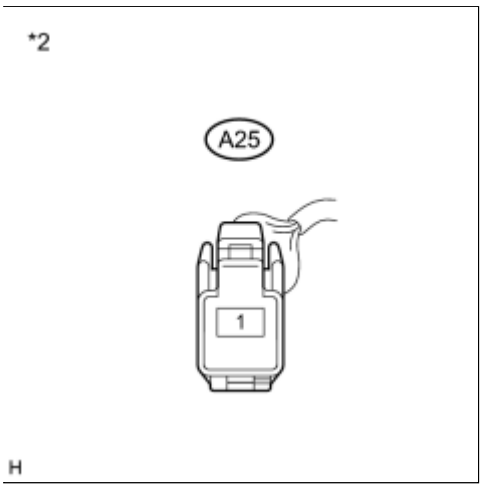
NG ▶ INSPECT PARKING BRAKE SWITCH ASSEMBLY

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (PARKING BRAKE SWITCH ASSEMBLY - NAVIGATION RECEIVER ASSEMBLY) |




(a) Disconnect the L42 navigation receiver assembly connector.




(b) Disconnect the A25 parking brake switch assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L42-1 (PKB) - A25-1 | Always | Below 1 Ω |
| L42-1 (PKB) - Body ground | Always | 10 kΩ or higher |

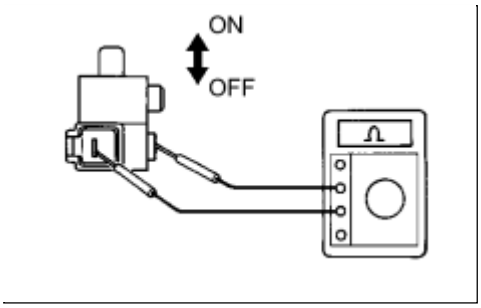
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Parking Brake Switch Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **3.** | **INSPECT PARKING BRAKE SWITCH ASSEMBLY** |




(a) Disconnect the parking brake switch assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| Switch connector - Switch body | ON (When shaft is not pressed) | Below 1 Ω |
| Switch connector - Switch body | OFF (When shaft is pressed) | 10 kΩ or higher |

**NG** ▶ **REPLACE PARKING BRAKE SWITCH ASSEMBLY**

**OK** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**Speaker Circuit**

## DESCRIPTION

The sound signals amplified by the stereo component amplifier assembly are sent to the speakers from the stereo component amplifier assembly via the speaker circuit.

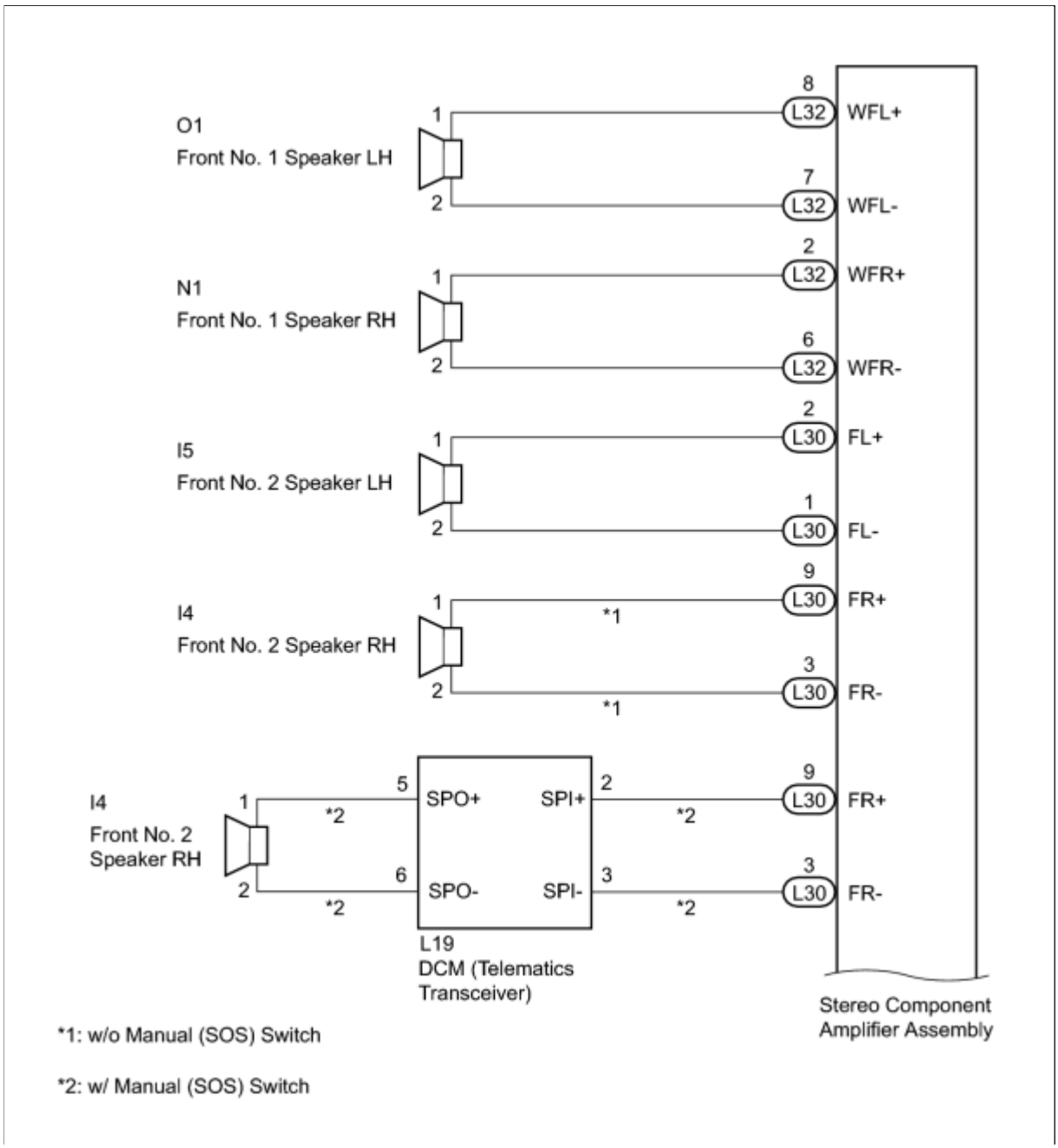
If there is a short in this circuit, the stereo component amplifier assembly detects it and stops output to the speakers.

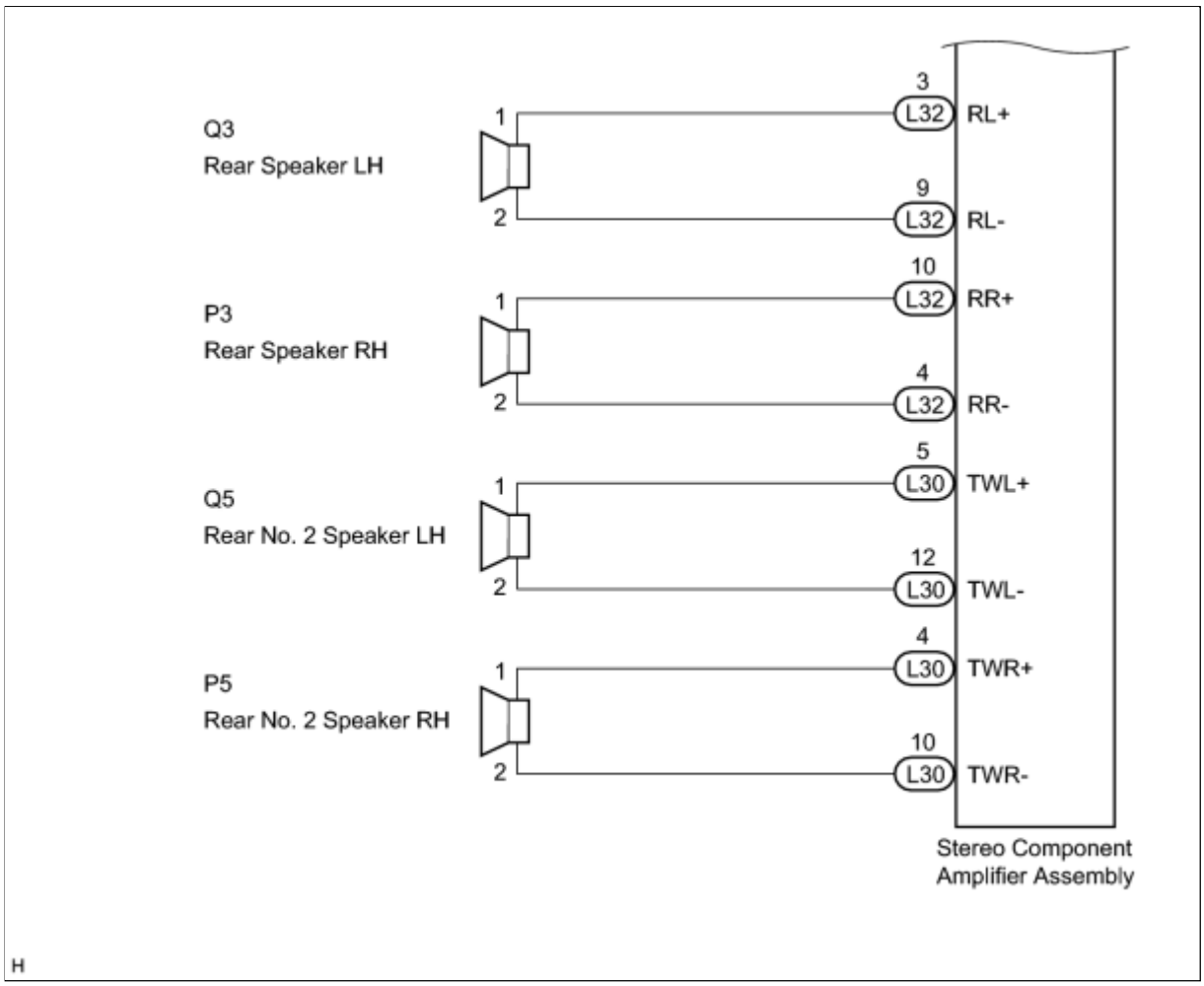
Thus sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier assembly or speakers.

If a short is detected in the speaker circuit, no sound can be heard from the speakers.

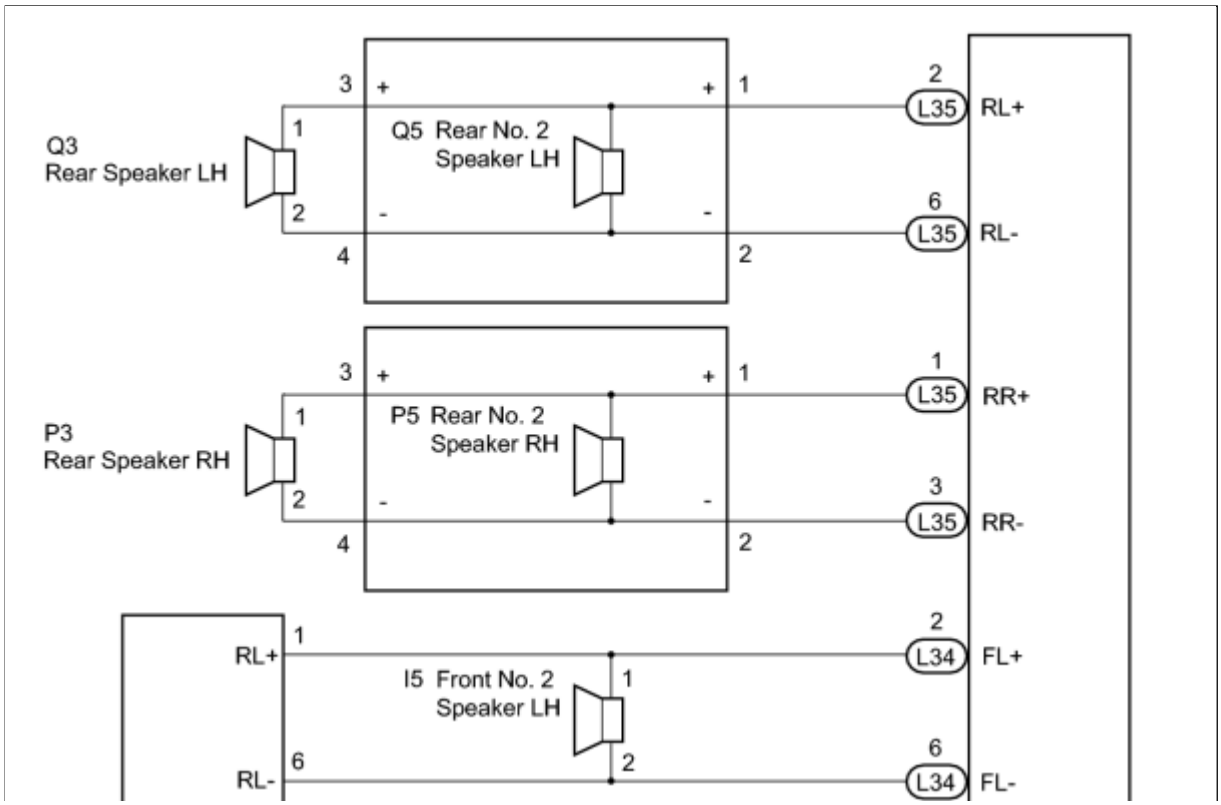
## WIRING DIAGRAM

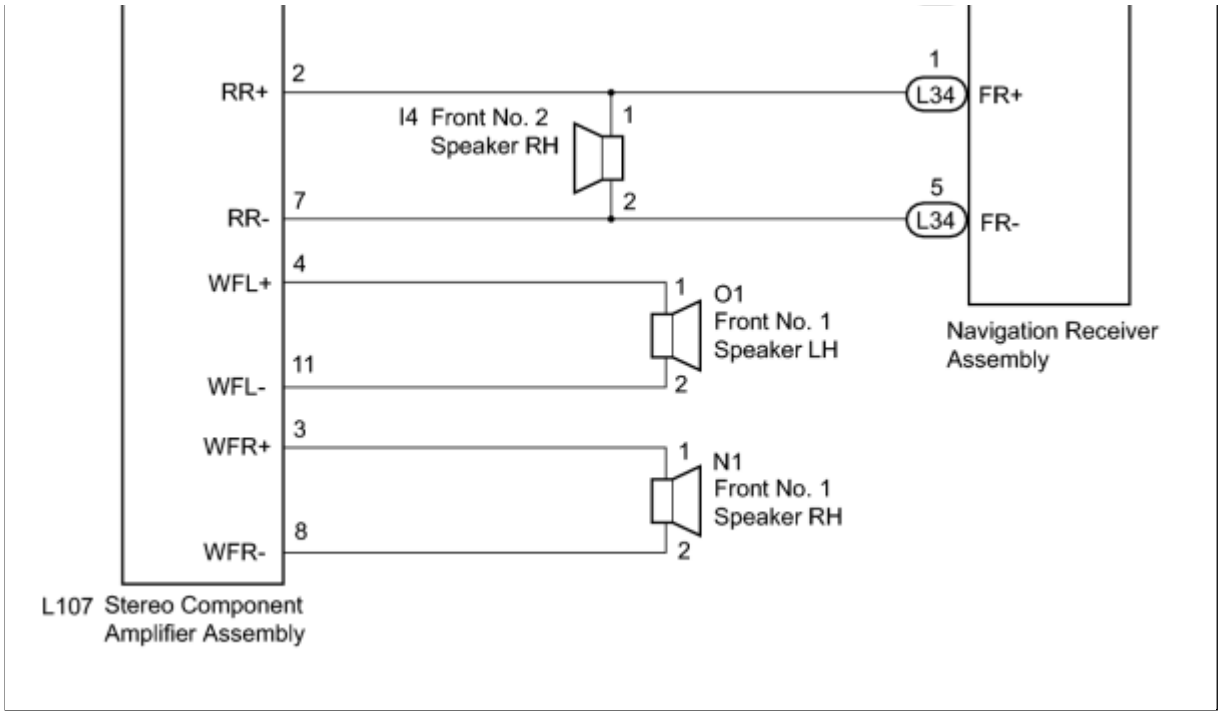
**1. w/ "Bluetooth" Audio System**






**2. w/o "Bluetooth" Audio System**






## INSPECTION PROCEDURE

**NOTICE:**

**If the DCM (telematics transceiver) has been replaced, perform the Activate DCM procedure using the Techstream** INFO **.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CONFIRM MODEL** |

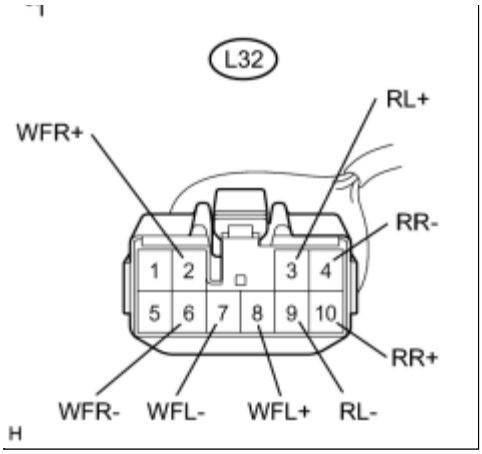
Result:

| RESULT | PROCEED TO |
|---|---|
| w/ "Bluetooth" Audio System | A |
| w/o "Bluetooth" Audio System | B |

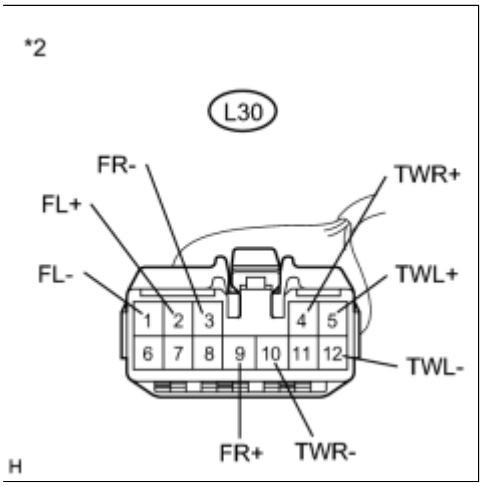
**B** ▶ **CHECK HARNESS AND CONNECTOR**

**A** ▼

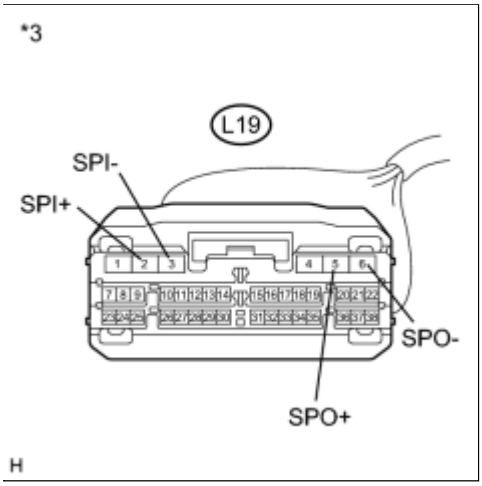
| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR** |



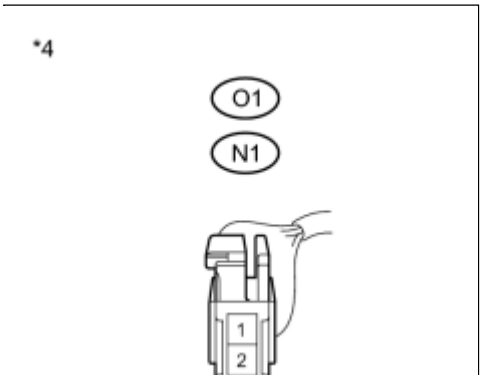

(a) Disconnect the L32 stereo component amplifier assembly connector.




(b) Disconnect the L30 stereo component amplifier assembly connector.

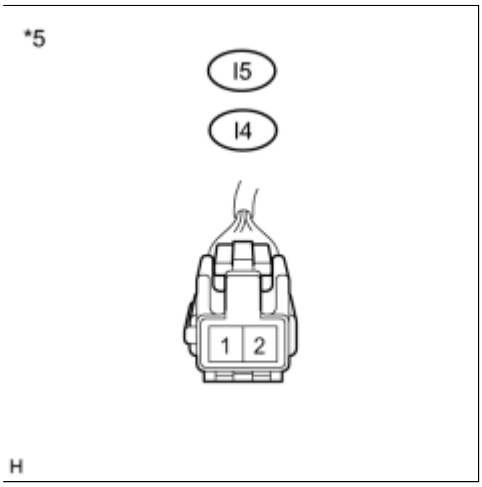



(c) Disconnect the L19 DCM (telematics transceiver) connector (w/ Manual (SOS) Switch).

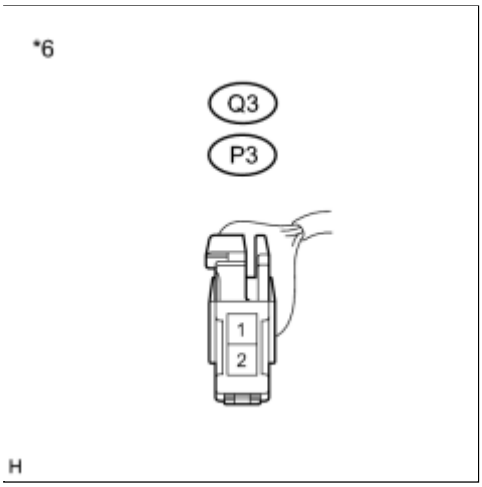



(d) Disconnect the O1 and N1 front No. 1 speaker connectors.

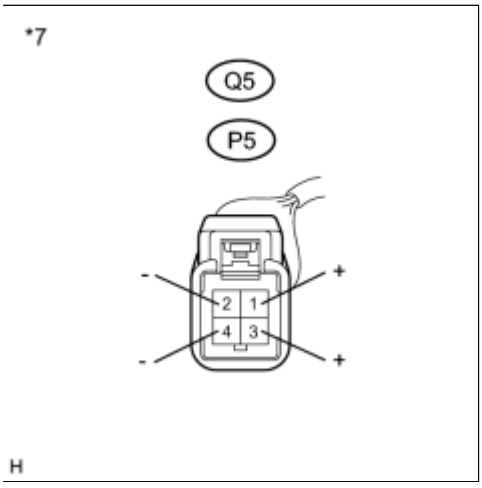



(e) Disconnect the I5 and I4 front No. 2 speaker connectors.




(f) Disconnect the Q3 and P3 rear speaker connectors.




(g) Disconnect the Q5 and P5 rear No. 2 speaker connectors.

(h) Measure the resistance between each of the front No. 1 speakers and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L32-8 (WFL+) - O1-1 | Always | Below 1 Ω |
| L32-7 (WFL-) - O1-2 | Always | Below 1 Ω |
| L32-2 (WFR+) - N1-1 | Always | Below 1 Ω |
| L32-6 (WFR-) - N1-2 | Always | Below 1 Ω |
| L32-8 (WFL+) - Body ground | Always | 10 kΩ or higher |
| L32-7 (WFL-) - Body ground | Always | 10 kΩ or higher |
| L32-2 (WFR+) - Body ground | Always | 10 kΩ or higher |
| L32-6 (WFR-) - Body ground | Always | 10 kΩ or higher |

(i) w/o Manual (SOS) Switch:

Measure the resistance between each of the front No. 2 speakers and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L30-2 (FL+) - I5-1 | Always | Below 1 Ω |
| L30-1 (FL-) - I5-2 | Always | Below 1 Ω |
| L30-9 (FR+) - I4-1 | Always | Below 1 Ω |
| L30-3 (FR-) - I4-2 | Always | Below 1 Ω |
| L30-2 (FL+) - Body ground | Always | 10 kΩ or higher |
| L30-1 (FL-) - Body ground | Always | 10 kΩ or higher |
| L30-9 (FR+) - Body ground | Always | 10 kΩ or higher |
| L30-3 (FR-) - Body ground | Always | 10 kΩ or higher |

(j) w/ Manual (SOS) Switch:

Measure the resistance between the DCM (telematics transceiver) and the front No. 2 speaker RH to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-5 (SPO+) - I4-1 | Always | Below 1 Ω |
| L19-6 (SPO-) - I4-2 | Always | Below 1 Ω |
| L19-5 (SPO+) - Body ground | Always | 10 kΩ or higher |
| L19-6 (SPO-) - Body ground | Always | 10 kΩ or higher |

(k) w/ Manual (SOS) Switch:

Measure the resistance between the DCM (telematics transceiver) and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-2 (SPI+) - L30-9 (FR+) | Always | Below 1 Ω |
| L19-3 (SPI-) - L30-3 (FR-) | Always | Below 1 Ω |
| L19-2 (SPI+) - Body ground | Always | 10 kΩ or higher |
| L19-3 (SPI-) - Body ground | Always | 10 kΩ or higher |

(l) w/ Manual (SOS) Switch:

Measure the resistance between the front No. 2 speaker LH and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L30-2 (FL+) - I5-1 | Always | Below 1 Ω |
| L30-1 (FL-) - I5-2 | Always | Below 1 Ω |
| L30-2 (FL+) - Body ground | Always | 10 kΩ or higher |
| L30-1 (FL-) - Body ground | Always | 10 kΩ or higher |

(m) Measure the resistance between each of the rear speakers and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L32-3 (RL+) - Q3-1 | Always | Below 1 Ω |
| L32-9 (RL-) - Q3-2 | Always | Below 1 Ω |
| L32-10 (RR+) - P3-1 | Always | Below 1 Ω |
| L32-4 (RR-) - P3-2 | Always | Below 1 Ω |
| L32-3 (RL+) - Body ground | Always | 10 kΩ or higher |
| L32-9 (RL-) - Body ground | Always | 10 kΩ or higher |
| L32-10 (RR+) - Body ground | Always | 10 kΩ or higher |
| L32-4 (RR-) - Body ground | Always | 10 kΩ or higher |

(n) Measure the resistance between each of the rear No. 2 speakers and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L30-5 (TWL+) - Q5-1 | Always | Below 1 Ω |
| L30-12 (TWL-) - Q5-2 | Always | Below 1 Ω |
| L30-4 (TWR+) - P5-1 | Always | Below 1 Ω |
| L30-10 (TWR-) - P5-2 | Always | Below 1 Ω |
| L30-5 (TWL+) - Body ground | Always | 10 kΩ or higher |

| | | |
|---|---|---|
| L30-12 (TWL-) - Body ground | Always | 10 kΩ or higher |
| L30-4 (TWR+) - Body ground | Always | 10 kΩ or higher |
| L30-10 (TWR-) - Body ground | Always | 10 kΩ or higher |

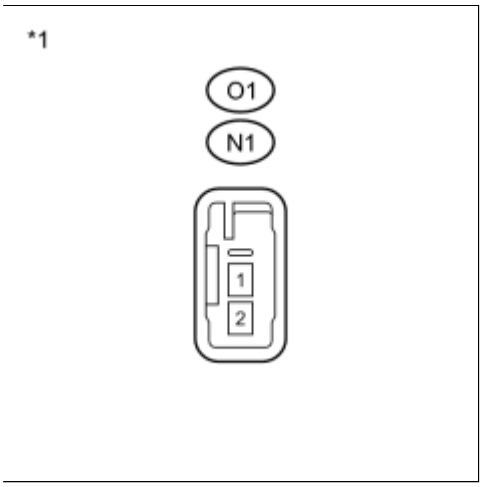
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |
| *3 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |
| *4 | Front view of wire harness connector<br>(to Front No. 1 Speaker) |
| *5 | Front view of wire harness connector<br>(to Front No. 2 Speaker) |
| *6 | Front view of wire harness connector<br>(to Rear Speaker) |
| *7 | Front view of wire harness connector<br>(to Rear No. 2 Speaker) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT FRONT NO. 1 SPEAKER** |




(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| O1-1 - O1-2 | Always | 1.4 to 2.2 Ω |
| N1-1 - N1-2 | Always | 1.4 to 2.2 Ω |

**NOTICE:**

**The speaker should not be removed to check resistance.**

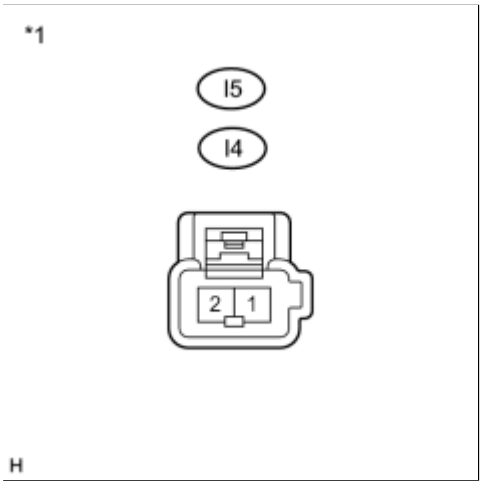
**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Front No. 1 Speaker) |

**NG** ▶ **REPLACE FRONT NO. 1 SPEAKER**

**OK** ▼

| | |
|---|---|
| **4.** | **INSPECT FRONT NO. 2 SPEAKER** |




(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| I5-1 - I5-2 | Always | 1.5 to 2.5 Ω |
| I4-1 - I4-2 | Always | 1.5 to 2.5 Ω |

**NOTICE:**

**The speaker should not be removed to check resistance.**

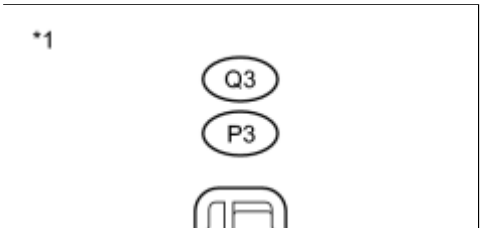
**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Front No. 2 Speaker) |

**NG** ▶ **REPLACE FRONT NO. 2 SPEAKER**

**OK** ▼

| | |
|---|---|
| **5.** | **INSPECT REAR SPEAKER** |




(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|




| | | |
|---|---|---|
| Q3-1 - Q3-2 | Always | 1.5 to 2.2 Ω |
| P3-1 - P3-2 | Always | 1.5 to 2.2 Ω |

**NOTICE:**

**The speaker should not be removed to check resistance.**

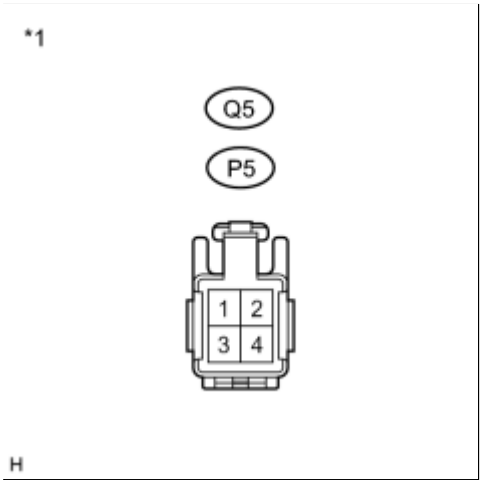
**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear Speaker) |

**NG** ▶ **REPLACE REAR SPEAKER**

**OK** ▼

| | |
|---|---|
| **6.** | **INSPECT REAR NO. 2 SPEAKER** |




(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| Q5-1 - Q5-2 | Always | 1.5 to 2.5 Ω |
| P5-1 - P5-2 | Always | 1.5 to 2.5 Ω |

**NOTICE:**

**The speaker should not be removed to check resistance.**

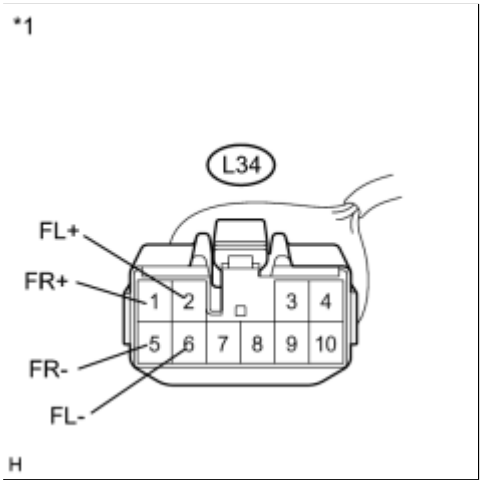
**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear No. 2 Speaker) |

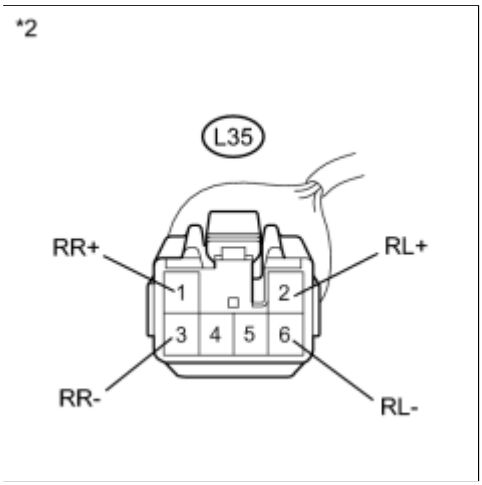
**NG** ▶ **REPLACE REAR NO. 2 SPEAKER**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

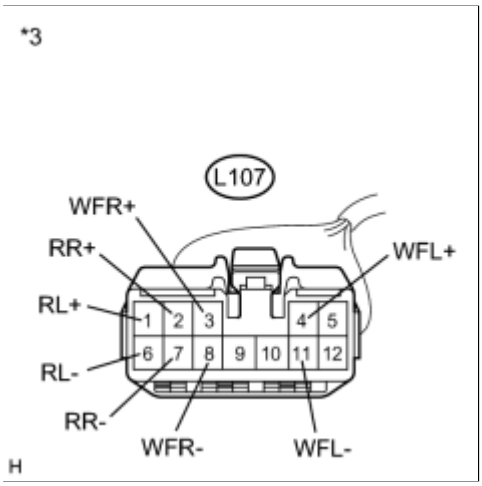
| | |
|---|---|
| **7.** | **CHECK HARNESS AND CONNECTOR** |



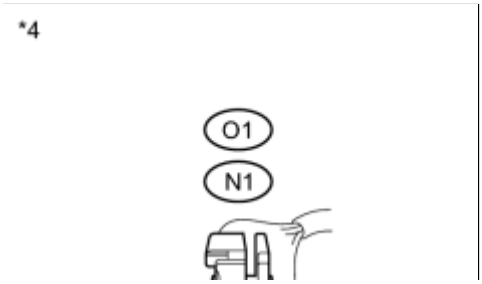

(a) Disconnect the L34 navigation receiver assembly connector.



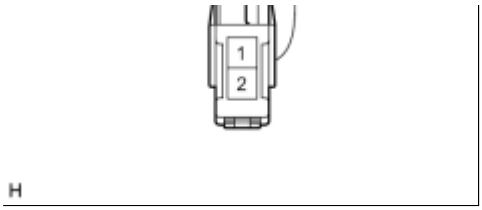

(b) Disconnect the L35 navigation receiver assembly connector.

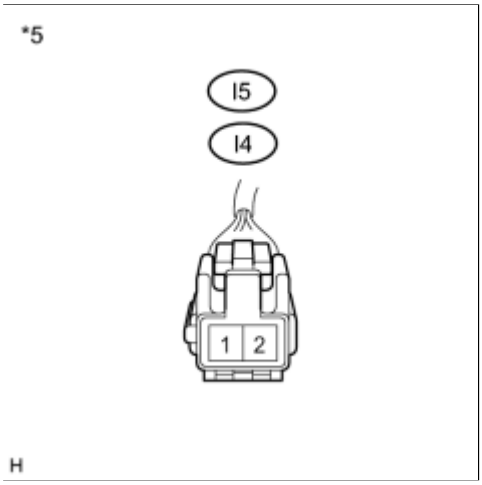



(c) Disconnect the L107 stereo component amplifier assembly connector.

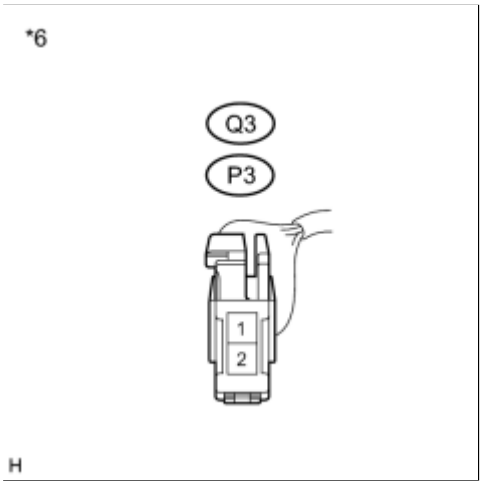



(d) Disconnect the O1 and N1 front No. 1 speaker connectors.

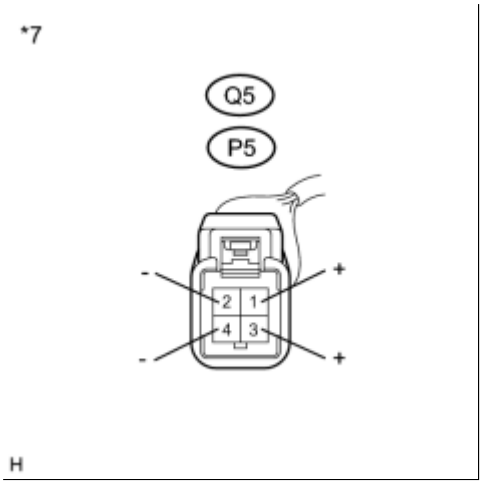



(e) Disconnect the I5 and I4 front No. 2 speaker connectors.




(f) Disconnect the Q3 and P3 rear speaker connectors.




(g) Disconnect the Q5 and P5 rear No. 2 speaker connectors.

(h) Measure the resistance between each of the front No. 2 speakers and the navigation receiver assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L34-2 (FL+) - I5-1 | Always | Below 1 Ω |
| L34-6 (FL-) - I5-2 | Always | Below 1 Ω |
| L34-1 (FR+) - I4-1 | Always | Below 1 Ω |
| L34-5 (FR-) - I4-2 | Always | Below 1 Ω |
| L34-2 (FL+) - Body ground | Always | 10 kΩ or higher |
| L34-6 (FL-) - Body ground | Always | 10 kΩ or higher |
| L34-1 (FR+) - Body ground | Always | 10 kΩ or higher |
| L34-5 (FR-) - Body ground | Always | 10 kΩ or higher |

(i) Measure the resistance between the navigation receiver assembly and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L34-2 (FL+) - L107-1 (RL+) | Always | Below 1 Ω |
| L34-6 (FL-) - L107-6 (RL-) | Always | Below 1 Ω |
| L34-1 (FR+) - L107-2 (RR+) | Always | Below 1 Ω |
| L34-5 (FR-) - L107-7 (RR-) | Always | Below 1 Ω |
| L34-2 (FL+) - Body ground | Always | 10 kΩ or higher |
| L34-6 (FL-) - Body ground | Always | 10 kΩ or higher |
| L34-1 (FR+) - Body ground | Always | 10 kΩ or higher |
| L34-5 (FR-) - Body ground | Always | 10 kΩ or higher |

(j) Measure the resistance between each of the front No. 1 speakers and the stereo component amplifier assembly to check for an open or a short circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L107-4 (WFL+) - O1-1 | Always | Below 1 Ω |
| L107-11 (WFL-) - O1-2 | Always | Below 1 Ω |
| L107-3 (WFR+) - N1-1 | Always | Below 1 Ω |
| L107-8 (WFR-) - N1-2 | Always | Below 1 Ω |
| L107-4 (WFL+) - Body ground | Always | 10 kΩ or higher |
| L107-11 (WFL-) - Body ground | Always | 10 kΩ or higher |
| L107-3 (WFR+) - Body ground | Always | 10 kΩ or higher |
| L107-8 (WFR-) - Body ground | Always | 10 kΩ or higher |

(k) Measure the resistance between each of the rear No. 2 speakers and the navigation receiver assembly

to check for an open circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L35-2 (RL+) - Q5-1 (+) | Always | Below 1 Ω |
| L35-6 (RL-) - Q5-2 (-) | Always | Below 1 Ω |
| L35-1 (RR+) - P5-1 (+) | Always | Below 1 Ω |
| L35-3 (RR-) - P5-2 (-) | Always | Below 1 Ω |
| L35-2 (RL+) - Body ground | Always | 10 kΩ or higher |
| L35-6 (RL-) - Body ground | Always | 10 kΩ or higher |
| L35-1 (RR+) - Body ground | Always | 10 kΩ or higher |
| L35-3 (RR-) - Body ground | Always | 10 kΩ or higher |

(l) Measure the resistance between each of the rear No. 2 speakers and the rear speakers to check for an open circuit in the wire harness.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| Q5-3 (+) - Q3-1 | Always | Below 1 Ω |
| Q5-4 (-) - Q3-2 | Always | Below 1 Ω |
| P5-3 (+) - P3-1 | Always | Below 1 Ω |
| P5-4 (-) - P3-2 | Always | Below 1 Ω |
| Q5-3 (+) - Body ground | Always | 10 kΩ or higher |
| Q5-4 (-) - Body ground | Always | 10 kΩ or higher |
| P5-3 (+) - Body ground | Always | 10 kΩ or higher |
| P5-4 (-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *3 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |
| *4 | Front view of wire harness connector<br>(to Front No. 1 Speaker) |
| *5 | Front view of wire harness connector<br>(to Front No. 2 Speaker) |
| *6 | Front view of wire harness connector<br>(to Rear Speaker) |
| *7 | Front view of wire harness connector<br>(to Rear No. 2 Speaker) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

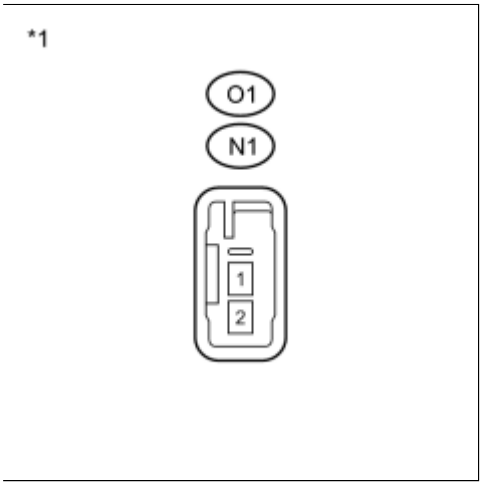
OK ▼

| | |
|---|---|
| 8. | INSPECT FRONT NO. 1 SPEAKER |

(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

Standard Resistance:




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| O1-1 - O1-2 | Always | 1.6 to 2.4 Ω |
| N1-1 - N1-2 | Always | 1.6 to 2.4 Ω |

**NOTICE:**

**The speaker should not be removed to check resistance.**

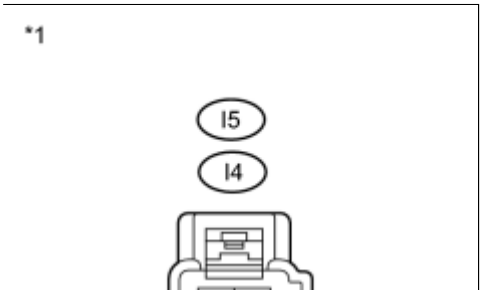
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Front No. 1 Speaker) |

NG ▶ REPLACE FRONT NO. 1 SPEAKER

OK ▼

| | |
|---|---|
| 9. | INSPECT FRONT NO. 2 SPEAKER |

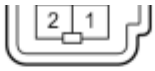



(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| I5-1 - I5-2 | Always | 6.4 to 9.6 Ω |




H

| | | |
|---|---|---|
| I4-1 - I4-2 | Always | 6.4 to 9.6 Ω |

**NOTICE:**

**The speaker should not be removed to check resistance.**

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Front No. 2 Speaker) |

**NG** ▶ **REPLACE FRONT NO. 2 SPEAKER**

**OK** ▼

| | |
|---|---|
| **10.** | **INSPECT REAR SPEAKER** |

(a) Resistance check

(1) Measure the resistance between the terminals of the speaker.

Standard Resistance:

*1




| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| Q3-1 - Q3-2 | Always | 3.2 to 4.8 Ω |
| P3-1 - P3-2 | Always | 3.2 to 4.8 Ω |

**NOTICE:**

**The speaker should not be removed to check resistance.**

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear Speaker) |

**NG** ▶ **REPLACE REAR SPEAKER**

**OK** ▼

| | |
|---|---|
| **11.** | **INSPECT REAR NO. 2 SPEAKER** |

(a) Check that the malfunction disappears when another speaker in good condition is installed.

Standard:

Malfunction disappears.

**HINT:**

- Connect all the connectors to the rear No. 2 speakers that were disconnected.
- If there is a possibility that either the right or left rear No. 2 speaker is defective, inspect by interchanging the right one with the left one.
- Perform the above inspection on both LH and RH sides.

**NG** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**OK** ▶ **REPLACE REAR NO. 2 SPEAKER**

**Sound Signal Circuit between Navigation Receiver Assembly and Stereo Component Amplifier**

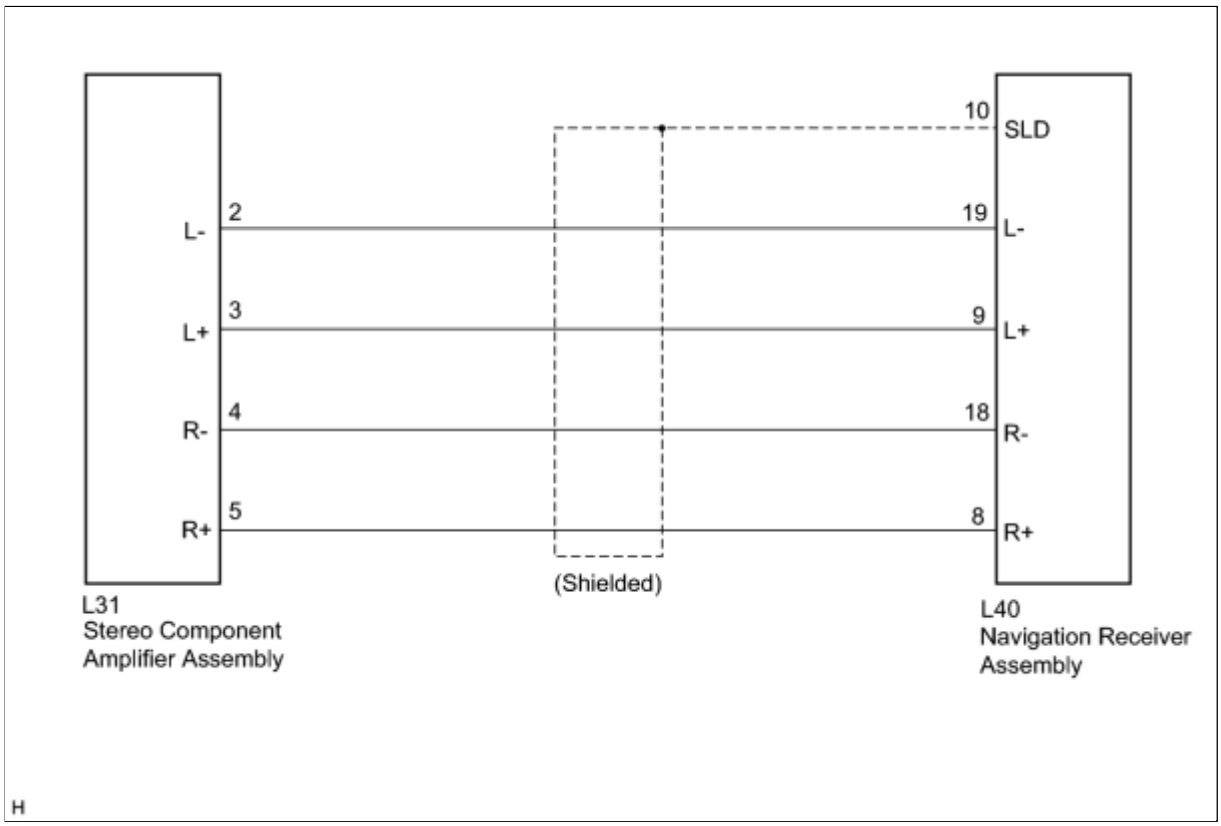
## DESCRIPTION

The navigation receiver assembly sends a sound signal to the stereo component amplifier assembly via the sound signal circuit.

The sound signal that has been sent is amplified by the stereo component amplifier assembly, and then is sent to the speakers.

If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier assembly or speakers.

## WIRING DIAGRAM

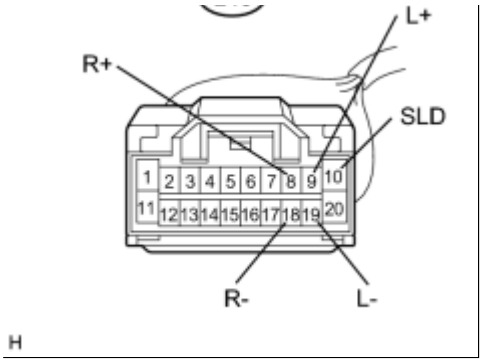



## INSPECTION PROCEDURE

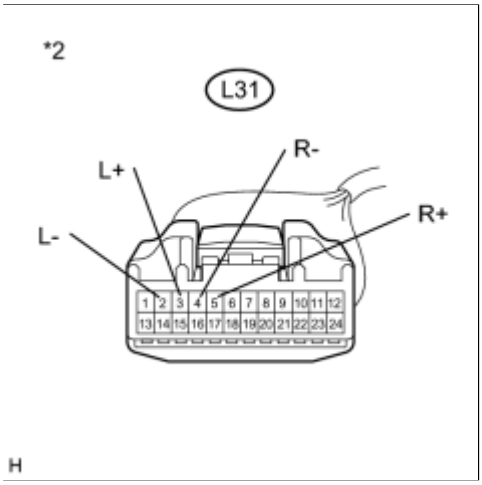
## PROCEDURE

| | |
|---|---|
| 1. | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT AMPLIFIER)** |






(a) Disconnect the L40 navigation receiver assembly connector.




(b) Disconnect the L31 stereo component amplifier assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-8 (R+) - L31-5 (R+) | Always | Below 1 Ω |
| L40-18 (R-) - L31-4 (R-) | Always | Below 1 Ω |
| L40-9 (L+) - L31-3 (L+) | Always | Below 1 Ω |
| L40-19 (L-) - L31-2 (L-) | Always | Below 1 Ω |
| L40-10 (SLD) - Body ground | Always | 10 kΩ or higher |
| L40-8 (R+) - Body ground | Always | 10 kΩ or higher |
| L40-18 (R-) - Body ground | Always | 10 kΩ or higher |
| L40-9 (L+) - Body ground | Always | 10 kΩ or higher |
| L40-19 (L-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| OK | PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE |

**Sound Signal Circuit between Navigation Receiver Assembly and Stereo Jack Adapter**

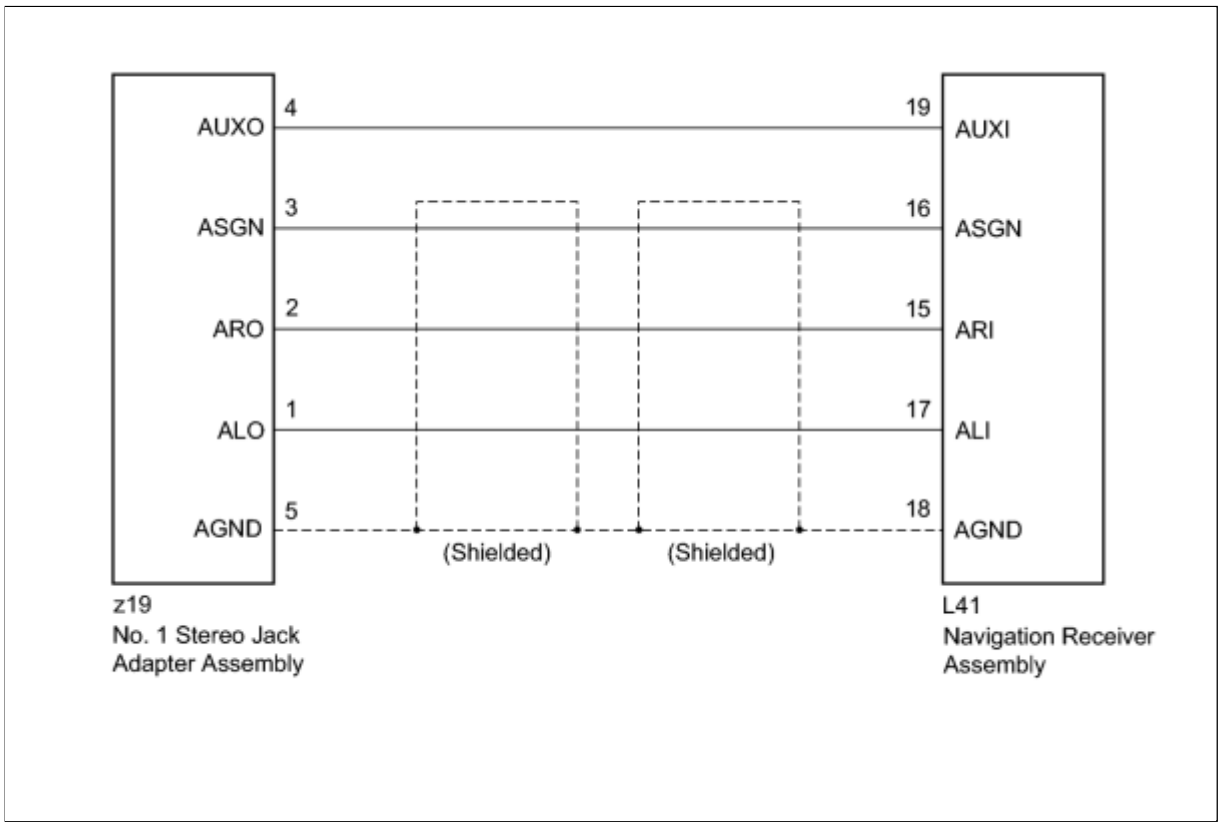
## DESCRIPTION

The No. 1 stereo jack adapter assembly sends an external device sound signal to the navigation receiver assembly via the sound signal circuit.

The sound signal that has been sent is amplified by the stereo component amplifier assembly, and then is sent to the speakers.

If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier assembly, navigation receiver assembly or speakers.

## WIRING DIAGRAM

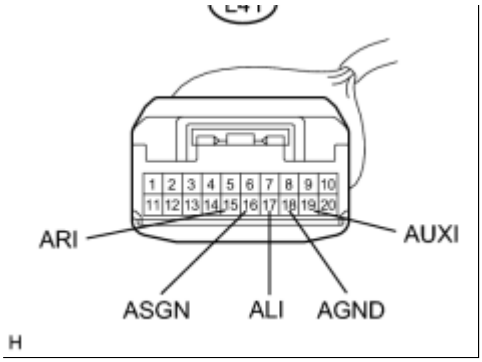



## INSPECTION PROCEDURE

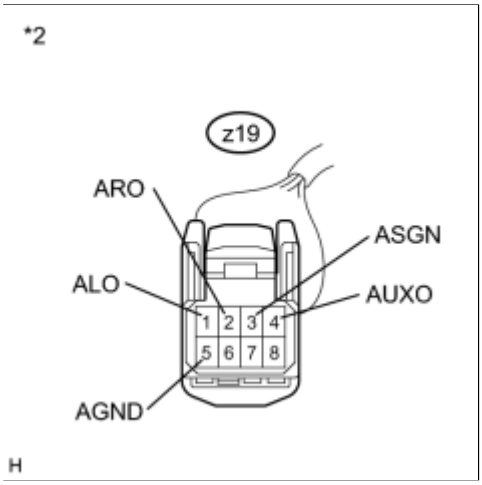
## PROCEDURE

| | |
|---|---|
| 1. | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - NO. 1 STEREO JACK ADAPTER)** |






(a) Disconnect the L41 navigation receiver assembly connector.




(b) Disconnect the z19 No. 1 stereo jack adapter assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L41-19 (AUXI) - z19-4 (AUXO) | Always | Below 1 Ω |
| L41-18 (AGND) - z19-5 (AGND) | Always | Below 1 Ω |
| L41-15 (ARI) - z19-2 (ARO) | Always | Below 1 Ω |
| L41-17 (ALI) - z19-1 (ALO) | Always | Below 1 Ω |
| L41-16 (ASGN) - z19-3 (ASGN) | Always | Below 1 Ω |
| L41-19 (AUXI) - Body ground | Always | 10 kΩ or higher |
| L41-18 (AGND) - Body ground | Always | 10 kΩ or higher |
| L41-15 (ARI) - Body ground | Always | 10 kΩ or higher |
| L41-17 (ALI) - Body ground | Always | 10 kΩ or higher |
| L41-16 (ASGN) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to No. 1 Stereo Jack Adapter Assembly) |

NG

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

**Sound Signal Circuit between Navigation Receiver Assembly and Stereo Component Tuner Assembly**

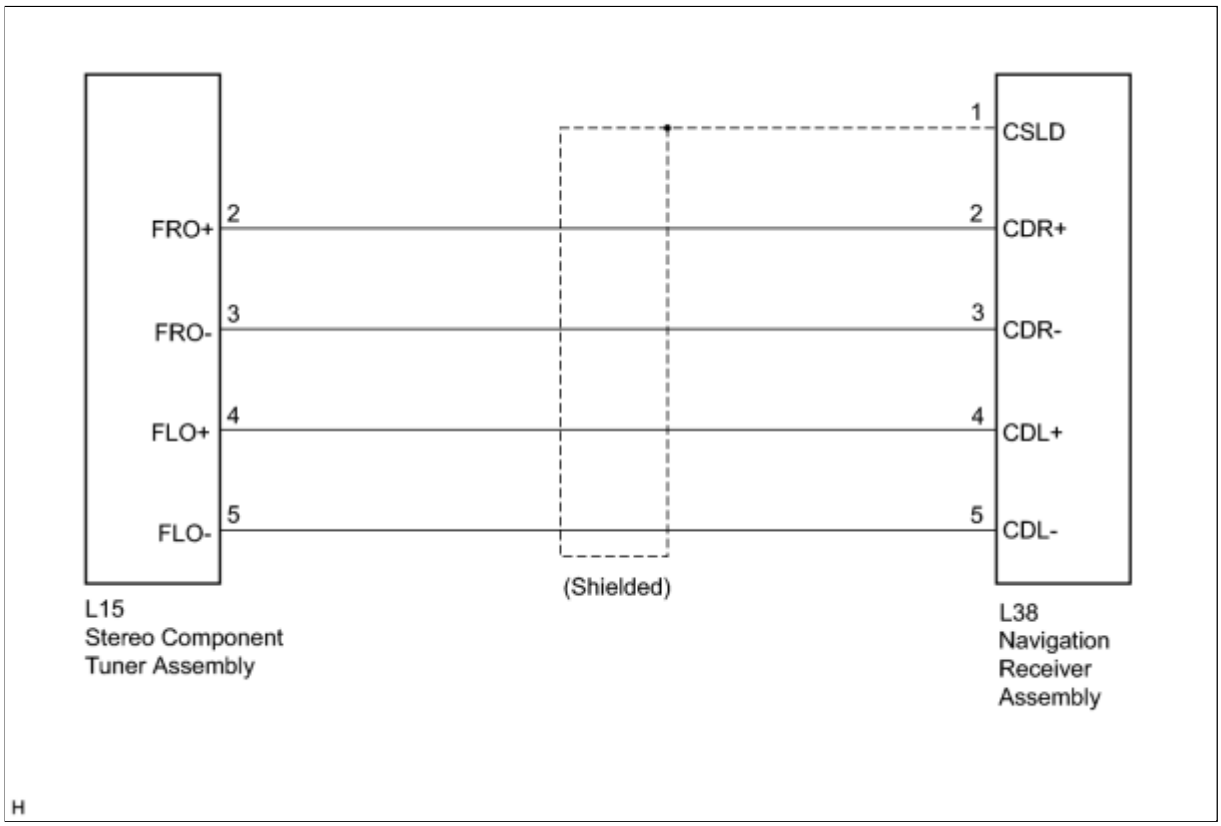
## DESCRIPTION

The stereo component tuner assembly sends satellite radio sound signals to the navigation receiver assembly via the sound signal circuit.

The sound signal that has been sent is amplified by the stereo component amplifier assembly, and then is sent to the speakers.

If there is an open or short in the circuit, sound cannot be heard from the speakers even if there is no malfunction in the stereo component amplifier assembly, navigation receiver assembly or speakers.

## WIRING DIAGRAM



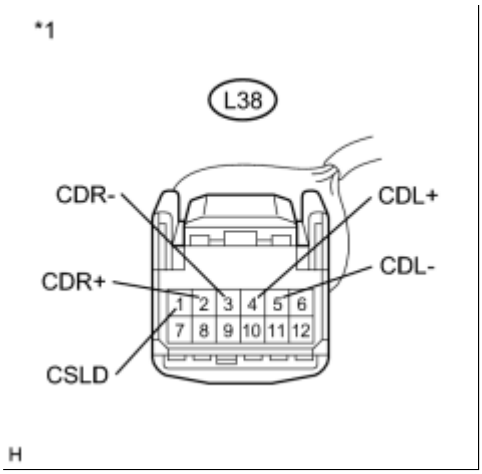

## INSPECTION PROCEDURE

**NOTICE:**

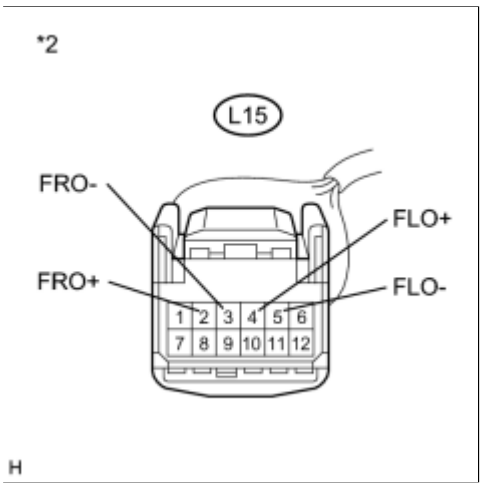
**After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT TUNER)** |




(a) Disconnect the L38 navigation receiver assembly connector.




(b) Disconnect the L15 stereo component tuner assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L38-2 (CDR+) - L15-2 (FRO+) | Always | Below 1 Ω |
| L38-3 (CDR-) - L15-3 (FRO-) | Always | Below 1 Ω |
| L38-4 (CDL+) - L15-4 (FLO+) | Always | Below 1 Ω |
| L38-5 (CDL-) - L15-5 (FLO-) | Always | Below 1 Ω |
| L38-2 (CDR+) - Body ground | Always | 10 kΩ or higher |
| L38-3 (CDR-) - Body ground | Always | 10 kΩ or higher |
| L38-4 (CDL+) - Body ground | Always | 10 kΩ or higher |
| L38-5 (CDL-) - Body ground | Always | 10 kΩ or higher |
| L38-1 (CSLD) - Body ground | Always | 10 kΩ or higher |

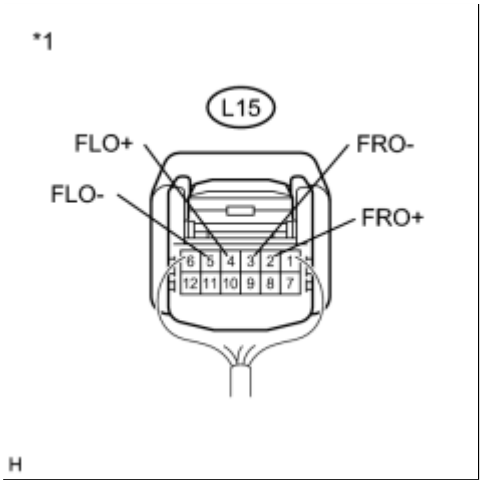
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Tuner Assembly) |

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **2.** | **INSPECT STEREO COMPONENT TUNER ASSEMBLY** |




(a) Reconnect the L15 stereo component tuner assembly connector.

(b) Check the waveform according to the conditions in the table below.

Standard:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L15-2 (FRO+) - Body ground | Voice sound being produced | A waveform synchronized with sound is output |
| L15-3 (FRO-) - Body ground | Voice sound being produced | A waveform synchronized with sound is output |
| L15-4 (FLO+) - Body ground | Voice sound being produced | A waveform synchronized with sound is output |
| L15-5 (FLO-) - Body ground | Voice sound being produced | A waveform synchronized with sound is output |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Stereo Component Tuner Assembly) |

NG ▶ **REPLACE STEREO COMPONENT TUNER ASSEMBLY**

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

**Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Amplifier**

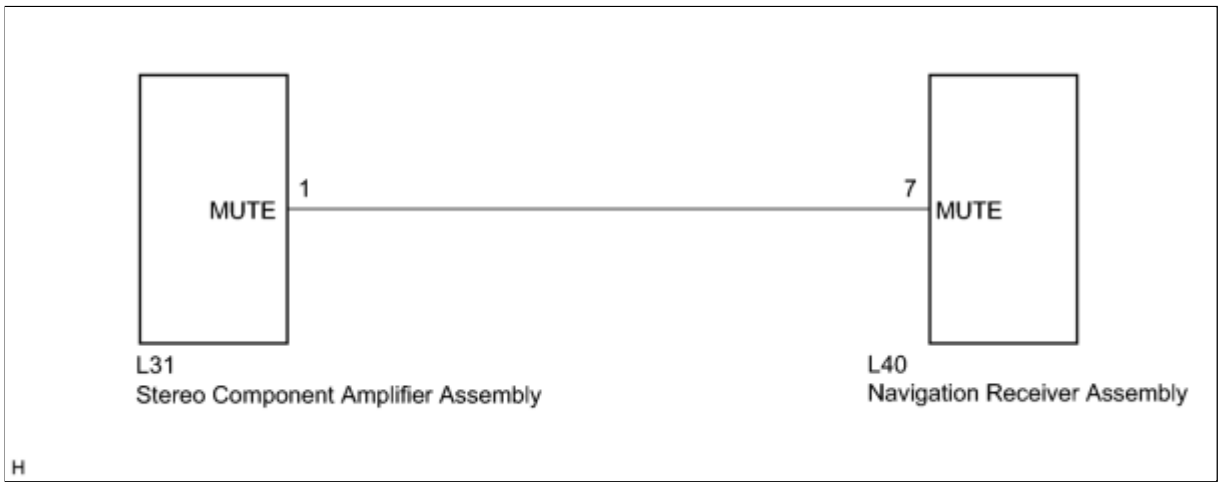
## DESCRIPTION

This circuit sends a signal to the stereo component amplifier assembly to mute noise. Because of that, the noise produced by changing the sound source ceases.

If there is an open in the circuit, noise can be heard from the speakers when changing the sound source.

If there is a short in the circuit, even though the stereo component amplifier assembly is functioning normally, no sound or only an extremely faint sound can be heard.

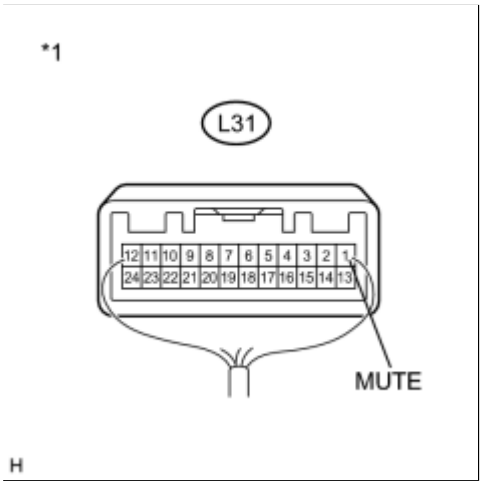
## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY** |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L31-1 (MUTE) - Body ground | Power switch on (ACC), Audio system playing → Changing source | Above 3.5 V → Below 1 V |

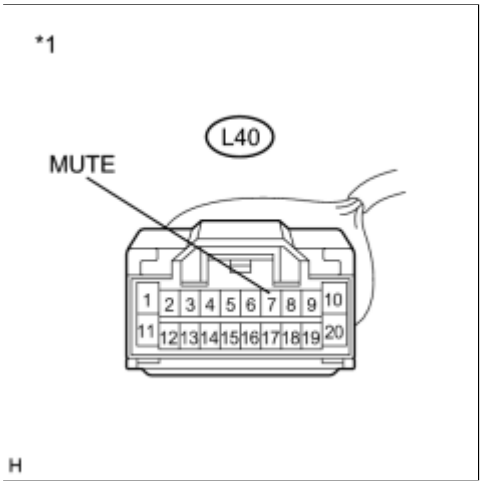
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Stereo Component Amplifier Assembly) |

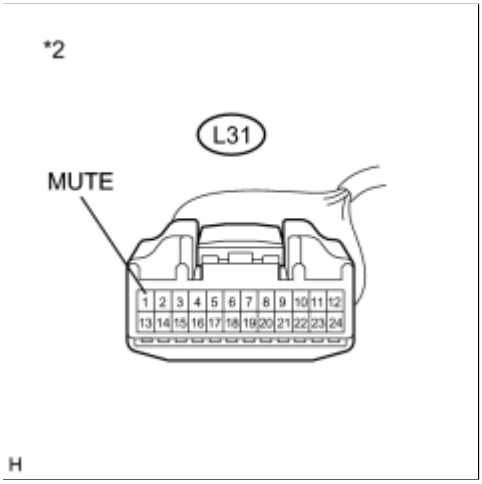
NG ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT AMPLIFIER)**

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT AMPLIFIER)** |




(a) Disconnect the L40 navigation receiver assembly connector.




(b) Disconnect the L31 stereo component amplifier assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-7 (MUTE) - L31-1 (MUTE) | Always | Below 1 Ω |
| L40-7 (MUTE) - Body ground | Always | 10 kΩ or higher |

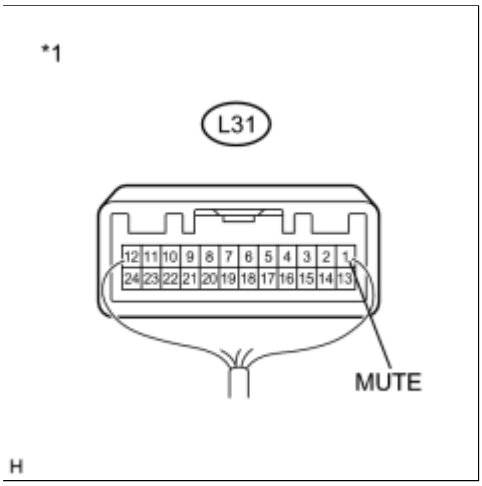
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY (OUTPUT SIGNAL)** |




(a) Reconnect the L31 stereo component amplifier assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L31-1 (MUTE) - Body ground | Power switch on (ACC)<br>Audio system playing | Above 3.5 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Stereo Component Amplifier Assembly) |

**NG** ▶ **REPLACE STEREO COMPONENT AMPLIFIER ASSEMBLY**

**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

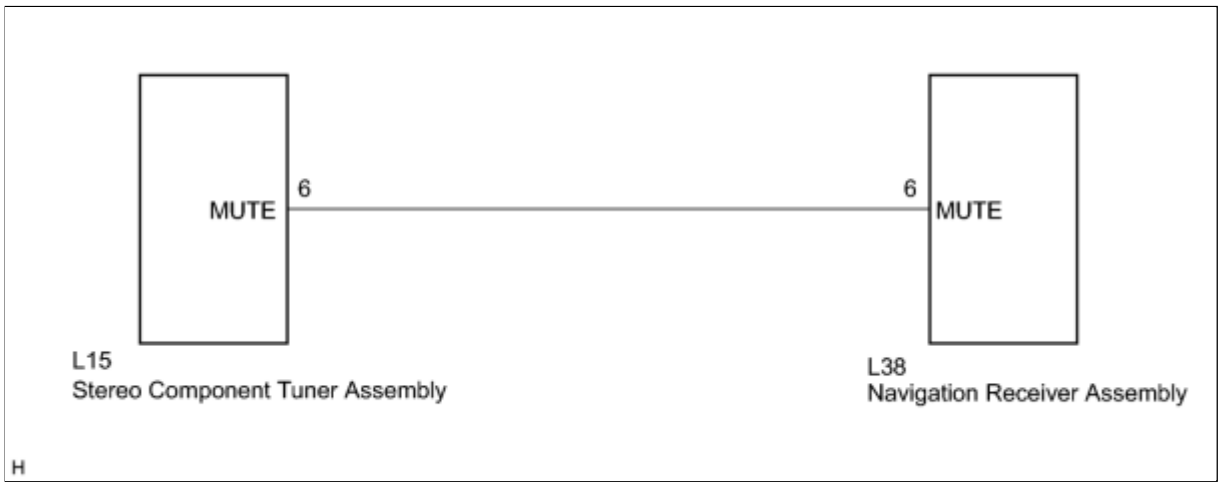
**Mute Signal Circuit between Navigation Receiver Assembly and Stereo Component Tuner Assembly**

## DESCRIPTION

The navigation receiver assembly controls the volume according to the MUTE signal from the stereo component tuner assembly.

The MUTE signal is sent to reduce noise and a popping sound generated when switching the mode etc. If there is an open in the circuit, noise can be heard from the speakers when changing the sound source. If there is a short in the circuit, even though the navigation receiver assembly is functioning normally, no sound or only an extremely faint sound can be heard.

## WIRING DIAGRAM



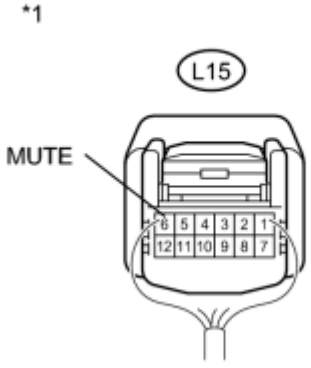

## INSPECTION PROCEDURE

**NOTICE:**

**After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.**

## PROCEDURE

| | |
|---|---|
| 1. | **INSPECT STEREO COMPONENT TUNER ASSEMBLY** |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L15-6 (MUTE) - Body ground | Power switch on (ACC), Satellite radio playing → Changing source | Above 3.5 V → Below 1 V |

H

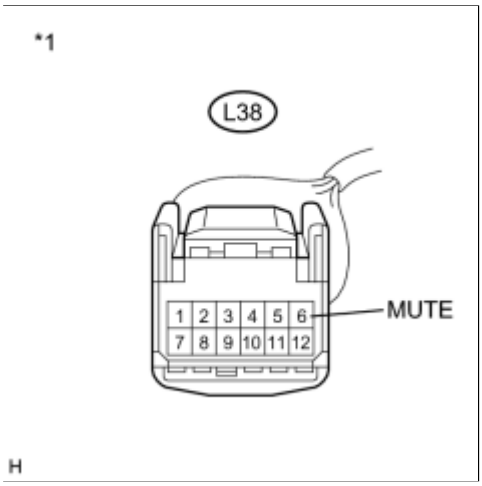
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Stereo Component Tuner Assembly) |

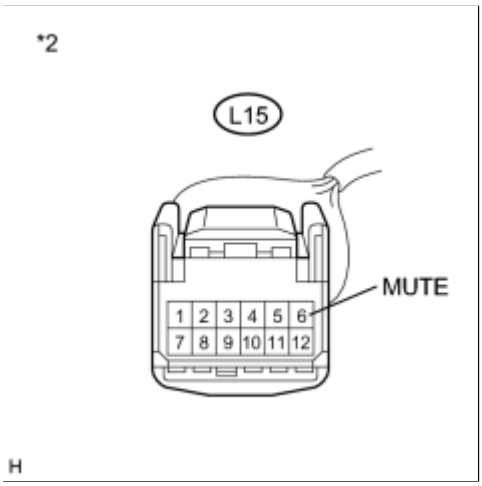
NG ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT TUNER)**

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT TUNER)** |




(a) Disconnect the L38 navigation receiver assembly connector.




(b) Disconnect the L15 stereo component tuner assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L38-6 (MUTE) - L15-6 (MUTE) | Always | Below 1 Ω |
| L38-6 (MUTE) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Tuner Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **REPLACE STEREO COMPONENT TUNER ASSEMBLY** |

(a) Replace the stereo component tuner assembly and check if it operates normally INFO .

OK:

The navigation system operates normally.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **END**

**Mute Signal Circuit between Stereo Component Amplifier and Telematics Transceiver**

## DESCRIPTION

The DCM (telematics transceiver) sends a mute signal to the stereo component amplifier assembly.

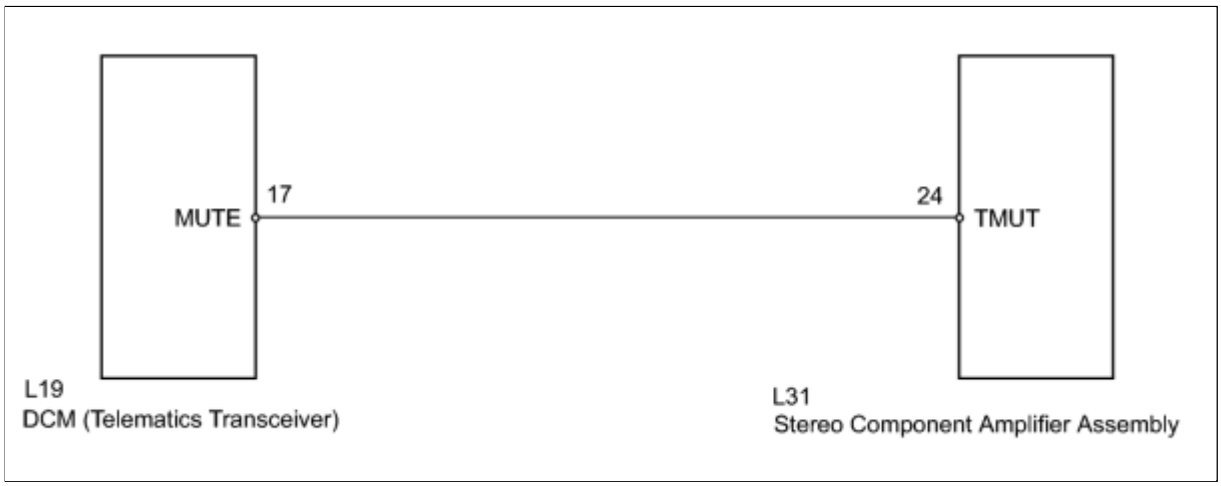
The stereo component amplifier assembly controls the volume according to the mute signal from the DCM (telematics transceiver).

The mute signal is sent to reduce noise and popping sounds generated when switching modes.

If there is an open in the circuit, noise can be heard from the speakers when changing the sound source.

If there is a short in the circuit, even though the stereo component amplifier assembly is functioning, no sound, or only an extremely faint sound, can be heard.

## WIRING DIAGRAM



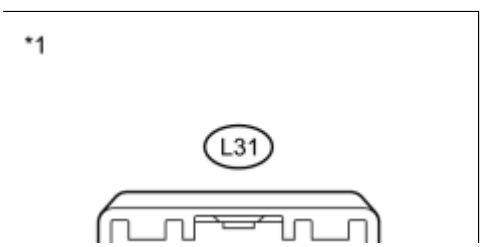

## INSPECTION PROCEDURE

**NOTICE:**

**If the DCM (telematics transceiver) has been replaced, perform the Activate DCM procedure using the Techstream INFO .**

## PROCEDURE

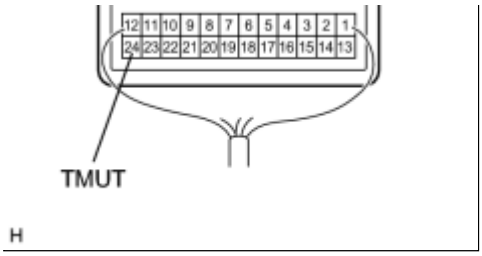
| | |
|---|---|
| 1. | **INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY** |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L31-24 (TMUT) - Body ground | Power switch on (ACC), Audio system is playing → Manual (SOS) switch on, Emergency call mode | Above 3.5 V → Below 1 V |




| | | |
|---|---|---|
| | Emergency call mode | |

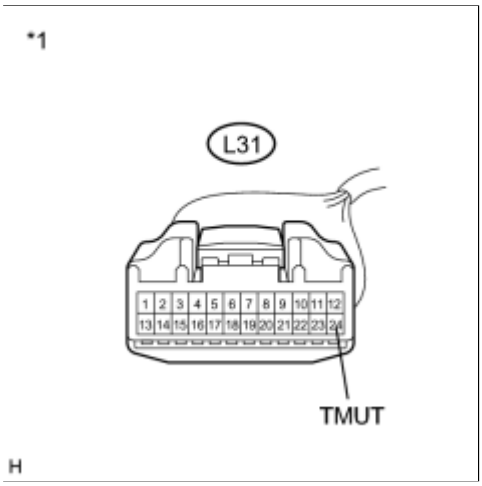
## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Stereo Component Amplifier Assembly) |

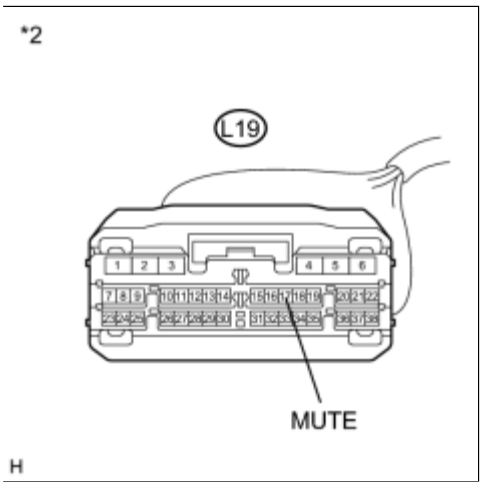
**NG** ▶ **CHECK HARNESS AND CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR** |




(a) Disconnect the L31 stereo component amplifier assembly connector.




(b) Disconnect the L19 DCM (telematics transceiver) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|

| | | |
|---|---|---|
| L31-24 (TMUT) - L19-17 (MUTE) | Always | Below 1 Ω |
| L31-24 (TMUT) - Body ground | Always | 10 kΩ or higher |

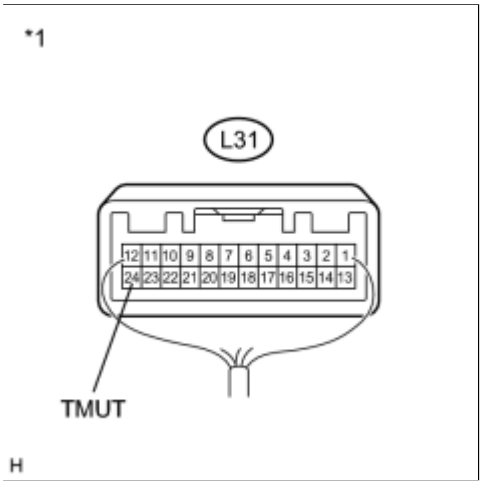
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |
| *2 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY** |




(a) Reconnect the L31 stereo component amplifier assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L31-24 (TMUT) - Body ground | Power switch on (ACC) | Above 3.5 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Stereo Component Amplifier Assembly) |

**NG** ▶ **REPLACE STEREO COMPONENT AMPLIFIER ASSEMBLY**

**OK** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

OK → REPLACE DCM (TELEMATICS TRANSCEIVER)

**AVC-LAN Circuit**

## DESCRIPTION

Each unit of the navigation system connected to the AVC-LAN (communication bus) transfers switch signals by the AVC-LAN.

If a short to +B or short to ground occurs in this AVC-LAN, the navigation system will not function normally as communication is stopped.

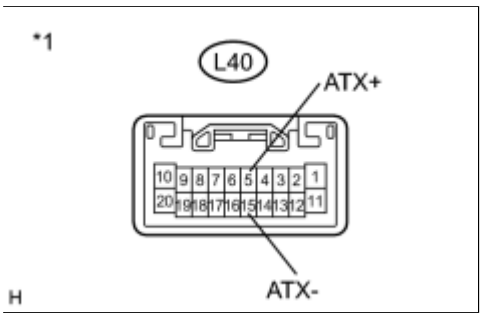
## INSPECTION PROCEDURE

**NOTICE:**

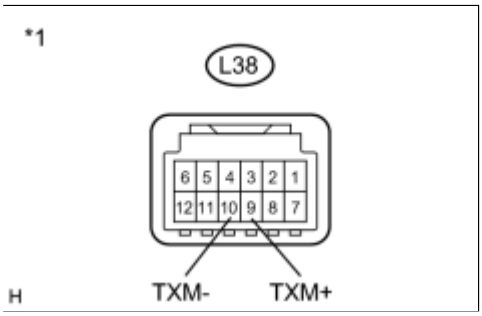
- The navigation receiver assembly is the master unit.
- After replacing the stereo component tuner assembly of vehicles subscribed to pay-type satellite radio broadcasts, registration of the XM radio ID is necessary.

## PROCEDURE

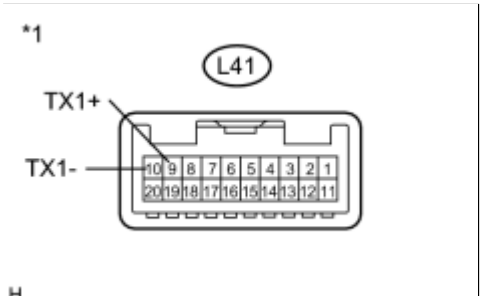
| | |
|---|---|
| 1. | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |




(a) Disconnect the L40 navigation receiver assembly connector (w/ "Bluetooth" Audio System).




(b) Disconnect the L38 navigation receiver assembly connector (w/ SDARS System).




(c) Disconnect the L41 navigation receiver assembly connector (w/ Advanced Parking Assist System).

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-5 (ATX+) - L40-15 (ATX-)*2 | Always | 60 to 80 Ω |
| L38-9 (TXM+) - L38-10 (TXM-)*3 | Always | 60 to 80 Ω |
| L41-9 (TX1+) - L41-10 (TX1-)*4 | Always | 60 to 80 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Navigation Receiver Assembly) |

*2: w/ "Bluetooth" Audio System
*3: w/ SDARS System
*4: w/ Advanced Parking Assist System

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (AVC-LAN CIRCUIT)** |

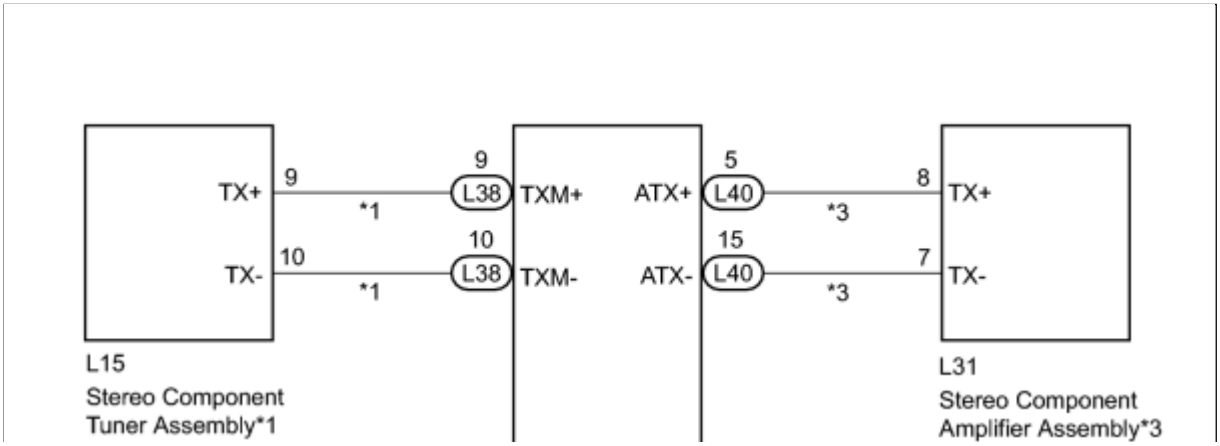
**HINT:**

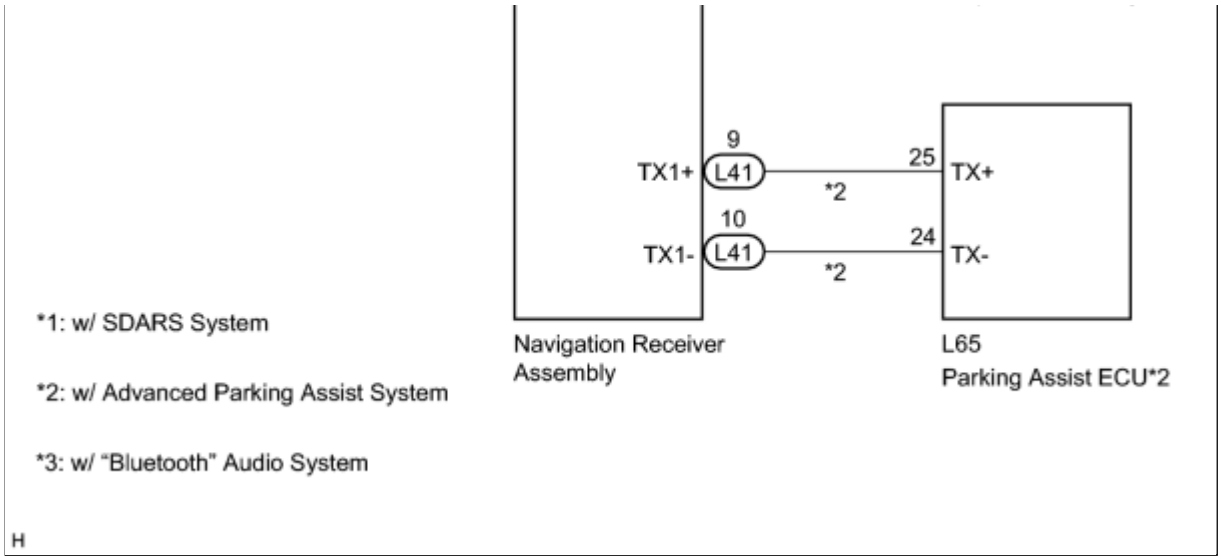
**For details of the connectors, refer to Terminals of ECU** INFO **.**

(a) Referring to the AVC-LAN wiring diagram below, check all AVC-LAN circuits.

(1) Disconnect all connectors in all AVC-LAN circuits.

(2) Check for an open or short in all AVC-LAN circuits.






OK:

There is no open or short circuit.

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT MALFUNCTIONING PARTS** |

(a) Disconnect and reconnect each slave unit one by one until the master unit returns to normal operation.

**HINT:**

- Check all slave units.
- If disconnecting a slave unit causes the master unit to return to normal operation, the slave unit is defective and should be replaced.

OK:

Master unit returns to normal operation.

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▶ **REPLACE MALFUNCTIONING PARTS**

**Vehicle Speed Signal Circuit between Stereo Component Amplifier and Combination Meter**

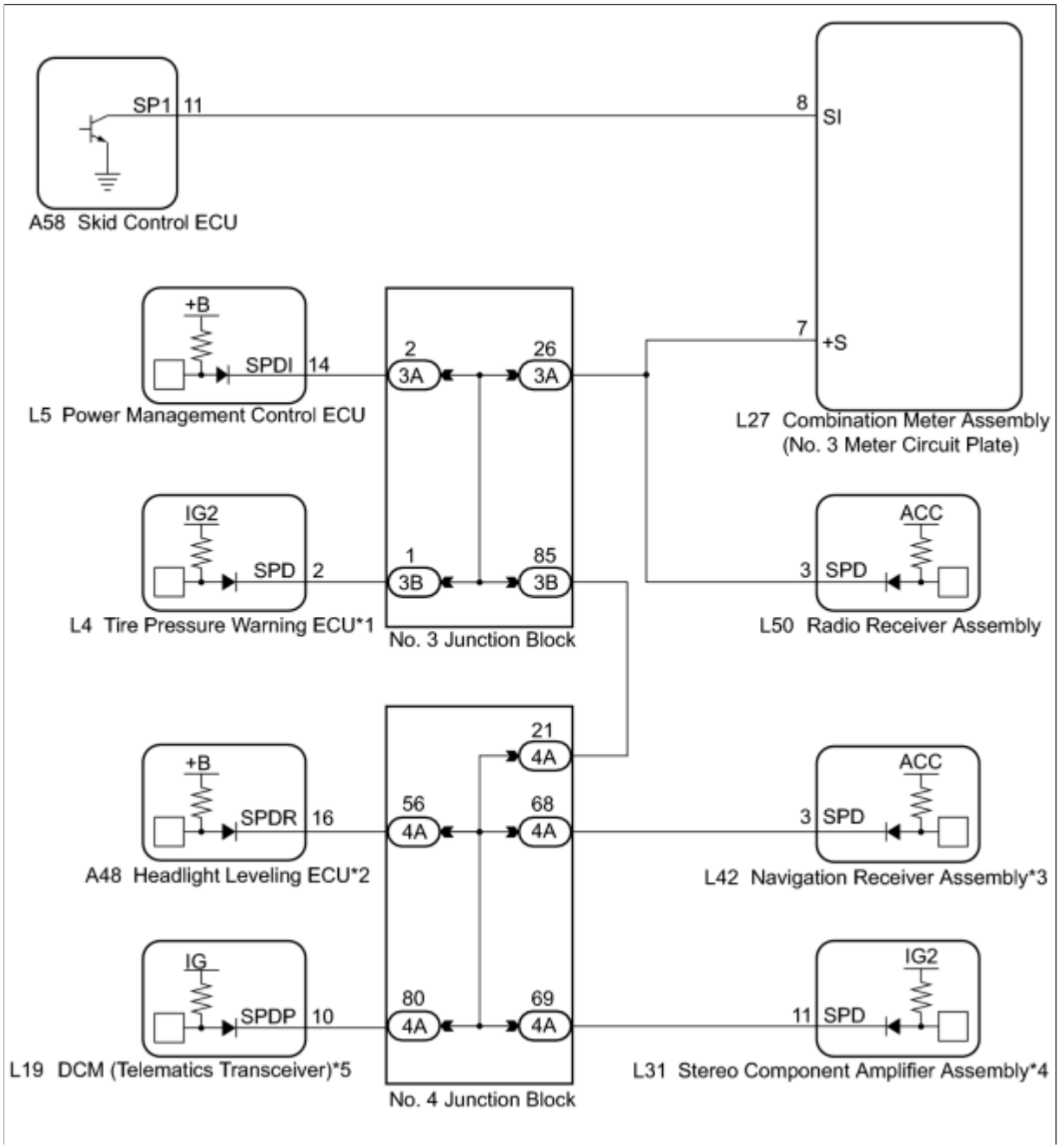
## DESCRIPTION

The stereo component amplifier assembly (No. 3 meter circuit plate) receives a vehicle speed signal from the combination meter assembly (No. 3 meter circuit plate) to control the ASL function.

**HINT:**

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter assembly (No. 3 meter circuit plate). The signal is changed to a pulse signal at the transistor in the combination meter assembly (No. 3 meter circuit plate). Each ECU controls the respective systems based on the pulse signal.
- If a short occurs in any of the ECUs or in the wire harness connected to an ECU, all systems in the diagram below will not operate normally.

## WIRING DIAGRAM



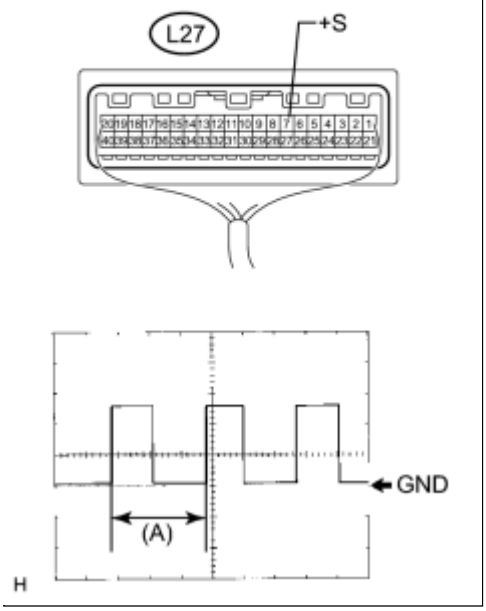
| | |
|---|---|
| *1: w/ Tire Pressure Warning System | *2: w/ Automatic Type Headlight Beam Level Control |
| *3: w/ Navigation System | *4: for Separate Type Amplifier System |
| *5: w/ Manual (SOS) Switch | |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **INSPECT COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE OUTPUT WAVEFORM)** |

*1




(a) Check the output waveform.

(1) Remove the combination meter assembly with the connector(s) still connected.

(2) Connect an oscilloscope to terminal L27-7 (+S) and body ground.

(3) Turn the power switch on (IG).

(4) Turn a wheel slowly.

(5) Check the signal waveform according to the condition(s) in the table below.

| ITEM | CONDITION |
|---|---|
| Measurement terminal | L27-7 (+S) - Body ground |
| Tool setting | 5 V/DIV., 20 ms./DIV. |
| Vehicle condition | Wheel being rotated |

OK:

The waveform is similar to that shown in the illustration.

**HINT:**

**When the system is functioning normally, one wheel revolution generates 4 pulses. As the vehicle speed increases, the width indicated by (A) in the illustration narrows.**

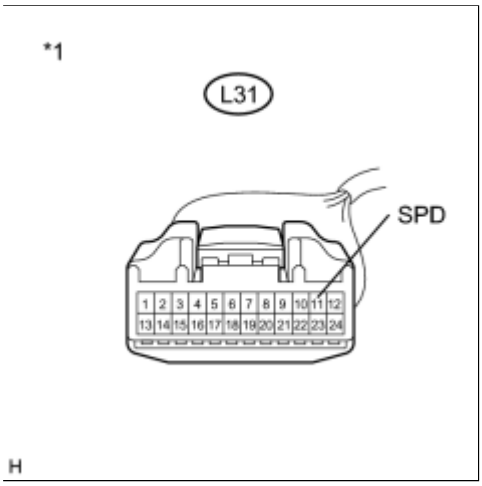
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Combination Meter Assembly) |

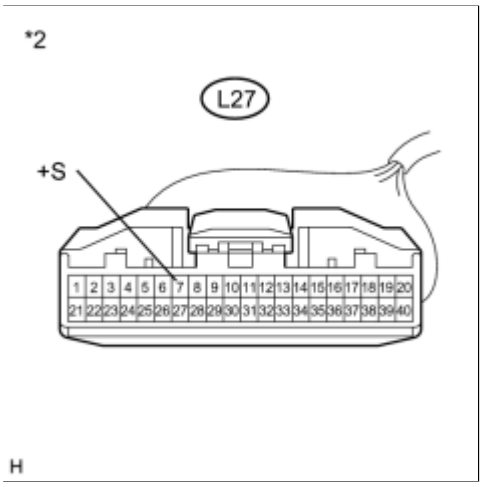
**NG** ▶ **GO TO METER / GAUGE SYSTEM**

**OK**

| | |
|---|---|
| 2. | **CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER - COMBINATION METER)** |




(a) Disconnect the L31 stereo component amplifier assembly connector.




(b) Disconnect the L27 combination meter assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L31-11 (SPD) - L27-7 (+S) | Always | Below 1 Ω |

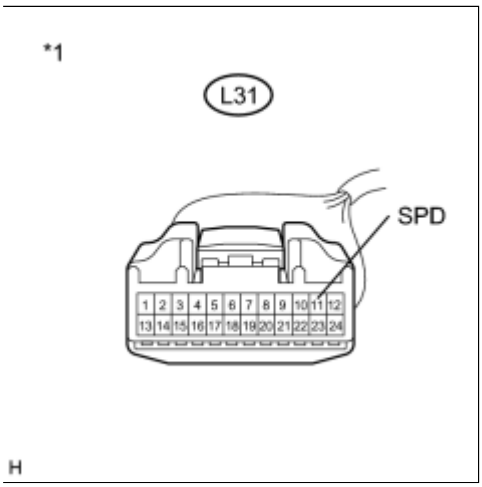
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |
| *2 | Front view of wire harness connector<br>(to Combination Meter Assembly) |

NG ▶ **CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER - NO. 4 JUNCTION CONNECTOR)**

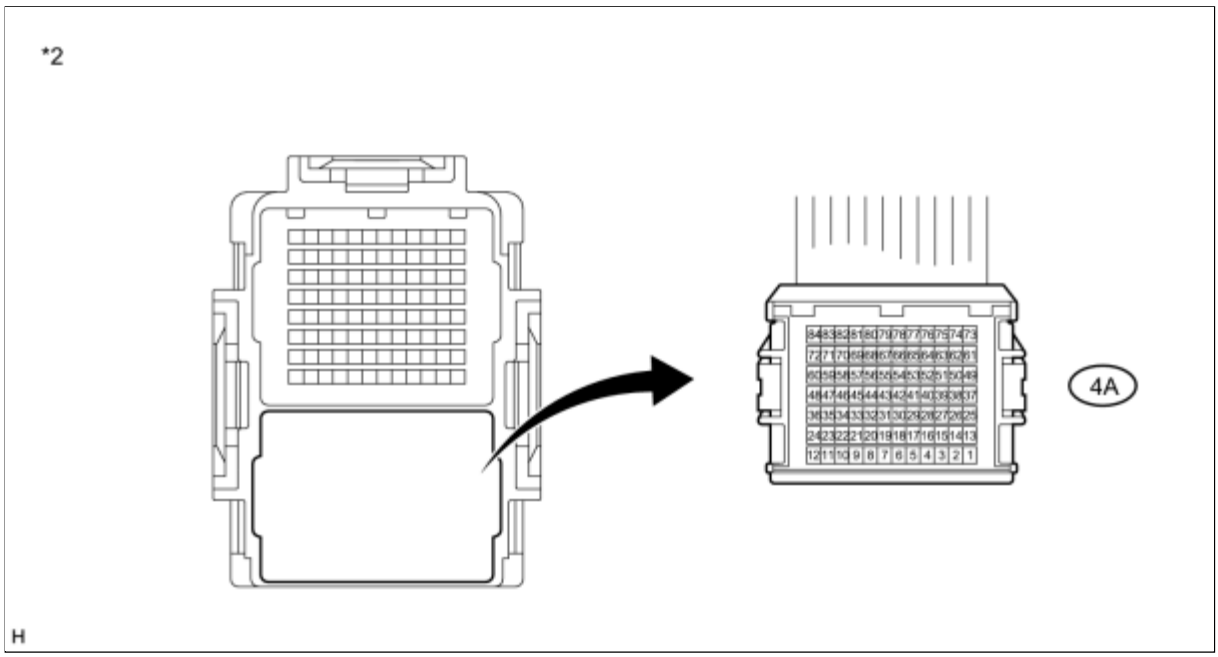
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **3.** | **CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER - NO. 4 JUNCTION CONNECTOR)** |




(a) Disconnect the L31 stereo component amplifier assembly connector.

(b) Disconnect the 4A No. 4 junction block connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|

| | | |
|---|---|---|
| L31-11 (SPD) - 4A-69 | Always | Below 1 Ω |

**Text in Illustration**

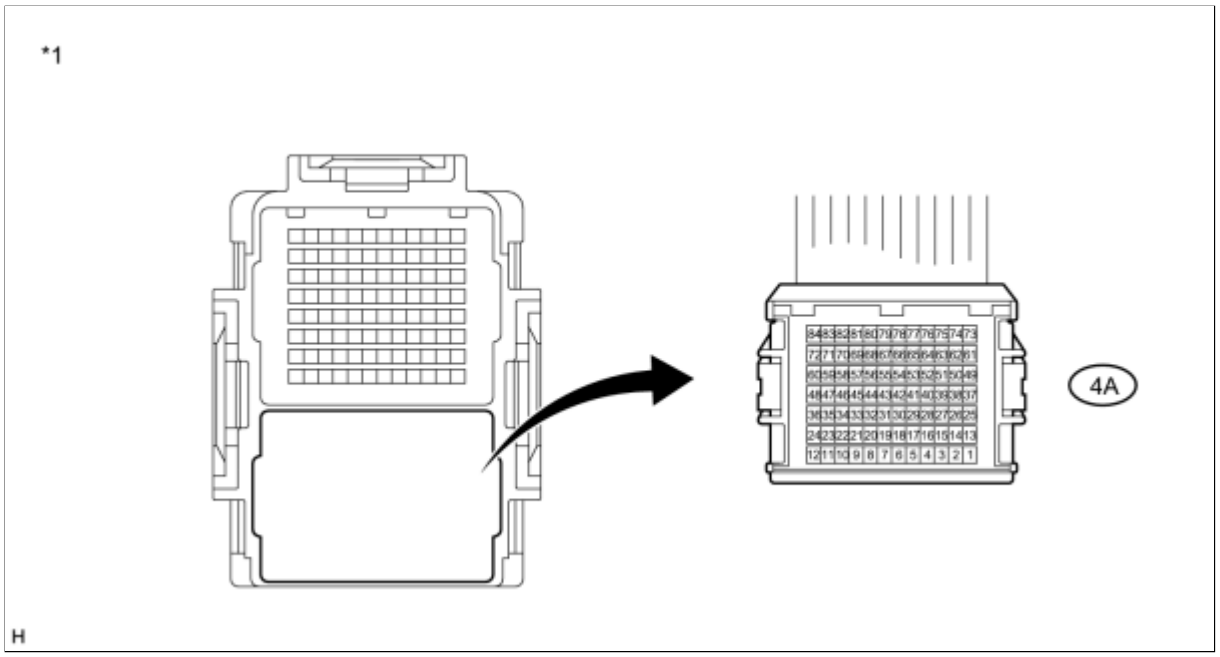
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |
| *2 | Front view of wire harness connector<br>(to No. 4 Junction Block) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (STEREO COMPONENT AMPLIFIER - NO. 4 JUNCTION CONNECTOR)**

**OK** ▼

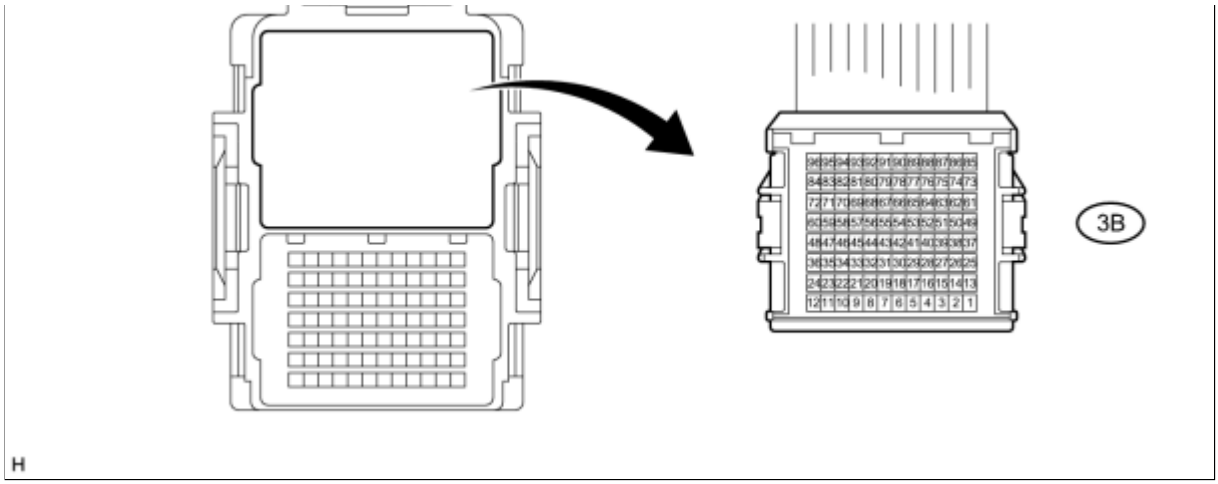
| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (NO. 4 JUNCTION CONNECTOR - NO. 3 JUNCTION CONNECTOR)** |

(a) Disconnect the 4A No. 4 junction block connector.




(b) Disconnect the 3B No. 3 junction block connector.






(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 4A-21 - 3B-85 | Always | Below 1 Ω |

**Text in Illustration**

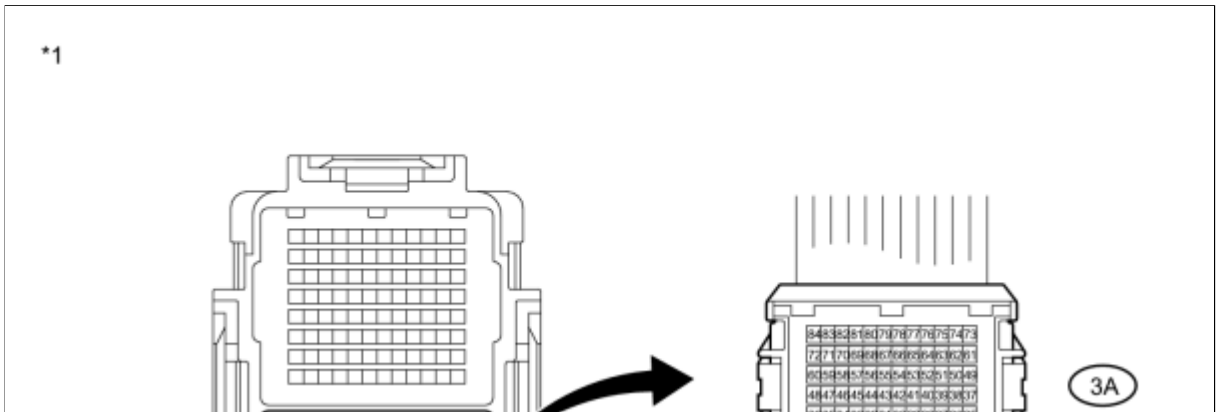
| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector (to No. 4 Junction Block) | *2 | Front view of wire harness connector (to No. 3 Junction Block) |

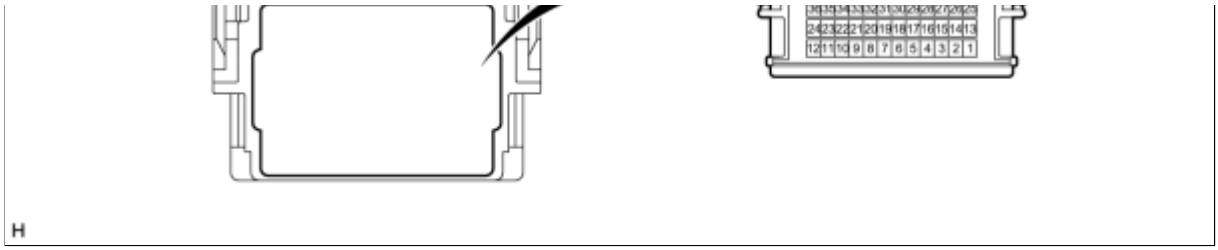
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (NO. 4 JUNCTION CONNECTOR - NO. 3 JUNCTION CONNECTOR)**

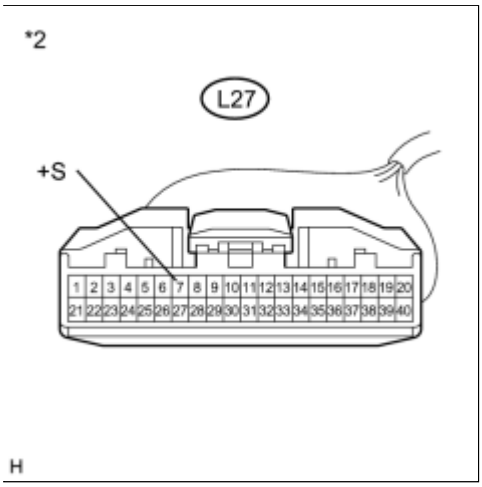
**OK** ▼

| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR (NO. 3 JUNCTION CONNECTOR - COMBINATION METER ASSEMBLY)** |

(a) Disconnect the 3A No. 3 junction block connector.






(b) Disconnect the L27 combination meter assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 3A-26 - L27-7 (+S) | Always | Below 1 Ω |

**Text in Illustration**

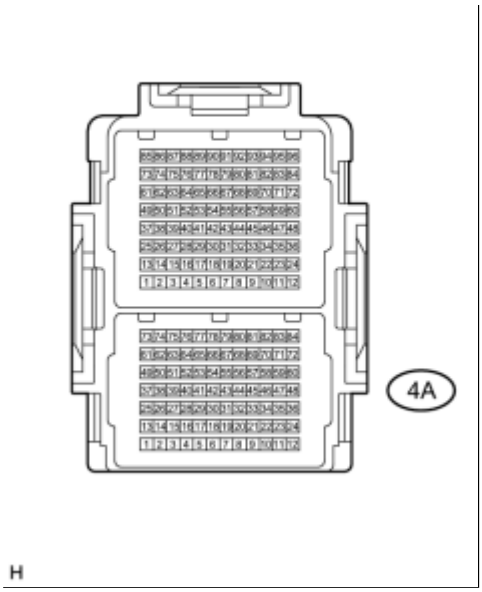
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to No. 3 Junction Block) |
| *2 | Front view of wire harness connector<br>(to Combination Meter Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (NO. 3 JUNCTION CONNECTOR - COMBINATION METER ASSEMBLY)**

**OK**
▼

| | |
|---|---|
| **6.** | **INSPECT NO. 4 JUNCTION BLOCK** |






(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 4A-69 - 4A-21 | Always | Below 1 Ω |

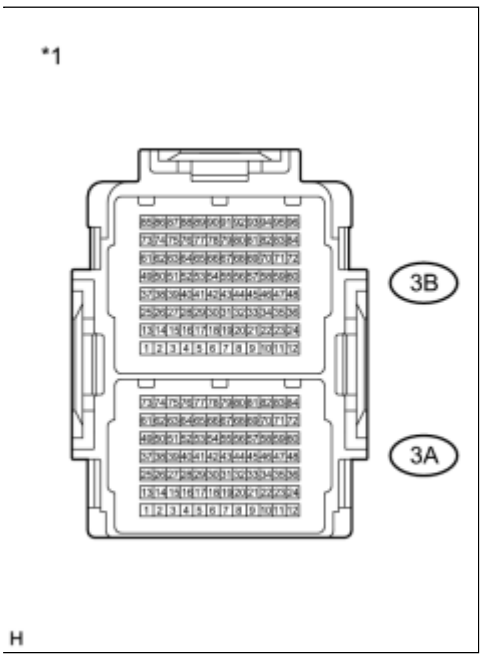
**Text in Illustration**

| | |
|---|---|
| *1 | No. 4 Junction Block |

**NG** ▶ **REPLACE NO. 4 JUNCTION BLOCK**

**OK** ▼

| | |
|---|---|
| **7.** | **INSPECT NO. 3 JUNCTION BLOCK** |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 3A-26 - 3B-85 | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | No. 3 Junction Block |

**NG** ▶ **REPLACE NO. 3 JUNCTION BLOCK**

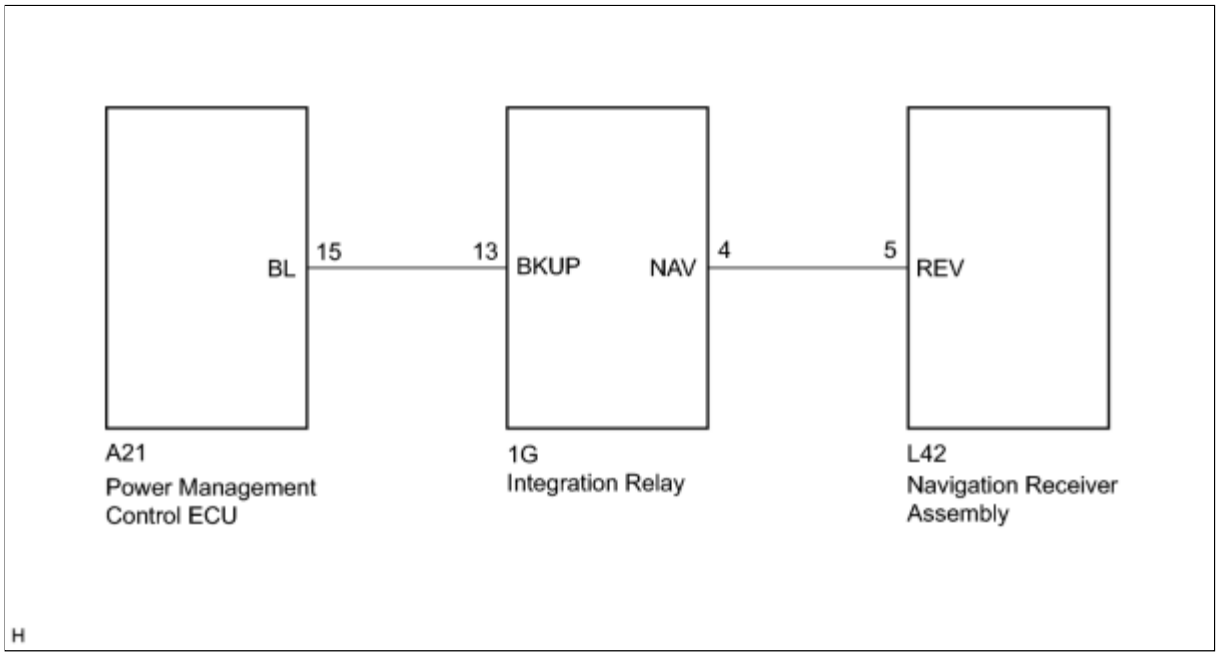
**OK** ▶ **REPLACE STEREO COMPONENT AMPLIFIER ASSEMBLY**

**Reverse Signal Circuit**

## DESCRIPTION

The navigation receiver assembly receives a reverse signal from the power management control ECU via the integration relay to use for adjusting the vehicle position on the navigation display.

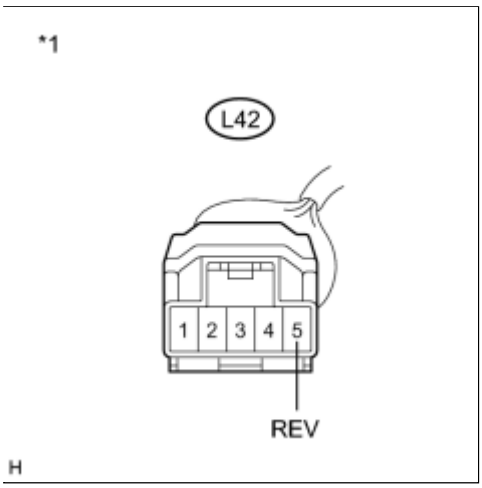
## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |




(a) Disconnect the L42 navigation receiver assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L42-5 (REV) - Body ground | Power switch on (IG)<br>Shift lever in R | 11 to 14 V |
| L42-5 (REV) - Body ground | Power switch on (IG)<br>Shift lever in any position except R | Below 1 V |

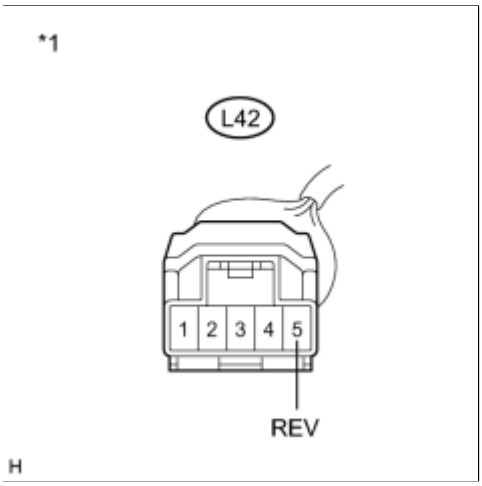
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |

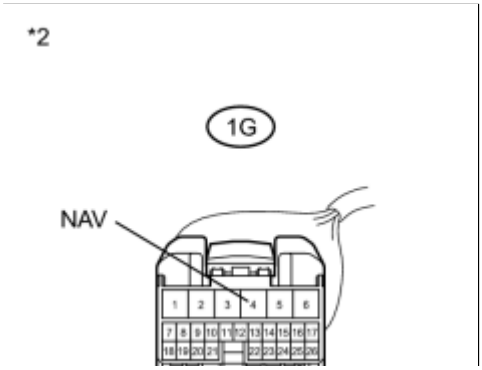
**NG** ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - INTEGRATION RELAY)**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

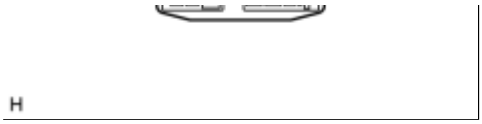
| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - INTEGRATION RELAY)** |




(a) Disconnect the L42 navigation receiver assembly connector.




(b) Disconnect the 1G integration relay connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L42-5 (REV) - 1G-4 (NAV) | Always | Below 1 Ω |
| L42-5 (REV) - Body ground | Always | 10 kΩ or higher |

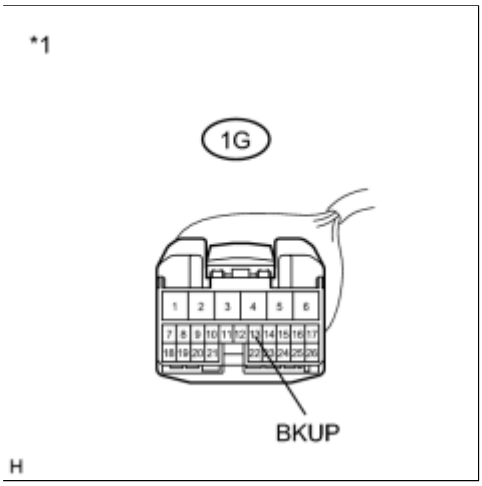
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Integration Relay) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT INTEGRATION NO.1 RELAY** |




(a) Disconnect the 1G integration relay connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1G-13 (BKUP) - Body ground | Power switch on (IG) | 11 to 14 V |

| | | |
|---|---|---|
| | Shift lever in R | |
| 1G-13 (BKUP) - Body ground | Power switch on (IG)<br>Shift lever in any position except R | Below 1 V |

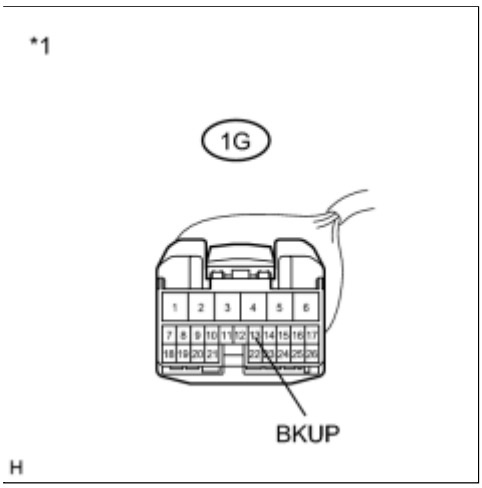
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Integration Relay) |

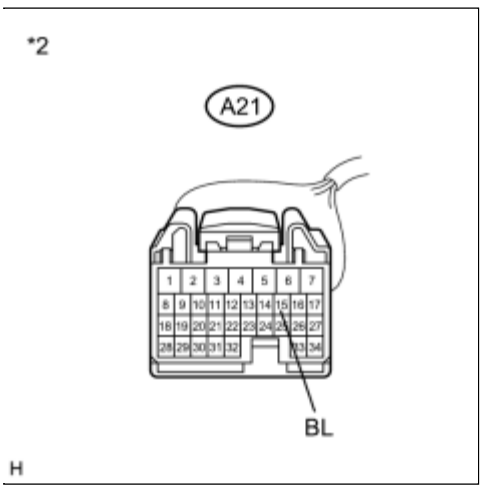
**NG** ▶ **CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - POWER MANAGEMENT CONTROL ECU)**

**OK** ▶ **REPLACE INTEGRATION NO.1 RELAY**

| | |
|---|---|
| **4.** | **CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - POWER MANAGEMENT CONTROL ECU)** |




(a) Disconnect the 1G integration relay connector.




(b) Disconnect the A21 power management control ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1G-13 (BKUP) - A21-15 (BL) | Always | Below 1 Ω |
| 1G-13 (BKUP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Integration Relay) |
| *2 | Front view of wire harness connector<br>(to Power Management Control ECU) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

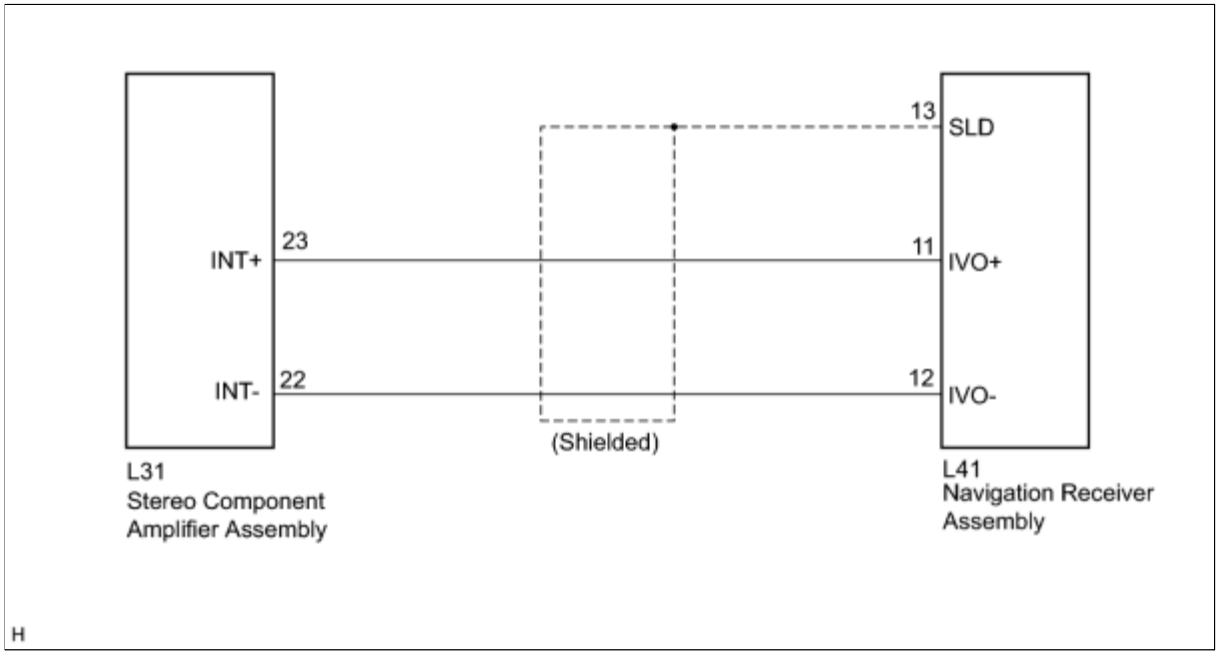
**OK** ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

**Navigation Voice Circuit**

## DESCRIPTION

This circuit is used when the voice guidance in the navigation system is on.

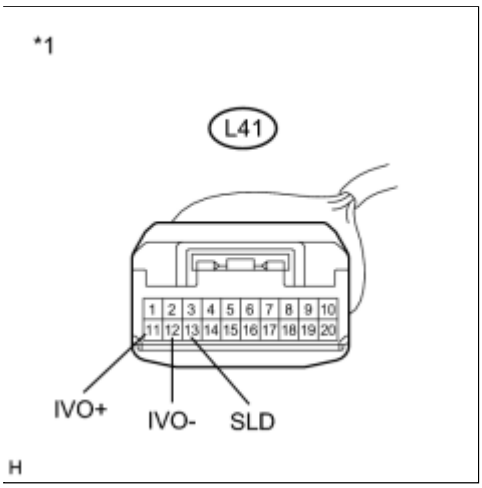
## WIRING DIAGRAM



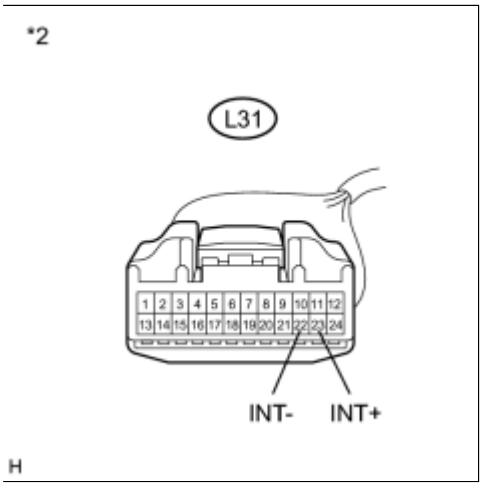

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - STEREO COMPONENT AMPLIFIER)** |




(a) Disconnect the L41 navigation receiver assembly connector.




(b) Disconnect the L31 stereo component amplifier assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L41-11 (IVO+) - L31-23 (INT+) | Always | Below 1 Ω |
| L41-12 (IVO-) - L31-22 (INT-) | Always | Below 1 Ω |
| L41-11 (IVO+) - Body ground | Always | 10 kΩ or higher |
| L41-12 (IVO-) - Body ground | Always | 10 kΩ or higher |
| L41-13 (SLD) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

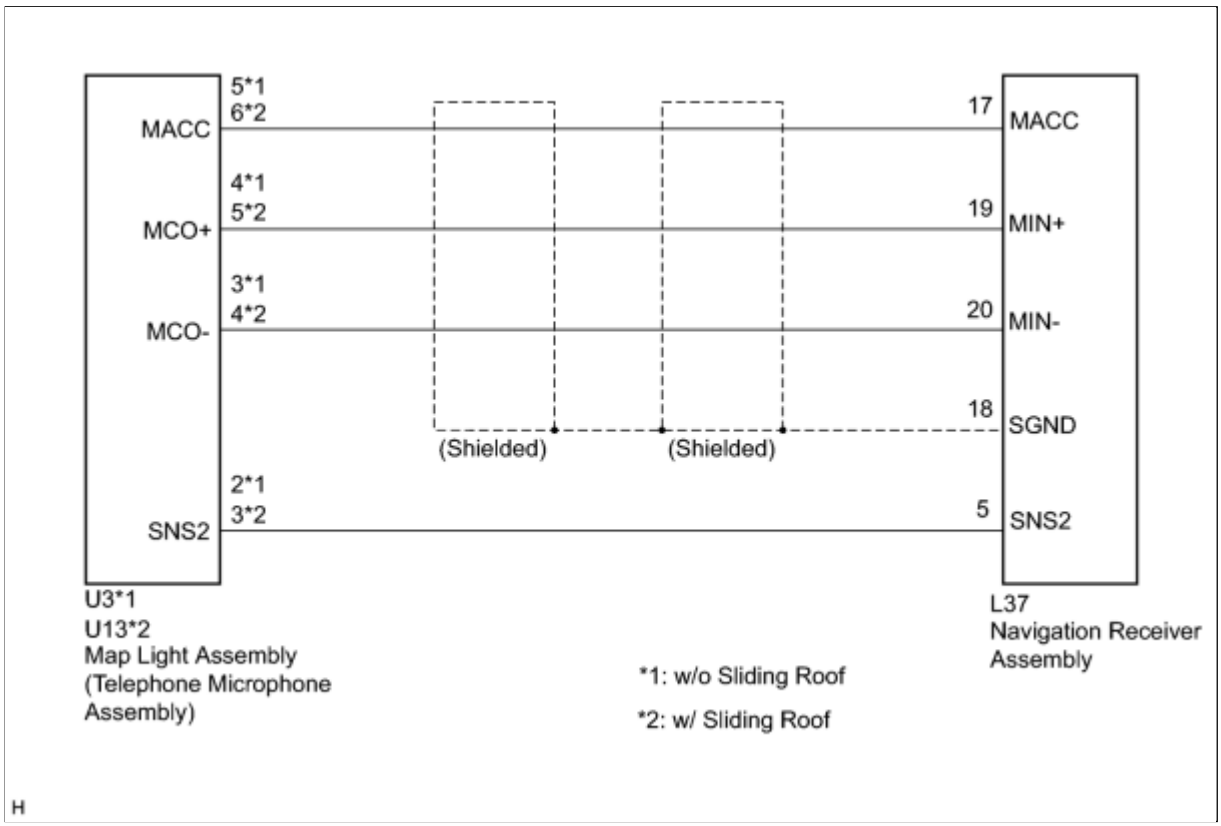
**Microphone Circuit between Microphone and Navigation Receiver Assembly**

# DESCRIPTION

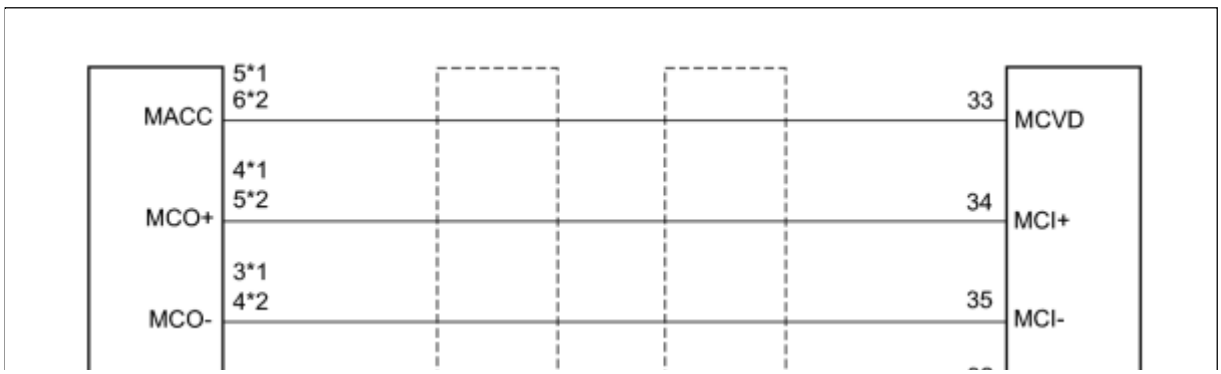
- Using this circuit, the navigation receiver assembly sends power to the map light assembly (telephone microphone assembly), and the map light assembly sends microphone signals to the navigation receiver assembly (w/o manual (SOS) switch).
- Using this circuit, the DCM (telematics transceiver) sends power to the map light assembly (telephone microphone assembly), and the map light assembly (telephone microphone assembly) sends microphone signals to the navigation receiver assembly via the DCM (telematics transceiver). The navigation receiver assembly and map light assembly (telephone microphone assembly) are connected to each other using the microphone connection detection signal lines (w/ manual (SOS) switch).

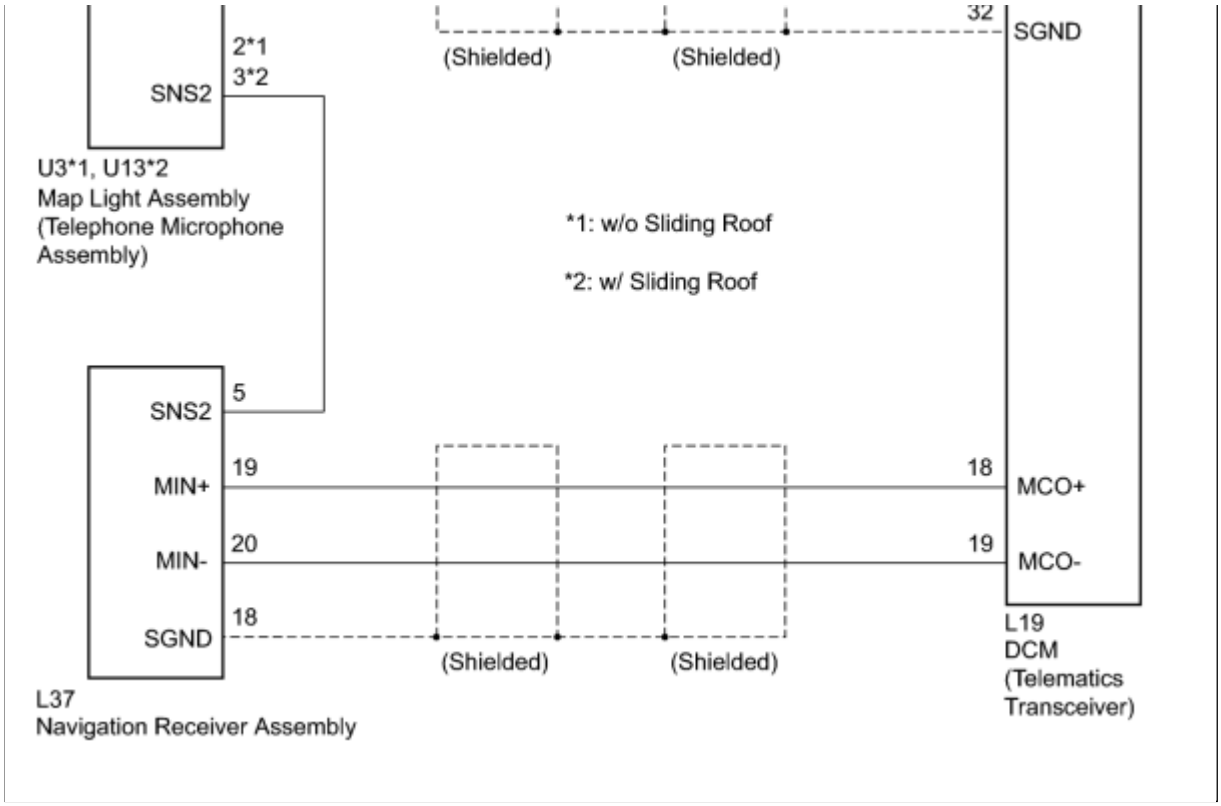
# WIRING DIAGRAM

### 1. w/o Manual (SOS) Switch




### 2. w/ Manual (SOS) Switch






## INSPECTION PROCEDURE

**NOTICE:**

**If the DCM (telematics transceiver) has been replaced, perform the Activate DCM procedure using the Techstream INFO .**

## PROCEDURE

| | |
|---|---|
| 1. | **CONFIRM MODEL** |

(a) Choose the model to be inspected.

Result:

| MODEL | PROCEED TO |
|---|---|
| w/o Manual (SOS) Switch | A |
| w/ Manual (SOS) Switch | B |

**B** ▶ **CONFIRM MODEL**

**A** ▼

| | |
|---|---|
| 2. | **CONFIRM MODEL** |

| | |
|---|---|
| 2. | CONFIRM MODEL |

(a) Choose the model to be inspected.

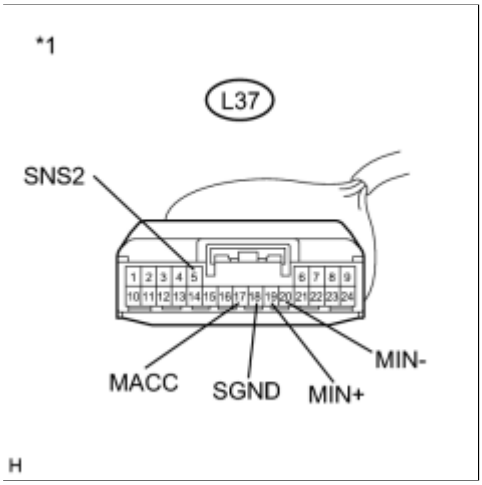
Result:

| MODEL | PROCEED TO |
|---|---|
| w/o Sliding Roof | A |
| w/ Sliding Roof | B |

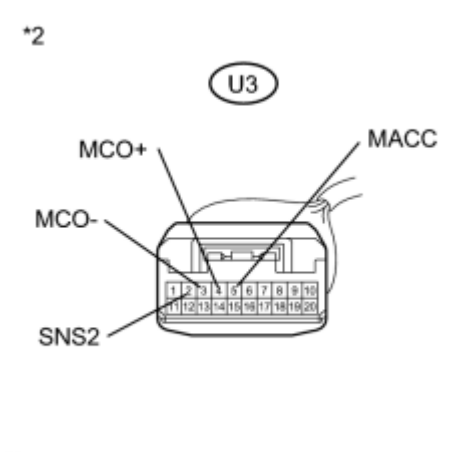
B ▶ CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - MAP LIGHT ASSEMBLY)

A ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - MAP LIGHT ASSEMBLY) |




(a) Disconnect the L37 navigation receiver assembly connector.




(b) Disconnect the U3 map light assembly connector.

H

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-5 (SNS2) - U3-2 (SNS2) | Always | Below 1 Ω |
| L37-17 (MACC) - U3-5 (MACC) | Always | Below 1 Ω |
| L37-19 (MIN+) - U3-4 (MCO+) | Always | Below 1 Ω |
| L37-20 (MIN-) - U3-3 (MCO-) | Always | Below 1 Ω |
| L37-5 (SNS2) - Body ground | Always | 10 kΩ or higher |
| L37-17 (MACC) - Body ground | Always | 10 kΩ or higher |
| L37-19 (MIN+) - Body ground | Always | 10 kΩ or higher |
| L37-20 (MIN-) - Body ground | Always | 10 kΩ or higher |
| L37-18 (SGND) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

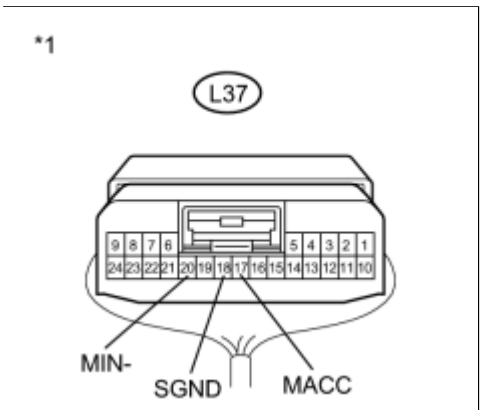
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**

▼

| | |
|---|---|
| **4.** | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |

(a) Disconnect the U3 map light assembly connector.




(b) Reconnect the L37 navigation receiver assembly connector.




(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-17 (MACC) - Body ground | Power switch on (ACC) | 4 to 6 V |

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-18 (SGND) - Body ground | Always | Below 1 Ω |
| L37-20 (MIN-) - Body ground | Always | Below 1 Ω |

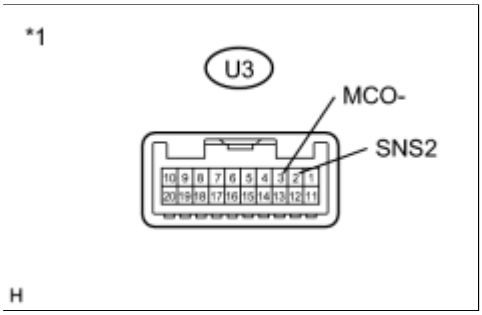
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Navigation Receiver Assembly) |

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **5.** | **INSPECT MAP LIGHT ASSEMBLY** |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U3-2 (SNS2) - U3-3 (MCO-) | Always | Below 1 Ω |

**Text in Illustration**

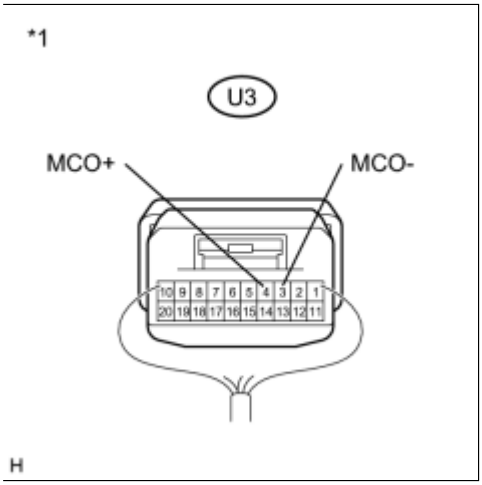
| | |
|---|---|
| *1 | Component without harness connected<br>(Map Light Assembly) |

**NG** ▶ **REPLACE TELEPHONE MICROPHONE ASSEMBLY**

**OK**

| | |
|---|---|
| **6.** | **INSPECT MAP LIGHT ASSEMBLY** |

(a) Reconnect the L37 navigation receiver assembly connector.




(b) Reconnect the U3 map light assembly connector.

(c) Turn the power switch on (ACC).

(d) Connect an oscilloscope to terminals 4 (MCO+) and 3 (MCO-) of the U3 map light assembly connector.

(e) Check the waveform of the telephone microphone assembly using the oscilloscope.

Result:

| RESULT | PROCEED TO |
|---|---|
| A waveform synchronized with the voice input to the map light assembly is output | A |
| A waveform synchronized with the voice input to the map light assembly is not output | B |

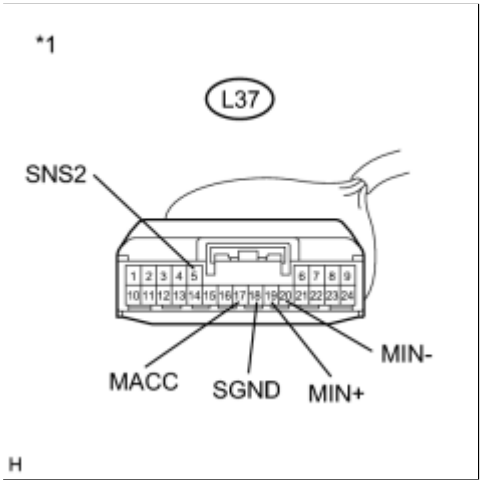
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

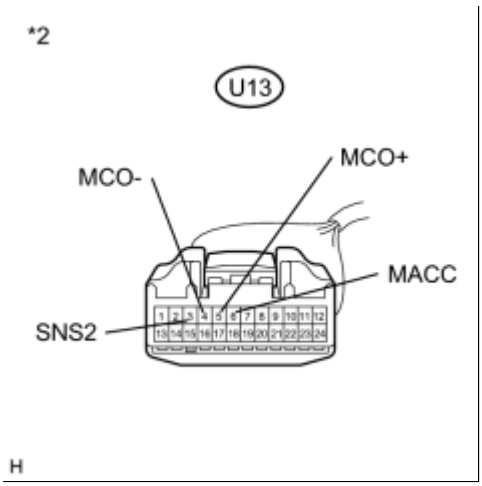
**B** ▶ **REPLACE TELEPHONE MICROPHONE ASSEMBLY**

**A** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **7.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - MAP LIGHT ASSEMBLY)** |




(a) Disconnect the L37 navigation receiver assembly connector.




(b) Disconnect the U13 map light assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-5 (SNS2) - U13-3 (SNS2) | Always | Below 1 Ω |
| L37-17 (MACC) - U13-6 (MACC) | Always | Below 1 Ω |
| L37-19 (MIN+) - U13-5 (MCO+) | Always | Below 1 Ω |
| L37-20 (MIN-) - U13-4 (MCO-) | Always | Below 1 Ω |
| L37-5 (SNS2) - Body ground | Always | 10 kΩ or higher |
| L37-17 (MACC) - Body ground | Always | 10 kΩ or higher |
| L37-19 (MIN+) - Body ground | Always | 10 kΩ or higher |
| L37-20 (MIN-) - Body ground | Always | 10 kΩ or higher |
| L37-18 (SGND) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector |

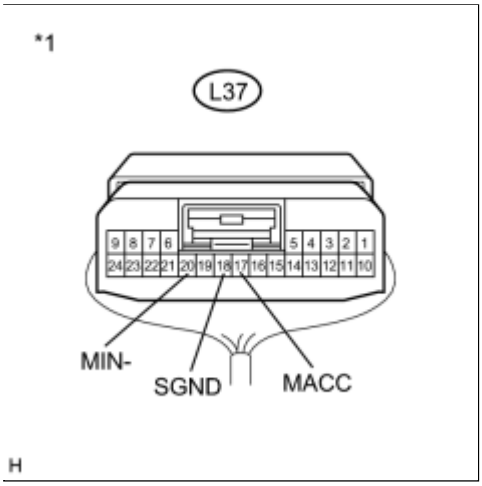
| | |
|---|---|
| | (to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **8.** | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |

(a) Disconnect the U3 map light assembly connector.




(b) Reconnect the L37 navigation receiver assembly connector.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-17 (MACC) - Body ground | Power switch on (ACC) | 4 to 6 V |

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-18 (SGND) - Body ground | Always | Below 1 Ω |
| L37-20 (MIN-) - Body ground | Always | Below 1 Ω |

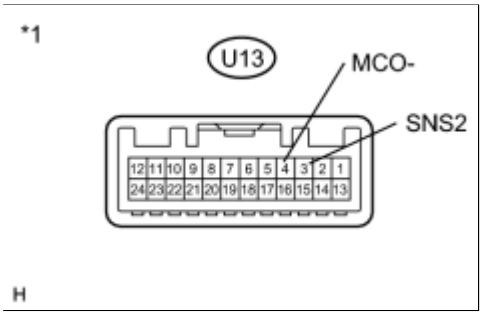
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Navigation Receiver Assembly) |

NG ▶ REPLACE NAVIGATION RECEIVER ASSEMBLY

OK ▼

| | |
|---|---|
| 9. | INSPECT MAP LIGHT ASSEMBLY |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U13-3 (SNS2) - U13-4 (MCO-) | Always | Below 1 Ω |

**Text in Illustration**

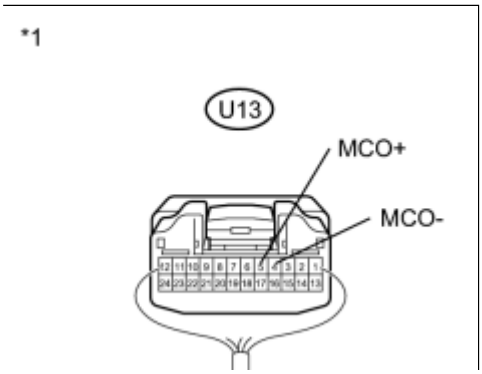
| | |
|---|---|
| *1 | Component without harness connected<br>(Map Light Assembly) |

NG ▶ REPLACE TELEPHONE MICROPHONE ASSEMBLY

OK ▼

| | |
|---|---|
| 10. | INSPECT MAP LIGHT ASSEMBLY |

(a) Reconnect the L37 navigation receiver assembly connector.




(b) Reconnect the U13 map light assembly connector.




(c) Turn the power switch on (ACC).

(d) Connect an oscilloscope to terminals 5 (MCO+) and 4 (MCO-) of the U13 map light assembly connector.

(e) Check the waveform of the telephone microphone assembly using the oscilloscope.

Result:

| RESULT | PROCEED TO |
|---|---|
| A waveform synchronized with the voice input to the map light assembly is output | A |
| A waveform synchronized with the voice input to the map light assembly is not output | B |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

**B** ▶ **REPLACE TELEPHONE MICROPHONE ASSEMBLY**

**A** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **11.** | **REPLACE TELEPHONE MICROPHONE ASSEMBLY** |

(a) Replace the telephone microphone assembly.

**HINT:**

- w/o Sliding Roof INFO
- w/ Sliding Roof INFO

(b) Check if the same malfunction recurs.

Result:

| RESULT | PROCEED TO |
|---|---|
| Malfunction does not recur<br>(returns to normal) | A |
| Malfunction recurs | B |

**B** ▶ **REPLACE MAP LIGHT ASSEMBLY**

**A** ▶ **END**

| | |
|---|---|
| **12.** | **CONFIRM MODEL** |

(a) Choose the model to be inspected.

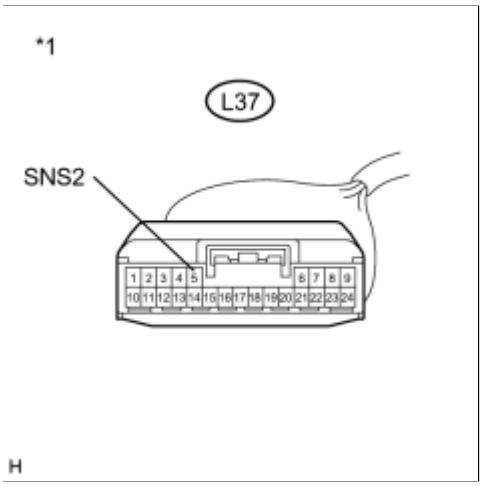
Result:

| MODEL | PROCEED TO |
|---|---|
| w/o Sliding Roof | A |
| w/ Sliding Roof | B |

**B** ▶ **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - MAP LIGHT ASSEMBLY)**

**A** ▼

| | |
|---|---|
| **13.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - MAP LIGHT ASSEMBLY)** |




(a) Disconnect the L37 navigation receiver assembly connector.




(b) Disconnect the U3 map light assembly connector.

H

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-5 (SNS2) - U3-2 (SNS2) | Always | Below 1 Ω |
| L37-5 (SNS2) - Body ground | Always | 10 kΩ or higher |

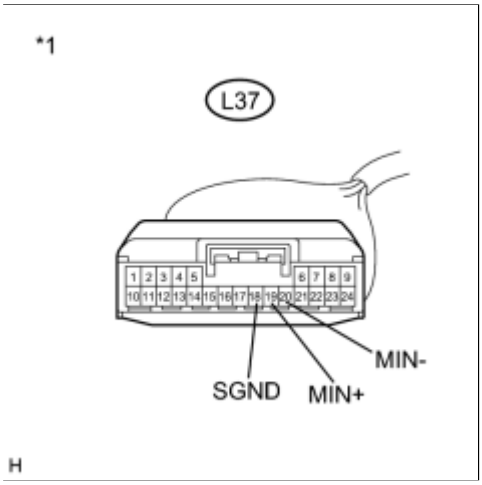
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

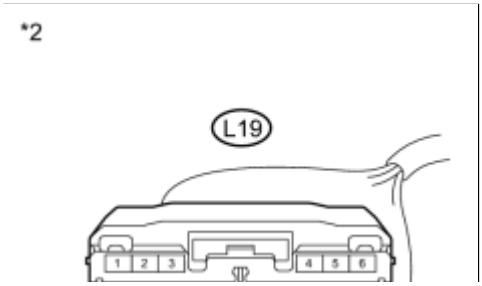
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

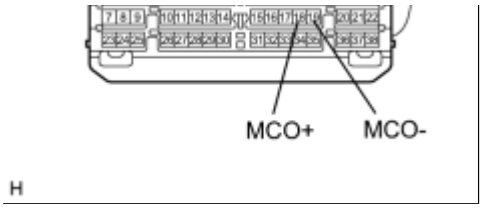
| | |
|---|---|
| **14.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - DCM)** |




(a) Disconnect the L37 navigation receiver assembly connector.




(b) Disconnect the L19 DCM (telematics transceiver) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-19 (MIN+) - L19-18 (MCO+) | Always | Below 1 Ω |
| L37-20 (MIN-) - L19-19 (MCO-) | Always | Below 1 Ω |
| L37-19 (MIN+) - Body ground | Always | 10 kΩ or higher |
| L37-20 (MIN-) - Body ground | Always | 10 kΩ or higher |
| L37-18 (SGND) - Body ground | Always | 10 kΩ or higher |

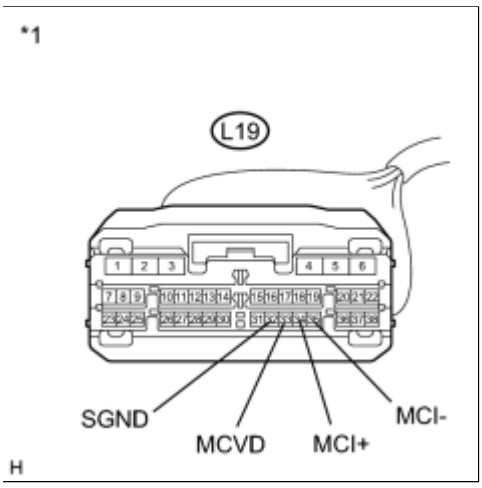
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |

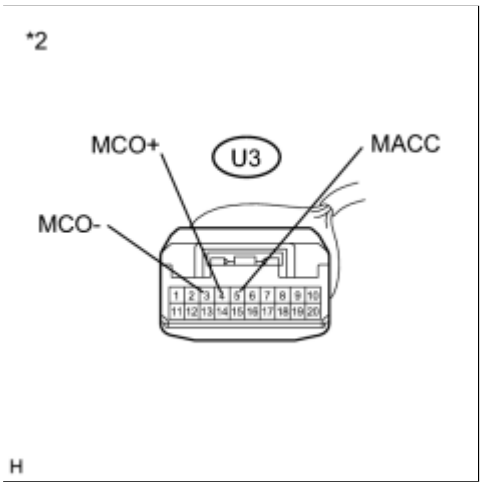
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **15.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - MAP LIGHT ASSEMBLY)** |




(a) Disconnect the L19 DCM (telematics transceiver) connector.




(b) Disconnect the U3 map light assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-33 (MCVD) - U3-5 (MACC) | Always | Below 1 Ω |
| L19-34 (MCI+) - U3-4 (MCO+) | Always | Below 1 Ω |
| L19-35 (MCI-) - U3-3 (MCO-) | Always | Below 1 Ω |
| L19-33 (MCVD) - Body ground | Always | 10 kΩ or higher |
| L19-34 (MCI+) - Body ground | Always | 10 kΩ or higher |
| L19-35 (MCI-) - Body ground | Always | 10 kΩ or higher |
| L19-32 (SGND) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

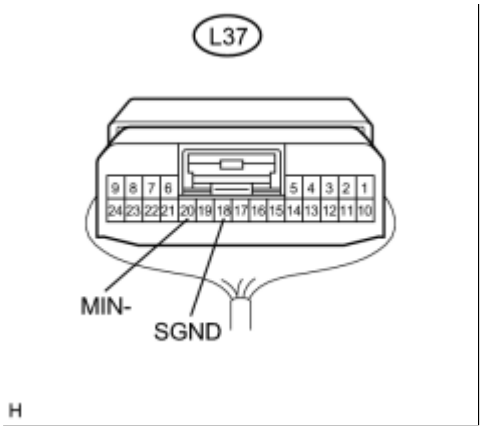
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **16.** | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |






(a) Reconnect the L37 navigation receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-18 (SGND) - Body ground | Always | Below 1 Ω |
| L37-20 (MIN-) - Body ground | Always | Below 1 Ω |

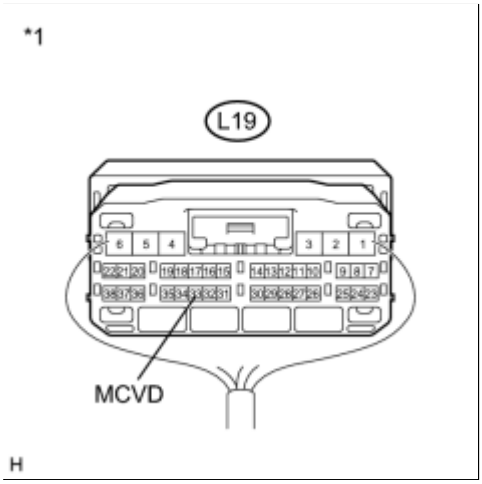
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Navigation Receiver Assembly) |

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **17.** | **INSPECT DCM (TELEMATICS TRANSCEIVER)** |




(a) Reconnect the L19 DCM (telematics transceiver) connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-33 (MCVD) - Body ground | Power switch on (ACC) | 5 V |

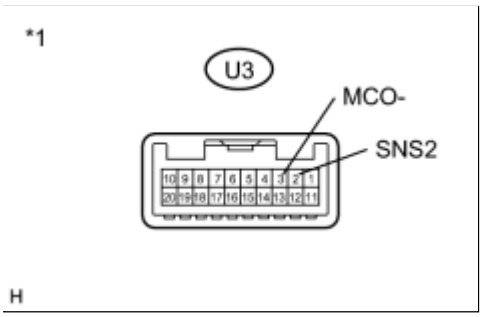
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

**NG** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**OK** ▼

| | |
|---|---|
| **18.** | **INSPECT MAP LIGHT ASSEMBLY** |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U3-2 (SNS2) - U3-3 (MCO-) | Always | Below 1 Ω |

**Text in Illustration**

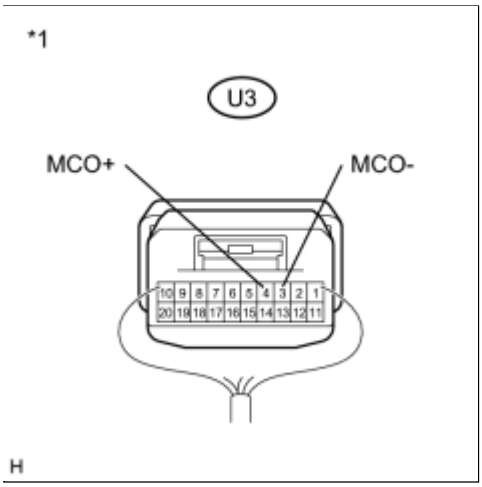
| | |
|---|---|
| *1 | Component without harness connected<br>(Map Light Assembly) |

**NG** ▶ **REPLACE TELEPHONE MICROPHONE ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **19.** | **INSPECT MAP LIGHT ASSEMBLY** |

(a) Reconnect the L37 navigation receiver assembly connector.




(b) Reconnect the U3 map light assembly connector.

(c) Turn the power switch on (ACC).

(d) Connect an oscilloscope to terminals 4 (MCO+) and 3 (MCO-) of the U3 map light assembly connector.

(e) Check the waveform of the telephone microphone assembly using the oscilloscope.

Result:

| RESULT | PROCEED TO |
|---|---|
| A waveform synchronized with the voice input to the map light assembly is output | A |
| A waveform synchronized with the voice input to the map light assembly is not output | B |

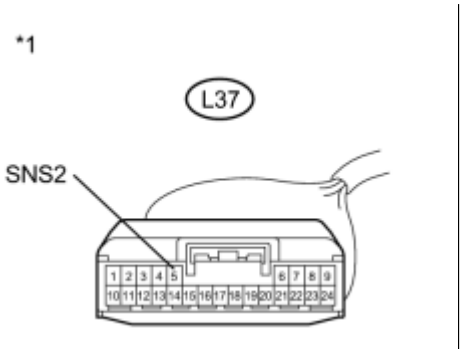
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

**B** ▶ **REPLACE TELEPHONE MICROPHONE ASSEMBLY**

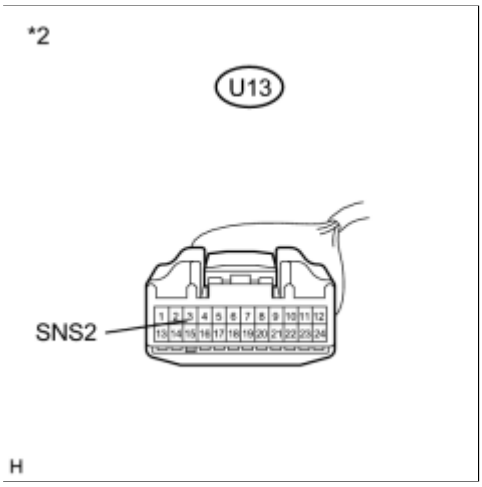
**A** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **20.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - MAP LIGHT ASSEMBLY)** |




(a) Disconnect the L37 navigation receiver assembly connector.

H




(b) Disconnect the U13 map light assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-5 (SNS2) - U13-3 (SNS2) | Always | Below 1 Ω |
| L37-5 (SNS2) - Body ground | Always | 10 kΩ or higher |

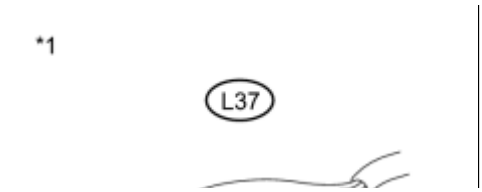
**Text in Illustration**

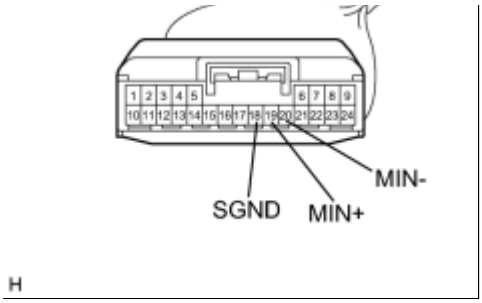
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

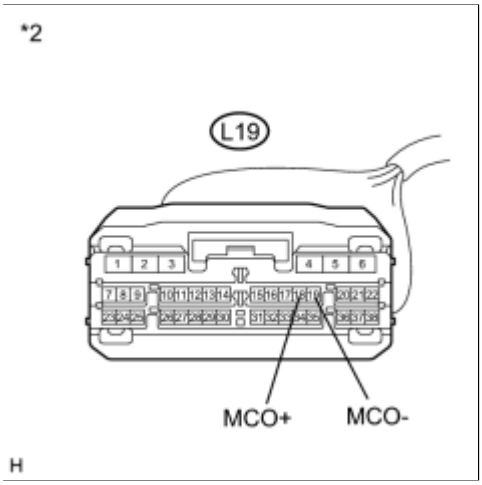
**OK**
▼

| | |
|---|---|
| **21.** | **CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY - DCM)** |






(a) Disconnect the L37 navigation receiver assembly connector.




(b) Disconnect the L19 DCM (telematics transceiver) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-19 (MIN+) - L19-18 (MCO+) | Always | Below 1 Ω |
| L37-20 (MIN-) - L19-19 (MCO-) | Always | Below 1 Ω |
| L37-19 (MIN+) - Body ground | Always | 10 kΩ or higher |
| L37-20 (MIN-) - Body ground | Always | 10 kΩ or higher |
| L37-18 (SGND) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

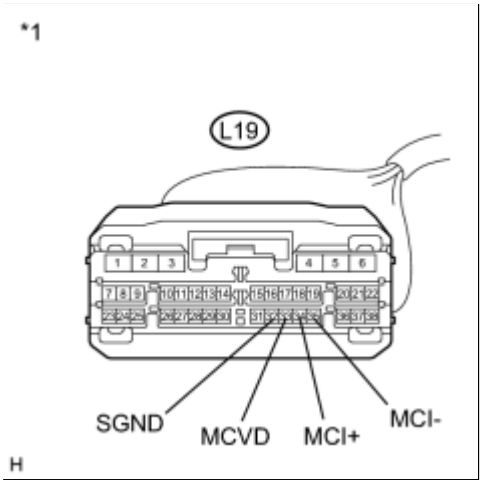
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

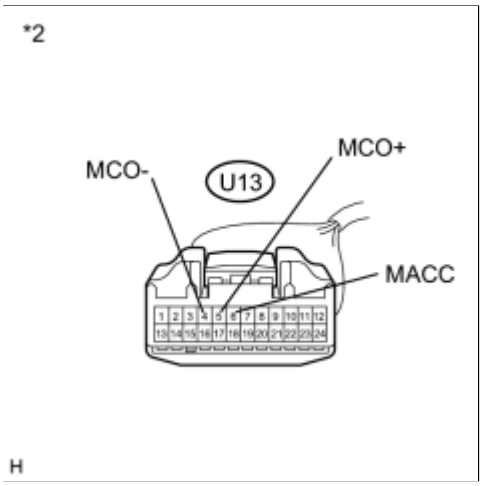
**OK** ▼

| | |
|---|---|
| | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - MAP LIGHT** |

| | |
|---|---|
| **22.** | **CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) - MAP LIGHT ASSEMBLY)** |




(a) Disconnect the L19 DCM (telematics transceiver) connector.




(b) Disconnect the U13 map light assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-33 (MCVD) - U13-6 (MACC) | Always | Below 1 Ω |
| L19-34 (MCI+) - U13-5 (MCO+) | Always | Below 1 Ω |
| L19-35 (MCI-) - U13-4 (MCO-) | Always | Below 1 Ω |
| L19-33 (MCVD) - Body ground | Always | 10 kΩ or higher |
| L19-34 (MCI+) - Body ground | Always | 10 kΩ or higher |
| L19-35 (MCI-) - Body ground | Always | 10 kΩ or higher |
| L19-32 (SGND) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

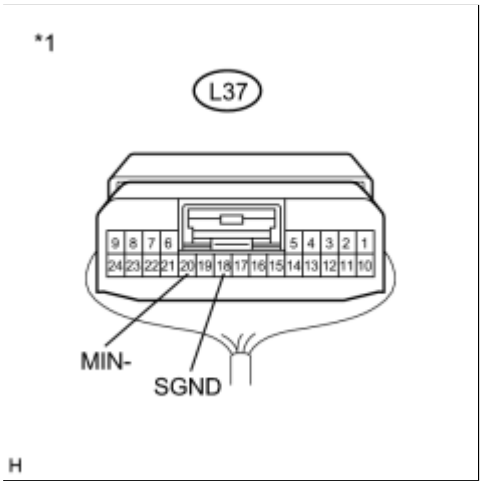
| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to DCM (Telematics Transceiver)) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br>(to Map Light Assembly) |

NG ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **23.** | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |




(a) Reconnect the L37 navigation receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-18 (SGND) - Body ground | Always | Below 1 Ω |
| L37-20 (MIN-) - Body ground | Always | Below 1 Ω |

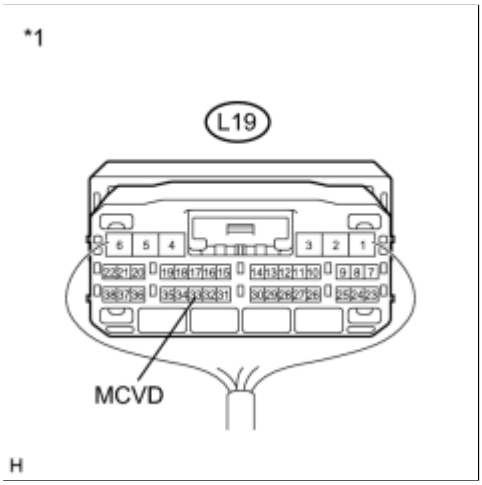
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Navigation Receiver Assembly) |

NG ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **24.** | **INSPECT DCM (TELEMATICS TRANSCEIVER)** |




(a) Reconnect the L19 DCM (telematics transceiver) connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L19-33 (MCVD) - Body ground | Power switch on (ACC) | 5 V |

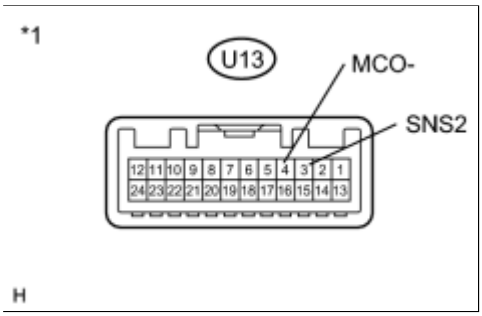
**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(DCM (Telematics Transceiver)) |

**NG** ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

**OK** ▼

| | |
|---|---|
| **25.** | **INSPECT MAP LIGHT ASSEMBLY** |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| U13-3 (SNS2) - U13-4 (MCO-) | Always | Below 1 Ω |

**Text in Illustration**

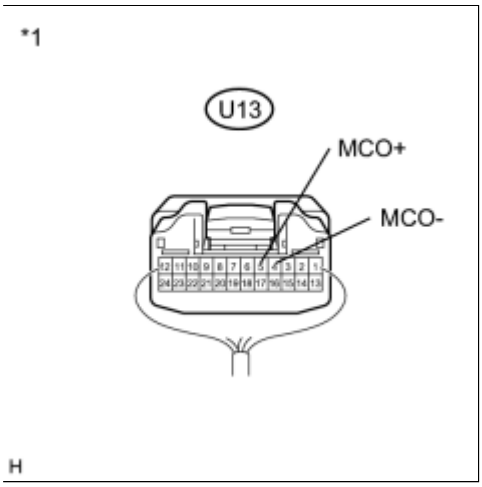
| | |
|---|---|
| *1 | Component without harness connected<br>(Map Light Assembly) |

**NG** ▶ **REPLACE TELEPHONE MICROPHONE ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **26.** | **INSPECT MAP LIGHT ASSEMBLY** |

(a) Reconnect the L37 navigation receiver assembly connector.




(b) Reconnect the U13 map light assembly connector.

(c) Turn the power switch on (ACC).

(d) Connect an oscilloscope to terminals 5 (MCO+) and 4 (MCO-) of the U13 map light assembly connector.

(e) Check the waveform of the telephone microphone assembly using the oscilloscope.

Result:

| RESULT | PROCEED TO |
|---|---|
| A waveform synchronized with the voice input to the map light assembly is output | A |
| A waveform synchronized with the voice input to the map light assembly is not output | B |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Map Light Assembly) |

**B** ▶ **REPLACE TELEPHONE MICROPHONE ASSEMBLY**

**A** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM**

A SYMPTOMS TABLE

| | |
|---|---|
| 27. | REPLACE TELEPHONE MICROPHONE ASSEMBLY |

(a) Replace the telephone microphone assembly.

**HINT:**

- w/o Sliding Roof INFO
- w/ Sliding Roof INFO

(b) Check if the same malfunction recurs.

Result:

| RESULT | PROCEED TO |
|---|---|
| Malfunction does not recur (returns to normal) | A |
| Malfunction recurs | B |

B REPLACE MAP LIGHT ASSEMBLY

A END

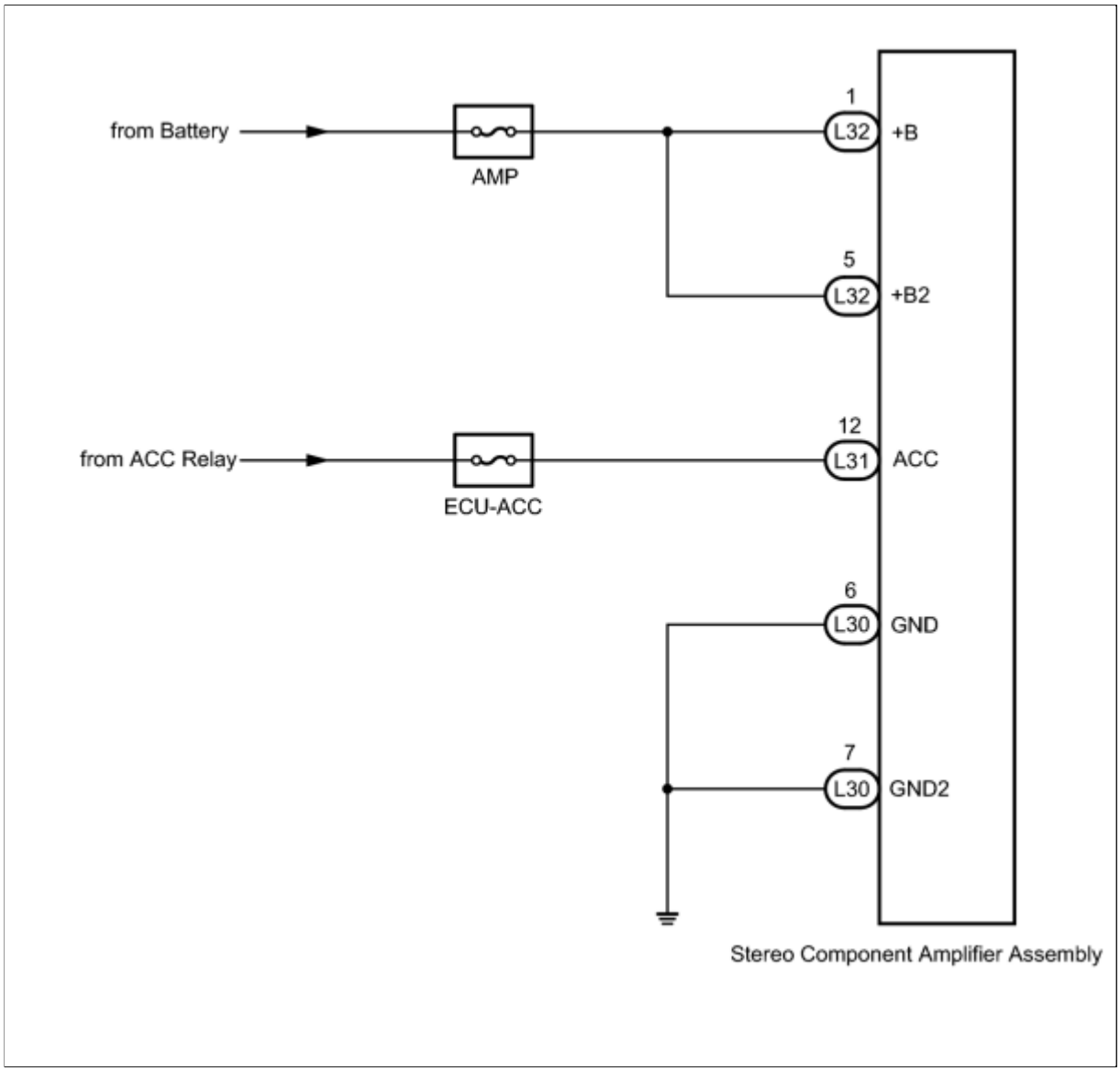
**Stereo Component Amplifier Power Source Circuit**

## DESCRIPTION

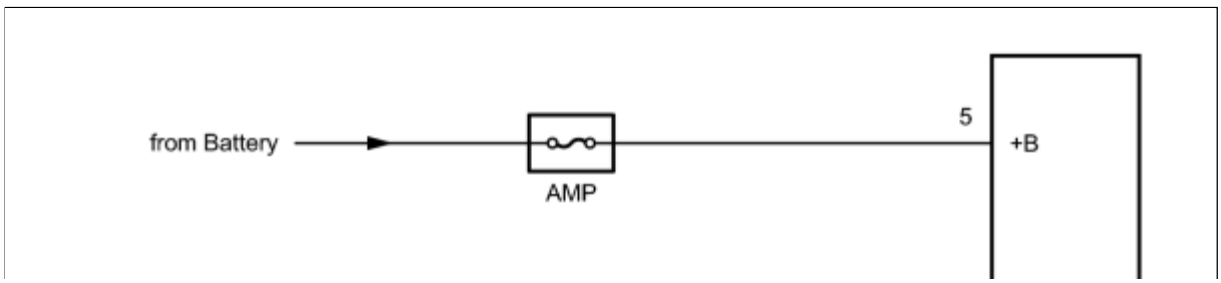
This is the power source circuit to operate the stereo component amplifier assembly.

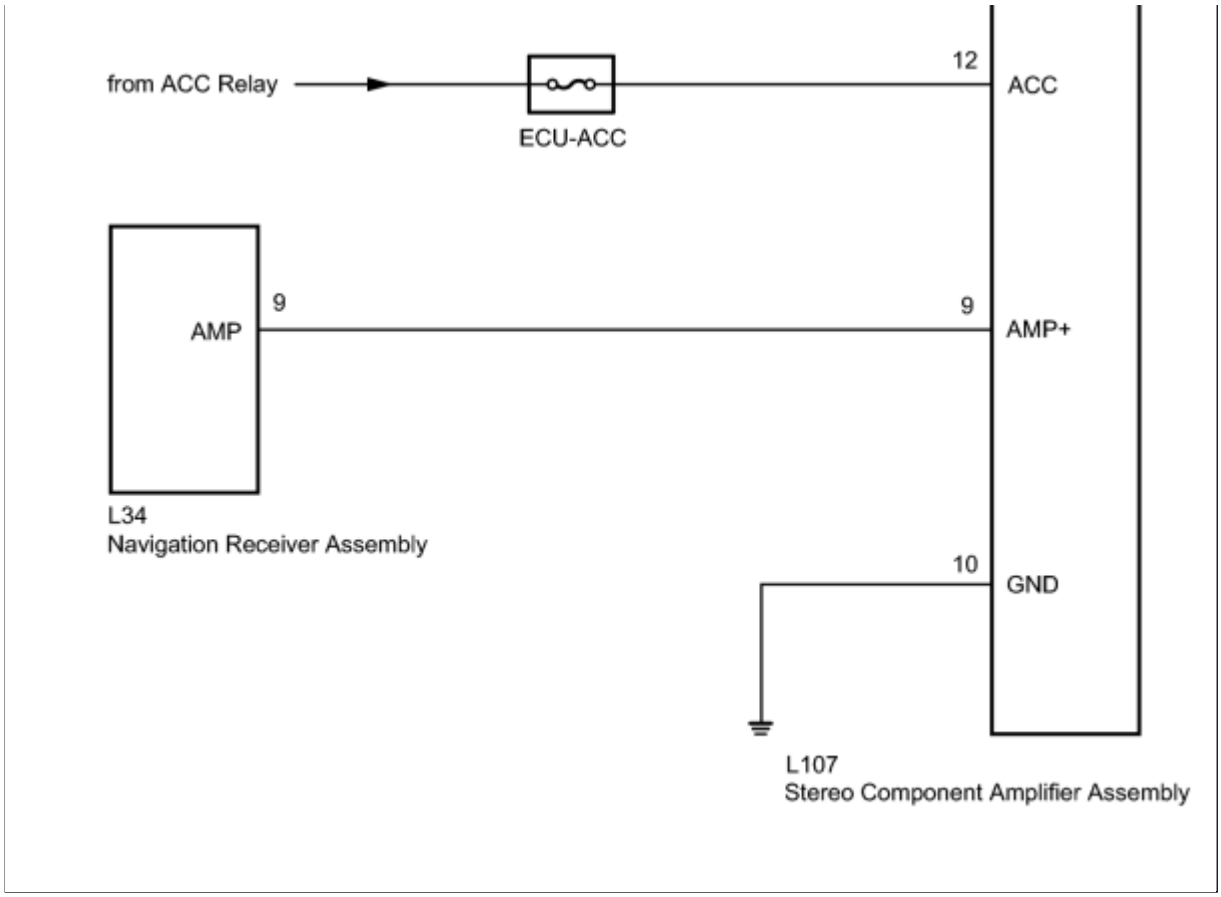
## WIRING DIAGRAM

**1. w/ "Bluetooth" Audio System**




**2. w/o "Bluetooth" Audio System**






## INSPECTION PROCEDURE

**NOTICE:**

**Inspect the fuses for circuits related to this system before performing the following inspection procedure.**

## PROCEDURE

| | |
|---|---|
| **1.** | **CONFIRM MODEL** |

(a) Choose the model to be inspected.

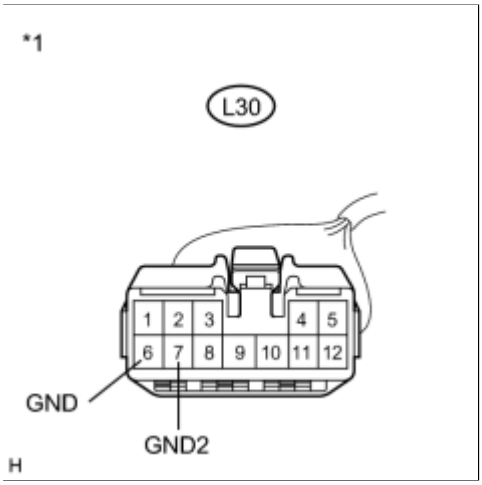
Result:

| RESULT | PROCEED TO |
|---|---|
| w/ "Bluetooth" Audio System | A |
| w/o "Bluetooth" Audio System | B |

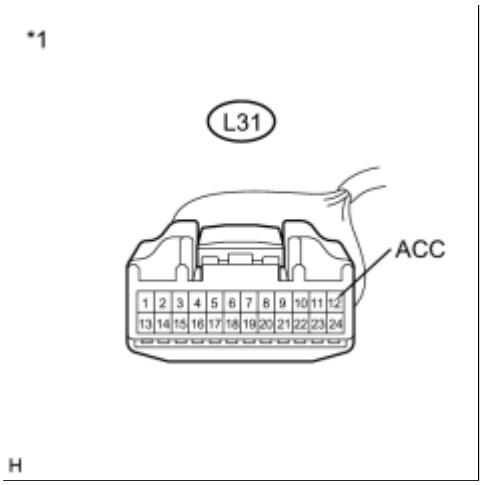
**B** ▶ **INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY**

**A** ▼

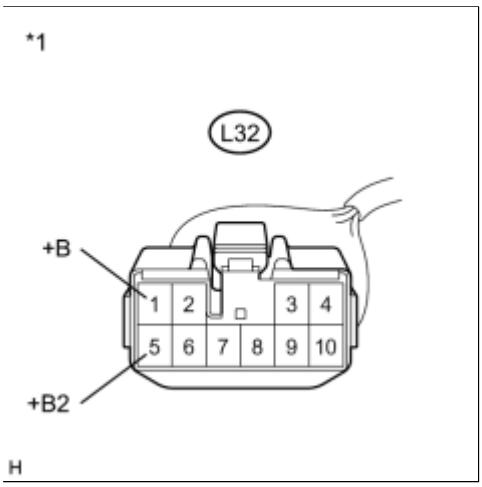
| 2. | INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY |
|---|---|




(a) Disconnect the L30 stereo component amplifier assembly connector.




(b) Disconnect the L31 stereo component amplifier assembly connector.




(c) Disconnect the L32 stereo component amplifier assembly connector.

(d) Measure the resistance according to the value(s) in the table below .

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|

| | | |
|---|---|---|
| L30-6 (GND) - Body ground | Always | Below 1 Ω |
| L30-7 (GND2) - Body ground | Always | Below 1 Ω |

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L32-1 (+B) - L30-6 (GND) | Power switch off | 11 to 14 V |
| L32-5 (+B2) - L30-6 (GND) | Power switch off | 11 to 14 V |
| L31-12 (ACC) - L30-6 (GND) | Power switch on (ACC) | 11 to 14 V |

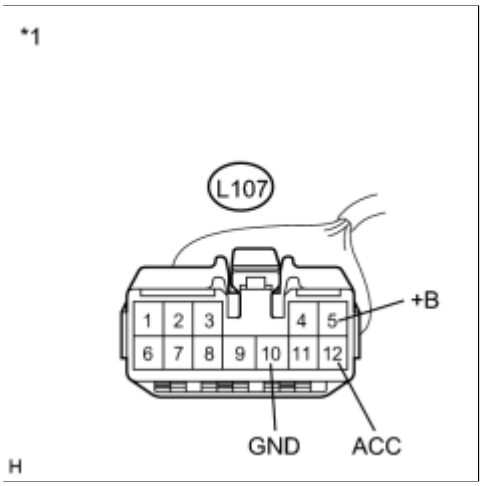
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **3.** | **INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY** |




(a) Disconnect the L107 stereo component amplifier assembly connector.

(b) Measure the resistance according to the value(s) in the table below .

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L107-10 (GND) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L107-5 (+B) - L107-10 (GND) | Power switch off | 11 to 14 V |
| L107-12 (ACC) - L107-10 (GND) | Power switch on (ACC) | 11 to 14 V |

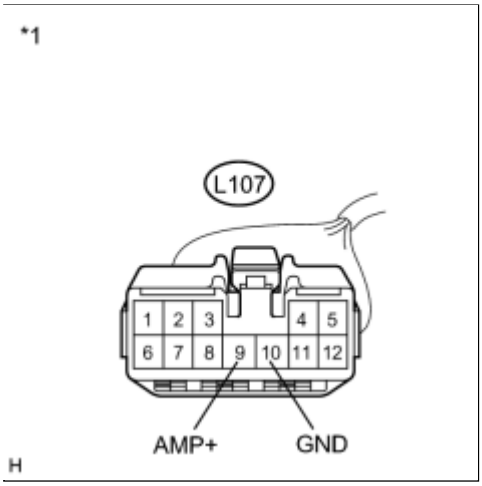
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **4.** | **INSPECT STEREO COMPONENT AMPLIFIER ASSEMBLY** |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L107-9 (AMP+) - L107-10 (GND) | Power switch on (IG) | 11 to 14 V |

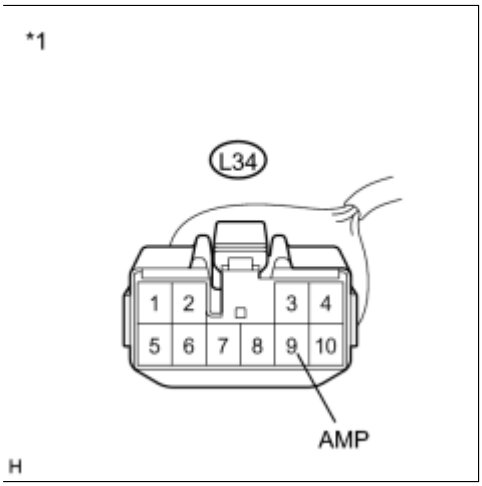
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

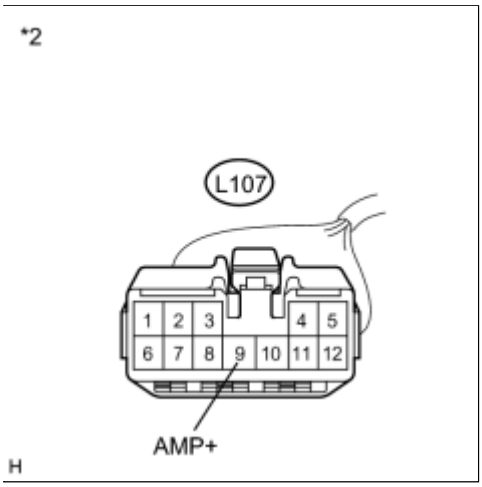
**NG** ▶ **CHECK HARNESS AND CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| **5.** | **CHECK HARNESS AND CONNECTOR** |




(a) Disconnect the L34 navigation receiver assembly connector.




(b) Measure the resistance according to the value(s) in the table below .

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L34-9 (AMP) - L107-9 (AMP+) | Always | Below 1 Ω |
| L34-9 (AMP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |
| *2 | Front view of wire harness connector<br>(to Stereo Component Amplifier Assembly) |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

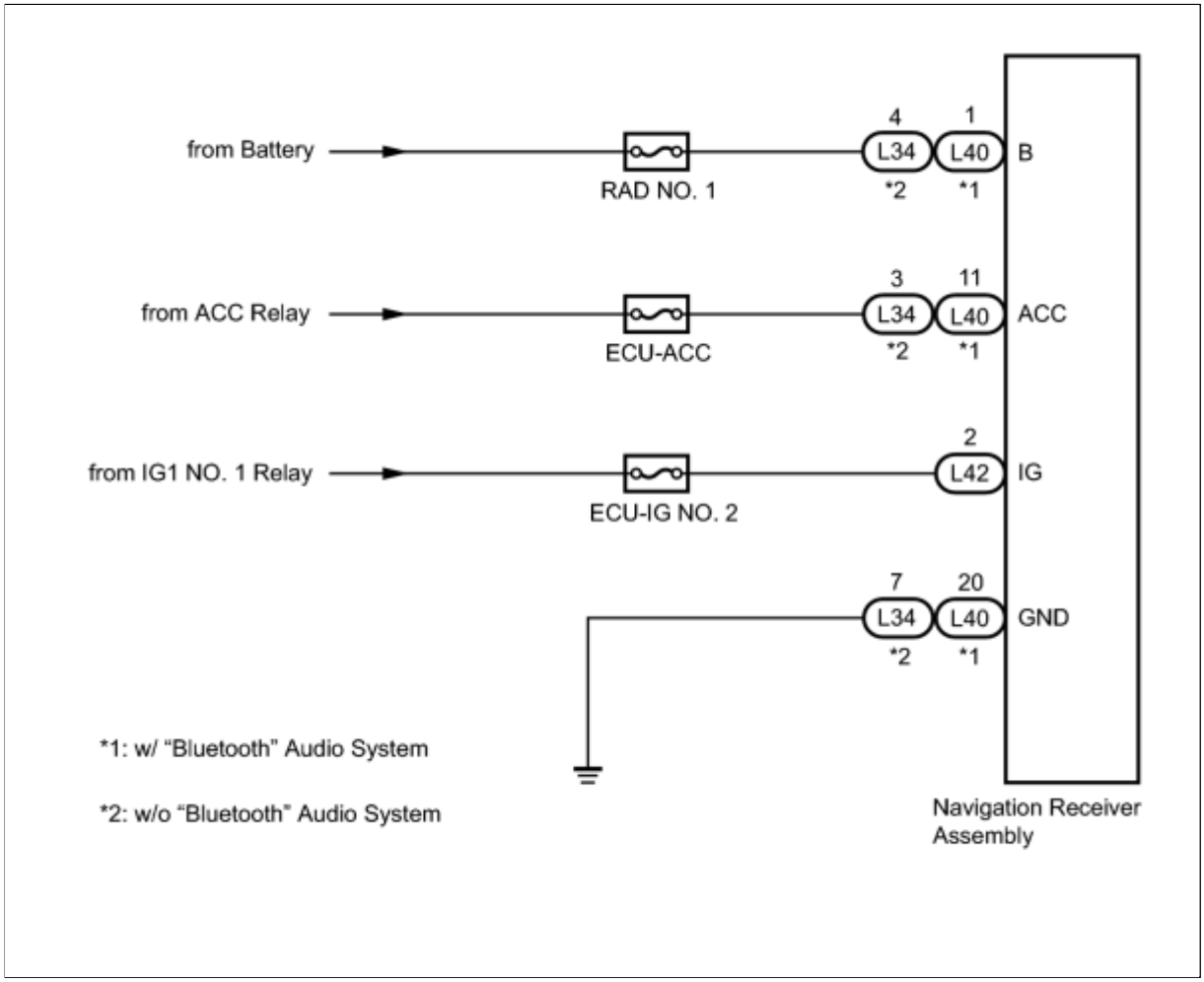
**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Navigation Receiver Assembly Power Source Circuit**

## DESCRIPTION

This is the power source circuit to operate the navigation receiver assembly.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

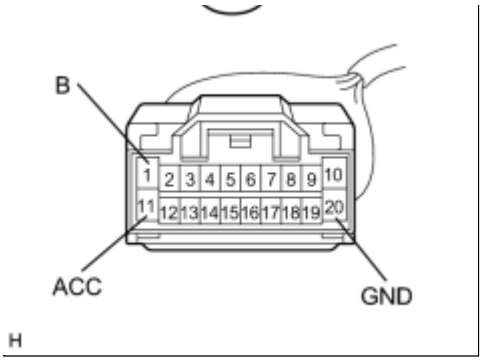
**NOTICE:**

**Inspect the fuses for circuits related to this system before performing the following inspection procedure.**

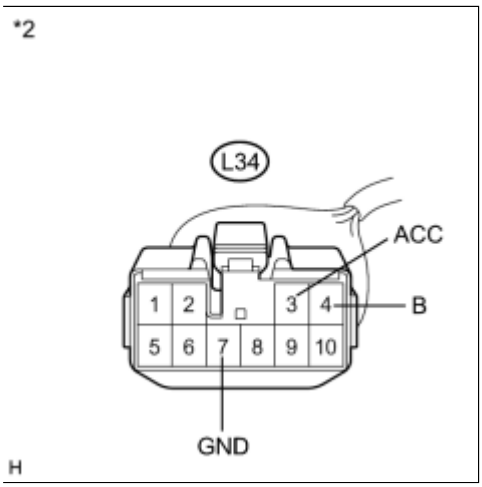
## PROCEDURE

| | |
|---|---|
| 1. | **INSPECT NAVIGATION RECEIVER ASSEMBLY** |

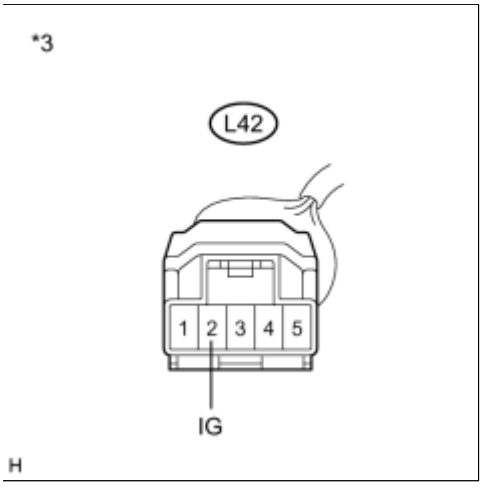





(a) Disconnect the L40 navigation receiver assembly connector (w/ "Bluetooth" Audio System).




(b) Disconnect the L34 navigation receiver assembly connector (w/o "Bluetooth" Audio System).




(c) Disconnect the L42 navigation receiver assembly connector.

(d) Measure the resistance according to the value(s) in the table below .

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L40-20 (GND) - Body ground*4 | Always | Below 1 Ω |
| L34-7 (GND) - Body ground*5 | Always | Below 1 Ω |

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|

| | | |
|---|---|---|
| L40-1 (B) - L40-20 (GND)*4 | Power switch off | 11 to 14 V |
| L40-11 (ACC) - L40-20 (GND)*4 | Power switch on (ACC) | 11 to 14 V |
| L42-2 (IG) - L40-20 (GND)*4 | Power switch on (IG) | 11 to 14 V |
| L34-4 (B) - L34-7 (GND)*5 | Power switch off | 11 to 14 V |
| L34-3 (ACC) - L34-7 (GND)*5 | Power switch on (ACC) | 11 to 14 V |
| L42-2 (IG) - L34-7 (GND)*5 | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br>(to Navigation Receiver Assembly)*4 |
| *2 | Front view of wire harness connector<br>(to Navigation Receiver Assembly)*5 |
| *3 | Front view of wire harness connector<br>(to Navigation Receiver Assembly) |

*4: w/ "Bluetooth" Audio System
*5: w/o "Bluetooth" Audio System

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# PRECAUTION

## 1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

**NOTICE:**

**When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the terminal is reconnected.**

| SYSTEM NAME | SEE PROCEDURE |
|---|---|
| Advanced Parking Guidance System | INFO |

## 2. POINTS TO NOTE WHEN SERVICING

(a) Pay attention to the following points when servicing.

(1) When disconnecting the cable from the negative (-) battery terminal, "System initializing" may appear on the navigation receiver assembly. In this case, restore the steering angle neutral point INFO .

(2) Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

**HINT:**

**Each adjusted value for the calibration of the advanced parking guidance system will be stored in the parking assist ECU.**

(3) When the lens of the rear television camera assembly is dirty, wash the lens with water and wipe it off with a soft cloth to obtain clear images. For heavy dirt, use neutral detergent to clean the lens.

## 3. NOTES FOR REAR TELEVISION CAMERA

(a) Notes for the rear television camera assembly

(1) The advanced parking guidance system may not function properly if subjected to a severe blow by any hard object.

(2) Do not scrub the cover part of the camera (resin made). Scrubbing may scratch the cover and affect the image. Prevent organic solvents, waxes, bond removing solvents or glass coating from adhering to the cover. If such material adheres to the cover, clean it off immediately and wash with water.

(3) Exposing the camera to a sudden temperature change may affect proper functioning of the camera.

(4) A clear image may not appear if the camera is dirty with snow, mud, etc. In that case, wash it with water and wipe off the lens. Use a detergent to remove dirt if necessary.

(b) Images are difficult to discern even in normal conditions if:

(1) Noise may occur in the image depending on electrical devices used in the cabin.

(2) Noise may occur in the image if the outer mirror switch assembly is operated.

(3) Noise may occur in the image if accessories that generate radio waves have been installed.

(4) The camera screen is frosted over (the image immediately after turning the power switch on (IG) may be blurred or darker than normal).

(5) The camera lens is dirty with snow, mud, etc.

(6) A strong beam of light, such as a sunbeam or headlight, hits the camera.

(7) It is too dark around the camera (at night etc.).

(8) The ambient temperature around the camera is either too high or too low.

(9) The vehicle is tilted at a steep angle.

(10) The ambience of the camera is too bright. (When a strong light, such as a sunbeam reflected off the vehicle body, hits the camera, the image may be blurred. This is called the "SMEAR" phenomenon, peculiar to the CCD camera.)

### 4. NOTES FOR ULTRASONIC SENSOR

(a) Under the following conditions, the detection function may not function properly:

(1) A sensor or the front bumper is not installed in the correct position.

(2) A sensor is improperly located due to damage to the front bumper.

(3) A sensor is covered with foreign matter, such as mud or snow (detection function returns to normal when the sensor is cleaned).

(4) A sensor is frozen (detection function returns to normal when the temperature of the sensor rises).

(5) A hand is blocking a sensor.

**HINT:**

- In very cold weather where a malfunction display appears, the sensor may not be able to detect obstacles.
- If the sensor has malfunction, the advanced parking guidance system DTC will be output 

.
- If the malfunction display appears, visually check the sensor first. If the sensor is free of foreign matter but the malfunction display remains, the sensor may have a malfunction.

(b) The detection range may be affected by the following conditions:

**HINT:**

**Depending on a shape of a parked vehicle or an obstacle such as a wall or post near the parking space, the detection range may change even though the sensors are operating normally.**

(1) A sensor or the front bumper is not installed in the correct position.

(2) A sensor is improperly located due to damage to the front bumper.

(3) A sensor is covered with foreign matter, such as mud or snow.

(4) The vehicle is in an excessively hot or excessively cold area.

(c) Under the following conditions, a detection error may occur:

**HINT:**

**Depending on a shape of a parked vehicle or an obstacle such as a wall or post near the parking space, the detection range may change even though the sensors are operating normally.**

(1) A sensor or the front bumper is not installed in the correct position.

(2) A sensor is improperly located due to damage to the front bumper.

(3) Driving on a bumpy road, an unpaved road or in tall grass.

(4) Ultrasonic waves are received from the horn or parking sonar system of another vehicle, a motorcycle engine, or the air brakes of a large vehicle.

(5) It is raining heavily or the sensor is splashed with water.

(6) The vehicle is tilted at a steep angle.

(7) The vehicle is equipped with a fender pole or a wireless antenna mechanism.

(8) A sensor is covered with foreign matter, such as mud or snow.

(9) The vehicle is moving forward or backward towards high curbs or objects that are perpendicular to the ground.

(10) A sensor is sprayed with high pressure water or steam.

(d) The sensors cannot detect the following objects:

(1) Thin objects, such as wires and ropes.

(2) Materials that absorb ultrasonic waves, such as cotton, snow, etc.

(3) Objects with sharp edges.

(4) Short objects.

(5) Objects that are tall and protrude toward the vehicle above the detection range of the sensors.

(e) Other notices:

(1) The sensors cannot detect objects directly under the bumper. (A sensor may detect low objects and thin poles, and then lose track of them.)

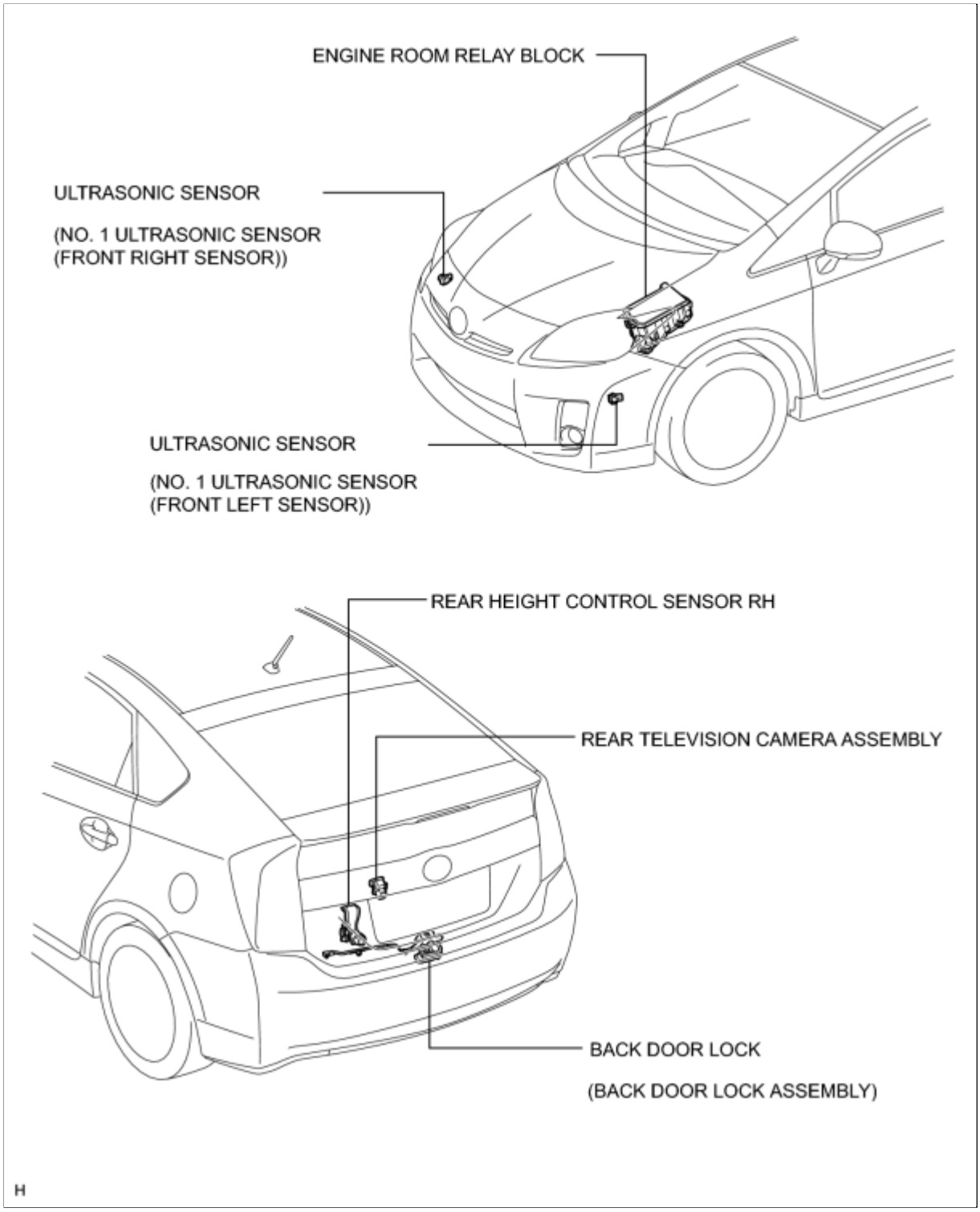
(2) Beware that the detection range of the ultrasonic sensor is limited. In certain conditions, some objects may not be detected. As a result, always make sure to check all around the vehicle when driving or parking.

(3) The sensors may not be able to detect obstacles that are too close to the sensor.

(4) The sensors may not be able to detect obstacles if the sensors have been dropped or subjected to a strong impact.

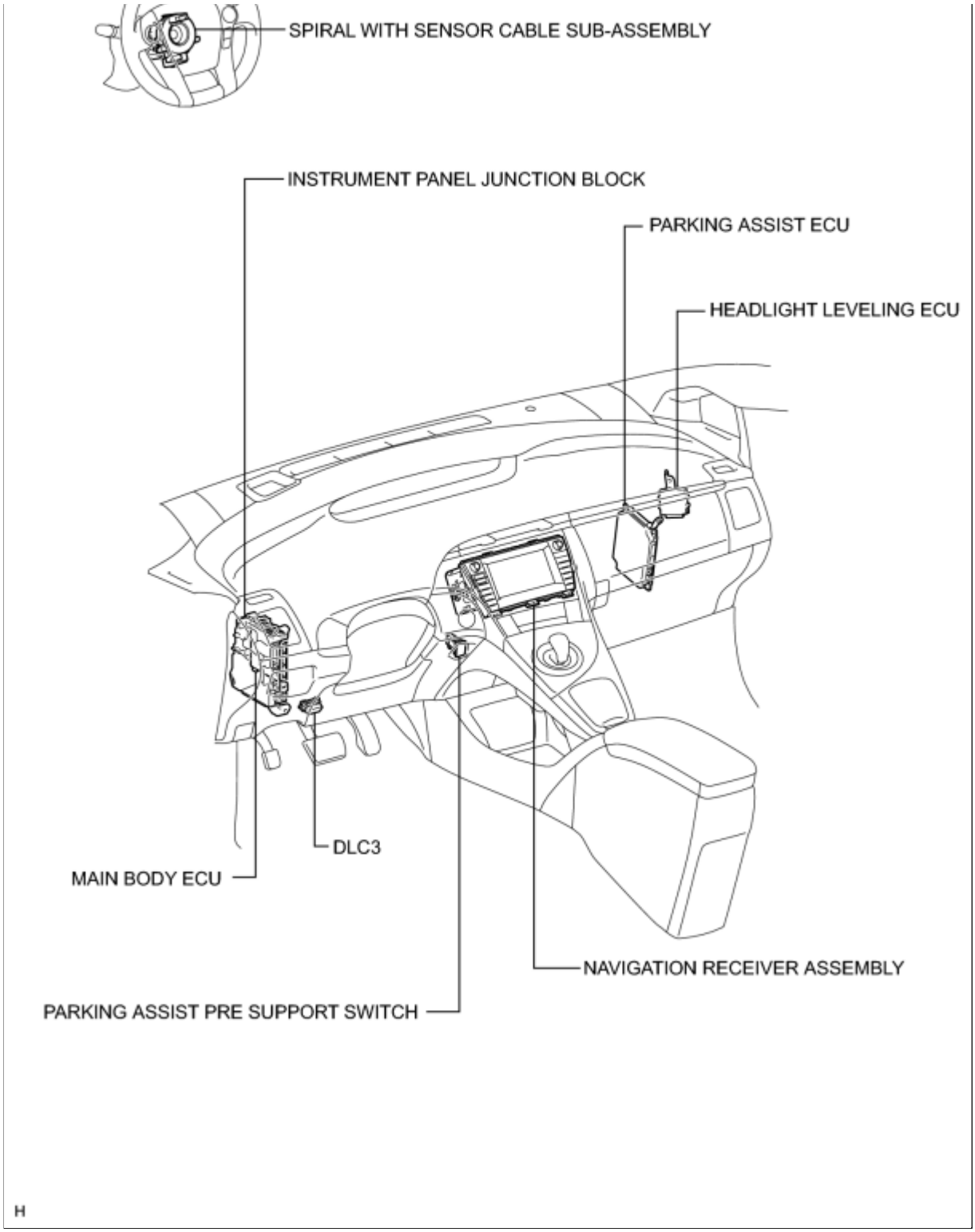
## PARTS LOCATION

## ILLUSTRATION

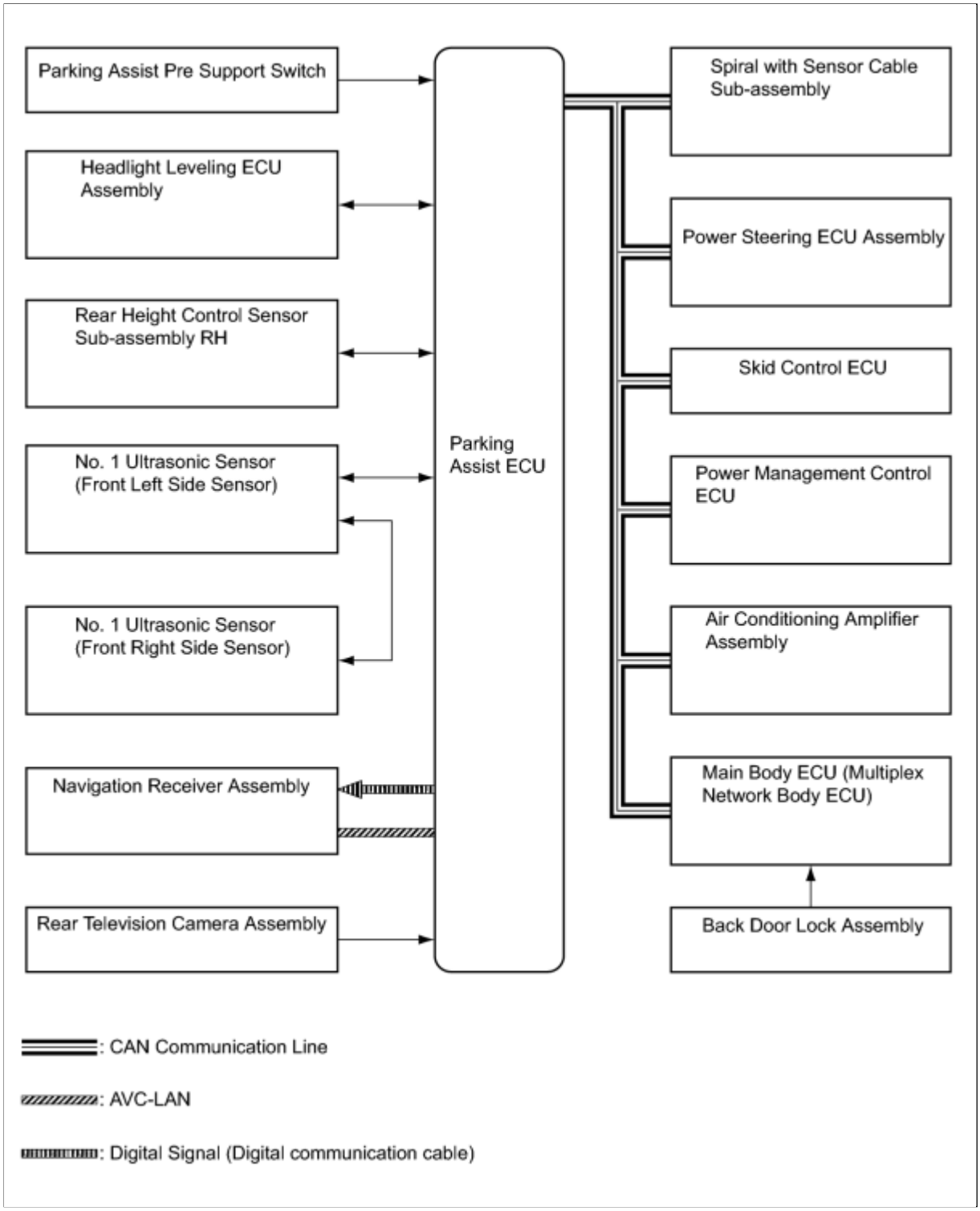



## ILLUSTRATION




SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY
INSTRUMENT PANEL JUNCTION BLOCK
PARKING ASSIST ECU
HEADLIGHT LEVELING ECU
DLC3
MAIN BODY ECU
NAVIGATION RECEIVER ASSEMBLY
PARKING ASSIST PRE SUPPORT SWITCH
H

# SYSTEM DIAGRAM




**Communication Table**

| SENDER | RECEIVER | SIGNAL | LINE |
|---|---|---|---|
| Navigation Receiver Assembly | | Vehicle angle data | AVC-LAN |
| Spiral with Sensor Cable Sub-assembly | | Steering angle | CAN |
| Power Steering ECU Assembly | | Current status | CAN |
| | | • Current status | |

| | | | |
|---|---|---|---|
| Skid Control ECU | Parking Assist ECU | • Current status<br>• G<br>• Vehicle speed | CAN |
| Power Management Control ECU | | • Current status<br>• Shift position information<br>• Accelerator opening angle<br>• Front HV motor revolution angle<br>• Vehicle information | CAN |
| Air Conditioning Amplifier Assembly | | Outside temperature | CAN |
| Main Body ECU | | • Parking brake information<br>• Back door courtesy | CAN |
| Parking Assist ECU | Navigation Receiver Assembly | Display | GVIF |
| | Power Steering ECU Assembly | • Target steering angle<br>• Current status | CAN |
| | Power Management Control ECU | Creep up rate request | CAN |

# SYSTEM DESCRIPTION

## 1. GENERAL

(a) The parking assist ECU uses vehicle condition signals from the spiral with sensor cable sub-assembly, power steering ECU, skid control ECU, power management control ECU, etc. to make calculations and estimates. These results are used to make various guidelines, which are combined together with video from the rear television camera, and output to the navigation receiver assembly. Also, control signals are output to each ECU and the advanced parking guidance system various controls are performed.

(b) This system has a rear television camera assembly mounted on the back door to display an image of the area behind the vehicle on the navigation receiver assembly display. The display panel also shows a composite view consisting of the area behind the vehicle and parking guidelines to assist the driver in parking the vehicle by monitoring the area behind the vehicle.

(c) This system is equipped with a self-diagnosis system, which is operated on a designated window that appears on the display panel, just as in the navigation system.

## 2. FUNCTION OF COMPONENTS

(a) The parking assist ECU controls the system by using information from the following components.

| COMPONENT | FUNCTION |
|---|---|
| Rear Television Camera Assembly | • Mounted on the back door to the transmit an image of the area behind the vehicle to the parking assist ECU.<br>• Has a color video camera that uses a Charge Coupled Device (CCD) and a wide-angle lens. |
| Parking Assist ECU | Receives vehicle condition signals from various ECUs, makes frame based on calculations, combines the frame with video from the rear television camera, and outputs the video with frame to the navigation receiver assembly. Also, control signals are output to each ECU and the advanced parking guidance system various controls are performed. |
| Navigation Receiver Assembly | • Receives video signals containing a composite of an image of the area behind the vehicle and the frame signals from the parking assist ECU, and displays them on the display panel.<br>• Uses the yaw rate detected by the gyro sensor that is built into the navigation receiver assembly to transmit the movement of the vehicle to the parking assist ECU. |
| Spiral with Sensor Cable Sub-assembly | Detects the angle of the steering wheel and sends the resulting signals to the parking assist ECU through CAN communication. |
| ECM | Sends the shift position signal to the parking assist ECU through CAN communication. |
| Skid Control ECU | Sends stop switch, vehicle speed, driving distance, and other vehicle condition signals to the parking assist ECU. |
| Power Steering ECU Assembly | Sends EPS failure, intervention steering, and other related vehicle condition signals to the parking assist ECU. Also, based on advanced parking guidance control signals and steering-related signals, performs steering control. |
| Parking Assist Pre Support Switch | Sends the switch operation signal to the parking assist ECU. |
| No. 1 Ultrasonic Sensor | Controlled by the parking assist ECU and detects an available parking space. |
| Air Conditioner Amplifier Assembly | Sends the outside temperature signal to the parking assist ECU through CAN communication. |
| Rear Height Control | |

| | |
|---|---|
| Sensor Sub-assembly RH | Sends the vehicle height signal to the parking assist ECU. |

## 3. OPERATION EXPLANATION

(a) The parking assist ECU receives the camera activation information from the navigation receiver assembly. Then, the parking assist ECU switches the display signal for the navigation receiver assembly from the navigation system to the advanced parking guidance system.

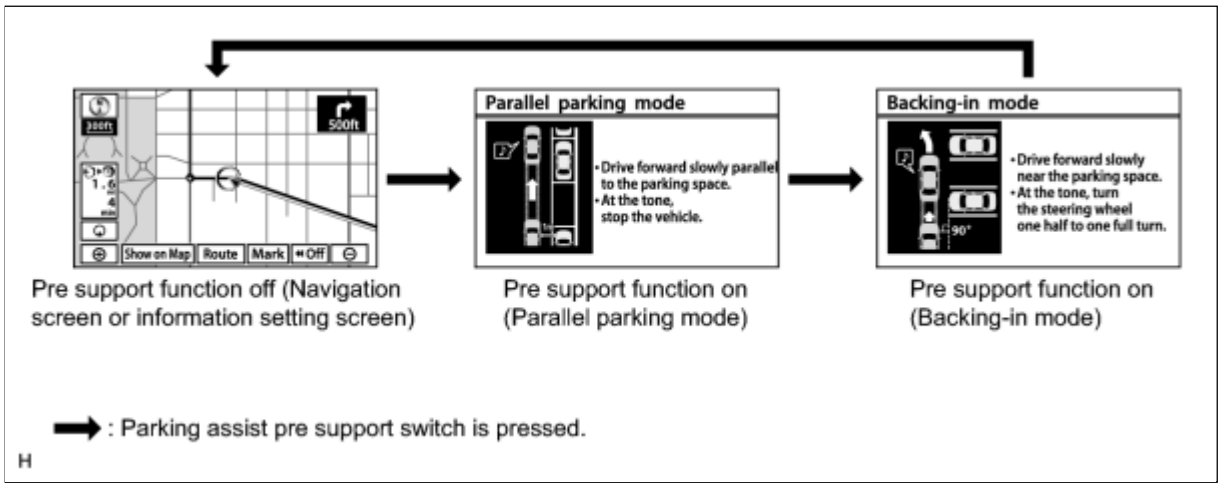
## 4. PRE SUPPORT FUNCTION

(a) Function Description

(1) A pre support function is provided to assist the driver with initial positioning of the vehicle when backing-in mode or parallel parking mode operation is used.

(b) Pre Support Function Operation Condition

(1) For the pre support function, when the advanced parking guidance system is operating normally (no DTCs are stored) and the following conditions are met, pressing the parking assist pre support switch changes the image displayed on the screen and pre support operation starts.

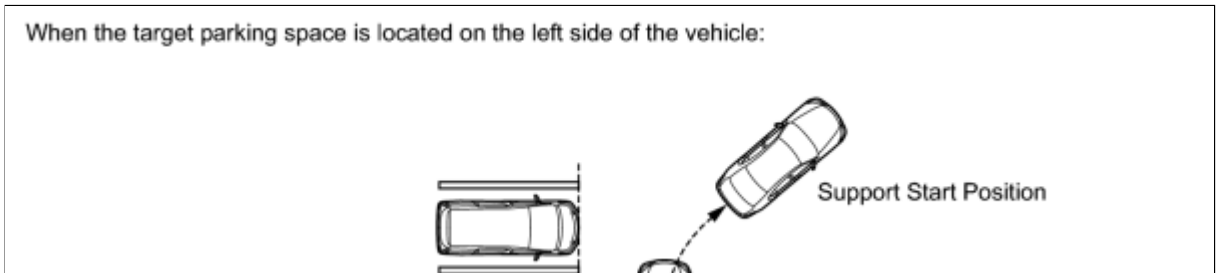


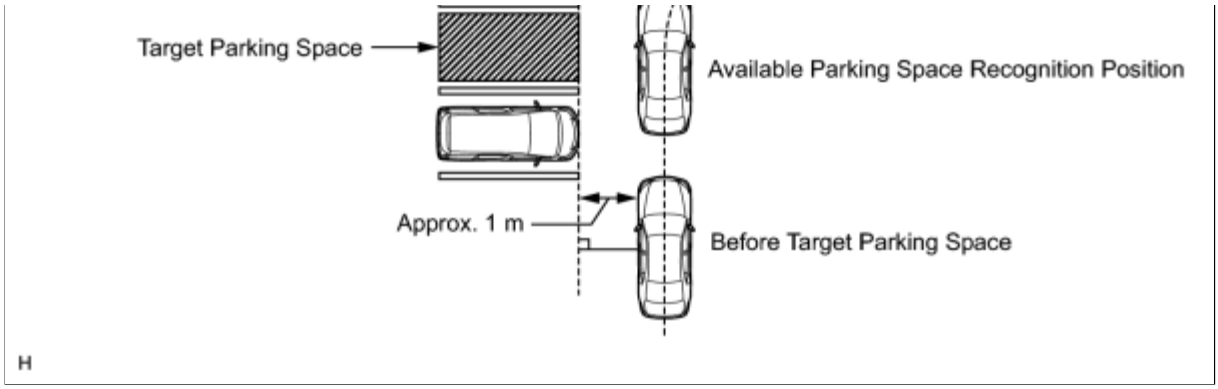

H

| SCREEN DISPLAYED ON NAVIGATION RECEIVER ASSEMBLY | SHIFT POSITION | VEHICLE SPEED | SCREEN DISPLAYED (DISPLAY SWITCHES IN THE FOLLOWING SEQUENCE WHEN PARKING ASSIST PRE SUPPORT SWITCH IS PRESSED) |
|---|---|---|---|
| Navigation screen or information setting screen | Other than P or R | 15 km/h (9.3 mph) or less | Pre support off (Navigation screen or information setting screen) → Pre support on (Parallel parking mode) → Pre support on (Backing-in mode) → Pre support off (Navigation screen or information setting screen)*1 |

*1: A tone sounds when the screen transfers.

(c) Backing-in Mode Operation






(1) Press the parking assist pre support switch before the target parking space to turn on the pre support function (backing-in mode).

(2) Drive the vehicle slowly while keeping a distance of approximately 1 m (3.3 ft.) from and perpendicular to the target parking space or vehicles around the target parking space. When the ultrasonic sensor (No. 1 ultrasonic sensor) detects an available parking space, start to turn the steering wheel from the straight ahead position when the tone sounds.

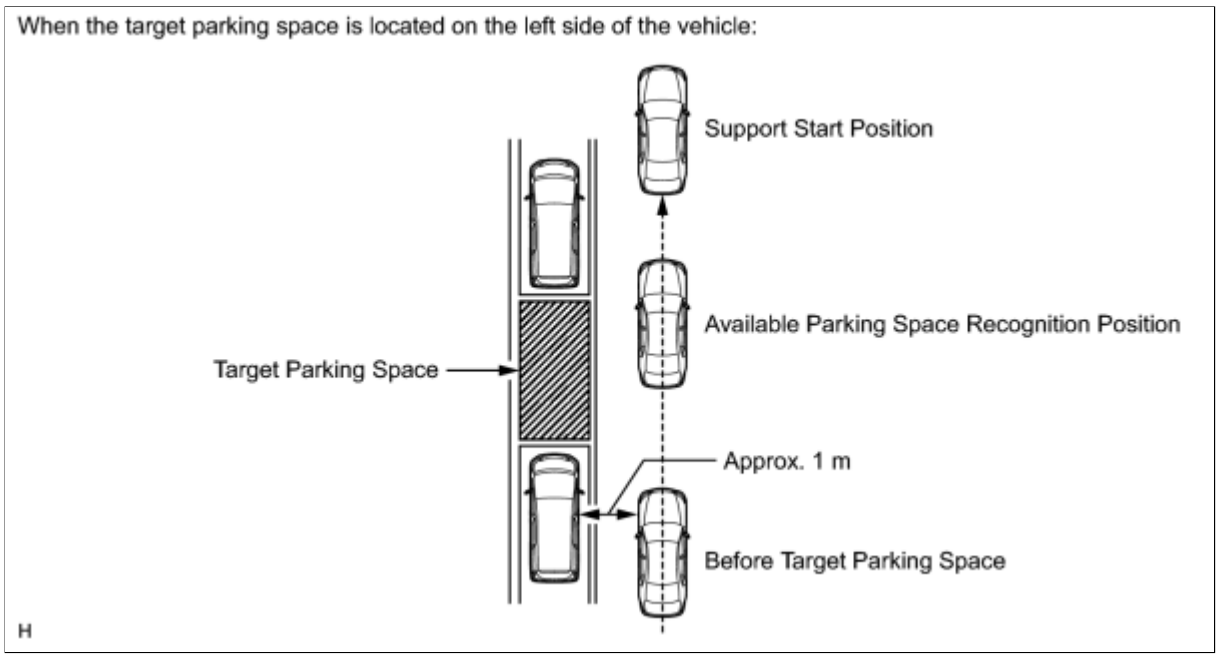
**HINT:**

- An available parking space may not be detected by the ultrasonic sensor (No. 1 ultrasonic sensor) depending on the distance between the vehicle being parked and the target parking space or vehicles around the target parking space, vehicle orientation and vehicle speed.
- A target parking space may not be detected by the ultrasonic sensor (No. 1 ultrasonic sensor) depending on the conditions around the target parking space. For details, refer to Precautions for the parking space detection sensor INFO .
- When the ultrasonic sensor (No. 1 ultrasonic sensor) cannot detect a target parking space, a tone will not sound.

(3) Drive the vehicle while turning the steering wheel and when the vehicle reaches the support start position (the tone will sound twice), stop the vehicle, return the steering wheel to the straight ahead position, and move the shift lever to R.

(4) When the advanced parking guidance screen is displayed, the target parking frame will also displayed for the target parking space that is detected by the ultrasonic sensor (No. 1 ultrasonic sensor) during the pre support function operation.

(d) Parallel Parking Mode Operation



(1) Press the parking assist pre support switch before the target parking space to turn on the pre support function (parallel parking mode).

(2) Drive the vehicle slowly while keeping a distance of approximately 1 m (3.3 ft.) from and parallel to the target parking space or vehicles around the target parking space to allow the ultrasonic sensor (No. 1 ultrasonic sensor) to start detection.

**HINT:**

- For parallel parking mode, a tone will not sound when the ultrasonic sensor (No. 1 ultrasonic sensor) detects the available parking space.
- An available parking space may not be detected by the ultrasonic sensor (No. 1 ultrasonic sensor) depending on a distance between the vehicle being parked and the target parking space or vehicles around the target parking space, vehicle orientation and vehicle speed.
- A target parking space may not be detected by the ultrasonic sensor (No. 1 ultrasonic sensor) depending on the conditions around the target parking space. For details, refer to Precautions for the parking space detection sensor INFO .

(3) Drive as is and stop the vehicle when the vehicle reaches the support start position (the tone will sound twice), and move the shift lever to R.

**HINT:**

**When the ultrasonic sensor (No. 1 ultrasonic sensor) cannot detect a target parking space, the tone will not sound.**

(4) When the advanced parking guidance screen is displayed, the target parking frame will also be displayed for the target parking space that is detected by the ultrasonic sensor (No. 1 ultrasonic sensor) during the pre support function operation.

### 5. COMMUNICATION SYSTEM OUTLINE

(a) The components of the advanced parking guidance system communicate with each other through the AVC-LAN. The parking assist ECU judges the vehicle angle data transmitted via the AVC-LAN from the navigation receiver assembly (the data is calculated by the navigation receiver assembly by integrating the yaw rate of the gyro sensor built into the navigation receiver assembly).

(b) If a short circuit or open circuit occurs in the AVC-LAN, communication is interrupted and this system will stop functioning.

### 6. DIAGNOSTIC FUNCTION OUTLINE

(a) This advanced parking guidance system has a diagnostic function displayed in the navigation receiver assembly. This function enables the calibration (adjustment and verify) of the advanced parking guidance system INFO .

(b) The advanced parking guidance system can check the following items by using the Techstream.

| ITEM | PROCEED TO |
|---|---|
| DTC | INFO |
| Data List / Active Test | INFO |

# HOW TO PROCEED WITH TROUBLESHOOTING

**HINT:**

- Use the following procedure to troubleshoot the advanced parking guidance system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

**NEXT**

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, replace or recharge the battery before proceeding to the next step.

**NEXT**

| | |
|---|---|
| 3. | CHECK NAVIGATION SYSTEM |

(a) Refer to the navigation system INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Navigation system is normal | A |
| Navigation system is abnormal | B |

**B** **GO TO NAVIGATION SYSTEM**

**A**

| | |
|---|---|
| **4.** | **CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM*** |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| RESULT | PROCEED TO |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

**B** ▶ INFO **GO TO CAN COMMUNICATION SYSTEM**

**A** ▼

| | |
|---|---|
| **5.** | **CHECK FOR DTC*** |

(a) Check for DTCs and note any codes that are output INFO .

(b) Clear the DTC INFO .

(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is output | A |
| DTC is not output | B |

**B** ▶ **Go to step 7**

**A** ▼

| | |
|---|---|
| **6.** | **DIAGNOSTIC TROUBLE CODE CHART*** |

(a) Refer to Diagnostic Trouble Code Chart INFO .

NEXT ▶

NEXT Go to step 9

| 7. | PROBLEM SYMPTOMS TABLE |
|---|---|

(a) Refer to Problem Symptoms Table INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B Go to step 9

A

| 8. | OVERALL ANALYSIS AND TROUBLESHOOTING* |
|---|---|

(a) Data List / Active Test INFO

(b) Terminals of ECU INFO

NEXT

| 9. | CIRCUIT INSPECTION |
|---|---|

NEXT

| 10. | ADJUST, REPAIR OR REPLACE |
|---|---|

NEXT

| | |
|---|---|
| 11. | CONFIRMATION TEST |

NEXT END

# INITIALIZATION

## 1. INITIALIZE ADVANCED PARKING GUIDANCE SYSTEM

(a) When "System initializing" message is displayed on the navigation receiver assembly, correct the steering angle neutral point using the following method.

(1) Fully turn the steering wheel to the right and left on the flat ground.

**NOTICE:**

**Memorizing the steering angle neutral point must be carried out with the hybrid system started. Apply the parking brake, depress the brake pedal, push the P position switch, and ensure that the vehicle is not moving.**

**HINT:**

**"?" button is displayed at the same time as "System initializing" message. If the "?" button is selected, this method is displayed.**

# CALIBRATION

## 1. ADJUST ADVANCED PARKING GUIDANCE SYSTEM

(a) This advanced parking guidance system can be set from the diagnostic screen of the navigation receiver assembly.

(b) If the following operations are performed, it is necessary to perform adjustments and checks on the diagnostic screen.

| PART NAME | OPERATION | ADJUSTMENT ITEM | PROCEED TO |
|---|---|---|---|
| Spiral with sensor cable sub-assembly | • Removal and installation of the spiral with sensor cable sub-assembly<br>• Removal and installation of the connector of the spiral with sensor cable sub-assembly | Steering angle neutral point | INFO |
| | | Steering angle setting | INFO |
| Spiral with sensor cable sub-assembly | Replacement | Steering angle neutral point | INFO |
| | | Steering angle setting | INFO |
| Parking assist ECU | Replacement | Parking assist ECU initialization | Step 2 |
| Suspension, tires, etc. | The vehicle height changes because of suspension or tire replacement | Height control sensor vehicle height difference (Height set) | Step 3 |
| | | Rear television camera optical axis (Camera position setting) | Step 4 |
| Rear television camera assembly | • Replacement<br>• Installation angle of the rear television camera changes because of the removal and installation of the rear television camera, etc. | Rear television camera optical axis (Camera position setting) | Step 4 |
| Rear height control sensor sub-assembly RH | • Replacement<br>• Installation position of the rear height control sensor sub-assembly RH changes because of the removal and installation of the rear height control sensor sub-assembly RH | Height control sensor vehicle height difference (Height set) | Step 3 |
| | | Rear television camera optical axis (Camera position setting) | Step 4 |
| | | Lighting system initialization | INFO |
| Rear bumper cover | • Replacement<br>• Installation position of the rear bumper cover changes because of the removal and installation of the rear bumper cover | Rear bumper position (BUMPER) | Step 5 |

**HINT:**

**The adjustment values stored while performing advanced parking guidance system calibration are stored in the parking assist ECU.**

## 2. PARKING ASSIST ECU INITIALIZATION

**HINT:**

**Be sure to check for DTCs before performing this procedure** INFO **.**

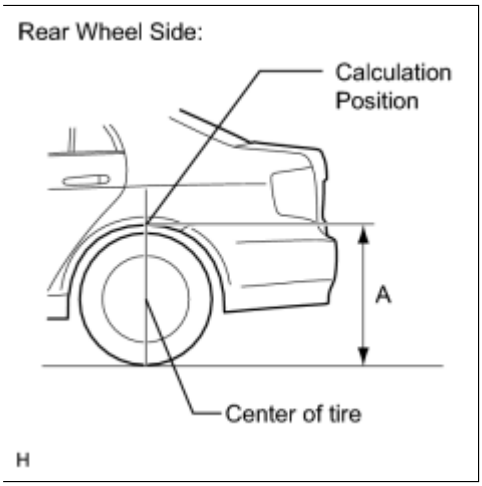
(a) Preparation for adjustment

(1) Park the vehicle on the flat place with the steering wheel centered.

**HINT:**

**Before parking the vehicle, be sure to move the vehicle forward and in reverse to check that the tires are facing straight ahead with the steering wheel centered.**

(2) Adjust the tire pressure to the specification.




(3) Measure the distance A between the ground and the edge of a rear wheel arch.

(4) Calculate the difference between the distance A and the standard height below.

Standard:
697 mm (2.29 ft.)

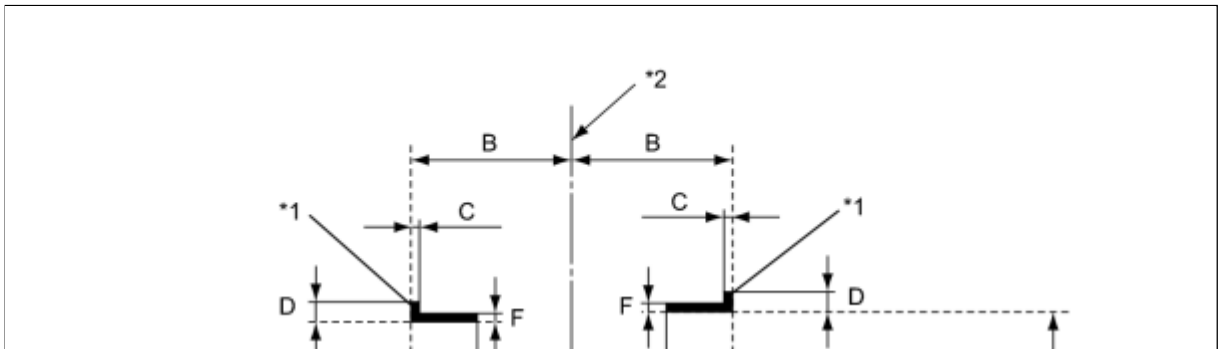
**HINT:**

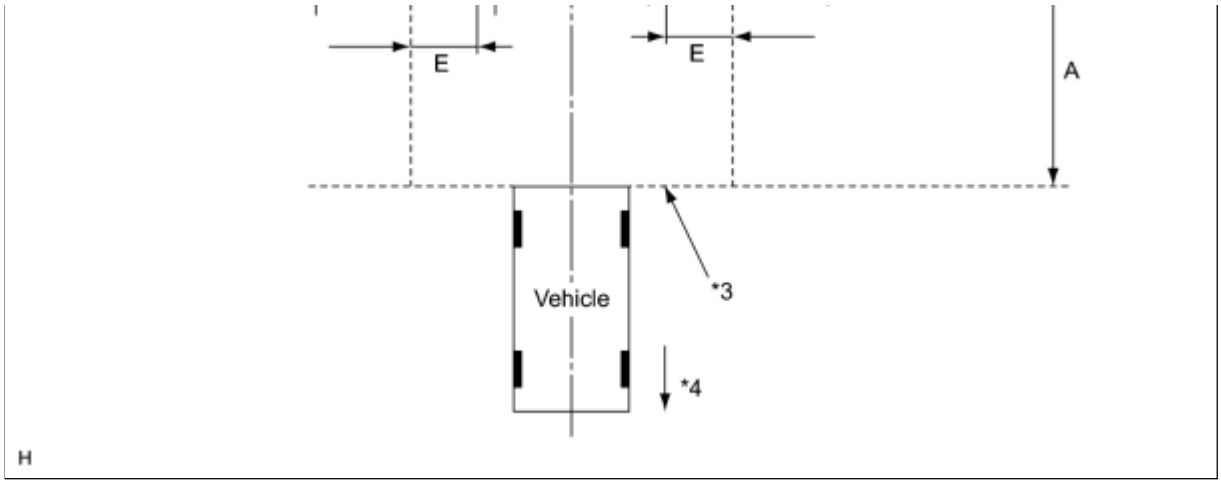
**Subtract the standard value from the measured value to get the standard height. When the measured value is 707 mm: 707 - 697 = +10 (standard height is +10 mm).**

(5) Set a target bar for optical axis adjustment of the rear television camera.

**HINT:**

**Only when adjusting the optical axis of the camera, create a target bar for adjustment.**






Dimension:

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| 1100 mm (3.61 ft.) | 1600 mm (5.25 ft.) | 30 mm (1.18 in.) | 100 mm (3.94 in.) | 500 mm (1.64 ft.) | 30 mm (1.18 in.) |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Target Bar for Camera Adjustment | *2 | Vehicle Center |
| *3 | Bumper Edge | *4 | Front Side |

**HINT:**

**Check the tape color on the navigation receiver assembly and choose a tape color which can be easily seen.**

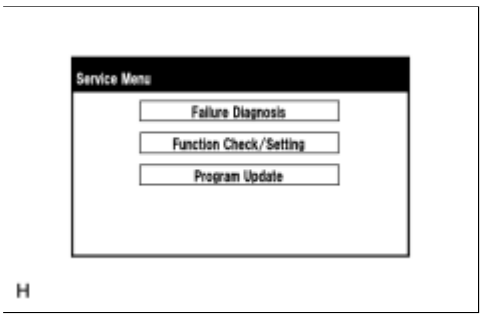
(b) Start diagnostic mode INFO .

**NOTICE:**

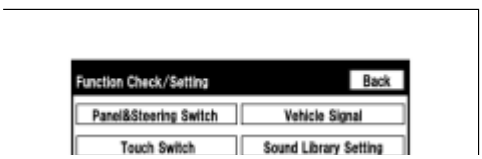
**Mode setting must be carried out with the hybrid system started. Apply the parking brake, depress the brake pedal, push the P position switch, and ensure that the vehicle is not moving.**

**HINT:**

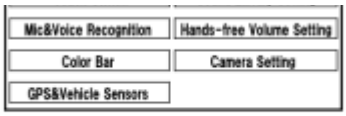
**The displayed items may differ depending on vehicle specifications.**




(1) Select "Function Check/Setting" on the Service Menu screen.



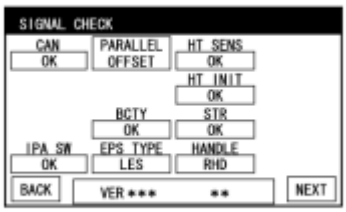

(2) Select "Camera Setting" on the Function Check/Setting screen.




H

(2) Select "Camera Setting" on the Function Check/Setting screen.

(3) Check that "CHK" (red) is not displayed on the SIGNAL CHECK screen.




H

- When "CHK" (red) is displayed for any items except "EPS TYPE" on the SIGNAL CHECK screen, selecting "NEXT" will not change the screen to the INDIVIDUAL SETTING screen.
- When "CHK" (red) is displayed for any items except "EPS TYPE" and "HT INIT" on the SIGNAL CHECK screen, perform inspections using the SIGNAL CHECK screen INFO .

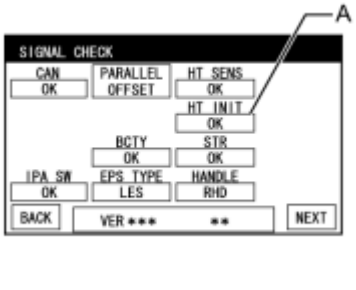
**HINT:**

**When the screen is not change to the HEIGHT SET screen, check for DTCs and perform troubleshooting based on the output DTCs INFO .**

(c) HEIGHT SET

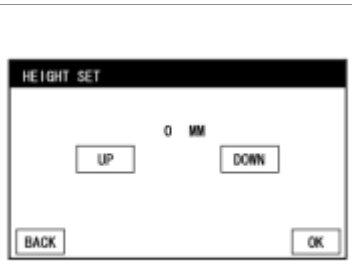
**NOTICE:**

- The height control sensor vehicle height difference setting must be performed on the flat place.
- Before performing the television camera optical axis adjustment, the height control sensor vehicle height difference must be performed in the "HEIGHT SET" screen.




H

(1) Select the indicator "A" for "HT INIT" on the SIGNAL CHECK screen.




H

(2) Press "UP" and "DOWN" to input the calculated difference.

- A positive value is indicated in green and a negative value is indicated in red.
- When a value is "10 MM" in green, it means +10 mm.
- Available setting range: -102 mm to +102 mm (can be adjusted in 1 mm increments)

(3) After inputting the calculated difference, select "OK". The height control sensor vehicle height difference setting will be recorded.

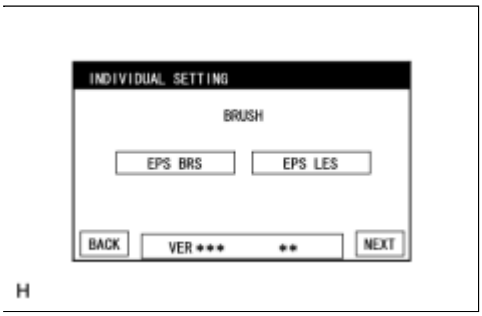
**HINT:**

- When "OK" is selected, a beep will sound to confirm that the height difference set values have been stored.
- The setting value will not be stored unless "OK" is selected.
- Until a beep finishes sounding, the adjustment values are not stored.
- When "BACK" is selected, the screen changes to SIGNAL CHECK screen without storing the set values.
- Press "OK" with the vehicle in the same condition as when the vehicle height was measured.
- If a person was in the driver seat when the vehicle height was measured, press "OK" with the same person in the driver seat.
- On the "SIGNAL CHECK" screen, check that the indicator "A" for "HT INIT" is "OK" (blue).

(4) Select "NEXT" on the SIGNAL CHECK screen.

(d) INDIVIDUAL SETTING

(1) Confirm the vehicle specification and select the EPS brush specification.




| VEHICLE SPECIFICATION | EPS BRUSH SPECIFICATION |
|---|---|
| for 15 inch tire models | EPS BRS (Brush type) |
| for 17 inch tire models | EPS LES (Brushless type) |

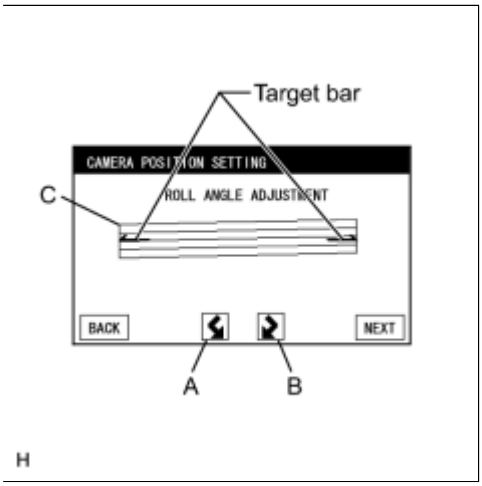
- Selected EPS brush specification is indicated in blue.
- EPS brush refers to the type of motor used for the EPS system (with brushes or brushless).

(2) Select "NEXT" on the INDIVIDUAL SETTING screen.

(e) CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT)

**NOTICE:**

**Before performing the television camera optical axis adjustment, the height control sensor vehicle height difference setting must be performed in the "HEIGHT SET" screen.**



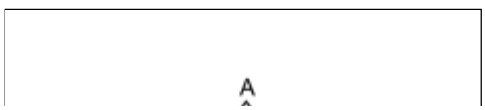

- When the back door is open, the "Back door is open. Do not use the rear view monitor when the back door is not completely closed." message will be displayed and television camera optical axis adjustment will not be possible.
- If the "Back door is open. Do not use the rear view monitor when the back door is not completely closed." message is displayed even when the back door is closed, perform inspections according to Problem Symptoms Table (A back door open warning message is displayed even after back door is closed) INFO .

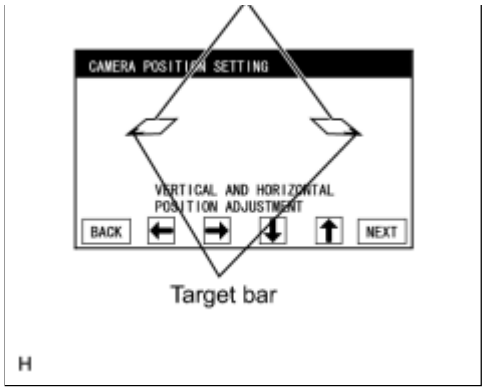
(1) Select switches A and B to rotate C so that it is parallel to the target adjustment bar.

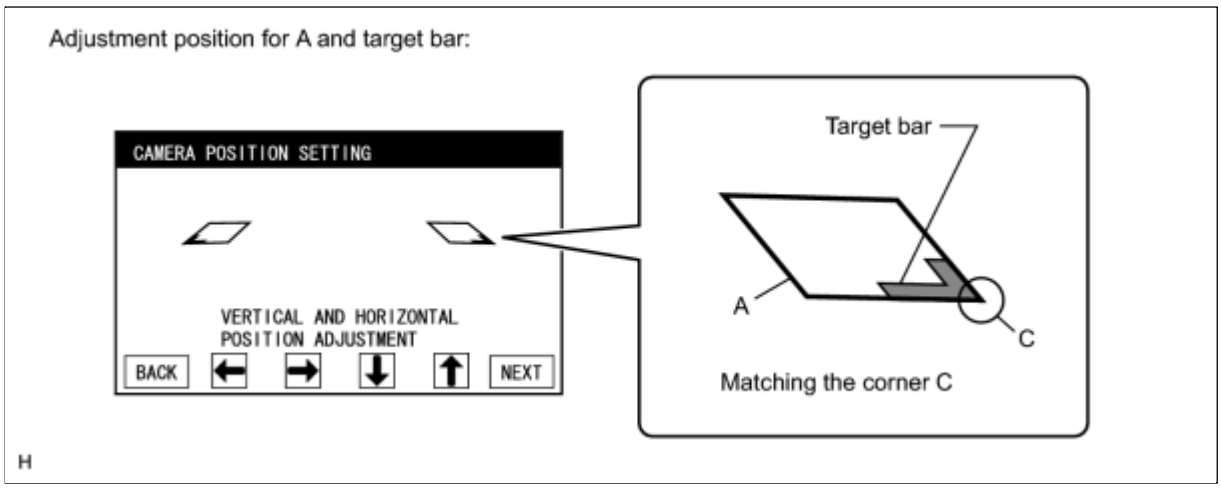
(2) Select "NEXT" on the CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT) screen.

(f) CAMERA POSITION SETTING (VERTICAL AND HORIZONTAL POSITION ADJUSTMENT)

(1) By pressing the left and right, and up and down switches, move the parallelograms (A) vertically and horizontally so that the corners of the target bars (C) and the corners of the parallelograms (A) match.

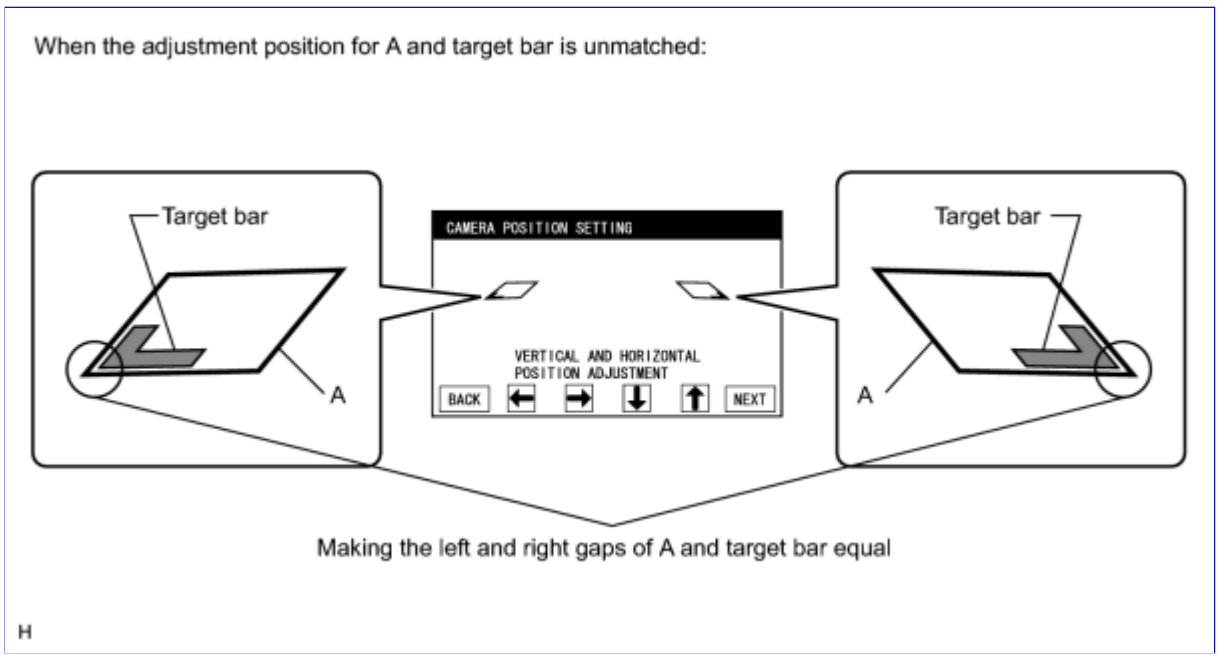





**NOTICE:**

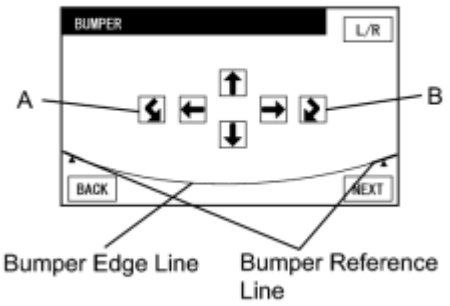
- If the left and right parallelograms (A) and target bars do not match completely, just match the corners of the target bars (C) with the corners of the parallelograms (A).
- If the left and right parallelograms (A) and the corners of the target bars (C) do not match, make the gaps between each parallelogram (A) and the target bars equal on the left and right sides.




(2) Select "NEXT" on the CAMERA POSITION SETTING (VERTICAL AND HORIZONTAL POSITION ADJUSTMENT) screen.

(g) BUMPER (SIMULTANEOUS ADJUSTMENT)

Adjustment for left and right bumpers reference lines:




H

(1) By pressing the left and right, up and down and A and B switches, move the bumper reference lines vertically and horizontally or rotate them so that the bumper reference lines overlap or contact the bumper edge line.

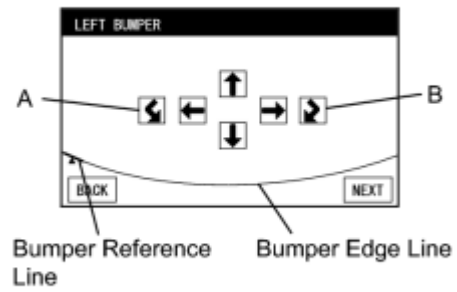
**HINT:**

**If the bumper reference lines do not overlap or contact the bumper edge line, select "L/R" to perform bumper reference line position adjustment (individual adjustment).**

(2) When the bumper reference lines and bumper edge line overlap or contact each other, select "NEXT".

(h) LEFT BUMPER

Adjustment for left bumper reference line:




H

(1) By pressing the left and right, up and down and A and B switches, move the left bumper reference line vertically and horizontally or rotate it so that the bumper reference lines overlap or contact the bumper edge line.

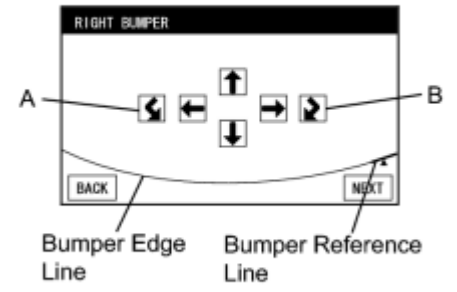
**HINT:**

**When the left bumper reference line overlaps or contacts the bumper edge line in the bumper reference line position adjustment (individual adjustment) step, select "NEXT".**

(2) Select "NEXT" on the LEFT BUMPER screen.

(i) RIGHT BUMPER

Adjustment for right bumper reference line:




H

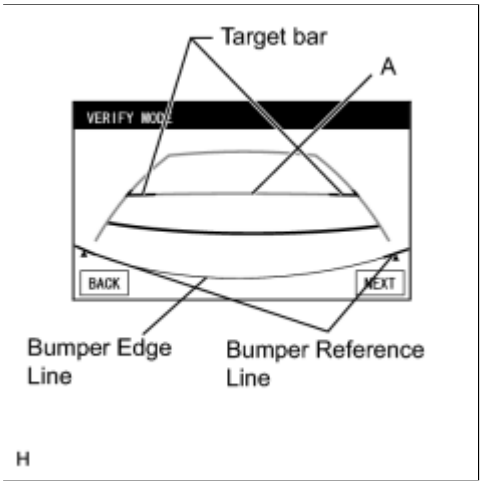
(1) By pressing the left and right, up and down and A and B switches, move the right bumper reference line vertically and horizontally or rotate it so that the bumper reference lines overlap or contact the bumper edge line.

**HINT:**

**When the right bumper reference line overlaps or contacts the bumper edge line in the bumper reference line position adjustment (individual adjustment) step, select "NEXT".**

(2) Select "NEXT" on the RIGHT BUMPER screen.

(j) VERIFY MODE



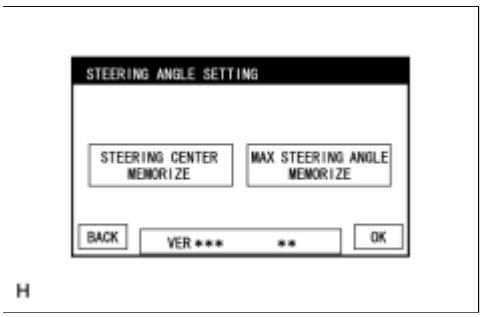

(1) Check that line A (indicating 1100 mm forward from the bumper edge) and the target bars are nearly overlapping and that the bumper reference lines and bumper edge line are nearly overlapping. With the steering wheel centered, check that the predicted path line is straight (overlapping the vehicle width extension lines).

(2) Selecting "NEXT" on the VERIFY MODE screen will be completed the camera aiming adjustment.

**HINT:**

- When "NEXT" is selected, a beep will sound to confirm that the camera aiming adjustment values have been stored.
- The adjustment value will not be stored unless "NEXT" is selected.
- Until a beep finishes sounding, the adjustment values are not stored.

(k) STEERING ANGLE SETTING




(1) Perform the STEERING CENTER MEMORIZE operation.

- Check that the steering wheel is centered, and then select "STEERING CENTER MEMORIZE".

**HINT:**

**When performing removal and installation, or replacement of the television camera, steering angle adjustment is not required.**

(2) Perform the MAX STEERING ANGLE MEMORIZE operation.

- After adjusting the steering angle neutral point, turn the steering wheel to the left and right lock positions and select "MAX STEERING ANGLE MEMORIZE". The maximum steering angle is then stored and the screen changes to the Function Check/Setting screen.

  **HINT:**

  - It is also possible to start by initially turning the steering to the right side.
  - When "MAX STEERING ANGLE MEMORIZE" is selected, a beep will sound to confirm that the steering adjustment values have been stored.
  - Until a beep finishes sounding, the adjustment values are not stored.
  - The adjustment value will not be stored unless "MAX STEERING ANGLE MEMORIZE" is selected after turning the steering wheel side to side.
  - When "BACK" is selected, the screen changes to VERIFY MODE without storing the set values.
  - The "OK" button does not respond until the system stores the steering angle neutral point and maximum steering angle.
  - Even if no DTCs are detected, selecting "MAX STEERING ANGLE MEMORIZE" may not cause the adjustment value to be stored if the steering sensor is malfunctioning.
  - If selecting "MAX STEERING ANGLE MEMORIZE" does not cause the adjustment value to be stored after adjusting the steering angle, replace the spiral with sensor cable sub-assembly

stored after adjusting the steering angle, replace the spiral with sensor cable sub-assembly INFO .

(l) Finish diagnostic mode INFO .

(m) Confirm steering angle adjustment.

**HINT:**

**If the steering angle has been adjusted, confirm the steering angle adjustment on the advanced parking guidance screen after finishing diagnosis mode.**

(1) Check on the advanced parking guidance screen that the predicted path line moves until the steering wheel is fully turned to either the left or right.

**HINT:**

**If the predicted path line stops moving before the steering wheel is fully turned to either the left or right, the steering angle adjustment values have not been stored correctly. In this case, perform "STEERING CENTER MEMORIZE" and "MAX STEERING ANGLE MEMORIZE" again.**

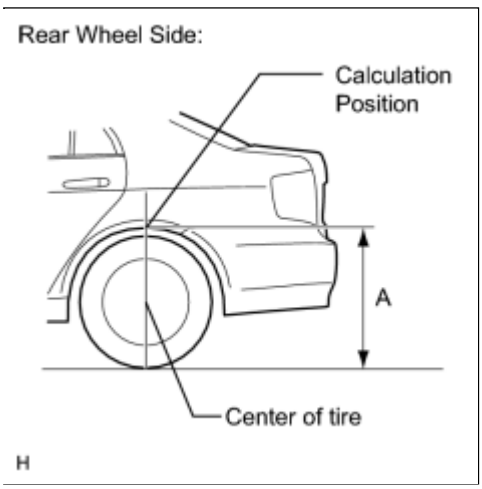
### 3. HEIGHT CONTROL SENSOR VEHICLE HEIGHT DIFFERENCE SETTING (HEIGHT SET)

(a) Preparation for adjustment

**HINT:**

- The height control sensor vehicle height difference setting must be performed on the flat place.
- Before performing the television camera optical axis adjustment, the height control sensor vehicle height difference setting must be performed in the "HEIGHT SET" screen.

(1) Adjust the tire pressure to the specification.




(2) Measure the distance A between the ground and the edge of a rear wheel arch.

(3) Calculate the difference between the distance A and the standard height below.

Standard:
697 mm (2.29 ft.)

**HINT:**

**Subtract the standard value from the measured value to get the standard height. When the measured value is 707 mm: 707 - 697 = +10 (standard height is +10 mm).**

(b) Start diagnostic mode.

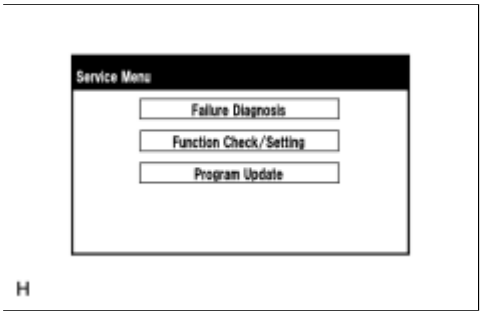
**NOTICE:**

Mode setting must be carried out with the hybrid system started. Apply the parking brake, depress the

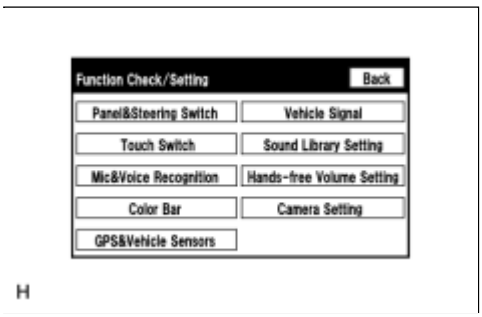
**Mode setting must be carried out with the hybrid system started. Apply the parking brake, depress the brake pedal, push the P position switch, and ensure that the vehicle is not moving.**

**HINT:**

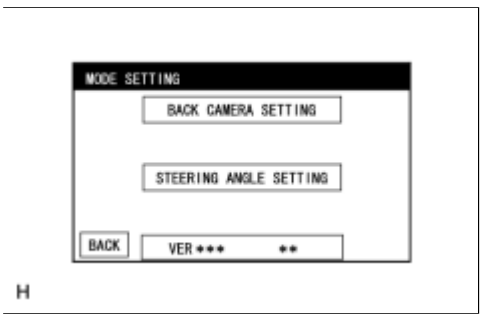
**The displayed items may differ depending on vehicle specifications.**




(1) Select "Function Check/Setting" on the Service Menu screen.



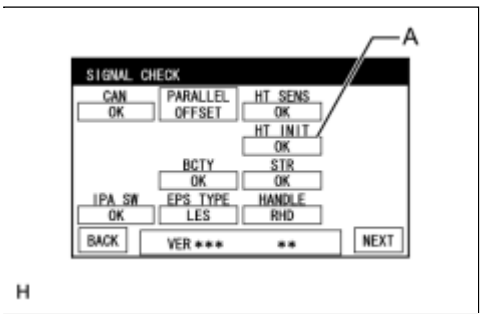

(2) Select "Camera Setting" on the Function Check/Setting screen.




(3) Select "BACK CAMERA SETTING" on the MODE SETTING screen.

**HINT:**

**To select a grayed out item, select and hold the item for 2 seconds or more.**



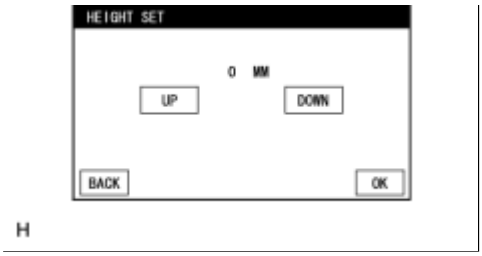

(4) Select the indicator "A" for "HT INIT" on the SIGNAL CHECK screen.

- When "CHK" (red) is displayed for any items except "EPS TYPE" and "HT INIT" on the SIGNAL CHECK screen, perform inspections using the SIGNAL CHECK screen.
- When the screen is not change to the HEIGHT SET screen, check for DTCs and perform troubleshooting based on the output DTCs.

(c) HEIGHT SET



(1) Press "UP" and "DOWN" to input the calculated difference.




- A positive value is indicated in green and a negative value is indicated in red.
- When a value is "10 MM" in green, it means +10 mm.
- Available setting range: -102 mm to +102 mm (can be adjusted in 1 mm increments)

(2) After inputting the calculated difference, select "OK". The height control sensor vehicle height difference setting will be recorded.

**HINT:**

- When "OK" is selected, a beep will sound to confirm that the height difference set values have been stored.
- The setting value will not be stored unless "OK" is selected.
- Until a beep finishes sounding, the adjustment values are not stored.
- When "BACK" is selected, the screen changes to SIGNAL CHECK screen without storing the set values.
- Press "OK" with the vehicle in the same condition as when the vehicle height was measured.
- If a person was in the driver seat when the vehicle height was measured, press "OK" with the same person in the driver seat.
- On the "SIGNAL CHECK" screen, check that the indicator "A" for "HT INIT" is "OK" (blue).

(d) Finish diagnostic mode.

## 4. REAR TELEVISION CAMERA OPTICAL AXIS ADJUSTMENT (CAMERA POSITION SETTING)

**HINT:**

**Be sure to check for DTCs before performing this procedure.**

(a) Preparation for adjustment

**NOTICE:**

**Before performing the television camera optical axis adjustment, the height control sensor vehicle height difference setting must be performed in the "HEIGHT SET" screen.**

(1) Park the vehicle with the steering wheel centered.

**HINT:**

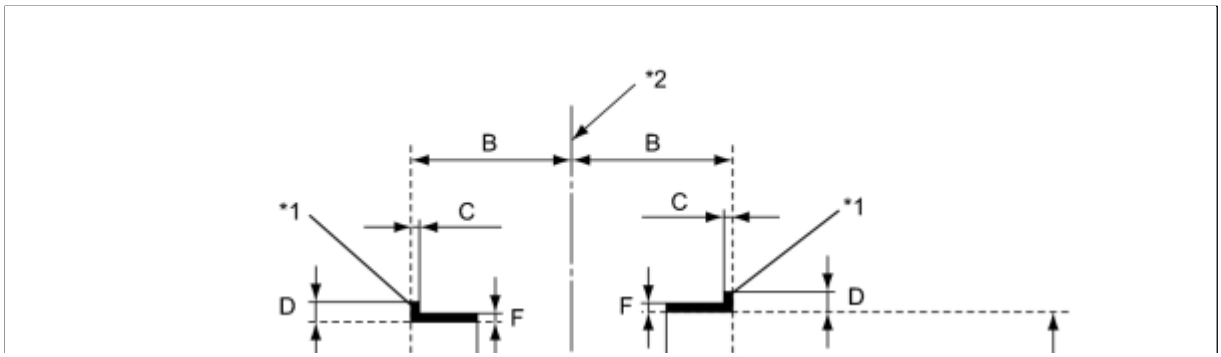
**Before parking the vehicle, be sure to move the vehicle forward and in reverse to check that the tires are facing straight ahead with the steering wheel centered.**

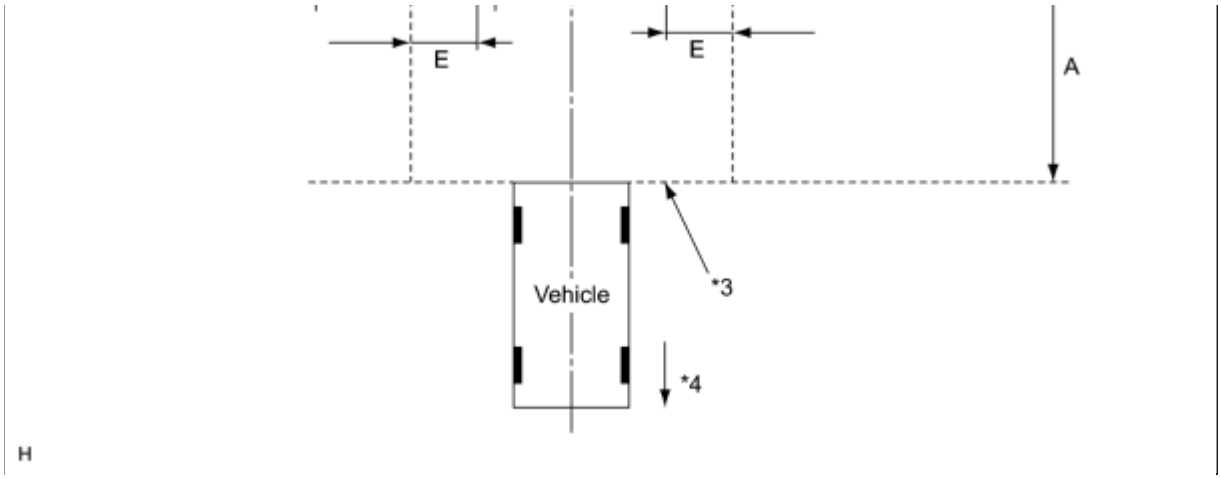
(2) Adjust the tire pressure to the specification.

(3) Set a target bar for optical axis adjustment of the rear television camera.

**HINT:**

**Only when adjusting the optical axis of the camera, create a target bar for adjustment.**






Dimension:

| A | B | C | D | E | F |
|---|---|---|---|---|---|
| 1100 mm (3.61 ft.) | 1600 mm (5.25 ft.) | 30 mm (1.18 in.) | 100 mm (3.94 in.) | 500 mm (1.64 ft.) | 30 mm (1.18 in.) |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Target Bar for Camera Adjustment | *2 | Vehicle Center |
| *3 | Bumper Edge | *4 | Front Side |

**HINT:**

**Check the tape color on the navigation receiver assembly and choose a tape color which can be easily seen.**

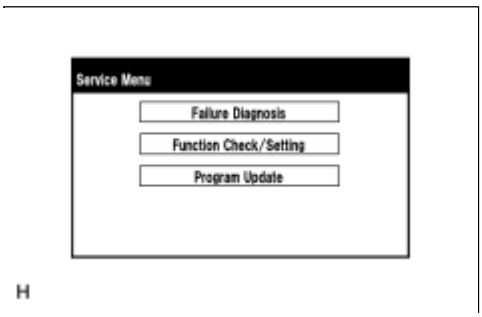
(b) Start diagnostic mode.

**NOTICE:**

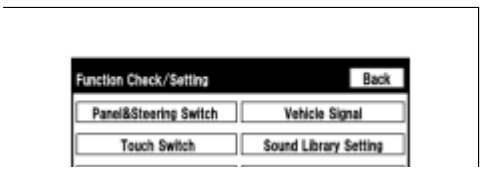
**Mode setting must be carried out with the hybrid system started. Apply the parking brake, depress the brake pedal, push the P position switch, and ensure that the vehicle is not moving.**

**HINT:**

**The displayed items may differ depending on vehicle specifications.**



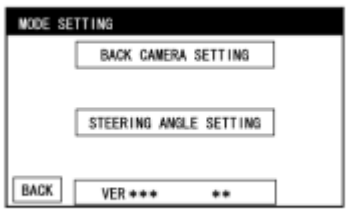

(1) Select "Function Check/Setting" on the "Service Menu" screen.




(2) Select "Camera Setting" on the Function Check/Setting screen.




H

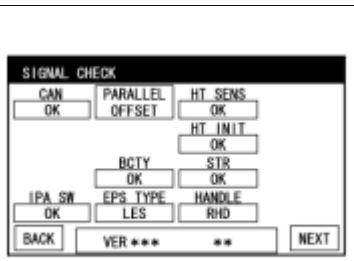



H

(3) Select "BACK CAMERA SETTING" on the MODE SETTING screen.

**HINT:**

**To select a grayed out item, select and hold the item for 2 seconds or more.**




H

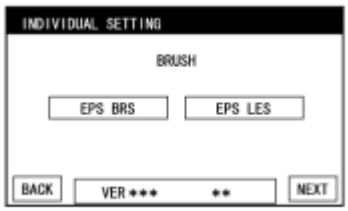
(4) Select "NEXT" on the SIGNAL CHECK screen.

- When "CHK" (red) is displayed for any items except "EPS TYPE" on the SIGNAL CHECK screen, selecting "NEXT" will not change the screen to the INDIVIDUAL SETTING screen.
- When "CHK" (red) is displayed for any items except "EPS TYPE" and "HT INIT" on the SIGNAL CHECK screen, perform inspections using the SIGNAL CHECK screen.

(c) INDIVIDUAL SETTING

(1) Confirm the vehicle specification and select the EPS brush specification.

| VEHICLE SPECIFICATION | EPS BRUSH SPECIFICATION |
|---|---|
| for 15 inch tire models | EPS BRS (Brush type) |
| for 17 inch tire models | EPS LES (Brushless type) |




H

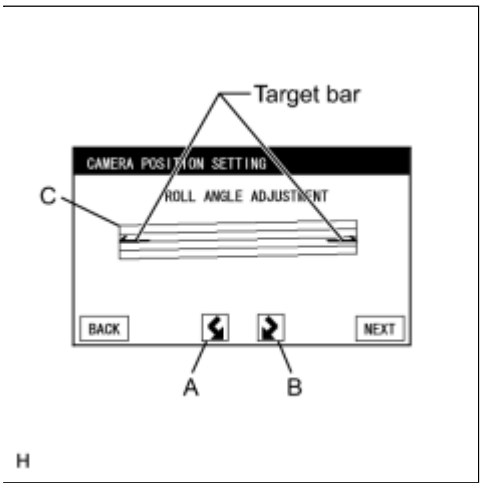
- Selected EPS brush specification is indicated in blue.
- EPS brush refers to the type of motor used for the EPS system (with brushes or brushless).
- If the selected EPS brush specification does not match the vehicle specification, select the one that matches the vehicle specification.
- When the EPS brush specification is modified, steering angle setting is required 

.

(2) Select "NEXT" on the INDIVIDUAL SETTING screen.

- The INDIVIDUAL SETTING screen will not be displayed when "BACK" is selected after switching to the CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT) screen.
- To display the INDIVIDUAL SETTING screen again, go back to the Function Check/Setting screen, select "Camera Setting" and repeat the steps.

(d) CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT)




**NOTICE:**

**Before performing the television camera optical axis adjustment, the height control sensor vehicle height difference setting must be performed in the "HEIGHT SET" screen.**

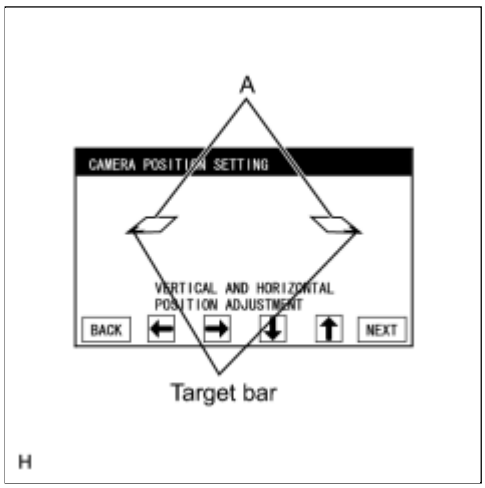
- When the back door is open, the "Back door is open. Do not use the rear view monitor when the back door is not completely closed." message will be displayed and television camera optical axis adjustment will not be possible.
- If the "Back door is open. Do not use the rear view monitor when the back door is not completely closed." message is displayed even when the back door is closed, perform inspections according to Problem Symptoms Table (A back door open warning message is displayed even after back door is closed).

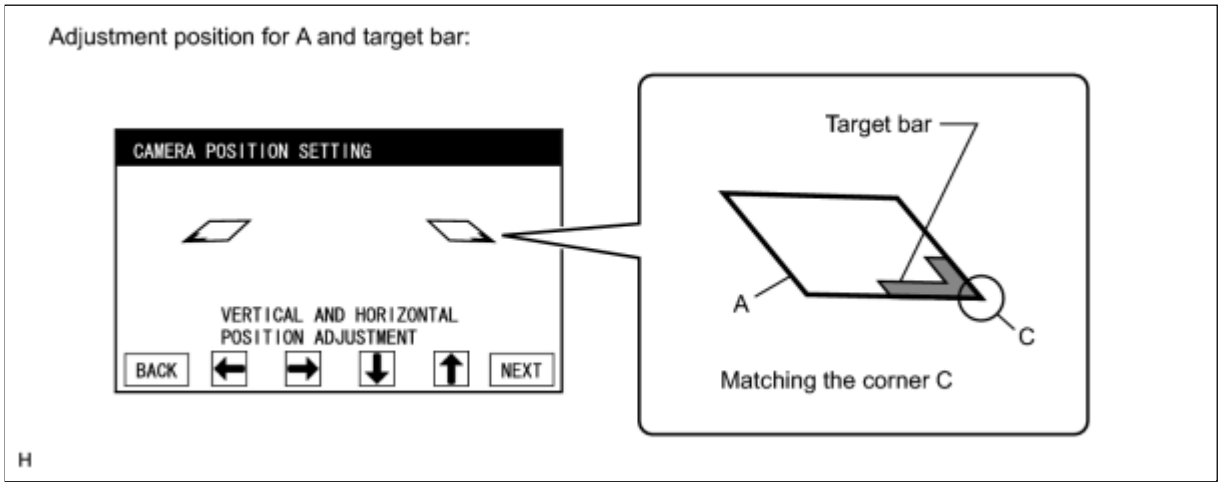
(1) Select switches A and B to rotate C so that it is parallel to the target adjustment bar.

(2) Select "NEXT" on the CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT) screen.

(e) CAMERA POSITION SETTING (VERTICAL AND HORIZONTAL POSITION ADJUSTMENT)

(1) By pressing the left and right, and up and down switches, move the parallelograms (A) vertically and horizontally so that the corners of the target bars (C) and the corners of the parallelograms (A) match.

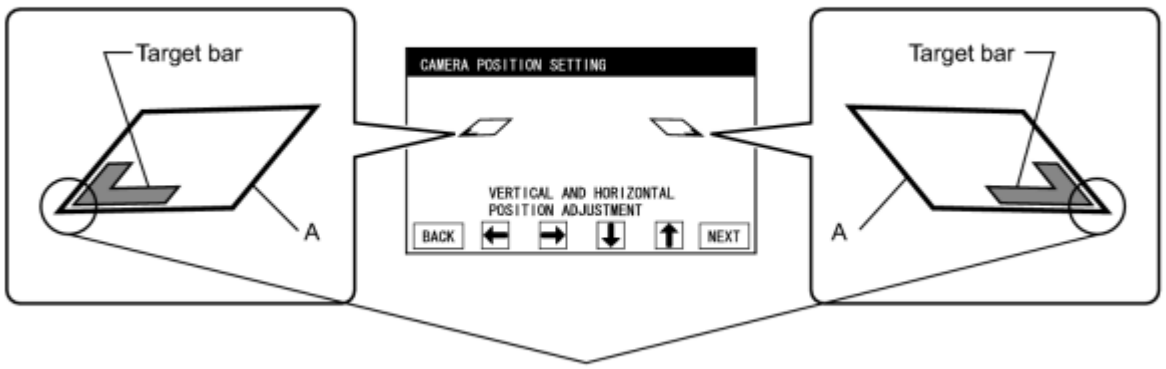


**NOTICE:**

- If the left and right parallelograms (A) and target bars do not match completely, just match the corners of the target bars (C) with the corners of the parallelograms (A).
- If the left and right parallelograms (A) and the corners of the target bars (C) do not match, make the gaps between each parallelogram (A) and the target bars equal on the left and right sides.

When the adjustment position for A and target bar is unmatched:

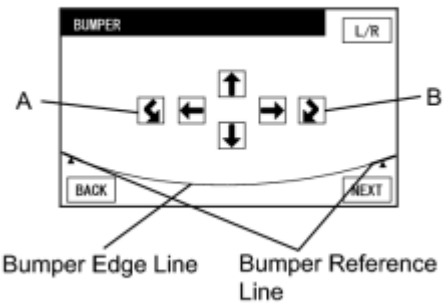



Making the left and right gaps of A and target bar equal

H

(2) Select "NEXT" on the CAMERA POSITION SETTING (VERTICAL AND HORIZONTAL POSITION ADJUSTMENT) screen.

Adjustment for left and right bumpers reference lines:




H

(f) BUMPER (SIMULTANEOUS ADJUSTMENT)

(1) By pressing the left and right, up and down and A and B switches, move the bumper reference lines vertically and horizontally or rotate them so that the bumper reference lines overlap or contact the bumper edge line.

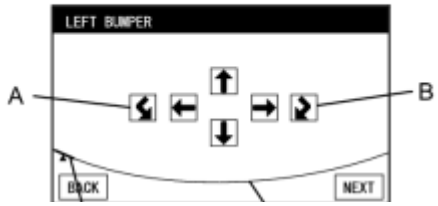
**HINT:**

**If the bumper reference lines do not overlap or contact the bumper edge line, select "L/R" to perform bumper reference line position adjustment (individual adjustment).**

(2) When the bumper reference lines and bumper edge line overlap or contact each other, select "NEXT".

(g) LEFT BUMPER

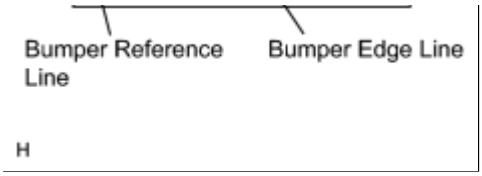
Adjustment for left bumper reference line:




(1) By pressing the left and right, up and down and A and B switches, move the left bumper reference line vertically and horizontally or rotate it so that the bumper reference lines overlap or contact the bumper edge line.

**HINT:**

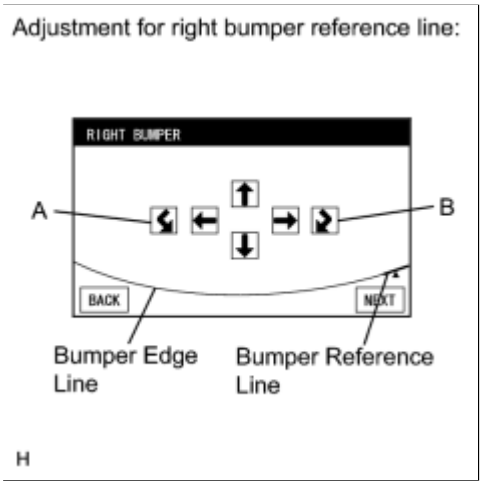
**When the left bumper reference line overlaps or contacts the bumper**




**edge line in the bumper reference line position adjustment (individual adjustment) step, select "NEXT".**

(2) Select "NEXT" on the LEFT BUMPER screen.

(h) RIGHT BUMPER



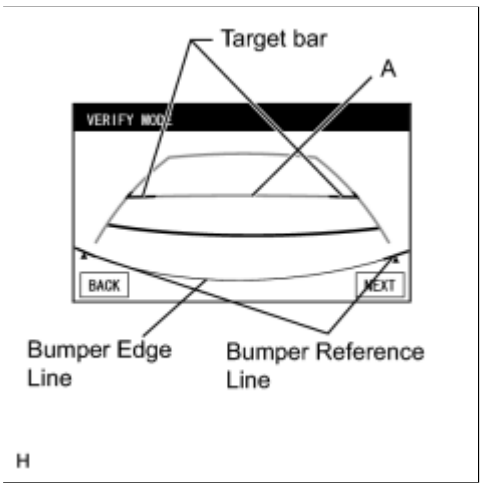

(1) By pressing the left and right, up and down and A and B switches, move the right bumper reference line vertically and horizontally or rotate it so that the bumper reference lines overlap or contact the bumper edge line.

**HINT:**

**When the right bumper reference line overlaps or contacts the bumper edge line in the bumper reference line position adjustment (individual adjustment) step, select "NEXT".**

(2) Select "NEXT" on the RIGHT BUMPER screen.

(i) VERIFY MODE




(1) Check that line A (indicating 1100 mm forward from the bumper edge) and the target bars are nearly overlapping and that the bumper reference lines and bumper edge line are nearly overlapping. With the steering wheel centered, check that the predicted path line is straight (overlapping the vehicle width extension lines).

(2) Selecting "NEXT" on the VERIFY MODE screen will be completed the camera aiming adjustment.

**HINT:**

- When "NEXT" is selected, a beep will sound to confirm that the camera aiming adjustment values have been stored.
- The adjustment value will not be stored unless "NEXT" is selected.
- Until a beep finishes sounding, the adjustment values are not stored.

(j) Finish diagnostic mode.

### 5. BUMPER POSITION SETTING

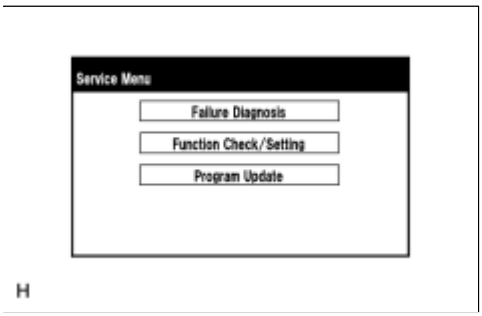
(a) Start diagnostic mode.

**NOTICE:**

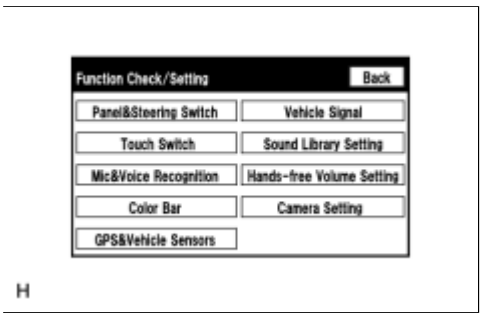
**Mode setting must be carried out with the hybrid system started. Apply the parking brake, depress the brake pedal, push the P position switch, and ensure that the vehicle is not moving.**

**HINT:**

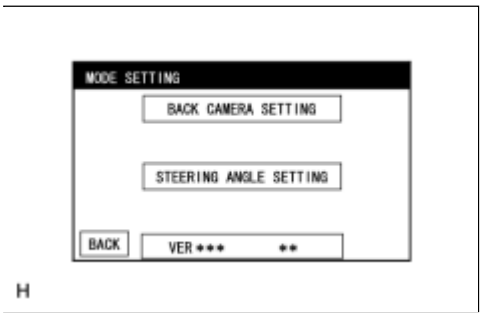
**The displayed items may differ depending on vehicle specifications.**




(1) Select "Function Check/Setting" on the "Service Menu" screen.



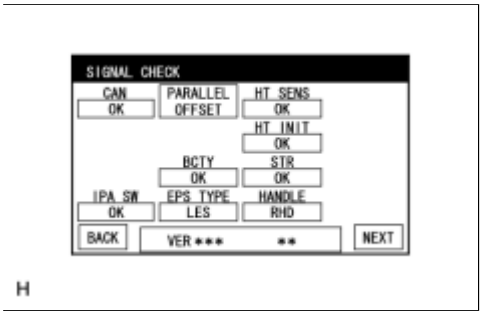

(2) Select "Camera Setting" on the Function Check/Setting screen.




(3) Select "BACK CAMERA SETTING" on the MODE SETTING screen.

**HINT:**

**To select a grayed out item, select and hold the item for 2 seconds or more.**



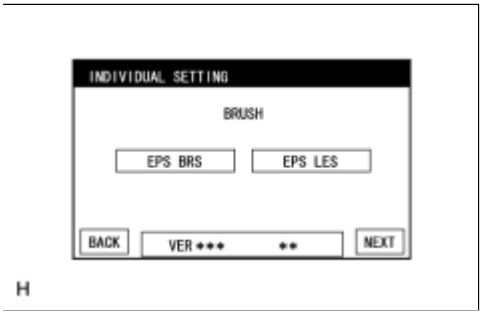

(4) Select "NEXT" on the SIGNAL CHECK screen.

- When "CHK" (red) is displayed for any items except "EPS TYPE" on the SIGNAL CHECK screen, selecting "NEXT" will not change the screen to the INDIVIDUAL SETTING screen.
- When "CHK" (red) is displayed for any items except "EPS TYPE" and "HT INIT" on the SIGNAL CHECK screen, perform inspections using the SIGNAL CHECK screen.

(b) INDIVIDUAL SETTING

(1) Confirm the vehicle specification and select the EPS brush specification.

| VEHICLE SPECIFICATION | EPS BRUSH SPECIFICATION |
|---|---|
| for 15 inch tire models | EPS BRS (Brush type) |
| for 17 inch tire models | EPS LES (Brushless type) |

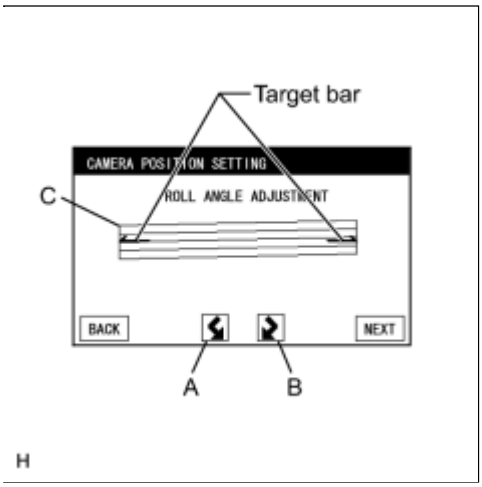



- Selected EPS brush specification is indicated in blue.
- EPS brush refers to the type of motor used for the EPS system (with brushes or brushless).
- If the selected EPS brush specification does not match the vehicle specification, select the one that matches the vehicle specification.
- When the EPS brush specification is modified, steering angle setting is required.

(2) Select "NEXT" on the INDIVIDUAL SETTING screen.

- The INDIVIDUAL SETTING screen will not be displayed when "BACK" is selected after switching to the CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT) screen.
- To display the INDIVIDUAL SETTING screen again, go back to the Function Check/Setting screen, select "Camera Setting" and repeat the steps.

(c) CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT)

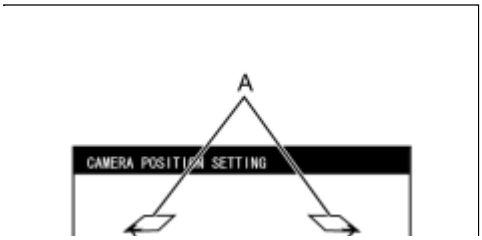



- When only bumper reference line position adjustment is required after servicing the vehicle, CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT) is unnecessary. Select "NEXT".
- When the back door is open, the "Back door is open. Do not use the rear view monitor when the back door is not completely closed." message will be displayed and television camera optical axis adjustment will not be possible.
- If the "Back door is open. Do not use the rear view monitor when the back door is not completely closed." message is displayed even when the back door is closed, perform inspections according to Problem Symptoms Table (A back door open warning message is displayed even after back door is closed).

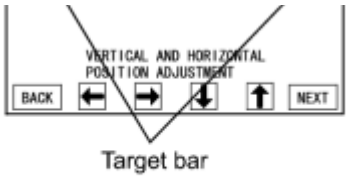
(1) Select switches A and B to rotate C so that it is parallel to the target adjustment bar.

(2) Select "NEXT" on the CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT) screen.

(d) CAMERA POSITION SETTING (VERTICAL AND HORIZONTAL POSITION ADJUSTMENT)




(1) By pressing the left and right, and up and down switches, move the parallelograms (A) vertically and horizontally so that the corners of the target bars (C) and the corners of the parallelograms (A) match.



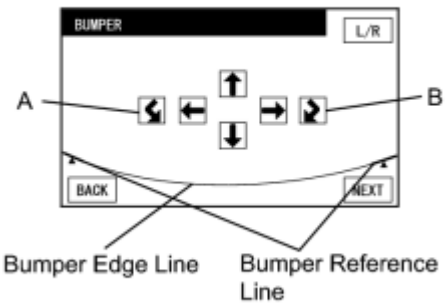

H

**HINT:**

**When only bumper reference line position adjustment is required after servicing the vehicle, CAMERA POSITION SETTING (ROLL ANGLE ADJUSTMENT) is unnecessary. Select "NEXT".**

(2) Select "NEXT" on the CAMERA POSITION SETTING (VERTICAL AND HORIZONTAL POSITION ADJUSTMENT) screen.

Adjustment for left and right bumpers reference lines:




H

(e) BUMPER (SIMULTANEOUS ADJUSTMENT)

(1) By pressing the left and right, up and down and A and B switches, move the bumper reference lines vertically and horizontally or rotate them so that the bumper reference lines overlap or contact the bumper edge line.

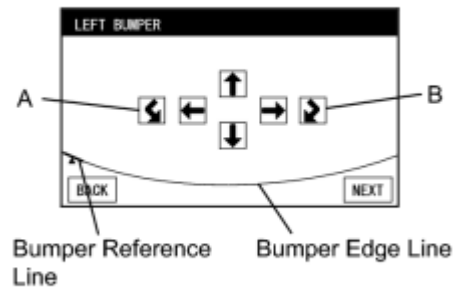
**HINT:**

**If the bumper reference lines do not overlap or contact the bumper edge line, select "L/R" to perform bumper reference line position adjustment (individual adjustment).**

(2) When the bumper reference lines and bumper edge line overlap or contact each other, select "NEXT".

(f) LEFT BUMPER

Adjustment for left bumper reference line:




H

(1) By pressing the left and right, up and down and A and B switches, move the left bumper reference line vertically and horizontally or rotate it so that the bumper reference lines overlap or contact the bumper edge line.

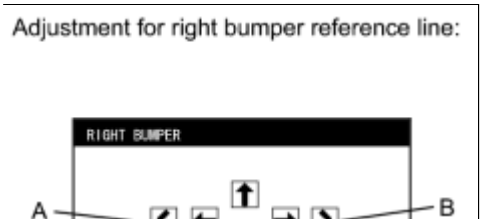
**HINT:**

**When the left bumper reference line overlaps or contacts the bumper edge line in the bumper reference line position adjustment (individual adjustment) step, select "NEXT".**

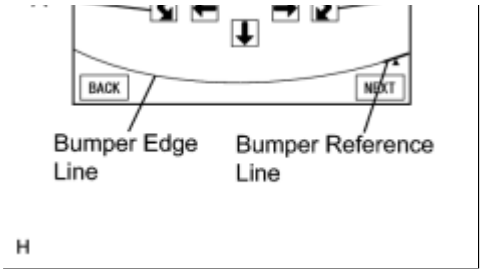
(2) Select "NEXT" on the LEFT BUMPER screen.

(g) RIGHT BUMPER

Adjustment for right bumper reference line:




(1) By pressing the left and right, up and down and A and B switches, move the right bumper reference line vertically and horizontally or rotate it so that the bumper reference lines overlap or contact the bumper edge line.

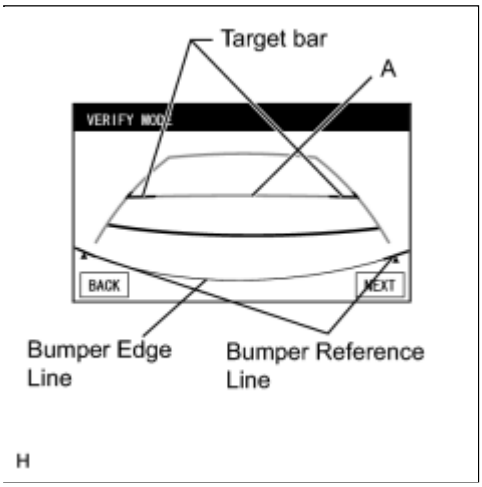



**HINT:**

**When the right bumper reference line overlaps or contacts the bumper edge line in the bumper reference line position adjustment (individual adjustment) step, select "NEXT".**

(2) Select "NEXT" on the RIGHT BUMPER screen.

(h) VERIFY MODE




(1) Check that the bumper reference lines and bumper edge line are nearly overlapping.

(2) Selecting "NEXT" on the VERIFY MODE screen will be completed the camera aiming adjustment.

**HINT:**

- When "NEXT" is selected, a beep will sound to confirm that the bumper position adjustment values have been stored.
- The adjustment value will not be stored unless "NEXT" is selected.
- Until a beep finishes sounding, the adjustment values are not stored.

(i) Finish diagnostic mode.

# PROBLEM SYMPTOMS TABLE

**HINT:**

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms the listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**NOTICE:**

**The following inspection procedure of the advanced parking guidance is described on the assumption that the navigation system is normal. If navigation system has any malfunction, first proceed with troubleshooting of the navigation system.**

**General**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| When the shift lever is in R, the advanced parking guidance image is not displayed (screen is not black). | Reverse signal circuit (Navigation System) | INFO |
| | Navigation receiver assembly | INFO |
| When the shift lever is in R, the advanced parking guidance image is not displayed (screen is black). | Power source circuit | INFO |
| | Image from camera for advanced parking guidance is abnormal | INFO |
| | Parking assist ECU | INFO |
| When the shift lever is not in R, the advanced parking guidance image is displayed. | Reverse signal circuit (Navigation System) | INFO |
| | Navigation receiver assembly | INFO |
| | Parking assist ECU | INFO |

**Display Malfunction**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Image from camera for the advanced parking guidance is abnormal. | Image from camera for advanced parking guidance is abnormal | INFO |
| | Parking assist ECU | INFO |

**Switch Malfunction**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| The illumination of the parking assist pre support switch does not illuminate. | Parking assist pre support switch inspection | INFO |
| | Harness or connector | - |
| The touch switch on the navigation receiver display does not operate at all. | Touch SW inspection (Navigation System) | INFO |
| | Navigation receiver assembly | INFO |
| | Parking assist ECU | INFO |

**Pre Support Function Malfunction**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Pre support function does not operate. | Pre support function operation condition (System Description) | INFO |
| | Signal check (Diagnosis System) | INFO |
| | Parking assist ECU | INFO |
| When the target parking position is set after pre support operation, the initial display position of the target parking space is very far from the actual parking space. | Pre support function (System Description) | INFO |
| | Notes for ultrasonic sensor (Precaution) | INFO |
| | Ultrasonic sensor | INFO |
| | Front bumper cover | INFO |
| | Parking assist ECU | INFO |
| "Check APGS. Have your vehicle checked by a dealer." is displayed on the pre support screen. | Parking assist ECU | INFO |
| "APGS not available now." is displayed on the pre support screen. | Correct the steering angle neutral point | INFO |
| "APGS not available now." is displayed on the pre support screen though the steering angle neutral point has been corrected. | Spiral with sensor cable sub-assembly | INFO |
| | Steering angle setting (Diagnosis System) | INFO |
| | Parking assist ECU | INFO |

**Advanced Parking Guidance Function Malfunction**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| The vehicle width extension line is not overlapping with the predicted path line when the steering wheel is centered. | Check the installation of steering wheel | - |
| | Steering angle setting (Diagnosis System) | INFO |
| | Check the installation of rear television camera assembly | INFO |
| | Height control sensor vehicle height difference setting | INFO |
| | Rear television camera optical axis adjustment | INFO |
| | Parking assist ECU | INFO |
| The predicted path line stops before turning the steering wheel to the lock position. | Steering angle setting (Diagnosis System) | INFO |
| "Check APGS System. Have your vehicle checked by a dealer." is displayed on the advanced parking guidance screen. | Parking assist ECU | INFO |

| | | |
|---|---|---|
| Projected course guidelines are not displayed on the advanced parking guidance screen. | Parking assist ECU | INFO |
| "System initializing." is displayed. | Correct the steering angle neutral point | INFO |
| "System initializing." is displayed though the steering angle neutral point has been corrected. | Spiral with sensor cable sub-assembly | INFO |
| | Steering angle setting (Diagnosis System) | INFO |
| | Parking assist ECU | INFO |
| "System not ready." is displayed. | Parking assist ECU initialization | INFO |
| "System not ready." is displayed though the parking assist ECU initialization has been performed. | Parking assist ECU | INFO |
| The assist operation stops frequently ("System cannot assist under current conditions." is displayed). | Inspect the tire (tire size, tire pressure, tire worn) | - |
| | Parking assist ECU | INFO |
| The assist operation stops frequently ("Use on flat surface." is displayed). | Parking assist ECU | INFO |
| A set parking position and an actual parking position swerve to the right or the left at parallel parking mode. | Parallel parking offset (Diagnosis System) | INFO |
| A rear bumper edge and a bumper reference line swerve at the advanced parking guidance screen. | Check the installation of the rear television camera assembly | INFO |
| | Height control sensor vehicle height difference setting | INFO |
| | Rear television camera optical axis adjustment | INFO |
| The vehicle does not move to a set parking position. | Vehicle does not move to set parking position | INFO |
| When the target parking position is set, the initial display position of the target parking space is very far from the actual parking position. | Notes for ultrasonic sensor (Precaution) | INFO |
| | Ultrasonic sensor | INFO |
| | Front bumper cover | INFO |
| | Parking assist ECU | INFO |
| "CHK" message(s) are displayed on the SIGNAL CHECK screen. | "CHK" message(s) are displayed on the SIGNAL CHECK screen | INFO |
| A back door open warning message is displayed even after the back door is closed. | "Message indicating back door is open is displayed even after back door is closed" | INFO |

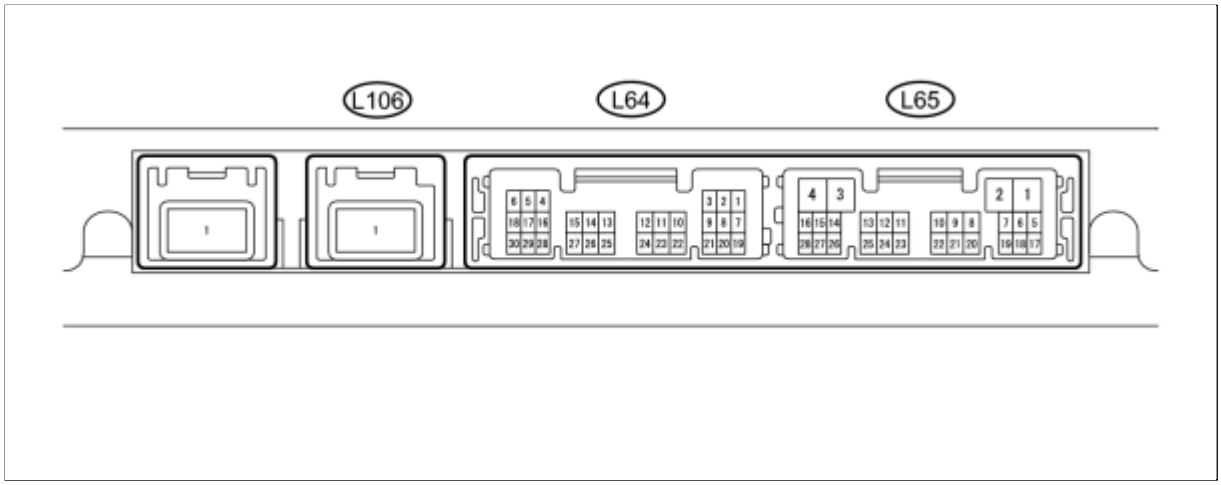
**Guide Voice Malfunction**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| A guide voice for the advanced parking guidance system is mute or too small (a voice for navigation system is normal). | Check the DTC (Navigation System) | INFO |
| | Parking assist ECU | INFO |
| | Navigation receiver | INFO |

| | | |
|---|---|---|
| | assembly | |

# TERMINALS OF ECU

## 1. PARKING ASSIST ECU




(a) Disconnect the L65 connector from the parking assist ECU.

(b) Measure the voltage and resistance of each terminal of the wire harness side connector.

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| L65-1 (+B) - L65-3 (GND1) | SB - W-B | Power source signal | Always | 11 to 14 V |
| L65-3 (GND1) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| L65-7 (IG) - L65-3 (GND1) | B - W-B | IG power source signal | Power switch on (IG) | 11 to 14 V |
| L65-8 (ACC) - L65-3 (GND1) | GR - W-B | ACC power source signal | Power switch on (ACC) | 11 to 14 V |

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the L65 connector to the ECU.

(d) Measure the voltage and resistance, and check for pulses according to the value(s) in the table below.

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| L64-11 (CV-) - L65-3 (GND1) | B - W-B | Rear television camera ground | Always | Below 1 V |
| L64-12 (CV+) - L65-3 (GND1) | R - W-B | Rear television camera display signal (NTSC) input | Power switch on (IG)<br>Shift lever in R<br>Under normal conditions | Pulse generation (See waveform 1) |
| | | | Power switch on (IG)<br>Shift lever in R<br>Camera lens is covered, blacking out screen | Pulse generation (See waveform 2) |
| L64-13 (CGND) - L65-3 (GND1) | Shield - W-B | Rear television camera ground (shield) | Always | Below 1 V |
| L64-14 (CB+) - | W - W-B | Power source to rear television | Power switch on (IG) | 5.8 to 7.0 V |

| | | | | |
|---|---|---|---|---|
| L65-3 (GND1) | W - W-B | camera | Shift lever in R | 5.8 to 7.0 V |
| L64-19 (CSB3) - L65-3 (GND1) | G - W-B | Power source to ultrasonic sensor | Power switch on (IG) | 7 to 9 V |
| L64-20 (CSG3) - L65-3 (GND1) | R - W-B | Ultrasonic sensor ground | Always | Below 1 Ω |
| L64-21 (LIN3) | GR | Ultrasonic sensor signal input and output | - | - |
| L65-11 (ISSW) - L65-3 (GND1) | L - W-B | Parking assist pre support signal input | Power switch on (IG) Parking assist pre support switch pushed in | Below 1 V |
| | | | Power switch on (IG) Parking assist pre support switch not pushed | 4.75 to 5.25 V |
| L65-21 (CANL) - L65-3 (GND1) | BR - W-B | CAN communication signal | CAN communication circuit | Pulse generation |
| L65-22 (CANH) - L65-3 (GND1) | Y - W-B | CAN communication signal | CAN communication circuit | Pulse generation |
| L65-24 (TX-) - L65-25 (TX+) | P - LG | AVC-LAN communication signal | - | - |

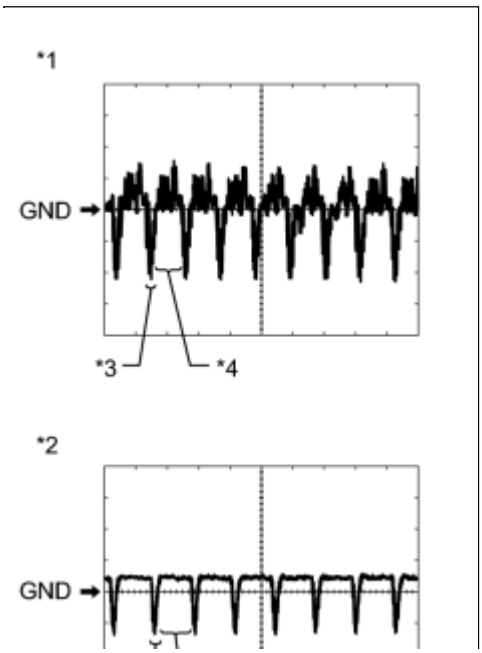
If the result is not as specified, the ECU may have a malfunction.

(e) Reference (Oscilloscope waveform):

**HINT:**

**A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the parking assist ECU with the connector connected.**

(1) Waveform 1 (under normal conditions)



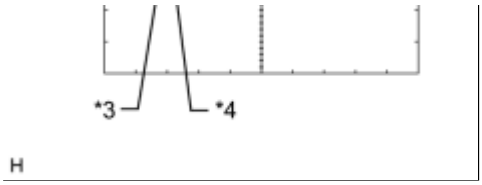

| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | L64-12 (CV+) - L65-3 (GND1) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

(2) Waveform 2 (camera lens is covered, blacking out the screen)

| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | L64-12 (CV+) - L65-3 (GND1) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |




**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

## Text in Illustration

| | |
|---|---|
| *1 | Waveform 1 (under normal conditions) |
| *2 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *3 | Synchronized Signal |
| *4 | Video Waveform |

### 2. REAR TELEVISION CAMERA ASSEMBLY




(a) Disconnect the V6 connector from the rear television camera assembly.

(b) Measure the voltage of each terminal of the wire harness side connector.

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| V6-3 (CGND) - Body ground | W-B - Body ground | Ground | Always | Below 1 V |
| V6-4 (CB+) - V6-3 (CGND) | W - W-B | Power source | Power switch on (IG)<br>Shift lever in R | 5.8 to 7.0 V |

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the V6 connector to the rear television camera assembly.

(d) Check for pulses according to the value(s) in the table below.

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| | | | Power switch on (IG) | Pulse generation |

| | | | | |
|---|---|---|---|---|
| V6-2 (CV+) - V6-1 (CV-) | R - B | Display signal | Shift lever in R<br>Under normal conditions | (See waveform 1) |
| | | | Power switch on (IG)<br>Shift lever in R<br>Camera lens covered, blacking out screen | Pulse generation<br>(See waveform 2) |

**HINT:**

**A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the parking assist ECU with the connector connected.**

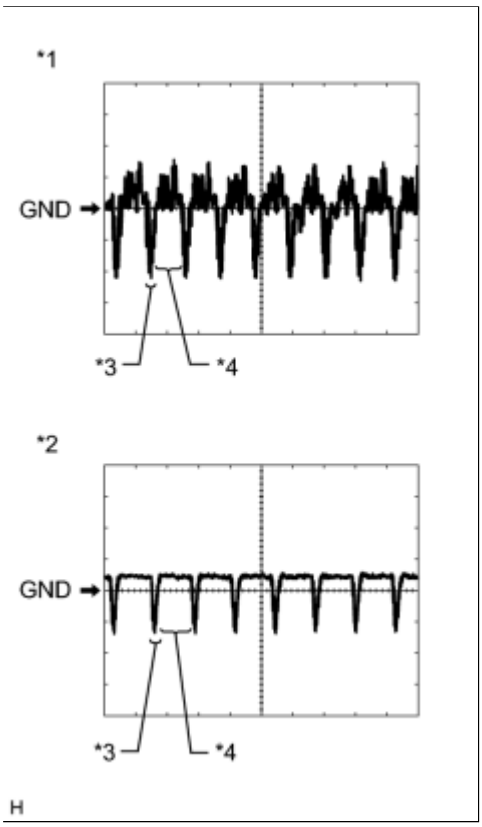
If the result is not as specified, the camera may have a malfunction.

(e) Reference (Oscilloscope waveform):

**HINT:**

**A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the parking assist ECU with the connector connected.**

(1) Waveform 1 (under normal conditions)




| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | V6-2 (CV+) - V6-1 (CV-) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

(2) Waveform 2 (camera lens is covered, blacking out the screen)

| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | V6-2 (CV+) - V6-1 (CV-) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

## Text in Illustration

| | |
|---|---|
| *1 | Waveform 1 (under normal conditions) |
| *2 | Waveform 2 (camera lens is covered, blacking out the screen) |

| | |
|---|---|
| *3 | Synchronized Signal |
| *4 | Video Waveform |

### 3. NAVIGATION RECEIVER ASSEMBLY INFO

# DIAGNOSIS SYSTEM

## 1. ADVANCED PARKING GUIDANCE OR DIAGNOSIS SYSTEM

(a) For advanced parking guidance system diagnosis, signals received by the parking assist ECU can be checked and the advanced parking guidance system can be calibrated, adjusted and checked using the navigation receiver assembly.

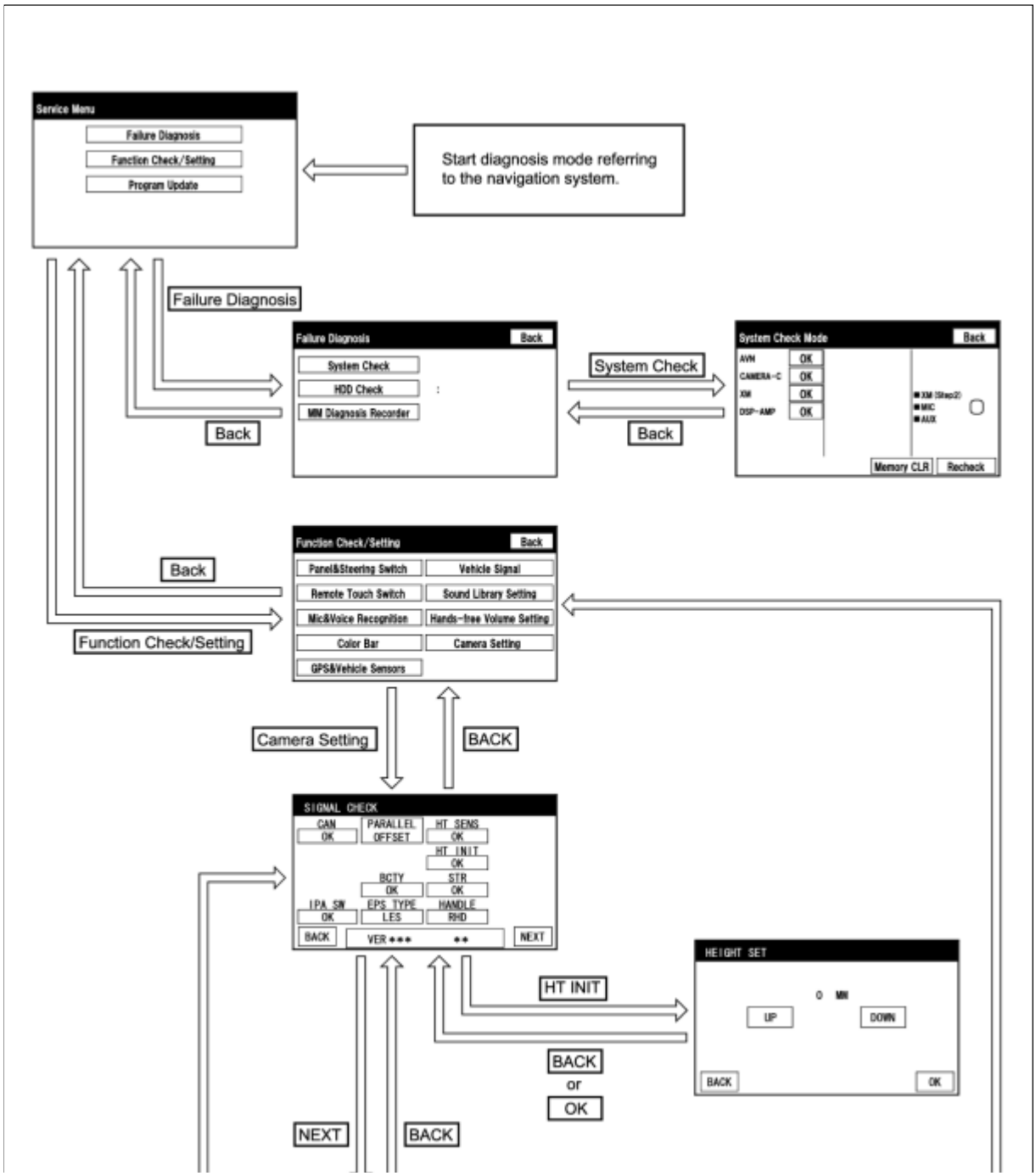
**NOTICE:**

**Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed** INFO **.**

**HINT:**

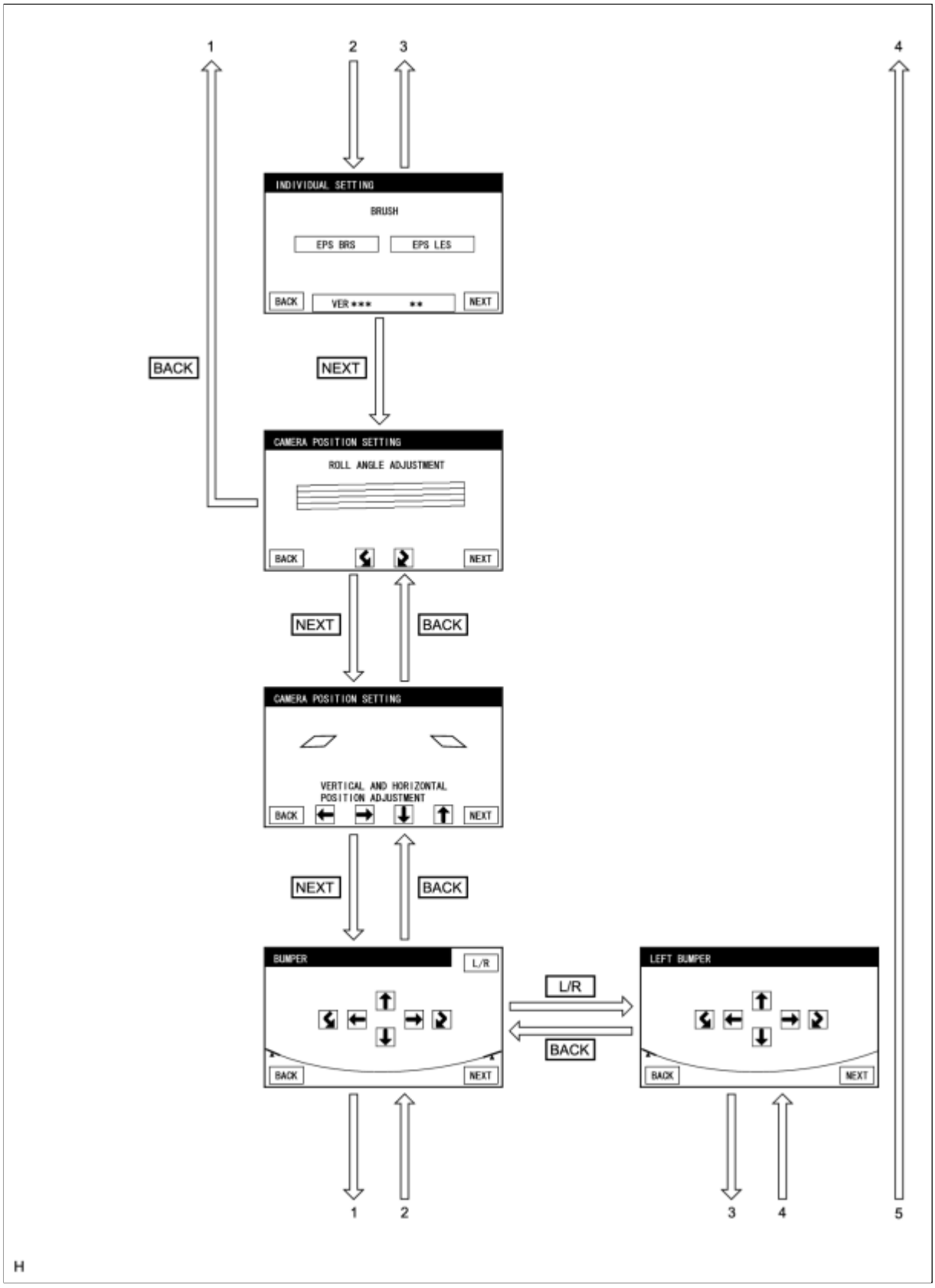
**The displayed screens and items may differ depending on vehicle specifications.**

## 2. DIAGNOSIS SCREEN TRANSITION (during parking assist ECU initialization)

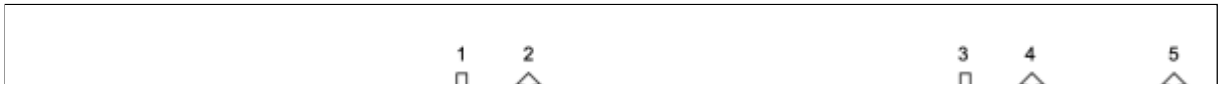


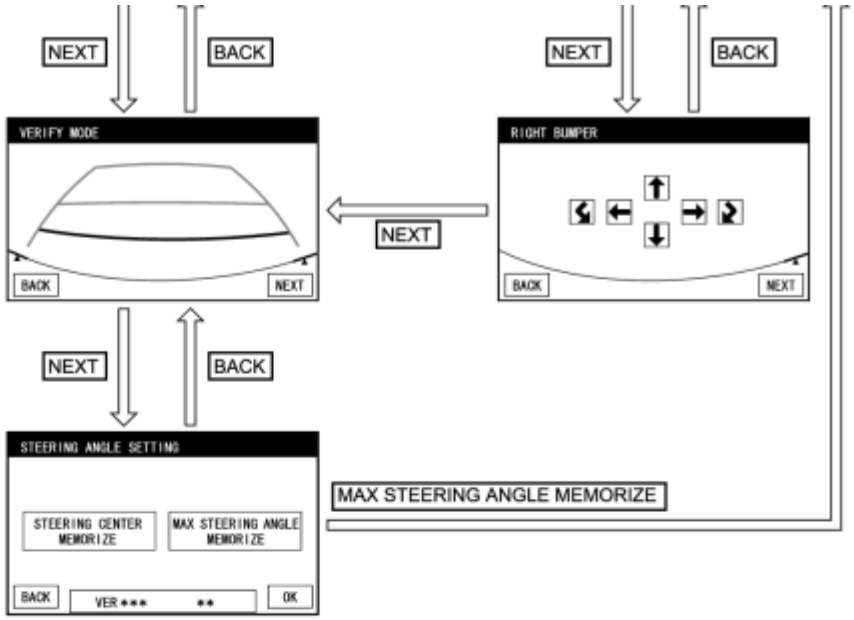

1
2
3
4

H


1
2
3
4
INDIVIDUAL SETTING
BRUSH
EPS BRS
EPS LES
BACK
VER ***
**
NEXT
BACK
NEXT
CAMERA POSITION SETTING
ROLL ANGLE ADJUSTMENT
BACK
NEXT
NEXT
BACK
CAMERA POSITION SETTING
VERTICAL AND HORIZONTAL
POSITION ADJUSTMENT
BACK
NEXT
NEXT
BACK
BUMPER
L/R
BACK
NEXT
L/R
BACK
LEFT BUMPER
BACK
NEXT
1
2
3
4
5

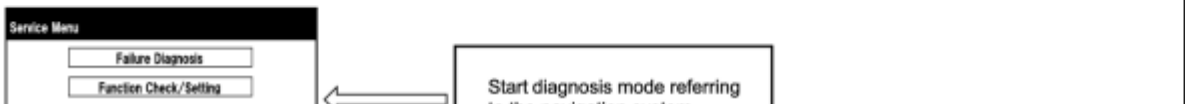
H

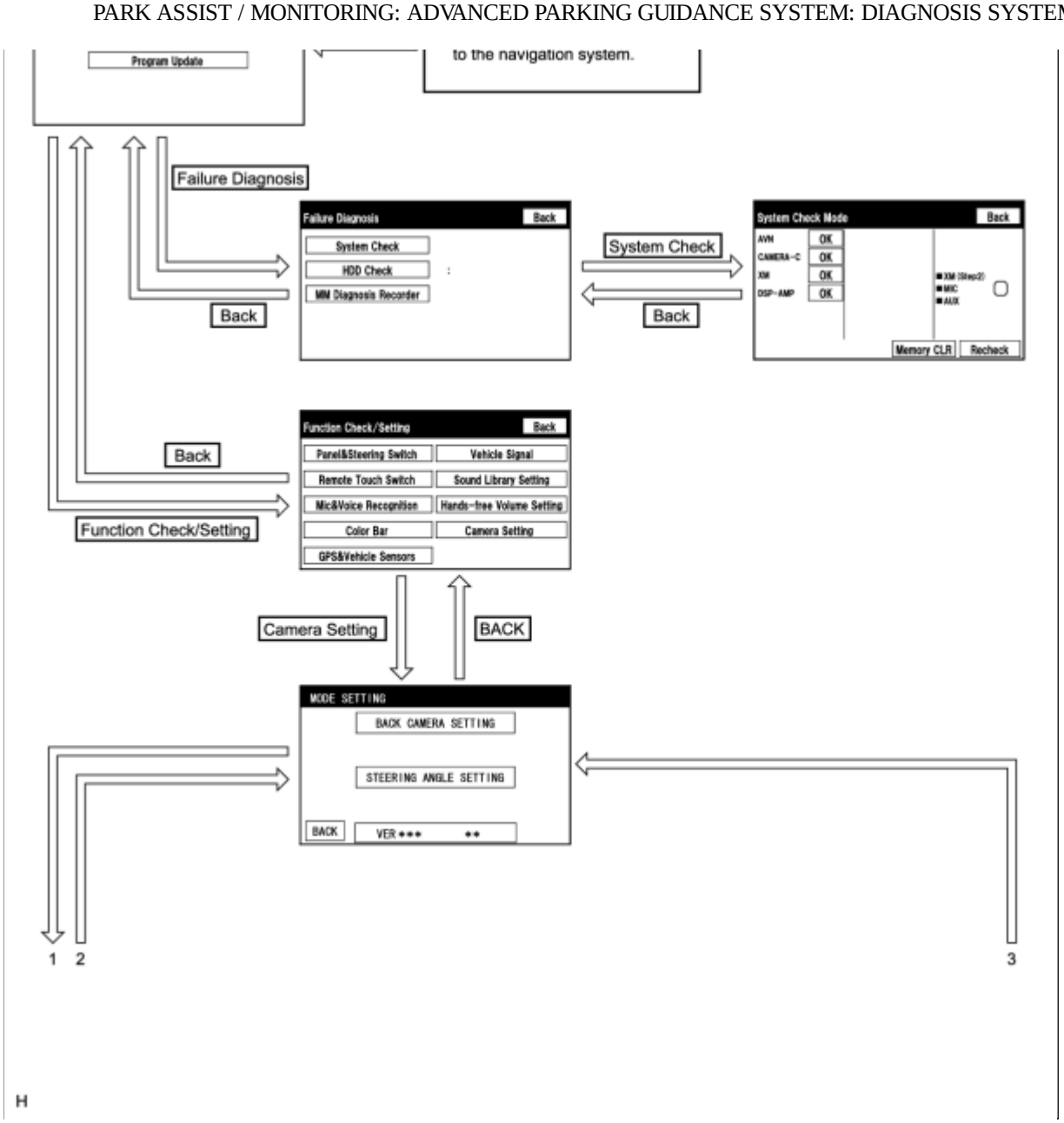

1
2
3
4
5



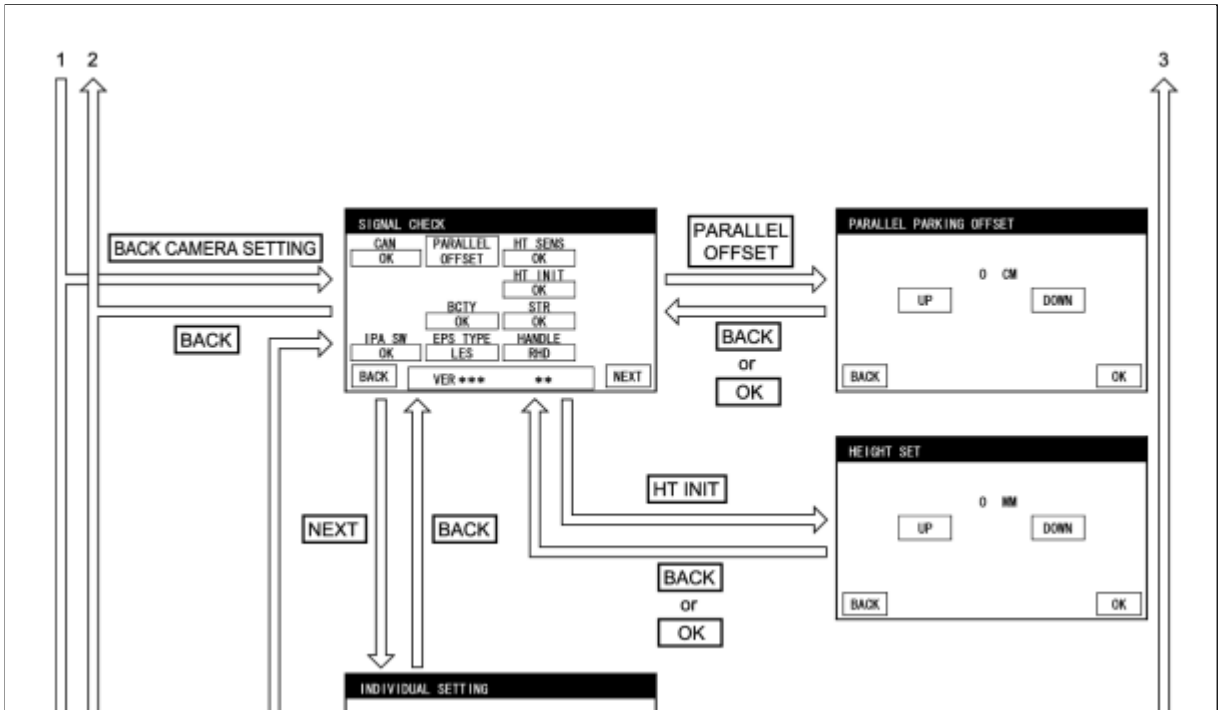

H

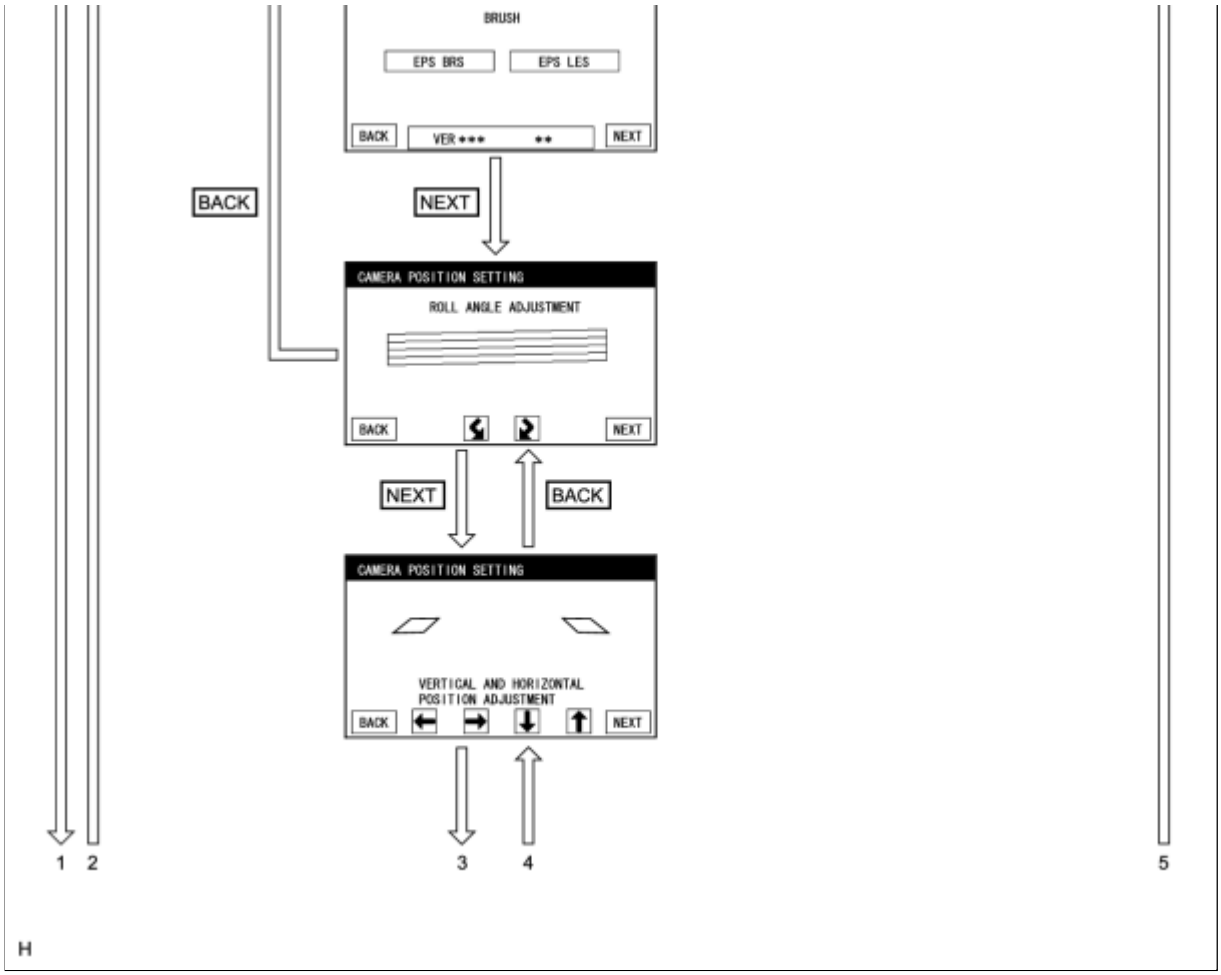
### 3. DIAGNOSIS SCREEN TRANSITION (after parking assist ECU initialization)

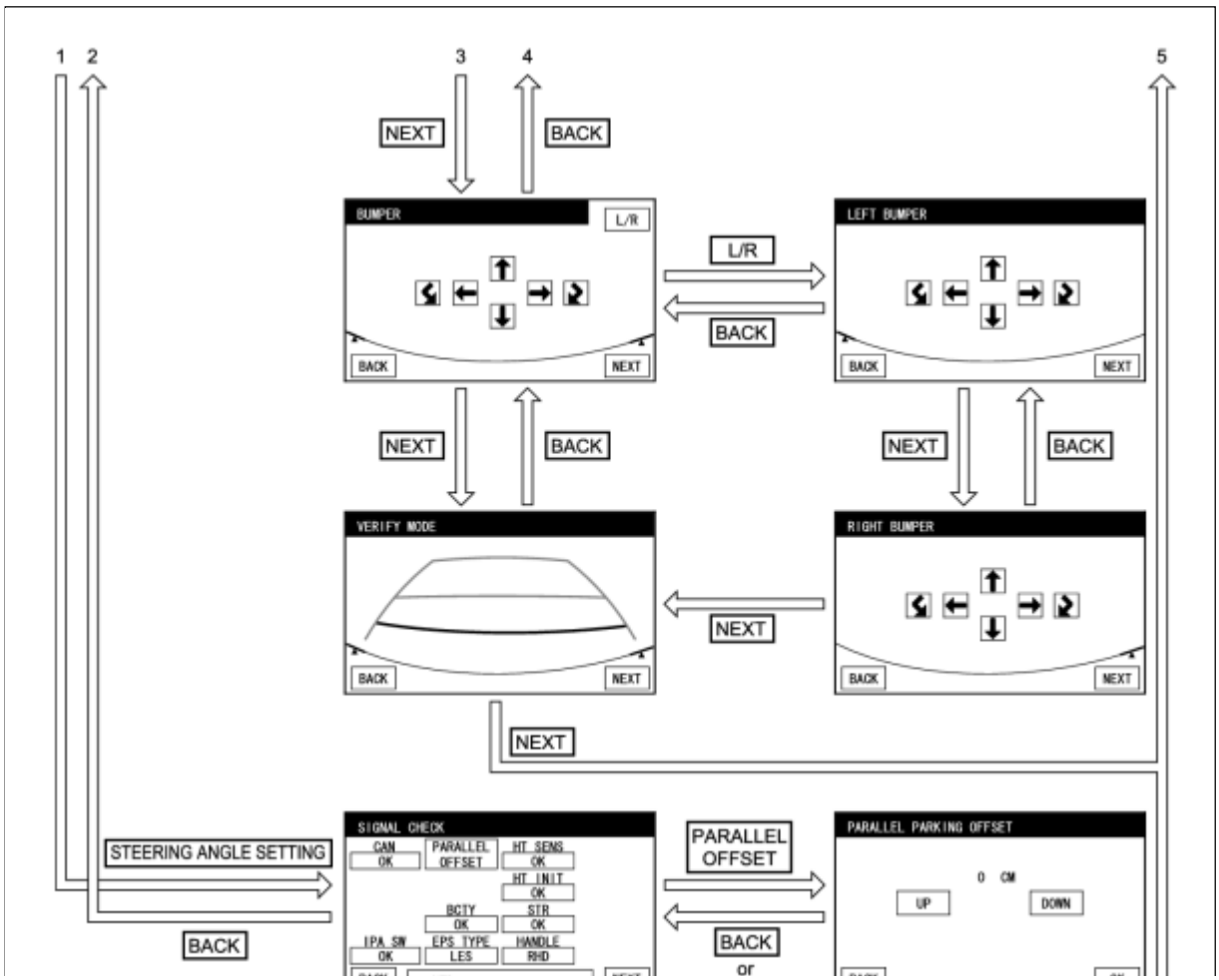


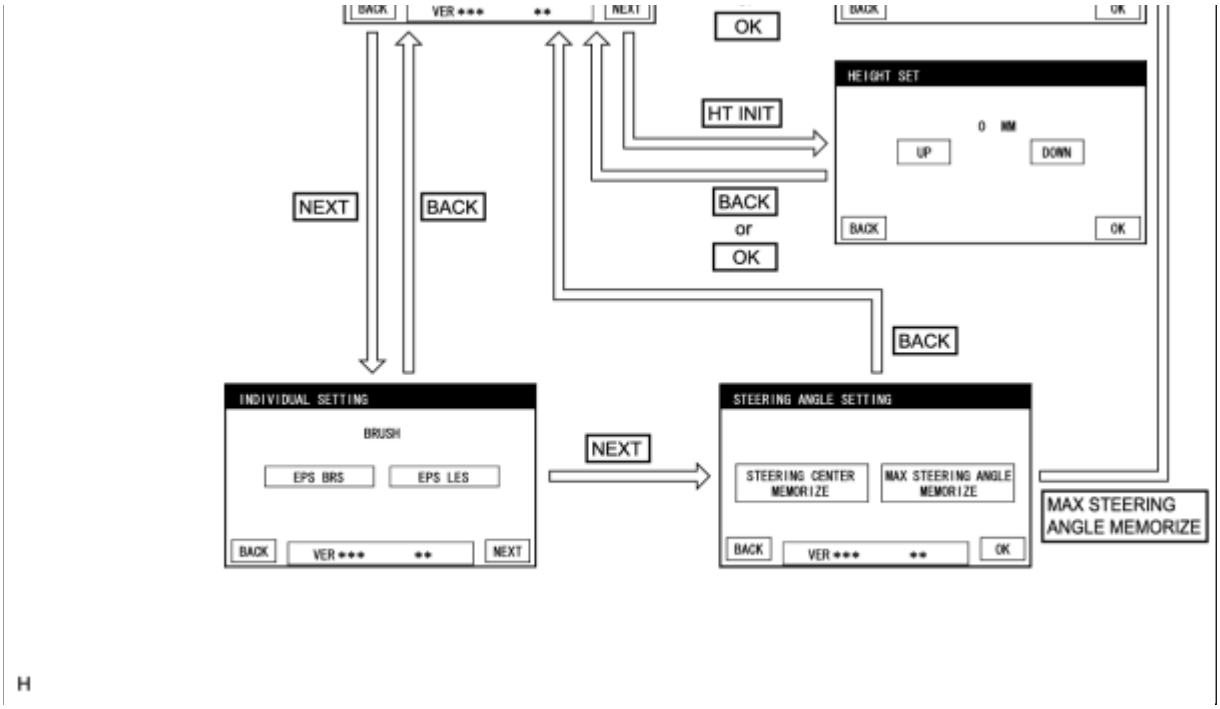

Program Update
to the navigation system.
Failure Diagnosis
Back
Failure Diagnosis
Back
System Check
HDD Check
MM Diagnosis Recorder
System Check
Back
System Check Mode
Back
AVN
CAMERA-C
XM
DSP-AMP
OK
Memory CLR
Recheck
Back
Function Check/Setting
Function Check/Setting
Back
Panel&Steering Switch
Vehicle Signal
Remote Touch Switch
Sound Library Setting
Mic&Voice Recognition
Hands-free Volume Setting
Color Bar
Camera Setting
GPS&Vehicle Sensors
Camera Setting
BACK
MODE SETTING
BACK CAMERA SETTING
STEERING ANGLE SETTING
BACK
VER ***
1
2
3

H


1
2
3
BACK CAMERA SETTING
BACK
SIGNAL CHECK
CAN
OK
PARALLEL
OFFSET
HT SENS
OK
HT INIT
OK
BCTY
OK
STR
OK
IPA SW
OK
EPS TYPE
LES
HANDLE
RHD
BACK
VER ***
NEXT
PARALLEL
OFFSET
BACK
or
OK
PARALLEL PARKING OFFSET
0 CM
UP
DOWN
BACK
OK
HT INIT
NEXT
BACK
BACK
or
OK
HEIGHT SET
0 MM
UP
DOWN
BACK
OK
INDIVIDUAL SETTING


BRUSH
EPS BRS
EPS LES
BACK
VER ***
**
NEXT
BACK
NEXT
CAMERA POSITION SETTING
ROLL ANGLE ADJUSTMENT
BACK
NEXT
NEXT
BACK
CAMERA POSITION SETTING
VERTICAL AND HORIZONTAL
POSITION ADJUSTMENT
BACK
NEXT
1
2
3
4
5
H


1
2
3
4
5
NEXT
BACK
BUMPER
L/R
BACK
NEXT
L/R
BACK
LEFT BUMPER
BACK
NEXT
NEXT
BACK
NEXT
BACK
VERIFY MODE
BACK
NEXT
NEXT
RIGHT BUMPER
BACK
NEXT
NEXT
STEERING ANGLE SETTING
BACK
SIGNAL CHECK
CAN
OK
PARALLEL
OFFSET
HT SENS
OK
HT INIT
OK
BCTY
OK
STR
OK
IPA SW
OK
EPS TYPE
LES
HANDLE
RHD
PARALLEL
OFFSET
BACK
or
PARALLEL PARKING OFFSET
0 CM
UP
DOWN




H

### 4. DIAGNOSTIC MODE

(a) Start diagnostic mode INFO .

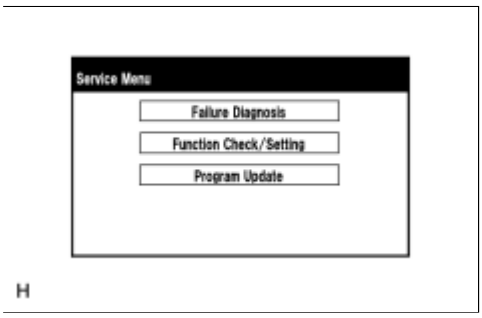
(b) Failure diagnosis.

(c) System check (check using system check mode screen).

(d) Finish diagnostic mode.

### 5. SIGNAL CHECK (parking assist ECU input signal)

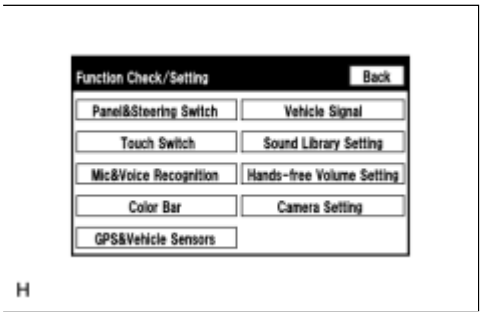
(a) Start diagnostic mode INFO .




H

(1) Select "Function Check/Setting" on the Service Menu screen to display the Function Check/Setting screen.

(2) Select "Camera Setting" on the Function Check/Setting screen.

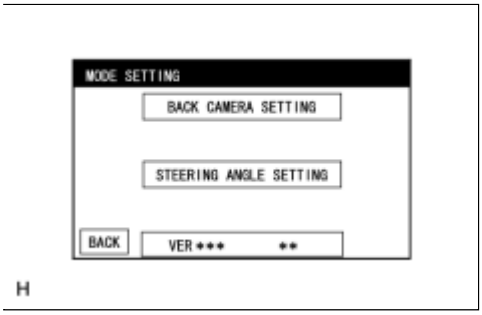



H

**HINT:**

**After "Camera Setting" is selected, the screen transitions differ depending on whether initialization of the parking assist ECU was performed after parking assist ECU replacement.**

| PARKING ASSIST ECU INITIALIZATION | SCREEN TRANSITION |
|---|---|
| Not performed | SIGNAL CHECK screen |
| Performed | MODE SETTING screen |




(3) When the screen changes to the MODE SETTING screen, select "BACK CAMERA SETTING" to display the SIGNAL CHECK screen.

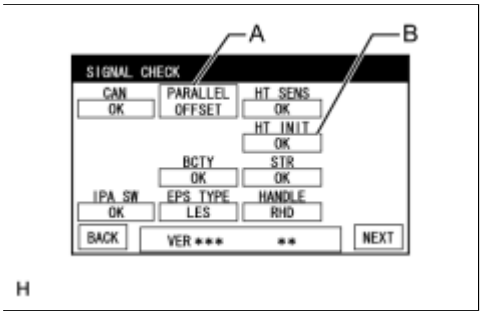
**HINT:**

**To select a grayed out item, select and hold the item for 2 seconds or more.**

(b) SIGNAL CHECK

(1) On the SIGNAL CHECK screen, the following contents are possible:

- Inspect the state of signals sent to the parking assist ECU.
- Confirm the state of the height control sensor vehicle height difference setting.
- Adjust the parking position for parallel parking mode.




| ITEM | INSPECTION DETAIL | NOTE |
|---|---|---|
| CAN | CAN communication status | When "CHK" (red) is displayed, selecting "NEXT" will not change to the next screen. |
| IPA SW | Parking assist pre support switch signal input | |
| BCTY | CAN communication condition with main body ECU (multiplex network body ECU) | |
| EPS TYPE | Brush information for EPS currently selected | - |
| HT SENS | Height control sensor signal input | When "CHK" (red) is displayed, selecting "NEXT" will not change to the next screen. |
| HT INIT | Vehicle height difference setting status | |
| STR | Steering angle sensor signal input | |
| HANDLE | Steering position signal input | |

- When "CHK" (red) is displayed, perform inspections based on the result of the following inspections.
- If performing the adjustment after proceeding to the next screen, confirm that all items display "OK" (blue) before selecting "NEXT".
- Select the following buttons changes to each adjustment screen.

| BUTTON | TRANSIT SCREEN | ADJUSTMENT CONTENTS |
|---|---|---|
| A | PARALLEL PARKING OFF SET | Parking position for parallel parking mode |
| B | HEIGHT SET | Height control sensor vehicle height difference setting INFO |

(c) CAN inspection

**HINT:**

**If "CHK" (red) is displayed for "CAN", check for DTCs and perform troubleshooting based on the output DTCs** INFO **.**

(d) IPA SW inspection

(1) Check that "OK" (blue) is displayed for "IPA SW" and select "OK".

(2) Check that "OK" (blue) changes to "CHK" (red). Press the parking assist pre support switch and check that "CHK" (red) returns to "OK" (blue).

**HINT:**

**If "CHK" (red) remains displayed or the "IPA SW" inspection result is not normal, perform troubleshooting according to Problem Symptoms Table ("CHK" message(s) are displayed on the SIGNAL CHECK screen)** INFO **.**

(e) BCTY inspection

**HINT:**

**If "CHK" (red) is displayed for "BCTY", check for DTCs and perform troubleshooting based on the output DTCs** INFO **.**

(f) EPS TYPE inspection

(1) Confirm the vehicle specification and check that the EPS brush information shown under "EPS TYPE" matches the vehicle specification.

| VEHICLE SPECIFICATION | EPS BRUSH SPECIFICATION |
|---|---|
| for 15 inch tire models | EPS BRS (Brush type) |
| for 17 inch tire models | EPS LES (Brushless type) |

**NOTICE:**

- If the EPS brush information shown under "EPS TYPE" does not match the vehicle specification, change the EPS brush specification to one that matches the vehicle specification.
- The EPS brush specification can be changed on the INDIVIDUAL SETTING screen which is displayed after "NEXT" is selected.
- When the EPS brush specification is modified, steering angle setting is required INFO .

(g) HT SENS inspection

**HINT:**

**If "CHK" (red) is displayed for "HT SENS", check for DTCs and perform troubleshooting based on the output DTCs** INFO **.**

(h) HT INIT inspection

**HINT:**

**If "CHK" (red) is displayed for "HT INIT", perform troubleshooting according to the table below.**

| DISPLAYED | CAUSE | TROUBLESHOOTING |
|---|---|---|

| CONTENT | | |
|---|---|---|
| CHK (red) | • Vehicle height difference setting is not completed<br>• Rear height control sensor sub-assembly RH is malfunctioning | • If "CHK" (red) is also displayed for "HT SENS", check for DTCs and perform troubleshooting based on the output DTCs INFO .<br>• If "OK" (blue) is displayed for "HT SENS", perform vehicle height difference setting INFO . |

(i) STR inspection

**HINT:**

**If "CHK" (red) is displayed for "STR", check for DTCs and perform troubleshooting based on the output DTCs INFO .**

(j) HANDLE inspection

**HINT:**

**If "CHK" (red) is displayed for "HANDLE", check for DTCs and perform troubleshooting based on the output DTCs INFO .**

(k) Finish diagnostic mode INFO .

### 6. CALIBRATION WHEN SERVICING VEHICLE

**NOTICE:**

**Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .**

### 7. STEERING ANGLE SETTING (after parking assist ECU is initialized)

**HINT:**

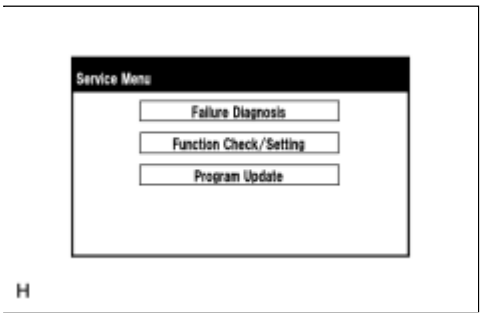
**If the vehicle width extension lines and predicted path lines are not aligned when the steering wheel is centered, or if the predicted path line does not move before the steering wheel is fully turned to either the left or right, adjust the steering angle settings.**

(a) Center the steering wheel and stop the vehicle.

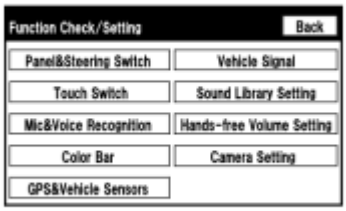
(b) Start diagnostic mode.

**NOTICE:**

**Steering angle setting must be carried out with the hybrid system started. Apply the parking brake, depress the brake pedal, push the P position switch, and ensure that the vehicle is not moving.**

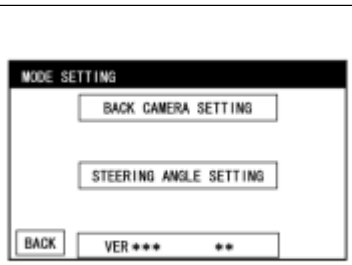



(1) Select "Function Check/Setting" on the Service Menu screen.




H

(2) Select "Camera Setting" on the Function Check/Setting screen.

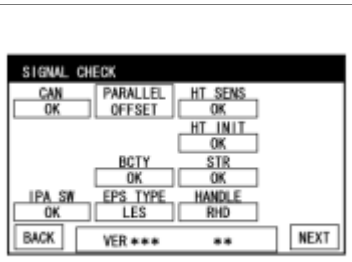



H

(3) Select "STEERING ANGLE SETTING" on the MODE SETTING screen.

**HINT:**

**To select a grayed out item, select and hold the item for 2 seconds or more.**




H

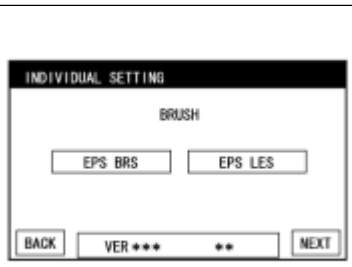
(4) Select "NEXT" on the SIGNAL CHECK screen.

- When "CHK" (red) is displayed for any items on the SIGNAL CHECK screen, selecting "NEXT" will not change the screen to the STEERING ANGLE SETTING screen.
- When "CHK" is displayed for any items on the SIGNAL CHECK screen, perform inspections using the SIGNAL CHECK screen.

(c) Individual setting

(1) Confirm the vehicle specification and select the EPS brush specification.

| VEHICLE SPECIFICATION | EPS BRUSH SPECIFICATION |
|---|---|
| for 15 inch tire models | EPS BRS (Brush type) |
| for 17 inch tire models | EPS LES (Brushless type) |




H

- Selected EPS brush specification is indicated in blue.
- EPS brush refers to the type of motor used for the EPS system (with brushes or brushless).

**NOTICE:**

**If the selected EPS brush specification does not match the vehicle specification, select the one that matches the vehicle specification.**

(2) Select "NEXT" on the INDIVIDUAL SETTING screen.

- The INDIVIDUAL SETTING screen will not be displayed when "BACK" is selected after switching to the STEERING ANGLE SETTING screen.
- To display the INDIVIDUAL SETTING screen again, go back to the Function Check/Setting screen, select "Camera Setting" and repeat the

Function Check/Setting screen, select "Camera Setting" and repeat the steps.

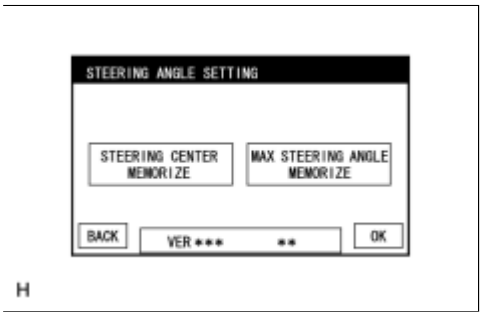
(d) Steering angle setting

(1) Check that the steering wheel is centered (approximately +/- 5 degrees or less) and select "STEERING CENTER MEMORIZE".

(2) After the centered steering position is memorized, turn the steering wheel to the left and then to the right full lock positions and select "MAX STEERING ANGLE MEMORIZE".

**HINT:**

**It is also possible to start by initially turning the steering wheel to the right side.**




(3) Select "MAX STEERING ANGLE MEMORIZE" to store the steering angle adjustment value and change the screen to the MODE SETTING screen.

- When "MAX STEERING ANGLE MEMORIZE" is selected, a beep will sound to confirm that the steering angle adjustment values have been stored.
- The adjustment values will not be stored unless "MAX STEERING ANGLE MEMORIZE" is selected.
- Until a beep finishes sounding, the adjustment values are not stored.
- When "BACK" is selected, the screen changes to SIGNAL CHECK without storing the set values.
- Even if "OK" is selected, the adjustment values will not be stored.
- If the steering angle settings have not been adjusted, selecting "MAX STEERING ANGLE MEMORIZE" will not cause the adjustment values to be stored.
- Even if no DTCs are detected, selecting "MAX STEERING ANGLE MEMORIZE" may not cause the adjustment value to be stored if the steering sensor is malfunctioning.
- If selecting "MAX STEERING ANGLE MEMORIZE" does not cause the adjustment value to be stored after adjusting the steering angle, replace the spiral with sensor cable sub-assembly INFO .

(e) Finish diagnostic mode.

(f) Confirm steering angle adjustment.

**HINT:**

**If the steering angle has been adjusted, confirm the steering angle adjustment on the advanced parking guidance screen after finishing diagnosis mode.**

(1) Check on the advanced parking guidance screen that the predicted path line moves until the steering wheel is fully turned to either the left or right.

**HINT:**

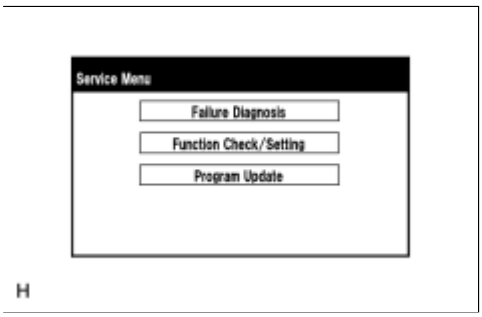
**If the predicted path line stops moving before the steering wheel is fully turned to either the left or right, the steering angle adjustment values have not been stored correctly. In this case, perform "STEERING CENTER MEMORIZE" and "MAX STEERING ANGLE MEMORIZE" again.**

### 8. PARKING POSITION HORIZONTAL ADJUSTMENT FOR PARALLEL PARKING MODE

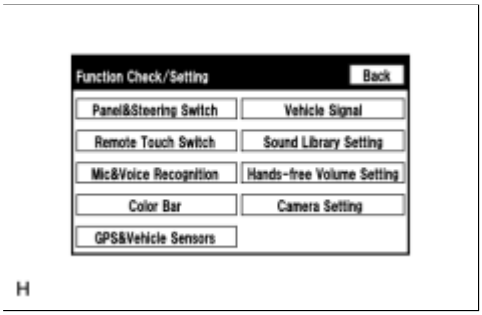
(a) Start diagnostic mode.

**NOTICE:**

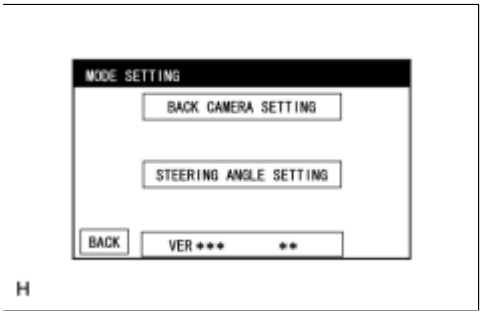
**Parallel parking offset must be carried out with the hybrid system started. Apply the parking brake, depress the brake pedal, push the P position switch, and ensure that the vehicle is not moving.**




(1) Select "Function Check/Setting" on the Service Menu screen.



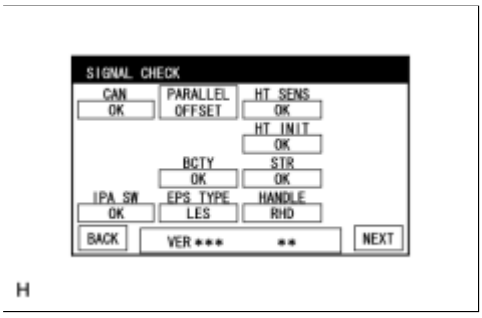

(2) Select "Camera Setting" on the Function Check/Setting screen.




(3) Select "BACK CAMERA SETTING" or "STEERING ANGLE SETTING" on the MODE SETTING screen.

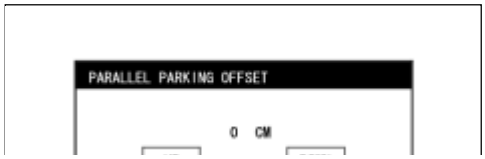
**HINT:**

**To select a grayed out item, select and hold the item for 2 seconds or more.**




(4) Select "PARALLEL OFFSET" on the SIGNAL CHECK screen.

(b) PARALLEL PARKING OFFSET

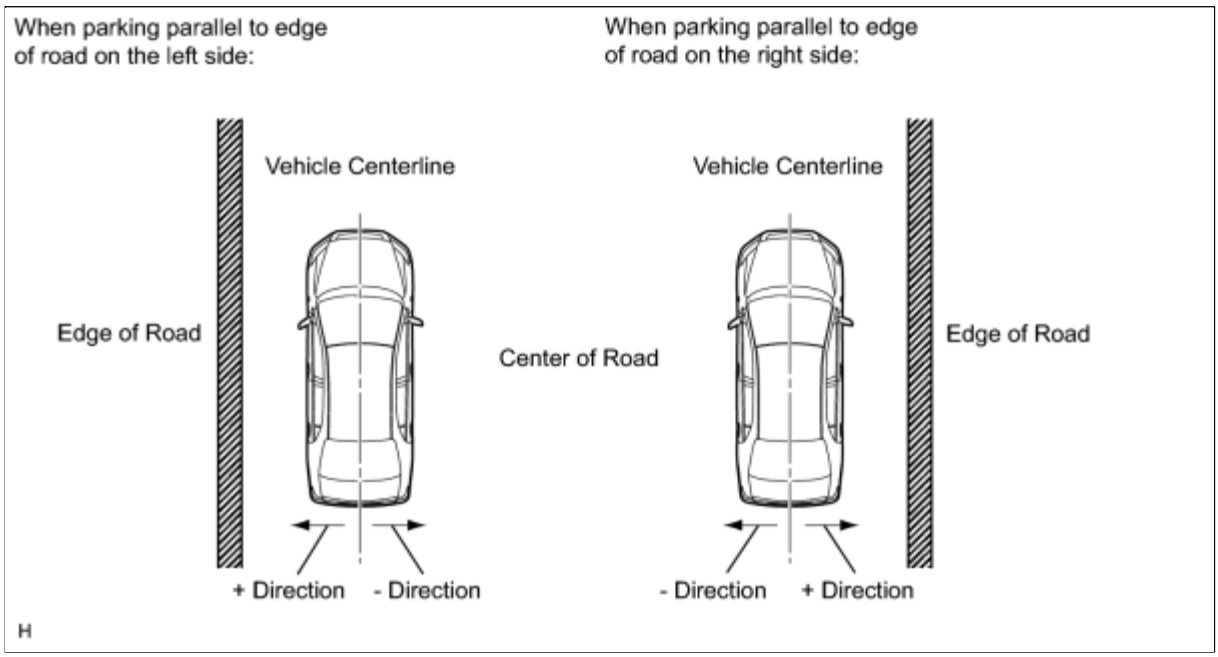





**HINT:**

**The PARALLEL PARKING OFFSET screen allows the parking position to be offset when the actual parking position deviates to the right or left of the set target parking position during parallel parking mode.**

(1) Press "UP" or "DOWN" to adjust the parallel parking position horizontal offset amount.




**HINT:**

- A positive value is indicated in green and a negative value is indicated in red.
- The + direction indicates an offset toward the edge of the road, the - direction indicates an offset toward the road surface.
- When a value is shown as "10 CM" in red, it means -10 cm (the parking position is offset 10 cm towards the center of the road).
- Available setting range: +20 cm to -40 cm (can be adjusted in 1 cm increments)

(2) When "OK" is selected, the screen switches to the signal connection screen and a set value is stored.

- When "OK" is selected, the set value is stored after a "beep" sounds for confirmation.
- The memory is not updated until "OK" is selected.
- Until a beep finishes sounding, the adjustment values are not stored.
- When "BACK" is selected, the screen switches to the signal connection screen without storing a value (values entered are not stored).

(c) Finish diagnostic mode.

# DTC CHECK / CLEAR

### 1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Advanced Parking Guidance System / Trouble Codes.

(e) Check the details of the DTCs 

.

### 2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Advanced Parking Guidance System / Trouble Codes.

(e) According to the display on the Techstream, select the trouble code data display with the clear button.

# DATA LIST / ACTIVE TEST

## 1. DATA LIST

**HINT:**

**Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring disturbed. Reading the Data List information early in troubleshooting one way to save diagnostic time.**

**NOTICE:**

**In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part faulty or not.**

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Advanced Parking Guidance System / Data List.

(e) According to the display on the Techstream, read the Data List.

**Advanced Parking Guidance System**

| TESTER DISPLAY | MEASUREMENT ITEM/RANGE | NORMAL CONDITION | DIAGNOSTIC NOTE |
|---|---|---|---|
| AVC-LAN Master Connect Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |
| AVC-LAN Master Reset Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |
| AVC-LAN Master Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |
| AVC-LAN Connect Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |
| AVC-LAN Sending Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |
| AVC-LAN Regist Complete Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |
| AVC-LAN Regist Request Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |

| | | | |
|---|---|---|---|
| ON/OFF Parameter Status | AVC-LAN communication condition/OK or NG | OK: AVC-LAN communication condition normal<br>NG: AVC-LAN communication condition abnormal | - |
| ROM/SUM Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| Mirror Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| High-Speed RAM Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| EEPROM Status (Initial read) | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| RAM Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| IG Voltage Low Status | IG voltage input to parking assist ECU/OK or NG | OK: IG voltage normal<br>NG: IG voltage abnormal (too low) | - |
| IG Voltage High Status | IG voltage input to parking assist ECU/OK or NG | OK: IG voltage normal<br>NG: IG voltage abnormal (too high) | - |
| ACC Voltage Low Status | ACC voltage input to parking assist ECU/OK or NG | OK: ACC voltage normal<br>NG: ACC voltage abnormal (too low) | - |
| ACC Voltage High Status | ACC voltage input to parking assist ECU/OK or NG | OK: ACC voltage normal<br>NG: ACC voltage abnormal (too high) | - |
| CPU Busy Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| CPU Communication Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| Integer Arithmetic Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| FPU Calculation Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU normal<br>NG: Parking assist ECU abnormal | - |
| AISIC Output Status | Output condition of camera display signal/OK or NG | OK: Output condition of camera display signal normal<br>NG: Output condition of camera display signal abnormal | - |
| EPS Status | EPS (Power Steering System) status/OK or NG | OK: EPS available<br>NG: EPS not available | - |
| Wheel Speed Sensor (4wheel) | Effectivity of speed signal from speed signal sensor/OK or NG | OK: Speed signal effective<br>NG: Speed signal not effective | - |
| Height Sensor Volt Status (L) | Power supply for rear height control sensor sub-assembly RH (Low)/OK or NG | OK: Power supply for rear height control sensor sub-assembly RH normal<br>NG: Power supply for rear height control sensor sub-assembly RH abnormal | - |
| | | OK: Power supply for rear height | |

| | | | |
|---|---|---|---|
| Height Sensor Volt Status (H) | Power supply for rear height control sensor sub-assembly RH (High)/OK or NG | OK: Power supply for rear height control sensor sub-assembly RH normal<br>NG: Power supply for rear height control sensor sub-assembly RH abnormal | - |
| Height Sensor Status | Vehicle height signal from rear height control sensor sub-assembly RH/OK or NG | OK: Signal from rear height control sensor sub-assembly RH normal<br>NG: Signal from rear height control sensor sub-assembly RH abnormal | - |
| Height Sensor Status (Fixing) | Vehicle height signal from rear height control sensor sub-assembly RH (Fixing)/OK or NG | OK: Rear height control sensor sub-assembly RH normal<br>NG: Rear height control sensor sub-assembly RH fixing | - |
| FLS Sensor Status (Left) | No. 1 ultrasonic sensor (front left sensor) condition/OK or NG | OK: No. 1 ultrasonic sensor (front left sensor) normal<br>NG: No. 1 ultrasonic sensor (front left sensor) abnormal | - |
| FLS Sensor Status (Right) | No. 1 ultrasonic sensor (front right sensor) condition/OK or NG | OK: No. 1 ultrasonic sensor (front right sensor) normal<br>NG: No. 1 ultrasonic sensor (front right sensor) abnormal | - |
| Temp Sensor Activate Status | Ambient temperature sensor status/valid or invalid | OK: Ambient temperature sensor available<br>NG: Ambient temperature sensor not available | - |
| Temp Sensor Status | Ambient temperature sensor status/OK or NG | OK: Ambient temperature sensor available<br>NG: Ambient temperature sensor not available | - |
| A/C Communication Status | Communication condition to air conditioning amplifier assembly/OK or NG | OK: Communication condition available<br>NG: Communication condition not available | - |
| Number of DTC | Number of stored trouble codes/min.: 0, max.: 255 | Number of DTCs will be displayed | - |

# DIAGNOSTIC TROUBLE CODE CHART

**HINT:**

**If a trouble code is output during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" in the DTC chart. Inspect fuses and relays before investigating the trouble areas shown in the table below.**

**Advanced Parking Guidance System**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| C1611 | ECU Malfunction | 1. Parking assist ECU initialization (not initialized parking assist ECU)<br>2. Height control sensor vehicle height difference setting (not initialized parking assist ECU)<br>3. Rear television camera optical axis adjustment (initialized parking assist ECU)<br>4. Steering angle setting (initialized parking assist ECU)<br>5. Parking assist ECU | INFO |
| C1612 | IG Voltage is Low or High | 1. Harness or connector<br>2. Parking assist ECU | INFO |
| C1613 | ACC Voltage is Low or High | 1. Harness or connector<br>2. Parking assist ECU | INFO |
| C1621 | Back Camera Power Supply Failure | 1. Harness or connector<br>2. Rear television camera assembly<br>3. Parking assist ECU | INFO |
| C1622 | Open or Short Circuit in Back Camera Signal | 1. Harness or connector<br>2. Rear television camera assembly<br>3. Parking assist ECU | INFO |
| C1625 | Open or Short in Steering Angle Sensor +B | 1. Harness or connector<br>2. Steering angle sensor (spiral with sensor cable sub-assembly) | INFO |
| C1626 | Steering Angle Sensor Failure | 1. Steering angle sensor (spiral with sensor cable sub-assembly)<br>2. Parking assist ECU | INFO |
| C1627 | Vehicle Height Sensor Voltage is Low or High | 1. Harness or connector<br>2. Headlight leveling ECU assembly<br>3. Parking assist ECU | INFO |
| C1628 | Vehicle Height Sensor Failure | 1. Harness or connector<br>2. Rear height control sensor sub-assembly RH<br>3. Parking assist ECU | INFO |
| C1645 | Power Steering Control System Failure | Power steering system | INFO |
| C164A | EPS Communication Malfunction | 1. Parking assist ECU<br>2. Power steering system<br>3. Power steering ECU | INFO |
| C164E | Stop Switch Circuit Malfunction | Electronically controlled brake system | INFO |
| C1657 | Hybrid Powertrain Control Module | Hybrid control system | INFO |

| | | | |
|---|---|---|---|
| C1658 | Speed Sensor Malfunction | Electronically controlled brake system | INFO |
| C1659 | Brake System Malfunction | Electronically controlled brake system | INFO |
| C1662 | Ambient Temperature High | Parking assist ECU | INFO |
| C168B | AVC-LAN Communication Malfunction | AVC-LAN communication | INFO |
| C168C | AVC-LAN Command Time Out | AVC-LAN communication | INFO |
| C1691 | Back Camera Initialization Incomplete | 1. Height control sensor vehicle height difference setting<br>2. Rear television camera optical axis adjustment<br>3. Parking assist ECU | INFO |
| C1694 | Steering Angle Initialization Incomplete | 1. Steering angle setting<br>2. Parking assist ECU | INFO |
| C1695 | Zero point Calibration of Vehicle Height Sensor Incomplete | 1. Height control sensor vehicle height difference setting<br>2. Parking assist ECU | INFO |
| C1AE0 | Front Left Side Sensor | 1. No. 1 ultrasonic sensor (front left side sensor)<br>2. Parking assist ECU | INFO |
| C1AE5 | Front Right Side Sensor | 1. No. 1 ultrasonic sensor (front right side sensor)<br>2. Parking assist ECU | INFO |
| U0073 | Control Module Communication Bus Off | CAN communication system | INFO |
| U0126 | Lost Communication with Steering Angle Sensor Module | CAN communication system | INFO |
| U0129 | Lost Communication with Brake System Control Module | CAN communication system | INFO |
| U0131 | Lost Communication with Power Steering Control Module | CAN communication system | INFO |
| U0140 | Lost Communication with Main Body ECU | CAN communication system | INFO |
| U0293 | Lost Communication with HV ECU | CAN communication system | INFO |
| U1000 | Can Communication Failure(Message Registry) | Parking assist ECU | INFO |
| C1AEE | APGS Sensor Communication Circuit | 1. Harness or connector<br>2. No. 1 ultrasonic sensor (front left side sensor)<br>3. No. 1 ultrasonic sensor (front right side sensor)<br>4. Parking assist ECU | INFO |

| DTC | C1611 | ECU Malfunction |
|---|---|---|

## DESCRIPTION

This DTC is stored if the parking assist ECU judges that there is an internal malfunction as a result of its self check.

**HINT:**

**The parking assist ECU stores different types of information during initialization. If the parking assist ECU cannot read the stored information when it is activated, the parking assist ECU judges that there is an internal malfunction and stores this DTC.**

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1611 | When one of the following conditions is met:<br>• ROM/SUM check malfunction<br>• Mirror check malfunction<br>• High-speed RAM check malfunction<br>• EEPROM (Initial read) malfunction<br>• RAM check malfunction<br>• CPU busy malfunction<br>• CPU communication malfunction<br>• Integer arithmetic malfunction<br>• FPU calculation malfunction<br>• AISIC output malfunction | • Parking assist ECU initialization (not initialized parking assist ECU)<br>• Height control sensor vehicle height difference setting (not initialized parking assist ECU)<br>• Rear television camera optical axis adjustment (initialized parking assist ECU)<br>• Steering angle setting (initialized parking assist ECU)<br>• Parking assist ECU |

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **READ VALUE USING TECHSTREAM** |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Advanced Parking Guidance System / Data List.

(e) Check the Data List for proper functioning of the following items.

**Advanced Parking Guidance**

| TESTER DISPLAY | MEASUREMENT ITEM/RANGE | NORMAL CONDITION | DIAGNOSTIC NOTE |
|---|---|---|---|
| ROM/SUM Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| Mirror Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| High-Speed RAM Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| EEPROM Status (Initial read) | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| RAM Check | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| CPU Busy Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| CPU Communication Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| Integer Arithmetic Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| FPU Calculation Status | Parking assist ECU information/OK or NG | OK: Parking assist ECU is normal<br>NG: Parking assist ECU is abnormal | - |
| AISIC Output Status | Output condition of camera display signal/OK or NG | OK: Output condition of camera display signal is normal<br>NG: Output condition of camera display signal is abnormal | - |

Result:

| RESULT | PROCEED TO |
|---|---|
| OK is displayed for all items. | A |
| NG is displayed for EEPROM status (Initial read). | A |
| NG is displayed except EEPROM status (Initial read). | B |

**B** ▶ **REPLACE PARKING ASSIST ECU**

**A** ▼

| 2. | ADJUST SETTINGS (PARKING ASSIST ECU INITIALIZATION) |
|---|---|

**HINT:**

- The parking assist ECU stores different types of information during initialization. If the parking assist ECU cannot read the stored information when it is activated, the parking assist ECU judges that there is an internal malfunction and stores this DTC.
- If the parking assist ECU cannot read the stored information when it is activated, allowing the ECU to store the information again may return the system to normal.

(a) Use the transition of diagnosis screens (note which transition pattern occurs) to confirm if the parking assist ECU was able to properly store the information from initialization INFO .

**HINT:**

**The procedure to make the parking assist ECU store the vehicle information differs when the parking assist ECU has stored the information (initialized) and when the information has not been stored (not initialized).**

(b) Perform the following procedure depending on the memory conditions to register the vehicle information into the parking assist ECU.

| CONDITION | PROCEDURE |
|---|---|
| Not initialized | Parking assist ECU initialization INFO |
| Initialized | • Height control sensor vehicle height difference setting INFO<br>• Rear television camera optical axis adjustment INFO<br>• Steering angle setting INFO |

**NEXT**

| 3. | CHECK DTC OUTPUT |
|---|---|

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1611 is output | A |
| No DTC is output | B |

**HINT:**

- If DTC C1611 is output, perform the procedure to allow the parking assist ECU to store the vehicle information again.
- If DTC C1611 is still output after performing the procedure to make the parking assist ECU store the vehicle information 3 times, replace the parking assist ECU.
- If DTC C1611 is output frequently, replace the parking assist ECU even though the DTC is not output when rechecking for DTCs.

**B** ▶ **END**

**A** ▶ **REPLACE PARKING ASSIST ECU**

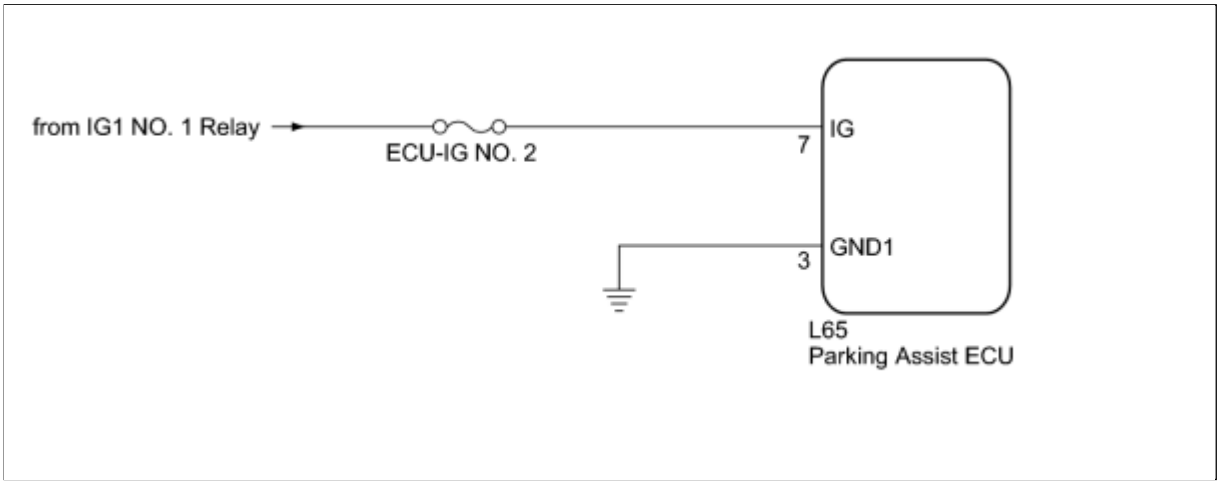
| DTC | C1612 | IG Voltage is Low or High |
|---|---|---|

## DESCRIPTION

This DTC is stored if the parking assist ECU judges as a result of its self check that the voltage received by terminal IG is low or high.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1612 | • IG voltage is low<br>• IG voltage is high | • Harness or connector<br>• Parking assist ECU |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1612 is output | A |
| No DTC is output | B |

**HINT:**

**If the parking assist ECU cannot read the stored information when it is activated, allowing the ECU to store the information again may return the system to normal.**

**B** ▶ **USE SIMULATION METHOD TO CHECK**

**A** ▼

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU IG VOLTAGE)** |

(a) Disconnect the L65 connector from the parking assist ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-7 (IG) - L65-3 (GND1) | Power switch on (IG) | 11 to 14 V |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **REPLACE PARKING ASSIST ECU**

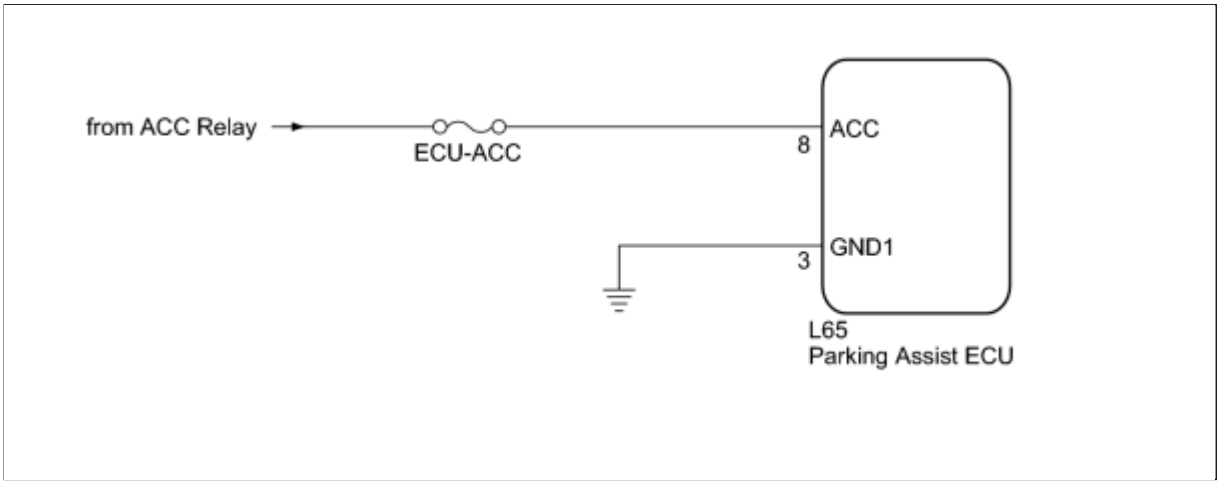
| DTC | C1613 | ACC Voltage is Low or High |
|---|---|---|

## DESCRIPTION

This DTC is stored if the parking assist ECU judges as a result of its self check that the voltage received by terminal ACC is not normal.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1613 | • ACC voltage is low<br>• ACC voltage is high | • Harness or connector<br>• Parking assist ECU |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1613 is output | A |
| No DTC is output | B |

**HINT:**

**If the parking assist ECU cannot read the stored information when it is activated, allowing the ECU to store the information again may return the system to normal.**

**B** ▶ **USE SIMULATION METHOD TO CHECK**

**A**

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU ACC VOLTAGE)** |

(a) Disconnect the L65 connector from the parking assist ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-8 (ACC) - L65-3 (GND1) | Power switch on (ACC) | 11 to 14 V |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **REPLACE PARKING ASSIST ECU**

| | | |
|---|---|---|
| **DTC** | **C1621** | **Back Camera Power Supply Failure** |

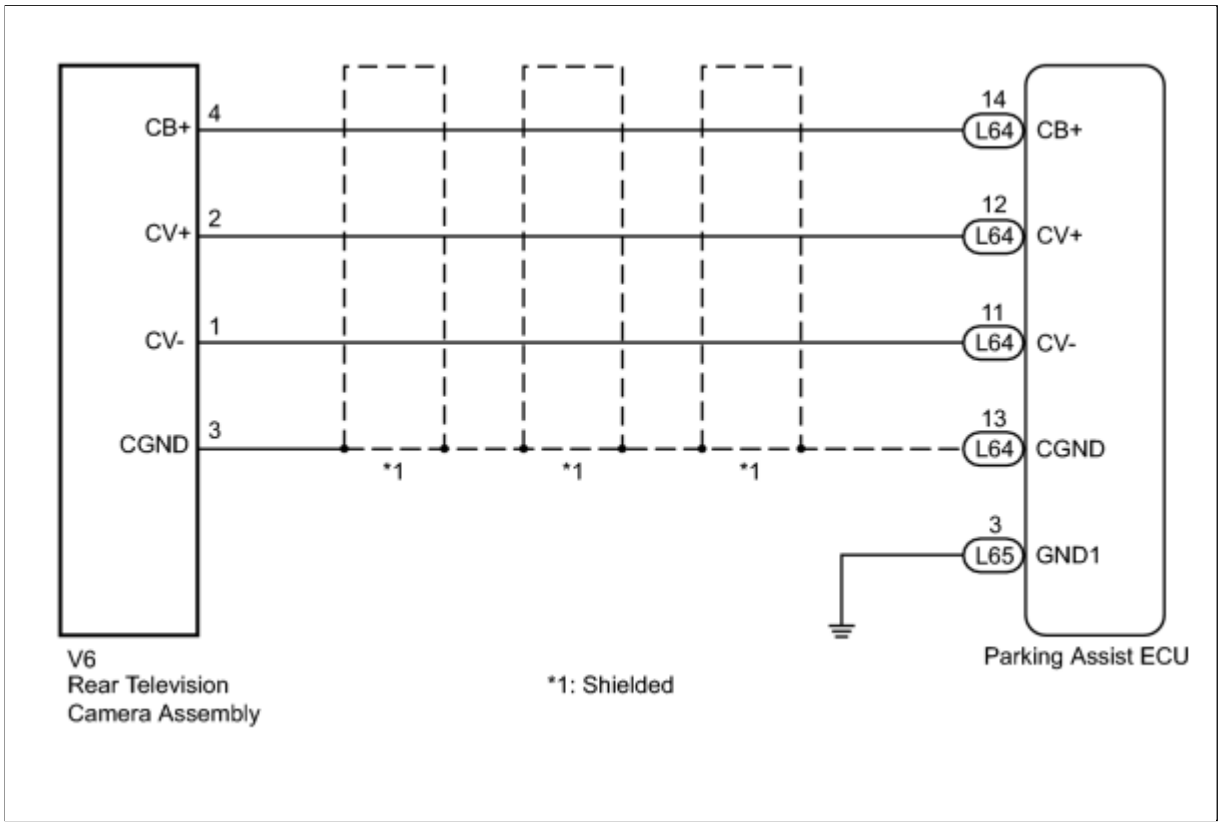
| | | |
|---|---|---|
| **DTC** | **C1622** | **Open or Short Circuit in Back Camera Signal** |

## DESCRIPTION

These DTCs are stored if the parking assist ECU judges as a result of its self check that the signals or signal lines between the parking assist ECU and rear television camera assembly are not normal.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1621 | Rear television camera power supply failure | • Harness or connector<br>• Rear television camera assembly<br>• Parking assist ECU |
| C1622 | An open or short in the rear television camera signal circuit | • Harness or connector<br>• Rear television camera assembly<br>• Parking assist ECU |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU - REAR TELEVISION CAMERA)** |

(a) Disconnect the L64 connector from the parking assist ECU.

(b) Disconnect the V6 connector from the rear television camera assembly.

(c) Measure the resistance according to the value(s) in the table below.

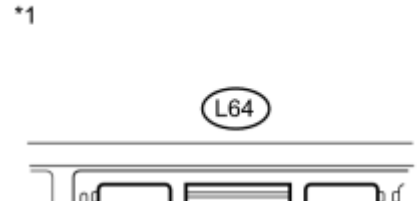
Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L64-11 (CV-) - V6-1 (CV-) | Always | Below 1 Ω |
| L64-12 (CV+) - V6-2 (CV+) | Always | Below 1 Ω |
| L64-13 (CGND) - V6-3 (CGND) | Always | Below 1 Ω |
| L64-14 (CB+) - V6-4 (CB+) | Always | Below 1 Ω |
| L64-11 (CV-) - Body ground | Always | 10 kΩ or higher |
| L64-12 (CV+) - Body ground | Always | 10 kΩ or higher |
| L64-13 (CGND) - Body ground | Always | 10 kΩ or higher |
| L64-14 (CB+) - Body ground | Always | 10 kΩ or higher |

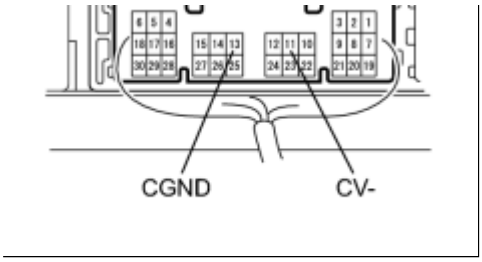
**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| 2. | **CHECK PARKING ASSIST ECU (CV-, CGND)** |




(a) Disconnect the L64 connector from the parking assist ECU.




(a) Reconnect the L64 connector to the parking assist ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L64-11 (CV-) - Body ground | Always | Below 1 Ω |
| L64-13 (CGND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br>(Parking Assist ECU) |

**NG** ▶ **REPLACE PARKING ASSIST ECU**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK REAR TELEVISION CAMERA ASSEMBLY (CB+, CGND)** |

(a) Disconnect the V6 connector from the rear television camera assembly.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

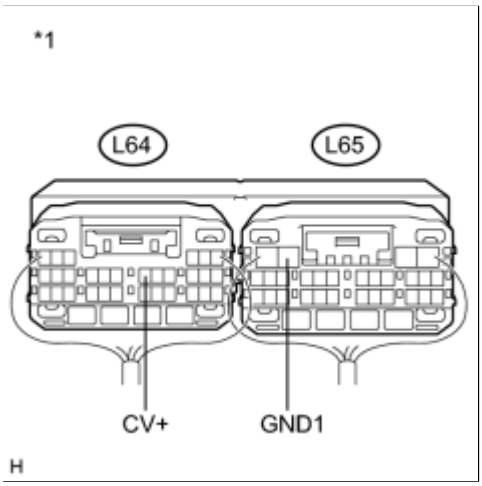
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| V6-3 (CGND) - V6-4 (CB+) | Power switch on (IG)<br>Shift lever in R | 5.8 to 7.0 V |

**NG** ▶ **REPLACE PARKING ASSIST ECU**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK PARKING ASSIST ECU (CV+, GND1)** |

(a) Reconnect the V6 connector to the rear television camera assembly.




(b) Reconnect the L64 and L65 connectors to the parking assist ECU.

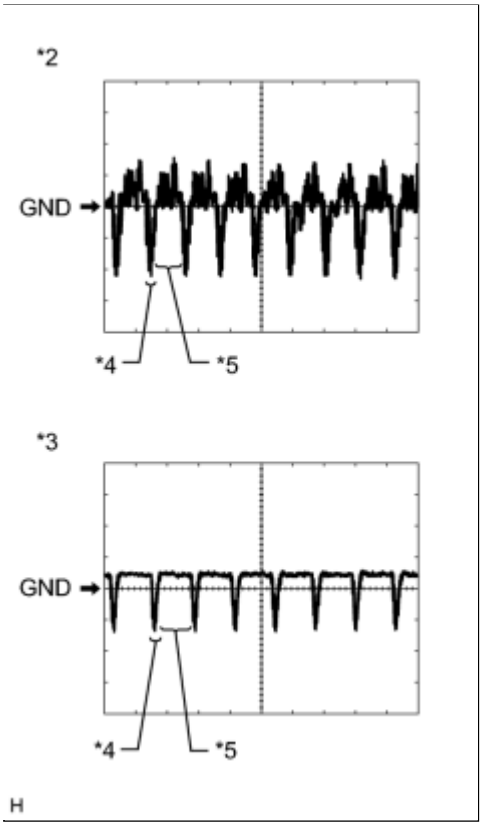
(c) Check the waveform of the rear television camera assembly using an oscilloscope.

**HINT:**

**A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the parking assist ECU with the connector connected.**

OK:

Waveform is as shown in the illustration.




| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | L64-12 (CV+) - L65-3 (GND1) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Parking Assist ECU) |
| *2 | Waveform 1 (under normal conditions) |
| *3 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *4 | Synchronized Signal |
| *5 | Video Waveform |

NG ▶ REPLACE REAR TELEVISION CAMERA ASSEMBLY

OK ▶ REPLACE PARKING ASSIST ECU

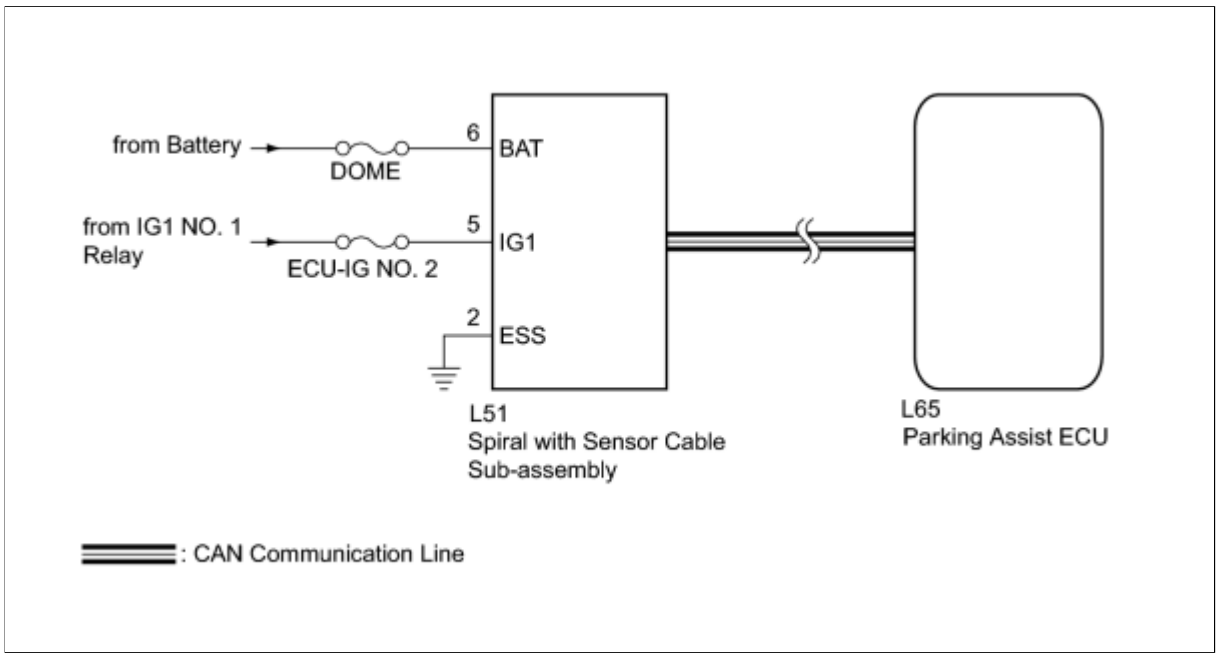
| DTC | C1625 | Open or Short in Steering Angle Sensor +B |
|---|---|---|

## DESCRIPTION

This DTC is stored if the parking assist ECU receives a signal via CAN communication from the spiral with sensor cable sub-assembly that indicates a power supply system problem.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1625 | Open or short in steering angle sensor +B | • Harness or connector<br>• Steering angle sensor (spiral with sensor cable sub-assembly) |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY POWER SUPPLY)** |

(a) Disconnect the L51 connector from the spiral with sensor cable sub-assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L51-2 (ESS) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L51-5 (IG1) - 2 (ESS) | Power switch on (IG) | 11 to 14 V |
| L51-6 (BAT) - 2 (ESS) | Always | 11 to 14 V |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **REPLACE SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY**

| DTC | C1626 | Steering Angle Sensor Failure |
|---|---|---|

## DESCRIPTION

This DTC is stored if the parking assist ECU receives a signal via CAN communication from the spiral with sensor cable sub-assembly that indicates an internal malfunction.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1626 | A fail flag is transmitted from the steering angle sensor. | • Steering angle sensor (spiral with sensor cable sub-assembly)<br>• Parking assist ECU |

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **REPLACE SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY** |

(a) Replace the spiral with sensor cable sub-assembly INFO .

**NEXT**

| | |
|---|---|
| 2. | **CHECK DTC OUTPUT** |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1626 is output | A |

| | |
|---|---|
| No DTC is output | B |

**B** ▶ **END**

**A** ▶ **REPLACE PARKING ASSIST ECU**

| | | |
|---|---|---|
| **DTC** | **C168B** | **AVC-LAN Communication Malfunction** |

| | | |
|---|---|---|
| **DTC** | **C168C** | **AVC-LAN Command Time Out** |

## DESCRIPTION

These DTCs are stored if the parking assist ECU judges that there is a problem with the AVC-LAN communication system as a result of self check.

**HINT:**

**These DTCs may be stored due to the battery condition or changes in the power supply waveform when starting the engine, even though there is no problem with the AVC-LAN communication system.**

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C168B | • AVC-LAN communication malfunction: No master<br>• AVC-LAN communication malfunction: Master reset<br>• AVC-LAN communication malfunction: Master malfunction<br>• AVC-LAN communication malfunction: Abnormal connection check<br>• AVC-LAN communication malfunction: Transmission not completed<br>• AVC-LAN communication malfunction: Abnormal transmission completion notification<br>• AVC-LAN communication malfunction: Registration request transmission<br>• AVC-LAN communication malfunction: Abnormal ON/OFF parameter | AVC-LAN communication |
| C168C | • AVC-LAN command time out: Output ON request notification command time out<br>• AVC-LAN command time out: Output OFF request notification command time out<br>• AVC-LAN command time out: Voice production start request notification command time out<br>• AVC-LAN command time out: Voice production end request notification command time out | |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC OUTPUT** |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C168B or C168C is output (w/ navigation system) | A |
| No DTC is output | B |

**HINT:**

- This DTC may be stored due to the battery condition or changes in the power supply waveform when starting the engine, even though there is no problem with the AVC-LAN communication system.
- If DTC C168B or C168C is output frequently, duplicate the problem symptoms and perform the inspection again, even though the DTC is not output when rechecking for DTCs INFO .

**B** ▶ **USE SIMULATION METHOD TO CHECK**

**A** ▶ **GO TO NAVIGATION SYSTEM**

| DTC | C1691 | Back Camera Initialization Incomplete |
|---|---|---|

## DESCRIPTION

This DTC is stored when the parking assist ECU judges that the back camera initial setting has not been memorized (rear television camera optical axis adjustment is incomplete).

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1691 | Back camera initial setting has not been memorized | • Height control sensor vehicle height difference setting<br>• Rear television camera optical axis adjustment<br>• Parking assist ECU |

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| 1. | ADJUST SETTINGS (HEIGHT SET AND CAMERA POSITION SETTING) |
|---|---|

(a) Perform the following procedure depending on the memory conditions to register the vehicle information into the parking assist ECU.

**HINT:**

**Before performing the rear television camera optical axis adjustment, the height control sensor vehicle height difference setting must be performed in the "HEIGHT SET" screen.**

(1) Height control sensor vehicle height difference setting INFO

(2) Rear television camera optical axis adjustment INFO

**NEXT**

| 2. | CHECK DTC OUTPUT |
|---|---|

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1691 is output | A |
| No DTC is output | B |

**HINT:**

- If DTC C1691 is output, perform the rear television camera optical axis adjustment again.
- If DTC C1691 is still output after performing the height control sensor vehicle height difference setting and rear television camera optical axis adjustment 3 times, replace the parking assist ECU.

**B** ▶ **END**

**A** ▶ **REPLACE PARKING ASSIST ECU**

| DTC | C1694 | Steering Angle Initialization Incomplete |
|---|---|---|

## DESCRIPTION

This DTC is stored when the parking assist ECU judges that the maximum steering angle has not been memorized (steering angle setting is incomplete).

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1694 | Maximum steering angle has not been memorized | • Steering angle setting<br>• Parking assist ECU |

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| 1. | ADJUST SETTINGS (STEERING ANGLE SETTING) |
|---|---|

(a) Perform the following procedure depending on the memory conditions to register the vehicle information into the parking assist ECU.

(1) Steering angle setting (Diagnosis system) INFO

**NEXT**

| 2. | CHECK DTC OUTPUT |
|---|---|

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1694 is output | A |

| | |
|---|---|
| DTC C1694 is output | A |
| No DTC is output | B |

**HINT:**

- If DTC C1694 is output, perform the steering angle setting again.
- If DTC C1694 is still output after performing the steering angle setting 3 times, replace the parking assist ECU.

**B** ▶ **END**

**A** ▶ **REPLACE PARKING ASSIST ECU**

| DTC | C1695 | Zero point Calibration of Vehicle Height Sensor Incomplete |
|---|---|---|

## DESCRIPTION

This DTC is stored when the parking assist ECU judges that the zero point calibration of the vehicle height sensor is incomplete (height control sensor vehicle height difference setting is incomplete).

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1695 | Zero point calibration of vehicle height sensor is incomplete | • Height control sensor vehicle height difference setting<br>• Parking assist ECU |

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | ADJUST SETTINGS (HEIGHT CONTROL SENSOR VEHICLE HEIGHT DIFFERENCE SETTING) |

(a) Perform the following procedure depending on the memory conditions to register the vehicle information into the parking assist ECU.

(1) Height control sensor vehicle height difference setting INFO

**NEXT**

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1695 is output | A |
| No DTC is output | B |

**HINT:**

- If DTC C1695 is output, perform the height control sensor vehicle height difference setting again.
- If DTC C1695 is still output after performing the height control sensor vehicle height difference setting 3 times, replace the parking assist ECU.

**B** ▶ **END**

**A** ▶ **REPLACE PARKING ASSIST ECU**

| | | |
|---|---|---|
| **DTC** | **C1AE0** | **Front Left Side Sensor** |

## DESCRIPTION

This DTC is stored when the parking assist ECU receives an abnormal signal from the No. 1 ultrasonic sensor (front left side sensor) immediately after the power switch is turned on (IG) or while the No. 1 ultrasonic sensor is operating (neither P nor R is selected, and the vehicle is not stopped).

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1AE0 | Ultrasonic sensor (front left side sensor) malfunction | • No . 1 ultrasonic sensor (front left side sensor)<br>• Parking assist ECU |

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| **1.** | **REPLACE NO. 1 ULTRASONIC SENSOR (FRONT LEFT SIDE SENSOR)** |

(a) Replace the No. 1 ultrasonic sensor (front left side sensor) with a normally functioning sensor INFO .

**NEXT**

| | |
|---|---|
| **2.** | **CHECK DTC OUTPUT** |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|

| | |
|---|---|
| DTC C1AE0 is output | A |
| No DTC is output | B |

**B** ▶ **END (FRONT LEFT SIDE SENSOR WAS DEFECTIVE)**

**A** ▶ **REPLACE PARKING ASSIST ECU**

| DTC | C1AE5 | Front Right Side Sensor |
|---|---|---|

## DESCRIPTION

This DTC is stored when the parking assist ECU receives an abnormal signal from the No. 1 ultrasonic sensor (front right side sensor) immediately after the power switch is turned on (IG) or while the No. 1 ultrasonic sensor is operating (neither P nor R is selected, and the vehicle is not stopped).

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1AE5 | Ultrasonic sensor (front right side sensor) malfunction | • No. 1 ultrasonic sensor (front right side sensor)<br>• Parking assist ECU |

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | REPLACE NO. 1 ULTRASONIC SENSOR (FRONT RIGHT SIDE SENSOR) |

(a) Replace the No. 1 ultrasonic sensor (front right side sensor) with a normally functioning sensor INFO .

**NEXT**

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|

| | |
|---|---|
| DTC C1AE5 is output | A |
| No DTC is output | B |

**B** ▶ **END (FRONT RIGHT SIDE SENSOR WAS DEFECTIVE)**

**A** ▶ **REPLACE PARKING ASSIST ECU**

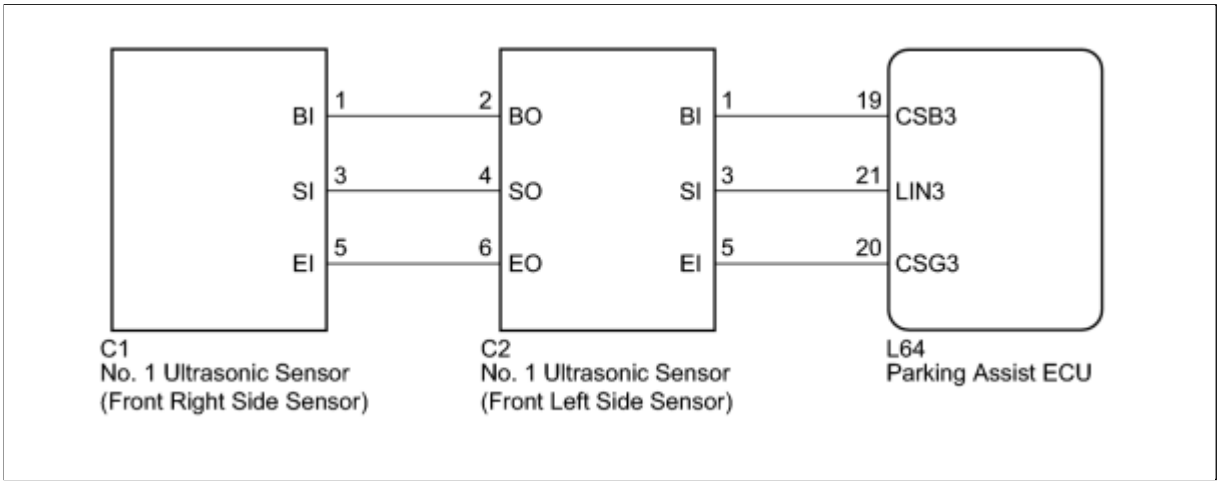
| DTC | C1AEE | APGS Sensor Communication Circuit |
|---|---|---|

## DESCRIPTION

The parking assist ECU communicates with the No. 1 ultrasonic sensor (front left side sensor), and the No. 1 ultrasonic sensor (front right side sensor) via the No. 1 ultrasonic sensor (front left side sensor). This DTC is stored when the parking assist ECU judges that there is an abnormality in the communication circuit to the No. 1 ultrasonic sensor (front left side sensor) or the No. 1 ultrasonic sensor (front right side sensor) that is connected via the front left side sensor, immediately after the power switch is turned on (IG), or while the sensors are operating (neither P nor R is selected and the vehicle is not stopped).

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1AEE | Ultrasonic sensor communication bus failure | • Harness or connector<br>• No. 1 ultrasonic sensor (front left side sensor)<br>• No. 1 ultrasonic sensor (front right side sensor)<br>• Parking assist ECU |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU - FRONT LEFT SIDE SENSOR) |

(a) Disconnect the L64 connector from the parking assist ECU.

(b) Disconnect the C2 connector from the No. 1 ultrasonic sensor (front left side sensor).

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L64-19 (CSB3) - Body ground | Always | 10 kΩ or higher |
| L64-21 (LIN3) - Body ground | Always | 10 kΩ or higher |
| L64-20 (CSG3) - Body ground | Always | 10 kΩ or higher |
| L64-19 (CSB3) - C2-1 (BI) | Always | Below 1 Ω |
| L64-21 (LIN3) - C2-3 (SI) | Always | Below 1 Ω |
| L64-20 (CSG3) - C2-5 (EI) | Always | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

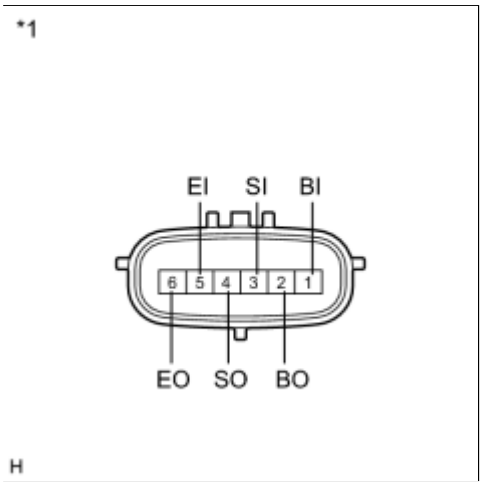
| | |
|---|---|
| **2.** | **CHECK NO. 1 ULTRASONIC SENSOR** |

(a) Remove the No. 1 ultrasonic sensor (front left side sensor) INFO .

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 (BI) - 5 (EI) | Always | 10 kΩ or higher |
| 1 (BI) - 2 (BO) | Always | 10 kΩ or higher |
| 3 (SI) - 4 (SO) | Always | Below 1 Ω |
| 5 (EI) - 6 (EO) | Always | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(No. 1 Ultrasonic Sensor (Front Left Side Sensor)) |

**NG** ▶ **REPLACE NO. 1 ULTRASONIC SENSOR (FRONT LEFT SIDE**

**SENSOR)**

**OK**

| | |
|---|---|
| **3.** | **CHECK HARNESS AND CONNECTOR (FRONT LEFT SIDE SENSOR - FRONT RIGHT SIDE SENSOR)** |

(a) Disconnect the C2 connector from the No. 1 ultrasonic sensor (front left side sensor).

(b) Disconnect the C1 connector from the No. 1 ultrasonic sensor (front right side sensor).

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| C2-2 (BO) - C1-1 (BI) | Always | Below 1 Ω |
| C2-4 (SO) - C1-3 (SI) | Always | Below 1 Ω |
| C2-6 (EO) - C1-5 (EI) | Always | Below 1 Ω |
| C2-2 (BO) - Body ground | Always | 10 kΩ or higher |
| C2-4 (SO) - Body ground | Always | 10 kΩ or higher |
| C2-6 (EO) - Body ground | Always | 10 kΩ or higher |

**NG** **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK**

| | |
|---|---|
| **4.** | **REPLACE NO. 1 ULTRASONIC SENSOR (FRONT LEFT SIDE SENSOR)** INFO |

**NEXT**

| | |
|---|---|
| **5.** | **CHECK DTC OUTPUT** |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1AEE is output | A |
| No DTC is output | B |

**B** ▶ **END (FRONT LEFT SIDE SENSOR WAS DEFECTIVE)**

**A**

▼

| | |
|---|---|
| **6.** | **REPLACE NO. 1 ULTRASONIC SENSOR (FRONT RIGHT SIDE SENSOR)** INFO |

**NEXT**

▼

| | |
|---|---|
| **7.** | **CHECK DTC OUTPUT** |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC C1AEE is output | A |
| No DTC is output | B |

**B** ▶ **END (FRONT RIGHT SIDE SENSOR WAS DEFECTIVE)**

**A** ▶ **REPLACE PARKING ASSIST ECU**

| | | |
|---|---|---|
| **DTC** | **U0073** | **Control Module Communication Bus Off** |

| | | |
|---|---|---|
| **DTC** | **U0126** | **Lost Communication with Steering Angle Sensor Module** |

| | | |
|---|---|---|
| **DTC** | **U0129** | **Lost Communication with Brake System Control Module** |

| | | |
|---|---|---|
| **DTC** | **U0131** | **Lost Communication with Power Steering Control Module** |

| | | |
|---|---|---|
| **DTC** | **U0140** | **Lost Communication with Main Body ECU** |

| | | |
|---|---|---|
| **DTC** | **U0293** | **Lost Communication with HV ECU** |

## DESCRIPTION

These DTCs are stored if there is a malfunction in the CAN communication system connected to the parking assist ECU.

**HINT:**

**If CAN communication system DTCs are stored, they may also be stored in other systems.**

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| U0073 | Control module communication bus off | CAN communication system |
| U0126 | Lost communication with steering angle sensor | |
| U0129 | Lost communication with brake system | |
| U0131 | Lost communication with power steering control module | |
| U0140 | Lost communication with main body ECU (multiplex network body ECU) | |
| U0293 | Lost communication with HV ECU | |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC OUTPUT** |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is output | A |
| No DTC is output | B |

**HINT:**

- If CAN communication system DTCs are stored, they may also be stored in other systems.
- If the CAN communication system has been inspected and repaired in other systems, the DTCs will not be output when rechecking for DTCs.
- If these DTCs are output frequently, duplicate the conditions that cause the problem symptoms and perform the inspection again, even though the DTC was not output when rechecking for DTCs INFO .

**B ▶ USE SIMULATION METHOD TO CHECK**

**A ▶ GO TO CAN COMMUNICATION SYSTEM**

| | | |
|---|---|---|
| **DTC** | **U1000** | **Can Communication Failure(Message Registry)** |

## DESCRIPTION

This DTC is stored when the parking assist ECU judges that it has an internal CAN malfunction.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| U1000 | CAN communication failure (message registry) | Parking assist ECU |

## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| **1.** | **CHECK DTC OUTPUT** |

(a) Clear the DTCs INFO .

(b) Check for DTCs INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC U1000 is output | A |
| No DTC is output | B |

**HINT:**

- If the DTC is not output again when rechecking for DTCs, it may have been stored due to a temporary CAN malfunction.
- If DTC U1000 is output frequently, duplicate the problem symptoms and perform the inspection again, even though the DTC is not output when rechecking for DTCs INFO .

**B** ▶ **USE SIMULATION METHOD TO CHECK**

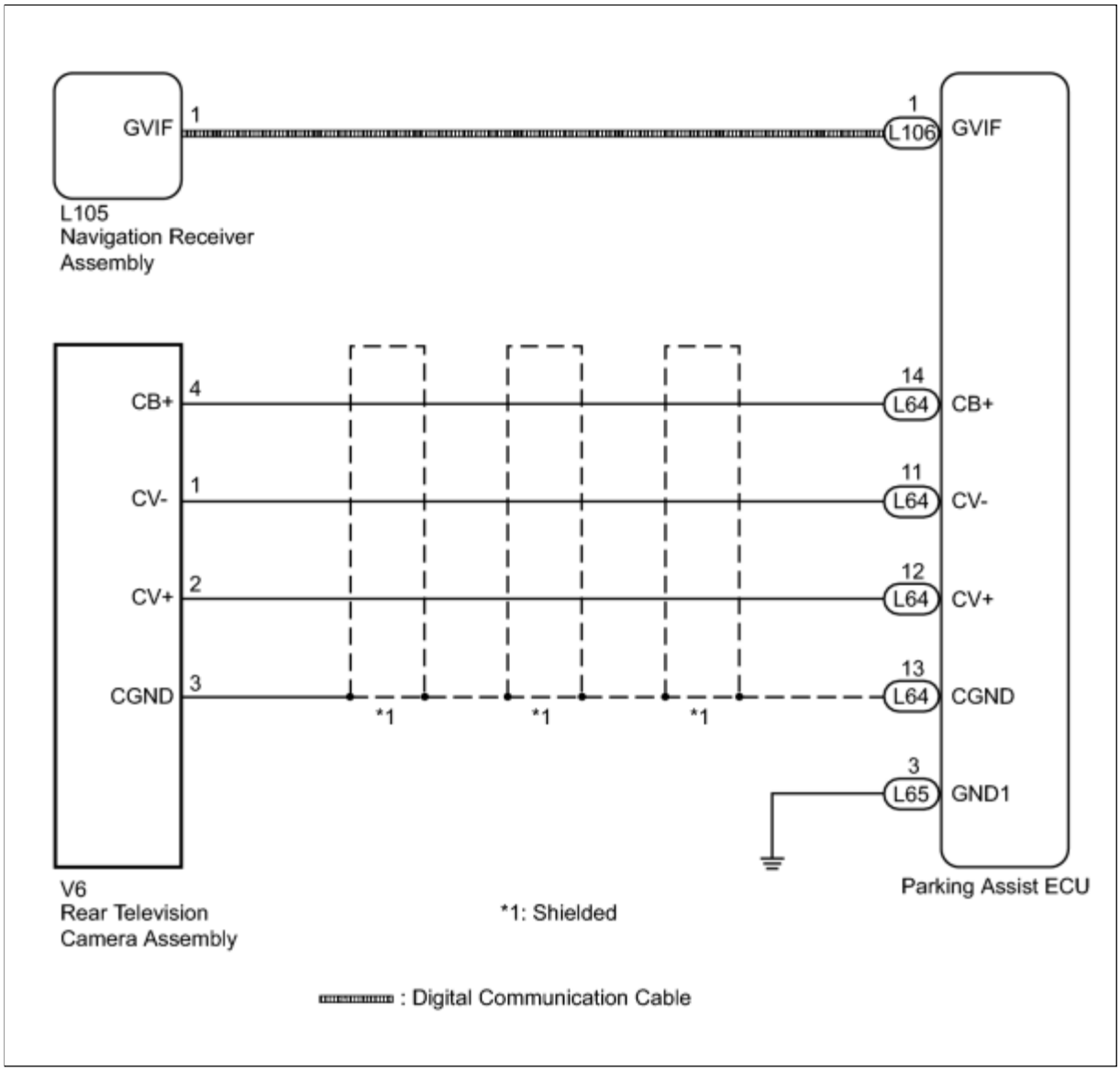
**A** ▶ **REPLACE PARKING ASSIST ECU**

**Image from Camera for Advanced Parking Guidance is Abnormal**

## DESCRIPTION

The display signal from the rear television camera assembly is transmitted to the navigation receiver assembly via the parking assist ECU.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

**HINT:**

**Images are difficult to discern even in normal conditions if:**

- Noise may occur in the image depending on electrical devices used in the cabin.
- Noise may occur in the image if the outer mirror switch assembly is operated.
- Noise may occur in the image if accessories that generate radio waves have been installed.
- The camera screen is frosted over (the image immediately after turning the power switch on (IG) may be blurred or darker than normal).
- The camera lens is dirty with snow, mud, etc.
- A strong beam of light, such as a sunbeam or headlight, hits the camera.
- It is too dark around the camera (at night etc.).
- The ambient temperature around the camera is either too high or too low.
- The vehicle is tilted at a steep angle.
- The ambience of the camera is too bright. (When a strong light, such as a sunbeam reflected off the vehicle body, hits the camera, the image may be blurred. This is called the "SMEAR" phenomenon, peculiar to the CCD camera.)

## PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU - REAR TELEVISION CAMERA) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 2. | CHECK PARKING ASSIST ECU (CV-, CGND) INFO |

NG ▶ REPLACE PARKING ASSIST ECU

OK ▼

| | |
|---|---|
| 3. | CHECK REAR TELEVISION CAMERA ASSEMBLY (CB+, CGND) INFO |

NG ▶ REPLACE PARKING ASSIST ECU

OK ▼

| | |
|---|---|
| 4. | CHECK PARKING ASSIST ECU (CV+, GND1) INFO |

NG ▶ REPLACE REAR TELEVISION CAMERA ASSEMBLY

OK ▼

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Advanced Parking Guidance System / Data List.

(e) Check the Data List for proper functioning of the following items.

**Advanced Parking Guidance System**

| TESTER DISPLAY | MEASUREMENT ITEM/RANGE | NORMAL CONDITION | DIAGNOSTIC NOTE |
|---|---|---|---|
| AISIC Output Status | Output condition of camera display/OK or NG | OK: Output condition of camera display is normal<br>NG: Output condition of camera display is abnormal | - |

NG ▶ REPLACE PARKING ASSIST ECU

OK ▼

| | |
|---|---|
| 6. | CHECK DIGITAL COMMUNICATION CABLE CONNECTOR |

(a) Check the digital communication cable connectors.

(1) Check the digital communication cable connectors between the parking assist ECU and navigation receiver assembly for any connection problems INFO .

(b) Check if the same malfunction recurs when the advanced parking guidance screen is displayed.

Result

Result:

| RESULT | PROCEED TO |
|---|---|
| Malfunction does not reoccur (returns to normal) | A |
| Malfunction reoccurs | B |

B ▶ **REPLACE WIRE HARNESS (DIGITAL COMMUNICATION CABLE)**

A ▶ **END**

| 7. | REPLACE WIRE HARNESS (DIGITAL COMMUNICATION CABLE) |
|---|---|

(a) Replace the digital communication cable between the parking assist ECU and navigation receiver assembly with a new one.

(b) Check if the same malfunction recurs when the advanced parking guidance screen is displayed.

Result:

| RESULT | PROCEED TO |
|---|---|
| Malfunction does not reoccur (returns to normal) | A |
| Malfunction reoccurs | B |

B ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

A ▶ **END**

| 8. | REPLACE NAVIGATION RECEIVER ASSEMBLY |
|---|---|

(a) Replace the navigation receiver assembly with a new or normally functioning one INFO .

(b) Check if the same malfunction recurs when the advanced parking guidance screen is displayed.

Result:

| RESULT | PROCEED TO |
|---|---|
| Malfunction does not reoccur | A |
| Malfunction reoccurs | B |

B ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

A ▶ **END**

**Vehicle does not Move to Set Parking Position**

## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .
- If initialization is necessary while performing an inspection, perform initialization first and then proceed to the next step.

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK TIRE SIZE** |

(a) Check that the tire pressure and tire size are as specified. Check that there is no excessive wear on the tires.

Result:

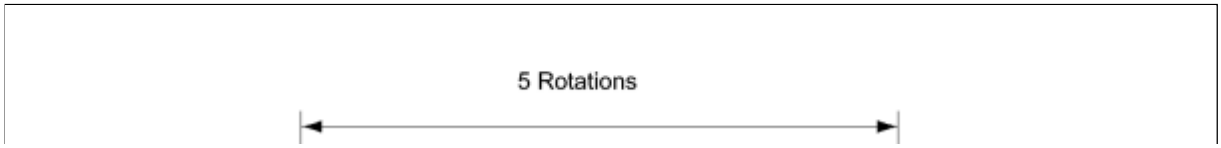
| RESULT | PROCEED TO |
|---|---|
| Tire size is as specified and there is no excessive wear | A |
| Tire size is as specified but there is excessive wear | B |
| Tire size is not as specified but there is no excessive wear | A |
| Tire size is not as specified and there is excessive wear | B |
| Tire size is totally different from specified size | B |

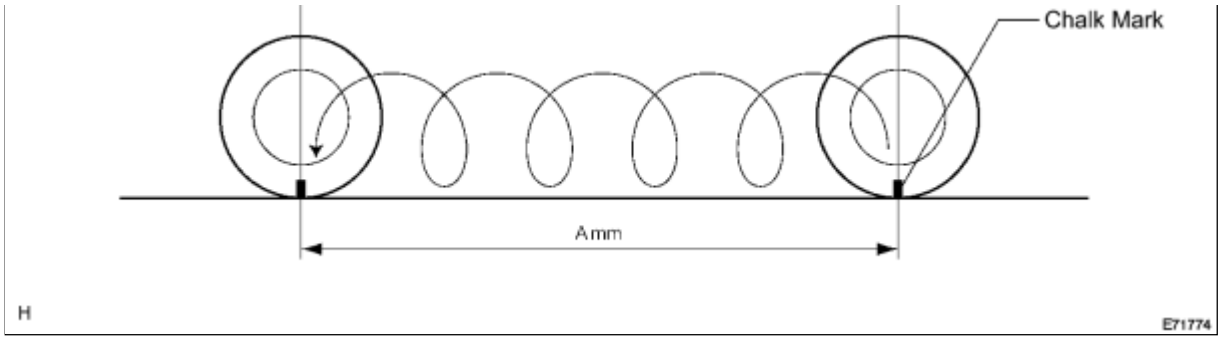
**B** ▶ **REPLACE TIRES**

**A** ▼

| | |
|---|---|
| 2. | **CHECK TIRE ROTATION** |

(a) Check tire movement distance.






(1) On a level surface, center the steering wheel and stop the vehicle.

(2) Apply chalk to a point on the tire and on the ground.

(3) Drive the vehicle straight ahead, and stop the vehicle after the tire rotates 5 times.

(4) Mark the vehicle stop position on the ground, and measure the movement distance A mm (ft.). Check that the measured distance is within the standard range.

Standard:

9582 to 9776 mm (31.44 to 32.07 ft.)

**NG** ▶ **REPLACE TIRES**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK SYMPTOMS** |

(a) Parallel parking

(1) Move the vehicle to a level surface area with parking spaces.

(2) Using the advanced parking guidance system, perform parallel parking. Check how the vehicle deviates from the set parking position.

**HINT:**

**Begin the check with the vehicle at a 45° angle to the parking space. Perform the check from the right and left side of the parking space.**

(3) Select a case below that is most similar to the problem, and follow the instructions.

(b) Deviation examples

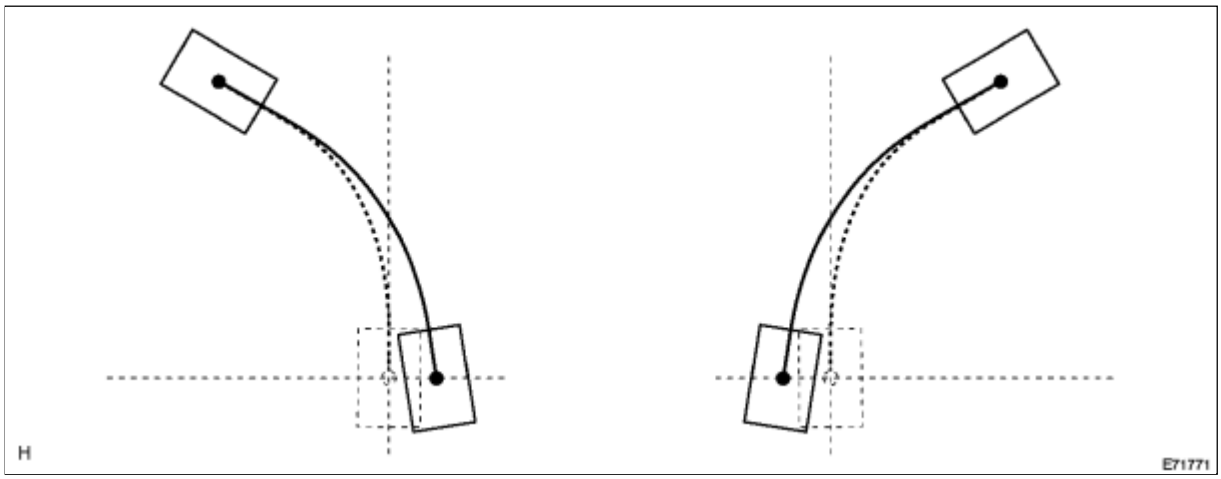
(1) Case 1





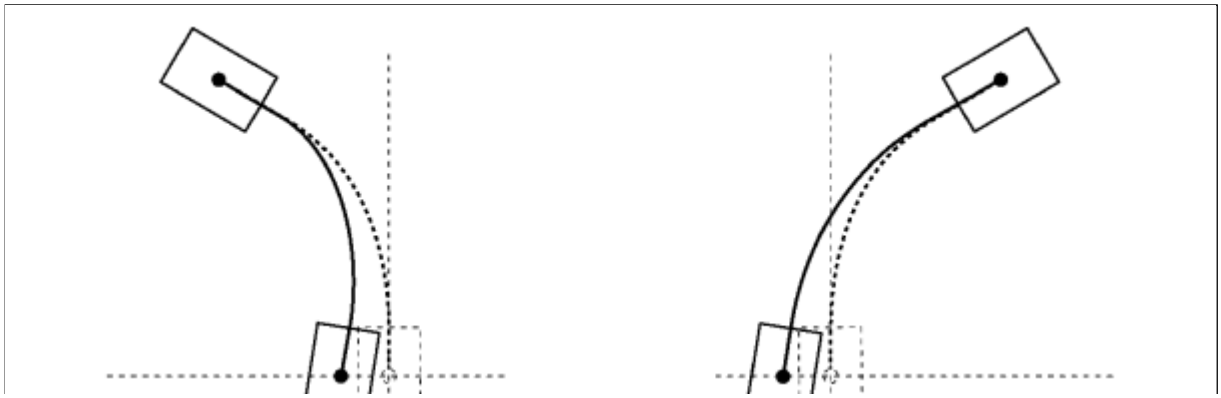

| CASE | TYPE OF DEVIATION | CAUSE | PROCEED TO |
|---|---|---|---|
| 1 | Vehicle deviates toward inner side (steering wheel is turned too much) | • Actual turning radius is small<br>• Television camera adjustment value deviated | A |

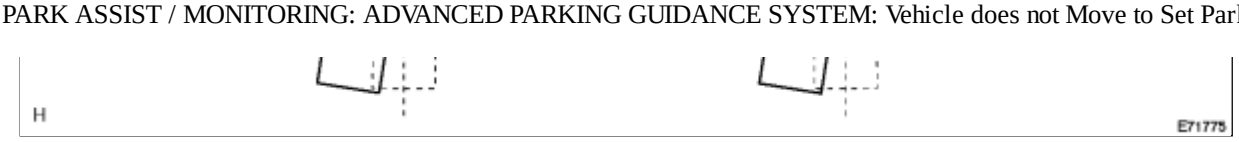
(2) Case 2




| CASE | TYPE OF DEVIATION | CAUSE | PROCEED TO |
|---|---|---|---|
| 2 | Vehicle deviates toward outer side (steering wheel is turned too little) | • Actual turning radius is large<br>• Television camera adjustment value deviated | B |

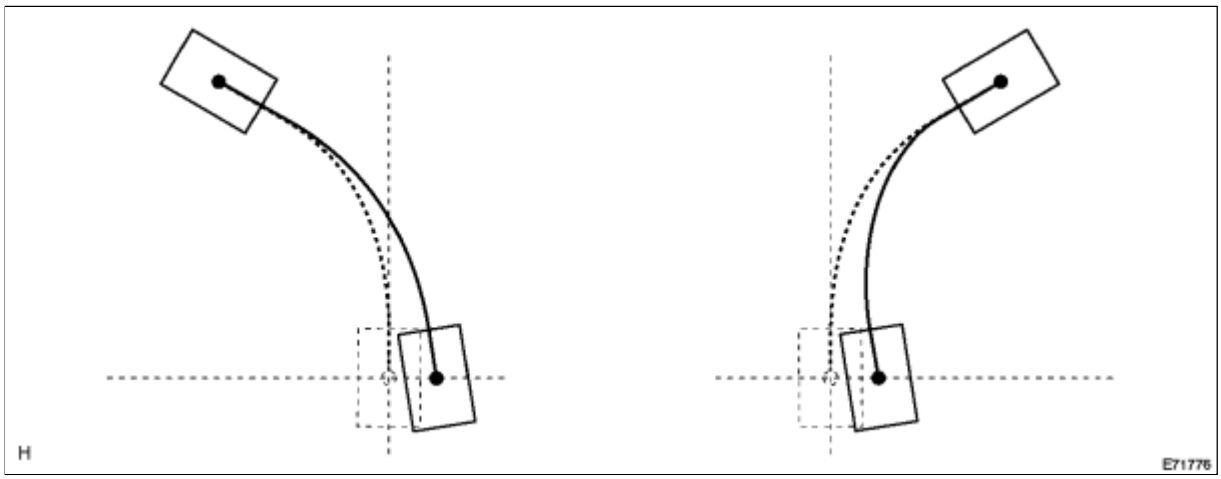
(3) Case 3





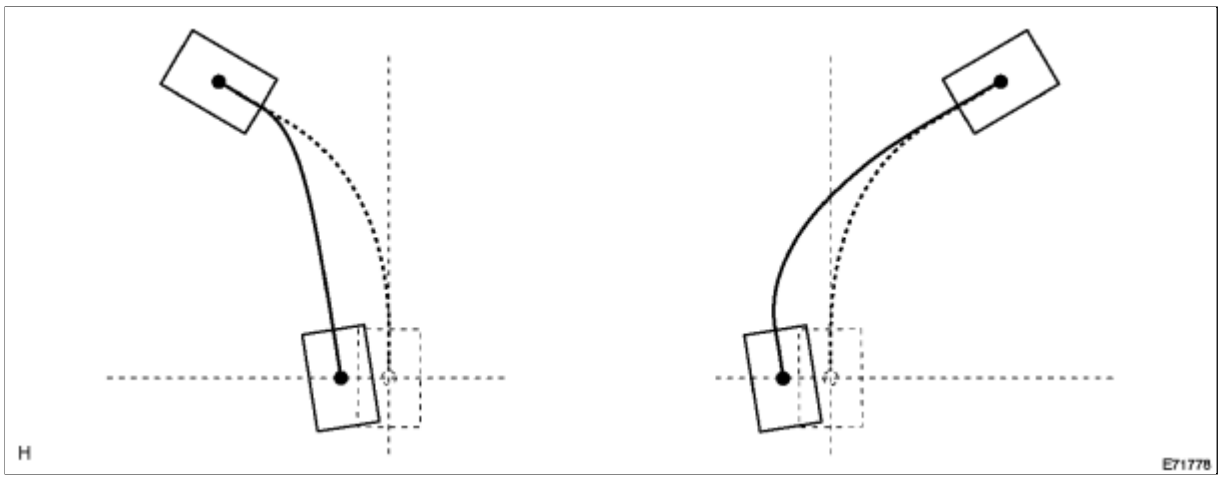

| CASE | TYPE OF DEVIATION | CAUSE | PROCEED TO |
|---|---|---|---|
| 3 | Regardless of side in which parking is performed, vehicle front deviates to right | • Steering angle memorized value deviated<br>• Television camera adjustment value deviated | C |

(4) Case 4



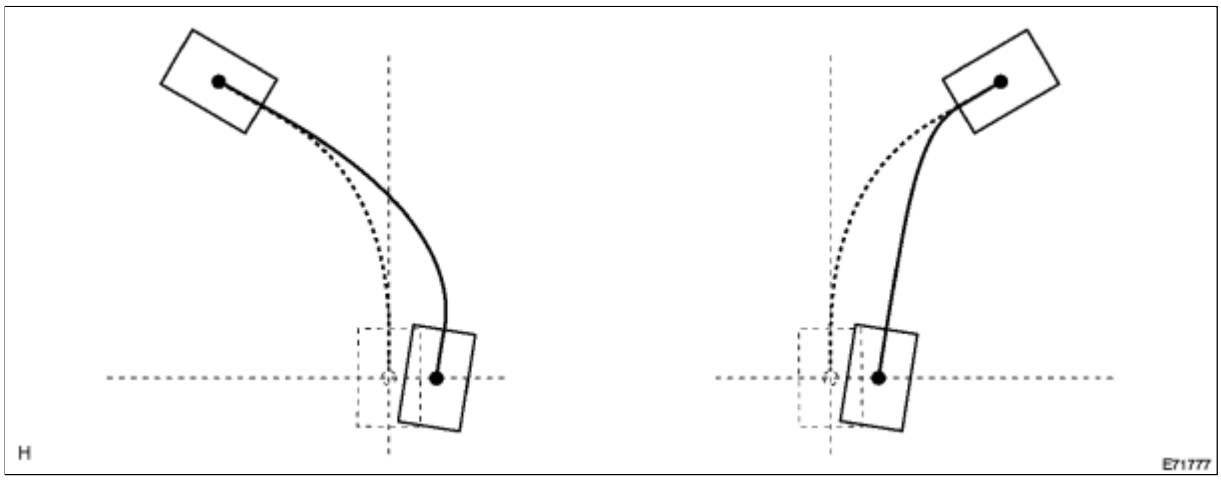

| CASE | TYPE OF DEVIATION | CAUSE | PROCEED TO |
|---|---|---|---|
| 4 | Regardless of side in which parking is performed, vehicle front deviates to left | • Steering angle memorized value deviated<br>• Television camera adjustment value deviated | C |

(5) Case 5



| CASE | TYPE OF DEVIATION | CAUSE | PROCEED TO |
|---|---|---|---|
| 5 | Regardless of side in which parking is performed, entire vehicle deviates to left | • Steering angle memorized value deviated<br>• Television camera adjustment value deviated | C |

(6) Case 6




| CASE | TYPE OF DEVIATION | CAUSE | PROCEED TO |
|---|---|---|---|
| 6 | Regardless of side in which parking is performed, entire vehicle deviates to right | • Steering angle memorized value deviated<br>• Television camera adjustment value deviated | C |

C ▶ ADJUST SETTINGS (STEERING ANGLE SETTING)

B ▶ CHECK FRONT WHEEL ALIGNMENT

A ▼

| 4. | ADJUST SETTINGS (HEIGHT SET AND CAMERA POSITION SETTING) |
|---|---|

(a) Perform the height control sensor vehicle height difference setting INFO .

(b) Perform the rear television camera optical axis adjustment INFO .

(c) Check deviation

(1) Operate the advanced parking guidance system and check if the malfunction reoccurs.

OK:

Returns to normal

**NG** ▶ **CHECK FRONT WHEEL ALIGNMENT**

**OK** ▶ **END**

| 5. | CHECK FRONT WHEEL ALIGNMENT |
|---|---|

(a) Perform the front wheel alignment inspection INFO .

**HINT:**

**For alignment inspection, follow the toe-in and camber specifications.**

Standard:

Returns to normal

**HINT:**

**For alignment adjustment, follow the toe-in and camber specifications.**

**NG** ▶ **ADJUST FRONT WHEEL ALIGNMENT**

**OK** ▼

| 6. | CHECK REAR WHEEL ALIGNMENT |
|---|---|

(a) Perform the rear wheel alignment inspection INFO .

**HINT:**

**For alignment inspection, follow the toe-in and camber specifications.**

Standard:

Returns to normal

**HINT:**

**For alignment adjustment, follow the toe-in and camber specifications.**

**NG** ▶ **ADJUST REAR WHEEL ALIGNMENT**

**OK** ▶ **REPLACE PARKING ASSIST ECU**

| | |
|---|---|
| 7. | CHECK FRONT WHEEL ALIGNMENT |

(a) Perform the front wheel alignment inspection INFO .

**HINT:**

**For alignment inspection, follow the toe-in and camber specifications.**

Standard:
Returns to normal

**HINT:**

**For alignment adjustment, follow the toe-in and camber specifications.**

**NG** ▶ **ADJUST FRONT WHEEL ALIGNMENT**

**OK** ▼

| | |
|---|---|
| 8. | CHECK REAR WHEEL ALIGNMENT |

(a) Perform the rear wheel alignment inspection INFO .

**HINT:**

**For alignment inspection, follow the toe-in and camber specifications.**

Standard:
Returns to normal

**HINT:**

**For alignment adjustment, follow the toe-in and camber specifications.**

**NG** ▶ **ADJUST REAR WHEEL ALIGNMENT**

**OK** ▼

| | |
|---|---|
| 9. | ADJUST SETTINGS (HEIGHT SET AND CAMERA POSITION SETTING) |

(a) Perform the height control sensor vehicle height difference setting INFO .

(b) Perform the rear television camera optical axis adjustment INFO

(b) Perform the rear television camera optical axis adjustment INFO .

(c) Check deviation

(1) Operate the advanced parking guidance system and check if the malfunction reoccurs.

OK:

Returns to normal

NG ▶ **REPLACE PARKING ASSIST ECU**

OK ▶ **END**

| 10. | ADJUST SETTINGS (STEERING ANGLE SETTING) |
|---|---|

(a) Perform the steering angle setting INFO .

(b) Check deviation

(1) Operate the advanced parking guidance system and check if the malfunction reoccurs.

OK:

Returns to normal

NG ▶ **ADJUST SETTINGS (HEIGHT SET AND CAMERA POSITION SETTING)**

OK ▶ **END**

| 11. | ADJUST SETTINGS (HEIGHT SET AND CAMERA POSITION SETTING) |
|---|---|

(a) Perform the height control sensor vehicle height difference setting INFO .

(b) Perform the rear television camera optical axis adjustment INFO .

(c) Check deviation

(1) Operate the advanced parking guidance system and check if the malfunction reoccurs.

OK:

Returns to normal

NG ▶ **CHECK FRONT WHEEL ALIGNMENT**

OK ▶ **END**

| 12. | CHECK FRONT WHEEL ALIGNMENT |
|---|---|

(a) Perform the front wheel alignment inspection INFO .

**HINT:**

**For alignment inspection, follow the toe-in and camber specifications.**

Standard:
Returns to normal

**HINT:**

**For alignment adjustment, follow the toe-in and camber specifications.**

**NG** ▶ **ADJUST FRONT WHEEL ALIGNMENT**

**OK** ▼

| | |
|---|---|
| **13.** | **CHECK REAR WHEEL ALIGNMENT** |

(a) Perform the rear wheel alignment inspection INFO .

**HINT:**

**For alignment inspection, follow the toe-in and camber specifications.**

Standard:
Returns to normal

**HINT:**

**For alignment adjustment, follow the toe-in and camber specifications.**

**NG** ▶ **ADJUST REAR WHEEL ALIGNMENT**

**OK** ▶ **REPLACE PARKING ASSIST ECU**

**"CHK" message(s) are displayed on the SIGNAL CHECK screen.**

## DESCRIPTION

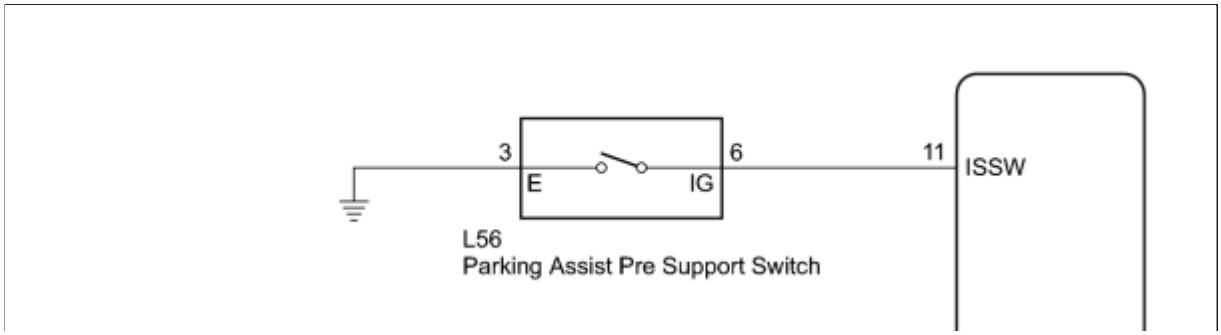
On the SIGNAL CHECK screen, it is possible to check if the state of signals sent to the parking assist ECU is normal INFO .

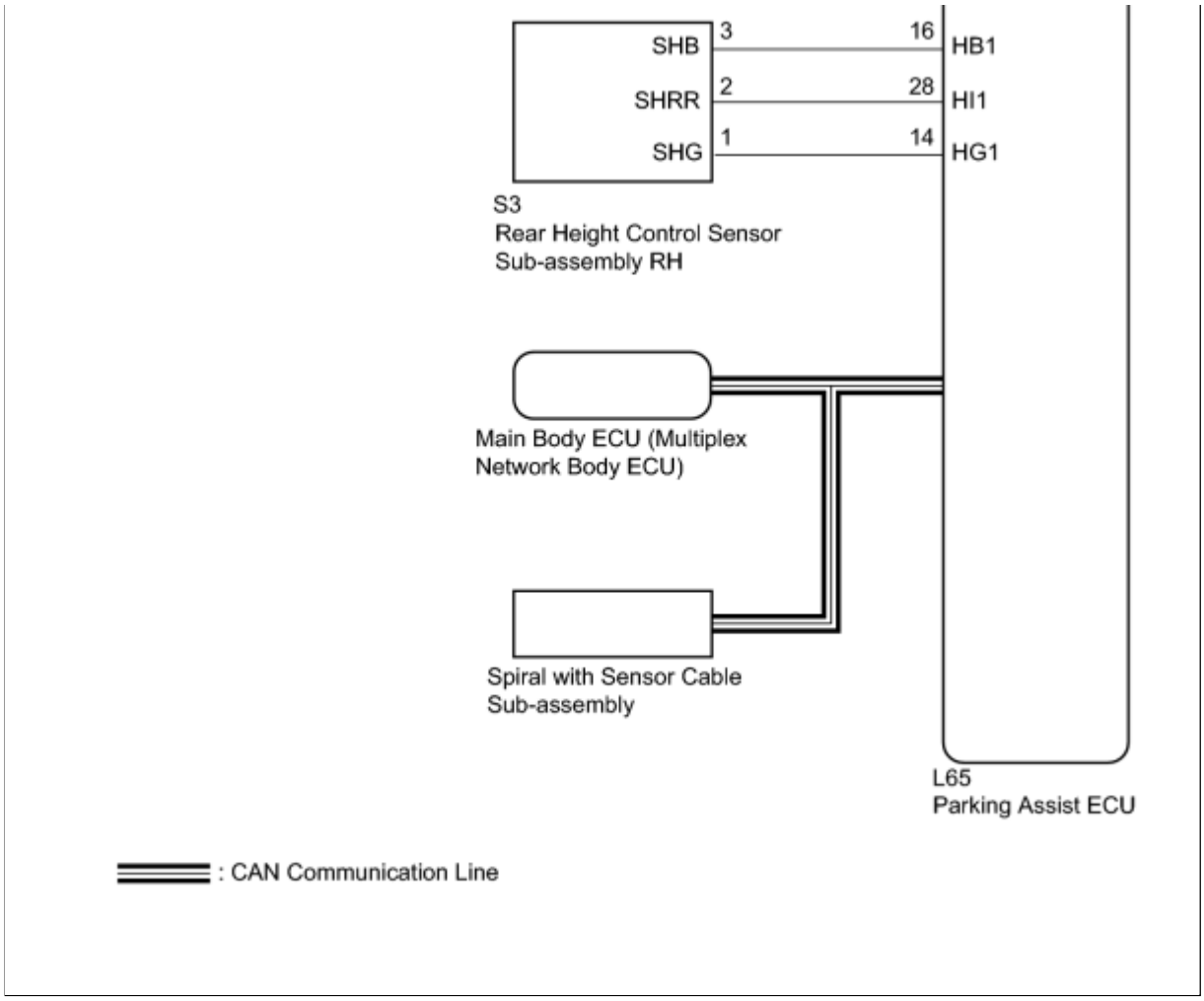
**HINT:**

- On the SIGNAL CHECK screen, "OK" (blue) is displayed for items with a normal inspection result or input state.
- On the SIGNAL CHECK screen, "CHK" (red) is displayed for items with an abnormal inspection result or input state.
- Displayed items may differ depending on vehicle specifications.

| ITEM | SIGNAL INPUT METHOD | DETAIL | DTC OUTPUT WHEN ABNORMAL RESULT IS DISPLAYED | SIGNAL RECEIVER |
|---|---|---|---|---|
| CAN | CAN communication | CAN communication condition | DTC is output | - |
| IPA SW | Vehicle wire harness | Parking assist pre support switch signal input | DTC is not output | Parking assist pre support switch |
| BCTY | CAN communication | CAN communication condition with main body ECU (multiplex network body ECU) | DTC is output | Main body ECU (multiplex network body ECU) |
| EPS TYPE | - | Brush information for EPS currently selected at individual setting screen | DTC is not output | - |
| HT SENS | Vehicle wire harness | Height control sensor signal input | DTC is output | Rear height control sensor sub-assembly RH |
| HT INIT | - | Height control sensor vehicle height difference setting status | DTC is output | - |
| STR | CAN communication | Steering angle sensor signal input | DTC is output | Spiral with sensor cable sub-assembly |
| HANDLE | CAN communication | Steering position signal input | DTC is output | Main body ECU (multiplex network body ECU) |

## WIRING DIAGRAM






## INSPECTION PROCEDURE

**NOTICE:**

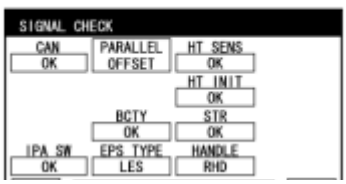
- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

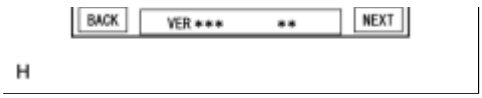
| | |
|---|---|
| 1. | **CHECK DISPLAY CHECK MODE** |

(a) Check which items display "CHK" (red) on the SIGNAL CHECK screen.

Result:




| RESULT | PROCEED TO |
|---|---|
| "IPA SW" displays "CHK" (red). | A |
| "HT INIT" displays "CHK" (red). | B |




H

| | |
|---|---|
| Both "HT SENS" and "HT INIT" display "CHK" (red). | C |
| Any of "CAN", "BCTY", "STR" and "HANDLE" displays "CHK" (red). | C |

**C** ▶ **CHECK DTC OUTPUT**

**B** ▶ **ADJUST HEIGHT CONTROL SENSOR VEHICLE HEIGHT DIFFERENCE SETTING**

**A** ▼

| | |
|---|---|
| **2.** | **CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU - PARKING ASSIST PRE SUPPORT SWITCH)** |

(a) Disconnect the L65 connector from the parking assist ECU.

(b) Disconnect the L56 connector from the parking assist pre support switch.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-11 (ISSW) - L56-6 (IG) | Always | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **INSPECT PARKING ASSIST PRE SUPPORT SWITCH** |

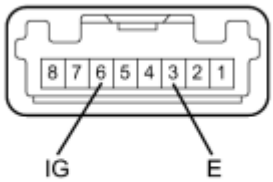
(a) Remove the parking assist pre support switch INFO .

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| | Parking assist pre support switch | |




H

| | | |
|---|---|---|
| 3 (E) - 6 (IG) | Parking assist pre support switch pushed in | Below 1 Ω |
| | Parking assist pre support switch not pushed | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Parking Assist Pre Support Switch) |

**NG** ▶ **REPLACE PARKING ASSIST PRE SUPPORT SWITCH**

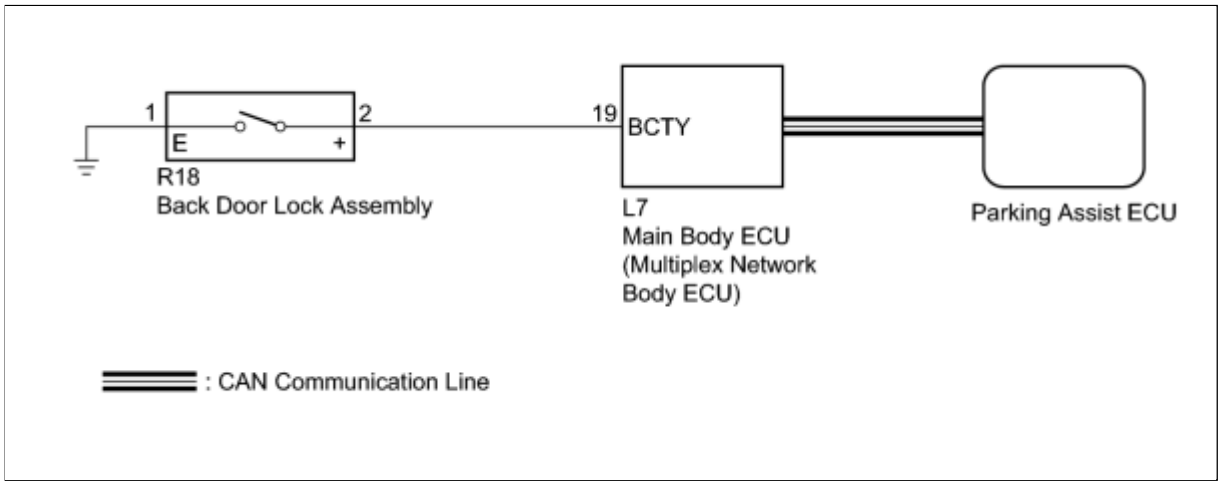
**OK** ▶ **REPLACE PARKING ASSIST ECU**

**Message indicating Back Door is Open is Displayed even after Back Door is Closed**

## DESCRIPTION

The parking assist ECU receives back door lock assembly open/close signals from the main body ECU (multiplex network body ECU) via CAN communication. When the back door is open, the camera aiming cannot be adjusted correctly because the rear television camera assembly is installed on the back door. Therefore, when adjusting the camera aiming calibration while the back door is open, a back door open warning message will be displayed on the screen and camera aiming adjustment will be canceled.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**NOTICE:**

- When "System initializing" message is displayed on the navigation receiver assembly after the battery terminal disconnected, correct the steering angle neutral point INFO .
- Depending on the parts that are replaced or operations that are performed during vehicle inspection or maintenance, calibration of other systems as well as the advanced parking guidance system may be needed INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **READ VALUE USING TECHSTREAM** |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body / Main Body / Data List.

(e) Check the Data List for proper functioning of the following item.

**Main Body (Main Body ECU (Multiplex Network Body ECU))**

| TESTER DISPLAY | MEASUREMENT ITEM/RANGE | NORMAL CONDITION | DIAGNOSTIC NOTE |
|---|---|---|---|
| Back Door Courtesy SW | Back door courtesy switch signal/ON or OFF | ON: Back door open<br>OFF: Back door closed | - |

OK:

The back door courtesy switch functions as specified in the normal condition column.

**NG** ▶ **CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - BACK DOOR LOCK)**

**OK** ▶ **REPLACE PARKING ASSIST ECU**

| 2. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - BACK DOOR LOCK) |
|---|---|

(a) Disconnect the L7 connector from the main body ECU (multiplex network body ECU).

(b) Disconnect the R18 connector from the back door lock assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

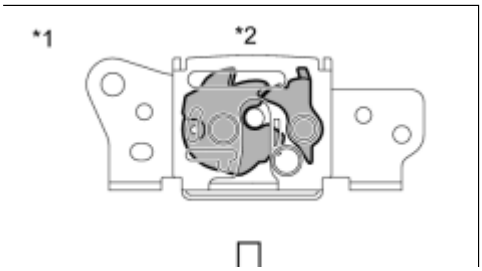
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L7-19 (BCTY) - R18-2 (+) | Always | Below 1 Ω |
| L7-19 (BCTY) - Body ground | Always | 10 kΩ or higher |
| R18-1 (E) - Body ground | Always | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

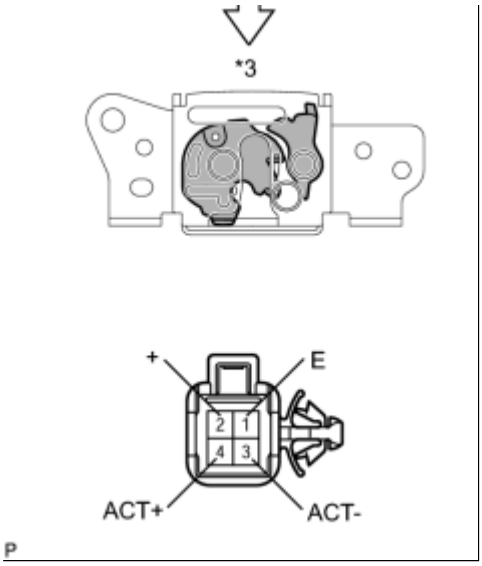
**OK** ▼

| 3. | INSPECT BACK DOOR LOCK ASSEMBLY |
|---|---|

(a) Remove the back door lock assembly INFO .




(b) Check the operation of the door lock motor.




(1) Move the door lock to the lock position.

(2) Apply battery voltage to the door lock motor and check the operation of the door lock motor.

| CONNECTION | RESULT |
|---|---|
| Battery positive (+) → 4 (ACT+)<br>Battery negative (-) → 3 (ACT-) | Unlocks |

(c) Check operation of the door courtesy switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| MEASUREMENT CONDITION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 1 (E) - 2 (+) | Locked | 10 kΩ or higher |
| 1 (E) - 2 (+) | Unlocked | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br>(Back Door Lock Assembly) |
| *2 | Lock |
| *3 | Unlock |

**NG** ▶ **REPLACE BACK DOOR LOCK ASSEMBLY**

**OK** ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

**ECU Power Source Circuit**

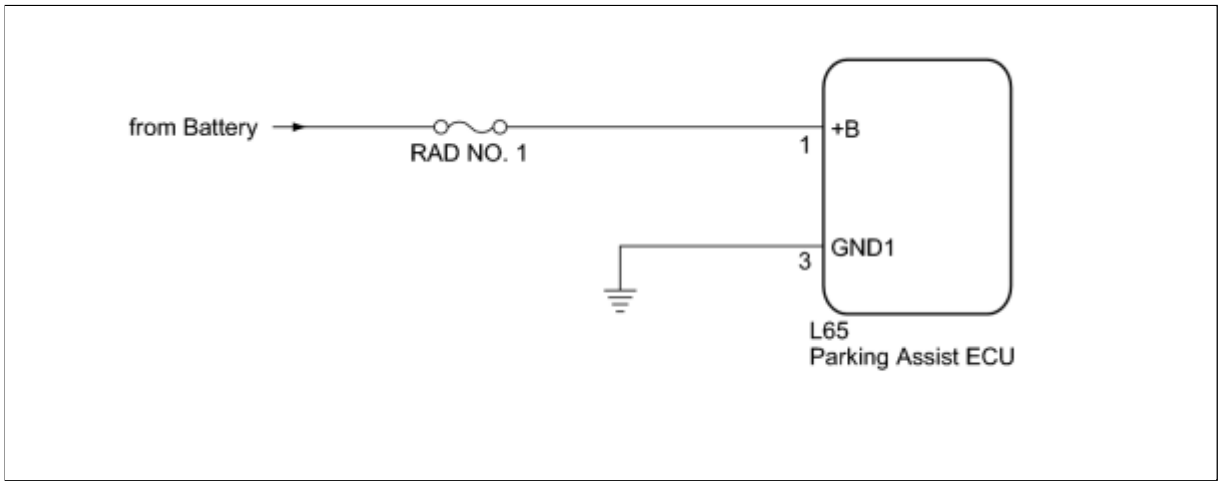
## DESCRIPTION

This circuit is the power source circuit to operate the parking assist ECU. The parking assist ECU controls the advanced parking guidance system.

**HINT:**

- The parking assist ECU is connected to other ECUs via CAN communication or AVC-LAN communication.
- If the parking assist ECU does not operate due to a power source problem, a navigation system DTC may be stored due to an AVC-LAN communication interruption.
- If the parking assist ECU does not operate due to a power source problem, other system DTCs may be stored due to a CAN communication interruption.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK HARNESS AND CONNECTOR (PARKING ASSIST ECU - BATTERY AND BODY GROUND)** |

(a) Disconnect the L65 connector from the parking assist ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-3 (GND1) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

Standard Voltage:

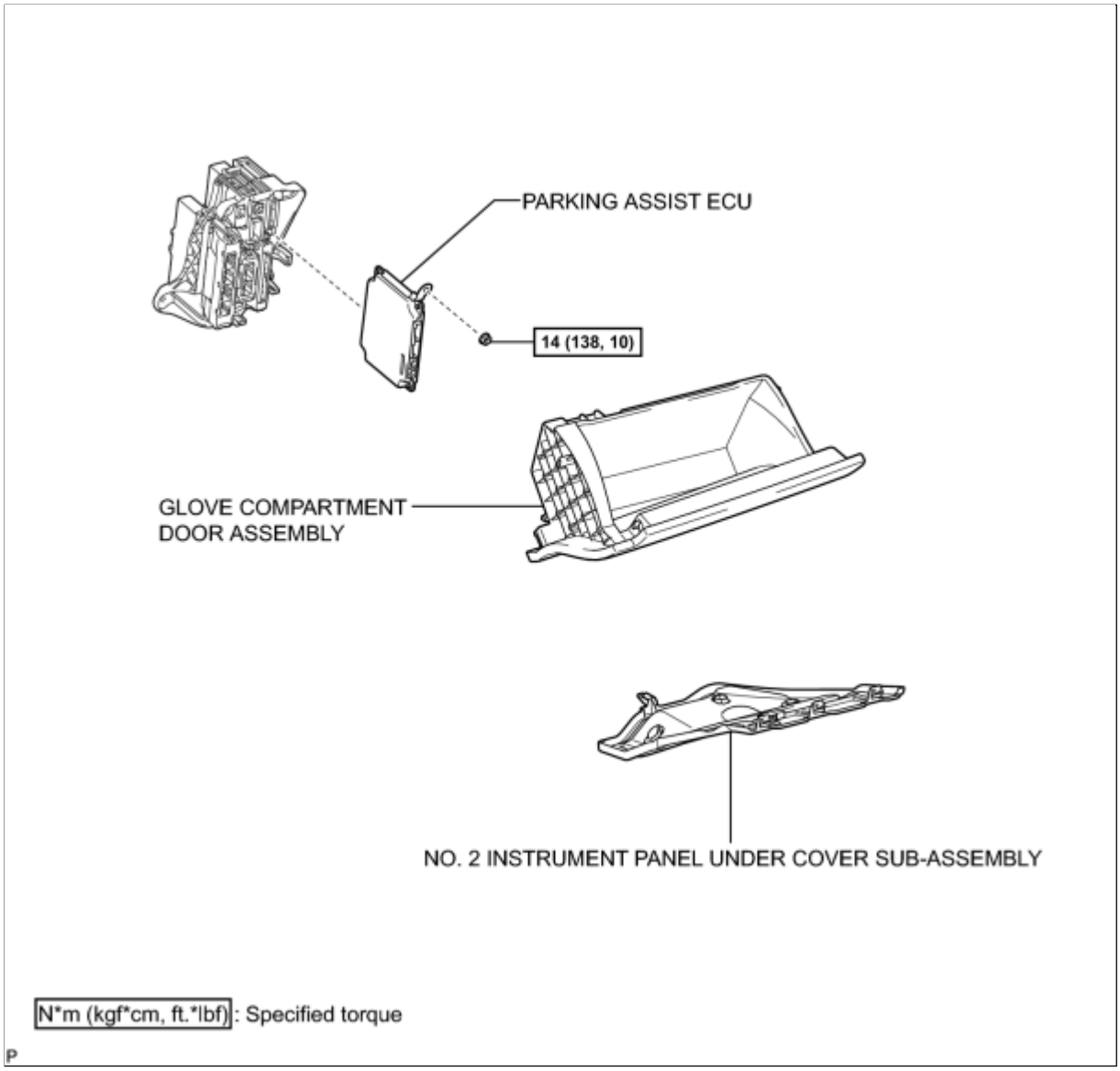
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L65-1 (+B) - L65-3 (GND1) | Always | 11 to 14 V |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

**OK** ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

## COMPONENTS

## ILLUSTRATION

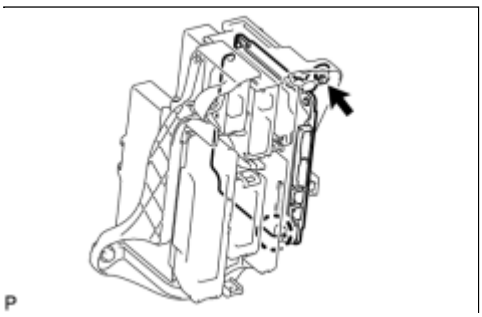


# REMOVAL

**1. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY** INFO

**2. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY** INFO

**3. REMOVE PARKING ASSIST ECU**

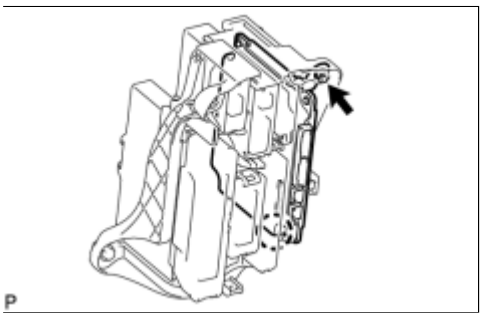



(a) Remove the nut.

(b) Disengage the claw and remove the parking assist ECU.

# INSTALLATION

## 1. INSTALL PARKING ASSIST ECU




(a) Engage the claw to install the parking assist ECU.

(b) Install the nut.

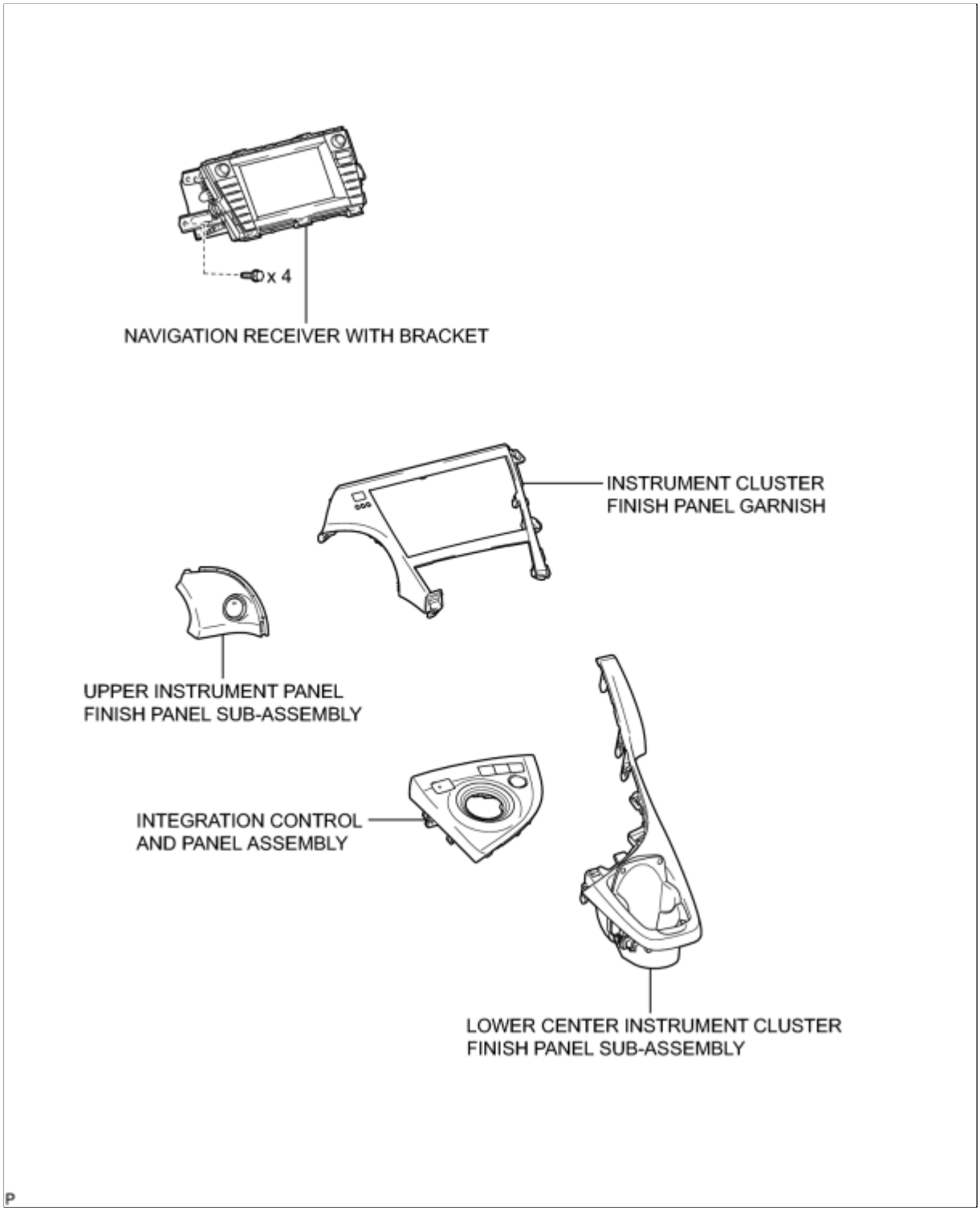
**Torque: 14 N·m (138 kgf·cm, 10ft·lbf)**

## 2. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

## 3. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

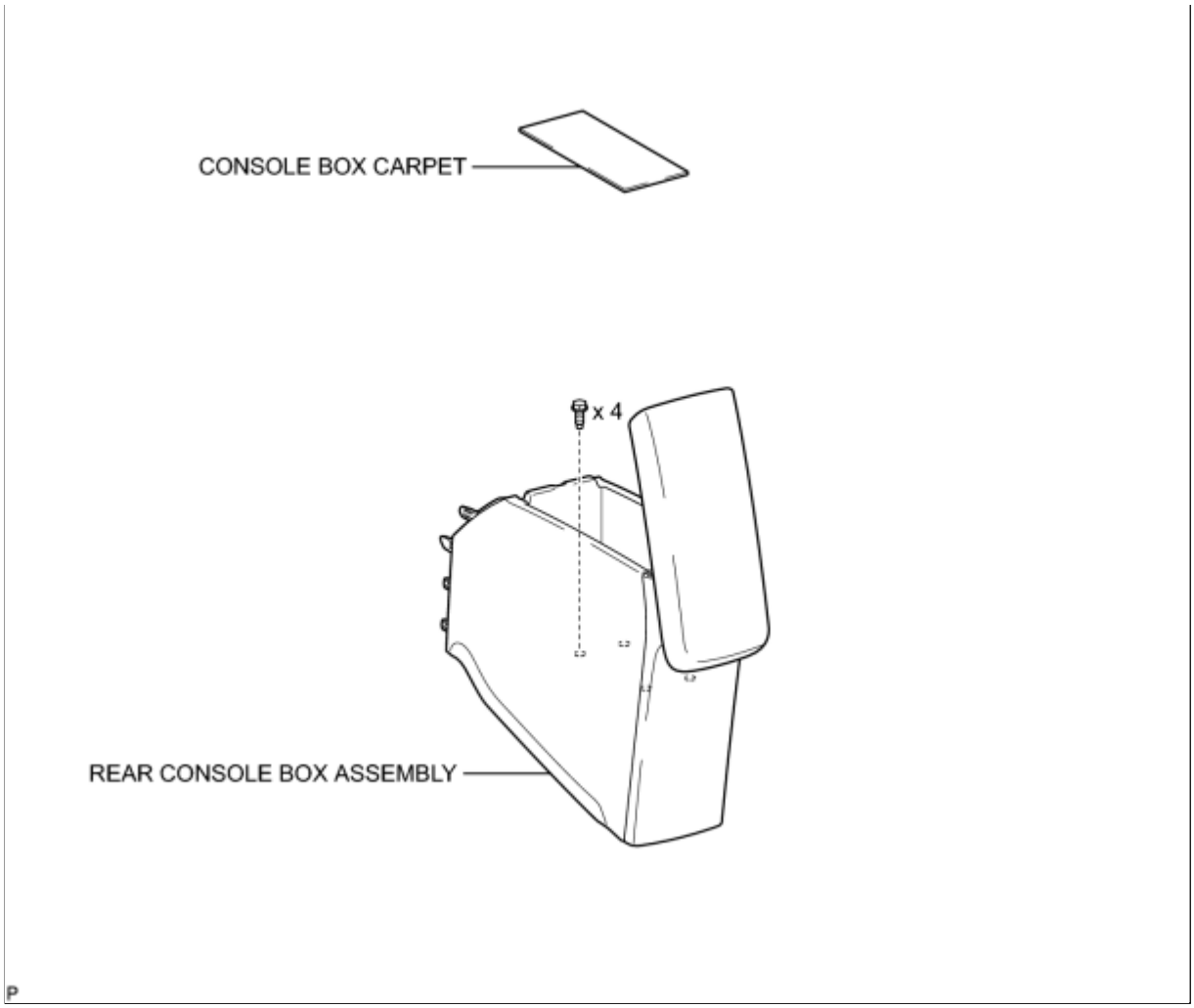
## COMPONENTS

## ILLUSTRATION

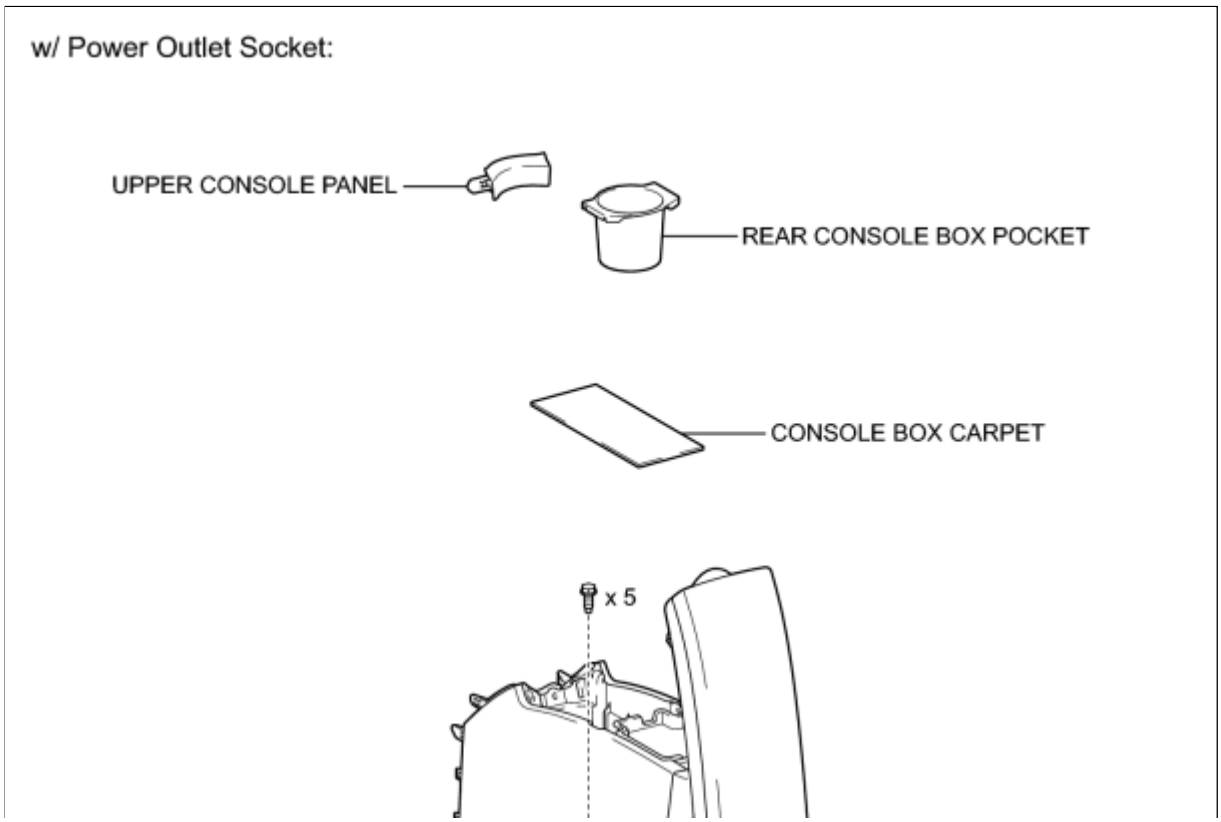


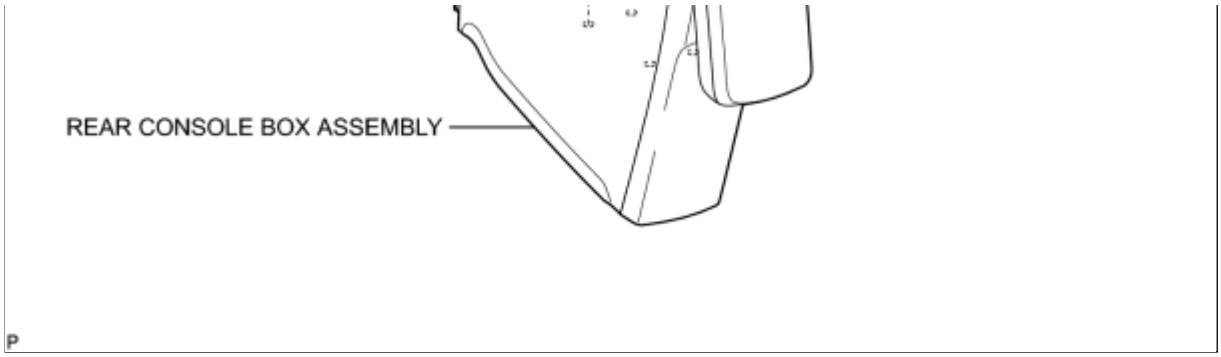

## ILLUSTRATION

w/o Power Outlet Socket:

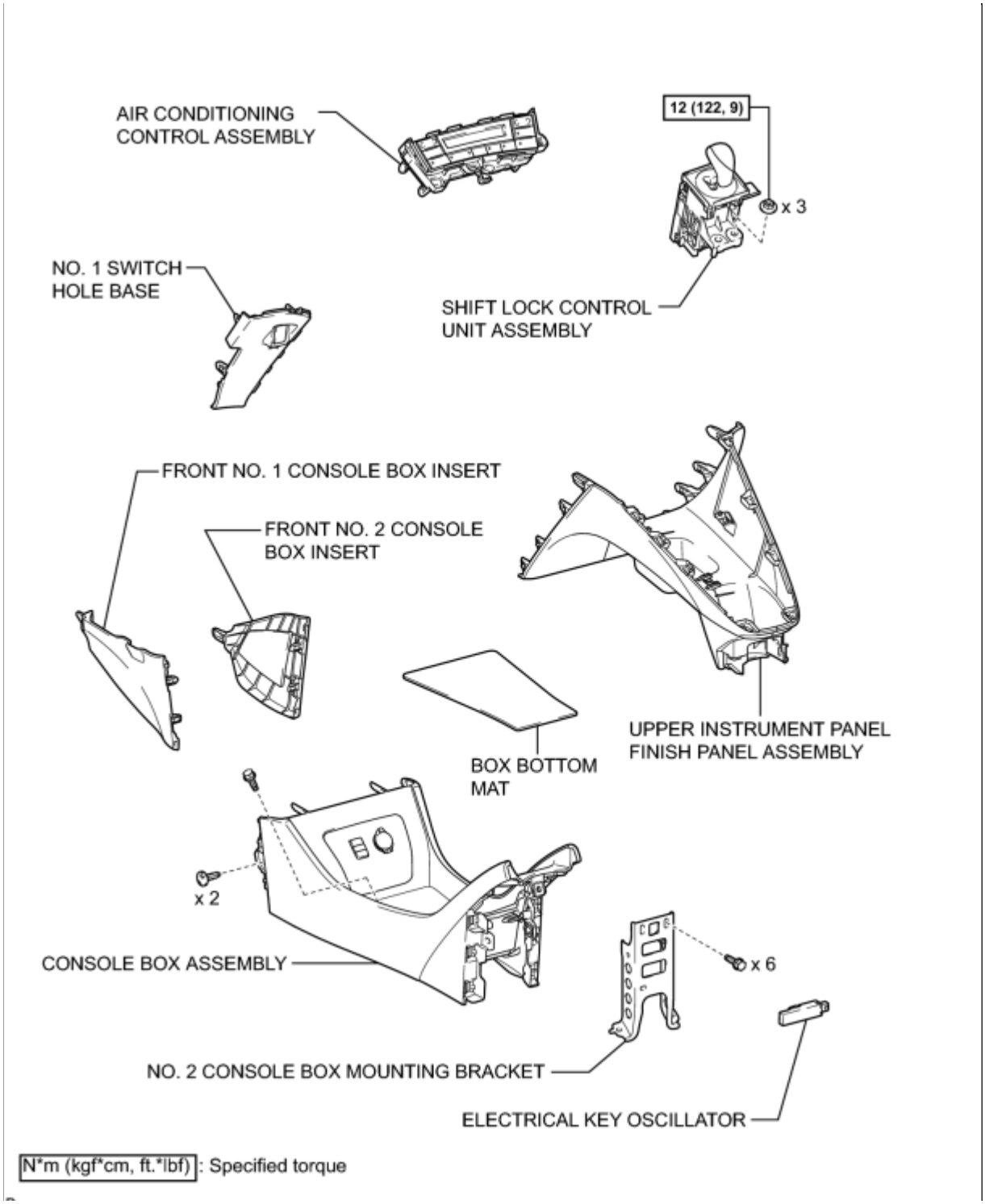



## ILLUSTRATION

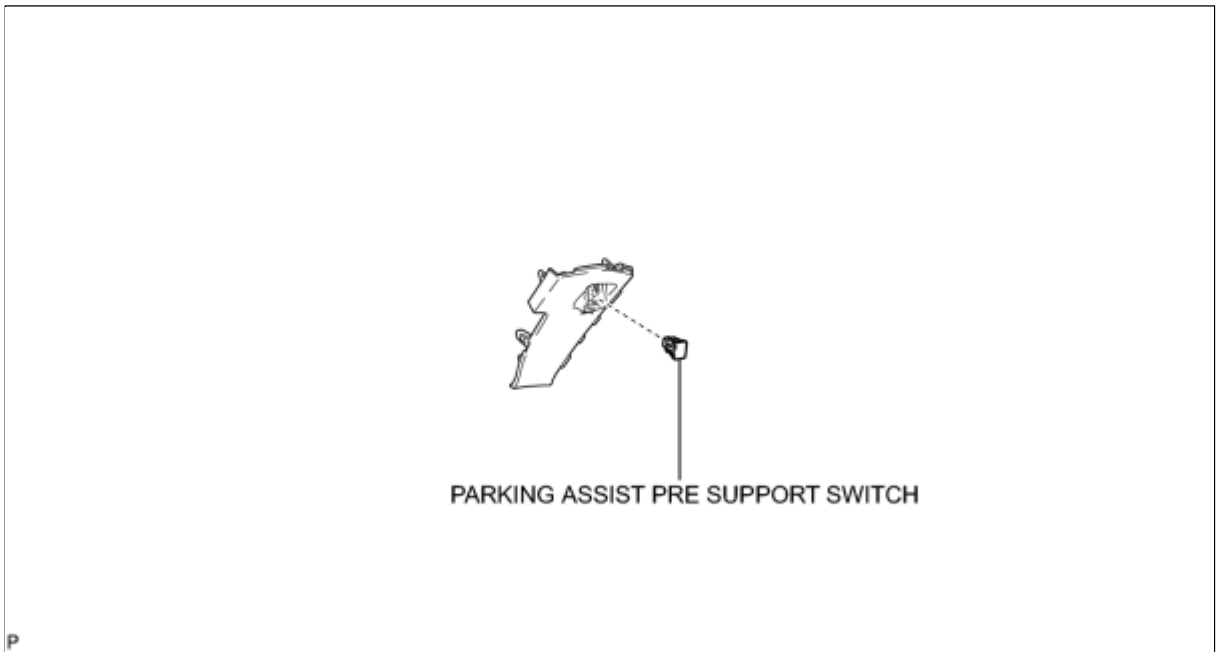





## ILLUSTRATION

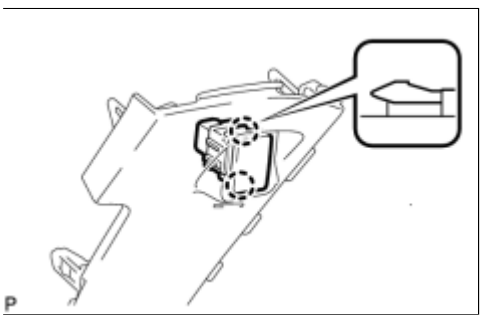


## ILLUSTRATION



# REMOVAL

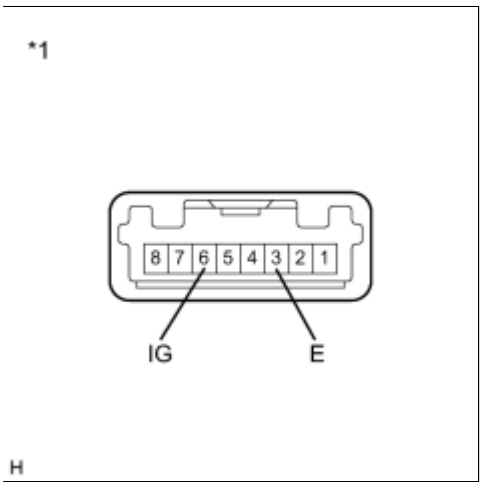
1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO
2. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO
3. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO
4. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO
5. REMOVE NAVIGATION RECEIVER WITH BRACKET INFO
6. REMOVE REAR CONSOLE BOX POCKET (w/ Power Outlet Socket) INFO
7. REMOVE UPPER CONSOLE PANEL (w/ Power Outlet Socket) INFO
8. REMOVE CONSOLE BOX CARPET INFO
9. REMOVE REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket) INFO
10. REMOVE REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket) INFO
11. REMOVE ELECTRICAL KEY OSCILLATOR INFO
12. REMOVE NO. 2 CONSOLE BOX MOUNTING BRACKET INFO
13. REMOVE FRONT NO. 1 CONSOLE BOX INSERT INFO
14. REMOVE FRONT NO. 2 CONSOLE BOX INSERT INFO
15. REMOVE BOX BOTTOM MAT INFO
16. SEPARATE CONSOLE BOX ASSEMBLY INFO
17. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO
18. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY INFO
19. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO
20. REMOVE CONSOLE BOX ASSEMBLY INFO
21. REMOVE NO. 1 SWITCH HOLE BASE INFO
22. REMOVE PARKING ASSIST PRE SUPPORT SWITCH




(a) Disengage the 2 claws and remove the parking assist pre support switch.

# INSPECTION

### 1. INSPECT PARKING ASSIST PRE SUPPORT SWITCH




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| 3 (E) - 6 (IG) | Parking assist pre support switch pushed in | Below 1 Ω |
| | Parking assist pre support switch not pushed | 10 kΩ or higher |

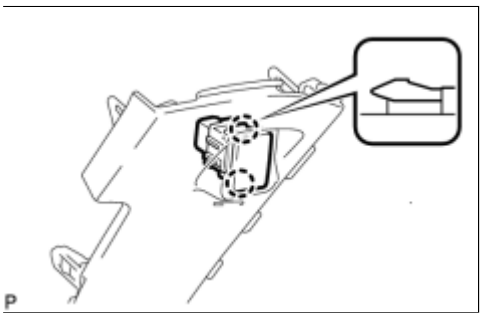
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected (Parking Assist Pre Support Switch) |

If the result is not as specified, replace the parking assist pre support switch.

# INSTALLATION

**1. INSTALL PARKING ASSIST PRE SUPPORT SWITCH**




(a) Engage the 2 claws to install the parking assist pre support switch.

**2. INSTALL NO. 1 SWITCH HOLE BASE** INFO

**3. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY** INFO

**4. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY** INFO

**5. INSTALL AIR CONDITIONING CONTROL ASSEMBLY** INFO

**6. INSTALL CONSOLE BOX ASSEMBLY** INFO

**7. INSTALL BOX BOTTOM MAT** INFO

**8. INSTALL FRONT NO. 2 CONSOLE BOX INSERT** INFO

**9. INSTALL FRONT NO. 1 CONSOLE BOX INSERT** INFO

**10. INSTALL NO. 2 CONSOLE BOX MOUNTING BRACKET** INFO

**11. INSTALL ELECTRICAL KEY OSCILLATOR** INFO

**12. INSTALL REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket)** INFO

**13. INSTALL REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket)** INFO

**14. INSTALL CONSOLE BOX CARPET** INFO

**15. INSTALL UPPER CONSOLE PANEL (w/ Power Outlet Socket)** INFO

**16. INSTALL REAR CONSOLE BOX POCKET (w/ Power Outlet Socket)** INFO

**17. INSTALL NAVIGATION RECEIVER WITH BRACKET** INFO

**18. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY** INFO

**19. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH** INFO

**20. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY** INFO

**21. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY** INFO

**22. INSPECT SHIFT LEVER** INFO

# PRECAUTION

## 1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

**NOTICE:**

**When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the terminal is reconnected.**

| SYSTEM NAME | SEE PROCEDURE |
|---|---|
| Advanced Parking Guidance System | INFO |

## 2. NOTES FOR REAR TELEVISION CAMERA

(a) Notes for the rear television camera assembly

(1) The rear view monitor system may not function properly if subjected to a severe blow by any hard object.

(2) Do not scrub the cover part of the camera (resin made). Scrubbing may scratch the cover and affect the image. Prevent organic solvents, waxes, bond removing solvents or glass coating from adhering to the cover. If such material adheres to the cover, clean it off immediately and wash with water.

(3) Exposing the camera to a sudden temperature change may affect proper functioning of the camera.

(4) A clear image may not appear if the camera is dirty with snow, mud, etc. In that case, wash it with water and wipe off the lens. Use a detergent to remove dirt if necessary.

(b) Images are difficult to discern even in normal conditions if:

(1) Noise may occur in the image depending on electrical devices used in the cabin.

(2) Noise may occur in the image if the outer mirror switch assembly is operated.

(3) Noise may occur in the image if accessories that generate radio waves have been installed.

(4) The camera screen is frosted over (the image immediately after turning the power switch on (IG) may be blurred or darker than normal).

(5) The camera lens is dirty with snow, mud, etc.

(6) A strong beam of light, such as a sunbeam or headlight, hits the camera.

(7) It is too dark around the camera (at night etc.).

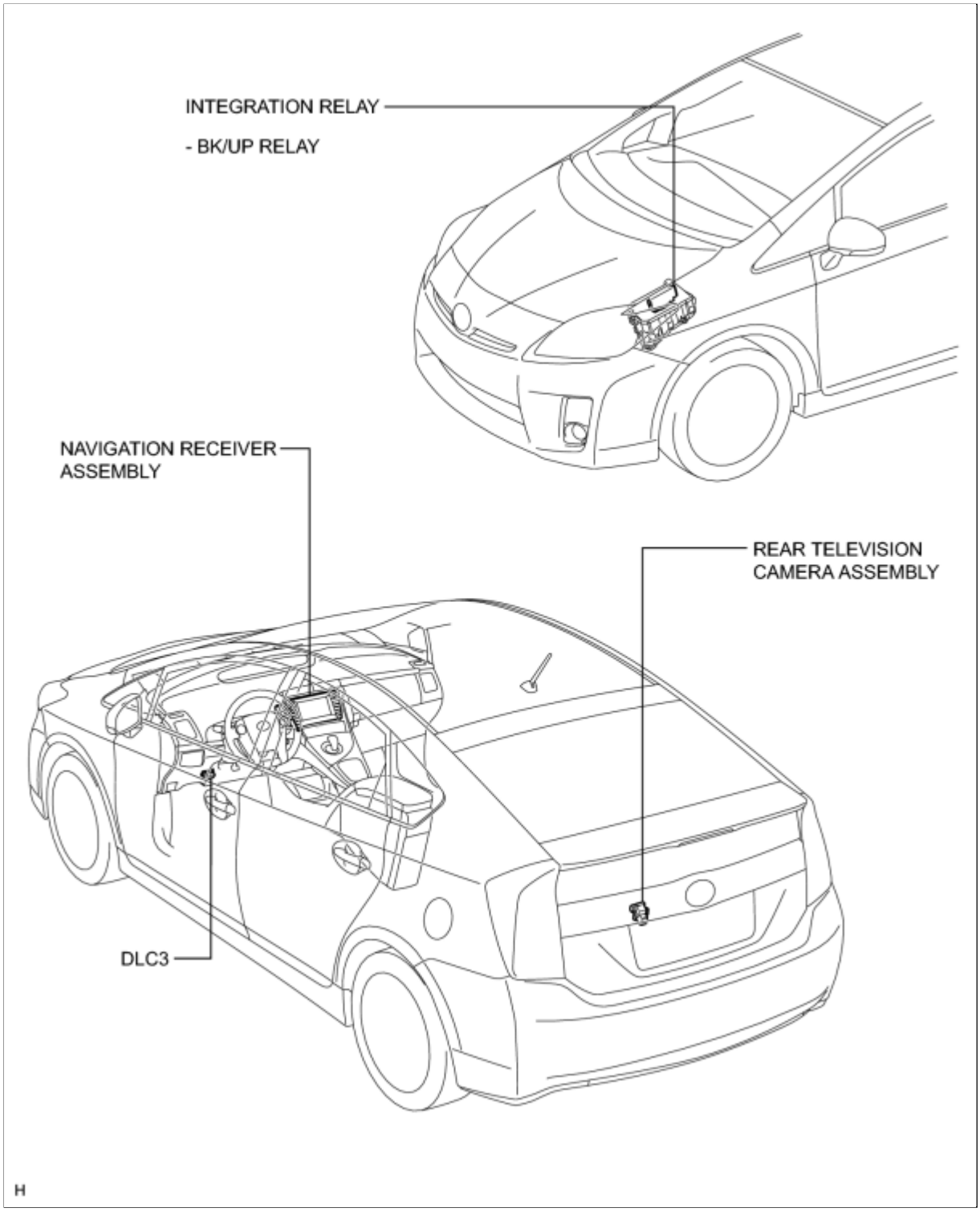
(8) The ambient temperature around the camera is either too high or too low.

(9) The vehicle is tilted at a steep angle.

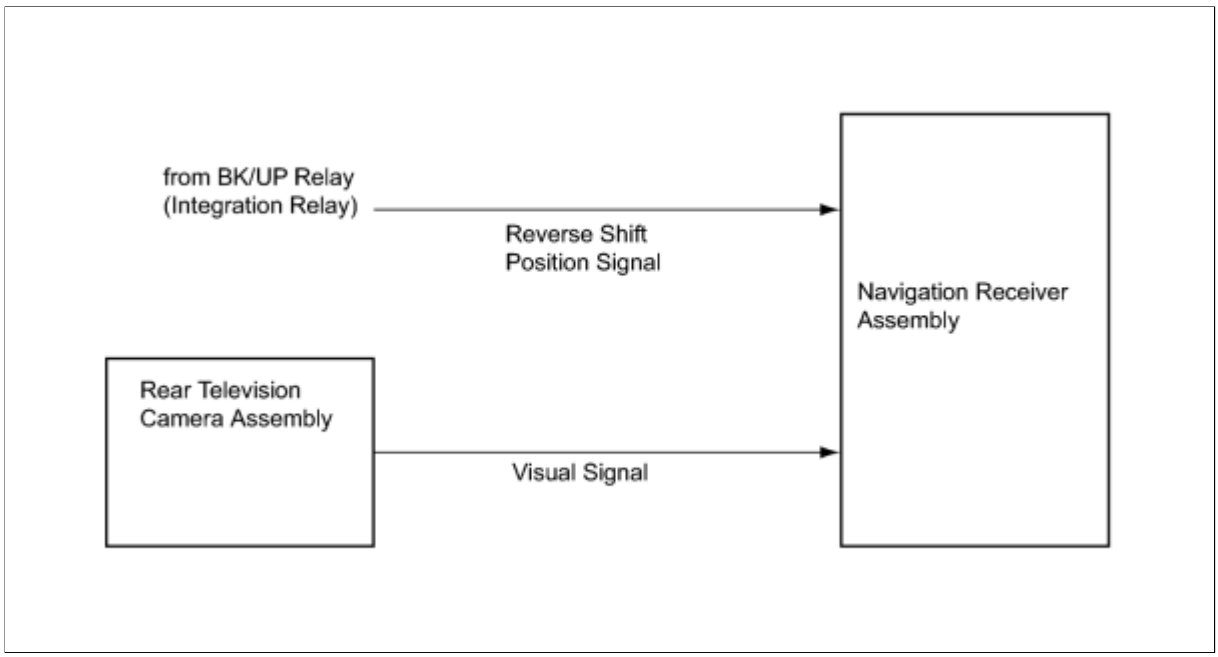
(10) The ambience of the camera is too bright. (When a strong light, such as a sunbeam reflected off the vehicle body, hits the camera, the image may be blurred. This is called the "SMEAR" phenomenon, peculiar to the CCD camera.)

# PARTS LOCATION

## ILLUSTRATION



# SYSTEM DIAGRAM



# SYSTEM DESCRIPTION

## 1. GENERAL

(a) To assist the driver with parking the vehicle by displaying an image of the area behind the vehicle, this system has a television camera mounted on the back door. The system displays the image on the navigation receiver assembly.

(b) This system consists of the following components:

(1) Navigation receiver assembly

(2) Rear television camera assembly

(3) BK/UP relay (integration relay)

## 2. FUNCTION OF COMPONENTS

(a) The navigation receiver assembly controls the system by using information from the following components:

| ITEM | FUNCTION |
|---|---|
| Rear Television Camera Assembly | • Mounted on the back door to transmit an image of the area behind the vehicle to the navigation receiver assembly.<br>• Has a color video camera that uses a Charge Coupled Device (CCD) and a wide-angle lens. |
| Navigation Receiver Assembly | • Receives video signals, which contain an image of the area behind the vehicle taken with the rear television camera assembly.<br>• Performs control of the system by receiving the shift position signal from the BK/UP relay (integration relay).<br>• Displays the rear view monitor image on the display panel. |
| BK/UP Relay (Integration Relay) | Transmits a reverse shift position signal to the navigation receiver assembly. |

## 3. OPERATION EXPLANATION

(a) The navigation receiver assembly receives the reverse shift position signal from the BK/UP relay (integration relay) when the shift lever is moved to R. After receiving the reverse shift position signal, the navigation receiver assembly switches from the navigation system to the rear view monitor system.

## 4. DIAGNOSTIC FUNCTION

(a) Navigation system has a diagnostic function displayed in the navigation receiver assembly. This function enables the confirmation of the input signal for reverse shift position 

.

# HOW TO PROCEED WITH TROUBLESHOOTING

**HINT:**

- Use the following procedure to troubleshoot the rear view monitor system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

**NEXT**

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

**NEXT**

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

**NEXT**

| | |
|---|---|
| 4. | PROBLEM SYMPTOM CONFIRMATION |

**Result**

| RESULT | PROCEED TO |
|---|---|
| Symptom does not occur | A |
| Symptom occurs | B |

B Go to step 6

A

| | |
|---|---|
| 5. | SYMPTOM SIMULATION |

NEXT

| | |
|---|---|
| 6. | CHECK DTC* |

(a) Check for DTCs and note any codes that are output INFO .

(b) Clear the DTC INFO .

(c) Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.

**NOTICE:**

**The navigation receiver assembly may output the DTCs of the following system. If DTCs other than those specified in Diagnostic Trouble Code Chart of the rear view monitor system are output, refer to Diagnostic Trouble Code Chart for the applicable system.**

| SYSTEM | PROCEED TO |
|---|---|
| Navigation System | INFO |

**Result**

| RESULT | PROCEED TO |
|---|---|
| DTC is output | A |
| DTC for the rear view system is not output | B |
| DTCs for the navigation system are output | C |

B Go to step 8

C GO TO NAVIGATION SYSTEM

A

| | |
|---|---|
| 7. | DIAGNOSTIC TROUBLE CODE CHART* |

(a) Refer to Diagnostic Trouble Code Chart INFO .

**NEXT** ▶ **Go to step 10**

| | |
|---|---|
| 8. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO .

**Result**

| RESULT | PROCEED TO |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

**B** ▶ **Go to step 9**

**A**
▼

| | |
|---|---|
| 9. | BASED ON MALFUNCTION SYMPTOM, PERFORM TROUBLESHOOTING BELOW |

(a) Refer to Terminals of ECU INFO .

**NEXT**
▼

| | |
|---|---|
| 10. | CIRCUIT INSPECTION |

**NEXT**
▼

| | |
|---|---|
| 11. | ADJUST, REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 12. | CONFIRMATION TEST |

NEXT END

# PROBLEM SYMPTOMS TABLE

**HINT:**

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**General**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| When the shift lever is in R, a rear view monitor image is not displayed (screen is not black). | Reverse signal circuit | INFO |
| | Navigation receiver assembly | INFO |
| When the shift lever is in R, a rear view monitor image is not displayed (screen is black). | Navigation receiver assembly power source circuit | INFO |
| | Image from camera for rear view monitor is abnormal | INFO |
| | Navigation receiver assembly | INFO |
| When the shift lever is not in R, a rear view monitor image is displayed. | Reverse signal circuit | INFO |
| | Navigation receiver assembly | INFO |

**Display Malfunction**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| Image from the camera for the rear view monitor is abnormal (color, disorder of picture). | Image from camera for rear view monitor is abnormal | INFO |
| | Navigation receiver assembly | INFO |

# TERMINALS OF ECU

## 1. REAR TELEVISION CAMERA ASSEMBLY




(a) Disconnect the V6 connector from the rear television camera assembly.

(b) Measure the voltage of each terminal of the wire harness side connector.

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| V6-3 (CGND) - Body ground | Shield - Body ground | Ground | Always | Below 1 V |
| V6-4 (CB+) - V6-3 (CGND) | W - Shield | Power source | Power switch on (IG)<br>Shift lever in R | 5.8 to 7.0 V |

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the V6 connector to the rear television camera assembly.

(d) Check for pulses between each terminal of the connector.

| TERMINAL NO. (SYMBOL) | WIRING COLOR | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|---|
| V6-2 (CV+) - V6-1 (CV-) | R - B | Display signal | Power switch on (IG)<br>Shift lever in R<br>Under normal conditions | Pulse generation<br>(See waveform 1) |
| | | | Power switch on (IG)<br>Shift lever in R<br>Camera lens covered, blacking out screen | Pulse generation<br>(See waveform 2) |

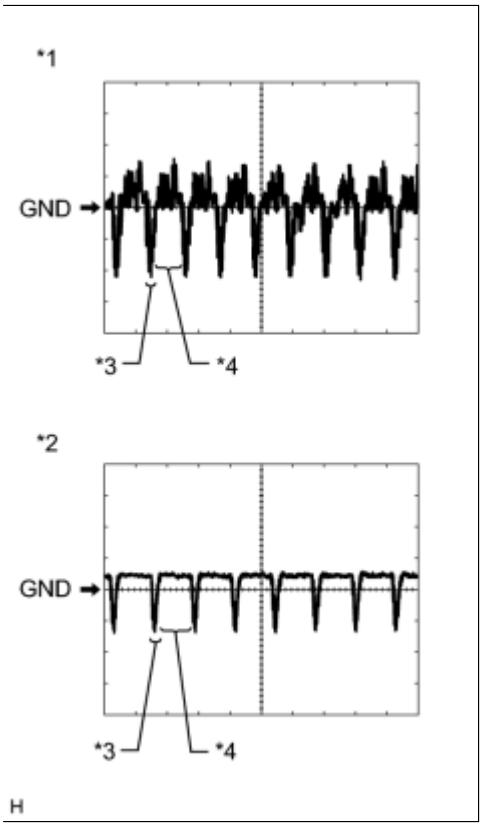
If the result is not as specified, the camera may have a malfunction.

(e) Reference (Oscilloscope waveform):

(1) Waveform 1 (under normal conditions)

| ITEM | CONTENT |
|---|---|

| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | V6-2 (CV+) - V6-1 (CV-) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |




**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

(2) Waveform 2 (camera lens is covered, blacking out the screen)

| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | V6-2 (CV+) - V6-1 (CV-) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

## Text in Illustration

| | |
|---|---|
| *1 | Waveform 1 (under normal conditions) |
| *2 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *3 | Synchronized Signal |
| *4 | Video Waveform |

### 2. NAVIGATION RECEIVER ASSEMBLY INFO

# DTC CHECK / CLEAR

### 1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch to on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Navigation System / Trouble Codes.

(e) Check the details of the DTCs INFO .

**HINT:**

**The navigation receiver assembly may output the DTCs of the following system. If DTCs other than those specified in Diagnostic Trouble Code Chart of the rear view monitor system are output, refer to Diagnostic Trouble Code Chart for the applicable system.**

| SYSTEM | PROCEED TO |
|---|---|
| Navigation System | INFO |

### 2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch to on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Navigation System / Trouble Codes.

(e) According to the display on the Techstream, select the trouble code data display with the clear button.

# DIAGNOSTIC TROUBLE CODE CHART

**HINT:**

**If a trouble code is output during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" in the DTC chart. Inspect fuses and relays before investigating the trouble areas shown in the table below.**

**Rear View Monitor System (w/ Navigation System)**

| DTC CODE | DETECTION ITEM | TROUBLE AREA | SEE PAGE |
|---|---|---|---|
| C1622 | Open or Short Circuit in Back Camera Signal | 1. Harness or connector<br>2. Navigation receiver assembly<br>3. Rear television camera assembly | INFO |

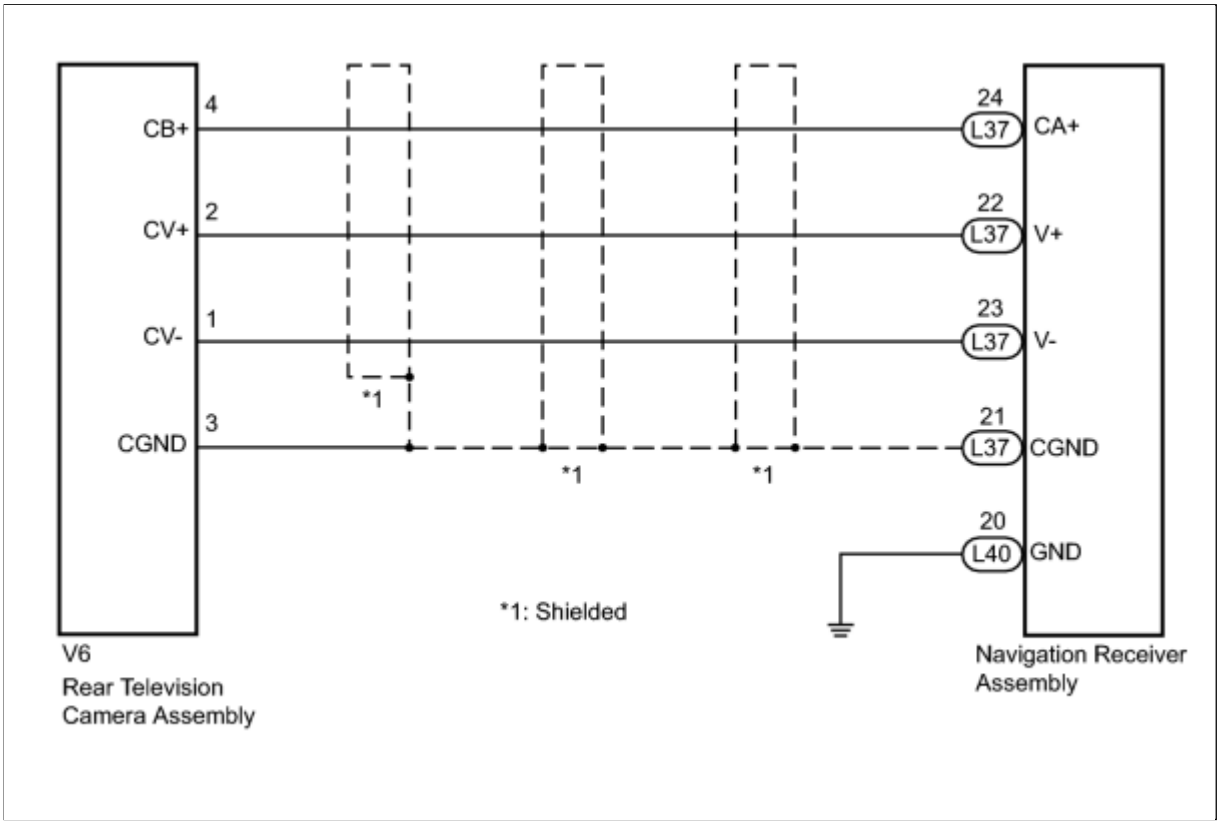
| DTC | C1622 | Open or Short Circuit in Back Camera Signal |
|---|---|---|

## DESCRIPTION

This DTC is stored if the navigation receiver assembly judges as a result of its self check that the signals or signal lines between the navigation receiver assembly and rear television camera assembly are not normal.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| C1622 | Open or short circuit in back camera signal | • Harness or connector<br>• Navigation receiver assembly<br>• Rear television camera assembly |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - REAR TELEVISION CAMERA) |

(a) Disconnect the L37 connector from the navigation receiver assembly.

(b) Disconnect the V6 connector from the rear television camera assembly.

(c) Measure the resistance according to the value(s) in the table below.

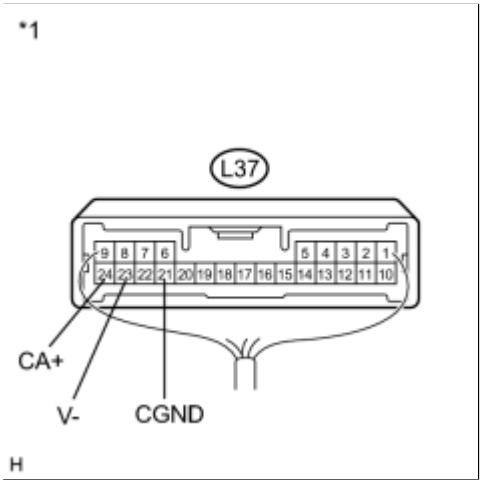
Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| V6-2 (CV+) - L37-22 (V+) | Always | Below 1 Ω |
| V6-4 (CB+) - L37-24 (CA+) | Always | Below 1 Ω |
| V6-3 (CGND) - L37-21 (CGND) | Always | Below 1 Ω |
| V6-1 (CV-) - L37-23 (V-) | Always | Below 1 Ω |
| V6-2 (CV+) - Body ground | Always | 10 kΩ or higher |
| V6-4 (CB+) - Body ground | Always | 10 kΩ or higher |
| V6-3 (CGND) - Body ground | Always | 10 kΩ or higher |
| V6-1 (CV-) - Body ground | Always | 10 kΩ or higher |

**NG** ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (NAVIGATION RECEIVER - REAR TELEVISION CAMERA)**

**OK** ▼

| | |
|---|---|
| **2.** | **CHECK NAVIGATION RECEIVER ASSEMBLY** |




(a) Reconnect the L37 connector to the navigation receiver assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-23 (V-) - Body ground | Always | Below 1 Ω |
| L37-21 (CGND) - Body ground | Always | Below 1 Ω |

| | | |
|---|---|---|
| L37-21 (CGND) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| L37-24 (CA+) - L37-21 (CGND) | Power switch on (IG)<br>Shift lever in R | 5.8 to 7.0 V |

**Text in Illustration**

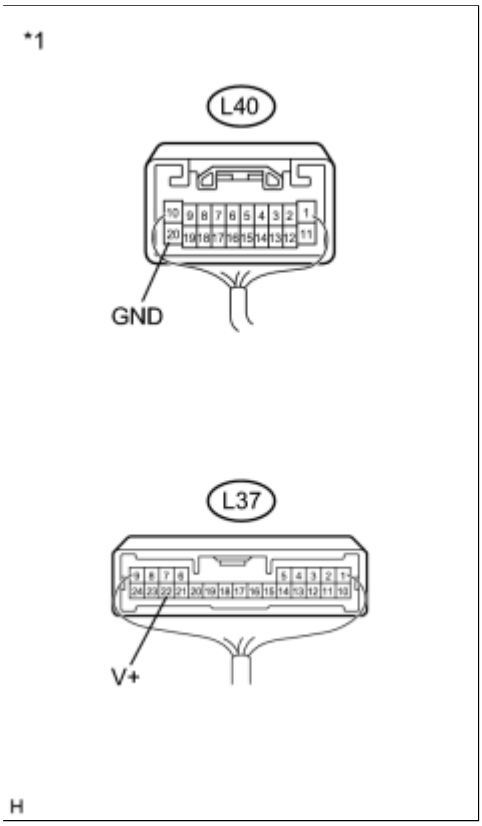
| | |
|---|---|
| *1 | Component with harness connected<br>(Navigation Receiver Assembly) |

**NG** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK REAR TELEVISION CAMERA ASSEMBLY** |

(a) Reconnect the V6 connector to the rear television camera assembly.

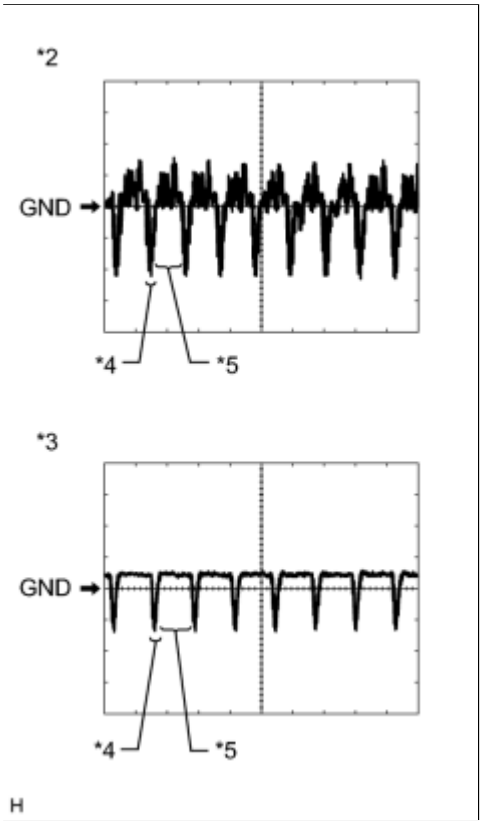



(b) Check that the L37 and L40 connectors are connected to the navigation receiver assembly.

(c) Check the waveform of the rear television camera assembly using an oscilloscope.

OK:

Waveform is as shown in the illustration.




| ITEM | CONTENT |
|---|---|
| Terminal No. (Symbol) | L37-22 (V+) - L40-20 (GND) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

**HINT:**

**The video waveform changes according to the image sent by the rear television camera assembly.**

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Navigation Receiver Assembly) |
| *2 | Waveform 1 (under normal conditions) |
| *3 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *4 | Synchronized Signal |
| *5 | Video Waveform |

**NG** ▶ **REPLACE REAR TELEVISION CAMERA ASSEMBLY**

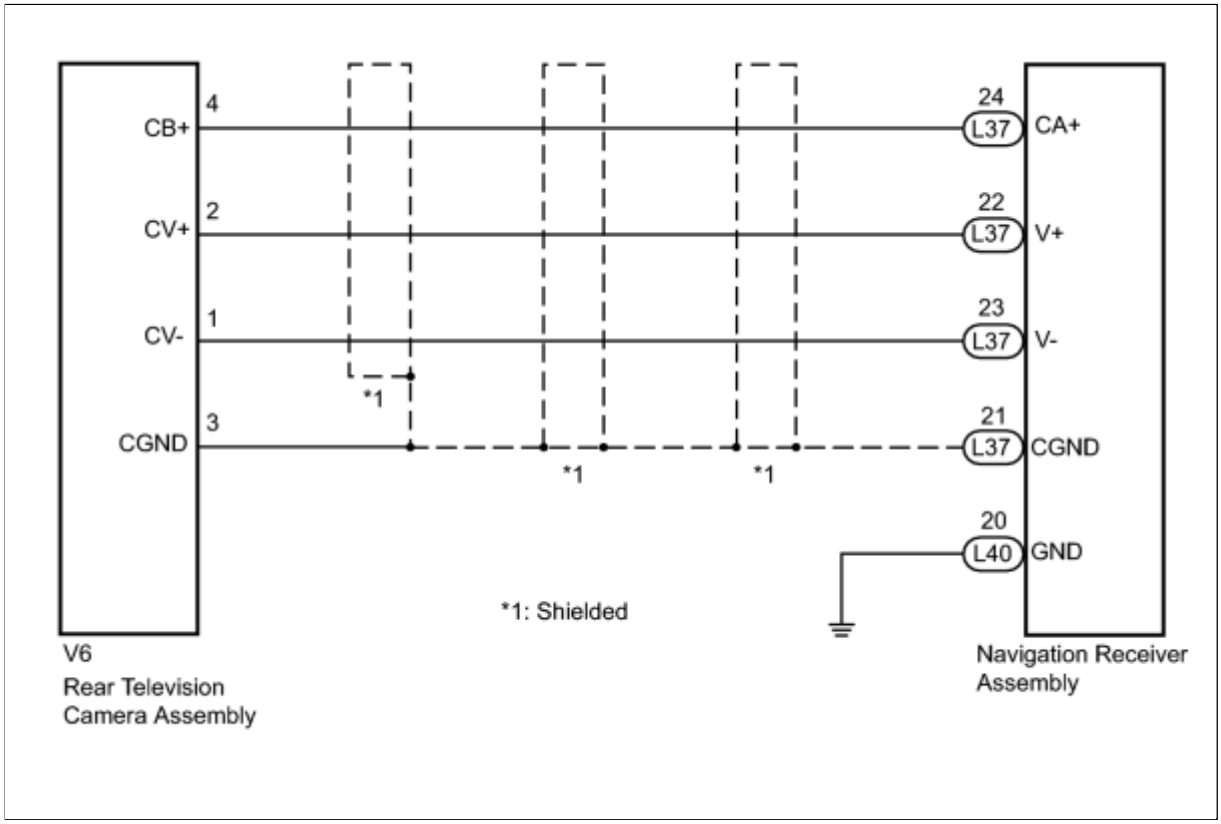
**OK** ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

**Image from Camera for Rear View Monitor is Abnormal**

## DESCRIPTION

The display signal from the rear television camera assembly transmits to the navigation receiver assembly.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER - REAR TELEVISION CAMERA) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (NAVIGATION RECEIVER - REAR TELEVISION CAMERA)

OK ▼

| | |
|---|---|
| 2 | CHECK NAVIGATION RECEIVER ASSEMBLY INFO |

| | |
|---|---|
| 2. | CHECK NAVIGATION RECEIVER ASSEMBLY |

NG → REPLACE NAVIGATION RECEIVER ASSEMBLY

OK ↓

| | |
|---|---|
| 3. | CHECK REAR TELEVISION CAMERA ASSEMBLY INFO |

NG → REPLACE REAR TELEVISION CAMERA ASSEMBLY

OK → PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the terminal is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. NOTES FOR REAR TELEVISION CAMERA

(a) Notes for the rear television camera assembly

(1) The rear view monitor system may not function properly if subjected to a severe blow by any hard object.

(2) Do not scrub the cover part of the camera (resin made). Scrubbing may scratch the cover and affect the image. Prevent organic solvents, waxes, bond removing solvents or glass coating from adhering to the cover. If such material adheres to the cover, clean it off immediately and wash with water.

(3) Exposing the camera to a sudden temperature change may affect proper functioning of the camera.

(4) A clear image may not appear if the camera is dirty with snow, mud, etc. In that case, wash it with water and wipe off the lens. Use a detergent to remove dirt if necessary.

(b) Images are difficult to discern even in normal conditions if:

(1) Noise may occur in the image depending on electrical devices used in the cabin.

(2) Noise may occur in the image if the outer mirror switch assembly is operated.

(3) Noise may occur in the image if accessories that generate radio waves have been installed.

(4) The camera screen is frosted over (the image immediately after turning the power switch on (IG) may be blurred or darker than normal).

(5) The camera lens is dirty with snow, mud, etc.

(6) A strong beam of light, such as a sunbeam or headlight, hits the camera.

(7) It is too dark around the camera (at night etc.).

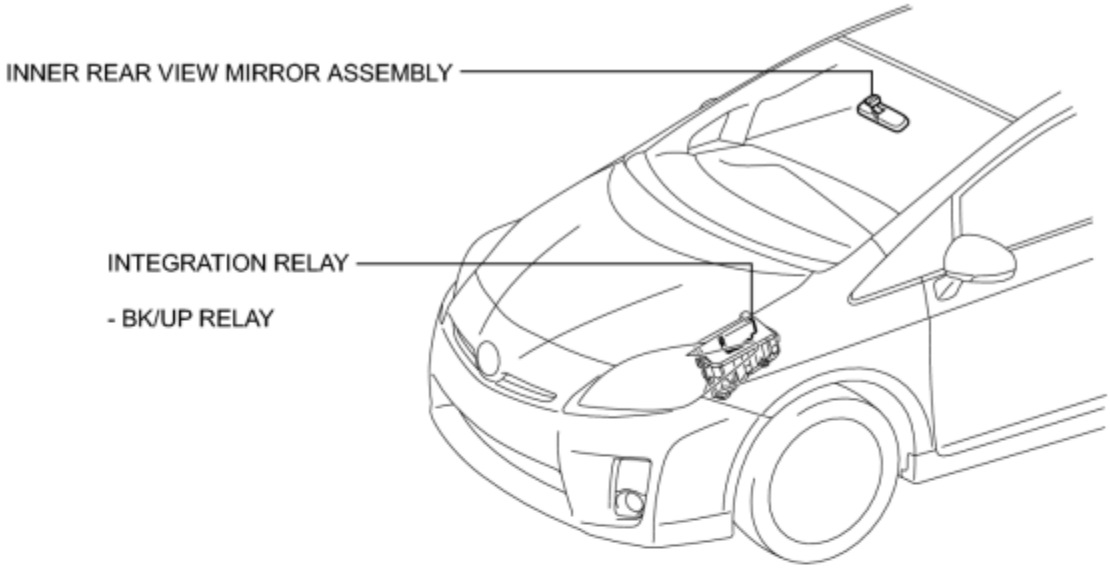
(8) The ambient temperature around the camera is either too high or too low.

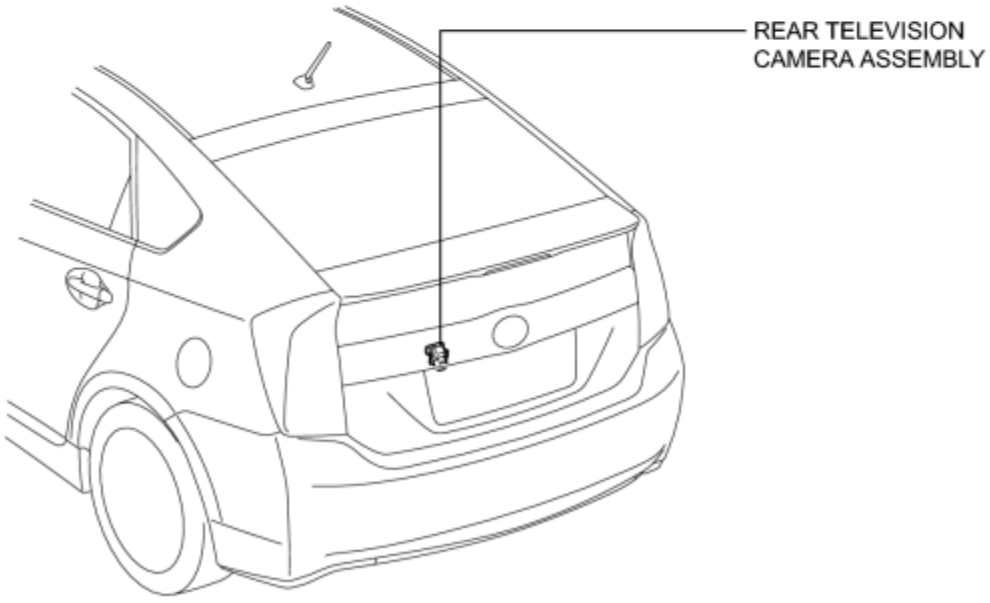
(9) The vehicle is tilted at a steep angle.

(10) The ambience of the camera is too bright. (When a strong light, such as a sunbeam reflected off the vehicle body, hits the camera, the image may be blurred. This is called the "SMEAR" phenomenon, peculiar to the CCD camera.)

# PARTS LOCATION

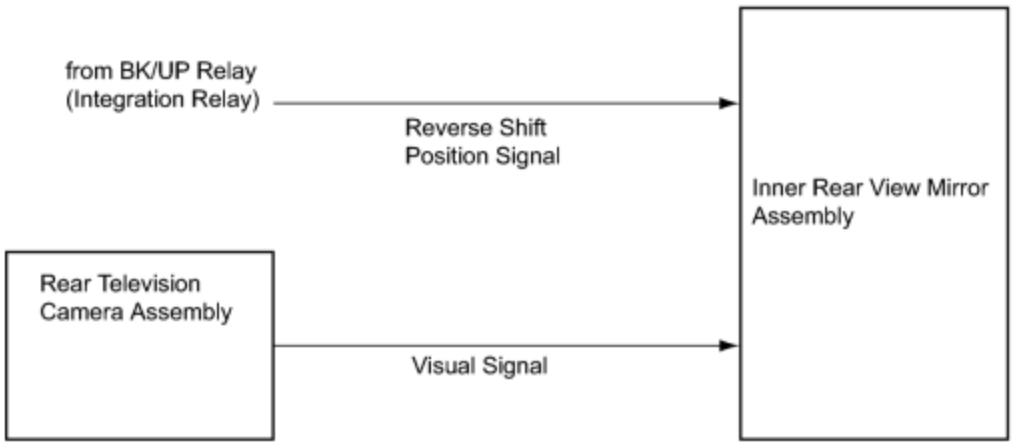
# ILLUSTRATION




H

# SYSTEM DIAGRAM



# SYSTEM DESCRIPTION

1. GENERAL

(a) To assist the driver with parking the vehicle by displaying an image of the area behind the vehicle, this system has a television camera mounted on the back door. The system displays the image on the inner rear view mirror assembly.

(b) This system consists of the following components:

(1) Inner rear view mirror assembly

(2) Rear television camera assembly

(3) BK/UP relay (integration relay)

2. FUNCTION OF COMPONENTS

(a) The inner rear view mirror assembly controls the system by using information from the following components:

| Item | Function |
|---|---|
| Television Camera Assembly | • Mounted on the back door to transmit an image of the area behind the vehicle to the inner rear view mirror assembly.<br>• Has a color video camera that uses a Charge Coupled Device (CCD) and a wide-angle lens. |
| Inner Rear View Mirror Assembly | • Receives video signals, which contain images of the area behind the vehicle taken with the rear television camera assembly.<br>• Performs control of the system by receiving the shift position signal from the BK/UP relay (integration relay).<br>• Displays the rear view monitor image on the display panel. |
| BK/UP Relay (Integration Relay) | Transmits a reverse shift position signal to the inner rear view mirror assembly. |

3. OPERATION EXPLANATION

(a) The inner rear view mirror assembly receives the reverse shift position signal from the BK/UP relay (integration relay) when the shift lever is moved to R. After receiving the reverse shift position signal, the inner rear view mirror assembly switches from except the rear view monitor system to the rear view monitor system.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Use the following procedure to troubleshoot the rear view monitor system.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT



| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

NEXT



| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT



| | |
|---|---|
| 4. | PROBLEM SYMPTOM CONFIRMATION |

**Result**

| Result | Proceed to |
|---|---|
| Symptom does not occur | A |
| Symptom occurs | B |

B  Go to step 6

A



| | |
|---|---|
| 5. | SYMPTOM SIMULATION |

NEXT

| | |
|---|---|
| 6. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

**Result**

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B Go to step 8

A

| | |
|---|---|
| 7. | BASED ON MALFUNCTION SYMPTOM, PERFORM TROUBLESHOOTING BELOW |

(a) Refer to Terminals of ECU INFO.

NEXT

| | |
|---|---|
| 8. | ADJUST, REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 9. | CONFIRMATION TEST |

NEXT **END**

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**General**

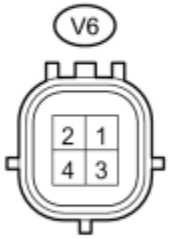
| Symptom | Suspected Area | See page |
|---|---|---|
| When the shift lever is in R, a rear view monitor image is not displayed (screen is not black). | Reverse signal circuit | INFO |
| | Image from camera for rear view monitor is abnormal | INFO |
| | Inner rear view mirror assembly | INFO |
| When the shift lever is in R, a rear view monitor image is not displayed (screen is black). | Inner rear view mirror power source circuit | INFO |
| | Image from camera for rear view monitor is abnormal | INFO |
| | Inner rear view mirror assembly | INFO |
| When the shift lever is not in R, a rear view monitor image is displayed. | Reverse signal circuit | INFO |
| | Inner rear view mirror assembly | INFO |

**Display Malfunction**

| Symptom | Suspected Area | See page |
|---|---|---|
| Image from the camera for the rear view monitor is abnormal (color, disorder of picture). | Image from camera for rear view monitor is abnormal | INFO |
| | Inner rear view mirror assembly | INFO |

# TERMINALS OF ECU

1. REAR TELEVISION CAMERA ASSEMBLY




(a) Disconnect the V6 connector from the rear television camera assembly.

(b) Measure the voltage of each terminal of the wire harness side connector.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| V6-3 (CGND) - Body ground | W-B - Body ground | Ground | Always | Below 1 V |
| V6-4 (CB+) - Body ground | W - Body ground | Power source | Power switch on (IG)<br><br>Shift lever in R | 5.8 to 7.0 V |

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the V6 connector to the rear television camera assembly.

(d) Check for pulses between each terminal of the connector.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| V6-2 (CV+) - V6-1 (CV-) | R - B | Display signal | Power switch on (IG) | Pulse generation |

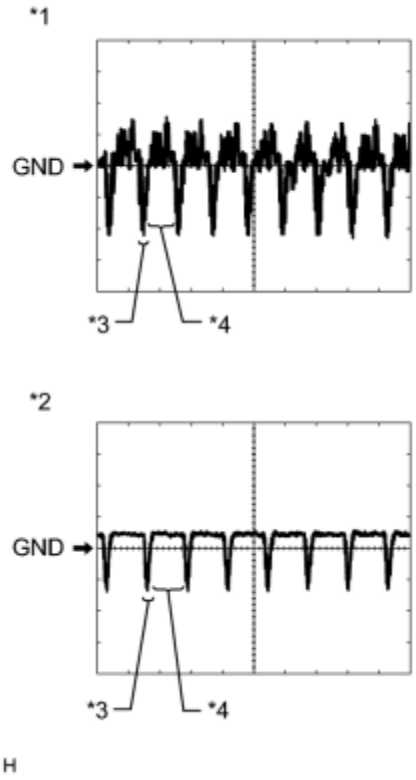
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | Shift lever in R<br><br>Under normal conditions | (See waveform 1) |
| | | | Power switch on (IG)<br><br>Shift lever in R<br><br>Camera lens covered, blacking out screen | Pulse generation<br><br>(See waveform 2) |

HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the inner rear view mirror assembly with the connector connected.

If the result is not as specified, the camera may have a malfunction.

(e) Reference (Oscilloscope waveform):




HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the inner rear view mirror assembly with the connector connected.

(1) Waveform 1 (under normal conditions)

| Item | Content |
|---|---|
| Terminal No. (Symbol) | V6-2 (CV+) - V6-1 (CV-) |
| Tool Setting | 200 mV/DIV., 50 μsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

(2) Waveform 2 (camera lens is covered, blacking out the

screen)

| Item | Content |
|---|---|
| Terminal No. (Symbol) | V6-2 (CV+) - V6-1 (CV-) |
| Tool Setting | 200 mV/DIV., 50 μsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

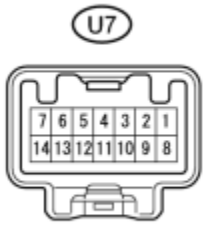
HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

# Text in Illustration

| | |
|---|---|
| *1 | Waveform 1 (under normal conditions) |
| *2 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *3 | Synchronized Signal |
| *4 | Video Waveform |

2. INNER REAR VIEW MIRROR ASSEMBLY




H

(a) Disconnect the U7 connector from the inner rear view mirror assembly.

(b) Measure the voltage of each terminal of the wire harness side connector.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| U7-1 (IG) - Body ground | BE - Body ground | Power switch signal | Power switch off | Below 1 V |
| | | | Power switch on (IG) | 11 to 14 V |
| U7-2 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 V |
| U7-3 (REV) - U7-2 (E) | P - W-B | Reverse signal | Power switch on (IG)<br>Shift lever in any position except R | Below 1 V |
| | | | Power switch on (IG)<br>Shift lever in R | 11 to 14 V |
| U7-13 (CGND) - U7-2 (E) | Shielded - W-B | Rear television camera ground (shielded) | Always | Below 1 V |
| U7-14 (CB+) - U7-2 (E) | W - W-B | Power source to television camera | Power switch on (IG)<br>Shift lever in R | 5.8 to 7.0 V |
| U7-6 (CV-) - U7-2 (E) | B - W-B | Rear television camera ground | Always | Below 1 V |

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the U7 connector to the inner rear view mirror assembly.

(d) Check for pulses between each terminal of the connector.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| U7-7 (CV+) - U7-2 (E) | R - W-B | Display signal | Power switch on (IG)<br>Shift lever in R<br>Under normal conditions | Pulse generation<br>(See waveform 1) |
| | | | Power switch on (IG)<br>Shift lever in R<br>Camera lens covered, blacking out screen | Pulse generation<br>(See waveform 2) |

HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the inner rear view mirror assembly with the connector connected.

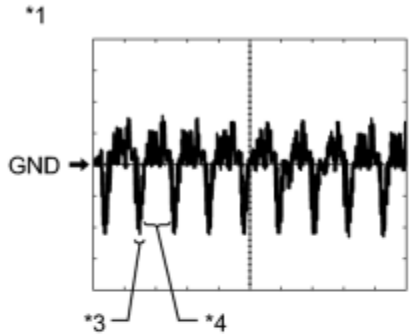
If the result is not as specified, the camera may have a malfunction.

(e) Reference (Oscilloscope waveform):

HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the inner rear view mirror assembly with the connector connected.

(1) Waveform 1 (under normal conditions)

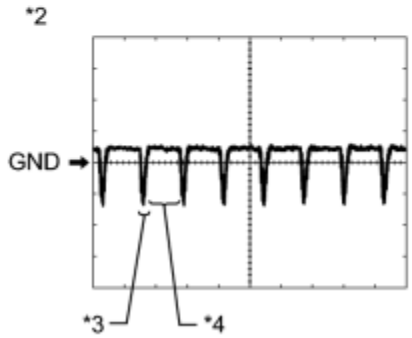



| Item | Content |
|---|---|
| Terminal No. (Symbol) | U7-7 (CV+) - U7-2 (E) |
| Tool Setting | 200 mV/DIV., 50 μsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

(2) Waveform 2 (camera lens is covered, blacking out the screen)




| Item | Content |
|---|---|
| Terminal No. (Symbol) | U7-7 (CV+) - U7-2 (E) |
| Tool Setting | 200 mV/DIV., 50 μsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

H

# Text in Illustration

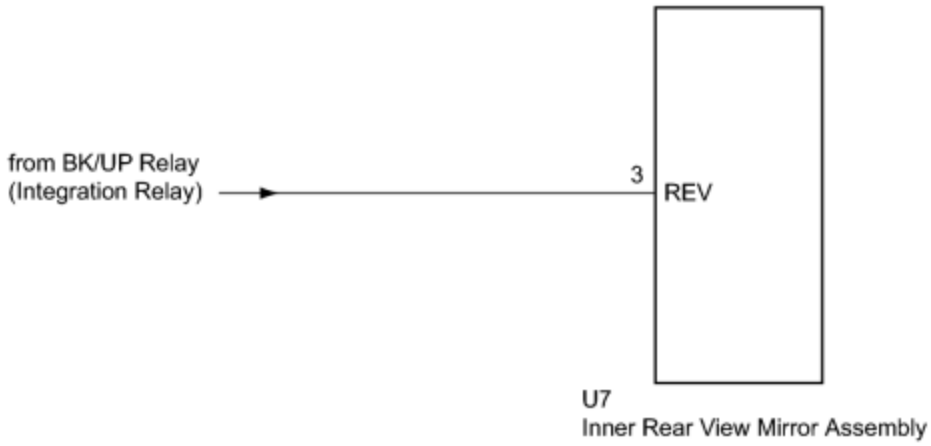
| | |
|---|---|
| *1 | Waveform 1 (under normal conditions) |
| *2 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *3 | Synchronized Signal |
| *4 | Video Waveform |

| Reverse Signal Circuit |
|---|

# DESCRIPTION

The inner rear view mirror assembly receives a reverse shift position signal from the BK/UP relay.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK BACK-UP LIGHT ASSEMBLY |
|---|---|

(a) Move the shift lever to R and check if the back-up light comes on.

OK:

The back-up light comes on.

NG GO TO LIGHTING SYSTEM

OK

| | |
|---|---|
| 2. | CHECK INNER REAR VIEW MIRROR ASSEMBLY (REV) |

(a) Disconnect the U7 connector from the inner rear view mirror assembly.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| U7-3 (REV) - Body ground | Power switch on (IG)<br><br>Shift lever in R | 11 to 14 V |
| U7-3 (REV) - Body ground | Power switch on (IG)<br><br>Shift lever in any position except R | Below 1 V |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

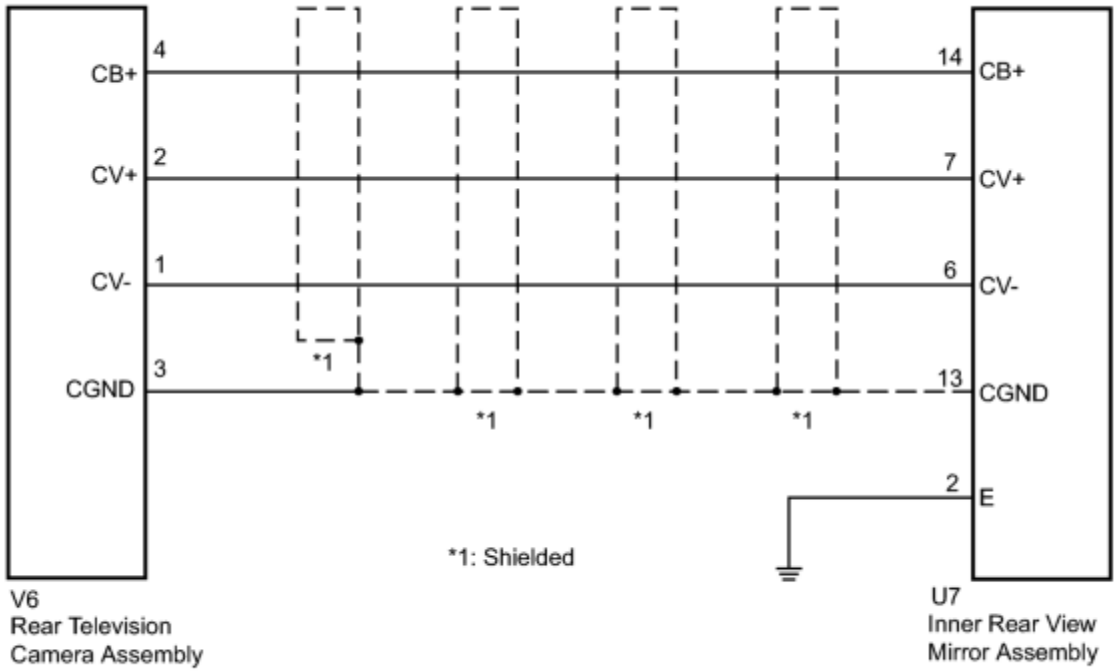
OK **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| Image from Camera for Rear View Monitor is Abnormal |
|---|

# DESCRIPTION

The display signal of the rear television camera assembly transmit to the inner rear view mirror assembly.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (INNER REAR VIEW MIRROR - REAR TELEVISION CAMERA) |

(a) Disconnect the U7 connector from the inner rear view mirror assembly.

(b) Disconnect the V6 connector from the rear television camera assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| U7-7 (CV+) - V6-2 (CV+) | Always | Below 1 Ω |
| U7-14 (CB+) - V6-4 (CB+) | Always | Below 1 Ω |
| U7-6 (CV-) - V6-1 (CV-) | Always | Below 1 Ω |
| U7-13 (CGND) - V6-3 (CGND) | Always | Below 1 Ω |
| U7-7 (CV+) - Body ground | Always | 10 kΩ or higher |
| U7-14 (CB+) - Body ground | Always | 10 kΩ or higher |
| U7-6 (CV-) - Body ground | Always | 10 kΩ or higher |
| U7-13 (CGND) - Body ground | Always | 10 kΩ or higher |

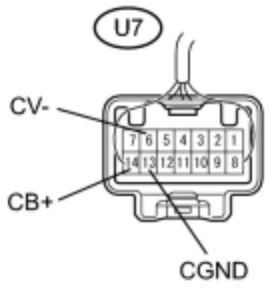
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 2. | CHECK INNER REAR VIEW MIRROR ASSEMBLY |

*1




(a) Reconnect the U7 connector to the inner rear view mirror assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| U7-6 (CV-) - Body ground | Always | Below 1 Ω |
| U7-13 (CGND) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| U7-14 (CB+) - U7-13 (CGND) | Power switch on (IG)<br><br>Shift lever in R | 5.8 to 7.0 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Inner Rear View Mirror Assembly) |

NG ▶ REPLACE INNER REAR VIEW MIRROR ASSEMBLY

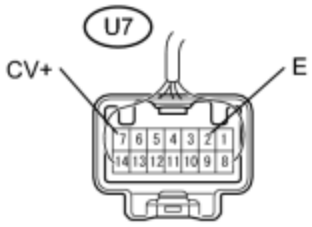
OK

▼

| | |
|---|---|
| 3. | CHECK REAR TELEVISION CAMERA ASSEMBLY |

(a) Reconnect the V6 connector to the rear television camera assembly.

*1

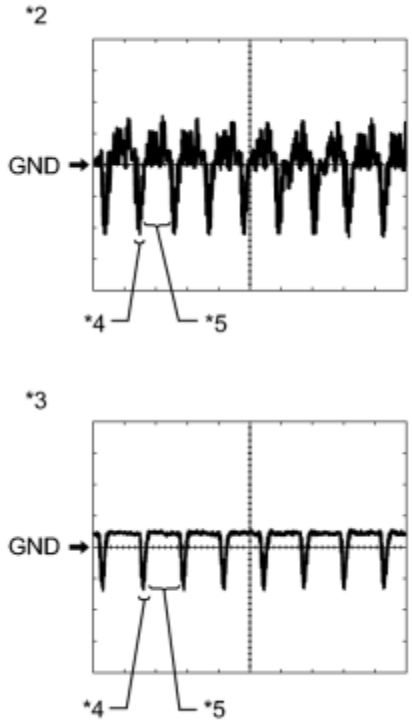



(b) Connect the U7 connector to the inner rear view mirror assembly.

(c) Check the waveform of the rear television camera assembly using an oscilloscope.

HINT:

A waterproof connector is used for the rear television camera assembly. Therefore, inspect the waveform at the inner rear view mirror assembly with the connector connected.




OK:

Waveform is as shown in the illustration.

| Item | Content |
|---|---|
| Terminal No. (Symbol) | U7-7 (CV+) - U7-2 (E) |
| Tool Setting | 200 mV/DIV., 50 µsec./DIV. |
| Condition | Power switch on (IG), shift lever in R |

HINT:

The video waveform changes according to the image sent by the rear television camera assembly.

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Inner Rear View Mirror Assembly) |
| *2 | Waveform 1 (under normal conditions) |
| *3 | Waveform 2 (camera lens is covered, blacking out the screen) |
| *4 | Synchronized Signal |
| *5 | Video Waveform |

NG ▶ REPLACE REAR TELEVISION CAMERA ASSEMBLY

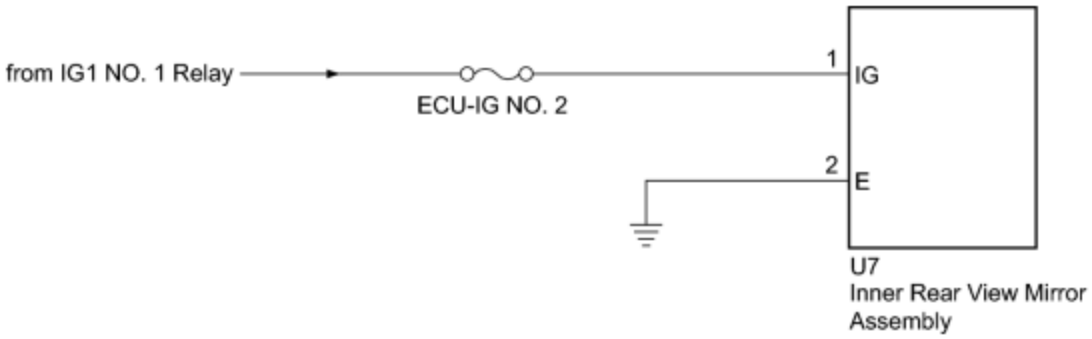
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| Inner Rear View Mirror Power Source Circuit |
|---|

# DESCRIPTION

This circuit detects the state of the power switch, and sends it to the inner rear view mirror assembly.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (BATTERY - INNER REAR VIEW MIRROR ASSEMBLY) |

(a) Disconnect the U7 inner rear view mirror assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

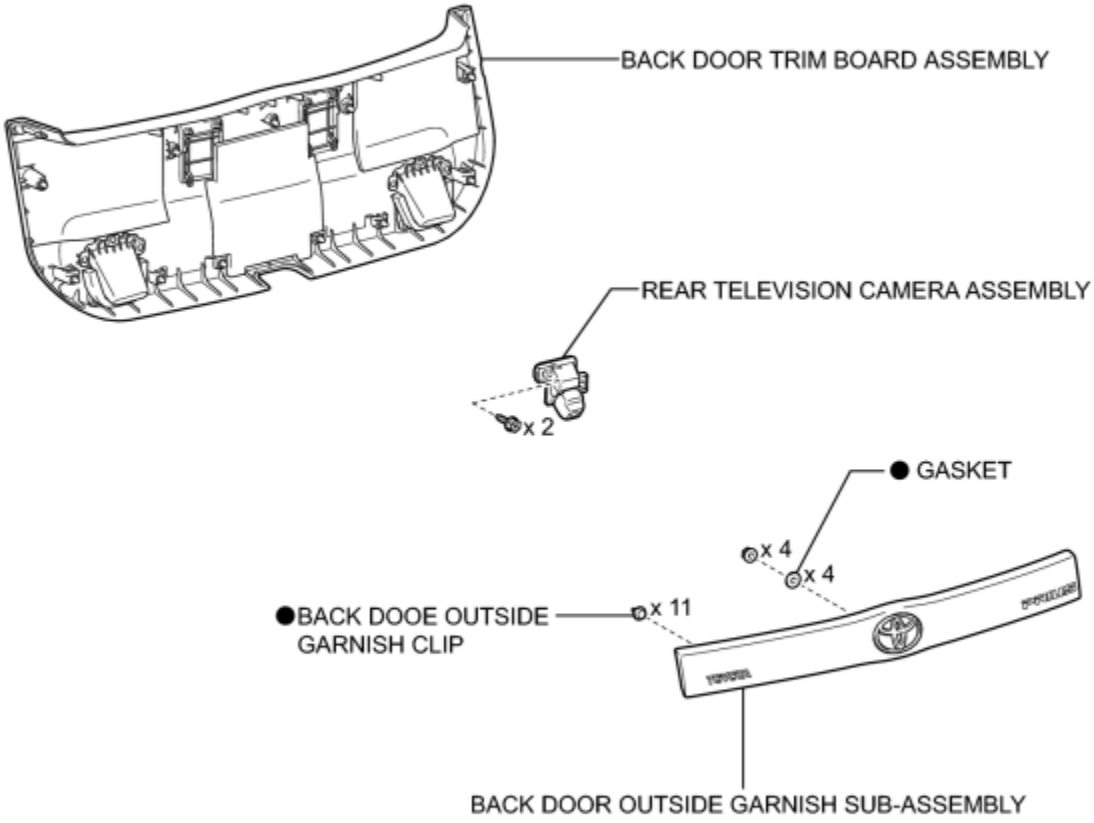
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| U7-1 (IG) - U7-2 (E) | Power switch on (IG) | 11 to 14 V |
| | Power switch off | Below 1 V |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# COMPONENTS

# ILLUSTRATION




● Non-reusable part

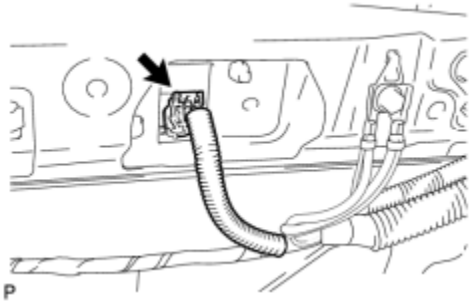
P

# REMOVAL

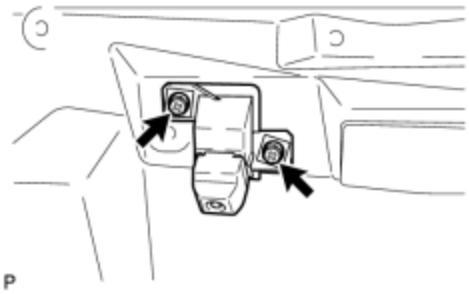
1. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

2. REMOVE BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

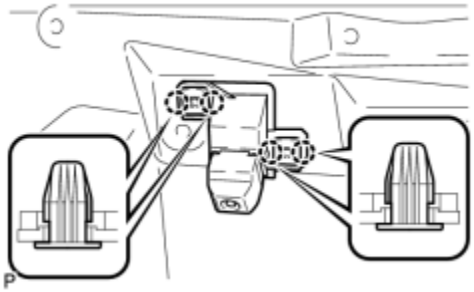
3. REMOVE REAR TELEVISION CAMERA ASSEMBLY



(a) Disconnect the connector.



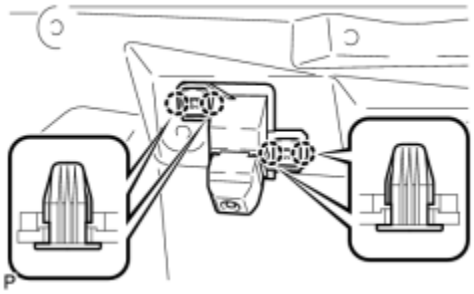
(b) Remove the 2 screws.



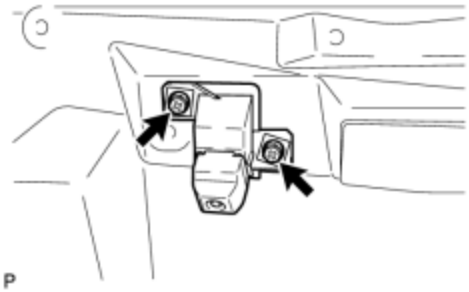
(c) Disengage the 4 claws and remove the rear television camera assembly.

# INSTALLATION

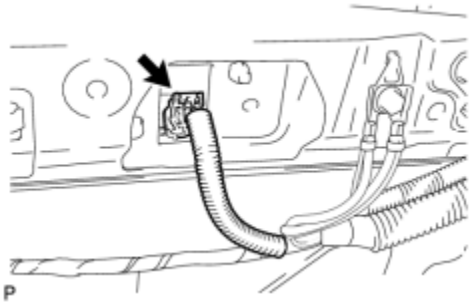
1. INSTALL REAR TELEVISION CAMERA ASSEMBLY



(a) Engage the 4 claws to temporarily install the rear television camera assembly.



(b) Install the rear television camera assembly with the 2 screws.



(c) Connect the connector.

2. INSTALL BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

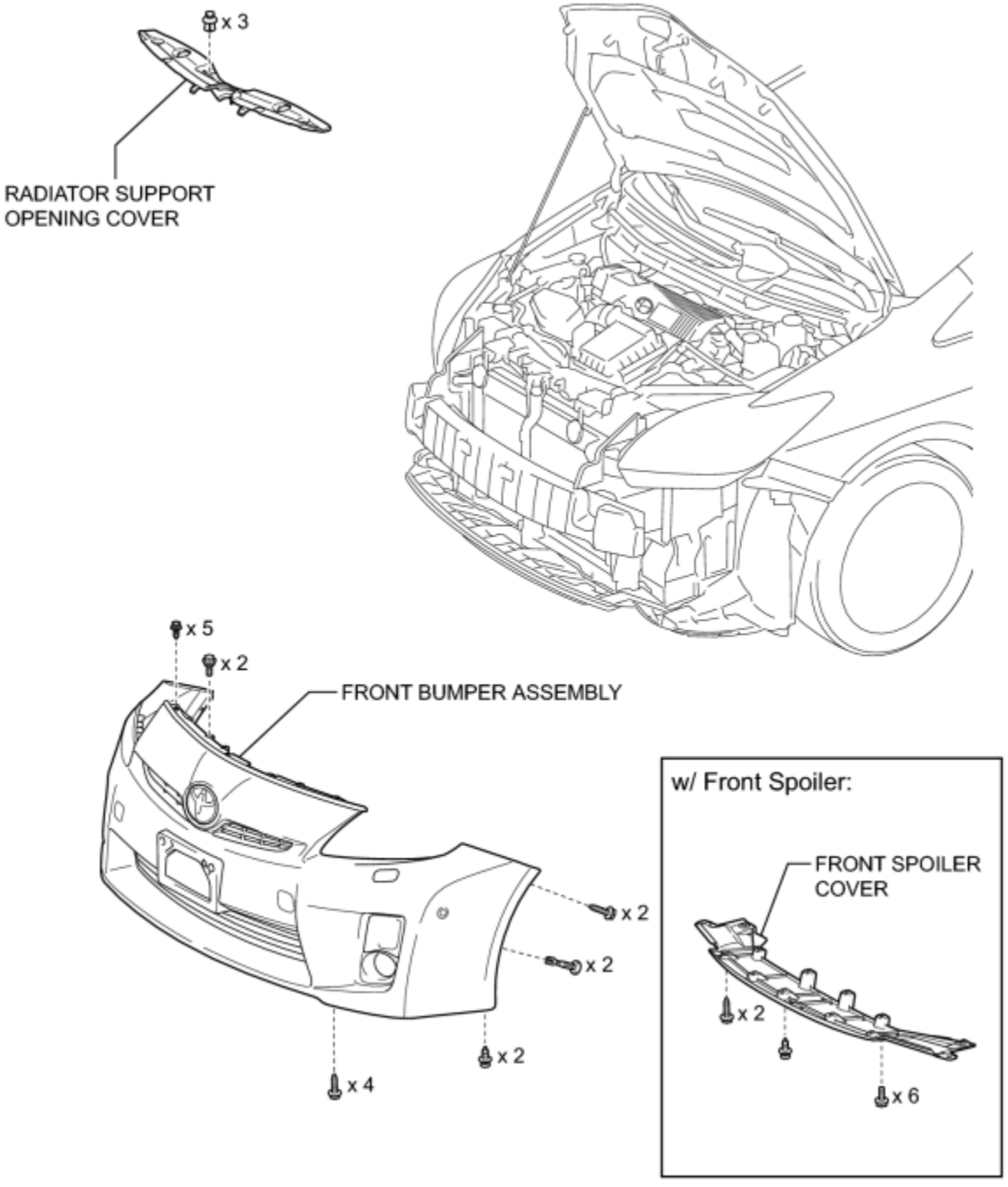
3. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

4. ADJUST REAR TELEVISION CAMERA OPTICAL AXIS (CAMERA POSITION SETTINGS) (w/ Advanced Parking Guidance System)

INFO

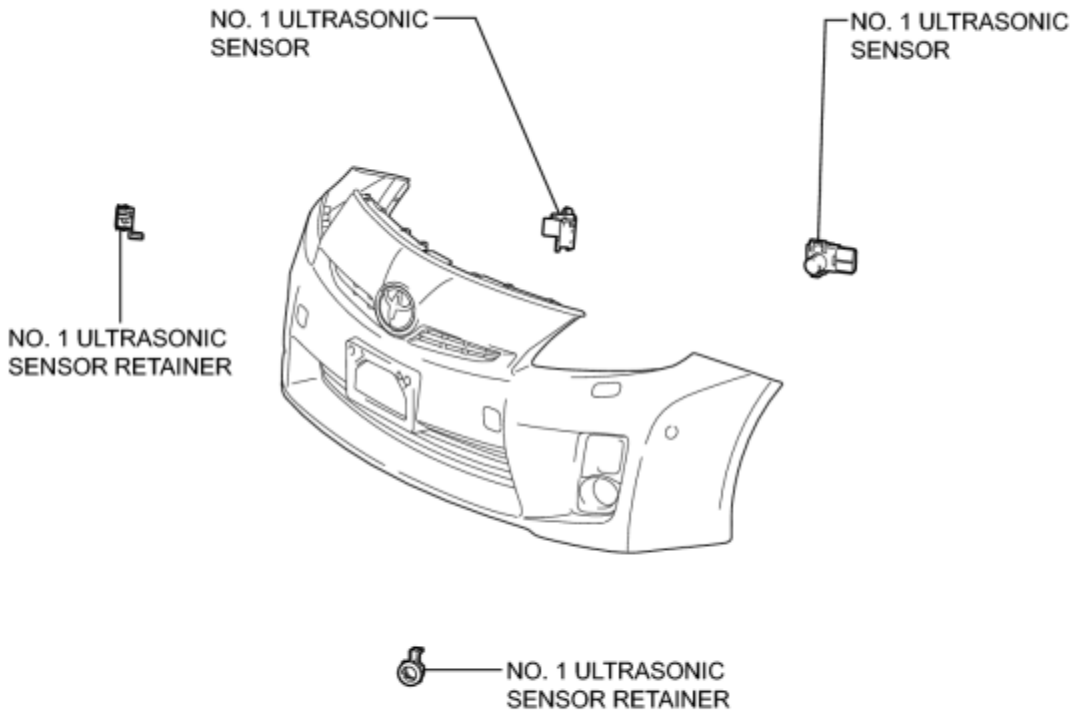
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION


NO. 1 ULTRASONIC SENSOR
NO. 1 ULTRASONIC SENSOR
NO. 1 ULTRASONIC SENSOR RETAINER
NO. 1 ULTRASONIC SENSOR RETAINER

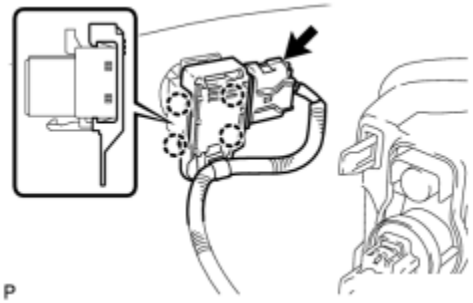
P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

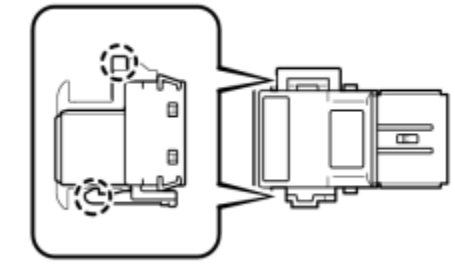
3. REMOVE NO. 1 ULTRASONIC SENSOR



P

(a) Disconnect the connector.

(b) Disengage the 4 claws and disconnect the wire harness with bracket.



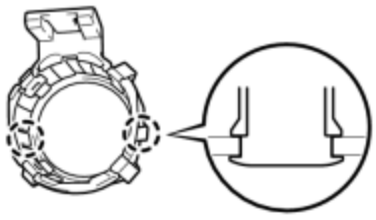
P

(c) Disengage the 2 claws and remove the No. 1 ultrasonic sensor.

HINT:

Use the same procedure for the RH side and LH side.

4. REMOVE NO. 1 ULTRASONIC SENSOR RETAINER



P

(a) Disengage the 2 claws and remove the No. 1 ultrasonic sensor retainer.

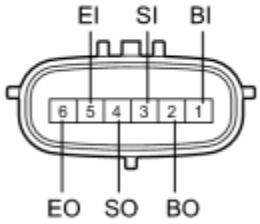
HINT:

Use the same procedure for the RH side and LH side.

# INSPECTION

1. INSPECT NO. 1 ULTRASONIC SENSOR

*1




H

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (BI) - 5 (EI) | Always | 10 kΩ or higher |
| 1 (BI) - 2 (BO) | Always | 10 kΩ or higher |
| 3 (SI) - 4 (SO) | Always | Below 1 Ω |
| 5 (EI) - 6 (EO) | Always | Below 1 Ω |

## Text in Illustration

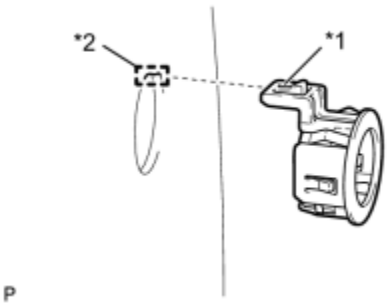
| | |
|---|---|
| *1 | Component without harness connected<br><br>(No. 1 Ultrasonic Sensor) |

If the result is not as specified, replace the No. 1 ultrasonic sensor.

# INSTALLATION

1. INSTALL NO. 1 ULTRASONIC SENSOR RETAINER

(a) Temporarily install the No. 1 ultrasonic sensor retainer to the front bumper.




P

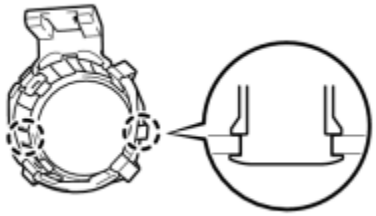
## Text in Illustration

| | |
|---|---|
| *1 | Protrusion |
| *2 | Keyhole |

- Do not damage the front bumper with the protrusion when installing the retainer.
- Securely install the No. 1 ultrasonic sensor retainer so that there are no gaps between the retainer and surface of the front bumper.

HINT:

When installing the retainer, align the keyhole and protrusion as shown in the illustration.



P

(b) Engage the 2 claws to install the No. 1 ultrasonic sensor retainer to the front bumper.

HINT:

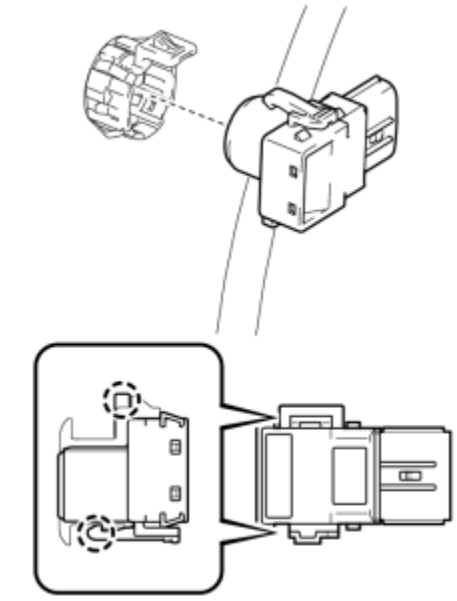
Use the same procedure for the RH side and LH side.

2. INSTALL NO. 1 ULTRASONIC SENSOR

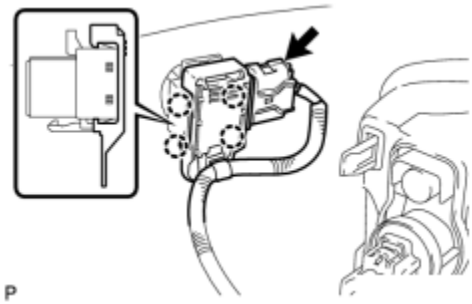
(a) Engage the 2 claws to install the No. 1 ultrasonic sensor as shown in the illustration.

NOTICE:

Push the No. 1 ultrasonic sensor retainer from the outside of the bumper when there is a gap between the retainer and the bumper surface. In this case, do not push on the ultrasonic sensor.



P



P

(b) Engage the 4 claws to connect the wire harness with bracket.

(c) Connect the connector.

HINT:

Use the same procedure for the RH side and LH side.

3. INSTALL FRONT BUMPER ASSEMBLY INFO

4. INSTALL RADIATOR SUPPORT OPENING COVER INFO

5. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

6. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT INFO

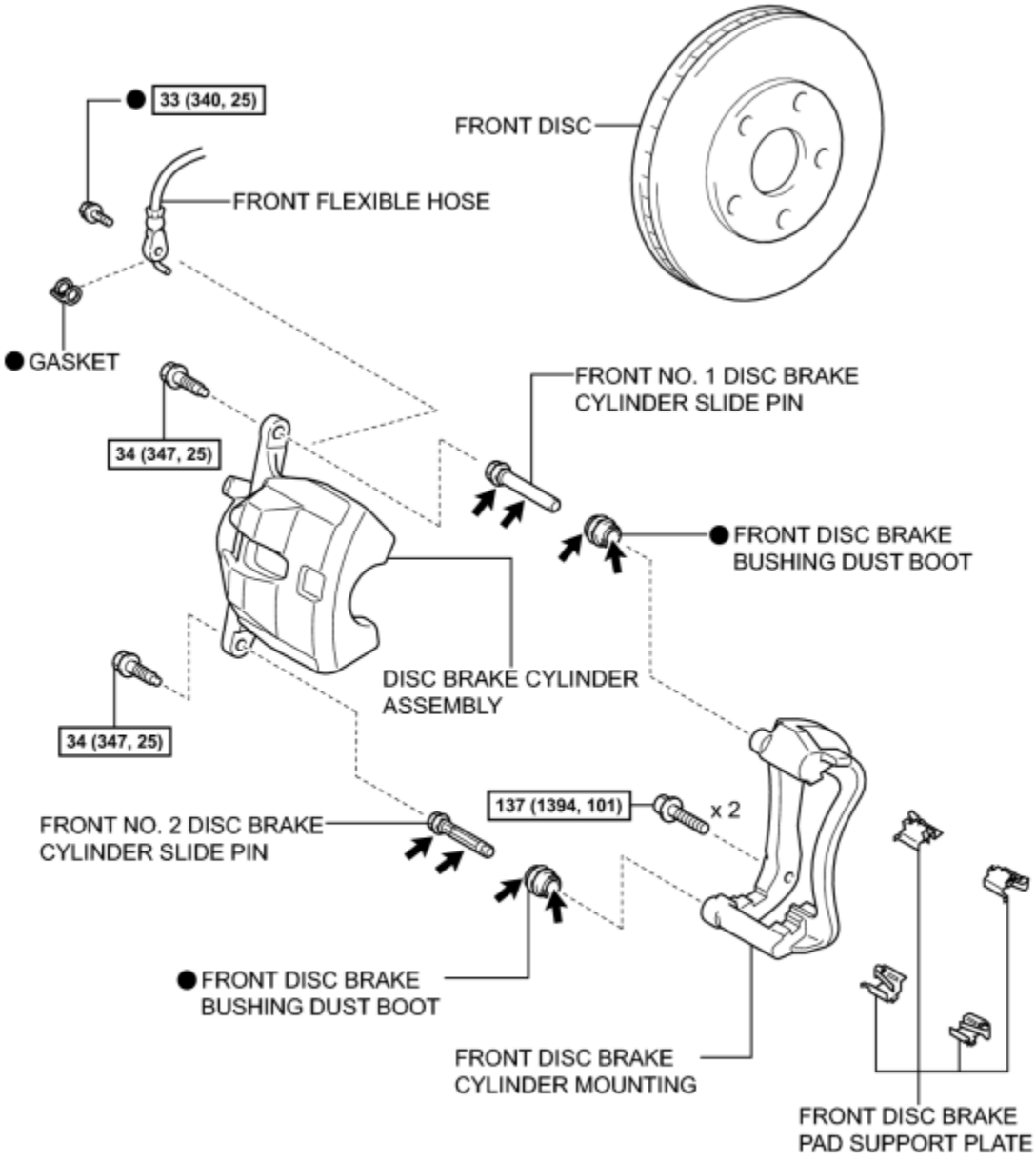
7. PREPARE FOR FOG LIGHT AIMING INFO

8. INSPECT FOG LIGHT AIMING INFO

9. ADJUST FOG LIGHT AIMING INFO

# COMPONENTS

# ILLUSTRATION



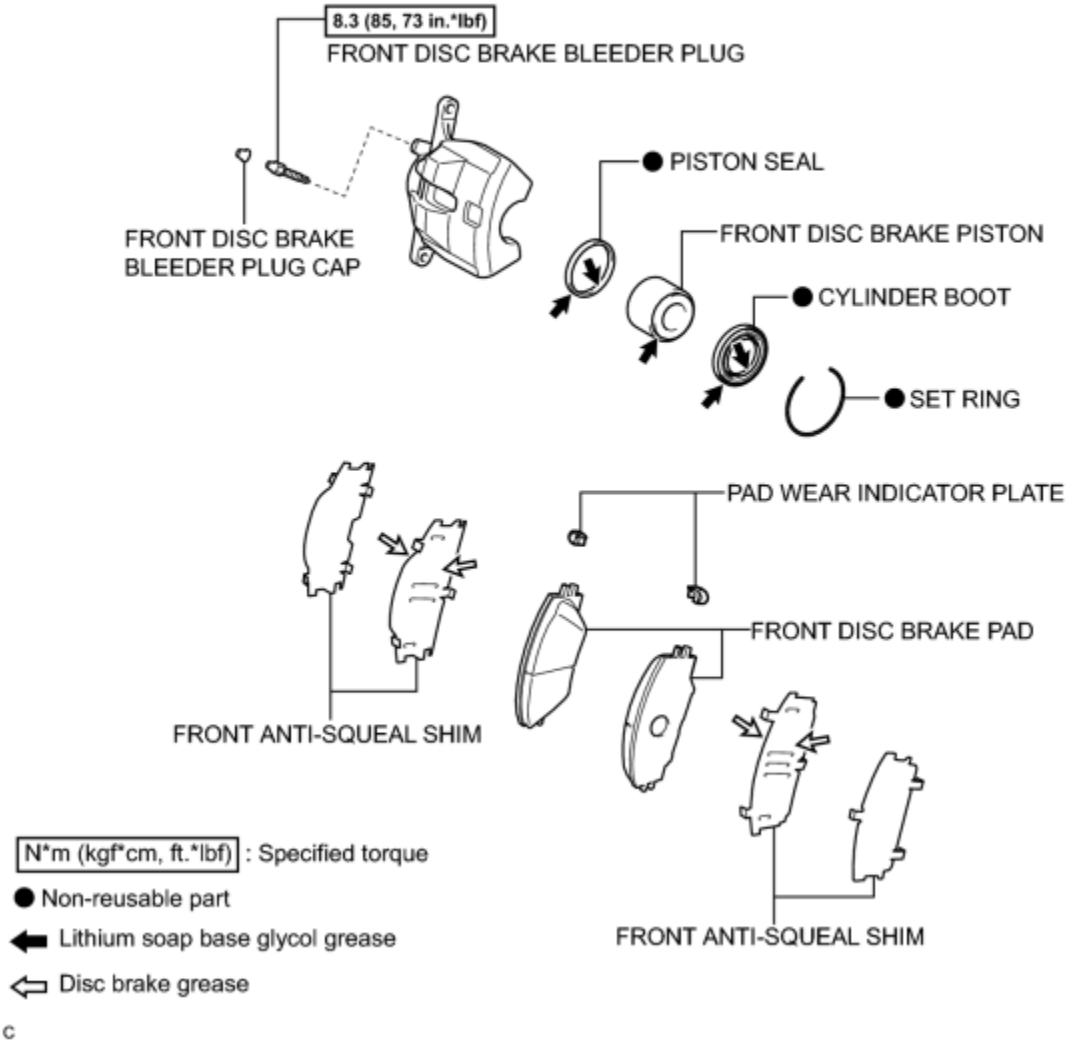

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ Lithium soap base glycol grease

c

# ILLUSTRATION


8.3 (85, 73 in.*lbf)
FRONT DISC BRAKE BLEEDER PLUG
FRONT DISC BRAKE BLEEDER PLUG CAP
PISTON SEAL
FRONT DISC BRAKE PISTON
CYLINDER BOOT
SET RING
PAD WEAR INDICATOR PLATE
FRONT DISC BRAKE PAD
FRONT ANTI-SQUEAL SHIM
FRONT ANTI-SQUEAL SHIM
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Lithium soap base glycol grease
Disc brake grease

c

# REMOVAL

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, clear the DTC.

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. DISABLE BRAKE CONTROL INFO

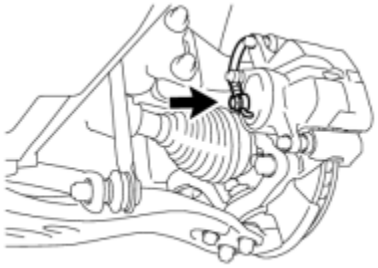
2. REMOVE FRONT WHEEL

3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately wash it off.

4. SEPARATE FRONT FLEXIBLE HOSE



C

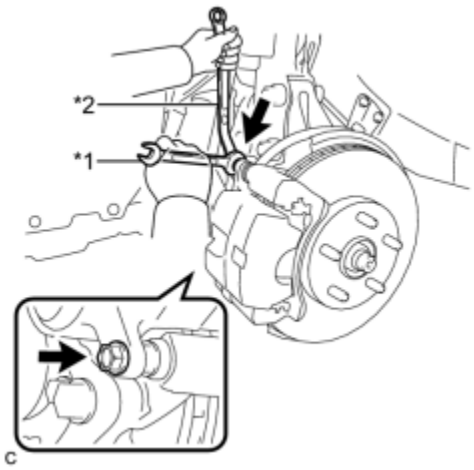
(a) Remove the union bolt and gasket, and separate the front flexible hose from the disc brake cylinder assembly.

5. REMOVE DISC BRAKE CYLINDER ASSEMBLY

(a) Hold the front disc brake cylinder slide pin, and remove the 2 bolts and disc brake cylinder assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Hold |

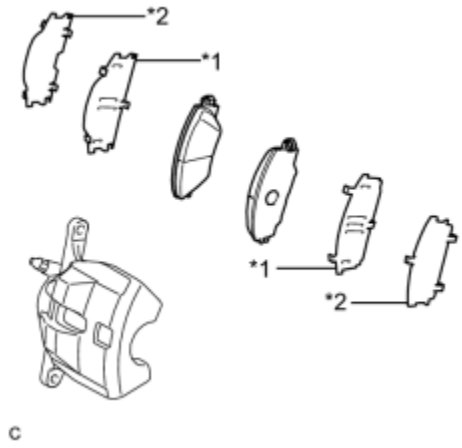



| | |
|---|---|
| *2 | Turn |

6. REMOVE FRONT DISC BRAKE PAD

(a) Remove the 2 front disc brake pads from the front disc brake cylinder mounting.

7. REMOVE FRONT ANTI-SQUEAL SHIM




(a) Remove the front No. 1 anti-squeal shim and front No. 2 anti-squeal shim from each brake pad.

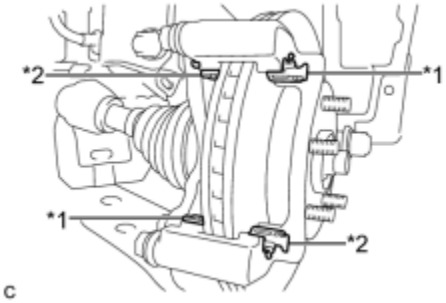
## Text in Illustration

| | |
|---|---|
| *1 | Front No. 1 Anti-squeal Shim |
| *2 | Front No. 2 Anti-squeal Shim |

(b) Remove the pad wear indicator plate from each front disc brake pad.

8. REMOVE FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Remove the 2 front No. 1 disc brake pad support plates and 2 front No. 2 disc brake pad support plates from the front disc brake cylinder mounting.




c

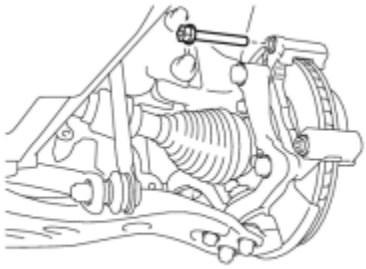
## Text in Illustration

| | |
|---|---|
| *1 | Front No. 1 Disc Brake Pad Support Plate |
| *2 | Front No. 2 Disc Brake Pad Support Plate |

NOTICE:

Each front disc brake pad support plate has a different shape. Be sure to put an identification mark on each front disc brake pad support plate so that it can be reinstalled to its original position.

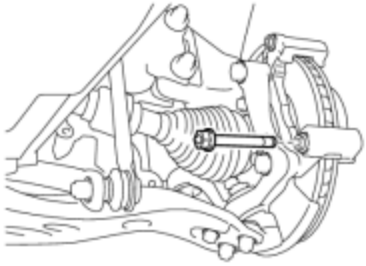
9. REMOVE FRONT NO. 1 DISC BRAKE CYLINDER SLIDE PIN



c

(a) Remove the front No. 1 disc brake cylinder slide pin from the front disc brake cylinder mounting.

10. REMOVE FRONT NO. 2 DISC BRAKE CYLINDER SLIDE PIN

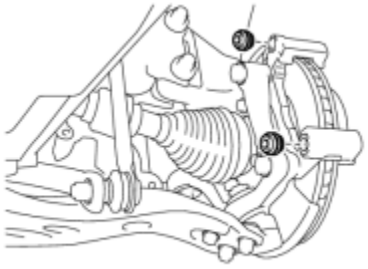


c

(a) Remove the front No. 2 disc brake cylinder slide pin from the front disc brake cylinder mounting.

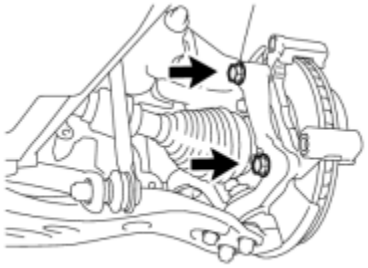
11. REMOVE FRONT DISC BRAKE BUSHING DUST BOOT

(a) Remove the 2 front disc brake bushing dust boots from the front disc brake cylinder mounting.



C

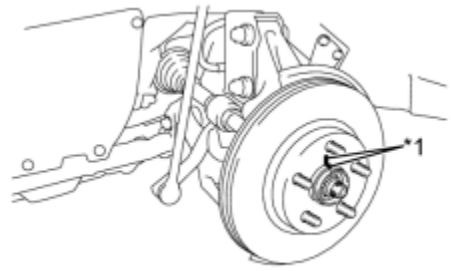
12. REMOVE FRONT DISC BRAKE CYLINDER MOUNTING



C

(a) Remove the 2 bolts and front disc brake cylinder mounting from the steering knuckle.

13. REMOVE FRONT DISC




C

(a) Remove the front disc.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

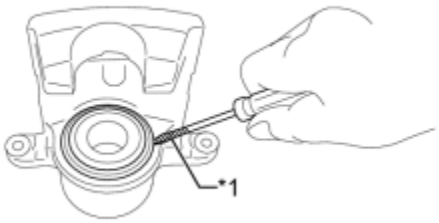
HINT:

Put matchmarks on the disc and the axle hub.

# DISASSEMBLY

1. REMOVE CYLINDER BOOT

(a) Using a screwdriver with its tip wrapped with vinyl tape, remove the set ring and cylinder boot from the disc brake cylinder assembly.




c

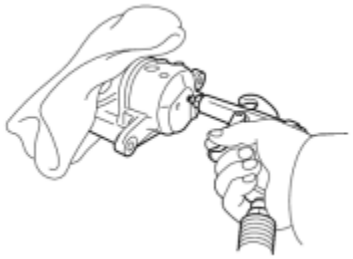
## Text in Illustration

| | |
|---|---|
| *1 | Vinyl Tape |

NOTICE:

Be careful not to damage the brake piston or cylinder.

2. REMOVE FRONT DISC BRAKE PISTON



c

(a) Place a piece of cloth between the front disc brake piston and disc brake cylinder assembly.

(b) Apply compressed air to remove the front disc brake piston from the disc brake cylinder assembly.

CAUTION:

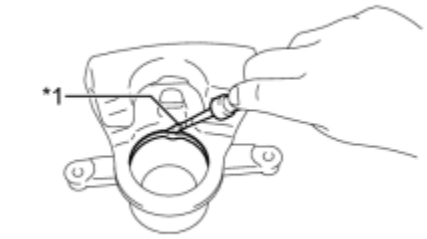
Do not place your fingers in front of the piston when using compressed air.

NOTICE:

Do not allow any brake fluid to spatter.

3. REMOVE PISTON SEAL

(a) Using a screwdriver with its tip wrapped with vinyl




P

tape, remove the piston seal from the disc brake cylinder assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Vinyl Tape |

NOTICE:

Do not damage the inner surface or piston seal groove of the cylinder.

4. REMOVE FRONT DISC BRAKE BLEEDER PLUG CAP

5. REMOVE FRONT DISC BRAKE BLEEDER PLUG

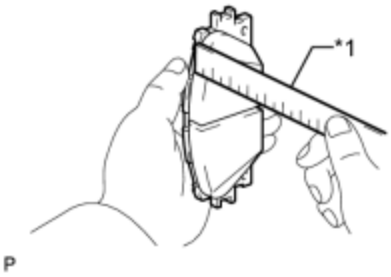
# INSPECTION

1. INSPECT BRAKE CYLINDER AND PISTON

(a) Check the cylinder bore and piston for rust and scoring. If necessary, replace the disc brake cylinder and piston.

2. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.




## Text in Illustration

| | |
|---|---|
| *1 | Ruler |

Standard thickness:

10.0 mm (0.394 in.)

Minimum thickness:

1.0 mm (0.0394 in.)

If the pad lining thickness is less than the minimum thickness, replace the disc brake pads.

HINT:

Be sure to check the wear of the front disc after replacing the brake pads with new ones.

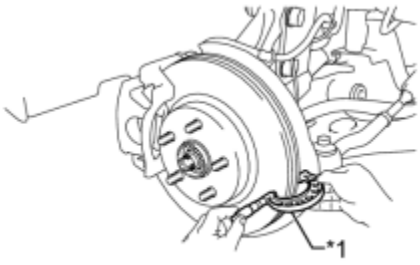
3. INSPECT FRONT DISC BRAKE PAD SUPPORT PLATE

(a) Make sure that the front disc brake pad support plates have sufficient rebound, no deformation, cracks or wear, and that all rust and dirt are cleaned off. If necessary, replace the front disc brake pad support plates.

4. INSPECT DISC THICKNESS

(a) Using a micrometer, measure the disc thickness.

## Text in Illustration




C

| | |
|---|---|
| *1 | Micrometer |

Standard thickness:

25.0 mm (0.984 in.)

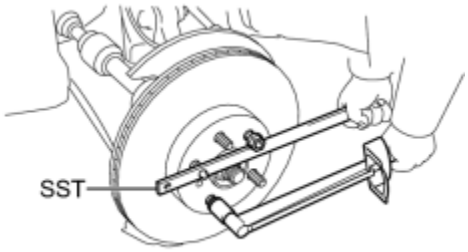
Minimum thickness:

22.0 mm (0.866 in.)

If the disc thickness is less than the minimum, replace the front disc.

5. INSPECT DISC RUNOUT

(a) Inspect the front axle hub bearing looseness and front axle hub runout INFO.




C

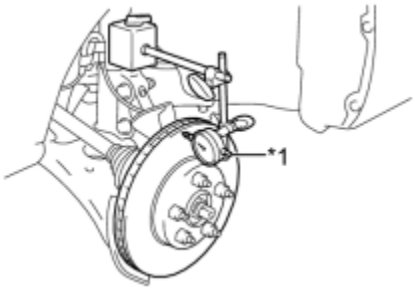
(b) Using SST to hold the disc, tighten the disc with the 5 nuts.

SST: 09330-00021

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

(c) Using a dial indicator, measure the disc runout 10 mm (0.394 in.) away from the outer edge of the front disc.

# Text in Illustration




C

| | |
|---|---|
| *1 | Dial Indicator |

Maximum disc runout:

0.05 mm (0.00197 in.)

NOTICE:

Keep the magnet of the dial indicator away from the axle hub and speed sensor.

If the runout exceeds the maximum value, change the installation position of the disc to minimize the runout. If the runout exceeds the maximum even when the installation position is changed, grind the disc. If the disc thickness is less than the minimum, replace the front disc.

(d) Remove the 5 nuts and front disc.

# REASSEMBLY

1. TEMPORARILY TIGHTEN FRONT DISC BRAKE BLEEDER PLUG

HINT:

Fully tighten the front disc brake bleeder plug after bleeding any air left in the system.

2. INSTALL FRONT DISC BRAKE BLEEDER PLUG CAP

3. INSTALL PISTON SEAL



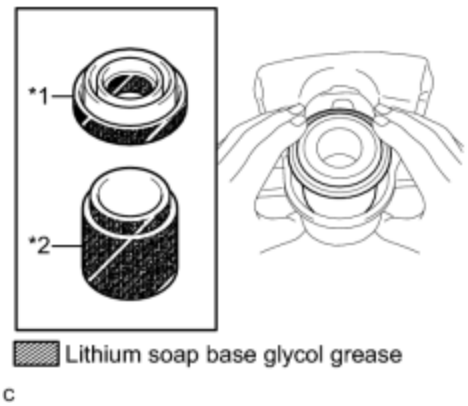

(a) Apply a light layer of lithium soap base glycol grease to the entire circumference of a new piston seal.

(b) Install the piston seal to the disc brake cylinder assembly.

NOTICE:

Securely install the piston seal into the groove of the disc brake cylinder.

4. INSTALL FRONT DISC BRAKE PISTON




(a) Apply a light layer of lithium soap base glycol grease to the entire circumference of a new cylinder boot.

## Text in Illustration

| | |
|---|---|
| *1 | Cylinder Boot |
| *2 | Front Disc Brake Piston |

(b) Install the cylinder boot to the front disc brake piston.

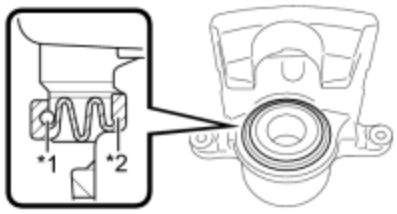
(c) Apply a light layer of lithium soap base glycol grease to the contact surfaces of the front disc brake piston, and install it to the disc brake cylinder assembly.

NOTICE:

Do not install the piston forcibly in the disc brake cylinder assembly.

5. INSTALL CYLINDER BOOT

(a) Install the cylinder boot to the disc brake cylinder assembly.




c

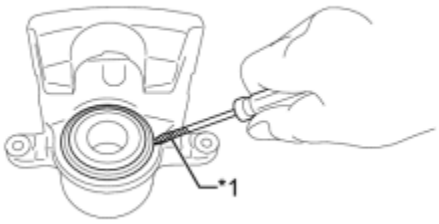
# Text in Illustration

| | |
|---|---|
| *1 | Set Ring |
| *2 | Cylinder Boot |

NOTICE:

Securely install the cylinder boot to the groove of the disc brake cylinder assembly and front disc brake piston.

(b) Using a screwdriver with its tip wrapped with vinyl tape, install a new set ring.




c

# Text in Illustration

| | |
|---|---|
| *1 | Vinyl Tape |

- Securely install the set ring to the outer groove of the cylinder boot.
- Do not damage the cylinder boot.

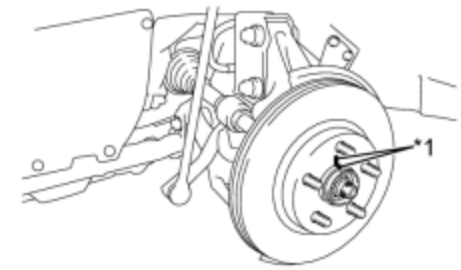
# INSTALLATION

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. INSTALL FRONT DISC

(a) Align the matchmarks of the disc and axle hub, and install the disc.




c

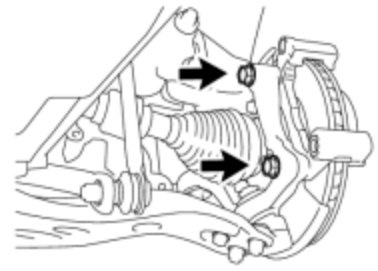
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

NOTICE:

When replacing the disc with a new one, select the installation position where the front disc has minimal runout.

2. INSTALL FRONT DISC BRAKE CYLINDER MOUNTING



c

(a) Install the front disc brake cylinder mounting to the steering knuckle with the 2 bolts.

Torque: **137 N·m (1394 kgf·cm, 101ft·lbf)**

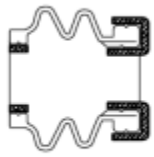
3. INSTALL FRONT DISC BRAKE BUSHING DUST BOOT

(a) Apply a light layer of lithium soap base glycol grease to the entire circumference of 2 new front disc brake bushing dust boots.

HINT:

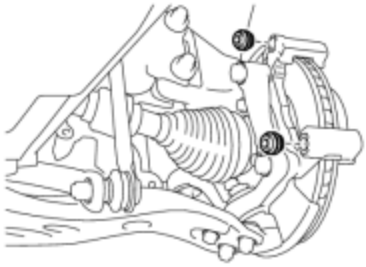
Apply at least 0.3 g (0.01 oz.) of lithium soap base glycol

grease to each front disc brake bushing dust boot.



Lithium soap base glycol grease

c



c

(b) Install the 2 front disc brake bushing dust boots to the front disc brake cylinder mounting.

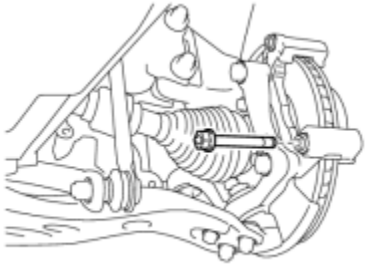
4. INSTALL FRONT NO. 2 DISC BRAKE CYLINDER SLIDE PIN



Lithium soap base glycol grease

c

(a) Apply a light layer of lithium soap base glycol grease to the sliding part and the seal surface of the front No. 2 disc brake cylinder slide pin.



c

(b) Install the front No. 2 disc brake cylinder slide pin to the front disc brake cylinder mounting.

(c) Push the front No. 2 disc brake cylinder slide pin into the front disc brake bushing dust boot to align them.

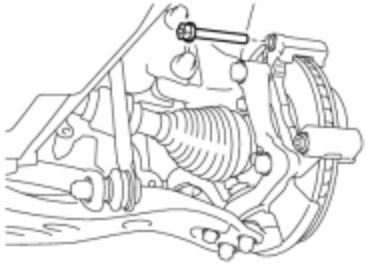
5. INSTALL FRONT NO. 1 DISC BRAKE CYLINDER SLIDE PIN



(a) Apply a light layer of lithium soap base glycol grease to the sliding part and the seal surface of the front No. 1 disc brake cylinder slide pin.

Lithium soap base glycol grease

c

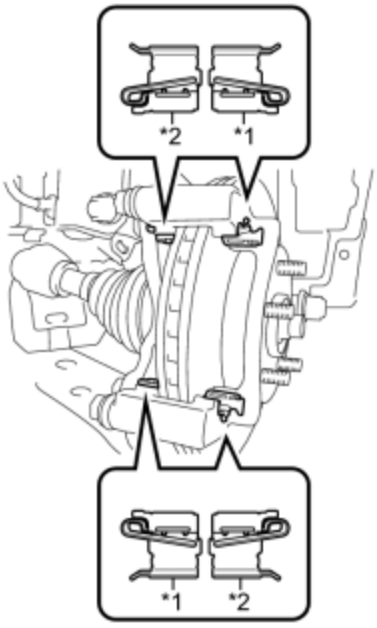


c

(b) Install the front No. 1 disc brake cylinder slide pin to the front disc brake cylinder mounting.

(c) Push the front No. 1 disc brake cylinder slide pin into the front disc brake bushing dust boot to align them.

6. INSTALL FRONT DISC BRAKE PAD SUPPORT PLATE




c

(a) Install the 2 front No. 1 disc brake pad support plates and 2 front No. 2 disc brake pad support plates to the front disc brake cylinder mounting.

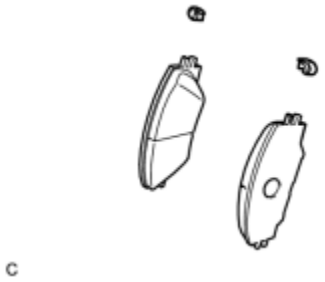
# Text in Illustration

| | |
|---|---|
| *1 | Front No. 1 Disc Brake Pad Support Plate |
| *2 | Front No. 2 Disc Brake Pad Support Plate |

NOTICE:

Be sure to install each front disc brake pad support plate in the correct position and direction.

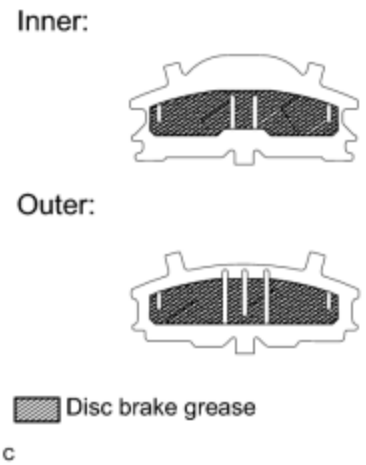
7. INSTALL FRONT ANTI-SQUEAL SHIM



(a) Install the pad wear indicator plate to each front disc brake pad.

NOTICE:

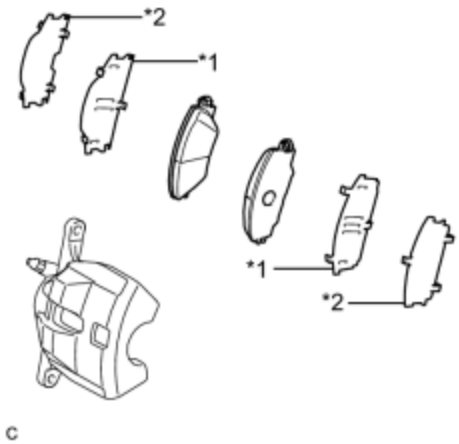
Install each pad wear indicator plate in the correct position and direction.




(b) Apply disc brake grease to both sides of each front No. 1 anti-squeal shim as shown in the illustration.

- When replacing worn pads, the front anti-squeal shims must be replaced together with the pads.
- Apply disc brake grease to the area that contacts the anti-squeal shims.

(c) Install the front No. 1 anti-squeal shim and front No. 2 anti-squeal shim to each front disc brake pad.



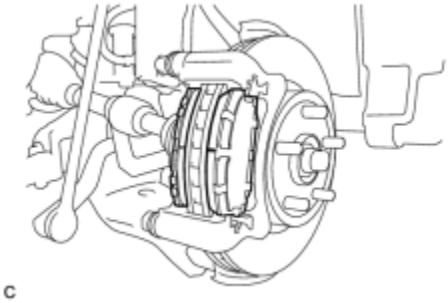

## Text in Illustration

| | |
|---|---|
| *1 | Front No. 1 Anti-squeal Shim |
| *2 | Front No. 2 Anti-squeal Shim |

- Install the shims in the correct positions and directions.
- Disc brake grease can seep out slightly from the area where the anti-squeal shim is installed.
- Make sure that disc brake grease is not applied onto the lining surface.

8. INSTALL FRONT DISC BRAKE PAD

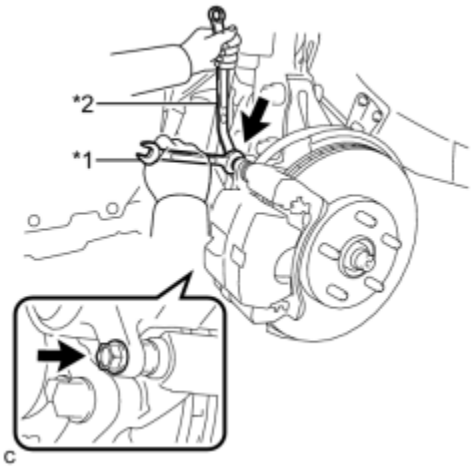
(a) Install the 2 front disc brake pads to the front disc brake cylinder mounting.



NOTICE:

There should be no oil or grease on the friction surfaces of the disc brake pads or the front disc.

9. INSTALL DISC BRAKE CYLINDER ASSEMBLY



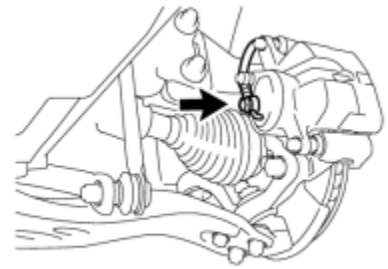

(a) Hold the front disc brake cylinder slide pin, and install the disc brake cylinder assembly to the front disc brake cylinder mounting with the 2 bolts.

## Text in Illustration

| | |
|---|---|
| *1 | Hold |
| *2 | Turn |

Torque: **34 N·m (347 kgf·cm, 25ft·lbf)**

10. CONNECT FRONT FLEXIBLE HOSE



(a) Connect the front flexible hose to the disc brake cylinder assembly with a new union bolt and a new gasket.

Torque: **33 N·m (340 kgf·cm, 25ft·lbf)**

HINT:

Install the flexible hose lock securely into the lock hole in the disc brake cylinder.

11. BLEED BRAKE LINE INFO

12. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE

HINT:

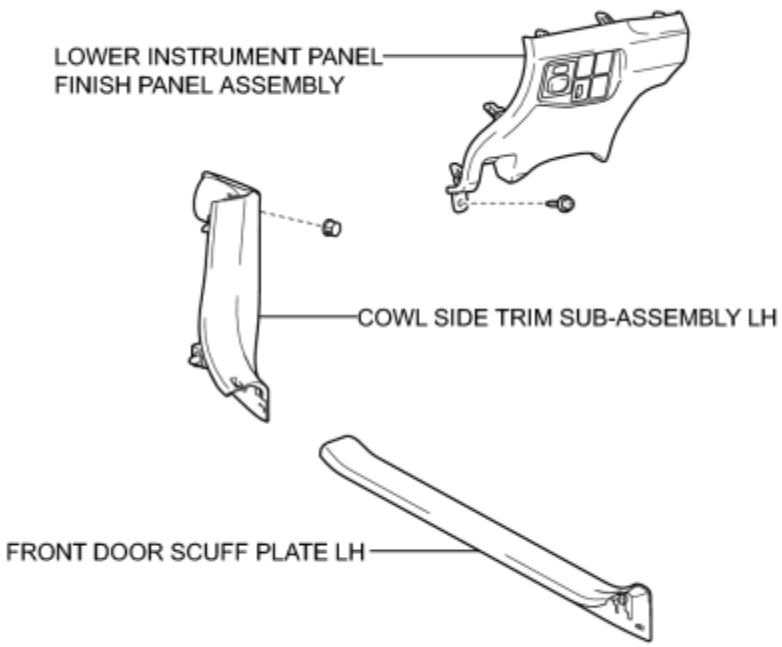
If the brake control has been disabled, make sure to perform initialization and calibration of the linear solenoid valve INFO.

13. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

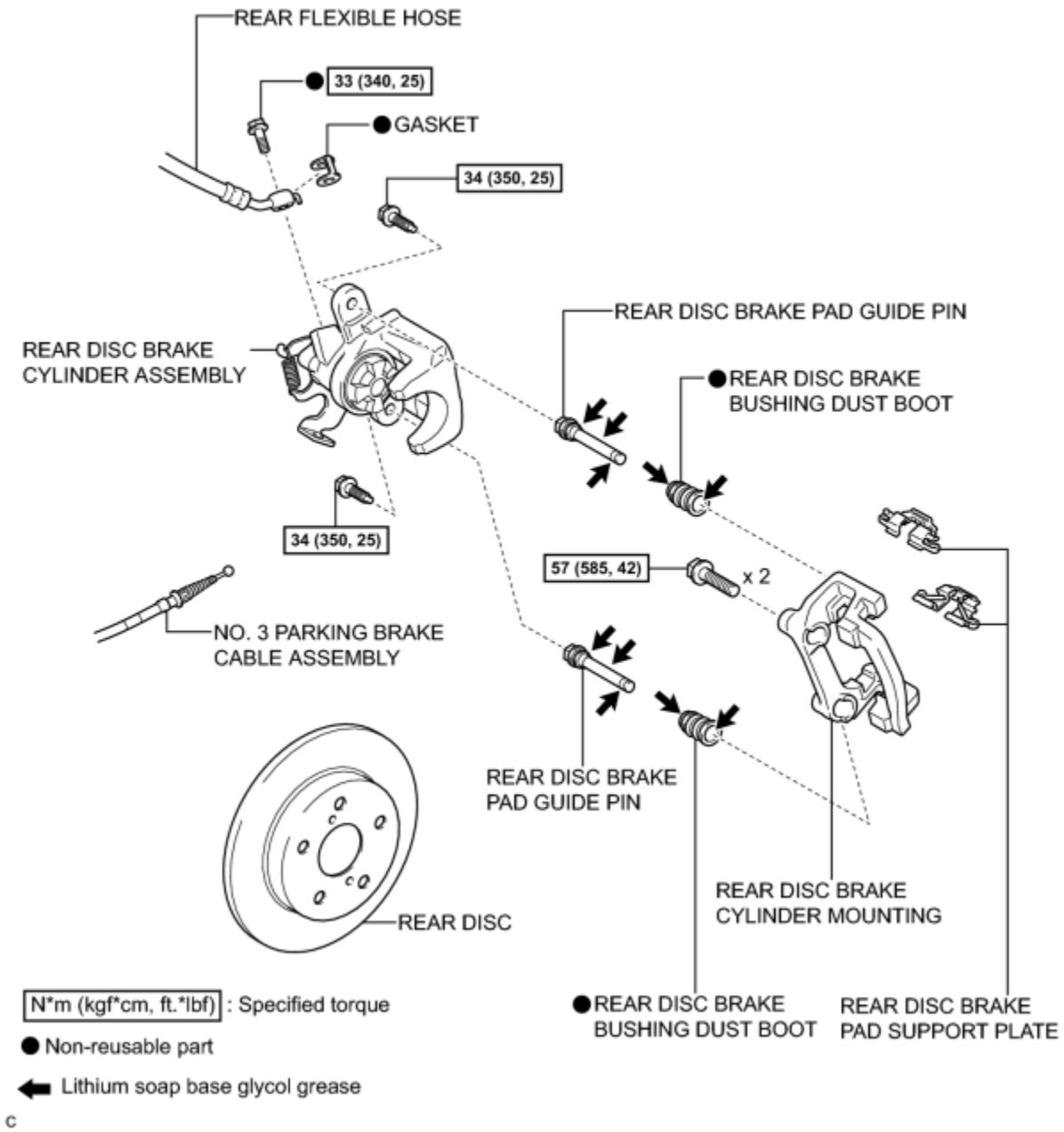
# COMPONENTS

# ILLUSTRATION



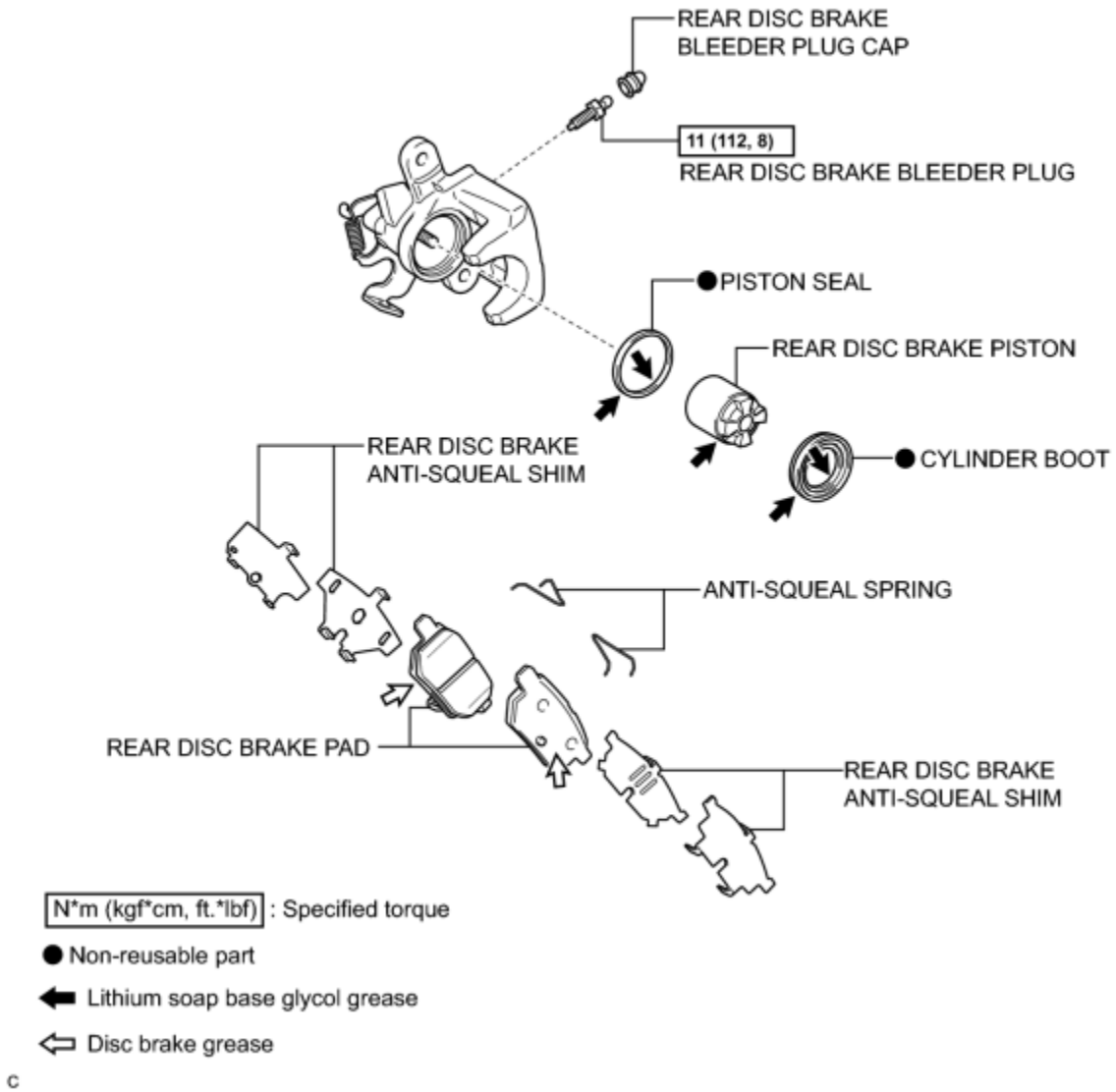

c

# ILLUSTRATION




c

# ILLUSTRATION


REAR DISC BRAKE
BLEEDER PLUG CAP
11 (112, 8)
REAR DISC BRAKE BLEEDER PLUG
PISTON SEAL
REAR DISC BRAKE PISTON
REAR DISC BRAKE
ANTI-SQUEAL SHIM
CYLINDER BOOT
ANTI-SQUEAL SPRING
REAR DISC BRAKE PAD
REAR DISC BRAKE
ANTI-SQUEAL SHIM
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Lithium soap base glycol grease
Disc brake grease

c

# REMOVAL

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, clear the DTC.

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. DISABLE BRAKE CONTROL INFO

2. REMOVE REAR WHEEL

3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately wash it off.

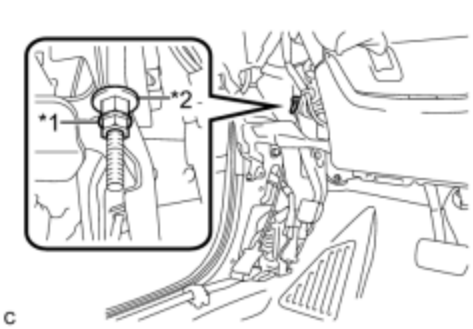
4. REMOVE FRONT DOOR SCUFF PLATE LH INFO

5. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

6. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

7. LOOSEN PARKING BRAKE CABLE

(a) Completely release the parking brake pedal.

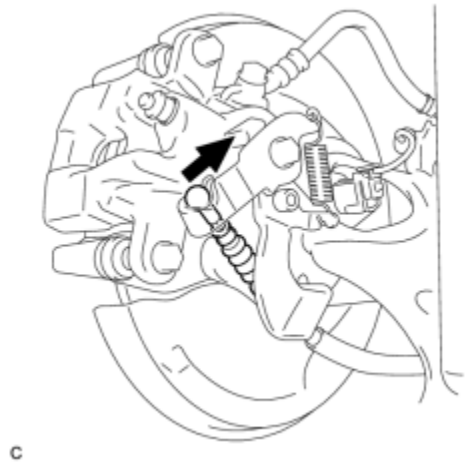



(b) Loosen the lock nut and adjusting nut to completely release the parking brake cable.

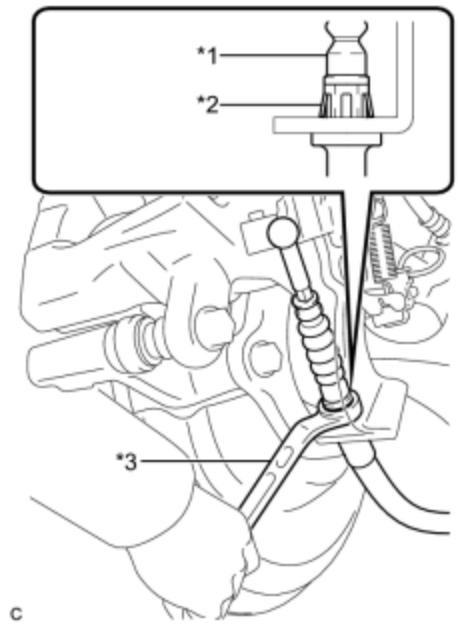
## Text in Illustration

| | |
|---|---|
| *1 | Lock Nut |
| *2 | Adjusting Nut |

8. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY



(a) Separate the No. 3 parking brake cable assembly from the rear disc brake cylinder assembly.




(b) Separate the No. 3 parking brake cable assembly from the rear disc brake cylinder assembly.

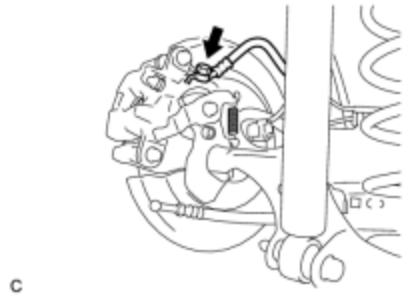
## Text in Illustration

| | |
|---|---|
| *1 | No. 3 Parking Brake Cable Assembly |
| *2 | Clip |
| *3 | Offset Wrench (14 mm) |

HINT:

Insert an offset wrench (14 mm) at the base of the No. 3 parking brake cable assembly as shown in the illustration to disengage the clip. Pull out the No. 3 parking brake cable assembly from the rear disc brake cylinder assembly.

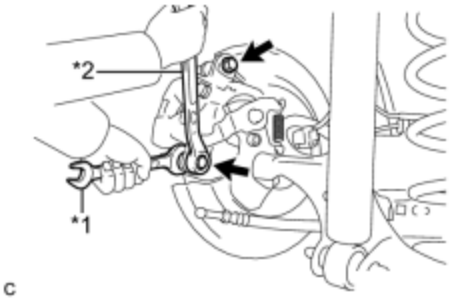
9. SEPARATE REAR FLEXIBLE HOSE



(a) Remove the union bolt and gasket, and separate the rear flexible hose from the rear disc brake cylinder assembly.

10. REMOVE REAR DISC BRAKE CYLINDER ASSEMBLY

(a) Hold the rear disc brake pad guide pin, and remove the 2 bolts and rear disc brake cylinder assembly.




C

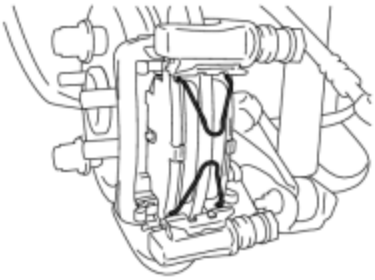
## Text in Illustration

| | |
|---|---|
| *1 | Hold |
| *2 | Turn |

NOTICE:

Remove the rear disc brake cylinder assembly while holding both of the rear disc brake pads because the anti-squeal springs may fall off the rear disc brake pads.

11. REMOVE REAR DISC BRAKE PAD



C

(a) Remove the 2 anti-squeal springs from the rear disc brake pads.

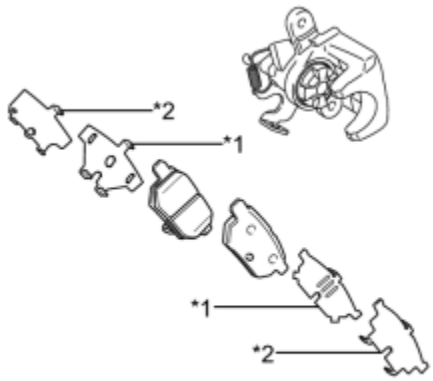
(b) Remove the 2 rear disc brake pads from the rear disc brake cylinder mounting.

12. REMOVE REAR DISC BRAKE ANTI-SQUEAL SHIM

(a) Remove the rear No. 1 disc brake anti-squeal shim and rear No. 2 disc brake anti-squeal shim from each rear disc brake pad.

## Text in Illustration

| | |
|---|---|
| *1 | Rear No. 1 Disc Brake Anti-squeal Shim |
| *2 | Rear No. 2 Disc Brake Anti-squeal Shim |




C

13. REMOVE REAR DISC BRAKE PAD SUPPORT PLATE



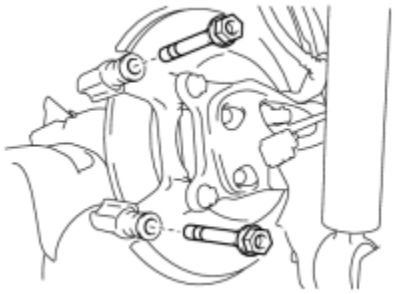
Y

(a) Remove the 2 rear disc brake pad support plates from the disc brake cylinder mounting.

NOTICE:

Each rear disc brake pad support plate has a different shape. Be sure to put an identification mark on each rear disc brake pad support plate so that it can be installed to its original position.

14. REMOVE REAR DISC BRAKE PAD GUIDE PIN



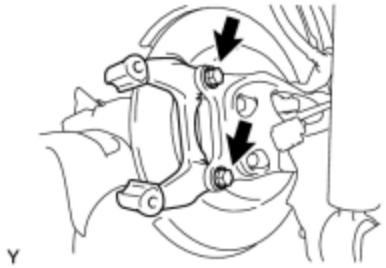
(a) Remove the 2 rear disc brake pad guide pins from the rear disc brake cylinder mounting.

15. REMOVE REAR DISC BRAKE BUSHING DUST BOOT

(a) Remove the 2 rear disc brake bushing dust boots from the rear disc brake cylinder mounting.



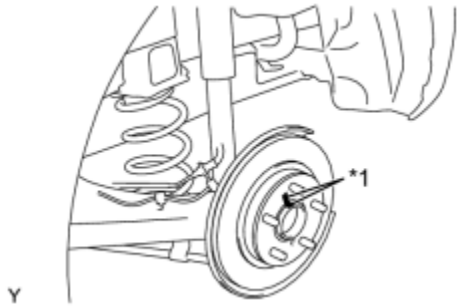

16. REMOVE REAR DISC BRAKE CYLINDER MOUNTING




(a) Remove the 2 bolts and rear disc brake cylinder mounting from the axle beam.

17. REMOVE REAR DISC

(a) Remove the rear disc.




# Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

HINT:

Place matchmarks on the disc and axle hub.

# DISASSEMBLY

1. REMOVE REAR DISC BRAKE PISTON




(a) Using SST, remove the rear disc brake piston by turning it counterclockwise.

SST: 09960-10010

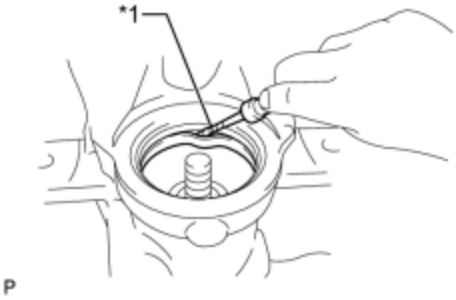
09963-00400

- Do not damage the piston.
- Do not allow any brake fluid to spatter.

2. REMOVE CYLINDER BOOT

(a) Remove the cylinder boot from the rear disc brake piston.

3. REMOVE PISTON SEAL




(a) Using a screwdriver with its tip wrapped with vinyl tape, remove the piston seal from the rear disc brake cylinder assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Vinyl Tape |

NOTICE:

Do not damage the inner surface or piston seal groove of the cylinder.

4. REMOVE REAR DISC BRAKE BLEEDER PLUG CAP

5. REMOVE REAR DISC BRAKE BLEEDER PLUG

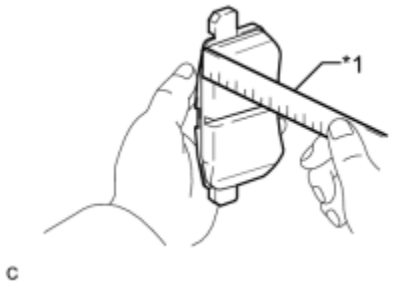
# INSPECTION

1. INSPECT BRAKE CYLINDER AND PISTON

(a) Check the cylinder bore and piston for rust and scoring. If necessary, replace the disc brake cylinder and piston.

2. INSPECT PAD LINING THICKNESS

(a) Using a ruler, measure the pad lining thickness.




C

## Text in Illustration

| | |
|---|---|
| *1 | Ruler |

Standard thickness:

9.5 mm (0.374 in.)

Minimum thickness:

1.0 mm (0.0394 in.)

If the pad lining thickness is equal to the minimum thickness or less, replace the brake pads with a disc brake pad kit.

HINT:

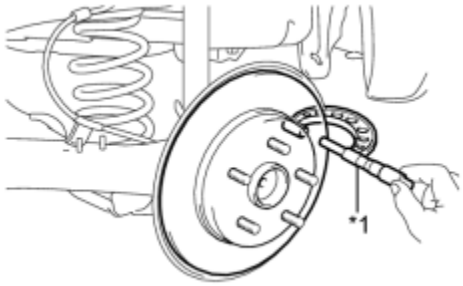
Be sure to check the wear of the rear disc after replacing the brake pads with new ones.

3. INSPECT REAR DISC BRAKE PAD SUPPORT PLATE

(a) Make sure that the rear disc brake pad support plates have sufficient rebound, no deformation, cracks or wear, and that all rust and dirt are removed. If necessary, replace the rear disc brake pad support plates.

4. INSPECT DISC THICKNESS

(a) Using a micrometer, measure the disc thickness.




# Text in Illustration

| | |
|---|---|
| *1 | Micrometer |

Standard thickness:

9.0 mm (0.354 in.)

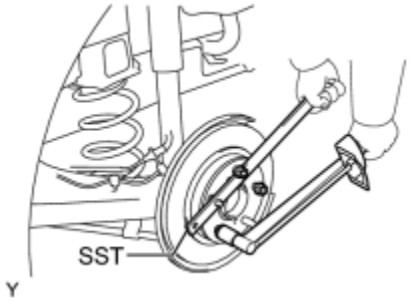
Minimum thickness:

7.5 mm (0.295 in.)

If the disc thickness is less than the minimum, replace the rear disc.

5. INSPECT DISC RUNOUT

(a) Inspect the rear axle hub bearing looseness and axle hub runout INFO.

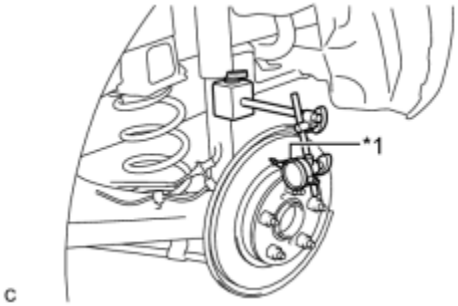



(b) While holding the disc using SST, tighten the disc with the 5 hub nuts.

SST: 09330-00021

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

(c) Using a dial indicator with magnetic base, measure the disc runout 10 mm (0.394 in.) away from the outer edge of the rear disc.




# Text in Illustration

| | |
|---|---|
| *1 | Dial Indicator |

Maximum disc runout:

0.15 mm (0.00591 in.)

NOTICE:

Keep the magnet of the dial indicator away from the axle hub and speed sensor.

If the runout exceeds the maximum value, change the installation position of the disc to minimize the runout. If the runout exceeds the maximum even when the installation position is changed, grind the disc. If the disc thickness is less than the minimum, replace the rear disc.

(d) Remove the 5 nuts and rear disc.

# REASSEMBLY

1. TEMPORARILY TIGHTEN REAR DISC BRAKE BLEEDER PLUG

HINT:

Fully tighten the rear disc brake bleeder plug after bleeding any air left in the system.

2. INSTALL REAR DISC BRAKE BLEEDER PLUG CAP

3. INSTALL PISTON SEAL




(a) Apply a light layer of lithium soap base glycol grease to the entire circumference of a new piston seal.

(b) Install the piston seal to the rear disc brake cylinder assembly.

NOTICE:

Securely install the piston seal to the groove of the rear disc brake cylinder assembly.

4. INSTALL CYLINDER BOOT

(a) Apply a light layer of lithium soap base glycol grease to the entire circumference of the rear disc brake piston and a new cylinder boot.

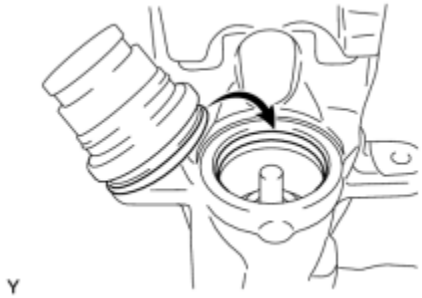



(b) Install the cylinder boot to the piston as shown in the illustration.

NOTICE:

Do not install the cylinder boot after installing the piston into the disc brake cylinder.

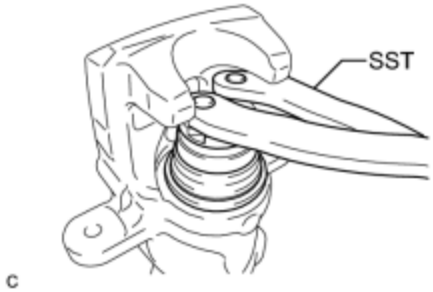
5. INSTALL REAR DISC BRAKE PISTON




(a) Install the seal portion of the cylinder boot into the groove portion of the rear disc brake cylinder assembly.

NOTICE:

Securely install the cylinder boot to the groove of the rear disc brake cylinder assembly.



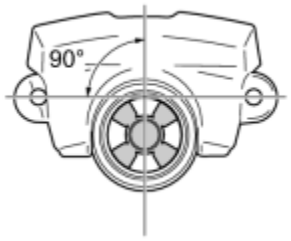

(b) Using SST, install the rear disc brake piston by turning it clockwise as far as possible.

SST: 09960-10010

09963-00400

- Securely install the cylinder boot to the groove of the piston.
- Do not damage the piston or cylinder boot.

(c) Using SST, slowly return the piston until the piston

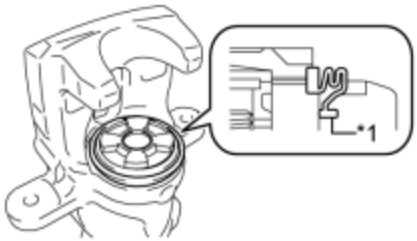



C

groove is positioned as shown in the illustration.

HINT:

When installing the rear disc brake cylinder assembly to the rear disc brake cylinder mounting, align the piston groove with the protrusion on the rear disc brake pad.




C

(d) Make sure that the cylinder boot is securely installed into the groove of the rear disc brake cylinder assembly and rear disc brake piston.

# Text in Illustration

| | |
|---|---|
| *1 | Cylinder Boot |

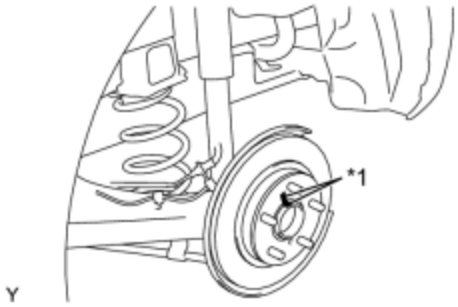
# INSTALLATION

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. INSTALL REAR DISC

(a) Align the matchmarks of the disc and axle hub, and install the disc.



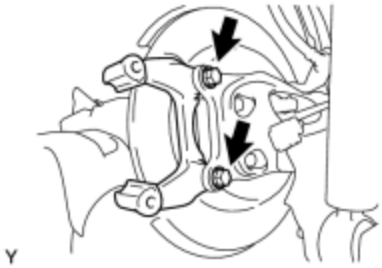

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

NOTICE:

When replacing the disc with a new one, select the installation position where the rear disc has minimal runout.

2. INSTALL REAR DISC BRAKE CYLINDER MOUNTING




(a) Install the rear disc brake cylinder mounting to the axle beam with the 2 bolts.

Torque: **57 N·m (585 kgf·cm, 42ft·lbf)**

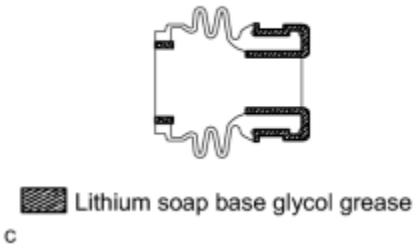
3. INSTALL REAR DISC BRAKE BUSHING DUST BOOT

(a) Apply a light layer of lithium soap base glycol grease to the entire circumference of 2 new rear disc brake bushing dust boots.

HINT:

Apply at least 0.3 g (0.01 oz.) of lithium soap base glycol

grease to each rear disc brake bushing dust boot.





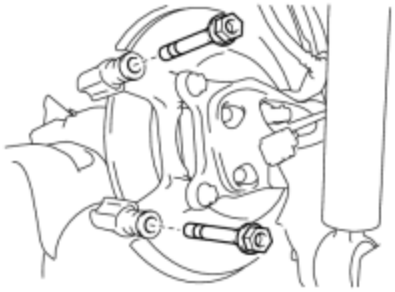


(b) Install the 2 rear disc brake bushing dust boots to the rear disc brake cylinder mounting.

4. INSTALL REAR DISC BRAKE PAD GUIDE PIN




(a) Apply a light layer of lithium soap base glycol grease to the sliding and sealing surfaces of the 2 rear disc brake pad guide pins.



(b) Install the 2 rear disc brake pad guide pins to the rear disc brake cylinder mounting.

5. INSTALL REAR DISC BRAKE PAD SUPPORT PLATE



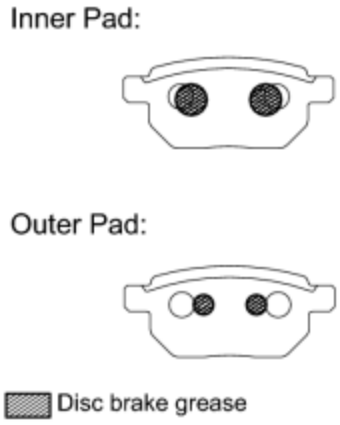
c

(a) Install the 2 rear disc brake pad support plates to the rear disc brake cylinder mounting.

NOTICE:

Be sure to install each rear disc brake pad support plate in the correct position and direction.

6. INSTALL REAR DISC BRAKE ANTI-SQUEAL SHIM

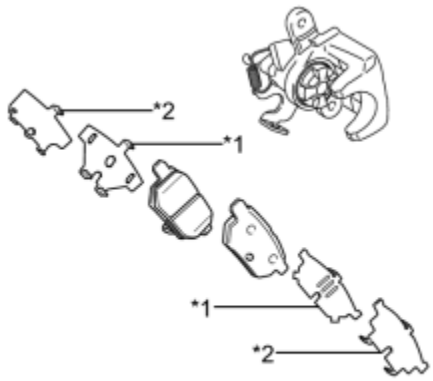



(a) Apply disc brake grease to the back plate of the rear disc brake pads.

(b) Install the rear No. 1 disc brake anti-squeal shim and rear No. 2 disc brake anti-squeal shim to each rear disc brake pad.

# Text in Illustration

| | |
|---|---|
| *1 | Rear No. 1 Disc Brake Anti-squeal Shim |

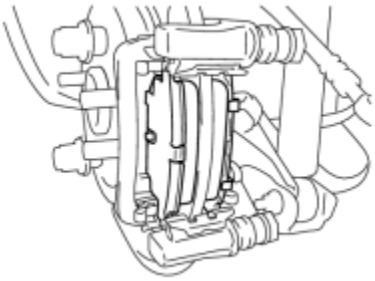



| | |
|---|---|
| *2 | Rear No. 2 Disc Brake Anti-squeal Shim |

- When replacing worn pads, the anti-squeal shims must be replaced together with the pads.
- Apply disc brake grease to the area that contacts the anti-squeal shim.
- Disc brake grease may seep out slightly from the areas where the anti-squeal shims are installed.
- Make sure that disc brake grease is not applied onto the lining surface.

C

7. INSTALL REAR DISC BRAKE PAD

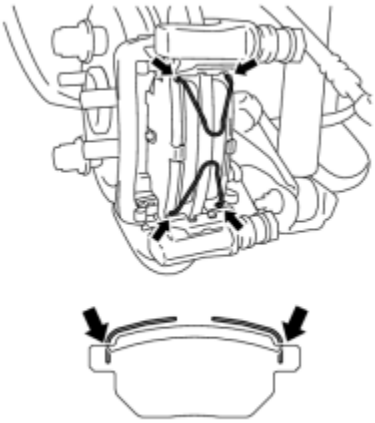


Y

(a) Install the 2 rear disc brake pads to the rear disc brake cylinder mounting.

NOTICE:

There should be no oil or grease on the friction surfaces of the disc brake pads or the rear disc.



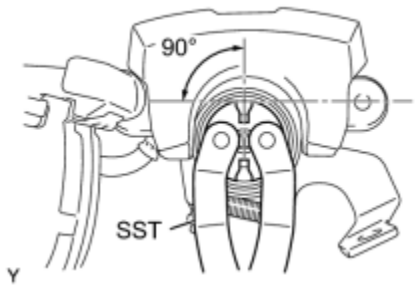
C

(b) Install the 2 anti-squeal springs to the rear disc brake pads.

- When replacing the rear disc brake pads with new ones, make sure to replace the anti-squeal springs at the same time.
- Be sure to install the anti-squeal springs into the rear disc brake pad installation holes as far as they will go.

8. INSTALL REAR DISC BRAKE CYLINDER ASSEMBLY

(a) To compensate for pad wear when reusing the pad, use SST to turn the piston to the position where the protrusion on the pad lines up properly with the piston groove.




| Retract | Extend |
|---|---|
| Clockwise | Counterclockwise |

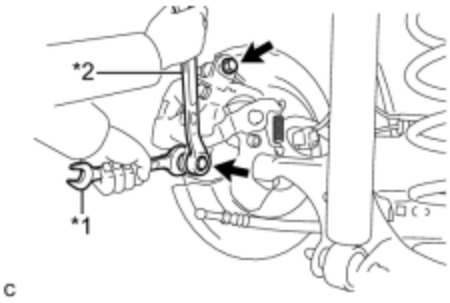
SST: 09960-10010

09963-00400

NOTICE:

Place the disc between the 2 brake pads and determine the piston return value.

(b) Hold the rear disc brake cylinder pad guide pin, and install the rear disc brake cylinder assembly to the rear disc brake cylinder mounting with the 2 bolts.




# Text in Illustration

| | |
|---|---|
| *1 | Hold |
| *2 | Turn |

Torque: **34 N·m (350 kgf·cm, 25ft·lbf)**

- Install the rear disc brake cylinder assembly while holding both of the rear disc brake pads because the anti-squeal springs may fall off the rear disc brake pads.
- Be sure that the anti-squeal springs are installed to the rear disc brake pads.

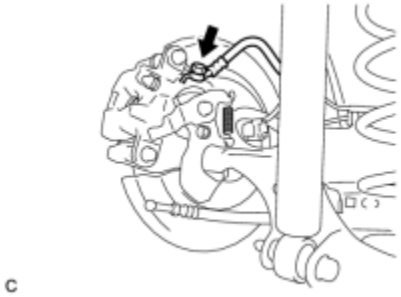
9. CONNECT REAR FLEXIBLE HOSE

(a) Connect the rear flexible hose to the rear disc brake cylinder assembly with a new union bolt and a new gasket.

Torque: **33 N·m (340 kgf·cm, 25ft·lbf)**

HINT:

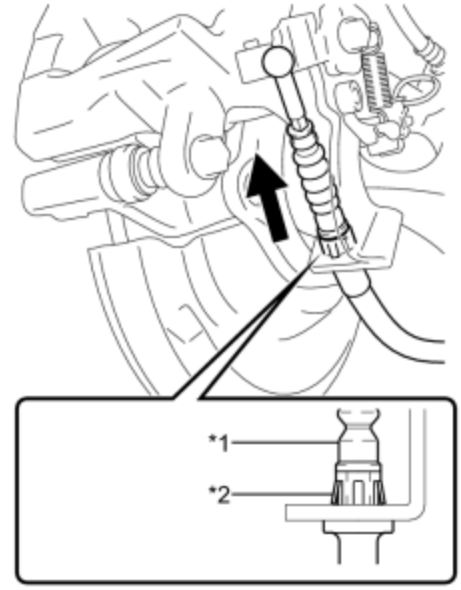
Install the flexible hose lock securely into the lock hole in



C

the disc brake cylinder.

10. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY




C

(a) Install the No. 3 parking brake cable assembly to the rear disc brake cylinder assembly.

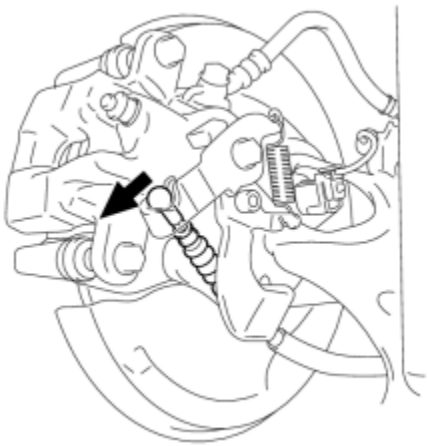
## Text in Illustration

| | |
|---|---|
| *1 | No. 3 Parking Brake Cable Assembly |
| *2 | Clip |

HINT:

Be sure to engage the No. 3 parking brake cable assembly clip onto the rear disc brake cylinder assembly as shown in the illustration.

(b) Connect the No. 3 parking brake cable assembly to the rear disc brake cylinder assembly.



C

11. BLEED BRAKE LINE INFO

12. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE

HINT:

If the brake control has been disabled, make sure to perform initialization and calibration of the linear solenoid valve INFO.

13. ADJUST PARKING BRAKE

HINT: INFO

14. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

15. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

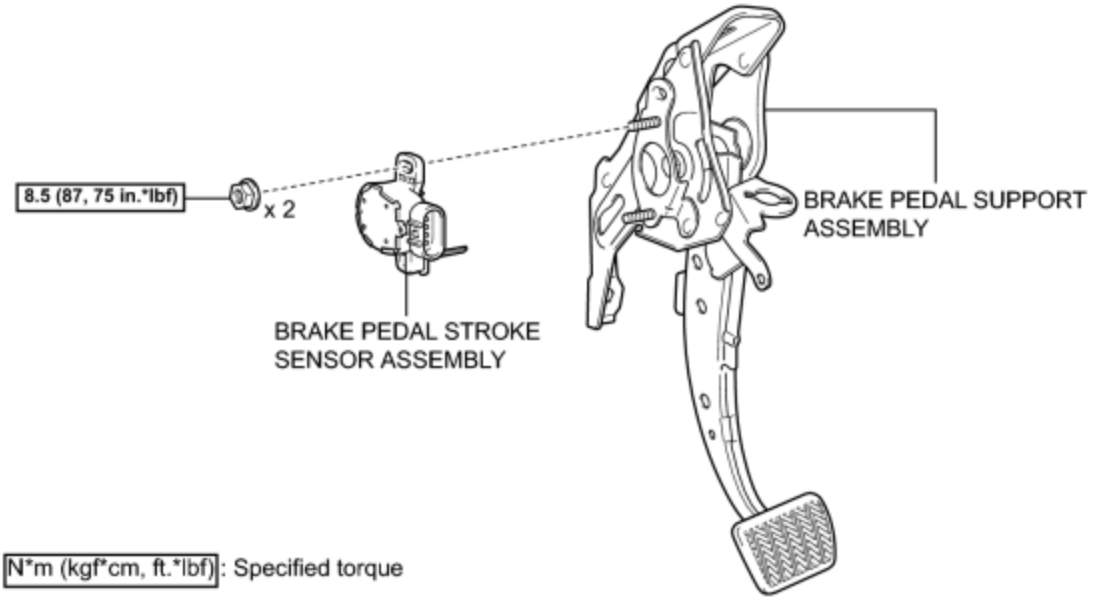
16. INSTALL FRONT DOOR SCUFF PLATE LH INFO

17. INSTALL REAR WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# COMPONENTS

# ILLUSTRATION




c

# REMOVAL

NOTICE:

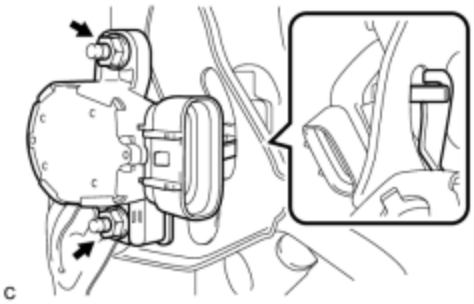
While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or any door courtesy switch turns on. Therefore, when servicing the brake system components, do not operate the brake pedal or open/close the doors while the battery is connected.

1. REMOVE BRAKE PEDAL SUPPORT ASSEMBLY

HINT:

Refer to the procedure up to Remove Brake Pedal Support Assembly INFO.

2. REMOVE BRAKE PEDAL STROKE SENSOR ASSEMBLY




(a) Remove the 2 nuts and brake pedal stroke sensor assembly.

NOTICE:

Do not drop the brake pedal stroke sensor assembly. If the brake pedal stroke sensor assembly has been dropped, replace the brake pedal stroke sensor assembly with a new one.

# INSTALLATION

NOTICE:

While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or any door courtesy switch turns on. Therefore, when servicing the brake system components, do not operate the brake pedal or open/close the doors while the battery is connected.

1. INSTALL BRAKE PEDAL STROKE SENSOR ASSEMBLY

NOTICE:

Do not drop the brake pedal stroke sensor assembly. If the brake pedal stroke sensor assembly has been dropped, replace the brake pedal stroke sensor assembly with a new one.

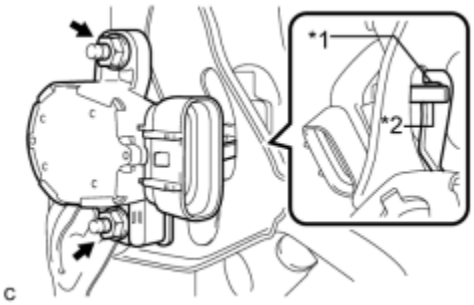
(a) When installing a new brake pedal stroke sensor assembly:

NOTICE:

Do not break the brake pedal stroke sensor assembly lever set pin before installing the brake pedal stroke sensor assembly with the bolts. If the brake pedal stroke sensor assembly lever set pin breaks while tightening a bolt, do not use that brake pedal stroke sensor assembly.

(1) Temporarily install a new brake pedal stroke sensor assembly with the 2 nuts.

## Text in Illustration



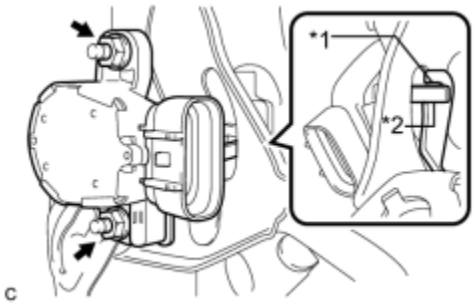

| | |
|---|---|
| *1 | Brake Pedal Groove |
| *2 | Brake Pedal Stroke Sensor Assembly Lever |

- Engage the brake pedal stroke sensor assembly lever with the brake pedal groove.
- Check that there is no foreign matter attached to the contact surface of the brake pedal stroke sensor assembly.
- Check that the tip of the brake pedal stroke sensor assembly lever is protruding from the brake pedal groove.

(b) When reusing the brake pedal stroke sensor assembly:

(1) Temporarily install the brake pedal stroke sensor assembly with the 2 nuts.

## Text in Illustration




| | |
|---|---|
| *1 | Brake Pedal Groove |
| *2 | Brake Pedal Stroke Sensor Assembly Lever |

- Engage the brake pedal stroke sensor assembly lever with the brake pedal groove.
- Check that there is no foreign matter attached to the contact surface of the brake pedal stroke sensor assembly.
- Check that the tip of the brake pedal stroke sensor assembly lever is protruding from the brake pedal groove.

2. INSTALL BRAKE PEDAL SUPPORT ASSEMBLY

HINT:

Refer to the instructions for installation of the Brake Pedal Support Assembly INFO

3. INSPECT AND ADJUST BRAKE PEDAL INFO

4. ADJUST BRAKE PEDAL STROKE SENSOR ASSEMBLY

(a) When installing a new brake pedal stroke sensor assembly:

(1) Fully tighten a new brake pedal stroke sensor assembly with the 2 nuts.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

(2) Firmly depress the brake pedal and break the brake pedal stroke sensor assembly lever set pin.

(3) Remove the broken lever set pin.

(b) When reusing the brake pedal stroke sensor assembly:

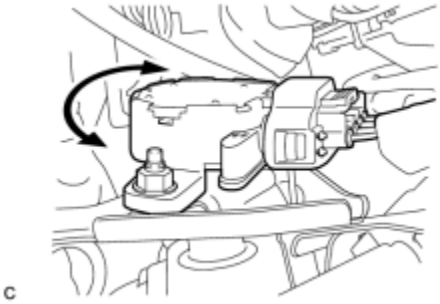
(1) Connect the cable to the negative (-) battery terminal.

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Turn the Techstream on.

(5) Enter the following menus: Chassis / ABS/VSC/ TRAC / Data List.




(6) Reading the value of the brake pedal stroke sensor assembly shown in the Data List, turn the brake pedal stroke sensor assembly slowly to the right and left to adjust the output voltage to the standard voltage.

Standard Voltage:

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stroke Sensor | Stroke sensor / min.: 0 V, max.: 5 V | 0.8 to 1.2 V | - |

(7) Tighten the 2 nuts.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

NOTICE:

Do not depress the brake pedal after turning the power switch on (IG).

(8) Turn the power switch off.

(9) Disconnect the Techstream.

5. CHECK AND CLEAR DTC

(a) Check and clear the DTCs INFO.

6. PERFORM LINEAR VALVE OFFSET LEARNING

(a) Perform linear valve offset learning INFO.

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTICE:

When disconnecting the battery negative (-) cable, initialize the following system after the cable is reconnected:

| System | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. TROUBLESHOOTING PRECAUTIONS

(a) When there is a malfunction with terminal contact points or part installation problems, removal and installation of the suspected problem parts may return the system to the normal condition either completely or temporarily.

(b) In order to determine the malfunctioning area, be sure to check the conditions at the time the malfunction occurred, such as DTC output and the Freeze Frame Data, and record it before disconnecting each connector or removing and installing parts.

(c) Since the system may be influenced by malfunctions in systems other than the brake control system, be sure to check for DTCs in other systems.

3. HANDLING PRECAUTIONS

(a) Do not remove or install electronically controlled brake system parts such as the steering angle sensor, yaw rate and acceleration sensor or brake pedal stroke sensor except when required, as they cannot be adjusted correctly after removal or installation.

(b) Be sure to perform preparation before work and confirmation after work is completed by following the directions in the repair manual when working on the electronically controlled brake system.

(c) Be sure that the power switch is off when removing and installing the ECU, actuator, each sensor, etc. unless it is specified otherwise in the inspection procedure.

(d) If the brake booster with master cylinder (skid control ECU and brake actuator) or a sensor has been removed and installed, it is necessary to check the system for problems after the parts have been reassembled. Check for DTCs using the Techstream, also check that system functions and signals received by the ECU are normal using Test Mode.

(e) If the brake pedal is depressed before the brake control system is prepared to operate, the pedal stroke may seem unusually long or short. This is due to the fact the stroke simulator cut solenoid has not yet operated and is not a malfunction.

After the power switch is turned on (IG) or the brake pedal is depressed twice or more, the stroke simulator will operate and the brake pedal stroke will remain consistent.

4. DTC PRECAUTION

(a) Warnings for some DTCs cannot be cleared only by repairing the malfunctioning parts. If the warning is displayed even after repair work, the DTC should be cleared after turning the power switch off.

NOTICE:

If a DTC part is still malfunctioning even after the DTC is cleared, the DTC will be stored again.

5. CHASSIS DYNAMOMETER PRECAUTION

(a) Enter Inspection Mode to disable TRAC and VSC control when using a chassis dynamometer INFO.

NOTICE:

- Make sure that the slip indicator lights blink (Inspection Mode is activated).
- Secure the vehicle with a lock chain for safety.

6. CAN COMMUNICATION SYSTEM PRECAUTIONS

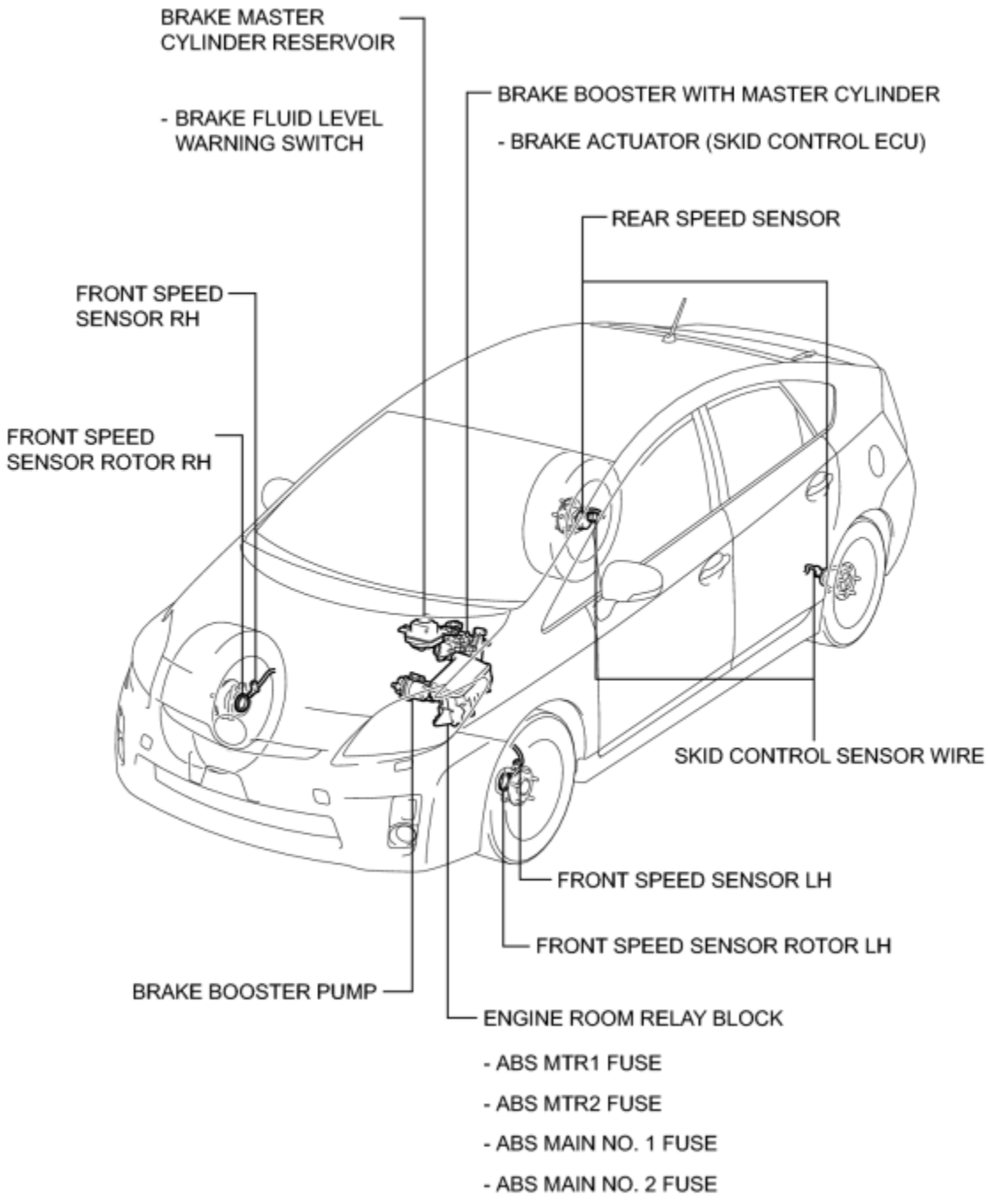
(a) The CAN communication system is used for the data communication between the skid control ECU, the steering angle sensor, yaw rate and acceleration sensor and other ECUs. If there are any problems in the CAN communication line, corresponding DTCs in the communication line are stored.

(b) If any CAN communication line DTCs are output, repair the malfunction in the communication line and troubleshoot the electronically controlled brake system when data communication is normal.

(c) In order to enable CAN communication, a specific type of wiring is used for the CAN communication lines. The wiring used for each communication line is a twisted pair of wires that have an equal length. A bypass wire should not be used, because the data being transmitted will be corrupted.

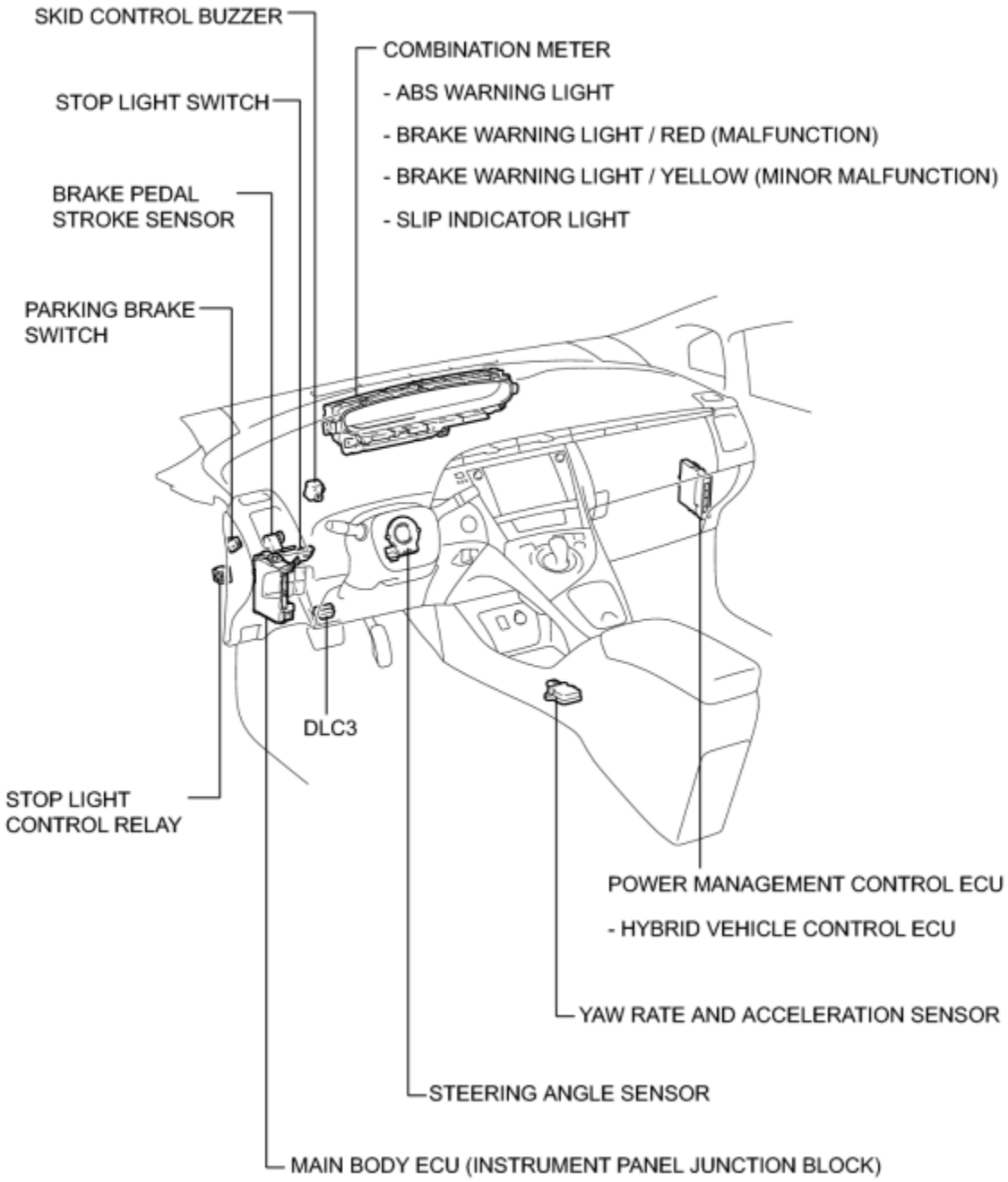
# PARTS LOCATION

# ILLUSTRATION



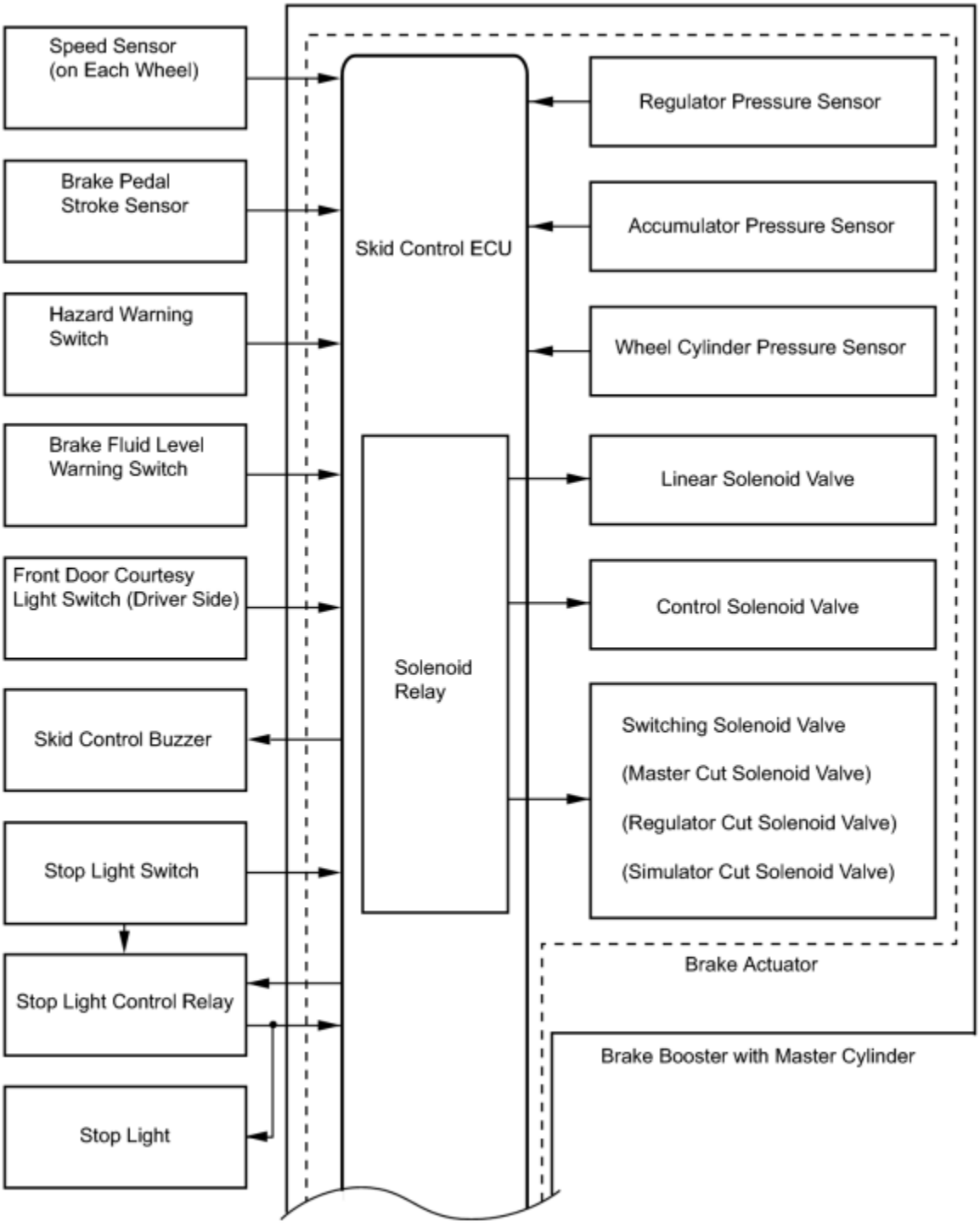

P

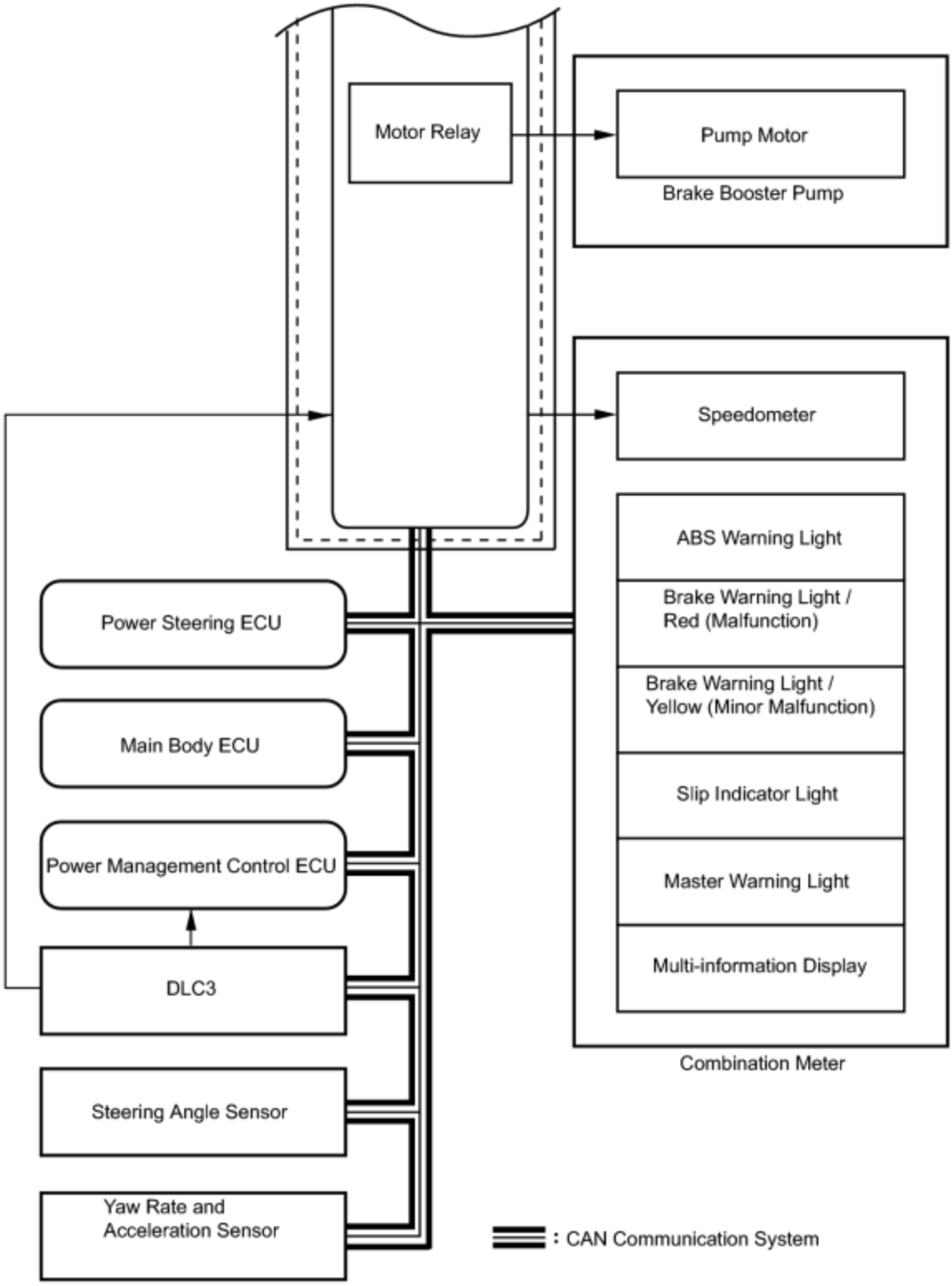
# ILLUSTRATION


SKID CONTROL BUZZER
COMBINATION METER
- ABS WARNING LIGHT
- BRAKE WARNING LIGHT / RED (MALFUNCTION)
- BRAKE WARNING LIGHT / YELLOW (MINOR MALFUNCTION)
- SLIP INDICATOR LIGHT
STOP LIGHT SWITCH
BRAKE PEDAL STROKE SENSOR
PARKING BRAKE SWITCH
DLC3
STOP LIGHT CONTROL RELAY
POWER MANAGEMENT CONTROL ECU
- HYBRID VEHICLE CONTROL ECU
YAW RATE AND ACCELERATION SENSOR
STEERING ANGLE SENSOR
MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

P

# SYSTEM DIAGRAM






| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Skid control ECU | Power steering ECU | • Target steering angle signal | CAN communication |

| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| | | • Target relative angle signal | system |
| Power steering ECU | Skid control ECU | Electronic power steering cooperative control enabling signal | CAN communication system |
| Main body ECU | Skid control ECU | Parking brake switch signal | CAN communication system |
| Skid control ECU | Power management control ECU | • Wheel speed signal<br>• VSC data signal | CAN communication system |
| Power management control ECU | Skid control ECU | • Shift lever position signal<br>• Throttle position signal<br>• Engine speed signal<br>• Intake air temperature signal<br>• Driving torque request signal<br>• Accelerator pedal position signal | CAN communication system |
| Skid control ECU | Steering angle sensor | Steering angle sensor request signal | CAN communication system |
| Steering angle sensor | Skid control ECU | Steering angle sensor signal | CAN communication system |
| Skid control ECU | Yaw rate and acceleration sensor | Yaw rate and acceleration request signal | CAN communication system |
| Yaw rate and acceleration sensor | Skid control ECU | Yaw rate and acceleration signal | CAN communication system |
| Skid control ECU | Combination meter | • ABS warning light signal<br>• Brake warning light / red (malfunction) signal<br>• Brake warning light / yellow (minor malfunction) signal<br>• Slip indicator light signal | CAN communication system |

# SYSTEM DESCRIPTION

1. FUNCTION DESCRIPTION

(a) Electronically Controlled Brake System

(1) Upon receiving signals from the skid control ECU, this system effects hydraulic pressure control at the four wheels.

(b) Regenerative Brake Cooperative Control

(1) Controls hydraulic braking in order to recover electrical energy by utilizing the regenerative brake of the hybrid control system as much as possible.

(c) Enhanced-VSC (Cooperative Control with EPS)

(1) Effects cooperative control with the power steering ECU in order to provide steering assist in accordance with the operating conditions of the vehicle.

(d) Anti-lock Brake System (ABS)

(1) The ABS helps prevent the wheels from locking when the brakes are applied firmly or when braking on a slippery surface.

(e) Electronic Brake force Distribution (EBD)

(1) The EBD control utilizes ABS, realizing proper brake force distribution between the front and rear wheels in accordance with the driving conditions. In addition, during braking while cornering, it also controls the brake forces of the right and left wheels, helping maintain vehicle behavior.

(f) Brake Assist (BA)

(1) The primary purpose of brake assist is to provide an auxiliary brake force to assist a driver who cannot generate a large brake force during emergency braking, thus helping draw the vehicles braking performance.

(g) Traction Control (TRAC)

(1) The TRAC helps restrain the slippage of the drive wheels if the driver depresses the accelerator pedal excessively when starting off or accelerating on a slippery surface.

(h) Vehicle Stability Control (VSC)

(1) The VSC helps restrain sideways slippage of the vehicle during a strong front wheel skid or strong rear wheel skid, during cornering.

(i) Hill-start Assist Control

(1) When starting uphill, this control maintains the brake hydraulic pressure to the four wheels, in order to momentarily prevent the vehicle from descending backward.

2. FUNCTION OF COMPONENTS

| Component | | Function |
|---|---|---|
| Brake Booster with Master Cylinder | Brake Actuator | • Consists of four switching solenoid valves, two linear solenoid valves, eight control solenoid valves.<br>• Changes the brake fluid path based on the signals from the skid control ECU during the operations of the ABS with EBD, BA, TRAC, VSC, hill-start assist control, and Enhanced-VSC in order to control the fluid pressure that is applied to the wheel cylinders. |
| | Hydraulic Brake Booster | • Generates hydraulic pressure in accordance with the amount of effort applied to the brake pedal by the driver.<br>• When a malfunction occurs in the brake system, the hydraulic brake booster supplies the fluid pressure (which is generated by the brake |

| Component | | Function |
|---|---|---|
| | | pedal effort) directly to the wheel cylinders. |
| | Stroke Simulator | Generates a pedal stroke during braking in accordance with the drivers pedal effort. |
| Brake Actuator | Skid Control ECU | • Monitors the driving conditions of the vehicle in accordance with the signals received from the sensors and through cooperative control with the power management control ECU and power steering ECU calculates the required amount of braking force, and controls the brake actuator.<br>• Judges the vehicle driving condition based on signals from each sensor, and controls ABS with EBD, BA, TRAC, Enhanced-VSC and hill-start assist control.<br>• Operates the brake booster pump to control accumulator pressure based on accumulator pressure sensor signal. |
| Skid Control ECU | Relief Valve | Returns the brake fluid to the reservoir to prevent excessive pressure if the pump operates continuously due to a malfunction of the accumulator pressure sensor. |
| | Solenoid Relay | Supply or cut off power to solenoid valves in the brake actuator. |
| | Motor Relay | Normally supplies power to the pump motor using two out of three relays. Ensures power to the pump motor by using the rest relay if the skid control ECU malfunctions. |
| | Linear Solenoid Valve | Controls the wheel cylinder pressure to generate a braking force responsive to the braking force requirement when the brake pedal is depressed normally. |
| | Switching Solenoid Valve | Switches the brake hydraulic path when the brake control system is activated. |
| | Control Solenoid Valve | Controls the wheel cylinder pressure when the ABS with EBD, BA, TRAC, VSC, hill-start control and Enhanced-VSC are activated. |
| | Regulator Pressure Sensor | The regulator pressure sensor converts the fluid pressure generated by the hydraulic brake booster into electrical signals and transmits them to the skid control ECU. Accordingly, the skid control ECU determines the braking force required by the driver. |
| | Wheel Cylinder Pressure Sensor | This sensor detects the fluid pressure that acts on the respective wheel cylinders and transmits them to the skid control ECU in the form of feedback. Accordingly, the skid control ECU monitors the fluid pressure of the wheel cylinders and controls the linear solenoid valve, in order to achieve the optimal wheel cylinder pressures. |
| | Accumulator Pressure Sensor | The accumulator pressure sensor constantly detects the brake fluid pressure in the accumulator and transmits the signals to the skid control ECU. Accordingly, the skid control ECU controls the pump motor. |
| Brake Booster Pump | | • Consisting of a pump, pump motor and accumulator, the hydraulic power source portion generates and stores the hydraulic pressure, which the skid control ECU uses for controlling braking.<br>• The relief valve is installed in the hydraulic brake booster. |

| Component | | Function |
|---|---|---|
| | | • The accumulator pressure sensor is installed in the brake actuator. |
| Speed Sensor | | Detects the wheel speed of each of four wheels. |
| Brake Pedal Stroke Sensor | | Directly detects the extent of the brake pedal stroke operated by the driver. |
| Brake Fluid Level Warning Switch | | Detects the low brake fluid level. |
| Skid Control Buzzer | | • This buzzer sounds continuously to inform the driver when there is a malfunction in the hydraulic pressure or a failure in the power supply.<br>• This buzzer sounds intermittently to inform the driver of the vehicle skidding. |
| Stop Light Switch | | Detects brake pedal operation. |
| Stop Light Control Relay | | Illuminates the stop lights when hill-start assist control is operating. |
| Power Steering ECU | | Operates cooperatively with the skid control ECU to control the steering assist torque. |
| Main Body ECU (Instrument Panel Junction Block) | | Detects the parking brake signal and outputs it to the skid control ECU via CAN communication. |
| Power Management Control ECU | | • Actuates the regenerative brake on receiving signal from the skid control ECU.<br>• Sends the actual regenerative brake control value to the skid control ECU.<br>• Controls the motive force based on an output control request signal received from the skid control ECU while the VSC, TRAC or the dynamic radar cruise control system is operating. |
| Steering Angle Sensor | | Detects the steering direction and angle of the steering wheel. |
| Yaw Rate and Acceleration Sensor | | • Detects the vehicles yaw rate.<br>• Detects the vehicles acceleration in the forward, rearward, and lateral. |
| Combination Meter | ABS Warning Light | Lights up to alert the driver when the skid control ECU detects the malfunction in the ABS, EBD, or BA. |
| | Brake Warning Light / Red (Malfunction) | • Lights up to alert the driver when the skid control ECU detects the malfunction in the apportioning of the brake.<br>• Lights up to inform the driver when the parking brake is on or the brake fluid level is low. |
| | Brake Warning Light / Yellow (Minor Malfunction) | Lights up to alert the driver when a minor malfunction occurs in the brake system, which does not affect the braking force (such as a malfunction in the regenerative brake). |
| | Slip Indicator Light | • Blinks to inform the driver when the TRAC, the VSC or the hill-start assist control is operated.<br>• Lights up to alert the driver in the event of malfunction of the TRAC or |

| Component | | Function |
| --- | --- | --- |
| | | VSC. |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

*: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

(a) Interview the customer and confirm the problem INFO.

NEXT

| | |
|---|---|
| 3. | CHECK DTC AND FREEZE FRAME DATA* |

(a) Check and record DTCs and Freeze Frame Data.

(b) Clear the DTCs and Freeze Frame Data INFO for DTC Check/Clear, and INFO for Freeze Frame Data).

(c) Reconfirm the DTCs.

(1) Reconfirm the DTCs based on the recorded DTCs and Freeze Frame Data INFO for DTC Check/Clear, and INFO for Freeze Frame Data).

HINT:

- When DTCs indicating CAN communication system malfunctions are output, repair the CAN communication system before repairing each corresponding sensor INFO.
- If any of DTCs U0123/62, U0124/95, U0126/63, and U0293/59 is output together with a CAN communication DTC, first check the appropriate sensor for a momentary open circuit INFO.
- If the Techstream cannot communicate with the skid control ECU, inspect the CAN communication system INFO.
- If there is no response from the skid control ECU, inspect the IG1 circuit of the skid control ECU INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is output | A |
| DTC is not output (Problem symptom does not occur) | B |
| DTC is not output (Problem symptom occurs) | C |

B Go to step 5

C Go to step 6

A

| | |
|---|---|
| 4. | DIAGNOSTIC TROUBLE CODE CHART |

(a) Proceed to Diagnostic Trouble Code Chart INFO.

NEXT **Go to step 7**

| | |
|---|---|
| 5. | SYMPTOM SIMULATION |

(a) Proceed to How to Proceed with Troubleshooting INFO.

NEXT

| | |
|---|---|
| 6. | PROBLEM SYMPTOMS TABLE |

(a) Proceed to Problem Symptoms Table INFO.

NEXT

| | |
|---|---|
| 7. | CIRCUIT INSPECTION* |

NEXT

| | |
|---|---|
| 8. | IDENTIFICATION OF PROBLEM |

NEXT

| | |
|---|---|
| 9. | REPAIR OR REPLACEMENT |

NEXT

| | |
|---|---|
| 10. | CONFIRMATION TEST* |

NEXT **END**

# CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

HINT:

A momentary interruption (open circuit) in the connectors and/or wire harnesses between the sensors and ECUs can be detected using the ECU Data List function of the Techstream.

(a) Turn the power switch off.

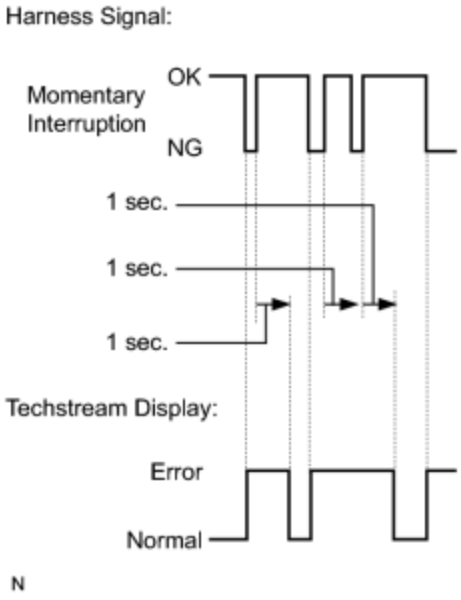
(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Follow the directions on the Techstream to display the Data List and select areas where momentary interruptions should be monitored.

- A momentary interruption (open circuit) cannot be detected for 3 seconds after the power switch is turned on (IG) (initial check).
- If the Error display remains displayed, check for continuity between the ECUs and the sensors, or between ECUs.
- The Error display on the Techstream will remain displayed for 1 second after the harness signal changes from momentary interruption (open circuit) to normal condition.



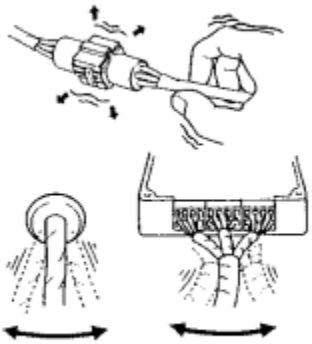

N

# ABS/VSC/TRAC

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Speed Open | Front speed sensor RH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| FL Speed Open | Front speed sensor LH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| RR Speed Open | Rear speed sensor RH open detection / Error or Normal | Error: Momentary interruption | - |

| | | | |
|---|---|---|---|
| | | Normal:<br>Normal | |
| RL Speed Open | Rear speed sensor LH open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |
| Yaw Rate Open | Yaw rate sensor open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |
| Deceleration Open | Acceleration sensor open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |
| Steering Open | Steering angle sensor open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |
| Master Cylinder Open | Regulator pressure sensor open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |
| Stroke Open | Brake pedal stroke sensor open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |
| FR Wheel Cylinder Open | Wheel cylinder pressure sensor open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |
| Accumulator Open | Accumulator pressure sensor open detection / Error or Normal | Error:<br>Momentary | - |

| | | | |
|---|---|---|---|
| | | interruption<br><br>Normal:<br>Normal | |
| HV Communication Open | Hybrid vehicle communication open detection / Error or Normal | Error:<br>Momentary interruption<br><br>Normal:<br>Normal | - |


F47126

(f) While observing the screen, gently jiggle the connectors or wire harnesses between the ECUs and sensors, or between ECUs.

OK:

Normal display appears.

HINT:

If the display changes, this indicates that there has been a momentary interruption (open circuit) in the connector and/or wire harness. In this case, repair or replace the connectors and/or wire harnesses as one of them is faulty.

# INITIALIZATION

1. DESCRIPTION

(a) Perform initialization and calibration of the linear solenoid valve when the brake booster with master cylinder (skid control ECU, brake actuator or pressure sensor), brake pedal stroke sensor or brake pedal is replaced.

Follow the procedure to perform initialization.

HINT:

- If there is a problem with the auxiliary battery (12 V) voltage, initialization and calibration of the linear solenoid valve cannot be completed normally. Make sure to check the auxiliary battery voltage before performing initialization and calibration of the linear solenoid valve.
- If the actuator's temperature is high, initialization and calibration of the linear solenoid valve may not be completed normally. If so, wait until the temperature decreases and then perform initialization and calibration of the linear solenoid valve.
- If the power switch is turned off, the brake pedal is operated, parking brake is applied or vehicle speed signal is input while the linear solenoid valve offset learning is being performed, the learning will be cancelled.

| Part to be Replaced | Necessary Operation |
|---|---|
| Brake booster with master cylinder<br><br>(Skid control ECU, brake actuator or pressure sensor) | Initialization and calibration of the linear solenoid valve |
| • Brake pedal stroke sensor<br>• Brake pedal | 1. Clearing stored linear solenoid valve calibration data<br>2. Initialization and calibration of the linear solenoid valve |

2. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE (When Using the Techstream)

NOTICE:

If the brake control has been disabled, or the brake pedal stroke sensor or brake pedal has been replaced, it is necessary to perform linear solenoid valve learning.

If the brake booster with master cylinder has been replaced, or the brake booster pump or brake master cylinder reservoir has been replaced, linear solenoid valve learning will be automatically performed during the Bleed Brake System procedure INFO.

(a) Clear the stored linear solenoid valve calibration data.

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that park (P) is selected.

(4) Connect the Techstream to the DLC3.

(5) Turn the power switch on (IG).

(6) Turn the Techstream on.

(7) Select the skid control ECU to clear the linear solenoid valve calibration data using the Techstream. Enter the following menus: Chassis / ABS/VSC/TRAC / Utility / Reset Memory.

(8) Perform initialization and calibration of the linear solenoid valve.

(9) Perform the zero point calibration of yaw rate and acceleration sensor INFO.

(b) Perform initialization and calibration of the linear solenoid valve.

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that park (P) is selected.

(4) Check that the parking brake is released.

NOTICE:

Linear valve offset learning cannot be started with the parking brake applied. If the parking brake is applied during offset learning, the learning process will be canceled and then restarted when the parking brake is released.

(5) Connect the Techstream to the DLC3.

(6) Turn the power switch on (IG) with the brake pedal released.

NOTICE:

- If the linear solenoid valve offset learning is performed without turning the power switch on (IG), the learning process may not be completed properly because of insufficient auxiliary battery voltage.
- When the linear solenoid valve offset learning is interrupted, or the learning process is performed with park (P) is not selected, DTC C1345 (Linear Solenoid Valve Offset Learning Undone) will be stored.

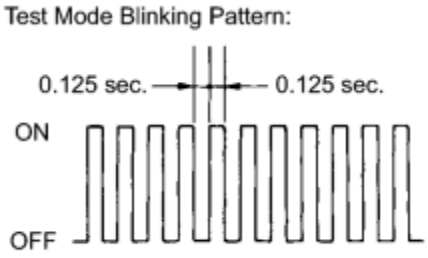
(7) Turn the Techstream on.

(8) Switch the skid control ECU to the Test Mode using the Techstream. Enter the following menus: Chassis / ABS/VSC/TRAC / Utility / ECB* Utility / Linear Valve Offset.

*: Electronically Controlled Brake System

(9) Leave the vehicle stationary without depressing the brake pedal for 1 or 2 minutes.

(10) Check that the interval between blinks of the brake warning light /




yellow (minor malfunction) changes from 1 second to 0.25 seconds.

- The time needed to complete initialization and calibration of the linear solenoid valve varies depending on auxiliary battery voltage.
- The brake warning light / yellow (minor malfunction) blinks at 1 second intervals during initialization and calibration of the linear solenoid valve and changes to the Test Mode display.
- The brake warning light / yellow (minor malfunction) blinks at 0.25 seconds intervals if the Test Mode is normal.

(11) Check that DTC C1345 (Linear Solenoid Valve Offset Learning Undone) which indicates trouble with stroke sensor zero point learning is not output when the brake warning light / yellow (minor malfunction) changes to the Test Mode display upon initialization and calibration of the linear solenoid valve completion.

(12) Enter the normal mode from the Test Mode following the Techstream directions.

HINT:

Refer to the Techstream operator's manual for further details.

3. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE (When not Using the Techstream)

NOTICE:

If the brake control has been disabled, or the brake pedal stroke sensor or brake pedal has been replaced, it is necessary to perform linear solenoid valve learning.

If the brake booster with master cylinder has been replaced, or the brake booster pump or brake master cylinder reservoir has been replaced, linear solenoid valve learning will be automatically performed during the Bleed Brake System procedure INFO.

(a) Clear the stored linear solenoid valve calibration data.

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

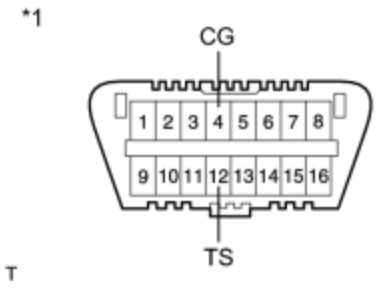
(3) Check that park (P) is selected.

(4) Check that the parking brake is released.

NOTICE:

Linear valve offset learning cannot be started with the parking brake applied. If the parking brake is applied during offset learning, the learning process will be canceled and then restarted when the parking brake is released.

(5) Turn the power switch on (IG) with the brake pedal released.




(6) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.

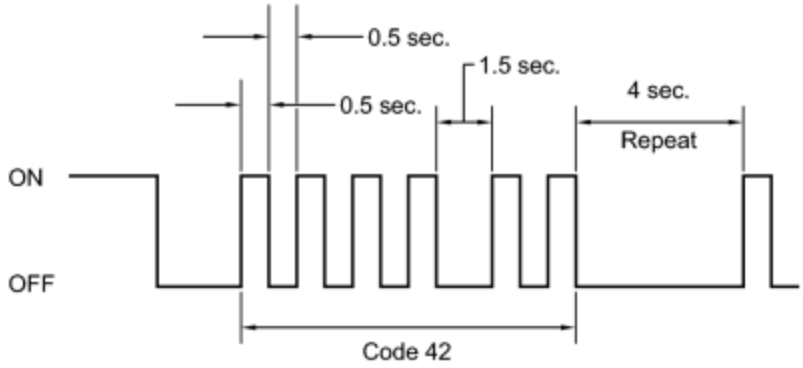
SST: 09843-18040

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

(7) Check that no codes other than ABS code 42, VSC code 45 and electronically controlled brake system code 48, 66, or 95 are stored in the diagnostic system.

Trouble Code Blinking Pattern (Example Code 42):




HINT:

The ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights do not indicate a normal system code.

(8) Remove SST from the terminals of the DLC3.

(9) Perform initialization and calibration of the linear solenoid valve.

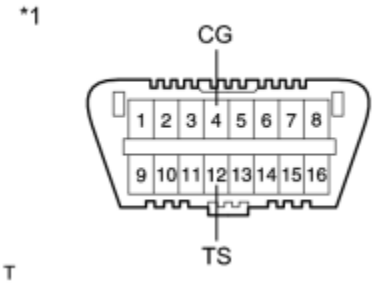
(10) Perform the zero point calibration of yaw rate and acceleration sensor INFO.

(b) Perform initialization and calibration of the linear solenoid valve.

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that park (P) is selected.




(4) Using SST, connect terminals TS and CG of the DLC3.

SST: 09843-18040

## Text in Illustration

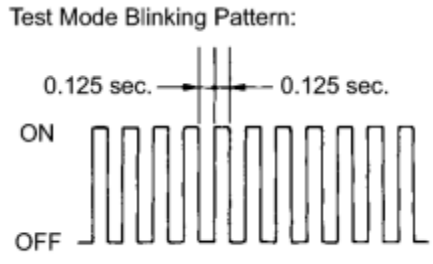
| | |
|---|---|
| *1 | Front view of DLC3 |

(5) Turn the power switch on (IG) with the brake pedal released.

NOTICE:

- If the linear solenoid valve offset learning is performed without turning the power switch on (IG), the learning process may not be completed properly because of insufficient auxiliary battery voltage.
- When the linear solenoid valve offset learning is interrupted, or the learning process is performed with park (P) is not selected, DTC 66 (Linear Solenoid Valve Offset Learning Undone) will be stored.

(6) Leave the vehicle stationary without depressing the brake pedal for 1 or 2 minutes.




(7) Check that the interval between blinks of the brake warning light / yellow (minor malfunction) changes from 1 second to 0.25 seconds.

- The time needed to complete initialization and calibration of the linear solenoid valve varies depending on the auxiliary battery voltage.
- The brake warning light / yellow (minor malfunction) blinks at 1 second intervals during initialization and calibration of the linear solenoid valve and changes to the Test Mode display.
- The brake warning light / yellow (minor malfunction) blinks at 0.25 seconds intervals if Test Mode is normal.

(8) Check that DTC 66 (Linear Solenoid Valve Offset Learning Undone) which indicates trouble with stroke sensor zero point learning is not output when the brake warning light / yellow (minor malfunction) changes to the Test Mode display upon initialization and calibration of the linear solenoid valve completion.

(9) Turn the power switch off and disconnect SST from the DLC3.

# CALIBRATION

1. DESCRIPTION

(a) After replacing any VSC related components or performing front wheel alignment adjustment, clear and read the sensor calibration data.

Follow the chart below to perform calibration.

| Part to be Replaced / Operation | Necessary Operation |
|---|---|
| Brake booster with master cylinder (Skid control ECU) | Yaw rate and acceleration sensor zero point calibration |
| Yaw rate and acceleration sensor | 1. Clearing zero point calibration data<br>2. Yaw rate and acceleration sensor zero point calibration |
| Front wheel alignment adjustment | 1. Clearing zero point calibration data<br>2. Yaw rate and acceleration sensor zero point calibration |

2. OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (When Using the Techstream)

NOTICE:

- While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it.
- Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).

(a) Clear the zero point calibration data.

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that park (P) is selected.

(4) Connect the Techstream to the DLC3.

(5) Turn the power switch on (IG).

(6) Turn the Techstream on.

(7) Select the skid control ECU to clear the zero point calibration data using the Techstream. Enter the following menus: Chassis / ABS/VSC/TRAC / Utility / Reset Memory.

(8) Turn the power switch off.

NOTICE:

If the power switch is turned on (IG) for more than 15 seconds with park (P) is selected after the zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the indicator light.

(b) Perform the zero point calibration of the yaw rate and acceleration sensor.

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that park (P) is selected.

NOTICE:

DTCs C1210 (Zero Point Calibration of Yaw Rate Sensor Undone) and C1336 (Zero Point Calibration of Acceleration Sensor Undone) will be stored if park (P) is not selected.

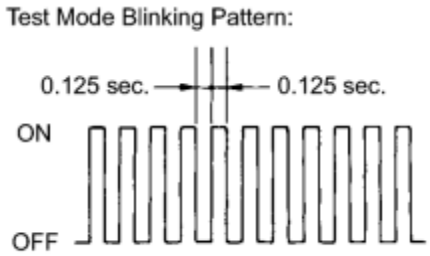
(4) Connect the Techstream to the DLC3.

(5) Turn the power switch on (IG).

(6) Turn the Techstream on.

(7) Switch the skid control ECU to Test Mode using the Techstream. Enter the following menus: Chassis / ABS/VSC/TRAC / Utility / Test Mode.

(8) After Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.




(9) Check that the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights come on for several seconds and then blink in Test Mode.

- If the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights do not blink, perform zero point calibration again.
- The zero point calibration is performed only once after the system enters Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(10) Turn the power switch off and disconnect the Techstream.

3. OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR (When not Using the Techstream)

NOTICE:

- While obtaining the zero point, keep the vehicle stationary and do not vibrate, tilt, move, or shake it.
- Be sure to perform this procedure on a level surface (with an inclination of less than 1 degree).

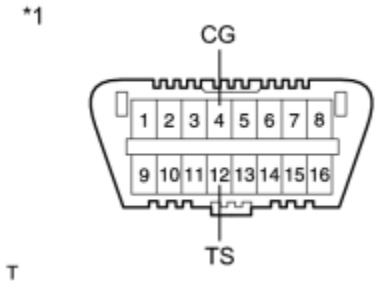
(a) Clear the zero point calibration data.

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that park (P) is selected.

(4) Turn the power switch on (IG).




(5) Using SST, connect and disconnect terminals TS and CG of the DLC3 4 times or more within 8 seconds.

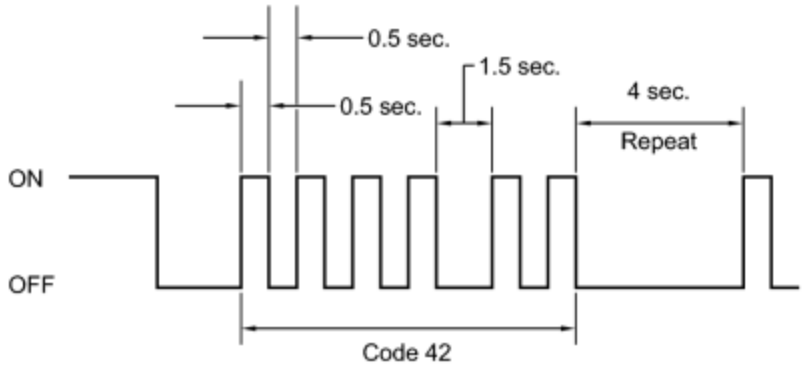
SST: 09843-18040

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

(6) Check that no codes other than ABS code 42, VSC code 45 and electronically controlled brake system code 48, 66, or 95 are stored in the diagnostic system.

Trouble Code Blinking Pattern (Example Code 42):




HINT:

The ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights do not indicate a normal system code.

NOTICE:

If the power switch is turned on (IG) for more than 15 seconds with park (P) is selected after the zero point of the yaw rate and acceleration sensor has been cleared, only the zero point of the yaw rate sensor will be stored. If the vehicle is driven under these conditions, the skid control ECU will store the zero point calibration for the acceleration sensor as not being completed. The skid control ECU will then also indicate this as a malfunction of the VSC system using the indicator light.

(7) Turn the power switch off.

(b) Perform the zero point calibration of the yaw rate and acceleration sensor.

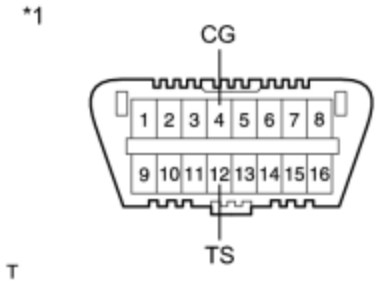
(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that park (P) is selected.

NOTICE:

DTCs 36 (Zero Point Calibration of Yaw Rate Sensor Undone) and 98 (Zero Point Calibration of Acceleration Sensor Undone) will be recorded if park (P) is not selected.




(4) Using SST, connect terminals TS and CG of the DLC3.

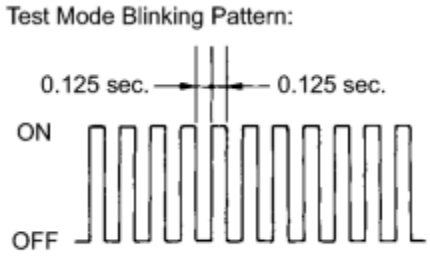
SST: 09843-18040

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

(5) Turn the power switch on (IG).

(6) After Test Mode has been entered, keep the vehicle stationary on a level surface for 2 seconds or more.




(7) Check that the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights come on for several seconds and then blinks in Test Mode.

- If the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights do not blink, perform zero point calibration again.
- The zero point calibration is performed only once after the system enters Test Mode.
- Calibration cannot be performed again until the stored data is cleared.

(8) Turn the power switch off and disconnect SST from the DLC3.

# TEST MODE PROCEDURE

1. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

When releasing the parking brake, push the P position switch for safety.

HINT:

When the parking brake is applied or the brake fluid level is low, the brake warning light / red (malfunction) comes on.

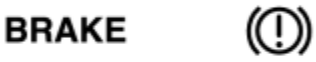
ABS Warning Light:

for U.S.A.: Except for U.S.A.:




Brake Warning Light / Red (Malfunction):

for U.S.A.: Except for U.S.A.:




Brake Warning Light / Yellow (Minor Malfunction):



Slip Indicator Light:



(b) When the power switch is turned on (IG), check that the ABS warning, brake warning / red (malfunction), brake warning / yellow (minor malfunction) and slip indicator lights come on until the power switch is turned on (READY).

- If the skid control ECU stores any DTCs, the ABS warning, brake warning / red (malfunction), brake warning / yellow (minor malfunction) and slip indicator lights will come on.
- If any of the indicators remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

| Trouble Area | See Procedure |
|---|---|
| ABS warning light circuit (Remains on) | INFO |
| ABS warning light circuit (Does not come on) | INFO |
| Brake warning light / red (malfunction) circuit (Remains on) | INFO |
| Brake warning light / red (malfunction) circuit (Does not come on) | INFO |
| Brake warning light / yellow (minor malfunction) circuit (Remains on) | INFO |
| Brake warning light / yellow (minor malfunction) circuit (Does not come on) | INFO |
| Slip indicator light circuit (Remains on) | INFO |
| Slip indicator light circuit (Does not come on) | INFO |

2. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (When Using the Techstream)

NOTICE:

Before performing the master cylinder pressure sensor check or yaw rate sensor zero point voltage check, perform linear valve offset learning.

HINT:

- If the power switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the sensor check will be cleared.
- During Test Mode (signal check), the skid control ECU records all DTCs detected in the sensor check. By performing Test Mode (signal check), the codes are cleared if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

(a) Procedure to enter the Test Mode

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that the parking brake is released.

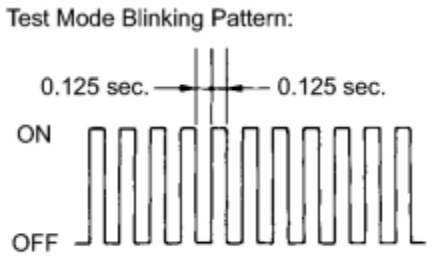
(4) Check that park (P) is selected.

(5) Connect the Techstream to the DLC3.

(6) Turn the power switch on (IG).

(7) Turn the Techstream on.

(8) Switch the skid control ECU to Test Mode using the Techstream. Enter the following menus: Chassis / ABS/VSC/TRAC / Utility / Signal Check.




(9) Check that the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights come on for several seconds and then blink in Test Mode.

HINT:

If the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights do not blink, inspect the TS and CG terminal circuit and ABS warning, brake warning / yellow (minor malfunction) and slip indicator light circuits.

(10) Check the ABS sensors.

HINT:

Check that the ABS warning light is blinking in the Test Mode blinking pattern before performing the ABS sensor check.

(b) Acceleration Sensor Check

(1) Keep the vehicle stationary on a level surface for 1 second or more.

HINT:

The acceleration sensor check can be performed with the master cylinder pressure sensor check below.

(c) Master Cylinder Pressure Sensor Check

NOTICE:

Before performing the master cylinder pressure sensor check, perform linear valve offset learning.

(1) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force greater than 98 N (10 kgf, 22.0 lbf) for 1 second.

(2) Check that the ABS warning light stays on for 3 seconds.

HINT:

- Confirm that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time the preceding brake pedal operation is performed.

(d) Speed Sensor Check

NOTICE:

Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.

(1) Drive the vehicle straight-ahead.

Accelerate the vehicle to a speed of 45 km/h (28 mph) or more for several seconds and check that the ABS warning light goes off.

HINT:

- The sensor check may not be completed if wheelspin occurs.
- The ABS warning light comes on immediately if a malfunction is detected during the speed sensor check.

(2) Stop the vehicle.

NOTICE:

- The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.
- After the ABS warning light goes off, if vehicle speed exceeds 80 km/h (50 mph), a sensor check code will be stored again. Decelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).
- If the sensor check has not been completed, the ABS warning light will blink while driving and the ABS will not operate.

(3) Check the VSC sensor.

HINT:

Check that the brake warning / yellow (minor malfunction) and slip indicator lights are blinking in the Test Mode blinking pattern before performing the VSC sensor check.

(e) Yaw Rate Sensor Zero Point Voltage Check

NOTICE:

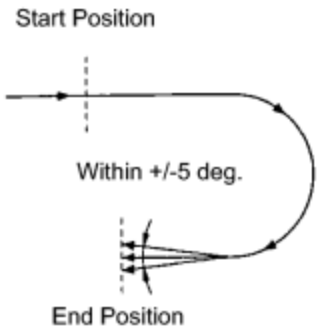
Before performing the yaw rate sensor zero point voltage check, perform linear valve offset learning.

(1) Check that park (P) is selected.

(2) Keep the vehicle stationary on a level surface for 1 second or more.

(3) Check that the brake warning light / yellow (minor malfunction) blinks.

(f) Yaw Rate Sensor Output Check




(1) Move the shift lever from P to D and drive the vehicle at a speed of approximately 5 km/h (3 mph), and turn the steering wheel either to the left or right 90° or more until the vehicle makes a 180° turn.

- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +/-5° of its start position.
- Do not allow the wheels to spin.
- Do not turn the power switch off while turning.
- Do not push the P position switch while turning, but changing the vehicle speed, stopping, or driving in reverse is acceptable.

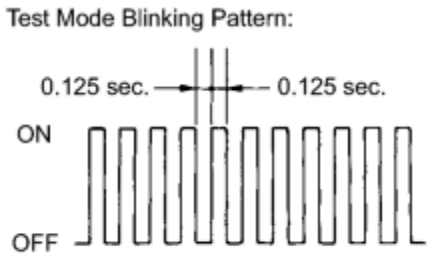
(2) Stop the vehicle and push the P position switch. Check that the skid control buzzer sounds for 3 seconds.

HINT:

- If the skid control buzzer sounds, the sensor check has completed normally.

- If the skid control buzzer does not sound, check the skid control buzzer circuit INFO, then perform the sensor check again.
- If the skid control buzzer still does not sound, the yaw rate sensor may be malfunctioning. Check for DTCs.

(g) End of Sensor Check




(1) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle is stopped and goes off while the vehicle is driving.

- When all the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.
- If the sensor check has not been completed, the ABS warning light will blink while driving and the ABS will not operate.

(h) Read Sensor Check DTCs

(1) Read the DTC(s) by following the Techstream screen.

NOTICE:

- If only DTCs other than Test Mode sensor check DTCs are displayed, repair the malfunction and clear the DTCs.
- If Test Mode sensor check DTCs and other DTCs are displayed or if only Test Mode sensor check DTCs are displayed, repair the malfunction, clear the DTCs, and perform the Test Mode inspection again.

HINT:

See "Sensor Check DTCs".

(2) Turn the power switch off and disconnect the Techstream.

(i) Sensor Check DTCs

**ABS Sensor**

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| C1271 | Low Output Signal of Front Speed Sensor RH | • Front speed sensor RH<br>• Sensor installation<br>• Speed sensor rotor |
| C1272 | Low Output Signal of Front Speed Sensor LH | • Front speed sensor LH<br>• Sensor installation<br>• Speed sensor rotor |
| C1273 | Low Output Signal of Rear Speed Sensor RH | • Rear speed sensor RH<br>• Sensor installation |

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| | | • Speed sensor rotor |
| C1274 | Low Output Signal of Rear Speed Sensor LH | • Rear speed sensor LH<br>• Sensor installation<br>• Speed sensor rotor |
| C1275 | Abnormal Change in Output Signal of Front Speed Sensor RH | • Front speed sensor RH<br>• Speed sensor rotor |
| C1276 | Abnormal Change in Output Signal of Front Speed Sensor LH | • Front speed sensor LH<br>• Speed sensor rotor |
| C1277 | Abnormal Change in Output Signal of Rear Speed Sensor RH | • Rear speed sensor RH<br>• Speed sensor rotor |
| C1278 | Abnormal Change in Output Signal of Rear Speed Sensor LH | • Rear speed sensor LH<br>• Speed sensor rotor |
| C1279 | Acceleration Sensor Output Voltage Malfunction | • Sensor installation<br>• Yaw rate and acceleration sensor |
| C1281 | Master Cylinder Pressure Sensor Output Malfunction | • Stop light switch<br>• Regulator pressure sensor |

**VSC Sensor**

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| C0371 | Yaw Rate Sensor | • Sensor installation<br>• Yaw rate and acceleration sensor |

**Electronically Controlled Brake System Sensor**

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| C1346 | Stroke Sensor Zero Point Learning Malfunction | • Brake pedal stroke sensor<br>• Brake pedal stroke sensor circuit |

HINT:

The codes in this table are output only in Test Mode (signal check).

3. SENSOR CHECK USING TEST MODE (SIGNAL CHECK) (When not Using the Techstream)

NOTICE:

Before performing the master cylinder pressure sensor check or yaw rate sensor zero point voltage check, perform linear valve offset learning.

HINT:

- If the power switch is turned from on (IG) to on (ACC) or off during Test Mode (signal check), DTCs recorded during the sensor check will be cleared.
- During Test Mode (signal check), the skid control ECU records all DTCs detected in the sensor check. By performing Test Mode (signal check), the codes are cleared if a normal condition is confirmed. The remaining codes are the codes where an abnormality was found.

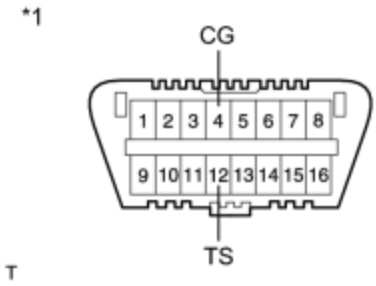
(a) Procedure to enter Test Mode

(1) Turn the power switch off.

(2) Check that the steering wheel is centered.

(3) Check that the parking brake is released.

(4) Check that park (P) is selected.



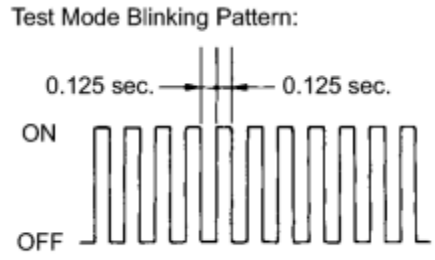

(5) Using SST, connect terminals TS and CG of the DLC3.

SST: 09843-18040

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

(6) Turn the power switch on (IG).




(7) Check that the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights come on for several seconds and then blink in Test Mode.

HINT:

If the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights do not blink, inspect the TS and CG terminal circuit and ABS warning, brake warning / yellow (minor malfunction) and slip indicator light circuits.

(8) Check the ABS sensors.

HINT:

Check that the ABS warning light is blinking in the Test Mode blinking pattern before performing the ABS sensor check.

(b) Acceleration Sensor Check

(1) Keep the vehicle stationary on a level surface for 1 second or more.

HINT:

The acceleration sensor check can be performed with the master cylinder pressure sensor check below.

(c) Master Cylinder Pressure Sensor Check

NOTICE:

Before performing the master cylinder pressure sensor check, perform linear valve offset learning.

(1) Leave the vehicle in a stationary condition and release the brake pedal for 1 second or more, and quickly and continuously depress the brake pedal with a force greater than 98 N (10 kgf, 22.0 lbf) for 1 second.

(2) Check that the ABS warning light stays on for 3 seconds.

HINT:

- Confirm that the ABS warning light comes on.
- While the ABS warning light stays on, continue to depress the brake pedal with a force of 98 N (10 kgf, 22 lbf) or more.
- The ABS warning light comes on for 3 seconds every time the preceding brake pedal operation is performed.

(d) Speed Sensor Check

NOTICE:

Before performing the speed sensor check, complete the acceleration sensor and master cylinder pressure sensor checks.

(1) Drive the vehicle straight-ahead.

Accelerate the vehicle to a speed of 45 km/h (28 mph) or more for several seconds and check that the ABS warning light goes off.

HINT:

- The sensor check may not be completed if wheelspin occurs.
- The ABS warning light comes on immediately if a malfunction is detected during the speed sensor check.

(2) Stop the vehicle.

NOTICE:

- The speed sensor check may not be completed if the speed sensor check is started while turning the steering wheel or spinning the wheels.
- After the ABS warning light goes off, if vehicle speed exceeds 80 km/h (50 mph), a sensor check code will be stored again. Decelerate or stop the vehicle before the speed reaches 80 km/h (50 mph).
- If the sensor check has not been completed, the ABS warning light will blink while driving and the ABS will not operate.

(3) Check the VSC sensor.

HINT:

Check that the brake warning / yellow (minor malfunction) and slip indicator lights are blinking in the Test Mode blinking pattern before performing the VSC sensor check.

(e) Yaw Rate Sensor Zero Point Voltage Check

NOTICE:

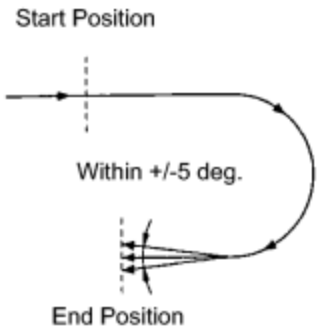
Before performing the yaw rate sensor zero point voltage check, perform linear valve offset learning.

(1) Check that park (P) is selected.

(2) Keep the vehicle stationary on a level surface for 1 second or more.

(3) Check that the brake warning light / yellow (minor malfunction) blinks.

(f) Yaw Rate Sensor Output Check




(1) Move the shift lever from P to D and drive the vehicle at a speed of approximately 5 km/h (3 mph), and turn the steering wheel either to the left or right 90° or more until the vehicle makes a 180° turn.

- Make a 180° turn. At the end of the turn, the direction of the vehicle should be within 180° +/-5° of its start position.
- Do not allow the wheels to spin.
- Do not turn the power switch off while turning.
- Do not push the P position switch while turning, but changing the vehicle speed, stopping, or driving in reverse is acceptable.

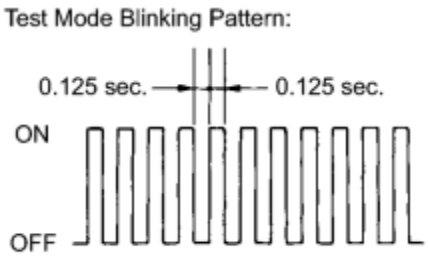
(2) Stop the vehicle and push the P position switch. Check that the skid control buzzer sounds for 3 seconds.

HINT:

- If the skid control buzzer sounds, the sensor check has completed normally.

- If the skid control buzzer does not sound, check the skid control buzzer circuit INFO, then perform the sensor check again.
- If the skid control buzzer still does not sound, the yaw rate sensor may be malfunctioning. Check for DTCs.

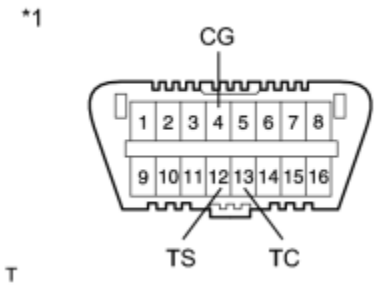
(g) End of Sensor Check




(1) If the sensor check is completed, the ABS warning light blinks (Test Mode) when the vehicle is stopped and goes off while the vehicle is driving.

- When the yaw rate sensor, acceleration sensor, speed sensor, and master cylinder pressure sensor checks are completed, the sensor check is completed.
- If the sensor check has not been completed, the ABS warning light will blink while driving and the ABS will not operate.

(h) Read Sensor Check DTCs




(1) Using SST, connect terminals TC and CG of the DLC3.

SST: 09843-18040

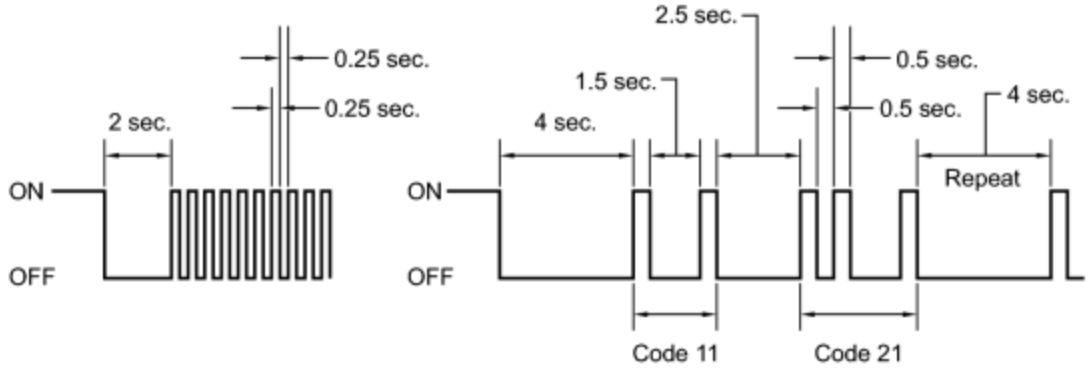
## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

(2) Count the number of blinks of the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights.

Normal System Code Blinking Pattern:

Trouble Code Blinking Pattern (Example Codes 11 and 21):




NOTICE:

- If only DTCs other than the Test Mode sensor check DTCs are displayed, repair the malfunctions and clear the DTCs.
- If Test Mode sensor check DTCs and other DTCs are displayed or if only the Test Mode sensor check DTCs are displayed, repair the malfunctions, clear the DTCs, and perform the Test Mode inspection again.

HINT:

- If more than 1 malfunction is detected at the same time, the lowest numbered code will be displayed first.
- See "Sensor Check DTCs".

(3) After performing the check, disconnect SST from terminals TS and CG, and TC and CG of the DLC3 and turn the power switch off.

HINT:

- If the power switch is not turned on (IG) after SST is removed from the DLC3, the previous Test Mode will continue.
- If the power switch is turned on (IG) with terminals TS and CG connected, the previous Test Mode will continue.

(i) Sensor Check DTCs

**ABS Sensor**

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| 71 | Low Output Signal of Front Speed Sensor RH | • Front speed sensor RH<br>• Sensor installation |

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| | | • Speed sensor rotor |
| 72 | Low Output Signal of Front Speed Sensor LH | • Front speed sensor LH<br>• Sensor installation<br>• Speed sensor rotor |
| 73 | Low Output Signal of Rear Speed Sensor RH | • Rear speed sensor RH<br>• Sensor installation<br>• Speed sensor rotor |
| 74 | Low Output Signal of Rear Speed Sensor LH | • Rear speed sensor LH<br>• Sensor installation<br>• Speed sensor rotor |
| 75 | Abnormal Change in Output Signal of Front Speed Sensor RH | • Front speed sensor RH<br>• Speed sensor rotor |
| 76 | Abnormal Change in Output Signal of Front Speed Sensor LH | • Front speed sensor LH<br>• Speed sensor rotor |
| 77 | Abnormal Change in Output Signal of Rear Speed Sensor RH | • Rear speed sensor RH<br>• Speed sensor rotor |
| 78 | Abnormal Change in Output Signal of Rear Speed Sensor LH | • Rear speed sensor LH<br>• Speed sensor rotor |
| 79 | Acceleration Sensor Output Voltage Malfunction | • Sensor installation<br>• Yaw rate and acceleration sensor |
| 81 | Master Cylinder Pressure Sensor Output Malfunction | • Stop light switch<br>• Regulator pressure sensor |

**VSC Sensor**

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| 71 | Yaw Rate Sensor | • Sensor installation<br>• Yaw rate and acceleration sensor |

**Electronically Controlled Brake System Sensor**

| DTC Code | Detection Item | Trouble Area |
|---|---|---|
| 71 | Stroke Sensor Zero Point Learning Malfunction | • Brake pedal stroke sensor |

| DTC Code | Detection Item | Trouble Area |
| --- | --- | --- |
| | | • Brake pedal stroke sensor circuit |

HINT:

The codes in this table are output only in Test Mode (signal check).

# PROBLEM SYMPTOMS TABLE

If there are no DTCs but the problem still occurs, check the circuits for each problem symptom in the order given in the table below and proceed to the relevant troubleshooting page.

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), sensor, etc., make sure that the power switch is turned off, the stop light switch is off, and 2 minutes have elapsed since the driver's door was closed.

HINT:

- Since the hydraulic passage is blocked off by the master cut solenoid during electronically controlled brake system control, there is no kickback (vibration) to the brake pedal, creating a quiet sound even while the ABS is operating.
- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**Electronically Controlled Brake System**

| Symptom | Suspected Area | See page |
|---|---|---|
| ABS, BA and/or EBD does not operate | Use a chassis dynamometer, etc. to check the electronically controlled brake system operation. | - |
| | Check the DTC again and make sure that the normal system code is output. | INFO |
| | IG power source circuit | INFO |
| | Front speed sensor circuit | INFO |
| | Rear speed sensor circuit | INFO |
| | Check the brake booster with master cylinder (brake actuator) using the Techstream. (Check brake booster with master cylinder (brake actuator) operation using the Active Test function.) If abnormal, check the hydraulic circuit for leaks. | INFO |
| | If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake booster with master cylinder (skid control ECU). | INFO |
| ABS, BA and/or EBD does not operate efficiently | Check the DTC again and make sure that the normal system code is output. | INFO |
| | Front speed sensor circuit | INFO |
| | Rear speed sensor circuit | INFO |
| | Check the brake booster with master cylinder (brake actuator) using the Techstream. (Check brake booster with master cylinder (brake actuator) | INFO |

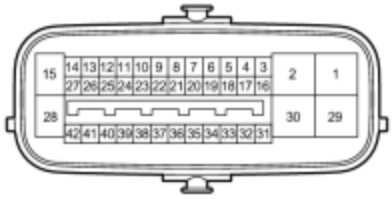
| Symptom | Suspected Area | See page |
|---|---|---|
| | operation using the Active Test function.) If abnormal, check the hydraulic circuit for leaks. | |
| | If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake booster with master cylinder (skid control ECU). | INFO |
| ABS warning light abnormal (Remains on) | ABS warning light circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| ABS warning light abnormal (Does not come on) | ABS warning light circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| Brake warning light / red (malfunction) abnormal (Remains on) | Brake fluid level warning switch circuit | INFO |
| | Brake warning light / red (malfunction) circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| Brake warning light / red (malfunction) abnormal (Does not come on) | Brake warning light / red (malfunction) circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| VSC and/or TRAC does not operate | Check that traction control has not operated by carrying out diagnosis. | - |
| | Check the DTC again and make sure that the normal system code is output. | INFO |
| | IG power source circuit | INFO |
| | Check the hydraulic circuit for leaks. | - |
| | Front speed sensor circuit | INFO |
| | Rear speed sensor circuit | INFO |
| | Yaw rate and acceleration sensor circuit | INFO |
| | Steering angle sensor circuit | INFO |
| | If the symptoms still occur even after the above circuits in suspected areas have been inspected and proved to be normal, replace the brake booster with master cylinder (skid control ECU). | INFO |
| Brake warning light / yellow (minor malfunction) abnormal (Remains on) | Brake warning light / yellow (minor malfunction) circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| Brake warning light / yellow (minor malfunction) abnormal (Does not come on) | Brake warning light / yellow (minor malfunction) circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| Slip indicator light abnormal (Remains on) | Slip indicator light circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| Slip indicator light abnormal (Does not come on) | Slip indicator light circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| DTC check cannot be done | Check the DTC again and make sure that the normal system code is output. | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | TC and CG terminal circuit | INFO |
| | If the symptoms still occur even after the above circuit in suspected areas has been inspected and proved to be normal, replace the brake booster with master cylinder (skid control ECU). | INFO |
| Sensor check cannot be done | TS and CG terminal circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |
| Skid control buzzer abnormal | Skid control buzzer circuit | INFO |
| | Brake booster with master cylinder (Skid control ECU) | INFO |

# TERMINALS OF ECU

1. TERMINALS OF ECU

*1




H

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Skid Control ECU) |

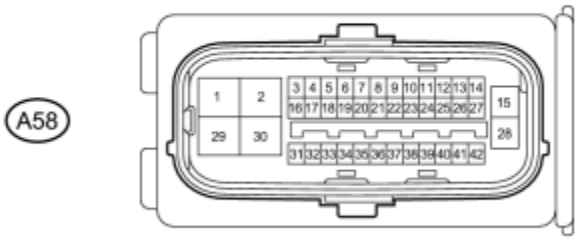
| Terminal No. (Symbol) | Terminal Description |
|---|---|
| 1 (MRI1) | Motor power supply input 1 |
| 2 (MRI2) | Motor power supply input 2 |
| 3 (STP0) | Stop light control relay output |
| 4 (TS) | Sensor check switch input |
| 5 (FR-) | Front speed sensor RH (-) signal input |
| 6 (STP2) | Stop light control relay input |
| 7 (RL-) | Rear speed sensor LH (-) signal input |
| 9 (RR-) | Rear speed sensor RH (-) signal input |
| 10 (HZRI) | Hazard warning switch input |
| 11 (SP1) | Speed sensor signal output |
| 12 (IG2) | IG2 power source input |
| 13 (BZ) | Skid control buzzer output |
| 14 (BI) | +B power source input |
| 15 (BS) | Solenoid power supply input |
| 16 (IG1) | IG1 power source input |
| 18 (FR+) | Front speed sensor RH (+) power supply output |
| 19 (CTY) | Courtesy switch input |

| Terminal No. (Symbol) | Terminal Description |
|---|---|
| 20 (RL+) | Rear speed sensor LH (+) power supply output |
| 22 (RR+) | Rear speed sensor RH (+) power supply output |
| 23 (GND6) | Skid control ECU ground 6 |
| 24 (GND5) | Skid control ECU ground 5 |
| 25 (GND4) | Skid control ECU ground 4 |
| 26 (GND3) | Skid control ECU ground 3 |
| 27 (GND2) | Skid control ECU ground 2 |
| 28 (GND) | Skid control ECU ground |
| 29 (MRO1) | Motor power supply output 1 |
| 30 (MRO2) | Motor power supply output 2 |
| 31 (FL+) | Front speed sensor LH (+) power supply output |
| 32 (FL-) | Front speed sensor LH (-) signal input |
| 33 (STP) | Stop light switch input |
| 34 (CA2L) | CAN communication line 2 (L) |
| 35 (CA2H) | CAN communication line 2 (H) |
| 36 (LBL) | Brake fluid level warning switch input |
| 37 (CA1H) | CAN communication line 1 (H) |
| 38 (CA1L) | CAN communication line 1 (L) |
| 39 (VCSK) | Stroke sensor power supply output |
| 40 (SKS2) | Stroke sensor signal input 2 |
| 41 (SKG) | Stroke sensor ground |
| 42 (SKS) | Stroke sensor signal input |

2. TERMINAL INSPECTION

(a) Disconnect the connector and measure the voltage or resistance on the wire harness side.

*1




H

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connected<br><br>(to Skid Control ECU) |

HINT:

Voltage cannot be measured with the connector connected to the skid control ECU as the connector is watertight.

**Standard**

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A58-1 (MRI1) - Body ground | B - Body ground | Motor power supply input 1 | Always | 11 to 14 V |
| A58-2 (MRI2) - Body ground | R - Body ground | Motor power supply input 2 | Always | 11 to 14 V |
| A58-3 (STP0) - Body ground | Y - Body ground | Stop light control relay output | Always | 11 to 14 V |
| A58-6 (STP2) - Body ground | BE - Body ground | Stop light control relay input | Stop light switch ON → OFF<br><br>(Brake pedal depressed → released) | 11 to 14 V → Below 1.5 V |
| A58-10 (HZRI) - Body ground | SB - Body ground | Hazard warning switch input | Hazard warning switch ON → OFF | Below 1 Ω → 10 kΩ or higher |
| A58-12 (IG2) - Body ground | BE - Body ground | IG2 power source input | Power switch on (IG) | 11 to 14 V |
| A58-13 (BZ) - Body ground | BR - Body ground | Skid control buzzer output | Power switch on (IG), buzzer not sounding | 11 to 14 V |
| A58-14 (BI) - Body ground | W - Body ground | +B power source input | Always | 11 to 14 V |
| A58-15 (BS) - Body ground | B - Body ground | Solenoid power supply input | Always | 11 to 14 V |
| A58-16 (IG1) - Body ground | B - Body ground | IG1 power source input | Power switch on (IG) | 11 to 14 V |
| A58-19 (CTY) - Body ground | V - Body ground | Courtesy switch input | Driver door close → open | 11 to 14 V → Below 1.5 V |
| A58-23 (GND6) - Body ground | W-B - Body ground | Skid control ECU ground 6 | Always | Below 1 Ω |
| A58-24 (GND5) - Body ground | W-B - Body ground | Skid control ECU ground 5 | Always | Below 1 Ω |
| A58-25 (GND4) - | W-B - Body | Skid control ECU | Always | Below 1 Ω |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Body ground | ground | ground 4 | | |
| A58-26 (GND3) - Body ground | W-B - Body ground | Skid control ECU ground 3 | Always | Below 1 Ω |
| A58-27 (GND2) - Body ground | W-B - Body ground | Skid control ECU ground 2 | Always | Below 1 Ω |
| A58-28 (GND) - Body ground | W - Body ground | Skid control ECU ground | Always | Below 1 Ω |
| A58-33 (STP) - Body ground | L - Body ground | Stop light switch input | Stop light switch ON → OFF<br><br>(Brake pedal depressed → released) | 11 to 14 V → Below 1.5 V |
| A58-36 (LBL) - Body ground | P - Body ground | Brake fluid level warning switch input | Brake fluid level warning switch OFF → ON | 1.84 to 2.16 kΩ → Below 1 Ω |

# DIAGNOSIS SYSTEM

1. DESCRIPTION

When troubleshooting a vehicle with the diagnosis system, the only difference from the usual troubleshooting procedure is connecting the Techstream to the vehicle and reading various data output from the vehicle's skid control ECU.

The skid control ECU records DTCs when it detects a malfunction in the ECU itself or in its circuits.

To check the DTCs, connect the Techstream to the DLC3 on the vehicle. The Techstream enables you to clear the DTCs, activate the various actuators, and check the Freeze Frame Data and Data List.

(a) Check the auxiliary battery voltage.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge the auxiliary battery before proceeding to the next step.

(b) Check the DLC3 

.

2. DIAGNOSIS

(a) If the skid control ECU detects a malfunction, the ABS warning, brake warning / red (malfunction), brake warning / yellow (minor malfunction) and slip indicator lights will come on in order to warn the driver.

ABS Warning Light:

| for U.S.A.: | Except for U.S.A.: |
| --- | --- |
| ABS |  |

Brake Warning Light / Red (Malfunction):

| for U.S.A.: | Except for U.S.A.: |
| --- | --- |
| BRAKE |  |

Brake Warning Light / Yellow (Minor Malfunction):



Slip Indicator Light:



(b) The DTCs are simultaneously stored in the memory.

The DTCs can be read by connecting SST between terminals TC and CG of the DLC3 and observing the blinking pattern of the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights, or by connecting the Techstream INFO.

(c) This system has a Test Mode (signal check) function.

The DTCs can be read by connecting SST between terminals TS and CG of the DLC3 and observing the blinking pattern of the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights, or by connecting the Techstream INFO.

3. WARNING LIGHT AND INDICATOR LIGHT INITIAL CHECK

(a) Release the parking brake.

NOTICE:

When releasing the parking brake, push the P position switch for safety.

HINT:

When the parking brake is applied or the brake fluid level is low, the brake warning light / red (malfunction) comes on.

ABS Warning Light:

for U.S.A.: Except for U.S.A.:




Brake Warning Light / Red (Malfunction):

for U.S.A.: Except for U.S.A.:




Brake Warning Light / Yellow (Minor Malfunction):



Slip Indicator Light:



(b) When the power switch is turned on (IG), check that the ABS warning, brake warning / red (malfunction), brake warning / yellow (minor malfunction) and slip indicator lights come on until the power switch is turned on (READY).

- If the warning light and indicator light check result is not normal, proceed to troubleshooting for the ABS warning, brake warning / red (malfunction), brake warning / yellow (minor malfunction) and slip indicator light circuits.
- If the indicator remains on or does not come on, proceed to troubleshooting for the light circuits listed below.

| Trouble Area | See Procedure |
|---|---|
| ABS warning light circuit (Remains on) | INFO |
| ABS warning light circuit (Does not come on) | INFO |
| Brake warning light / red (malfunction) circuit (Remains on) | INFO |
| Brake warning light / red (malfunction) circuit (Does not come on) | INFO |
| Brake warning light / yellow (minor malfunction) circuit (Remains on) | INFO |
| Brake warning light / yellow (minor malfunction) circuit (Does not come on) | INFO |
| Slip indicator light circuit (Remains on) | INFO |
| Slip indicator light circuit (Does not come on) | INFO |

# DTC CHECK / CLEAR

1. DTC CHECK/CLEAR (When Using the Techstream)

(a) Check for DTCs.

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Read the DTCs following the prompts on the Techstream screen. Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

(5) Check the details of the DTCs INFO.

(b) Clear the DTCs.

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

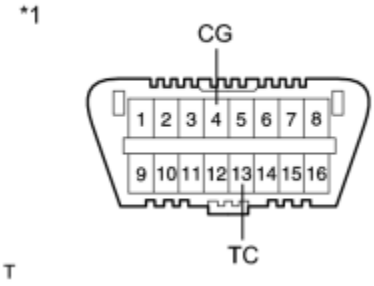
(3) Turn the Techstream on.

(4) Operate the Techstream to clear the codes. Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

(5) According to the display on the Techstream, select the trouble code data display with the clear button.

2. DTC CHECK/CLEAR (When not Using the Techstream)

(a) Check for DTCs.




(1) Using SST, connect terminals TC and CG of the DLC3.

SST: 09843-18040

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

(2) Turn the power switch on (IG).

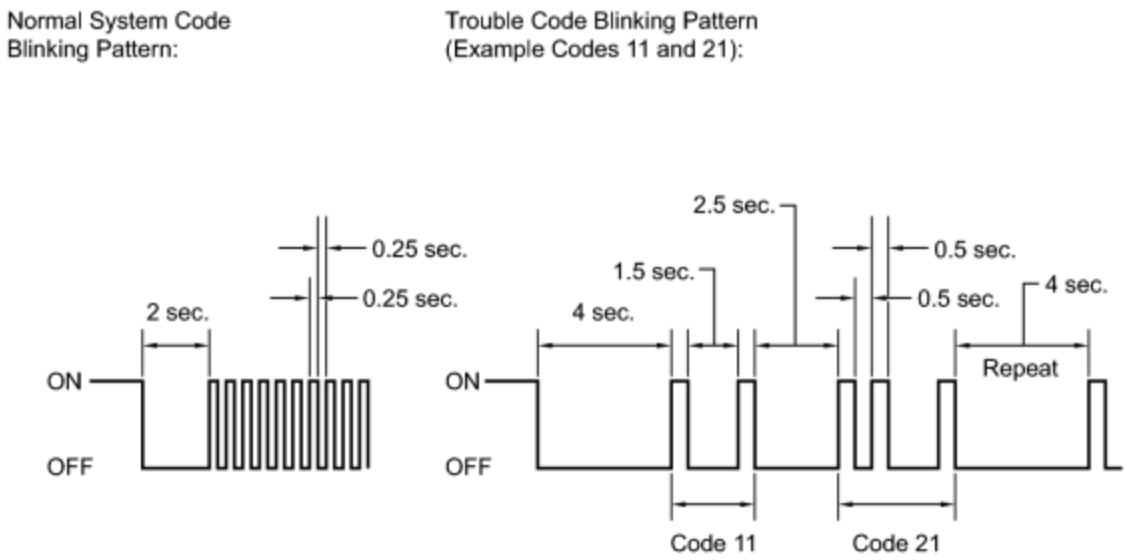
(3) Observe the blinking pattern of the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights in order to identify the DTC.

HINT:

If no code appears, inspect the TC and CG terminal circuit, and ABS warning, brake warning / yellow (minor malfunction) and slip indicator light circuits.

| Trouble Area | See Procedure |
|---|---|
| TC and CG terminal circuit | INFO |
| ABS warning light circuit (Remains on) | INFO |
| ABS warning light circuit (Does not come on) | INFO |
| Brake warning light / yellow (minor malfunction) circuit (Remains on) | INFO |
| Brake warning light / yellow (minor malfunction) circuit (Does not come on) | INFO |
| Slip indicator light circuit (Remains on) | INFO |
| Slip indicator light circuit (Does not come on) | INFO |

(4) As an example, the illustration below shows the blinking patterns of the normal system code and trouble codes 11 and 21 for the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights.



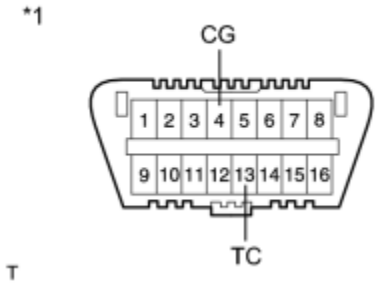

(5) Check the details of the DTCs INFO.

(6) After completing the check, disconnect terminals TC and CG of the DLC3 to turn off the display.

If 2 or more DTCs are detected at the same time, the DTCs will be displayed in ascending order.

(b) Clear the DTCs.

(1) Using SST, connect terminals TC and CG of the DLC3.

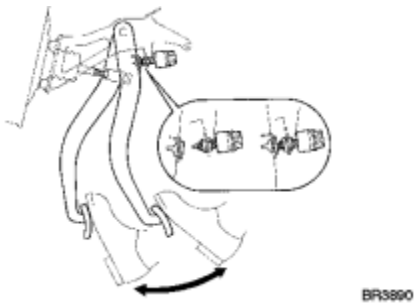



SST: 09843-18040

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

(2) Turn the power switch on (IG).




(3) Clear the DTCs stored in the ECU by depressing the brake pedal 8 times or more within 5 seconds.

(4) Check that the warning light indicates a normal system code.

(5) Remove SST from the terminals of the DLC3.

HINT:

The DTCs cannot be cleared by disconnecting the battery terminal or the ECU-IG NO. 2 fuse.

3. END OF DTC CHECK/CLEAR

(a) Turn the power switch on (IG).

(b) Check that the ABS warning, brake warning / yellow (minor malfunction) and slip indicator lights go off when the power switch is turned on (READY).

# FREEZE FRAME DATA

1. FREEZE FRAME DATA/INFORMATION

(a) Whenever an ABS, VSC, electronically controlled brake system DTC is detected, the skid control ECU stores the current vehicle (sensor) state as Freeze Frame Data.

(b) The skid control ECU stores the number of times (maximum: 31) the power switch has been turned from off to on (IG) since the last time the ABS was activated.

(c) For DTCs stored in the skid control ECU, information (INF) codes that are contained in the Freeze Frame Data can be displayed on the Techstream.

HINT:

- However, if the vehicle is stopped or at a low speed (7 km/h (4.3 mph) or less), or if a DTC is detected, the skid control ECU will stop counting the number of times the power switch has been turned from off to on (IG).
- Freeze Frame Data at the time the ABS operates:

  The skid control ECU stores and updates data whenever the ABS system operates.

  When the ECU stores data at the time a DTC is detected, the data stored during ABS operation is cleared.

- Freeze Frame Data at the time a DTC is detected:

  When the skid control ECU stores data at the time a DTC is detected, no updates will be performed until the data is cleared.

2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

(e) According to the display on the Techstream, select the trouble code data display with Freeze Frame Data.

(f) Read the Freeze Frame Data recorded when the DTC was set.

(g) Read the information.

(1) Select the item that has an information (INF) code from the Freeze Frame Data screen.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Detailed Freeze DTC | Detailed code for Freeze Frame DTC / Min.: 0, Max.: 65535 | - | Number of information (INF) code output is displayed |
| Elapsed Time after Freeze Trigger | Elapsed time after freeze trigger / Min.: 0 msec, Max.: 500 msec | - | - |
| Number of IG ON | Number of operations of power switch on (IG) after storing Freeze Frame Data / 0 to 31 | - | - |
| Elapsed Time | Elapsed time after power | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | switch on (IG) / Min.: 0 sec., Max.: 100661.76 sec. | | |
| Buzzer | Skid control buzzer / ON or OFF | ON: Buzzer on<br><br>OFF: Buzzer off | - |
| Stop Light SW | Stop light switch / ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Parking Brake SW | Parking brake switch / ON or OFF | ON: Parking brake applied<br><br>OFF: Parking brake released | - |
| Reservoir Warning SW | Brake fluid level warning switch / ON or OFF | ON: Reservoir level low<br><br>OFF: Reservoir level normal | - |
| Shift Lever Position | Shift lever position information / Fail, 1st-6th/B, D/M, P/N or R | Actual shift lever position | - |
| Operated System | Operated system status / ABS, VSC, TRAC, BA, PB, PBA, HAB, HA-CTRL, Fail, Non or Sys | - | ABS: ABS activated<br><br>VSC: VSC activated<br><br>TRAC: TRAC activated<br><br>BA: BA activated<br><br>PB: PB activated<br><br>PBA: PBA activated<br><br>HAB: HAB activated<br><br>HA-CTRL: Hill-start assist control activated<br><br>Fail: Fail safe mode activated<br><br>Non: No system activated<br><br>Sys: System prohibited |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stroke Sensor | Brake pedal stroke sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.65 to 1.35 V | Reading increases when brake pedal is depressed |
| Accumulator Sensor | Accumulator pressure sensor / Min.: 0 V, Max.: 5 V | Specified value: 2.9 to 4.2 V | When brake fluid is stored in the accumulator: Accumulator pressure changes in accordance with volume of fluid stored in the accumulator |
| Yaw Rate Sensor | Yaw rate sensor / Min.: -128 °/s, Max.: 127 °/s | Vehicle stopped: 0 °/s<br><br>Turning right: -128 to 0 °/s<br><br>Turning left: 0 to 127 °/s | - |
| Lateral G | Lateral G / Min.: -25.20 $m/s^2$, Max.: 24.91 $m/s^2$ | - | During turning: Changes in proportion with acceleration |
| Forward and Rearward G | Forward and backward G / Min.: -25.11 $m/s^2$, Max.: 24.91 $m/s^2$ | - | During acceleration/deceleration: Changes in proportion with acceleration |
| FR Wheel Speed | Front speed sensor RH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| FL Wheel Speed | Front speed sensor LH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| RR Wheel Speed | Rear speed sensor RH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| RL Wheel Speed | Rear speed sensor LH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| Vehicle Speed | Maximum wheel speed sensor / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| Accelerator Opening Angle % | The difference of a present accelerator / Min.: 0%, Max.: 127% | When the accelerator pedal released: 0% | During accelerator pedal operation: Changes in proportion with the pedal movement |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ECB* Motor Relay | ABS motor relay / ON or OFF | ON: Relay on<br><br>OFF: Relay off | - |
| ECB* Main Relay | ABS main relay / ON or OFF | ON: Relay on<br><br>OFF: Relay off | - |
| IG1 Voltage Value | IG1 voltage value / Min.: 0 V, Max.: 20 V | - | Changes in proportion to auxiliary battery voltage |
| IG2 Voltage Value | IG2 voltage value / Min.: 0 V, Max.: 20 V | - | Changes in proportion to auxiliary battery voltage |
| BS1 Voltage Value | BS voltage value / Min.: 0 V, Max.: 20 V | - | Changes in proportion to auxiliary battery voltage |
| VM1 Voltage Value | VM1 voltage value / Min.: 0 V, Max.: 20 V | - | Changes in proportion to auxiliary battery voltage |
| Motor Relay Voltage Value | Motor relay voltage value / Min.: 0 V, Max.: 20 V | During motor operation: 12 V<br><br>No motor operation: 0 V | - |
| Steering Angle Sensor | Steering angle sensor / Min.: - 3276.8 °, Max.: 3276.7 ° | Left turn: Increase<br><br>Right turn: Decrease | - |
| Regulator Pressure Sensor | Regulator pressure sensor / Min.: -1 MPa, Max.: 23.99 MPa | - | - |
| Regulator Pressure Sensor Output Variant | Regulator pressure sensor output variant / Min.: -30 MPa/s, Max.: 225 MPa/s | - | - |
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.1 to 0.9 V | Reading increases when brake pedal is depressed |
| SLA Solenoid Current | Linear solenoid additional valve (SLA) current / Min.: 0 A, Max.: 1.5 A | When brake pedal released: 0 A | - |
| SLR Solenoid Current | Linear solenoid reduction valve (SLR) current / Min.: 0 A, Max.: 1.5 A | When brake pedal released: 0 A | - |
| Target Oil Pressure | Wheel target hydraulic pressure / Min.: 0 MPa, Max.: 20 MPa | Changes according to the target wheel cylinder hydraulic pressure | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ECB* Solenoid (SSC) | Simulator cut solenoid valve (SSC) / ON or OFF | ON: Solenoid on<br>OFF: Solenoid off | - |
| ECB* Solenoid (SCC) | Switching solenoid valve (SCC) / ON or OFF | ON: Solenoid on<br>OFF: Solenoid off | - |
| ECB* Solenoid (SMC) | Master cut solenoid valve (SMC) / ON or OFF | ON: Solenoid on<br>OFF: Solenoid off | - |
| ECB* Solenoid (SRC) | Regulator cut solenoid valve (SRC) / ON or OFF | ON: Solenoid on<br>OFF: Solenoid off | - |

*: Electronically Controlled Brake System

3. CLEAR FREEZE FRAME DATA AND INFORMATION

NOTICE:

Clearing the DTCs will also clear the Freeze Frame Data and information (INF) codes.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs and Freeze Frame Data 

.

# FAIL-SAFE CHART

1. FAIL-SAFE FUNCTION OF CONTROL SYSTEM

(a) When a malfunction is detected in the brake control system, the skid control ECU turns the ABS warning, brake warning / red (malfunction), brake warning / yellow (minor malfunction) and slip indicator lights come on, as well as prohibits ABS, BA, TRAC and VSC operations.

(b) If the skid control ECU detects that a system related to the hybrid control system is malfunctioning, it will prohibit operation of the TRAC and VSC system in order to prevent further malfunctions and to protect the system.

| Item | Operation |
|---|---|
| Malfunction in the ABS system | ABS, BA, TRAC and VSC control prohibited |
| Malfunction in the BA system | ABS, BA, TRAC and VSC control prohibited |
| Malfunction in the EBD system | ABS, EBD, BA, TRAC and VSC control prohibited |
| Malfunction in the TRAC system | ABS, BA, TRAC and VSC control prohibited |
| Malfunction in the VSC system | ABS, BA, TRAC and VSC control prohibited |

2. FAIL-SAFE FUNCTION OF HYDRAULIC SYSTEM

(a) If a malfunction is detected in the brake booster with master cylinder (skid control ECU or brake actuator) or an individual sensor, control will be stopped and brake effort will be generated by the brake booster with master cylinder (hydraulic brake booster).

(b) If brake control is stopped due to a malfunction in the hydraulic pressure source, the pressure generated in the master cylinder by the driver is applied to the wheel cylinders to ensure braking force.

| Item | Operation |
|---|---|
| Skid control ECU malfunction | Brake booster with master cylinder (hydraulic brake booster) generated braking force |
| Hydraulic pressure controlling components malfunction | Brake booster with master cylinder (hydraulic brake booster) generated braking force |
| Power supply components (Hydraulic pressure source) malfunction | Braking force solely generated by the driver |

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / ABS/VSC/TRAC / Data List.

(g) According to the display on the Techstream, read the Data List.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ABS Warning Light | ABS warning light / ON or OFF | ON: Warning light on<br><br>OFF: Warning light off | - |
| Brake Warning Light | Brake warning light / red (malfunction) / ON or OFF | ON: Warning light on<br><br>OFF: Warning light off | - |
| ECB* Warning Light | Brake warning light / yellow (minor malfunction) / ON or OFF | ON: Warning light on<br><br>OFF: Warning | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | light off | |
| Buzzer | Skid control buzzer / ON or OFF | ON: Buzzer on<br><br>OFF: Buzzer off | - |
| Stop Light SW | Stop light switch / ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Parking Brake SW | Parking brake switch / ON or OFF | ON: Parking brake applied<br><br>OFF: Parking brake released | - |
| Reservoir Warning SW | Brake fluid level warning switch / ON or OFF | ON: Reservoir level low<br><br>OFF: Reservoir level normal | - |
| Main Idle SW | Main idle switch / ON or OFF | ON: Accelerator pedal released<br><br>OFF: Accelerator pedal depressed | - |
| Shift Lever Position | Shift lever position information / Fail, 1st-6th/B, D/M, P/N or R | Actual shift lever position | - |
| Inspection Mode | Inspection mode / Other or Inspect | Other: Normal mode<br><br>Inspect: Inspection mode | - |
| Regulator Pressure Sensor Output | Regulator pressure sensor output / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.1 to 0.9 V | Reading increases when brake pedal is depressed |
| Stroke Sensor | Brake pedal stroke sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.65 to 1.35 V | Reading increases when brake pedal is depressed |
| Voltage of Stroke Sensor | Voltage of brake pedal stroke sensor / Min.: -2.5 V, Max.: 2.49 V | - | - |
| Stroke Sensor2 | Brake pedal stroke sensor 2 / Min.: 0 V, Max.: 5 V | When brake pedal released: | Reading decreases when brake pedal is depressed |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | 3.65 to 4.35 V | |
| Voltage of Stroke Sensor2 | Voltage of brake pedal stroke sensor 2 / Min.: -2.5 V, Max.: 2.49 V | - | - |
| Accumulator Sensor | Accumulator pressure sensor / Min.: 0 V, Max.: 5 V | Specified value: 2.9 to 4.2 V | When brake fluid is stored in the accumulator: Accumulator pressure changes in accordance with volume of fluid stored in the accumulator |
| Deceleration Sensor | Acceleration sensor 1 / Min.: -18.18 $m/s^2$, Max.: 18.18 $m/s^2$ | - | During deceleration/acceleration: Changes continuously |
| Zero Point of Decele | Memorized zero value / Min.: -25.11 $m/s^2$, Max.: 24.91 $m/s^2$ | - | - |
| Deceleration Sensor2 | Acceleration sensor 2 / Min.: -18.18 $m/s^2$, Max.: 18.18 $m/s^2$ | - | During deceleration/acceleration: Changes continuously |
| Zero Point of Decele2 | Memorized zero value / Min.: -25.11 $m/s^2$, Max.: 24.91 $m/s^2$ | - | - |
| Yaw Rate Sensor | Yaw rate sensor 1 / Min.: -128 degrees/s, Max.: 127 degrees/s | Vehicle stationary: 0 degrees/s<br><br>Right turn: -128 to 0 degrees/s<br><br>Left turn: 0 to 127 degrees/s | - |
| Zero Point of Yaw Rate | Memorized zero value / Min.: -128 degrees/sec, Max.: 127 degrees/sec | - | After completing zero point calibration: 0 degrees/sec |
| Yaw Rate Sensor2 | Yaw rate sensor 2 / Min.: -128 degrees/s, Max.: 127 degrees/s | Vehicle stationary: 0 degrees/s<br><br>Right turn: -128 to 0 degrees/s<br><br>Left turn: 0 to 127 degrees/s | - |
| Zero Point of Yaw Rate2 | Memorized zero value / Min.: -128 degrees/s, Max.: 127 degrees/s | - | After completing zero point calibration: 0 degrees/s |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Steering Angle Sensor | Steering angle sensor / Min.: -3276.8 degrees, Max.: 3276.7 degrees | Left turn: Increase<br><br>Right turn: Decrease | - |
| Zero Point of Steering Angle | Memorized zero value / Min.: -3276.8 degrees, Max.: 3276.7 degrees | - | After clearing zero point calibration: 0 degrees |
| Lateral G | Lateral G / Min.: -25.11 $m/s^2$, Max.: 24.91 $m/s^2$ | - | During turning: Changes in proportion with acceleration |
| Forward and Rearward G | Forward and backward G / Min.: -25.11 $m/s^2$, Max.: 24.91 $m/s^2$ | - | During acceleration/deceleration: Changes in proportion with acceleration |
| Yaw Rate Value | Yaw rate value / Min.: -128 degrees/s, Max.: 127 degrees/s | - | During turning: Changes in proportion with yaw |
| Steering Angle Value | Steering angle value / Min.: -3276.8 degrees, Max.: 3276.7 degrees | - | During steering operation: Changes in proportion with steering wheel rotation |
| Slip Indicator Light | Slip indicator light / ON or OFF | ON: Indicator light on<br><br>OFF: Indicator light off | - |
| FR Wheel Speed | Front speed sensor RH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| FL Wheel Speed | Front speed sensor LH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| RR Wheel Speed | Rear speed sensor RH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| RL Wheel Speed | Rear speed sensor LH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| Vehicle Speed | Maximum wheel speed sensor / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Wheel Acceleration | Front wheel RH acceleration / Min.: -200.84 $m/s^2$, Max.: 199.27 $m/s^2$ | - | During deceleration/acceleration: Changes continuously |
| FL Wheel Acceleration | Front wheel LH acceleration / Min.: -200.84 $m/s^2$, Max.: 199.27 $m/s^2$ | - | During deceleration/acceleration: Changes continuously |
| RR Wheel Acceleration | Rear wheel RH acceleration / Min.: -200.84 $m/s^2$, Max.: 199.27 $m/s^2$ | - | During deceleration/acceleration: Changes continuously |
| RL Wheel Acceleration | Rear wheel LH acceleration / Min.: -200.84 $m/s^2$, Max.: 199.27 $m/s^2$ | - | During deceleration/acceleration: Changes continuously |
| Stop Light Relay Output | Stop light control relay output / ON or OFF | ON: Relay output on<br><br>OFF: Relay output off | - |
| FR Wheel ABS Ctrl Status | Front wheel RH ABS control status / ON or OFF | ON: During control | - |
| FL Wheel ABS Ctrl Status | Front wheel LH ABS control status / ON or OFF | ON: During control | - |
| RR Wheel ABS Ctrl Status | Rear wheel RH ABS control status / ON or OFF | ON: During control | - |
| RL Wheel ABS Ctrl Status | Rear wheel LH ABS control status / ON or OFF | ON: During control | - |
| RR Wheel EBD Ctrl Status | Rear wheel RH EBD control status / ON or OFF | ON: During control | - |
| RL Wheel EBD Ctrl Status | Rear wheel LH EBD control status / ON or OFF | ON: During control | - |
| BA Ctrl Status | BA control status / ON or OFF | ON: During control | - |
| PBA Ctrl Status | PBA control status / ON or OFF | ON: During control | - |
| TRC(TRAC) Ctrl Status | TRAC control status / ON or OFF | ON: During control | - |
| TRC(TRAC) Engine Ctrl Status | TRAC engine control status / ON or OFF | ON: During control | - |
| TRC(TRAC) Brake Ctrl Status | TRAC brake control status / ON or OFF | ON: During control | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Wheel VSC Ctrl Status | Front wheel RH VSC control status / ON or OFF | ON: During control | - |
| FL Wheel VSC Ctrl Status | Front wheel LH VSC control status / ON or OFF | ON: During control | - |
| RR Wheel VSC Ctrl Status | Rear wheel RH VSC control status / ON or OFF | ON: During control | - |
| RL Wheel VSC Ctrl Status | Rear wheel LH VSC control status / ON or OFF | ON: During control | - |
| Accelerator Opening Angle % | The difference of a present accelerator / Min.: 0%, Max.: 127% | When the accelerator pedal released: 0% | During accelerator pedal operation: Changes in proportion with the pedal movement |
| Regenerative Cooperation | Regenerative cooperation / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| FR Regenerative Request | FR regenerative request torque / Min.: 0 N*m, Max.: 65536 N*m | - | Changes according to brake pedal force<br><br>(When depressing the brake pedal lightly after above 30 km/h (19 mph) or more, avoiding sudden braking.) |
| FR Regenerative Operation | FR regenerative operation torque / Min.: 0 N*m, Max.: 65536 N*m | - | Changes according to brake pedal force<br><br>(When depressing the brake pedal lightly after above 30 km/h (19 mph) or more, avoiding sudden braking.) |
| ECB* Motor Relay | ABS motor relay / ON or OFF | ON: Relay on<br><br>OFF: Relay off | - |
| ECB* Main Relay | ABS main relay / ON or OFF | ON: Relay on<br><br>OFF: Relay off | - |
| ABS Solenoid (SFRH) | Holding solenoid valve (FRH) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ABS Solenoid (SFRR) | Reduction solenoid valve (FRR) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ABS Solenoid (SFLH) | Holding solenoid valve (FLH) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ABS Solenoid (SFLR) | Reduction solenoid valve (FLR) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ABS Solenoid (SRRH) | Holding solenoid valve (RRH) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ABS Solenoid (SRRR) | Reduction solenoid valve (RRR) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ABS Solenoid (SRLH) | Holding solenoid valve (RLH) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ABS Solenoid (SRLR) | Reduction solenoid valve (RLR) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ECB* Solenoid (SRC) | Regulator cut solenoid valve (SRC) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ECB* Solenoid (SCC) | Switching solenoid valve (SCC) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ECB* Solenoid (SMC) | Master cut solenoid valve (SMC) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| ECB* Solenoid (SSC) | Simulator cut solenoid valve (SSC) / ON or OFF | ON: Operate<br><br>OFF: Not operate | - |
| FR Speed Open | Front speed sensor RH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| FL Speed Open | Front speed sensor LH open detection / Error or Normal | Error: Momentary | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | interruption<br><br>Normal: Normal | |
| RR Speed Open | Rear speed sensor RH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| RL Speed Open | Rear speed sensor LH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Yaw Rate Open | Yaw rate sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Deceleration Open | Acceleration sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Steering Open | Steering angle sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Master Cylinder Open | Regulator pressure sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Stroke Open | Brake pedal stroke sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| FR Wheel Cylinder Open | Wheel cylinder pressure sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Accumulator Open | Accumulator pressure sensor open detection / | Error: Momentary | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Error or Normal | interruption<br><br>Normal: Normal | |
| HV Communication Open | Hybrid vehicle communication open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Number of DTC | Number of DTC / Min.: 0, Max.: 255 | - | Number of DTC output is displayed |
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.1 to 0.9 V | Reading increases when brake pedal is depressed |
| Regulator Pressure Sensor Output After Filter | Regulator pressure sensor output after filter / Min.: -1 MPa, Max.: 23.99 MPa | - | - |
| Regulator Pressure Sensor Variation | Regulator pressure sensor variation / Min.: -30 MPa/s, Max.: 225 MPa/s | - | - |
| SLA Solenoid Current | Linear solenoid additional valve (SLA) current / Min.: 0 A, Max.: 3 A | When brake pedal released: 0 A | - |
| SLR Solenoid Current | Linear solenoid reduction valve (SLR) current / Min.: 0 A, Max.: 3 A | When brake pedal released: 0 A | - |
| SSC Solenoid Current | Simulator cut solenoid valve (SSC) current / Min.: 0 A, Max.: 3 A | When brake pedal released: 0 A | - |
| SCC Solenoid Current | Switching solenoid valve (SCC) current / Min.: 0 A, Max.: 3 A | When brake pedal released: 0 A | - |
| SMC Solenoid Current | Master cut solenoid valve (SMC) current / Min.: 0 A, Max.: 3 A | When brake pedal released: 0 A | - |
| SRC Solenoid Current | Regulator cut solenoid valve (SRC) current / Min.: 0 A, Max.: 3 A | When brake pedal released: 0 A | - |
| Hazard Switch History | Hazard switch history / Incomplete or Complete | Incomplete: Incomplete<br><br>Complete: Complete | - |

*: Electronically Controlled Brake System

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts to operate without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Warm up the engine.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / ABS/VSC/TRAC / Active Test.

(g) According to the display on the Techstream, perform the Active Test.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ABS Warning Light | ABS warning light | Warning light ON/OFF | Observe combination meter |
| Brake Warning Light | Brake warning light / red (malfunction) | Warning light ON/OFF | Observe combination meter |
| ECB* Warning Light | Brake warning light / yellow (minor malfunction) | Warning light ON/OFF | Observe combination meter |
| Buzzer | Skid control buzzer | Buzzer ON/OFF | Buzzer can be heard |
| Stop Light Relay | Stop light control relay | Relay ON/OFF | Stop lights come on |
| ECB* Main Relay | ABS main relay | Relay ON/OFF | - |
| ECB* Motor Relay | ABS motor relay | Relay ON/OFF | - |
| ABS Solenoid (SRLR) | Reduction solenoid valve (RLR) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ABS Solenoid (SRLH) | Holding solenoid valve (RLH) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ABS Solenoid (SRRR) | Reduction solenoid valve (RRR) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ABS Solenoid (SRRH) | Holding solenoid valve (RRH) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ABS Solenoid (SFLR) | Reduction solenoid valve (FLR) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ABS Solenoid (SFLH) | Holding solenoid valve (FLH) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ABS Solenoid (SFRR) | Reduction solenoid valve (FRR) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ABS Solenoid (SFRH) | Holding solenoid valve (FRH) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ECB* Control Invalid | Electronically controlled brake system control invalid | Control invalid ON/OFF | Electronically controlled brake system control is disabled (braking with no accumulator assist) |
| Accumulator Zero Down | Accumulator zero down activation | Activation ON/OFF | Brake fluid in the accumulator makes noise |
| Actuator Air Bleeding Pattern | Actuator air bleeding pattern activation | Activation ON/OFF | When accumulator pressure lowers, pump operation creates sound |
| Power Supply Air Bleeding Pattern1 | Power supply air bleeding pattern activation 1 | Activation ON/OFF | When accumulator pressure lowers, pump operation creates sound |
| Power Supply Air Bleeding Pattern2 | Power supply air bleeding pattern activation 2 | Activation ON/OFF | When accumulator pressure lowers, pump operation creates sound |
| Slip Indicator Light | Slip indicator light | Indicator light ON/OFF | Observe combination meter |
| ECB* Solenoid (SLR) Valve Close | Linear solenoid reduction valve (SLR) | Valve close ON/OFF | - |
| ECB* Solenoid (SLA) Valve Close | Linear solenoid additional valve (SLA) | Valve close ON/OFF | - |
| Stroke Simulator Cut Valve Pattern | Simulator cut solenoid valve (SSC) | Pattern activation ON/OFF | (Difficult to identify visually) |
| ECB* Solenoid (SRC) | Regulator cut solenoid valve (SRC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ECB* Solenoid (SMC) | Master cut solenoid valve (SMC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ECB* Solenoid (SCC) | Switching solenoid valve (SCC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ECB* Solenoid (SSC) | Simulator cut solenoid valve (SSC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |
| ECB* Solenoid (SMC/SRC/SCC) | Switching solenoid valve (SMC/SRC/SCC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |

*: Electronically Controlled Brake System

# DIAGNOSTIC TROUBLE CODE CHART

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), sensor, etc., make sure that the power switch is turned off, the stop light switch is off, and 2 minutes have elapsed since the driver's door was closed.

HINT:

- If no abnormality is found when inspecting parts, inspect the skid control ECU and ground points for poor connections.
- If a trouble code is displayed during the DTC check, check the circuit indicated by the DTC. For details of each code, refer to the page for the respective "DTC Code" in the DTC chart.
- When 2 or more DTCs are detected, perform circuit inspections one by one until the problem is identified.
- Inspect the fuses and relays before inspecting the trouble areas as shown in the table below.

**ABS DTC**

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| 42 | Electronically Controlled Brake System Malfunction | - | Electronically controlled brake system | INFO |
| C0200/31 | Front Speed Sensor RH Circuit | 501<br>502<br>503<br>504<br>506<br>507<br>508 | 1. Open or short in speed sensor<br>2. Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>3. Open or short in wire harness<br>4. Improperly connected connector, deformation or corrosion of terminals<br>5. Front speed sensor RH<br>6. Brake booster with master cylinder (Skid control ECU) | INFO |
| C0205/32 | Front Speed Sensor LH Circuit | 511<br>512<br>513<br>514<br>516<br>517 | 1. Open or short in speed sensor<br>2. Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>3. Open or short in wire harness<br>4. Improperly connected connector, deformation or corrosion of terminals<br>5. Front speed sensor LH | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| | | 518 | 6. Brake booster with master cylinder (Skid control ECU) | |
| C0210/33 | Rear Speed Sensor RH Circuit | 521<br>522<br>523<br>524<br>526<br>527<br>528 | 1. Open or short in speed sensor<br>2. Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>3. Open or short in wire harness<br>4. Improperly connected connector, deformation or corrosion of terminals<br>5. Rear speed sensor RH<br>6. Brake booster with master cylinder (Skid control ECU) | INFO |
| C0215/34 | Rear Speed Sensor LH Circuit | 531<br>532<br>533<br>534<br>536<br>537<br>538 | 1. Open or short in speed sensor<br>2. Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>3. Open or short in wire harness<br>4. Improperly connected connector, deformation or corrosion of terminals<br>5. Rear speed sensor LH<br>6. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1235/35 | Foreign Object is Attached on Tip of Front Speed Sensor RH | 541 | 1. Speed sensor rotor malfunction (foreign object attached)<br>2. Foreign object attached to speed sensor<br>3. Open or short in speed sensor<br>4. Open or short in wire harness<br>5. Improperly connected connector, deformation or corrosion of terminals<br>6. Resistance in speed sensor circuit<br>7. Brake booster with master cylinder (Skid control ECU) | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| C1236/36 | Foreign Object is Attached on Tip of Front Speed Sensor LH | 542 | 1. Speed sensor rotor malfunction (foreign object attached)<br><br>2. Foreign object attached to speed sensor<br><br>3. Open or short in speed sensor<br><br>4. Open or short in wire harness<br><br>5. Improperly connected connector, deformation or corrosion of terminals<br><br>6. Resistance in speed sensor circuit<br><br>7. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1238/38 | Foreign Object is Attached on Tip of Rear Speed Sensor RH | 543 | 1. Speed sensor rotor malfunction (foreign object attached)<br><br>2. Foreign object attached to speed sensor<br><br>3. Open or short in speed sensor<br><br>4. Open or short in wire harness<br><br>5. Improperly connected connector, deformation or corrosion of terminals<br><br>6. Resistance in speed sensor circuit<br><br>7. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1239/39 | Foreign Object is Attached on Tip of Rear Speed Sensor LH | 544 | 1. Speed sensor rotor malfunction (foreign object attached)<br><br>2. Foreign object attached to speed sensor<br><br>3. Open or short in speed sensor<br><br>4. Open or short in wire harness<br><br>5. Improperly connected connector, deformation or corrosion of terminals<br><br>6. Resistance in speed sensor circuit<br><br>7. Brake booster with master cylinder (Skid | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| | | | control ECU) | |
| C1243/43 | Acceleration Sensor Stuck Malfunction | 561<br>562<br>563<br>564 | Yaw rate and acceleration sensor internal stuck malfunction | INFO |
| C1244/44 | Open or Short in Acceleration Sensor Circuit | 571 | 1. Yaw rate and acceleration sensor installed improperly<br>2. Yaw rate and acceleration sensor | INFO |
| C1245/45 | Acceleration Sensor Output Malfunction | 581 | 1. Yaw rate and acceleration sensor installed improperly<br>2. Yaw rate and acceleration sensor | INFO |
| C1336/98 | Zero Point Calibration of Acceleration Sensor Undone | - | 1. Zero point calibration undone<br>2. Yaw rate and acceleration sensor<br>3. Brake booster with master cylinder (Skid control ECU)<br>(Perform 0 point calibration and check for DTCs. If no DTCs are output again, the sensor is normal.) | INFO |
| C1381/97 | Acceleration Sensor Power Supply Voltage Malfunction | 601 | 1. Yaw rate and acceleration sensor supply voltage shut down<br>2. Yaw rate and acceleration sensor<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1442/44 | Invalid Data Received from Acceleration Sensor | 572 | Yaw rate and acceleration sensor | INFO |
| U0124/95 | Lost Communication with Lateral Acceleration Sensor Module | 591<br>592 | 1. CAN communication line (CAN No. 1 bus)<br>2. Yaw rate and acceleration sensor<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |

**VSC DTC**

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| 43 | ABS Control System Malfunction | - | ABS control system | INFO |
| 45 | Electronically Controlled Brake System Malfunction | - | Electronically controlled brake system | INFO |
| C1210/36 | Zero Point Calibration of Yaw Rate Sensor Undone | - | 1. Zero point calibration undone<br>2. Yaw rate and acceleration sensor<br>3. Brake booster with master cylinder (Skid control ECU)<br>(Perform 0 point calibration and check for DTCs. If no DTCs are output again, the sensor is normal.) | INFO |
| C1231/31 | Steering Angle Sensor Circuit Malfunction | 701<br>702<br>703 | Steering angle sensor internal malfunction | INFO |
| C1234/34 | Yaw Rate Sensor Malfunction | 711<br>712<br>713<br>714 | Yaw rate and acceleration sensor internal malfunction | INFO |
| C1290/66 | Steering Angle Sensor Zero Point Malfunction | 751 | 1. Yaw rate and acceleration sensor zero point calibration incomplete<br>2. Poor adjustment of the center position of the steering wheel<br>3. Poor adjustment of front wheel alignment | INFO |
| C1310/51 | Malfunction in HV system | - | Power management control ECU (Hybrid vehicle control ECU) | INFO |
| C1380/64 | Stop Light Control Relay Malfunction | 761<br>762 | 1. Stop light switch<br>2. Stop light switch circuit<br>3. Stop light control relay<br>4. Stop light control relay circuit<br>5. Brake booster with master cylinder (Skid control ECU) | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| C1439/66 | Steering Angle Sensor Initialization Incomplete | 752 | 1. Steering angle sensor<br>2. Yaw rate and acceleration sensor<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1440/98 | Unusual Bank Angle Detected | - | Yaw rate and acceleration sensor | INFO |
| C1443/34 | Invalid Data Received from Yaw Rate Sensor | 715 | Yaw rate and acceleration sensor | INFO |
| C1445/66 | Vehicle Driven with Steering Angle Sensor not Initialized | 753 | 1. Steering angle sensor<br>2. Yaw rate and acceleration sensor<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |
| U0123/62 | Lost Communication with Yaw Rate Sensor Module | 731<br>732 | 1. CAN communication line (CAN No. 1 bus)<br>2. Yaw rate and acceleration sensor<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |
| U0126/63 | Lost Communication with Steering Angle Sensor Module | 741<br>742 | 1. CAN communication line (CAN No. 1 bus)<br>2. Steering angle sensor<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |

**Electronically Controlled Brake System DTC**

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| 36 | ABS Control System Malfunction | - | ABS control system | INFO |
| C1202/68 | Master Reservoir Level Malfunction | 371 | 1. Low brake fluid level<br>2. Brake fluid leaks<br>3. Brake master cylinder reservoir (Brake fluid level warning switch) internal open circuit<br>4. Brake master cylinder reservoir (Brake fluid level warning switch) internal short circuit | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| | | | 5. Open in wire harness<br><br>6. Short in wire harness<br><br>7. Brake disc rotor excessive wear<br><br>8. Brake booster with master cylinder (Skid control ECU) | |
| C1203/95 | ECM Communication Circuit Malfunction | - | 1. The wrong ECU and sensor was installed<br><br>2. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1211/25 | SLA Linear Solenoid | 21<br><br>22<br><br>23<br><br>24 | 1. Supply voltage reduced<br><br>2. Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1212/26 | SLR Linear Solenoid | 31<br><br>32<br><br>33<br><br>34 | 1. Supply voltage reduced<br><br>2. Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1214/62 | Hydraulic Control System Malfunction | 431<br><br>432<br><br>433<br><br>434<br><br>435<br><br>436<br><br>437<br><br>438 | 1. Brake fluid leaks<br><br>2. Brake disc rotor excessive wear<br><br>3. Brake booster with master cylinder (Brake actuator) | INFO |
| C1225/31 | SA1 Solenoid Circuit | 41<br><br>42 | 1. Supply voltage reduced<br><br>2. Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| | | 43<br>44 | | |
| C1226/32 | SA2 Solenoid Circuit | 51<br>52<br>53<br>54 | 1. Supply voltage reduced<br>2. Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1227/33 | SA3 Solenoid Circuit | 61<br>62<br>63<br>64 | 1. Supply voltage reduced<br>2. Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1228/34 | STR Solenoid Circuit | 71<br>72<br>73<br>74 | 1. Supply voltage reduced<br>2. Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1242/42 | Open in IG1 / IG2 Power Source Circuit | 111<br>112 | 1. Open or short in IG1 circuit<br>2. Open or short in IG2 circuit<br>3. Improperly connected connector, deformation or corrosion of terminals<br>4. Smart key system (IG start circuit)<br>5. Auxiliary battery<br>6. Hybrid control system (Charging circuit)<br>7. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1246/46 | Master Cylinder Pressure Sensor Malfunction | 201<br>202<br>203 | 1. Brake pedal stroke sensor<br>2. Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| | | 204<br>207 | | |
| C1247/47 | Stroke Sensor Malfunction | 211<br>212<br>213<br>214<br>215<br>216<br>217<br>218<br>219<br>220<br>221<br>222<br>223 | 1. Open or short in brake pedal stroke sensor power supply circuit<br>2. Open or short in wire harness<br>3. Improperly connected connector, deformation or corrosion of terminals<br>4. Brake pedal stroke sensor<br>5. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1249/49 | Open in Stop Light Switch Circuit | 231 | 1. STOP fuse<br>2. Stop light switch<br>3. Stop light switch circuit<br>4. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1252/52 | Brake Booster Pump Motor on Time Abnormally Long | 311 | 1. Short in motor circuit or motor monitor circuit<br>2. Motor relay stuck<br>3. Accumulator pressure sensor malfunction in brake actuator<br>4. Brake booster with master cylinder (Skid control ECU) | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| C1253/53 | Pump Motor Relay Malfunction | 321<br>322<br>323<br>324<br>325<br>326<br>327<br>328<br>329 | 1. Open or short in motor circuit or motor monitor circuit<br>2. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1256/56 | Accumulator Low Pressure | 341 | 1. Accumulator pressure dropped due to frequent brake pedal operation (not a malfunction)<br>2. Pump motor malfunction<br>3. Accumulator deterioration<br>4. Accumulator pressure sensor<br>5. Supply voltage reduced | INFO |
| C1257/57 | Power Supply Drive Circuit | 361<br>362 | Brake booster with master cylinder (Skid control ECU) | INFO |
| C1259/58 | HV System Regenerative Malfunction | - | Power management control ECU (Hybrid vehicle control ECU) | INFO |
| C1300 | Skid Control ECU Malfunction | - | Brake booster with master cylinder (Skid control ECU) | INFO |
| C1311/11 | Open in Main Relay 1 Circuit | 1 | 1. Open or short in ABS main relay circuit<br>2. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1312/12 | Short in Main Relay 1 Circuit | 2 | 1. Short in ABS main relay circuit<br>2. ABS main relay internal stuck<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |
| C1345/66 | Linear Solenoid Valve Offset | - | Perform linear valve offset learning and check for | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| | Learning Undone | | DTCs. If no DTCs are output again, the valve is normal. | |
| C1352/21 | Front Increasing Pressure Solenoid RH Malfunction | 11<br>12 | Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1353/23 | Front Increasing Pressure Solenoid LH Malfunction | 15<br>16 | Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1356/22 | Front Decreasing Pressure Solenoid RH Malfunction | 13<br>14 | Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1357/24 | Front Decreasing Pressure Solenoid LH Malfunction | 17<br>18 | Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1364/61 | Wheel Cylinder Pressure Sensor Malfunction | 421<br>422<br>423<br>424<br>426 | Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1365/54 | Accumulator Pressure Sensor Malfunction | 331<br>332<br>333<br>334 | Brake booster with master cylinder (Skid control ECU or brake actuator) | INFO |
| C1368/67 | Linear Solenoid Valve Offset Malfunction | - | 1. Perform linear valve offset learning and check for DTCs. If no DTCs are output again, the valve is normal.<br><br>2. Brake booster with master cylinder (Brake actuator) | INFO |
| C1391/69 | Accumulator Leak Malfunction | 351 | 1. Brake fluid leaks<br><br>2. Brake booster with master cylinder (Brake actuator)<br><br>(Malfunctioning internal seal, low gas pressure in accumulator, etc.) | INFO |
| C1392/48 | Stroke Sensor Zero Point Calibration Undone | - | 1. Brake pedal stroke sensor zero point calibration incomplete (Initialization and calibration of linear solenoid valve incomplete) | INFO |

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| | | | 2. Brake booster with master cylinder (Skid control ECU) | |
| C1451/72 | Motor Drive Permission Malfunction | - | 1. Brake fluid leaks<br>2. Air bleeding not performed | INFO |
| U0073/94 | Control Module Communication Bus OFF | 461<br>462<br>463<br>464<br>465<br>466 | 1. CAN communication line (CAN No. 1 bus)<br>2. Yaw rate and acceleration sensor<br>3. Steering angle sensor<br>4. Brake booster with master cylinder (Skid control ECU) | INFO |
| U0293/59 | Communication Error from HV ECU | 411<br>412<br>413 | 1. CAN communication line (Power management bus)<br>2. Power management control ECU (Hybrid vehicle control ECU)<br>3. Brake booster with master cylinder (Skid control ECU) | INFO |

**ABS and Electronically Controlled Brake System DTC**

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| C1241/41 | Low Battery Positive Voltage | 101*1<br>102*2<br>551*2<br>552*2<br>553*2 | 1. Improperly connected connector, deformation or corrosion of terminals<br>2. Auxiliary battery<br>3. Hybrid control system (Charging circuit)<br>4. Brake booster with master cylinder (Skid control ECU) | INFO |

*1: Electronically Controlled Brake System DTC

*2: ABS DTC

**ABS Test Mode DTC**

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| C1271/71 | Low Output Signal of Front Speed Sensor RH (Test Mode DTC) | - | 1. Front speed sensor RH<br>2. Sensor installation<br>3. Speed sensor rotor | INFO |
| C1272/72 | Low Output Signal of Front Speed Sensor LH (Test Mode DTC) | - | 1. Front speed sensor LH<br>2. Sensor installation<br>3. Speed sensor rotor | INFO |
| C1273/73 | Low Output Signal of Rear Speed Sensor RH (Test Mode DTC) | - | 1. Rear speed sensor RH<br>2. Sensor installation<br>3. Speed sensor rotor | INFO |
| C1274/74 | Low Output Signal of Rear Speed Sensor LH (Test Mode DTC) | - | 1. Rear speed sensor LH<br>2. Sensor installation<br>3. Speed sensor rotor | INFO |
| C1275/75 | Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC) | - | 1. Front speed sensor RH<br>2. Speed sensor rotor | INFO |
| C1276/76 | Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC) | - | 1. Front speed sensor LH<br>2. Speed sensor rotor | INFO |
| C1277/77 | Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC) | - | 1. Rear speed sensor RH<br>2. Speed sensor rotor | INFO |
| C1278/78 | Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC) | - | 1. Rear speed sensor LH<br>2. Speed sensor rotor | INFO |
| C1279/79 | Acceleration Sensor Output Voltage Malfunction (Test Mode DTC) | - | 1. Sensor installation<br>2. Yaw rate and acceleration sensor | INFO |
| C1281/81 | Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC) | - | 1. Stop light switch<br>2. Regulator pressure sensor | INFO |

**VSC Test Mode DTC**

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| C0371/71 | Yaw Rate Sensor (Test Mode DTC) | - | 1. Sensor installation<br><br>2. Yaw rate and acceleration sensor | INFO |

**Electronically Controlled Brake System Test Mode DTC**

| DTC Code | Detection Item | INF Code | Trouble Area | See page |
|---|---|---|---|---|
| C1346/71 | Stroke Sensor Zero Point Learning Malfunction (Test Mode DTC) | - | 1. Brake pedal stroke sensor<br><br>2. Brake pedal stroke sensor circuit | INFO |

| | | |
|---|---|---|
| DTC | 36 | ABS Control System Malfunction |
| DTC | 43 | ABS Control System Malfunction |

# DESCRIPTION

These DTCs are stored if the VSC and/or electronically controlled brake system detects a malfunction in the ABS control system.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| 36 | - | Malfunction in the ABS control system. | ABS control system |
| 43 | - | Malfunction in the ABS control system. | ABS control system |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ABS CONTROL SYSTEM |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Drive the vehicle at a speed of approximately 40 km/h (25 mph) or more for 60 seconds or more.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (ABS control system DTC) is not output | A |
| DTC (ABS control system DTC) is output | B |

B ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A ▼

| | |
|---|---|
| 2. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle at a speed of approximately 40 km/h (25 mph) or more for 60 seconds or more.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (36 and 43) are not output | A |
| DTCs (36 and/or 43) are output | B |

B ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | 42 | Electronically Controlled Brake System Malfunction |
| DTC | 45 | Electronically Controlled Brake System Malfunction |

# DESCRIPTION

These DTCs are stored if the ABS and/or VSC system detects a malfunction in the electronically controlled brake system.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| 42 | - | Malfunction in the electronically controlled brake system. | Electronically controlled brake system |
| 45 | - | Malfunction in the electronically controlled brake system. | Electronically controlled brake system |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ELECTRONICALLY CONTROLLED BRAKE SYSTEM |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Drive the vehicle at a speed of approximately 40 km/h (25 mph) or more for 60 seconds or more.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (Electronically controlled brake system DTC) is not output | A |
| DTC (Electronically controlled brake system DTC) is output | B |

B ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A ▼

| | |
|---|---|
| 2. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle at a speed of approximately 40 km/h (25 mph) or more for 60 seconds or more.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (42 and 45) are not output | A |
| DTCs (42 and/or 45) are output | B |

B ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

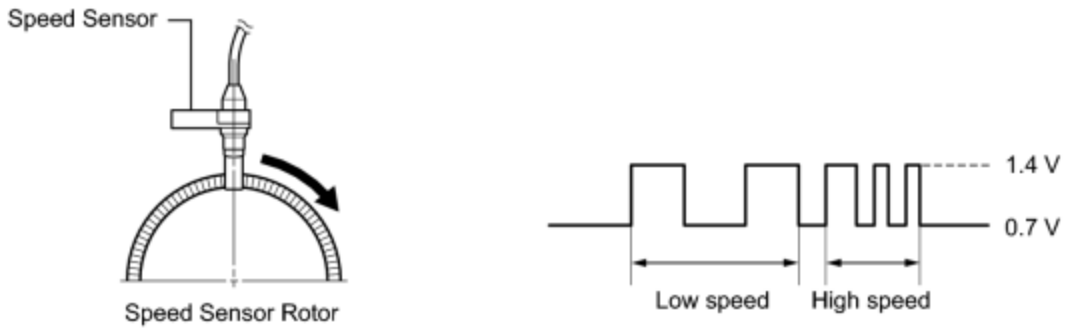
A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | C0200/31 | Front Speed Sensor RH Circuit |
| DTC | C0205/32 | Front Speed Sensor LH Circuit |
| DTC | C1271/71 | Low Output Signal of Front Speed Sensor RH (Test Mode DTC) |
| DTC | C1272/72 | Low Output Signal of Front Speed Sensor LH (Test Mode DTC) |

# DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

DTCs C1271/71 and C1272/72 can be cleared when the speed sensor sends a wheel speed signal or when Test Mode ends. DTCs C1271/71 and C1272/72 are output only in Test Mode.




P

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C0200/31 | 501 | While driving at 10 km/h (6 mph) or more, speed sensor output from one or two wheels is lower than that from other wheels for 15 seconds or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Front speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 502 | A malfunction occurs in 2 or more wheels. | ↑ |
| ↑ | 503 | An open is detected in the speed sensor signal circuit for 0.05 seconds or more. | • Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | terminals<br>• Front speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 504 | Instantaneous interruption of sensor signal from the malfunctioning wheel occurs 255 times or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Front speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 506 | When VM1 voltage is 8.6 V or more, sensor supply voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 507 | While driving at 10 km/h (6 mph) or more, speed sensor output from one wheel is 0 km/h (0 mph) for 1 second or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Front speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 508 | When IG1 terminal voltage is 9.5 V or more, sensor voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| C0205/32 | 511 | While driving at 10 km/h (6 mph) or more, speed sensor output from one or two wheels is lower than that from other wheels for 15 seconds or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Front speed sensor LH<br>• Brake booster with master cylinder |

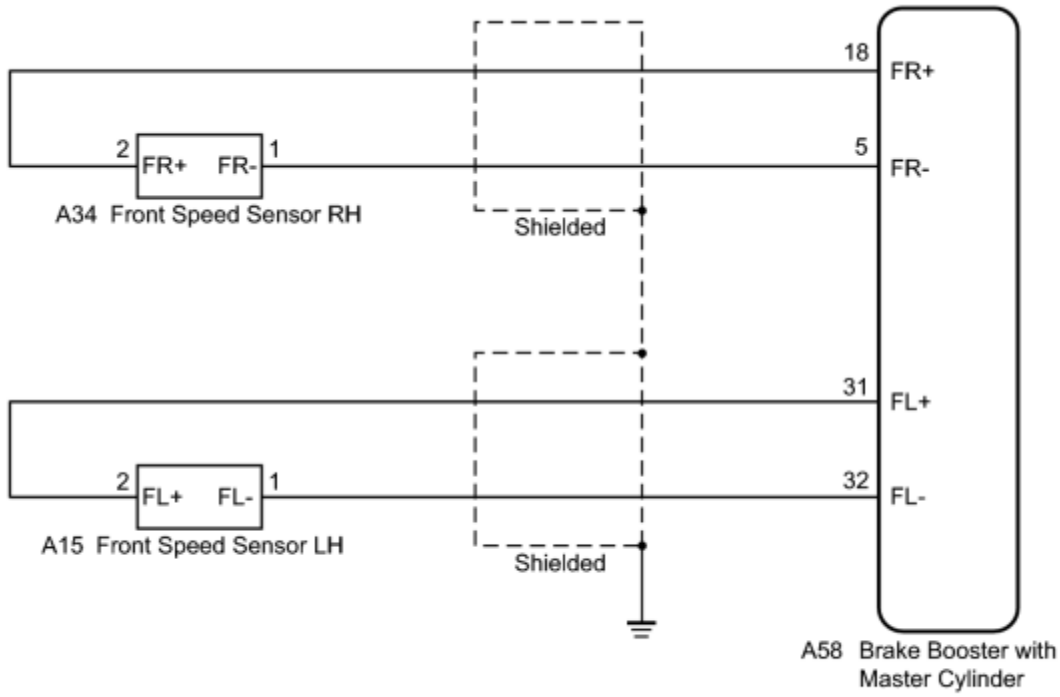
| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | (Skid control ECU) |
| ↑ | 512 | A malfunction occurs in 2 or more wheels. | ↑ |
| ↑ | 513 | An open is detected in the speed sensor signal circuit for 0.05 seconds or more. | • Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Front speed sensor LH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 514 | Instantaneous interruption of sensor signal from the malfunctioning wheel occurs 255 times or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Front speed sensor LH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 516 | When VM1 voltage is 8.6 V or more, sensor supply voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 517 | While driving at 10 km/h (6 mph) or more, speed sensor output from one wheel is 0 km/h (0 mph) for 1 second or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Front speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 518 | When IG1 terminal voltage is 9.5 V or more, sensor voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| C1271/71 | - | Detected only during Test Mode. | • Front speed sensor RH/LH<br>• Sensor installation |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1272/72 | | | • Speed sensor rotor |

HINT:

- DTCs C0200/31 and C1271/71 are for the front speed sensor RH.
- DTCs C0205/32 and C1272/72 are for the front speed sensor LH.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve .

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION) |

(a) Using the Techstream, check for any momentary interruptions in the wire harness and connector corresponding to a DTC .

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Speed Open | Front speed sensor RH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| FL Speed Open | Front speed sensor LH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |

OK:

There are no momentary interruptions.

HINT:

Perform the above inspection before removing the sensor and connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (FRONT SPEED SENSOR) |

(a) Select the Data List on the Techstream .

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Wheel Speed | Front speed sensor RH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| FL Wheel Speed | Front speed sensor LH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |

(b) Check that the speed value output from the speed sensor displayed on the Techstream.

HINT:

Factors that affect the indicated vehicle speed include tire size, tire inflation, and tire wear. The speed indicated on the speedometer has an allowable margin of error. This can be tested using a speedometer tester (calibrated chassis dynamometer). For details about testing and the margin of error, see the reference chart .

OK:

The speed value output from the speed sensor displayed on the Techstream is the similar speed as indicated on the speedometer.

NG ▶ CHECK FRONT SPEED SENSOR INSTALLATION

OK

▼

| | |
|---|---|
| 3. | PERFORM TEST MODE INSPECTION (SIGNAL CHECK) |

(a) Turn the power switch off.

(b) Perform the sensor check in the Test Mode procedure .

OK:

All Test Mode DTCs are cleared.

NG ▶ CHECK FRONT SPEED SENSOR INSTALLATION

OK

▼

| | |
|---|---|
| 4. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs .

(c) Turn the power switch on (READY).

(d) Perform a road test.

(e) Check if the same DTC is recorded .

Result:

| Result | Proceed to |
|---|---|
| DTCs (C0200/31 and C0205/32) are not output | A |
| DTCs (C0200/31 and/or C0205/32) are output | B |

HINT:

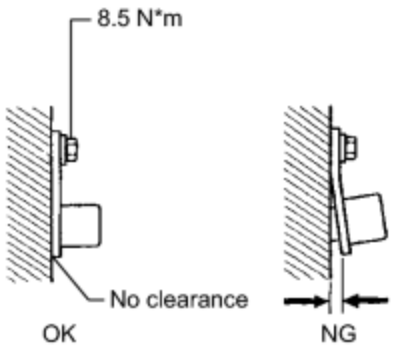
If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step .

B REPLACE FRONT SPEED SENSOR

A **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 5. | CHECK FRONT SPEED SENSOR INSTALLATION |

Front Speed Sensor:




(a) Turn the power switch off.

(b) Check the speed sensor installation.

OK:

There is no clearance between the sensor and the front steering knuckle.

The installation bolt is tightened properly.

Torque

8.5 N*m (87 kgf*cm, 75 in.*lbf)

NG INSTALL FRONT SPEED SENSOR CORRECTLY

OK

▼

| | |
|---|---|
| 6. | CHECK FRONT SPEED SENSOR TIP |

(a) Remove the front speed sensor .

(b) Check the speed sensor tip.

OK:

The sensor tip is free of scratches, oil, and foreign matter.

NOTICE:

Check the speed sensor signal after cleaning or replacement .

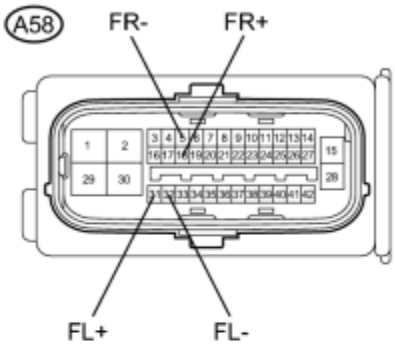
NG ▶ CLEAN OR REPLACE FRONT SPEED SENSOR

OK

▼

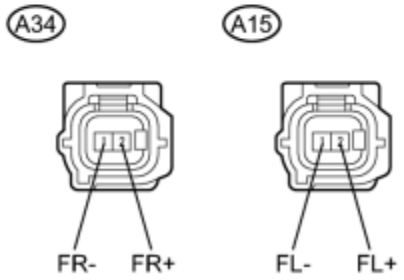
| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR) |

*1




(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

*2




(b) Disconnect the skid control ECU connector and the front speed sensor connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for RH

for LH

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-18 (FR+) - A34-2 (FR+) | Always | Below 1 Ω |
| A58-18 (FR+) - Body ground | Always | 10 kΩ or higher |
| A58-5 (FR-) - A34-1 (FR-) | Always | Below 1 Ω |
| A58-5 (FR-) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-31 (FL+) - A15-2 (FL+) | Always | Below 1 Ω |
| A58-31 (FL+) - Body ground | Always | 10 kΩ or higher |
| A58-32 (FL-) - A15-1 (FL-) | Always | Below 1 Ω |
| A58-32 (FL-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

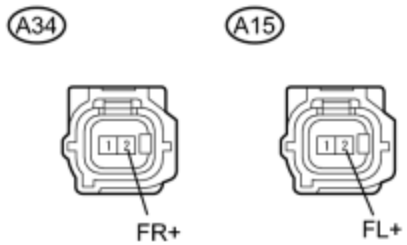
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Front Speed Sensor) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 8. | INSPECT SKID CONTROL ECU (SENSOR OUTPUT) |

*1




(a) Reconnect the skid control ECU connector.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

for RH

for LH

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A34-2 (FR+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A15-2 (FL+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Speed Sensor) |

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

▼

| | |
|---|---|
| 9. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Reconnect the front speed sensor connector.

(c) Clear the DTCs INFO.

(d) Turn the power switch on (READY).

(e) Perform a road test.

(f) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C0200/31 and/or C0205/32) are output | A |
| DTCs (C0200/31 and C0205/32) are not output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 10. | REPLACE FRONT SPEED SENSOR |

(a) Turn the power switch off.

(b) Replace the front speed sensor INFO.

NOTICE:

Check the speed sensor signal after replacement INFO.

NEXT

| | |
|---|---|
| 11. | RECONFIRM DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Perform a road test.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C0200/31 and/or C0205/32) are output | A |
| DTCs (C0200/31 and C0205/32) are not output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B END

A

| | |
|---|---|
| 12. | REPLACE FRONT SPEED SENSOR ROTOR |

(a) Turn the power switch off.

(b) Replace the front axle hub sub-assembly (front speed sensor rotor) INFO.

HINT:

The front speed sensor rotor is incorporated into the front axle hub sub-assembly.

If the front speed sensor rotor needs to be replaced, replace it together with the front axle hub sub-assembly.

NOTICE:

Check the speed sensor signal after replacement INFO.

NEXT

| | |
|---|---|
| 13. | RECONFIRM DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Perform a road test.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C0200/31 and/or C0205/32) are output | A |
| DTCs (C0200/31 and C0205/32) are not output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B END

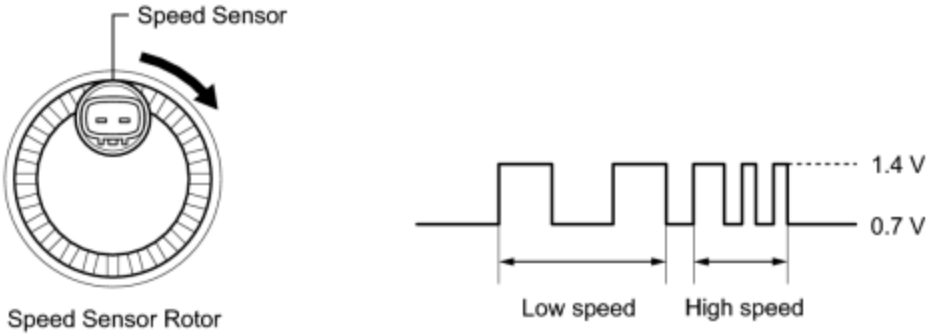
A **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | | |
|---|---|---|
| DTC | C0210/33 | Rear Speed Sensor RH Circuit |
| DTC | C0215/34 | Rear Speed Sensor LH Circuit |
| DTC | C1273/73 | Low Output Signal of Rear Speed Sensor RH (Test Mode DTC) |
| DTC | C1274/74 | Low Output Signal of Rear Speed Sensor LH (Test Mode DTC) |

# DESCRIPTION

The speed sensor detects wheel speed and sends the appropriate signals to the skid control ECU. These signals are used for ABS control.

DTCs C1273/73 and C1274/74 can be cleared when the speed sensor sends a wheel speed signal or when Test Mode ends. DTCs C1273/73 and C1274/74 are output only in Test Mode.




| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C0210/33 | 521 | While driving at 10 km/h (6 mph) or more, speed sensor output from one or two wheels is lower than that from other wheels for 15 seconds or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Rear speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 522 | A malfunction occurs in 2 or more wheels. | ↑ |
| ↑ | 523 | An open is detected in the speed sensor signal circuit for 0.05 seconds or more. | • Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | terminals<br>• Rear speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 524 | Instantaneous interruption of sensor signal from the malfunctioning wheel occurs 255 times or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Rear speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 526 | When VM1 voltage is 8.6 V or more, sensor supply voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 527 | While driving at 10 km/h (6 mph) or more, speed sensor output from one wheel is 0 km/h (0 mph) for 1 second or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Rear speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 528 | When IG1 terminal voltage is 9.5 V or more, sensor voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| C0215/34 | 531 | While driving at 10 km/h (6 mph) or more, speed sensor output from one or two wheels is lower than that from other wheels for 15 seconds or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Rear speed sensor LH<br>• Brake booster with master cylinder |

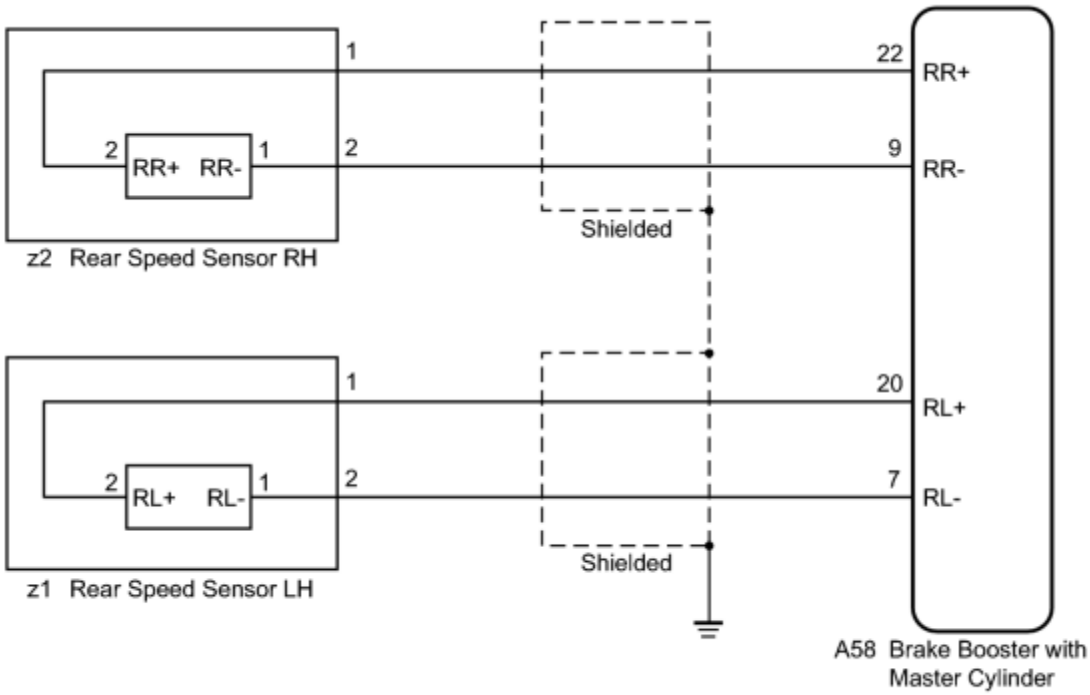
| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | (Skid control ECU) |
| ↑ | 532 | A malfunction occurs in 2 or more wheels. | ↑ |
| ↑ | 533 | An open is detected in the speed sensor signal circuit for 0.05 seconds or more. | • Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Rear speed sensor LH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 534 | Instantaneous interruption of sensor signal from the malfunctioning wheel occurs 255 times or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Rear speed sensor LH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 536 | When VM1 voltage is 8.6 V or more, sensor supply voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 537 | While driving at 10 km/h (6 mph) or more, speed sensor output from one wheel is 0 km/h (0 mph) for 1 second or more. | • Open or short in speed sensor<br>• Improperly installed speed sensor, or abnormal clearance between sensor and rotor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Rear speed sensor RH<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 538 | When IG1 terminal voltage is 9.5 V or more, sensor voltage drops for 0.5 seconds or more. | • Open or short in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| C1273/73 | - | Detected only during Test Mode. | • Rear speed sensor RH/LH<br>• Sensor installation |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1274/74 | | | • Speed sensor rotor |

HINT:

- DTCs C0210/33 and C1273/73 are for the rear speed sensor RH.
- DTCs C0215/34 and C1274/74 are for the rear speed sensor LH.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION) |

(a) Using the Techstream INFO ck for any momentary interruptions in the wire harness and connector corresponding to a DTC .

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RR Speed Open | Rear speed sensor RH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| RL Speed Open | Rear speed sensor LH open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |

OK:

There are no momentary interruptions.

HINT:

Perform the above inspection before removing the sensor and connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (REAR SPEED SENSOR) |

(a) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RR Wheel Speed | Rear speed sensor RH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |
| RL Wheel Speed | Rear speed sensor LH / Min.: 0 km/h (0 mph), Max.: 326.4 km/h (202 mph) | Vehicle stopped: 0 km/h (0 mph) | When driving at constant speed: No large fluctuations |

(b) Check that the speed value output from the speed sensor displayed on the Techstream.

HINT:

Factors that affect the indicated vehicle speed include tire size, tire inflation, and tire wear. The speed indicated on the speedometer has an allowable margin of error. This can be tested using a speedometer tester (calibrated chassis dynamometer). For details about testing and the margin of error, see the reference chart INFO.

OK:

The speed value output from the speed sensor displayed on the Techstream is the similar speed as indicated on the speedometer.

NG ▶ CHECK REAR SPEED SENSOR INSTALLATION

OK

▼

| | |
|---|---|
| 3. | PERFORM TEST MODE INSPECTION (SIGNAL CHECK) |

(a) Turn the power switch off.

(b) Perform the sensor check in the Test Mode procedure INFO.

OK:

All Test Mode DTCs are cleared.

NG ▶ CHECK REAR SPEED SENSOR INSTALLATION

OK

▼

| | |
|---|---|
| 4. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Perform a road test.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C0210/33 and C0215/34) are not output | A |
| DTCs (C0210/33 and/or C0215/34) are output | B |

HINT:

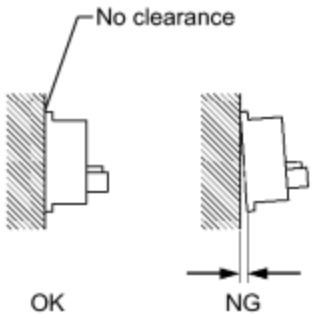
If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B REPLACE REAR SPEED SENSOR AND REAR SPEED SENSOR ROTOR

A **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 5. | CHECK REAR SPEED SENSOR INSTALLATION |

Rear Speed Sensor:




(a) Turn the power switch off.

(b) Check the speed sensor installation.

OK:

There is no clearance between the sensor and rear axle carrier.

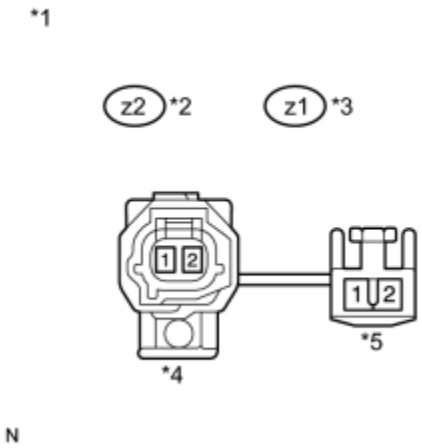
NG INSTALL REAR SPEED SENSOR CORRECTLY

OK

▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE) |

(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.




(b) Disconnect the rear speed sensor connector and the skid control sensor wire.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for RH

for LH

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z2 ("A"-2) - z2 ("B"-1) | Always | Below 1 Ω |
| z2 ("A"-2) - z2 ("B"-2) | Always | 10 kΩ or higher |
| z2 ("A"-2) - Body ground | Always | 10 kΩ or higher |
| z2 ("A"-1) - z2 ("B"-2) | Always | Below 1 Ω |
| z2 ("A"-1) - z2 ("B"-1) | Always | 10 kΩ or higher |
| z2("A"-1) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z1 ("A"-2) - z1 ("B"-1) | Always | Below 1 Ω |
| z1 ("A"-2) - z1 ("B"-2) | Always | 10 kΩ or higher |
| z1 ("A"-2) - Body ground | Always | 10 kΩ or higher |
| z1 ("A"-1) - z1 ("B"-2) | Always | Below 1 Ω |
| z1 ("A"-1) - z1 ("B"-1) | Always | 10 kΩ or higher |
| z1 ("A"-1) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of skid control sensor wire |
| *2 | for RH |

| | |
|---|---|
| *3 | for LH |
| *4 | Front view of wire harness connector<br><br>(to Sensor Side Connector "A") |
| *5 | Front view of wire harness connector<br><br>(to Vehicle Side Connector "B") |

NOTICE:

Check the speed sensor signal after replacement INFO.

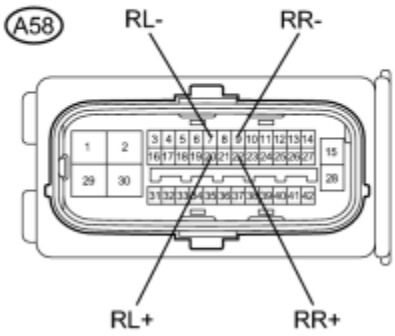
NG ▶ REPLACE SKID CONTROL SENSOR WIRE

OK

▼

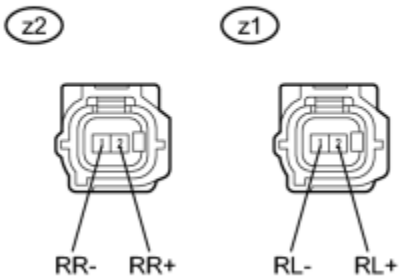
| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR) |

*1




(a) Reconnect the skid control sensor wire (for vehicle side connector).

*2



(b) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(c) Disconnect the skid control ECU connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for RH

for LH

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-22 (RR+) - z2-2 (RR+) | Always | Below 1 Ω |
| A58-22 (RR+) - Body ground | Always | 10 kΩ or higher |
| A58-9 (RR-) - z2-1 (RR-) | Always | Below 1 Ω |
| A58-9 (RR-) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-20 (RL+) - z1-2 (RL+) | Always | Below 1 Ω |
| A58-20 (RL+) - Body ground | Always | 10 kΩ or higher |
| A58-7 (RL-) - z1-1 (RL-) | Always | Below 1 Ω |
| A58-7 (RL-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Rear Speed Sensor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

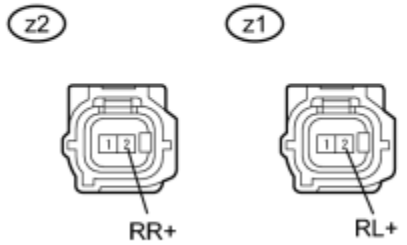
OK

▼

| | |
|---|---|
| 8. | INSPECT SKID CONTROL ECU (SENSOR OUTPUT) |

(a) Reconnect the skid control ECU connector.

*1




N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

for RH

for LH

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z2-2 (RR+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z1-2 (RL+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Rear Speed Sensor) |

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

▼

| | |
|---|---|
| 9. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Reconnect the rear speed sensor connector.

(c) Clear the DTCs INFO.

(d) Turn the power switch on (READY).

(e) Perform a road test.

(f) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C0210/33 and/or C0215/34) are output | A |
| DTCs (C0210/33 and C0215/34) are not output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 10. | REPLACE REAR SPEED SENSOR AND REAR SPEED SENSOR ROTOR |

(a) Turn the power switch off.

(b) Replace the rear speed sensor and the rear axle hub and bearing assembly (rear speed sensor rotor) INFO.

HINT:

The rear speed sensor rotor is incorporated into the rear axle hub and bearing assembly.

If the rear speed sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly with rear speed sensor.

NOTICE:

Check the speed sensor signal after replacement INFO.

NEXT

| | |
|---|---|
| 11. | RECONFIRM DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Perform a road test.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C0210/33 and/or C0215/34) are output | A |
| DTCs (C0210/33 and C0215/34) are not output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B END

A **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | | |
|---|---|---|
| DTC | C0371/71 | Yaw Rate Sensor (Test Mode DTC) |
| DTC | C1234/34 | Yaw Rate Sensor Malfunction |
| DTC | C1243/43 | Acceleration Sensor Stuck Malfunction |
| DTC | C1244/44 | Open or Short in Acceleration Sensor Circuit |
| DTC | C1245/45 | Acceleration Sensor Output Malfunction |
| DTC | C1279/79 | Acceleration Sensor Output Voltage Malfunction (Test Mode DTC) |
| DTC | C1381/97 | Acceleration Sensor Power Supply Voltage Malfunction |

# DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.

The yaw rate sensor has a built-in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2).

If there are any problems in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, DTCs U0123/62 (Lost Communication with Yaw Rate Sensor Module) and U0124/95 (Lost Communication with Lateral Acceleration Sensor Module) are output.

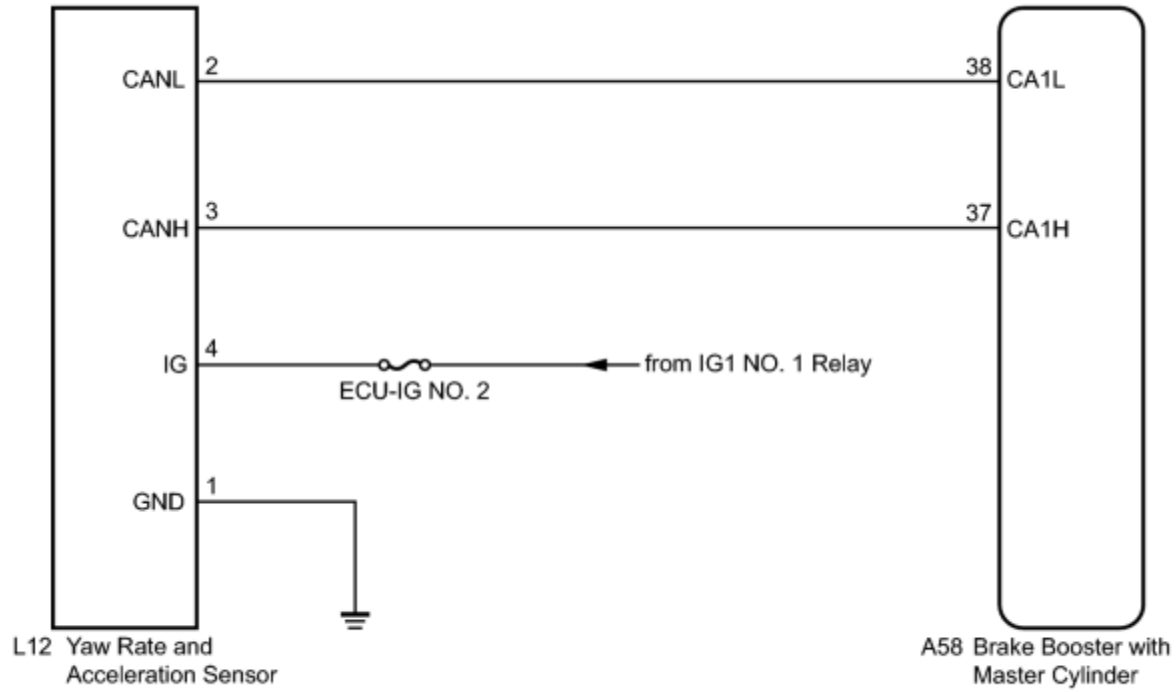
These DTCs are also output when calibration has not been completed.

DTCs C0371/71 and C1279/79 will be cleared when the yaw rate and acceleration sensor sends a yaw rate and/or acceleration signal or when Test Mode ends. DTCs C0371/71 and C1279/79 are output only in Test Mode.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1234/34 | 711 | While yaw rate sensor communication is enabled, a malfunction signal output is received during the sensor self-check (sensor 1 (GL1) malfunction). | Yaw rate and acceleration sensor internal malfunction |
| ↑ | 712 | While yaw rate sensor communication is enabled, a malfunction signal output is received during the sensor self-check (sensor 2 (GL2) malfunction). | ↑ |
| ↑ | 713 | While yaw rate sensor communication is enabled, a malfunction signal output is received during the sensor self-check (0 point calibration malfunction). | ↑ |
| ↑ | 714 | While yaw rate sensor communication is enabled, a malfunction signal output is received during the sensor self-check (Two-value comparison malfunction). | ↑ |
| C1243/43 | 561 | An acceleration sensor malfunction occurs 16 times or more when the vehicle speed drops from above 30 km/h (19 mph) to 0 km/h (0 mph). | Yaw rate and acceleration sensor internal stuck malfunction |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| ↑ | 562<br>563<br>564 | A fixed acceleration sensor value is determined. | ↑ |
| C1244/44 | 571 | Either of the following is detected:<br>1. Difference between GL1 and GL2 does not become less than 0.4 G for 60 seconds or more after reaching 0.6 G when the vehicle is stopped.<br>2. A malfunction signal from the acceleration sensor is received. | • Yaw rate and acceleration sensor installed improperly<br>• Yaw rate and acceleration sensor |
| C1245/45 | 581 | Difference between longitudinal G calculated from the acceleration sensor value and that calculated from the vehicle speed exceeds 0.35 G for 60 seconds or more. | • Yaw rate and acceleration sensor installed improperly<br>• Yaw rate and acceleration sensor |
| C1381/97 | 601 | While yaw rate and acceleration sensor communication is enabled, a supply voltage malfunction signal is received from the sensor for 10 seconds. | • Yaw rate and acceleration sensor supply voltage shut down<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU) |
| C0371/71 | - | Detected only during Test Mode. | • Sensor installation<br>• Yaw rate and acceleration sensor |
| C1279/79 | - | Detected only during Test Mode. | • Sensor installation<br>• Yaw rate and acceleration sensor |

# WIRING DIAGRAM




N

# INSPECTION PROCEDURE

NOTICE:

When replacing the yaw rate and acceleration sensor, perform zero point calibration INFO.

HINT:

When U0123/62 and/or U0124/95 is output together with C1234/34, C1243/43, C1244/44, C1245/45, and/or C1381/97, inspect and repair the trouble areas indicated by U0123/62 and/or U0124/95 first INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch off.

(c) Turn the power switch on (READY).

(d) Drive the vehicle at a speed of 30 km/h (19 mph) or more, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.

(e) Turn the power switch on (IG) again and check that no CAN communication system DTC is output INFO.

(f) Check if DTC C1210/36 (Zero Point Calibration of Yaw Rate Sensor Undone) or C1336/98 (Zero Point Calibration of Acceleration Sensor Undone) is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1210/36, C1336/98 and CAN communication system DTC) are not output | A |
| CAN communication system DTC is output | B |
| DTCs (C1210/36 and/or C1336/98) are output | C |

C REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

B INSPECT CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION |

(a) Turn the power switch off.

(b) Check that the yaw rate and acceleration sensor has been installed properly INFO.

OK:

The sensor is tightened to the specified torque.

The sensor is not tilted.

NG INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY

OK

| | |
|---|---|
| 3. | INSPECT YAW RATE AND ACCELERATION SENSOR (IG TERMINAL) |

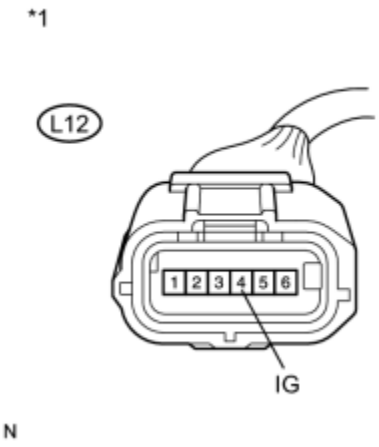
(a) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(b) Disconnect the yaw rate and acceleration sensor connector.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L12-4 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

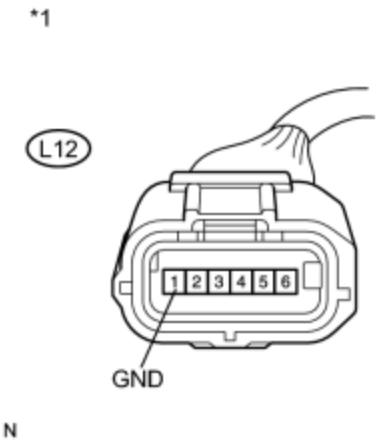
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Yaw Rate and Acceleration Sensor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IG CIRCUIT)

OK

▼

| | |
|---|---|
| 4. | INSPECT YAW RATE AND ACCELERATION SENSOR (GND TERMINAL) |




(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L12-1 (GND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Yaw Rate and Acceleration Sensor) |

NOTICE:

Check the yaw rate and acceleration sensor signal after replacement INFO.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK → **REPLACE YAW RATE AND ACCELERATION SENSOR**

| DTC | C1202/68 | Master Reservoir Level Malfunction |
|---|---|---|

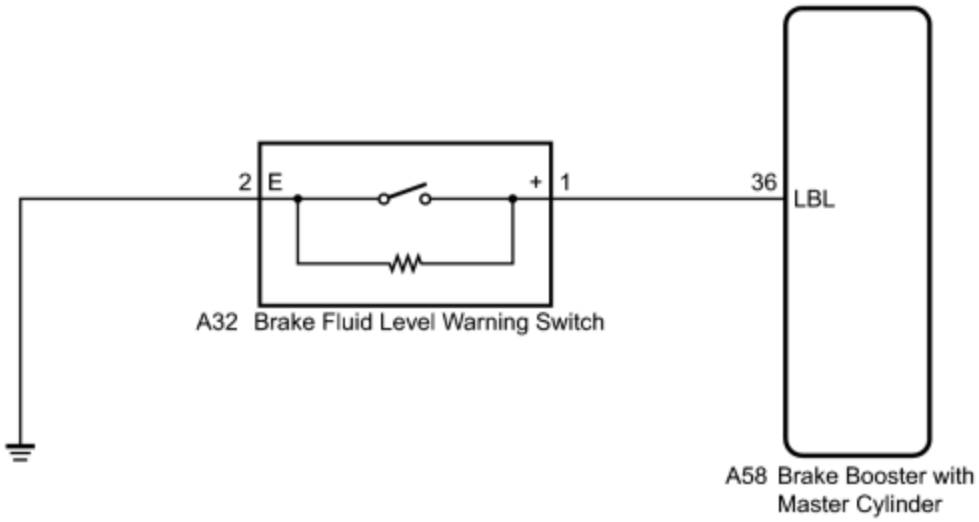
# DESCRIPTION

When a fluid level drop in the master cylinder reservoir is detected, the signal is input to the skid control ECU.

If the DTC for the fluid level drop is memorized, the warning will be canceled and the DTC will not be stored when the fluid level returns to normal.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1202/68 | 371 | An open is detected in the switch signal circuit for 2 seconds or more. | • Brake master cylinder reservoir (Brake fluid level warning switch) internal open circuit<br>• Open in wire harness<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | - | The reservoir level remains low. | • Low brake fluid level<br>• Brake fluid leaks<br>• Brake master cylinder reservoir (Brake fluid level warning switch) internal short circuit<br>• Short in wire harness<br>• Brake disc rotor excessive wear<br>• Brake booster with master cylinder (Skid control ECU) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

HINT:

When releasing the parking brake, chock the wheels for safety.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK BRAKE FLUID LEVEL |

(a) Check that the brake fluid level is sufficient.

OK:

Brake fluid level is sufficient.

HINT:

If the fluid level is low, check for fluid leaks, and repair as necessary.

(1) Check for brake fluid leaks (Connection between the brake booster pump, brake master cylinder reservoir and brake booster with master cylinder, and the brake booster with master cylinder and wheel cylinders).

HINT:

If no leaks exist, add and adjust fluid using the Techstream INFO.

(2) Check that the trouble code is not output again INFO.

(b) Check that there are no leaks from the connections between the brake booster pump and brake booster with master cylinder.

HINT:

As a visual check is very difficult, perform the check with the following procedure.

(1) Bleed the air from the brake systems INFO.

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Accumulator Sensor | Accumulator pressure sensor / Min.: 0 V, Max.: 5 V | Specified value: 2.9 to 4.2 V | When brake fluid is stored in the accumulator: Accumulator pressure changes in accordance with volume of fluid stored in the accumulator |

(5) Wait for 30 seconds without depressing the brake pedal.

(6) Check that the accumulator pressure sensor output values change is within the specified range.

OK:

Accumulator pressure sensor output values change is within 0.55 V.

NG ▶ CHECK AND REPAIR BRAKE FLUID LEAKS OR ADD FLUID

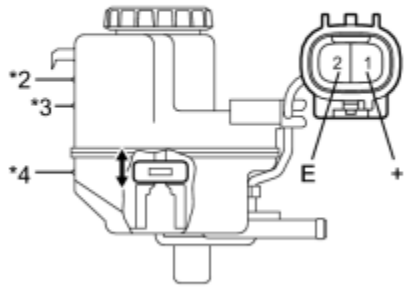
OK

▼

| | |
|---|---|
| 2. | INSPECT BRAKE FLUID LEVEL WARNING SWITCH |

(a) Turn the power switch off.

*1




H

(b) Remove the reservoir filler cap and strainer.

(c) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(d) Disconnect the brake fluid level warning switch connector.

(e) Measure the resistance according to the value(s) in the table below.

HINT:

A float is located inside the reservoir. Its position changes according to the level of brake fluid.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (+) - 2 (E) | Brake fluid level warning switch OFF (Float up) | 1.84 to 2.16 kΩ |
| 1 (+) - 2 (E) | Brake fluid level warning switch ON (Float down) | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Brake Fluid Level Warning Switch) |
| *2 | MAX Line |
| *3 | Fluid Level Support Line |
| *4 | MIN Line |

NG ▶ REPLACE BRAKE MASTER CYLINDER RESERVOIR ASSEMBLY (BRAKE FLUID LEVEL WARNING SWITCH)

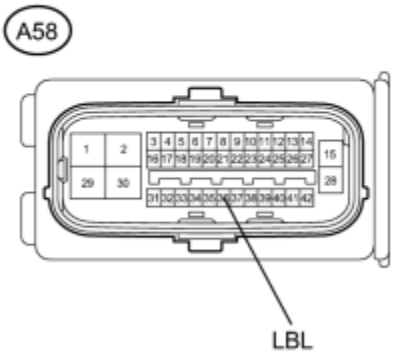
OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE FLUID LEVEL |

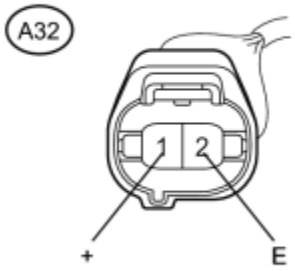
| | |
|---|---|
| | WARNING SWITCH) |

*1




(a) Make sure that there is no looseness at the locking part and the connecting part of the connector.

*2




(b) Disconnect the skid control ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-36 (LBL) - A32-1 (+) | Always | Below 1 Ω |
| A58-36 (LBL) - Body ground | Always | 10 kΩ or higher |
| A32-2 (E) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Brake Fluid Level Warning Switch) |

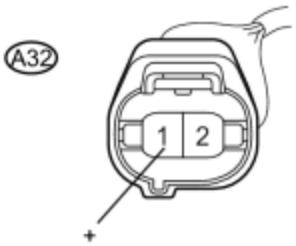
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | INSPECT SKID CONTROL ECU (SWITCH INPUT) |

*1




H

(a) Reconnect the skid control ECU connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A32-1 (+) - Body ground | Power switch on (IG) | 4 to 7 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Brake Fluid Level Warning Switch) |

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

▼

| | |
|---|---|
| 5. | CHECK BRAKE DISC |

(a) Turn the power switch off.

(b) Reconnect the brake fluid level warning switch connector.

(c) Disconnect the brake pedal stroke sensor connector.

(d) Perform a road test according to Freeze Frame Data or customer problem analysis. Check the brake line pressure vibration caused due to uneven wear of the disc according to brake pedal vibration.

OK:

Brake pedal does not vibrate during braking.

HINT:

- An unevenly worn disc may vibrate the caliper piston and cause fluctuations in brake line pressure, triggering a malfunction detection condition.
- The brake pedal does not kick back due to wheel cylinder piston vibration during electronically controlled brake system control.
- If the brake pedal stroke sensor connector is disconnected, the fail-safe function will prohibit electronically controlled brake system control.
- The Active Test does not prohibit electronically controlled brake system control when the vehicle is running, so disconnect the stroke sensor connector before continuing with inspection.
- Disc uneven wear can be checked by measuring the disc thickness variation INFO for front, or INFO for rear).

NG ▶ REPLACE BRAKE DISC

OK

▼

| | |
|---|---|
| 6. | RECONFIRM DTC |

(a) Reconnect the brake pedal stroke sensor connector.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Perform a road test.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1202/68) is not output | A |
| DTC (C1202/68) is output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | C1203/95 | ECM Communication Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The circuit is used to send TRAC and VSC information from the skid control ECU to the power management control ECU, and hybrid control system information from the power management control ECU to the skid control ECU via the CAN communication system.

Identification information sent from other ECUs is stored when shipped from the factory and used as default values.

NOTICE:

DTC C1203/95 is output when an incorrect ECU is installed. If initialization is performed and learning occurs with an incorrect ECU installed, operations and functions will differ from that stored when the vehicle was shipped from the factory. Therefore, make sure that learning occurs properly.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1203/95 | - | Either of the following is detected:<br>1. Identification information sent from other ECUs does not match with the value stored when shipped from the factory.<br>2. No stored information for destination. | • The wrong ECU and sensor was installed<br>• Brake booster with master cylinder (Skid control ECU) |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| 1. | CHECK PART NUMBER |
|---|---|

(a) Check that a proper power management control ECU, main body ECU and yaw rate and acceleration sensor are installed.

OK:

Proper ECUs and sensor are installed.

(b) Check if the power management control ECU, main body ECU and yaw rate and acceleration sensor had been replaced before the DTC was recorded.

OK:

ECU and sensor had not been replaced.

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (A proper power management control ECU is not installed and/or the power management control ECU had been replaced) | B |
| NG (A proper main body ECU is not installed and/or the main body ECU had been replaced) | C |
| NG (A proper yaw rate and acceleration sensor is not installed and/or the yaw rate and acceleration sensor had been replaced) | D |

D REPLACE YAW RATE AND ACCELERATION SENSOR

C REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)

B REPLACE POWER MANAGEMENT CONTROL ECU

A

| | |
|---|---|
| 2. | PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE |

(a) Perform initialization and calibration of the linear solenoid valve INFO.

HINT:

Before carrying out Perform Initialization and Calibration of Linear Solenoid Valve, C1203/95 will be output.

NEXT

| | |
|---|---|
| 3. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (IG).

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
| --- | --- |
| DTC (C1203/95) is output | A |
| DTC (C1203/95) is not output | B |

B ▶ END

A ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | | |
|---|---|---|
| DTC | C1210/36 | Zero Point Calibration of Yaw Rate Sensor Undone |
| DTC | C1336/98 | Zero Point Calibration of Acceleration Sensor Undone |

# DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.

The yaw rate sensor has a built-in acceleration sensor and detects the vehicle's condition using 2 circuits (GL1, GL2).

If there are any problems in the bus lines between the yaw rate and acceleration sensor and the CAN communication system, DTCs U0123/62 (Lost Communication with Yaw Rate Sensor Module) and U0124/95 (Lost Communication with Lateral Acceleration Sensor Module) will be output.

The DTCs will be also output when the calibration has not been completed.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1210/36 | - | Yaw rate sensor 0 point calibration is incomplete. | • Zero point calibration undone<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU)<br><br>(Perform 0 point calibration and check for DTCs. If no DTCs are output again, the sensor is normal.) |
| C1336/98 | - | Either of the following is detected:<br><br>1. The vehicle is driven normally without 0 point calibration completed.<br>2. After completing 0 point calibration, 0 point voltage of the sensor is not within the range of 2.38 to 2.62 V. | • Zero point calibration undone<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU)<br><br>(Perform 0 point calibration and check for DTCs. If no DTCs are output again, the sensor is normal.) |

# INSPECTION PROCEDURE

NOTICE:

- When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.
- When replacing the yaw rate and acceleration sensor, perform zero point calibration INFO.

HINT:

When U0123/62 and/or U0124/95 is output together with C1210/36 and/or C1336/98, inspect and repair trouble areas indicated by U0123/62 and/or U0124/95 first INFO.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR |

(a) Perform zero point calibration of the yaw rate and acceleration sensor INFO.

NEXT

| | |
|---|---|
| 2. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle at a speed of 30 km/h (18 mph) or more, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1210/36 and/or C1336/98) are output | A |
| DTCs (C1210/36 and C1336/98) are not output | B |

HINT:

- The DTCs are recorded because zero point calibration has not been completed.
- End the procedure because the same DTCs are not recorded after completion of zero point calibration.

B END

A

| | |
|---|---|
| 3. | CHECK YAW RATE AND ACCELERATION SENSOR INSTALLATION |

(a) Turn the power switch off.

(b) Check that the yaw rate and acceleration sensor has been installed properly INFO.

OK:

The sensor bolt should be tightened to the specified torque.

The sensor should not be tilted.

NG ▶ INSTALL YAW RATE AND ACCELERATION SENSOR CORRECTLY

OK

▼

| | |
|---|---|
| 4. | REPLACE YAW RATE AND ACCELERATION SENSOR |

(a) Replace the yaw rate and acceleration sensor INFO.

NOTICE:

Check the yaw rate and acceleration sensor signal after replacement INFO.

NEXT

▼

| | |
|---|---|
| 5. | RECONFIRM DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Drive the vehicle at a speed of 30 km/h (18 mph) or more, turn the steering wheel, and decelerate (depress the brake pedal) the vehicle.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1210/36 and/or C1336/98) are output | A |
| DTCs (C1210/36 and C1336/98) are not output | B |

B ▶ END

A ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | | |
|---|---|---|
| DTC | C1211/25 | SLA Linear Solenoid |
| DTC | C1212/26 | SLR Linear Solenoid |
| DTC | C1225/31 | SA1 Solenoid Circuit |
| DTC | C1226/32 | SA2 Solenoid Circuit |
| DTC | C1227/33 | SA3 Solenoid Circuit |
| DTC | C1228/34 | STR Solenoid Circuit |
| DTC | C1352/21 | Front Increasing Pressure Solenoid RH Malfunction |
| DTC | C1353/23 | Front Increasing Pressure Solenoid LH Malfunction |
| DTC | C1356/22 | Front Decreasing Pressure Solenoid RH Malfunction |
| DTC | C1357/24 | Front Decreasing Pressure Solenoid LH Malfunction |

# DESCRIPTION

Each solenoid adjusts pressure which affects each wheel cylinder according to signals from the skid control ECU and controls the vehicle.

The master cut solenoid is closed and blocks the regulator pressure from the electronically controlled brake system control pressure when the system is normal. The master cut solenoid is open and sends the master cylinder and regulator hydraulic pressure to the non-assisted brake wheel cylinders during the fail-safe due to a system malfunction.

HINT:

If the supply voltage decreases, a drop in current may cause a DTC to be stored.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1211/25 | 21 | Excess current is applied for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 22 | An open is detected for 0.05 seconds or more while the solenoid is OFF. | ↑ |
| ↑ | 23 | An open is detected for 0.05 seconds or more while the solenoid is ON. | • Supply voltage reduced<br>• Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 24 | A short to +B or voltage leaks is detected for 0.05 seconds. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1212/26 | 31 | Excess current is applied for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 32 | An open is detected for 0.05 seconds or more while the solenoid is OFF. | ↑ |
| ↑ | 33 | An open is detected for 0.05 seconds or more | • Supply voltage reduced |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | while the solenoid is ON. | • Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 34 | A short to +B or voltage leaks is detected for 0.05 seconds. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1225/31 | 41 | Excess current is applied for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 42 | An open is detected for 0.05 seconds or more while the solenoid is OFF. | ↑ |
| ↑ | 43 | An open is detected for 0.05 seconds or more while the solenoid is ON. | • Supply voltage reduced<br>• Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 44 | A short to +B or voltage leaks are detected for 0.05 seconds. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1226/32 | 51 | Excess current is applied for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 52 | An open is detected for 0.05 seconds or more while the solenoid is OFF. | ↑ |
| ↑ | 53 | An open is detected for 0.05 seconds or more while the solenoid is ON. | • Supply voltage reduced<br>• Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 54 | A short to +B or voltage leaks are detected for 0.05 seconds. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1227/33 | 61 | Excess current is applied for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 62 | An open is detected for 0.05 seconds or more while the solenoid is OFF. | ↑ |
| ↑ | 63 | An open is detected for 0.05 seconds or more while the solenoid is ON. | • Supply voltage reduced<br>• Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 64 | A short to +B or voltage leaks are detected for 0.05 seconds. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1228/34 | 71 | Excess current is applied for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 72 | An open is detected for 0.05 seconds or more while the solenoid is OFF. | ↑ |
| ↑ | 73 | An open is detected for 0.05 seconds or more while the solenoid is ON. | • Supply voltage reduced<br>• Brake booster with master cylinder (Skid control ECU or brake actuator) |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| ↑ | 74 | A short to +B or voltage leaks are detected for 0.05 seconds. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1352/21 | 11<br>12 | When the solenoid relay contact on, open or short in solenoid circuit continues for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1353/23 | 15<br>16 | When the solenoid relay contact on, open or short in solenoid circuit continues for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1356/22 | 13<br>14 | When the solenoid relay contact on, open or short in solenoid circuit continues for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1357/24 | 17<br>18 | When the solenoid relay contact on, open or short in solenoid circuit continues for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU or brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Clear the DTCs INFO.

(b) Check if the same DTC is recorded INFO.

HINT:

If a DTC for undervoltage is output, first troubleshoot the power source system.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1211/25, C1212/26, C1225/31, C1226/32, C1227/33, C1228/34, C1352/21, C1353/23, C1356/22 and C1357/24) are not output | A |
| A DTC (C1241/41) for undervoltage is output | B |
| DTCs (C1211/25, C1212/26, C1225/31, C1226/32, C1227/33, C1228/34, C1352/21, C1353/23, C1356/22 and/or C1357/24) are output | C |

C REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

B REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | C1214/62 | Hydraulic Control System Malfunction |
|---|---|---|

# DESCRIPTION

The skid control ECU controls braking force according to the hybrid control system regenerative braking force and inputs the hydraulic pressure necessary for operating each wheel cylinder according to the wheel cylinder pressure sensor.

DTCs may be stored if one of the following occurs:

- Brake fluid leaks.
- Wheel cylinder vibrates due to uneven wear of a brake rotor.
- Foreign matter enters solenoid valve.
- Line pressure drops during air bleeding.
- Brake pad is replaced.
- Rotor is replaced.

HINT:

When replacing the brake pad, retracting the brake calipers piston and attaching a new brake pad will greatly increase the clearance between the brake pad and brake disc, which will likely cause these DTCs to be set the next time the brake pedal is depressed. As there is not malfunction, clear the DTCs.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1214/62 | 431 | Decrease in hydraulic pressure control performance.<br><br>(Pressure increase malfunction) | • Brake fluid leaks<br>• Brake disc rotor excessive wear<br>• Brake booster with master cylinder (Brake actuator) |
| ↑ | 432 | Decrease in hydraulic pressure control performance.<br><br>(Pressure decrease malfunction) | ↑ |
| ↑ | 433 | Malfunctions such as leaks occur in the SLA valve. | ↑ |
| ↑ | 434<br><br>435 | Malfunctions such as leaks occur in the SLR valve. | ↑ |
| ↑ | 436<br><br>437 | Decrease in hydraulic pressure control performance. | ↑ |
| ↑ | 438 | Malfunctions such as leaks occur in a hydraulic circuit valve. | Brake booster with master cylinder (Brake actuator) |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

HINT:

When C1364/61 is output together with C1214/62, inspect and repair the trouble areas indicated by C1364/61 first INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR FLUID LEAK |

(a) Check that there is no fluid leaks in the brake line between the brake actuator and the wheel cylinder.

(b) Check that the brake is not dragging.

OK:

There is no fluid leaks or dragging.

NG ▶ REPAIR OR REPLACE APPLICABLE PART

OK

▼

| | |
|---|---|
| 2. | PERFORM AIR BLEEDING |

(a) Bleed the air from the brake systems INFO.

NEXT

▼

| | |
|---|---|
| 3. | CHECK BRAKE BOOSTER WITH MASTER CYLINDER (ACTUATOR SIDE) |

(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(b) Disconnect the skid control ECU connector 2 minutes after the power switch is turned off.

(c) Check both the connector case and the terminal for deformation and corrosion.

OK:

No deformation or corrosion.

NG REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (VEHICLE SIDE) |

(a) Measure the voltage and resistance on the wire harness side INFO.

OK:

Voltage and resistance readings are all normal.

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (WHEEL CYLINDER PRESSURE SENSOR) |

(a) Reconnect the skid control ECU connector.

(b) Connect a pedal effort gauge INFO.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released:<br><br>0.1 to 0.9 V | Reading increases when brake pedal is depressed |

(f) Check the output value of the wheel cylinder pressure sensor at each hydraulic pressure level during the electronically controlled brake system control.

Standard Voltage:

for Front Wheel Cylinder Pressure Sensor LH

for Front Wheel Cylinder Pressure Sensor RH

| Hydraulic Pressure (MPa (kgf/cm$^2$, psi)) | Wheel Cylinder Pressure Sensor (V) |
|---|---|
| 2.0 (20.4, 290) | 0.53 to 1.33 |
| 5.0 (51.0, 725) | 1.12 to 1.92 |
| 7.0 (71.4, 1015) | 1.52 to 2.32 |
| 10.0 (102.0, 1451) | 2.14 to 2.94 |


| Hydraulic Pressure (MPa (kgf/cm$^2$, psi)) | Wheel Cylinder Pressure Sensor (V) |
|---|---|
| 2.0 (20.4, 290) | 0.53 to 1.33 |
| 5.0 (51.0, 725) | 1.12 to 1.92 |
| 7.0 (71.4, 1015) | 1.52 to 2.32 |
| 10.0 (102.0, 1451) | 2.14 to 2.94 |


NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

▼

| | |
|---|---|
| 6. | CHECK BRAKE DISC |

(a) Turn the power switch off.

(b) Disconnect the brake pedal stroke sensor connector.

(c) Perform a road test according to Freeze Frame Data or customer problem analysis. Check the brake line pressure vibration caused due to uneven wear of the disc according to brake pedal vibration.

OK:

Brake pedal does not vibrate during braking.

HINT:

- An unevenly worn disc may vibrate the caliper piston and cause fluctuations in brake line pressure, triggering a malfunction detection condition.
- The brake pedal does not kick back due to wheel cylinder piston vibration during electronically controlled brake system control.
- If the brake pedal stroke sensor connector is disconnected, the fail-safe function will prohibit electronically controlled brake system control.
- The Active Test does not prohibit electronically controlled brake system control when the vehicle is running, so disconnect the stroke sensor connector before continuing with inspection.
- Disc uneven wear can be checked by measuring the disc thickness variation INFO for front, or INFO for rear).

NG ▶ REPLACE BRAKE DISC

OK

| | |
|---|---|
| 7. | RECONFIRM DTC |

(a) Reconnect the brake pedal stroke sensor connector.

(b) Clear the DTCs INFO.

(c) Perform a road test under the same malfunction conditions recreated based on the Freeze Frame Data or customer problem analysis.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1214/62) is not output | A |
| DTC (C1214/62) is output | B |

HINT:

If the DTC is no longer output, it can be suspected that it was output due to an improperly connected connector.

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **CHECK FOR INTERMITTENT PROBLEMS**

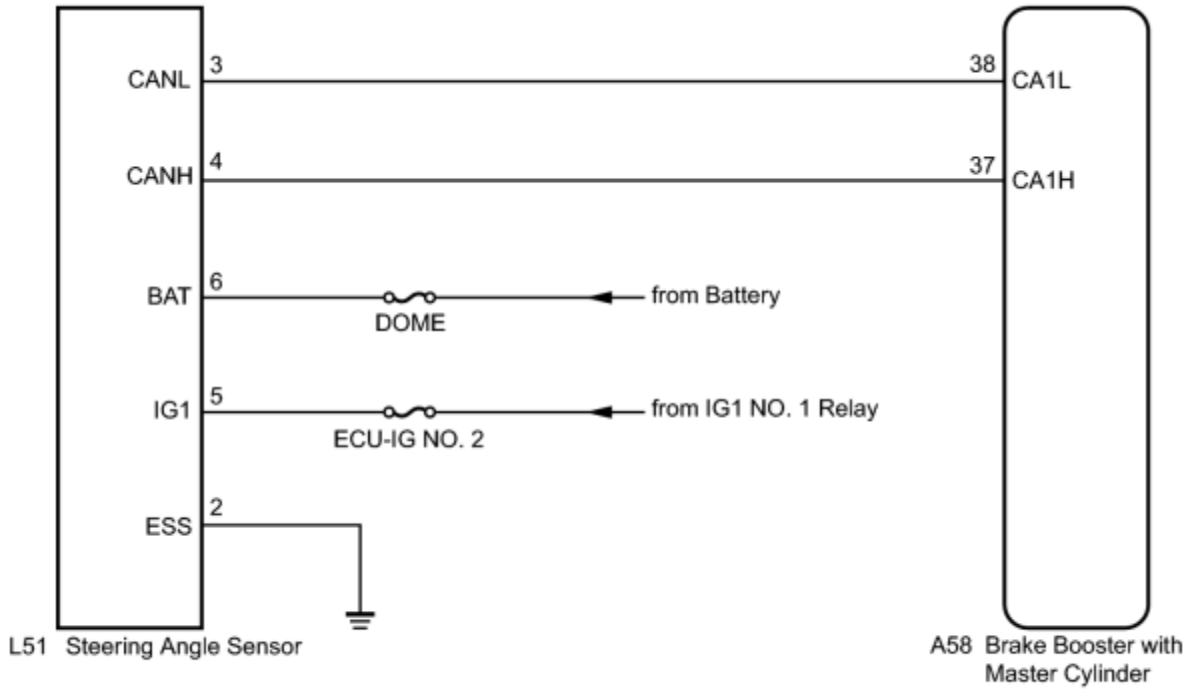
| DTC | C1231/31 | Steering Angle Sensor Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The skid control ECU inputs steering angle sensor signals via the CAN communication. When a malfunction occurs in the communication line with the steering angle sensor, DTC U0126/63 (Lost Communication with Steering Angle Sensor Module) is output.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1231/31 | 701 | While steering angle sensor communication is enabled, a malfunction signal output is received during the sensor self-check (sensor malfunction). | Steering angle sensor internal malfunction |
| ↑ | 702 | While steering angle sensor communication is enabled, a malfunction signal output is received during the sensor self-check (internal malfunction). | ↑ |
| ↑ | 703 | While steering angle sensor communication is enabled, a malfunction signal output is received during the sensor self-check (+B malfunction). | ↑ |

# WIRING DIAGRAM




N

# INSPECTION PROCEDURE

HINT:

- When U0126/63 is output together with C1231/31, inspect and repair the trouble areas indicated by U0126/63 first INFO.
- When the speed sensor or the yaw rate and acceleration sensor are malfunctioning, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate and acceleration sensor are output together with DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate and acceleration sensor first, and then inspect and repair the steering angle sensor.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch off.

(c) Turn the power switch on (IG) again and check that no CAN communication system DTC is output INFO.

(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 35 km/h (22 mph) and check that no speed sensor and/or yaw rate and acceleration sensor DTCs are output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1231/31) is output | A |
| CAN communication system DTC is output | B |
| Speed sensor and/or yaw rate and acceleration sensor DTC is output | C |
| DTC (C1231/31) is not output | D |

HINT:

- When DTCs indicating CAN communication system malfunctions are output, repair the CAN communication system before repairing each corresponding sensor.
- If there is a malfunction in the speed sensor or the yaw rate and acceleration sensor, an abnormal value may be output although the steering angle sensor is normal.
- If speed sensor and yaw rate and acceleration sensor DTCs are output simultaneously, repair these two sensors and inspect the steering angle sensor.

D ▶ CHECK FOR INTERMITTENT PROBLEMS

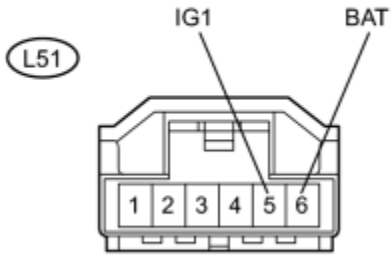
C ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | INSPECT STEERING ANGLE SENSOR (POWER SOURCE TERMINAL) |

*1




(a) Turn the power switch off.

(b) Remove the steering wheel and the column cover.

(c) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(d) Disconnect the steering angle sensor connector.

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L51-5 (IG1) - Body ground | Power switch on (IG) | 11 to 14 V |
| L51-6 (BAT) - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Steering Angle Sensor) |

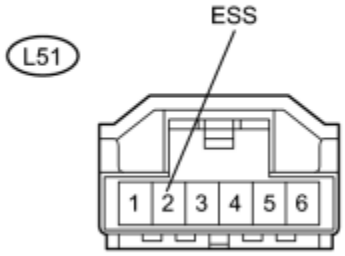
NG REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK

| | |
|---|---|
| 3. | INSPECT STEERING ANGLE SENSOR (GROUND TERMINAL) |

(a) Turn the power switch off.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L51-2 (ESS) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Steering Angle Sensor) |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

OK ▶ **REPLACE SPIRAL CABLE SUB-ASSEMBLY (STEERING ANGLE SENSOR)**

| | | |
|---|---|---|
| DTC | C1235/35 | Foreign Object is Attached on Tip of Front Speed Sensor RH |
| DTC | C1236/36 | Foreign Object is Attached on Tip of Front Speed Sensor LH |
| DTC | C1238/38 | Foreign Object is Attached on Tip of Rear Speed Sensor RH |
| DTC | C1239/39 | Foreign Object is Attached on Tip of Rear Speed Sensor LH |
| DTC | C1275/75 | Abnormal Change in Output Signal of Front Speed Sensor RH (Test Mode DTC) |
| DTC | C1276/76 | Abnormal Change in Output Signal of Front Speed Sensor LH (Test Mode DTC) |
| DTC | C1277/77 | Abnormal Change in Output Signal of Rear Speed Sensor RH (Test Mode DTC) |
| DTC | C1278/78 | Abnormal Change in Output Signal of Rear Speed Sensor LH (Test Mode DTC) |

# DESCRIPTION

When foreign matter adheres to the speed sensor tip or speed sensor rotor, these DTCs are output. An abnormal waveform input from the sensor determines these conditions.

These DTCs may be detected when a malfunction occurs in the connector terminals or wire harness of the speed sensor circuit.

DTCs C1275/75 to C1278/78 will be cleared when the speed sensor sends a wheel speed signal or when Test Mode ends. DTCs from C1275/75 to C1278/78 are output only in Test Mode.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1235/35 | 541 | Either of the following is detected:<br>1. When driving at 20 km/h (12 mph) or more, noise occurs on the speed sensor signal waveform for 5 seconds or more.<br>2. When driving at 10 km/h (6 mph) or more, noise occurs once per wheel revolution for 15 seconds or more. | • Speed sensor rotor malfunction (foreign object attached)<br>• Foreign object attached to speed sensor<br>• Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Resistance in speed sensor circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| C1236/36 | 542 | Either of the following is detected:<br>1. When driving at 20 km/h (12 mph) or more, noise occurs on the speed sensor signal waveform for 5 seconds or more.<br>2. When driving at 10 km/h (6 mph) or more, noise occurs once per wheel revolution for 15 seconds or more. | • Speed sensor rotor malfunction (foreign object attached)<br>• Foreign object attached to speed sensor<br>• Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Resistance in speed sensor circuit |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | • Brake booster with master cylinder (Skid control ECU) |
| C1238/38 | 543 | Either of the following is detected:<br>1. When driving at 20 km/h (12 mph) or more, noise occurs on the speed sensor signal waveform for 5 seconds or more.<br>2. When driving at 10 km/h (6 mph) or more, noise occurs once per wheel revolution for 15 seconds or more. | • Speed sensor rotor malfunction (foreign object attached)<br>• Foreign object attached to speed sensor<br>• Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Resistance in speed sensor circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| C1239/39 | 544 | Either of the following is detected:<br>1. When driving at 20 km/h (12 mph) or more, noise occurs on the speed sensor signal waveform for 5 seconds or more.<br>2. When driving at 10 km/h (6 mph) or more, noise occurs once per wheel revolution for 15 seconds or more. | • Speed sensor rotor malfunction (foreign object attached)<br>• Foreign object attached to speed sensor<br>• Open or short in speed sensor<br>• Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Resistance in speed sensor circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| C1275/75<br>C1276/76<br>C1277/77<br>C1278/78 | - | Detected only during Test Mode. | • Speed sensor<br>• Speed sensor rotor |

HINT:

- DTCs C1235/35 and C1275/75 are for the front speed sensor RH.
- DTCs C1236/36 and C1276/76 are for the front speed sensor LH.
- DTCs C1238/38 and C1277/77 are for the rear speed sensor RH.
- DTCs C1239/39 and C1278/78 are for the rear speed sensor LH.

# WIRING DIAGRAM

Refer to DTCs C0200/31, C0205/32, C0210/33 and C0215/34 INFO for front, and INFO for rear).

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Check that no speed sensor malfunction DTC is output INFO.

HINT:

When C0200/31, C0205/32, C0210/33, and/or C0215/34 are output together with C1235/35, C1236/36, C1238/38, and/or C1239/39, inspect and repair the trouble areas indicated by C0200/31, C0205/32, C0210/33, and/or C0215/34 first.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1235/35 and/or C1236/36) are output | A |
| DTCs (C1238/38 and C1239/39) are output | B |
| Speed sensor malfunction DTCs (C0200/31, C0205/32, C0210/33 and/or C0215/34) are output | C |

C REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

B CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE)

A

| | |
|---|---|
| 2. | CHECK FRONT SPEED SENSOR AND FRONT SPEED SENSOR ROTOR |

(a) Remove the front speed sensor and front speed sensor rotor INFO and INFO).

(b) Check the speed sensor tip and speed sensor rotor.

OK:

The sensor tip and rotor is free of scratches, oil, and foreign matter.

NOTICE:

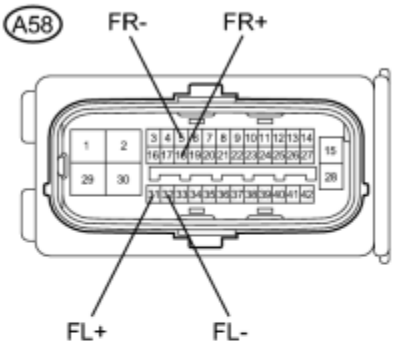
Check the speed sensor signal after cleaning or replacement INFO.

NG CLEAN OR REPLACE FRONT SPEED SENSOR AND FRONT SPEED SENSOR ROTOR

OK

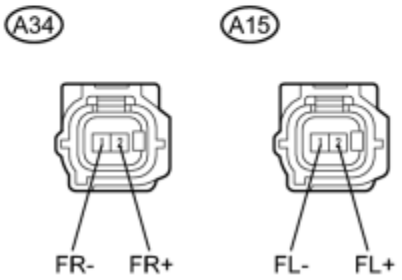
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - FRONT SPEED SENSOR) |

*1




(a) Install the front speed sensor and front speed sensor rotor.

*2




(b) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(c) Disconnect the skid control ECU connector and the front speed sensor connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for RH

for LH

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-18 (FR+) - A34-2 (FR+) | Always | Below 1 Ω |
| A58-18 (FR+) - Body ground | Always | 10 kΩ or higher |
| A58-5 (FR-) - A34-1 (FR-) | Always | Below 1 Ω |
| A58-5 (FR-) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-31 (FL+) - A15-2 (FL+) | Always | Below 1 Ω |
| A58-31 (FL+) - Body ground | Always | 10 kΩ or higher |
| A58-32 (FL-) - A15-1 (FL-) | Always | Below 1 Ω |
| A58-32 (FL-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Front Speed Sensor) |

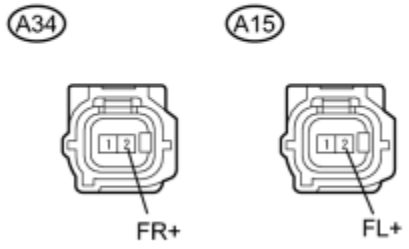
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | INSPECT SKID CONTROL ECU (SENSOR OUTPUT) |

*1




(a) Reconnect the skid control ECU connector.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

for RH

for LH

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A34-2 (FR+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A15-2 (FL+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Speed Sensor) |

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

▼

| | |
|---|---|
| 5. | RECONFIRM DTC |

(a) Reconnect the front speed sensor connector.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 15 seconds.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1235/35 and/or C1236/36) are output | A |
| DTCs (C1235/35 and C1236/36) are not output | B |

B ▶ CHECK FOR INTERMITTENT PROBLEMS

A

▼

| | |
|---|---|
| 6. | REPLACE FRONT SPEED SENSOR |

(a) Turn the power switch off.

(b) Replace the front speed sensor INFO.

NOTICE:

Check the speed sensor signal after replacement INFO.

NEXT

| | |
|---|---|
| 7. | RECONFIRM DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 15 seconds.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1235/35 and/or C1236/36) are output | A |
| DTCs (C1235/35 and C1236/36) are not output | B |

B END

A

| | |
|---|---|
| 8. | REPLACE FRONT SPEED SENSOR ROTOR |

(a) Turn the power switch off.

(b) Replace the front axle hub sub-assembly (front speed sensor rotor) INFO.

HINT:

The front speed sensor rotor is incorporated into the front axle hub sub-assembly.

If the front speed sensor rotor needs to be replaced, replace it together with the front axle hub sub-assembly.

NOTICE:

Check the speed sensor signal after replacement INFO.

NEXT

| | |
|---|---|
| 9. | RECONFIRM DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 15 seconds.

(d) Check if the same DTC is recorded INFO.

Result:

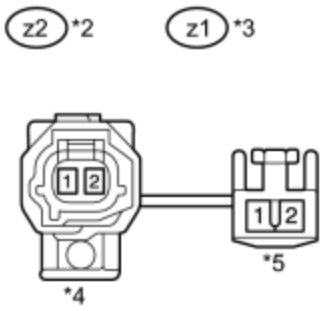
| Result | Proceed to |
|---|---|
| DTCs (C1235/35 and/or C1236/36) are output | A |
| DTCs (C1235/35 and C1236/36) are not output | B |

B END

A **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (SKID CONTROL SENSOR WIRE) |

*1




(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

N

(b) Disconnect the rear speed sensor connector and the skid control sensor wire.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for RH

for LH

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z2 ("A"-2) - z2 ("B"-1) | Always | Below 1 Ω |
| z2 ("A"-2) - z2 ("B"-2) | Always | 10 kΩ or higher |
| z2 ("A"-2) - Body ground | Always | 10 kΩ or higher |
| z2 ("A"-1) - z2 ("B"-2) | Always | Below 1 Ω |
| z2 ("A"-1) - z2 ("B"-1) | Always | 10 kΩ or higher |
| z2("A"-1) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z1 ("A"-2) - z1 ("B"-1) | Always | Below 1 Ω |
| z1 ("A"-2) - z1 ("B"-2) | Always | 10 kΩ or higher |
| z1 ("A"-2) - Body ground | Always | 10 kΩ or higher |
| z1 ("A"-1) - z1 ("B"-2) | Always | Below 1 Ω |
| z1 ("A"-1) - z1 ("B"-1) | Always | 10 kΩ or higher |
| z1 ("A"-1) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of skid control sensor wire |
| *2 | for RH |
| *3 | for LH |
| *4 | Front view of wire harness connector<br><br>(to Sensor Side Connector "A") |
| *5 | Front view of wire harness connector<br><br>(to Vehicle Side Connector "B") |

NOTICE:

Check the speed sensor signal after replacement INFO.

NG ▶ REPLACE SKID CONTROL SENSOR WIRE

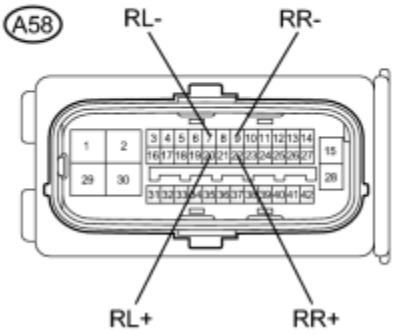
OK

▼

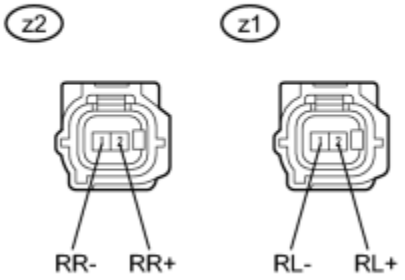
| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - REAR SPEED SENSOR) |

(a) Reconnect the skid control sensor wire (for vehicle side connector).

*1




*2




(b) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(c) Disconnect the skid control ECU connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

for RH

for LH

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-22 (RR+) - z2-2 (RR+) | Always | Below 1 Ω |
| A58-22 (RR+) - Body ground | Always | 10 kΩ or higher |
| A58-9 (RR-) - z2-1 (RR-) | Always | Below 1 Ω |
| A58-9 (RR-) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-20 (RL+) - z1-2 (RL+) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-20 (RL+) - Body ground | Always | 10 kΩ or higher |
| A58-7 (RL-) - z1-1 (RL-) | Always | Below 1 Ω |
| A58-7 (RL-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Rear Speed Sensor) |

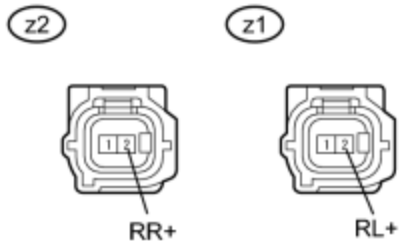
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 12. | INSPECT SKID CONTROL ECU (SENSOR OUTPUT) |

*1




(a) Reconnect the skid control ECU connector.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

for RH

for LH

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z2-2 (RR+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z1-2 (RL+) - Body ground | Power switch on (IG) | 5.7 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Rear Speed Sensor) |

NG REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

| | |
|---|---|
| 13. | RECONFIRM DTC |

(a) Reconnect the rear speed sensor connector.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 15 seconds.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1238/38 and/or C1239/39) are output | A |
| DTCs (C1238/38 and C1239/39) are not output | B |

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 14. | REPLACE REAR SPEED SENSOR AND REAR SPEED SENSOR ROTOR |

(a) Turn the power switch off.

(b) Replace the rear speed sensor and the rear axle hub and bearing assembly (rear speed sensor rotor) INFO.

HINT:

The rear speed sensor rotor is incorporated into the rear axle hub and bearing assembly.

If the rear speed sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly with rear speed sensor.

NOTICE:

Check the speed sensor signal after replacement INFO.

NEXT

| | |
|---|---|
| 15. | RECONFIRM DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Drive the vehicle at a speed of 20 km/h (12 mph) or more for at least 15 seconds.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1238/38 and/or C1239/39) are output | A |
| DTCs (C1238/38 and C1239/39) are not output | B |

B END

A **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | | |
|---|---|---|
| DTC | C1241/41 | Low Battery Positive Voltage |
| DTC | C1242/42 | Open in IG1 / IG2 Power Source Circuit |

# DESCRIPTION

If a malfunction is detected in the power supply circuit, the skid control ECU power source voltage drops, or there is insufficient voltage to operate ABS main relay, the skid control ECU will store these codes.

These codes may be also be stored if the auxiliary battery voltage drops below 9.5 V.

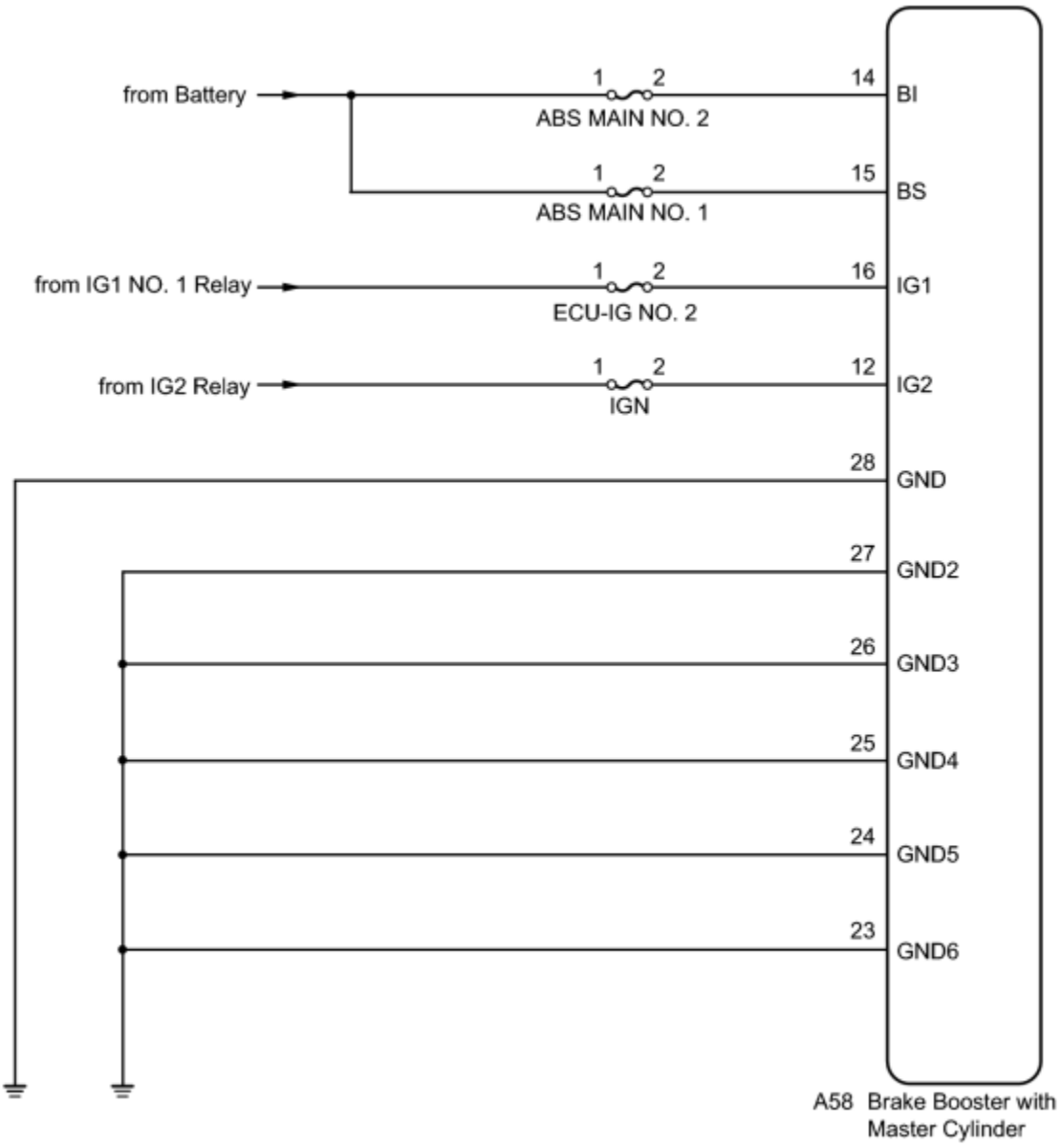
HINT:

DTC C1256/56 (Accumulator Low Pressure) may also be memorized if there is a drop in power source voltage.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1241/41 | 101 | Any of the following conditions when the BS terminal voltage is 9.3 V or less:<br>1. Vehicle not decelerated (brake pedal is not depressed) for 3 seconds or more.<br>2. While depressing the brake pedal, linear solenoid current does not satisfy 1.34A.<br>3. Vehicle decelerated (brake pedal is depressed) for 0.06 seconds. | • Improperly connected connector, deformation or corrosion of terminals<br>• Auxiliary battery<br>• Hybrid control system (Charging circuit)<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 102 | Either of the following conditions when the ECU internal voltage is 6.3 V or less:<br>1. When main relay ON is requested, voltage of the relay connection does not exceed 3.5 V for 0.22 seconds or more.<br>2. Sensor supply voltage is 4.75 V or less, or 5.25 V or more for 0.06 seconds.<br>3. Accumulator pressure sensor output voltage is 4.54 V or less, or 5.46 V or more for 0.06 seconds. | ↑ |
| ↑ | 551 | When driving at 3 km/h (1.9 mph) or more, IG1 terminal voltage is 9.5 V or less, or VM1 voltage is 8.6 V or less for 10 seconds or more. | ↑ |
| ↑ | 552 | When VM1 voltage is 8.6 V or less, sensor supply voltage is low for 60 seconds or more. | ↑ |
| ↑ | 553 | VM1 voltage is 16.6 V or more for 0.8 seconds. | ↑ |
| C1242/42 | 111 | Voltage is not applied to the IG1 terminal (less than 3.5 V), and applied to the IG2 terminal (9.5 V or more) for 4 seconds or more. | • Open or short in IG1 circuit<br>• Improperly connected connector, deformation or corrosion of terminals |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | • Smart key system (IG start circuit)<br>• Auxiliary battery<br>• Hybrid control system (Charging circuit)<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 112 | Voltage is not applied to the IG2 terminal (less than 3.5 V), and applied to the IG1 terminal (9.5 V or more) for 4 seconds or more. | • Open or short in IG2 circuit<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Smart key system (IG start circuit)<br>• Auxiliary battery<br>• Hybrid control system (Charging circuit)<br>• Brake booster with master cylinder (Skid control ECU) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK SMART KEY SYSTEM (for Start Function) |

(a) Check if the smart key system (for start function) DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B INSPECT SMART KEY SYSTEM (for Start Function)

A

| | |
|---|---|
| 2. | CHECK HYBRID CONTROL SYSTEM |

(a) Check if the hybrid control system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B INSPECT HYBRID CONTROL SYSTEM

A

| | |
|---|---|
| 3. | CHECK DTC |

(a) Check that no main relay DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| Main relay malfunction DTC is not output | A |
| Main relay malfunction DTC is output | B |

B REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A

| | |
|---|---|
| 4. | CHECK AUXILIARY BATTERY |

(a) Check the auxiliary battery voltage.

Standard Voltage:

11 to 14 V

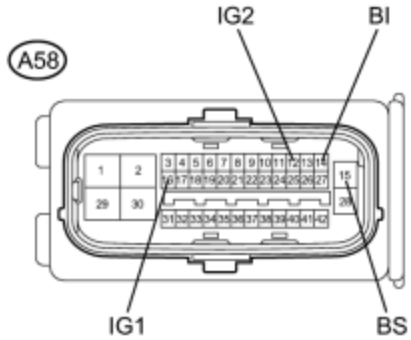
NG ▶ CHARGE OR REPLACE AUXILIARY BATTERY

OK

▼

| | |
|---|---|
| 5. | INSPECT SKID CONTROL ECU (POWER SOURCE TERMINAL) |

*1




(a) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(b) Disconnect the skid control ECU connector.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-14 (BI) - Body ground | Always | 11 to 14 V |
| A58-15 (BS) - Body ground | Always | 11 to 14 V |
| A58-16 (IG1) - Body ground | Power switch on (IG) | 11 to 14 V |
| A58-12 (IG2) - Body ground | Power switch on (IG) | 11 to 14 V |

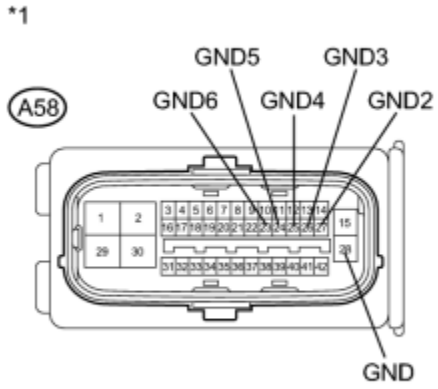
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK

| | |
|---|---|
| 6. | INSPECT SKID CONTROL ECU (GND TERMINAL) |




(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-28 (GND) - Body ground | Always | Below 1 Ω |
| A58-27 (GND2) - Body ground | Always | Below 1 Ω |
| A58-26 (GND3) - Body ground | Always | Below 1 Ω |
| A58-25 (GND4) - Body ground | Always | Below 1 Ω |
| A58-24 (GND5) - Body ground | Always | Below 1 Ω |
| A58-23 (GND6) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK

| | |
|---|---|
| 7. | RECONFIRM DTC |

(a) Reconnect the skid control ECU connector.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Perform a road test.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1241/41 and C1242/42) are not output | A |
| DTCs (C1241/41 and/or C1242/42) are output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | C1246/46 | Master Cylinder Pressure Sensor Malfunction |
| DTC | C1281/81 | Master Cylinder Pressure Sensor Output Malfunction (Test Mode DTC) |
| DTC | C1364/61 | Wheel Cylinder Pressure Sensor Malfunction |

# DESCRIPTION

The regulator pressure sensor and the wheel cylinder pressure sensor are built into the brake actuator, and measure the regulator pressure and the wheel cylinder pressure sent to the skid control ECU.

DTC C1281/81 will be cleared when the regulator pressure sensor sends a regulator pressure signal or when Test Mode ends. DTC C1281/81 is output only in Test Mode.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1246/46 | 201 | Sensor supply voltage (VCM1) is 4.75 V or less, or 5.25 V or more for 0.05 seconds. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 202 | Regulator pressure sensor output voltage (Preg) is less than 8%, or 90.3% or more (less than 0.4 V, or 4.52 V or more) of sensor supply voltage (VCM1) for 0.05 seconds or more. | ↑ |
| ↑ | 203 | When not under braking, the regulator pressure sensor output voltage is 0.2 V or less or 0.88 V or more for 3 seconds or more. | ↑ |
| ↑ | 204 | Either of the following is detected:<br>1. The regulator pressure sensor output voltage does not correspond with stroke sensor and the readings remain out of specification for 0.5 to 5 seconds or more continuously.<br>(The stroke sensor may be malfunctioning.)<br>2. The regulator pressure sensor output voltage does not correspond with wheel cylinder pressure sensor and the outputs remain out of specification for 0.5 to 5 seconds or more continuously.<br>(May be output with INF code 424.) | • Brake pedal stroke sensor<br>• Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 207 | Fluctuation of regulator pressure sensor output is out of specification (the difference between the present value and last value is 15 MPa or more) for 0.1 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| C1364/61 | 421 | Sensor supply voltage 1 (VCM1) is 4.75 V or less, or 5.25 V or more for 0.05 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 422 | Wheel cylinder pressure sensor output voltage (Pfront) is less than 8%, or 90.3% or more (less than 0.4 V, or 4.52 V | ↑ |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | or more) of sensor supply voltage (VCM1) for 0.05 seconds or more. | |
| ↑ | 423 | When not under braking, the wheel cylinder pressure sensor output voltage is 0.2 V or less or 0.88 V or more for 0.1 to 3 seconds or more. | ↑ |
| ↑ | 424 | The wheel cylinder pressure sensor output voltage does not correspond with regulator pressure sensor and the outputs remain out of specification for 0.5 to 5 seconds or more continuously.<br><br>(May be output with INF code 204.) | ↑ |
| ↑ | 426 | Fluctuation of wheel cylinder pressure sensor output is out of specification (the difference between the present value and last value is 15 MPa or more) for 0.1 seconds or more. | ↑ |
| C1281/81 | - | Detected only during Test Mode. | • Stop light switch<br>• Regulator pressure sensor |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU or brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (REGULATOR PRESSURE SENSOR) |

(a) Set a pedal effort gauge and LSPV gauge to rear wheel INFO.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Regulator Pressure Sensor Output | Regulator pressure sensor output / Min.: 0 V, Max.: 5 V | When brake pedal released: | Reading increases when brake pedal is depressed |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | 0.1 to 0.9 V | |

(e) Check the output value of the regulator pressure sensor as the brake pedal is depressed.

Standard Voltage:

| Brake Effort (N (kgf, lbf)) | Regulator Pressure Sensor Output (V) | Rear Right Wheel Hydraulic Pressure (MPa (kgf/cm$^2$, psi)) | Rear Left Wheel Hydraulic Pressure (MPa (kgf/cm$^2$, psi)) |
|---|---|---|---|
| 100 (10.2, 22.5) | 1.35 to 2.15 | 4.10 to 8.10 (41.8 to 82.5, 595 to 1174) | 4.10 to 8.10 (41.8 to 82.5, 595 to 1174) |
| 200 (20.4, 45.0) | 3.00 to 3.80 | 12.20 to 16.20 (124.4 to 165.1, 1770 to 2349) | 12.20 to 16.20 (124.4 to 165.1, 1770 to 2349) |

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (WHEEL CYLINDER PRESSURE SENSOR) |

(a) Set a LSPV gauge to front wheel INFO.

(b) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released:<br><br>0.1 to 0.9 V | Reading increases when brake pedal is depressed |

(c) Check the output value of the wheel cylinder pressure sensor at each hydraulic pressure during electronically controlled brake system control.

Standard Voltage:

for Front Wheel Cylinder Pressure Sensor LH

for Front Wheel Cylinder Pressure Sensor RH

| Hydraulic Pressure (MPa (kgf/cm$^2$, psi)) | Wheel Cylinder Pressure Sensor (V) |
|---|---|
| 2.0 (20.4, 290) | 0.53 to 1.33 |
| 5.0 (51.0, 725) | 1.12 to 1.92 |
| 7.0 (71.4, 1015) | 1.52 to 2.32 |
| 10.0 (102.0, 1451) | 2.14 to 2.94 |


| Hydraulic Pressure (MPa (kgf/cm$^2$, psi)) | Wheel Cylinder Pressure Sensor (V) |
|---|---|
| 2.0 (20.4, 290) | 0.53 to 1.33 |
| 5.0 (51.0, 725) | 1.12 to 1.92 |
| 7.0 (71.4, 1015) | 1.52 to 2.32 |
| 10.0 (102.0, 1451) | 2.14 to 2.94 |


NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK

▼

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (BRAKE PEDAL STROKE SENSOR AND PRESSURE SENSOR COMPARISON) |

(a) Set a pedal effort gauge and LSPV gauge to front and rear wheel INFO.

(b) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stroke Sensor | Brake pedal stroke sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.65 to 1.35 V | Reading increases when brake pedal is depressed |
| Stroke Sensor2 | Brake pedal stroke sensor 2 / Min.: 0 V, Max.: 5 V | When brake pedal released: 3.65 to 4.35 V | Reading decreases when brake pedal is depressed |
| Regulator Pressure Sensor Output | Regulator pressure sensor output / Min.: 0 V, Max.: 5 V | When brake pedal released:<br><br>0.1 to 0.9 V | Reading increases when brake pedal is depressed |
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released:<br><br>0.1 to 0.9 V | Reading increases when brake pedal is depressed |

(c) Check the output value of the brake pedal stroke sensor as the brake pedal is depressed.

Standard Voltage:

| Brake Effort (N (kgf, lbf)) | Stroke Sensor (V) | Stroke Sensor2 (V) | Regulator Pressure Sensor Output (V) | Wheel Cylinder Pressure Sensor (V) |
|---|---|---|---|---|
| 100 (10.2, 22.5) | 1.10 to 1.80 | 3.20 to 3.90 | 1.35 to 2.15 | 1.17 to 1.97 |
| 200 (20.4, 45.0) | 1.45 to 2.15 | 2.85 to 3.55 | 3.00 to 3.80 | 2.58 to 3.38 |

NG REPLACE BRAKE PEDAL STROKE SENSOR

OK

| | |
|---|---|
| 4. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Perform a road test.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1246/46 and C1364/61) are not output | A |
| DTCs (C1246/46 and/or C1364/61) are output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | C1247/47 | Stroke Sensor Malfunction |
| DTC | C1346/71 | Stroke Sensor Zero Point Learning Malfunction (Test Mode DTC) |
| DTC | C1392/48 | Stroke Sensor Zero Point Calibration Undone |

# DESCRIPTION

The stroke sensor inputs the pedal stroke into the skid control ECU.

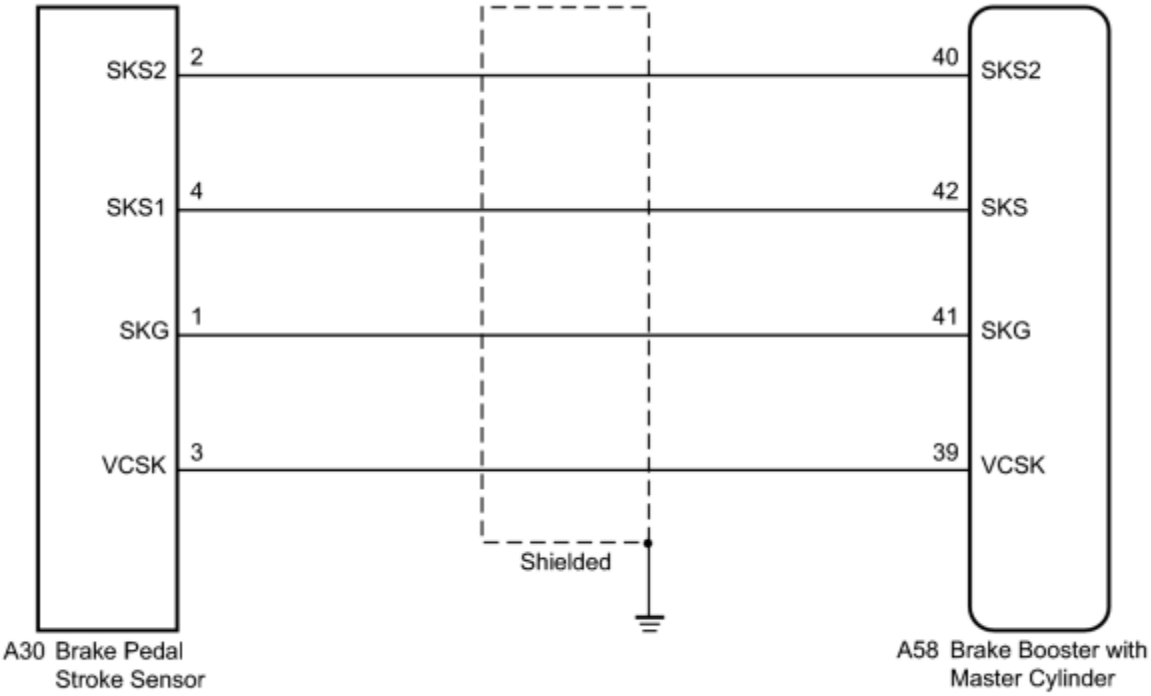
DTC C1346/71 will be cleared when the brake pedal stroke sensor sends a stroke sensor signal or when Test Mode ends. DTC C1346/71 is output only in Test Mode.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1247/47 | 211 | Sensor supply voltage (VCM1) is 4.75 V or less, or 5.25 V or more for 0.2 seconds or more. | • Open or short in brake pedal stroke sensor power supply circuit<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 212 | Sensor output voltage 1 (SKS1) is less than 3%, or 97% or more (less than 0.15 V, or 4.85 V or more) of sensor supply voltage (VCM1) for 0.2 seconds or more. | • Open or short in wire harness<br>• Improperly connected connector, deformation or corrosion of terminals<br>• Brake pedal stroke sensor |
| ↑ | 213 | Sensor output voltage 2 (SKS2) is less than 3%, or 97% or more (less than 0.15 V, or 4.85 V or more) of sensor supply voltage (VCSK) for 0.2 seconds or more. | ↑ |
| ↑ | 214 | Either of the following is detected:<br>1. Fluctuation of sensor output 1 (SKS1) is out of specification.<br>2. The difference between the present value and last value of sensor output voltage 1 (SKS1) is 8.5% or more (0.43 V or more) of sensor supply voltage (VCM1) for 0.2 seconds or more. | ↑ |
| ↑ | 215 | Either of the following is detected:<br>1. Fluctuation of sensor output 2 (SKS2) is out of specification.<br>2. The difference between the present value and last value of the sensor output voltage 2 (SKS2) is 8.5% or more (0.43 V or more) of the sensor | ↑ |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | supply voltage (VCM1) for 0.2 seconds or more. | |
| ↑ | 216 | Either of the following is detected:<br>1. Brake pedal OFF position (0 point learned value) is out of specification.<br>2. The 0 point learned value of sensor output 1 (SKS1) is -17% to 25.9% (0.15 to 2.3V) or more than the theoretical value. | ↑ |
| ↑ | 217 | Either of the following is detected:<br>1. Brake pedal OFF position (0 point learned value) is out of specification.<br>2. The 0 point learned value of sensor output 2 (SKS2) is -31.7% to 17% (2.42 to 4.85V) or more than the theoretical value. | ↑ |
| ↑ | 218 | An excessive difference between the change in sensor output 1 (SKS1) and sensor output 2 (SKS2) is detected for 0.2 seconds or more. | ↑ |
| ↑ | 219 | Sensor data is invalid for 0.2 seconds or more.<br>(Skid control ECU internal monitor circuit malfunction.) | ↑ |
| ↑ | 220 | The output from sensor 1 (SKS1) and sensor 2 (SKS2) differ by 15% or more from the theoretical value 5 V. | ↑ |
| ↑ | 221 | The output variation between sensor 1 (SKS1) and sensor 2 (SKS2) differ by an excessive amount. | ↑ |
| ↑ | 222 | Sensor data is invalid for 0.2 seconds or more with sensor supply voltage (VCM1) 4.75 V or less, or 5.25 V or more. | ↑ |
| ↑ | 223 | Sensor data is invalid for 0.2 seconds or more.<br>(Open, short, or noise.) | ↑ |
| C1392/48 | - | Zero point calibration of stroke sensor is unfinished. | • Brake pedal stroke sensor zero point calibration incomplete (Initialization and calibration of linear solenoid valve incomplete)<br>• Brake booster with master cylinder (Skid control ECU) |
| C1346/71 | - | Detected only during Test Mode. | • Brake pedal stroke sensor |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | • Brake pedal stroke sensor circuit |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU) or brake pedal stroke sensor, perform initialization and calibration of the linear solenoid valve INFO.

HINT:

Check the condition of each related circuit connector before troubleshooting INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK BRAKE PEDAL |

(a) Check that the brake pedal and the brake pedal stroke sensor are properly installed and that the pedal can be operated normally.

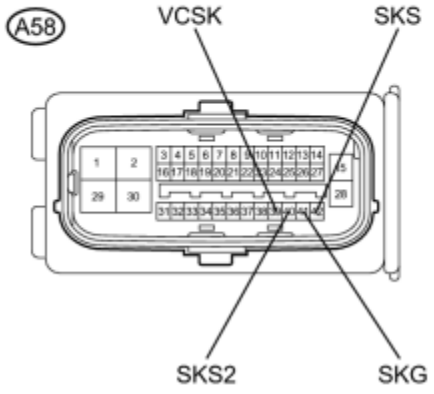
(b) Check and adjust the brake pedal height INFO.

(c) Adjust the brake pedal stroke sensor INFO.

NEXT

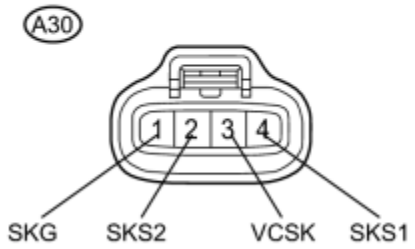
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE PEDAL STROKE SENSOR) |

*1




(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

*2




(b) Disconnect the skid control ECU connector and the brake pedal stroke sensor connector.

(c) Check both the connector case and the terminal for deformation and corrosion.

OK:

No deformation or corrosion.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-39 (VCSK) - A30-3 (VCSK) | Always | Below 1 Ω |
| A58-39 (VCSK) - Body ground | Always | 10 kΩ or higher |
| A58-41 (SKG) - A30-1 (SKG) | Always | Below 1 Ω |
| A58-41 (SKG) - Body ground | Always | 10 kΩ or higher |
| A58-42 (SKS) - A30-4 (SKS1) | Always | Below 1 Ω |
| A58-42 (SKS) - Body ground | Always | 10 kΩ or higher |
| A58-40 (SKS2) - A30-2 (SKS2) | Always | Below 1 Ω |
| A58-40 (SKS2) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Brake Pedal Stroke Sensor) |

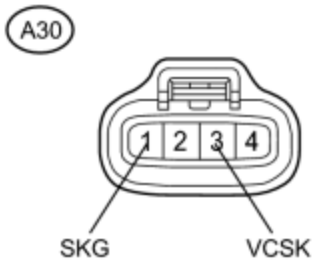
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | INSPECT SKID CONTROL ECU (SENSOR OUTPUT) |

*1




(a) Reconnect the skid control ECU connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A30-3 (VCSK) - A30-1 (SKG) | Power switch on (IG) | 4.84 to 5.16 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Brake Pedal Stroke Sensor) |

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK ▶ **REPLACE BRAKE PEDAL STROKE SENSOR**

| | | |
|---|---|---|
| DTC | C1249/49 | Open in Stop Light Switch Circuit |

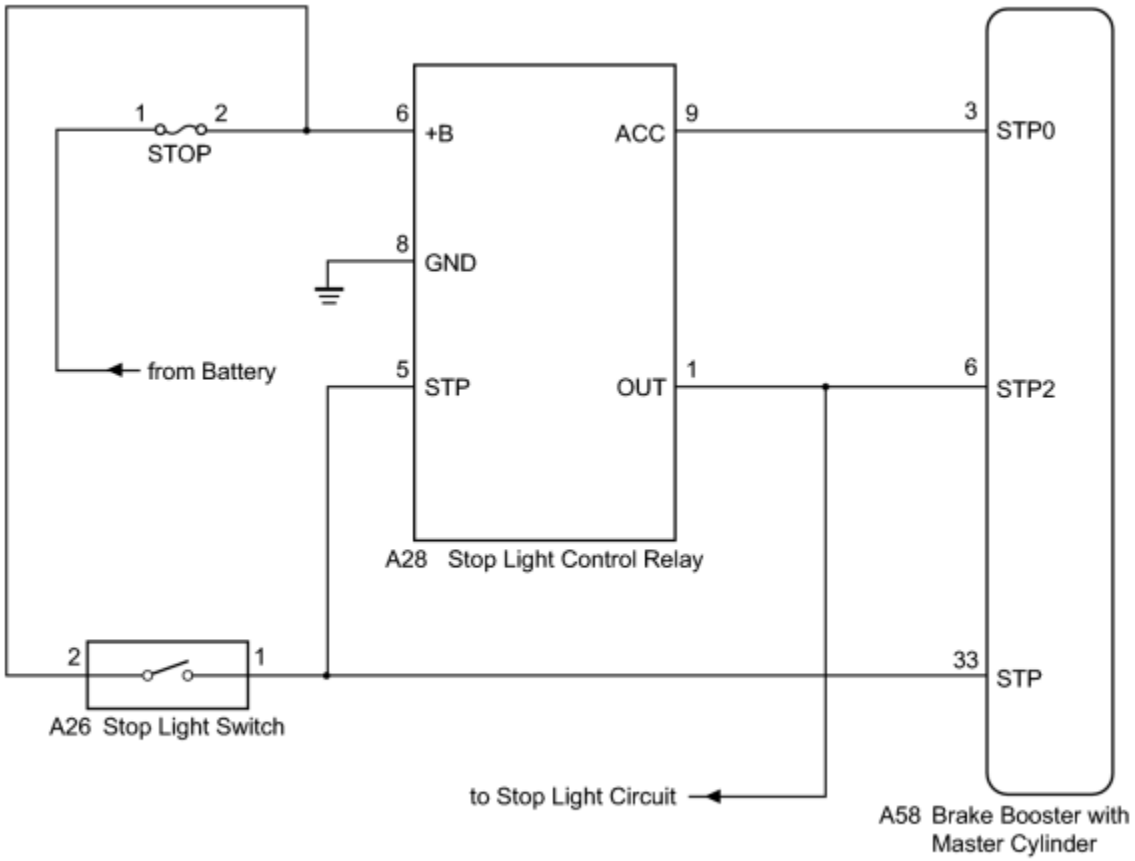
# DESCRIPTION

The skid control ECU inputs the stop light switch signal and detects the brake pedal operation status.

The skid control ECU has an open detection circuit, which outputs this DTC if it detects an open in the stop light input line or ground line of the stop light circuit with the stop light switch off (brake pedal not depressed).

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1249/49 | 231 | When IG1 terminal voltage is 9.5 V or more, an open stop light switch circuit continues for 10 seconds or more. | • STOP fuse<br>• Stop light switch<br>• Stop light switch circuit<br>• Brake booster with master cylinder (Skid control ECU) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK STOP LIGHT OPERATION |

(a) Check that the stop lights come on when the brake pedal is depressed, and go off when the brake pedal is released.

OK:

| Condition | Illumination Condition |
|---|---|
| Brake pedal depressed | ON |

| Condition | Illumination Condition |
|---|---|
| Brake pedal released | OFF |

NG ▶ INSPECT STOP FUSE

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (STOP LIGHT SWITCH) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stop Light SW | Stop light switch / ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |

(d) Check that the stop light switch display observed on the Techstream changes according to brake pedal operation.

OK:

The Techstream displays ON or OFF according to brake pedal operation.

NG ▶ CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH)

OK

▼

| | |
|---|---|
| 3. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Depress the brake pedal several times to test the stop light circuit.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1249/49) is not output | A |
| DTC (C1249/49) is output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

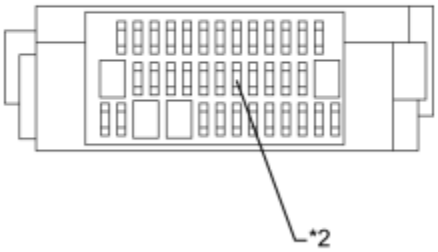
A **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 4. | INSPECT STOP FUSE |

(a) Remove the STOP fuse from the main body ECU (instrument panel junction block).

(b) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| STOP (10 A) fuse | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Main Body ECU (Instrument Panel Junction Block) |
| *2 | STOP Fuse |

H

NG REPLACE STOP FUSE

OK

| | |
|---|---|
| 5. | INSPECT STOP LIGHT SWITCH (POWER SOURCE TERMINAL) |

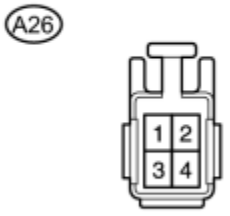
(a) Install the STOP fuse.

(b) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(c) Disconnect the stop light switch connector.

(d) Measure the voltage according to the value(s) in the table below.

*1




Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-2 - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch) |

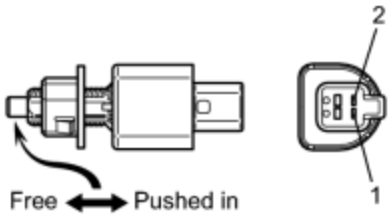
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK

▼

| | |
|---|---|
| 6. | INSPECT STOP LIGHT SWITCH |

Component without harness connected:
(Stop Light Switch)




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Switch pin free | Below 1 Ω |
| 1 - 2 | Switch pin pushed in | 10 kΩ or higher |

N

NG ▶ REPLACE STOP LIGHT SWITCH

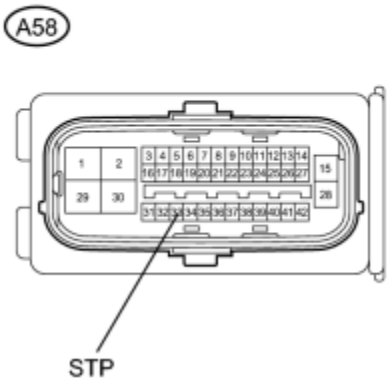
OK

▼

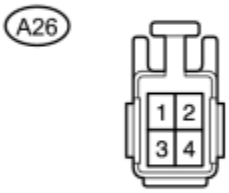
| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH) |

(a) Make sure that there is no looseness at the locking part and the connecting part of the connector.

*1




*2




(b) Disconnect the skid control ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-33 (STP) - A26-1 | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Stop Light Switch) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 8. | RECONFIRM DTC |

(a) Reconnect the skid control ECU connector and the stop light switch connector.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Depress the brake pedal several times to test the stop light circuit.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C249/49) is not output | A |
| DTC (C1249/49) is output | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **INSPECT LIGHTING SYSTEM (STOP LIGHT CIRCUIT)**

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT SWITCH) |

(a) Turn the power switch off.

(b) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

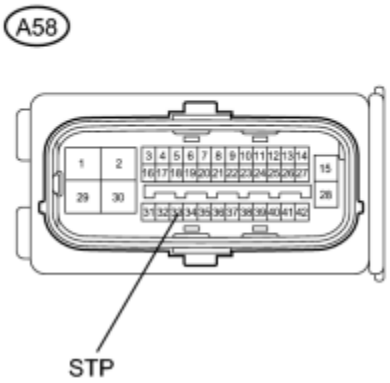
(c) Disconnect the skid control ECU connector and the stop light switch connector.

(d) Measure the resistance according to the value(s) in the table below.

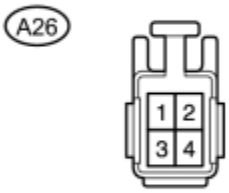
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-33 (STP) - A26-1 | Always | Below 1 Ω |

*1




*2




**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Stop Light Switch) |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

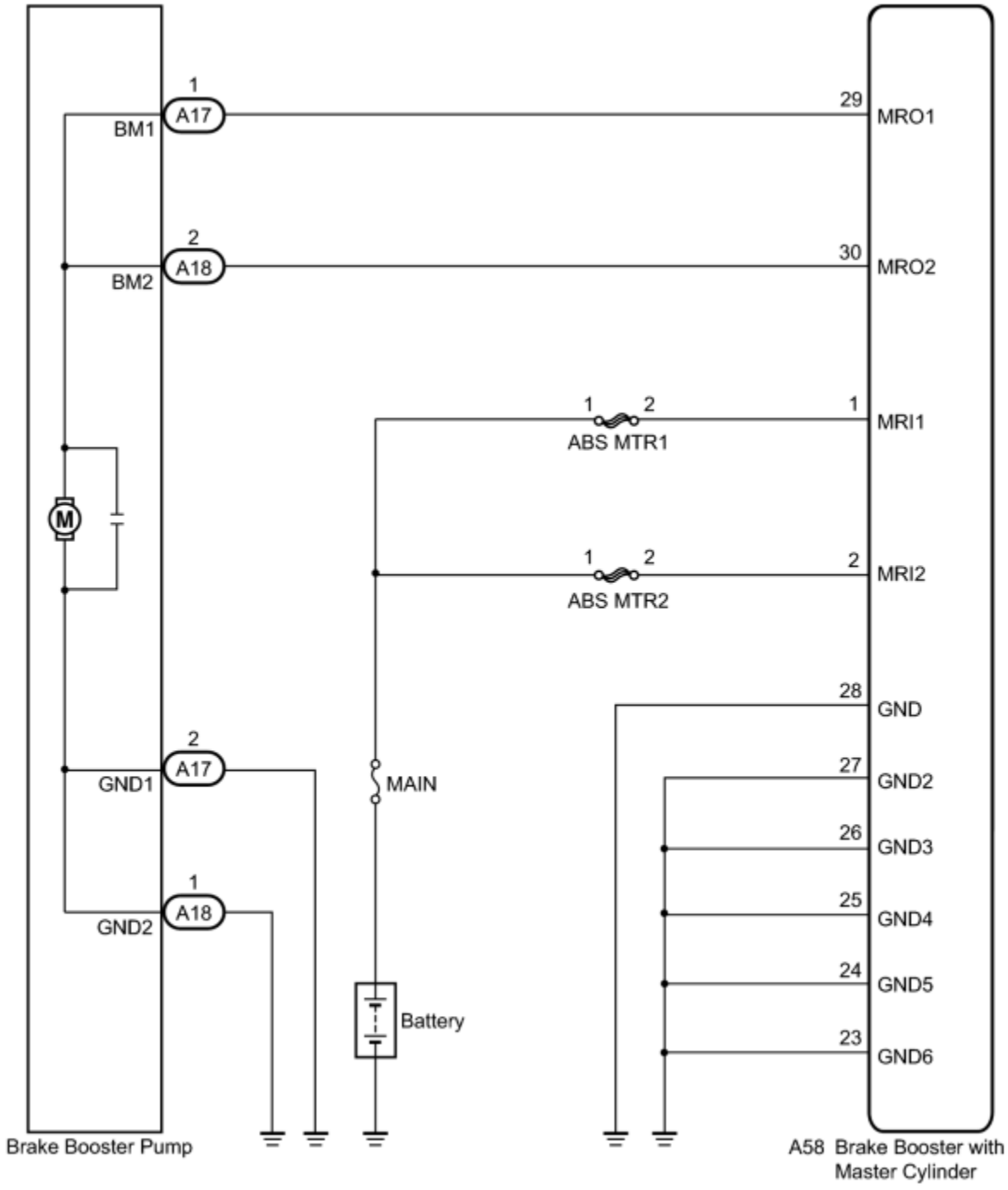
| | | |
|---|---|---|
| DTC | C1252/52 | Brake Booster Pump Motor on Time Abnormally Long |
| DTC | C1253/53 | Pump Motor Relay Malfunction |

# DESCRIPTION

The skid control ECU detects decreases in the accumulator pressure according to the data from the accumulator pressure sensor, and then starts and stops the pump motor by operating the motor relay.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1252/52 | 311 | The pump motor is operating continuously for 178 seconds or more. (When relay malfunction is 98 seconds or more.) | • Short in motor circuit or motor monitor circuit<br>• Motor relay stuck<br>• Accumulator pressure sensor malfunction in brake actuator<br>• Brake booster with master cylinder (Skid control ECU) |
| C1253/53 | 321 | With the IG1 terminal voltage 9.5 V or more, the motor drive monitor remains off for 0.2 seconds or more after a motor drive on request. | • Open in motor circuit or motor monitor circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 322 | The motor drive monitor remains on for 2 seconds or more after a motor drive off request. | • Short in motor circuit or motor monitor circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 323 | The skid control ECU internal motor drive logical inconsistency continues for 2 seconds or more. | Brake booster with master cylinder (Skid control ECU) |
| ↑ | 324 | An open circuit in both skid control ECU internal motor relays 1 and 2. | • Open in motor circuit or motor monitor circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 325 | An open circuit in both skid control ECU internal motor relays 1 and 3. | ↑ |
| ↑ | 326 | An open circuit in both skid control ECU internal motor relays 2 and 3. | ↑ |
| ↑ | 327 | An open circuit in skid control ECU internal motor relay 1. | ↑ |
| ↑ | 328 | An open circuit in skid control ECU internal motor relay 2. | ↑ |
| ↑ | 329 | An open circuit in skid control ECU internal motor relay 3. | ↑ |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU or brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (ABS MOTOR RELAY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Active Test on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ECB* Motor Relay | ABS motor relay | Relay ON/OFF | - |

*: Electronically Controlled Brake System

(d) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ECB* Motor Relay | ABS motor relay / ON or OFF | ON: Relay on<br><br>OFF: Relay off | - |

*: Electronically Controlled Brake System

(e) Check the operating condition of the ABS motor relay when operating it with the Techstream.

Result:

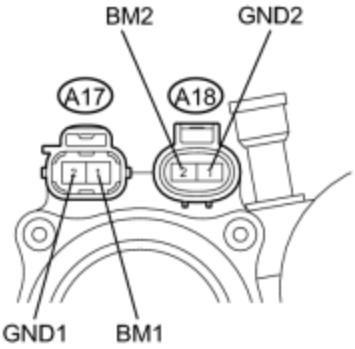
| Result | Proceed to |
|---|---|
| ABS motor relay in the Data List turns ON/OFF using the Active Test | A |
| ABS motor relay in the Data List does not change using the Active Test | B |

B INSPECT ABS MTR FUSES

A

| | |
|---|---|
| 2. | INSPECT BRAKE BOOSTER PUMP |

*1




H

(a) Turn the power switch off.

(b) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(c) Disconnect the brake booster pump connectors.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A17-1 (BM1) - A17-2 (GND1) | Always | Below 10 Ω |
| A18-2 (BM2) - A18-1 (GND2) | Always | Below 10 Ω |
| A17-1 (BM1) - A18-2 (BM2) | Always | Below 1 Ω |
| A17-2 (GND1) - A18-1 (GND2) | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Brake Booster Pump) |

NG ▶ REPLACE BRAKE BOOSTER PUMP

OK

▼

| | |
|---|---|
| 3. | INSPECT BRAKE BOOSTER PUMP (GND TERMINAL) |

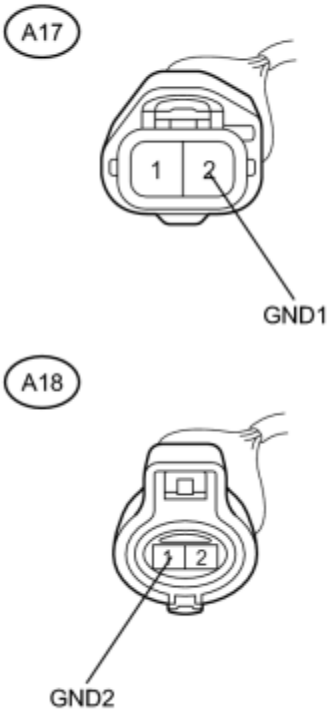
(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| | | |
|---|---|---|
| A17-2 (GND1) - Body ground | Always | Below 1 Ω |
| A18-1 (GND2) - Body ground | Always | Below 1 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Brake Booster Pump) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK

▼

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (ACCUMULATOR PRESSURE SENSOR) |

(a) Reconnect the brake booster pump connectors.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Accumulator Sensor | Accumulator | Specified value: 2.9 to 4.2 V | When brake fluid is stored in the accumulator: Accumulator pressure changes in accordance with |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | pressure sensor /<br><br>Min.: 0 V, Max.: 5 V | | volume of fluid stored in the accumulator |

(e) Wait for 30 seconds without depressing the brake pedal.

(f) Check that the accumulator pressure sensor output values change is within the specified range.

OK:

Accumulator pressure sensor output values change is within 0.55 V.

NG PERFORM ACTIVE TEST USING TECHSTREAM (SOLENOID VALVE)

OK

| | |
|---|---|
| 5. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (IG).

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1252/52 and C1253/53) are not output | A |
| DTCs (C1252/52 and/or C1253/53) are output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

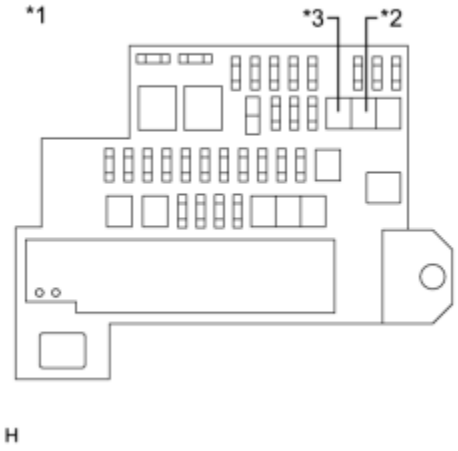
A **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 6. | INSPECT ABS MTR FUSES |

(a) Turn the power switch off.

(b) Remove the ABS MTR fuses.

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| ABS MTR1 (30 A) fuse | Always | Below 1 Ω |
| ABS MTR2 (30 A) fuse | Always | Below 1 Ω |

**Text in Illustration**

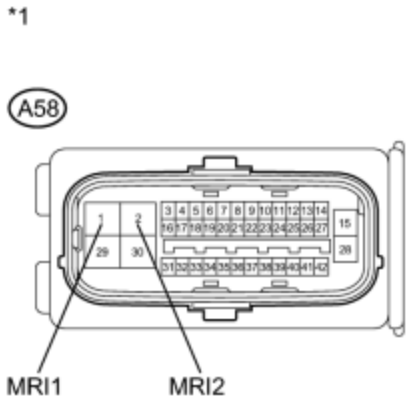
| | |
|---|---|
| *1 | Engine Room Relay Block |
| *2 | ABS MTR1 Fuse |
| *3 | ABS MTR2 Fuse |

NG ▶ REPLACE ABS MTR FUSES

OK

▼

| | |
|---|---|
| 7. | INSPECT SKID CONTROL ECU (MRI TERMINAL) |




(a) Install the ABS MTR fuses.

(b) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(c) Disconnect the skid control ECU connector.

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-1 (MRI1) - Body ground | Always | 11 to 14 V |
| A58-2 (MRI2) - Body ground | Always | 11 to 14 V |

**Text in Illustration**

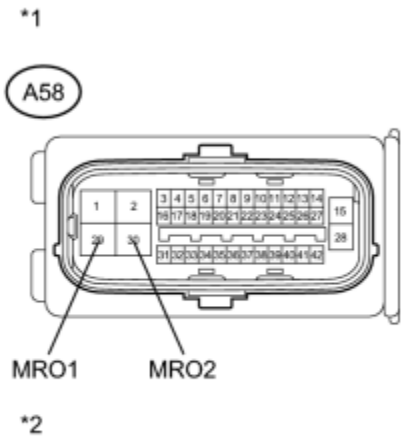
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

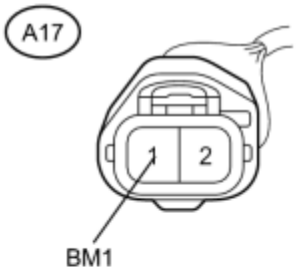
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MRI CIRCUIT)

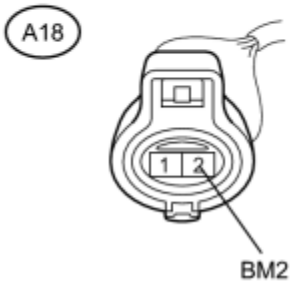
OK

▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - BRAKE BOOSTER PUMP) |




(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(b) Disconnect the brake booster pump connectors.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-29 (MRO1) - A17-1 (BM1) | Always | Below 1 Ω |
| A58-29 (MRO1) - Body ground | Always | 10 kΩ or higher |
| A58-30 (MRO2) - A18-2 (BM2) | Always | Below 1 Ω |
| A58-30 (MRO2) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Brake Booster Pump) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 9. | PERFORM ACTIVE TEST USING TECHSTREAM (SOLENOID VALVE) |

(a) Select the Active Test on the Techstream INFO.

HINT:

The Active Test can be performed when the following conditions are met.

- ABS main relay is on.
- Park (P) selected.
- Parking brake is applied.
- Vehicle speed is 0 km/h (0 mph).

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ECB* Solenoid (SMC/SRC/SCC) | Switching solenoid valve (SMC/SRC/SCC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |

*: Electronically Controlled Brake System

(b) Perform the Active Test of the solenoid using the Techstream.

(c) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.1 to 0.9 V | Reading increases when brake pedal is depressed |

(d) Check that the output value of wheel cylinder does not increase.

OK:

The output value of wheel cylinder does not increase.

HINT:

If any output value increases, there may be brake fluid leaks in the brake actuator.

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK ▶ **REPLACE BRAKE BOOSTER PUMP**

| DTC | C1256/56 | Accumulator Low Pressure |
|---|---|---|

# DESCRIPTION

The accumulator pressure sensor is built into the actuator and detects the accumulator pressure.

The skid control ECU turns on the brake warning light / red (malfunction) and brake warning light / yellow (minor malfunction), and sounds the skid control buzzer if it senses a decrease in the accumulator pressure.

DTC C1256/56 may be output if the accumulator pressure drops due to frequent braking (this is not a malfunction).

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1256/56 | 341 | Significant drop in accumulator pressure continues.<br><br>(DTCs will be stored and the buzzer will operate when either condition is met.) | • Accumulator pressure dropped due to frequent brake pedal operation (not a malfunction)<br>• Pump motor malfunction<br>• Accumulator deterioration<br>• Accumulator pressure sensor<br>• Supply voltage reduced |

# WIRING DIAGRAM

Refer to DTCs C1252/52 and C1253/53 INFO.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

HINT:

When C1202/68, C1241/41, C1252/52, C1253/53 and/or C1391/69 are output together with C1256/56, inspect and repair the trouble areas indicated by C1202/68, C1241/41, C1252/52, C1253/53 and/or C1391/69 first INFO , INFO, INFO, or INFO).

# PROCEDURE

| 1. | BRAKE PROBLEM CHECK |
|---|---|

(a) Ask the customer if frequent braking was performed while the brake warning light / yellow (minor malfunction) was on.

OK:

| Result | Proceed to |
|---|---|
| Frequent braking was not performed | A |
| Frequent braking was performed | B |

HINT:

This DTC is output even if the accumulator pressure drops only temporarily due to frequent braking.

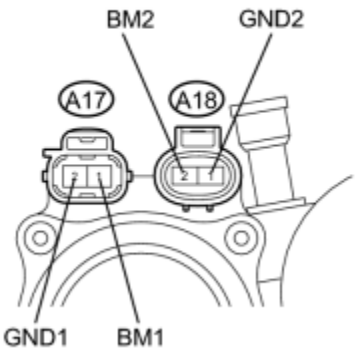
B ▶ END

A

▼

| | |
|---|---|
| 2. | INSPECT BRAKE BOOSTER PUMP |

*1




H

(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(b) Disconnect the brake booster pump connectors.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A17-1 (BM1) - A17-2 (GND1) | Always | Below 10 Ω |
| A18-2 (BM2) - A18-1 (GND2) | Always | Below 10 Ω |
| A17-1 (BM1) - A18-2 (BM2) | Always | Below 1 Ω |
| A17-2 (GND1) - A18-1 (GND2) | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Brake Booster Pump) |

NG REPLACE BRAKE BOOSTER PUMP

OK

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (ACCUMULATOR PRESSURE SENSOR) |

(a) Reconnect the brake booster pump connectors.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Accumulator Sensor | Accumulator pressure sensor /<br><br>Min.: 0 V, Max.: 5 V | Specified value: 2.9 to 4.2 V | When brake fluid is stored in the accumulator: Accumulator pressure changes in accordance with volume of fluid stored in the accumulator |

(e) Wait for 30 seconds without depressing the brake pedal.

(f) Check that the accumulator pressure sensor output values change is within the specified range.

OK:

Accumulator pressure sensor output values change is within 0.55 V.

NG PERFORM ACTIVE TEST USING TECHSTREAM (SOLENOID VALVE)

OK **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 4. | PERFORM ACTIVE TEST USING TECHSTREAM (SOLENOID VALVE) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Select the Active Test on the Techstream INFO.

HINT:

The Active Test can be performed when the following conditions are met.

- ABS main relay is on.
- Park (P) selected.
- Parking brake is applied.
- Vehicle speed is 0 km/h (0 mph).

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ECB* Solenoid (SMC/SRC/SCC) | Switching solenoid valve (SMC/SRC/SCC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |

*: Electronically Controlled Brake System

(e) Perform the Active Test of the solenoid using the Techstream.

(f) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.1 to 0.9 V | Reading increases when brake pedal is depressed |

(g) Check that the output value of wheel cylinder does not increase.

OK:

The output value of wheel cylinder does not increase.

HINT:

If any output value increases, there may be brake fluid leaks in the brake actuator.

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK ▶ **REPLACE BRAKE BOOSTER PUMP**

| | | |
|---|---|---|
| DTC | C1257/57 | Power Supply Drive Circuit |

# DESCRIPTION

The skid control ECU detects a drop in accumulator pressure according to the signals from the accumulator pressure sensor, then operates and stops the motor relay as well as the pump motor.

The skid control ECU troubleshoots the built-in motor relay drive circuit, and outputs this DTC when a malfunction is detected.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1257/57 | 361 | While accumulator pressure falls below hard pump ON pressure, the hard drive circuit does not operate for 1 second or more. | Brake booster with master cylinder (Skid control ECU) |
| ↑ | 362 | When hard driving, one of the 3 built-in motor relays does not operate for 0.2 seconds or more. | ↑ |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

HINT:

When C1241/41, C1242/42 and/or C1253/53 are output together with C1257/57, inspect and repair the trouble areas indicated by C1241/41, C1242/42 and/or C1253/53 first INFO or INFO).

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT **END**

| | | |
|---|---|---|
| DTC | C1259/58 | HV System Regenerative Malfunction |
| DTC | C1310/51 | Malfunction in HV system |

# DESCRIPTION

The skid control ECU communicates with the power management control ECU and controls braking force according to the motor's regenerative force.

The skid control ECU sends Enhanced-VSC signals to the power management control ECU and inputs operating signals from the power management control ECU.

The skid control ECU uses CAN communication for communication with the power management control ECU. If a communication malfunction is memorized, the skid control ECU prohibits Enhanced-VSC operation and a part of electronically controlled brake system control by fail-safe function.

If the signals from the power management control ECU returned to normal, the warning light will go off and the DTCs C1259/58 and C1310/51 will be cleared.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1259/58 | - | The regeneration malfunction signal is input for at least 0.036 seconds when IG2 terminal voltage is 9.5 V or more for at least 2 seconds and communication with power management control ECU is valid. | Power management control ECU (Hybrid vehicle control ECU) |
| C1310/51 | - | The internal malfunction signal is input for at least 0.072 seconds when IG2 terminal voltage is 10.5 V or more for at least 2 seconds and communication with power management control ECU is valid. | Power management control ECU (Hybrid vehicle control ECU) |

HINT:

This DTC will be output from the skid control ECU when the power management control ECU sends a malfunction signal to the skid control ECU.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HYBRID CONTROL SYSTEM |

(a) Check if the hybrid control system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|

| Result | Proceed to |
| --- | --- |
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT HYBRID CONTROL SYSTEM

A ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| DTC | C1290/66 | Steering Angle Sensor Zero Point Malfunction |
|---|---|---|

# DESCRIPTION

The skid control ECU acquires the steering angle sensor zero point every time the power switch is turned on (READY) and the vehicle is driven at 35 km/h (22 mph) or more for approximately 5 seconds. The ECU also stores the previous zero point.

If the front wheel alignment or the steering wheel position is adjusted without disconnecting the cable from the negative (-) battery terminal, or if yaw rate and acceleration sensor zero point is not acquired after the adjustments have been completed, the skid control ECU detects the difference between the previous zero point and newly acquired zero point and outputs this DTC to indicate a poor adjustment.

The warning of the steering angle sensor zero point malfunction will be cancelled by turning the power switch off.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1290/66 | 751 | The steering angle sensor 0 point is judged as an abnormal value. | • Yaw rate and acceleration sensor zero point calibration incomplete<br>• Poor adjustment of the center position of the steering wheel<br>• Poor adjustment of front wheel alignment |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| 1. | PERFORM ZERO POINT CALIBRATION OF YAW RATE AND ACCELERATION SENSOR |
|---|---|

(a) Perform zero point calibration of the yaw rate and acceleration sensor INFO.

HINT:

- When the stored zero point of the yaw rate and acceleration sensor is cleared, steering angle sensor zero point will also be cleared.
- If the zero point and output value of the yaw rate and acceleration sensor and the output value of the speed sensors are not normal, steering angle sensor zero point cannot be acquired normally even if the vehicle is driven straight ahead at 35 km/h (22 mph) or more.

NEXT

| 2. | CHECK STEERING ANGLE SENSOR ZERO POINT CALIBRATION |
|---|---|

(a) Turn the power switch off.

(b) Turn the power switch on (READY).

(c) Drive the vehicle straight ahead at 35 km/h (22 mph) or more for at least 5 seconds.

(d) Check that the steering wheel is centered correctly while driving straight ahead.

HINT:

If front wheel alignment and steering position are adjusted as a result of an off-center of the steering wheel, acquire yaw rate and acceleration sensor zero point again after the adjustments are completed.

OK:

The steering wheel is centered correctly.

NG ADJUST FRONT WHEEL ALIGNMENT OR STEERING POSITION

OK

| 3. | RECONFIRM DTC |
|---|---|

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle and turn the steering wheel to the right and left at a speed of 35 km/h (22 mph) or more.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1290/66) is not output | A |
| DTC (C1290/66) is output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A END

| | | |
|---|---|---|
| DTC | C1300 | Skid Control ECU Malfunction |

# DESCRIPTION

The skid control ECU outputs this DTC if malfunctions are found in the circuit inside the ECU by self diagnosis.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1300 | - | Skid control ECU internal malfunction. | Brake booster with master cylinder (Skid control ECU) |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

(b) Perform initialization and calibration of the linear solenoid valve INFO.

(c) Perform the zero point calibration of the yaw rate and acceleration sensor INFO.

(d) Perform the sensor check in the Test Mode procedure INFO.

NEXT ▶ **END**

| | | |
|---|---|---|
| DTC | C1311/11 | Open in Main Relay 1 Circuit |
| DTC | C1312/12 | Short in Main Relay 1 Circuit |

# DESCRIPTION

The ABS main relay supplies power to the changeover solenoid and the linear solenoid.

The ABS main relay remains on for approximately 2 minutes after the power switch is turned off and the input of brake pedal operation signals stops, and supplies power to the system to keep it ready to operate.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1311/11 | 1 | Either of the following is detected:<br><br>1. When the power switch is on (READY):<br><br>The ABS main relay contact is not turned ON (BS terminal voltage 3.5 V or more) for 0.2 seconds or more when ABS main relay ON is requested while IG1 terminal voltage is 9.5 V or more.<br><br>2. When the power switch is off:<br><br>The ABS main relay contact is not turned ON (BS terminal voltage 3.5 V or more) for 0.2 seconds or more when ABS main relay ON is requested. | • Open or short in ABS main relay circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| C1312/12 | 2 | The ABS main relay contact is turned ON (BS terminal voltage 3.5 V or more) for 4.5 seconds or more when ABS main relay OFF is requested from the ECU. | • Short in ABS main relay circuit<br>• ABS main relay internal stuck<br>• Brake booster with master cylinder (Skid control ECU) |

# WIRING DIAGRAM

Refer to DTCs C1241/41 and C1242/42 INFO.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (ABS MAIN RELAY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Active Test on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ECB* Main Relay | ABS main relay | Relay ON/OFF | - |

*: Electronically Controlled Brake System

(d) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ECB* Main Relay | ABS main relay / ON or OFF | ON: Relay on<br><br>OFF: Relay off | - |

*: Electronically Controlled Brake System

(e) Check the operating condition of the ABS main relay when operating it with the Techstream.

Result:

| Result | Proceed to |
|---|---|
| ABS main relay in the Data List turns ON/OFF using the Active Test | A |
| ABS main relay in the Data List does not change using the Active Test | B |

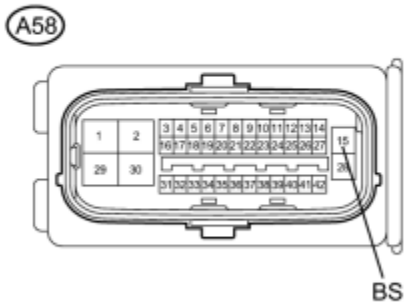
B INSPECT ABS MAIN FUSES

A

| | |
|---|---|
| 2. | INSPECT SKID CONTROL ECU (BS TERMINAL) |

(a) Turn the power switch off.

*1




(b) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(c) Disconnect the skid control ECU connector.

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-15 (BS) - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (BS CIRCUIT)

OK

▼

| | |
|---|---|
| 3. | RECONFIRM DTC |

(a) Reconnect the skid control ECU connector.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (IG).

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1311/11and C1312/12) are not output | A |
| DTCs (C1311/11 and/or C1312/12) are output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **CHECK FOR INTERMITTENT PROBLEMS**

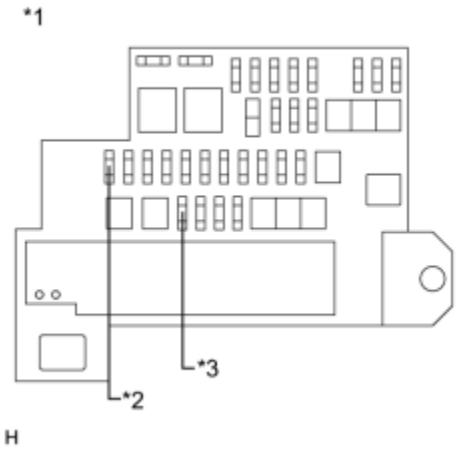
| | |
|---|---|
| 4. | INSPECT ABS MAIN FUSES |

(a) Turn the power switch off.

(b) Remove the ABS MAIN fuses from the engine room relay block.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| ABS MAIN NO. 1 (20 A) fuse | Always | Below 1 Ω |
| ABS MAIN NO. 2 (7.5 A) fuse | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Relay Block |
| *2 | ABS MAIN NO. 1 Fuse |
| *3 | ABS MAIN NO. 2 Fuse |

NG REPLACE ABS MAIN FUSES

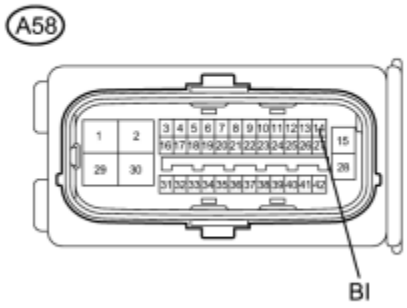
OK

▼

| | |
|---|---|
| 5. | INSPECT SKID CONTROL ECU (BI TERMINAL) |

(a) Install the ABS MAIN fuses.

*1




(b) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(c) Disconnect the skid control ECU connector.

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-14 (BI) - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (BI CIRCUIT)

OK

▼

| | |
|---|---|
| 6. | INSPECT SKID CONTROL ECU (BS TERMINAL) |

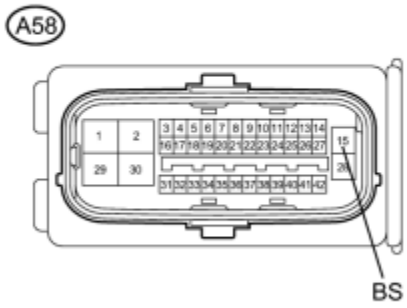
(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-15 (BS) - Body ground | Always | 11 to 14 V |

# Text in Illustration

*1




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (BS CIRCUIT)

OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | | |
|---|---|---|
| DTC | C1345/66 | Linear Solenoid Valve Offset Learning Undone |
| DTC | C1368/67 | Linear Solenoid Valve Offset Malfunction |

# DESCRIPTION

The skid control ECU stores and corrects the individual differences in the stroke sensor, actuator solenoids, and stroke simulator solenoid. Perform initialization of the linear solenoid valve and calibration if any of these parts is replaced.

The skid control ECU receives park (P) signal from the power management control ECU through the CAN communication system.

The DTCs are cleared when the linear valve offset learning results are normal.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1345/66 | - | Linear valve offset learning undone. | Perform linear valve offset learning and check for DTCs. If no DTCs are output again, the valve is normal. |
| C1368/67 | - | Offset learned value out of specification. | • Perform linear valve offset learning and check for DTCs. If no DTCs are output again, the valve is normal.<br>• Brake booster with master cylinder (Brake actuator) |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

HINT:

When C1451/72 is output together with C1345/66 and/or C1368/67, inspect and repair the trouble areas indicated by C1451/72 first INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch off.

(c) Turn the power switch on (IG).

(d) Check that the DTCs (electronically controlled brake system and hybrid control system) are recorded INFO for electronically controlled brake system, or INFO for hybrid control system).

Result:

| Result | Proceed to |
|---|---|
| DTCs (except C1345/66, C1368/67 and hybrid control system DTC) are not output | A |
| Hybrid control system DTC is output | B |
| DTCs (except C1345/66 and/or C1368/67) are output | C |

HINT:

Before carrying out Perform Initialization and Calibration of the Linear Solenoid Valve, C1203/95 will output.

C REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

B INSPECT HYBRID CONTROL SYSTEM

A

| | |
|---|---|
| 2. | PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE |

(a) Turn the power switch off.

(b) Perform initialization and calibration of the linear solenoid valve INFO.

NEXT

| | |
|---|---|
| 3. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (IG).

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1345/66 and C1368/67) are not output | A |
| DTCs (C1345/66 and/or C1368/67) are output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **END**

| DTC | C1365/54 | Accumulator Pressure Sensor Malfunction |
|---|---|---|

# DESCRIPTION

The accumulator pressure sensor is built into the brake actuator.

The skid control ECU detects the accumulator pressure from the data sent from the accumulator pressure sensor, and then runs and stops the pump motor by operating the motor relay.

DTCs may be output if the accumulator pressure drops due to frequent braking (this is not a malfunction).

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1365/54 | 331 | Sensor supply voltage (VACC) is 4.54 V or less, or 5.46 V or more for 0.8 seconds or more. | Brake booster with master cylinder (Skid control ECU or brake actuator) |
| ↑ | 332 | Accumulator pressure sensor output voltage (PACC) is less than 8%, or 88% or more of sensor supply voltage for 0.8 seconds or more (less than 0.4 V, or 4.4 V or more for 0.8 seconds or more). | ↑ |
| ↑ | 333 | Fluctuation of sensor output is out of specification (the difference between the present value and last value is 7.5 MPa) for 0.8 seconds or more. | ↑ |
| ↑ | 334 | With the vehicle driven at 6 km/h (4 mph) or more and output value of the accumulator pressure sensor 19.7 MPa or less, the pump motor does not operate for 12 seconds or more. | ↑ |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU or brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM (ACCUMULATOR PRESSURE SENSOR) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Accumulator Sensor | Accumulator pressure sensor /<br><br>Min.: 0 V, Max.: 5 V | Specified value: 2.9 to 4.2 V | When brake fluid is stored in the accumulator: Accumulator pressure changes in accordance with volume of fluid stored in the accumulator |

(d) Wait for 30 seconds without depressing the brake pedal.

(e) Check that the accumulator pressure sensor output values change is within the specified range.

OK:

Accumulator pressure sensor output values change is within 0.55 V.

NG ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

OK ▼

| | |
|---|---|
| 2. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Perform a road test.

(d) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1365/54) is not output | A |
| DTC (C1365/54) is output | B |

B ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | C1380/64 | Stop Light Control Relay Malfunction |
|---|---|---|

# DESCRIPTION

Upon receiving the dynamic radar cruise control system operating signal from the skid control ECU, the relay contact turns on and the stop light comes on.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1380/64 | 761 | When the voltage at the BI terminal is 8.9 V or more and the stop light control relay drive output (STP0) is ON, a signal is not input to the STP2 terminal for 2 seconds or more. | • Stop light switch<br>• Stop light switch circuit<br>• Stop light control relay<br>• Stop light control relay circuit<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 762 | When the voltage at the BI terminal is 8.9 V or more and the stop light control relay drive output (STP0) is OFF, the signal at the STP terminal is different from the input signal at the STP2 for 5 seconds or more. | • Stop light switch<br>• Stop light switch circuit<br>• Stop light control relay<br>• Stop light control relay circuit<br>• Brake booster with master cylinder (Skid control ECU) |

# WIRING DIAGRAM

Refer to DTC C1249/49 INFO.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

HINT:

When C1249/49 is output together with C1380/64, inspect and repair the trouble areas indicated by C1249/49 first INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK STOP LIGHT OPERATION |

(a) Check that the stop lights come on when the brake pedal is depressed and go off when the brake pedal is released.

OK:

| Condition | Illumination Condition |
|---|---|
| Brake pedal depressed | ON |
| Brake pedal released | OFF |

NG ▶ INSPECT STOP LIGHT CIRCUIT

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (STOP LIGHT SWITCH) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stop Light SW | Stop light switch / ON or OFF | ON: Brake pedal depressed<br>OFF: Brake pedal released | - |

(d) Check that the stop light switch condition observed on the Techstream changes according to brake pedal operation.

OK:

The Techstream displays ON or OFF according to brake pedal operation.

NG ▶ INSPECT SKID CONTROL ECU (STP TERMINAL)

OK

▼

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (STOP LIGHT CONTROL RELAY) |

(a) Select the Active Test on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Stop Light Relay | Stop light control relay | Relay ON/OFF | Stop lights come on |

(b) Perform the Active Test of the stop light control relay using the Techstream.

(c) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stop Light Relay Output | Stop light control relay output / ON or OFF | ON: Relay output on<br>OFF: Relay output off | - |

(d) Check for stop light control relay operation using Data List and stop light operation by performing an Active Test.

Result:

| Result | Proceed to |
|---|---|
| Data List content and stop light operation are normal | A |
| Data List content is normal but stop lights do not turn on or off | B |

B ▶ INSPECT STOP LIGHT CONTROL RELAY

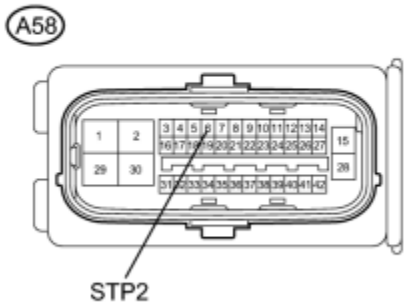
A

▼

| | |
|---|---|
| 4. | INSPECT SKID CONTROL ECU (STP2 TERMINAL) |

(a) Turn the power switch off.

*1




(b) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

(c) Disconnect the skid control ECU connector.

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A58-6 (STP2) - Body ground | Stop light switch ON (Brake pedal depressed) | 11 to 14 V |
| A58-6 (STP2) - Body ground | Stop light switch OFF (Brake pedal released) | Below 1.5 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STP2 CIRCUIT)

OK

▼

| | |
|---|---|
| 5. | RECONFIRM DTC |

(a) Reconnect the skid control ECU connector.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Perform a road test.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1380/64) is not output | A |
| DTC (C1380/64) is output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 6. | INSPECT STOP LIGHT CONTROL RELAY |

(a) Inspect the stop light control relay INFO.

OK:

The stop light control relay is normal.

NG REPLACE STOP LIGHT CONTROL RELAY

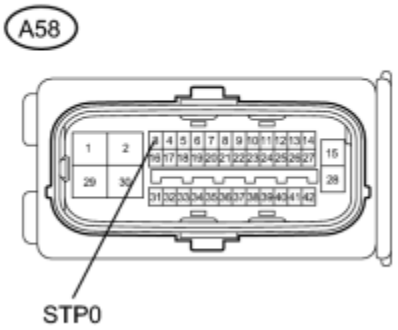
OK

▼

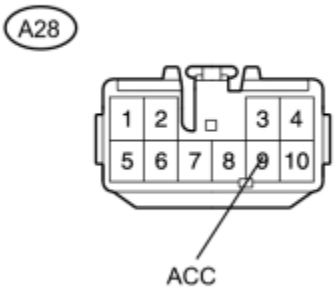
| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - STOP LIGHT CONTROL RELAY) |

(a) Make sure that there is no looseness at the locking part and the connecting part of the connectors.

*1




*2




(b) Disconnect the skid control ECU connector and the stop light control relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-3 (STP0) - A28-9 (ACC) | Always | Below 1 Ω |
| A58-3 (STP0) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

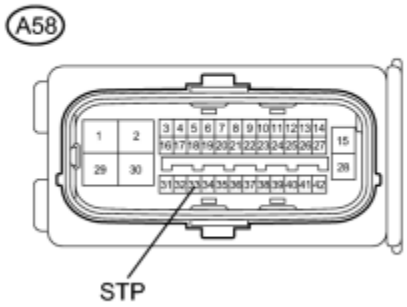
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Stop Light Control Relay) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 8. | INSPECT SKID CONTROL ECU (STP TERMINAL) |

*1




(a) Turn the power switch off.

(b) Make sure that there is no looseness at the locking part and the connecting part of the connector.

(c) Disconnect the skid control ECU connector.

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A58-33 (STP) - Body ground | Stop light switch ON (Brake pedal depressed) | 11 to 14 V |
| A58-33 (STP) - Body ground | Stop light switch OFF (Brake pedal released) | Below 1.5 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (STP CIRCUIT)

OK **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| DTC | C1391/69 | Accumulator Leak Malfunction |
|---|---|---|

# DESCRIPTION

The DTC is stored if internal or external brake fluid leaks are detected due to improper sealing in the brake actuator or brake booster pump. Internal leaks are suspected if the pump motor operates frequently without braking.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1391/69 | 351 | Either of the following is detected:<br>1. Accumulator pressure sensor input does not increase before braking or while the pump motor is operating.<br>2. Accumulator pressure sensor input reduction rate exceeds the specification before braking and while the pump motor is not operating. | • Brake fluid leaks<br>• Brake booster with master cylinder (Brake actuator)<br>(Malfunctioning internal seal, low gas pressure in accumulator, etc.) |

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (brake actuator), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| 1. | CHECK FOR FLUID LEAK |
|---|---|

(a) Check that there is no fluid leaks in the brake line between the brake actuator and the wheel cylinder which is indicated by DTCs.

(b) Check that the brake is not dragging.

OK:

There is no fluid leaks or dragging.

NG ▶ REPAIR OR REPLACE APPLICABLE PART

OK

▼

| 2. | RECONFIRM DTC |
|---|---|

(a) Clear the DTCs INFO.

(b) Turn the power switch on (READY).

(c) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1391/69) is output | A |
| DTC (C1391/69) is not output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (SOLENOID VALVE) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Select the Active Test on the Techstream INFO.

HINT:

The Active Test can be performed when the following conditions are met.

- ABS main relay is on.
- Park (P) selected.
- Parking brake is applied.
- Vehicle speed is 0 km/h (0 mph).

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ECB* Solenoid (SMC/SRC/SCC) | Switching solenoid valve (SMC/SRC/SCC) | Solenoid ON/OFF | Operation sound of solenoid (clicking sound) can be heard |

*: Electronically Controlled Brake System

(e) Perform the Active Test of the solenoid using the Techstream.

(f) Select the Data List on the Techstream INFO.

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wheel Cylinder Pressure Sensor | Wheel cylinder pressure sensor / Min.: 0 V, Max.: 5 V | When brake pedal released: 0.1 to 0.9 V | Reading increases when brake pedal is depressed |

(g) Check that the output value of wheel cylinder does not increase.

OK:

The output value of wheel cylinder does not increase.

HINT:

If any output value increases, there may be brake fluid leaks in the brake actuator.

Result:

| Result | Proceed to |
|---|---|
| The output value of wheel cylinder increases | A |
| The output values of wheel cylinders do not increase | B |

B REPLACE BRAKE BOOSTER PUMP

A

| | |
|---|---|
| 4. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (brake actuator) INFO.

NEXT **REPLACE BRAKE BOOSTER PUMP**

| | | |
|---|---|---|
| DTC | C1439/66 | Steering Angle Sensor Initialization Incomplete |
| DTC | C1445/66 | Vehicle Driven with Steering Angle Sensor not Initialized |

# DESCRIPTION

The skid control ECU acquires the steering angle sensor zero point every time the power switch is turned on (IG) and the vehicle is driven at 35 km/h (22 mph) or more for approximately 5 seconds. The ECU also stores previous zero points.

DTCs C1439/66 and C1445/66 will be cleared when the power switch is turned off.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1439/66 | 752 | After the steering angle sensor zero point calibration is cleared due to, for example, fluctuations in the power source, the steering angle sensor zero point calibration cannot be obtained for 60 seconds of continuous driving. | • Steering angle sensor<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU) |
| C1445/66 | 753 | Steering angle sensor zero point calibration cannot be obtained when the vehicle is driven without a record of steering angle sensor zero point calibration at a speed of 35 km/h (22 mph) or more for 30 seconds or more without the brake pedal being depressed. | • Steering angle sensor<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU) |

# INSPECTION PROCEDURE

NOTICE:

Before proceeding with the inspection, explain to the customer that the output DTC is related to temporary loss of the steering angle zero calibration, such as when the power source voltage drops when the battery is removed, and confirm that this condition occurred.

HINT:

- When DTC U0073/94, U0123/62, U0124/95 and/or U0126/63 is output together with DTC C1439/66 and/or C1445/66, inspect and repair the trouble areas indicated by DTC U0073/94, U0123/62, U0124/95 and/or U0126/63 first INFO.
- When the speed sensor or the yaw rate and acceleration sensor has trouble, DTCs for the steering angle sensor may be output even when the steering angle sensor is normal. When DTCs for the speed sensor or yaw rate and acceleration sensor are output together with other DTCs for the steering angle sensor, inspect and repair the speed sensor and yaw rate and acceleration sensor first, and then inspect and repair the steering angle sensor.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Clear the DTCs INFO.

(b) Turn the power switch off.

(c) Turn the power switch on (IG) again and check that no CAN communication system DTCs are output INFO.

(d) Drive the vehicle and turn the steering wheel to the right and left at a speed of 35 km/h (22 mph) and check that no speed sensor, yaw rate and acceleration sensor and steering angle sensor DTCs are output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1439/66 and/or C1445/66) are output | A |
| CAN communication system DTC is output | B |
| Speed sensor, yaw rate and acceleration sensor and/or steering angle sensor DTC is output | C |
| DTCs (C1439/66 and C1445/66) are not output | D |

HINT:

- When DTCs indicating CAN communication system malfunctions are output, repair the CAN communication system before repairing each corresponding sensor.
- If there is a malfunction in the speed sensor or the yaw rate and acceleration sensor, an abnormal value may be output although the steering angle sensor is normal.
- If the speed sensor and the yaw rate and acceleration sensor DTCs are output simultaneously, repair the sensors and inspect the steering angle sensor.
- If the same DTC C1439/66 and/or C1445/66 is not output again, the DTC may have been stored due to a temporary loss of the steering angle zero calibration, such as when the power source voltage drops.

D CHECK FOR INTERMITTENT PROBLEMS

C REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

B INSPECT CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | CHECK STEERING ANGLE SENSOR ZERO POINT CALIBRATION |

(a) Drive the vehicle straight ahead at 35 km/h (22 mph) or more for at least 5 seconds.

(b) Check that the steering wheel is centered correctly while driving straight ahead.

HINT:

If the front wheel alignment and steering position are adjusted as a result of an off-centered position of the steering wheel, acquire yaw rate and acceleration sensor zero point again after the adjustments are completed.

OK:

The steering wheel is centered correctly.

NG ▶ ADJUST FRONT WHEEL ALIGNMENT OR STEERING POSITION

OK

▼

| | |
|---|---|
| 3. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle and turn the steering wheel to the right and left at the speed of 35 km/h (22 mph) or more.

(e) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1439/66 and C1445/66) are not output | A |
| Yaw rate and acceleration sensor and/or steering angle sensor DTC is output | B |

HINT:

If the same DTC C1439/66 and/or C1445/66 is not output again, the DTC may have been stored due to a temporary loss of the steering angle zero calibration, such as when the power source voltage drops.

B ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A ▶ **END**

| | | |
|---|---|---|
| DTC | C1440/98 | Unusual Bank Angle Detected |

# DESCRIPTION

If the skid control ECU determines that the vehicle is being driven at a steep bank angle, the skid control ECU stores DTC C1440/98 while VSC operation is temporarily disabled.

It is not a malfunction if the system and sensor circuits are normal and if the normal VSC operation resumes.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1440/98 | - | Driving at a steep bank angle. | Yaw rate and acceleration sensor |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Clear the DTCs INFO.

(b) Perform a road test.

(c) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1440/98) is output | A |
| DTC (C1440/98) is not output | B |
| Yaw rate and acceleration sensor DTC is output | C |

C REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

B END

A

| | |
|---|---|
| 2. | CLEAR DTC |

(a) Clear the DTCs INFO.

HINT:

- If the skid control ECU determines that the vehicle is being driven at a steep bank angle, the skid control ECU stores DTC C1440/98 while VSC operation is temporarily disabled.
- It is not a malfunction if the system and sensor circuits are normal and if the normal VSC operation resumes.

NEXT **END**

| | | |
|---|---|---|
| DTC | C1442/44 | Invalid Data Received from Acceleration Sensor |
| DTC | C1443/34 | Invalid Data Received from Yaw Rate Sensor |

# DESCRIPTION

The skid control ECU receives signals from the yaw rate and acceleration sensor via the CAN communication system.

The yaw rate sensor has a built-in acceleration sensor and detects the vehicle condition.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1442/44 | 572 | With terminal IG1 voltage between 9.5 and 17.4 V, an invalid data signal is received from the acceleration sensor for 10 seconds or more. | Yaw rate and acceleration sensor |
| C1443/34 | 715 | With terminal IG1 voltage between 9.5 and 17.4 V, an invalid data signal is received from the yaw rate sensor for 10 seconds or more. | Yaw rate and acceleration sensor |

# INSPECTION PROCEDURE

NOTICE:

When replacing the yaw rate and acceleration sensor, perform zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Clear the DTCs INFO.

(b) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTCs (C1442/44 and/or C1443/34) are output | A |
| DTCs (C1442/44 and C1443/34) are not output | B |

B ▶ CHECK FOR INTERMITTENT PROBLEMS

A ▶ **REPLACE YAW RATE AND ACCELERATION SENSOR**

| DTC | C1451/72 | Motor Drive Permission Malfunction |
|---|---|---|

# DESCRIPTION

If air bleeding has not been performed, the skid control ECU stores DTC C1451/72 to prevent the entry of air due to the pump motor operation.

If DTC C1451/72 is stored, the system will not return to normal until air bleeding is performed.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| C1451/72 | - | Air bleeding has not been performed. | • Brake fluid leaks<br>• Air bleeding not performed |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK BRAKE FLUID LEVEL |
|---|---|

(a) Check that the brake fluid level is sufficient.

OK:

Brake fluid level is sufficient.

HINT:

- If the fluid level drops, check for fluid leaks, and repair as necessary.
- If no fluid leaks exist, add and adjust fluid INFO.

NG ▶ CHECK AND REPAIR BRAKE FLUID LEAKS OR ADD FLUID

OK

▼

| 2. | PERFORM AIR BLEEDING |
|---|---|

(a) Bleed the air from the brake systems INFO.

HINT:

If air bleeding has been performed, this DTC will be cleared.

NEXT

| | |
|---|---|
| 3. | RECONFIRM DTC |

(a) Check if the same DTC is recorded INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC (C1451/72) is output | A |
| DTC (C1451/728) is not output | B |

B END

A

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Clear the DTCs INFO.

NEXT **END**

| | | |
|---|---|---|
| DTC | U0073/94 | Control Module Communication Bus OFF |
| DTC | U0123/62 | Lost Communication with Yaw Rate Sensor Module |
| DTC | U0124/95 | Lost Communication with Lateral Acceleration Sensor Module |
| DTC | U0126/63 | Lost Communication with Steering Angle Sensor Module |
| DTC | U0293/59 | Communication Error from HV ECU |

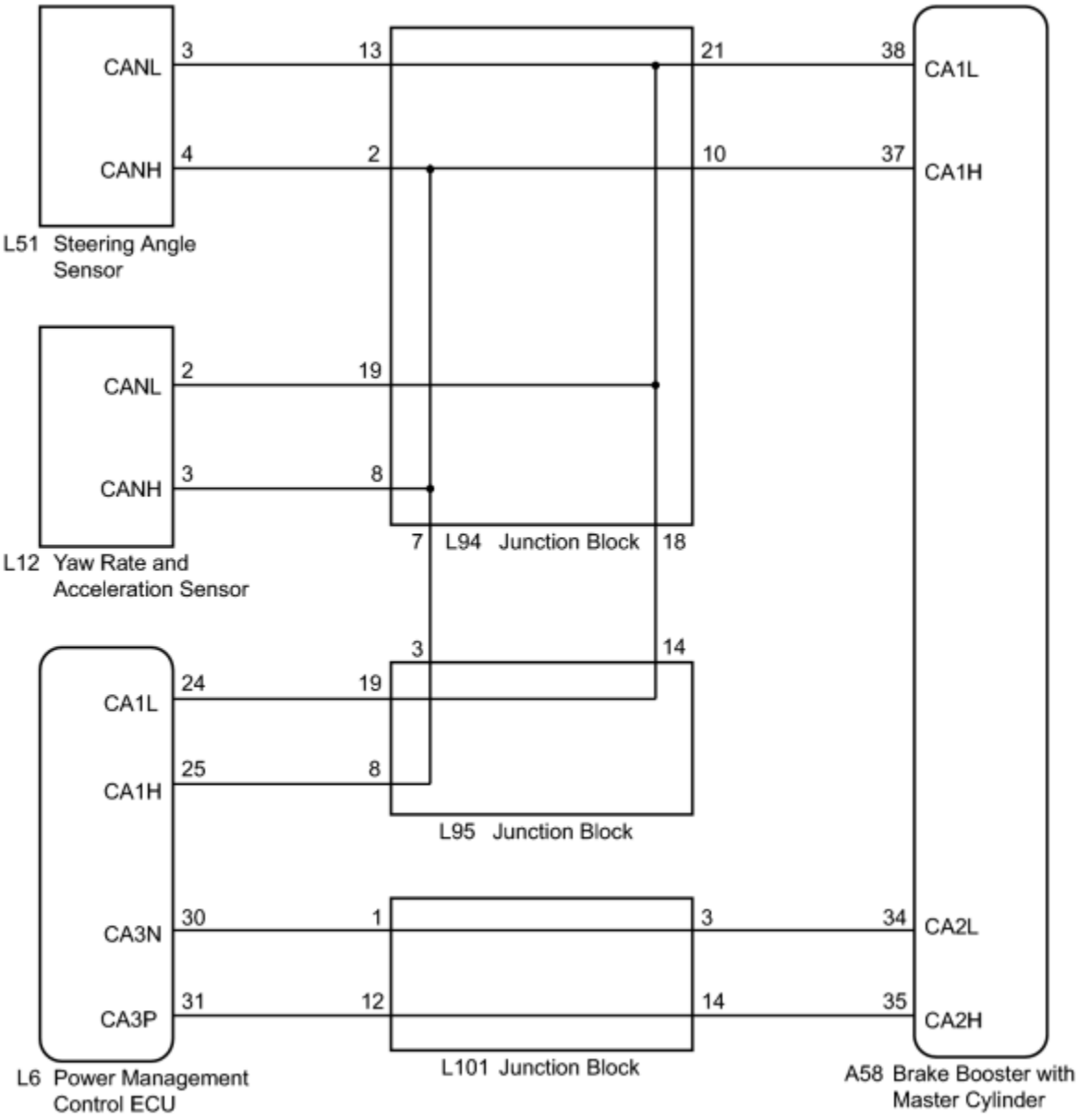
# DESCRIPTION

The skid control ECU receives the signals from the power management control ECU, steering angle sensor, and yaw rate and acceleration sensor via the CAN communication system.

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| U0073/94 | 461 | Either of the following is detected:<br>1. Yaw rate and acceleration sensor communication is disabled for 1 second or more.<br>2. Yaw rate and acceleration sensor communication is disabled once or more per 5 seconds 10 times or more within 60 seconds. | • CAN communication line (CAN No. 1 bus)<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 462 | Either of the following is detected:<br>1. Steering angle sensor communication is disabled for 1 second or more.<br>2. Steering angle sensor communication is disabled once or more per 5 seconds 10 times or more within 60 seconds. | • CAN communication line (CAN No. 1 bus)<br>• Steering angle sensor<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 463<br>464 | Bus off occurs once or more per 0.1 seconds 10 times repeatedly. | • CAN communication line<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 465<br>466 | Sending does not complete within 5 seconds after data is output from the skid control ECU. | ↑ |
| U0123/62 | 731 | Yaw rate sensor communication is disabled for 1 second or more. | • CAN communication line (CAN No. 1 bus)<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU) |

| DTC Code | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| ↑ | 732 | Yaw rate sensor communication is disabled once or more per 5 seconds 10 times or more within 60 seconds. | ↑ |
| U0124/95 | 591 | Acceleration sensor communication is disabled for 1 second or more. | • CAN communication line (CAN No. 1 bus)<br>• Yaw rate and acceleration sensor<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 592 | Acceleration sensor communication is disabled once per 5 seconds 10 times or more within 60 seconds. | ↑ |
| U0126/63 | 741 | Steering angle sensor communication is disabled for 1 second or more. | • CAN communication line (CAN No. 1 bus)<br>• Steering angle sensor<br>• Brake booster with master cylinder (Skid control ECU) |
| ↑ | 742 | Steering angle sensor communication is disabled once or more per 5 seconds 10 times or more within 60 seconds. | ↑ |
| U0293/59 | 411<br>412<br>413 | Either of the following is detected:<br>1. With the IG2 terminal voltage 9.5 V or more, data from the power management control ECU cannot be received for 2 seconds or more.<br>2. With the IG2 terminal voltage 9.5 V or more, data from the power management control ECU cannot be received once or more within 5 seconds occur 10 times in succession. | • CAN communication line (Power management bus)<br>• Power management control ECU (Hybrid vehicle control ECU)<br>• Brake booster with master cylinder (Skid control ECU) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (MOMENTARY INTERRUPTION) |

(a) Using the Techstream, check for any momentary interruptions in the wire harness and connector corresponding to a DTC INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Yaw Rate Open | Yaw rate sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| Steering Open | Steering angle sensor open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |
| HV Communication Open | Hybrid vehicle communication open detection / Error or Normal | Error: Momentary interruption<br><br>Normal: Normal | - |

Result:

| Result | Proceed to |
|---|---|
| There is a constant open circuit | A |
| There are no momentary interruptions | B |
| There are momentary interruptions | C |

HINT:

Perform the above inspection before removing any sensor or connector.

C REPAIR OR REPLACE HARNESS OR CONNECTOR

B RECONFIRM DTC

A

| | |
|---|---|
| 2. | CHECK IF EACH SENSOR AND ECU CONNECTOR ARE SECURELY CONNECTED |

(a) Turn the power switch off.

(b) Check if each sensor and ECU connector are securely connected.

OK:

Each sensor and ECU connector are securely connected.

NG CONNECT CONNECTOR TO EACH SENSOR OR ECU CORRECTLY

OK

| | |
|---|---|
| 3. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Record the output DTCs (for ABS, VSC, electronically controlled brake system, and/or CAN communication system) INFO for ABS, VSC and/or electronically controlled brake system, or INFO for CAN communication system).

HINT:

If the CAN communication system DTC and the relevant sensor DTCs are output simultaneously, troubleshoot the relevant sensor DTCs (for ABS, VSC and/or electronically controlled brake system) after the CAN communication system returns to normal.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC (ABS, VSC and/or electronically controlled brake system DTC) is output | B |
| DTC (CAN communication system DTC) is output | C |

C INSPECT CAN COMMUNICATION SYSTEM

B REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 4. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Turn the power switch off.

(b) Repair or replace the harness or connector.

(c) Check for any momentary interruption between the skid control ECU and each sensor or ECU INFO.

(d) Check that there are no momentary interruptions.

NEXT

| | |
|---|---|
| 5. | RECONFIRM DTC |

(a) Turn the power switch off.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (READY).

(d) Drive the vehicle and turn the steering wheel to the right and left at a speed of 15 km/h (9 mph) or more.

(e) Check that no CAN communication system DTC is output INFO.

(f) If ABS, VSC and/or electronically controlled brake system DTCs are output, record them INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC (ABS, VSC and/or electronically controlled brake system DTC) is output | B |
| DTC (CAN communication system DTC) is output | C |

HINT:

The CAN communication system must be normal when repairing each sensor DTC (for ABS, VSC and/or electronically controlled brake system).

C ▶ INSPECT CAN COMMUNICATION SYSTEM

B ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A ▶ **END**

ABS Warning Light Remains ON

# DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

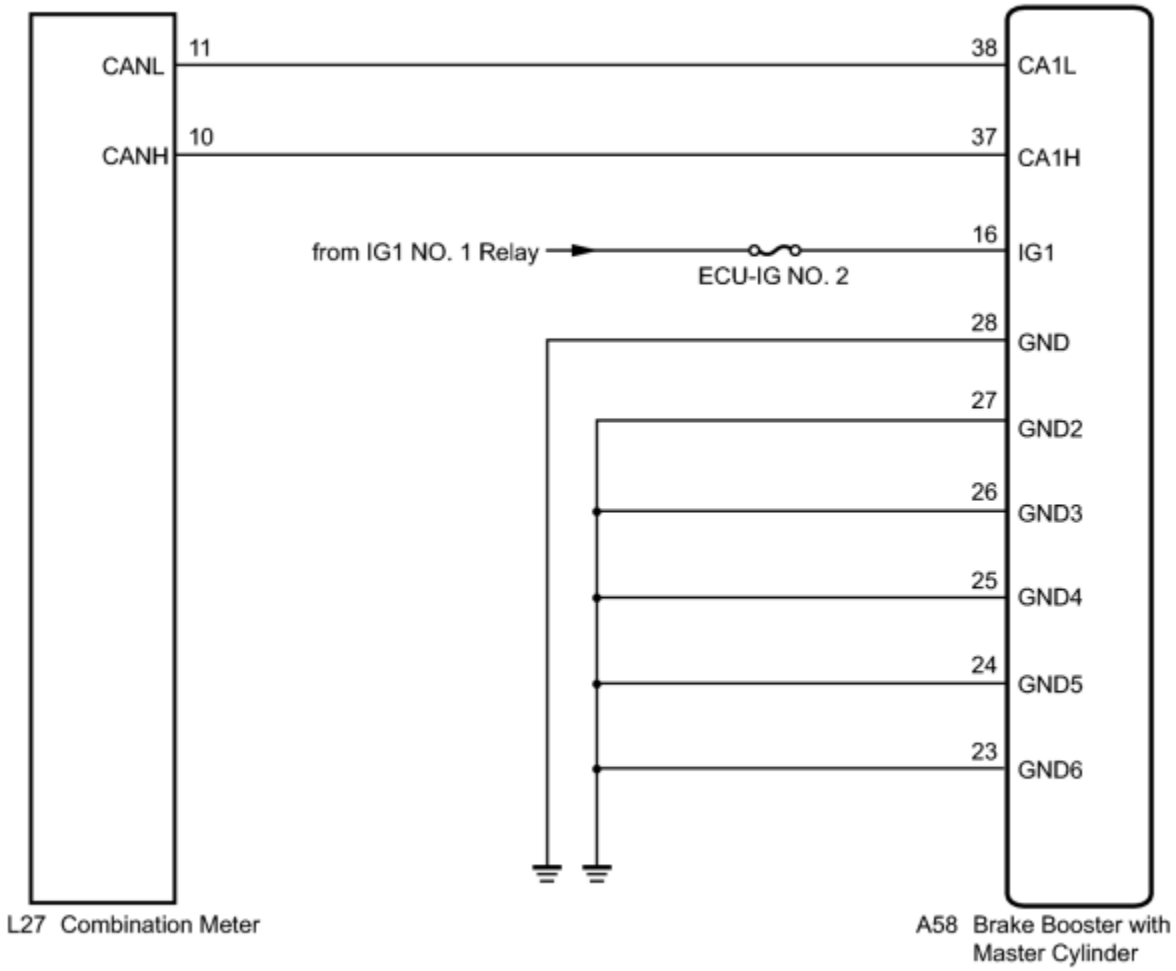
If any of the following is detected, the ABS warning light remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- There is a malfunction in the skid control ECU internal circuit.
- There is an open in the harness between the combination meter and the skid control ECU.
- The ABS control system is defective.

HINT:

In some cases, the Techstream cannot be used when the skid control ECU is malfunctioning.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B → INSPECT CAN COMMUNICATION SYSTEM

A

▼

| | |
|---|---|
| 2. | CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED |

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector is securely connected.

NG → CONNECT CONNECTOR TO ECU CORRECTLY

OK

▼

| | |
|---|---|
| 3. | CHECK AUXILIARY BATTERY |

(a) Check the auxiliary battery voltage.

Standard Voltage:

11 to 14 V

NG → CHARGE OR REPLACE AUXILIARY BATTERY

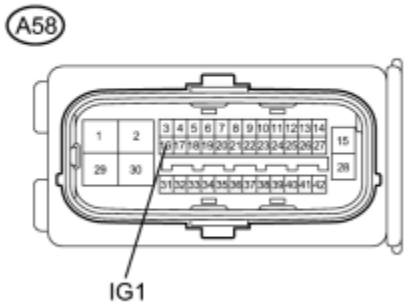
OK

▼

| | |
|---|---|
| 4. | INSPECT SKID CONTROL ECU (IG1 TERMINAL) |

(a) Disconnect the skid control ECU connector.

*1




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A58-16 (IG1) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

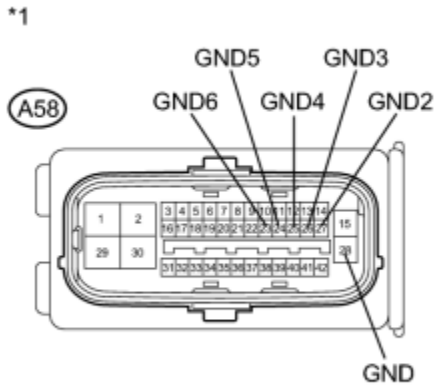
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

OK

▼

| | |
|---|---|
| 5. | INSPECT SKID CONTROL ECU (GND TERMINAL) |

(a) Turn the power switch off.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-28 (GND) - Body ground | Always | Below 1 Ω |
| A58-27 (GND2) - Body ground | Always | Below 1 Ω |
| A58-26 (GND3) - Body ground | Always | Below 1 Ω |
| A58-25 (GND4) - Body ground | Always | Below 1 Ω |
| A58-24 (GND5) - Body ground | Always | Below 1 Ω |
| A58-23 (GND6) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK

▼

| | |
|---|---|
| 6. | INSPECT COMBINATION METER |

(a) Reconnect the skid control ECU connector.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The ABS warning light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG REPLACE NO. 3 METER CIRCUIT PLATE

OK **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| |
|---|
| ABS Warning Light does not Come ON |

# DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

# WIRING DIAGRAM

Refer to ABS Warning Light Remains ON INFO.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK ABS WARNING LIGHT |

(a) Disconnect the skid control ECU connector.

(b) Turn the power switch on (IG).

(c) Check that the ABS warning light comes on.

OK:

The ABS warning light comes on.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ INSPECT COMBINATION METER
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 3. | INSPECT COMBINATION METER |

(a) Turn the power switch off.

(b) Reconnect the skid control ECU connector.

(c) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(d) Check the combination meter.

OK:

The ABS warning light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

Brake Warning Light Remains ON

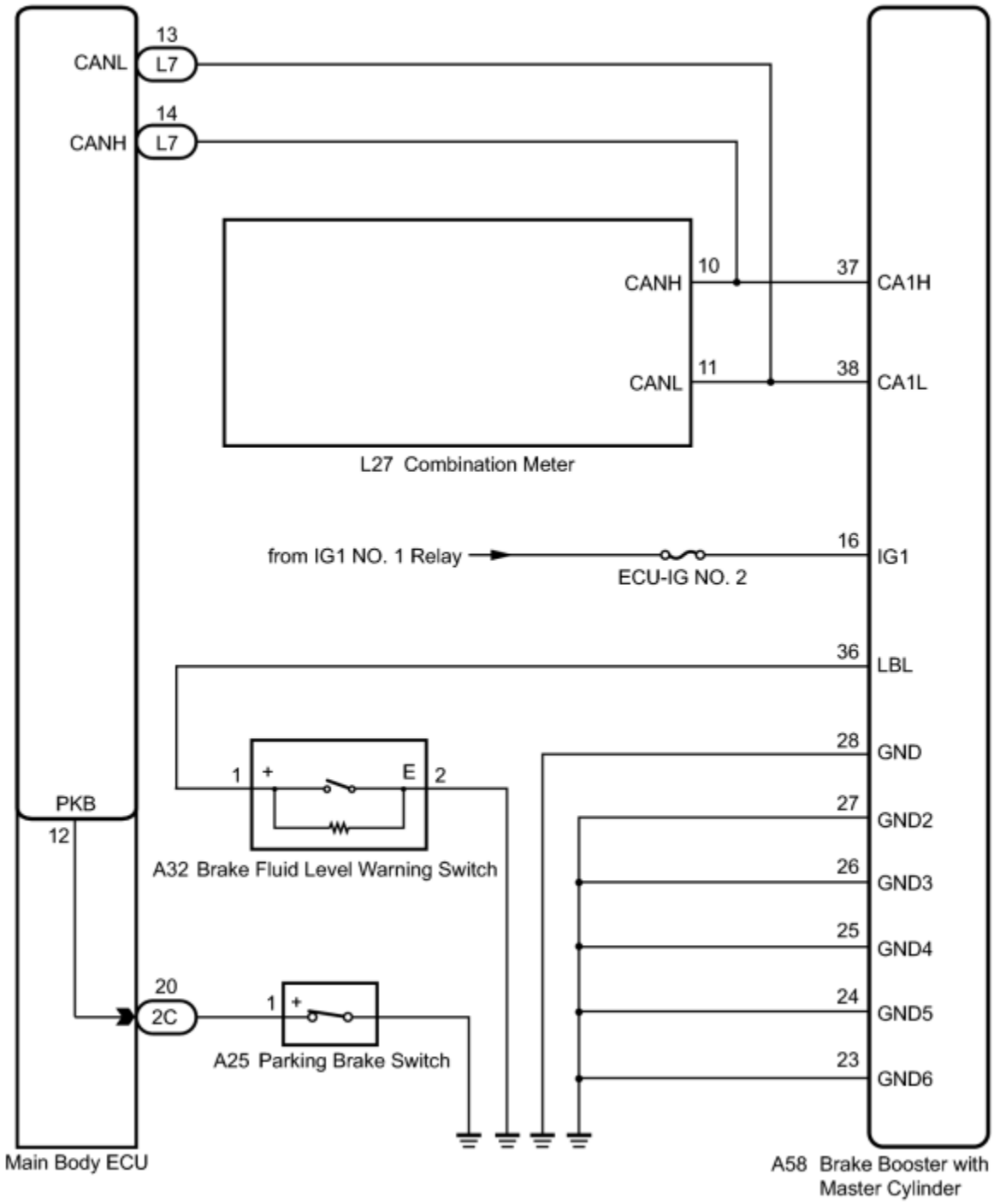
# DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

If any of the following is detected, the brake warning light / red (malfunction) remains on:

- The skid control ECU connector is disconnected from the skid control ECU.
- The brake fluid level is insufficient.
- The parking brake is applied.
- EBD operation has been disabled.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |

(a) Check if a ABS, VSC and/or electronically controlled brake system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A

▼

| | |
|---|---|
| 2. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A

▼

| | |
|---|---|
| 3. | CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED |

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector is securely connected.

NG ▶ CONNECT CONNECTOR TO ECU CORRECTLY

OK

▼

| | |
|---|---|
| 4. | CHECK AUXILIARY BATTERY |

(a) Check the auxiliary battery voltage.

Standard Voltage:

11 to 14 V

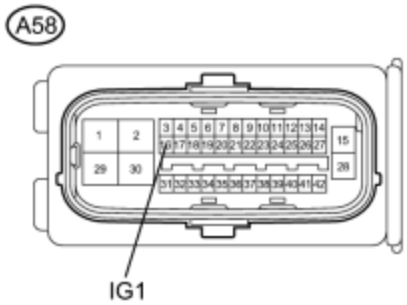
NG ▶ CHARGE OR REPLACE AUXILIARY BATTERY

OK

▼

| | |
|---|---|
| 5. | INSPECT SKID CONTROL ECU (IG1 TERMINAL) |

*1




(a) Disconnect the skid control ECU connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A58-16 (IG1) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

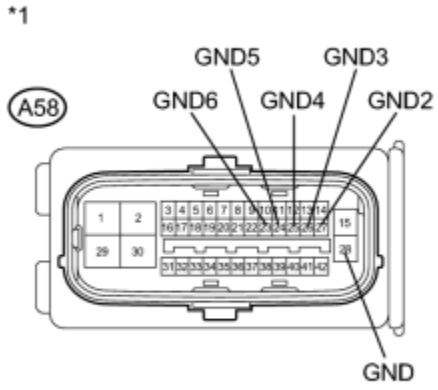
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 CIRCUIT)

OK

▼

| | |
|---|---|
| 6. | INSPECT SKID CONTROL ECU (GND TERMINAL) |




(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-28 (GND) - Body ground | Always | Below 1 Ω |
| A58-27 (GND2) - Body ground | Always | Below 1 Ω |
| A58-26 (GND3) - Body ground | Always | Below 1 Ω |
| A58-25 (GND4) - Body ground | Always | Below 1 Ω |
| A58-24 (GND5) - Body ground | Always | Below 1 Ω |
| A58-23 (GND6) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK

▼

| | |
|---|---|
| 7. | READ VALUE USING TECHSTREAM (PARKING BRAKE SWITCH) |

(a) Reconnect the skid control ECU connector.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Select the Data List on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Parking Brake SW | Parking brake switch / ON or OFF | ON: Parking brake applied<br><br>OFF: Parking brake released | - |

(e) Using the Techstream, check the switch condition on the Techstream changes according to parking brake operation.

OK:

The Techstream displays ON or OFF according to parking brake operation.

NG ▶ INSPECT PARKING BRAKE SWITCH

OK

▼

| | |
|---|---|
| 8. | INSPECT COMBINATION METER |

(a) Turn the power switch off.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The brake warning light / red (malfunction) turns on or off in accordance with the Techstream operation.

HINT:

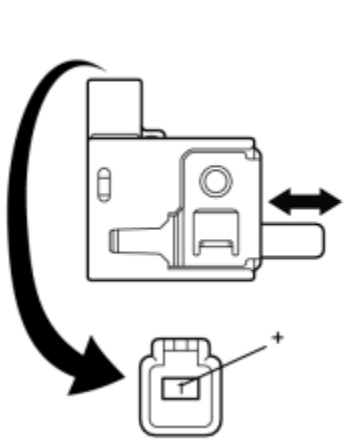
If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE

OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 9. | INSPECT PARKING BRAKE SWITCH |

(a) Turn the power switch off.




(b) Disconnect the parking brake switch connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (+) - Body ground | Parking brake switch ON<br><br>(Switch pin free) | Below 1 Ω |
| 1 (+) - Body ground | Parking brake switch OFF<br><br>(Switch pin pushed in) | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Parking Brake Switch) |

NG ▶ REPLACE PARKING BRAKE SWITCH

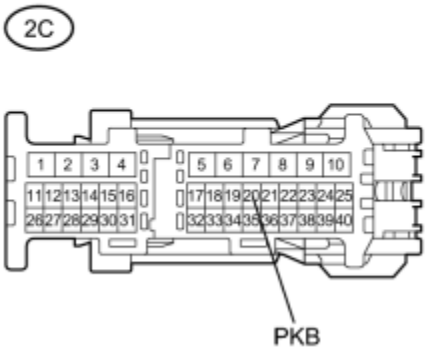
OK

▼

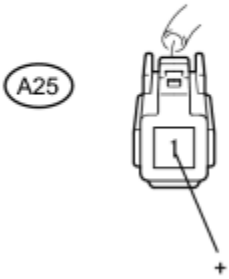
| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - PARKING BRAKE SWITCH) |

(a) Disconnect the main body ECU connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2C-20 (PKB) - A25-1 (+) | Always | Below 1 Ω |
| 2C-20 (PKB) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Main Body ECU) |
| *2 | Front view of wire harness connector<br><br>(to Parking Brake Switch) |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE MAIN BODY ECU (INSTRUMENT PANEL JUNCTION BLOCK)**

| Brake Warning Light does not Come ON |
|---|

# DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

# WIRING DIAGRAM

Refer to Brake Warning Light Remains ON INFO.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK BRAKE WARNING LIGHT / RED (MALFUNCTION) |

(a) Disconnect the skid control ECU connector.

(b) Turn the power switch on (IG).

(c) Check that the brake warning light / red (malfunction) comes on.

OK:

The brake warning light / red (malfunction) comes on.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ INSPECT COMBINATION METER
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 3. | INSPECT COMBINATION METER |

(a) Turn the power switch off.

(b) Reconnect the skid control ECU connector.

(c) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(d) Check the combination meter.

OK:

The brake warning light / red (malfunction) turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

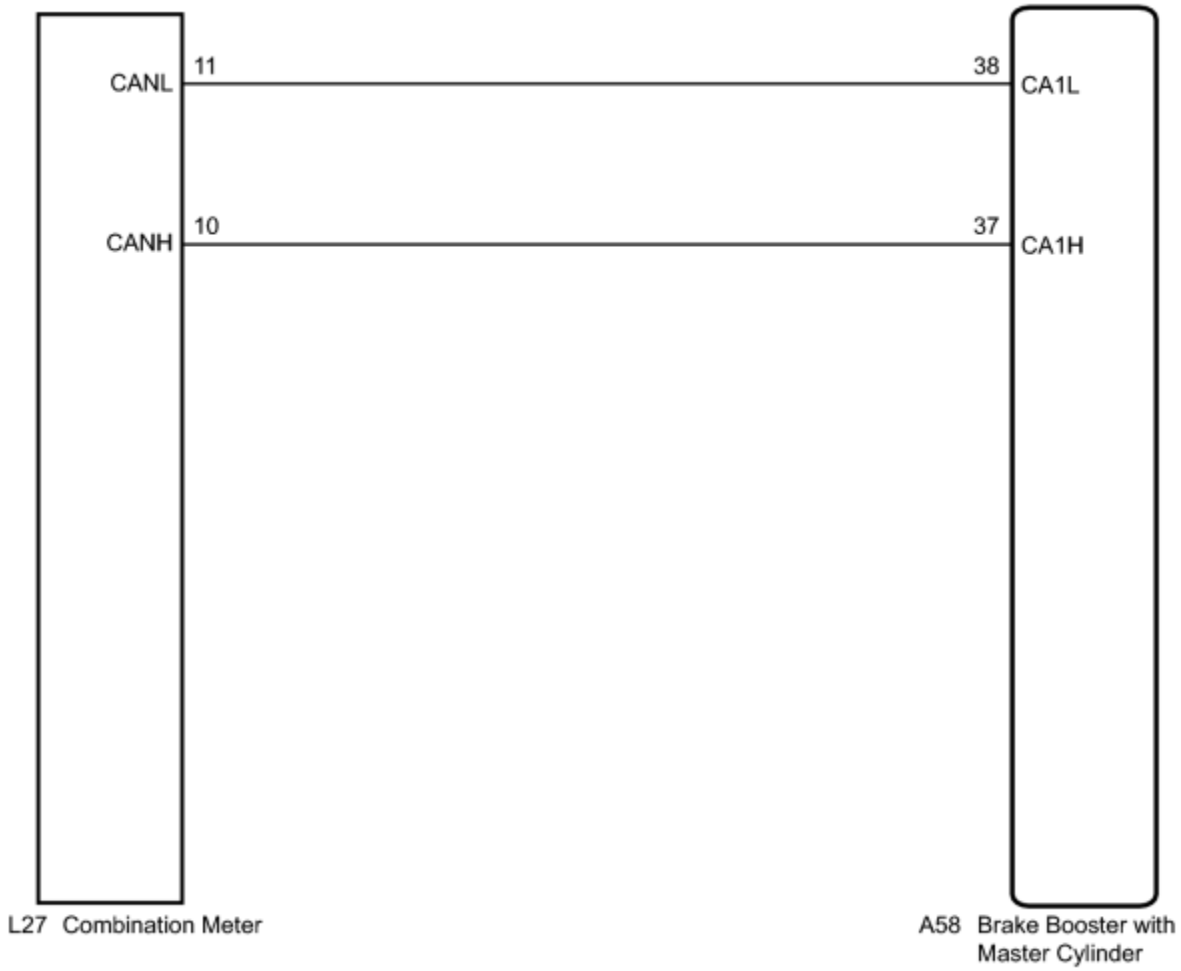
NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

# DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

If the skid control ECU stores a DTC, the brake warning light / yellow (minor malfunction) comes on in the combination meter.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED |

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector is securely connected.

NG ▶ CONNECT CONNECTOR TO ECU CORRECTLY

OK ▼

| | |
|---|---|
| 3. | CHECK AUXILIARY BATTERY |

(a) Check the auxiliary battery voltage.

Standard Voltage:

11 to 14 V

NG ▶ CHARGE OR REPLACE AUXILIARY BATTERY

OK ▼

| | |
|---|---|
| 4. | INSPECT COMBINATION METER |

(a) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(b) Check the combination meter.

OK:

The brake warning light / yellow (minor malfunction) turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| |
|---|
| Brake Control Warning Light does not Come ON |

# DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

# WIRING DIAGRAM

Refer to Brake Control Warning Light Remains ON INFO.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (BRAKE WARNING LIGHT / YELLOW (MINOR MALFUNCTION)) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Active Test on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| ECB* Warning | Brake warning light / yellow (minor | Warning light | Observe combination |

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Light | malfunction) | ON/OFF | meter |

*: Electronically Controlled Brake System

(d) Check that the brake warning light / yellow (minor malfunction) on the combination meter turns on or off in accordance with the Techstream operation.

OK:

The brake warning light / yellow (minor malfunction) turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ INSPECT COMBINATION METER
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 3. | INSPECT COMBINATION METER |

(a) Turn the power switch off.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The brake warning light / yellow (minor malfunction) turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

Slip Indicator Light Remains ON

# DESCRIPTION

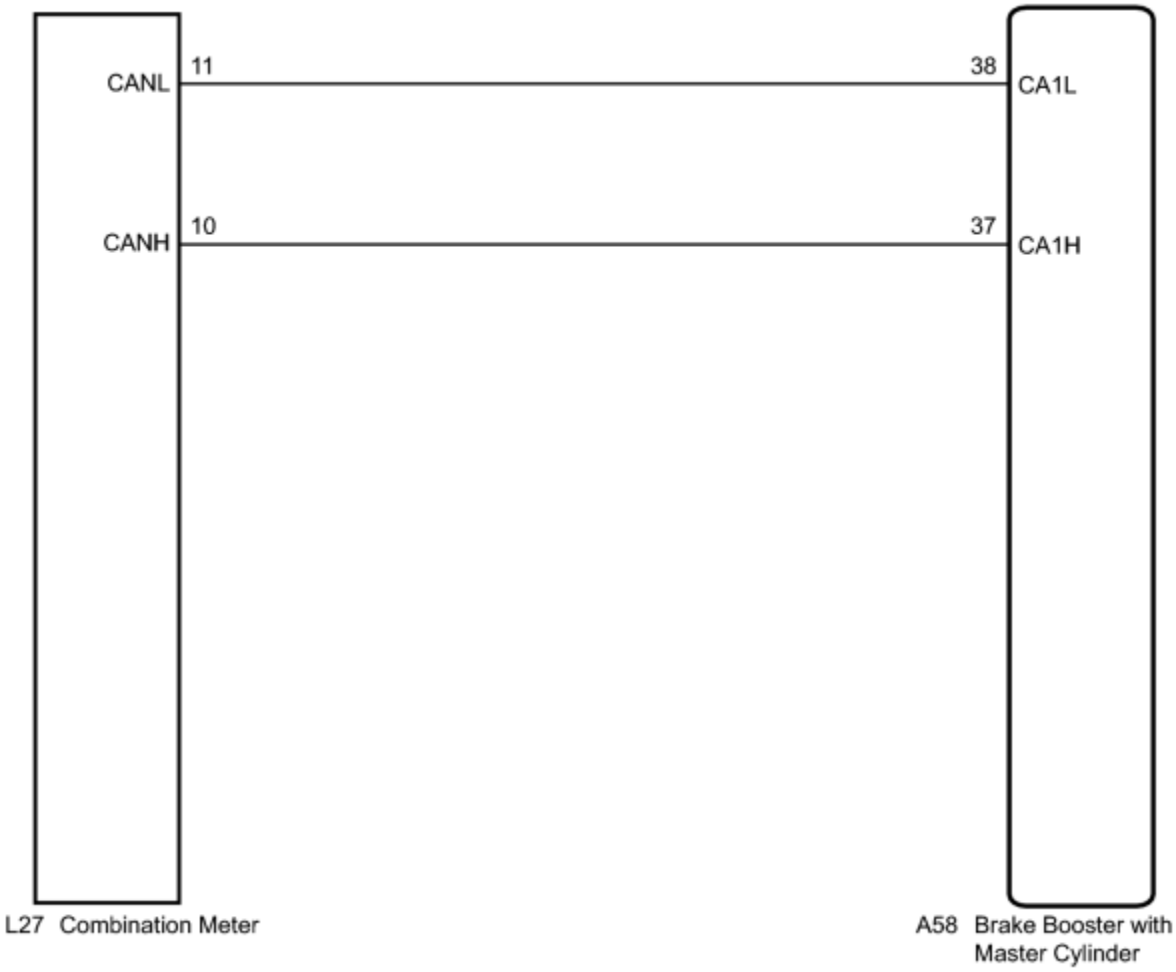
The skid control ECU is connected to the combination meter via CAN communication.

If the skid control ECU stores a DTC, the slip indicator light comes on in the combination meter.

The slip indicator light blinks during VSC and/or TRAC operation.

When the system fails, the slip indicator light comes on to warn the driver INFO.

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK IF SKID CONTROL ECU CONNECTOR IS SECURELY CONNECTED |

(a) Check if the skid control ECU connector is securely connected.

OK:

The connector is securely connected.

NG ▶ CONNECT CONNECTOR TO ECU CORRECTLY

OK ▼

| | |
|---|---|
| 3. | CHECK AUXILIARY BATTERY |

(a) Check the auxiliary battery voltage.

Standard Voltage:

11 to 14 V

NG ▶ CHARGE OR REPLACE AUXILIARY BATTERY

OK ▼

| | |
|---|---|
| 4. | INSPECT COMBINATION METER |

(a) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(b) Check the combination meter.

OK:

The slip indicator light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 5 METER CIRCUIT PLATE
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 5. | REPLACE NO. 5 METER CIRCUIT PLATE |

(a) Replace the No. 5 meter circuit plate INFO.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The slip indicator light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 2 METER CIRCUIT PLATE
OK ▶ **END**

| | |
|---|---|
| 6. | REPLACE NO. 2 METER CIRCUIT PLATE |

(a) Replace the No. 2 meter circuit plate INFO.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The slip indicator light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE
OK ▶ **END**

| |
|---|
| Slip Indicator Light does not Come ON |

# DESCRIPTION

The skid control ECU is connected to the combination meter via CAN communication.

# WIRING DIAGRAM

Refer to Slip Indicator Light Remains ON INFO.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (SLIP INDICATOR LIGHT) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Active Test on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Slip Indicator Light | Slip indicator light | Indicator light ON/OFF | Observe combination meter |

(d) Check that the slip indicator light on the combination meter turns on or off in accordance with the Techstream operation.

OK:

The slip indicator light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ INSPECT COMBINATION METER
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 3. | INSPECT COMBINATION METER |

(a) Turn the power switch off.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The slip indicator light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

NG ▶ REPLACE NO. 5 METER CIRCUIT PLATE
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 4. | REPLACE NO. 5 METER CIRCUIT PLATE |

(a) Replace the No. 5 meter circuit plate INFO.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The slip indicator light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 2 METER CIRCUIT PLATE
OK ▶ **END**

| | |
|---|---|
| 5. | REPLACE NO. 2 METER CIRCUIT PLATE |

(a) Replace the No. 2 meter circuit plate INFO.

(b) Perform the Active Test of the combination meter (meter CPU) using the Techstream INFO.

(c) Check the combination meter.

OK:

The slip indicator light turns on or off in accordance with the Techstream operation.

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE
OK ▶ **END**

Skid Control Buzzer Circuit

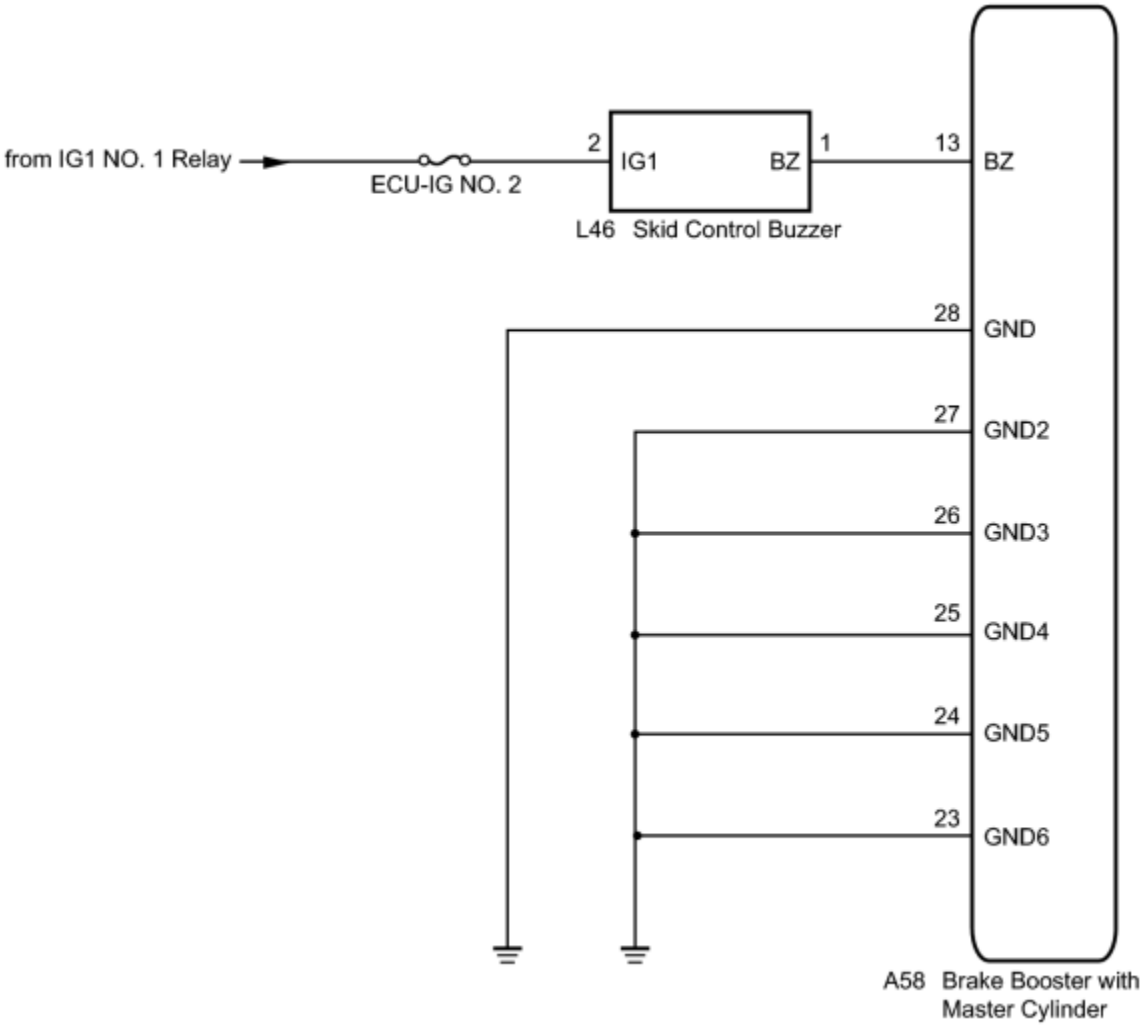
# DESCRIPTION

The skid control buzzer sounds intermittently to warn the driver when the accumulator pressure is abnormally low. This buzzer also sounds intermittently when VSC is operating.

HINT:

The skid control buzzer may sound when the accumulator pressure drops due to frequent braking INFO.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK BUZZER OPERATION |

(a) Confirm problem symptoms of the skid control buzzer according to the customer problem analysis.

HINT:

If the buzzer stops after sounding continuously, a temporary drop in accumulator pressure is the suspected cause.

Result:

| Result | Proceed to |
|---|---|
| Buzzer does not sound | A |
| Buzzer sounds constantly | B |

B ▶ INSPECT SKID CONTROL ECU

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (SKID CONTROL BUZZER) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the Active Test on the Techstream INFO.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Buzzer | Skid control buzzer | Buzzer ON/OFF | Buzzer can be heard |

(d) Check that the buzzer sounds/stops when turning the skid control buzzer on/off using the Techstream.

Result:

| Result | Proceed to |
|---|---|
| Buzzer does not sound | A |
| Buzzer sounds/stops | B |

HINT:

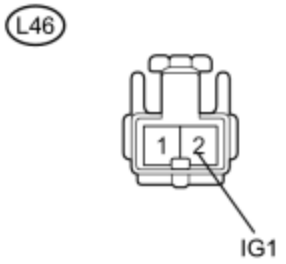
If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step INFO.

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 3. | INSPECT SKID CONTROL BUZZER (POWER SOURCE TERMINAL) |

*1




(a) Turn the power switch off.

(b) Disconnect the skid control buzzer connector.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L46-2 (IG1) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control Buzzer) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

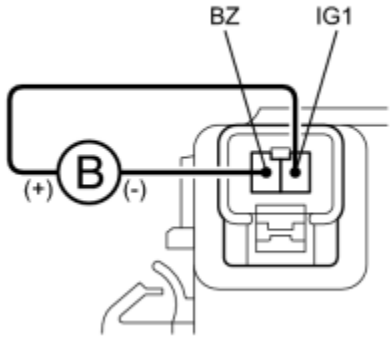
OK

| | |
|---|---|
| 4. | INSPECT SKID CONTROL BUZZER |

(a) Turn the power switch off.

(b) Connect a negative (-) lead from the battery to terminal 1, and a

*1




N

positive (+) lead to terminal 2 of the skid control buzzer, and then check that the buzzer sounds.

OK:

The skid control buzzer sounds.

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Skid Control Buzzer) |

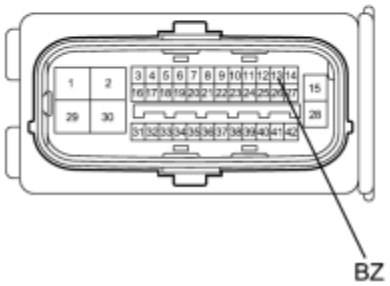
NG ▶ REPLACE SKID CONTROL BUZZER

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - SKID CONTROL BUZZER) |

*1

A58



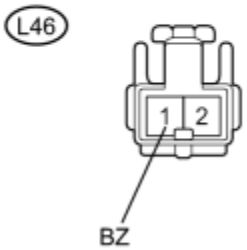

(a) Disconnect the skid control ECU connector 2 minutes after the power switch is turned off.

HINT:

Do not open/close the driver door within 2 minutes after the power switch is turned off.

*2

L46




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-13 (BZ) - L46-1 (BZ) | Always | Below 1 Ω |
| A58-13 (BZ) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Skid Control Buzzer) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

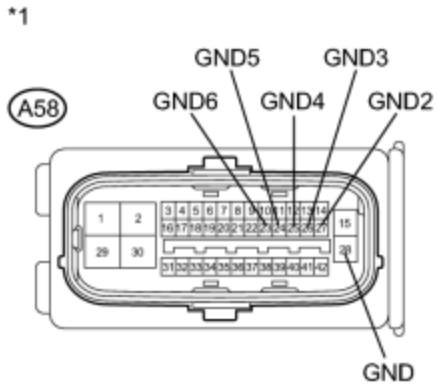
OK ▼

| | |
|---|---|
| 6. | INSPECT SKID CONTROL ECU (GND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-28 (GND) - Body ground | Always | Below 1 Ω |
| A58-27 (GND2) - Body ground | Always | Below 1 Ω |
| A58-26 (GND3) - Body ground | Always | Below 1 Ω |
| A58-25 (GND4) - Body ground | Always | Below 1 Ω |
| A58-24 (GND5) - Body ground | Always | Below 1 Ω |
| A58-23 (GND6) - Body ground | Always | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 7. | INSPECT SKID CONTROL ECU |

(a) Disconnect the skid control ECU connector.

(b) Check that the skid control buzzer operation.

Result:

| Result | Proceed to |
|---|---|
| Buzzer stops | A |
| Buzzer sounds constantly | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

B REPLACE SKID CONTROL BUZZER
A **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

| | |
|---|---|
| 8. | REPLACE SKID CONTROL BUZZER |

(a) Reconnect the skid control ECU connector.

(b) Replace the skid control buzzer INFO.

(c) Check that the skid control buzzer operation.

Result:

| Result | Proceed to |
|---|---|
| Buzzer stops | A |
| Buzzer sounds constantly | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

B CHECK IF CONNECTOR IS SECURELY CONNECTED
A **END**

| | |
|---|---|
| 9. | CHECK IF CONNECTOR IS SECURELY CONNECTED |

(a) Gently jiggle the connectors and wire harnesses and check the skid control buzzer operation.

Result:

| Result | Proceed to |
|---|---|

| Result | Proceed to |
|---|---|
| Buzzer stops | A |
| Buzzer sounds constantly | B |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

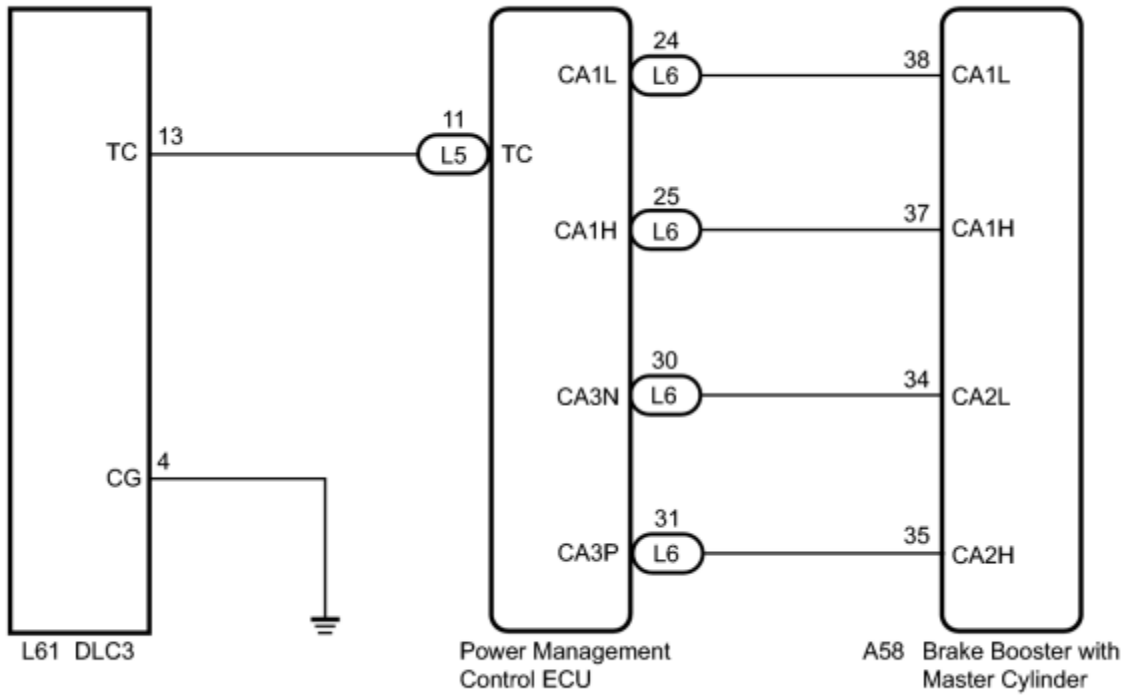
B ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
A ▶ **END**

| TC and CG Terminal Circuit |
|---|

# DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the ECU to display the DTC by blinking the ABS warning light.

# WIRING DIAGRAM




HINT:

When the warning lights continue to blink, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in one or more ECUs is suspected.

# INSPECTION PROCEDURE

NOTICE:

When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication system DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INSPECT CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (TC of DLC3 - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the power management control ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-13 (TC) - L5-11 (TC) | Always | Below 1 Ω |

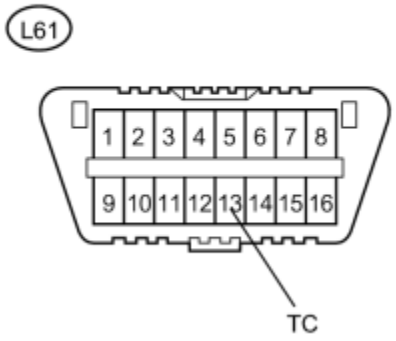
**Text in Illustration**

| | |
|---|---|
| *1 | Front view of DLC3 |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

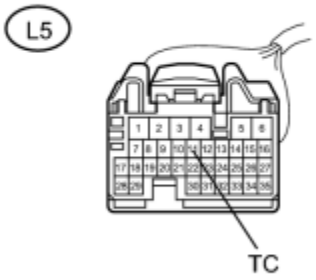
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

*1

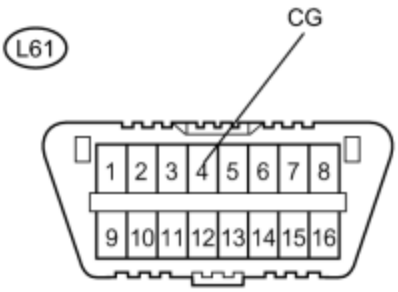



*2




| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND) |

*1




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-4 (CG) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

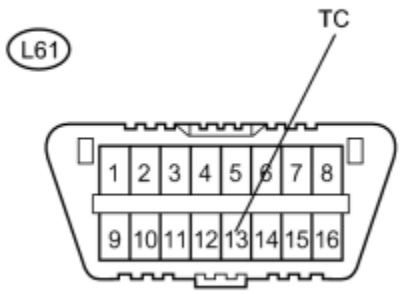
OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (TC of DLC3 - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-13 (TC) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

HINT:

If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPAIR OR REPLACE WIRE HARNESS OR EACH ECU
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

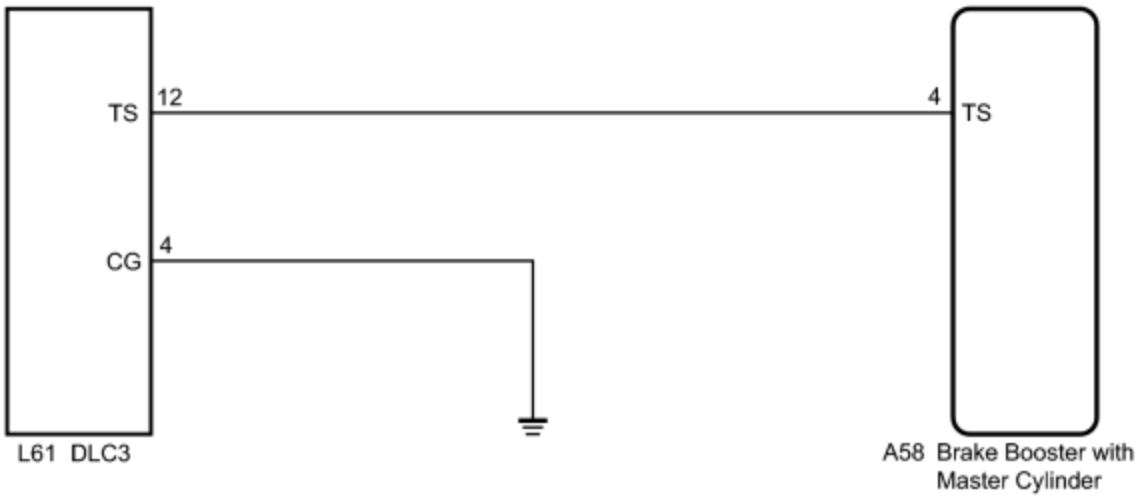
TS and CG Terminal Circuit

# DESCRIPTION

In Test Mode (signal check), a malfunction in a speed sensor that cannot be detected when the vehicle is stopped can be detected while driving.

Sensor check mode can be entered by connecting terminals TS and CG of the DLC3 and turning the power switch from off to on (IG).

# WIRING DIAGRAM




N

# INSPECTION PROCEDURE

NOTICE:

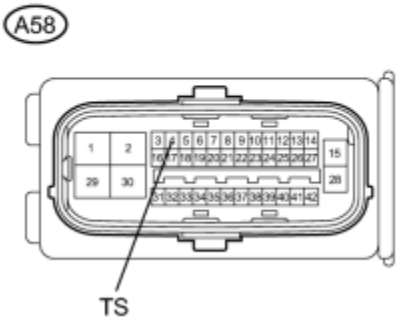
When replacing the brake booster with master cylinder (skid control ECU), perform initialization and calibration of the linear solenoid valve INFO.

# PROCEDURE

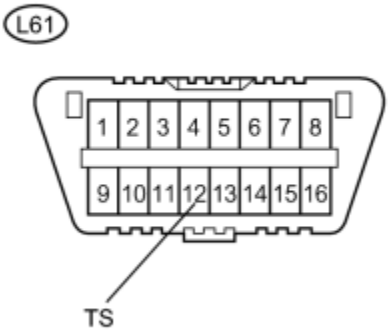
| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (SKID CONTROL ECU - TS of DLC3) |

(a) Disconnect the skid control ECU connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-4 (TS) - L61-12 (TS) | Always | Below 1 Ω |
| A58-4 (TS) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |
| *2 | Front view of DLC3 |

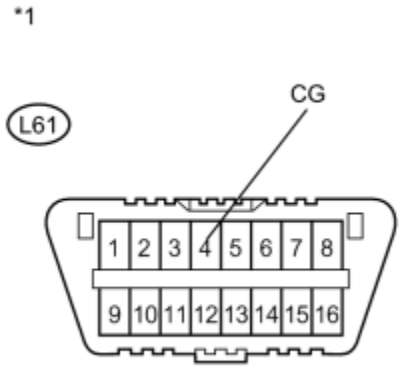
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CG of DLC3 - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-4 (CG) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of DLC3 |

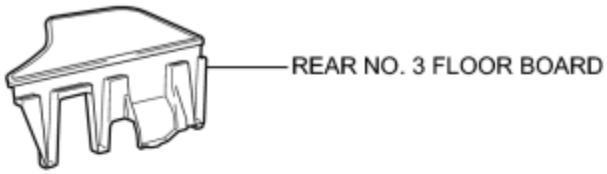
HINT:

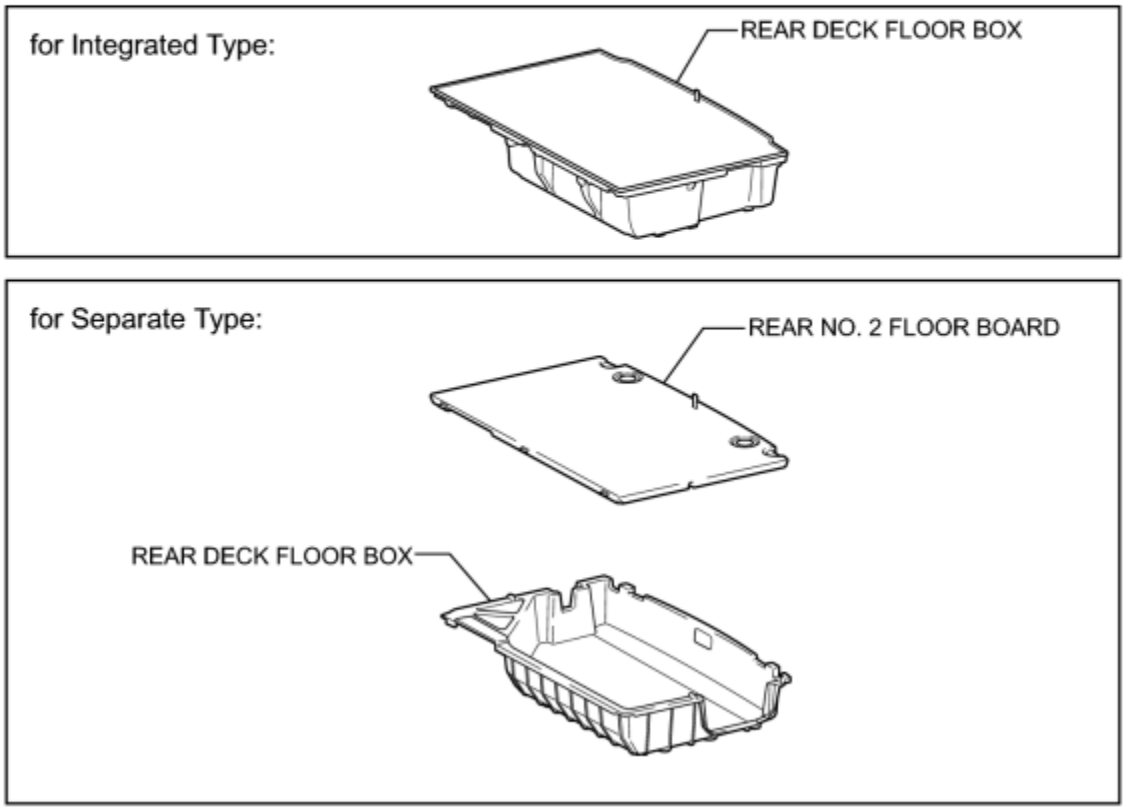
If troubleshooting has been carried out according to Problem Symptoms Table, refer back to the table and proceed to the next step before replacing the part INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

# COMPONENTS

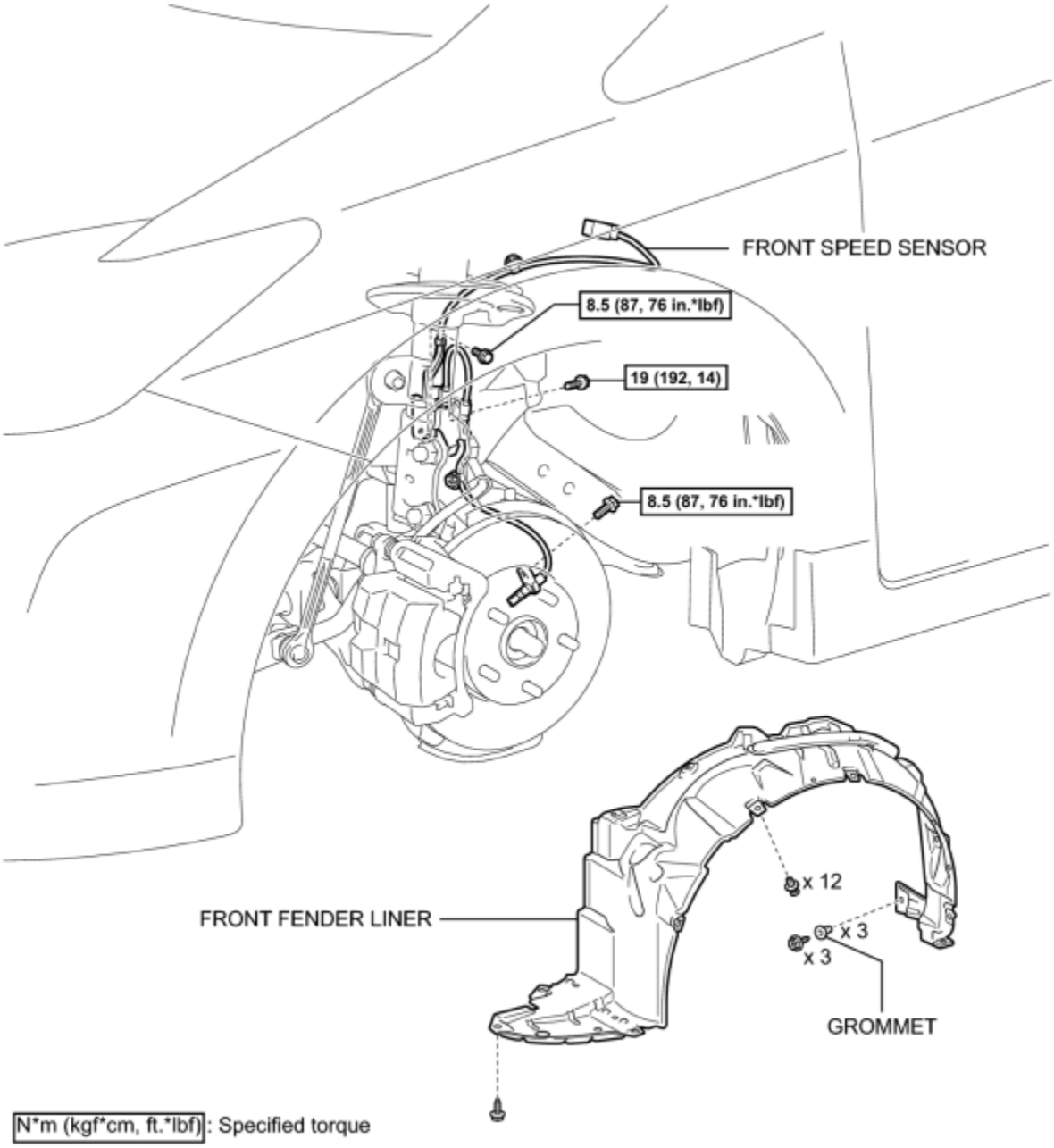
# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

NOTICE:

While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or any door courtesy switch is turned on. Therefore, when servicing the brake system components, do not depress the brake pedal or open/ close the doors while the battery is connected.

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.
- If the sensor rotor needs to be replaced, replace it together with the front axle hub and bearing assembly.

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

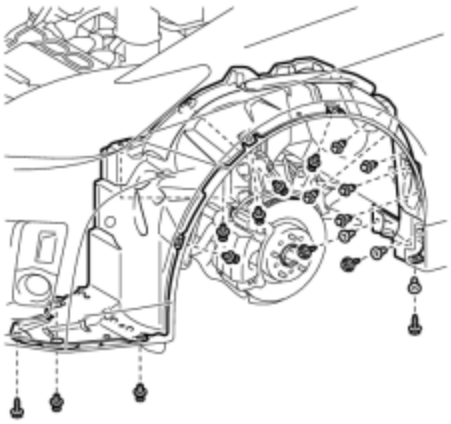
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT WHEEL

6. REMOVE FRONT FENDER LINER



C

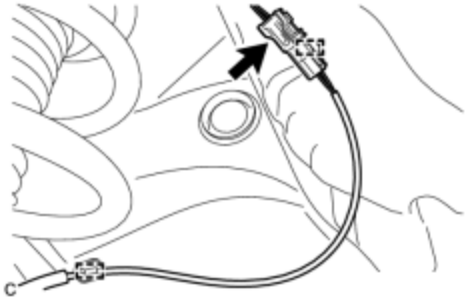
(a) Remove the 12 clips, 4 screws, 3 grommets, and front fender liner.

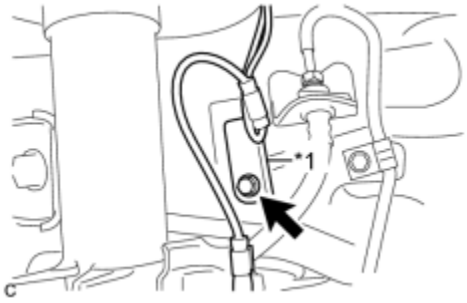
HINT:

Use the same procedure for the RH side and LH side.

7. REMOVE FRONT SPEED SENSOR

(a) Remove the 2 clamps and disconnect the front speed sensor connector.

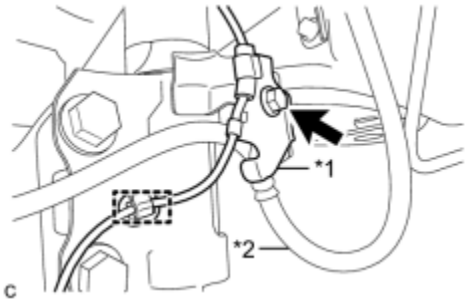





(b) Remove the bolt and No. 2 sensor clamp from the body.

## Text in Illustration

| | |
|---|---|
| *1 | No. 2 Sensor Clamp |

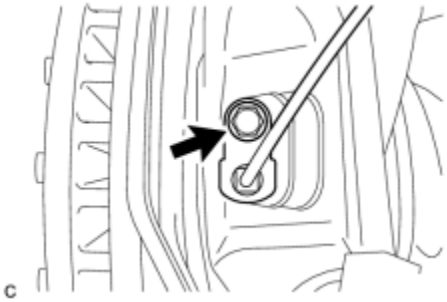



(c) Remove the bolt, No. 1 sensor clamp and front brake flexible hose together from the shock absorber assembly.

## Text in Illustration

| | |
|---|---|
| *1 | No. 1 Sensor Clamp |
| *2 | Front Brake Flexible Hose |

(d) Remove the clamp from the shock absorber assembly.



(e) Remove the bolt and front speed sensor.

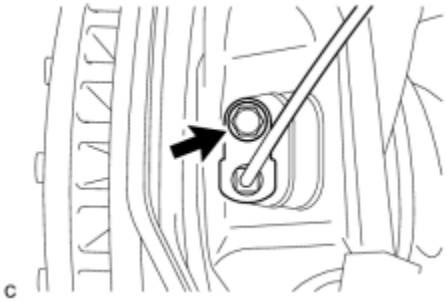
- Prevent foreign matter from attaching to the front speed sensor tip.
- Clean the speed sensor installation hole and the contact surfaces every time the front speed sensor is removed.

# INSTALLATION

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.
- If the sensor rotor needs to be replaced, replace it together with the front axle hub and bearing assembly.

1. INSTALL FRONT SPEED SENSOR



C

(a) Install the front speed sensor with the bolt.

Torque: **8.5 N·m (87 kgf·cm, 76in·lbf)**

- Prevent foreign matter from attaching to the front speed sensor tip.
- Firmly insert the front speed sensor body into the knuckle before tightening the bolt.
- After installing the front speed sensor to the knuckle, make sure that there is no clearance between the front speed sensor stay and knuckle. Also make sure that no foreign matter is stuck between the parts.
- Before installing the clamp, firmly insert the points of the clamp into the installation holes.

(b) Temporarily install the front brake flexible hose.




C

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front Brake Flexible Hose | *2 | No. 1 Sensor Clamp |

(c) Install the front brake flexible hose and No. 1 sensor clamp together to the shock absorber with the bolt.

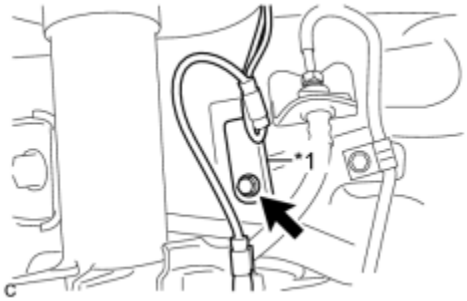
Torque: **19 N·m (192 kgf·cm, 14ft·lbf)**

NOTICE:

- Do not twist the wire harness for the front speed sensor when installing the speed sensor.
- Bolt tightens the brake flexible hose and front speed sensor together. Make sure that the front speed sensor is positioned over the front brake flexible hose.



(d) Install the clamp to the shock absorber assembly.

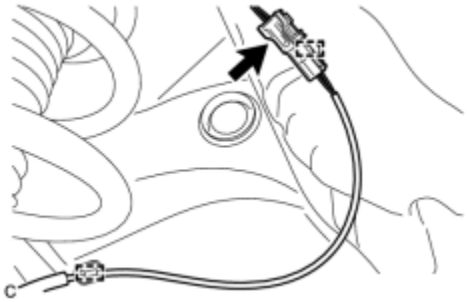



(e) Install the No. 2 sensor clamp to the body with the bolt.

Torque: **8.5 N·m (87 kgf·cm, 76in·lbf)**

## Text in Illustration

| | |
|---|---|
| *1 | No. 2 Sensor Clamp |

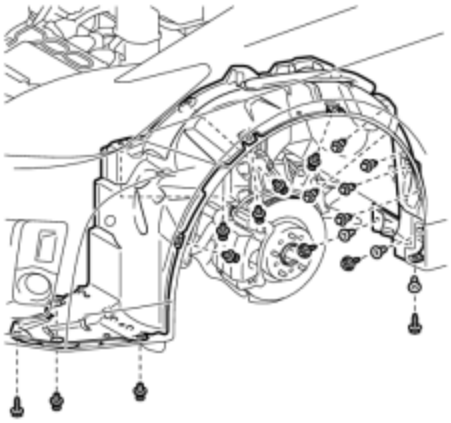


(f) Connect the speed sensor connector.

(g) Connect the 2 speed sensor wire harness clamps to the body.

2. INSTALL FRONT FENDER LINER

(a) Install the front fender liner with the 12 clips, 3 grommets and 4 screws.



C

3. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. INSTALL REAR NO. 3 FLOOR BOARD INFO

6. INSTALL REAR DECK FLOOR BOX INFO

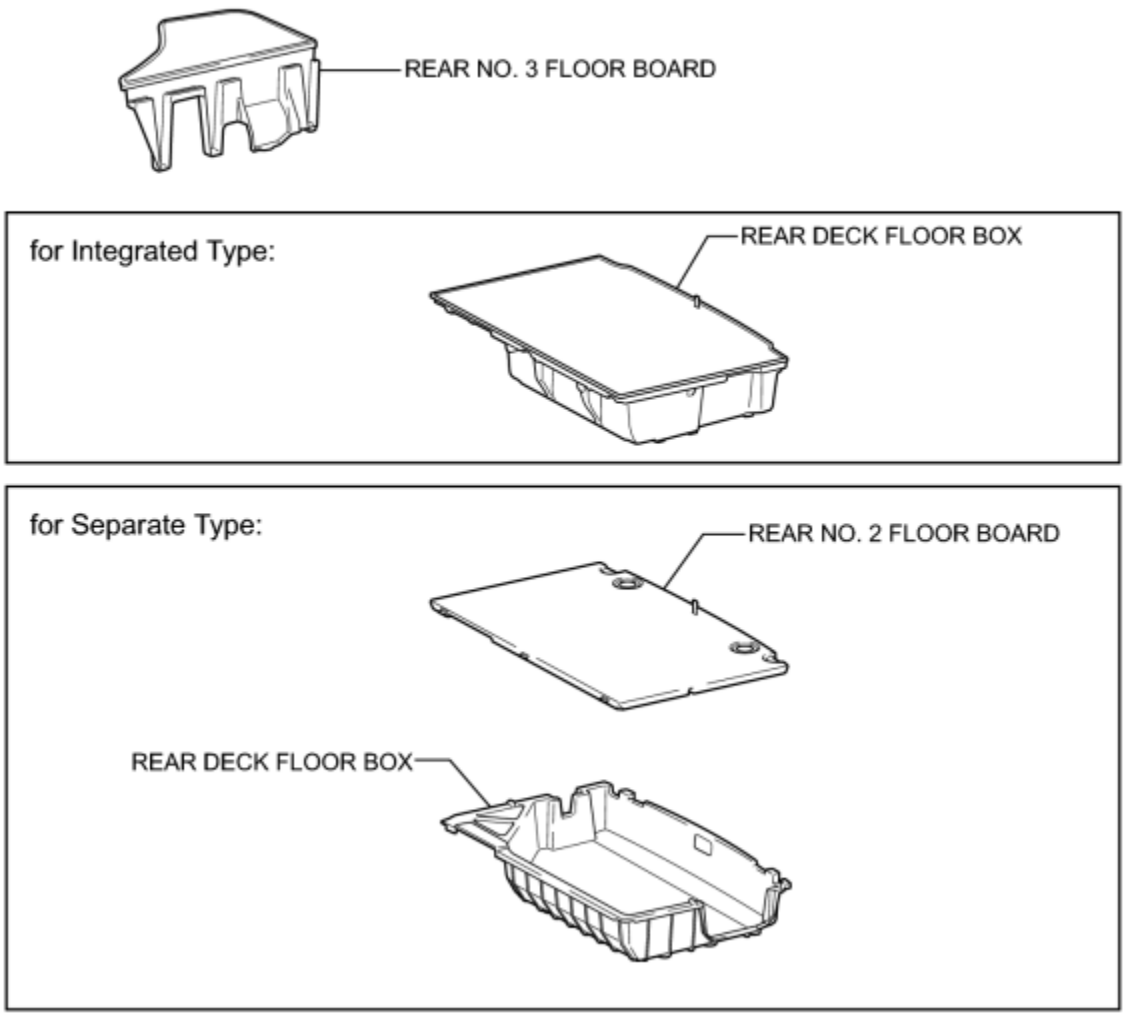
7. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

8. CHECK FOR SPEED SENSOR SIGNAL

INFO

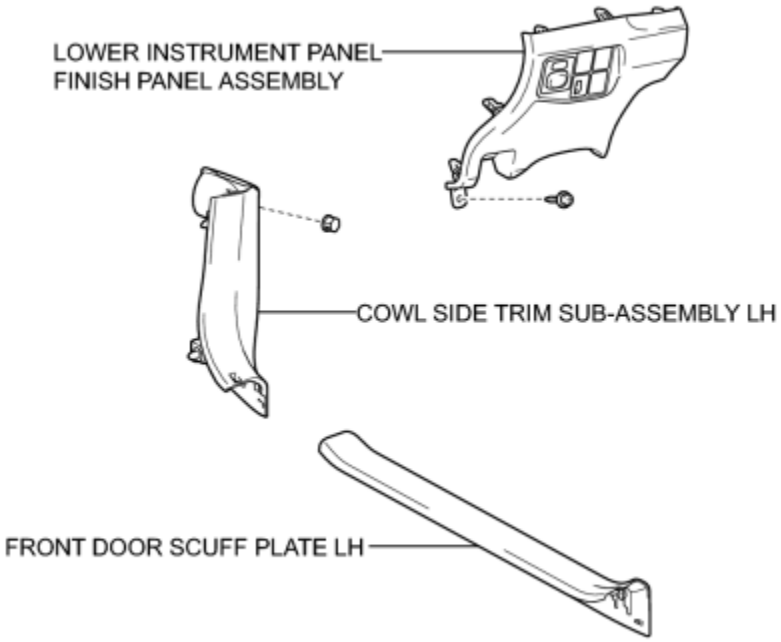
# COMPONENTS

# ILLUSTRATION



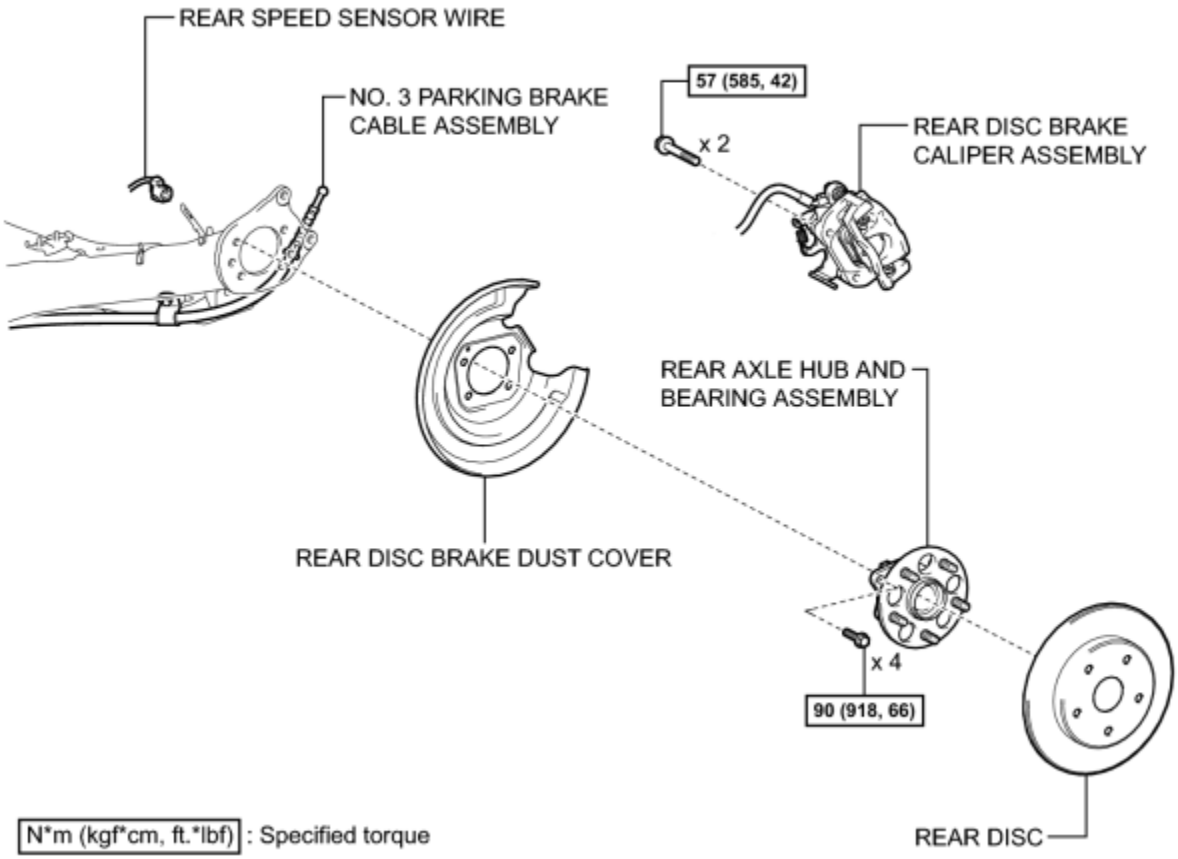

P

# ILLUSTRATION




c

# ILLUSTRATION


REAR SPEED SENSOR WIRE
NO. 3 PARKING BRAKE CABLE ASSEMBLY
57 (585, 42)
x 2
REAR DISC BRAKE CALIPER ASSEMBLY
REAR AXLE HUB AND BEARING ASSEMBLY
REAR DISC BRAKE DUST COVER
x 4
90 (918, 66)
REAR DISC
N*m (kgf*cm, ft.*lbf) : Specified torque

c

# REMOVAL

NOTICE:

- While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or any door courtesy switch is turned on. Therefore, when servicing the brake system components, do not depress the brake pedal or open/ close the doors while the battery is connected.
- When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, clear the DTC.

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.
- If the sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly.
- The rear speed sensor is a component of the rear axle hub and bearing assembly. If the sensor malfunctions, replace the rear axle hub and bearing assembly.

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE REAR WHEEL

6. REMOVE FRONT DOOR SCUFF PLATE LH INFO

7. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

8. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

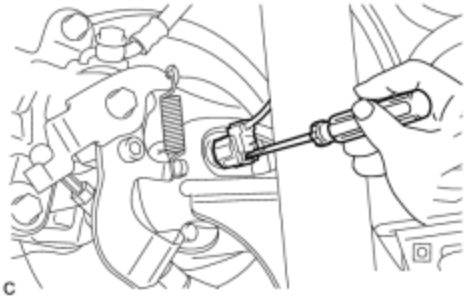
9. LOOSEN PARKING BRAKE CABLE INFO

10. DISCONNECT REAR SPEED SENSOR WIRE

(a) Using a screwdriver, disconnect the connector from the rear speed sensor.

NOTICE:

Be careful not to damage the rear speed sensor.




11. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

12. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY INFO

13. REMOVE REAR DISC INFO

14. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY

(a) Remove the rear axle hub and bearing assembly INFO.

HINT:

The rear speed sensor is a component of the rear axle hub and bearing assembly. If the sensor malfunctions, replace the rear axle hub and bearing assembly.

# INSTALLATION

HINT:

- If the sensor rotor needs to be replaced, replace it together with the rear axle hub and bearing assembly.
- The rear speed sensor is a component of the rear axle hub and bearing assembly. If the sensor malfunctions, replace the rear axle hub and bearing assembly.

1. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY

(a) Install the rear axle hub and bearing assembly INFO.

HINT:

The rear speed sensor is a component of the rear axle hub and bearing assembly. If the sensor malfunctions, replace the rear axle hub and bearing assembly.

2. INSPECT REAR AXLE HUB BEARING LOOSENESS INFO

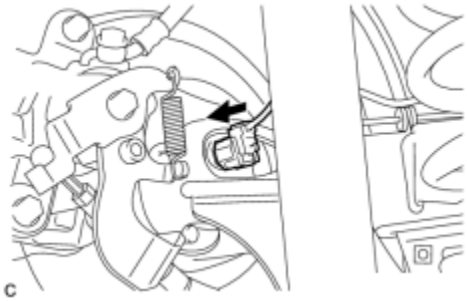
3. INSPECT REAR AXLE HUB RUNOUT INFO

4. INSTALL REAR DISC INFO

5. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY INFO

6. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

7. CONNECT REAR SPEED SENSOR WIRE




(a) Connect the rear speed sensor wire connector to the rear speed sensor.

8. ADJUST PARKING BRAKE LEVER TRAVEL INFO

9. INSPECT REAR DISC BRAKE CYLINDER OPERATION LEVER AND STOPPER CLEARANCE INFO

10. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

11. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

12. INSTALL FRONT DOOR SCUFF PLATE LH INFO

13. INSTALL REAR WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

14. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

15. INSTALL REAR NO. 3 FLOOR BOARD INFO

16. INSTALL REAR DECK FLOOR BOX INFO

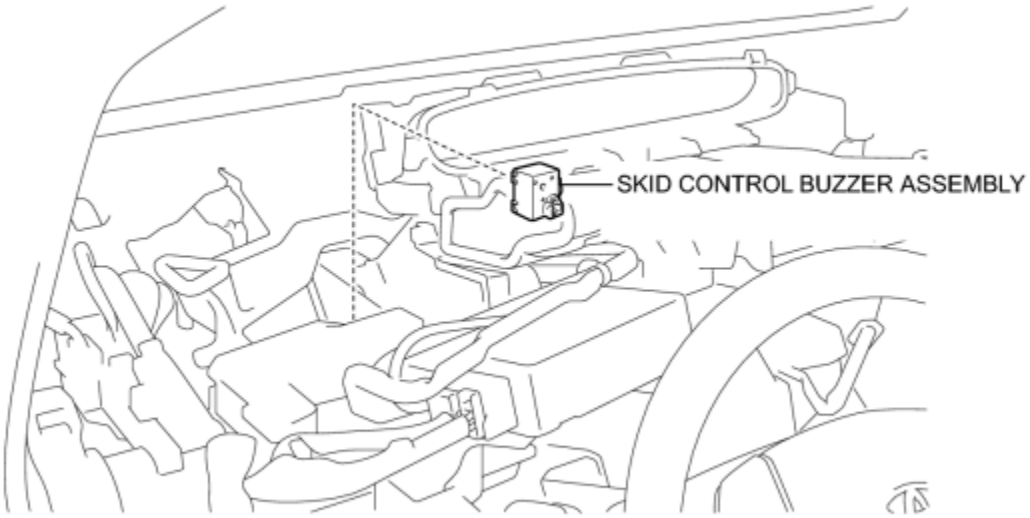
17. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

18. CHECK FOR SPEED SENSOR SIGNAL

INFO

# COMPONENTS

# ILLUSTRATION




C

# REMOVAL

NOTICE:

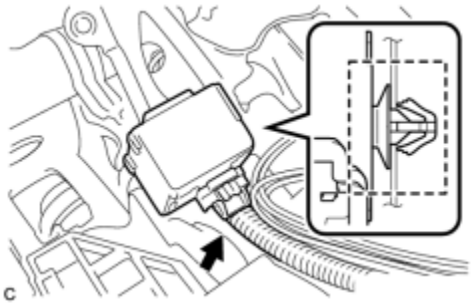
While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or any door courtesy switch is turned on. Therefore, when servicing the brake system components, do not depress the brake pedal or open/close the doors while the battery is connected.

1. REMOVE UPPER INSTRUMENT PANEL SUB-ASSEMBLY

HINT:

Refer to the instructions for Removal of the Upper Instrument Panel Sub-assembly INFO.

2. REMOVE SKID CONTROL BUZZER ASSEMBLY




(a) Remove the skid control buzzer assembly.

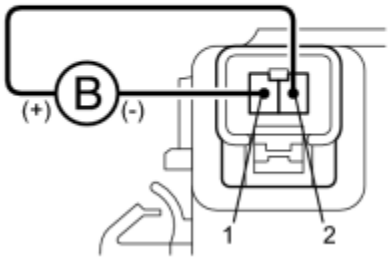
(b) Disconnect the skid control buzzer connector.

# INSPECTION

1. INSPECT SKID CONTROL BUZZER ASSEMBLY

(a) Connect a negative (-) lead from the battery to terminal 1 of the skid control buzzer and a positive (+) lead to terminal 2, and then check that the buzzer sounds.

*1




N

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Skid Control Buzzer) |

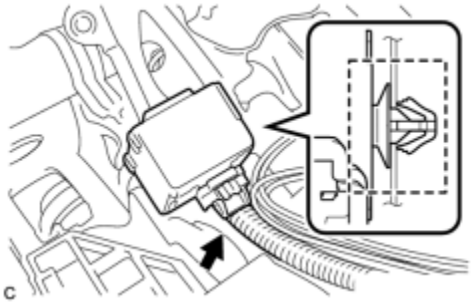
OK:

The skid control buzzer sounds.

If the result is not as specified, replace the switch.

# INSTALLATION

1. INSTALL SKID CONTROL BUZZER ASSEMBLY




(a) Connect the skid control buzzer connector.

(b) Install the skid control buzzer assembly.

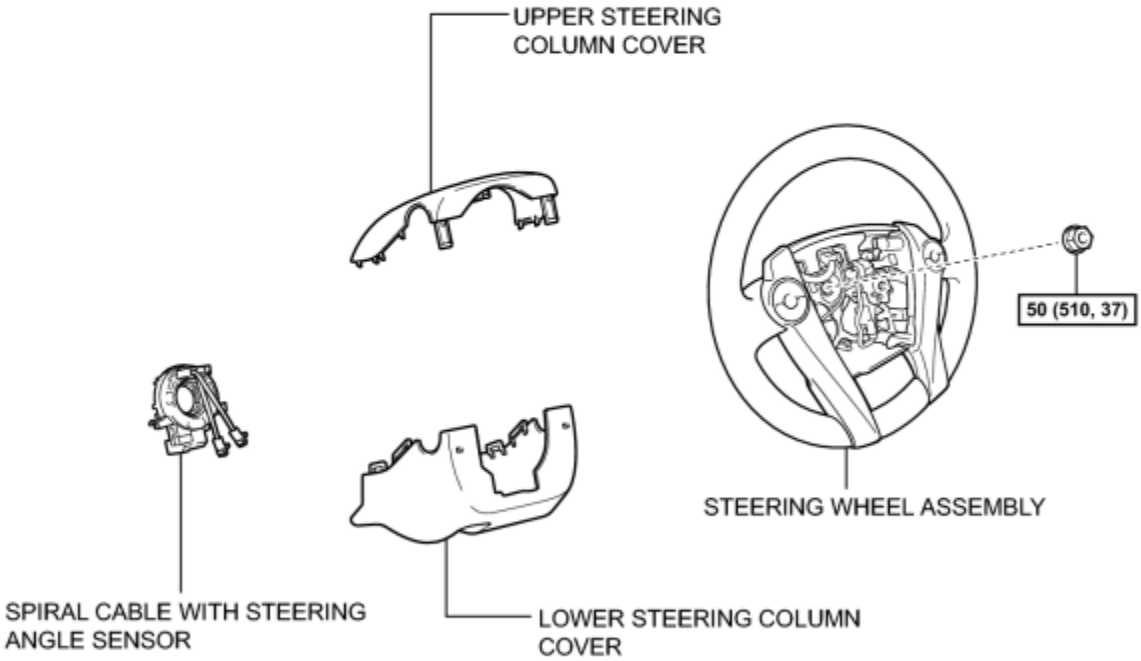
2. INSTALL UPPER INSTRUMENT PANEL SUB-ASSEMBLY

HINT:

Refer to the instructions for Installation of the Upper Instrument Panel Sub-assembly INFO.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

# REMOVAL

NOTICE:

- Do not remove the steering angle sensor from the spiral cable.
- While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or any door courtesy switch is turned on. Therefore, when servicing the brake system components, do not depress the brake pedal or open/ close the doors while the battery is connected.

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

3. REMOVE STEERING PAD

HINT:

Refer to the procedure up to Remove Steering Pad INFO.

4. REMOVE STEERING WHEEL ASSEMBLY INFO

5. REMOVE LOWER STEERING COLUMN COVER INFO

6. REMOVE UPPER STEERING COLUMN COVER INFO

7. REMOVE SPIRAL CABLE WITH STEERING ANGLE SENSOR

(a) Remove the spiral cable with steering angle sensor INFO.

NOTICE:

- Do not replace spiral cable with steering angle sensor with the battery connected and the power switch on (IG).
- Do not rotate the spiral cable with steering angle sensor with the battery connected and the power switch on (IG).
- Ensure that the steering wheel is installed and aligned straight when inspecting the steering angle sensor.
- Do not remove the steering angle sensor from the spiral cable.

# INSTALLATION

1. INSTALL SPIRAL CABLE WITH STEERING ANGLE SENSOR

(a) Install the spiral cable with steering angle sensor INFO.

NOTICE:

- Do not replace the spiral cable with steering angle sensor with the battery connected and the power switch on (IG).
- Do not rotate the spiral cable with steering angle sensor with the battery connected and the power switch on (IG).
- Ensure that the steering wheel is installed and aligned straight when inspecting the steering angle sensor.
- Do not remove the steering angle sensor from the spiral cable.

2. INSTALL UPPER STEERING COLUMN COVER INFO

3. INSTALL LOWER STEERING COLUMN COVER INFO

4. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

5. ADJUST SPIRAL CABLE INFO

6. INSTALL STEERING WHEEL ASSEMBLY INFO

7. INSPECT STEERING WHEEL CENTER POINT

8. INSTALL STEERING PAD

HINT:

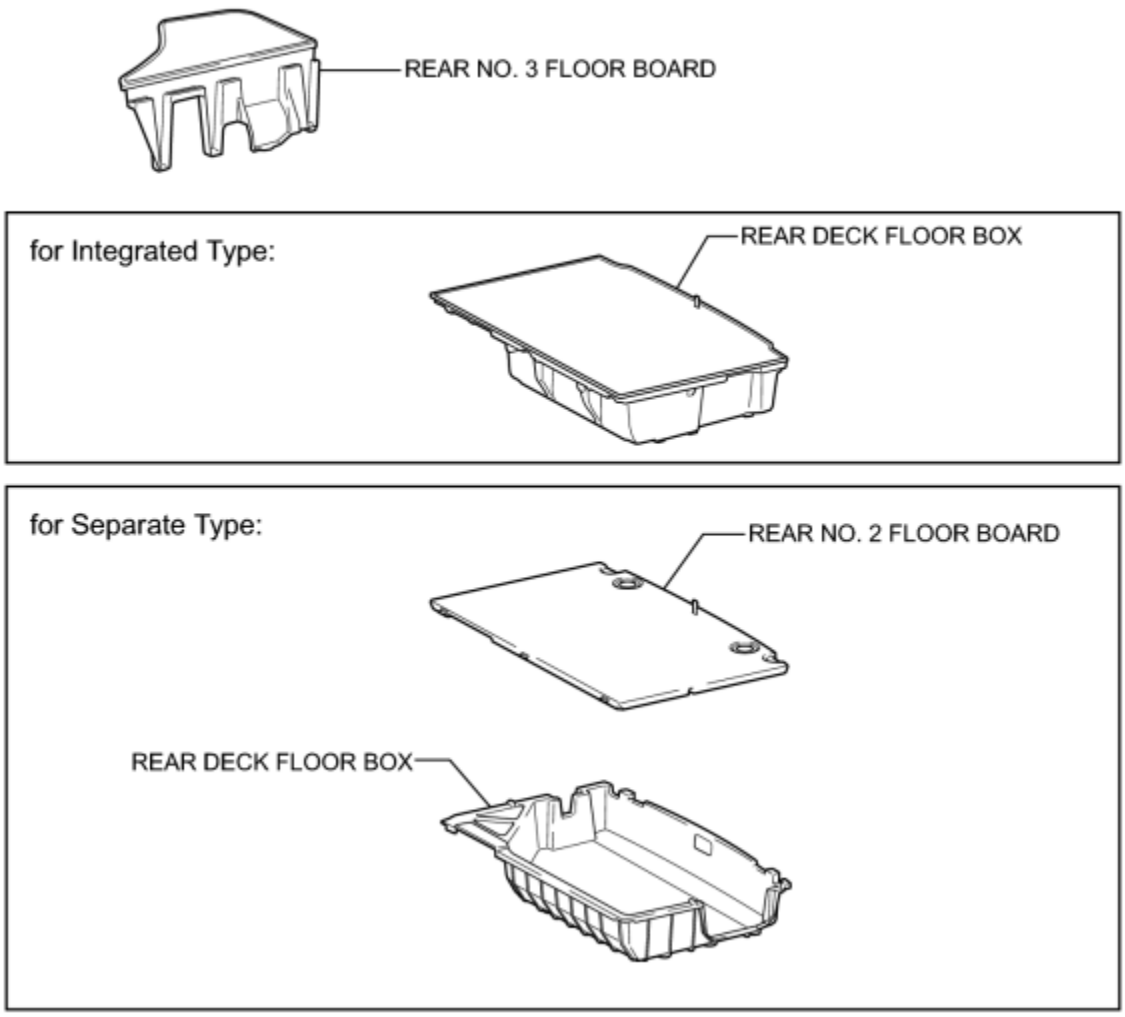
Refer to the procedure from Install Steering Pad INFO.

9. CALIBRATE STEERING ANGLE SENSOR

INFO

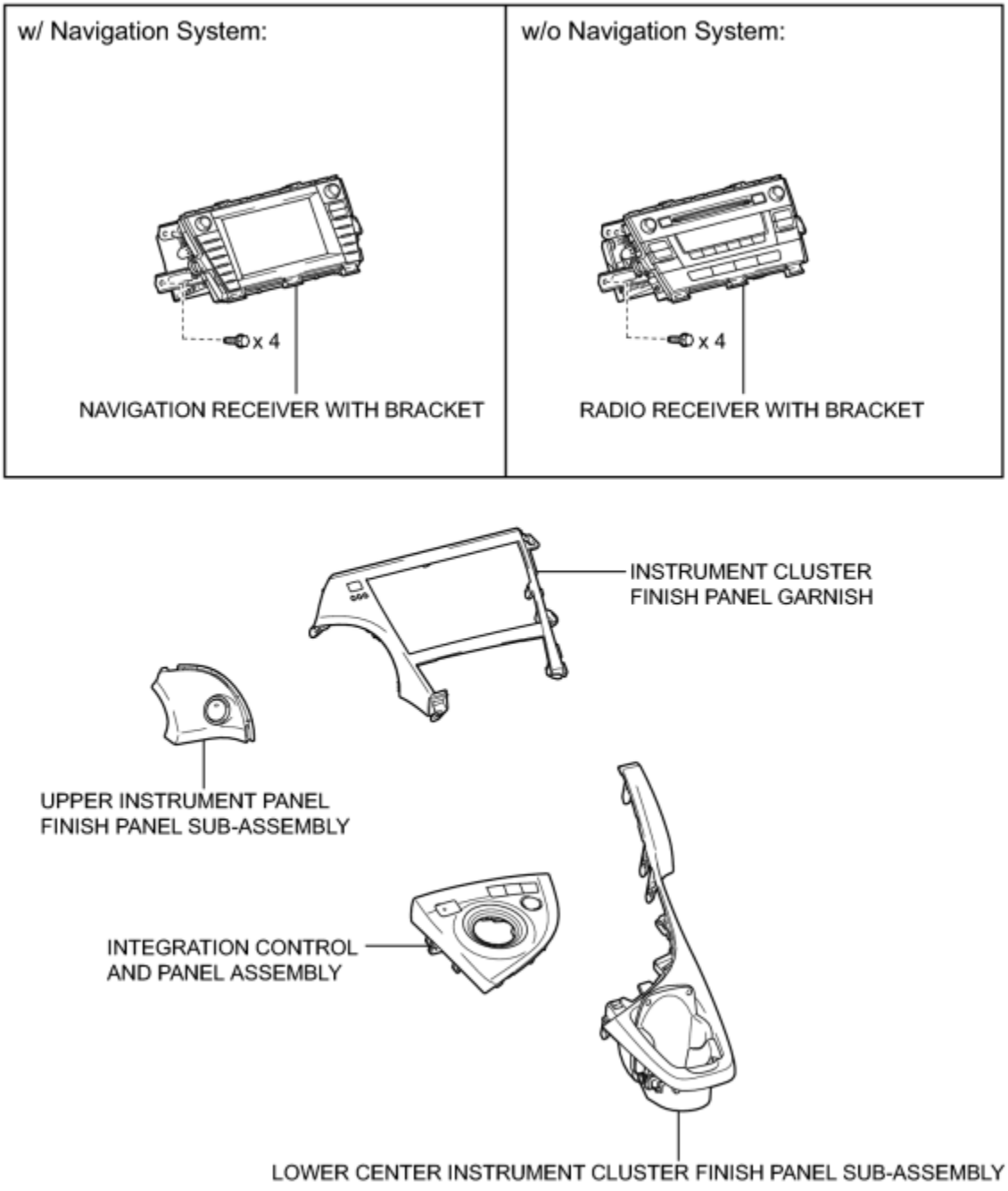
# COMPONENTS

# ILLUSTRATION



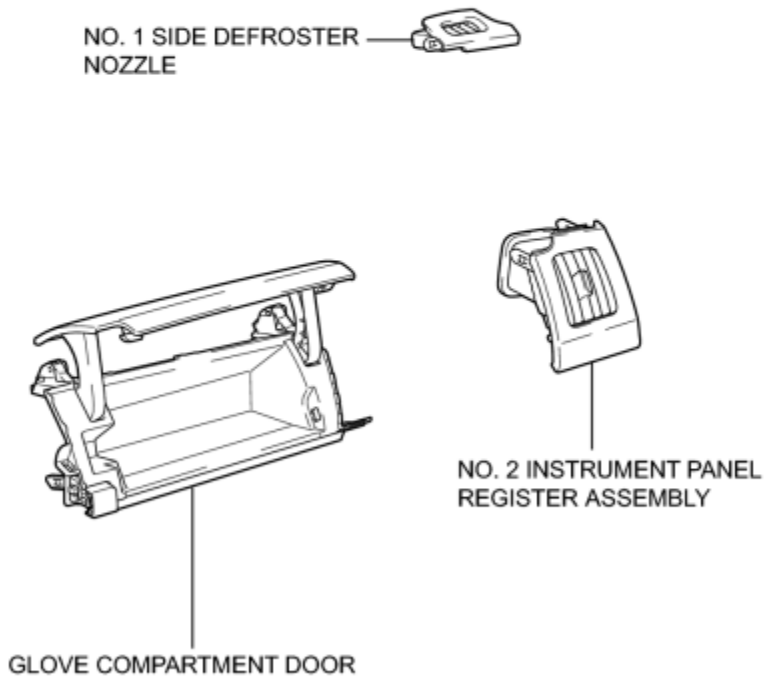

P

# ILLUSTRATION

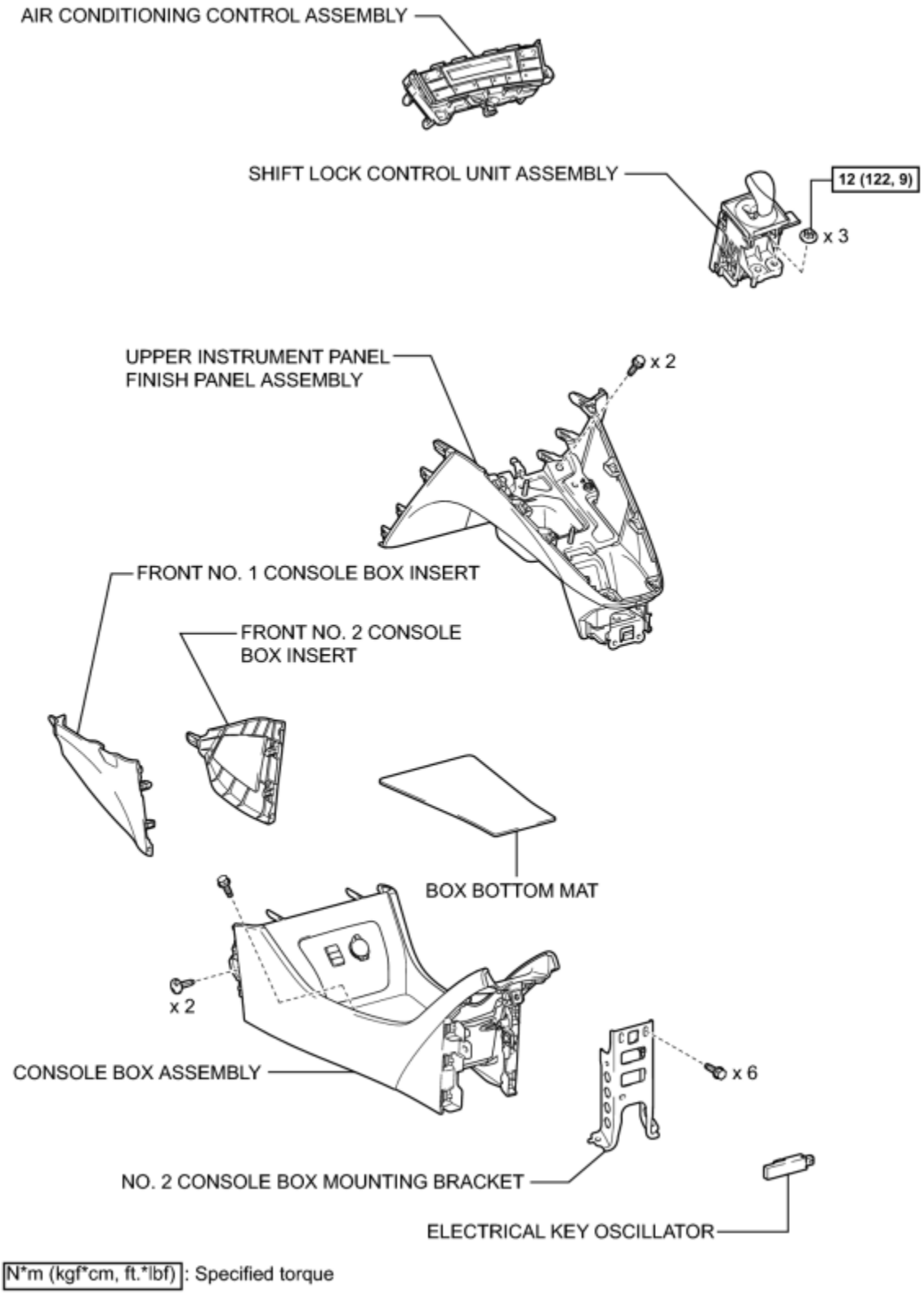



P

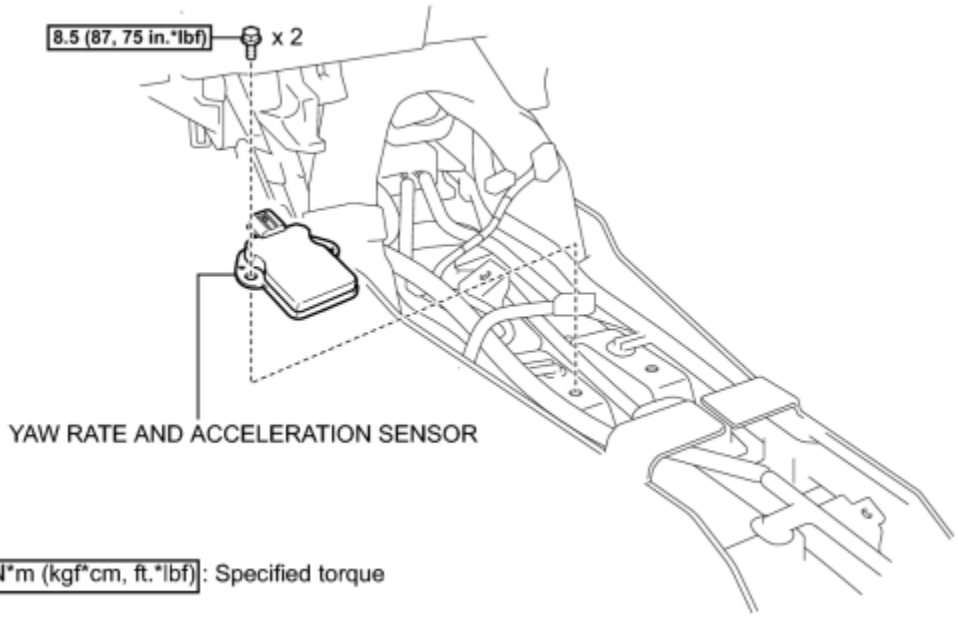
# ILLUSTRATION




# ILLUSTRATION




# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

NOTICE:

While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or any door courtesy switch is turned on. Therefore, when servicing the brake system components, do not depress the brake pedal or open/ close the doors while the battery is connected.

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

6. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

7. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

8. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

9. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

10. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

11. REMOVE NO. 1 SIDE DEFROSTER NOZZLE INFO

12. REMOVE NO. 2 INSTRUMENT PANEL REGISTER ASSEMBLY INFO

13. REMOVE GLOVE COMPARTMENT DOOR INFO

14. REMOVE REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure up to Remove Rear Console Box Assembly INFO.

15. REMOVE ELECTRICAL KEY OSCILLATOR INFO

16. REMOVE NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

17. REMOVE FRONT NO. 1 CONSOLE BOX INSERT INFO

18. REMOVE FRONT NO. 2 CONSOLE BOX INSERT INFO

19. REMOVE BOX BOTTOM MAT INFO

20. SEPARATE CONSOLE BOX ASSEMBLY INFO

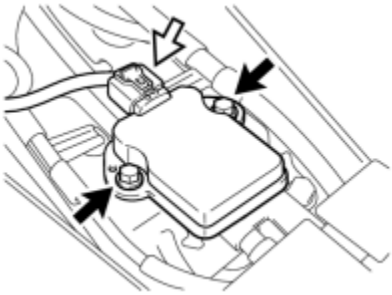
21. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO

22. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

23. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

24. REMOVE CONSOLE BOX ASSEMBLY INFO

25. REMOVE YAW RATE AND ACCELERATION SENSOR

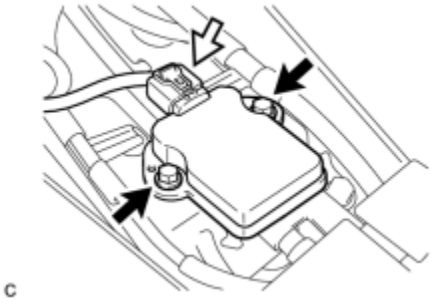



(a) Remove the 2 bolts and yaw rate and acceleration sensor.

(b) Disconnect the connector from the yaw rate and acceleration sensor.

# INSTALLATION

1. INSTALL YAW RATE AND ACCELERATION SENSOR




(a) Connect the yaw rate and acceleration sensor connector.

NOTICE:

Make sure that the yaw rate and acceleration sensor connector is connected securely.

(b) Install the yaw rate and acceleration sensor with the 2 bolts.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

NOTICE:

- Do not damage the yaw rate and acceleration sensor.
- Make sure that the yaw rate and acceleration sensor is installed securely.
- Do not use dropped or damaged parts.
- Keep the contact surfaces of the yaw rate and acceleration sensor and the body free of foreign matter.
- Make sure that the sensor is facing the correct direction.

2. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

4. INSTALL AIR CONDITIONING CONTROL ASSEMBLY INFO

5. INSTALL CONSOLE BOX ASSEMBLY INFO

6. INSTALL BOX BOTTOM MAT INFO

7. INSTALL FRONT NO. 2 CONSOLE BOX INSERT INFO

8. INSTALL NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

9. INSTALL ELECTRICAL KEY OSCILLATOR INFO

10. INSTALL FRONT NO. 1 CONSOLE BOX INSERT INFO

11. INSTALL REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure from Install Rear Console Box Assembly INFO.

12. INSTALL GLOVE COMPARTMENT DOOR INFO

13. INSTALL NO. 2 INSTRUMENT PANEL REGISTER ASSEMBLY INFO

14. INSTALL NO. 1 SIDE DEFROSTER NOZZLE INFO

15. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

16. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

17. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

18. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

19. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

20. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

21. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

22. INSTALL REAR NO. 3 FLOOR BOARD INFO

23. INSTALL REAR DECK FLOOR BOX INFO

24. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

25. PERFORM YAW RATE AND ACCELERATION SENSOR ZERO POINT CALIBRATION

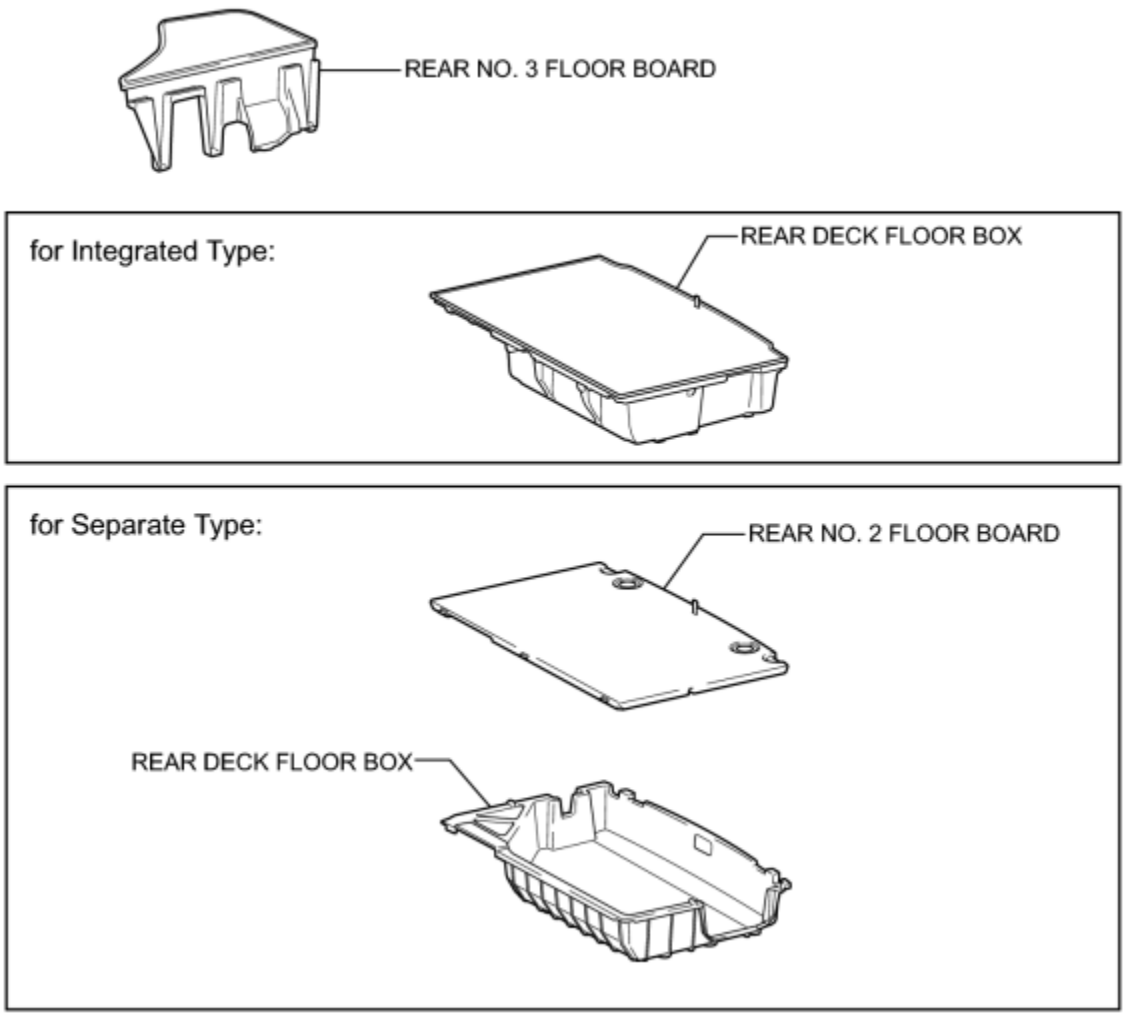
(a) Perform the yaw rate and acceleration sensor zero point calibration INFO.

26. CHECK FOR YAW RATE AND ACCELERATION SENSOR SIGNAL

INFO

# COMPONENTS

# ILLUSTRATION



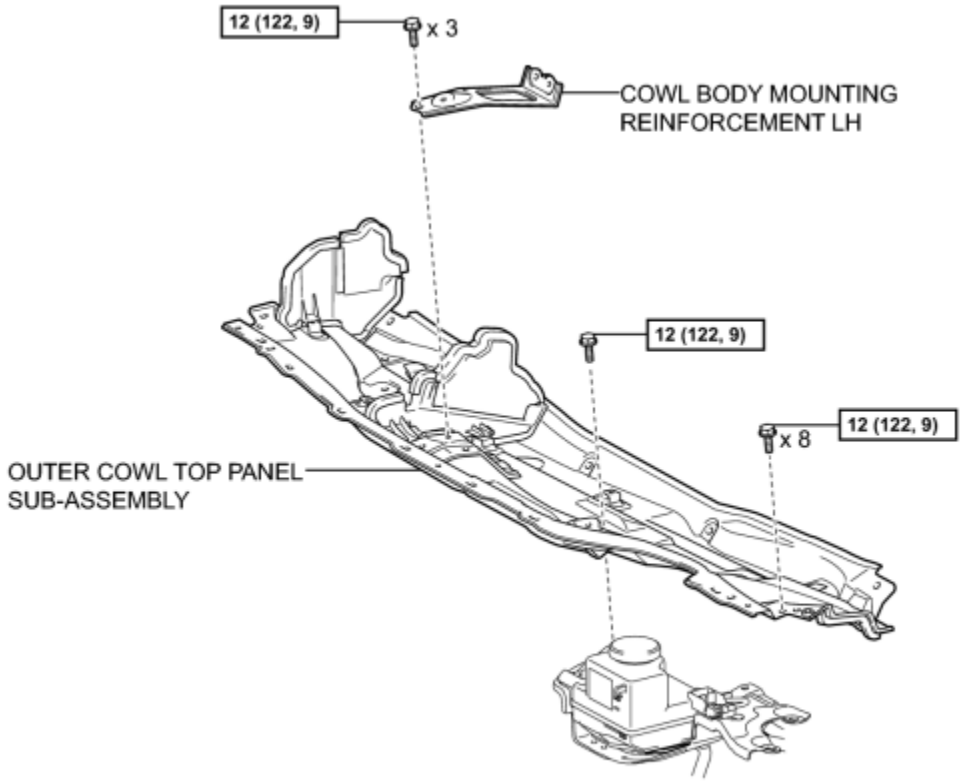

P

# ILLUSTRATION




C

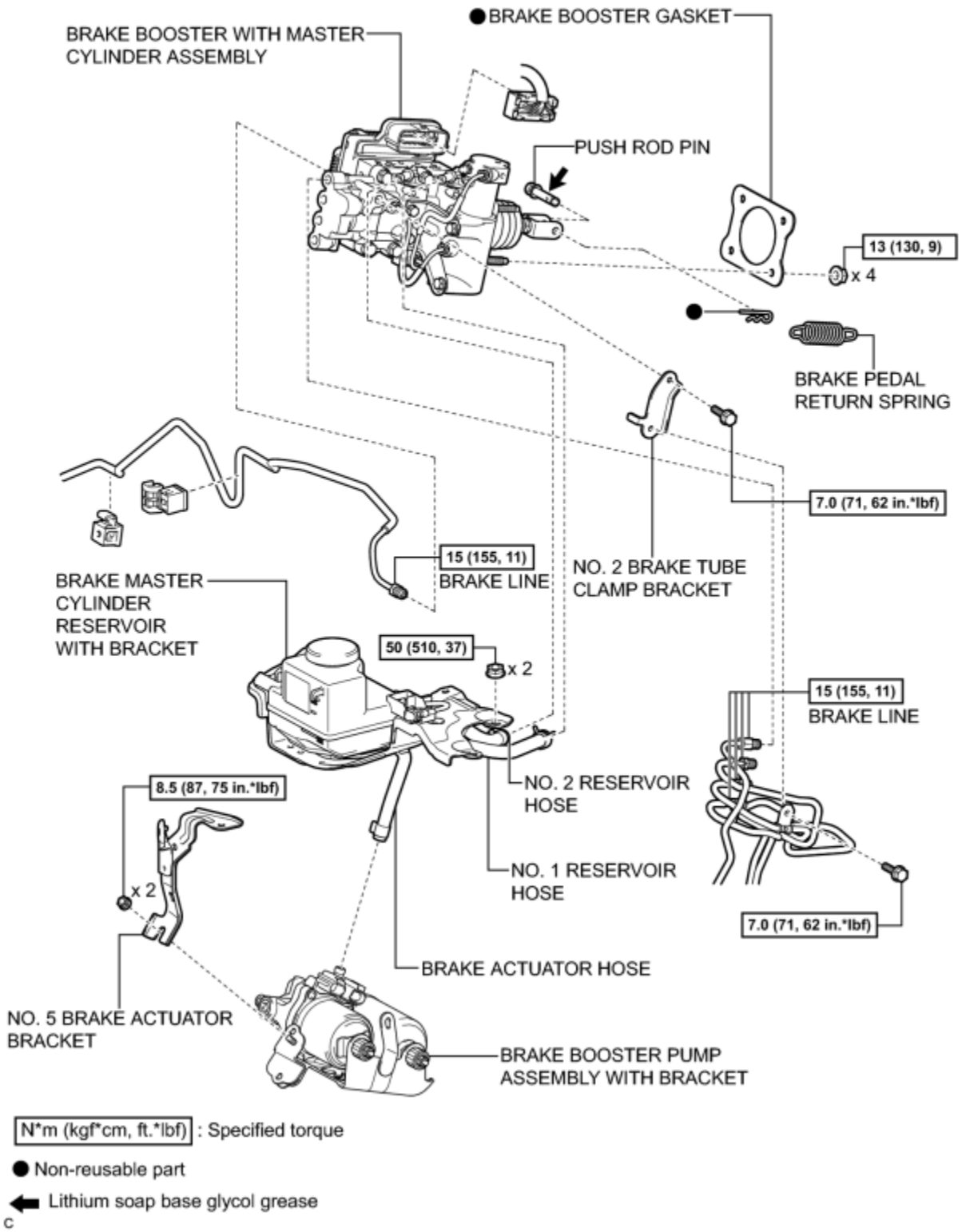
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

# ILLUSTRATION


BRAKE BOOSTER GASKET
BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY
PUSH ROD PIN
13 (130, 9)
x 4
BRAKE PEDAL RETURN SPRING
7.0 (71, 62 in.*lbf)
15 (155, 11)
BRAKE LINE
NO. 2 BRAKE TUBE CLAMP BRACKET
BRAKE MASTER CYLINDER RESERVOIR WITH BRACKET
50 (510, 37)
x 2
15 (155, 11)
BRAKE LINE
NO. 2 RESERVOIR HOSE
8.5 (87, 75 in.*lbf)
x 2
NO. 1 RESERVOIR HOSE
7.0 (71, 62 in.*lbf)
BRAKE ACTUATOR HOSE
NO. 5 BRAKE ACTUATOR BRACKET
BRAKE BOOSTER PUMP ASSEMBLY WITH BRACKET
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
Lithium soap base glycol grease
C

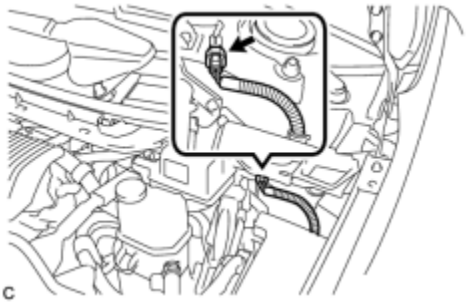
# REMOVAL

1. DISABLE BRAKE CONTROL

(a) Wait at least 2 minutes after the power switch off.

NOTICE:

When the brake pedal is depressed or the door courtesy switch is turned on even if the power switch is off, the brake control system activates. Therefore do not depress the brake pedal or open/close the doors until the reservoir level switch connector is disconnected.




(b) Disconnect the reservoir level switch connector.

(c) Connect the Techstream to the DLC3 and turn the power switch on (IG).

(d) Turn the Techstream on and enter the following menu: Chassis / ABS/VSC/TRC / Active Test.

(e) Select "ECB (Electronically Controlled Brake system) Control Invalid".

(f) Depress the brake pedal 40 times or more to return the all fluid in the accumulator back to the reservoir.

NOTICE:

A drop in accumulator pressure may cause a buzzer to sound. This is not a malfunction, therefore continue with the operation.

(g) Check that the brake pedal can not be further depressed.

(h) Select "NEXT" to finish "ECB (Electronically Controlled Brake system) Invalid".

(i) Turn the power switch off and turn the Techstream off.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

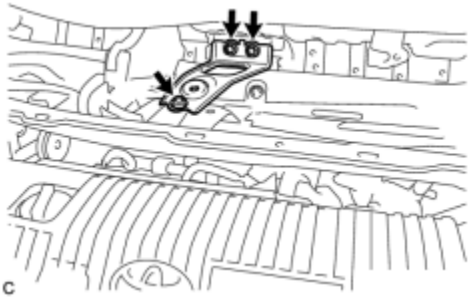
6. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

7. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

HINT:

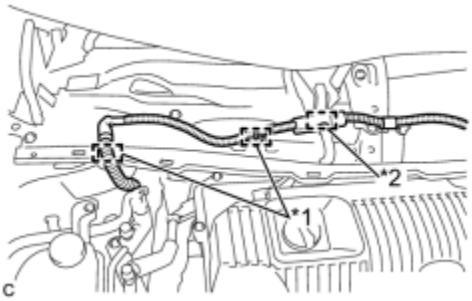
Refer to the procedure up to Remove Windshield Wiper Motor And Link Assembly INFO.

8. REMOVE COWL BODY MOUNTING REINFORCEMENT LH



(a) Remove the 3 bolts and cowl body mounting reinforcement LH.

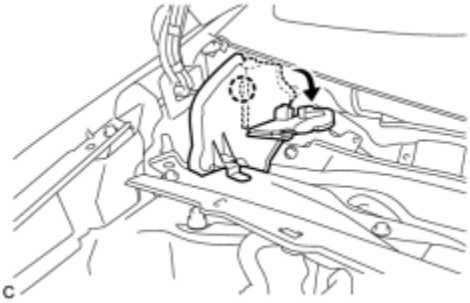
9. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY




(a) Disengage the 2 clamps and guide of the wire harness.

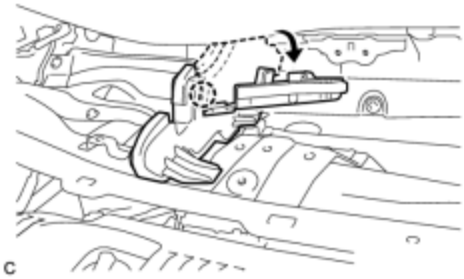
## Text in Illustration

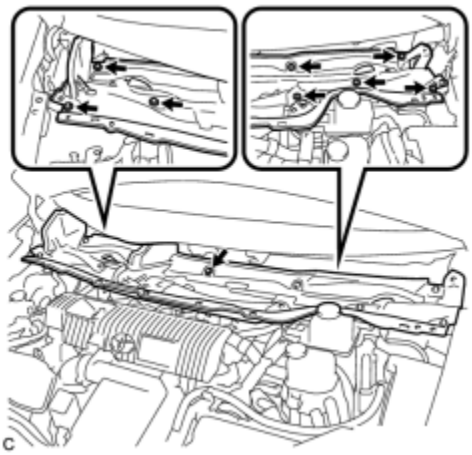
| | |
|---|---|
| *1 | Clamp |
| *2 | Guide |



(b) Disengage the claw and bend the No. 1 heater air duct splash shield seal.

(c) Disengage the claw and bend the water guard plate RH.





(d) Remove the 9 bolts and outer cowl top panel sub-assembly.

10. DRAIN BRAKE FLUID

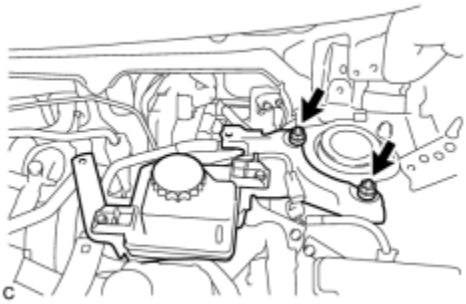
NOTICE:

If brake fluid leaks onto any painted surface, immediately wash it off.

11. REMOVE BRAKE PEDAL RETURN SPRING INFO

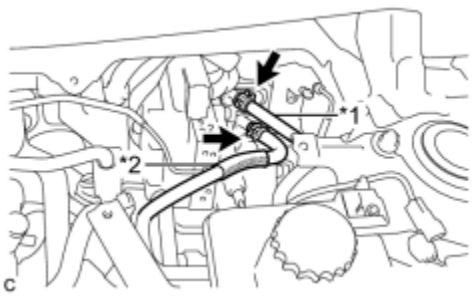
12. REMOVE PUSH ROD PIN INFO

13. SEPARATE BRAKE MASTER CYLINDER RESERVOIR WITH BRACKET



(a) Remove the 2 nuts and separate the brake master cylinder reservoir with bracket.

14. DISCONNECT NO. 1 RESERVOIR HOSE



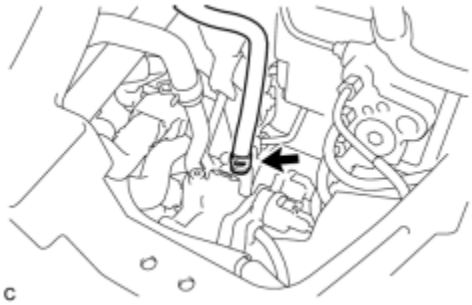

(a) Move the 2 clips and disconnect the No. 1 reservoir hose and No. 2 reservoir hose from the brake booster with master cylinder assembly.

## Text in Illustration

| | |
|---|---|
| *1 | No. 1 Reservoir Hose |
| *2 | No. 2 Reservoir Hose |

15. DISCONNECT NO. 2 RESERVOIR HOSE

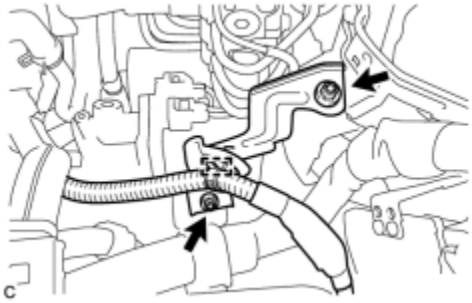
16. DISCONNECT BRAKE ACTUATOR HOSE




(a) Move the clip and disconnect the brake actuator hose from the brake booster pump assembly.

17. REMOVE BRAKE MASTER CYLINDER RESERVOIR WITH BRACKET

18. REMOVE NO. 5 BRAKE ACTUATOR BRACKET



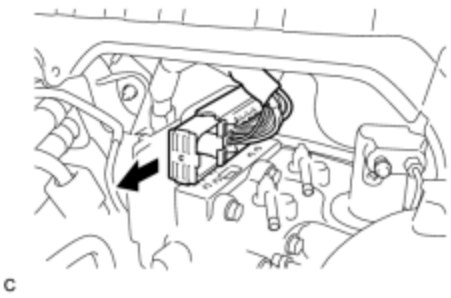

(a) Disengage the clamp.

(b) Remove the 2 nuts and No. 5 brake actuator bracket.

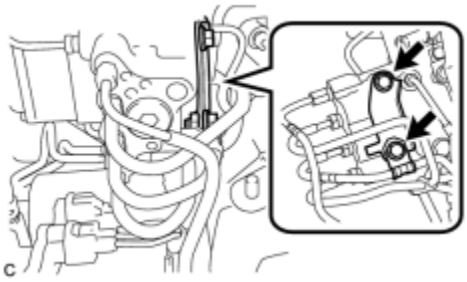
19. REMOVE BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY

(a) Release the lock lever and disconnect the connector.

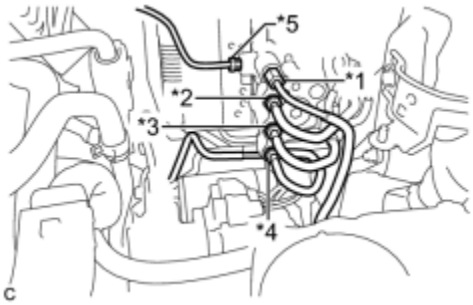
NOTICE:




Be careful not to allow the brake fluid to enter the removed connector.




(b) Remove the 2 bolts and No. 2 brake tube clamp bracket from the brake booster with master cylinder assembly.



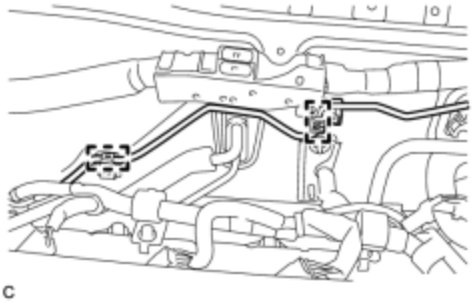

(c) Using a union nut wrench, disconnect the 5 brake lines from the brake booster with master cylinder assembly.

(d) Use tags or make a memo to identify the places to reconnect.

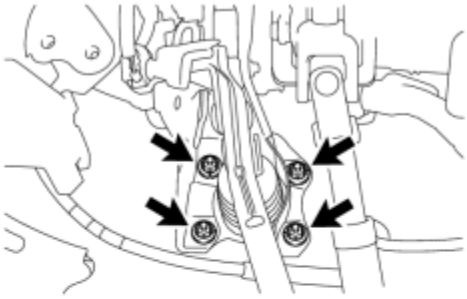
***Text in Illustration***

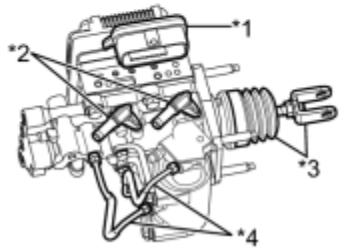
| | |
|---|---|
| *1 | to Front Wheel Cylinder LH |
| *2 | to Rear Wheel Cylinder RH |
| *3 | to Brake Booster Pump Assembly |
| *4 | to Rear Wheel Cylinder LH |
| *5 | to Front Wheel Cylinder RH |

(e) Disengage the 2 clamps and separate the brake line.



C






C

(f) Remove the 4 nuts and brake booster with master cylinder assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Connector Portion |
| *2 | Union |
| *3 | Push Rod Clevis and Boot |
| *4 | Front No. 2 Brake Tube |

- Do not kink or damage the brake lines.
- Do not carry the brake booster with master cylinder assembly by the portion shown in the illustration.

20. REMOVE BRAKE BOOSTER GASKET

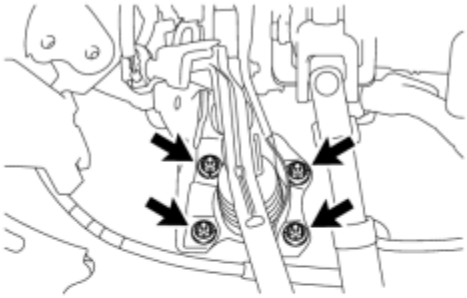
# INSTALLATION

1. INSTALL BRAKE BOOSTER GASKET

(a) Install a new brake booster gasket to the brake booster with master cylinder assembly.

2. INSTALL BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY

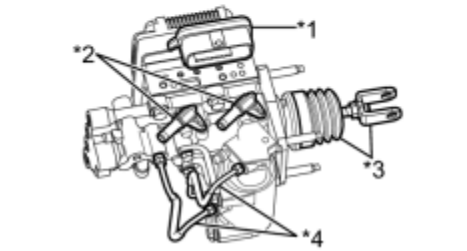
(a) Install the brake booster with master cylinder assembly with the 4 nuts.



## Text in Illustration

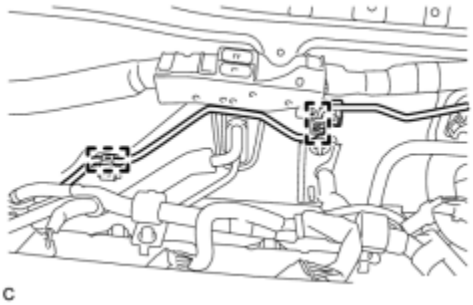
| | |
|---|---|
| *1 | Connector Portion |
| *2 | Union |
| *3 | Push Rod Clevis and Boot |
| *4 | Front No. 2 Brake Tube |

Torque: **13 N·m (130 kgf·cm, 9ft·lbf)**



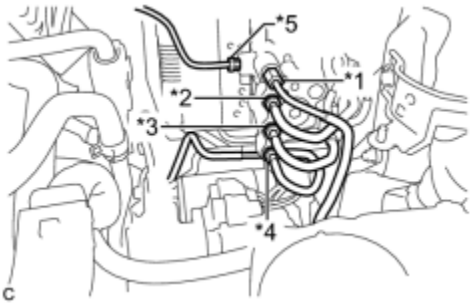

c

- Do not kink or damage the brake lines.
- Do not carry the brake booster with master cylinder assembly by the portion shown in the illustration.
- Be careful not to allow brake fluid to enter the connector of ECU.
- If installing a new brake booster with master cylinder assembly, do not remove the hole plugs before connecting the brake lines because the brake booster with master cylinder is filled with brake fluid.



c

(b) Engage the 2 clamps to install the brake line.




c

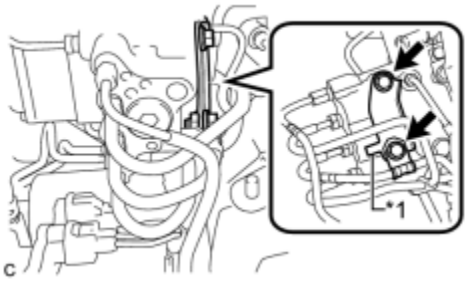
(c) Temporarily tighten each brake line to the correct position on the brake booster with master cylinder assembly as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | to Front Wheel Cylinder LH |
| *2 | to Rear Wheel Cylinder RH |
| *3 | to Brake Booster Pump Assembly |

| | |
|---|---|
| *4 | to Rear Wheel Cylinder LH |
| *5 | to Front Wheel Cylinder RH |

(d) Install the No. 2 brake tube clamp bracket to the brake booster with master cylinder assembly with the 2 bolts.




## Text in Illustration

| | |
|---|---|
| *1 | Stopper |

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**

NOTICE:

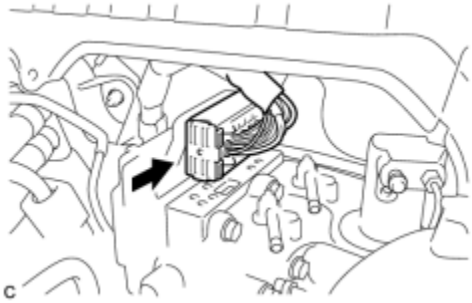
Securely install the No. 2 brake tube clamp bracket so that its stopper contacts the brake booster with master cylinder assembly as shown in the illustration.

(e) Using a union nut wrench, fully tighten each brake line.

Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

NOTICE:

- Do not kink or damage the brake lines.
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.



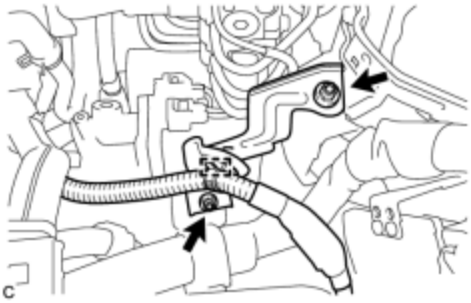

(f) Connect the connector.

- Make sure that the connector can be connected smoothly. Do not allow water, oil or dirt to enter.
- Make sure that the connector lock is locked securely.

3. INSTALL NO. 5 BRAKE ACTUATOR BRACKET

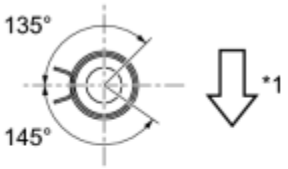
(a) Install the No. 5 brake actuator bracket with the 2 nuts.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**



(b) Engage the clamp.

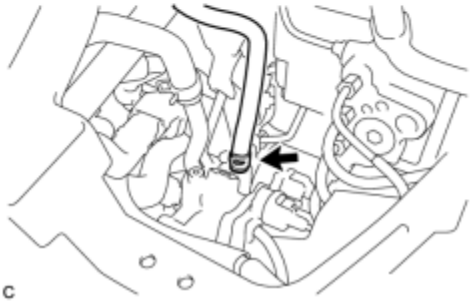
4. CONNECT BRAKE ACTUATOR HOSE




(a) Connect the brake actuator hose to the brake booster pump assembly with the clip.

## Text in Illustration

| | |
|---|---|
| *1 | Front of Vehicle |



- Make sure to match the identification mark (yellowish green) on the hose with the brake booster pump rib.
- Make sure to install the hose to the proper location.
- Install the clip within the range shown in the illustration.

5. CONNECT NO. 1 RESERVOIR HOSE

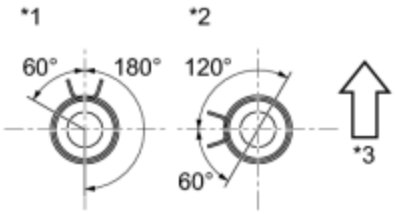
(a) Connect the No. 1 reservoir hose and No. 2 reservoir hose to the brake booster with master cylinder assembly with the 2 clips.

## Text in Illustration

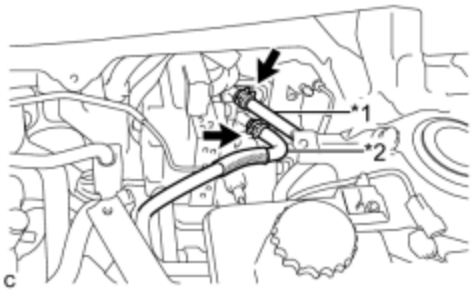
| | |
|---|---|
| *1 | No. 1 Reservoir Hose |
| *2 | No. 2 Reservoir Hose |
| *3 | Top of Vehicle |

- Make sure to match the identification marks on the hoses and brake booster with master cylinder assembly.

| | Hose Identification | Brake Booster with Mas |
|---|---|---|



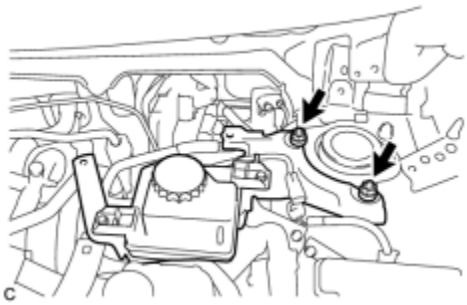

| | Mark Color | Cylinder Assembly Identification Mark Color |
|---|---|---|
| No. 1 Reservoir Hose | White | White (Unpainted Color) |
| No. 2 Reservoir Hose | Green | Green |




- When connecting the reservoir hose, face the identification mark to the top of the vehicle.
- Make sure to install the hose to the proper location.
- Install the clip within the range shown in the illustration.

6. CONNECT NO. 2 RESERVOIR HOSE

7. INSTALL BRAKE MASTER CYLINDER RESERVOIR WITH BRACKET



(a) Install the brake master cylinder reservoir with bracket with the 2 nuts.

Torque: **50 N·m (510 kgf·cm, 37ft·lbf)**

8. INSTALL PUSH ROD PIN INFO

9. INSTALL BRAKE PEDAL RETURN SPRING INFO

10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

11. BLEED BRAKE SYSTEM INFO

12. INSPECT AND ADJUST BRAKE PEDAL

HINT: INFO

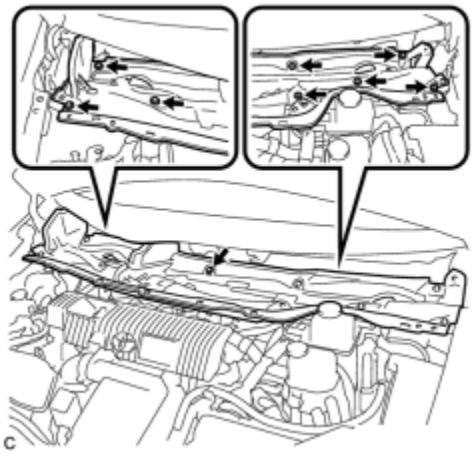
13. OBTAIN ZERO POINT OF YAW RATE AND ACCELERATION SENSOR

HINT:

After the brake booster with master cylinder assembly is replaced, obtain the zero point of the yaw rate and acceleration sensor INFO.

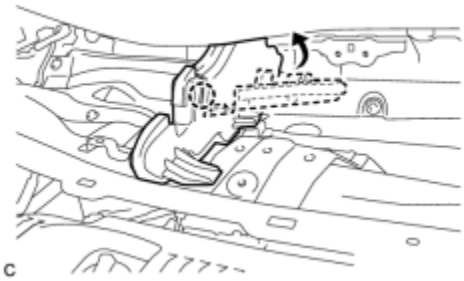
14. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

15. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY

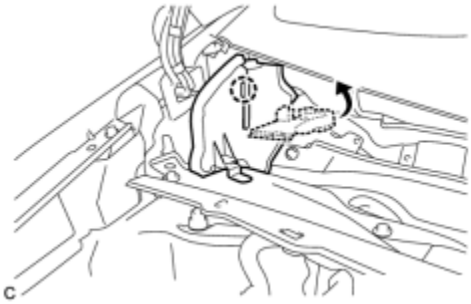


(a) Install the outer cowl top panel sub-assembly with the 9 bolts.

Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**



(b) Bend the water guard plate RH and engage the claw.

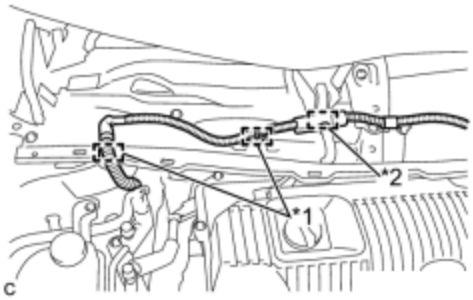


(c) Bend the No. 1 heater air duct splash shield seal and engage the claw.

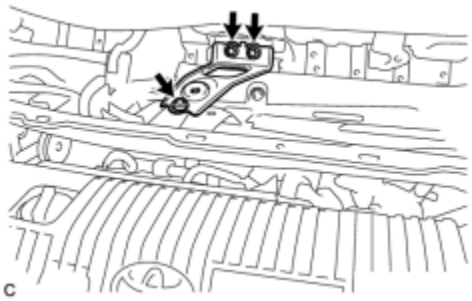
(d) Engage the 2 clamps and guide to install the wire harness.

# Text in Illustration

| | |
|---|---|
| *1 | Clamp |
| *2 | Guide |




16. INSTALL COWL BODY MOUNTING REINFORCEMENT LH




(a) Install the cowl body mounting reinforcement LH with the 3 bolts.

Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**

17. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

HINT:

Refer to the procedure from Install Windshield Wiper Motor And Link Assembly INFO.

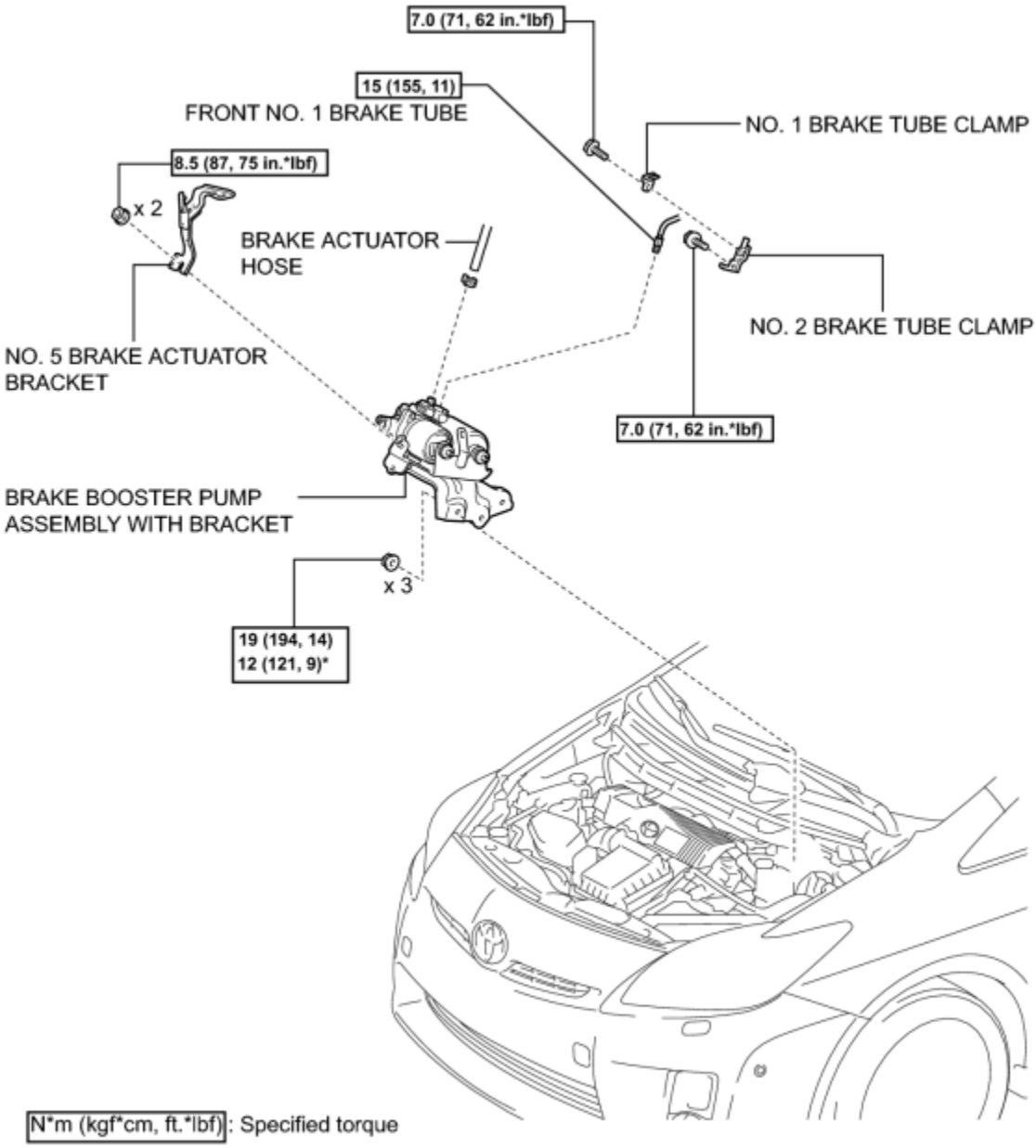
18. INSTALL REAR NO. 3 FLOOR BOARD INFO

19. INSTALL REAR DECK FLOOR BOX INFO

20. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION

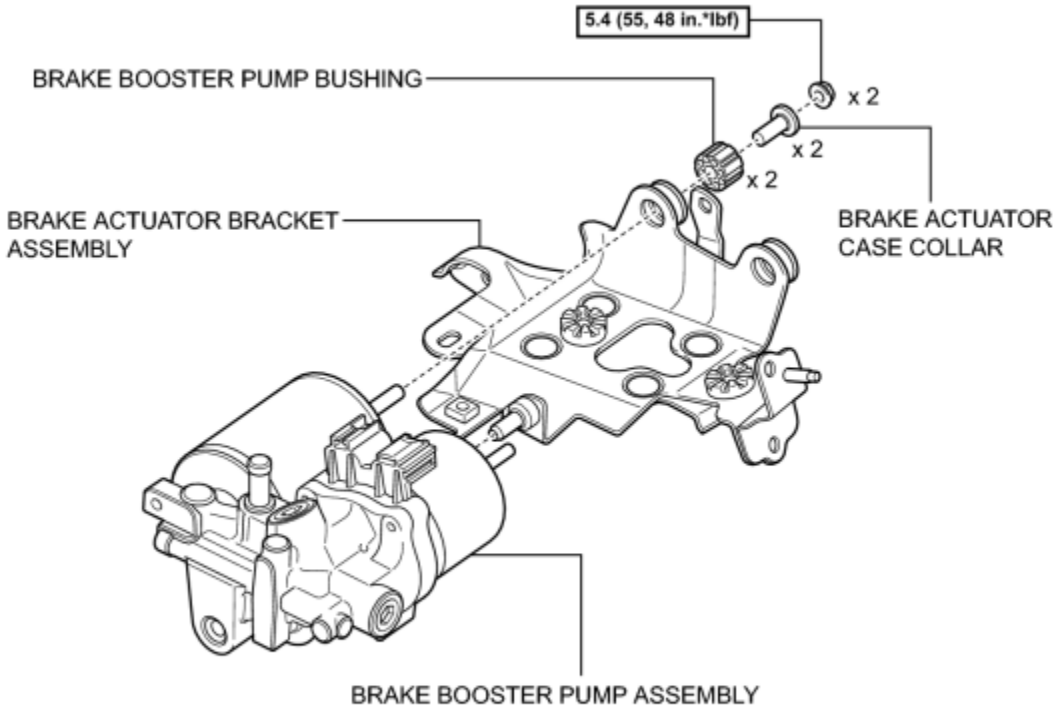



N*m (kgf*cm, ft.*lbf): Specified torque

* For use with SST

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

1. REMOVE BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY

HINT:

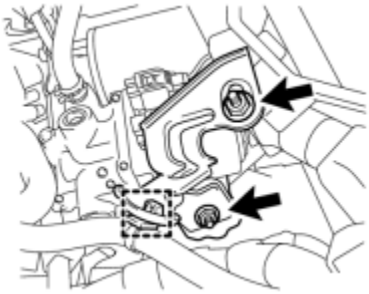
Refer to the procedure up to Remove Brake Booster with Master Cylinder Assembly INFO.

2. REMOVE FRONT CROSS MEMBER SUB-ASSEMBLY

HINT:

Refer to the procedure up to Remove Front Cross Member Sub-assembly INFO.

3. REMOVE NO. 5 BRAKE ACTUATOR BRACKET

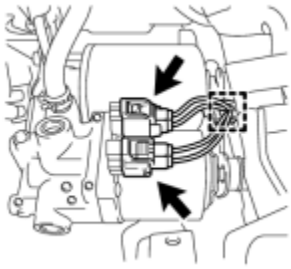


C

(a) Remove the 2 nuts and No. 5 brake actuator bracket.

(b) Separate the wire harness clamp.

4. REMOVE BRAKE BOOSTER PUMP ASSEMBLY WITH BRACKET



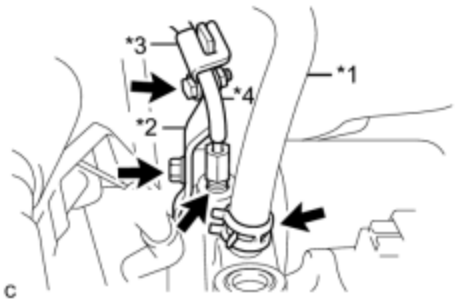
C

(a) Disconnect the 2 connectors and separate the clamp from the brake booster pump assembly.

(b) Remove the clip and brake actuator hose.

## Text in Illustration

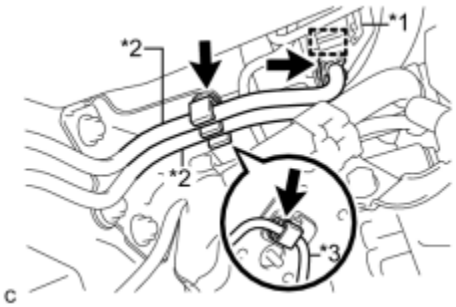
| | |
|---|---|
| *1 | Brake Actuator Hose |
| *2 | No. 2 Brake Tube Clamp |




| | |
|---|---|
| *3 | No. 1 Brake Tube Clamp |
| *4 | Front No. 1 Brake Tube |

(c) Remove the 2 bolts, No. 1 brake tube clamp and No. 2 brake tube clamp.

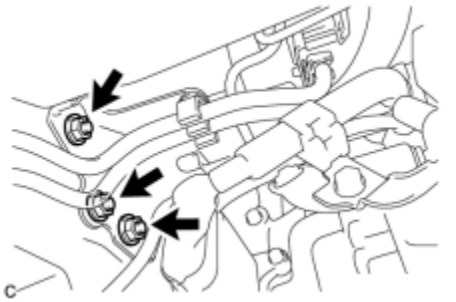
(d) Disconnect the front No. 1 brake tube.




(e) Separate the wire harness clamp, 2 fuel lines and front No. 4 brake tube from the brake booster pump assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Wire Harness Clamp |
| *2 | Fuel Line |
| *3 | Front No. 4 Brake Tube |



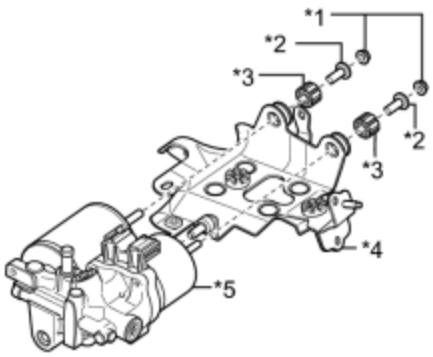

(f) Remove the 3 nuts and brake booster pump assembly with bracket.

5. REMOVE BRAKE BOOSTER PUMP ASSEMBLY

(a) Remove the 2 nuts, brake booster pump bushings, brake actuator case collars and brake booster pump assembly from the brake actuator bracket assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Nut |
| *2 | Brake Actuator Case Collar |
| *3 | Brake Booster Pump Bushing |
| *4 | Brake Actuator Bracket Assembly |

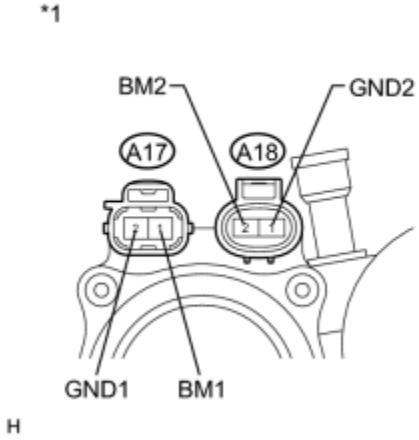



| | |
|---|---|
| *5 | Brake Booster Pump Assembly |

c

# INSPECTION

1. INSPECT BRAKE BOOSTER PUMP ASSEMBLY




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A17-1 (BM1) - A17-2 (GND1) | Always | Below 10 Ω |
| A18-2 (BM2) - A18-1 (GND2) | Always | Below 10 Ω |
| A17-1 (BM1) - A18-2 (BM2) | Always | Below 1 Ω |
| A17-2 (GND1) - A18-1 (GND2) | Always | Below 1 Ω |

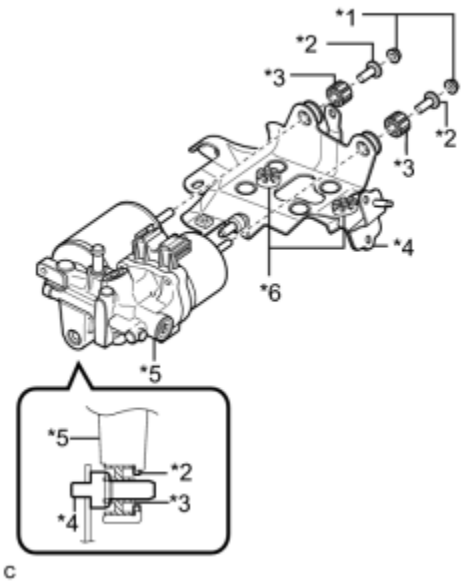
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Brake Booster Pump) |

# INSTALLATION

1. INSTALL BRAKE BOOSTER PUMP ASSEMBLY

(a) Install the brake booster pump assembly, brake booster pump bushings and brake actuator case collars to the brake actuator bracket assembly with the 2 nuts.




## Text in Illustration

| | |
|---|---|
| *1 | Nut |
| *2 | Brake Actuator Case Collar |
| *3 | Brake Booster Pump Bushing |
| *4 | Brake Actuator Bracket Assembly |
| *5 | Brake Booster Pump Assembly |
| *6 | Cushion |

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

- Do not drop the brake booster pump assembly when carrying it.
- Do not carry the brake booster pump assembly by the connector.
- Confirm that the 2 cushions are on the brake actuator bracket, bushings and collars on the brake booster pump assembly when assembling the brake booster pump assembly.
- Do not remove the hole plug before installing a new brake booster pump assembly because the brake booster pump assembly is filled with brake fluid.

2. INSTALL BRAKE BOOSTER PUMP ASSEMBLY WITH BRACKET

(a) Using SST, install the brake booster pump assembly with bracket with the 3 nuts.

SST: 09961-00950

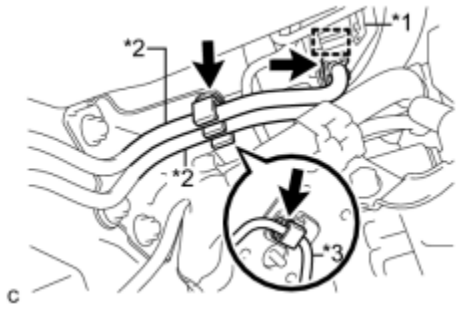
without SST - Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**

with SST - Torque: **12 N·m (121 kgf·cm, 9ft·lbf)**

- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- Tighten the 3 nuts in the order shown in the illustration.
- Do not damage the fuel line, the brake lines and wire harness.
- Use the formula to calculate special torque values for situations where the SST is combined with a torque wrench INFO.




(b) Install the wire harness clamp, 2 fuel lines and front No. 4 brake tube to the brake booster pump assembly.




NOTICE:

Do not damage the fuel line, the brake lines and wire harness.

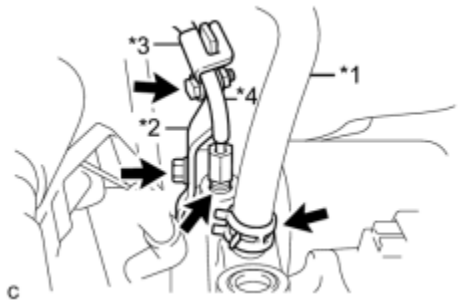
## Text in Illustration

| | |
|---|---|
| *1 | Wire Harness Clamp |
| *2 | Fuel Line |
| *3 | Front No. 4 Brake Tube |

(c) Connect the front No. 1 brake tube.

(1) Install the No. 2 brake tube clamp to the brake booster pump assembly with the bolt.

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**




## Text in Illustration

| | |
|---|---|
| *1 | Brake Actuator Hose |
| *2 | No. 2 Brake Tube Clamp |
| *3 | No. 1 Brake Tube Clamp |
| *4 | Front No. 1 Brake Tube |

(2) Install the front No. 1 brake tube to the brake booster pump assembly.

Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

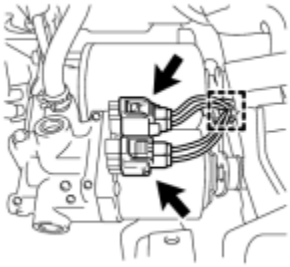
NOTICE:

- This torque value is effective when the union nut wrench is parallel to the torque wrench.
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.

(3) Install the No. 1 brake tube clamp to the brake booster pump assembly with the bolt.

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**

(d) Install the brake actuator hose and clip.

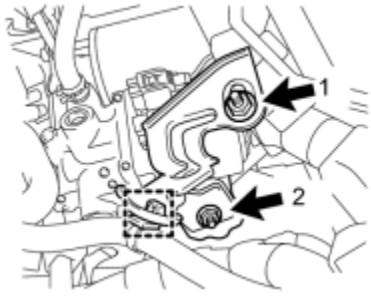


C

(e) Install the wire harness clamp.

(f) Connect the 2 connectors.

3. INSTALL NO. 5 BRAKE ACTUATOR BRACKET




C

(a) Install the No. 5 brake actuator bracket with the 2 nuts.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

NOTICE:

Tighten the 2 nuts in the order shown in the illustration.

(b) Install the wire harness clamp.

4. INSTALL FRONT CROSS MEMBER SUB-ASSEMBLY

HINT:

Refer to the procedure from Install Front Cross Member Sub-assembly INFO.

5. INSTALL BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY

HINT:

Refer to the procedure from Install Brake Booster with Master Cylinder Assembly INFO.

6. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

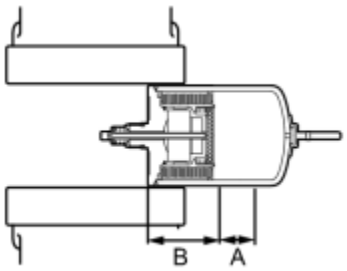
(a) Adjust front wheel alignment INFO.

# DISPOSAL

1. DISPOSE OF BRAKE BOOSTER PUMP ASSEMBLY

(a) Remove the accumulator from the brake booster pump assembly.

(b) Secure the accumulator in a vise.




c

(c) Using a hacksaw, make a cut in the side of the accumulator at location [A] to release the high-pressure gas.

| Point | Area |
|---|---|
| A | 25 mm (0.984 in.) |
| B | 60 mm (2.362 in.) |

CAUTION:

Small pieces of metal may fly out when cutting into the accumulator. Put a cloth over the hacksaw when cutting the accumulator. Cut the accumulator slowly so that the gas will be released gradually.

HINT:

The gas is colorless, odorless and non-poisonous.

# ON-VEHICLE INSPECTION

NOTICE:

If using a dropper to adjust the fluid amount, make sure that the dropper has not been used with mineral oils, water or deteriorated brake fluid. Sealed areas may deteriorate and lead to fluid leaks, or the fluid may deteriorate and lead to decreased efficiency.

HINT:

If the brake fluid level is lower than the MIN line, inspect for brake fluid leaks and brake pad wear. After repair or replacement, adjust the brake fluid level in the reservoir as specified below.

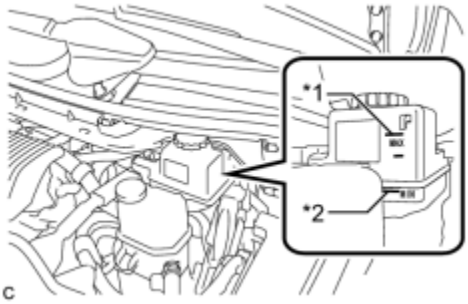
1. INSPECT AND ADJUST FLUID LEVEL IN RESERVOIR (for Using the Techstream)

(a) Connect the Techstream to the DLC3 with the power switch off.

(b) Check that park (P) is selected and the parking brake is applied, and turn the power switch on (IG).

(c) Turn the Techstream on and enter the following menus: Chassis / ABS/VSC/TRC / Utility / ECB (Electronically Controlled Brake system) utility / Zero Down.

(d) Select "Next" and wait for 10 seconds.




(e) After the booster pump stopped, inspect the fluid level is between the MAX and MIN lines. If necessary, refill the brake fluid to the MAX line.

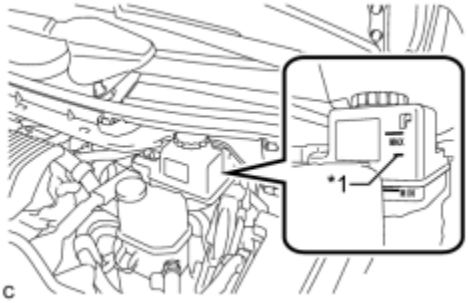
## Text in Illustration

| | |
|---|---|
| *1 | MAX Line |
| *2 | MIN Line |

Brake fluid:

SAE J1703 or FMVSS No. 116 DOT3

2. INSPECT AND ADJUST FLUID LEVEL IN RESERVOIR (for not Using the Techstream)




(a) Inspect the fluid level is above the MIN line with the power switch on (IG). If necessary, refill the brake fluid to the fluid level support line with the power switch on (IG).

## Text in Illustration

| | |
|---|---|
| *1 | Fluid Level Support Line |

# REPLACEMENT

HINT:

There are 2 ways of brake fluid replacement: using the Techstream or not using the Techstream.

NOTICE:

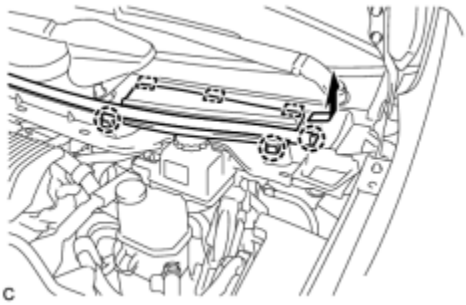
- Perform fluid replacement with park (P) selected and the parking brake applied.
- As brake fluid may overflow when replacing brake fluid, do not place the fluid can on the reservoir filler opening.
- Perform fluid replacement while maintaining the brake fluid level between the MIN/MAX level on the brake fluid reservoir.
- Replacing brake fluid will be difficult if the following occurs:
    a. The brake actuator hose (the hose between the brake booster pump and brake fluid reservoir) is lowered into the fluid and air enters the hose.
    b. During the fluid replacement procedure, air enters the brake booster pump while operating the pump motor.
- While performing fluid replacement, the accumulator pressure drop may cause a buzzer to sound. As there is no problem, continue with the fluid replacement.
- During fluid replacement, DTCs for pressure sensor malfunctions, etc. may be stored. After fluid replacement and if instructed in the procedures, clear the DTCs.
- Do not allow brake fluid to adhere to any painted surface such as the vehicle body. If brake fluid leaks onto any painted surface, immediately clean it off.

1. REPLACE BRAKE FLUID (for Using the Techstream)

NOTICE:

- Add brake fluid carefully and check that the reservoir level remains between the MIN and MAX lines.
- Do not stand the fluid can on the reservoir inlet. Doing so will cause brake fluid to overflow.

(a) Remove the center cowl top ventilator cover.

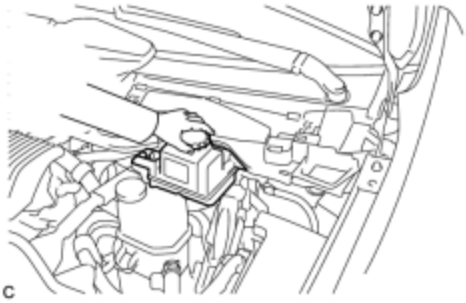



(1) Slide the hood to cowl top seal and disengage the claw.

(2) Disengage the 2 claws and 3 guides, and remove the center cowl top ventilator cover.

(b) Replace brake fluid.

(1) Remove the brake master cylinder reservoir filler cap assembly.



(2) Add brake fluid into the reservoir between MAX and MIN level on the brake fluid reservoir.

Brake fluid:

SAE J1703 or FMVSS No. 116 DOT3

(3) Connect the Techstream to the DLC3 and turn the power switch on (IG).

(4) Turn the Techstream on and enter the following menus: Chassis / ABS/VSC/TRC / Air Bleeding.

(5) Select the "Usual air bleeding" on the Techstream display, and replace the brake fluid following the instructions on the Techstream.

(6) After replacing brake fluid, tighten each bleeder plug.

front bleeder plug - Torque: **8.3 N·m (85 kgf·cm, 73in·lbf)**

rear bleeder plug - Torque: **11 N·m (112 kgf·cm, 8ft·lbf)**

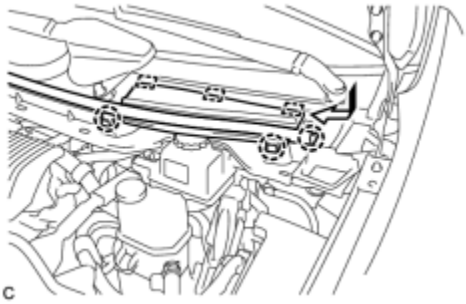
(c) Clear the DTCs INFO.

(d) Turn the Techstream off and turn the power switch off.

(e) Inspect for brake fluid leaks.

(f) Install the brake master cylinder reservoir filler cap.

(g) Install the center cowl top ventilator cover.



(1) Engage the 2 claws and 3 guides to install the center cowl top ventilator cover.

(2) Slide the hood to cowl top seal to engage the claw.

2. REPLACE BRAKE FLUID (for not Using the Techstream)

NOTICE:

- Performing the following procedure will select ECB (Electronically Controlled Brake system) Invalid Mode without using the Techstream.
- ECB (Electronically Controlled Brake system) Invalid Mode allows the brake fluid to be replaced without using the Techstream.
- The brake warning light / yellow will blink to indicate when ECB (Electronically Controlled Brake system) Invalid Mode is selected.
- Be sure to inspect that the brake warning light / yellow is blinking while replacing the brake fluid.
- When one of the following conditions is met, ECB (Electronically Controlled Brake system) Invalid Mode is cancelled, and then the DTCs may be stored. So do not cancel the ECB (Electronically Controlled Brake system) Invalid Mode while replacing brake fluid.

| |
|---|
| The shift lever is used to select from P to any other position. |
| Turn the power switch on (READY). |
| Turn the power switch off. |
| The parking brake is released. |
| The vehicle velocity is not 0 km/h (0 mph). |

- Do not rotate the brake disc while ECB (Electronically Controlled Brake system) Invalid Mode is selected.
- When replacing the brake fluid from the brake line, do not depress the brake pedal to operate the brake booster pump more than 100 seconds. If the brake booster pump is operated more than 100 seconds, ECB (Electronically Controlled Brake system) Invalid Mode is automatically finished and the DTCs may be stored.
- Add brake fluid carefully and check that the reservoir level remains between the MIN and MAX lines.
- Do not stand the fluid can on the reservoir inlet. Doing so will cause brake fluid to overflow.

(a) Remove 4 wheels.

(b) Select ECB (Electronically Controlled Brake system) Invalid Mode.

(1) Perform the procedure listed below in 1 minute.

1. Turn the power switch on (IG) with park (P) selected and parking brake applied.
2. Select N and then depress the brake pedal more than 8 times in 5 seconds.
3. Push the P position switch and then depress the brake pedal more than 8 times in 5 seconds.
4. Select N and then depress the brake pedal more than 8 times in 5 seconds.
5. Push the P position switch.

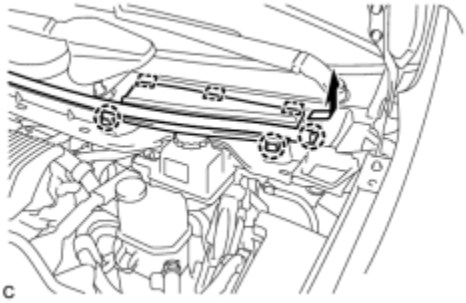
(2) Check that the brake warning light / yellow is blinking.

Brake Warning Light / Yellow



N

(c) Remove the center cowl top ventilator cover.

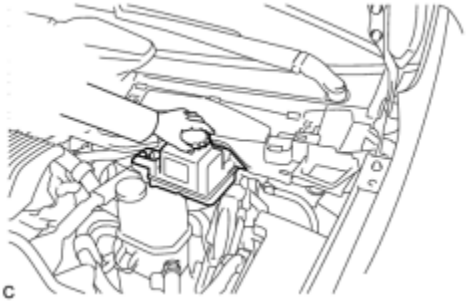


C

(1) Slide the hood to cowl top seal and disengage the claw.

(2) Disengage the 2 claws and 3 guides, and remove the center cowl top ventilator cover.

(d) Replace the brake fluid.



C

(1) Remove the brake master cylinder reservoir filler cap assembly.

(2) Add brake fluid into the reservoir between MAX and MIN level on the brake fluid reservoir.

Brake fluid:

SAE J1703 or FMVSS No. 116 DOT3

(3) Connect a vinyl tube to the bleeder plug of the front disc brake cylinder assembly RH.

(4) Depress the brake pedal several times, and then loosen the bleeder plug with the pedal depressed.*1

(5) When fluid stops coming out, tighten the bleeder plug, and then release the brake pedal.*2

(6) Repeat *1 and *2 until all the air in the brake fluid is completely bled out and a new brake fluid comes out.

(7) Tighten the bleeder plug completely.

Torque: **8.3 N·m (85 kgf·cm, 73in·lbf)**

(8) Replace the brake fluid from the front disc brake cylinder assembly LH using the same procedure as for RH.

(9) Connect a vinyl tube to the bleeder plug of the rear disc brake cylinder assembly LH.

(10) Loosen the bleeder plug while depressing and holding the brake pedal, and replace the brake fluid while the brake booster pump assembly and solenoid running.*3

NOTICE:

- Be sure to keep the brake pedal depressed.
- Do not depress the brake pedal to operate the brake booster pump more than 100 seconds. When performing this procedure continuously, release the brake pedal to stop the brake booster pump operating and depress the brake pedal again.

(11) Tighten the bleeder plug, then release the brake pedal.*4

(12) Repeat steps *3 and *4 until all the air in the brake fluid is completely bled out and a new brake fluid comes out.

(13) Tighten the bleeder plug completely.

Torque: **11 N·m (112 kgf·cm, 8ft·lbf)**

(14) Replace the brake fluid from the rear disc brake cylinder assembly RH using the same procedure as for LH.

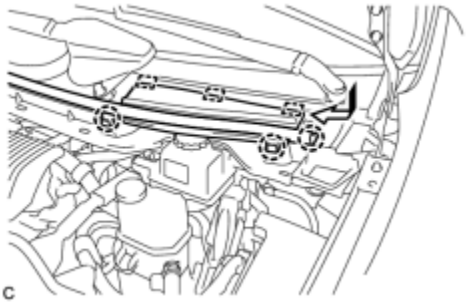
(15) Turn the power switch off.

(e) Inspect for brake fluid leaks.

(f) Adjust the brake fluid level in the reservoir INFO.

(g) Install the brake master cylinder reservoir filler cap.

(h) Install the center cowl top ventilator cover.




(1) Engage the 2 claws and 3 guides to install the center cowl top ventilator cover.

(2) Slide the hood to cowl top seal to engage the claw.

(i) Install the 4 wheels.

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# BLEEDING

CAUTION:

The Techstream must be used for air bleeding. If not used, the air bleeding will be incomplete, which is hazardous and may lead to an accident.

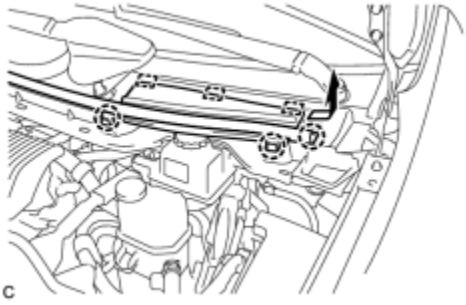
NOTICE:

- Perform air bleeding with park (P) selected and the parking brake applied.
- As brake fluid may overflow when bleeding, do not place the fluid can on the reservoir filler opening.
- Perform air bleeding while maintaining the brake fluid level between the MIN/MAX level on the brake fluid reservoir.
- Air bleeding will be difficult if the following occurs:
    a. The brake actuator hose (the hose between the brake booster pump and brake fluid reservoir) is lowered into the fluid and air enters the hose.
    b. During the air bleeding procedure, air enters the brake booster pump while operating the pump motor.
- While performing air bleeding, the accumulator pressure drop may cause a buzzer to sound. As there is no problem, continue with the operation.
- During air bleeding, DTCs for pressure sensor malfunctions, etc. may be stored. After air bleeding and if instructed in the procedures, clear the DTCs.
- Release the parking brake while the linear valve offset calibration procedure.
- Do not allow brake fluid to adhere to any painted surface such as the vehicle body. If brake fluid leaks onto any painted surface, immediately clean it off.
- When bleeding air, select the suitable procedure according to the table below.

| Replaced/Installed Item | Work Procedure |
|---|---|
| Flexible hose (front/rear) | Bleed brake line |
| Disc brake cylinder assembly (front/rear) | |
| Brake booster pump assembly | Bleed brake system |
| Brake booster with master cylinder assembly | |
| Brake master cylinder reservoir assembly | |

1. BLEED BRAKE LINE

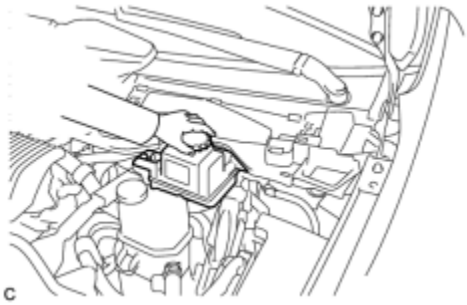
(a) Remove the center cowl top ventilator cover.




(1) Slide the hood to cowl top seal and disengage the claw.

(2) Disengage the 2 claws and 3 guides, and remove the center cowl top ventilator cover.

(b) Bleed brake line.




(1) Remove the brake master cylinder reservoir filler cap assembly.

(2) Add brake fluid into the reservoir between MAX and MIN level on the brake fluid reservoir.

Brake fluid:

SAE J1703 or FMVSS No. 116 DOT3

(3) Connect the Techstream to the DLC3 and turn the power switch on (IG).

(4) Turn the Techstream on and enter the following menus: Chassis / ABS/VSC/TRC / Air Bleeding.

(5) Select the "Usual air bleeding" on the Techstream display, and bleed air from the brake fluid following the instructions on the Techstream.

(6) After air bleeding, tighten each bleeder plug.

front bleeder plug - Torque: **8.3 N·m (85 kgf·cm, 73in·lbf)**

rear bleeder plug - Torque: **11 N·m (112 kgf·cm, 8ft·lbf)**

(7) Clear the DTCs INFO.

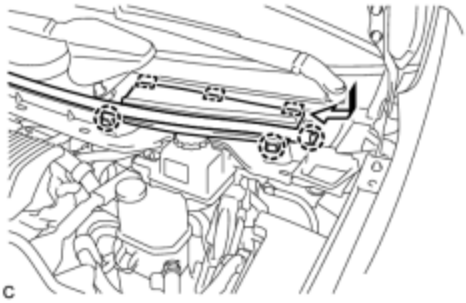
(8) Turn the Techstream off and turn the power switch off.

(c) Inspect for brake fluid leaks.

(d) Install the brake master cylinder reservoir filler cap.

(e) Install the center cowl top ventilator cover.

(1) Engage the 2 claws and 3 guides to install the center cowl top ventilator cover.

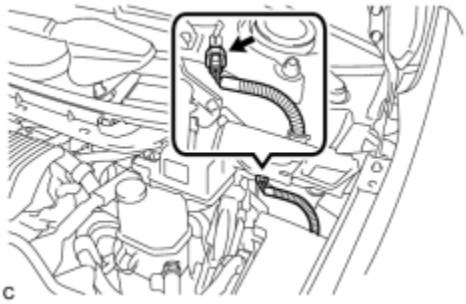


(2) Slide the hood to cowl top seal to engage the claw.

2. BLEED BRAKE SYSTEM

(a) Remove the outer cowl top panel sub-assembly INFO.

(b) Bleed the brake system.



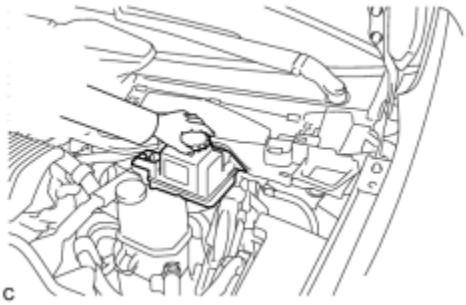
(1) Wait at least 2 minutes with the power switch off, and disconnect the reservoir level switch connector.

NOTICE:

Do not depress the brake pedal or open/close the doors until the reservoir level switch connector is disconnected.

HINT:

This procedure is not required if the reservoir level switch connector has been disconnected.



(2) Remove the brake master cylinder reservoir filler cap assembly.

(3) Add brake fluid into the reservoir between MAX and MIN level on the brake fluid reservoir.

Brake fluid:

SAE J1703 or FMVSS No. 116 DOT3

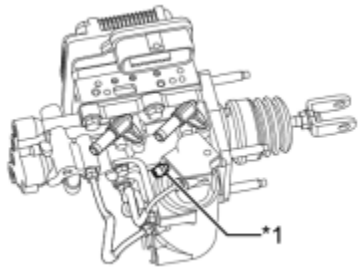
(4) Connect the Techstream to the DLC3 and turn the power switch on (IG).

(5) Turn the Techstream on and enter the following menus: Chassis / ABS/VSC/TRC / Air Bleeding.

(6) Select the "ABS actuator has been replaced" on the Techstream display, and bleed air from the brake fluid following the instructions on the Techstream.

NOTICE:

Before following the instructions on the Techstream to perform linear valve offset calibration, release the parking brake. When calibration is complete, immediately apply the parking brake.




C

(7) After air bleeding, tighten each bleeder plug.

front bleeder plug - Torque: **8.3 N·m (85 kgf·cm, 73in·lbf)**

rear bleeder plug - Torque: **11 N·m (112 kgf·cm, 8ft·lbf)**

stroke simulator bleeder plug - Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

HINT:

The stroke simulator bleeder plug is positioned as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Stroke Simulator Bleeder Plug |

(8) Clear the DTCs INFO.

(9) Turn the Techstream off and turn the power switch off.

(c) Install the brake master cylinder reservoir filler cap.

(d) Inspect for brake fluid leaks.

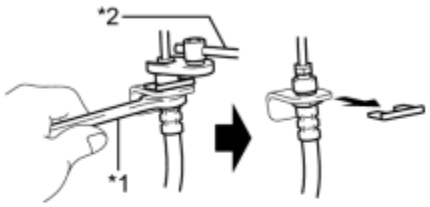
(e) Install the outer cowl top panel sub-assembly INFO.

# PRECAUTION

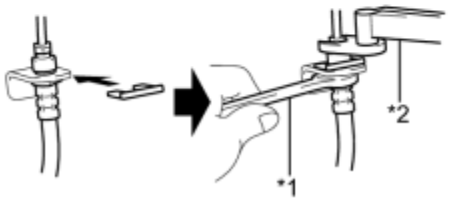
NOTICE:

- Since the brake lines are classified as critical safety related parts, be sure to disassemble and inspect the components if any brake fluid leaks are found. If any abnormality is found, replace the component with a new one.
- When removing brake system components, cover the brake line connections to prevent foreign matter such as dust or dirt from entering the lines.
- Do not allow brake fluid to adhere to any painted surface such as the vehicle body. If brake fluid leaks onto any painted surface, immediately clean it off.
- When installing a grommet to the body, ensure that the brake line passes through the center of the grommet.
- Do not damage or deform the brake lines when removing and installing them.
- When installing a brake line or flexible hose, ensure that they are free from twists or bends.
- Do not deform the bracket and the body when connecting a brake line and flexible hose.
- If the cap of a flexible hose does not match the groove on the bracket, twist the hose slightly to insert it.
- Flexible hoses must be free from shock absorber oil, grease, etc.
- When installing a brake line to a plastic clamp, ensure that the brake line is not loose or pinched.
- Do not reuse any clips or plastic clamps removed from a flexible hose.
- After installing a brake line or flexible hose, ensure that they do not interfere with any other components.
- When disconnecting and connecting a flexible hose and brake line:

Disconnecting:




Connecting:



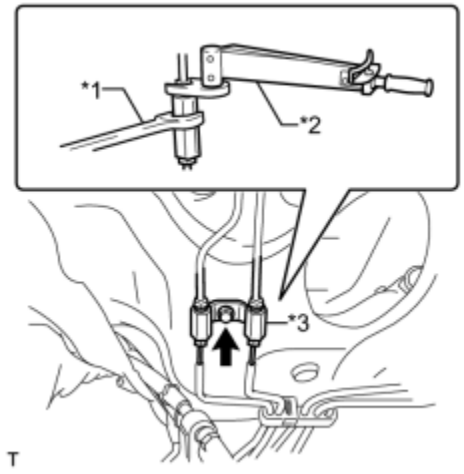

P

***Text in Illustration***

| | |
|---|---|
| *1 | Hold |
| *2 | Turn |

a. Hold the flexible hose with a wrench and disconnect the brake line with a union nut wrench without deforming the line.
b. Remove the clip.
c. Install a new clip.
d. Connect the brake line with a union nut wrench without deforming the line.

- When connecting a brake line and way:

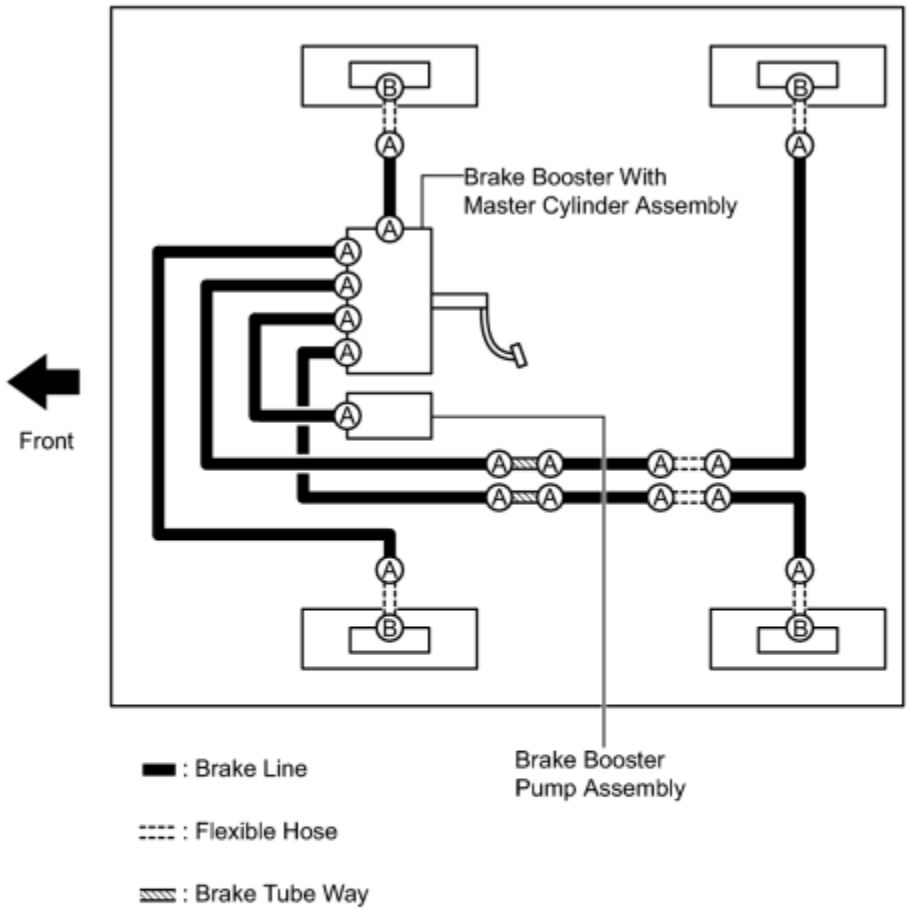



***Text in Illustration***

| | |
|---|---|
| *1 | Hold |
| *2 | Turn |
| *3 | Way |

a. Support the way to prevent deformation of the brake line and connect the brake line to the way with a union nut wrench.
b. Support the way to prevent deformation of the brake line and install the bolt to secure the way to the body.

# SYSTEM DIAGRAM




c

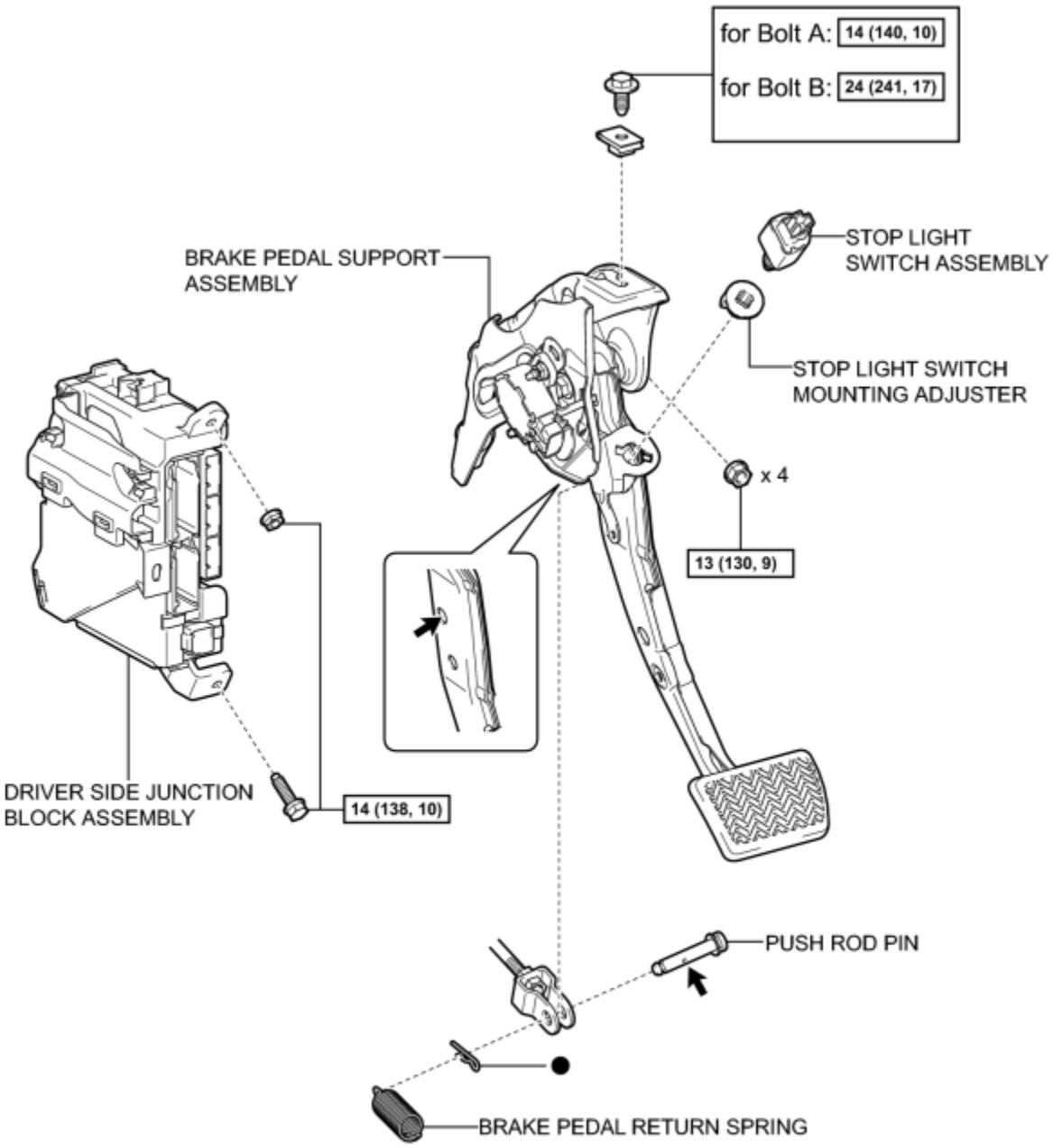
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION



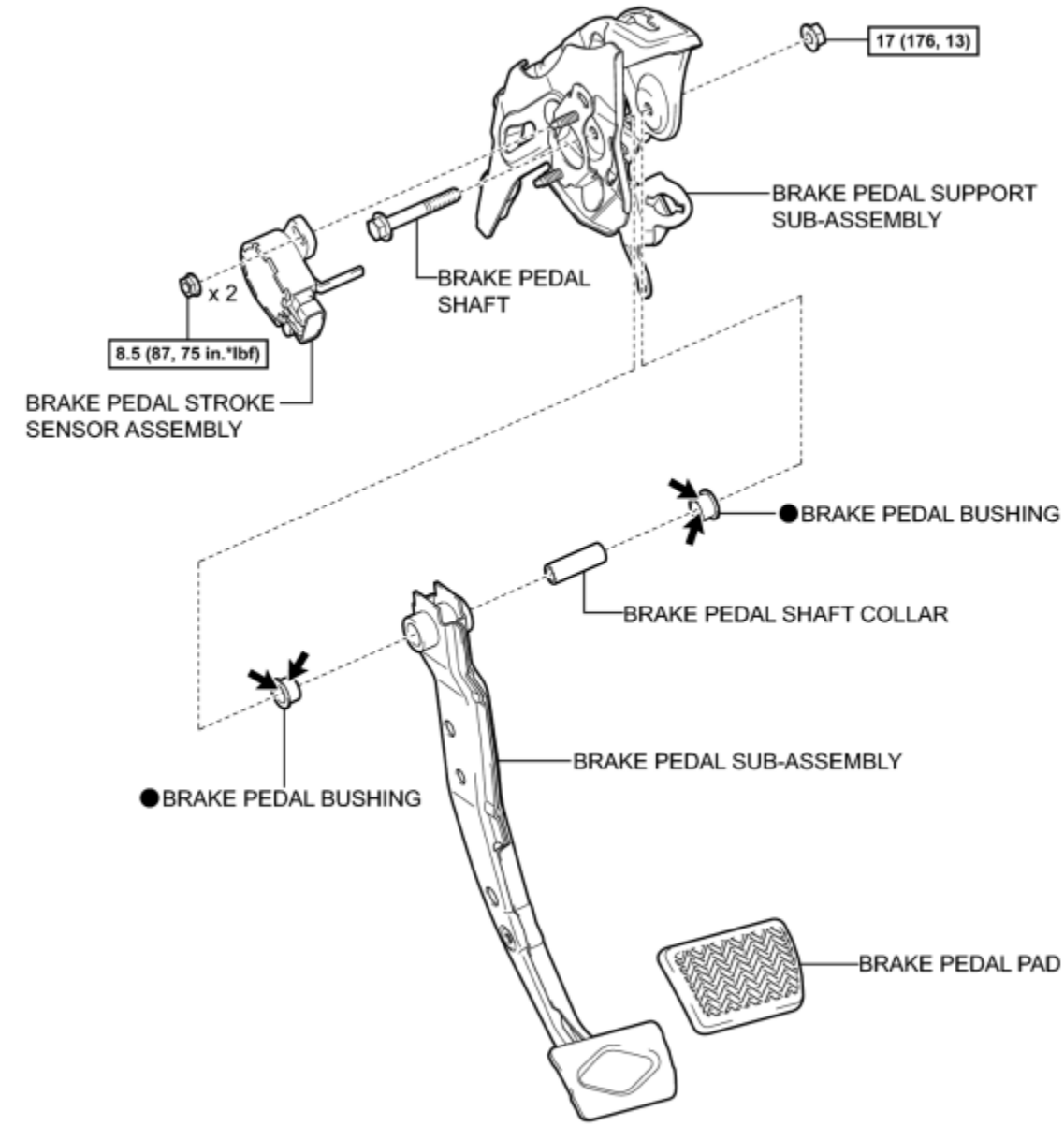

N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ Lithium soap base glycol grease

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ Lithium soap base glycol grease

P

# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

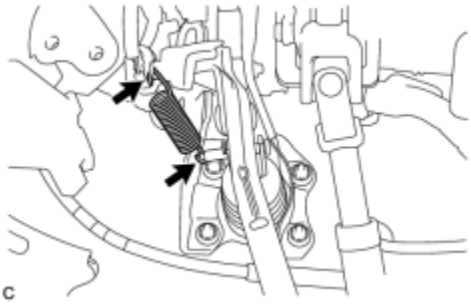
Refer to the instructions for Removal of the upper instrument panel assembly INFO.

2. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

3. REMOVE STOP LIGHT SWITCH ASSEMBLY INFO

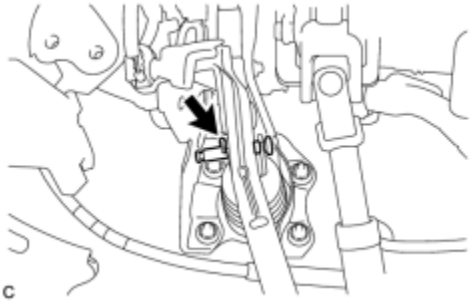
4. REMOVE STOP LIGHT SWITCH MOUNTING ADJUSTER

5. REMOVE BRAKE PEDAL RETURN SPRING



(a) Remove the brake pedal return spring from the brake pedal support sub-assembly and push rod pin.

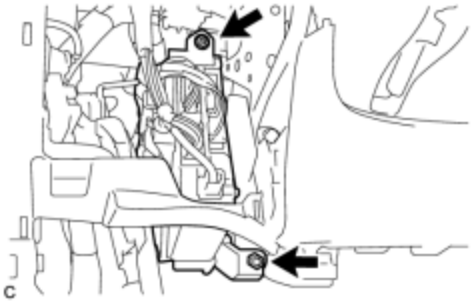
6. REMOVE PUSH ROD PIN



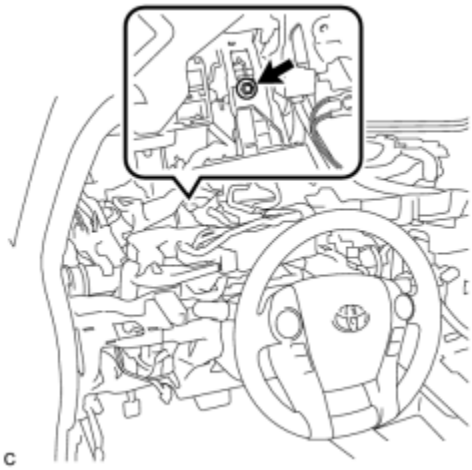
(a) Remove the clip and push rod pin to separate the brake pedal sub-assembly from the push rod clevis.

7. SEPARATE DRIVER SIDE JUNCTION BLOCK ASSEMBLY

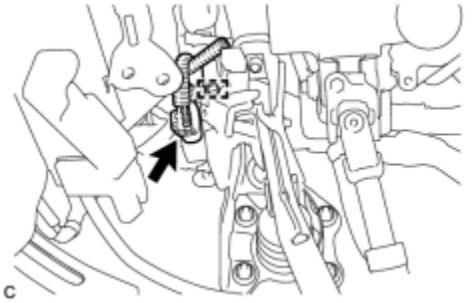
(a) Remove the bolt and nut, and separate the driver side junction block assembly.



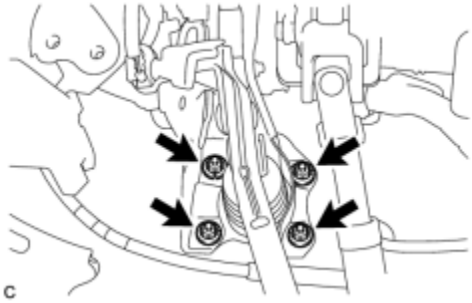
8. REMOVE BRAKE PEDAL SUPPORT ASSEMBLY



(a) Remove the bolt and separate the brake pedal support assembly from the instrument panel reinforcement.



(b) Disengage the clamp and disconnect the connector from the brake pedal stroke sensor assembly.



(c) Remove the 4 nuts and brake pedal support assembly.

(d) Remove the nut from the brake pedal support assembly.

c



# DISASSEMBLY

1. REMOVE BRAKE PEDAL STROKE SENSOR ASSEMBLY INFO

2. REMOVE BRAKE PEDAL SUB-ASSEMBLY



C

(a) Remove the brake pedal shaft and nut to remove the brake pedal sub-assembly from the brake pedal support sub-assembly.

3. REMOVE BRAKE PEDAL SHAFT COLLAR

(a) Remove the brake pedal shaft collar from the brake pedal sub-assembly.

4. REMOVE BRAKE PEDAL BUSHING

(a) Remove the 2 brake pedal bushings from the brake pedal sub-assembly.

5. REMOVE BRAKE PEDAL PAD

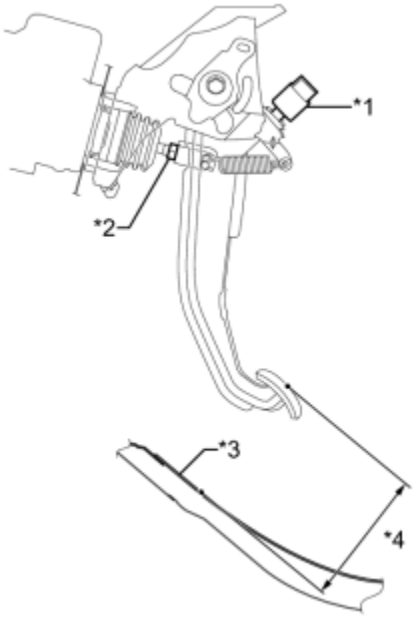
# ADJUSTMENT

1. INSPECT AND ADJUST BRAKE PEDAL HEIGHT

(a) Check the brake pedal height.

(1) Turn back the carpet.

(2) Turn back the dash silencer from the slit provided on the dash silencer.




C

(3) Measure the shortest distance between the brake pedal surface and floor panel.

## Text in Illustration

| | |
|---|---|
| *1 | Stop Light Switch Assembly |
| *2 | Clevis Lock Nut |
| *3 | Floor Panel |
| *4 | Brake Pedal Height |

Brake pedal height from floor panel:

127.7 to 137.7 mm (5.03 to 5.42 in.)

(b) Adjust the brake pedal height.

(1) Remove the stop light switch assembly INFO.

(2) Loosen the clevis lock nut.

(3) Adjust the brake pedal height by turning the push rod.

(4) Tighten the clevis lock nut.

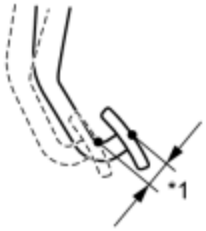
Torque: **26 N·m (260 kgf·cm, 19ft·lbf)**

(5) Install and adjust the stop light switch assembly INFO.

2. INSPECT AND ADJUST BRAKE PEDAL STROKE SENSOR ASSEMBLY INFO

3. INSPECT BRAKE PEDAL FREE PLAY

(a) Depress the pedal until a slight resistance is felt. Measure the brake




T

pedal free play as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Brake Pedal Free Play |

Pedal free play:

1.0 to 6.0 mm (0.0394 to 0.236 in.)

If the pedal free play is not as specified, check the stop light switch clearance INFO. If the pedal free play is as specified, proceed to the Inspect Brake Pedal Reserve Distance procedure.

4. INSPECT BRAKE PEDAL RESERVE DISTANCE

HINT:

Measure the distance at the same point used for the brake pedal height inspection.

(a) Release the parking brake pedal.

(b) With the power switch on (READY), depress the brake pedal and measure the pedal reserve distance.

Pedal reserve distance from the floor panel at 196 N (20 kgf, 44.1 lbf):

More than 78.0 mm (3.07 in.)

If the distance is not as specified, troubleshoot the brake system INFO.

# REASSEMBLY

1. INSTALL BRAKE PEDAL PAD

2. INSTALL BRAKE PEDAL BUSHING

(a) Apply lithium soap base glycol grease to 2 new brake pedal bushings.

(b) Install the 2 brake pedal bushings to the brake pedal sub-assembly.

3. INSTALL BRAKE PEDAL SHAFT COLLAR

(a) Install the brake pedal shaft collar to the brake pedal sub-assembly.

4. INSTALL BRAKE PEDAL SUB-ASSEMBLY



C

(a) Install the brake pedal sub-assembly to the brake pedal support sub-assembly with the brake pedal shaft and nut.

Torque: **17 N·m (176 kgf·cm, 13ft·lbf)**

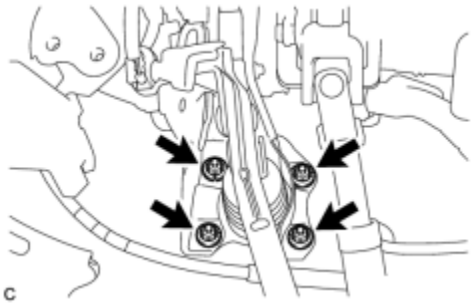
5. INSTALL BRAKE PEDAL STROKE SENSOR ASSEMBLY INFO

# INSTALLATION

1. INSTALL BRAKE PEDAL SUPPORT ASSEMBLY

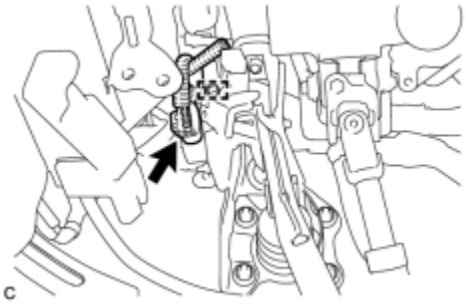


(a) Install the nut to the brake pedal support assembly.



(b) Install the brake pedal support assembly with the 4 nuts.

Torque: **13 N·m (130 kgf·cm, 9ft·lbf)**



(c) Engage the clamp and connect the connector to the brake pedal stroke sensor assembly.

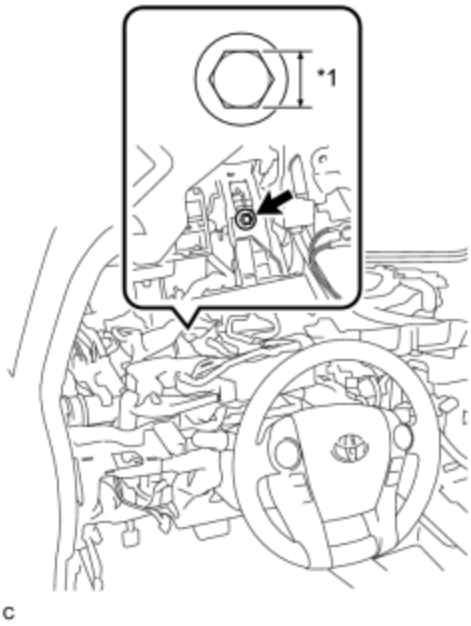
(d) Install the brake pedal support assembly to the instrument panel reinforcement with the bolt.

## Text in Illustration

| | |
|---|---|
| *1 | Bolt Width |

| Bolt Variation | Bolt Width |
|---|---|
| Bolt A | 14 mm (0.551 in.) |
| Bolt B | 12 mm (0.472 in.) |

for Bolt A - Torque: **14 N·m (140 kgf·cm, 10ft·lbf)**

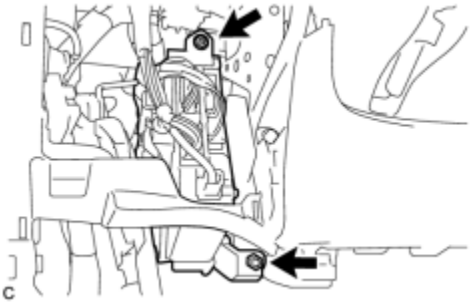



for Bolt B - Torque: **24 N·m (241 kgf·cm, 17ft·lbf)**

HINT:

Two types of bolts each with a different torque specification are used.

2. INSTALL DRIVER SIDE JUNCTION BLOCK ASSEMBLY

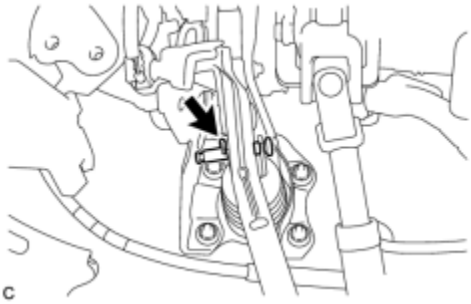



(a) Install the driver side junction block assembly with the bolt and nut.

Torque: **14 N·m (138 kgf·cm, 10ft·lbf)**

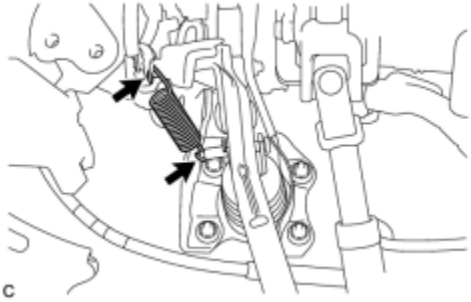
3. INSTALL PUSH ROD PIN

(a) Apply lithium soap base glycol grease to the push rod pin and installation hole of the brake pedal sub-assembly.




(b) Install the push rod pin and a new clip to connect the push rod clevis to the brake pedal sub-assembly.

4. INSTALL BRAKE PEDAL RETURN SPRING




(a) Install the brake pedal return spring to the brake pedal support sub-assembly and push rod pin.

5. INSTALL STOP LIGHT SWITCH MOUNTING ADJUSTER

6. INSTALL STOP LIGHT SWITCH ASSEMBLY INFO

7. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the instructions for Installation of the upper instrument panel assembly INFO.

8. INSPECT AND ADJUST BRAKE PEDAL

HINT: INFO

9. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

10. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE

HINT: INFO

# PRECAUTION

CAUTION:

- While the battery is connected, even if the power switch is off, the brake control system activates when the brake pedal is depressed or the door courtesy switch is turned on. Therefore during servicing of the brake system components, do not depress the brake pedal or open/close the doors while the battery is connected.
- The Techstream must be used when bleeding air. If not used, the air bleeding will be incomplete, which is hazardous and may lead to an accident.

NOTICE:

- Care must be taken to replace each part properly as it could affect the performance of the brake system and result in a driving hazard. Replace the parts with those having the same part number or equivalent.
- It is very important to keep parts and the area clean when repairing the brake system.
- If the vehicle is equipped with a mobile communication system, refer to Precaution in the INTRODUCTION section 

.
- Care must be taken when using magnets as they could affect the performance of the speed sensors.
- Make sure to disable brake control before disconnecting the brake lines.

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Brake System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Low or spongy pedal | Fluid leaks in brake system | - |
| | Air in brake system | INFO |
| | Piston seals (Worn or damaged) (Front) | INFO |
| | Piston seals (Worn or damaged) (Rear) | INFO |
| | Brake booster with master cylinder assembly (Faulty) | INFO |
| Brake drag | Brake pedal free play (Insufficient) | INFO |
| | Parking brake pedal travel (Out of adjustment) | INFO |
| | Parking brake cable (Sticking) | INFO |
| | Pad (Cracked or distorted) (Front) | INFO |
| | Pad (Cracked or distorted) (Rear) | INFO |
| | Piston (Stuck) (Front) | INFO |
| | Piston (Stuck) (Rear) | INFO |
| | Piston (Seized) (Front) | INFO |
| | Piston (Seized) (Rear) | INFO |
| | Brake booster with master cylinder assembly (Faulty) | INFO |
| Brake pull | Piston (Stuck) (Front) | INFO |
| | Piston (Stuck) (Rear) | INFO |
| | Pad (Oily) (Front) | INFO |
| | Pad (Oily) (Rear) | INFO |
| | Piston (Seized) (Front) | INFO |
| | Piston (Seized) (Rear) | INFO |
| | Disc (Scored) (Front) | INFO |
| | Disc (Scored) (Rear) | INFO |
| | Pad (Cracked or distorted) (Front) | INFO |
| | Pad (Cracked or distorted) (Rear) | INFO |
| Hard pedal but brake inefficient | Fluid leaks in brake system | - |
| | Air in brake system | INFO |
| | Pad (Worn) (Front) | INFO |
| | Pad (Worn) (Rear) | INFO |
| | Pad (Cracked or distorted) (Front) | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Pad (Cracked or distorted) (Rear) | INFO |
| | Pad (Oily) (Front) | INFO |
| | Pad (Oily) (Rear) | INFO |
| | Pad (Glazed) (Front) | INFO |
| | Pad (Glazed) (Rear) | INFO |
| | Disc (Scored) (Front) | INFO |
| | Disc (Scored) (Rear) | INFO |
| Noise from brakes | Pad (Cracked or distorted) (Front) | INFO |
| | Pad (Cracked or distorted) (Rear) | INFO |
| | Cylinder mounting bolt (Loose) (Front) | INFO |
| | Cylinder mounting bolt (Loose) (Rear) | INFO |
| | Disc (Scored) (Front) | INFO |
| | Disc (Scored) (Rear) | INFO |
| | Pad support plate (Loose) (Front) | INFO |
| | Pad support plate (Loose) (Rear) | INFO |
| | Slide pin (Worn) (Front) | INFO |
| | Pad guide pin (Worn) (Rear) | INFO |
| | Pad (Dirty) (Front) | INFO |
| | Pad (Dirty) (Rear) | INFO |
| | Pad (Glazed) (Front) | INFO |
| | Pad (Glazed) (Rear) | INFO |
| | Anti-squeal shim (Damaged) (Front) | INFO |
| | Anti-squeal shim (Damaged) (Rear) | INFO |

# ON-VEHICLE INSPECTION

NOTICE:

A DTC may be stored during the inspection procedure. Be sure to clear the DTC and check that a normal system code is output after the inspection is finished.

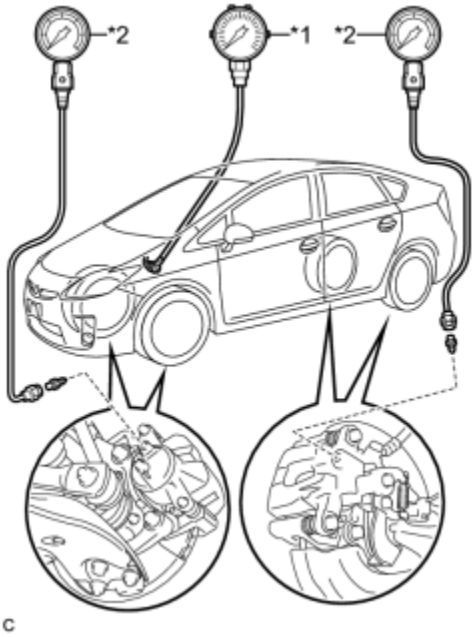
1. INSPECT PRESSURE SENSOR

(a) Check battery voltage.

Standard voltage:

11 to 14 V (while the power switch is off)

(b) Set a pedal effort gauge, SST (LSPV gauge) and connect the Techstream.




c

(1) Set a pedal effort gauge and SST (LSPV gauge).

SST: 09709-29018

## Text in Illustration

| | |
|---|---|
| *1 | Pedal Effort Gauge |
| *2 | SST (LSPV Gauge) |

(2) Bleed air from SST (LSPV gauge) INFO.

(3) Connect the Techstream to the DLC3 with the power switch off, park (P) selected and parking brake applied.

(4) Turn the power switch on (IG) and turn the Techstream on.

(5) Clear the DTCs INFO.

(c) Inspect wheel cylinder pressure sensor and regulator pressure sensor.

(1) Enter the following menus: Chassis / ABS/VSC/TRC / Active Test / Power Supply Air Bleeding Pattern 1.

(2) Select "Wheel Cylinder Pressure Sensor" and "Regulator Pressure Sensor Output".

(3) Check the value output from "Wheel Cylinder Pressure Sensor" and "Pressure Regulator Sensor Output" by depressing the brake pedal.

Standard Result:

| Pedal Effort<br><br>N (kgf, lbf) | Regulator Pressure Sensor Output<br><br>(V) | Rear Right Wheel Hydraulic Pressure<br><br>(MPa (kgf/cm$^2$, psi)) | Rear Left Wheel Hydraulic Pressure<br><br>(MPa (kgf/cm$^2$, psi)) |
|---|---|---|---|
| 50 (5, 11.2) | 0.52 to 1.32 | 0.0 to 4.0 (0.0 to 40.7, 0 to 580) | 0.0 to 4.0 (0.0 to 40.7, 0 to 580) |
| 100 (10, 22.5) | 1.35 to 2.15 | 4.1 to 8.1 (41.8 to 82.5, 595 to 1174) | 4.1 to 8.1 (41.8 to 82.5, 595 to 1174) |
| 150 (15, 33.7) | 2.17 to 2.97 | 8.15 to 12.15 (83.1 to 123.8, 1182 to 1762) | 8.15 to 12.15 (83.1 to 123.8, 1182 to 1762) |
| 200 (20, 45.0) | 3.00 to 3.80 | 12.20 to 16.20 (124.4 to 165.1, 1770 to 2349) | 12.20 to 16.20 (124.4 to 165.1, 1770 to 2349) |

Standard Result:

| Pedal Effort<br><br>N (kgf, lbf) | Wheel Cylinder Pressure Sensor<br><br>(V) | Front Right Wheel Hydraulic Pressure<br><br>(MPa (kgf/cm$^2$, psi)) | Front Left Wheel Hydraulic Pressure<br><br>(MPa (kgf/cm$^2$, psi)) |
|---|---|---|---|
| 50 (5, 11.2) | 0.46 to 1.26 | 0.0 to 3.76 (0.0 to 38.3, 0 to 545) | 0.0 to 3.76 (0.0 to 38.3, 0 to 545) |
| 100 (10, 22.5) | 1.17 to 1.97 | 3.22 to 7.22 (32.8 to 73.6, 467 to 1047) | 3.22 to 7.22 (32.8 to 73.6, 467 to 1047) |
| 150 (15, 33.7) | 1.87 to 2.67 | 6.69 to 10.69 (68.2 to 109.0, 970 to 1550) | 6.69 to 10.69 (68.2 to 109.0, 970 to 1550) |
| 200 (20, 45.0) | 2.58 to 3.38 | 10.13 to 14.13 (103.3 to 144.0, 1469 to 2049) | 10.13 to 14.13 (103.3 to 144.0, 1469 to 2049) |

(4) After inspection, turn "Power Supply Air Bleeding Pattern 1" off.

(d) Inspect accumulator sensor.

(1) Enter the following menus: Chassis / ABS/VSC/TRAC / Data List "Accumulator Sensor".

(2) Depress the brake pedal 4 or 5 times and operate the booster pump motor.

(3) After confirming that the booster pump motor stops, check the output voltage.

Standard voltage:

2.9 to 4.2 V

2. INSPECT BRAKE BOOSTER WITH MASTER CYLINDER ASSEMBLY

(a) Check battery voltage.

Standard voltage:

11 to 14 V (while the power switch is off)

(b) Connect the Techstream and set a pedal effort gauge.

(1) Set a pedal effort gauge.

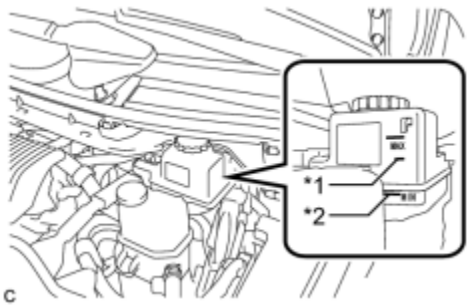
(2) Connect the Techstream to the DLC3 with the power switch off, park (P) selected and parking brake applied.

(3) Turn the power switch on (IG) and turn the Techstream on.

(4) Clear the DTCs INFO.

(c) Check operation without the brake booster.

(1) Inspect and adjust the brake pedal height INFO.




(2) Adjust the brake fluid level in the reservoir between MIN line and fluid level support line.

## Text in Illustration

| | |
|---|---|
| *1 | Fluid Level Support Line |
| *2 | MIN Line |

(3) Turn the Techstream on and enter the following menus: Chassis / ABS/VSC/TRAC / Utility / ECB (Electronically Controlled Brake system) Utility / Zero Down.

NOTICE:

Go to the next step without turning the power switch off.

(4) Enter the following menus: Chassis / ABS/VSC/TRAC / Data List "Wheel Cylinder Pressure Sensor", "Stroke Sensor" and "Stroke Sensor 2".

(5) Check the value output from "Wheel Cylinder Pressure Sensor", "Stroke Sensor" and "Stroke Sensor 2" by depressing the brake pedal.

Standard Voltage:

| Pedal Effort<br><br>N (kgf, lbf) | Wheel Cylinder Pressure Sensor<br><br>(V) | Stroke Sensor<br><br>(V) | Stroke Sensor 2<br><br>(V) |
|---|---|---|---|
| 200 (20, 45.0) | 0.453 to 1.253 | 0.98 to 1.68 | 3.32 to 4.02 |
| 500 (51, 112.4) | 0.982 to 1.782 | 1.15 to 1.86 | 3.14 to 4.84 |

(6) Turn the power switch off to finish "Zero Down".

(7) Turn the power switch on and wait at 20 seconds, then enter the following menus: Chassis / ABS/VSC/TRAC / Data List "Accumulator Sensor", and check the output voltage.

Standard voltage:

2.9 to 4.2 V

3. INSPECT STROKE SIMULATOR

(a) Check battery voltage.

Standard voltage:

11 to 14 V (while the power switch is off)

(b) Connect the Techstream and set a pedal effort gauge.

(1) Set a pedal effort gauge.

(2) Connect the Techstream to the DLC3 with the power switch off, park (P) selected and parking brake applied.

(3) Turn the power switch on (IG) and turn the Techstream on.

(4) Clear the DTCs INFO.

(c) Check operation with the brake booster.

(1) Turn the power switch on (IG).

(2) Enter the following menus: Chassis / ABS/VSC/TRAC / Data List "Stroke Sensor" and "Stroke Sensor 2".

(3) Depress the brake pedal 4 or 5 times.

(4) Check the value output from "Stroke Sensor" and "Stroke Sensor 2" by depressing the brake pedal.

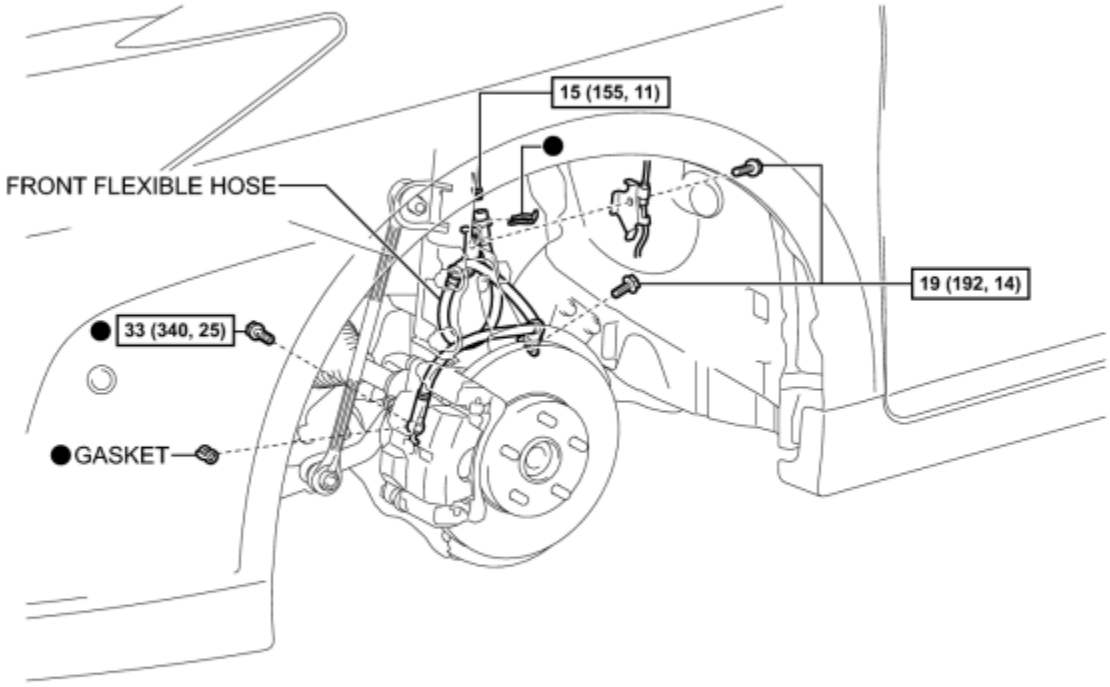
Standard Voltage:

| Pedal Effort<br><br>N (kgf, lbf) | Stroke Sensor<br><br>(V) | Stroke Sensor 2<br><br>(V) |
|---|---|---|

| Pedal Effort<br><br>N (kgf, lbf) | Stroke Sensor<br><br>(V) | Stroke Sensor 2<br><br>(V) |
|---|---|---|
| 50 (5 11.2) | 1.03 to 1.73 | 3.26 to 3.96 |
| 100 (10, 22.4) | 1.26 to 1.96 | 3.04 to 3.74 |
| 150 (15, 34.0) | 1.30 to 2.00 | 3.00 to 3.70 |

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

# REMOVAL

NOTICE:

If both RH side hose and LH side hose are disconnected at the same time, be sure to place identification marks indicating the position on each side.

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. DISABLE BRAKE CONTROL INFO

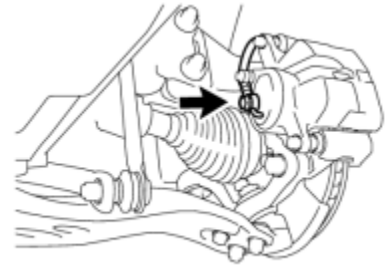
2. REMOVE FRONT WHEEL

3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately wash it off.

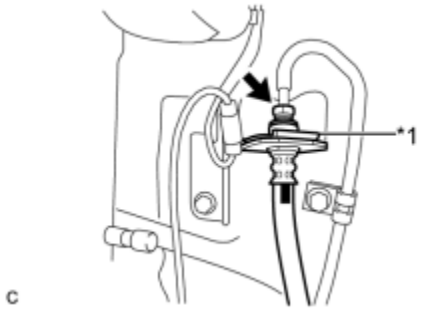
4. REMOVE FRONT FLEXIBLE HOSE



C

(a) Remove the union bolt and gasket, and separate the front flexible hose from the disc brake cylinder assembly.

(b) Using a union nut wrench, disconnect the brake line while holding the front flexible hose with a wrench.




C

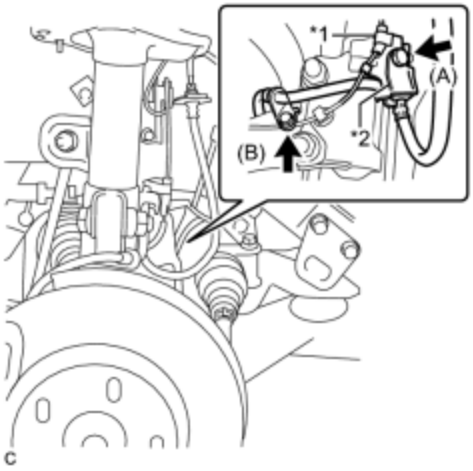
## Text in Illustration

| | |
|---|---|
| *1 | Clip |

- Do not kink or damage the brake line.
- Do not allow any foreign matter such as dirt or dust to enter the brake line from the clip or bracket.

(c) Remove the clip.

(d) Remove the bolt (A) and separate the front speed sensor bracket from




the absorber bracket.

## Text in Illustration

| | |
|---|---|
| *1 | Front Speed Sensor Bracket |
| *2 | Front Flexible Hose Bracket |

(e) Remove the bolt (B) and front flexible hose from the steering knuckle.

# INSTALLATION

NOTICE:

- Because the left and right hoses are not interchangeable, verify the part number when installing the flexible hoses.
- If the hoses are to be reused, connect them after checking the identification marks placed when each hose was disconnected.

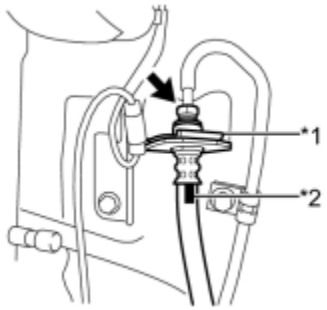
HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. INSTALL FRONT FLEXIBLE HOSE

(a) Install a new clip to the front flexible hose.

c




## Text in Illustration

| | |
|---|---|
| *1 | Clip |
| *2 | Identification Mark |

- Install the clip as far as it will go.
- When installing the front flexible hose, face the identification mark to the outside of the vehicle and minimize twisting of the hose.

(b) Using a union nut wrench, connect the brake line to the front flexible hose while holding the flexible hose with a wrench.

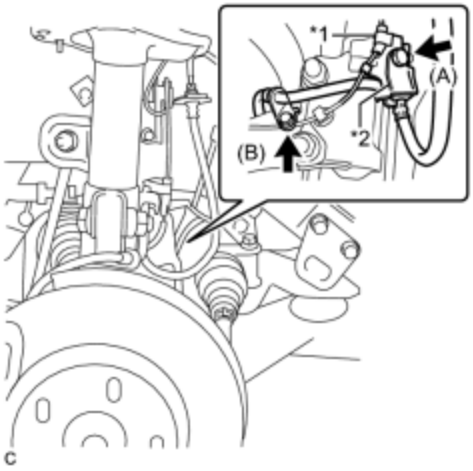
Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

NOTICE:

- Do not kink or damage the brake line.
- Do not allow any foreign matter such as dirt or dust to enter the brake line from the clip or bracket.
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.

(c) Install the front flexible hose to the steering knuckle with the bolt (B).

Torque: **19 N·m (192 kgf·cm, 14ft·lbf)**




(d) Install the front flexible hose and front speed sensor bracket to the absorber bracket with the bolt (A).

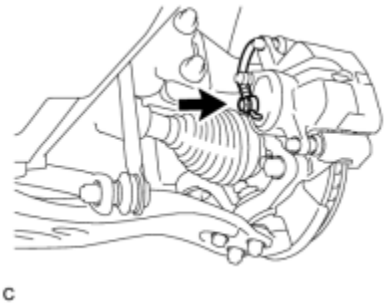
***Text in Illustration***

| | |
|---|---|
| *1 | Front Speed Sensor Bracket |
| *2 | Front Flexible Hose Bracket |

Torque: **19 N·m (192 kgf·cm, 14ft·lbf)**

NOTICE:

Install the front flexible hose first and then the front speed sensor bracket.




(e) Connect the front flexible hose to the front disc brake cylinder assembly with a new union bolt and a new gasket.

Torque: **33 N·m (340 kgf·cm, 25ft·lbf)**

2. BLEED BRAKE LINE INFO

3. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE

HINT:

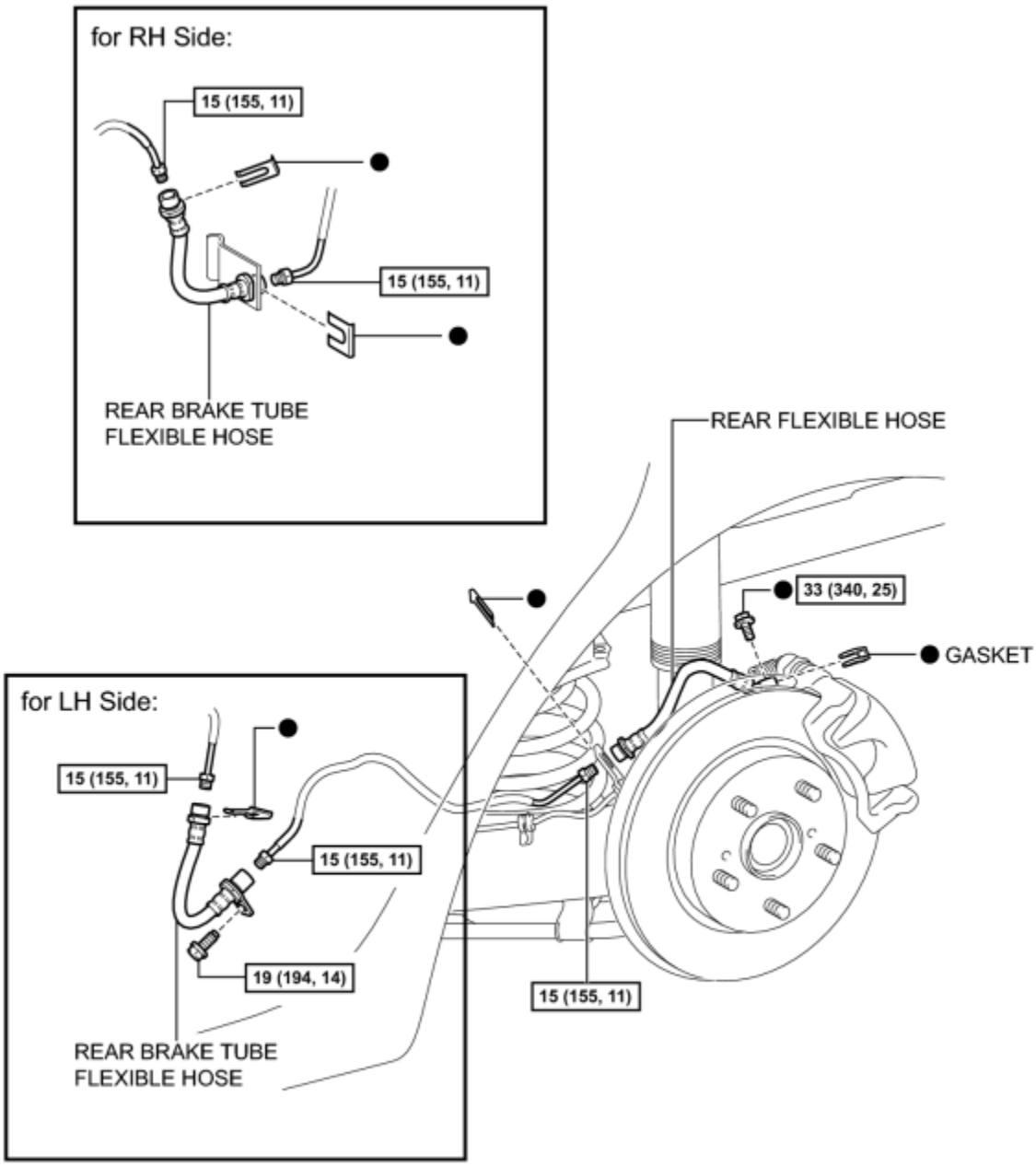
If the brake control has been disabled, make sure to perform initialization and calibration of the linear solenoid valve INFO.

4. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

T

# REMOVAL

NOTICE:

If both RH side hose and LH side hose are disconnected at the same time, be sure to place identification mark indicating the position on each side.

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. DISABLE BRAKE CONTROL INFO

2. REMOVE REAR WHEEL

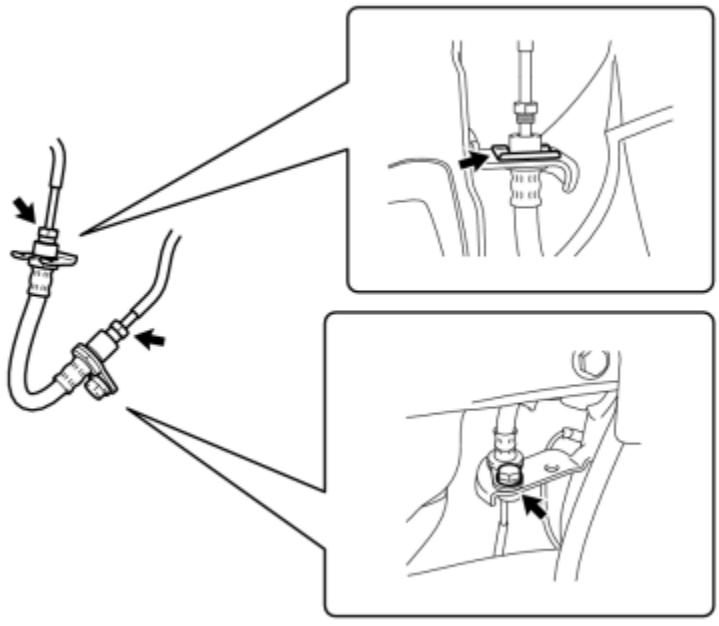
3. DRAIN BRAKE FLUID

NOTICE:

If brake fluid leaks onto any painted surface, immediately wash it off.

4. REMOVE REAR BRAKE TUBE FLEXIBLE HOSE (for LH Side)

(a) Using a union nut wrench, disconnect the 2 brake lines while holding the rear brake tube flexible hose with a wrench.



C

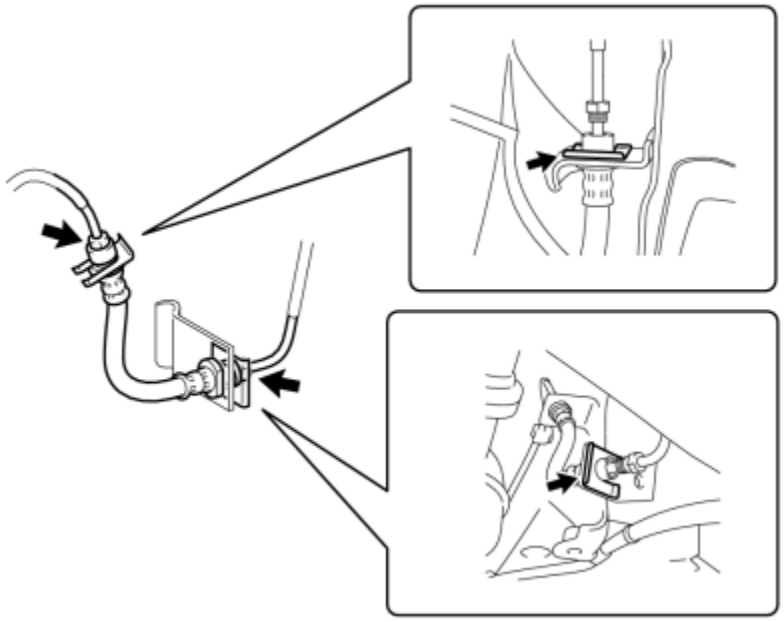
NOTICE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt or dust to enter the brake line from the connecting points.

(b) Remove the clip, bolt and rear brake tube flexible hose.

5. REMOVE REAR BRAKE TUBE FLEXIBLE HOSE (for RH Side)

(a) Using a union nut wrench, disconnect the 2 brake lines while holding the rear brake tube flexible hose with a wrench.



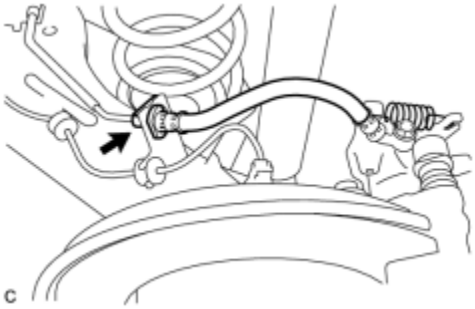
c

NOTICE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt or dust to enter the brake line from the connecting points.

(b) Remove the 2 clips and rear brake tube flexible hose.

6. REMOVE REAR FLEXIBLE HOSE



c

(a) Using a union nut wrench, Disconnect the brake line while holding the rear flexible hose with a wrench.

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt or dust to enter the brake line from the connecting points.

(b) Remove the clip and separate the rear flexible hose from the brake line.







(c) Remove the union bolt, gasket and rear flexible hose.

# INSTALLATION

NOTICE:

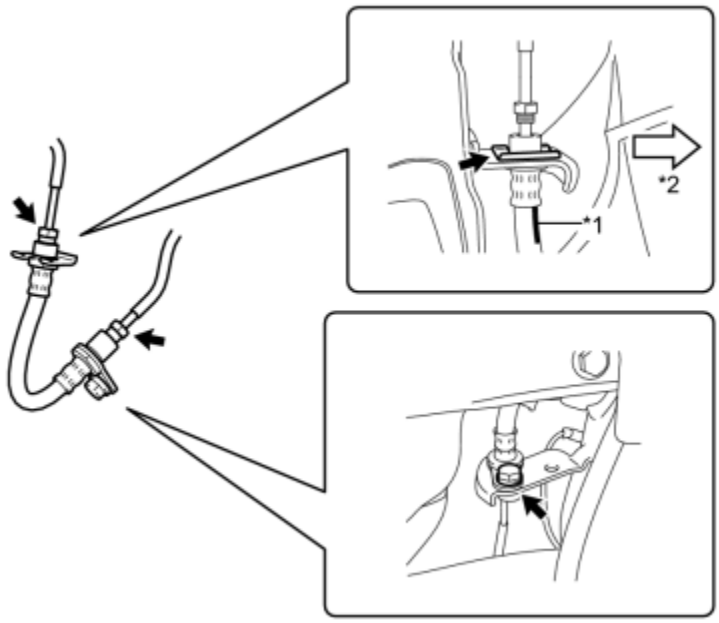
- Because the left and right rear flexible hoses are not interchangeable, verify the part number when installing the flexible hoses.
- If the hoses are to be reused, connect them after checking the identification marks placed when each hose was disconnected.

HINT:

- Use the same procedure for the LH side and RH side.
- The following procedure is for the LH side.

1. INSTALL REAR BRAKE TUBE FLEXIBLE HOSE (for LH Side)

(a) Install the rear brake tube flexible hose with the bolt and a new clip.




c

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Identification Mark | *2 | Inside of the Vehicle |

Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**

NOTICE:

- Install the clip as far as it will go.
- When installing the rear brake tube flexible hose, face the identification mark to the inside of the vehicle and minimize twisting of the hose.

(b) Using a union nut wrench, connect the 2 brake lines to the rear brake tube flexible hose.

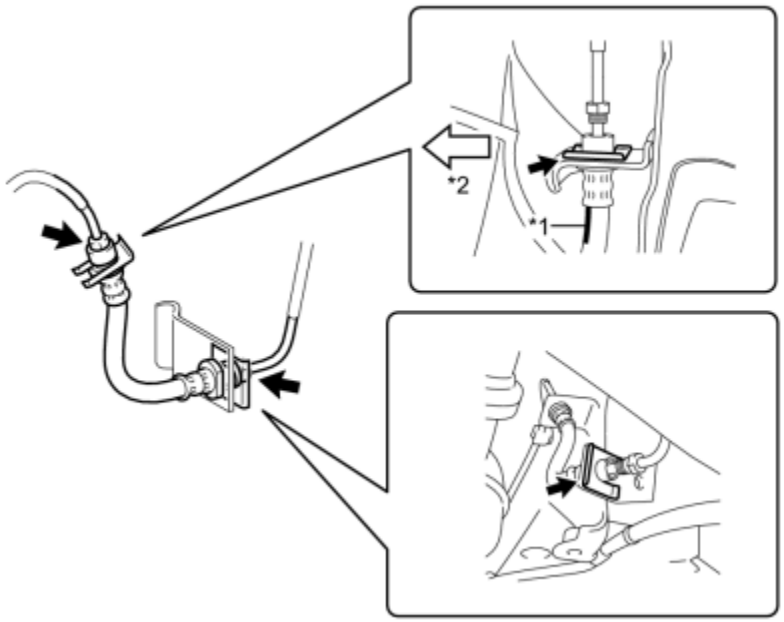
Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

NOTICE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake line from the connecting points.
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.

2. INSTALL REAR BRAKE TUBE FLEXIBLE HOSE (for RH Side)

(a) Install the rear brake tube flexible hose with 2 new clips.




C

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Identification Mark | *2 | Inside of the Vehicle |

NOTICE:

- Install the clip as far as it will go.
- When installing the rear brake tube flexible hose, face the identification mark to the inside of the vehicle and minimize twisting of the hose.

(b) Using a union nut wrench, connect the 2 brake lines to the rear brake tube flexible hose.

Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

NOTICE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake line from the connecting points.
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.

3. INSTALL REAR FLEXIBLE HOSE




(a) Connect the rear flexible hose to the rear disc brake cylinder assembly with a new union bolt and a new gasket.

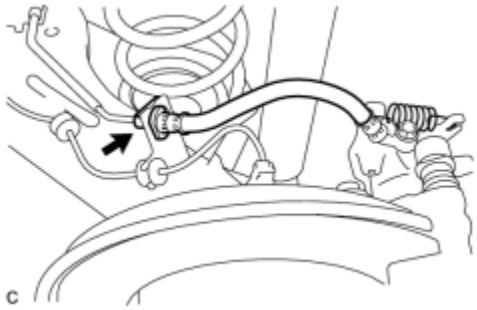
Torque: **33 N·m (340 kgf·cm, 25ft·lbf)**




(b) Install a new clip.

NOTICE:

Install the clip as far as it will go.




(c) Using a union nut wrench, connect the brake line to the rear flexible hose while holding the rear flexible hose with a wrench.

Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake line from the connecting points.
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.

4. BLEED BRAKE LINE INFO

5. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE

HINT:

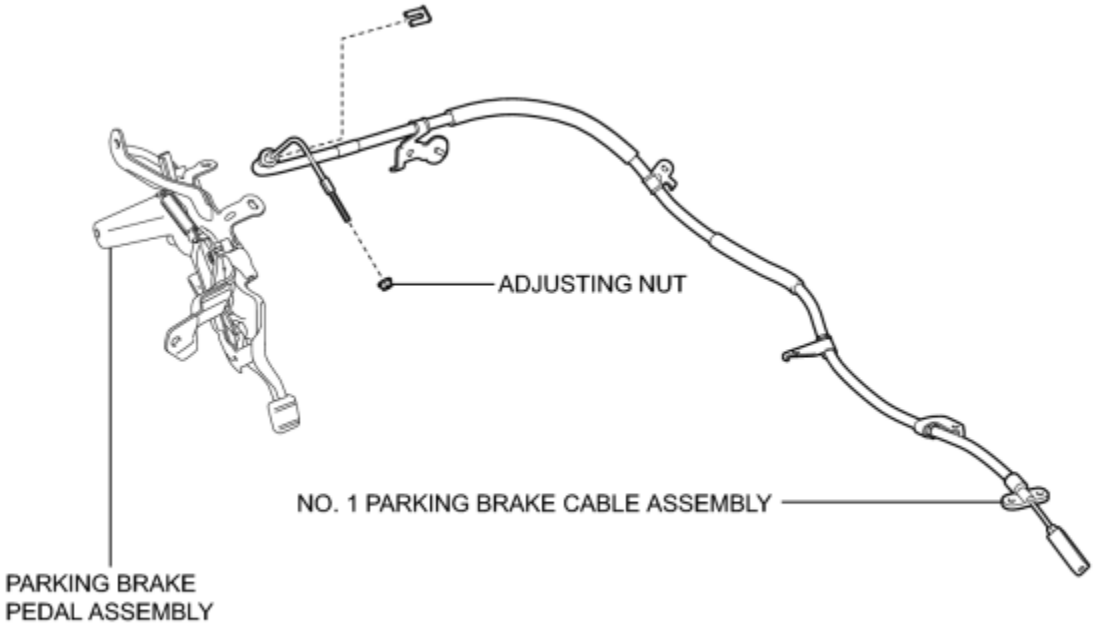
If the brake control has been disabled, make sure to perform initialization and calibration of the linear solenoid valve INFO.

6. INSTALL REAR WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

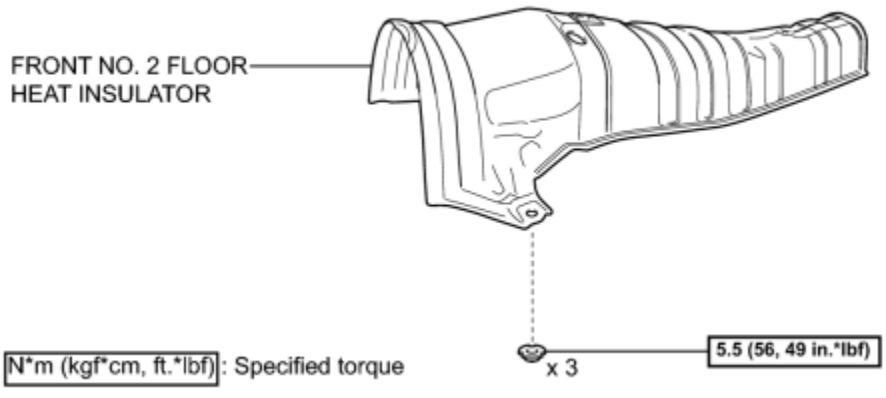
# COMPONENTS

# ILLUSTRATION



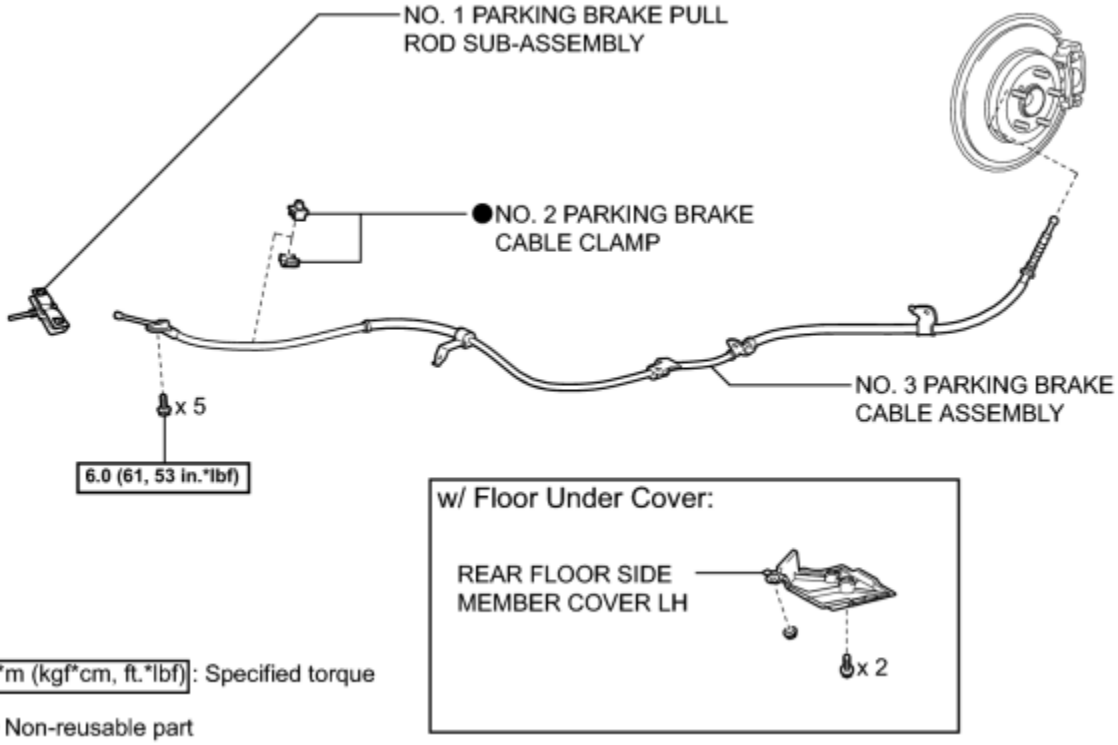

c

# ILLUSTRATION




c

# ILLUSTRATION


NO. 1 PARKING BRAKE PULL ROD SUB-ASSEMBLY
●NO. 2 PARKING BRAKE CABLE CLAMP
NO. 3 PARKING BRAKE CABLE ASSEMBLY
x 5
6.0 (61, 53 in.*lbf)
w/ Floor Under Cover:
REAR FLOOR SIDE MEMBER COVER LH
x 2
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part

c

# REMOVAL

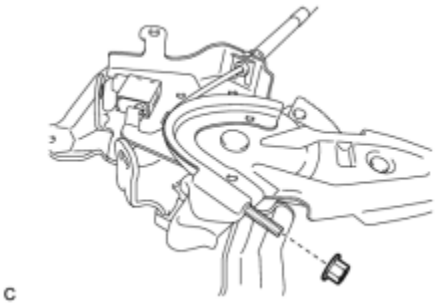
1. REMOVE REAR WHEEL

2. REMOVE PARKING BRAKE CONTROL PEDAL ASSEMBLY

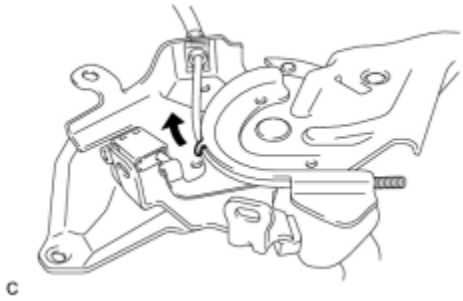
HINT:

Refer to the instructions for Removal of the parking brake control pedal assembly INFO.

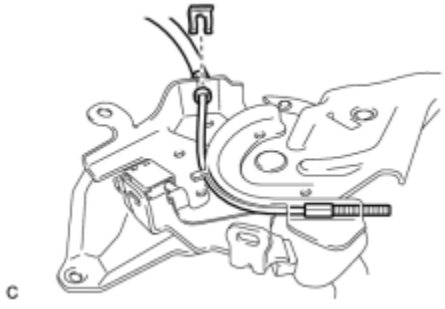
3. REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY




(a) Remove the adjusting nut.




(b) Pull up the parking brake pedal claw.




(c) Remove the clip from the No. 1 parking brake cable assembly.

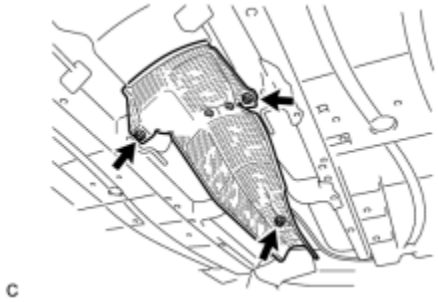
(d) Remove the No. 1 parking brake cable assembly from the parking brake pedal assembly.

4. REMOVE FRONT EXHAUST PIPE ASSEMBLY

HINT:

Refer to the instructions for Removal of the front exhaust pipe assembly INFO.

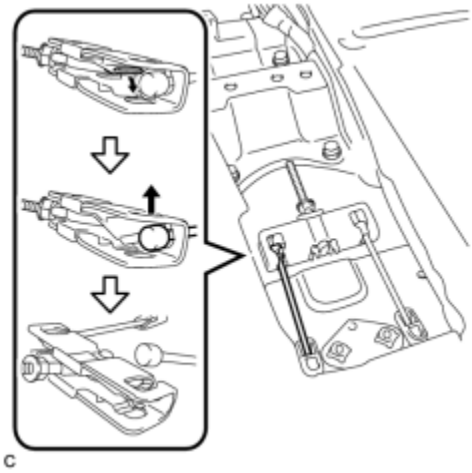
5. REMOVE FRONT NO. 2 FLOOR HEAT INSULATOR



(a) Remove the 3 nuts and front No. 2 floor heat insulator.

6. REMOVE REAR FLOOR SIDE MEMBER COVER LH (w/ Floor Under Cover) INFO

7. REMOVE NO. 1 PARKING BRAKE PULL ROD SUB-ASSEMBLY



(a) Separate the No. 3 parking brake cable assembly from the No. 1 parking brake pull rod sub-assembly as shown in the illustration.

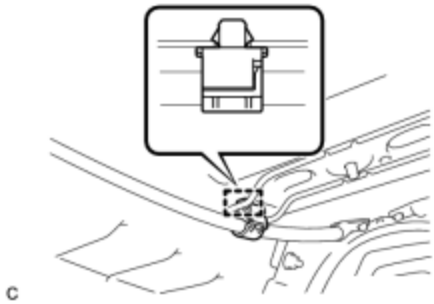
(b) Separate the No. 2 parking brake cable assembly to remove the No. 1 parking brake pull rod sub-assembly.

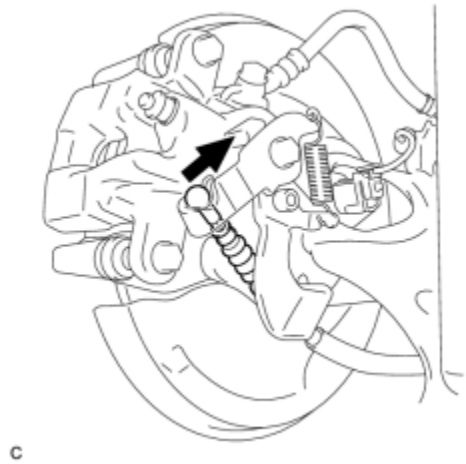
HINT:

Perform the same procedure as for the No. 3 parking brake cable assembly.

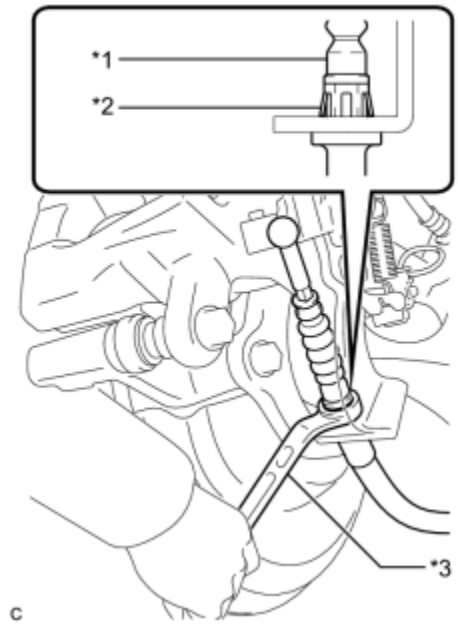
8. REMOVE NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Disengage the clamp to separate the No. 2 parking brake cable clamp.





(b) Separate the No. 3 parking brake cable assembly from the rear disc brake cylinder assembly.




(c) Disconnect the No. 3 parking brake cable assembly from the rear disc brake cylinder assembly.

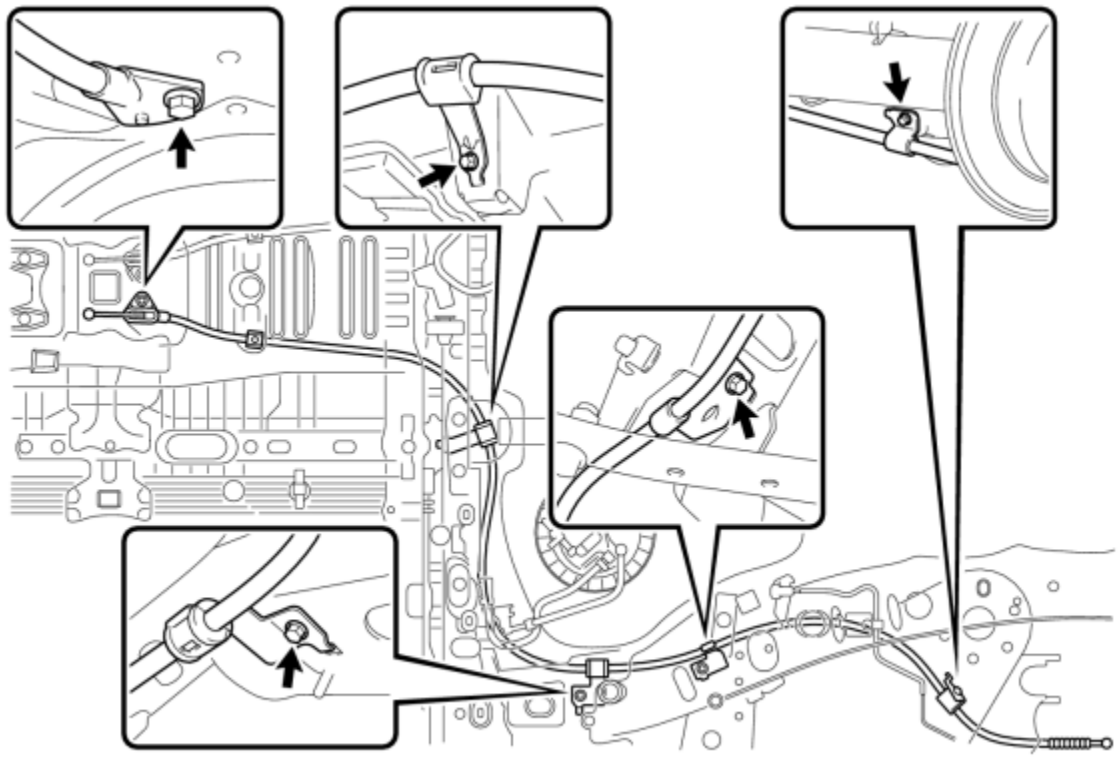
## Text in Illustration

| | |
|---|---|
| *1 | No. 3 Parking Brake Cable Assembly |
| *2 | Clip |
| *3 | Offset Wrench (14 mm) |

HINT:

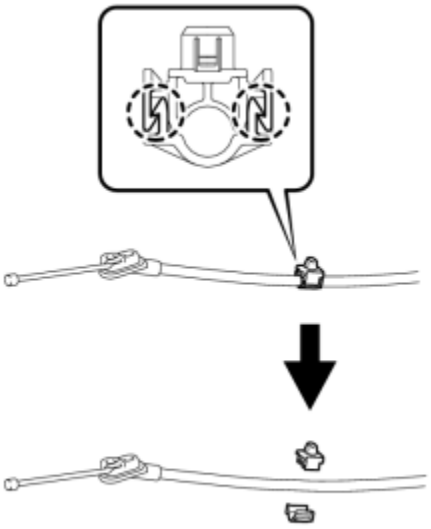
Insert an offset wrench (14 mm) at the base of the No. 3 parking brake cable assembly as shown in the illustration to disengage the clip. Pull out the No. 3 parking brake cable assembly from the rear disc brake cylinder assembly.

(d) Remove the 5 bolts and No. 3 parking brake cable assembly.



C

9. REMOVE NO. 2 PARKING BRAKE CABLE CLAMP

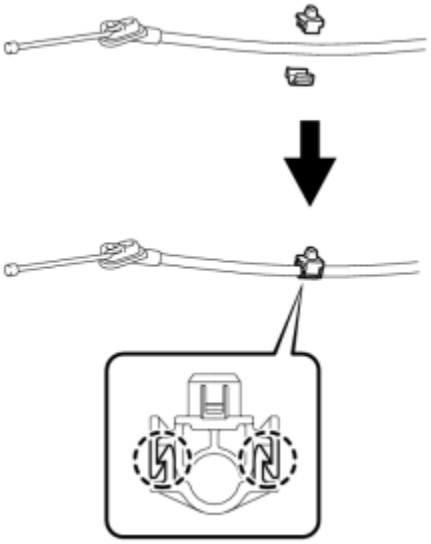


P

(a) Disengage the 2 claws to remove the No. 2 parking brake cable clamp from the No. 3 parking brake cable assembly.

# INSTALLATION

1. INSTALL NO. 2 PARKING BRAKE CABLE CLAMP

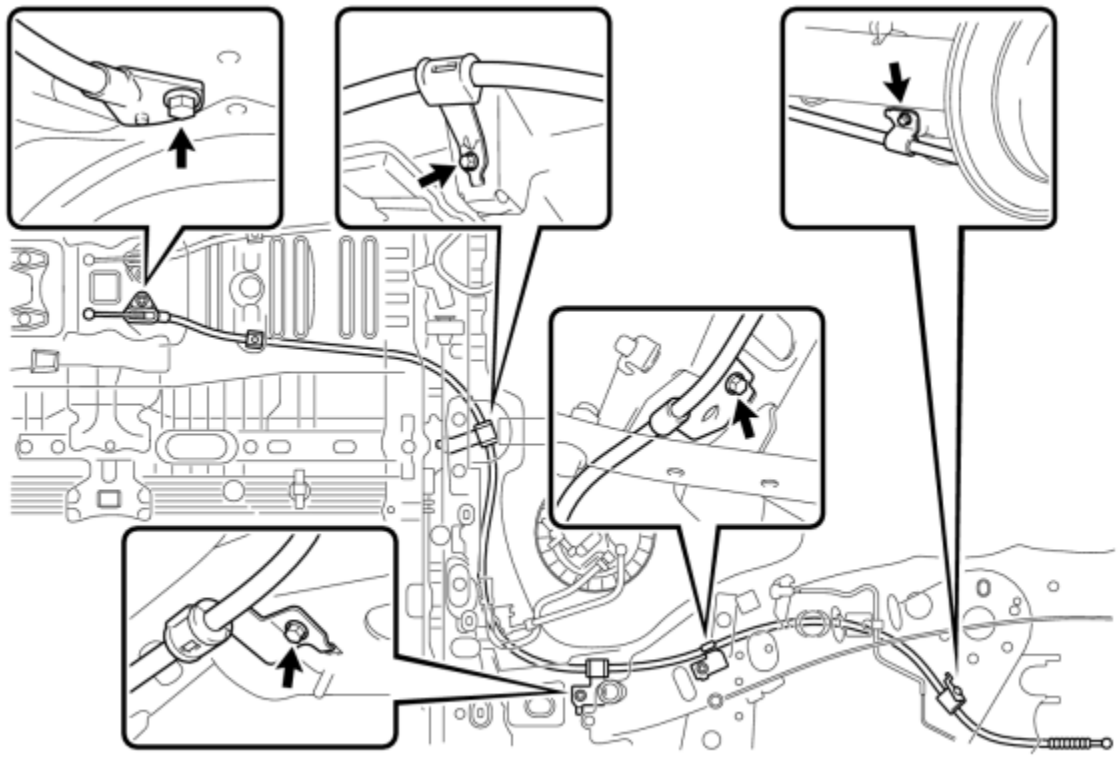


P

(a) Engage the 2 claws to install a new No. 2 parking brake cable clamp to the No. 3 parking brake cable assembly.

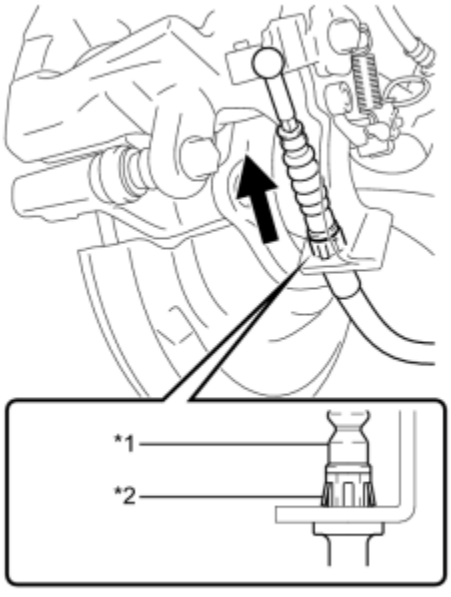
2. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Install the No. 3 parking brake cable assembly with the 5 bolts.



c

Torque: **6.0 N·m (61 kgf·cm, 53in·lbf)**




c

(b) Install the No. 3 parking brake cable assembly to the rear disc brake cylinder assembly.

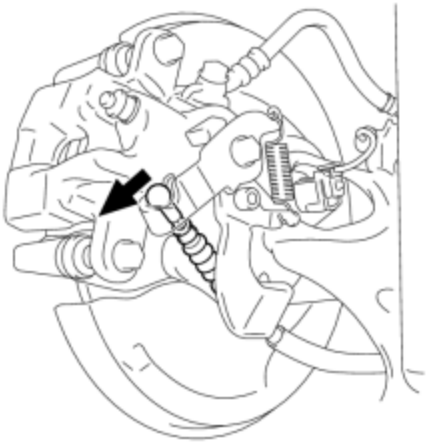
# Text in Illustration

| | |
|---|---|
| *1 | No. 3 Parking Brake Cable Assembly |
| *2 | Clip |

HINT:

Be sure to engage the No. 3 parking brake cable assembly clip onto the rear disc brake cylinder assembly as shown in the illustration.

(c) Connect the No. 3 parking brake cable assembly to the rear disc brake cylinder assembly.

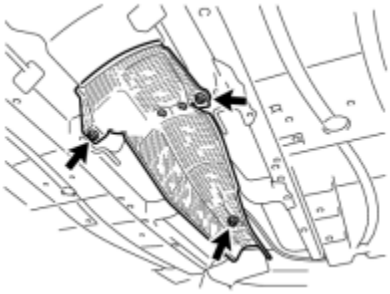




(d) Engage the clamp to install the No. 2 parking brake cable clamp.

3. INSTALL REAR FLOOR SIDE MEMBER COVER LH (w/ Floor Under Cover) INFO

4. INSTALL FRONT NO. 2 FLOOR HEAT INSULATOR



(a) Install the front No. 2 floor heat insulator with the 3 nuts.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

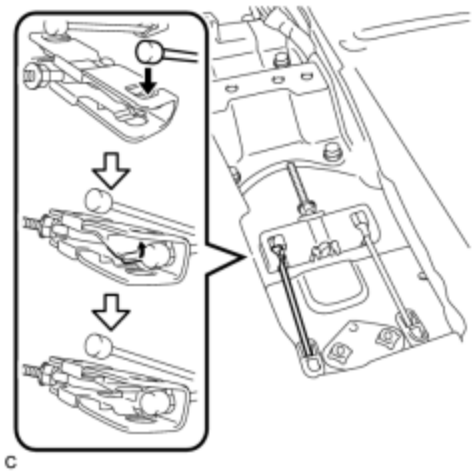
5. INSTALL FRONT EXHAUST PIPE ASSEMBLY

HINT:

Refer to the instructions for Installation of the front exhaust pipe assembly INFO.

6. INSTALL NO. 1 PARKING BRAKE PULL ROD SUB-ASSEMBLY

(a) Connect the No. 3 parking brake cable assembly to the No. 1 parking




brake pull rod sub-assembly as shown in the illustration.

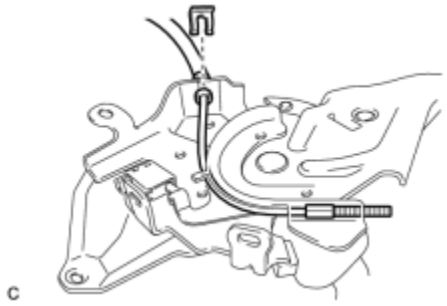
(b) Connect the No. 2 parking brake cable assembly to the No. 1 parking brake pull rod sub-assembly.

HINT:

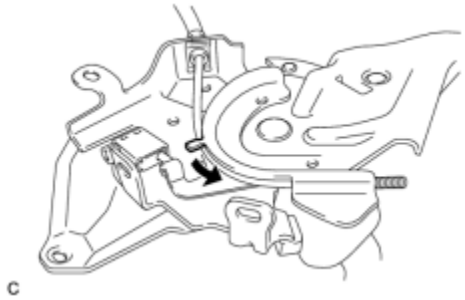
Perform the same procedure as for the No. 3 parking brake cable assembly.

7. INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY

(a) Pass the No. 1 parking brake cable assembly through the parking brake pedal assembly.

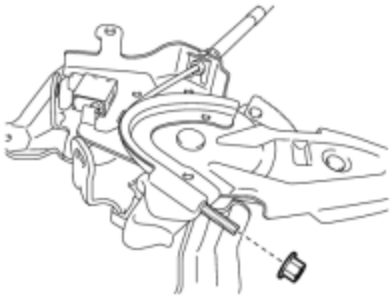



(b) Install the clip to the No. 1 parking brake cable assembly.




(c) Bend the parking brake pedal claw.

(d) Temporarily install the adjusting nut.




8. INSTALL PARKING BRAKE CONTROL PEDAL ASSEMBLY

HINT:

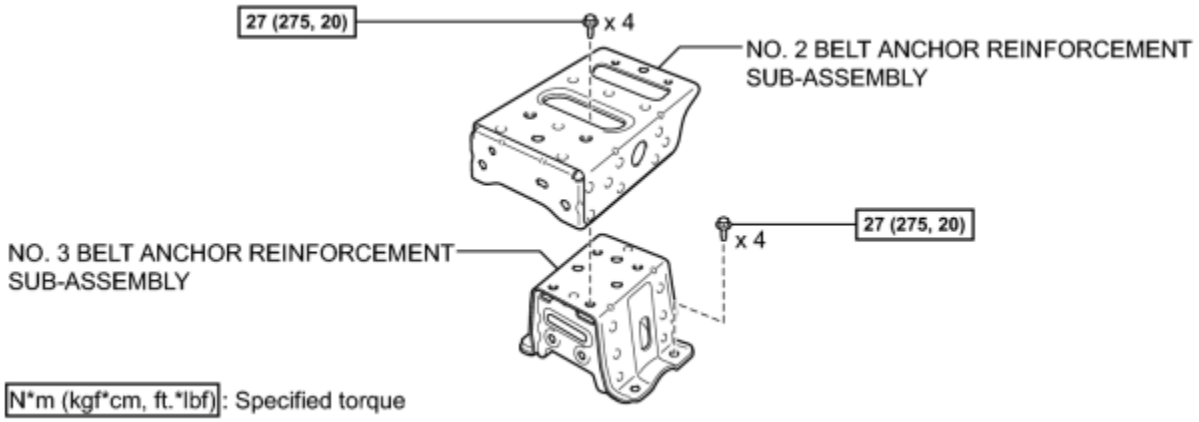
Refer to the instructions for Installation of the parking brake control pedal assembly INFO.

9. INSTALL REAR WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

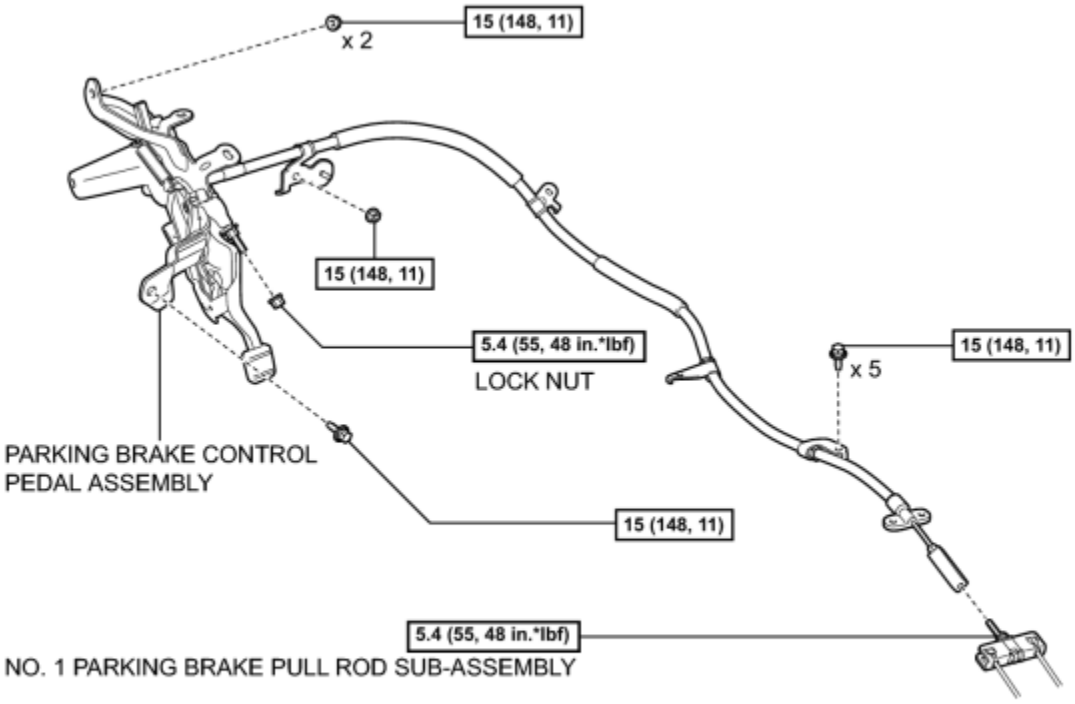
# COMPONENTS

# ILLUSTRATION




c

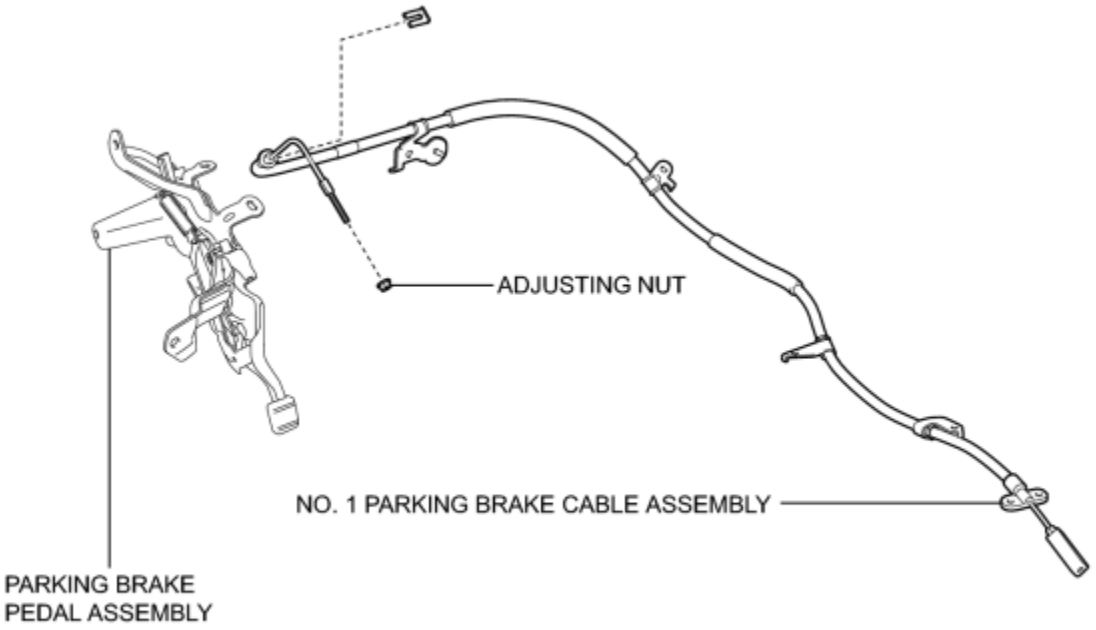
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

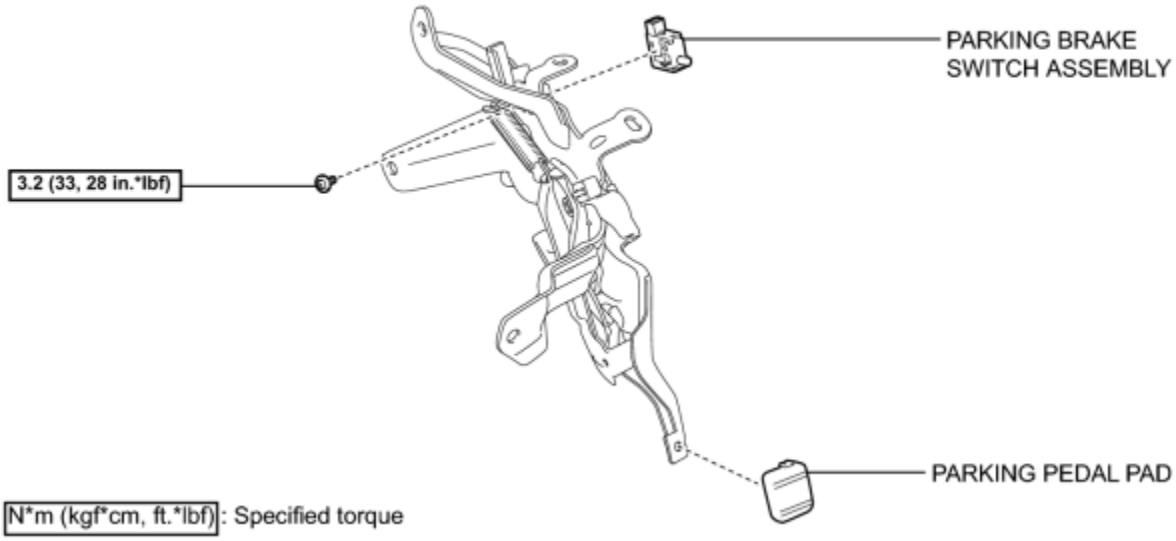
c

# ILLUSTRATION




c

# ILLUSTRATION




c

# REMOVAL

1. REMOVE AIR CONDITIONING UNIT

HINT:

Refer to the instructions for Removal of the air conditioning unit INFO.

2. REMOVE FRONT SEAT ASSEMBLY LH

HINT:

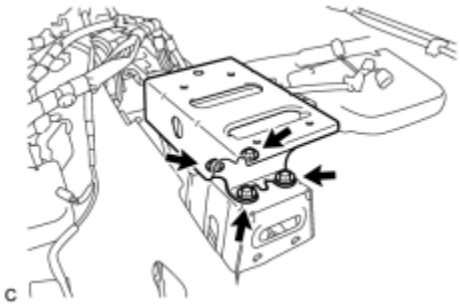
Refer to the instructions for Removal of the front seat assembly INFO.

3. REMOVE FRONT SEAT ASSEMBLY RH

HINT:

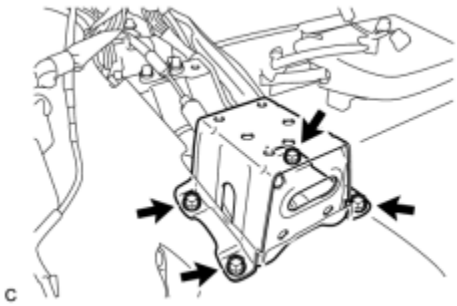
Perform the same procedure as for the LH side.

4. REMOVE NO. 2 BELT ANCHOR REINFORCEMENT SUB-ASSEMBLY



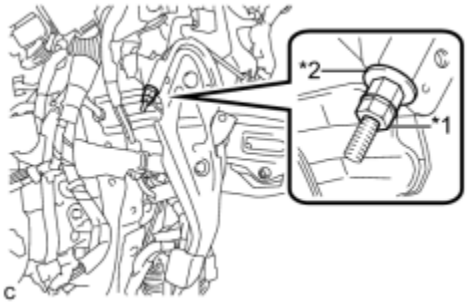

(a) Remove the 4 bolts and No. 2 belt anchor reinforcement sub-assembly.

5. REMOVE NO. 3 BELT ANCHOR REINFORCEMENT SUB-ASSEMBLY




(a) Remove the 4 bolts and No. 3 belt anchor reinforcement sub-assembly.

6. LOOSEN ADJUSTING NUT

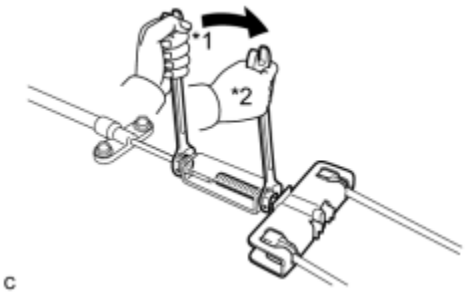



(a) Remove the lock nut and loosen the adjusting nut.

## Text in Illustration

| | |
|---|---|
| *1 | Lock Nut |
| *2 | Adjusting Nut |

7. SEPARATE NO. 1 PARKING BRAKE PULL ROD SUB-ASSEMBLY

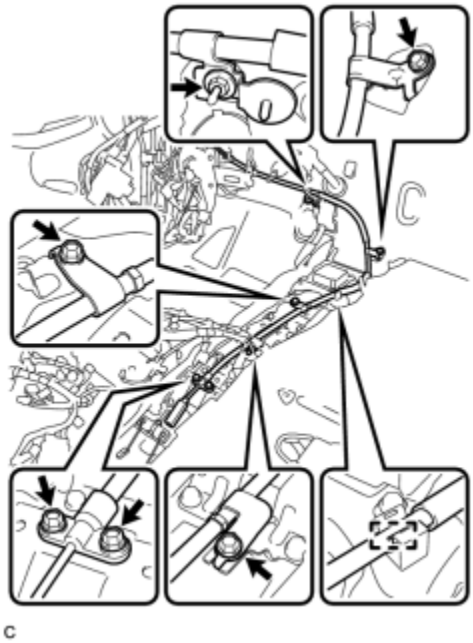



(a) Separate the No. 1 parking brake pull rod sub-assembly from the parking brake control pedal assembly as shown in the illustration.

## Text in Illustration

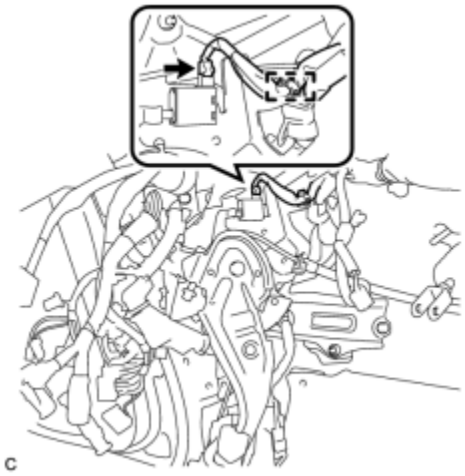
| | |
|---|---|
| *1 | Turn |
| *2 | Hold |

8. REMOVE PARKING BRAKE CONTROL PEDAL ASSEMBLY



(a) Remove the 5 bolts and nut, and separate the No. 1 parking brake cable assembly.

(b) Remove the clamp.




(c) Disconnect the parking brake switch connector.

(d) Disengage the wire harness clamp.




(e) Remove the bolt, 2 nuts and parking brake control pedal assem

# DISASSEMBLY

1. REMOVE NO. 1 PARKING BRAKE CABLE ASSEMBLY INFO

2. REMOVE PARKING BRAKE SWITCH ASSEMBLY INFO

3. REMOVE PARKING PEDAL PAD

(a) Remove the parking pedal pad from the parking brake pedal assembly.

# REASSEMBLY

1. INSTALL PARKING PEDAL PAD

(a) Install the parking pedal pad to the parking brake pedal assembly.

2. INSTALL PARKING BRAKE SWITCH ASSEMBLY INFO

3. INSTALL NO. 1 PARKING BRAKE CABLE ASSEMBLY INFO

# INSTALLATION

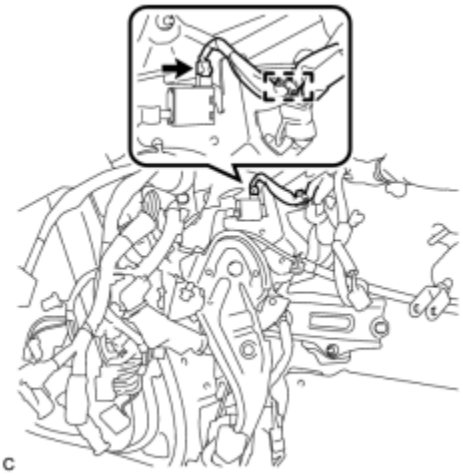
1. INSTALL PARKING BRAKE CONTROL PEDAL ASSEMBLY



C

(a) Install the parking brake control pedal assembly with the bolt and 2 nuts.

Torque: **15 N·m (148 kgf·cm, 11ft·lbf)**



C

(b) Connect the parking brake switch connector.

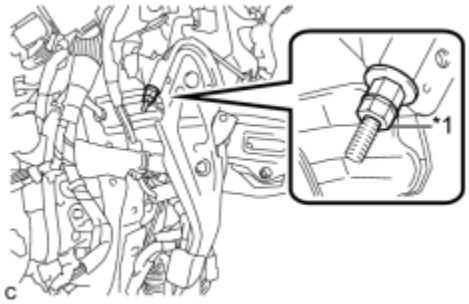
(c) Engage the wire harness clamp.

(d) Install the No. 1 parking brake cable assembly with the 5 bolts and nut.

Torque: **15 N·m (148 kgf·cm, 11ft·lbf)**



(e) Engage the clamp.




(f) Temporarily install the lock nut.

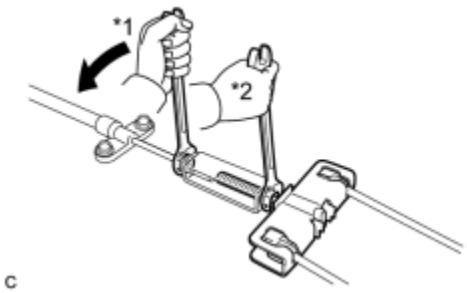
## Text in Illustration

| | |
|---|---|
| *1 | Lock Nut |

HINT:

After adjusting parking brake pedal travel, tighten the lock nut.

2. CONNECT NO. 1 PARKING BRAKE PULL ROD SUB-ASSEMBLY




(a) Connect the No. 1 parking brake pull rod sub-assembly to the parking brake control pedal assembly as shown in the illustration.

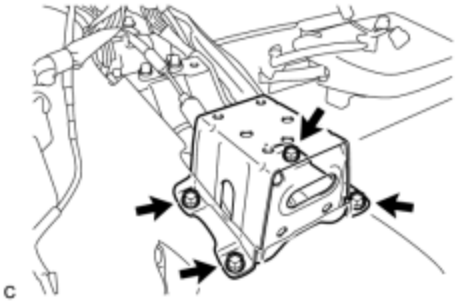
## Text in Illustration

| | |
|---|---|
| *1 | Turn |
| *2 | Hold |

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

3. INSTALL NO. 3 BELT ANCHOR REINFORCEMENT SUB-ASSEMBLY

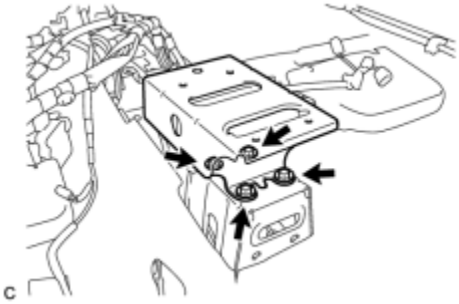
(a) Install the No. 3 belt anchor reinforcement sub-assembly with the 4



bolts.

Torque: **27 N·m (275 kgf·cm, 20ft·lbf)**

4. INSTALL NO. 2 BELT ANCHOR REINFORCEMENT SUB-ASSEMBLY



(a) Install the No. 2 belt anchor reinforcement sub-assembly with the 4 bolts.

Torque: **27 N·m (275 kgf·cm, 20ft·lbf)**

5. INSTALL FRONT SEAT ASSEMBLY LH

HINT:

Refer to the instructions for Installation of the front seat assembly INFO.

6. INSTALL FRONT SEAT ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

7. INSTALL AIR CONDITIONING UNIT

HINT:

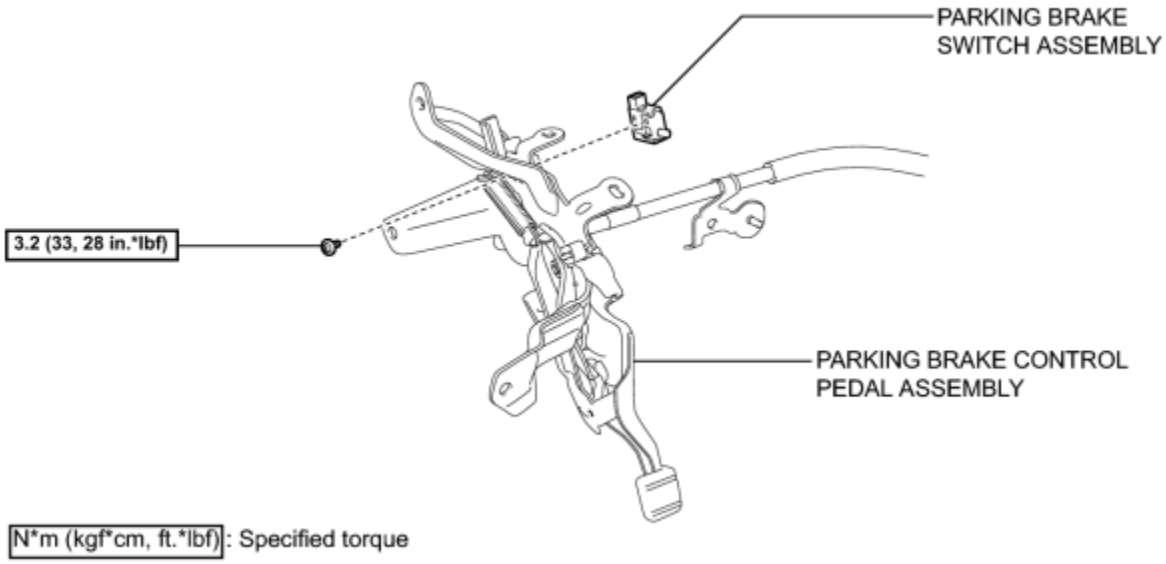
Refer to the instructions for Installation of the air conditioning unit INFO.

8. ADJUST PARKING BRAKE PEDAL TRAVEL INFO

9. INSPECT BRAKE WARNING LIGHT INFO

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

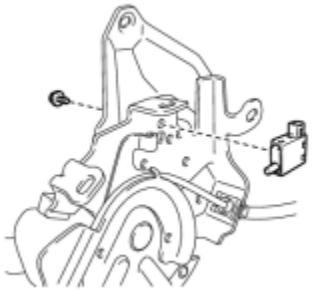
# REMOVAL

1. REMOVE PARKING BRAKE CONTROL PEDAL ASSEMBLY

HINT:

Refer to the procedures up to Remove Parking Brake Control Pedal Assembly INFO.

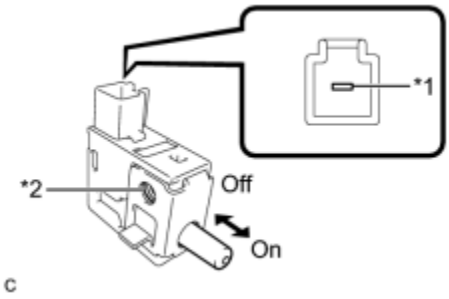
2. REMOVE PARKING BRAKE SWITCH ASSEMBLY




(a) Remove the screw and parking brake switch assembly from the parking brake control pedal assembly.

# INSPECTION

1. INSPECT PARKING BRAKE SWITCH ASSEMBLY




(a) Measure the resistance between the connector terminal and the nut inside the parking brake switch assembly.

## Standard Resistance

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| Terminal - Nut | on (When shaft is not pressed) | Below 1 Ω |
| Terminal - Nut | off (When shaft is pressed) | 10 kΩ or higher |

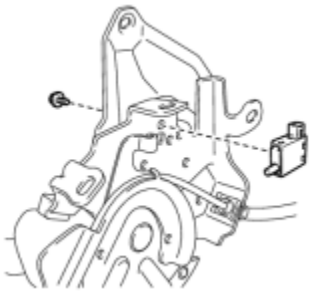
## Text in Illustration

| | |
|---|---|
| *1 | Terminal |
| *2 | Nut |

If the value is not as specified, replace the parking brake switch assembly.

# INSTALLATION

1. INSTALL PARKING BRAKE SWITCH ASSEMBLY




(a) Install the parking brake switch assembly to the parking brake control pedal assembly with the screw.

Torque: **3.2 N·m (33 kgf·cm, 28in·lbf)**

2. INSTALL PARKING BRAKE CONTROL PEDAL ASSEMBLY

HINT:

Refer to the procedures from Install Parking Brake Control Pedal Assembly INFO.

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTICE:

When disconnecting the battery negative (-) cable, initialize the following system after the cable is reconnected:

| System | See Procedure |
| --- | --- |
| Advanced Parking Guidance System | INFO |

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Parking Brake System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Brake drag | Parking brake pedal travel (Out of adjustment) | INFO |
| | Parking brake cable (Sticking) | INFO |
| | Rear disc brake piston (Stuck) | INFO |

# ADJUSTMENT

1. INSPECT PARKING BRAKE PEDAL TRAVEL

(a) Fully depress the parking brake pedal to engage the parking brake.

(b) Depress the pedal again to disengage the parking brake.



P

(c) Slowly depress the parking brake pedal using the specified force, and count the number of clicks.

Parking brake pedal travel:

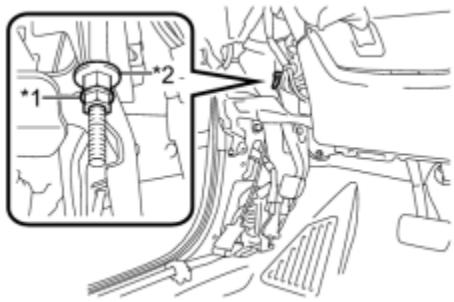
8 to 11 notches at 300 N (31 kgf, 67.5 lbf)

If the parking brake pedal travel is not as specified, adjust the parking brake pedal travel.

2. ADJUST PARKING BRAKE PEDAL TRAVEL

(a) Remove the lower instrument panel finish panel assembly INFO.

(b) Completely release the parking brake pedal.




C

(c) Loosen the lock nut and the adjusting nut to completely release the parking brake cable.

## Text in Illustration

| | |
|---|---|
| *1 | Lock Nut |
| *2 | Adjusting Nut |

(d) Turn the adjusting nut until the parking brake pedal travel is corrected to be within the specified range.

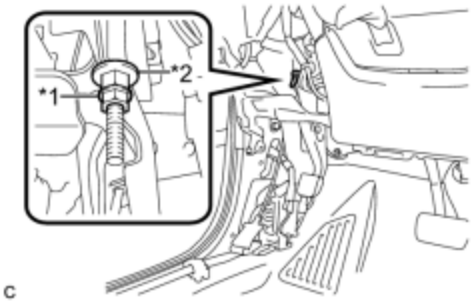
Parking brake pedal travel:

8 to 11 notches at 300 N (31 kgf, 67.5 lbf)

(e) Using a wrench or an equivalent tool, hold the adjusting nut and tighten the lock nut.

## Text in Illustration

| | |
|---|---|
| *1 | Lock Nut |




| | |
|---|---|
| *2 | Adjusting Nut |

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

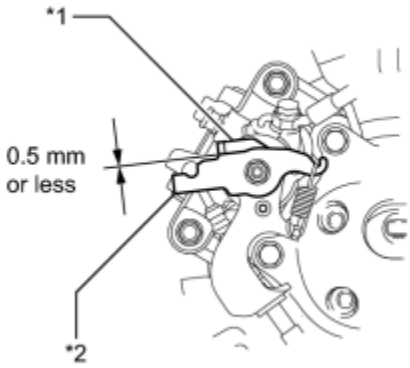
(f) Operate the parking brake pedal 3 to 4 times, and check the parking brake pedal travel.

(g) Check whether the parking brake drags or not.

(h) Install the lower instrument panel finish panel assembly INFO.

3. INSPECT REAR DISC BRAKE CYLINDER OPERATION LEVER AND STOPPER CLEARANCE

(a) Release the parking brake lever and check that the clearance measurement between the rear disc brake cylinder operation lever and the stopper is within the specified range.




## Text in Illustration

| | |
|---|---|
| *1 | Stopper |
| *2 | Operation Lever |

Clearance:

0.5 mm (0.0197 in.) or less

If the clearance is not within the specified range, replace the rear disc brake caliper assembly.

4. INSPECT BRAKE WARNING LIGHT

(a) When operating the parking brake pedal, check that the brake warning light illuminates.

Standard:

The brake warning light always illuminates at the first click.

# PROBLEM SYMPTOMS TABLE

HINT:

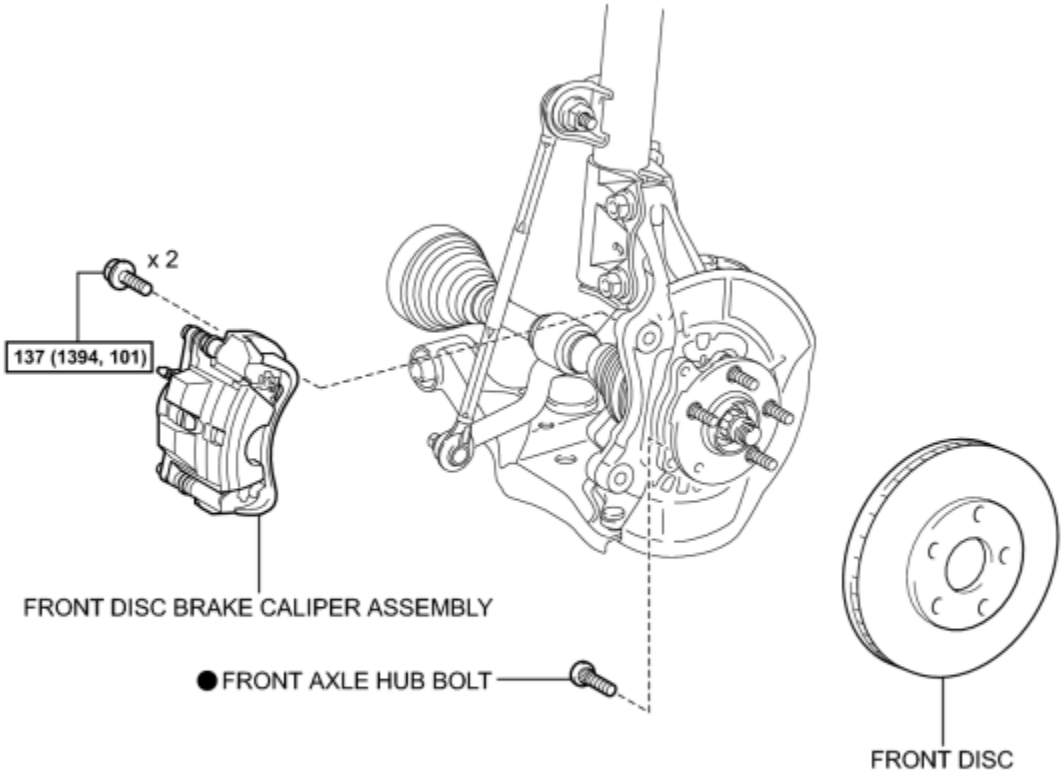
Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Axle System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Wander or pulls | Tire (worn or improperly inflated) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Rear wheel alignment (incorrect) | INFO |
| | Front axle hub bearing (loose or worn) | INFO |
| | Rear axle hub and bearing (loose or worn) | INFO |
| | Steering intermediate shaft (loose or worn) | INFO |
| | Steering gear (broken) | INFO |
| | Suspension parts (worn out) | - |
| Front wheel shimmy | Tire (worn or improperly inflated) | INFO |
| | Wheel (out of balance) | INFO |
| | Front shock absorber (worn out) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Front lower ball joint (worn) | INFO |
| | Front axle hub bearing (loose or worn) | INFO |
| | Steering intermediate shaft (loose or worn) | INFO |
| | Steering gear (broken) | INFO |
| Rear wheel shimmy | Tire (worn or improperly inflated) | INFO |
| | Wheel (out of balance) | INFO |
| | Rear shock absorber (worn out) | INFO |
| | Rear axle hub and bearing (loose or worn) | INFO |
| | Rear wheel alignment (incorrect) | INFO |

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

c

# REPLACEMENT

NOTICE:

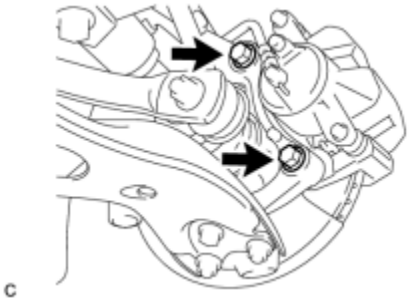
When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, clear the DTC.

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT WHEEL

2. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY



(a) Remove the 2 bolts and separate the front disc brake caliper assembly.

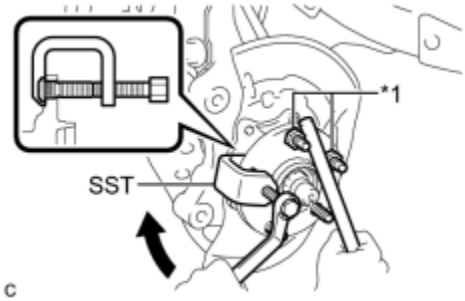
NOTICE:

Use wire or an equivalent tool to keep the front disc brake caliper assembly from hanging down by the flexible hose.

3. REMOVE FRONT DISC INFO

4. REMOVE FRONT AXLE HUB BOLT

(a) Temporarily install 2 nuts to the front axle hub bolts as shown in the illustration.




## Text in Illustration

| | |
|---|---|
| *1 | Nut |

Recommended service nut:

Thread diameter: 12.0 mm (0.472 in.)

Thread pitch: 1.5 mm (0.0591 in.)

NOTICE:

Install the nuts to prevent damage to the hub bolts.

(b) Using SST and a brass bar or an equivalent tool to hold the front axle, remove the front axle hub bolt.

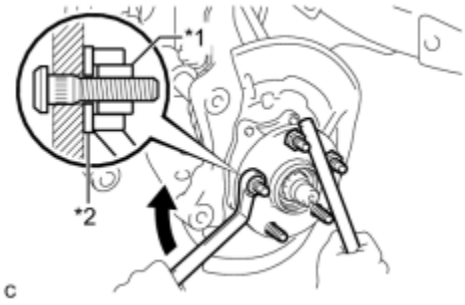
SST: 09611-12010

NOTICE:

Do not damage the threads of the front axle hub bolts.

5. INSTALL FRONT AXLE HUB BOLT

(a) Install a washer and nut to a new front axle hub bolt as shown in the illustration.




## Text in Illustration

| | |
|---|---|
| *1 | Nut |
| *2 | Washer |

Recommended service nut:

Thread diameter: 12.0 mm (0.472 in.)

Thread pitch: 1.5 mm (0.0591 in.)

HINT:

Recommended thickness of the washer is 5 mm (0.197 in.) or more.

(b) Using a brass bar or an equivalent tool to hold the front axle, install the hub bolt by tightening the nut.

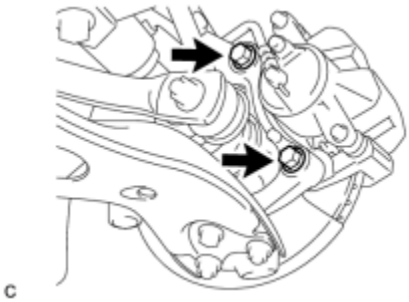
NOTICE:

- Install the nuts to prevent damage to the front axle hub bolts.
- Do not damage the threads of the front axle hub bolts.

(c) Remove the 3 nuts and washer from the 3 front axle hub bolts.

6. INSTALL FRONT DISC INFO

7. INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY



(a) Install the front disc brake caliper assembly to the steering knuckle with the 2 bolts.

Torque: **137 N·m (1394 kgf·cm, 101ft·lbf)**

NOTICE:

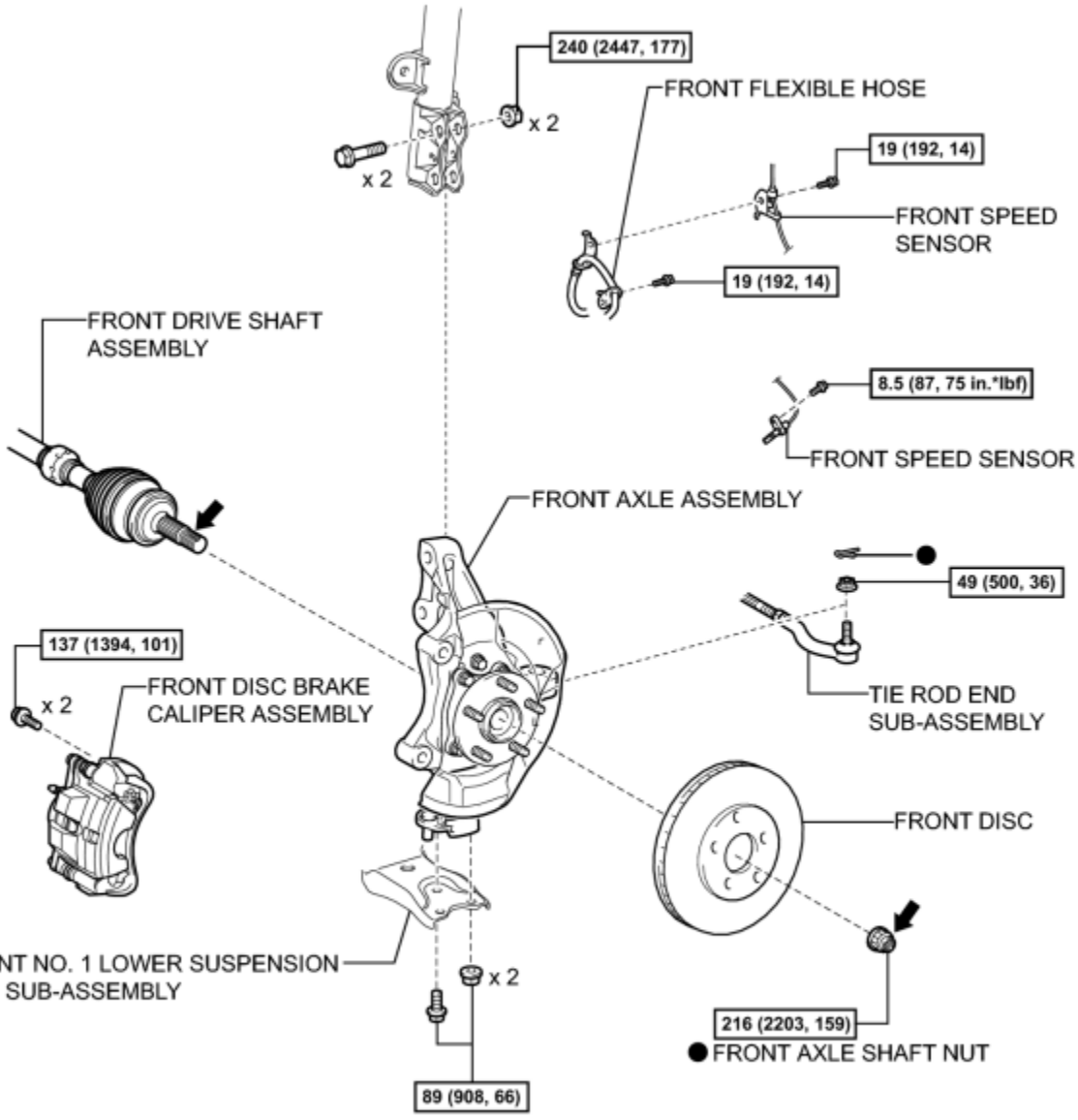
Do not twist the brake hose when installing the front disc brake caliper assembly.

8. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# COMPONENTS

# ILLUSTRATION



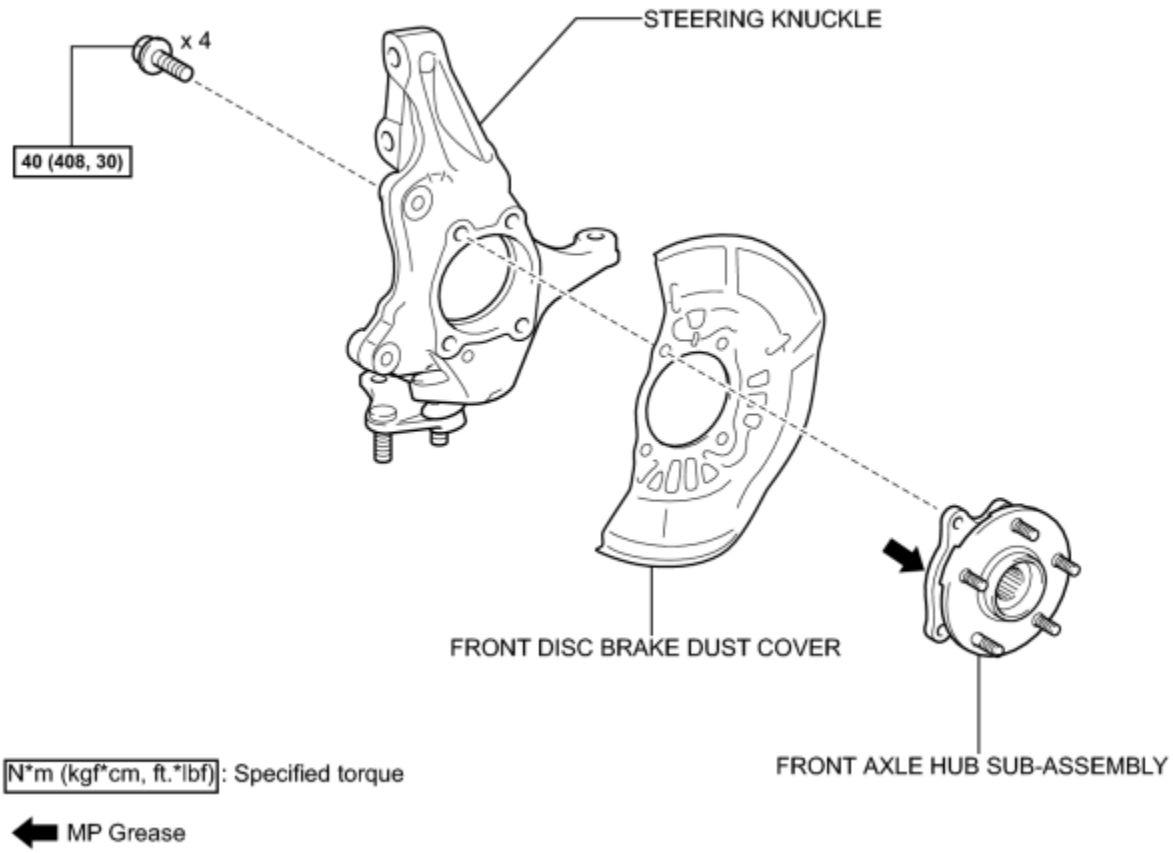

N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

⬅ Do not apply lubricants to the threaded parts

c

# ILLUSTRATION


x 4
40 (408, 30)
STEERING KNUCKLE
FRONT DISC BRAKE DUST COVER
FRONT AXLE HUB SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
MP Grease

c 0

# ON-VEHICLE INSPECTION

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, clear the DTC.

HINT:

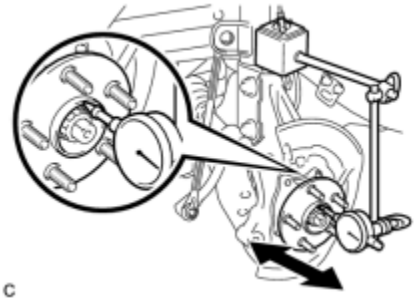
- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT WHEEL

2. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY INFO

3. REMOVE FRONT DISC INFO

4. INSPECT FRONT AXLE HUB BEARING LOOSENESS




(a) Using a dial indicator, check for looseness near the center of the axle hub.

Maximum looseness:

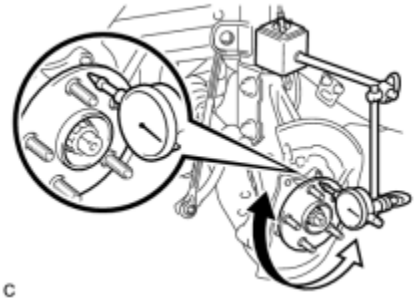
0.05 mm (0.00196 in.)

- Ensure that the dial indicator is set perpendicular to the measurement surface.
- Keep the magnet of the dial indicator away from the front speed sensor.

HINT:

If the looseness exceeds the maximum, replace the front axle hub bearing.

5. INSPECT FRONT AXLE HUB RUNOUT




(a) Using a dial indicator, check for runout on the surface of the axle hub outside the hub bolt.

Maximum runout:

0.05 mm (0.00196 in.)

- Ensure that the dial indicator is set perpendicular to the measurement surface.
- Keep the magnet of the dial indicator away from the front speed

sensor.

HINT:

If the runout exceeds the maximum, replace the front axle hub.

6. INSTALL FRONT DISC INFO

7. INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY INFO

8. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# REMOVAL

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, clear the DTC.

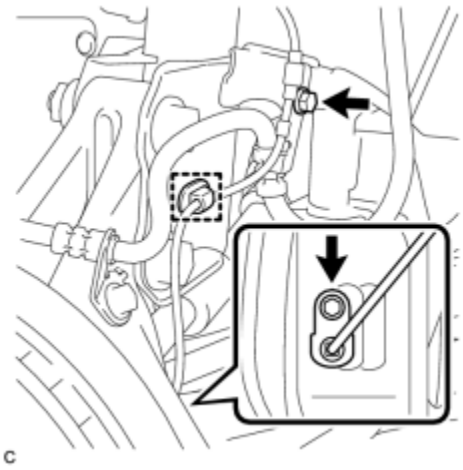
HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT WHEEL

2. REMOVE FRONT AXLE SHAFT NUT INFO

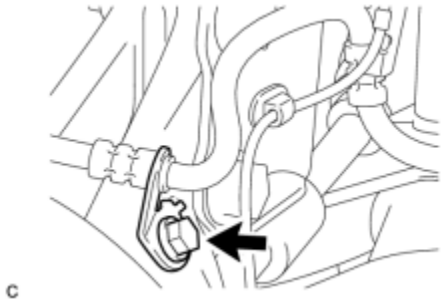
3. SEPARATE FRONT SPEED SENSOR




(a) Remove the 2 bolts and clamp, and separate the front speed sensor.

- Be sure to separate the front speed sensor from the front shock absorber with coil spring completely.
- Prevent foreign matter from attaching to the sensor tip.
- Be careful not to damage the front speed sensor.
- Clean the speed sensor installation hole and the contact surfaces every time the speed sensor is removed.

4. SEPARATE FRONT FLEXIBLE HOSE



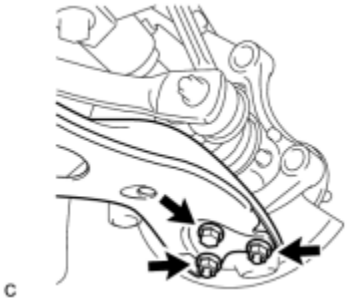

(a) Remove the bolt and separate the front flexible hose from the steering knuckle.

5. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY INFO

6. REMOVE FRONT DISC INFO

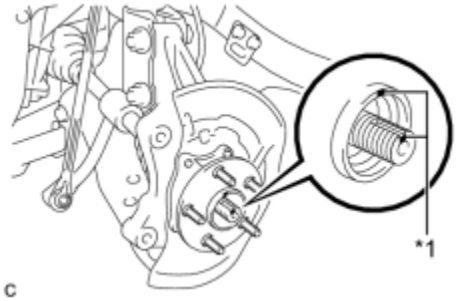
7. SEPARATE TIE ROD END SUB-ASSEMBLY INFO

8. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY



(a) Remove the bolt and 2 nuts, and separate the front No. 1 lower suspension arm sub-assembly from the front lower ball joint.

9. SEPARATE FRONT DRIVE SHAFT ASSEMBLY




(a) Put matchmarks on the front drive shaft assembly and front axle hub sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

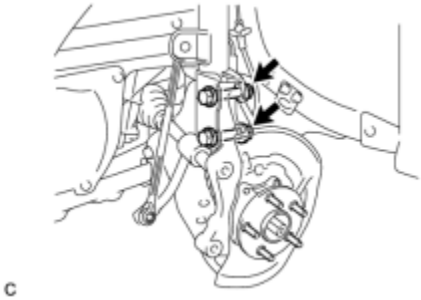


(b) Using a plastic hammer, separate the front drive shaft assembly from the front axle assembly. If it is difficult to separate, tap the end of the front drive shaft assembly using a brass bar and a hammer.

NOTICE:

Be careful not to damage the drive shaft boot and speed sensor rotor.

10. REMOVE FRONT AXLE ASSEMBLY



(a) Remove the 2 bolts, 2 nuts and front axle assembly.

- When removing the nuts, keep the bolts from rotating.
- Be careful not to damage the drive shaft boot and speed sensor rotor.

11. REMOVE FRONT AXLE HUB SUB-ASSEMBLY

(a) Secure the front axle assembly between aluminium plates in a vise.

NOTICE:

Do not overtighten the vise.



C

(b) Remove the 4 bolts, front axle hub sub-assembly and front disc brake dust cover.

NOTICE:

Do not drop the front axle hub sub-assembly.

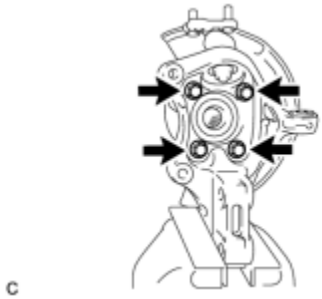
# INSTALLATION

1. INSTALL FRONT AXLE HUB SUB-ASSEMBLY

(a) Secure the steering knuckle between aluminium plates in a vise.

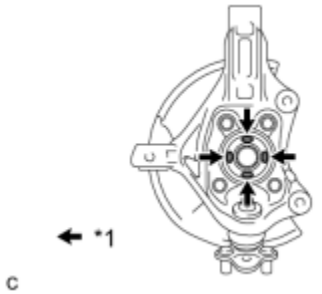
NOTICE:

Do not overtighten the vise.



(b) Install the front axle hub sub-assembly and front disc brake dust cover with the 4 bolts.

Torque: **40 N·m (408 kgf·cm, 30ft·lbf)**




(c) Apply MP grease to the areas indicated by the arrows in the illustration on the front drive shaft assembly contact surface of the front axle hub sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | MP grease |

HINT:

Apply 0.1 to 0.3 g (0.00353 to 0.0106 oz.) of MP grease to each area.

2. INSTALL FRONT AXLE ASSEMBLY



(a) Install the front axle assembly to the front shock absorber with the 2 bolts and 2 nuts.

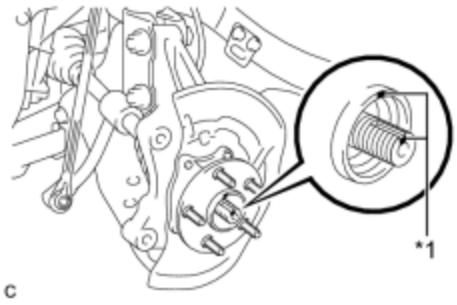
Torque: **240 N·m (2447 kgf·cm, 177ft·lbf)**

NOTICE:

When installing the nuts, keep the bolts from rotating.

3. INSTALL FRONT DRIVE SHAFT ASSEMBLY

(a) Align the matchmarks and install the front drive shaft assembly to the

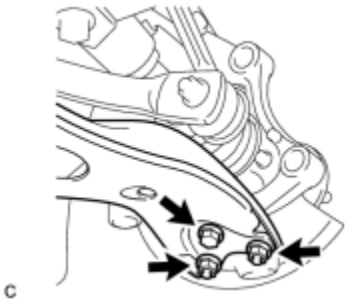



front axle hub sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

4. INSTALL FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY




(a) Install the front No. 1 lower suspension arm sub-assembly to the front lower ball joint with the bolt and 2 nuts.

Torque: **89 N·m (908 kgf·cm, 66ft·lbf)**

5. CONNECT TIE ROD END SUB-ASSEMBLY INFO

6. INSTALL FRONT DISC INFO

7. INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY INFO

8. TEMPORARILY INSTALL FRONT AXLE SHAFT NUT

(a) Clean the threaded parts on the front drive shaft assembly and a new front axle shaft nut using a non-residue solvent.

NOTICE:

- Be sure to perform this work even when using a new drive shaft.
- Keep the threaded parts free of oil and foreign matter.

(b) Using a socket wrench (30 mm), while applying the brakes, temporarily install the front axle shaft nut.

Torque: **216 N·m (2203 kgf·cm, 159ft·lbf)**

NOTICE:

Stake the front axle shaft nut after inspecting for looseness and runout in the following steps.

HINT:

Keep depressing the brake pedal to prevent the drive shaft from rotating.

9. SEPARATE FRONT DISC BRAKE CALIPER ASSEMBLY INFO

10. REMOVE FRONT DISC INFO

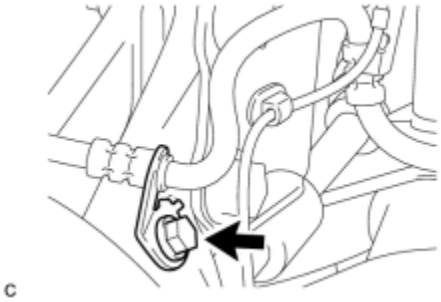
11. INSPECT FRONT AXLE HUB BEARING LOOSENESS INFO

12. INSPECT FRONT AXLE HUB RUNOUT INFO

13. INSTALL FRONT DISC INFO

14. INSTALL FRONT DISC BRAKE CALIPER ASSEMBLY INFO

15. INSTALL FRONT FLEXIBLE HOSE

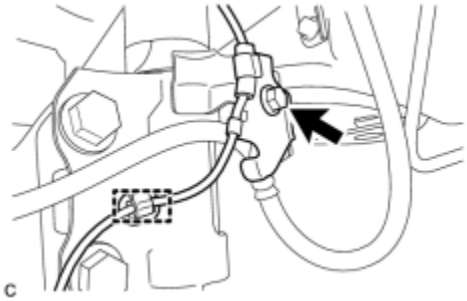



(a) Install the front flexible hose to the steering knuckle with the bolt.

Torque: **19 N·m (192 kgf·cm, 14ft·lbf)**

16. INSTALL FRONT SPEED SENSOR

(a) Install the front speed sensor and front flexible hose to the front shock absorber with the bolt and clamp.



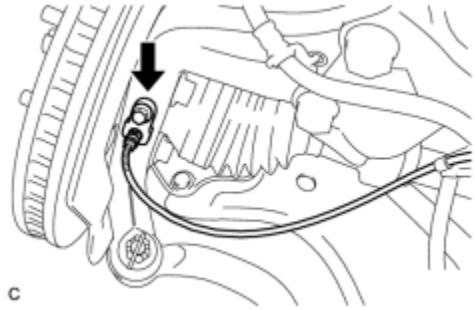

Torque: **19 N·m (192 kgf·cm, 14ft·lbf)**

NOTICE:

Do not twist the front speed sensor when installing it.

HINT:

Install the font flexible hose first and then the speed sensor harness bracket.



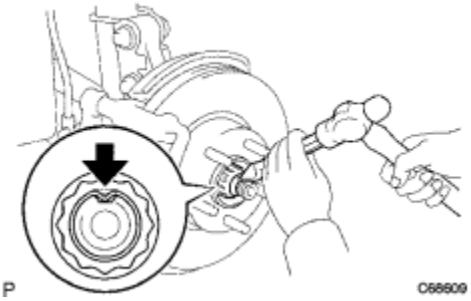

(b) Install the front speed sensor to the steering knuckle with the bolt.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

NOTICE:

Do not twist the front speed sensor when installing it.

17. INSTALL FRONT AXLE SHAFT NUT




(a) Using a chisel and hammer, stake the front axle shaft nut.

18. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

19. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

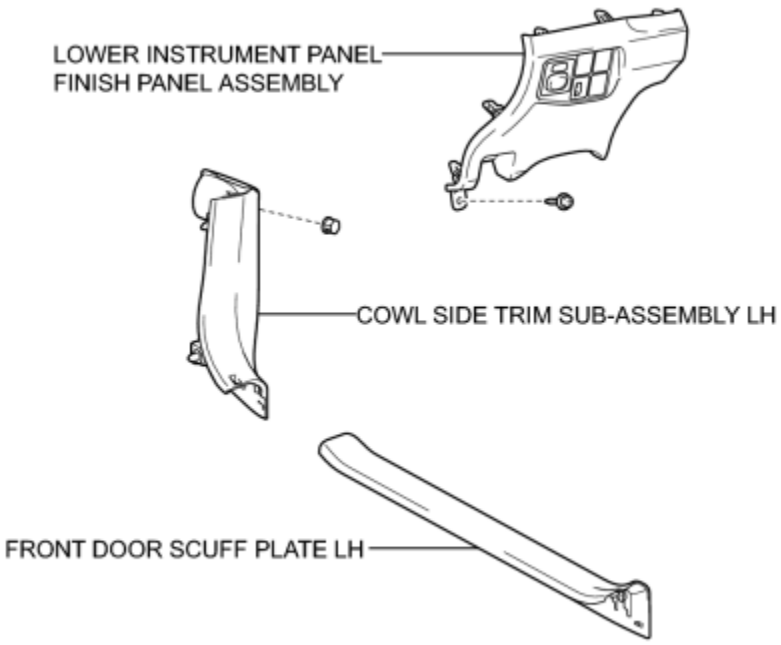
HINT: INFO

20. CHECK FOR SPEED SENSOR SIGNAL

HINT: INFO

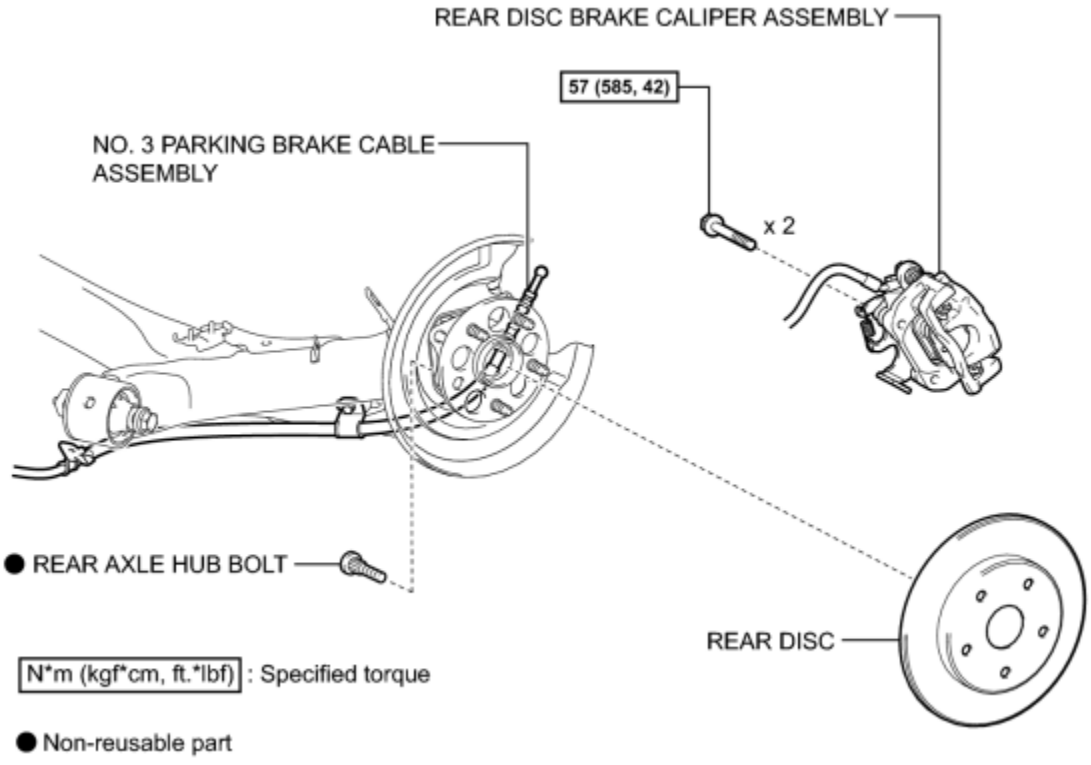
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION


REAR DISC BRAKE CALIPER ASSEMBLY
57 (585, 42)
NO. 3 PARKING BRAKE CABLE ASSEMBLY
x 2
● REAR AXLE HUB BOLT
REAR DISC
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part

c

# REPLACEMENT

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, delete the DTC.

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE REAR WHEEL

2. REMOVE FRONT DOOR SCUFF PLATE LH INFO

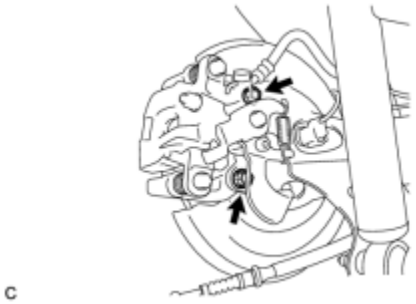
3. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

5. LOOSEN PARKING BRAKE CABLE INFO

6. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

7. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY




(a) Remove the 2 bolts, and separate the rear disc brake caliper assembly.

NOTICE:

Use wire or an equivalent tool to keep the brake caliper from hanging down by the flexible hose.

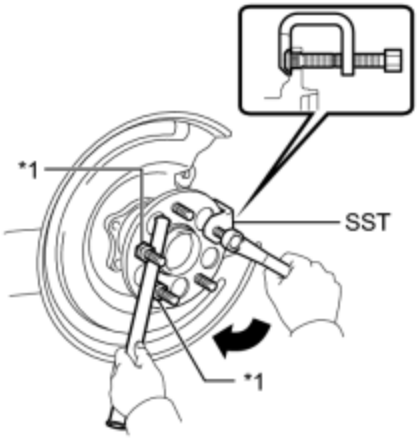
8. REMOVE REAR DISC INFO

9. REMOVE REAR AXLE HUB BOLT

(a) Temporarily install 2 nuts to the rear axle hub bolt as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Nut |




c

Recommended service nut:

Thread diameter: 12.0 mm (0.472 in.)

Thread pitch: 1.5 mm (0.0591 in.)

NOTICE:

Install the nuts to prevent damage to the hub bolts.

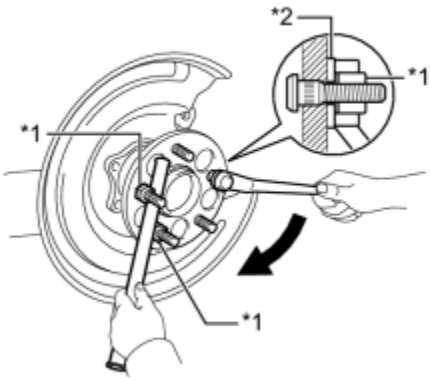
(b) Using SST and a brass bar or an equivalent tool to hold the rear axle hub and bearing assembly, remove the rear axle hub bolt.

SST: 09611-12010

NOTICE:

Do not damage the threads of the rear axle hub bolts.

10. INSTALL REAR AXLE HUB BOLT




c

(a) Temporarily install a new rear axle hub bolt to the rear axle hub and bearing assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Nut |
| *2 | Washer |

(b) Install a washer and nut to the new rear axle hub bolt as shown in the illustration.

Recommended service nut:

Thread diameter: 12.0 mm (0.472 in.)

Thread pitch: 1.5 mm (0.0591 in.)

HINT:

The thickness of the washer is preferably 5 mm (0.197 in.) or more.

(c) Using a brass bar or an equivalent tool to hold the rear axle hub and bearing assembly, install the rear axle hub bolt by tightening the nut.

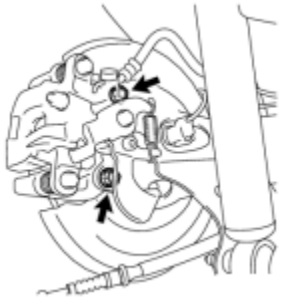
NOTICE:

- Install the nuts to prevent damage to the hub bolts.
- Do not damage the threads of the rear axle hub bolts.

(d) Remove the 3 nuts and washer from the 3 rear axle hub bolts.

11. INSTALL REAR DISC INFO

12. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY




(a) Install the rear disc brake caliper assembly with the 2 bolts.

Torque: **57 N·m (585 kgf·cm, 42ft·lbf)**

13. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

14. ADJUST PARKING BRAKE

HINT: INFO

15. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

16. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

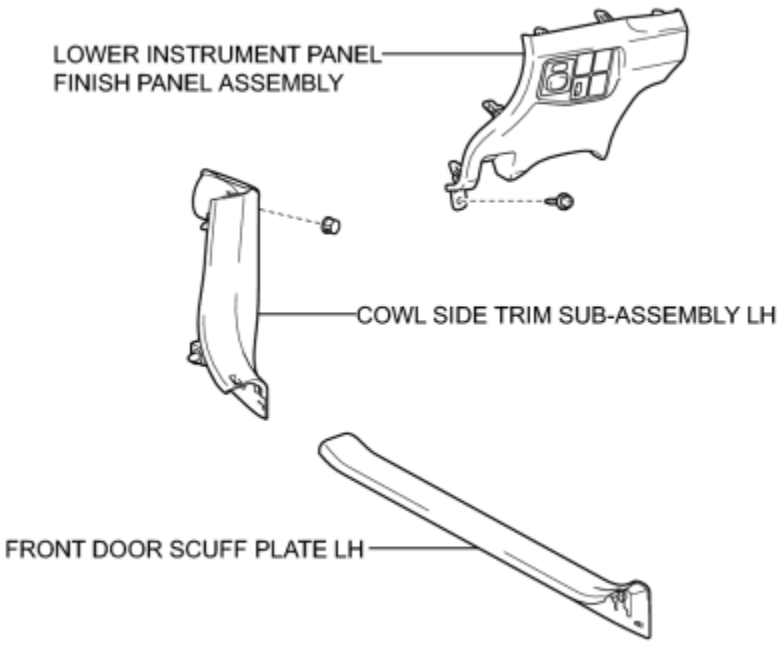
17. INSTALL FRONT DOOR SCUFF PLATE LH INFO

18. INSTALL REAR WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

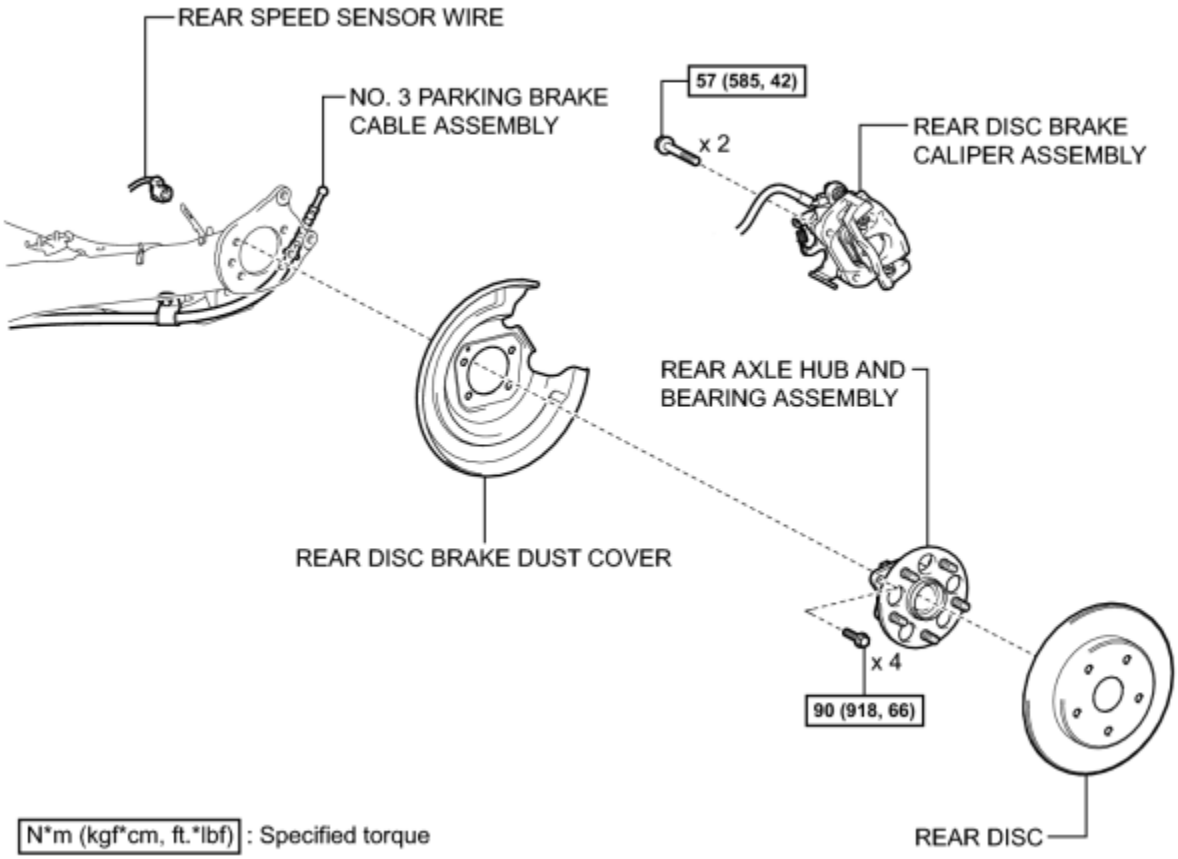
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION


REAR SPEED SENSOR WIRE
NO. 3 PARKING BRAKE CABLE ASSEMBLY
57 (585, 42)
x 2
REAR DISC BRAKE CALIPER ASSEMBLY
REAR AXLE HUB AND BEARING ASSEMBLY
REAR DISC BRAKE DUST COVER
x 4
90 (918, 66)
REAR DISC
N*m (kgf*cm, ft.*lbf) : Specified torque

c

# ON-VEHICLE INSPECTION

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, delete the DTC.

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE REAR WHEEL

2. REMOVE FRONT DOOR SCUFF PLATE LH INFO

3. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

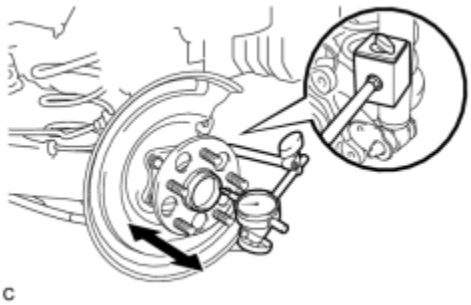
5. LOOSEN PARKING BRAKE CABLE INFO

6. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

7. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY INFO

8. REMOVE REAR DISC INFO

9. INSPECT REAR AXLE HUB BEARING LOOSENESS




(a) Using a dial indicator, check for looseness near the center of the axle hub.

Maximum looseness:

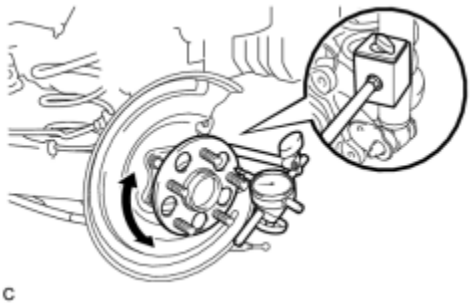
0.05 mm (0.00196 in.)

- Ensure that the dial indicator is set perpendicular to the measurement surface.
- Keep the magnet of the dial indicator away from the rear axle hub and bearing (rear speed sensor).

HINT:

If the looseness exceeds the maximum, replace the rear axle hub and bearing assembly.

10. INSPECT REAR AXLE HUB RUNOUT




(a) Using a dial indicator, check for runout on the surface of the axle hub outside the rear axle hub bolt.

Maximum runout:

0.05 mm (0.00196 in.)

- Ensure that the dial indicator is set perpendicular to the measurement surface.
- Make sure to install the tip of the dial indicator towards the outside of the rear axle hub bolt.
- Keep the magnet of the dial indicator away from the rear axle hub and bearing (rear speed sensor).

HINT:

If the runout exceeds the maximum, replace the rear axle hub and bearing assembly.

11. INSTALL REAR DISC INFO

12. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY INFO

13. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

14. ADJUST PARKING BRAKE

HINT: INFO

15. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

16. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

17. INSTALL FRONT DOOR SCUFF PLATE LH INFO

18. INSTALL REAR WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# REMOVAL

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, delete the DTC.

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE REAR WHEEL

2. REMOVE FRONT DOOR SCUFF PLATE LH INFO

3. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

5. LOOSEN PARKING BRAKE CABLE INFO

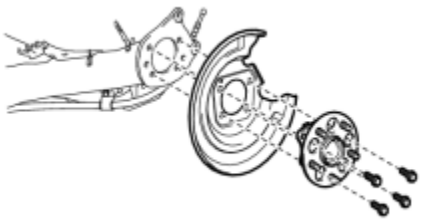
6. DISCONNECT REAR SPEED SENSOR WIRE INFO

7. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

8. SEPARATE REAR DISC BRAKE CALIPER ASSEMBLY INFO

9. REMOVE REAR DISC INFO

10. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY



C

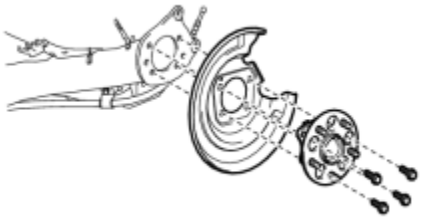
(a) Remove the 4 bolts, rear axle hub and bearing assembly and rear disc brake dust cover from the rear axle beam assembly.

# INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY



(a) Install the rear axle hub and bearing assembly and rear disc brake dust cover to the rear axle beam assembly with the 4 bolts.

Torque: **90 N·m (918 kgf·cm, 66ft·lbf)**

c

2. INSPECT REAR AXLE HUB BEARING LOOSENESS INFO

3. INSPECT REAR AXLE HUB RUNOUT INFO

4. INSTALL REAR DISC INFO

5. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY INFO

6. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

7. CONNECT REAR SPEED SENSOR WIRE INFO

8. ADJUST PARKING BRAKE

HINT: INFO

9. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

10. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

11. INSTALL FRONT DOOR SCUFF PLATE LH INFO

12. INSTALL REAR WHEEL

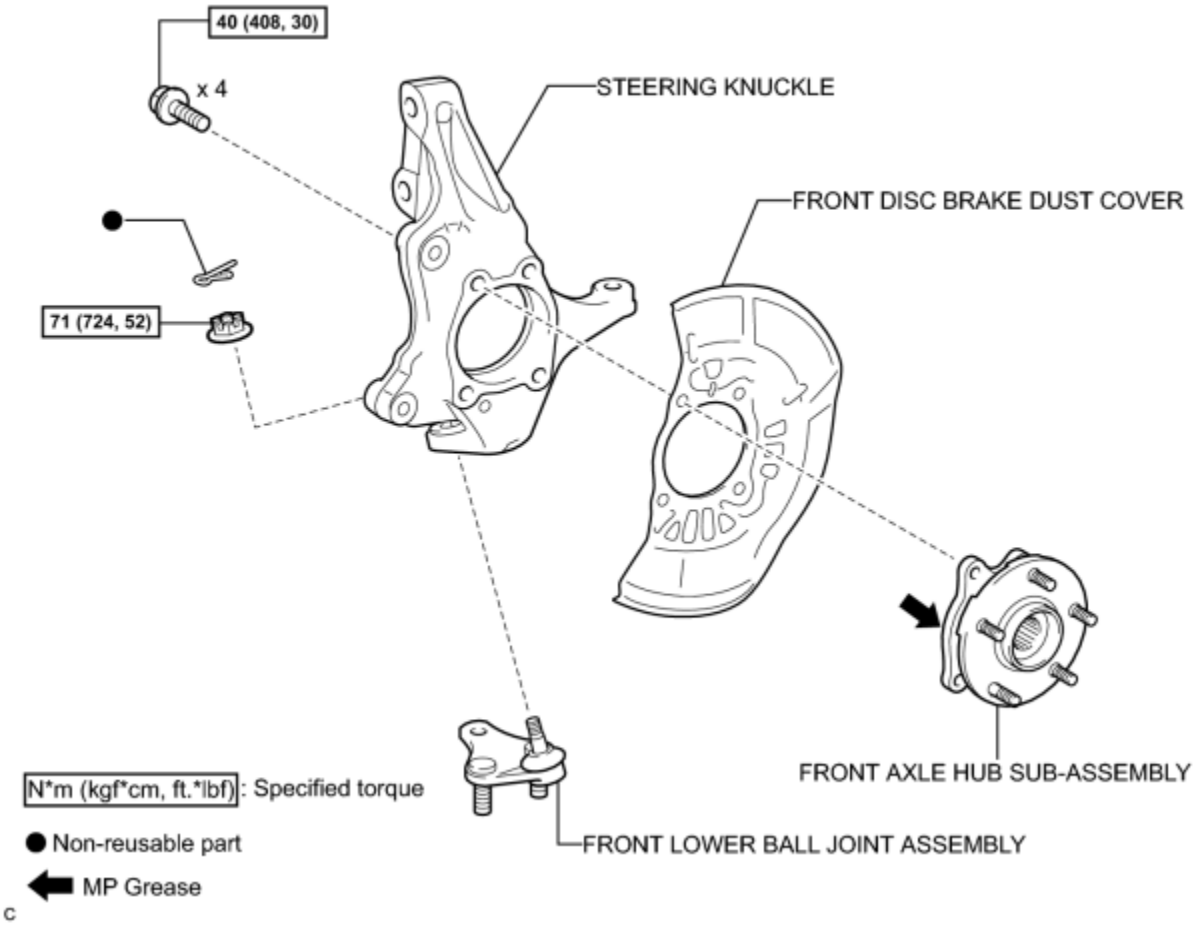
Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

13. CHECK FOR SPEED SENSOR SIGNAL

HINT: INFO

# COMPONENTS

# ILLUSTRATION



# REMOVAL

NOTICE:

When the brake pedal is first depressed after replacing the brake pads or pushing back the disc brake piston, DTC C1214 may be output. As there is no malfunction, clear the DTC.

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT AXLE ASSEMBLY

HINT:

Refer to the procedures up to Remove Front Axle Assembly INFO.

2. REMOVE FRONT LOWER BALL JOINT ASSEMBLY INFO

3. REMOVE STEERING KNUCKLE

(a) Secure the front axle assembly between aluminium plates in a vise.

NOTICE:

Do not overtighten the vise.



C

(b) Remove the 4 bolts, front axle hub sub-assembly and front disc brake dust cover.

NOTICE:

Do not drop the front axle hub sub-assembly.

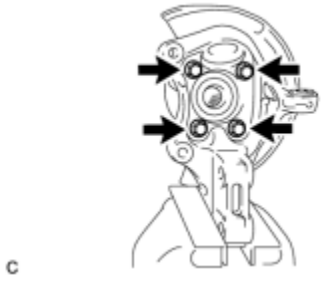
# INSTALLATION

1. INSTALL STEERING KNUCKLE

(a) Secure the steering knuckle between aluminium plates in a vise.

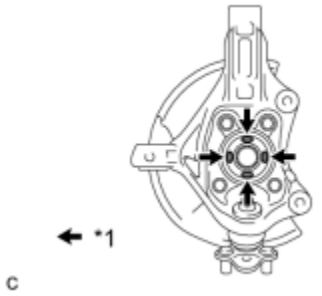
NOTICE:

Do not overtighten the vise.



(b) Install the front axle hub sub-assembly and front disc brake dust cover with the 4 bolts.

Torque: **40 N·m (408 kgf·cm, 30ft·lbf)**




(c) Apply MP grease to the areas indicated by the arrows in the illustration on the front drive shaft assembly contact surface of the front axle hub sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | MP grease |

HINT:

Apply 0.1 to 0.3 g (0.00353 to 0.0106 oz.) of MP grease to each area.

2. INSTALL FRONT LOWER BALL JOINT ASSEMBLY INFO

3. INSTALL FRONT AXLE ASSEMBLY

HINT:

Refer to the procedures from Install Front Axle Assembly INFO.

# PROBLEM SYMPTOMS TABLE

HINT:

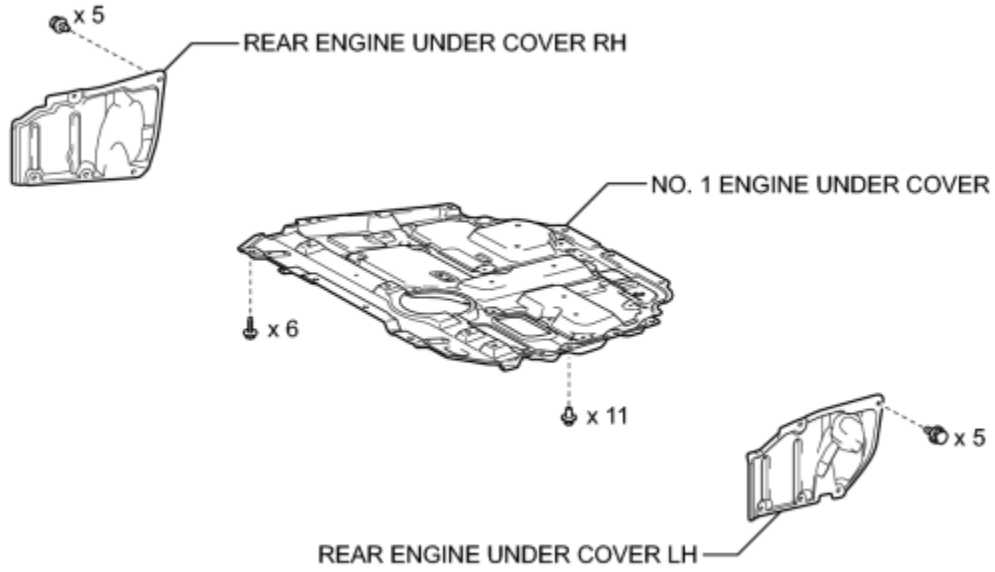
Use the table below to help determine the cause of the problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Front Drive Shaft*

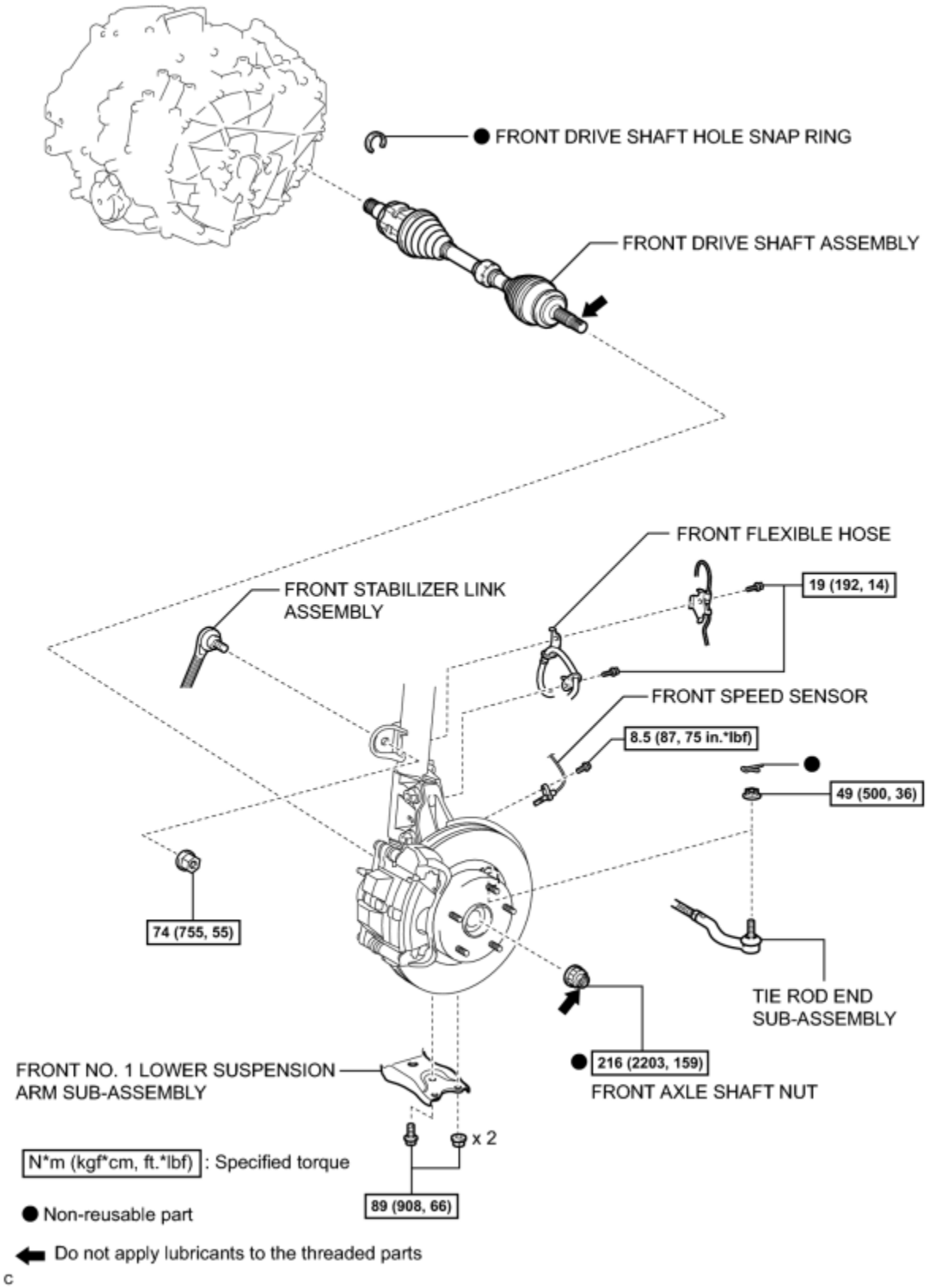
| Symptom | Suspected Area | See page |
|---|---|---|
| Front wheel shimmy | Front drive shaft (worn) | INFO |

# COMPONENTS

# ILLUSTRATION

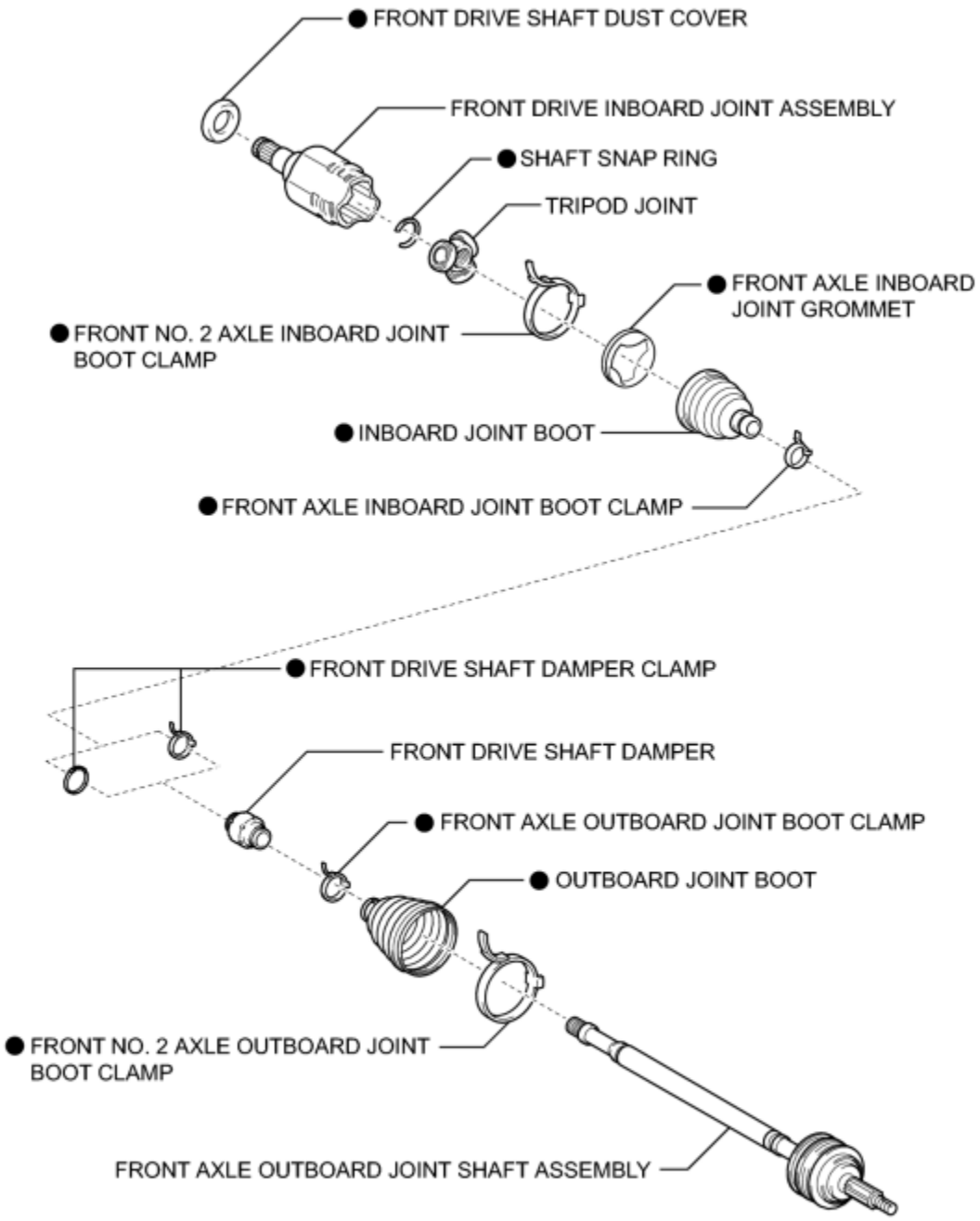



# ILLUSTRATION




# ILLUSTRATION

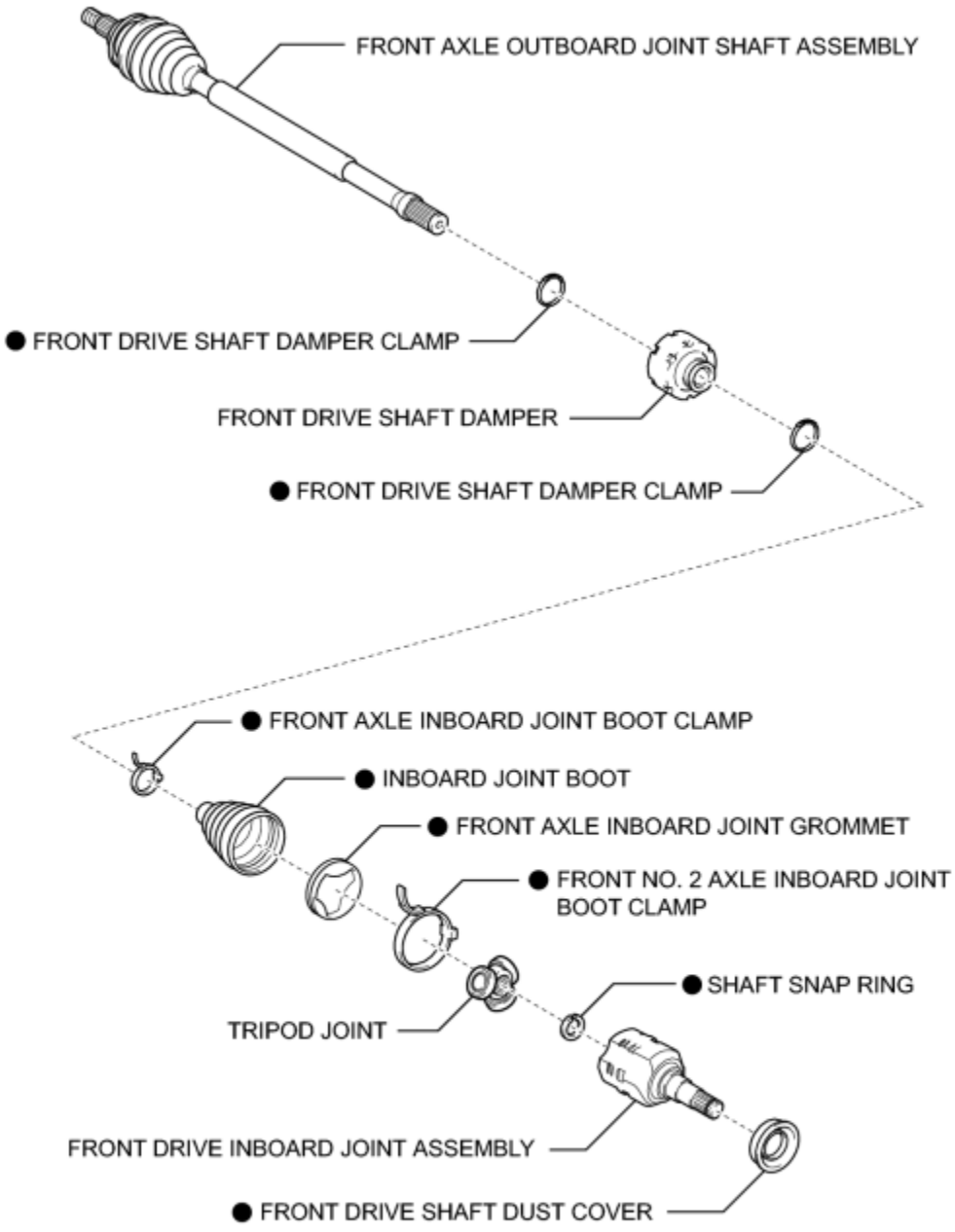
for LH Side:




● Non-reusable part

# ILLUSTRATION

for RH Side:




● Non-reusable part

c

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT WHEELS

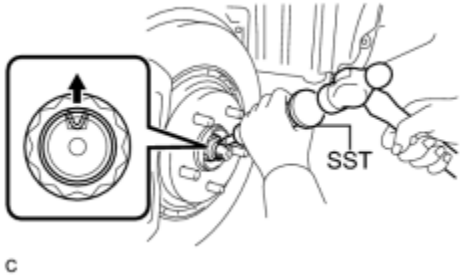
2. REMOVE NO. 1 ENGINE UNDER COVER

3. REMOVE REAR ENGINE UNDER COVER LH

4. REMOVE REAR ENGINE UNDER COVER RH

5. DRAIN HYBRID TRANSAXLE FLUID INFO

6. REMOVE FRONT AXLE SHAFT NUT




(a) Using SST and a hammer, release the staked part of the front axle shaft nut.

SST: 09930-00010

NOTICE:

Loosen the staked part of the nut completely, otherwise the threads of the drive shaft may be damaged.

(b) While applying the brakes, remove the front axle shaft nut.

7. SEPARATE FRONT SPEED SENSOR INFO

8. SEPARATE FRONT FLEXIBLE HOSE INFO

9. SEPARATE TIE ROD END SUB-ASSEMBLY INFO

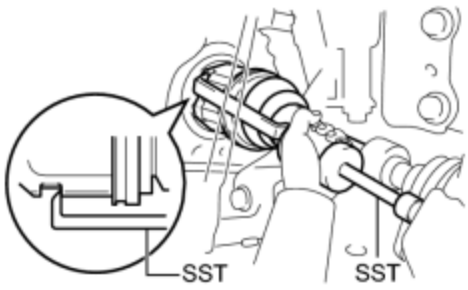
10. SEPARATE FRONT STABILIZER LINK ASSEMBLY INFO

11. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY INFO

12. SEPARATE FRONT DRIVE SHAFT ASSEMBLY INFO

13. REMOVE FRONT DRIVE SHAFT ASSEMBLY

(a) Using SST, remove the front drive shaft assembly.



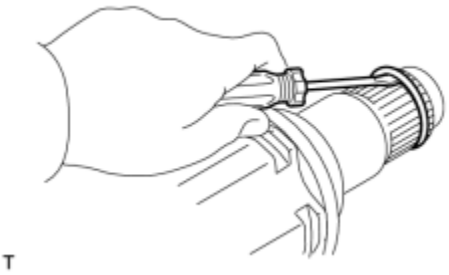

SST: 09520-00031

SST: 09520-01010

SST: 09521-00020

- Do not damage the transaxle case oil seal.
- Do not damage the inboard joint boot.
- Do not drop the front drive shaft assembly.

14. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING

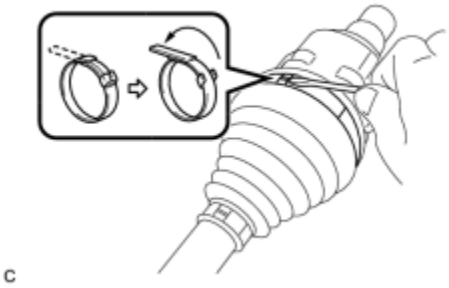


T

(a) Using a screwdriver, remove the front drive shaft hole snap ring.

# DISASSEMBLY

1. SEPARATE FRONT NO. 2 AXLE INBOARD JOINT BOOT CLAMP



C

(a) Using a screwdriver, release the staked part of the front No. 2 axle inboard joint boot clamp and separate the front No. 2 axle inboard joint boot clamp as shown in the illustration.

2. SEPARATE FRONT AXLE INBOARD JOINT BOOT CLAMP

HINT:

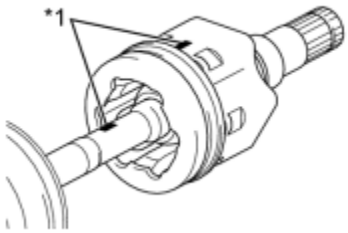
Perform the same procedure as for the front No. 2 axle inboard joint boot clamp.

3. SEPARATE INBOARD JOINT BOOT

(a) Separate the inboard joint boot from the front drive inboard joint assembly.

4. REMOVE FRONT DRIVE INBOARD JOINT ASSEMBLY

(a) Remove the old grease from the front drive inboard joint assembly.




P

(b) Put matchmarks on the front drive inboard joint assembly and front axle outboard joint shaft assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

NOTICE:

Do not punch the marks.

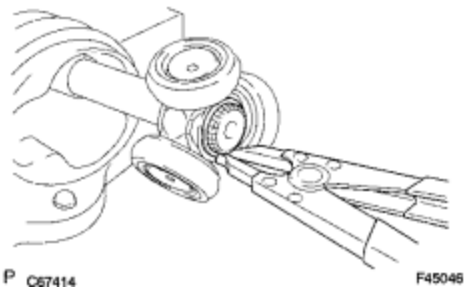
(c) Remove the front drive inboard joint assembly from the front axle outboard joint shaft assembly.

(d) Secure the front axle outboard joint shaft assembly in a vise using aluminum plates.

NOTICE:

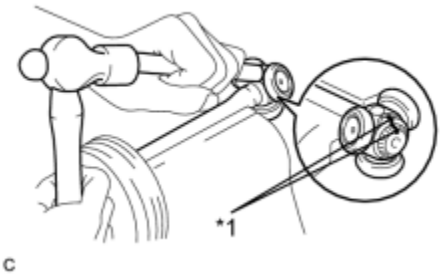
Do not overtighten the vise.

(e) Using a snap ring expander, remove the shaft snap ring from the front




axle outboard joint shaft assembly.

(f) Put matchmarks on the front axle outboard joint shaft assembly and tripod joint.




## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

NOTICE:

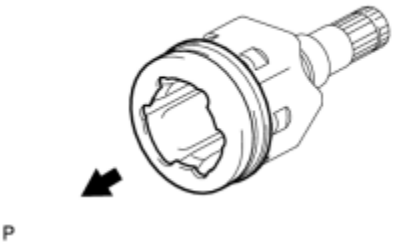
Do not punch the marks.

(g) Using a brass bar and a hammer, tap out the tripod joint from the front axle outboard joint shaft assembly.

NOTICE:

- Do not tap the rollers.
- Do not drop the tripod joint.

(h) Remove the front No. 2 axle inboard joint boot clamp, inboard joint boot and front axle inboard joint boot clamp.



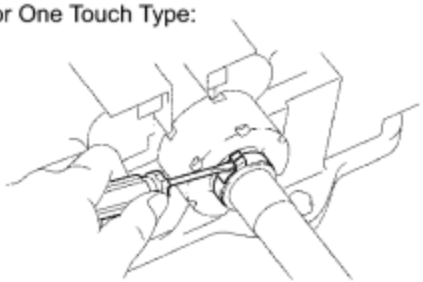

(i) Remove the font axle inboard joint grommet from the front drive inboard joint assembly.

5. SEPARATE FRONT DRIVE SHAFT DAMPER CLAMP (for LH Side)

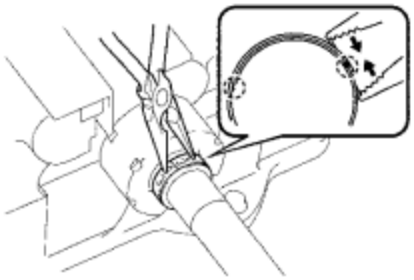
(a) for one touch type:

(1) Using a screwdriver, release the staked part of the front drive shaft damper clamp and separate the front drive shaft damper clamp as shown in the illustration.

for One Touch Type:



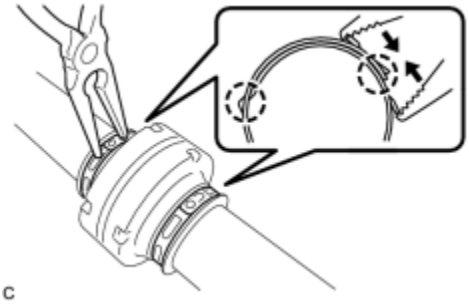
for Claw Engagement Type:



(b) for claw engagement type:

(1) Using needle-nose pliers, disengage the 2 claws and remove the front drive shaft damper clamp as shown in the illustration.

6. SEPARATE FRONT DRIVE SHAFT DAMPER CLAMP (for RH Side)



c

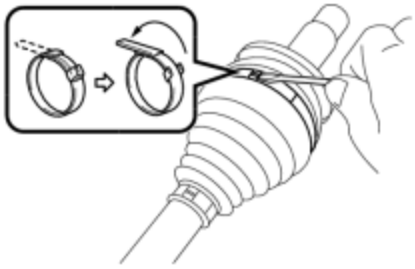
(a) Using needle-nose pliers, disengage the 2 claws on each front drive shaft damper clamp, and then remove each clamp as shown in the illustration.

7. REMOVE FRONT DRIVE SHAFT DAMPER

(a) Remove the front drive shaft damper from the front axle outboard joint shaft assembly.

8. SEPARATE FRONT NO. 2 AXLE OUTBOARD JOINT BOOT CLAMP (for LH Side)

(a) Using a screwdriver, release the staked part of the front No. 2 axle outboard joint boot clamp and separate the front No. 2 axle outboard joint boot clamp as shown in the illustration.



C

9. SEPARATE FRONT AXLE OUTBOARD JOINT BOOT CLAMP (for LH Side)

HINT:

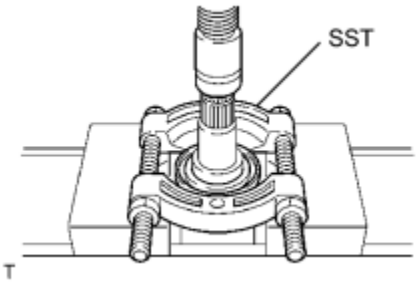
Perform the same procedure as for the front No. 2 axle outboard joint boot clamp.

10. REMOVE OUTBOARD JOINT BOOT (for LH Side)

(a) Remove the front axle outboard joint boot clamp, outboard joint boot and front No. 2 axle outboard joint boot clamp from the front axle outboard joint shaft assembly.

(b) Remove the old grease from the outboard joint.

11. REMOVE FRONT DRIVE SHAFT DUST COVER




T

(a) Using SST and a press, remove the front drive shaft dust cover from the front drive inboard joint assembly.

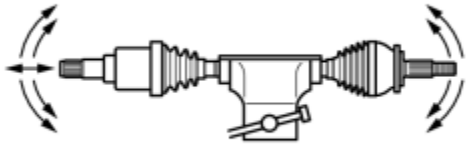
SST: 09950-00020

NOTICE:

Do not drop the front drive inboard joint assembly.

# INSPECTION

1. INSPECT FRONT DRIVE SHAFT ASSEMBLY



(a) Check that there is no excessive play in the outboard joint.

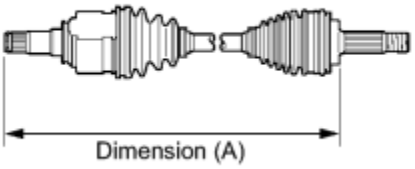
(b) Check that the inboard joint slides smoothly in the thrust direction.

(c) Check that there is no excessive play in the radial directions of the inboard joint.

(d) Check the boots for damage.

NOTICE:

Keep the drive shaft assembly level during inspection.




HINT:

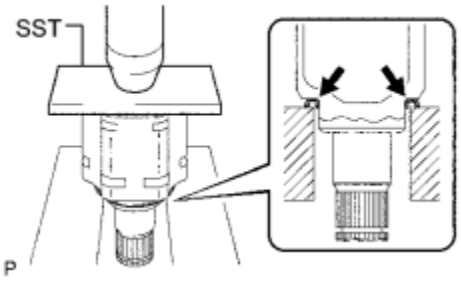
For dimensions (A), refer to the following values.

## Dimension (A)

| LH Side | RH Side |
|---|---|
| 556.2 mm (1.82 ft.) | 905.2 mm (2.96 ft.) |

# REASSEMBLY

1. INSTALL FRONT DRIVE SHAFT DUST COVER (for LH Side)

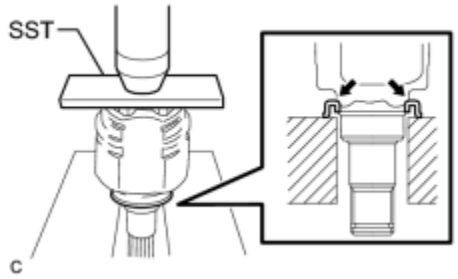



(a) Using SST and a press, install a new front drive shaft dust cover into the front drive inboard joint assembly until it is flush with the end.

SST: 09527-10011

- Install the front drive shaft dust cover in the correct direction.
- Do not deform the front drive shaft dust cover.

2. INSTALL FRONT DRIVE SHAFT DUST COVER (for RH Side)

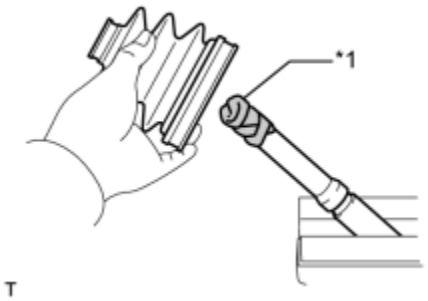



(a) Using SST and a press, install a new front drive shaft dust cover into the front drive inboard joint assembly until it is flush with the end.

SST: 09527-10011

- Install the front drive shaft dust cover in the correct direction.
- Do not deform the front drive shaft dust cover.

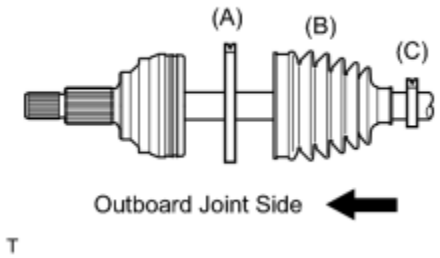
3. INSTALL OUTBOARD JOINT BOOT (for LH Side)




(a) Wrap the splines of the front axle outboard joint shaft assembly with protective tape to prevent the boot from being damaged.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |




(b) Install new parts onto the front axle outboard joint shaft assembly in the following order:

(1) Front No. 2 axle outboard joint boot clamp (A)

(2) Outboard joint boot (B)

(3) Front axle outboard joint boot clamp (C)

(c) Pack the joint portion of the front axle outboard joint shaft assembly and outboard joint boot with grease.

Standard grease capacity:

135 to 145 g (4.8 to 5.1 oz.)

(d) Install the outboard joint boot onto the front axle outboard joint shaft assembly groove.

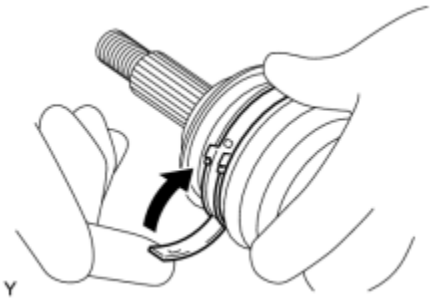
NOTICE:

- Do not allow grease to adhere to the boot clamp track of the outboard joint boot.
- Keep the inside of the outboard joint boot free of foreign matter.

4. INSTALL FRONT NO. 2 AXLE OUTBOARD JOINT BOOT CLAMP (for LH Side)

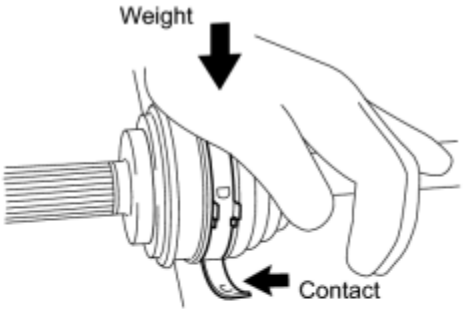
CAUTION:

Wear protective gloves. Sharp areas on the parts may injure your hands.



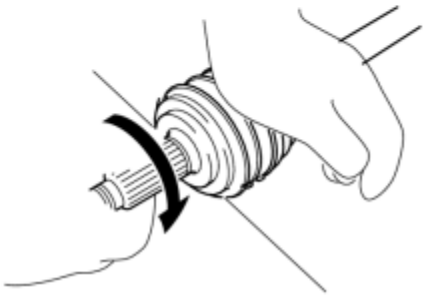
(a) Install the front No. 2 axle outboard joint boot clamp onto the outboard joint boot and temporarily fold back the lever.

- Set the lever into the guide groove correctly and install the clamp as far into the inside of the vehicle as possible.
- Check the band and the lever for any deformation before folding back the lever.

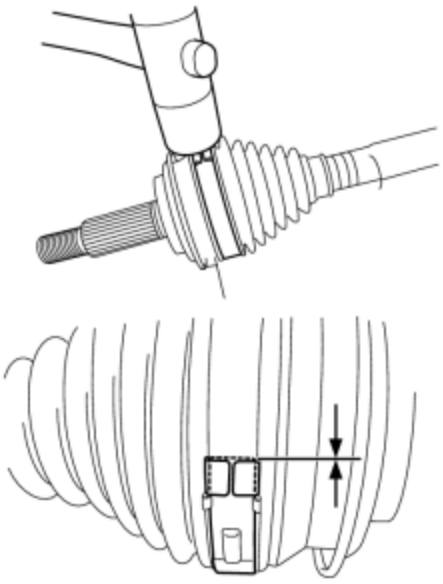



(b) Lean your weight on your hand and roll the outboard joint forward while pressing the outboard joint against the work plane. Roll the outboard joint and fold the lever until a click sound can be heard.

- Do not damage the deflector.
- Make sure that the outboard joint is in direct contact with the work plane.



(c) Using a plastic hammer, tap the buckle to secure it while adjusting the clearance between the lever and the groove to make the clearance between the buckle edge and the lever end even.



NOTICE:

Do not damage the outboard joint boot.

5. INSTALL FRONT AXLE OUTBOARD JOINT BOOT CLAMP (for LH Side)

CAUTION:

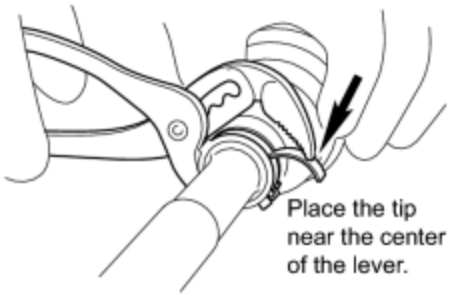
Wear protective gloves. Sharp areas on the parts may injure your hands.

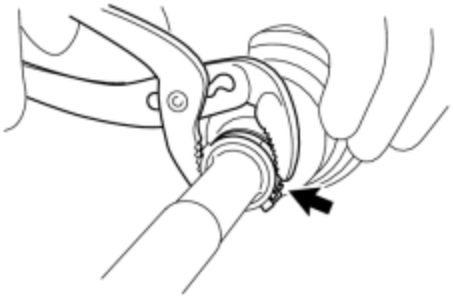


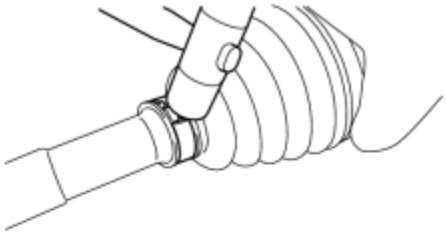
(a) Install the front axle outboard joint boot clamp onto the outboard joint boot and temporarily fold back the lever.

- Set the lever into the guide groove correctly.
- Check the band and the lever for any deformation before folding back the lever.

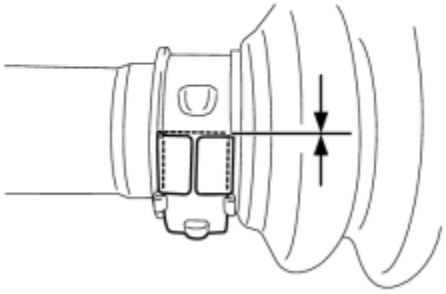
(b) Using water pump pliers, pinch the front axle outboard joint boot clamp to temporarily secure it.





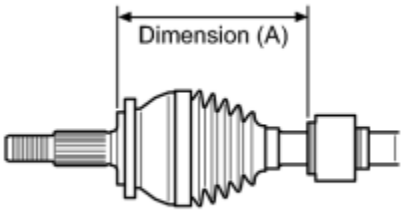
(c) Using a plastic hammer, tap the buckle to secure it while adjusting the clearance between the lever and the groove to make the clearance between the buckle edge and the lever end even.



NOTICE:

Do not damage the outboard joint boot.

6. INSTALL FRONT DRIVE SHAFT DAMPER (for LH Side)




(a) Install the front drive shaft damper onto the front axle outboard joint shaft assembly as shown in the illustration.

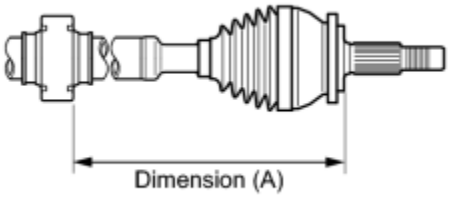
HINT:

Make sure that the front drive shaft damper is on the shaft groove.

Dimension (A):

163 to 165 mm (6.42 to 6.49 in.)

7. INSTALL FRONT DRIVE SHAFT DAMPER (for RH Side)




(a) Install the front drive shaft damper onto the front axle outboard joint shaft assembly as shown in the illustration.

HINT:

Make sure that the front drive shaft damper is on the shaft groove.

Dimension (A):

460 to 462 mm (1.50 to 1.51 ft.)

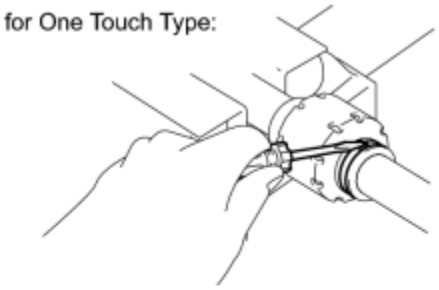
8. INSTALL FRONT DRIVE SHAFT DAMPER CLAMP (for LH Side)

(a) Secure the front axle outboard joint shaft assembly in a vise using aluminum plates.

NOTICE:

Do not overtighten the vise.

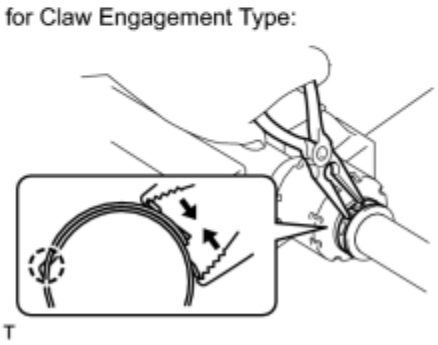
(b) for one touch type:




(1) Using a screwdriver, install a new front drive shaft damper clamp, as shown in the illustration.

NOTICE:

Do not damage the outboard joint boot.

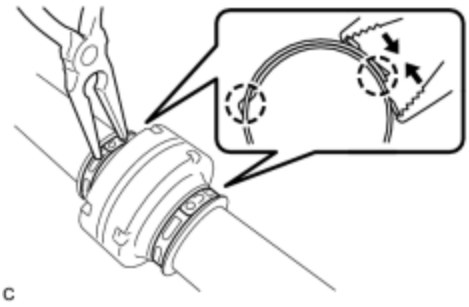



(c) for claw engagement type:

(1) Using needle-nose pliers, install a new front drive shaft damper clamp, as shown in the illustration.

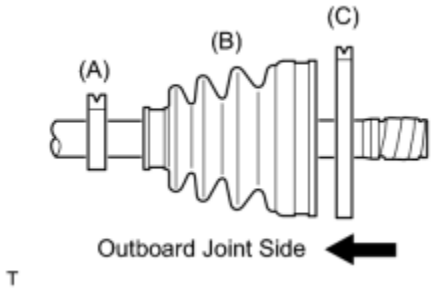
9. INSTALL FRONT DRIVE SHAFT DAMPER CLAMP (for RH Side)

(a) Using needle-nose pliers, install 2 new front drive shaft damper



clamps, as shown in the illustration.

10. INSTALL FRONT DRIVE INBOARD JOINT ASSEMBLY




(a) Install new parts onto the front axle outboard joint shaft assembly in the following order:

(1) Front axle inboard joint boot clamp (A)

(2) Inboard joint boot (B)

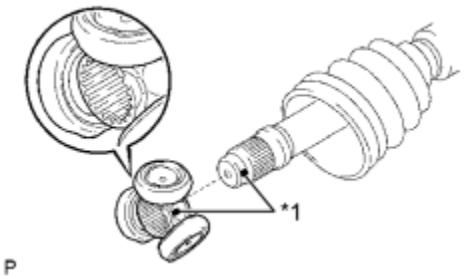
(3) Front No. 2 axle inboard joint boot clamp (C)

(b) Secure the front axle outboard joint shaft assembly in a vise using aluminum plates.

NOTICE:

Do not overtighten the vise.

(c) Remove the protective tape.




(d) Align the matchmarks and install the tripod joint onto the front axle outboard joint shaft assembly as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

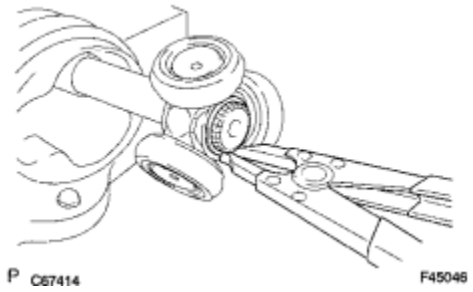
NOTICE:

Face the serrated side of the tripod joint outward and install it onto the outboard joint end.

(e) Using a brass bar and a hammer, install the tripod joint to the front axle outboard joint shaft assembly.

NOTICE:

- Do not tap the rollers.
- Keep the tripod joint free of foreign matter.

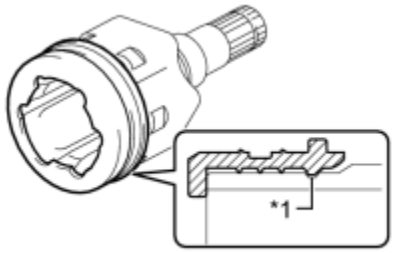



(f) Using a snap ring expander, install a new shaft snap ring to the front axle outboard joint shaft assembly.

(g) Pack the front drive inboard joint assembly and inboard joint boot with grease.

Standard grease capacity:

168 to 178 g (5.9 to 6.2 oz.)



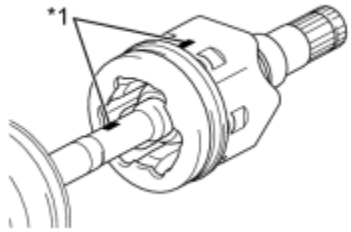

(h) Install a new front axle inboard joint grommet onto the inboard joint groove.

## Text in Illustration

| | |
|---|---|
| *1 | Groove |

NOTICE:

Securely fit the protrusion on the inboard joint grommet into the inboard joint groove.




(i) Align the matchmarks and install the front drive inboard joint assembly onto the front axle outboard joint shaft assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

11. INSTALL INBOARD JOINT BOOT

(a) Install the inboard joint boot into the grooves of the inboard joint grommet and inboard joint boot.

NOTICE:

Keep the grooves free of grease.

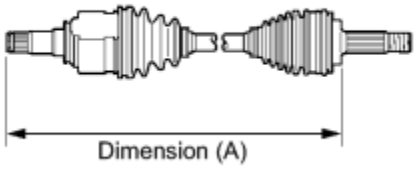
12. INSTALL FRONT NO. 2 AXLE INBOARD JOINT BOOT CLAMP

CAUTION:

Wear protective gloves. Sharp areas on the parts may injure your hands.

(a) Install the boot clamp onto the inboard joint boot.

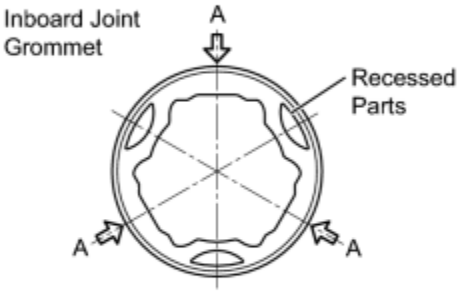
(b) Adjust dimension (A) until it is within the specified length.




# Dimension (A)

| LH Side | RH Side |
|---|---|
| 556.2 mm (1.82 ft.) | 905.2 mm (2.96 ft.) |




(c) While keeping dimension (A) within the specified length, put the inside of the inboard joint under atmospheric pressure by pulling the recessed parts on the inboard joint grommet out.

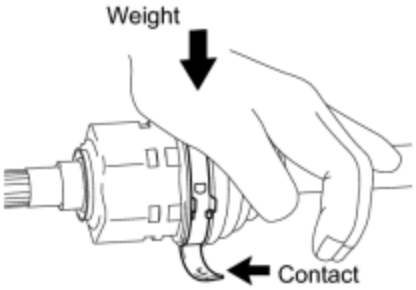



(d) Set the lever fulcrum point at any point A indicated in the illustration and temporarily bend the lever.

NOTICE:

- Perform this work with the inside of the inboard joint kept at atmospheric pressure.
- Set the lever into the guide groove correctly and install the clamp as far into the inside of the vehicle as possible.
- Check the band and the lever for any deformation before folding back the lever.

(e) Lean your weight on your hand and roll the inboard joint forward while pressing the inboard joint against the work plane. Roll the inboard joint and fold the lever until a click sound can be heard.

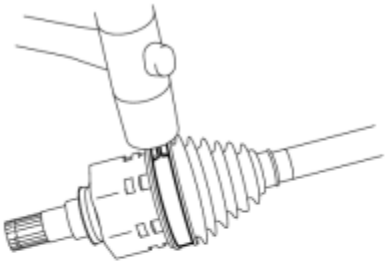


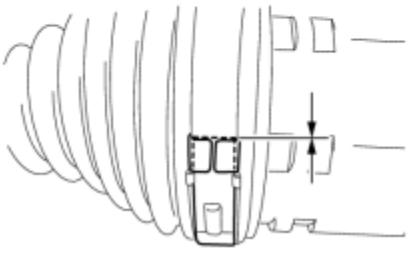



P

NOTICE:

Make sure that the outboard joint is in direct contact with the work plane.





P

(f) Using a plastic hammer, tap the buckle to secure it while adjusting the clearance between the lever and the groove to make the clearance between the buckle edge and the lever end even.

NOTICE:

Do not damage the inboard joint boot.

13. INSTALL FRONT AXLE INBOARD JOINT BOOT CLAMP

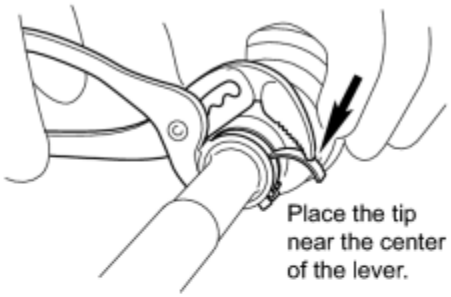
CAUTION:

Wear protective gloves. Sharp areas on the parts may injure your hands.

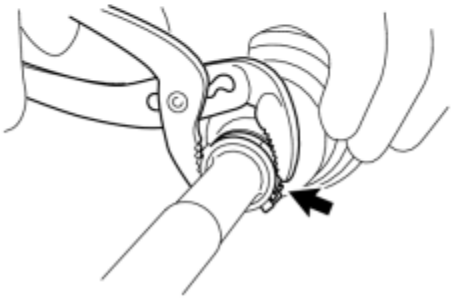
(a) Install the front axle inboard joint boot clamp onto the inboard joint boot and temporarily fold back the lever.

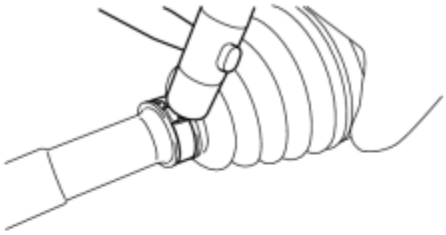
- Set the lever into the guide groove correctly.
- Check the band and the lever for any deformation before folding back the lever.



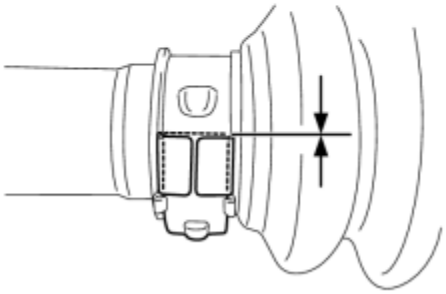




(b) Using water pump pliers, pinch the front axle outboard joint boot clamp to temporarily secure it.





(c) Using a plastic hammer, tap the buckle to secure it while adjusting the clearance between the lever and the groove to make the clearance between the buckle edge and the lever end even.



NOTICE:

Do not damage the inboard joint boot.

14. INSPECT FRONT DRIVE SHAFT ASSEMBLY INFO

# INSTALLATION

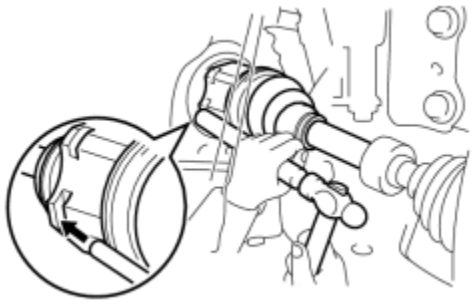
1. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING

(a) Install a new front drive shaft hole snap ring to the front drive inboard joint assembly.

HINT:

Face the end gap of the front drive inboard joint hole snap ring downward.

2. INSTALL FRONT DRIVE SHAFT ASSEMBLY

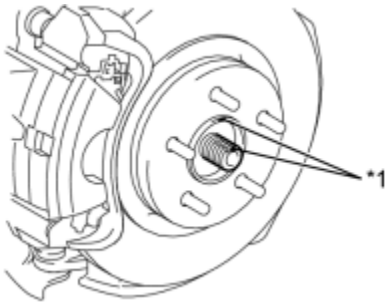


(a) Align the inboard joint splines, and using a brass bar and a hammer, install the front drive shaft assembly.

- Face the end gap of the front drive shaft hole snap ring downward.
- Do not damage the transaxle case oil seal.
- Do not damage the inboard joint boot.
- Make sure to center the front drive shaft assembly during installation to prevent damage to the front drive shaft hole snap ring.

HINT:

Confirm whether the drive shaft is securely driven in by checking the reaction force and sound.




(b) Align the matchmarks and install the front drive shaft assembly to the front axle hub sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

3. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY INFO

4. CONNECT FRONT STABILIZER LINK ASSEMBLY INFO

5. CONNECT TIE ROD END SUB-ASSEMBLY INFO

6. INSTALL FRONT FLEXIBLE HOSE INFO

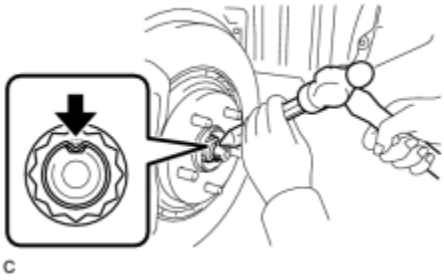
7. CONNECT FRONT SPEED SENSOR INFO

8. INSTALL FRONT AXLE SHAFT NUT

(a) Clean the threaded parts on the drive shaft and a new axle shaft nut using a non-residue solvent.

HINT:

- Be sure to perform this work even when using a new drive shaft.
- Keep the threaded parts free of oil and foreign matter.




(b) Using a socket wrench (30 mm), install the axle shaft nut.

Torque: **216 N·m (2203 kgf·cm, 159ft·lbf)**

(c) Using a chisel and hammer, stake the front axle shaft nut.

9. ADD HYBRID TRANSAXLE FLUID INFO

10. INSPECT HYBRID TRANSAXLE FLUID INFO

11. INSTALL FRONT WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

12. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT: INFO.

13. INSTALL REAR ENGINE UNDER COVER LH

14. INSTALL REAR ENGINE UNDER COVER RH

15. INSTALL NO. 1 ENGINE UNDER COVER

16. INSPECT SPEED SENSOR SIGNAL

HINT: INFO.

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING THE CABLE FROM THE NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected:

| System | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. NOTICE FOR HYBRID SYSTEM ACTIVATION

(a) When the warning light is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.

3. CAN COMMUNICATION SYSTEM PRECAUTIONS

(a) The CAN communication system is used for data communication between the transmission control ECU assembly, the power management control ECU and other ECUs. If there are any problems in the CAN communication lines, corresponding DTCs for the communication lines are output.

(b) If any CAN communication line DTCs are output, repair the malfunction in the communication lines and troubleshoot the electronic shift lever system after data communication becomes normal.

4. LIN COMMUNICATION SYSTEM PRECAUTIONS

(a) The LIN communication system is used for data communication between the transmission control ECU assembly, the certification ECU and other ECUs. If there are any problems in the LIN communication lines, the P position cannot be disengaged.

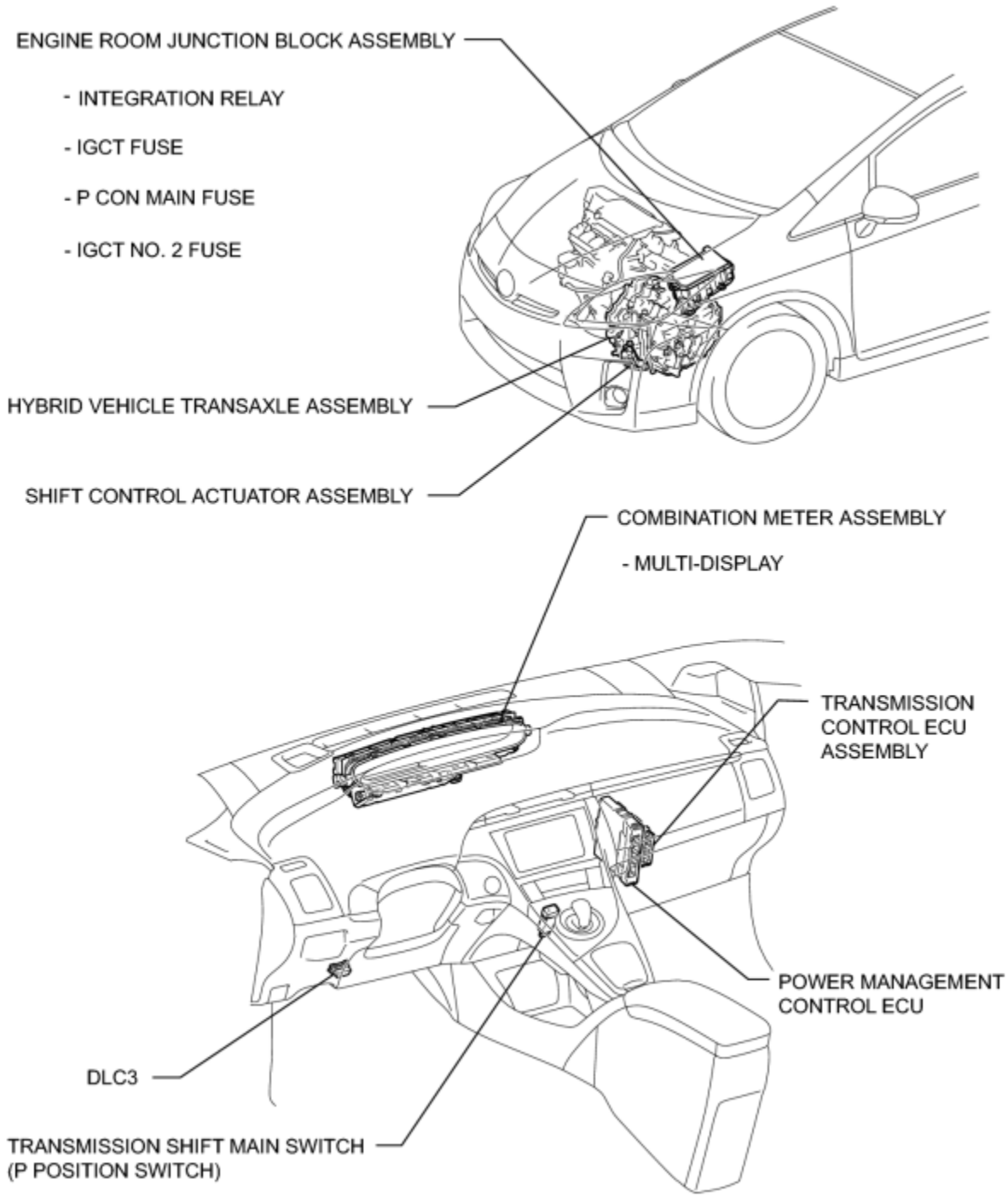
(b) If any LIN communication line DTCs are output, repair the malfunction in the communication lines and troubleshoot the electric shift lever system after data communication becomes normal.

5. DTC PRECAUTION

(a) It is not possible to clear the following DTCs using the Techstream: DTC C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

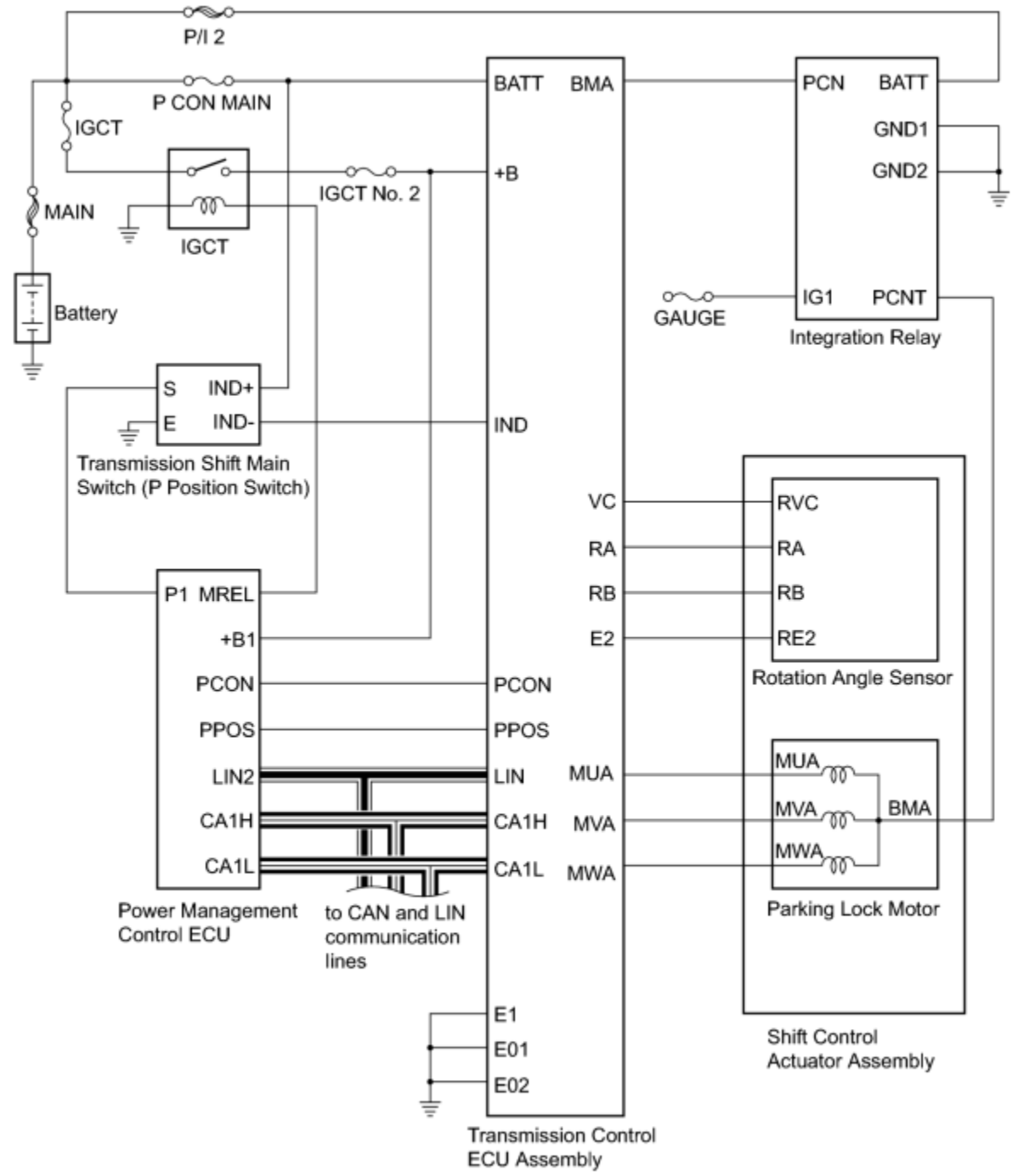
# PARTS LOCATION

# ILLUSTRATION




H

# SYSTEM DIAGRAM




H

# SYSTEM DESCRIPTION

1. SYSTEM DESCRIPTION

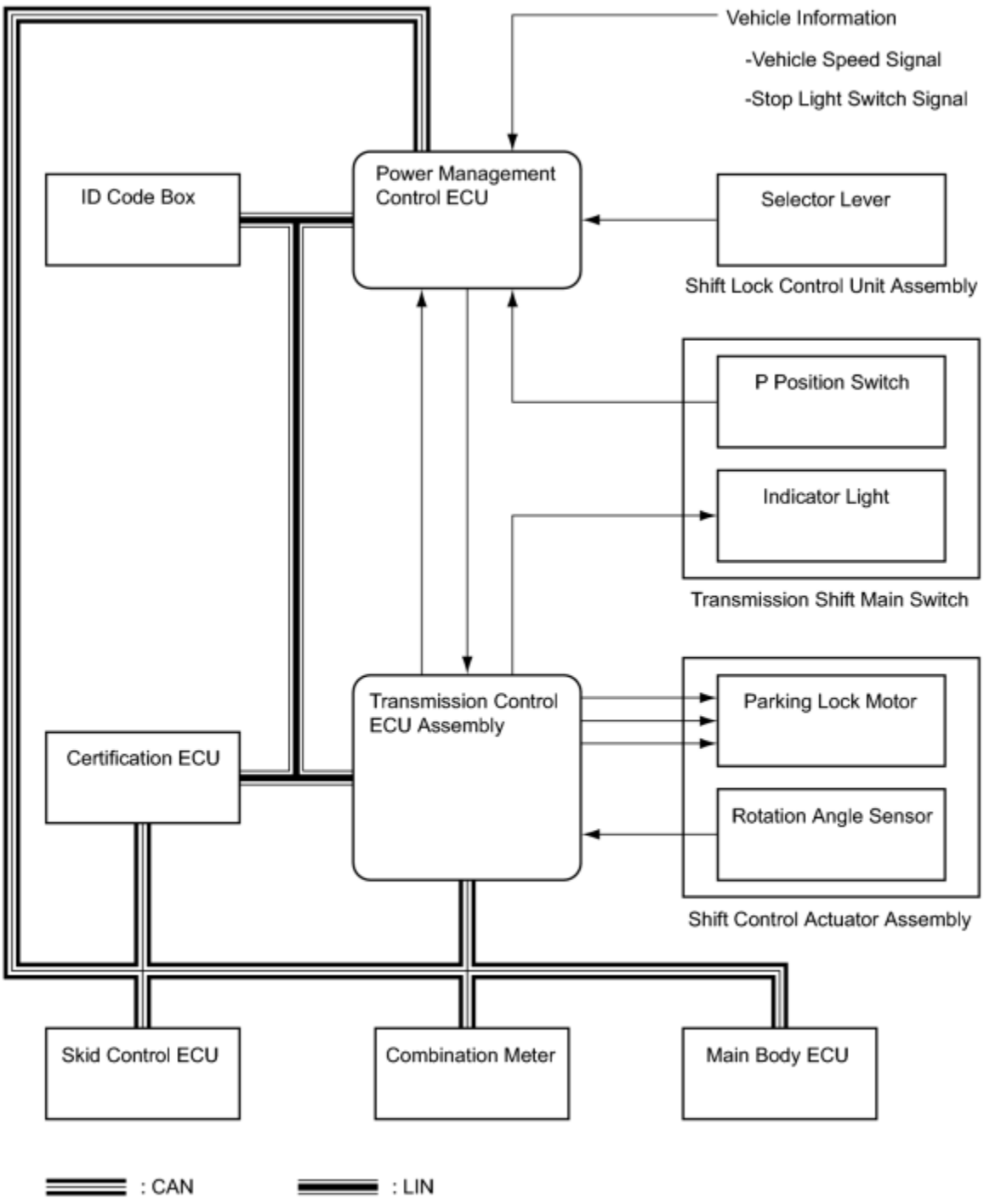
The electronic shift lever system electrically controls the parking lock mechanism by using the actuator.

The transmission control ECU assembly locks/unlocks gearshift control based on lock/unlock request signals from the certification ECU (smart key ECU assembly).

The transmission control ECU assembly controls the shift control actuator when gearshift control is unlocked, and also controls the entire system based on information from the power management control ECU.

The transmission control ECU assembly detects DTCs when there are any malfunctions in the system, and informs the driver of selected malfunctions by illuminating the P position switch indicator light and master warning light, and indicating an error message on the multi-display.

2. SYSTEM DIAGRAM




H

### *Input and Output Signals of Each ECU*

| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Main Body ECU | Power Management Control ECU | Parking brake switch signal | CAN |
| Power Management | Power Management | Power off preparation signal | CAN |

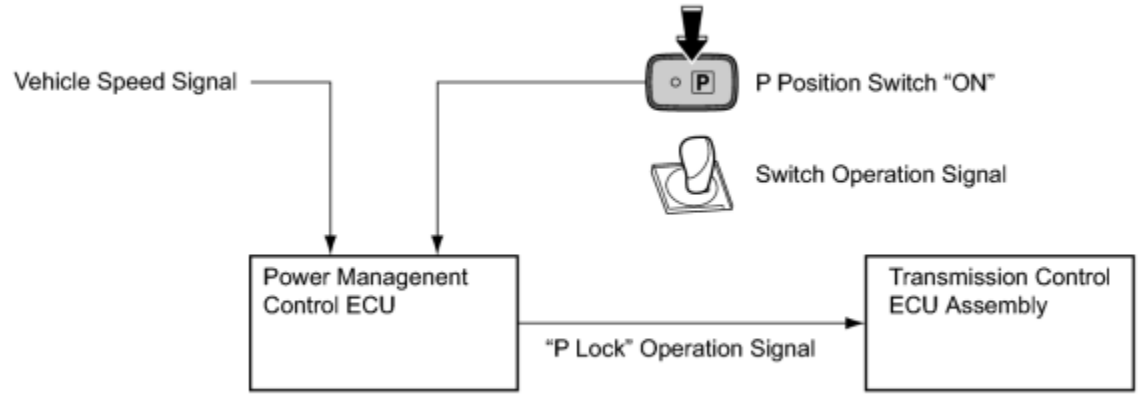
| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Control ECU | Control ECU | | |
| Main Body ECU | Transmission control ECU assembly | • Power switch signal<br>• ACC switch signal | CAN |
| Transmission control ECU assembly | Power Management Control ECU | • P position state signal<br>• Transmission control ECU assembly trouble condition signal<br>• Non-P position state signal | CAN, SIL |
| Power Management Control ECU | Power Management Control ECU | • Auto P cancel signal<br>• Auto P permit signal | CAN |
| Transmission control ECU assembly | Combination Meter | Transmission control ECU assembly trouble signal | CAN |
| Power Management Control ECU | Certification ECU | P position state signal | LIN |

3. FUNCTION OF EACH COMPONENT

| Part Name | Function |
|---|---|
| Shift Control Actuator | • Composed of the parking lock motor and the rotation angle sensor. The motor is activated by electric current from the transmission control ECU assembly.<br>• Motor rotation is reduced by the cycloid reduction mechanism in the shift control actuator and then output.<br>• The rotation angle sensor detects the motor rotation angle with the 2 Hall ICs. |
| Transmission control ECU assembly | • The transmission control ECU assembly activates the shift control actuator based on signals from the power management control ECU.<br>• The transmission control ECU assembly controls the application timing of current to the parking lock motor based on signals from the rotation angle sensor. |
| Parking Lock Mechanism | The parking lock pawl rotates according to the movement of the parking lock rod when the parking lock motor rotates, and engages with the parking gear on the transaxle side, causing the parking lock mechanism to lock or unlock. |
| Power Management Control ECU | • The power management control ECU sends a P lock or P unlock demand signal to the transmission control ECU assembly based on information from the selector lever and the P position switch.<br>• The power management control ECU sends a signal with power off information to the power management control ECU. The power management control ECU then sends the signal to the power management control ECU. |
| P Position Switch Indicator Light | The P position switch indicator light comes on/goes off to indicate the P lock/unlock status and blinks to indicate a malfunction in the electronic shift lever system. |
| Combination Meter | A malfunction in the transmission control ECU assembly is indicated by the illumination of the master warning light on the combination meter. |

4. OPERATION DESCRIPTION

(a) Operation to switch to the P position:



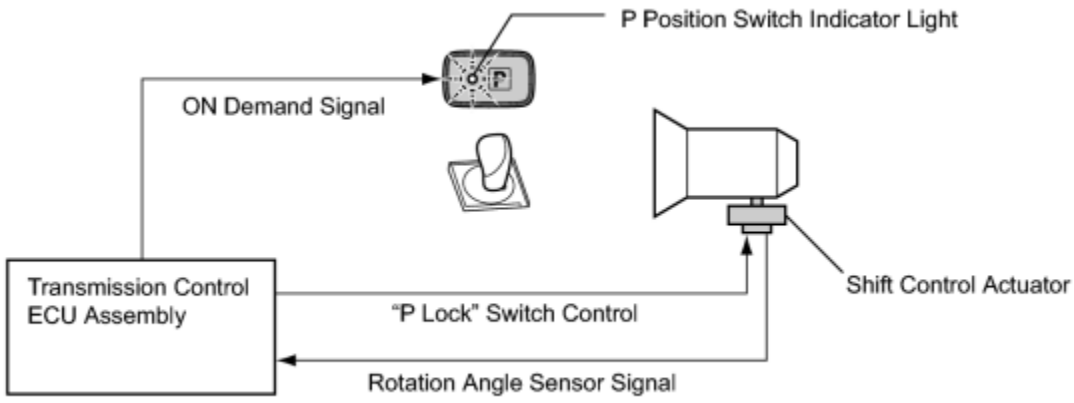

H

(1) When the park (P) is selected to activate parking lock, a signal is sent to the power management control ECU.

(2) The power management control ECU determines whether "P lock" is possible or not based on this signal and other vehicle information.

(3) If the power management control ECU determines that "P lock" is possible, it sends a "P lock" operation demand signal to the transmission control ECU assembly.

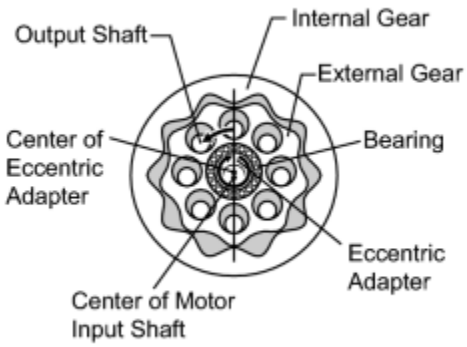
(4) After receiving the signal, the transmission control ECU assembly activates the shift control actuator in order to lock the parking lock mechanism.




H

(5) The transmission control ECU assembly controls motor rotation angle based on signals from the rotation angle sensor in the shift control actuator.

Cycloid Reduction Mechanism



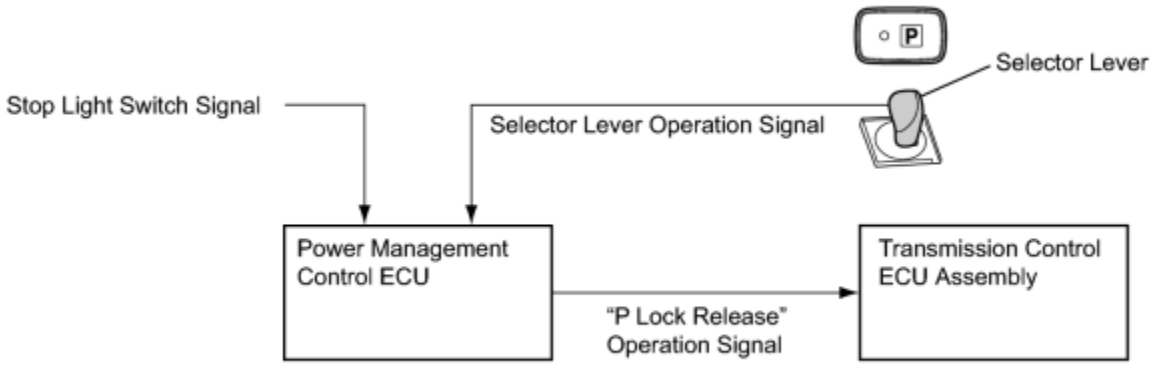

N

HINT:

In the cycloid reduction mechanism, the output shaft is linked to the external gear. Together, they rotate only a single tooth when the eccentric adapter, which is linked to the motor, rotates once. Driving force is increased in this way so that the parking lock mechanism can be switched even when high output is required for parking on a hill, etc.

(6) Turn on the P position switch indicator light.

(b) Operation to switch to a non-P position:

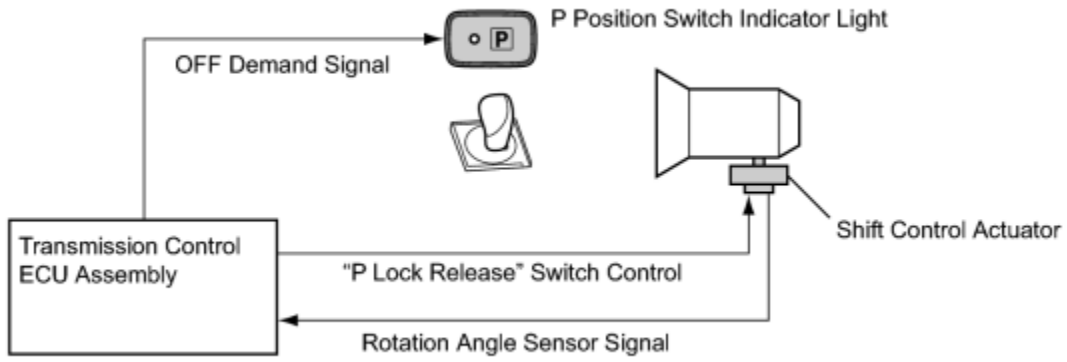



H

(1) When the hybrid system is started (the vehicle is ready to be driven) and the selector lever is moved to R, N, or D with the brake pedal depressed, a signal is sent to the power management control ECU.

(2) This signal is then sent from the power management control ECU to the transmission control ECU assembly as a "P lock release" operation demand signal.

(3) After receiving the signal, the transmission control ECU assembly activates the shift control actuator in order to unlock the parking lock mechanism.




H

(4) The transmission control ECU assembly controls motor rotation angle based on signals from the rotation angle sensor in the shift control actuator.

(5) Turn off the P position switch indicator light.

5. SHIFT POSITION CHANGE FUNCTION

(a) The electronic shift lever system comprehensively determines vehicle conditions and changes the shift position, as shown in the following chart, by cooperating with the shift control function of the hybrid system (except when the reject function, described later, is in operation).

(b) Other than indicated in the following chart, when the power switch is turned off with the vehicle stopped, the shift position is automatically changed to the P position and all power is turned off.

| Power Status | Operation | P | R | N | D | B |
|---|---|---|---|---|---|---|
| ACC ON* (The vehicle cannot be driven.) | Selector lever operation | ● | Unable to change the shift position | | | |
| | P position switch operation | ← | ← | ● | | |
| IG ON* (The vehicle cannot be driven.) | Selector lever operation | ● | → | ● | | |
| | P position switch operation | ← | ← | ● | | |
| The hybrid system is started. (The vehicle can be driven.) | Selector lever operation | ● → | ● → | ● → | ● → | ● |
| | | ● | ● → | ● → | ● → | ● |
| | | ● | ● ← | ● → | ● → | ● |
| | | ● | ● | ● ← | ● → | ● |
| | | ● | ● | ● | ● ← | ● |
| | | ● | ● | ● | ● | ● ← |
| | P position switch operation | ← | ● | | | |
| | | ← | ← | ● | | |
| | | ← | ← | ← | ● | |
| | | ← | ← | ← | ← | ● |

*: The vehicle cannot be driven because the hybrid system has not been started.

● : Current position → : Positions to which the shift position can be changed

N

6. REJECT FUNCTION

(a) In the electronic shift lever system, there may be a situation in which a shift change cannot be done for safety reasons. When attempting to move the selector lever in such a situation, the system sounds a reject buzzer inside the meter and changes the shift position as shown in the following table.

| Shift operation which causes reject function to operate | Shift position after rejection |
|---|---|
| Moving the selector lever to any position with park (P) selected and the brake pedal not depressed | Held in the P position |

| Shift operation which causes reject function to operate | Shift position after rejection |
|---|---|
| Pushing the P position switch while driving | Changed to the N position |
| Moving the selector lever from D to R or R to D while driving at 12 km/h or more | Changed to the N position |
| Moving the selector lever to B from a position other than D or P | Changed to the N position |
| Moving the selector lever to B with park (P) selected and the brake pedal depressed | Held in the P position |

7. P POSITION SWITCH INDICATOR LIGHT CONTROL

(a) The indicator light comes on when the P position switch is pressed (the P position is engaged), goes off when the switch is released (the P position is disengaged) and blinks when the system malfunction occurs.

***Indicator Light***

| DTC No. | Indicator Light | Suspected Cause |
|---|---|---|
| C2300 | Blinks | • Initial drive shift count malfunction<br>• Move shift range malfunction<br>• Feedbacks shift count malfunction<br>• Parking lock position memory malfunction<br>• Parking lock moving range memory malfunction |
| C2301 | Blinks | Shift changing time malfunction |
| C2303 | Normal<br><br>(Comes on when the P position is engaged and goes off when it is disengaged) | Integration relay lockup |
| C2304 | Blinks | Open or short in shift control actuator assembly [parking lock motor (MUA)] signal circuit |
| C2305 | Blinks | Open or short in shift control actuator assembly [parking lock motor (MVA)] signal circuit |
| C2306 | Blinks | Open or short in shift control actuator assembly [parking lock motor (MWA)] signal circuit |
| C2307 | Blinks | Power source circuit malfunction |
| C2308 | Normal<br><br>(Comes on when the P position is engaged, and goes off when it is disengaged) | Transmission control ECU assembly internal error |
| C2309 | Blinks | Open in +B signal circuit |
| C2310 | Normal<br><br>(Comes on when the P position is engaged, and goes off when it is disengaged) | Open or short in BATT signal circuit |
| C2311 | Blinks | • PCON DUTY malfunction<br>• Open or short in PCON signal circuit |

| DTC No. | Indicator Light | Suspected Cause |
|---|---|---|
| C2315 | Normal<br><br>(Comes on when the P position is engaged, and goes off when it is disengaged) | • Open or short in PCOS signal circuit<br>• Transmission shift main switch (P position switch) circuit malfunction |
| U0146 | Normal<br><br>(Comes on when the P position is engaged, and goes off when it is disengaged) | CAN communication system malfunction |

NOTICE:

Even if the system has returned to normal, the indicator light does not return to normal without the selector lever moved from the home position to N. (Normal refers to the indicator light coming on when the P position is engaged and it goes off when the P position is disengaged.)

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

*: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

NEXT

| | |
|---|---|
| 3. | CONNECT TECHSTREAM TO THE DLC3* |

HINT:

If the display on the Techstream indicates a communication fault, inspect the DLC3.

NEXT

| | |
|---|---|
| 4. | CHECK DTC AND SAVE FREEZE FRAME DATA* INFO, INFO |

HINT:

Make sure to save freeze frame data because the data is necessary for a simulation test.

NEXT

| | |
|---|---|
| 5. | CLEAR DTC AND FREEZE FRAME DATA* INFO |

NEXT

| | |
|---|---|
| 6. | CONDUCT VISUAL INSPECTION |

NEXT

| | |
|---|---|
| 7. | CONFIRM PROBLEM SYMPTOMS |

*Result*

| Result | Proceed to |
|---|---|
| Malfunction does not occur | A |
| Malfunction occurs | B |

B GO TO STEP 11

A

| | |
|---|---|
| 8. | DUPLICATE CONDITIONS THAT PRODUCE SYMPTOMS |

NEXT

| | |
|---|---|
| 9. | CHECK FOR DTCS* INFO |

*Result*

| Result | Proceed to |
|---|---|
| DTC is output | A |
| DTC is not output | B |

B GO TO STEP 11

A

| | |
|---|---|
| 10. | REFER TO DTC CHART |

NEXT GO TO STEP 13

| | |
|---|---|
| 11. | CONDUCT BASIC INSPECTION |

*Result*

| Result | Proceed to |
|---|---|
| Malfunctioning parts not confirmed | A |
| Malfunctioning parts confirmed | B |

B GO TO STEP 15

A

| | |
|---|---|
| 12. | CHECK ECU POWER SOURCE CIRCUIT |

NEXT

| | |
|---|---|
| 13. | CONDUCT CIRCUIT INSPECTION |

*Result*

| Result | Proceed to |
|---|---|
| Malfunction not confirmed | A |
| Malfunction confirmed | B |

B GO TO STEP 16

A

| | |
|---|---|
| 14. | CHECK FOR INTERMITTENT PROBLEMS INFO |

NEXT GO TO STEP 16

| | |
|---|---|
| 15. | CONDUCT PARTS INSPECTION |

NEXT

| | |
|---|---|
| 16. | IDENTIFY PROBLEM |

NEXT

| | |
|---|---|
| 17. | ADJUST AND/OR REPAIR |

NEXT

| | |
|---|---|
| 18. | CONDUCT CONFIRMATION TEST |

NEXT **END**

# PROBLEM SYMPTOMS TABLE

HINT:

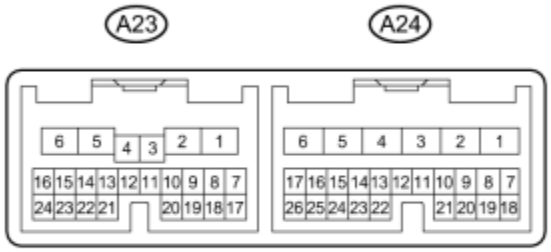
- Use the table below to help determine the cause the problem symptoms. If multiple suspected areas are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Electronic Shift Lever System*

| Symptom | Suspected Area | See page |
|---|---|---|
| The P position switch indicator light does not come on. | P position switch indicator light circuit | INFO |
| The P position switch indicator light does not go off. | P position switch indicator light circuit | INFO |

# TERMINALS OF ECU

1. TRANSMISSION CONTROL ECU INSPECTION




H

HINT:

Inspect the connectors from the back side while the connector is connected.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A23-1 (MWA) - A24-6 (E01) | W - W-B | Parking lock motor | Engine stopped (hybrid system stopped), power switch on (IG) | 9 to 14 V |
| A23-2 (MVA) - A24-6 (E01) | R - W-B | Parking lock motor | Engine stopped (hybrid system stopped), power switch on (IG) | 9 to 14 V |
| A23-5 (MUA) - A24-6 (E01) | B - W-B | Parking lock motor | Engine stopped (hybrid system stopped), power switch on (IG) | 9 to 14 V |
| A23-7 (VC) - A23-19 (E2) | G - P | Power source (Rotation angle sensor) | Engine stopped (hybrid system stopped), power switch on (IG) | 4.5 to 5.5 V |
| A23-8 (RB) - A23-19 (E2) | GR - P | Rotation angle sensor signal | Power switch off → Power switch on (IG) | 0 to 1.5 V ←→ 4 to 5.5 V |
| A23-15 (BATT) - A24-1 (E1) | SB - BR | Power source (RAM) | Always | 9 to 14 V |
| A23-16 (+B) - A24-1 (E1) | L - BR | Power source | Engine stopped (hybrid system stopped), power switch on (IG) | 9 to 14 V |
| A24-17 (RA) - A23-19 (E2) | LG - P | Rotation angle sensor signal | Power switch off → Power switch on (IG) | 0 to 1.5 V ←→ 4 to 5.5 V |
| A23-19 (E2) - Body ground | P - Body ground | Rotation angle sensor ground | Always | Below 1 Ω |
| A23-20 (IND) - | R - BR | P position switch | P position disengaged →P position | 9 to 14 V → 0 |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A24-1 (E1) | | indicator light | engaged [transmission shift main switch (P position switch on)] | to 1.5 V |
| A23-23 (BMA) - A24-1 (E1) | B - BR | Integration relay | Engine stopped (hybrid system stopped), power switch on (IG) | 9 to 14 V |
| A24-1 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| A24-5 (E02) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| A24-6 (E01) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| A24-15 (CA1L) - A24-1 (E1) | BR - BR | CAN communication | Power switch on (IG) | Pulse generation<br><br>(see waveform 1) |
| A24-16 (CA1H) - A24-1 (E1) | Y - BR | CAN communication | Power switch on (IG) | Pulse generation<br><br>(see waveform 1) |
| A24-22 (PCON) - A24-1 (E1) | LG - BR | Communication bus | Engine stopped (hybrid system stopped), power switch on (IG) | Pulse generation<br><br>(see waveform 2) |
| A24-23 (PPOS) - A24-1 (E1) | W - BR | Communication bus | Engine stopped (hybrid system stopped), power switch on (IG) | Pulse generation<br><br>(see waveform 2) |
| A24-24 (LIN) | L | LIN communication | - | - |

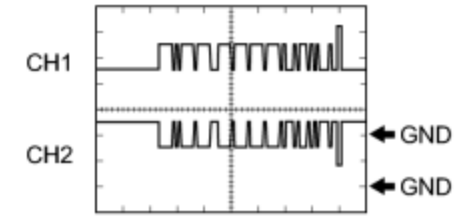
2. Oscilloscope waveforms

HINT:

Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.

(a) Waveform 1 (CAN communication signal)

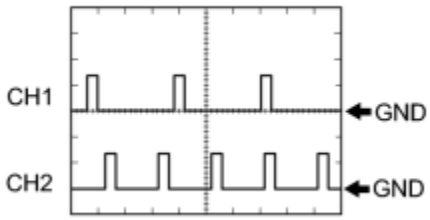
| Item | Contents |
|---|---|




c

| | |
|---|---|
| Terminal | CH1: A24-16 (CA1H) - A24-1 (E1)<br>CH2: A24-15 (CA1L) - A24-1 (E1) |
| Equipment setting | 1 V/DIV, 50 μs/DIV |
| Condition | Power switch on (IG) |

(b) Waveform 2 (Transmission control communication signal)




| Item | Contents |
|---|---|
| Terminal | CH1: A24-22 (PCON) - A24-1 (E1)<br>CH2: A24-23 (PPOS) - A24-1 (E1) |
| Equipment setting | 5 V/DIV, 20 ms/DIV |
| Condition | Power switch on (IG) |

# DTC CHECK / CLEAR

1. CHECK FOR DTCS (Using the Techstream)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(e) Check for DTCs and freeze frame data, and then write them down.

(f) Check the details of the DTCs.

2. CHECK FOR DTCS (Systems other than the transmission control ECU)

HINT:

The transmission control ECU maintains communication with other ECUs, including the hybrid vehicle control ECU and other ECUs. Therefore, if the transmission control ECU outputs a warning, it is necessary to check and record the DTCs of all systems.

(a) If DTCs are present, check the relevant systems.

HINT:

If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair any malfunctions in the CAN communication system.

3. CLEAR DTCS (Using the Techstream)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(e) Clear the DTCs and freeze frame data.

NOTICE:

- It is not possible to clear the following DTCs using the Techstream: DTCs C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

- Clearing the DTCs will also clear the freeze frame data.

4. CLEAR DTCS (Without using the Techstream)

(a) Turn the power switch off.

(b) Remove the P CON MAIN fuses from the engine room junction block assembly located inside the engine compartment for more than 1 minute.

(c) Check for DTCs again to see if the DTCs are cleared.

NOTICE:

- If the DTCs are output, repair the parts by following the diagnostic trouble code chart.
- Clearing the DTCs will also clear the freeze frame data.

# FREEZE FRAME DATA

1. CHECK FREEZE FRAME DATA

HINT:

The transmission control ECU records vehicle and driving condition information as freeze frame data the moment a DTC is stored. Freeze frame data can help determine the vehicle conditions when the malfunction occurred and help duplicate conditions when troubleshooting.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(e) Select a DTC in order to display its freeze frame data.

2. LIST OF FREEZE FRAME DATA

| Tester Display | Measurement Item | Reference Value |
|---|---|---|
| Shift Pos Display (P) | Shift position display (P) | ON / OFF |
| Shift Pos Display (Not P) | Shift position display (not P) | ON / OFF |
| Master Caution Display | Master caution display | Disp / Nondisp |
| PSW Indicator Mode | PSW indicator mode | OFF / ON / Blink |
| U Phase Voltage Value | U phase voltage value | 0 to 39 V |
| V Phase Voltage Value | V phase voltage value | 0 to 39 V |
| W Phase Voltage Value | W phase voltage value | 0 to 39 V |
| Battery Voltage Value | BATT voltage value | 0 to 19 V |
| IG(+B) Voltage Value | IG (+B) voltage value | 0 to 19 V |
| Cmplte of Learn Lck Pos | Completion of learning lock position | OK / NG |
| Cmplte of Learn Unlck Pos | Completion of learning unlock position | OK / NG |
| # of Trip Cuntr after Learn | Number of trip counter after learning | 0 to 65535 |
| Main Relay for Motor Drive | Integration relay for motor drive | ON / OFF |
| U Phase Crnt-Carry Status | U phase current-carrying status | ON / OFF |
| V Phase Crnt-Carry Status | V phase current-carrying status | ON / OFF |
| W Phase Crnt-Carry Status | W phase current-carrying status | ON / OFF |
| U Phase Voltage Status | U phase voltage status | ON / OFF |
| V Phase Voltage Status | V phase voltage status | ON / OFF |
| W Phase Voltage Status | W phase voltage status | ON / OFF |
| Battery Voltage Status | BATT voltage status | ON / OFF |

| Tester Display | Measurement Item | Reference Value |
|---|---|---|
| IG(+B) Phase Vol Status | IG (+B) phase voltage status | ON / OFF |
| ACC Condition Signal | ACC condition signal | ON / OFF |
| Init Drv Cntrl Completed | Initial drive control completed | OK / NG |
| Cmplte of Detct Lck Pos | Completion of detecting lock position | OK / NG |
| Cmplte of Detct Unlck Pos | Completion of detecting unlock position | OK / NG |
| P/Not P Move Shft Range | P/Not P movable shift range | Set / Unset |
| Main Relay | Integration relay | Normal / Abnoml |
| Current flag record | Current flag record | ON / OFF |
| Fail Rank | Fail rank | 0 to 255 |
| Detail Information # | - | - |

# FAIL-SAFE CHART

If the transmission control ECU detects a malfunction, the fail-safe functions shown in the table below are activated.

| DTC No. | Fail-safe Function | Problem Symptoms |
|---|---|---|
| C2300<br>C2301 | Only the P position release operation is possible and the shift control actuator is activated. | • The shift position is not indicated on the meter.<br>• Although the shift position is indicated on the meter, the vehicle cannot be driven. |
| C2303 | - | The battery is dead. |
| C2304<br>C2305<br>C2306 | The integration relay is turned off. | The parking lock mechanism cannot be switched. |
| C2307 | The integration relay is turned off. | • The shift position is not indicated on the meter.<br>• Although the shift position is indicated on the meter, the vehicle cannot be driven. |
| C2308 | - | • The parking lock mechanism cannot be switched.<br>• The key reminder buzzer sounds constantly. |
| C2309 | The integration relay is turned off. | The parking lock mechanism cannot be switched. |
| C2311 | - | The parking lock mechanism cannot be switched. |

# DATA LIST / ACTIVE TEST

1. DATA LIST

NOTICE:

- Some Data List values may vary significantly if there are slight differences in the environment in which the vehicle is operating when measurements are obtained. Variations may also occur due to aging of the vehicle. Due to these considerations, it is not always possible to provide definite values to be used for judgment of malfunctions. It is possible that a malfunction may be present even if measured values are within the reference range.
- In the event of a problem with intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions in order to reach an overall judgment by comparing all the items in the Data List.

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values. when deciding whether a part is faulty or not.

(a) Warm up the engine.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Transmission Control / Data List.

(g) According to the display on the Techstream, read the Data List.

HINT:

When reading the Data List information, first determine which items need to be monitored before proceeding. Attempting to view all of the data may result in a delayed, inaccurate inspection.

***Transmission Control ECU***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Shift Pos Display | Shift position display (P) | ON: Parking lock in P | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| (P) | /<br><br>ON or OFF | position<br><br>OFF: Parking lock in non-P position | |
| Shift Pos Display (Not P) | Shift position display (not P) /<br><br>ON or OFF | ON: Parking lock in non-P position<br><br>OFF: Parking lock in P position | - |
| Master Caution Display | Master caution display /<br><br>Disp or Nondisp | Disp: Malfunction occurs in this system<br><br>Nondisp: Malfunction does not occur in this system | Transmission control ECU assembly |
| PSW Indicator Mode | PSW indicator mode /<br><br>ON or OFF | ON: Parking lock in P position<br><br>OFF: Parking lock in non-P position<br><br>(When normal) | - |
| PSW Indicator Mode | PSW indicator mode /<br><br>Blink | Blink: Malfunction detected | - |
| U Phase Voltage Value | U phase voltage value /<br><br>Min: 0 V, Max: 39 V | 9 to 14 V: IG ON<br><br>(If shift control actuator assembly is operating: 0V) | Shift control actuator assembly [parking lock motor (MUA)] signal circuit |
| V Phase Voltage Value | V phase voltage value /<br><br>Min: 0 V, Max: 39 V | 9 to 14 V: IG ON<br><br>(If shift control actuator assembly is operating: 0V) | Shift control actuator assembly [parking lock motor(MVA)] signal circuit |
| W Phase Voltage Value | W phase voltage value /<br><br>Min: 0 V, Max: 39 V | 9 to 14 V: IG ON<br><br>(If shift control actuator assembly is operating: 0V) | Shift control actuator assembly [parking lock motor(MWA)] signal circuit |
| Battery Voltage Value | BATT voltage value /<br><br>Min: 0 V, Max: 19 V | 8 to 16 V: IG ON | BATT signal circuit |
| IG(+B) Voltage Value | IG (+B) voltage value /<br><br>Min: 0 V, Max: 19 V | 8 to 16 V: IG ON | +B signal circuit |
| Cmplte of Learn Lck Pos | Completion of learning lock position / | OK: Lock position learning completed | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | OK or NG | NG: Lock position learning not completed | |
| Cmplte of Learn Unlck Pos | Completion of learning unlock position /<br><br>OK or NG | OK: Unlock position learning completed<br><br>NG: Unlock position learning not completed | - |
| # of Trip Cuntr after Learn | Number of trip counter after learning /<br><br>Min: 0, Max: 65535 | Actual number of trip counter | - |
| Main Relay for Motor Drive | Integration relay for motor drive /<br><br>ON or OFF | ON: Motor drive main relay on<br><br>OFF: Motor drive main relay off | Integration relay circuit |
| U Phase Crnt-Carry Status | U phase current-carrying status /<br><br>ON or OFF | ON: U phase current flows<br><br>OFF: U phase current does not flow | Shift control actuator assembly [parking lock motor(MUA)] signal circuit |
| V Phase Crnt-Carry Status | V phase current-carrying status /<br><br>ON or OFF | ON: V phase current flows<br><br>OFF: V phase current does not flow | Shift control actuator assembly [parking lock motor(MVA)] signal circuit |
| W Phase Crnt-Carry Status | W phase current-carrying status /<br><br>ON or OFF | ON: W phase current flows<br><br>OFF: W phase current does not flow | Shift control actuator assembly [parking lock motor(MWA)] signal circuit |
| U Phase Voltage Status | U phase voltage status /F<br><br>ON or OFF | ON: 9 to 14 V<br><br>OFF: 0 V | Shift control actuator assembly [parking lock motor(MUA)] signal circuit |
| V Phase Voltage Status | V phase voltage status /<br><br>ON or OFF | ON: 9 to 14 V<br><br>OFF: 0 V | Shift control actuator assembly [parking lock motor(MVA)] signal circuit |
| W Phase Voltage Status | W phase voltage status /<br><br>ON or OFF | ON: 9 to 14 V<br><br>OFF: 0 V | Shift control actuator assembly [parking lock motor(MWA)] signal circuit |
| Battery Voltage Status | BATT voltage status /<br><br>ON or OFF | ON: 8 to 16 V<br><br>OFF: Below 8 V | BATT signal circuit |
| IG (+B) Phase Vol Status | IG (+B) phase voltage status /<br><br>ON or OFF | ON: 10 to 16 V<br><br>OFF: Below 10 V | +B signal circuit |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ACC Condition Signal | ACC condition signal /<br><br>ON or OFF | ON: 5 V or higher<br><br>OFF: Below 5 V | Judged according to the ACC signal via CAN communication line |
| Init Drv Cntrl Completed | Initial drive control completed /<br><br>OK or NG | OK: Initial drive control complete<br><br>NG: Initial drive control not complete | - |
| Cmplte of Detect Lck Pos | Completion of detecting lock position /<br><br>OK or NG | OK: Detection of lock position completed<br><br>NG: Detection of lock position not completed | - |
| Cmplte of Detect Unlck Pos | Completion of detecting unlock position /<br><br>OK or NG | OK: Detection of unlock position completed<br><br>NG: Detection of unlock position not completed | - |
| P/Not P Move Shft Range | P/Not P movable shift range /<br><br>Set or Unset | Set: P/Not P movable shift range set<br><br>Unset: P/Not P movable shift range unset | - |
| Main Relay | Integration relay /<br><br>Normal or Abnoml | Normal: Integration relay normal<br><br>Abnoml: Integration relay fault | Integration relay circuit |
| Current flag record | Current flag record<br><br>ON or OFF | ON: Current flag record stored<br><br>OFF: Current flag record not stored | - |
| Number of Diagnosis Code | Number of diagnosis code /<br><br>Min: 0, Max: 255 | Actual number of DTCs | - |

# DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for that code in the table below and proceed to the appropriate page.

HINT:

- Remove the P CON MAIN fuse to clear DTCs C2300, C2301, C2303, C2304, C2305, C2306, C2307 and C2309 because they cannot be clear with the Techstream.
- When a DTC is detected, the master warning light comes on and an error message is indicated on the multi-display.

### *Electronic Shift Lever System*

| DTC Code | Detection Item | Trouble Area | Master Warning Light | Multi-display Error Message | Memory | See page |
|---|---|---|---|---|---|---|
| C2300 | Actuator System Malfunction | - Transmission control ECU assembly<br>- Auxiliary battery<br>- Integration relay<br>- Shift control actuator assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |
| C2301 | Shift Changing Time Malfunction | - Auxiliary battery<br>- Shift control actuator assembly<br>- Hybrid vehicle transaxle assembly<br>- Transmission control ECU assembly | Comes on | Comes on | DTC stored | INFO |
| C2303 | Short in Power Source Relay Circuit | - Transmission control ECU assembly<br>- Integration relay<br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | Multi-display Error Message | Memory | See page |
|---|---|---|---|---|---|---|
| C2304 | Open or Short Circuit in U Phase | - Auxiliary battery<br>- Transmission control ECU assembly<br>- Shift control actuator assembly<br>- Integration relay<br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |
| C2305 | Open or Short Circuit in V Phase | - Auxiliary battery<br>- Transmission control ECU assembly<br>- Shift control actuator assembly<br>- Integration relay<br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |
| C2306 | Open or Short Circuit in W Phase | - Auxiliary battery<br>- Transmission control ECU assembly<br>- Shift control actuator assembly<br>- Integration relay<br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |
| C2307 | Power Supply | - Transmission control ECU assembly<br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |
| C2308 | EEPROM Malfunction | - Transmission control ECU assembly | - | - | DTC stored | INFO |
| C2309 | Open in B+ Circuit | - Transmission control | Comes on | Comes on | DTC stored | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | Multi-display Error Message | Memory | See page |
|---|---|---|---|---|---|---|
| | | ECU assembly<br><br>- Auxiliary battery<br><br>- Wire harness or connector | | | | |
| C2310 | Open or Short Circuit in Battery Circuit | - P CON MAIN fuse<br><br>- Transmission control ECU assembly<br><br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |
| C2311 | Communication Error from HV ECU | - Transmission control ECU assembly<br><br>- Power management control ECU<br><br>- Wire harness or connector | Comes on | Comes on | DTC stored | INFO |
| C2315 | HV System | - Power management control ECU | Comes on | Comes on | DTC stored | INFO |
| U0146 | Lost Communication with Body ECU | - CAN communication system | - | - | DTC stored | INFO |

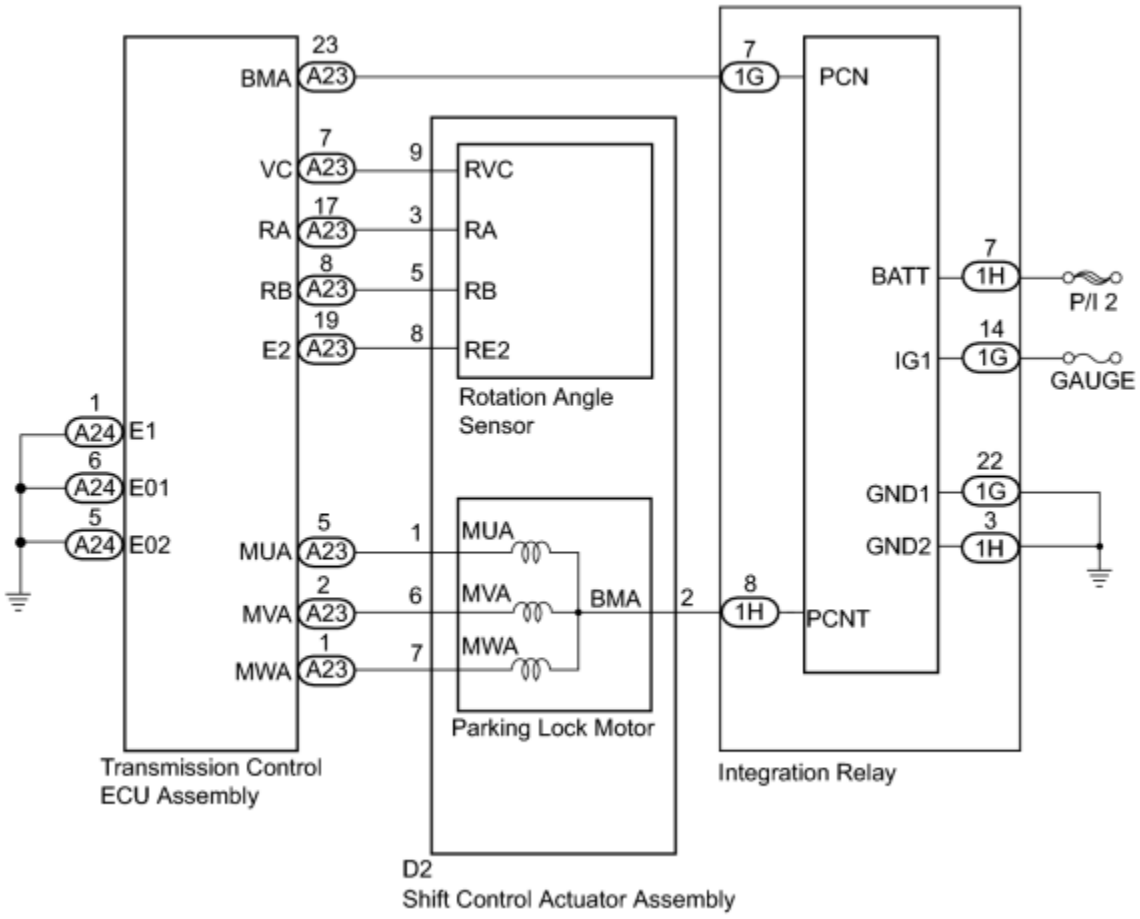
| DTC | C2300 | Actuator System Malfunction |
|---|---|---|

# DESCRIPTION

The shift control actuator consists of the parking lock motor and the rotation angle sensor. The transmission control ECU receives a P position switch signal from the power management control ECU (HV CPU) and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU also detects the rotor rotation angle through the rotation angle sensor to control timing of current application to the coils. The transmission control ECU outputs this DTC when it detects a malfunction in the shift control actuator system.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2300 | Open or short in the integration relay or shift control actuator assembly (parking lock motor or rotation angle sensor), or internal malfunction of the shift control actuator assembly (parking lock motor or rotation angle sensor). | • Transmission control ECU assembly<br>• Auxiliary battery<br>• Integration relay<br>• Shift control actuator assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

It is not possible to clear the following DTCs using the Techstream: DTCs C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FREEZE FRAME DATA |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Read the freeze frame data "Current flag record" of C2300.

***Result***

| Result | Proceed to |
|---|---|
| OFF | A |
| ON | B |

(e) Turn the power switch off.

B REPLACE TRANSMISSION CONTROL ECU ASSEMBLY

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (TRANSMISSION CONTROL) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Check if DTCs are output.

***Result***

| Result | Proceed to |
|---|---|
| Any of the following DTCs are not output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| C2304 | Open or Short Circuit in U Phase |
| C2305 | Open or Short Circuit in V Phase |
| C2306 | Open or Short Circuit in W Phase |

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK FREEZE FRAME DATA |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Read the freeze frame data of C2300.

***Result***

| Result | Proceed to |
|---|---|
| IG (+B) voltage is 9 V or more | A |
| IG (+B) voltage is less than 9 V | B |

(e) Turn the power switch off.

B ▶ REPLACE AUXILIARY BATTERY

A

▼

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Turn the power switch on (IG).

(b) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(c) Read and record the DTCs and freeze frame data.

(d) Turn the power switch off.

(e) Disconnect the P CON MAIN fuse and wait for at least 60 seconds.

(f) Check for DTCs again to see if the DTCs are cleared.

NEXT

▼

| | |
|---|---|
| 5. | CHARGE AUXILIARY BATTERY |

(a) Charge the auxiliary battery.

NEXT

▼

| | |
|---|---|
| 6. | CHECK DTC OUTPUT (SIMULATION TEST) |

(a) Connect the Techstream to the DLC3.

(b) Release the brake pedal and turn the power switch on (IG).

HINT:

Do not turn the power switch on (READY).

(c) Depress the brake pedal and move the selector lever to N.

(d) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(e) Check if DTCs are output.

***Result***

| Result | Proceed to |
|---|---|
| C2300 is output | A |
| DTC is not output. | B |

(f) Turn the power switch off.

B ▶ END (AUXILIARY BATTERY WAS INSUFFICIENTLY CHARGED)

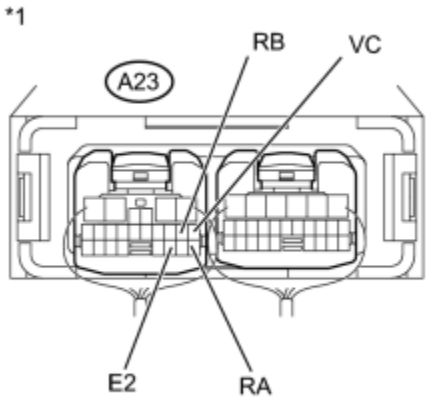
A

▼

| | |
|---|---|
| 7. | CHECK TRANSMISSION CONTROL ECU ASSEMBLY (VC, RA, RB, E2) |

(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A23-7 (VC) - A23-19 (E2) | Engine stopped (hybrid system stopped), power switch on (IG) | 4.5 to 5.5 V |
| A23-17 (RA) - A23-19 (E2) | Power switch off to on (IG) | 0 to 1.5 V ←→ 4 to 5.5 V |
| A23-8 (RB) - A23-19 (E2) | Power switch off to on (IG) | 0 to 1.5 V ←→ 4 to 5.5 V |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Transmission Control ECU Assembly) |

(b) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR)

OK

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (SHIFT CONTROL ACTUATOR ASSEMBLY POWER SOURCE CIRCUIT) |

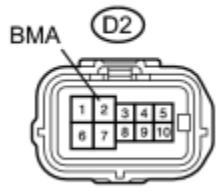
(a) Disconnect the D2 shift control actuator assembly.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

*1




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) - Body ground | Power switch on (IG) | 9 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Turn the power switch off.

(e) Connect the shift control actuator assembly.

NG CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY POWER SOURCE CIRCUIT)

OK

| | |
|---|---|
| 9. | READ VALUE USING TECHSTREAM (U, V, W VOLTAGE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Data List / U Phase Voltage Value, V Phase Voltage Value, W Phase Voltage Value.

(d) Read the data list displayed on the Techstream.

Result:

| Tester Display | Switch Condition | Specified Condition |
|---|---|---|

| Tester Display | Switch Condition | Specified Condition |
|---|---|---|
| U Phase Voltage Value | Power switch on (IG) | 9 to 14 V |
| V Phase Voltage Value | Power switch on (IG) | 9 to 14 V |
| W Phase Voltage Value | Power switch on (IG) | 9 to 14 V |

Turn the power switch off.

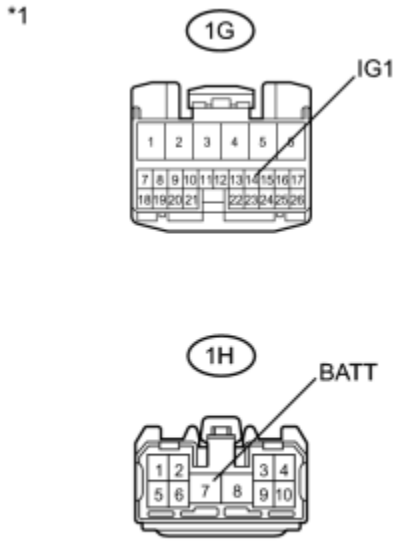
NG ▶ CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR)

OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

| 10. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY POWER SOURCE CIRCUIT) |
|---|---|

(a) Disconnect the 1G and 1H integration relay connectors.

(b) Turn the power switch on (IG).




(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1H-7 (BATT) - Body ground | Always | 9 to 14 V |
| 1G-14 (IG1) - Body ground | Power switch on (IG) | 9 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Turn the power switch off.

(e) Connect the integration relay connectors.

NG ▶ CHECK AND REPAIR POWER SOURCE CIRCUIT

OK

▼

| 11. | CHECK HARNESS AND CONNECTOR (SHIFT CONTROL ACTUATOR ASSEMBLY - |
|---|---|

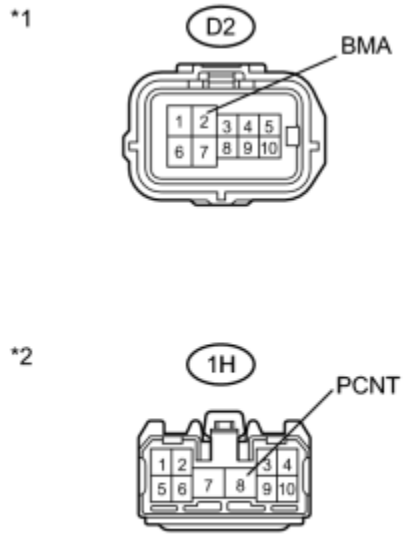
| | |
|---|---|
| | INTEGRATION RELAY) |

(a) Disconnect the D2 shift control actuator assembly connector.

(b) Disconnect the 1H integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) - 1H-8 (PCNT) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) or 1H-8 (PCNT) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Connect the integration relay connector.

(e) Connect the shift control actuator assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - INTEGRATION RELAY) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the 1G integration relay connector.

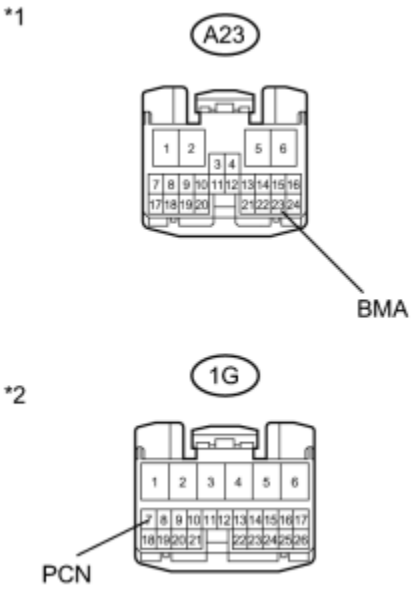
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-23 (BMA) - 1G-7 (PCN) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-23 (BMA) or 1G-7 (PCN) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Connect the integration relay connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BODY GROUND) |

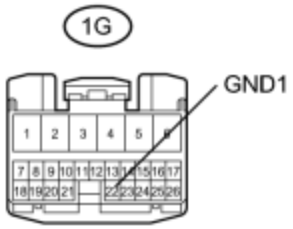
(a) Disconnect the 1G and 1H integration relay connectors.

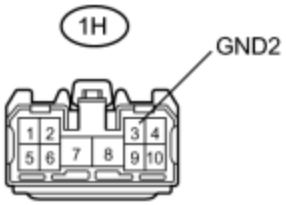
(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1G-22 (GND1) - Body ground | Power switch off | Below 1 Ω |
| 1H-3 (GND2) - Body ground | Power switch off | Below 1 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |

(c) Connect the integration relay connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE INTEGRATION NO.1 RELAY**

| | |
|---|---|
| 14. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the D2 shift control actuator assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

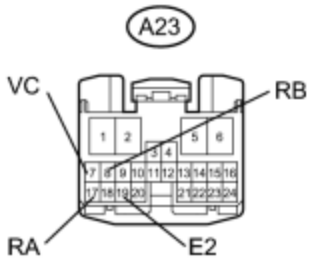
Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-7 (VC) - D2-9 (RVC) | Power switch off | Below 1 Ω |
| A23-17 (RA) - D2-3 (RA) | Power switch off | Below 1 Ω |
| A23-8 (RB) - D2-5 (RB) | Power switch off | Below 1 Ω |
| A23-19 (E2) - D2-8 (RE2) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

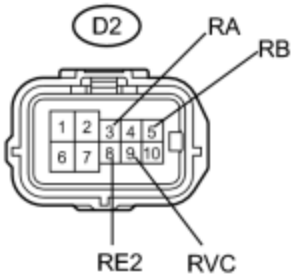
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-7 (VC) or D2-9 (RVC) - Body | Power switch | 10 kΩ or higher |

*1




| | | |
|---|---|---|
| ground and other terminals | off | |
| A23-17 (RA) or D2-3 (RA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-8 (RB) or D2-5 (RB) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-19 (E2) or D2-8 (RE2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

*2




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Connect the shift control actuator assembly connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

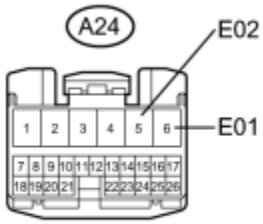
| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - BODY GROUND) |

(a) Disconnect the A24 transmission control ECU assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

*1




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A24-6 (E01) - Body ground | Power switch off | Below 1 Ω |
| A24-5 (E02) - Body ground | Power switch off | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

H

Result:

| Result | Proceed to |
|---|---|
| Abnormal | A |
| Normal | B |

(c) Connect the transmission control ECU assembly connector.

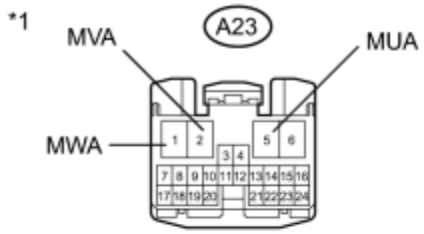
B CHECK SHIFT CONTROL ACTUATOR ASSEMBLY

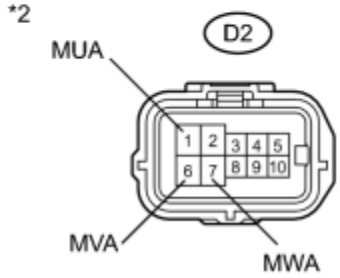
A **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 16. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the D2 shift control actuator assembly connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-5 (MUA) - D2-1 (MUA) | Power switch off | Below 1 Ω |
| A23-2 (MVA) - D2-6 (MVA) | Power switch off | Below 1 Ω |
| A23-1 (MWA) - D2-7 (MWA) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-5 (MUA) or D2-1 (MUA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-2 (MVA) or D2-6 (MVA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-1 (MWA) or D2-7 (MWA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Connect the shift control actuator assembly connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

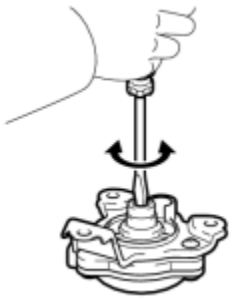
▼

| | |
|---|---|
| 17. | CHECK SHIFT CONTROL ACTUATOR ASSEMBLY |

(a) Disconnect the shift control actuator assembly connector.

(b) Remove the shift control actuator 3 bolts INFO.

(c) Slightly pull the shift control actuator assembly from the hybrid vehicle transaxle.



P

(d) Using a screwdriver with its tip wrapped with protective tape or a piece of cloth, rotate the shaft.

OK:

The shift control actuator assembly turns smoothly.

- During this inspection, make sure to use a screwdriver with its tip wrapped with protective tape or a piece of cloth to prevent the splines of the actuator from being damaged.
- The shift control actuator cannot be disassembled.

NG ▶ REPLACE SHIFT CONTROL ACTUATOR ASSEMBLY

OK

▼

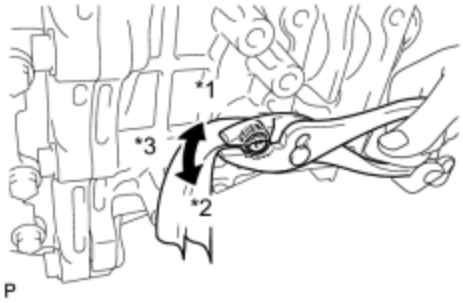
| | |
|---|---|
| 18. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Wrap the shaft with a piece of cloth and turn it using pliers.

OK:

The shaft rotates smoothly in the lock and unlock directions.

- Rotates the shaft using torque within 4 to 7 N*m (41 to 71 kgf*cm, 36 to 61 in.*lbf).




- During this inspection, ensure to use a piece of cloth to prevent the shaft splines from being damaged.

## Text in Illustration

| | |
|---|---|
| *1 | Lock |
| *2 | Unlock |
| *3 | Rotate approximately 20°. |

(b) Set the shaft in the lock position after the inspection.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

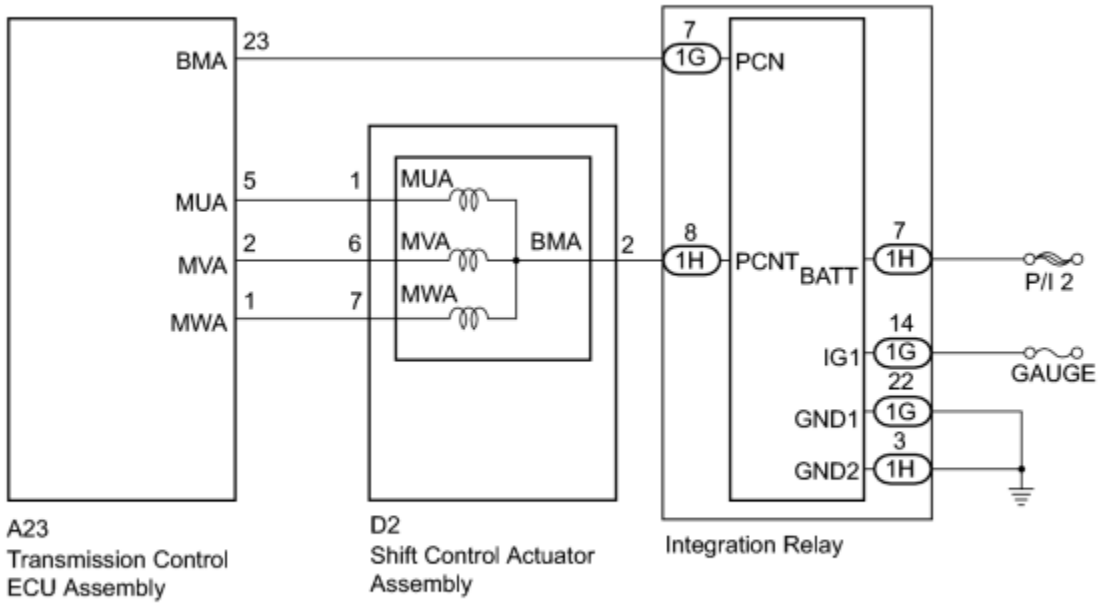
| DTC | C2301 | Shift Changing Time Malfunction |
|---|---|---|

# DESCRIPTION

The transmission control ECU receives a P position switch signal from the power management control ECU (HV CPU) and then activates the shift control actuator. At the same time, the transmission control ECU detects the length of time it takes for the parking lock mechanism to switch. The transmission control ECU outputs this DTC when this length of time is longer than specification.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2301 | A shift control actuator assembly (parking lock motor) internal malfunction (parking lock motor spins freely) is detected for 2 seconds or more. | • Auxiliary battery<br>• Shift control actuator assembly<br>• Hybrid vehicle transaxle assembly<br>• Transmission control ECU assembly |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

It is not possible to clear the following DTCs using the Techstream: DTCs C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FREEZE FRAME DATA |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Read the freeze frame data of C2301.

***Result***

| Result | Proceed to |
|---|---|
| IG (+B) voltage is 9 V or more | A |
| IG (+B) voltage is less than 9 V | B |

(e) Turn the power switch off.

B ▶ REPLACE AUXILIARY BATTERY

A

▼

| | |
|---|---|
| 2. | CLEAR DTC |

(a) Turn the power switch on (IG).

(b) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(c) Read and record the DTCs and freeze frame data.

(d) Turn the power switch off.

(e) Disconnect the P CON MAIN fuse and wait for at least 60 seconds.

(f) Check for DTCs again to see if the DTCs are cleared.

NEXT

| | |
|---|---|
| 3. | CHARGE AUXILIARY BATTERY |

(a) Charge the auxiliary battery.

NEXT

| | |
|---|---|
| 4. | CHECK DTC OUTPUT (SIMULATION TEST) |

(a) Connect the Techstream to the DLC3.

(b) Release the brake pedal and turn the power switch on (IG).

HINT:

Do not turn the power switch on (READY).

(c) Depress the brake pedal and move the selector lever to N.

(d) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(e) Check if DTCs are output.

***Result***

| Result | Proceed to |
|---|---|
| C2301 is output | A |
| DTC is not output. | B |

(f) Turn the power switch off.

B END (AUXILIARY BATTERY WAS INSUFFICIENTLY CHARGED)

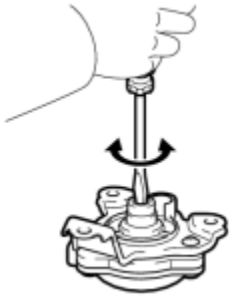
A

| | |
|---|---|
| 5. | CHECK SHIFT CONTROL ACTUATOR ASSEMBLY |

(a) Disconnect the shift control actuator assembly connector.

(b) Remove the shift control actuator 3 bolts INFO.

(c) Slightly pull the shift control actuator assembly from the hybrid vehicle transaxle.



P

(d) Using a screwdriver with its tip wrapped with protective tape or a piece of cloth, rotate the shaft.

OK:

The shift control actuator assembly turns smoothly.

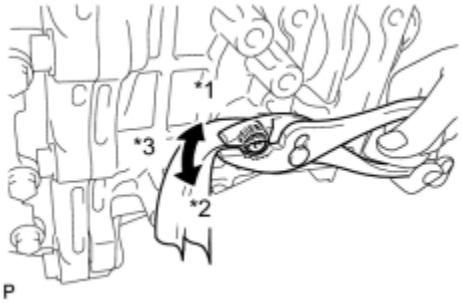
- During this inspection, make sure to use a screwdriver with its tip wrapped with protective tape or a piece of cloth to prevent the splines of the actuator from being damaged.
- The shift control actuator cannot be disassembled.

NG ▶ REPLACE SHIFT CONTROL ACTUATOR ASSEMBLY

OK

▼

| | |
|---|---|
| 6. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY |




P

(a) Wrap the shaft with a piece of cloth and turn it using pliers.

OK:

The shaft rotates smoothly in the lock and unlock directions.

- Rotates the shaft using torque within 4 to 7 N*m (41 to 71 kgf*cm, 36 to 61 in.*lbf).
- During this inspection, ensure to use a piece of cloth to prevent the shaft splines from being damaged.

## Text in Illustration

| | |
|---|---|
| *1 | Lock |
| *2 | Unlock |
| *3 | Rotate approximately 20°. |

(b) Set the shaft in the lock position after the inspection.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

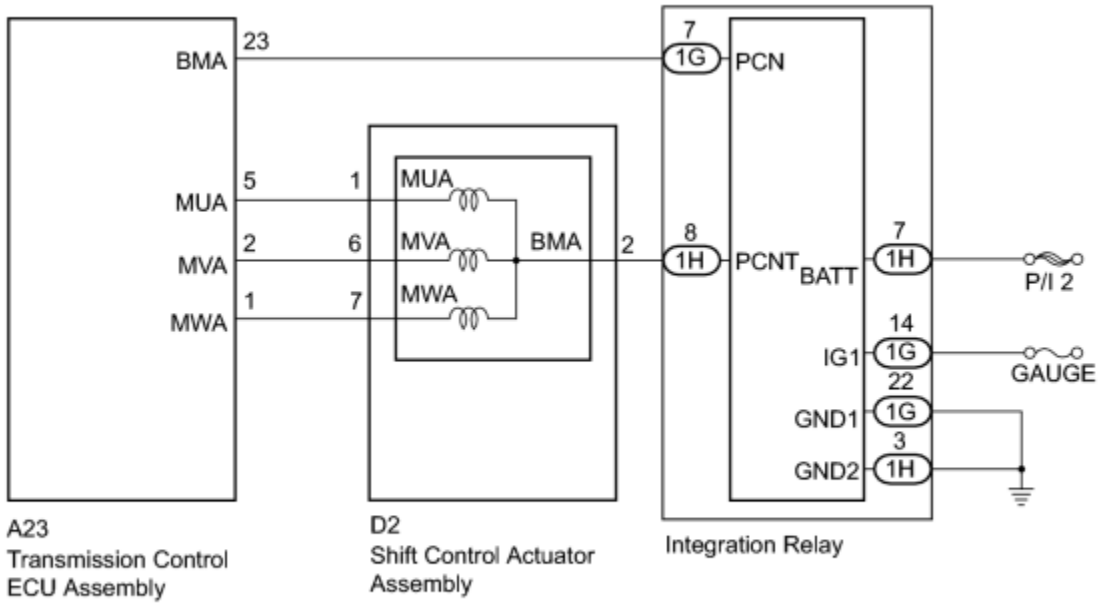
| DTC | C2303 | Short in Power Source Relay Circuit |
|---|---|---|

# DESCRIPTION

The integration relay is activated by output voltage from the transmission control ECU and supplies power to the shift control actuator (parking lock motor). The transmission control ECU outputs this DTC when it detects a malfunction in the integration relay.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2303 | When the integration relay is off, voltage of transmission control ECU terminal MUA, MVA and MWA are 6 V or more for 0.064 seconds or more. | • Transmission control ECU assembly<br>• Integration relay<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

It is not possible to clear the following DTCs using the Techstream: DTCs C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

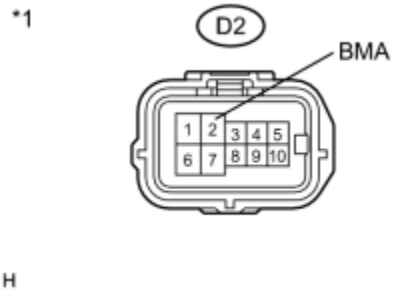
# PROCEDURE

| | |
|---|---|
| 1. | CHECK SHIFT CONTROL ACTUATOR ASSEMBLY (SHIFT CONTROL ACTUATOR ASSEMBLY POWER SOURCE CIRCUIT) |

(a) Disconnect the D2 shift control actuator assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) - Body ground | Power switch off | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(c) Connect the shift control actuator assembly connector.

(d) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - INTEGRATION RELAY)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR) |

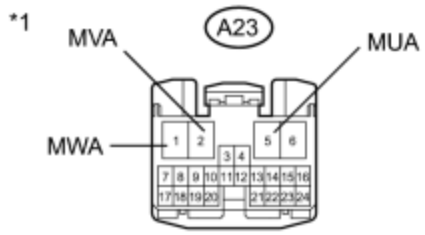
(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the D2 shift control actuator assembly connector.

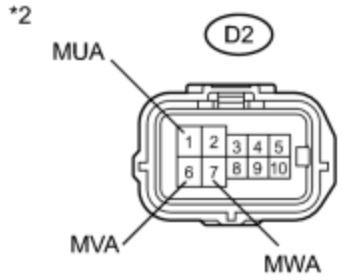
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):

| Tester Connection | Switch | Specified |
|---|---|---|




| | Condition | Condition |
|---|---|---|
| A23-5 (MUA) or D2-1 (MUA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-2 (MVA) or D2-6 (MVA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-1 (MWA) or D2-7 (MWA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Connect the shift control actuator assembly connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

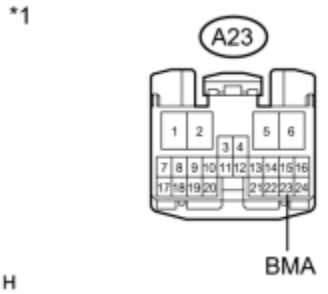
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - INTEGRATION RELAY) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the 1G integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-23 (BMA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

(d) Connect the integration relay connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK
▼

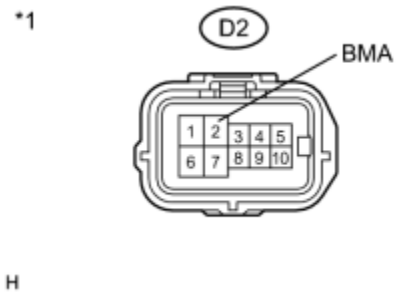
| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (SHIFT CONTROL ACTUATOR ASSEMBLY - INTEGRATION RELAY) |

(a) Disconnect the D2 shift control actuator assembly connector.

(b) Disconnect the 1H integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Connect the integration relay connector.

(e) Connect the shift control actuator assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE INTEGRATION NO.1 RELAY**

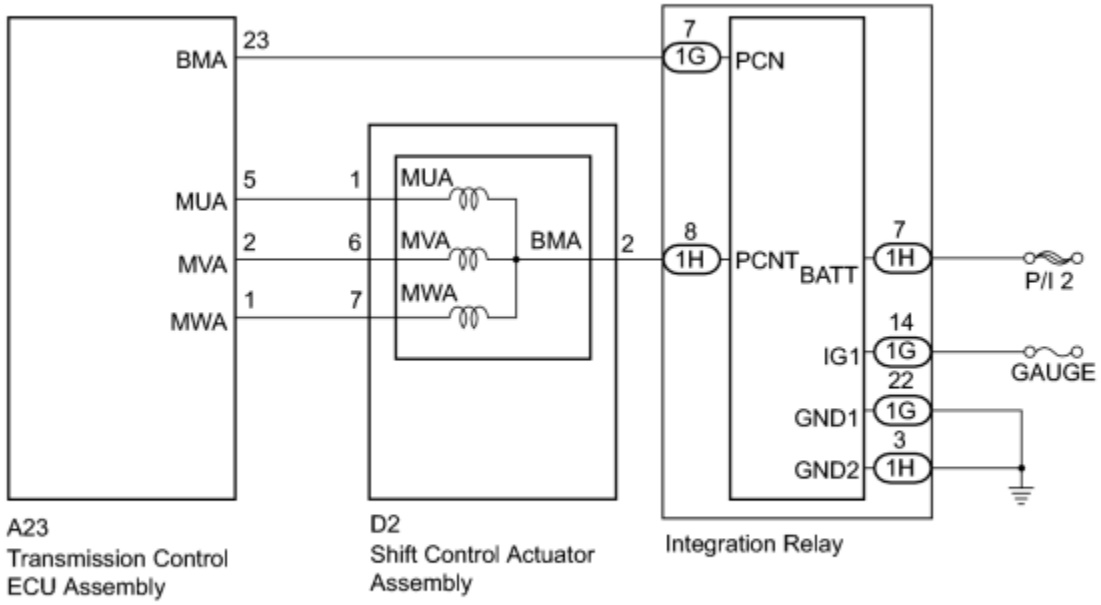
| | | |
|---|---|---|
| DTC | C2304 | Open or Short Circuit in U Phase |
| DTC | C2305 | Open or Short Circuit in V Phase |
| DTC | C2306 | Open or Short Circuit in W Phase |

# DESCRIPTION

The shift control actuator consists of the parking lock motor and the rotation angle sensor. The transmission control ECU receives a P position switch signal from the power management control ECU (HV CPU) and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU outputs these DTCs when it detects a malfunction in the parking lock motor system.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2304 | With the power switch on (IG) (battery voltage is 8 V or more), voltage of transmission control ECU terminal MUA is 6 V or less for 1 second or more. | • Auxiliary battery<br>• Transmission control ECU assembly<br>• Shift control actuator assembly<br>• Integration relay<br>• Wire harness or connector |
| C2305 | With the power switch on (IG) (battery voltage is 8 V or more), voltage of transmission control ECU terminal MVA is 6 V or less for 1 second or more. | |
| C2306 | With the power switch on (IG) (battery voltage is 8 V or more), voltage of transmission control ECU terminal MWA is 6 V or less for 1 second or more. | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

It is not possible to clear the following DTCs using the Techstream: DTCs C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (TRANSMISSION CONTROL) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Check if DTCs are output.

*Result*

| Result | Proceed to |
|---|---|
| C2304, C2305 and C2306 are detected simultaneously | A |
| One of C2304, C2305 and C2306 is detected | B |

HINT:

- If DTCs C2304, 2305 and 2306 are stored at the same time, there may be a malfunction in the parking lock motor (BMA signal) power source circuit.
- If DTC C2304, 2305 or 2306 is stored individually, there may be a malfunction in the parking lock motor (MUA, MVA or MWA signal) circuits.

(e) Turn the power switch off.

B READ VALUE USING TECHSTREAM (U, V, W VOLTAGE)

A

| | |
|---|---|
| 2. | CHECK FREEZE FRAME DATA |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Read the freeze frame data of C2304, 2305 and 2306.

*Result*

| Result | Proceed to |
|---|---|
| IG (+B) voltage is 9 V or more | A |
| IG (+B) voltage is less than 9 V | B |

(e) Turn the power switch off.

B REPLACE AUXILIARY BATTERY

A

| | |
|---|---|
| 3. | CLEAR DTC |

(a) Turn the power switch on (IG).

(b) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(c) Read and record the DTCs and freeze frame data.

(d) Turn the power switch off.

(e) Disconnect the P CON MAIN fuse and wait for at least 60 seconds.

(f) Check for DTCs again to see if the DTCs are cleared.

NEXT

| | |
|---|---|
| 4. | CHARGE AUXILIARY BATTERY |

(a) Charge the auxiliary battery.

NEXT

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (SIMULATION TEST) |

(a) Connect the Techstream to the DLC3.

(b) Release the brake pedal and turn the power switch on (IG).

HINT:

Do not turn the power switch on (READY).

(c) Depress the brake pedal and move the selector lever to N.

(d) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(e) Check if DTCs are output.

***Result***

| Result | Proceed to |
|---|---|
| C2304, 2305 or 2306 is output | A |
| DTC is not output. | B |

(f) Turn the power switch off.

B END (AUXILIARY BATTERY WAS INSUFFICIENTLY CHARGED)

A

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (SHIFT CONTROL ACTUATOR ASSEMBLY POWER SOURCE CIRCUIT) |

(a) Disconnect the D2 shift control actuator assembly connector.

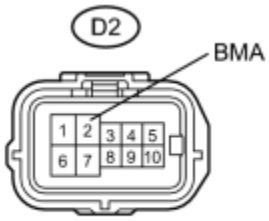
(b) Turn the power switch on (IG)

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) - Body ground | Power switch on (IG) | 9 to 14 V |

*1




H

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Turn the power switch off.

(e) Connect the shift control actuator assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY POWER SOURCE CIRCUIT)

OK

▼

| | |
|---|---|
| 7. | READ VALUE USING TECHSTREAM (U, V, W VOLTAGE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Data List / U Phase Voltage Value, V Phase Voltage Value, W Phase Voltage Value.

(d) Read the Data List displayed on the Techstream.

Result:

| Tester Display | Switch Condition | Specified Condition |
|---|---|---|
| U Phase Voltage Value | Power switch on (IG) | 9 to 14 V |
| V Phase Voltage Value | Power switch on (IG) | 9 to 14 V |

| Tester Display | Switch Condition | Specified Condition |
|---|---|---|
| W Phase Voltage Value | Power switch on (IG) | 9 to 14 V |

(e) Turn the power switch off.

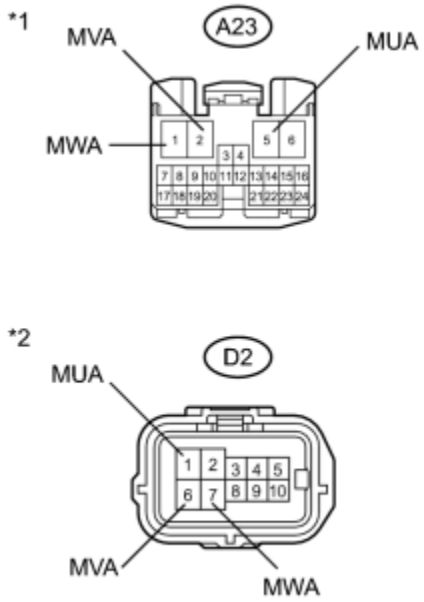
NG ▶ CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR)

OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the D2 shift control actuator assembly connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-5 (MUA) - D2-1 (MUA) | Power switch off | Below 1 Ω |
| A23-2 (MVA) - D2-6 (MVA) | Power switch off | Below 1 Ω |
| A23-1 (MWA) - D2-7 (MWA) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-5 (MUA) or D2-1 (MUA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-2 (MVA) or D2-6 (MVA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-1 (MWA) or D2-7 (MWA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Connect the shift control actuator assembly connector.

(e) Connect the transmission control ECU assembly connector.

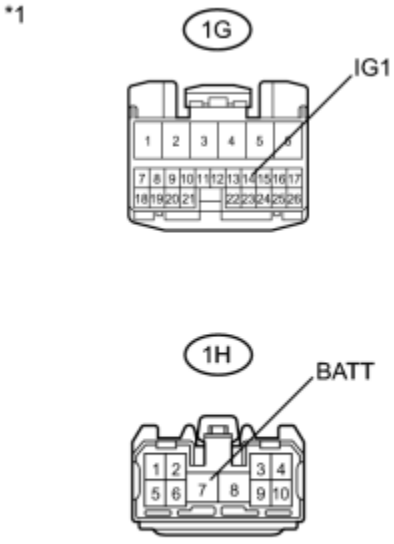
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE SHIFT CONTROL ACTUATOR ASSEMBLY**

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY POWER SOURCE CIRCUIT) |

(a) Disconnect the 1G and 1H integration relay connectors.

(b) Turn the power switch on (IG)




(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1H-7 (BATT) - Body ground | Always | 9 to 14 V |
| 1G-14 (IG1) - Body ground | Power switch on (IG) | 9 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Turn the power switch off.

(e) Connect the integration relay connectors.

NG ▶ CHECK AND REPAIR POWER SOURCE CIRCUIT

OK

▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (SHIFT CONTROL ACTUATOR ASSEMBLY - INTEGRATION RELAY) |

(a) Disconnect the D2 shift control actuator assembly connector.

(b) Disconnect the 1H integration relay connector.

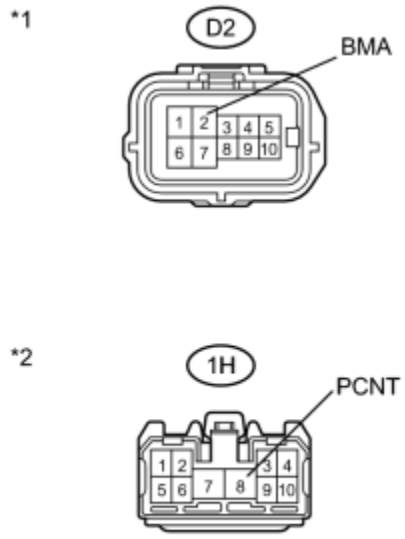
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) - 1H-8 (PCNT) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D2-2 (BMA) or 1H-8 (PCNT) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Connect the integration relay connector.

(e) Connect the shift control actuator assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - INTEGRATION RELAY) |

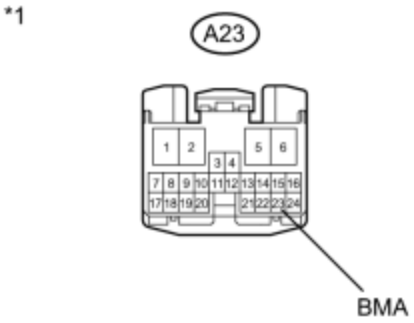
(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the 1G integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

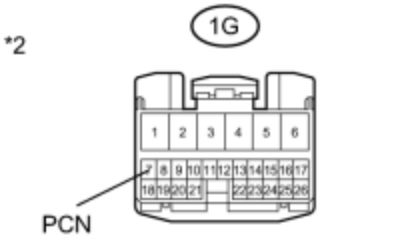
Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-23 (BMA) - 1G-7 (PCN) | Power switch off | Below 1 Ω |




Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-23 (BMA) or 1G-7 (PCN) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Connect the integration relay connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BODY GROUND) |

(a) Disconnect the 1G and 1H integration relay connectors.

(b) Measure the resistance according to the value(s) in the table below.

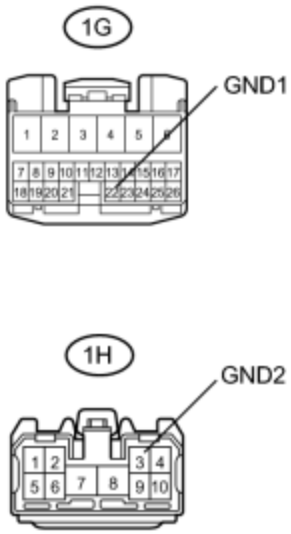
Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1G-22 (GND1) - Body ground | Power switch off | Below 1 Ω |
| 1H-3 (GND2) - Body ground | Power switch off | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |

*1




(c) Connect the integration relay connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE INTEGRATION NO.1 RELAY**

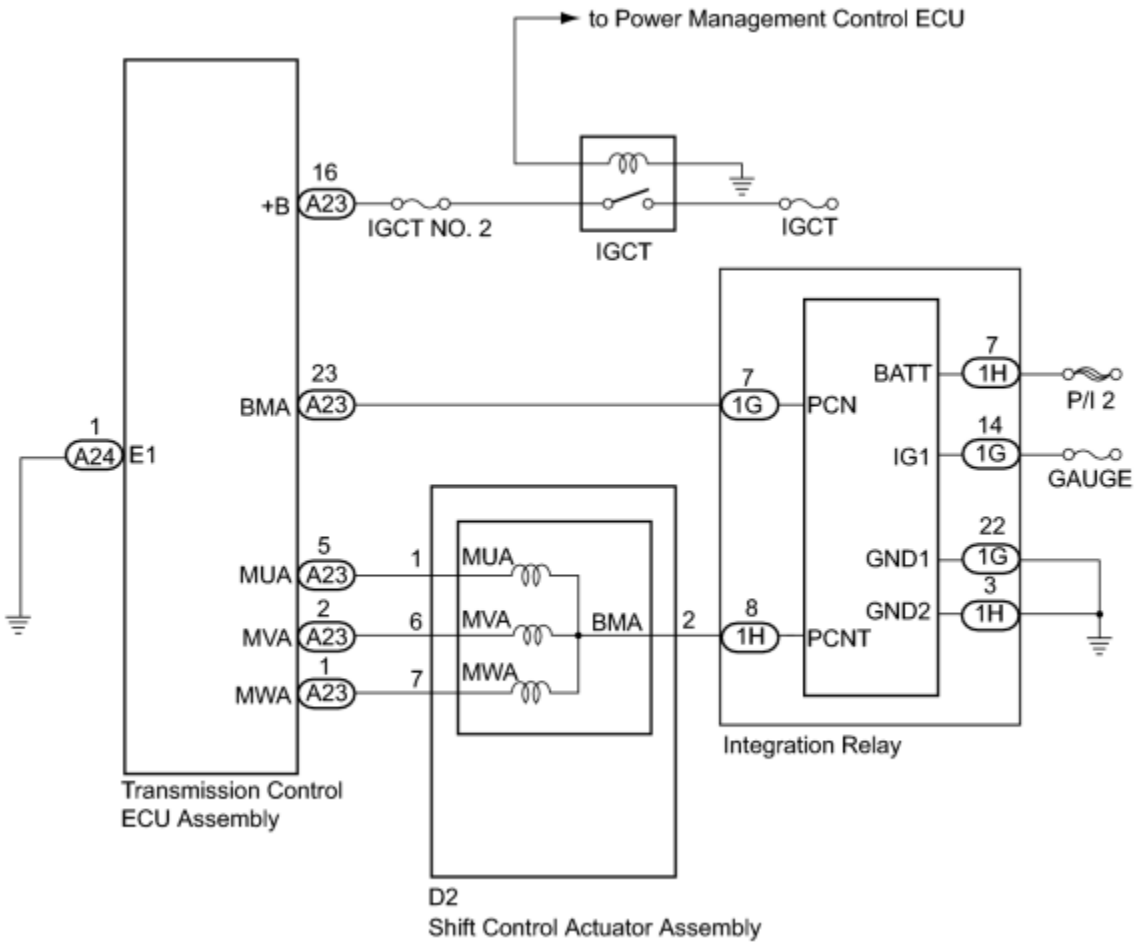
| DTC | C2307 | Power Supply |
|---|---|---|

# DESCRIPTION

The shift control actuator consists of the parking lock motor and the rotation angle sensor. The transmission control ECU receives a P position switch signal from the power management control ECU (HV CPU) and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU outputs this DTC when it detects a malfunction in the parking lock motor system and/or the ground circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2307 | With the power switch on (IG) (IG circuit malfunction is not detected), current of the parking lock motor is 50 A or more or open in the transmission control ECU terminal E1 circuit for 1 second or more. | • Transmission control ECU assembly<br>• Wire harness or connector |

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

It is not possible to clear the following DTCs using the Techstream: DTCs C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

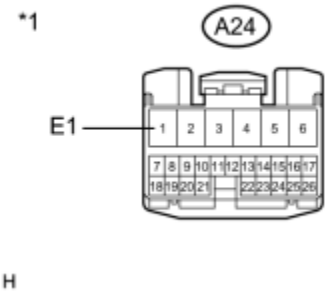
# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - BODY GROUND) |

(a) Disconnect the A24 transmission control ECU assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A24-1 (E1) - Body ground | Power switch off | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

(c) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

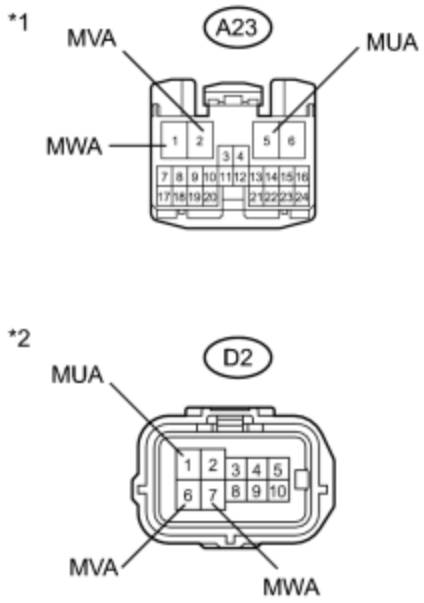
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - SHIFT CONTROL ACTUATOR) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the D2 shift control actuator assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-5 (MUA) or D2-1 (MUA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-2 (MVA) or D2-6 (MVA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A23-1 (MWA) or D2-7 (MWA) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Shift Control Actuator Assembly) |

(d) Connect the shift control actuator assembly connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

| | | |
|---|---|---|
| DTC | C2308 | EEPROM Malfunction |

# DESCRIPTION

The transmission control ECU assembly monitors its internal operation and it will set this DTC when it detects an EEPROM malfunction. If this DTC is output, replace the transmission control ECU assembly.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2308 | EEPROM malfunction | Transmission control ECU assembly |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE TRANSMISSION CONTROL ECU ASSEMBLY |

(a) Replace the transmission control ECU assembly INFO.

NEXT **END**

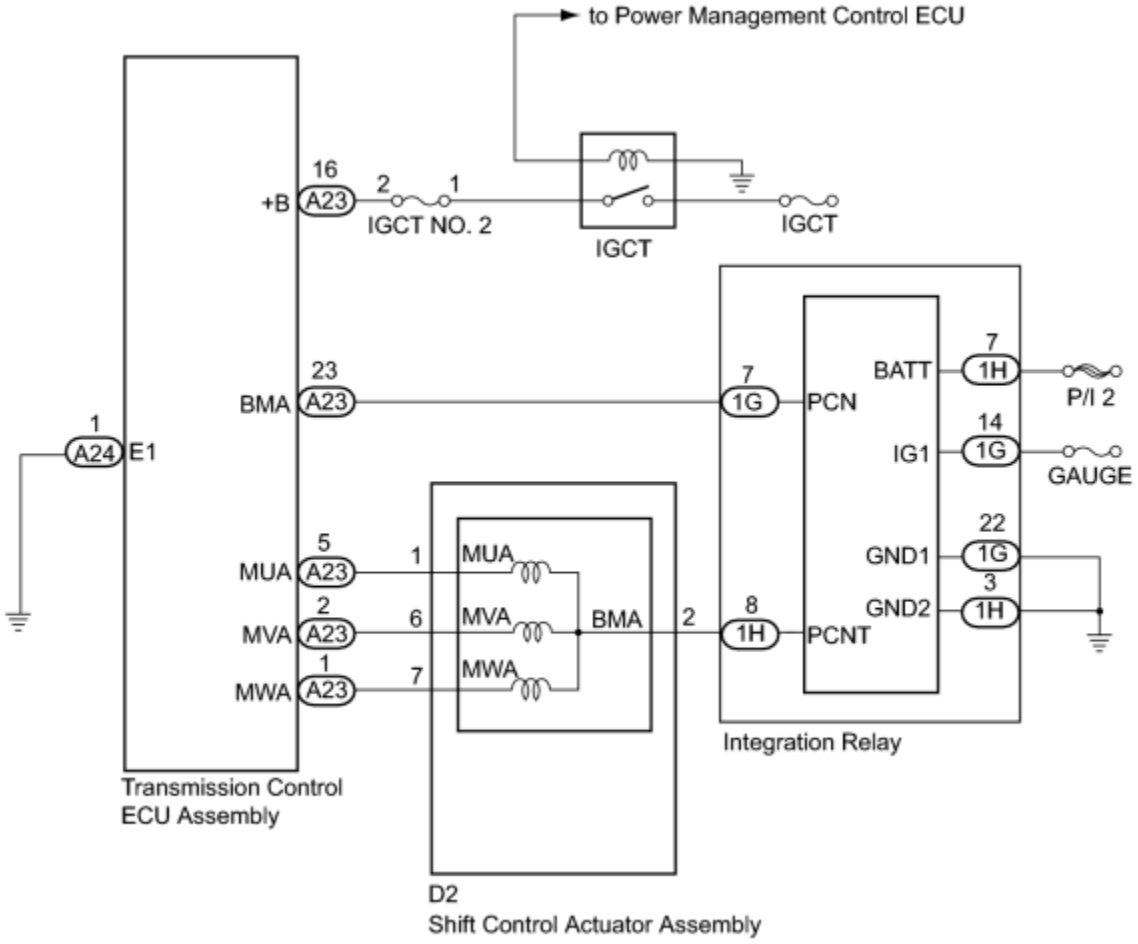
| DTC | C2309 | Open in B+ Circuit |
|---|---|---|

# DESCRIPTION

Battery voltage will be applied to the +B terminal when the power switch is turned on (IG). When a +B terminal voltage malfunction is detected, the transmission control ECU outputs this DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2309 | With the power switch on (IG), voltage of transmission control ECU terminal +B is 3 V or less for 1 second or more. | • Transmission control ECU assembly<br>• Auxiliary battery<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

It is not possible to clear the following DTCs using the Techstream: DTCs C2300 (Actuator System Malfunction), C2301 (Shift Changing Time Malfunction), C2303 (Short in Power Source Relay Circuit), C2304 (Open or Short Circuit in U Phase), C2305 (Open or Short Circuit in V Phase), C2306 (Open or Short Circuit in W Phase), C2307 (Power Supply) and C2309 (Open in B+ Circuit). After the repair, it is necessary to disconnect the P CON MAIN fuse and wait for at least 60 seconds to clear the DTCs.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (IG(+B) VOLTAGE VALUE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Data List / IG(+B) Voltage Value.

(d) Read the Data List displayed on the Techstream.

Result:

| Result | Proceed to |
|---|---|
| 3 V or less | A |
| Other than above | B |

(e) Turn the power switch off.

B ▶ REPLACE TRANSMISSION CONTROL ECU ASSEMBLY

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (BATTERY VOLTAGE VALUE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Data List / Battery Voltage Value.

(d) Read the Data List displayed on the Techstream.

Result:

| Result | Proceed to |
|---|---|
| 9 V or less | A |
| Other than above | B |

(e) Turn the power switch off.

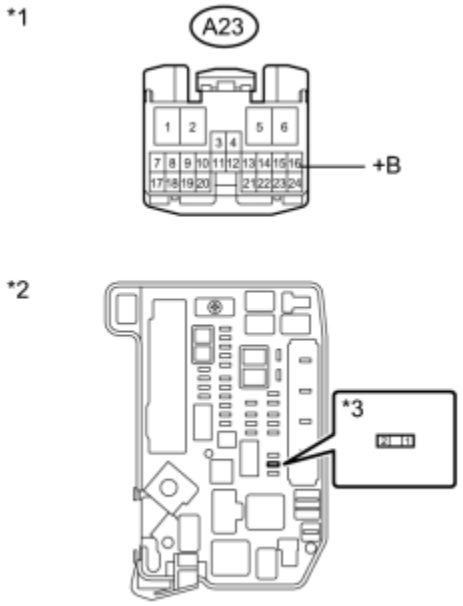
B ▶ CHARGE OR REPLACE AUXILIARY BATTERY

A ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - IGCT NO. 2 FUSE) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Remove the IGCT No. 2 fuse from the engine room junction block assembly.




(c) Measure the resistance according to the value(s) in the table below.

Standard resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-16 (+B) - 2 (IGCT No. 2 fuse) | Power switch off | Below 1 Ω |

Standard resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-16 (+B) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Engine Room Junction Block Assembly |
| *3 | IGCT No. 2 fuse |

NOTICE:

Be careful not to break the fuse holder by forcing the tester probes into it during this inspection.

(d) Install the IGCT No. 2 fuse.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **CHECK AND REPAIR POWER SOURCE CIRCUIT**

| DTC | C2310 | Open or Short Circuit in Battery Circuit |
|---|---|---|

# DESCRIPTION

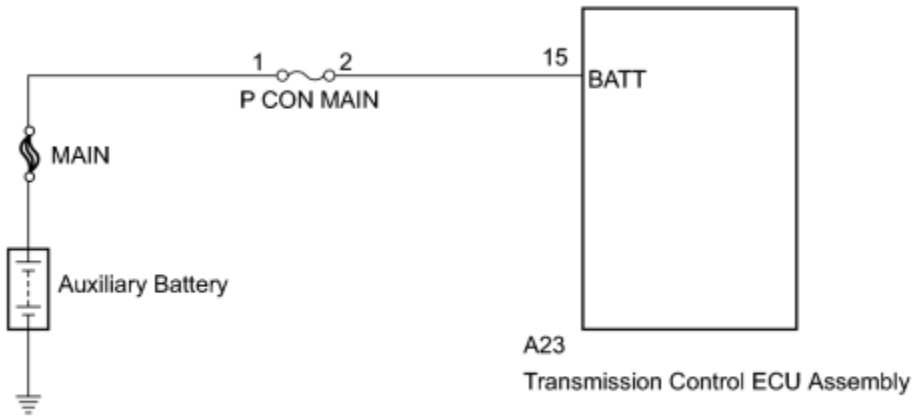
The battery voltage is constantly applied to terminal BATT. The terminal BATT voltage is used to power the transmission control ECU memory. The transmission control ECU outputs this DTC when it detects a malfunction related to terminal BATT.

HINT:

When there is an open or short in the BATT circuit, information on the actuator position ("P position" or "non-P position") stored in the transmission control ECU is cleared every time the power switch is turned off. Therefore, the ECU works to recognize the position each time the power switch is turned on (IG). As a result, the time from when the power switch is turned on (IG) until "READY ON" is indicated may become longer than normal.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2310 | With the power switch on (IG) (IG circuit malfunction is not detected), voltage of transmission control ECU terminal BATT is 8 V or less for 1 second or more. | • P CON MAIN fuse<br>• Transmission control ECU assembly<br>• Wire harness or connector |

# WIRING DIAGRAM



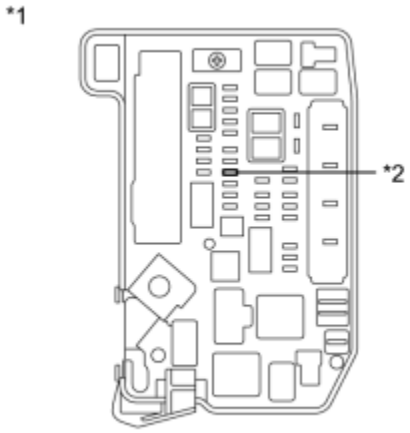

H

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT FUSE (P CON MAIN) |

(a) Remove the P CON MAIN fuse from the engine room junction block assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| P CON MAIN fuse | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | P CON MAIN fuse |

(c) Install the P CON MAIN fuse.

NG ▶ REPLACE FUSE (P CON MAIN)
OK
▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (BATT VOLTAGE VALUE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Data List / Battery Voltage Value.

(d) Read the Data List displayed on the Techstream.

Result:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Battery Voltage Value | Always | 9 to 14 V |

(e) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - P CON MAIN FUSE)

OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - P CON MAIN FUSE) |

(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the P CON MAIN fuse from the engine room junction block assembly.

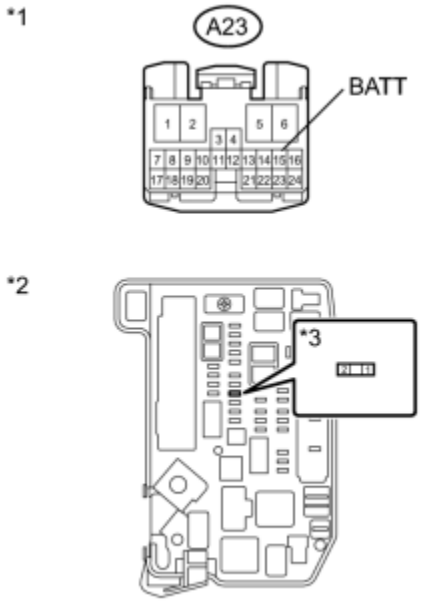
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-15 (BATT) - 2 (P CON MAIN fuse) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-15 (BATT) or 2 (P CON MAIN fuse) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Engine Room Junction Block Assembly |
| *3 | P CON MAIN fuse |

NOTICE:

Be careful not to break the fuse holder by forcing the tester probes into it during this inspection.

(d) Install the P CON MAIN fuse.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **CHECK AND REPAIR POWER SOURCE CIRCUIT**

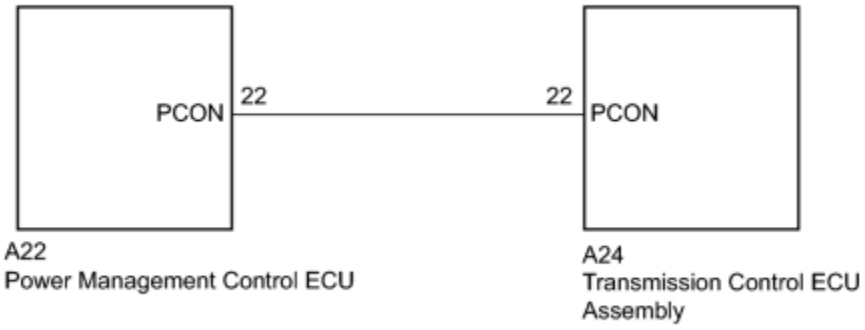
| DTC | C2311 | Communication Error from HV ECU |
|---|---|---|

# DESCRIPTION

The transmission control ECU receives a P position switch signal from the power management control ECU (HV CPU) and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. The transmission control ECU outputs this DTC when it detects a communication error between the power management control ECU (HV CPU) and the transmission control ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2311 | With the power switch on (IG) (IG circuit malfunction is not detected), a signal cannot be received from the power management control ECU (open or short in the PCON terminal circuit) or a pulse signal malfunction is received from the power management control ECU for 2 second or more. | • Transmission control ECU assembly<br>• Power management control ECU<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

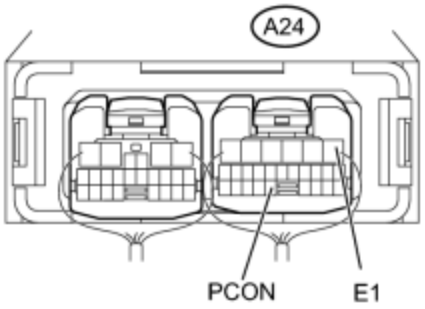
# PROCEDURE

| 1. | CHECK TRANSMISSION CONTROL ECU ASSEMBLY |
|---|---|

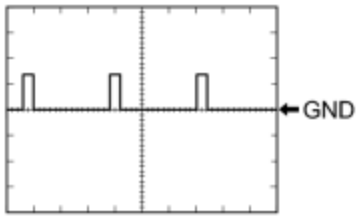
(a) Turn the power switch on (IG).

(b) Connect an oscilloscope between the transmission control ECU assembly terminals specified in the table below, and measure the

*1




*2




waveform.

| Item | Contents |
|---|---|
| Symbols | PCON - E1 |
| Tool setting | 5 V/DIV., 20 msec./DIV. |
| Vehicle condition | Power switch on (IG) |

OK:

The waveform appears as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Transmission Control ECU Assembly) |
| *2 | Waveform |

HINT:

Perform this inspection with the connector connected.

(c) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the A24 transmission control ECU assembly connector.

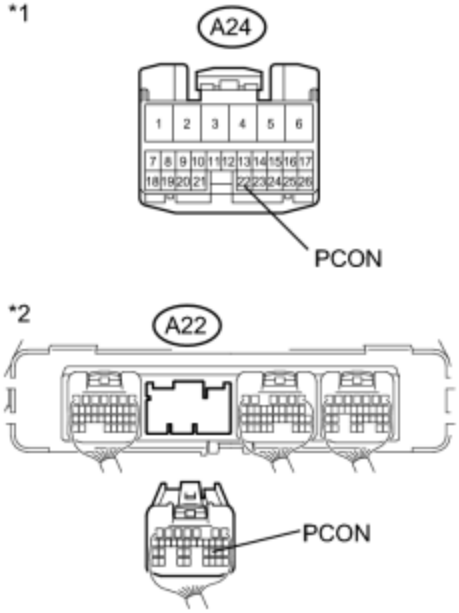
(b) Disconnect the A22 power management control ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A24-22 (PCON) - A22-22 (PCON) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A24-22 (PCON) or A22-22 (PCON) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the power management control ECU connector.

(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

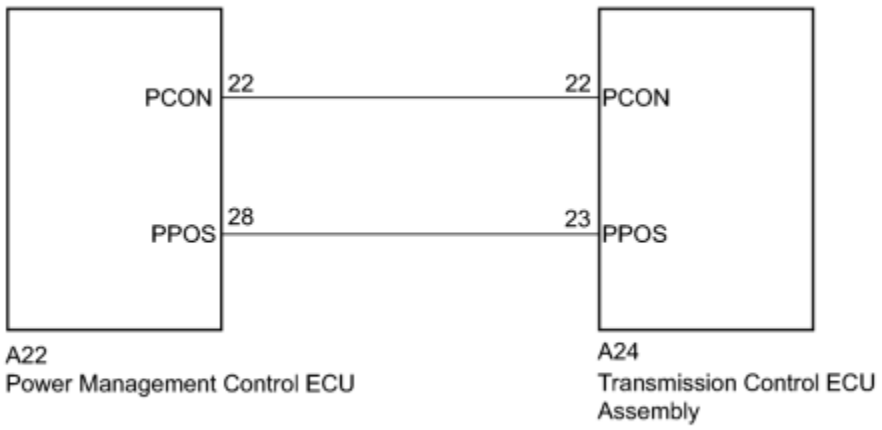
| | | |
|---|---|---|
| DTC | C2315 | HV System |

# DESCRIPTION

The transmission control ECU receives a P position switch signal from the power management control ECU (HV CPU) and activates the parking lock motor by controlling current, causing the parking lock mechanism to switch. When the power management control ECU (HV CPU) detects a malfunction with the P position switch or P position signal, it sends an information signal to the transmission control ECU. After receiving this signal, the transmission control ECU outputs this DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2315 | With the power switch on (IG) (IG circuit malfunction is not detected), a malfunction signal is received from the power management control ECU for 2 second or more. | Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

***Result***

| Result | Proceed to |
|---|---|
| Any of the following DTCs are not output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0851-579 | Park/Neutral Switch Input Circuit Low |
| P0852-580 | Park/Neutral Switch Input Circuit High |
| P085D-599 | Gear Shift Control Module "A" Performance |
| P0861-597 | Gear Shift Control Module "A" Communication Circuit Low |
| P0862-598 | Gear Shift Control Module "A" Communication Circuit High |
| U1107-436 | Lost Communication with Power Management Module |

(e) Turn the power switch off.

B GO TO DTC CHART

A **REPLACE POWER MANAGEMENT CONTROL ECU**

| DTC | U0146 | Lost Communication with Body ECU |
|---|---|---|

# DESCRIPTION

The transmission control ECU receives signals from the main body ECU via CAN communication. When a lost CAN communication malfunction is detected, the transmission control ECU stores this DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0146 | With the power switch on (IG), a signal cannot be received from the main body ECU for 10 seconds or more. | CAN communication system |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | GO TO CAN COMMUNICATION SYSTEM |
|---|---|

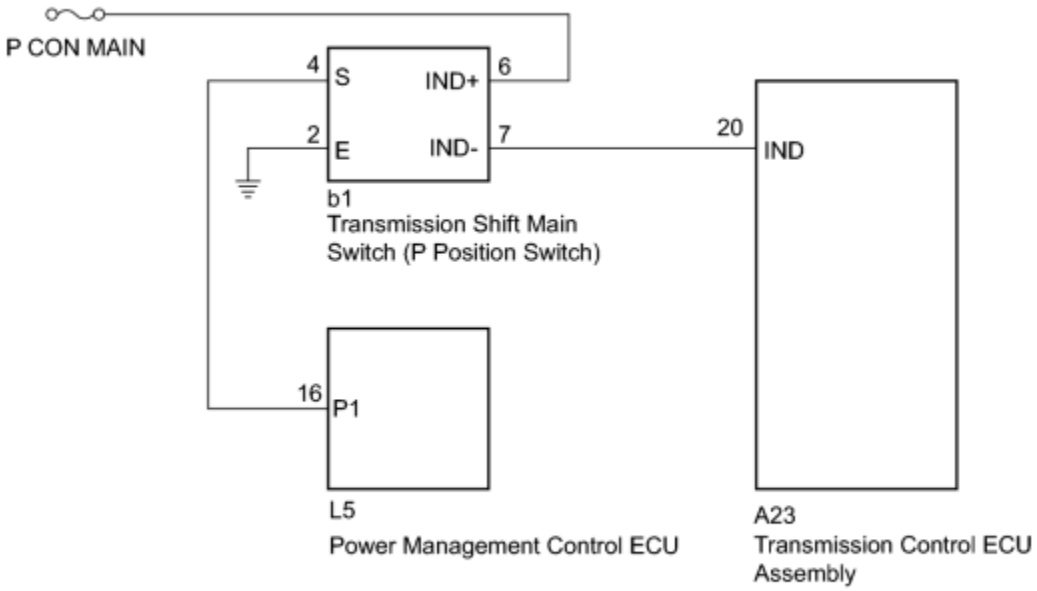
(a) Troubleshoot the CAN communication system INFO.

NEXT **END**

# DESCRIPTION

The indicator light comes on when the P position switch is pressed (the P position is engaged), goes off when the switch is released (the P position is disengaged) and blinks when a system malfunction occurs.

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK TRANSMISSION SHIFT MAIN SWITCH (INDICATOR LIGHT) |

(a) Turn the power switch on (IG).

(b) Depress the brake pedal and move the selector lever to N.

(c) Inspect the indicator light condition by operating the transmission shift main switch (P position switch).

*Result*

| Condition of Indicator Light | Proceed to |
|---|---|
| Indicator light does not go off. (Remains on) | A |
| Indicator light does not come on. | B |

(d) Turn the power switch off.

B ▶ CHECK HARNESS AND CONNECTOR (TRANSMISSION SHIFT MAIN SWITCH POWER SOURCE CIRCUIT)

A

▼

| | |
|---|---|
| 2. | CHECK TRANSMISSION SHIFT MAIN SWITCH (INDICATOR LIGHT) |

(a) Disconnect the A23 transmission control ECU assembly.

(b) Turn the power switch on (IG).

(c) Inspect the indicator light condition by operating the transmission shift main switch (P position switch).

*Result*

| Condition of Indicator Light | Proceed to |
|---|---|
| Comes on | A |
| Does not come on | B |

NOTICE:

Turning the power switch on (IG) with the transmission control ECU assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Connect the transmission control ECU assembly connector.

B ▶ REPLACE TRANSMISSION CONTROL ECU ASSEMBLY

A

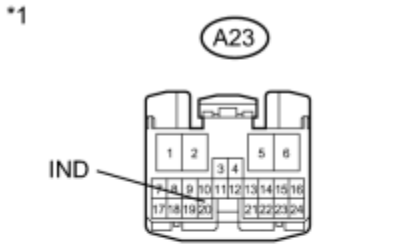
▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU - TRANSMISSION SHIFT MAIN SWITCH) |

(a) Disconnect the A23 transmission control ECU assembly connector.

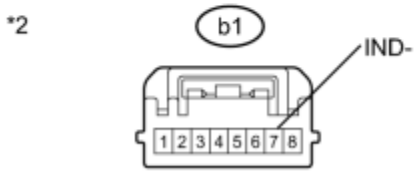
(b) Disconnect the b1 transmission shift main switch (P position switch) connector.

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-20 (IND) or b1-7 (IND-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Transmission Shift Main Switch (P Position Switch)) |

(d) Connect the transmission shift main switch (P position switch) connector.

(e) Connect the transmission control ECU assembly connector.

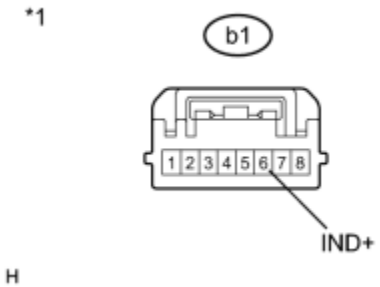
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE TRANSMISSION SHIFT MAIN SWITCH**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (TRANSMISSION SHIFT MAIN SWITCH POWER SOURCE CIRCUIT) |

(a) Disconnect the b1 transmission shift main switch (P position switch) connector.

(b) Measure the voltage according to the value(s) in the table below.




Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| b1-6 (IND+) - Body ground | Power switch off | 9 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Shift Main Switch (P Position Switch)) |

(c) Connect the transmission shift main switch (P position switch) connector.

NG CHECK AND REPAIR POWER SOURCE CIRCUIT

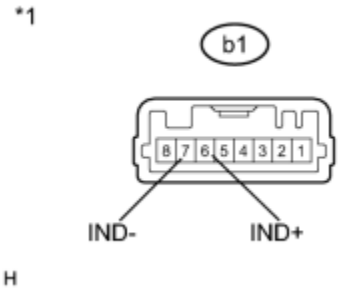
OK

| | |
|---|---|
| 5. | INSPECT TRANSMISSION SHIFT MAIN SWITCH |

(a) Disconnect the b1 transmission shift main switch (P position switch) connector.

(b) Apply auxiliary battery voltage between terminals b1-6 (IND+) and b1-7 (IND-) and check the indicator light.

Result:




| Condition | Specified Condition |
|---|---|
| Auxiliary battery voltage applied between terminals b1-6 (IND+) and b1-7 (IND-) | Comes on |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Transmission Shift Main Switch (P Position Switch)) |

(c) Connect the transmission shift main switch (P position switch) connector.

NG REPLACE TRANSMISSION SHIFT MAIN SWITCH

OK

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU - TRANSMISSION SHIFT MAIN SWITCH) |

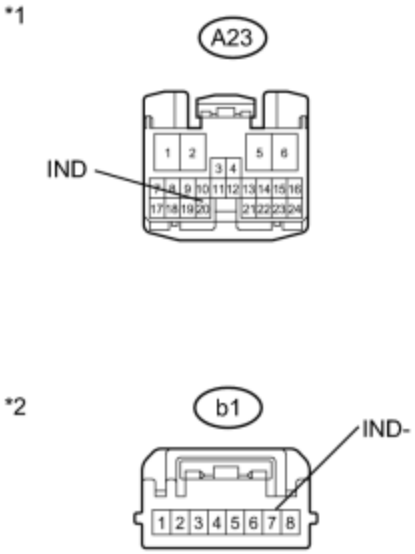
(a) Disconnect the A23 transmission control ECU assembly connector.

(b) Disconnect the b1 transmission shift main switch (P position switch) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A23-20 (IND) - b1-7 (IND-) | Power switch off | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Transmission Shift Main Switch (P Position Switch)) |

(d) Connect the transmission shift main switch (P position switch) connector.

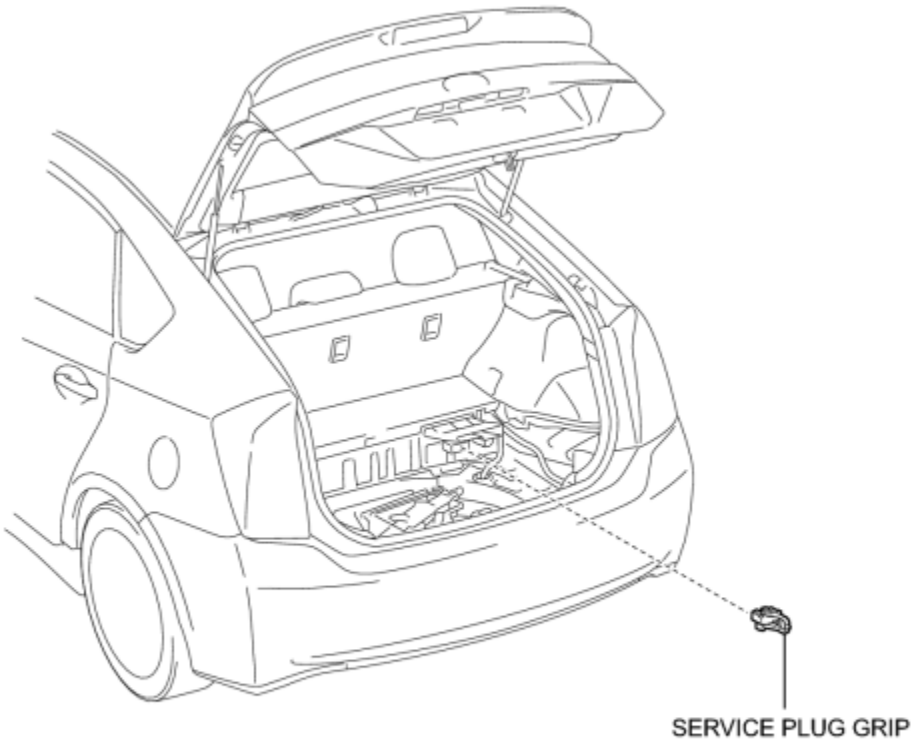
(e) Connect the transmission control ECU assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

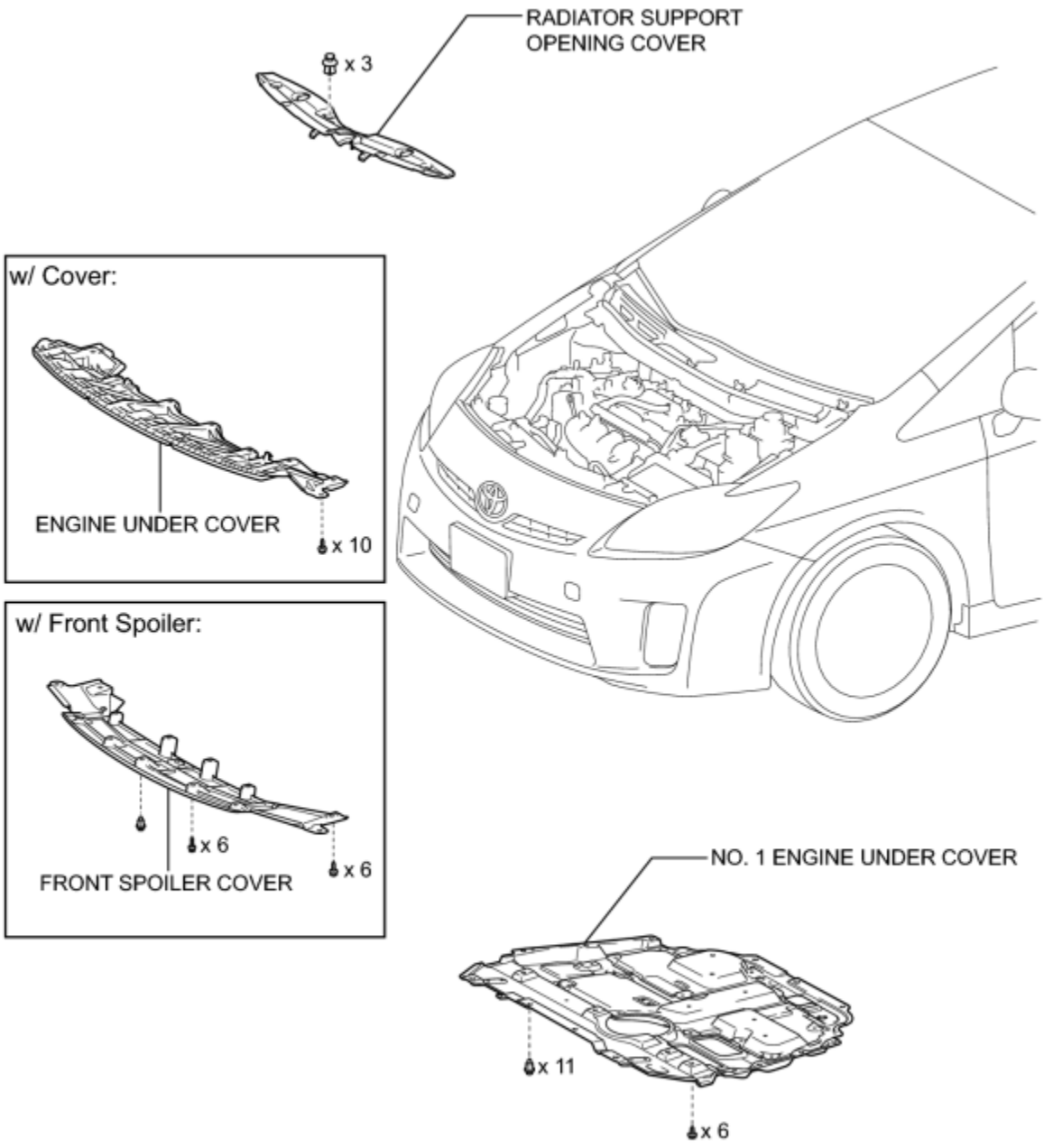
# COMPONENTS

# ILLUSTRATION



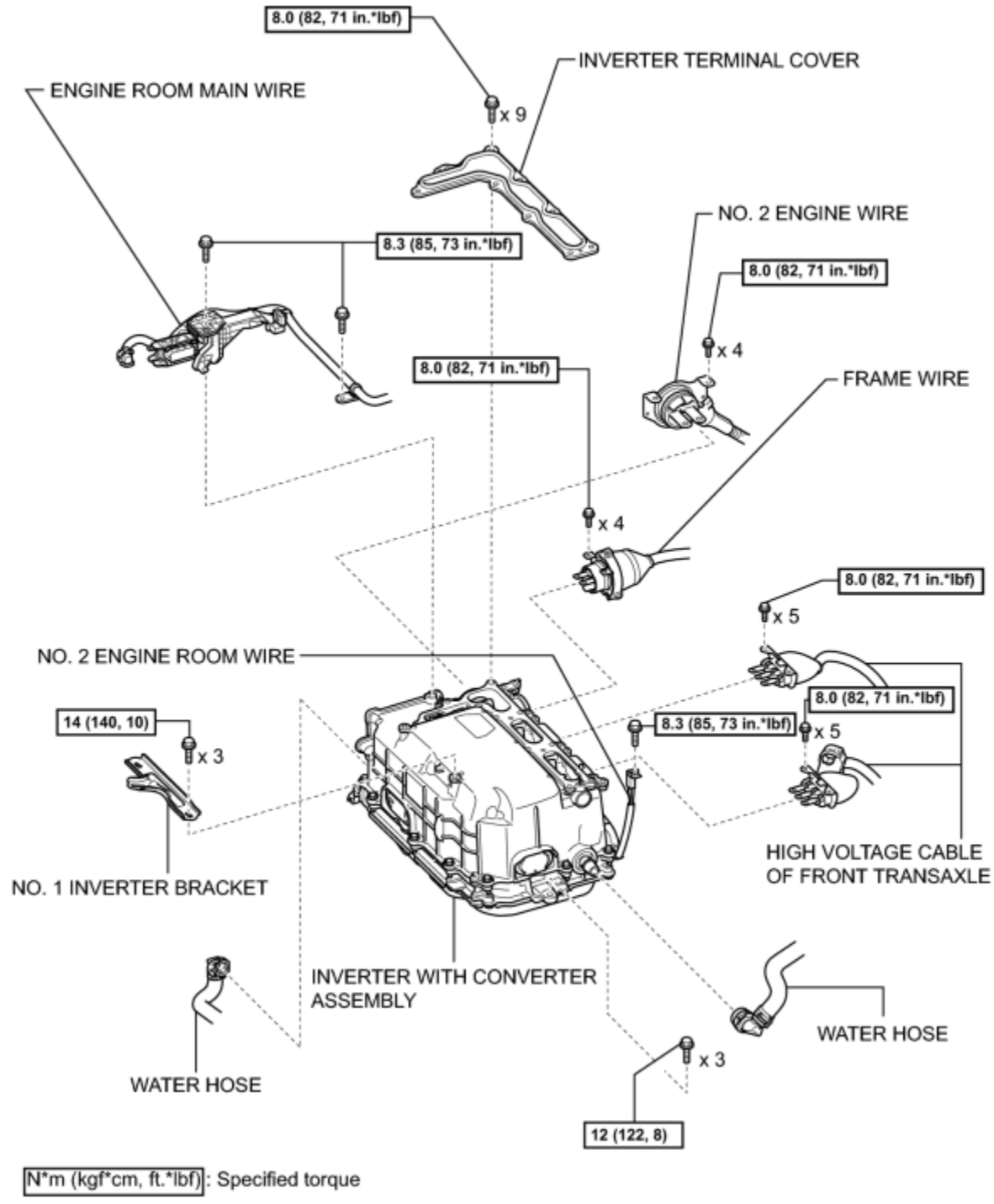

P

# ILLUSTRATION



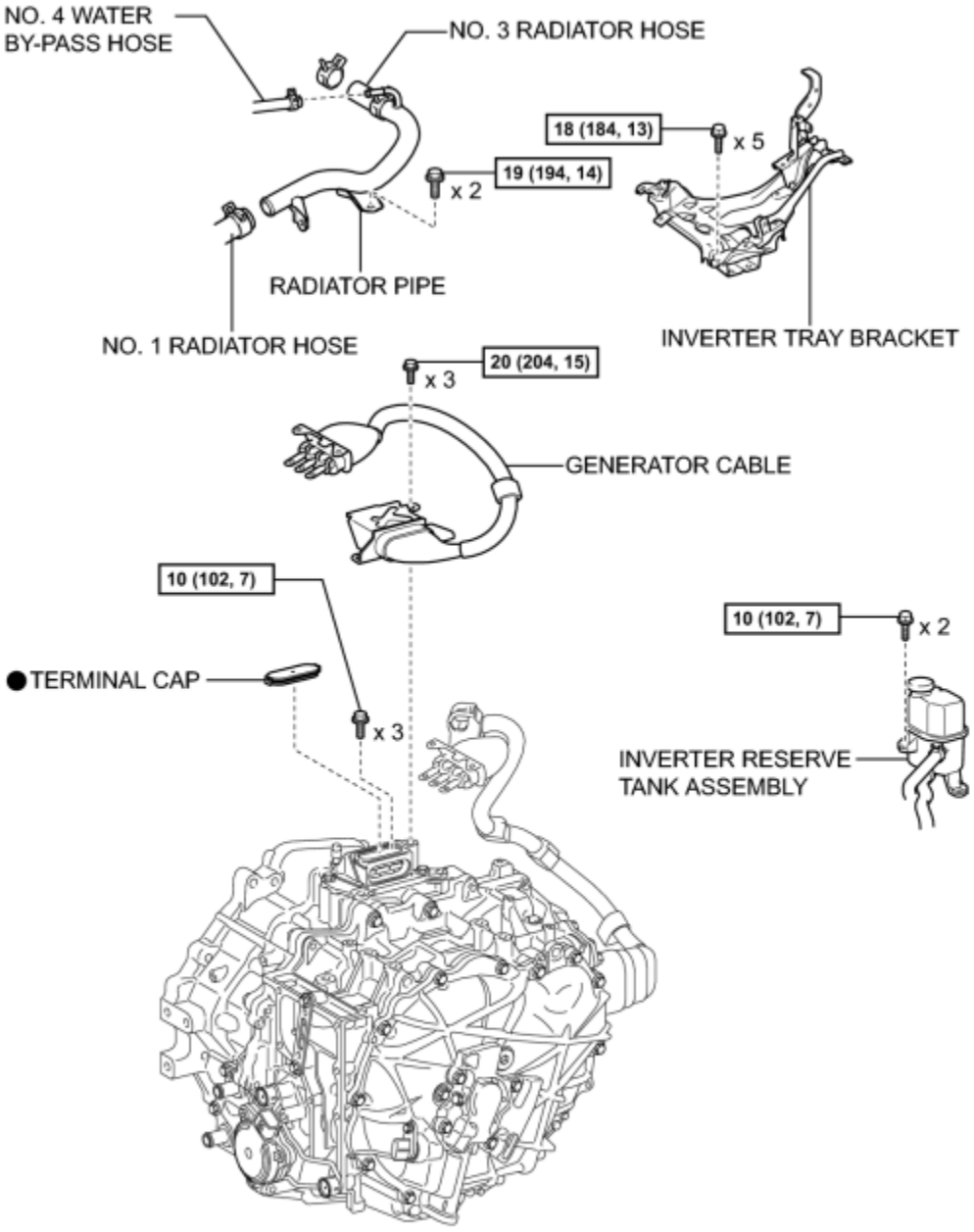

c

# ILLUSTRATION




c

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# REMOVAL

1. PRECAUTION

HINT: INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE SERVICE PLUG GRIP INFO

7. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

8. REMOVE ENGINE UNDER COVER (w/ Cover)

9. REMOVE NO. 1 ENGINE UNDER COVER

10. DRAIN COOLANT (for Engine) INFO

11. DRAIN COOLANT (for Inverter) INFO

12. REMOVE RADIATOR SUPPORT OPENING COVER INFO

13. REMOVE NO. 1 INVERTER BRACKET INFO

14. DISCONNECT ENGINE ROOM MAIN WIRE INFO

15. REMOVE INVERTER TERMINAL COVER INFO

16. CHECK TERMINAL VOLTAGE INFO

17. DISCONNECT FRAME WIRE INFO

18. DISCONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE INFO

19. DISCONNECT NO. 2 ENGINE WIRE INFO

20. INSTALL INVERTER TERMINAL COVER INFO

21. DISCONNECT NO. 2 ENGINE ROOM WIRE INFO

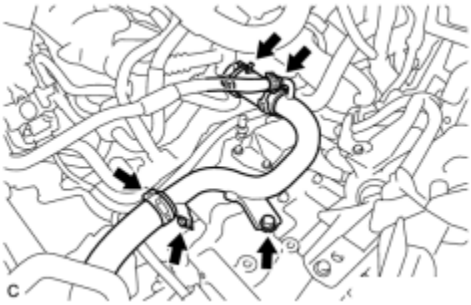
22. DISCONNECT WATER HOSE INFO

23. REMOVE INVERTER WITH CONVERTER ASSEMBLY INFO

24. REMOVE INVERTER RESERVE TANK ASSEMBLY INFO

25. REMOVE INVERTER TRAY BRACKET INFO

26. REMOVE RADIATOR PIPE



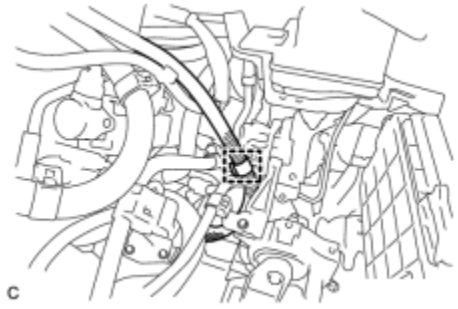
(a) Disconnect the clamps, No. 1 radiator hose, No. 4 water by-pass hose and No. 3 radiator hose.

(b) Remove the 2 bolts and radiator pipe.

27. REMOVE GENERATOR CABLE

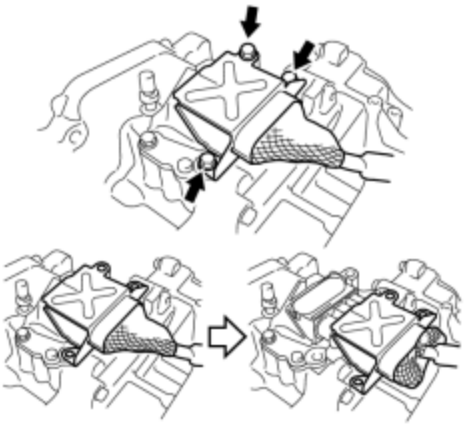
NOTICE:

Wear insulated gloves.

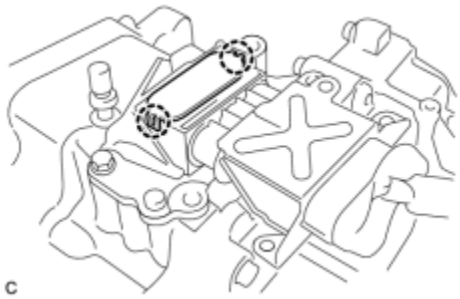


(a) Disconnect the generator cable clamp from the motor cable bracket.

(b) Remove the 3 bolts and slide the generator cable connector shell back.

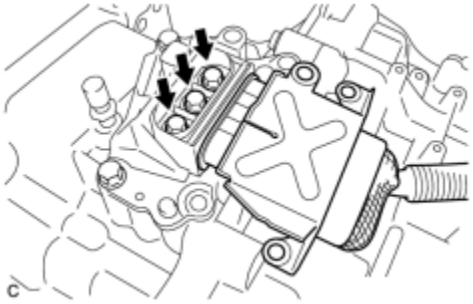


c



c

(c) Disengage the 2 claws to remove the terminal cap.



c

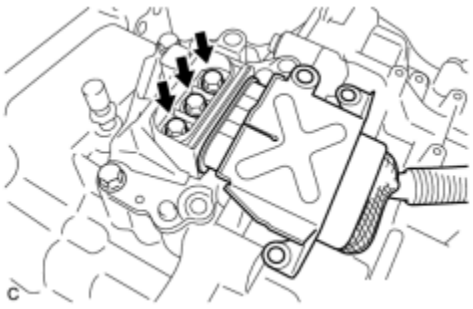
(d) Remove the 3 bolts and generator cable from the hybrid transaxle assembly.

# INSTALLATION

1. INSTALL GENERATOR CABLE

NOTICE:

Wear insulated gloves.

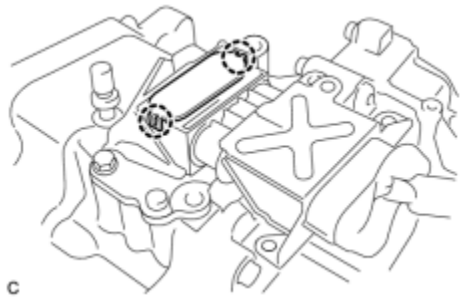


(a) Install the generator cable to the hybrid transaxle assembly with the 3 bolts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

NOTICE:

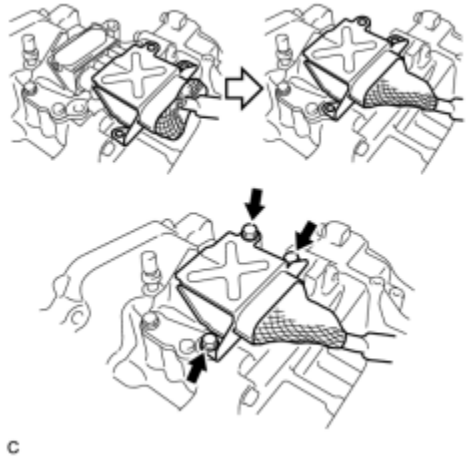
Keep the sealing surface of the generator cable and the connector terminal joint free of foreign matter.



(b) Engage the 2 claws to install a new terminal cap.

NOTICE:

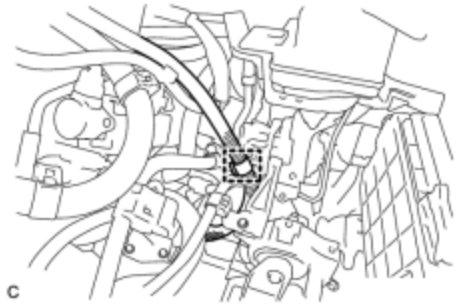
When installing the terminal cap to the generator cable terminal block, keep the sealing surface free of foreign matter.



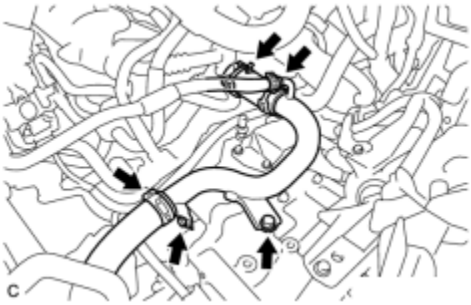
(c) Place the generator cable connector shell in position and install it with the 3 bolts.

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

(d) Connect the generator cable clamp to the motor cable bracket.



2. INSTALL RADIATOR PIPE



(a) Install the radiator pipe with the 2 bolts.

Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**

(b) Connect the No. 3 radiator hose, No. 4 water by-pass hose and No. 1 radiator hose with the clamps.

3. INSTALL INVERTER TRAY BRACKET INFO

4. INSTALL INVERTER RESERVE TANK ASSEMBLY INFO

5. INSTALL INVERTER WITH CONVERTER ASSEMBLY INFO

6. CONNECT WATER HOSE INFO

7. CONNECT NO. 2 ENGINE ROOM WIRE INFO

8. REMOVE INVERTER TERMINAL COVER INFO

9. CONNECT NO. 2 ENGINE WIRE INFO

10. CONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE INFO

11. CONNECT FRAME WIRE INFO

12. CHECK HIGH VOLTAGE CABLE CONNECTION INFO

13. INSTALL INVERTER TERMINAL COVER INFO

14. INSTALL ENGINE ROOM MAIN WIRE INFO

15. INSTALL NO. 1 INVERTER BRACKET INFO

16. INSTALL SERVICE PLUG GRIP INFO

17. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

18. INSTALL REAR NO. 3 FLOOR BOARD INFO

19. INSTALL REAR DECK FLOOR BOX INFO

20. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

21. ADD COOLANT (for Inverter) INFO

22. ADD COOLANT (for Engine) INFO

23. INSPECT FOR COOLANT LEAK (for Inverter) INFO

24. INSPECT FOR COOLANT LEAK (for Engine) INFO

25. INSTALL NO. 1 ENGINE UNDER COVER

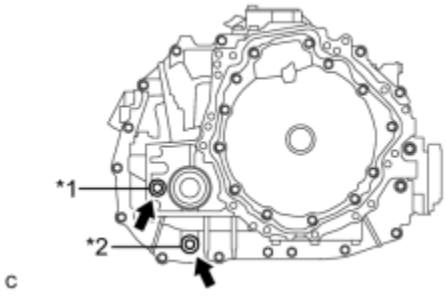
26. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

27. INSTALL ENGINE UNDER COVER (w/ Cover)

28. INSTALL RADIATOR SUPPORT OPENING COVER INFO

# REPLACEMENT

1. DRAIN HYBRID TRANSAXLE FLUID




(a) Using a 10 mm hexagon socket wrench, remove the filler plug and gasket.

## Text in Illustration

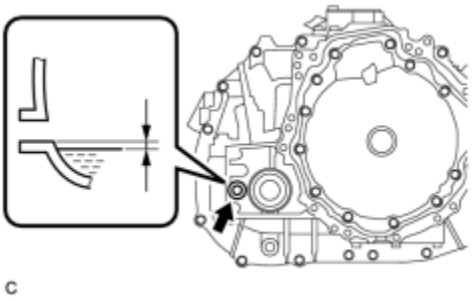
| | |
|---|---|
| *1 | Filler Plug |
| *2 | Drain Plug |

(b) Using a 10 mm hexagon socket wrench, remove the drain plug and gasket.

(c) Using a 10 mm hexagon socket wrench, install the drain plug, and a new gasket.

Torque: **39 N·m (398 kgf·cm, 29ft·lbf)**

2. ADD HYBRID TRANSAXLE FLUID



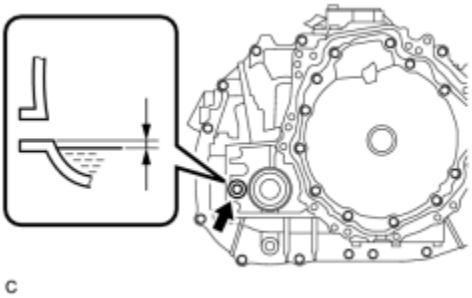

(a) Add transaxle fluid until the fluid level is between 0 to 10 mm (0 to 0.394 in.) from the bottom lip of the filler plug opening.

- Stop the vehicle on a flat road.
- Recheck the transaxle fluid level after driving when exchanging fluid.
- Insufficient or excessive amounts of transaxle fluid may be the cause of some trouble.

Reference:

3.3 liters (3.5 US qts, 2.9 lmp.qts)

3. INSPECT HYBRID TRANSAXLE FLUID




(a) Check that the fluid level is between 0 to 10 mm (0 to 0.394 in.) from the lowest position of the inner surface of the transaxle filler plug opening.

- Stop the vehicle on a flat road.
- Recheck the transaxle fluid level after driving when exchanging fluid.
- Insufficient or excessive amounts of transaxle fluid may be the cause of some trouble.

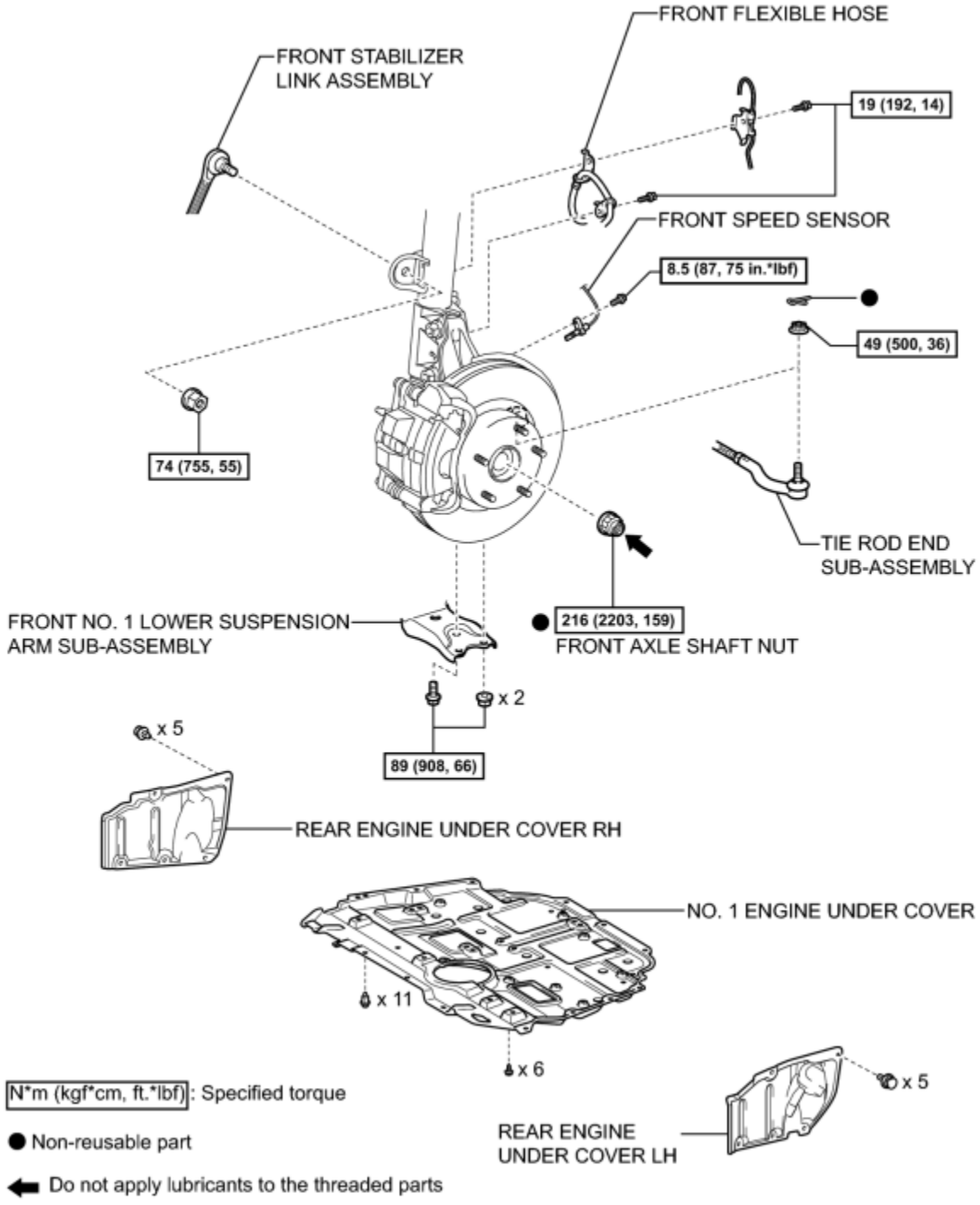
(b) Check for leaks if the quantity of transaxle fluid is low.

(c) Using a 10 mm hexagon socket wrench, install the filler plug with a new gasket.

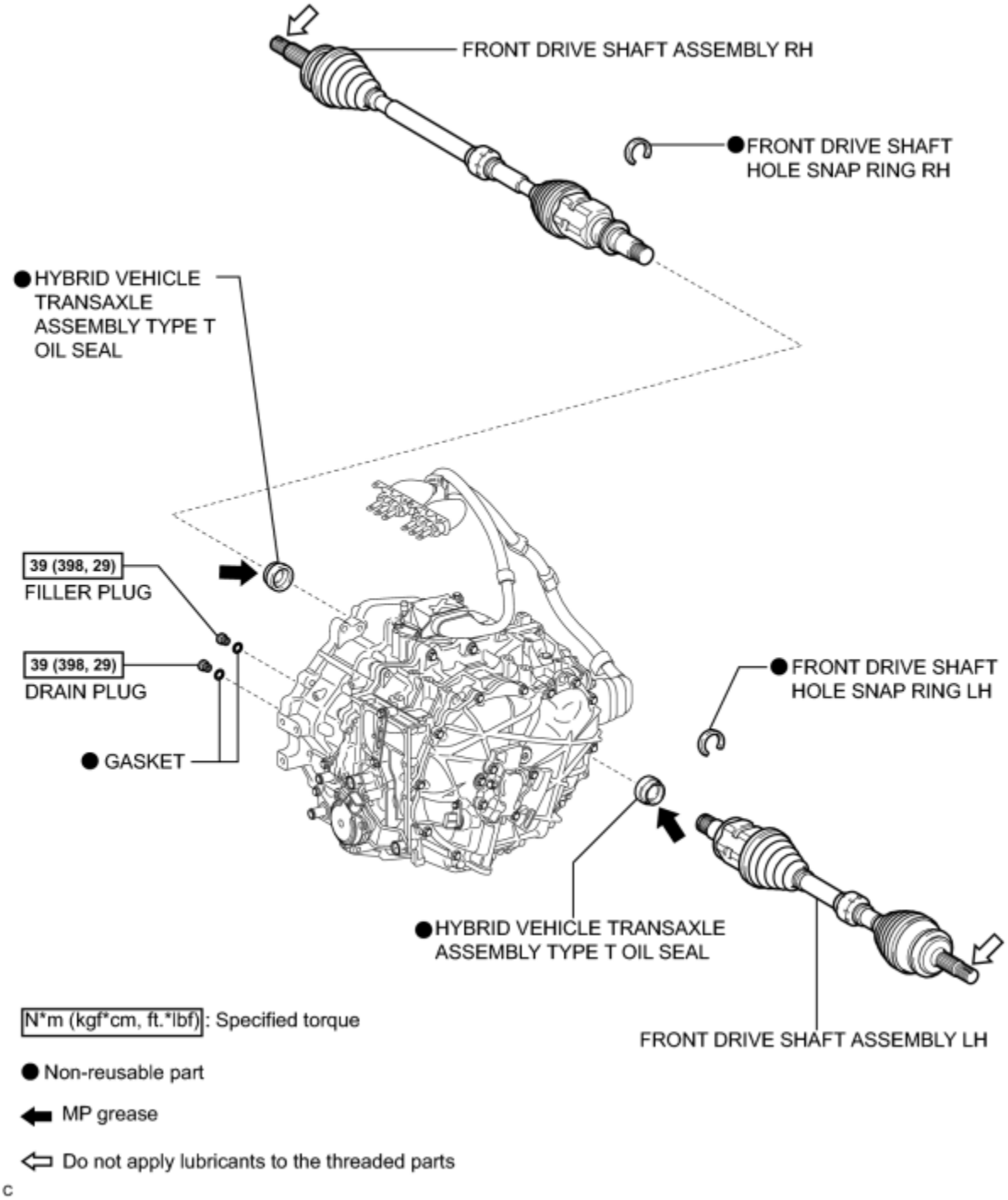
Torque: **39 N·m (398 kgf·cm, 29ft·lbf)**

# COMPONENTS

# ILLUSTRATION




# ILLUSTRATION


FRONT DRIVE SHAFT ASSEMBLY RH
FRONT DRIVE SHAFT HOLE SNAP RING RH
HYBRID VEHICLE TRANSAXLE ASSEMBLY TYPE T OIL SEAL
39 (398, 29)
FILLER PLUG
39 (398, 29)
DRAIN PLUG
GASKET
FRONT DRIVE SHAFT HOLE SNAP RING LH
HYBRID VEHICLE TRANSAXLE ASSEMBLY TYPE T OIL SEAL
FRONT DRIVE SHAFT ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
MP grease
Do not apply lubricants to the threaded parts

c

# REPLACEMENT

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT WHEEL

2. REMOVE NO. 1 ENGINE UNDER COVER

3. REMOVE REAR ENGINE UNDER COVER LH

4. REMOVE REAR ENGINE UNDER COVER RH

5. DRAIN HYBRID TRANSAXLE FLUID INFO

6. REMOVE FRONT AXLE SHAFT NUT INFO

7. SEPARATE FRONT SPEED SENSOR INFO

8. SEPARATE FRONT FLEXIBLE HOSE INFO

9. SEPARATE TIE ROD END SUB-ASSEMBLY INFO

10. SEPARATE FRONT STABILIZER LINK ASSEMBLY INFO

11. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY INFO

12. SEPARATE FRONT DRIVE SHAFT ASSEMBLY INFO

13. REMOVE FRONT DRIVE SHAFT ASSEMBLY INFO

14. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING INFO

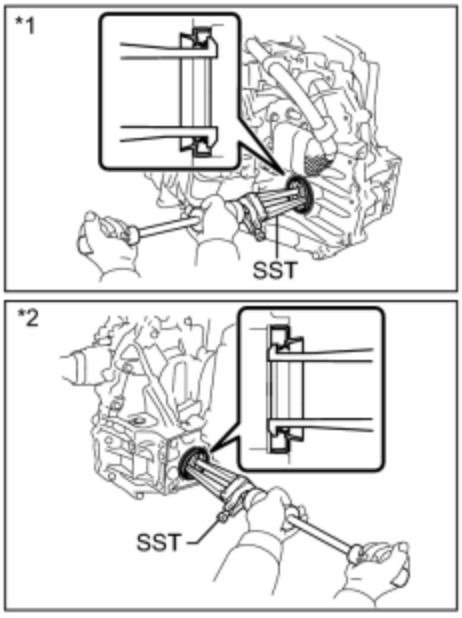
15. REMOVE HYBRID VEHICLE TRANSAXLE ASSEMBLY TYPE T OIL SEAL

(a) Using SST, tap out the 2 oil seals.

SST: 09308-00010

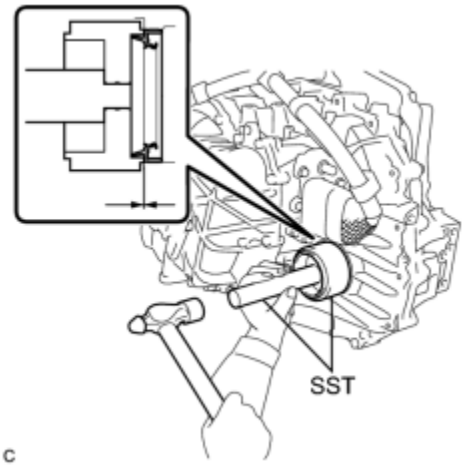
## Text in Illustration

| | |
|---|---|
| *1 | LH Side |
| *2 | RH Side |




16. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY TYPE T OIL SEAL

(a) Install a new oil seal LH side.




(1) Using SST and a hammer, tap in a new oil seal.

SST: 09316-10010

SST: 09950-70010

09951-07150

Oil seal driven in depth:

-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

(2) Coat the lip of the oil seal with MP grease.

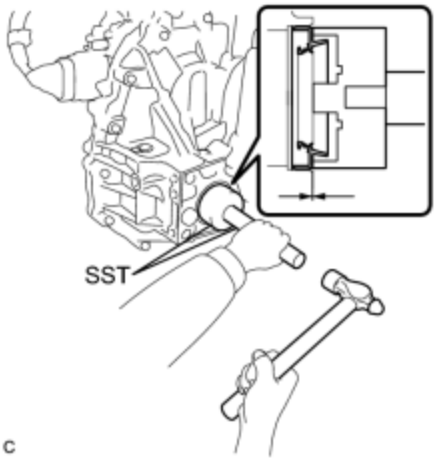
(b) Install a new oil seal RH side.

(1) Using SST and a hammer, tap in a new oil seal.

SST: 09726-36010

SST: 09950-70010

09951-07150




Oil seal driven in depth:

-0.5 to 0.5 mm (-0.0197 to 0.0197 in.)

(2) Coat the lip of the oil seal with MP grease.

17. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING INFO

18. INSTALL FRONT DRIVE SHAFT ASSEMBLY INFO

19. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY INFO

20. CONNECT FRONT STABILIZER LINK ASSEMBLY INFO

21. CONNECT TIE ROD END SUB-ASSEMBLY INFO

22. INSTALL FRONT FLEXIBLE HOSE INFO

23. CONNECT FRONT SPEED SENSOR INFO

24. INSTALL FRONT AXLE SHAFT NUT INFO

25. ADD HYBRID TRANSAXLE FLUID INFO

26. INSPECT HYBRID TRANSAXLE FLUID INFO

27. INSTALL FRONT WHEEL INFO

28. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT: INFO

29. INSTALL REAR ENGINE UNDER COVER LH

30. INSTALL REAR ENGINE UNDER COVER RH

31. INSTALL NO. 1 ENGINE UNDER COVER

32. INSPECT SPEED SENSOR SIGNAL

HINT: 

# ON-VEHICLE INSPECTION

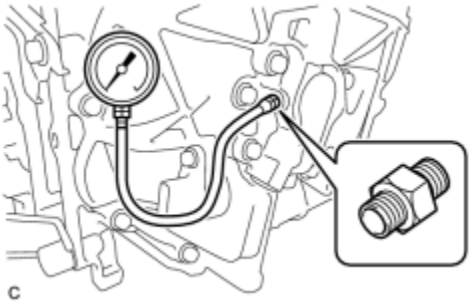
1. INSPECT TRANSAXLE FLUID PRESSURE

NOTICE:

Perform the test at normal operating transaxle fluid temperature 50 to 80°C (122 to 176°F).

(a) Lift up the vehicle.

(b) Remove the fluid pump cover plug and O-ring.




(c) Install an oil pressure gauge with the adapter.

(d) Put the engine in inspection mode INFO.

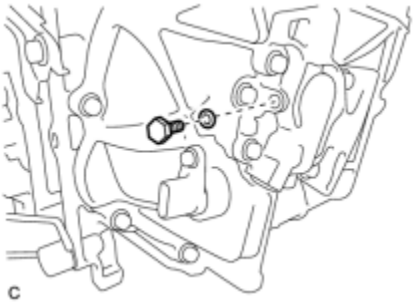
(e) Measure the transaxle fluid pressure.

Standard:

| Engine Speed | Transaxle Fluid Pressure |
|---|---|
| 1000 rpm | 3.0 kPa (0.03 kgf/cm$^2$, 0.4 psi) or more |

NOTICE:

Be sure to cancel inspection mode immediately after the transaxle fluid pressure check is completed.

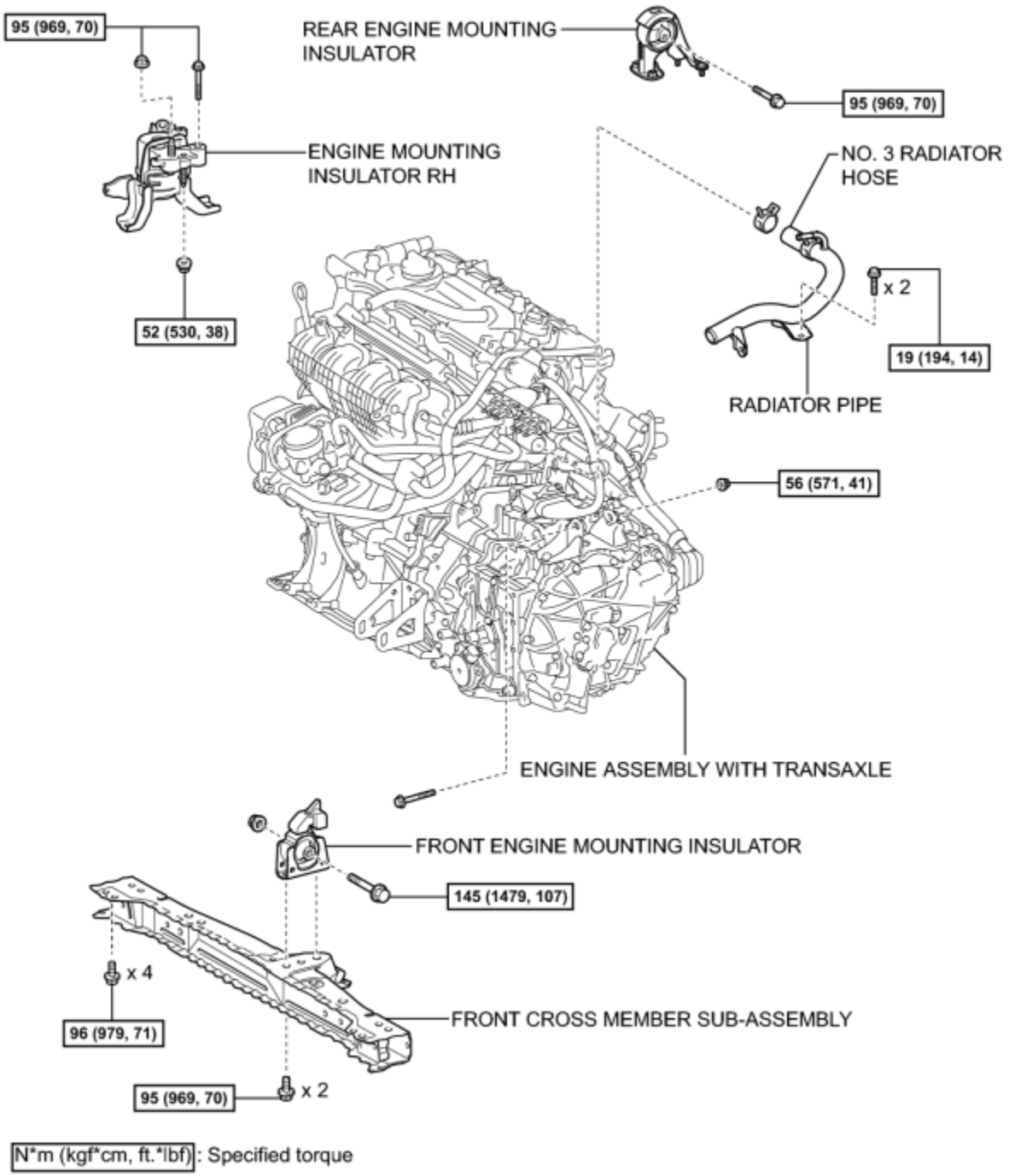



(f) Install a new O-ring and fluid pump cover plug.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

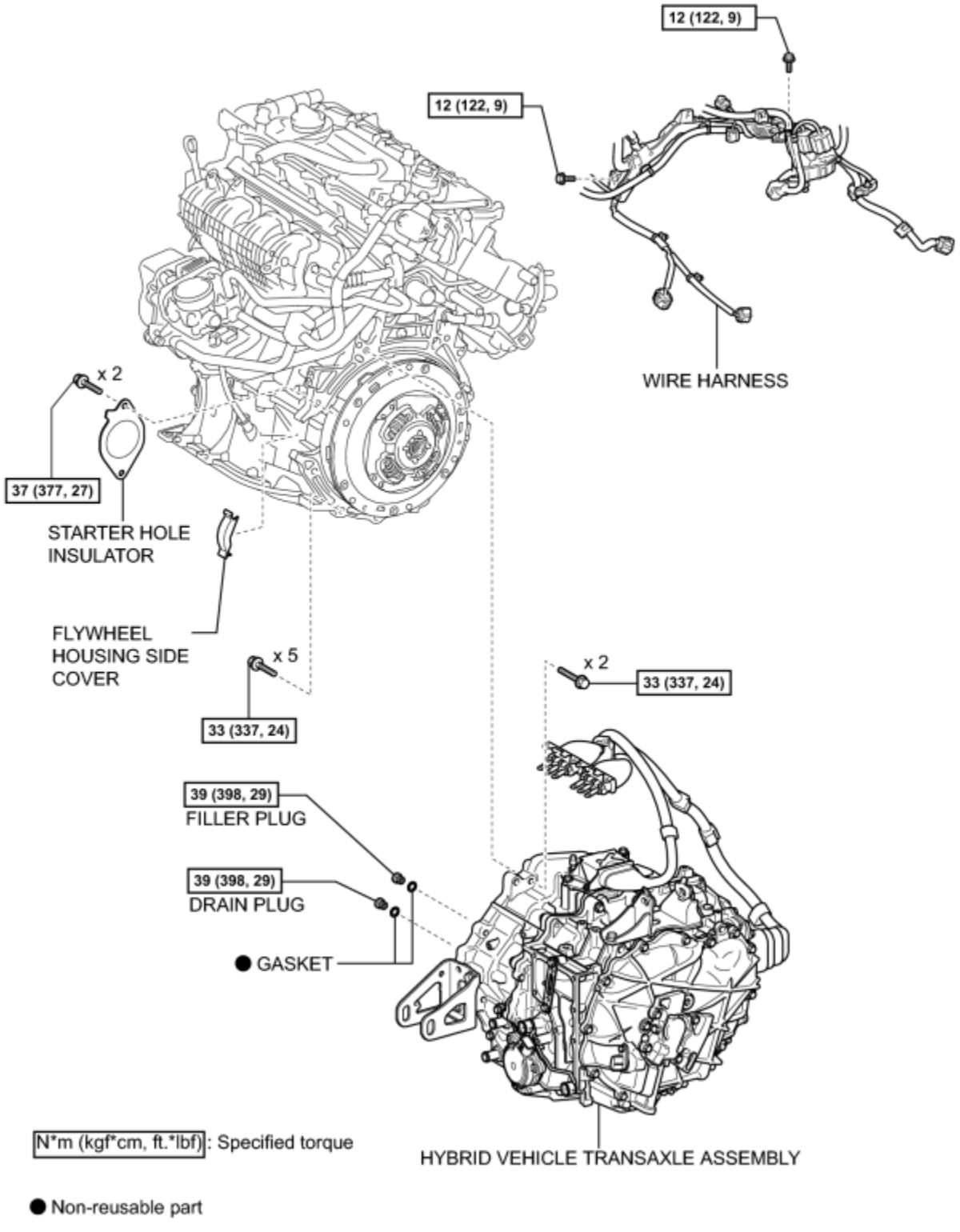
# COMPONENTS

# ILLUSTRATION



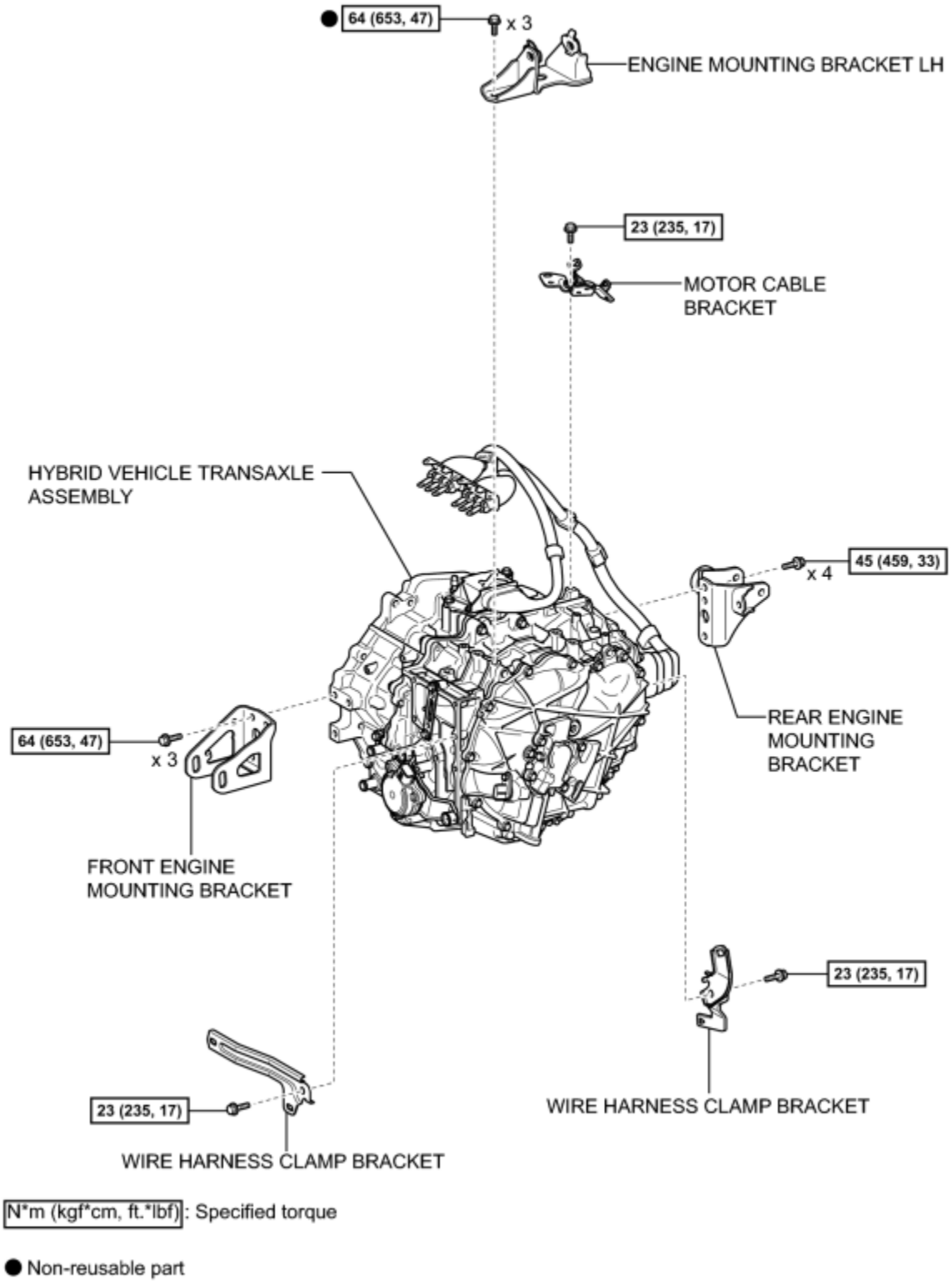

c

# ILLUSTRATION




c

# ILLUSTRATION


64 (653, 47)
x 3
ENGINE MOUNTING BRACKET LH
23 (235, 17)
MOTOR CABLE BRACKET
HYBRID VEHICLE TRANSAXLE ASSEMBLY
45 (459, 33)
x 4
REAR ENGINE MOUNTING BRACKET
64 (653, 47)
x 3
FRONT ENGINE MOUNTING BRACKET
23 (235, 17)
WIRE HARNESS CLAMP BRACKET
23 (235, 17)
WIRE HARNESS CLAMP BRACKET
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part

c

# REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO

2. REMOVE FRONT CROSS MEMBER SUB-ASSEMBLY INFO

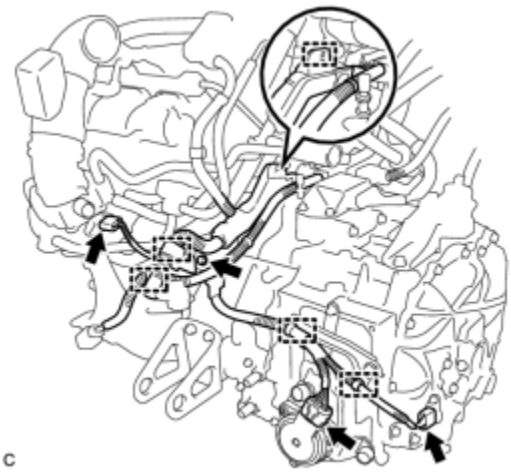
3. REMOVE FRONT ENGINE MOUNTING INSULATOR INFO

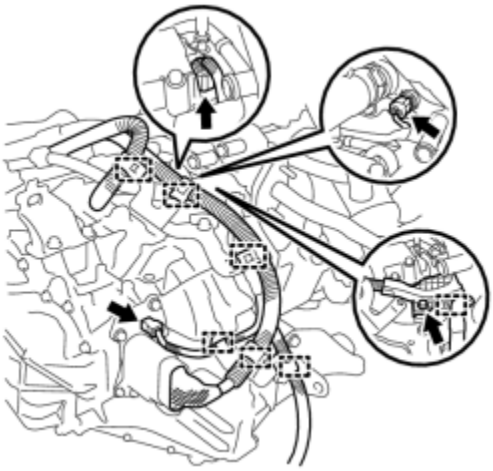
4. REMOVE REAR ENGINE MOUNTING INSULATOR INFO

5. REMOVE RADIATOR PIPE INFO

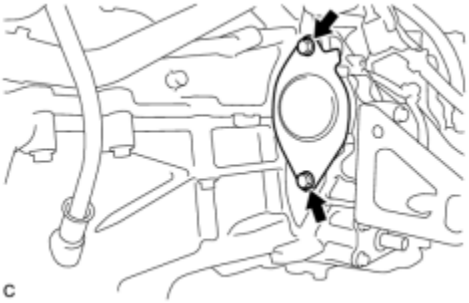
6. DISCONNECT WIRE HARNESS

(a) Remove the 2 bolts and disconnect the 6 connectors and 12 wire harness clamps.



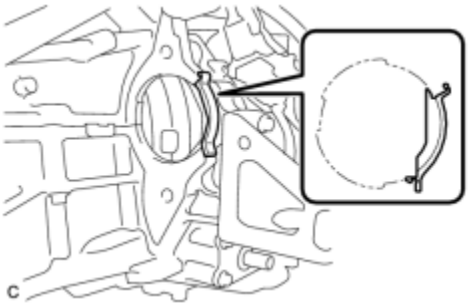



7. REMOVE STARTER HOLE INSULATOR




(a) Remove the 2 bolts and starter hole insulator.

8. REMOVE FLYWHEEL HOUSING SIDE COVER



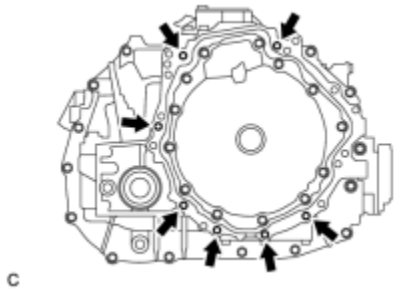
(a) Remove the flywheel housing side cover.

9. REMOVE HYBRID VEHICLE TRANSAXLE ASSEMBLY

(a) Using wood blocks or equivalent, set an engine lifter to the hybrid vehicle transaxle assembly.

NOTICE:

Using a rope, wooden blocks or equivalent, secure the hybrid vehicle transaxle assembly to the engine lifter.



(b) Remove the 7 bolts and hybrid vehicle transaxle assembly.

NOTICE:

To avoid damage to the knock pin, do not pry the connecting portion of the hybrid transaxle and the engine.

10. REMOVE WIRE HARNESS CLAMP BRACKET

(a) Remove the 2 bolts and 2 wire harness clamp brackets.

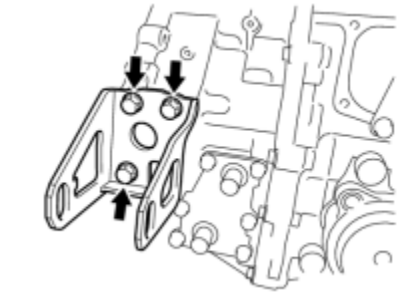


11. REMOVE MOTOR CABLE BRACKET



(a) Remove the bolt and motor cable bracket.

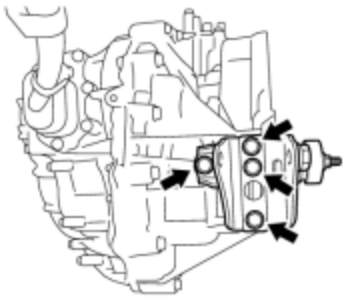
12. REMOVE FRONT ENGINE MOUNTING BRACKET



(a) Remove the 3 bolts and front engine mounting bracket.

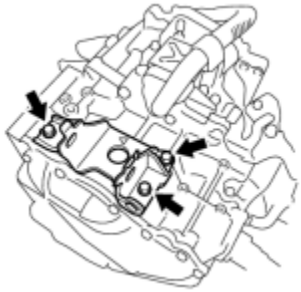
13. REMOVE REAR ENGINE MOUNTING BRACKET

(a) Remove the 4 bolts and rear engine mounting bracket.



C

14. REMOVE ENGINE MOUNTING BRACKET LH

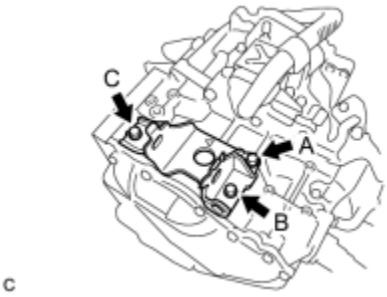


C

(a) Remove the 3 bolts and engine mounting bracket LH.

# INSTALLATION

1. INSTALL ENGINE MOUNTING BRACKET LH




c

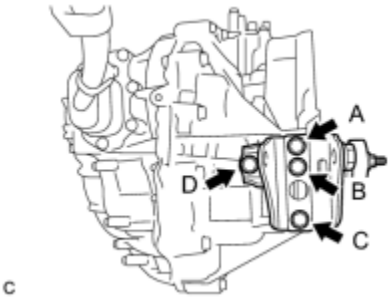
(a) Install the engine mounting bracket LH with 3 new bolts in several steps.

Torque: **64 N·m (653 kgf·cm, 47ft·lbf)**

NOTICE:

Temporarily tighten bolt A, and then fully tighten the 3 bolts in the order of B, C and A.

2. INSTALL REAR ENGINE MOUNTING BRACKET




c

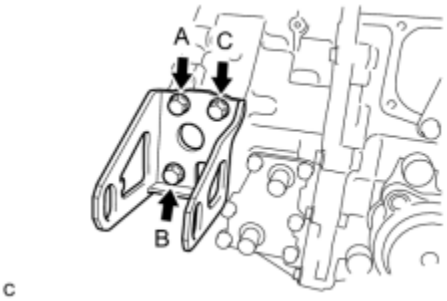
(a) Install the rear engine mounting bracket with the 4 bolts in several steps.

Torque: **45 N·m (459 kgf·cm, 33ft·lbf)**

NOTICE:

Temporarily tighten bolt A, and then fully tighten the 4 bolts in the order of C, B, D and A.

3. INSTALL FRONT ENGINE MOUNTING BRACKET




c

(a) Install the front engine mounting bracket with the 3 bolts in several steps.

Torque: **64 N·m (653 kgf·cm, 47ft·lbf)**

NOTICE:

Temporarily tighten bolt A, and then fully tighten the 3 bolts in the order of B, C and A.

4. INSTALL MOTOR CABLE BRACKET

(a) Install the motor cable bracket with the bolt.

Torque: **23 N·m (235 kgf·cm, 17ft·lbf)**



C

5. INSTALL WIRE HARNESS CLAMP BRACKET



C

(a) Install the 2 wire harness clamp brackets with the 2 bolts.

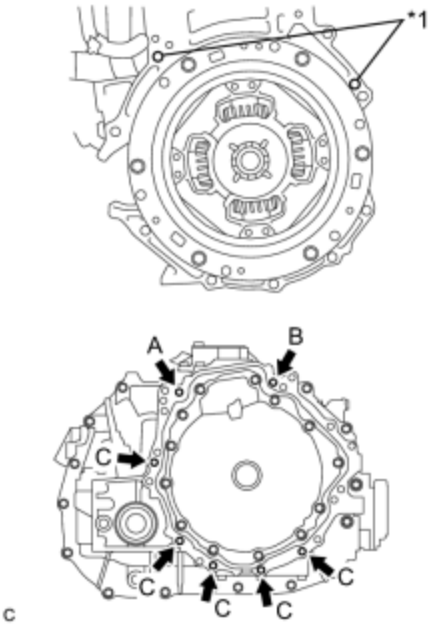
Torque: **23 N·m (235 kgf·cm, 17ft·lbf)**

6. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY

(a) Make sure that the knock pins are installed on the engine.

# Text in Illustration

| | |
|---|---|
| *1 | Knock Pin |




(b) Using an engine lifter, align the engine assembly and hybrid vehicle transaxle assembly, fit the knock pins into the knock pin holes, and tighten the 7 bolts shown in the illustration.

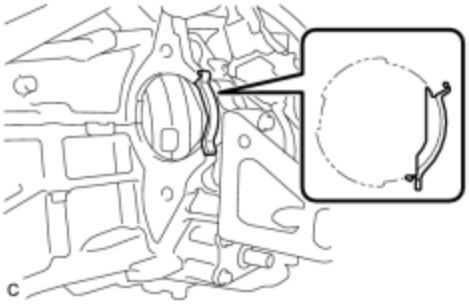
Torque: **33 N·m (337 kgf·cm, 24ft·lbf)**

NOTICE:

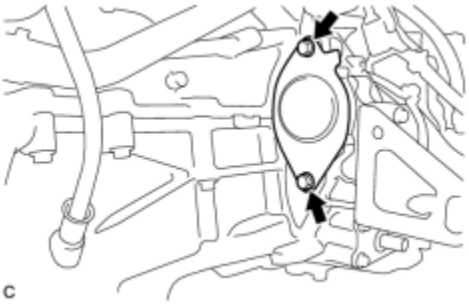
- Make sure to align the hybrid vehicle transaxle so that the input shaft of the hybrid vehicle transaxle will be inserted straight into the inner splines of the transmission input damper.
- When inserting the input shaft of the hybrid vehicle transaxle into the inner splines of the transmission input damper, do not shake the hybrid vehicle transaxle excessively.
- When mounting the hybrid vehicle transaxle to the engine, make sure to securely fit the knock pins into the knock holes.
- Push in the hybrid vehicle transaxle so that the contact surfaces of the engine and the hybrid vehicle transaxle will be are aligned evenly.
- While mounting the hybrid vehicle transaxle to the engine, temporarily tighten the bolt (A), fully tighten the bolt (B), fully tighten the bolt (A), and then fully tighten the bolts (C).
- Do not hang the hybrid vehicle transaxle off of the engine if the contact surfaces of the engine and the hybrid vehicle transaxle are not in full contact. The knock holes of the hybrid vehicle transaxle case may be deformed due to the excessive weight of the engine and hybrid vehicle transaxle, resulting in misalignment between the engine and hybrid vehicle transaxle.

7. INSTALL FLYWHEEL HOUSING SIDE COVER

(a) Install the flywheel housing side cover.



8. INSTALL STARTER HOLE INSULATOR

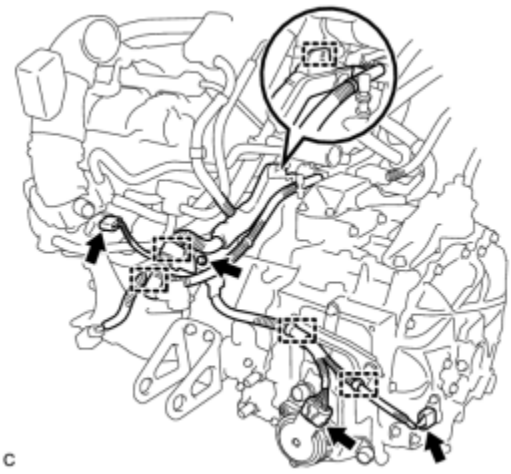


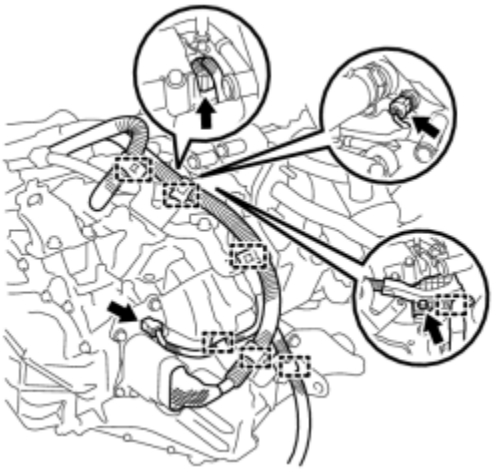
(a) Install the starter hole insulator with the 2 bolts.

Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

9. CONNECT WIRE HARNESS

(a) Connect the 12 wire harness clamps and 6 connectors and install the 2 bolts.





Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**

10. INSTALL RADIATOR PIPE INFO

11. INSTALL REAR ENGINE MOUNTING INSULATOR INFO

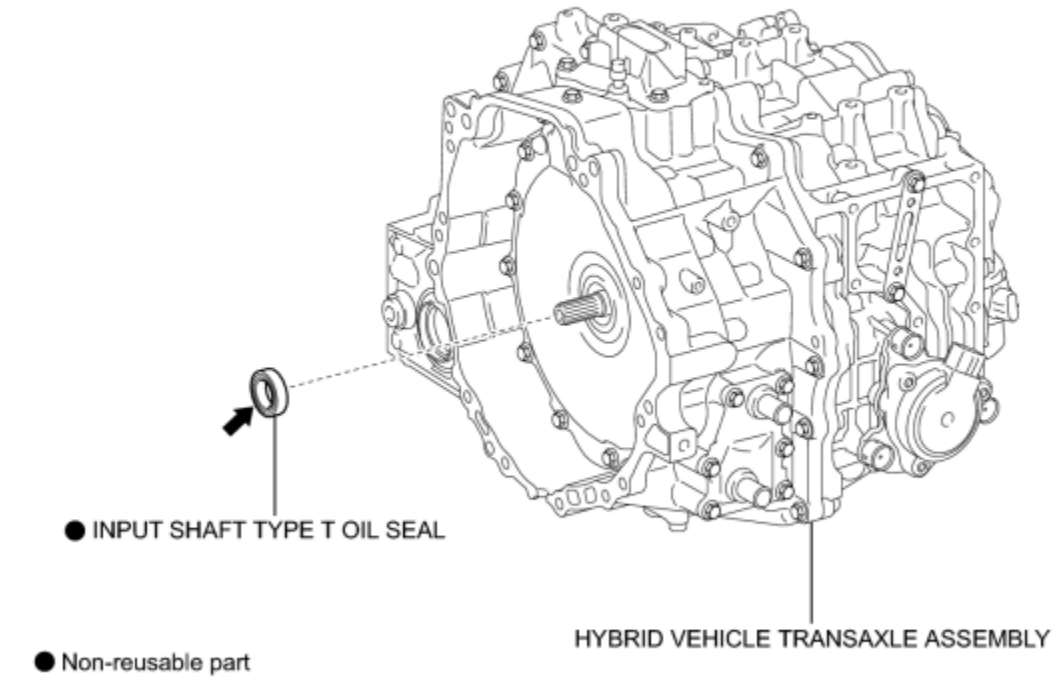
12. INSTALL FRONT ENGINE MOUNTING INSULATOR INFO

13. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO

# COMPONENTS

# ILLUSTRATION



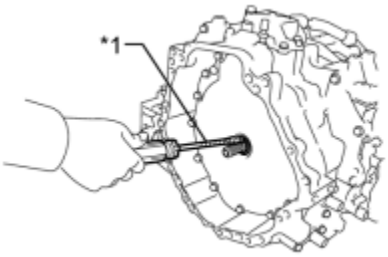

c

# REPLACEMENT

1. REMOVE HYBRID VEHICLE TRANSAXLE ASSEMBLY

HINT: INFO

2. REMOVE INPUT SHAFT TYPE T OIL SEAL

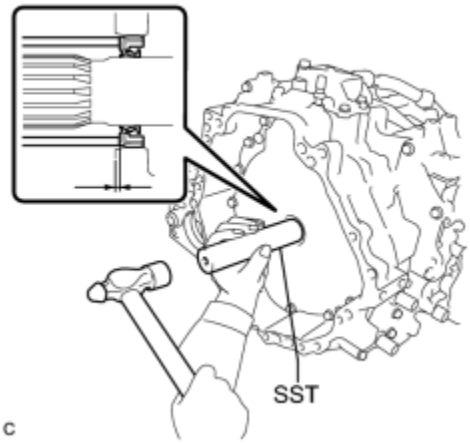



(a) Using a screwdriver with the tip taped, remove the oil seal.

## Text in Illustration

| | |
|---|---|
| *1 | Vinyl Tape |

3. INSTALL INPUT SHAFT TYPE T OIL SEAL




(a) Coat a lip of a new oil seal with MP grease.

(b) Using SST and a hammer, tap in the oil seal.

SST: 09330-50010

Oil seal driven in depth:

1.0 to 1.8 mm (0.0394 to 0.0709 in.)

NOTICE:

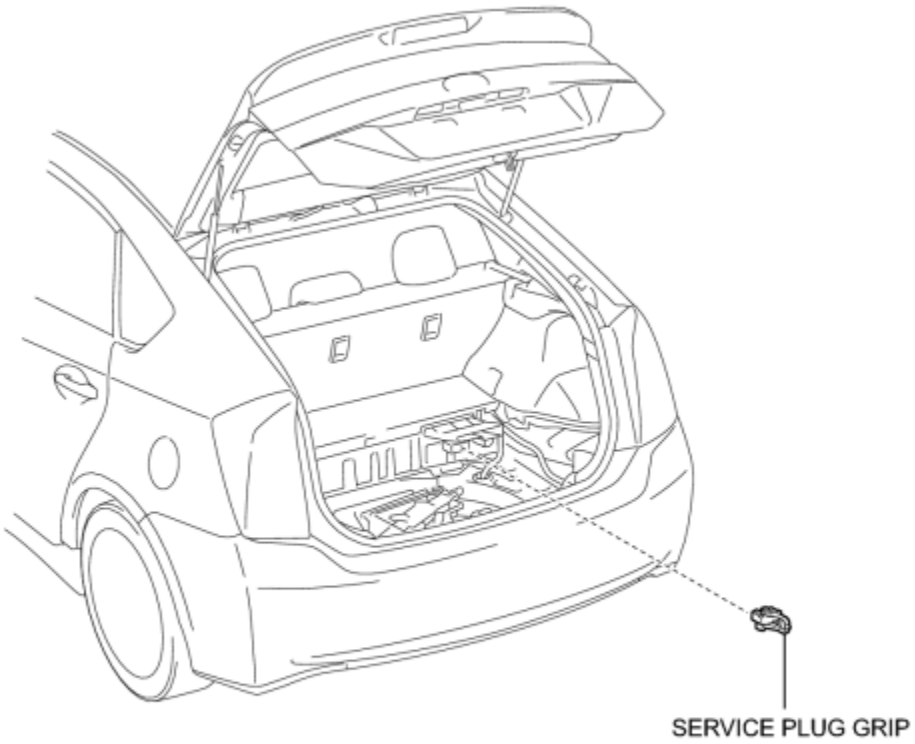
- Ensure that no foreign matter adhere to the oil seal lip.
- Ensure that the oil seal is not at an angle.

4. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY

HINT: 

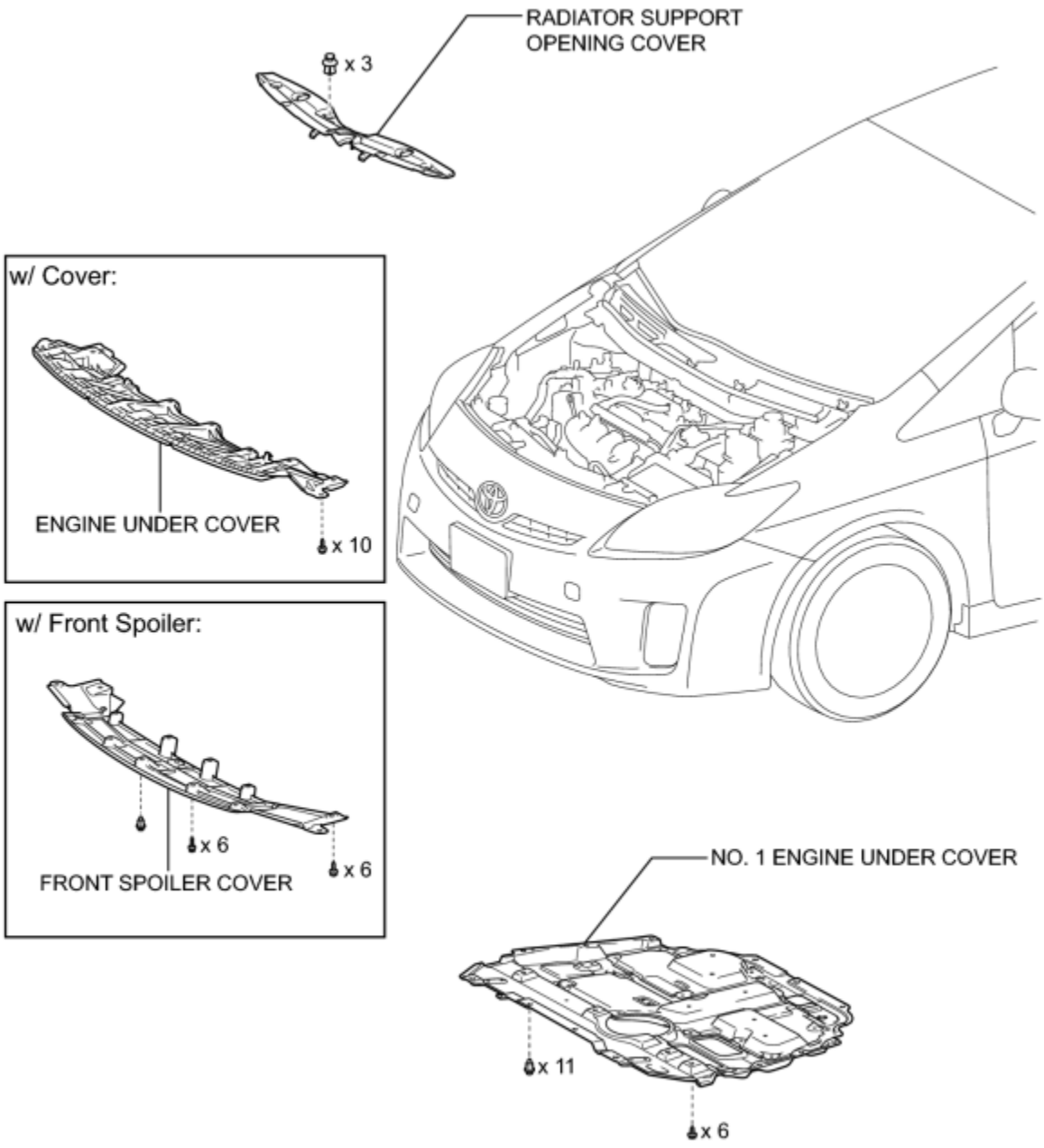
# COMPONENTS

# ILLUSTRATION



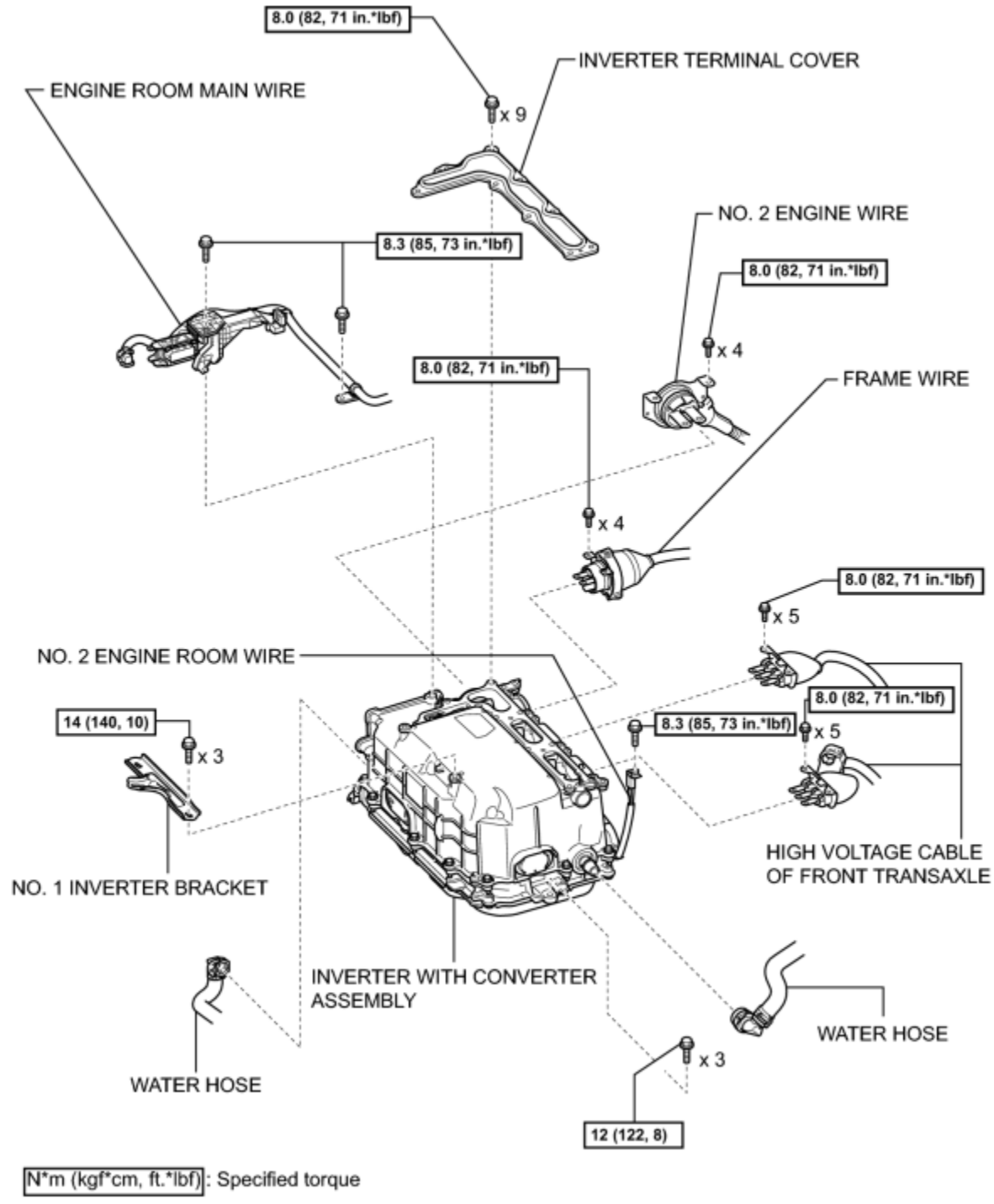

P

# ILLUSTRATION



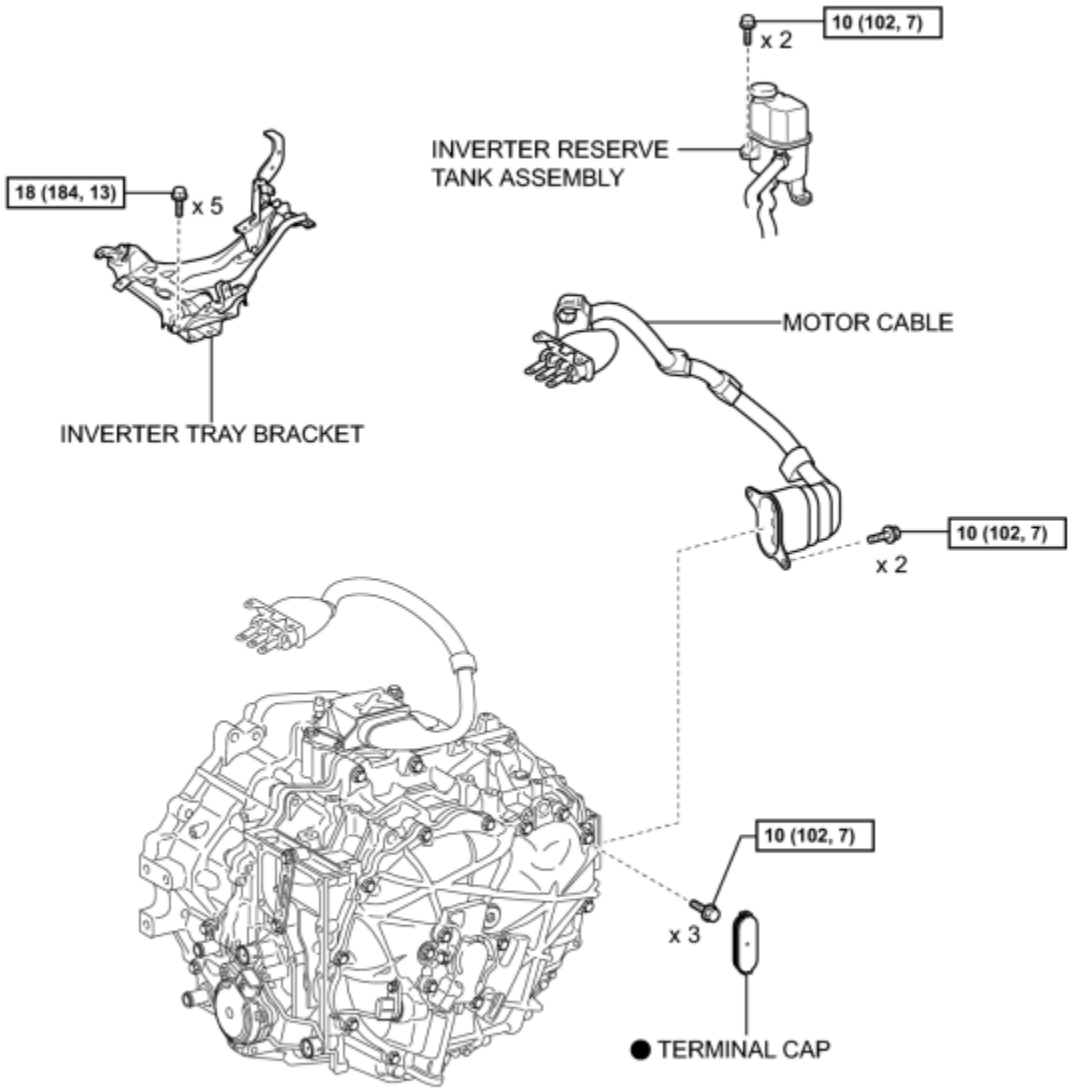

c

# ILLUSTRATION




c

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# REMOVAL

1. PRECAUTION

HINT: INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE SERVICE PLUG GRIP INFO

7. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

8. REMOVE ENGINE UNDER COVER (w/ Cover)

9. REMOVE NO. 1 ENGINE UNDER COVER

10. DRAIN COOLANT (for Inverter) INFO

11. REMOVE RADIATOR SUPPORT OPENING COVER INFO

12. REMOVE NO. 1 INVERTER BRACKET INFO

13. DISCONNECT ENGINE ROOM MAIN WIRE INFO

14. REMOVE INVERTER TERMINAL COVER INFO

15. CHECK TERMINAL VOLTAGE INFO

16. DISCONNECT FRAME WIRE INFO

17. DISCONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE INFO

18. DISCONNECT NO. 2 ENGINE WIRE INFO

19. INSTALL INVERTER TERMINAL COVER INFO

20. DISCONNECT NO. 2 ENGINE ROOM WIRE INFO

21. DISCONNECT WATER HOSE INFO

22. REMOVE INVERTER WITH CONVERTER ASSEMBLY INFO

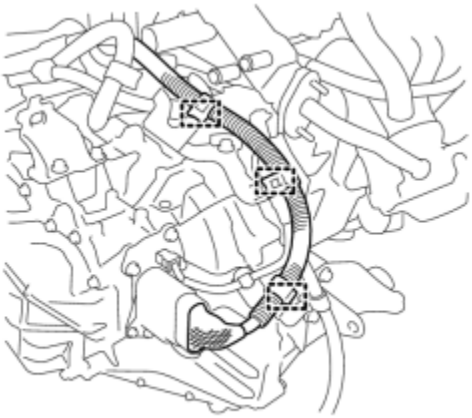
23. REMOVE INVERTER RESERVE TANK ASSEMBLY INFO

24. REMOVE INVERTER TRAY BRACKET INFO

25. REMOVE MOTOR CABLE

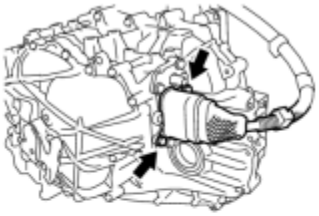
NOTICE:

Wear insulated gloves.

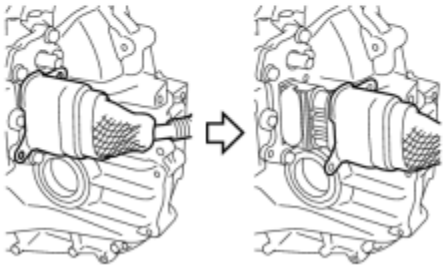


C

(a) Disconnect the 3 clamps.

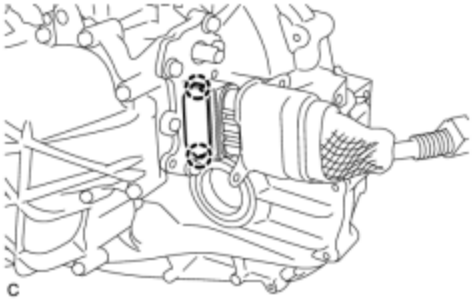


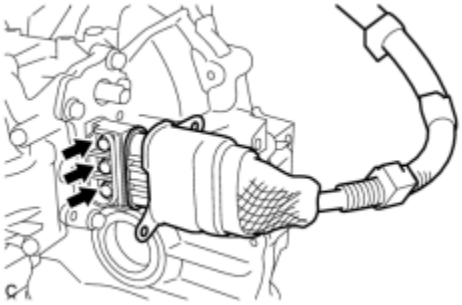
(b) Remove the 2 bolts and slide the motor cable connector shell back.



C

(c) Disengage the 2 claws to remove the terminal cap.





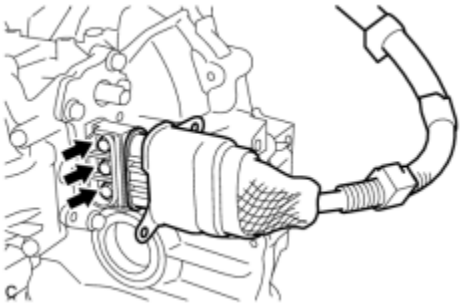
(d) Remove the 3 bolts and motor cable from the hybrid transaxle assembly.

# INSTALLATION

1. INSTALL MOTOR CABLE

NOTICE:

Wear insulated gloves.

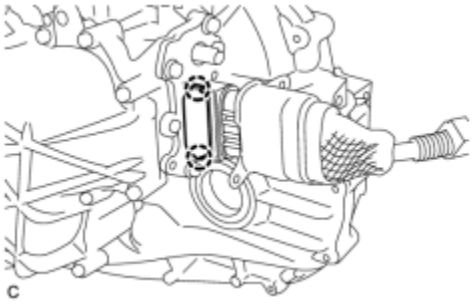


(a) Install the motor cable to the hybrid transaxle assembly with the 3 bolts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

NOTICE:

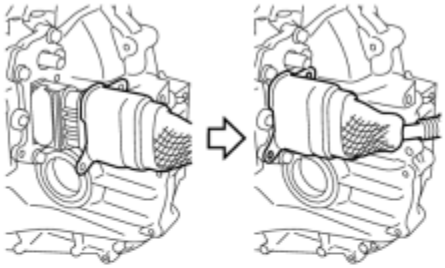
Keep the sealing surface of the motor cable and the connector terminal joint free of foreign matter.



(b) Engage the 2 claws to install a new terminal cap.

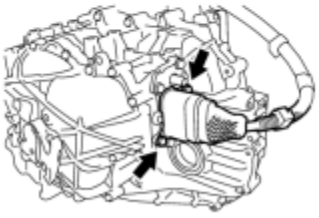
NOTICE:

When installing the terminal cap to the motor cable terminal block, keep the sealing surface free of foreign matter.

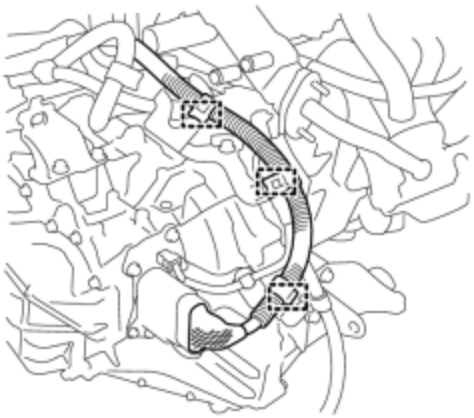


(c) Place the motor cable connector shell in position and install it with the 2 bolts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**



(d) Connect the 3 clamps.



c

2. INSTALL INVERTER TRAY BRACKET INFO

3. INSTALL INVERTER RESERVE TANK ASSEMBLY INFO

4. INSTALL INVERTER WITH CONVERTER ASSEMBLY INFO

5. CONNECT WATER HOSE INFO

6. CONNECT NO. 2 ENGINE ROOM WIRE INFO

7. REMOVE INVERTER TERMINAL COVER INFO

8. CONNECT NO. 2 ENGINE WIRE INFO

9. CONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE INFO

10. CONNECT FRAME WIRE INFO

11. CHECK HIGH VOLTAGE CABLE CONNECTION INFO

12. INSTALL INVERTER TERMINAL COVER INFO

13. INSTALL ENGINE ROOM MAIN WIRE INFO

14. INSTALL NO. 1 INVERTER BRACKET INFO

15. INSTALL SERVICE PLUG GRIP INFO

16. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

17. INSTALL REAR NO. 3 FLOOR BOARD INFO

18. INSTALL REAR DECK FLOOR BOX INFO

19. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

20. ADD COOLANT (for Inverter) INFO

21. INSPECT FOR COOLANT LEAK (for Inverter) INFO

22. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

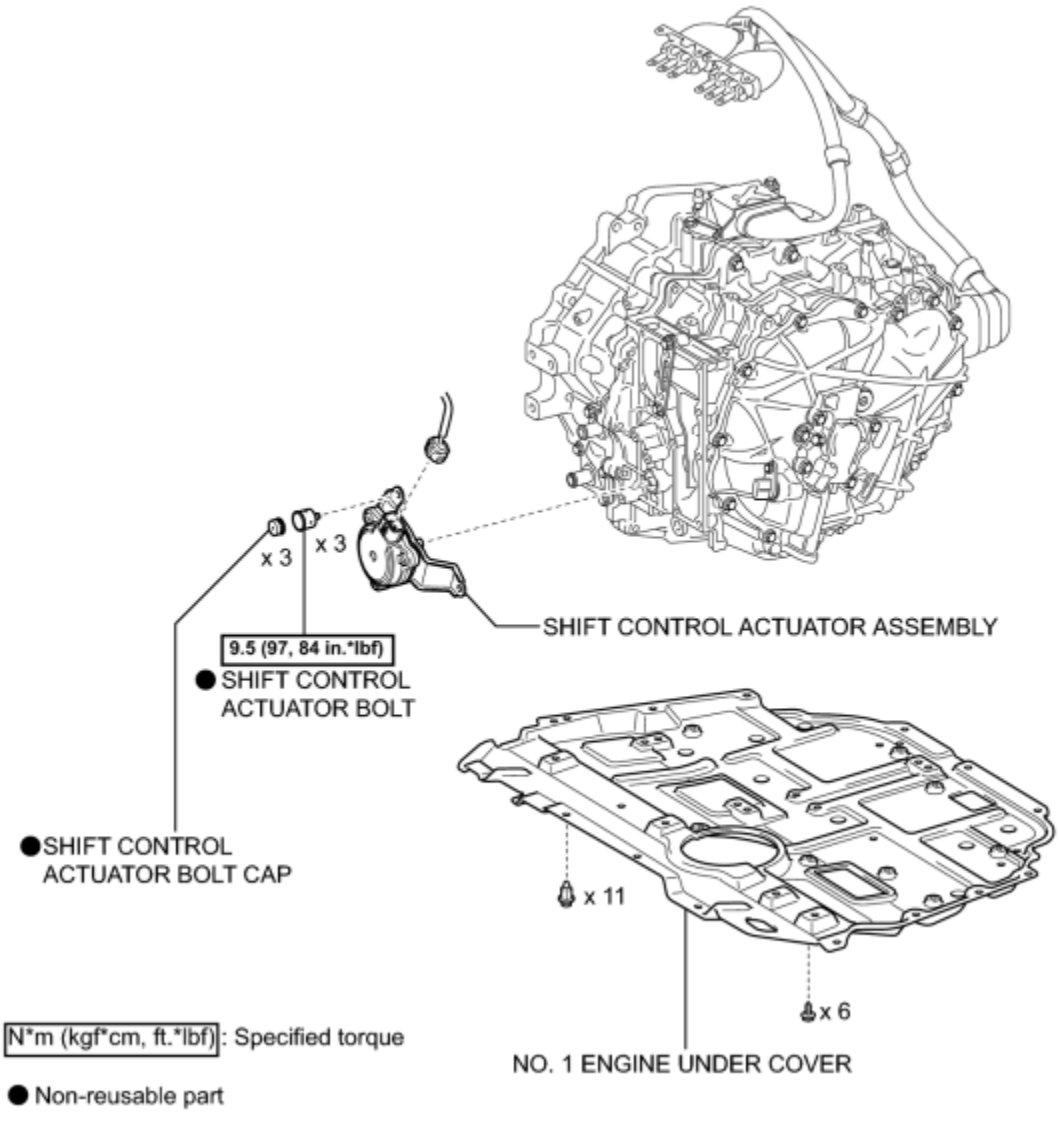
23. INSTALL ENGINE UNDER COVER (w/ Cover)

24. INSTALL NO. 1 ENGINE UNDER COVER

25. INSTALL RADIATOR SUPPORT OPENING COVER INFO

# COMPONENTS

# ILLUSTRATION

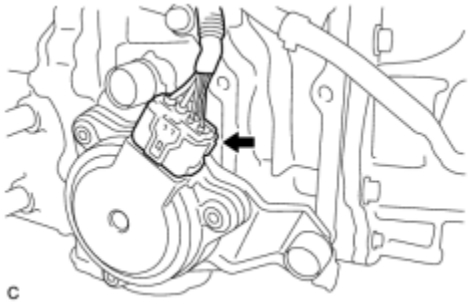



c

# REMOVAL

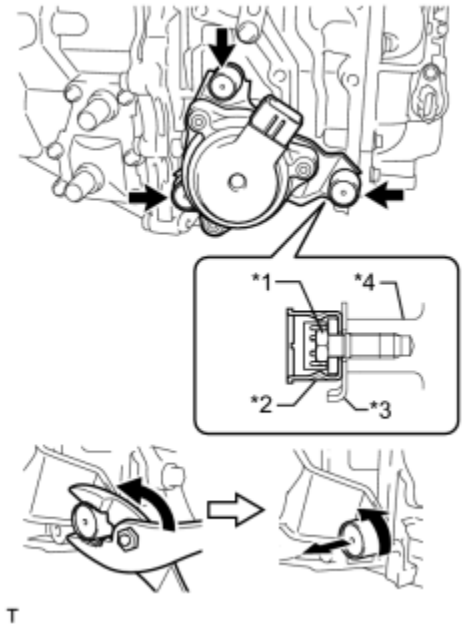
1. REMOVE NO. 1 ENGINE UNDER COVER

2. REMOVE SHIFT CONTROL ACTUATOR ASSEMBLY




(a) Disconnect the connector from the shift control actuator assembly.

(b) Using pliers or an equivalent tool, turn the shift control actuator bolt covers counterclockwise and remove the 3 shift control actuator bolts and shift control actuator assembly.



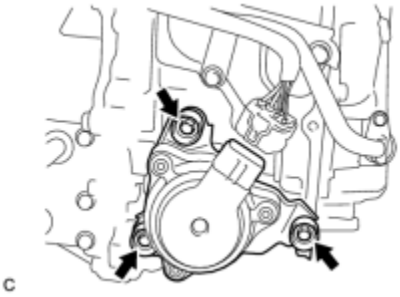

## Text in Illustration

| | |
|---|---|
| *1 | Shift Control Actuator Bolt |
| *2 | Cover |
| *3 | Shift Control Actuator Assembly |
| *4 | Transaxle Assembly |

- Use pliers or an equivalent tool to initially rotate the cover, and then proceed to remove the shift control actuator bolt and cover by pulling the cover towards the front of the vehicle by hand while rotating the bolt counterclockwise.
- This actuator is a precision instrument. Do not strike it with a plastic hammer or the like during installation.
- This actuator detects its own position when a battery is reinstalled. Thus it does not require initialization.

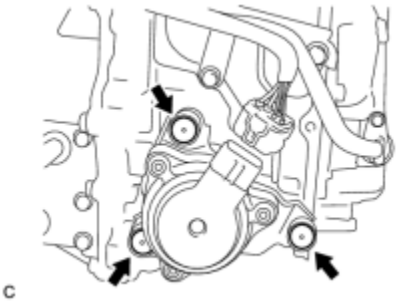
# INSTALLATION

1. INSTALL SHIFT CONTROL ACTUATOR ASSEMBLY




(a) Install the shift control actuator assembly with the 3 new shift control actuator bolts.

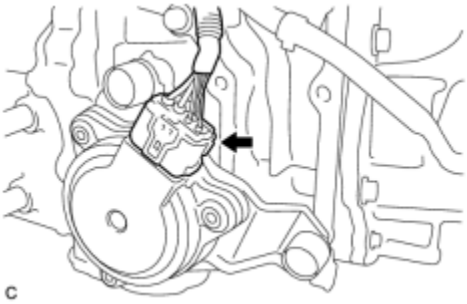
Torque: **9.5 N·m (97 kgf·cm, 84in·lbf)**




(b) Install the 3 new shift control actuator bolt caps to the shift control actuator bolts.

NOTICE:

Push in each shift control actuator cap firmly until the claw of the shift control actuator bolt cap engages with the control actuator bolt.

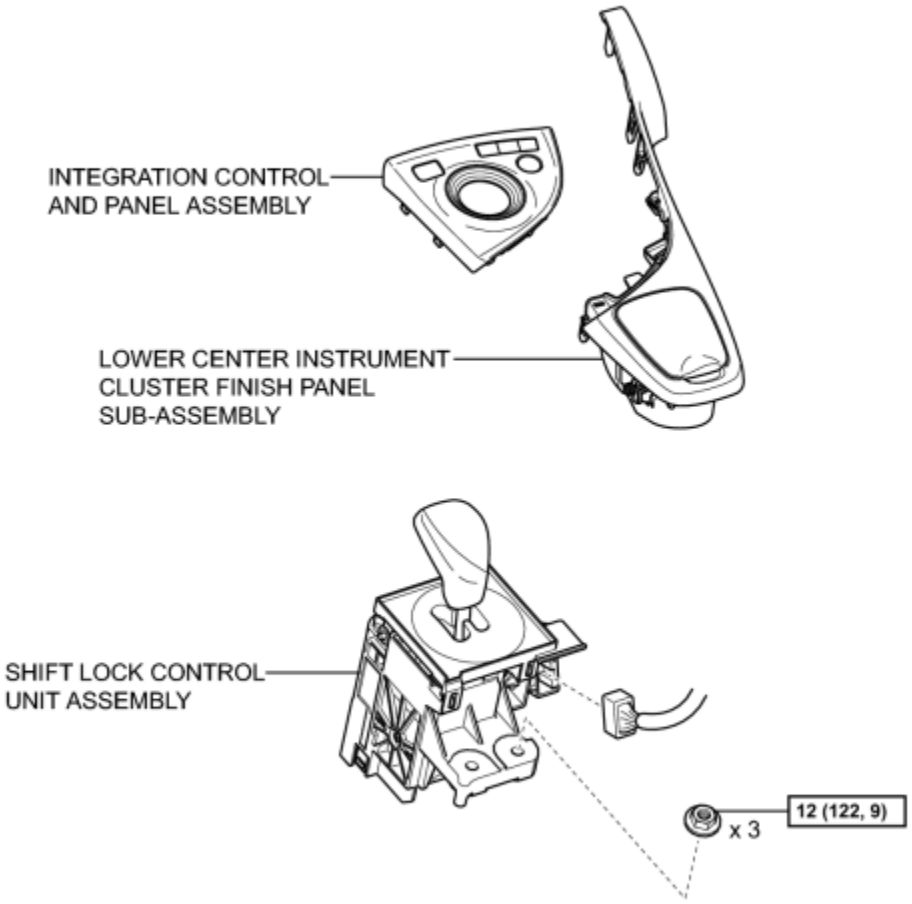



(c) Connect the connector to the shift control actuator assembly.

2. INSTALL NO. 1 ENGINE UNDER COVER

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

NOTICE:

If the shift lock control unit assembly is to be replaced with a new one, it is necessary to clear the learned shift sensor voltage value by disconnecting and reconnecting the cable of the negative (-) battery terminal INFO.

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

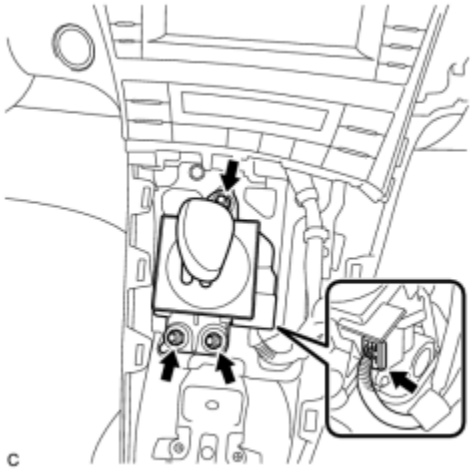
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

6. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

7. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY

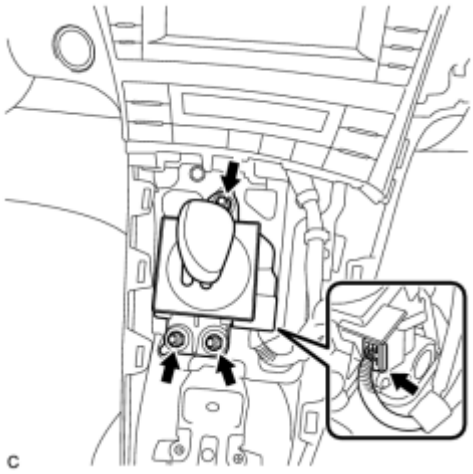



(a) Disconnect the connector from the shift lock control unit assembly.

(b) Remove the 3 nuts and shift lock control unit assembly.

# INSTALLATION

1. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY




(a) Install the shift lock control unit assembly with the 3 nuts.

Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**

(b) Connect the connector to the shift lock control unit assembly.

2. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

3. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. INSTALL REAR NO. 3 FLOOR BOARD INFO

6. INSTALL REAR DECK FLOOR BOX INFO

7. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

8. INSPECT SHIFT LEVER

(a) Turn the power switch on (READY).

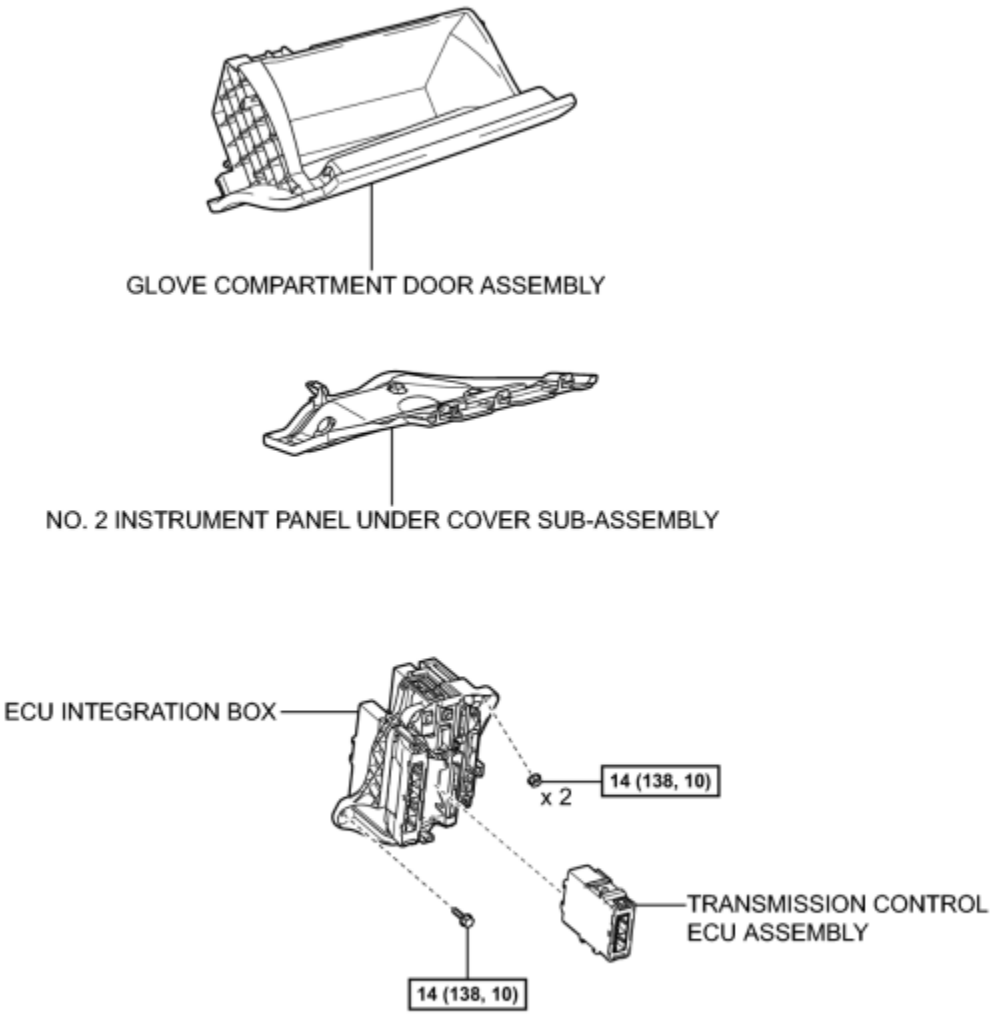
(b) Check that all available shift positions can be selected moving the shift lever.

HINT:

After the shift lever is replaced with a new one, perform the above operation. If this operation is not performed, moving the shift lever may not initially select shift positions.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

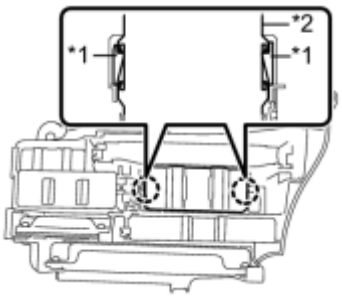
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

6. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO

7. REMOVE ECU INTEGRATION BOX INFO

8. REMOVE TRANSMISSION CONTROL ECU ASSEMBLY



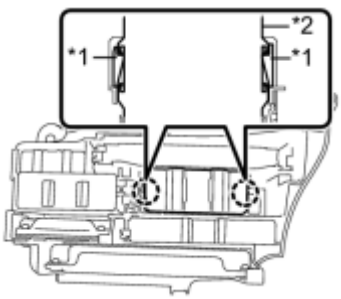

(a) Disengage the 2 claws and remove the transmission control ECU assembly from the ECU integration box.

## Text in Illustration

| | |
|---|---|
| *1 | Claw |
| *2 | Transmission Control ECU Assembly |

# INSTALLATION

1. INSTALL TRANSMISSION CONTROL ECU ASSEMBLY




(a) Engage the 2 claws to install the transmission control ECU assembly to the ECU integration box.

## Text in Illustration

| | |
|---|---|
| *1 | Claw |
| *2 | Transmission Control ECU Assembly |

2. INSTALL ECU INTEGRATION BOX INFO

3. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

4. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. INSTALL REAR NO. 3 FLOOR BOARD INFO

7. INSTALL REAR DECK FLOOR BOX INFO

8. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# REPLACEMENT

1. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

2. REMOVE ENGINE UNDER COVER (w/ Cover)

3. DRAIN COOLANT (for Engine)

NOTICE:

Do not remove the reservoir tank cap, cylinder block drain cock plugs and radiator drain cock plug while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

(a) Loosen the radiator drain cock plug and drain the coolant.

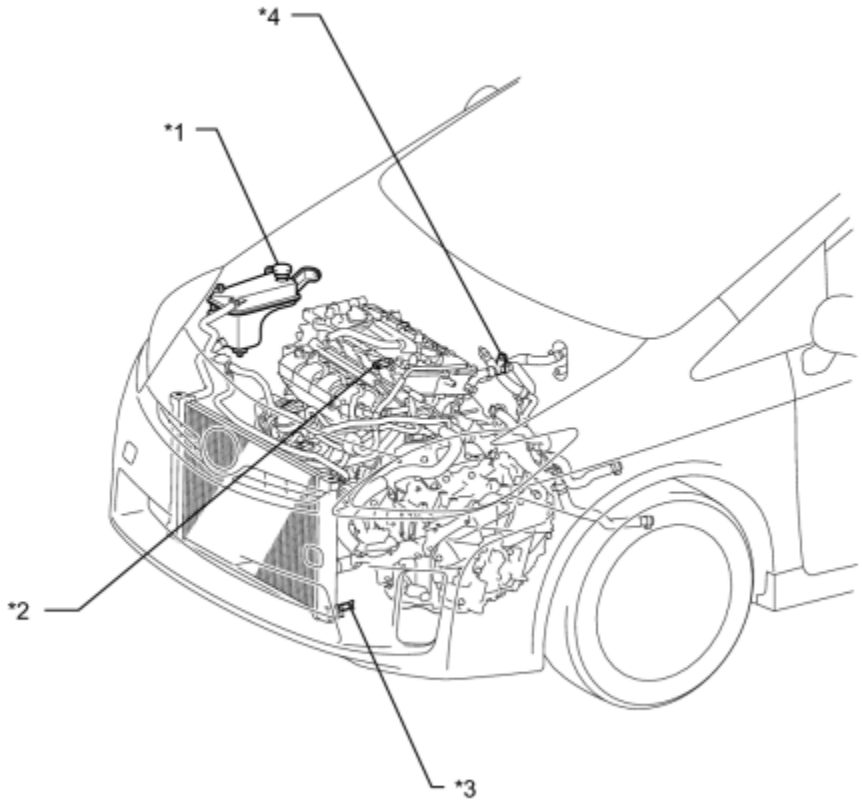
HINT:

Collect the coolant in a container and dispose of it according to the local regulations.

(b) Loosen the cylinder block drain cock plug.

HINT:

The plug is on the back of the generator on the exhaust manifold side.




c

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Reservoir Tank Cap | *2 | Cylinder Block Drain Cock Plug |
| *3 | Radiator Drain Cock Plug | *4 | Air Release Valve |

4. ADD COOLANT (for Engine)

(a) Tighten the radiator drain cock plug.

(b) Tighten the cylinder block drain cock plug.

Torque: **13 N·m (130 kgf·cm, 9ft·lbf)**

(c) Remove the reservoir tank cap.

(d) Connect the hose to the air release valve.

(e) Loosen the air release valve.

(f) Add TOYOTA Super Long Life Coolant (SLLC) to the reservoir tank filler opening until coolant overflows from the air release valve. Then tighten the air release valve.

Standard Capacity:

| Item | Capacity |
|---|---|
| Engine coolant | w/ Exhaust Heat Recirculation System:<br><br>7.3 liters (7.7 US qts, 6.4 lmp. qts) |
| | w/o Exhaust Heat Recirculation System:<br><br>6.5 liters (6.8 US qts, 5.7 lmp. qts) |

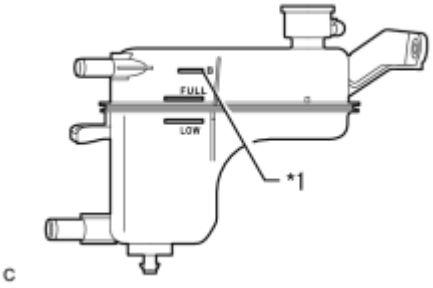
HINT:

- TOYOTA vehicles are filled with TOYOTA SLLC at the factory. In order to avoid damage to the engine cooling system and other technical problems, only use TOYOTA SLLC or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, non-borate coolant with long-life hybrid organic acid technology (coolant with long-life hybrid organic acid technology is a combination of low phosphates and organic acids).
- Contact your TOYOTA dealer for further details.

NOTICE:

Never use water as a substitute for engine coolant.

(g) Disconnect the hose from the air release valve.




(h) Add coolant to B line of the reservoir tank.

## Text in Illustration

| | |
|---|---|
| *1 | B Line |

(i) Squeeze the inlet and outlet radiator hoses several times by hand, and then check the level of the coolant.

If the coolant level is low, add coolant.

(j) Put the engine in inspection mode INFO.

(k) Install the reservoir tank cap, and warm up the engine sufficiently.

(l) Bleed air from the cooling system.

NOTICE:

- Before starting the engine, turn the A/C switch off.
- Adjust the heater control to the maximum hot setting.

- Adjust the blower speed to low setting.

(1) Warm up the engine until the thermostat opens. While the thermostat is open, allow the coolant to circulate for several minutes.

HINT:

The thermostat opening timing can be confirmed by squeezing the inlet radiator hose by hand, and sensing vibrations when the engine coolant starts to flow inside the hose.

## When squeezing the radiator hose:

- Wear protective gloves.
- Be careful as the radiator hoses are hot.
- Keep your hands away from the radiator fan.

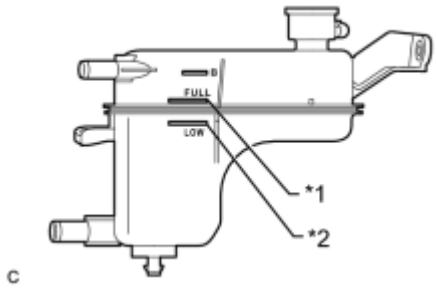
(2) After the engine is warmed up, let it idle for 7 minutes or more.

(3) Squeeze the inlet and outlet radiator hoses several times by hand to bleed air from the system.

## When squeezing the radiator hose:

- Wear protective gloves.
- Be careful as the radiator hoses are hot.
- Keep your hands away from the radiator fan.

(m) After the engine has cooled down, check that the coolant level is between full and low.




C

## Text in Illustration

| | |
|---|---|
| *1 | Full Line |
| *2 | Low Line |

If the coolant level is low, add coolant to the full line on the reservoir tank.

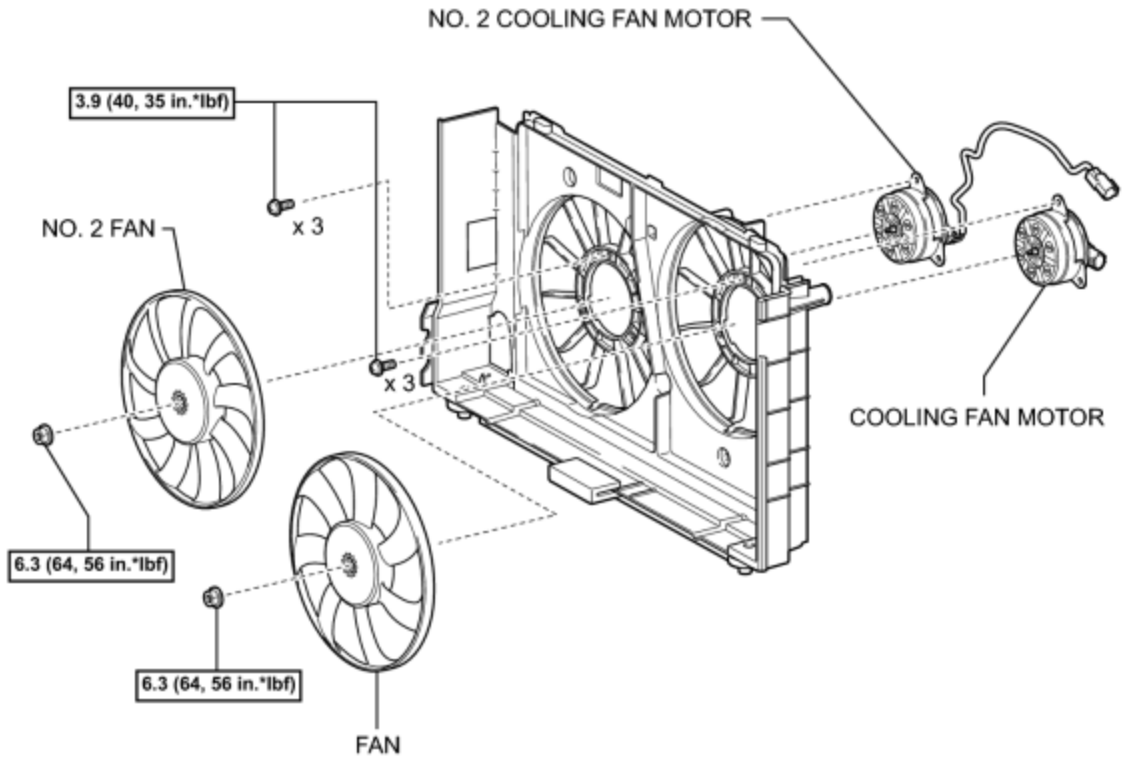
5. INSPECT FOR COOLANT LEAK (for Engine) INFO

6. INSTALL ENGINE UNDER COVER (w/ Cover)

7. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

# COMPONENTS

# ILLUSTRATION

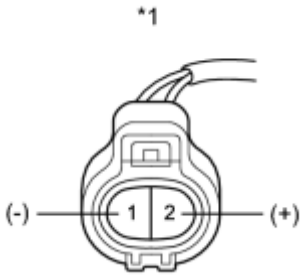



N*m (kgf*cm, ft.*lbf): Specified torque

c

# ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN MOTOR




(a) Check that the motor operates smoothly when the battery is connected to the cooling fan motor connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Cooling Fan Motor) |

(b) Clamp the 400 A probe of an ammeter over the M+ wire of the cooling fan motor.

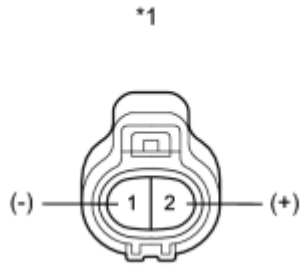
(c) Measure the current while the motor is operating.

Standard Current:

| Item | Condition | Specified Condition |
|---|---|---|
| Cooling fan motor | 20°C (68°F) | 4.7 to 8.7 A at 12 V |

If the result is not as specified, replace the cooling fan motor.

2. INSPECT NO. 2 COOLING FAN MOTOR




(a) Check that the motor operates smoothly when the battery is connected to the No. 2 cooling fan motor connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to No. 2 Cooling Fan Motor) |

(b) Clamp the 400 A probe of an ammeter over the M+ wire of the No. 2 cooling fan motor.

(c) Measure the current while the motor is operating.

Standard Current:

| Item | Condition | Specified Condition |
|---|---|---|
| No. 2 cooling fan motor | 20°C (68°F) | 4.7 to 8.7 A at 12 V |

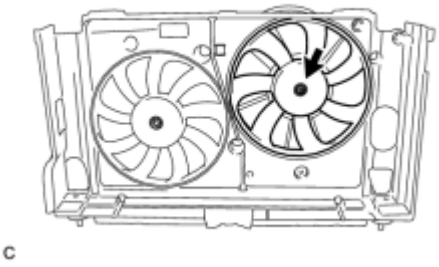
If the result is not as specified, replace the No. 2 cooling fan motor.

# REMOVAL

1. REMOVE RADIATOR ASSEMBLY

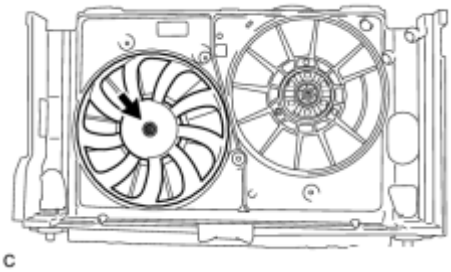
HINT: INFO

2. REMOVE FAN



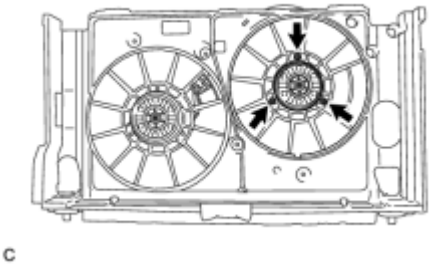

(a) Remove the nut and fan.

3. REMOVE NO. 2 FAN




(a) Remove the nut and No. 2 fan.

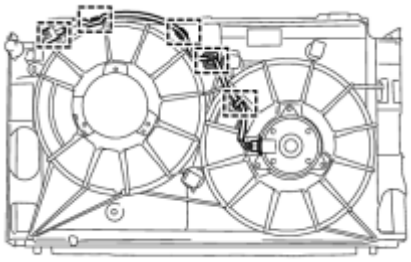
4. REMOVE COOLING FAN MOTOR




(a) Remove the 3 screws and cooling fan motor.

5. REMOVE NO. 2 COOLING FAN MOTOR

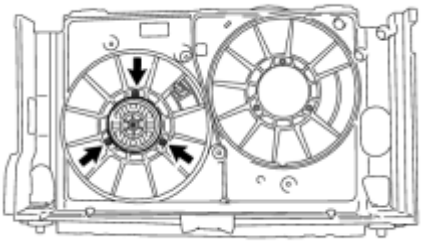
(a) Disconnect the 5 clamps.



C

NOTICE:

Be careful not to damage the connector.

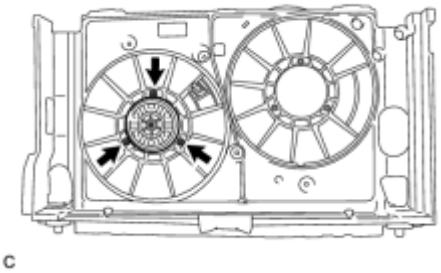


C

(b) Remove the 3 screws and No. 2 cooling fan motor.

# INSTALLATION

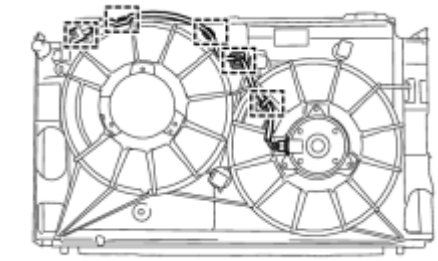
1. INSTALL NO. 2 COOLING FAN MOTOR



C

(a) Install the No. 2 cooling fan motor with the 3 screws.

Torque: **3.9 N·m (40 kgf·cm, 35in·lbf)**



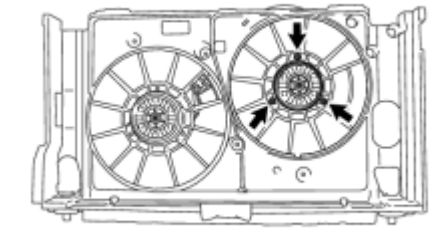
C

(b) Connect the 5 clamps.

NOTICE:

Be careful not to damage the connector.

2. INSTALL COOLING FAN MOTOR



C

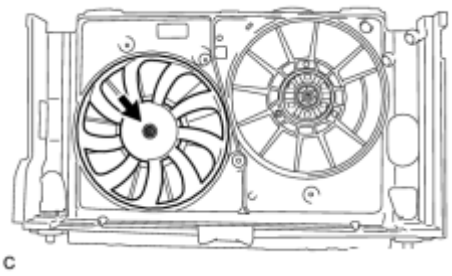
(a) Install the cooling fan motor with the 3 screws.

Torque: **3.9 N·m (40 kgf·cm, 35in·lbf)**

3. INSTALL NO. 2 FAN

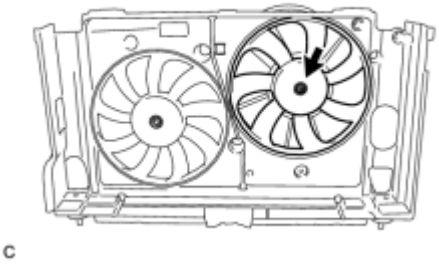
(a) Install the No. 2 fan with the nut.

Torque: **6.3 N·m (64 kgf·cm, 56in·lbf)**



C

4. INSTALL FAN



C

(a) Install the fan with the nut.

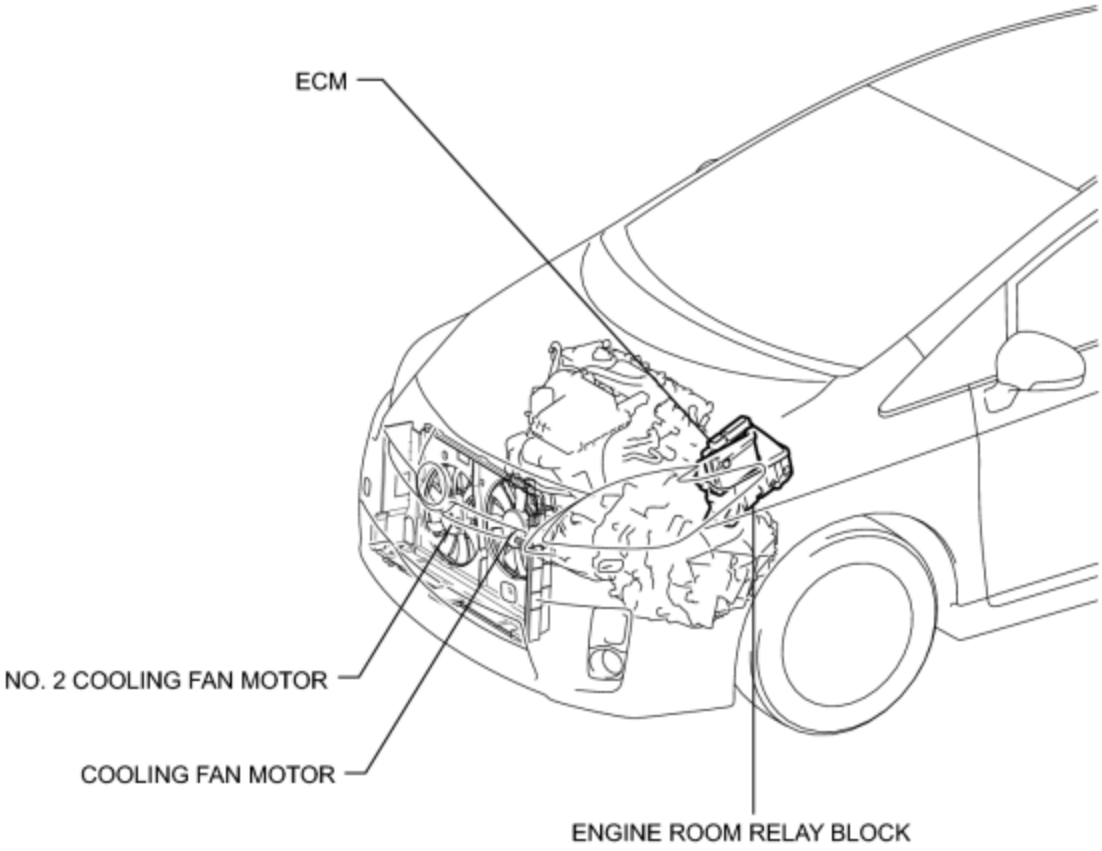
Torque: **6.3 N·m (64 kgf·cm, 56in·lbf)**

5. INSTALL RADIATOR ASSEMBLY

HINT: INFO

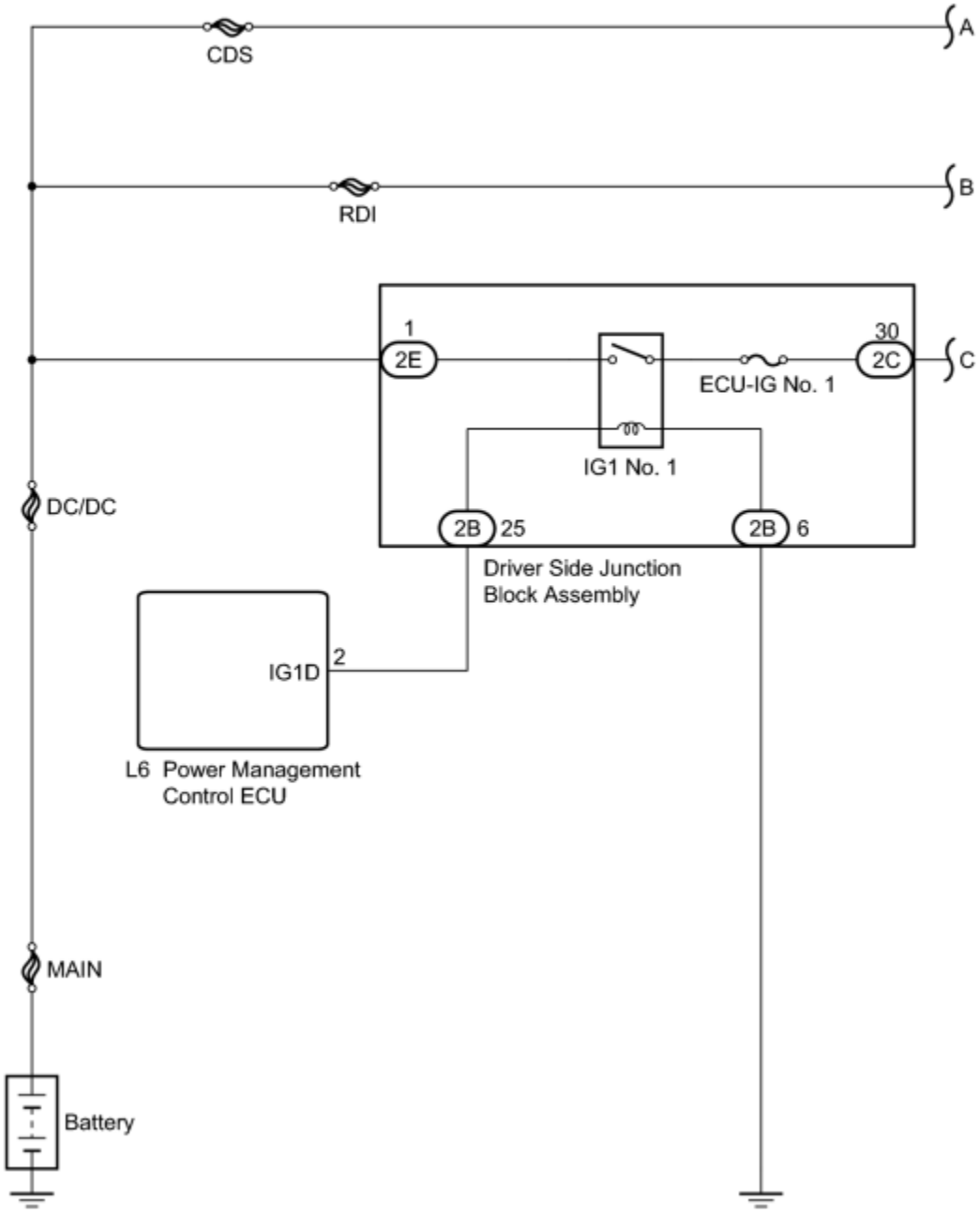
# PARTS LOCATION

# ILLUSTRATION

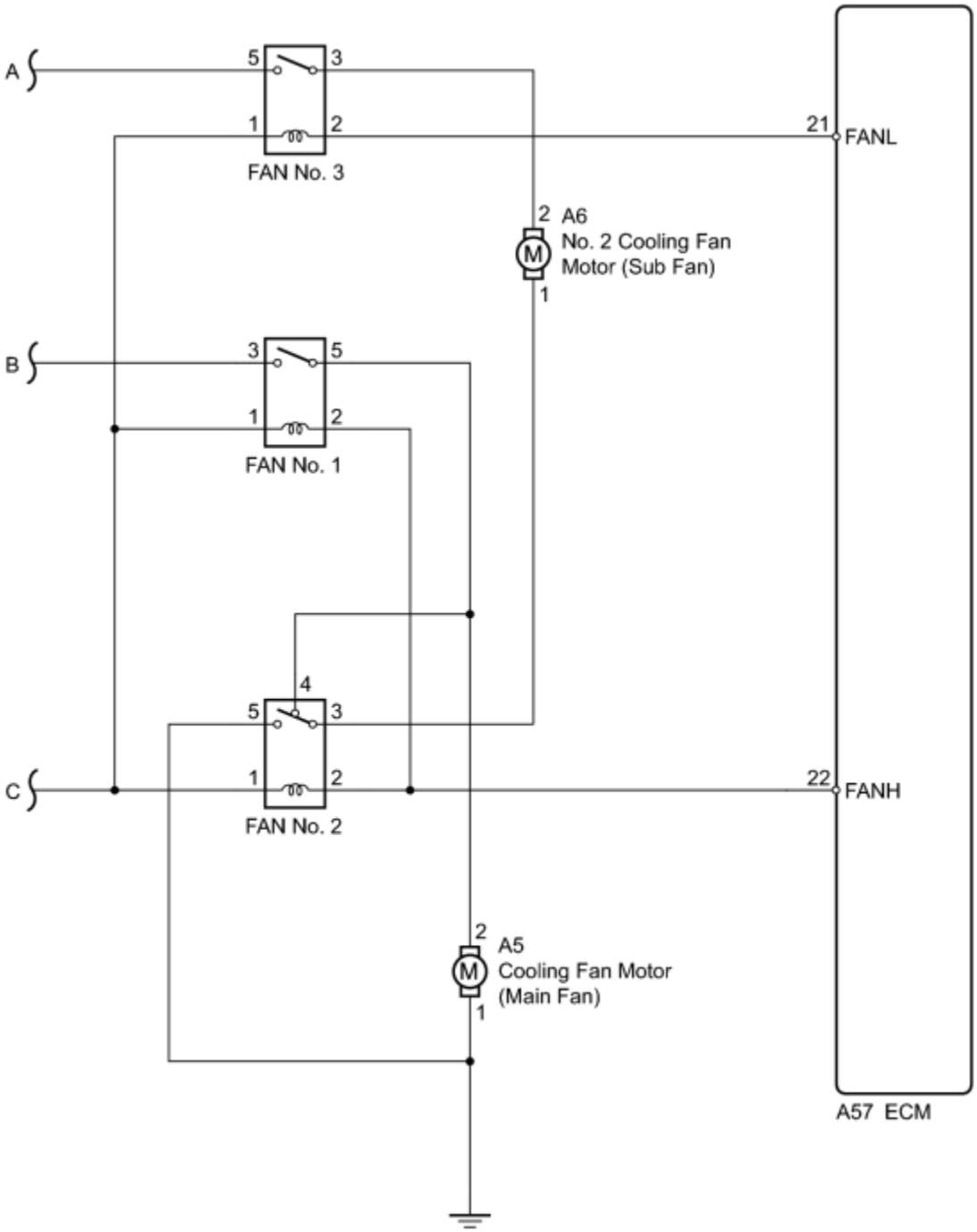



P

# SYSTEM DIAGRAM




c


A
5
3
1
2
FAN No. 3
21
FANL
2
A6
No. 2 Cooling Fan
Motor (Sub Fan)
M
1
B
3
5
1
2
FAN No. 1
4
5
3
C
1
2
FAN No. 2
22
FANH
2
A5
Cooling Fan Motor
(Main Fan)
M
1
A57 ECM

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses related to this system before inspecting the suspected areas below.

**Cooling Fan System**

| Symptom | Suspected Area | See page |
|---|---|---|
| Cooling fans do not operate (main and sub fans) | Cooling fan circuit | INFO |
| | FAN No. 3 relay | INFO |
| | Cooling fan motor | INFO |
| | No. 2 cooling fan motor | INFO |
| | Air conditioning system | INFO |
| | ECM | INFO |
| Cooling fan does not operate (main fan) | Engine coolant temperature sensor | INFO |
| | Cooling fan circuit | INFO |
| | FAN No. 1 relay | INFO |
| | FAN No. 2 relay | INFO |
| | Cooling fan motor | INFO |
| | ECM | INFO |
| Cooling fan does not operate (sub fan) | Cooling fan circuit | INFO |
| | No. 2 cooling fan motor | INFO |
| | Air conditioning system | INFO |
| | ECM | INFO |
| Cooling fans do not stop (main and sub fans) | Cooling fan circuit | INFO |
| | Air conditioning system | INFO |
| | FAN No. 3 relay | INFO |
| | ECM | INFO |
| Cooling fan does not stop (main fan) | Engine coolant temperature sensor | INFO |
| | Cooling fan circuit | INFO |
| | FAN No. 1 relay | INFO |
| | ECM | INFO |
| Cooling fan speed does not change (main and sub fans) | Engine coolant temperature sensor | INFO |
| | Cooling fan circuit | INFO |
| | FAN No. 2 relay | INFO |
| | ECM | INFO |

# ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN SYSTEM

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Engine / Active Test / Control the Electric Cooling Fan.

(d) Check operation of the cooling fans while operating them using the Techstream. If the cooling fans do not operate, check the cooling fan circuit 

.

| |
|---|
| Cooling Fan Circuit |

# DESCRIPTION

The ECM turns on or off the fan relays using signals calculated from the engine coolant temperature, air conditioning switch (on/off), air conditioning refrigerant pressure, engine speed, and vehicle speed signals.

The ECM switches the circuit of the cooling fan motors between series and parallel by turning on or off the fan relays in order to control the speed of the cooling fan motors in two steps.

# WIRING DIAGRAM

Refer to System Diagram INFO.

# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Electric Cooling Fan.

OK:

| Tester Operation | Specified Condition |
|---|---|
| ON | Fans operate |
| OFF | Fans do not operate |

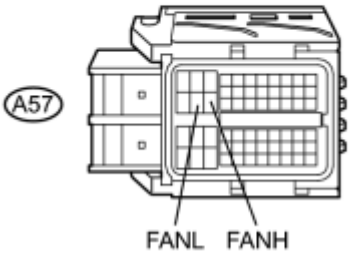
NG ▶ INSPECT ECM (FANL AND FANH VOLTAGE)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | INSPECT ECM (FANL AND FANH VOLTAGE) |

(a) Disconnect the ECM connector.

*1




N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-22 (FANH) - Body ground | Power switch on (IG) | 11 to 14 V |
| A57-21 (FANL) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

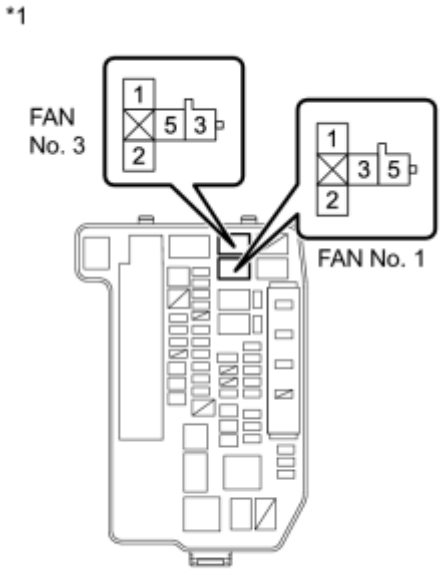
NG ▶ CHECK FUSE (ECU-IG NO. 1 FUSE VOLTAGE)

OK

▼

| | |
|---|---|
| 3. | INSPECT ENGINE ROOM RELAY BLOCK (FAN NO. 1 RELAY AND FAN NO. 3 RELAY VOLTAGE) |

(a) Remove the FAN No. 1 relay and FAN No. 3 relay from the engine room relay block.




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 (FAN No. 1 relay) - Body ground | Always | 11 to 14 V |
| 5 (FAN No. 3 relay) - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Relay Block |

(c) Reinstall the FAN No. 1 relay and FAN No. 3 relay.

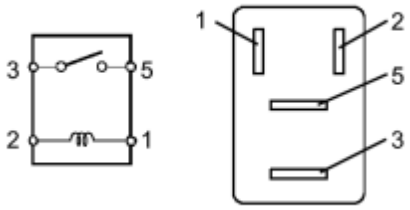
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (BATTERY - ENGINE ROOM RELAY BLOCK)

OK

▼

| | |
|---|---|
| 4. | INSPECT FAN NO. 1 RELAY |

(a) Remove the FAN No. 1 relay from the engine room relay block.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

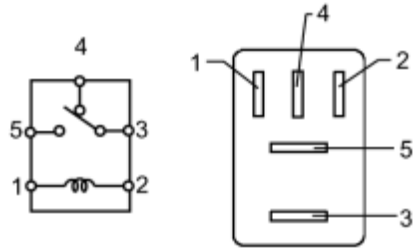
(c) Reinstall the FAN No. 1 relay.

NG ▶ REPLACE FAN NO. 1 RELAY

OK

▼

| | |
|---|---|
| 5. | INSPECT FAN NO. 2 RELAY |




(a) Remove the FAN No. 2 relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 4 | Battery voltage is not applied between terminals 1 and 2 | Below 1 Ω |
| | Battery voltage is applied between terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

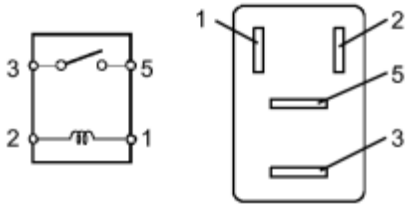
(c) Reinstall the FAN No. 2 relay.

NG ▶ REPLACE FAN NO. 2 RELAY

OK

▼

| | |
|---|---|
| 6. | INSPECT FAN NO. 3 RELAY |




(a) Remove the FAN No. 3 relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

(c) Reinstall the FAN No. 3 relay.

NG ▶ REPLACE FAN NO. 3 RELAY

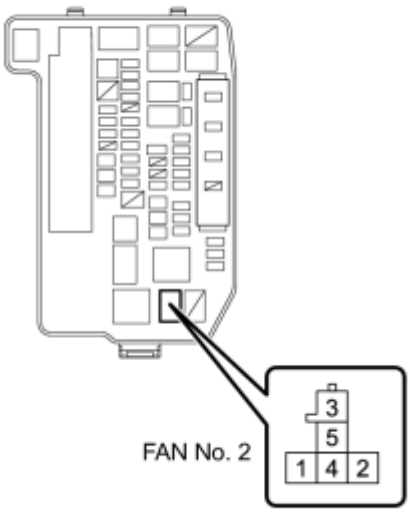
OK

▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (FAN NO. 2 RELAY - BODY GROUND) |

(a) Remove the FAN No. 2 relay from the engine room relay block.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 5 (FAN No. 2 relay) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Relay Block |

(c) Reinstall the FAN No. 2 relay.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (FAN NO. 2 RELAY - BODY GROUND)

OK

▼

| | |
|---|---|
| 8. | INSPECT COOLING FAN MOTOR |

(a) Disconnect the cooling fan motor connector.

*1




c

(b) Check that the cooling fan motor operates smoothly when the battery is connected to the cooing fan motor connector.

(c) Measure the current while the motor is operating.

Standard Current:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Always | 11.2 to 14.5 A |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Cooling Fan Motor) |

(d) Reconnect the cooling fan motor connector.

NG ▶ REPLACE COOLING FAN MOTOR

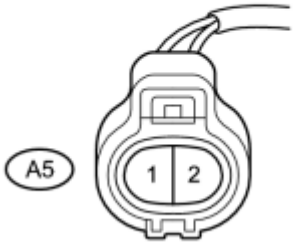
OK

▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (COOLING FAN MOTOR - BODY GROUND) |

(a) Disconnect the cooling fan motor connector.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A5-1 - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Cooling Fan Motor) |

(c) Reconnect the cooling fan motor connector.

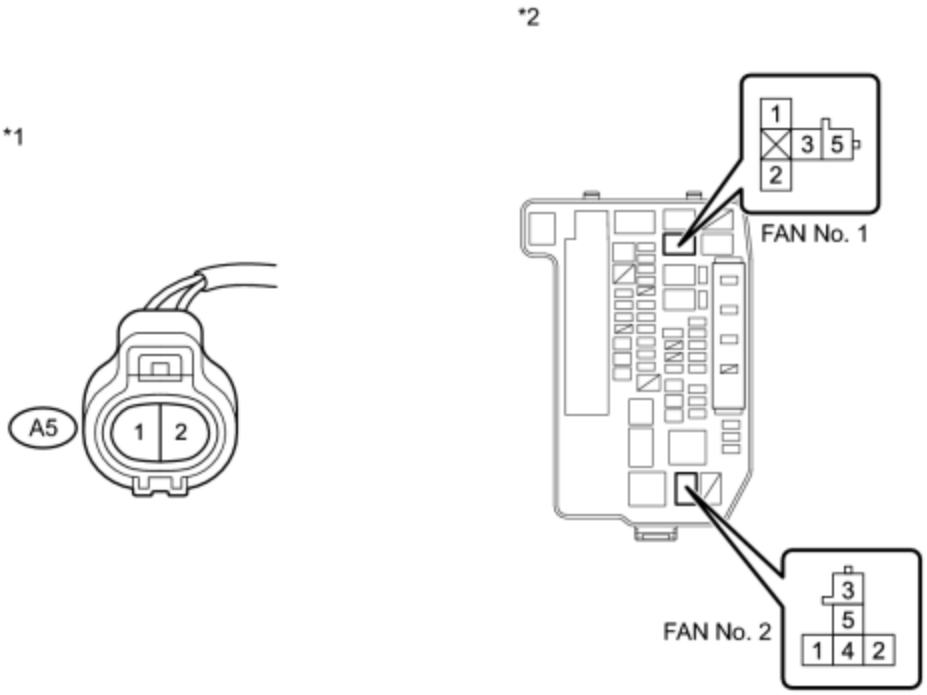
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (COOLING FAN MOTOR - BODY GROUND)

OK

▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (COOLING FAN MOTOR - ENGINE ROOM RELAY BLOCK) |

(a) Disconnect the cooling fan motor connector.




(b) Remove the FAN No. 1 relay and FAN No. 2 relay from the engine room relay block.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A5-2 - 5 (FAN No. 1 relay) | Always | Below 1 Ω |
| A5-2 - 4 (FAN No. 2 relay) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A5-2 or 5 (FAN No. 1 relay) - Body ground | Always | 10 kΩ or higher |
| A5-2 or 4 (FAN No. 2 relay) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Cooling Fan Motor) |
| *2 | Engine Room Relay Block |

(d) Reconnect the cooling fan motor connector.

(e) Reinstall the FAN No. 1 relay and FAN No. 2 relay.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (COOLING FAN MOTOR - ENGINE ROOM RELAY BLOCK)

OK

▼

| | |
|---|---|
| 11. | INSPECT NO. 2 COOLING FAN MOTOR |

*1




(a) Disconnect the No. 2 cooling fan motor connector.

c

(b) Check that the No. 2 cooling fan motor operates smoothly when the battery is connected to the No. 2 cooling fan motor connector.

(c) Measure the current while the motor is operating.

Standard Current:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Always | 7.4 to 10.9 A |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(No. 2 Cooling Fan Motor) |

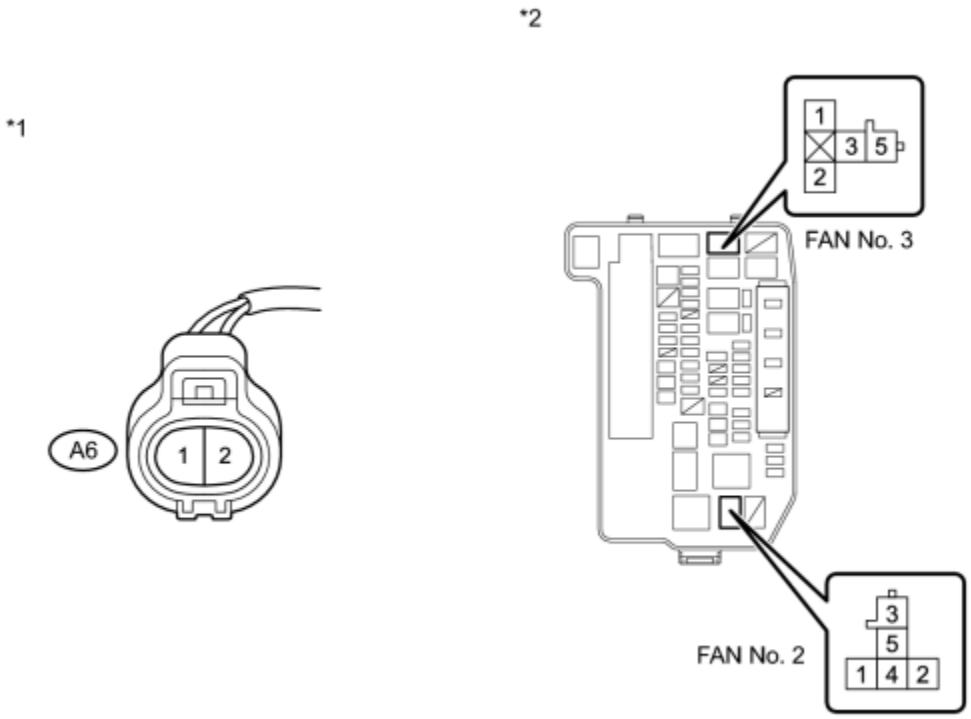
(d) Reconnect the No. 2 cooling fan fan motor connector.

NG ▶ REPLACE NO. 2 COOLING FAN MOTOR

OK

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (NO. 2 COOLING FAN MOTOR - ENGINE ROOM RELAY BLOCK) |

(a) Disconnect the No. 2 cooling fan motor connector.




(b) Remove the FAN No. 2 relay and FAN No. 3 relay from the engine room relay block.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A6-1 - 3 (FAN No. 2 relay) | Always | Below 1 Ω |
| A6-2 - 3 (FAN No. 3 relay) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A6-1 or 3 (FAN No. 2 relay) - Body ground | Always | 10 kΩ or higher |
| A6-2 or 3 (FAN No. 3 relay) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to No. 2 Cooling Fan Motor) |
| *2 | Engine Room Relay Block |

(d) Reconnect the No. 2 cooling fan motor connector.

(e) Reinstall the FAN No. 2 relay and FAN No. 3 relay.

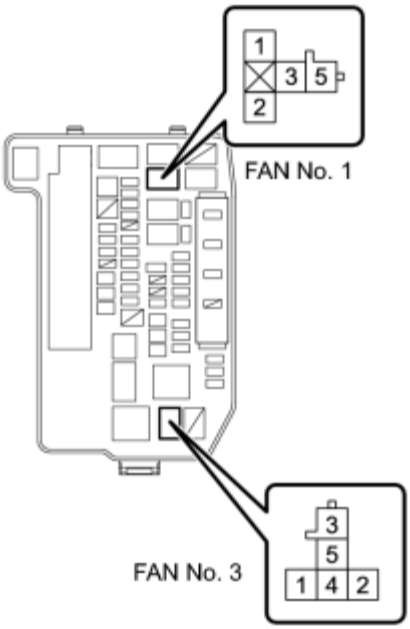
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (NO. 2 COOLING FAN MOTOR - ENGINE ROOM RELAY BLOCK)

OK

▼

| | |
|---|---|
| 13. | INSPECT ENGINE ROOM RELAY BLOCK (FAN NO. 1 RELAY - FAN NO. 2 RELAY) |

*1




(a) Remove the FAN No. 1 relay and FAN No. 2 relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (FAN No. 1 relay) - 1 (FAN No. 2 relay) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (FAN No. 1 relay) - 2 (FAN No. 2 relay) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (FAN No. 1 relay) or 1 (FAN No. 2 relay) - Body ground | Always | 10 kΩ or higher |
| 2 (FAN No. 1 relay) or 2 (FAN No. 2 relay) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Relay Block |

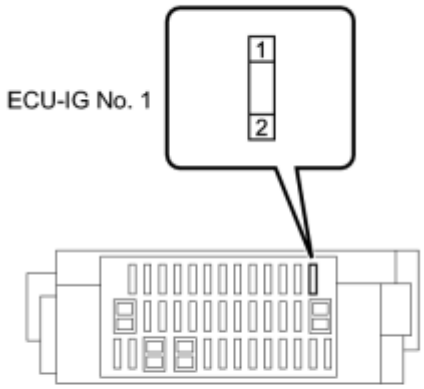
(c) Reinstall the FAN No. 1 relay and FAN No. 2 relay.

NG ▶ REPLACE ENGINE ROOM RELAY BLOCK

OK ▶ **REPLACE ECM**

| | |
|---|---|
| 14. | CHECK FUSE (ECU-IG NO. 1 FUSE VOLTAGE) |

*1




(a) Remove the ECU-IG No. 1 fuse from the instrument panel junction block.

c

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (ECU-IG No. 1 fuse) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Driver Side Junction Block |

(d) Reinstall the ECU-IG No. 1 fuse.

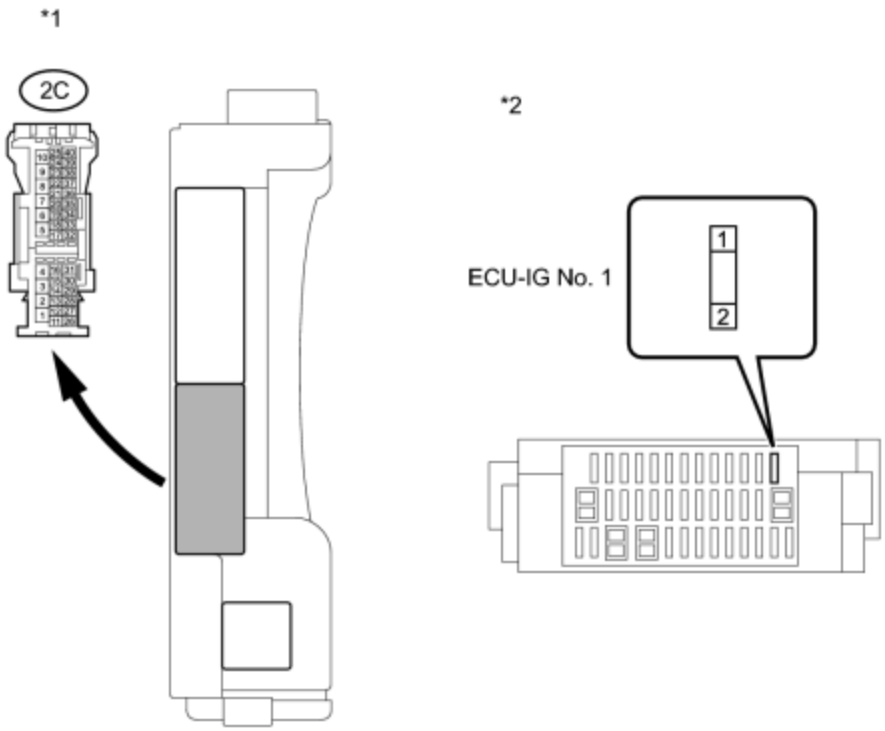
NG ▶ INSPECT DRIVER SIDE JUNCTION BLOCK ASSEMBLY (IG1 NO. 1 RELAY)

OK

▼

| | |
|---|---|
| 15. | INSPECT DRIVER SIDE JUNCTION BLOCK ASSEMBLY |

(a) Disconnect the driver side junction block assembly connector.




(b) Remove the ECU-IG No. 1 fuse from the driver side junction block assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2C-30 - 2 (ECU-IG No. 1) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2C-30 or 2 (ECU-IG No. 1) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Driver Side Junction Block Assembly) | *2 | Driver Side Junction Block Assembly |

(d) Reconnect the ECU-IG No. 1 fuse.

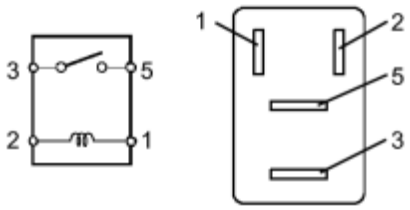
(e) Reconnect the Driver side junction block assembly connector.

NG ▶ REPLACE DRIVER SIDE JUNCTION BLOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 16. | INSPECT FAN NO. 1 RELAY |




(a) Remove the FAN No. 1 relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

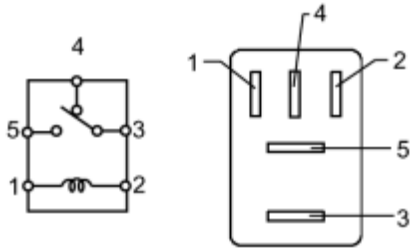
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

(c) Reinstall the FAN No. 1 relay.

NG ▶ REPLACE FAN NO. 1 RELAY

OK

| | |
|---|---|
| 17. | INSPECT FAN NO. 2 RELAY |




(a) Remove the FAN No. 2 relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

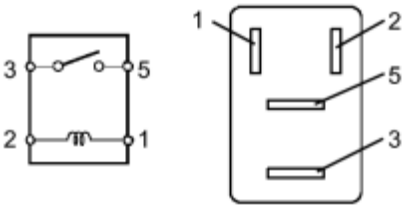
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 4 | Battery voltage is not applied between terminals 1 and 2 | Below 1 Ω |
| | Battery voltage is applied between terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

(c) Reinstall the FAN No. 2 relay.

NG REPLACE FAN NO. 2 RELAY

OK

| | |
|---|---|
| 18. | INSPECT FAN NO. 3 RELAY |




(a) Remove the FAN No. 3 relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

(c) Reinstall the FAN No. 3 relay.

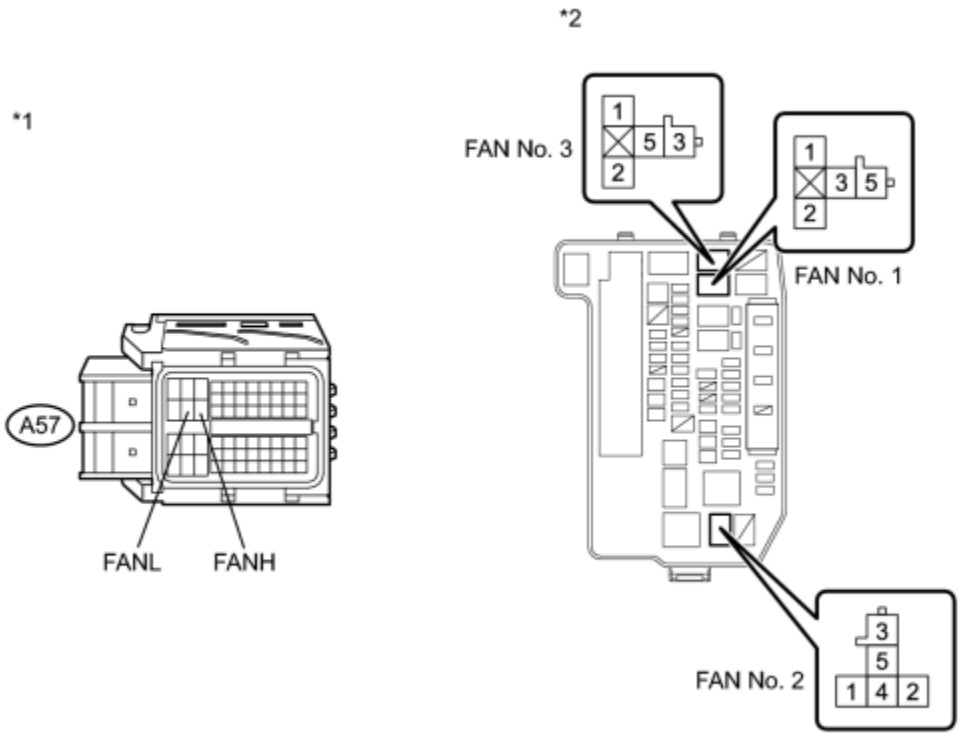
NG ▶ REPLACE FAN NO. 3 RELAY

OK

▼

| 19. | CHECK HARNESS AND CONNECTOR (ENGINE ROOM RELAY BLOCK - ECM) |
|---|---|

(a) Remove the FAN No. 1 relay, FAN No. 2 relay and FAN No. 3 relay from the engine room relay block.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (FAN No. 1 relay) - A57-22 (FANH) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (FAN No. 2 relay) - A57-22 (FANH) | Always | Below 1 Ω |
| 2 (FAN No. 3 relay) - A57-21 (FANL) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (FAN No. 1 relay) or A57-22 (FANH) - Body ground | Always | 10 kΩ or higher |
| 2 (FAN No. 2 relay) or A57-22 (FANH) - Body ground | Always | 10 kΩ or higher |
| 2 (FAN No. 3 relay) or A57-21 (FANL) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |
| *2 | Engine Room Relay Block |

(d) Reinstall the FAN No. 1 relay, FAN No. 2 relay and FAN No. 3 relay.

(e) Reconnect the ECM connector.

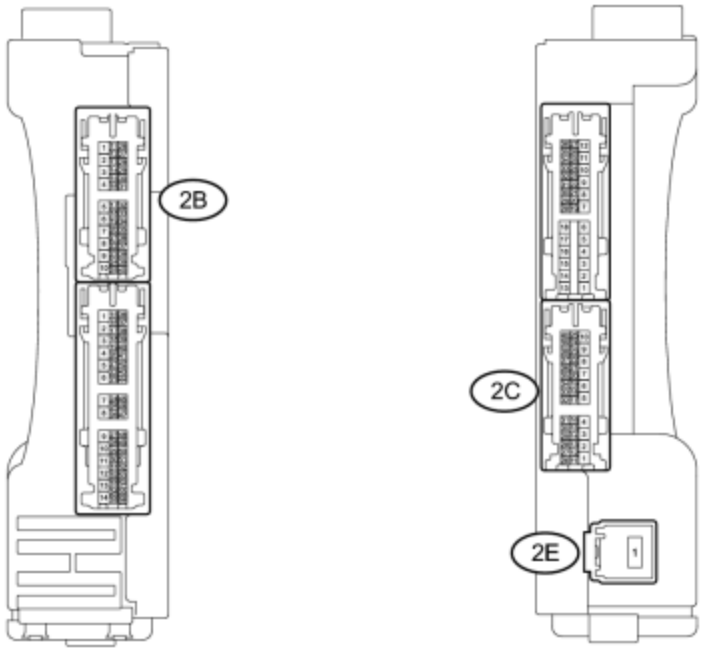
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM RELAY BLOCK - ECM)

OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (ECU-IG NO. 1 FUSE - ENGINE ROOM RELAY BLOCK)**

| | |
|---|---|
| 20. | INSPECT DRIVER SIDE JUNCTION BLOCK ASSEMBLY (IG1 NO. 1 RELAY) |

(a) Disconnect the driver side junction block assembly connector.

*1




c

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2E-1 - 2C-30 | Battery voltage is not applied between terminals 2B-25 - 2B-6 | 10 kΩ or higher |
| | Battery voltage is applied between terminals 2B-25 - 2B-6 | Below 1 Ω |

**Text in Illustration**

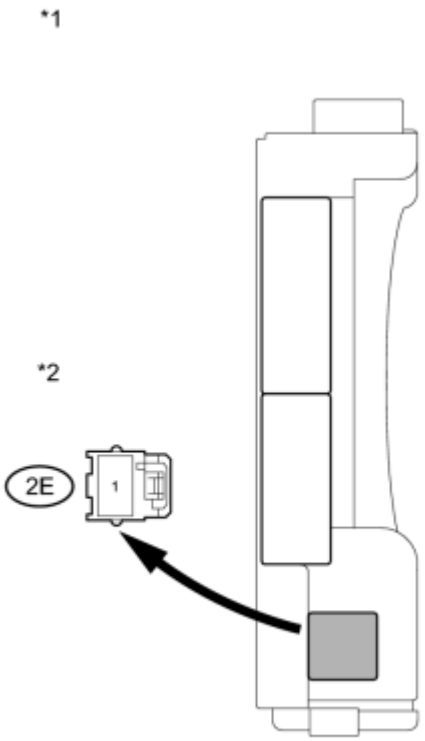
| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Driver Side Junction Block Assembly) |

(c) Reconnect the driver side junction block assembly connector.

NG ▶ REPLACE DRIVER SIDE JUNCTION BLOCK ASSEMBLY (IG1 NO. 1 RELAY)

OK

| | |
|---|---|
| 21. | INSPECT DRIVER SIDE JUNCTION BLOCK ASSEMBLY (IG1 NO. 1 RELAY VOLTAGE) |




(a) Disconnect the driver side junction block assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2E-1 - Body ground | Always | 11 to 14 V |

**Text in Illustration**

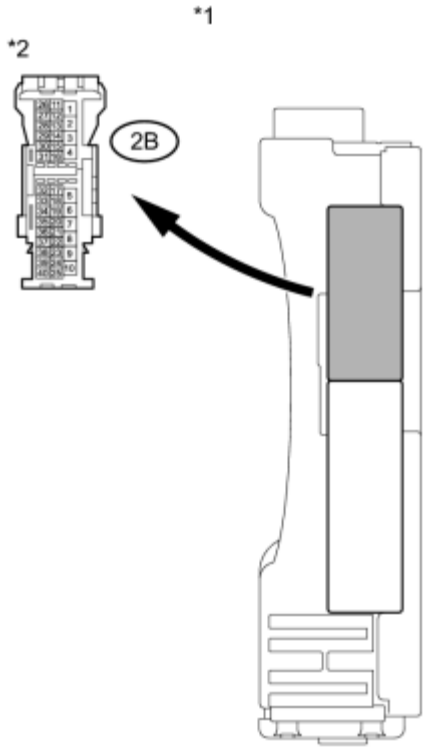
| | |
|---|---|
| *1 | Driver Side Junction Block Assembly |
| *2 | Front view of wire harness connector<br><br>(to Driver Side Junction Block Assembly) |

(c) Reconnect the driver side junction block assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (BATTERY - DRIVER SIDE JUNCTION BLOCK ASSEMBLY)

OK

| | |
|---|---|
| 22. | CHECK HARNESS AND CONNECTOR (DRIVER SIDE JUNCTION BLOCK ASSEMBLY - BODY GROUND) |




(a) Disconnect the driver side junction block assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-6 - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Driver Side Junction Block Assembly |
| *2 | Front view of wire harness connector<br><br>(to Driver Side Junction Block Assembly) |

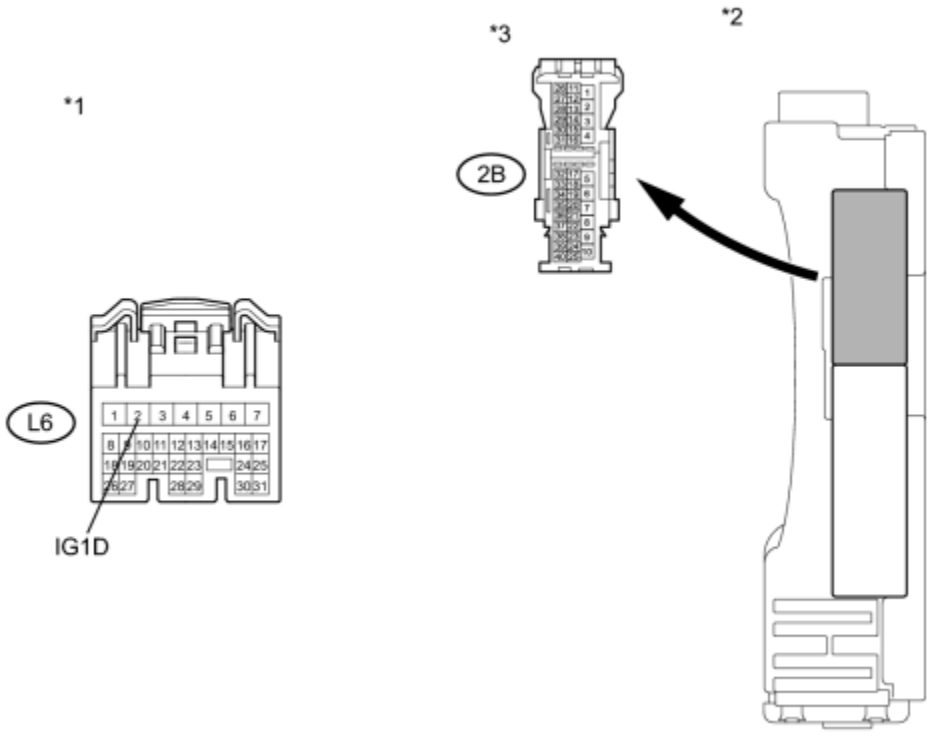
(c) Reconnect the driver side junction block assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 NO. 1 RELAY - BODY GROUND)

OK

| | |
|---|---|
| 23. | CHECK HARNESS AND CONNECTOR (IG1 NO. 1 RELAY - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the driver side junction block assembly connector.




(b) Disconnect the power management control ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-2 (IG1D) - 2B-25 | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-2 (IG1D) or 2B-25 - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Management Control ECU) | *2 | Driver Side Junction Block Assembly |
| *3 | Front view of wire harness connector<br><br>(to Driver Side Junction Block Assembly) | - | - |

(d) Reconnect the driver side junction block assembly connector.

(e) Reconnect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IG1 NO. 1 RELAY - POWER MANAGEMENT CONTROL ECU)

OK ▶ **CHECK SMART KEY SYSTEM**

# ON-VEHICLE INSPECTION

CAUTION:

Do not remove the radiator cap while the engine and radiator are still hot. Pressurized hot engine coolant and steam may be released and cause serious burns.

NOTICE:

Before performing each inspection, turn the A/C switch off.

1. INSPECT FOR COOLANT LEAK (for Engine)

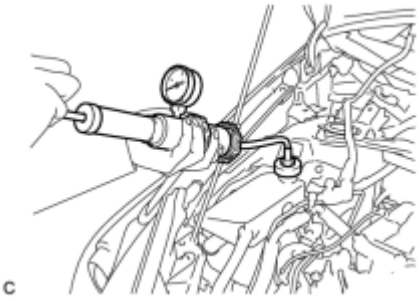
CAUTION:

Do not remove the reservoir tank cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

NOTICE:

Before performing each inspection, turn the A/C switch off.

(a) Remove the reservoir tank cap.




(b) Fill the radiator and reservoir with coolant, and then attach a radiator cap tester.

(c) Put the engine in inspection mode INFO.

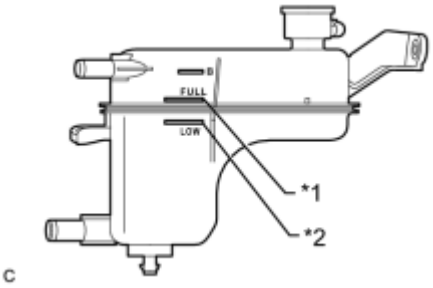
(d) Warm up the engine.

(e) Using the reservoir cap tester, increase the pressure inside the radiator to 108 kPa (1.1 kgf/cm$^2$, 16 psi), and check that the pressure does not drop. If the pressure drops, check the hoses, radiator, front exhaust pipe assembly and the heater hose around and water pump for leaks. If no external leaks are found, check the heater core, cylinder block and cylinder head.

(f) Remove the radiator cap tester.

(g) Install the reservoir tank cap.

2. INSPECT RESERVOIR TANK ENGINE COOLANT LEVEL (for Engine)




C

(a) Check that the engine coolant level is between the low and full lines when the engine is cold.

## Text in Illustration

| | |
|---|---|
| *1 | Full line |
| *2 | Low line |

HINT:

If the engine coolant level is low, check for leaks and add "TOYOTA Super Long Life Coolant" or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite and non-borate coolant with long-life hybrid organic acid technology to the full line.

3. INSPECT ENGINE COOLANT QUALITY (for Engine)

(a) Remove the reservoir tank cap.

CAUTION:

Do not remove the reservoir tank cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

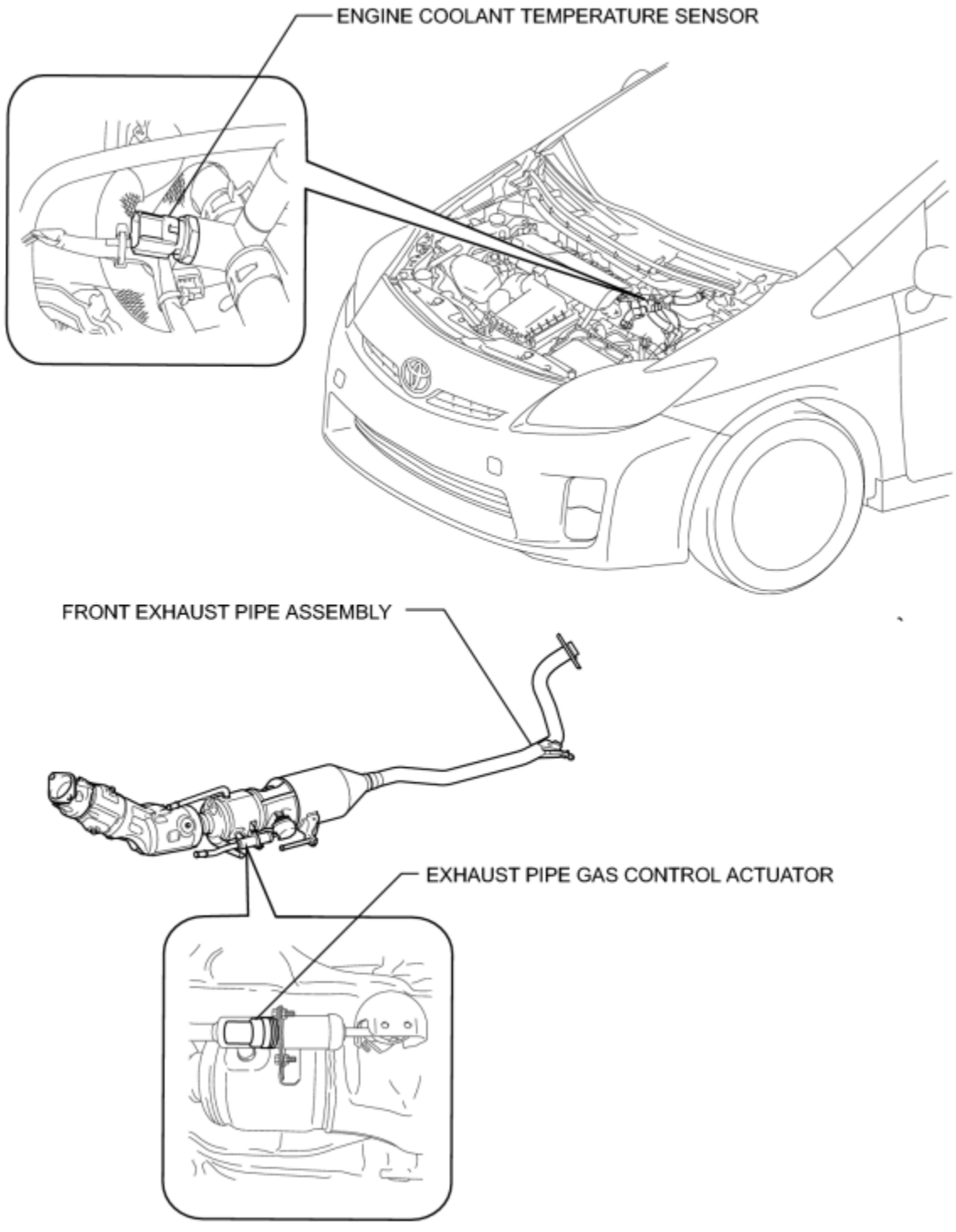
(b) Check if there are any excessive deposits of rust or scales around the radiator cap and radiator filler hole. Also, the coolant should be free of oil.

If excessively dirty, clean the coolant passage and replace the coolant.

(c) Install the reservoir tank cap.

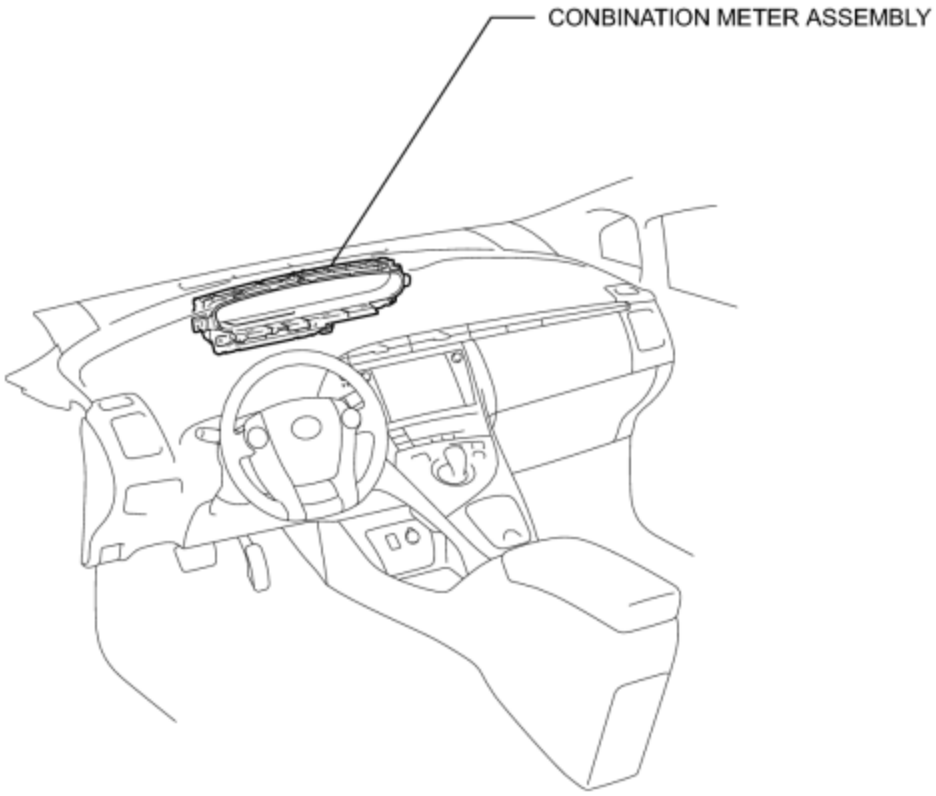
# PARTS LOCATION

# ILLUSTRATION

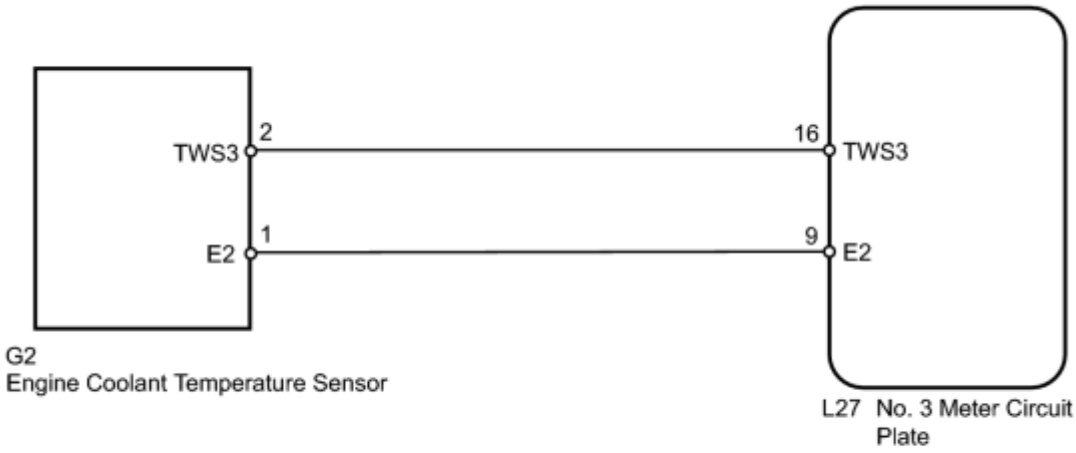



c

# ILLUSTRATION


CONBINATION METER ASSEMBLY

# SYSTEM DIAGRAM



# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

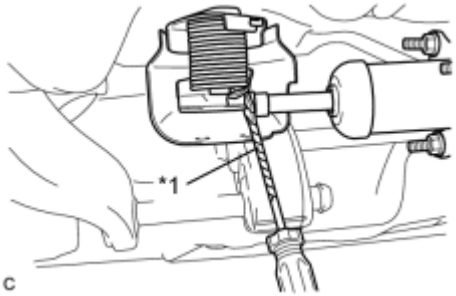
**Exhaust Heat Recirculation System**

| Symptom | Suspected Area | See page |
|---|---|---|
| Engine overheating | Engine coolant leaks (for engine side) | INFO |
| | Engine coolant leaks (for exhaust heat recirculation system) | INFO |
| | Front exhaust pipe assembly | INFO |
| | Exhaust pipe gas control actuator | INFO |
| | Exhaust heat recirculation system circuit | INFO |
| | Engine coolant temperature sensor (for exhaust heat recirculation system) | INFO |

# ON-VEHICLE INSPECTION

1. INSPECT FRONT EXHAUST PIPE ASSEMBLY

(a) Inspect exhaust flow control valve operation.




(1) Using a screwdriver, move the exhaust flow control valve from the bottom of the vehicle. Check that the valve moves smoothly.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

OK:

Valve moves smoothly.

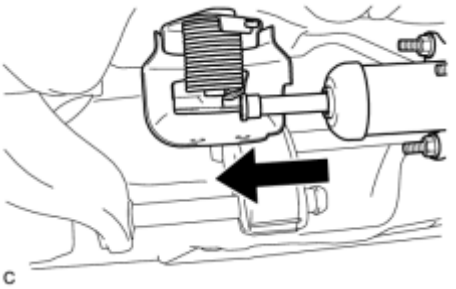
(2) If the valve is stuck or does not move smoothly, replace the front exhaust pipe assembly INFO.

(b) Inspect the exhaust pipe gas control actuator.

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG) and turn the Techstream on.

(3) Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.




(4) While checking the engine coolant temperature with the Techstream check the operation of the exhaust pipe gas control actuator rod when the temperature rises.

Standard:

| Condition | Rod Operation |
|---|---|
| Cold (below approx. 71°C (160°F)) → Warmed up (approx. 80°C (176°F) or more) | Rod gradually extends as the temperature rises. |

- After the engine has warmed up (thermostat temperature is approximately 80°C (176°F) or more), the rod should be extended approximately 7.2 mm (0.284 in.) or more compared to when the engine is cold (thermostat temperature is below 71°C (160°F)).

- The water temperature shown in the Data List may slightly deviate from the thermostat temperature. This is because the Data List value indicates the temperature detected by the water temperature sensor, which is mounted on the engine, while the thermostat is

positioned in the exhaust pipe gas control actuator.

- If it is difficult to check while the rod is operating, allow the engine to cool down until the water temperature matches the ambient temperature and then check the rod operation again.

(5) If the exhaust pipe gas control actuator rod does not move smoothly, replace the exhaust pipe gas control actuator INFO.

(6) Check for any cracks or damage on the exhaust pipe gas control actuator rod.

OK:

No cracks or damage is found.

(7) If any cracks or damage is found, replace the front exhaust pipe assembly INFO.

2. INSPECT FOR ENGINE COOLANT LEAK FROM FRONT EXHAUST PIPE ASSEMBLY

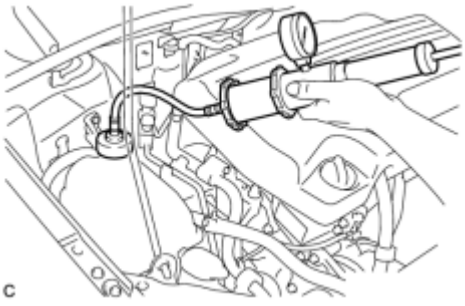
CAUTION:

Do not remove the reservoir tank cap while the engine and radiator are still hot. Pressurized, hot engine coolant and steam may be released and cause serious burns.

NOTICE:

Be sure to turn the A/C switch off before starting the following inspection.

(a) Turn the power switch off. Check for engine coolant leaks from the front exhaust pipe assembly and the heater hose around the engine coolant temperature sensor.




(b) Add engine coolant to the radiator and install the radiator cap tester.

(c) Pump it to 108 kPa (1.1 kgf/cm$^2$, 16 psi), then check that the pressure does not drop.

If the reading drops, check for leaks from the front exhaust pipe assembly and the heater hose around the engine coolant temperature sensor.

Exhaust Heat Recirculation System Circuit

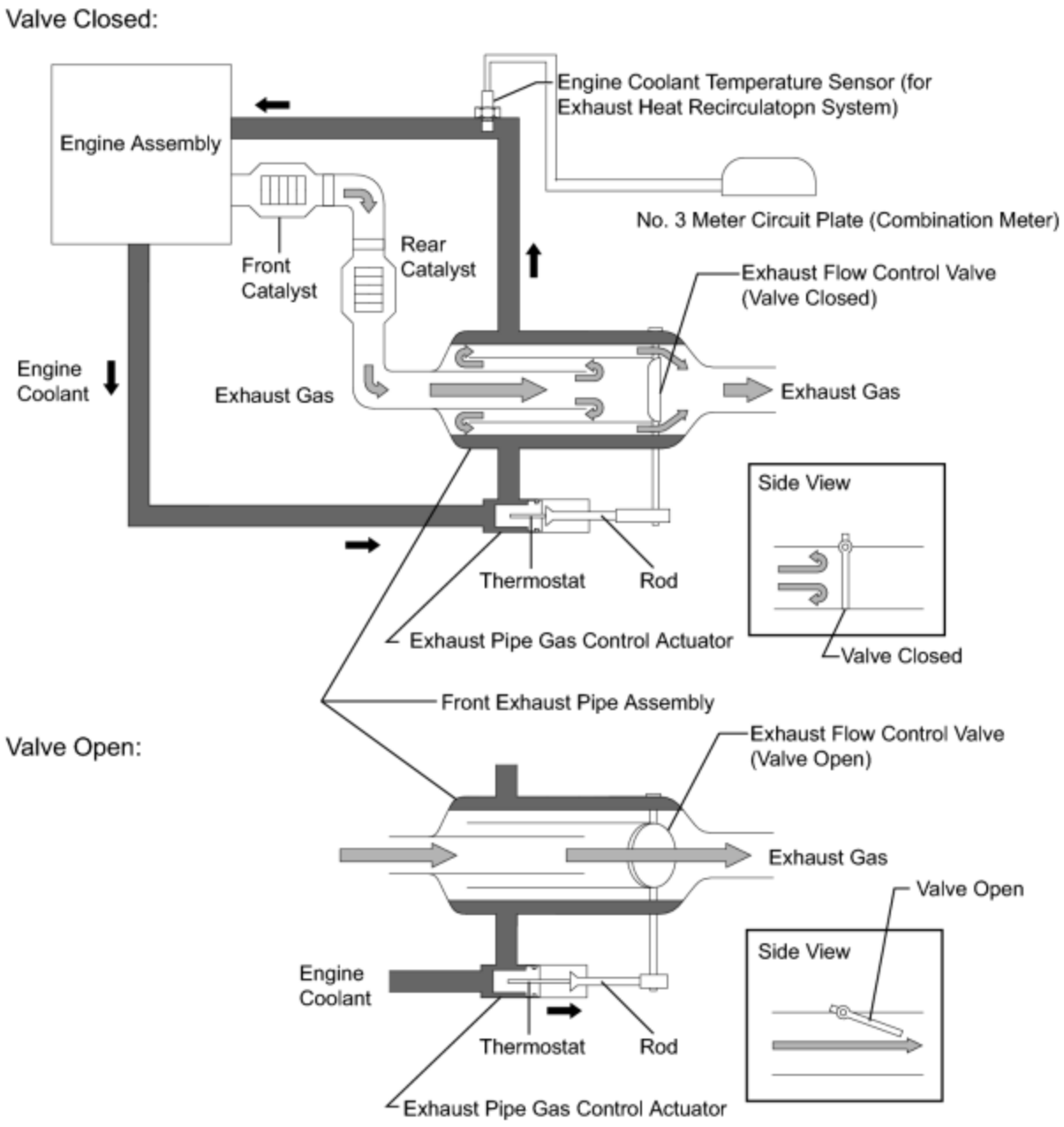
# DESCRIPTION

In the exhaust heat recirculation system, coolant is warmed up using conventionally wasted exhaust gas heat to accelerate engine warm-up time, enhancing fuel efficiency and heater performance.

The heat recirculator is positioned in the front exhaust pipe assembly after the catalyst. Coolant from the engine flows around the heat recirculator and then returns to the engine. If the engine is started while the engine is cold, the exhaust pipe gas control actuator rod is contracted and the exhaust flow control valve is closed, routing the exhaust gas around the heat recirculator to warm up the coolant.

After the engine coolant temperature rises and the engine has warmed up, the heat of the coolant expands the thermostat and the exhaust pipe gas control actuator rod extends. This opens the exhaust flow control valve to switch to the normal exhaust gas path.

The exhaust flow control valve can also be opened by exhaust gas pressure to prevent insufficient acceleration performance when the engine is cold. In addition, to monitor the engine coolant temperature, a engine coolant temperature sensor (for exhaust heat recirculation system) is provided between the engine and the heat recirculator. The engine coolant temperature sensor (for exhaust heat recirculation system) has a built-in thermistor with a resistance that varies according to the temperature of the engine coolant. When the engine coolant temperature becomes low, the resistance of the thermistor increases. When the temperature becomes high, the resistance drops. These variations in resistance are transmitted to the No. 3 meter circuit plate as voltage changes. If the engine coolant temperature is excessively high (overheating), the water temperature indicator light in the No. 3 meter circuit plate illuminate to inform the driver of the malfunction.




c

# WIRING DIAGRAM

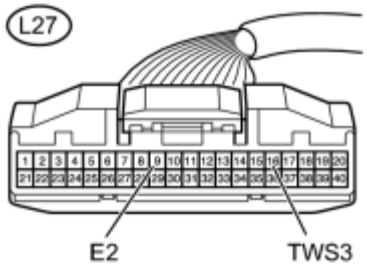
Refer to System Diagram INFO.

# INSPECTION PROCEDURE

# PROCEDURE

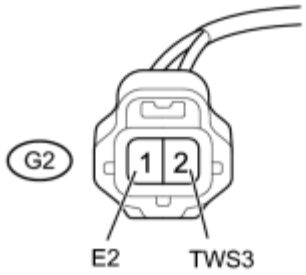
| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - COMBINATION METER) |

*1




(a) Disconnect the engine coolant temperature sensor (for exhaust heat recirculation system) connector.

*2




(b) Disconnect the No. 3 meter circuit plate connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| G2-2 (TWS3) - L27-16 (TWS3) | Always | Below 1 Ω |
| G2-1 (E2) - L27-9 (E2) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Condition | Condition | Specified Condition |
|---|---|---|
| G2-2 (TWS3) or L27-16 (TWS3) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to No. 3 Meter Circuit Plate) |
| *2 | Front view of wire harness connector<br><br>(to Engine Coolant temperature sensor) |

(d) Reconnect the No. 3 meter circuit plate connector.

(e) Reconnect the engine coolant temperature sensor (for exhaust heat recirculation system) connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - COMBINATION METER)

OK

▼

| | |
|---|---|
| 2. | INSPECT ENGINE COOLANT TEMPERATURE SENSOR (FOR EXHAUST HEAT RECIRCULATION SYSTEM) |

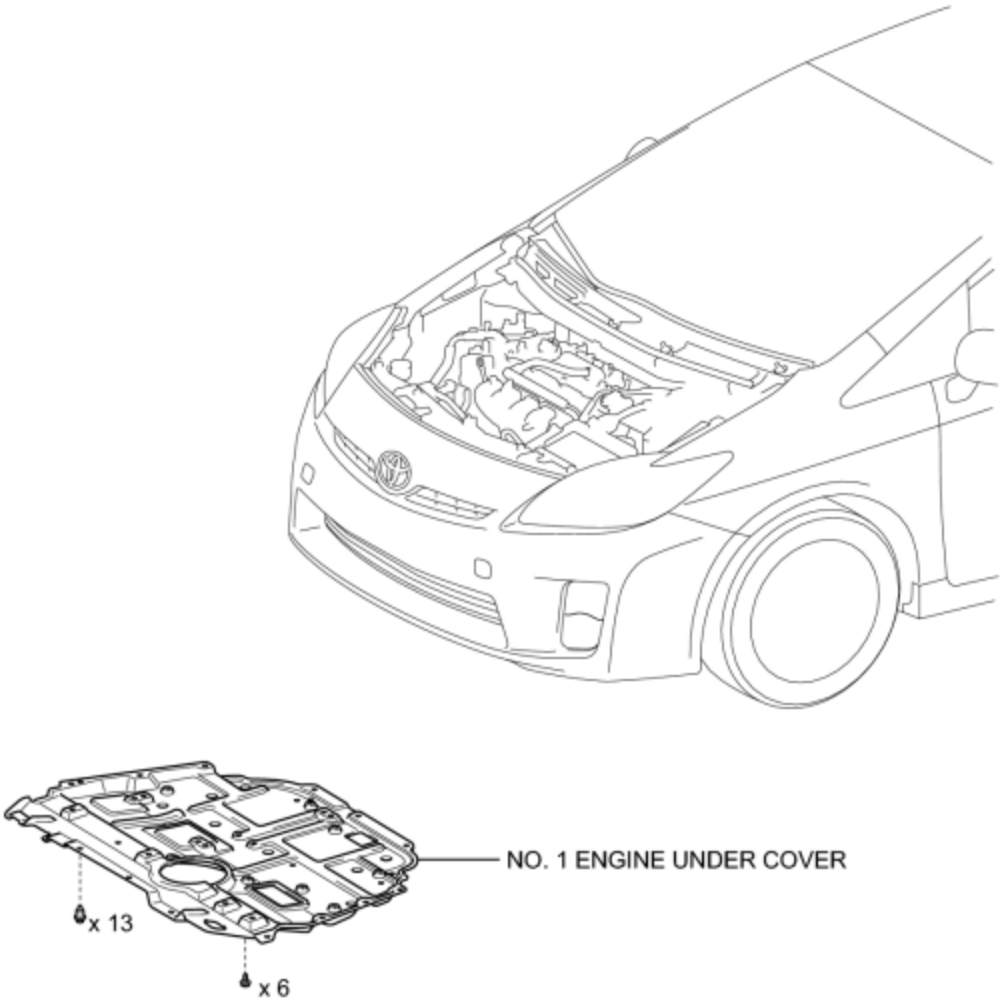
(a) Inspect the engine coolant temperature sensor (for exhaust heat recirculation system) INFO.

NG ▶ REPLACE ENGINE COOLANT TEMPERATURE SENSOR (FOR EXHAUST HEAT RECIRCULATION SYSTEM)

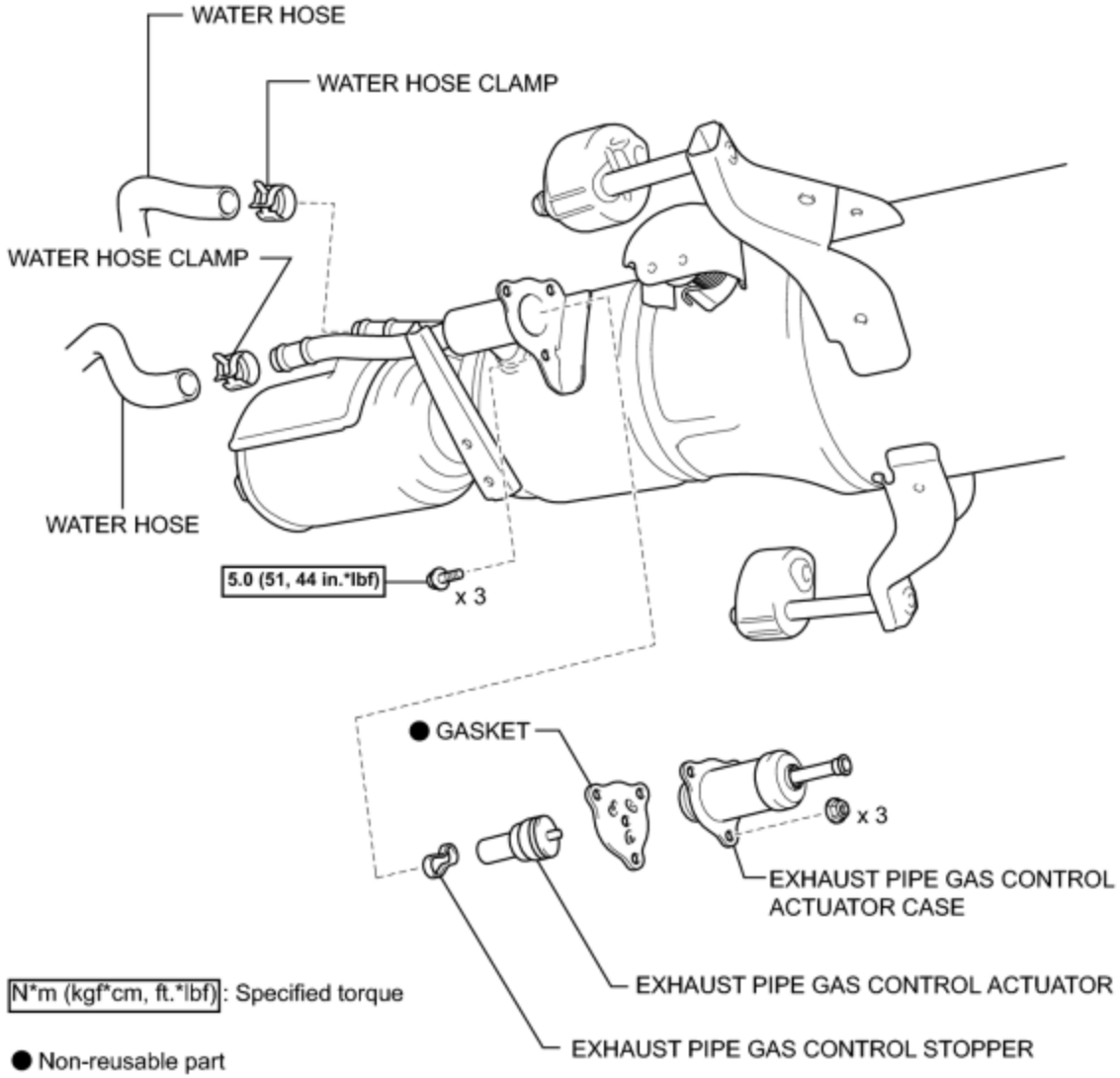
OK ▶ **REPLACE NO. 3 METER CIRCUIT PLATE**

## COMPONENTS

## ILLUSTRATION




## ILLUSTRATION


WATER HOSE
WATER HOSE CLAMP
WATER HOSE CLAMP
WATER HOSE
5.0 (51, 44 in.*lbf)
x 3
● GASKET
x 3
EXHAUST PIPE GAS CONTROL ACTUATOR CASE
EXHAUST PIPE GAS CONTROL ACTUATOR
EXHAUST PIPE GAS CONTROL STOPPER
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part

c

# REMOVAL

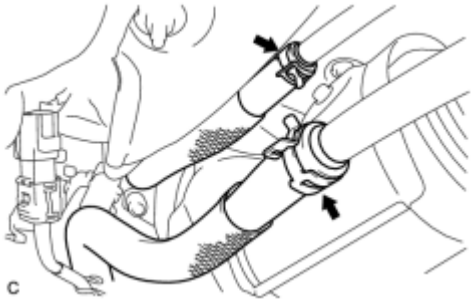
1. REMOVE NO. 1 ENGINE UNDER COVER

2. DRAIN ENGINE COOLANT (for Engine) INFO

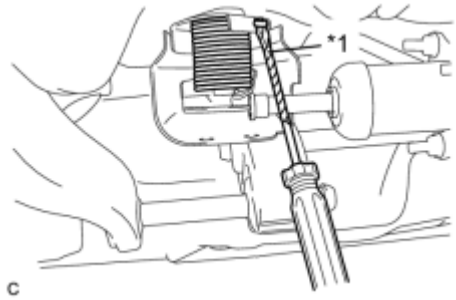
3. REMOVE EXHAUST PIPE GAS CONTROL ACTUATOR

NOTICE:

When removing the exhaust pipe gas control actuator, use caution because coolant may spill out from the exhaust heat recirculation system.



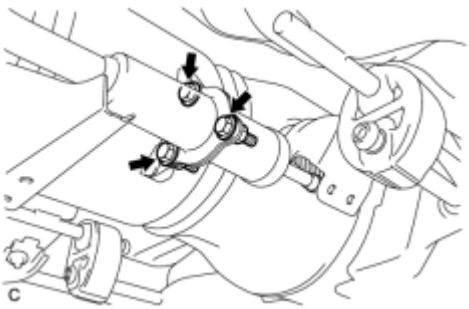
(a) Disconnect the 2 water hoses.




(b) Using a screwdriver with the tip taped, pry the portion indicated in the illustration to disengage the spring.

## Text in Illustration

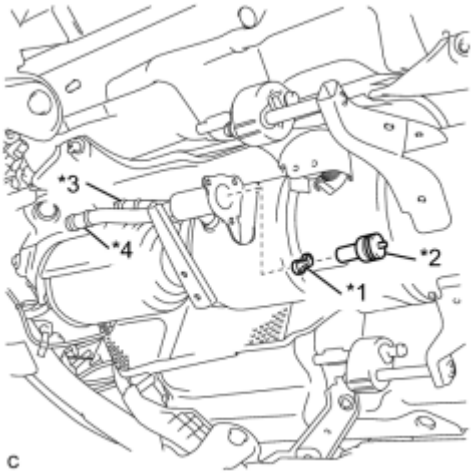
| | |
|---|---|
| *1 | Protective Tape |



(c) Remove the 3 bolts, 3 nuts, gasket and exhaust pipe gas control actuator case.

(d) While closing port A, apply compressed air to port B to remove the exhaust pipe gas control actuator shown in the illustration.

## Text in Illustration




| | |
|---|---|
| *1 | Exhaust Pipe Gas Control Stopper |
| *2 | Exhaust Pipe Gas Control Actuator |
| *3 | Port A |
| *4 | Port B |

HINT:

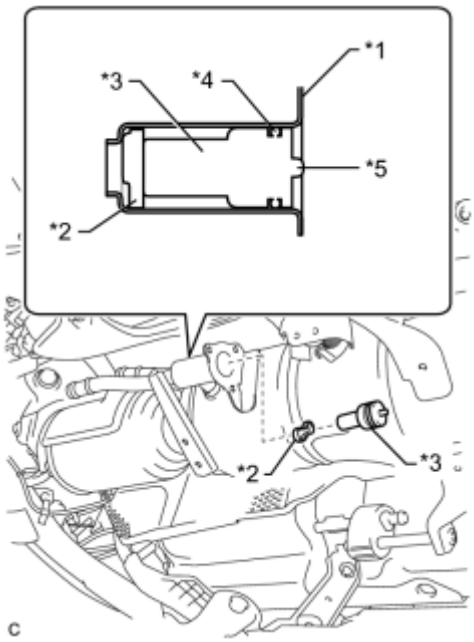
Use a piece of cloth to catch the exhaust pipe gas control actuator.

# INSTALLATION

1. INSTALL EXHAUST PIPE GAS CONTROL ACTUATOR

NOTICE:

When installing the water hose, ensure that the exhaust heat recirculation system is filled with coolant. Otherwise, the electric water pump may be damaged.




(a) Apply engine coolant to the O-ring.

## Text in Illustration

| | |
|---|---|
| *1 | Exhaust Pipe Gas Control Actuator Case |
| *2 | Exhaust Pipe Gas Control Stopper |
| *3 | Exhaust Pipe Gas Control Actuator |
| *4 | O-ring |
| *5 | Piston |

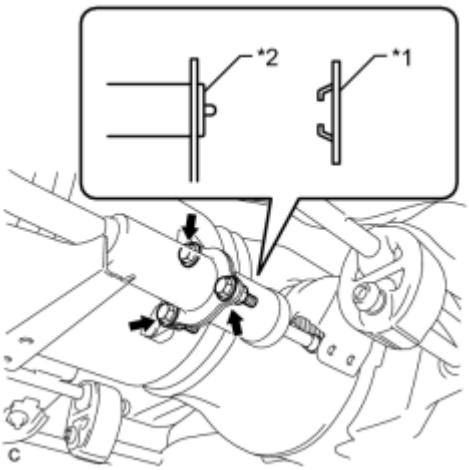
(b) Install the exhaust pipe gas control actuator and exhaust pipe gas control stopper.

NOTICE:

- Be sure to install the exhaust pipe gas control stopper in the correct direction.
- Check that the O-ring is not deformed, cracked or swollen.
- Be sure to install the exhaust pipe gas control actuator until it touches the exhaust pipe gas control stopper.
- When installing the exhaust pipe gas control actuator, do not push on the piston.
- Make sure that the exhaust pipe gas control actuator and the exhaust pipe gas control stopper are free of oil.

(c) Install a new gasket and the exhaust pipe gas control actuator case with the 3 bolts and 3 nuts.

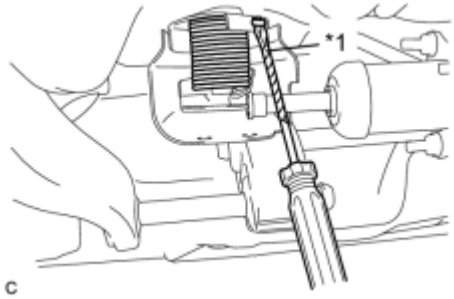
## Text in Illustration




| | |
|---|---|
| *1 | Gasket |
| *2 | Exhaust Pipe Gas Control Actuator |

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

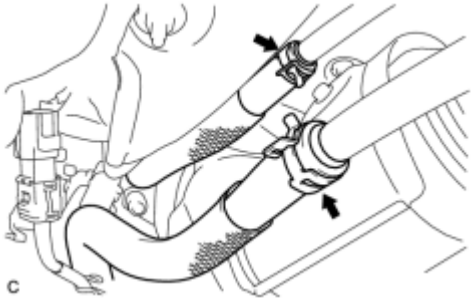
- Be sure to install a new gasket in the correct direction.
- Make sure that the exhaust pipe gas control actuator case and the new gasket are free of oil.




(d) Using a screwdriver with the tip taped, pry the portion indicated in the illustration to engage the spring.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |



(e) Connect the 2 water hoses.

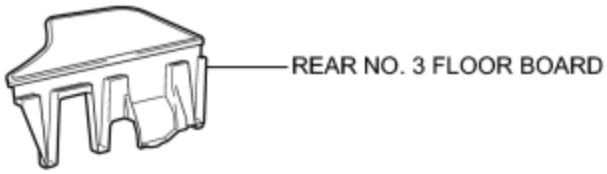
2. ADD ENGINE COOLANT (for Engine) INFO

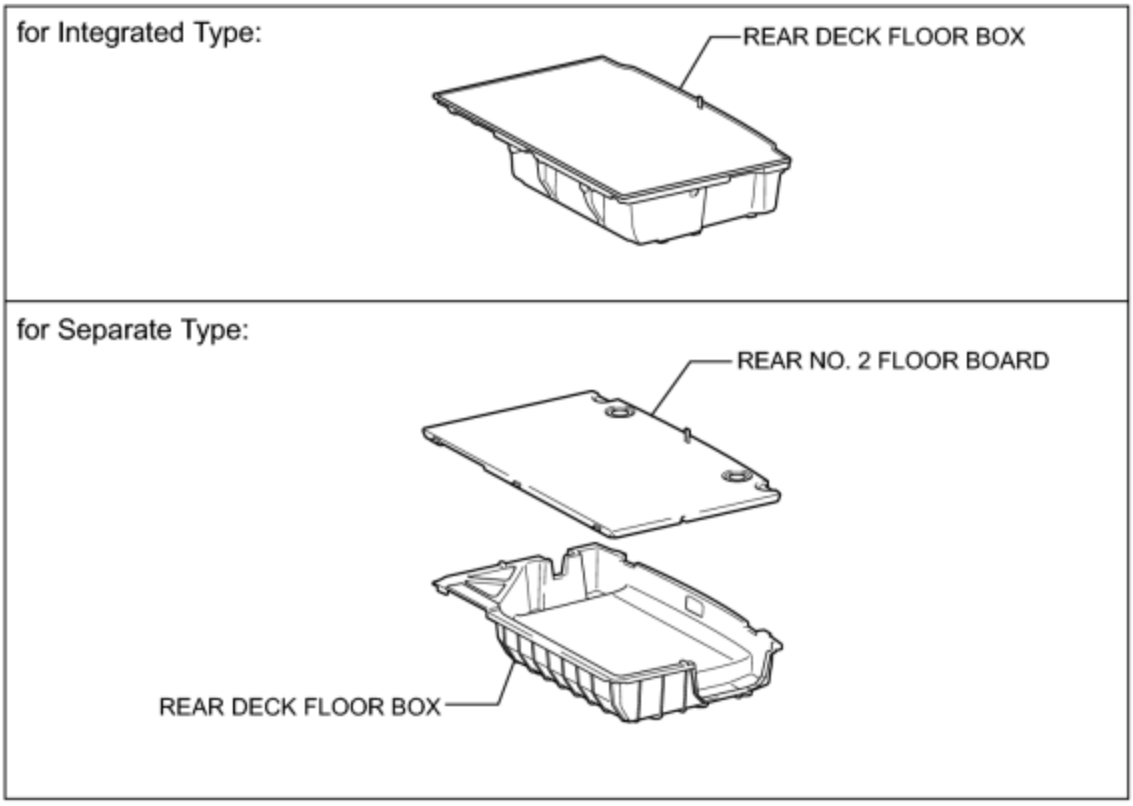
3. INSPECT FOR COOLANT LEAK INFO

4. INSTALL NO. 1 ENGINE UNDER COVER

# COMPONENTS

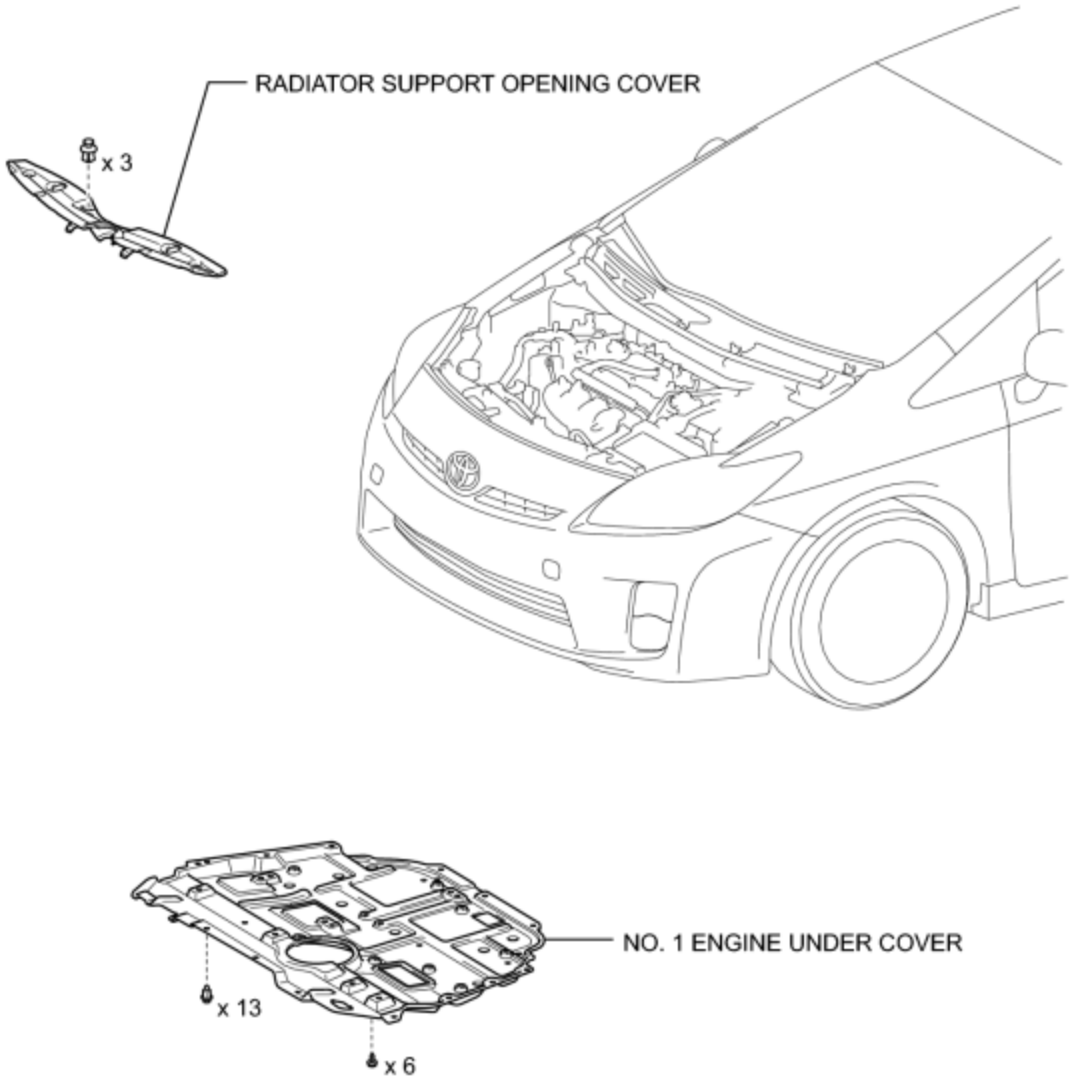
# ILLUSTRATION



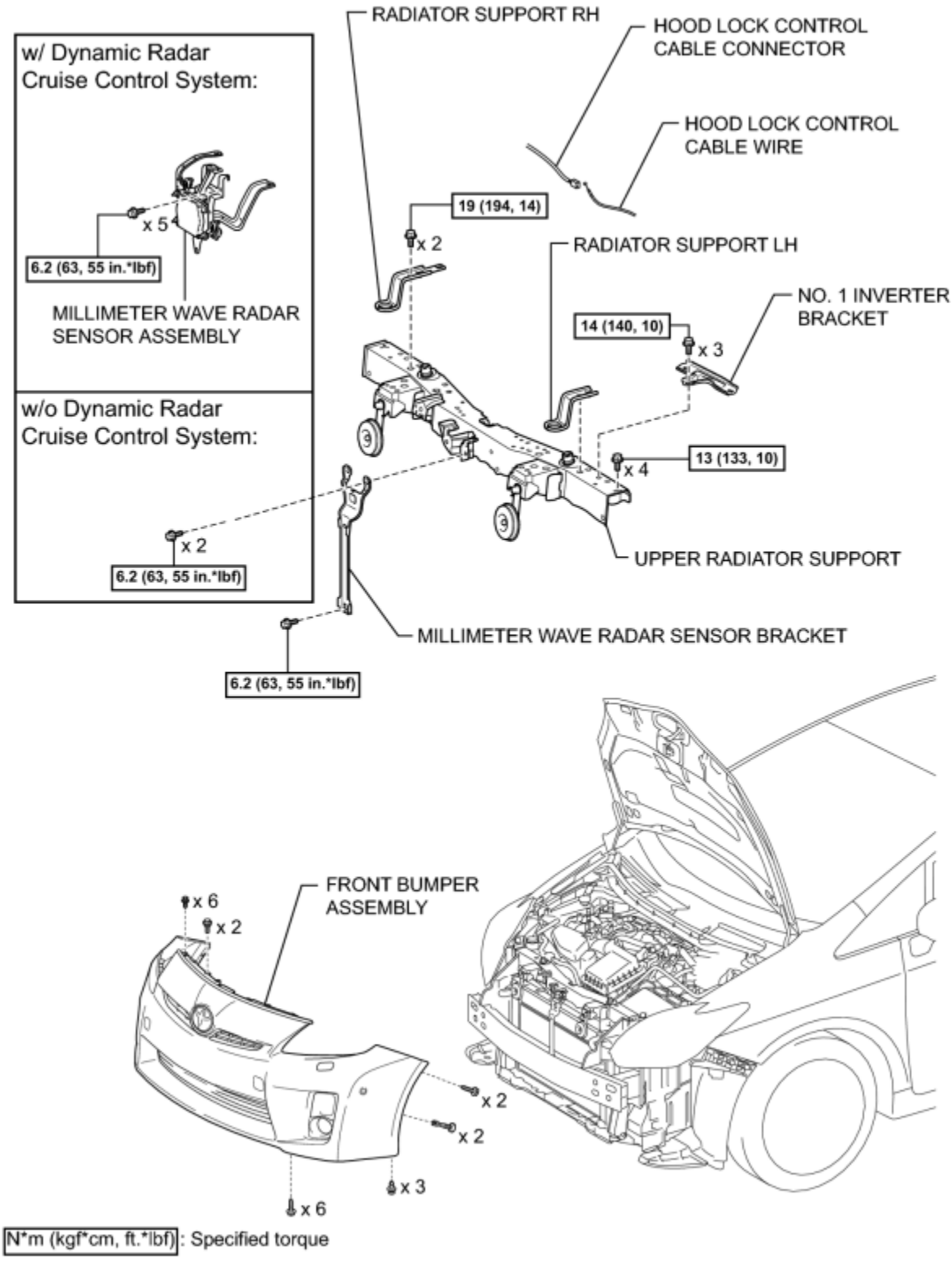




P

# ILLUSTRATION

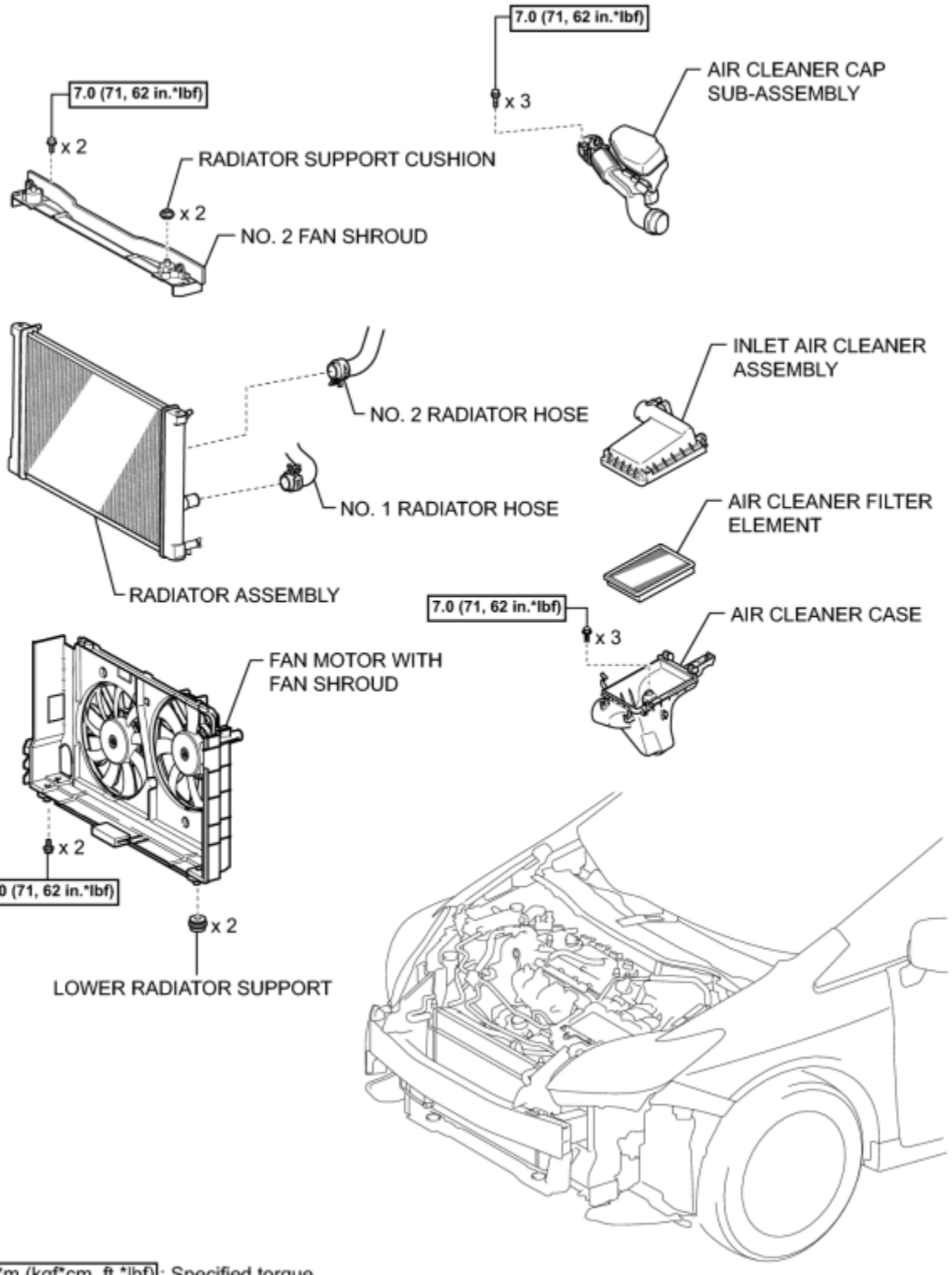



# ILLUSTRATION




T

# ILLUSTRATION



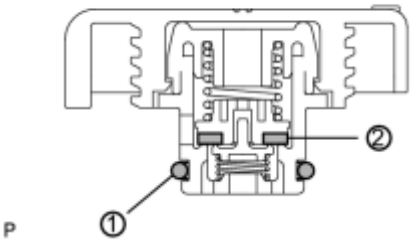

N*m (kgf*cm, ft.*lbf): Specified torque

c

# ON-VEHICLE INSPECTION

1. CHECK RESERVE TANK CAP (for Engine)

(a) Measure the valve opening pressure.




(1) If there are water stains or foreign matter on O-ring 1, clean it with water and finger scouring.

(2) Check that O-ring 1 is not deformed, cracked or swollen.

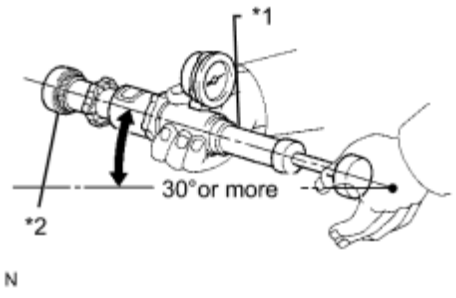
(3) Apply engine coolant to O-ring 1 and rubber packing 2 before using a radiator cap tester.

(4) When using the cap tester, tilt it upwards 30 degrees or more.

(5) Pump the cap tester several times, and check the maximum pressure*1.

## Text in Illustration

| | |
|---|---|
| *1 | Radiator Cap Tester |
| *2 | Radiator Cap |




Pumping speed:

1 pump per second

HINT:

*1: Even if the cap cannot maintain the maximum pressure, it is not a defect.

Judgment Criterion:

| Item | Specified Condition |
|---|---|
| Standard value<br><br>(for brand-new cap) | 94 to 122 kPa (1.0 to 1.2 kgf/cm$^2$, 13.5 to 17 psi) |

| | |
|---|---|
| Minimum standard value<br><br>(after using cap) | 79 kPa (0.8 kgf/cm$^2$, 11.4 psi) |

If the maximum pressure is less than the minimum standard value, replace the radiator cap sub-assembly.

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE NO. 1 ENGINE UNDER COVER

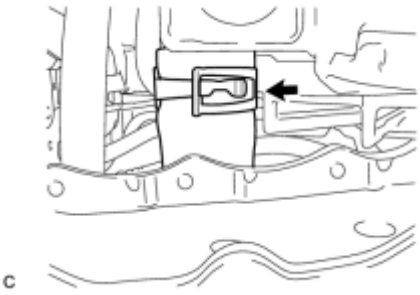
7. DRAIN ENGINE COOLANT (for Engine) INFO

8. DISCONNECT NO. 1 RADIATOR HOSE




(a) Disconnect the No. 1 radiator hose from the radiator assembly.

9. DISCONNECT NO. 2 RADIATOR HOSE




(a) Disconnect the No. 2 radiator hose from the radiator assembly.

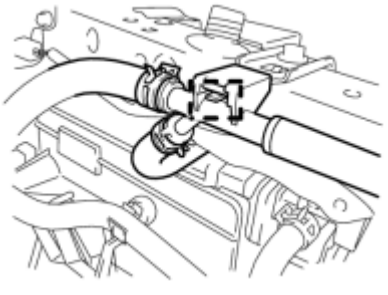
10. REMOVE FRONT BUMPER ASSEMBLY INFO

11. REMOVE MILLIMETER WAVE RADAR SENSOR ASSEMBLY (w/ Dynamic Radar Cruise Control System) INFO

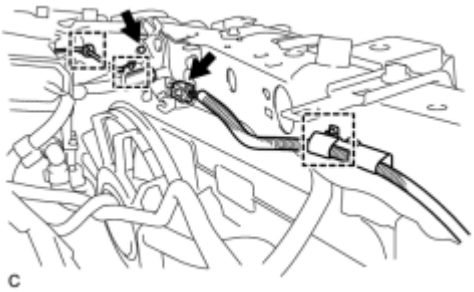
12. REMOVE MILLIMETER WAVE RADAR SENSOR BRACKET INFO

13. REMOVE NO. 1 INVERTER BRACKET INFO

14. REMOVE HOOD LOCK SUPPORT SUB-ASSEMBLY

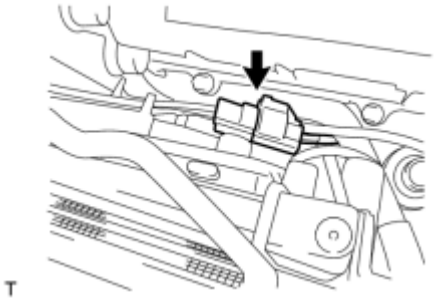



(a) Disconnect the water by-pass hose clamp from the radiator support RH.



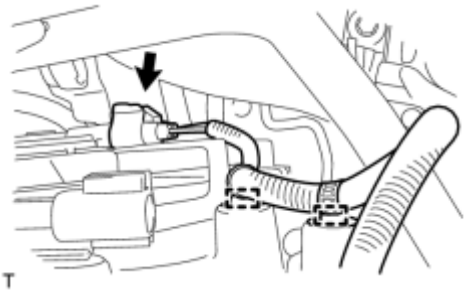

(b) Disconnect the hood lock connector and hood lock control cable wire.

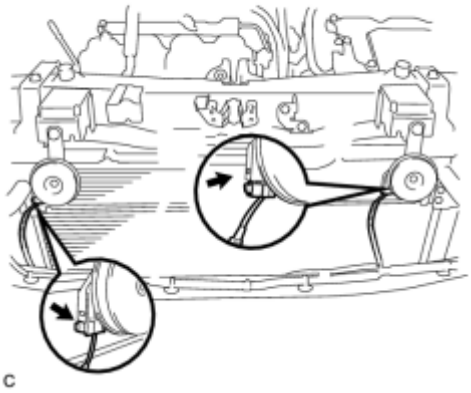
(c) Disconnect the 3 wire harness clamps.



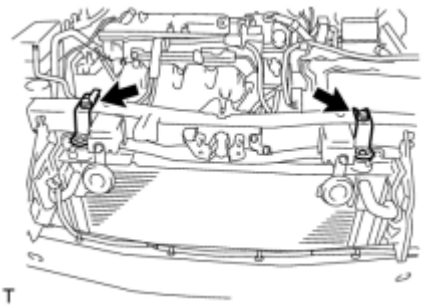

(d) Disconnect the connector from the No. 2 cooling fan motor.

(e) Disconnect the 2 wire harness clamps and connector from the fan shroud and cooling fan motor.

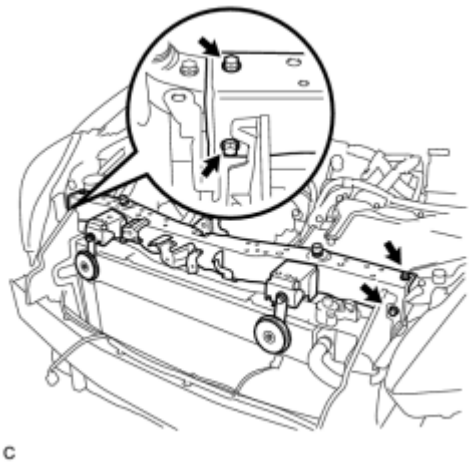



(f) Disconnect the 2 horn connectors.




(g) Remove the 2 bolts, radiator support RH and radiator support LH with the 2 cushions from the upper radiator support.




(h) Remove the 4 bolts and upper radiator support.

15. REMOVE AIR CLEANER CAP SUB-ASSEMBLY INFO

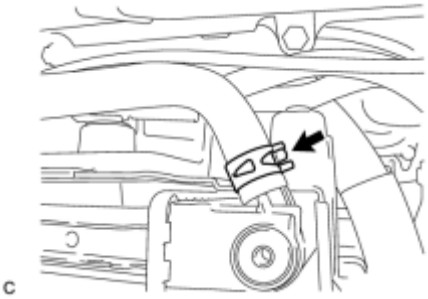
16. REMOVE INLET AIR CLEANER ASSEMBLY INFO

17. REMOVE AIR CLEANER CASE INFO

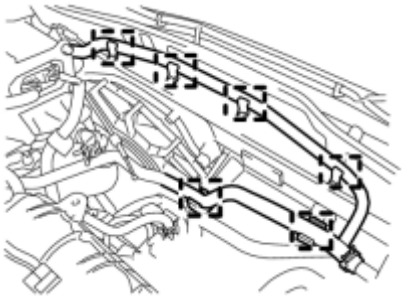
18. REMOVE NO. 2 FAN SHROUD




(a) Disconnect the No. 1 water by-pass hose from the radiator assembly.

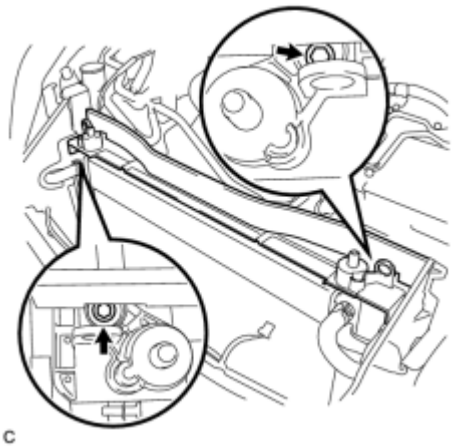



(b) Disconnect the water by-pass hose from the radiator assembly.



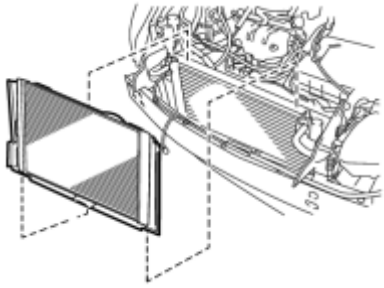
(c) Disconnect the 6 water by-pass hose clamps from the No. 2 fan shroud.

(d) Remove the 2 bolts and No. 2 fan shroud from the radiator assembly.



C

19. REMOVE RADIATOR ASSEMBLY



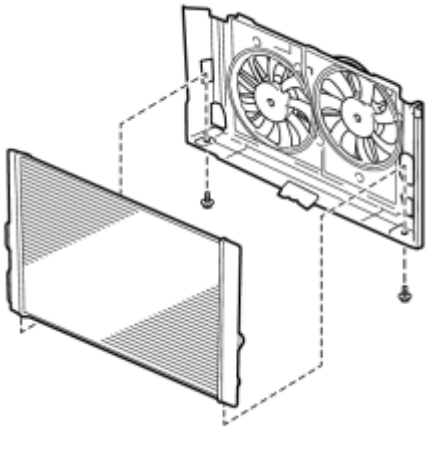
T

(a) Remove the radiator assembly with the fan shroud.

NOTICE:

For vehicles with the air conditioning system, do not apply any excessive force to the cooler condenser assembly or pipe when removing the radiator assembly.

(b) Remove the 2 lower radiator supports.



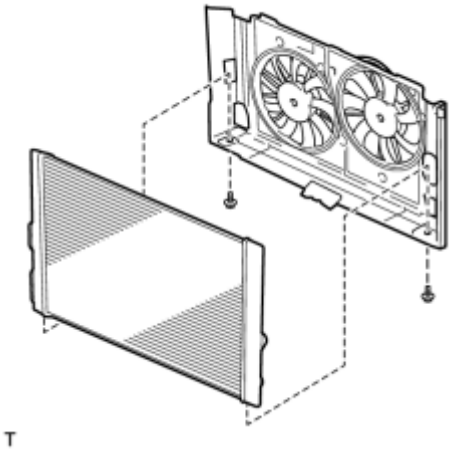
T

(c) Remove the 2 bolts.

(d) Remove the fan shroud from the radiator assembly.

# INSTALLATION

1. INSTALL RADIATOR ASSEMBLY

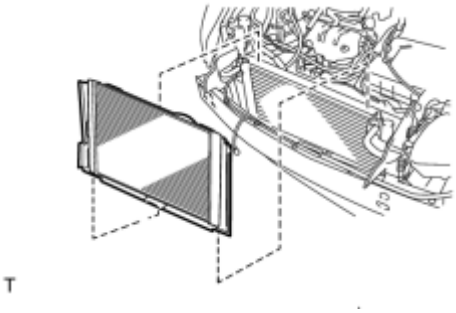


(a) Install the 2 bolts.

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**

(b) Install the fan shroud to the radiator assembly.

(c) Install the 2 lower radiator supports.



(d) Install the radiator assembly with the fan shroud.

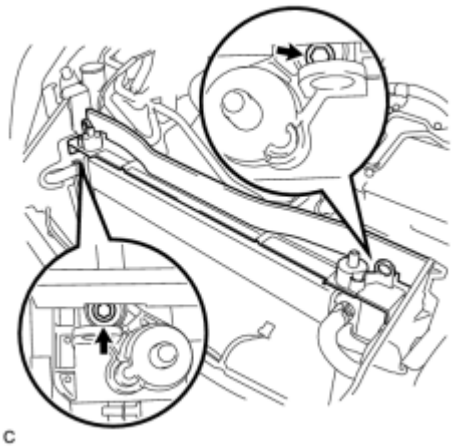
NOTICE:

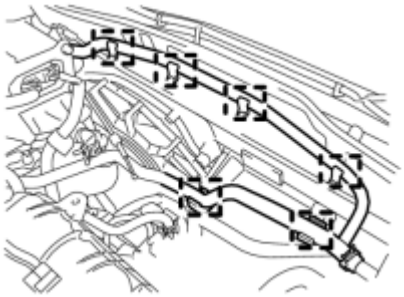
For vehicles with the air conditioning system, do not apply any excessive force to the cooler condenser assembly or pipe when installing the radiator assembly.

2. INSTALL NO. 2 FAN SHROUD

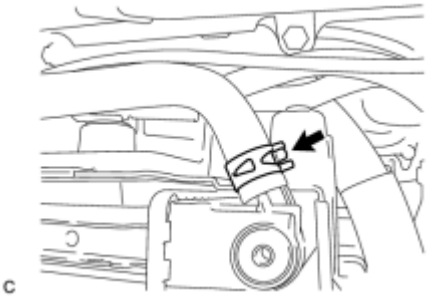
(a) Install the No. 2 fan shroud with the 2 bolts.

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**



(b) Connect the 6 water by-pass hose clamps to the No. 2 fan shroud.




(c) Connect the water by-pass hose to the radiator assembly.



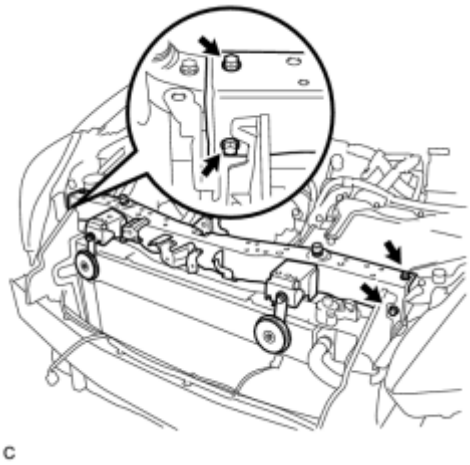

(d) Connect the No. 1 water by-pass hose to the radiator assembly.

3. INSTALL AIR CLEANER CASE INFO

4. INSTALL INLET AIR CLEANER ASSEMBLY INFO

5. INSTALL AIR CLEANER CAP SUB-ASSEMBLY INFO

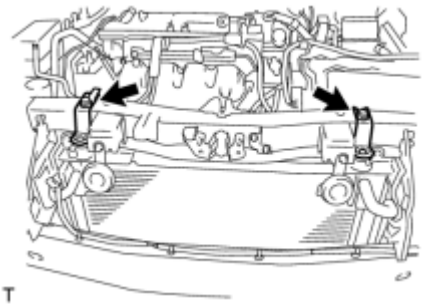
6. INSTALL HOOD LOCK SUPPORT SUB-ASSEMBLY




(a) Install the upper radiator support with the 4 bolts.

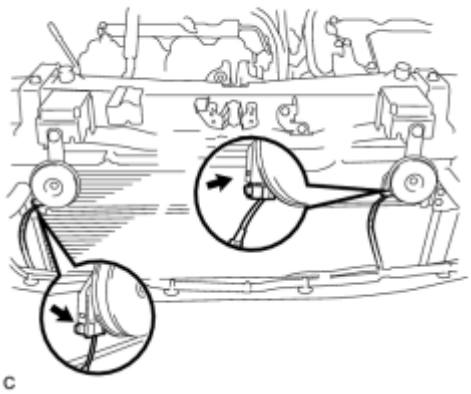
Torque: **13 N·m (133 kgf·cm, 10ft·lbf)**

(b) Install the 2 cushions to the radiator support RH and radiator support LH.



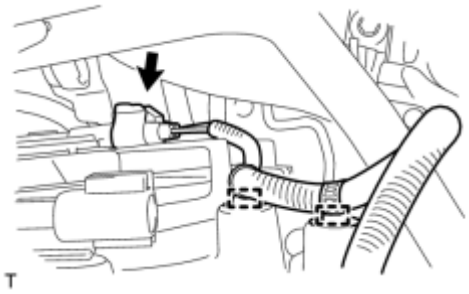

(c) Install the radiator support RH and radiator support LH with the 2 bolts.

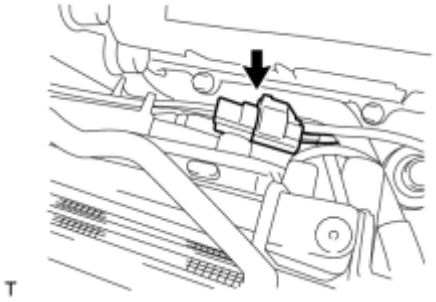
Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**



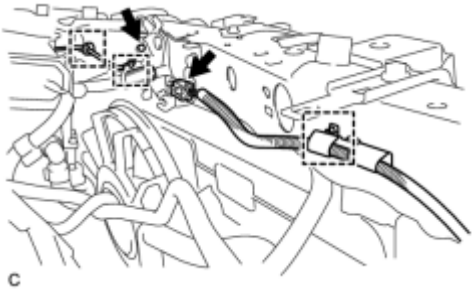

(d) Connect the 2 horn connectors.

(e) Connect the 2 wire harness clamps and connector to the fan shroud and cooling fan motor.



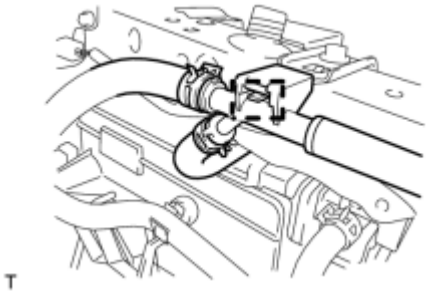




(f) Connect the connector to the No. 2 cooling fan motor.




(g) Connect the hood lock connector and hood lock control cable wire.

(h) Connect the 3 wire harness clamps.




(i) Connect the water by-pass hose clamp to the radiator support RH.

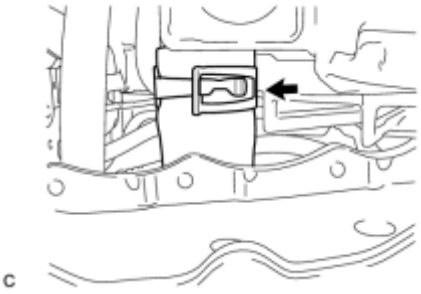
7. INSTALL NO. 1 INVERTER BRACKET INFO

8. INSTALL MILLIMETER WAVE RADAR SENSOR BRACKET INFO

9. INSTALL MILLIMETER WAVE RADAR SENSOR ASSEMBLY (w/ Dynamic Radar Cruise Control System) INFO

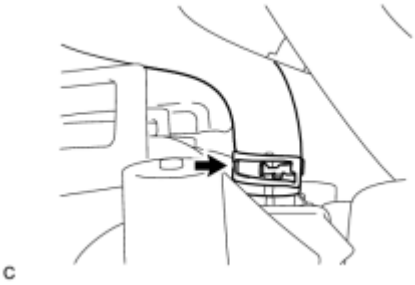
10. INSTALL FRONT BUMPER ASSEMBLY INFO

11. CONNECT NO. 2 RADIATOR HOSE




(a) Connect the No. 2 radiator hose to the radiator assembly with the clamp.

12. CONNECT NO. 1 RADIATOR HOSE




(a) Connect the No. 1 radiator hose to the radiator assembly with the clamp.

13. ADD ENGINE COOLANT (for Engine) INFO

14. INSPECT FOR COOLANT LEAK (for Engine) INFO

15. INSTALL NO. 1 ENGINE UNDER COVER

16. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

17. INSTALL REAR NO. 3 FLOOR BOARD INFO

18. INSTALL REAR DECK FLOOR BOX INFO

19. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

20. INSTALL RADIATOR SUPPORT OPENING COVER INFO

21. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

22. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT (w/ Fog Light) INFO

23. PREPARE FOR FOG LIGHT AIMING INFO

24. INSPECT FOG LIGHT AIMING INFO

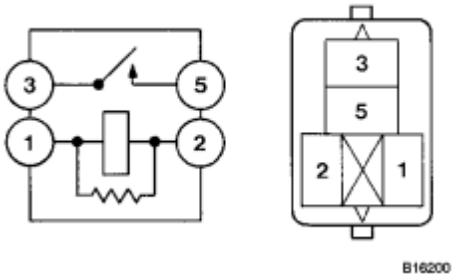
25. ADJUST FOG LIGHT AIMING INFO

# ON-VEHICLE INSPECTION

1. INSPECT COOLING FAN RELAY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



B16200

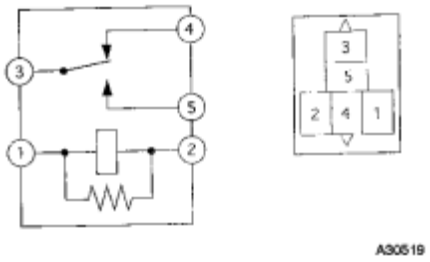
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

If the result is not as specified, replace the cooling fan relay.

2. INSPECT NO. 2 COOLING FAN RELAY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



A30519

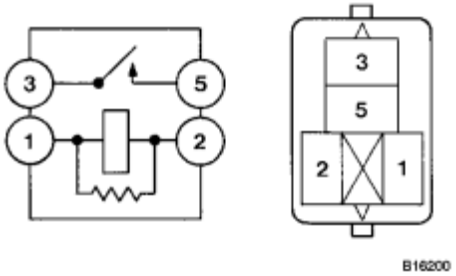
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 4 | Battery voltage is not applied between terminals 1 and 2 | Below 1 Ω |
| 3 - 4 | Battery voltage is applied between terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

If the result is not as specified, replace the cooling fan relay.

3. INSPECT NO. 3 COOLING FAN RELAY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



B16200

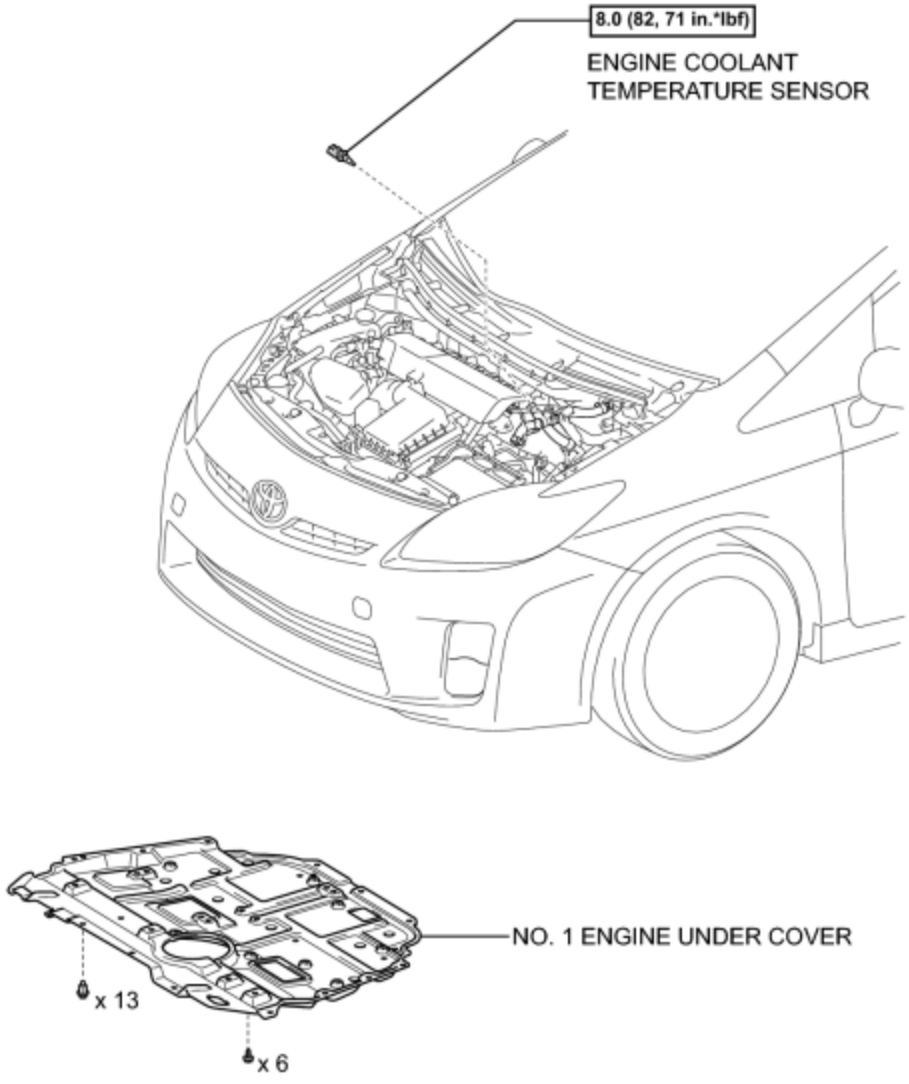
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Battery voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |

| | | |
|---|---|---|
| 3 - 5 | Battery voltage is applied between terminals 1 and 2 | Below 1 Ω |

If the result is not as specified, replace the cooling fan relay.

# COMPONENTS

# ILLUSTRATION



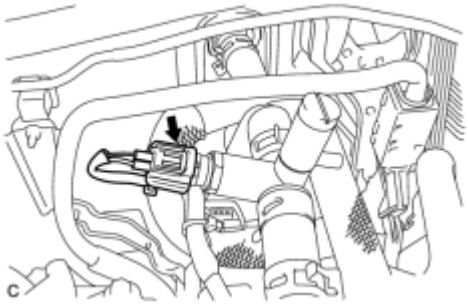

N*m (kgf*cm, ft.*lbf): Specified torque

# REMOVAL

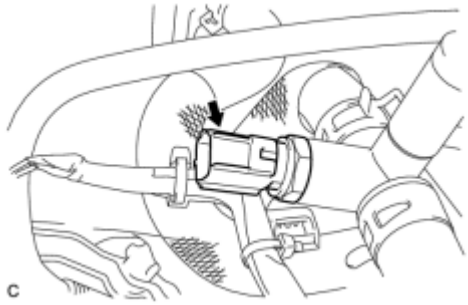
1. REMOVE NO. 1 ENGINE UNDER COVER

2. DRAIN ENGINE COOLANT (for Engine) INFO

3. REMOVE ENGINE COOLANT TEMPERATURE SENSOR




(a) Disconnect the engine coolant temperature sensor connector.




(b) Using a union nut wrench (19 mm), remove the engine coolant temperature sensor.

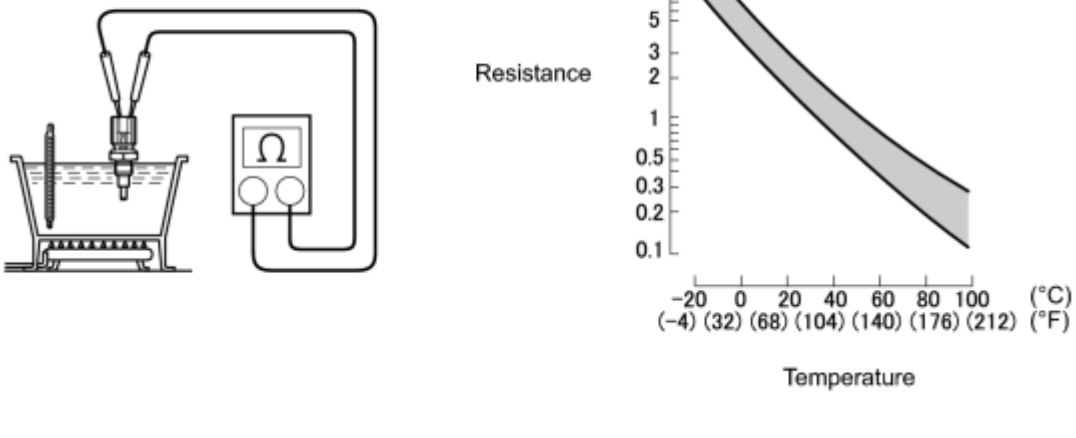
NOTICE:

Do not apply any excessive force to the heater pipe when removing the engine coolant temperature sensor.

# INSPECTION

1. INSPECT ENGINE COOLANT TEMPERATURE SENSOR

(a) Measure the resistance according to the value(s) in the table below.




G

Standard Resistance:

| Condition | Specified Condition |
|---|---|
| Approximately 20°C (68°F) | 2.32 to 2.59 kΩ |
| Approximately 80°C (176°F) | 0.310 to 0.326 kΩ |

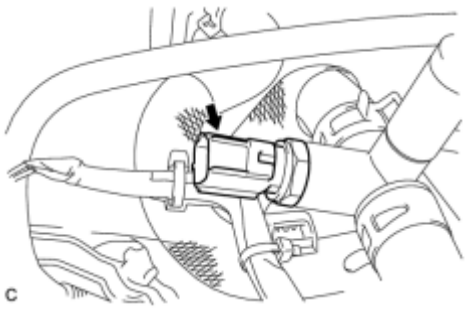
NOTICE:

When checking the engine coolant temperature sensor in water, keep the terminals dry. After the check, dry the engine coolant temperature sensor.

If the resistance is not as specified, replace the engine coolant temperature sensor.

# INSTALLATION

1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR

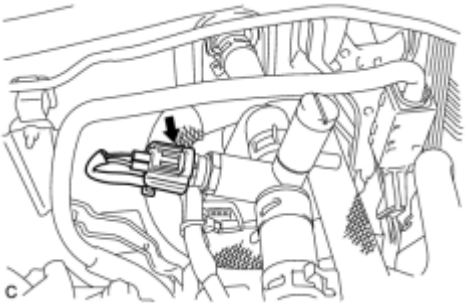



(a) Using a union nut wrench (19 mm), install the engine coolant temperature sensor.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

NOTICE:

Do not apply any excessive force to the heater pipe when installing the engine coolant temperature sensor.




(b) Connect the engine coolant temperature sensor connector.

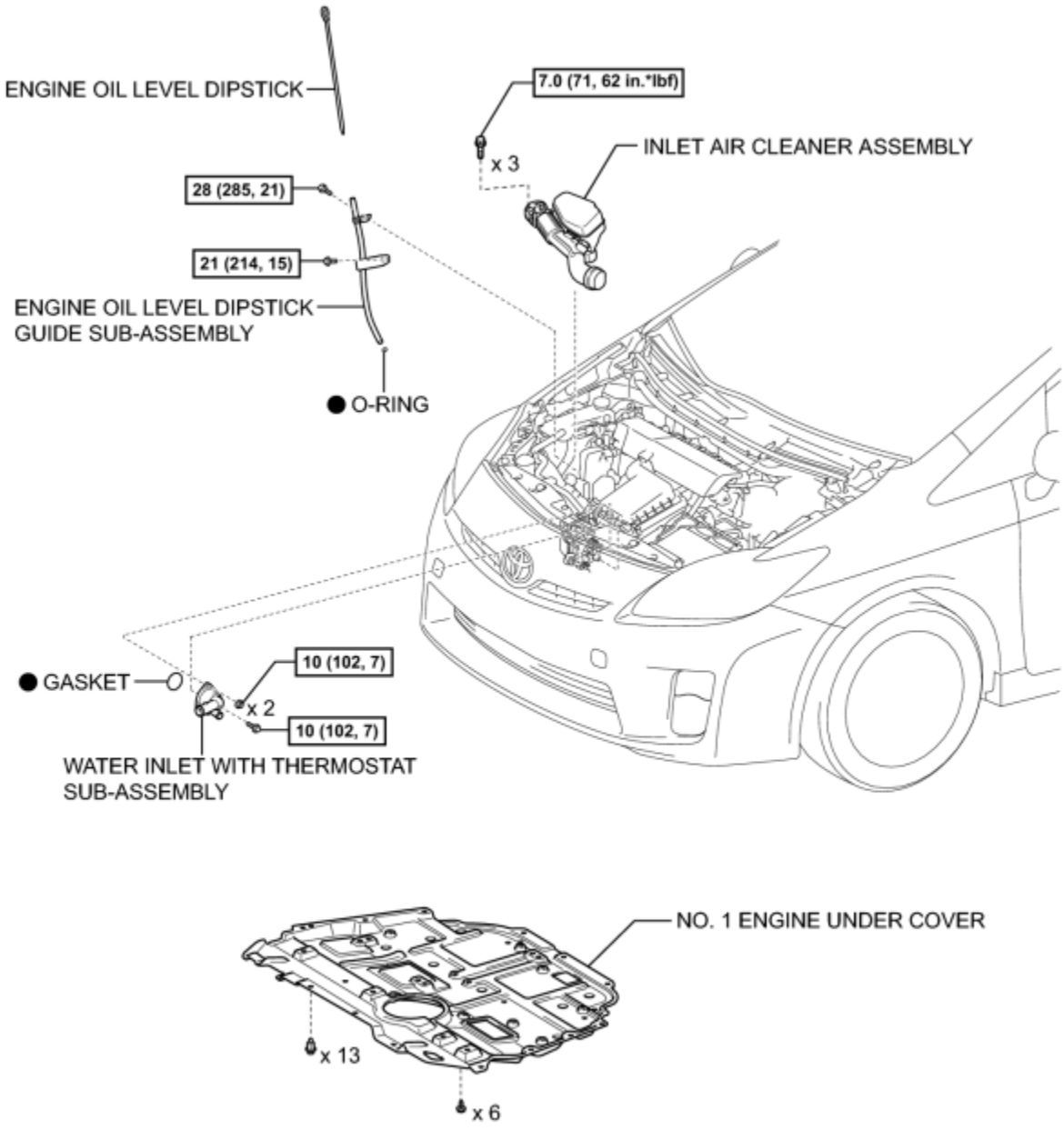
2. ADD ENGINE COOLANT (for Engine) INFO

3. INSPECT FOR COOLANT LEAK (for Engine) INFO

4. INSTALL NO. 1 ENGINE UNDER COVER

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

# REMOVAL

1. REMOVE NO. 1 ENGINE UNDER COVER

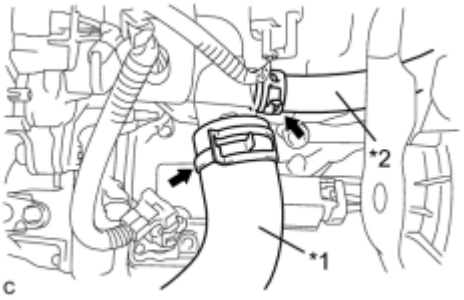
2. REMOVE INLET AIR CLEANER ASSEMBLY INFO

3. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE SUB-ASSEMBLY INFO

4. DRAIN ENGINE COOLANT (for Engine) INFO

5. REMOVE WATER INLET WITH THERMOSTAT SUB-ASSEMBLY

(a) Disconnect the No. 2 radiator hose and No. 3 water by-pass hose.



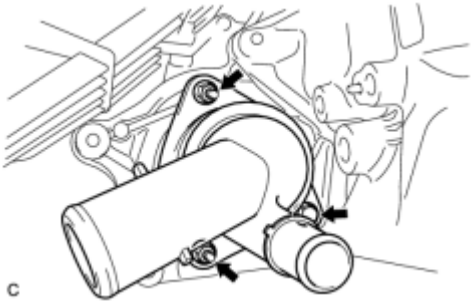

## Text in Illustration

| | |
|---|---|
| *1 | No. 2 Radiator Hose |
| *2 | No. 3 Water By-pass Hose |

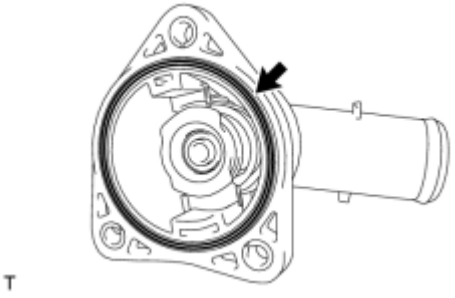
- Do not apply force to the water inlet with thermostat sub-assembly when disconnecting the No. 3 water by-pass hose.
- Do not damage the water inlet with thermostat sub-assembly.

HINT:

When disconnecting the No. 3 water by-pass hose, pinch the hose clamp, rotate the hose and pull it straight off the pipe.



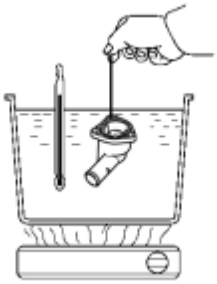

(b) Remove the 2 nuts, bolt and water inlet with thermostat sub-assembly.




(c) Remove the gasket from the water inlet with thermostat sub-assembly.

# INSPECTION

1. INSPECT WATER INLET WITH THERMOSTAT SUB-ASSEMBLY



Y A75919

(a) Immerse the water inlet with thermostat sub-assembly in water and then gradually heat the water.

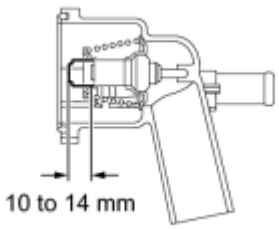
(b) Check the valve opening temperature of the water inlet with thermostat sub-assembly.

Valve opening temperature:

80 to 84°C (176 to 183°F)

HINT:

If the valve opening temperature is not as specified, replace the water inlet with thermostat sub-assembly.




T

(c) Check the valve lift.

Valve lift:

10 to 14 mm (0.394 to 0.551 in.) at 95°C (203°F)

HINT:

If the valve lift is not as specified, replace the water inlet with thermostat sub-assembly.

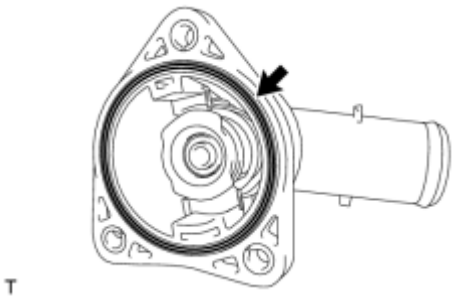
(d) Check that the valve is fully closed when the water inlet with thermostat sub-assembly is at low temperatures (below 77°C (171°F)).

HINT:

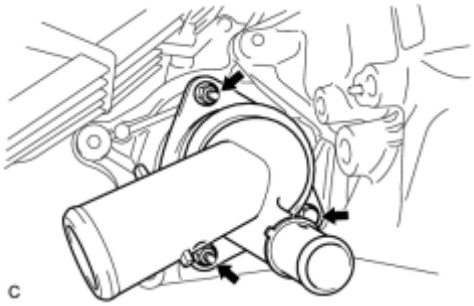
If it is not fully closed, replace the water inlet with thermostat sub-assembly.

# INSTALLATION

1. INSTALL WATER INLET WITH THERMOSTAT SUB-ASSEMBLY

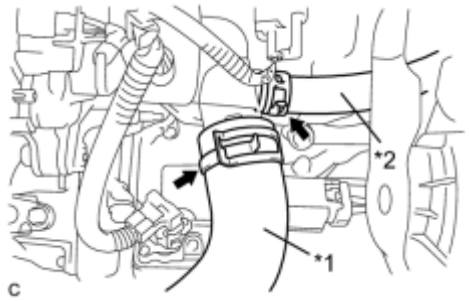



(a) Install a new gasket on the water inlet with thermostat sub-assembly.




(b) Install the water inlet with thermostat sub-assembly with the 2 nuts and bolt.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**




(c) Connect the No. 2 radiator hose and No. 3 water by-pass hose.

## Text in Illustration

| | |
|---|---|
| *1 | No. 2 Radiator Hose |
| *2 | No. 3 Water By-pass Hose |

2. ADD ENGINE COOLANT (for Engine) INFO

3. INSPECT FOR COOLANT LEAK (for Engine) INFO

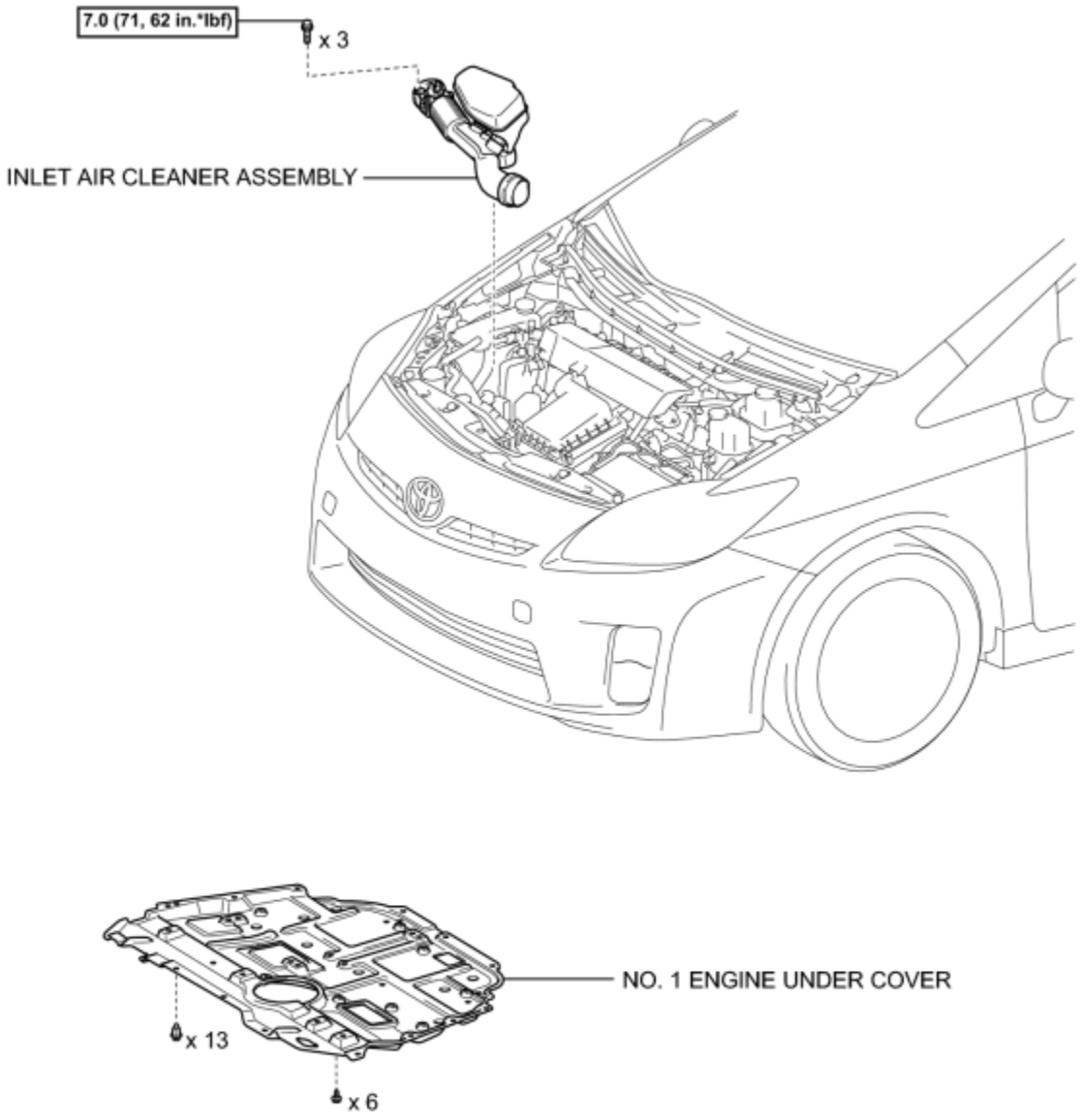
4. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE SUB-ASSEMBLY INFO

5. INSTALL INLET AIR CLEANER ASSEMBLY INFO

6. INSTALL NO. 1 ENGINE UNDER COVER

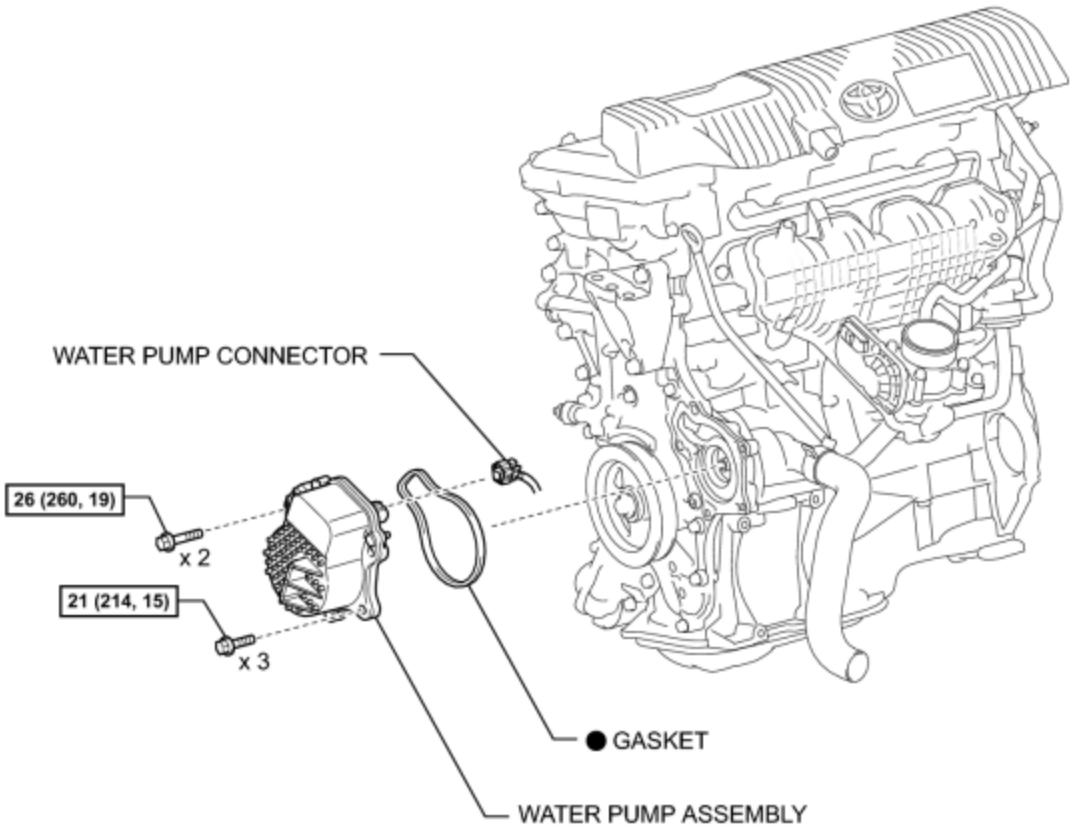
# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# REMOVAL

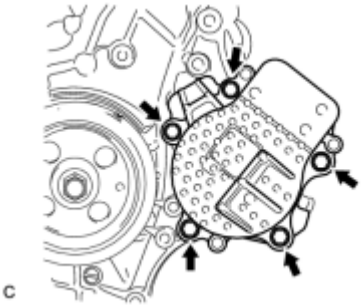
1. REMOVE NO. 1 ENGINE UNDER COVER

2. REMOVE INLET AIR CLEANER ASSEMBLY INFO

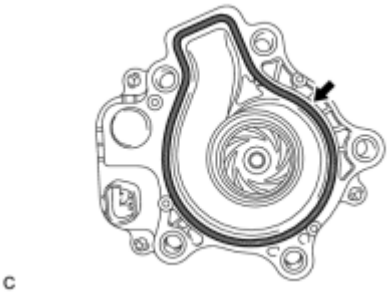
3. DRAIN COOLANT (for Engine) INFO

4. REMOVE WATER PUMP ASSEMBLY

(a) Disconnect the water pump connector from the water pump assembly.



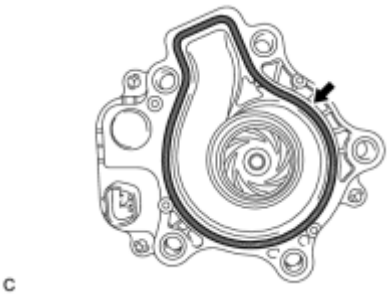

(b) Remove the 5 bolts and water pump assembly from the timing chain cover.




(c) Remove the water pump gasket from the water pump.

# INSTALLATION

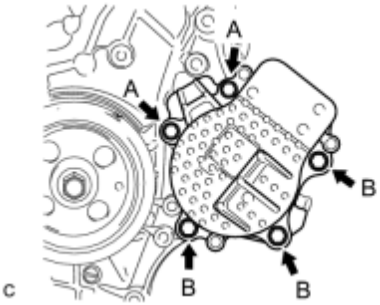
1. INSTALL WATER PUMP ASSEMBLY



(a) Install a new water pump gasket.

HINT:

Be sure to clean the contact surfaces.




(b) Install the water pump assembly to the timing chain cover with the 5 bolts.

Bolt A - Torque: **26 N·m (260 kgf·cm, 19ft·lbf)**

Bolt B - Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

Bolt Length:

| Item | Length |
|---|---|
| Bolt A | 35 mm (1.38 in.) |
| Bolt B | 18 mm (0.709 in.) |

(c) Connect the water pump connector to the water pump assembly.

2. ADD COOLANT (for Engine) INFO

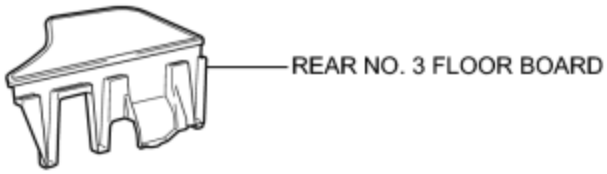
3. INSPECT FOR COOLANT LEAK (for Engine) INFO

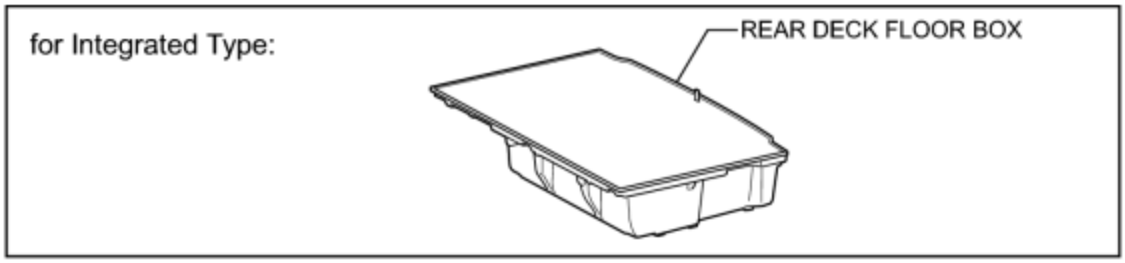
4. INSTALL INLET AIR CLEANER ASSEMBLY INFO

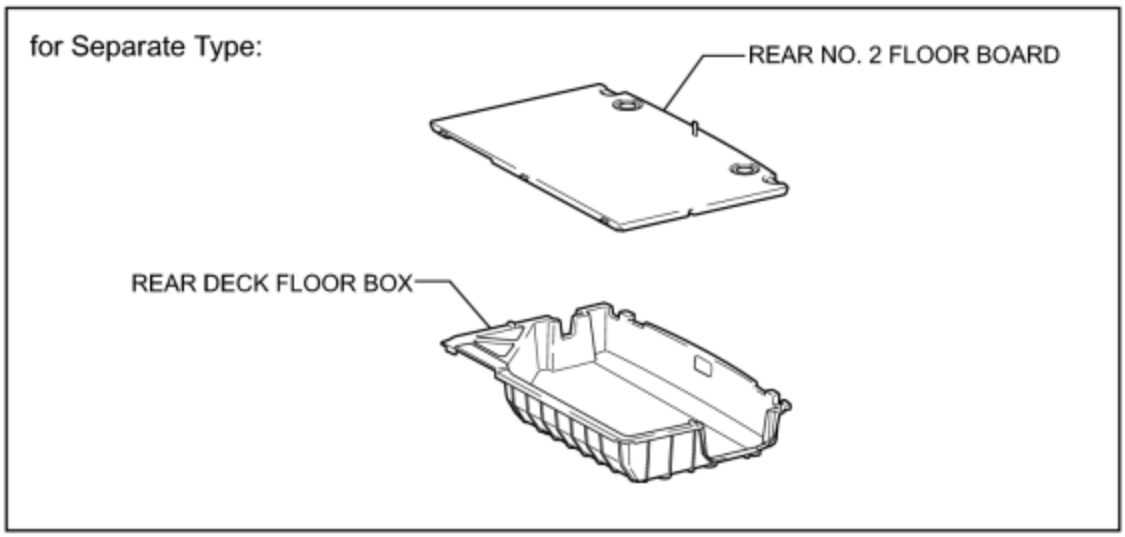
5. INSTALL NO. 1 ENGINE UNDER COVER

# COMPONENTS

# ILLUSTRATION

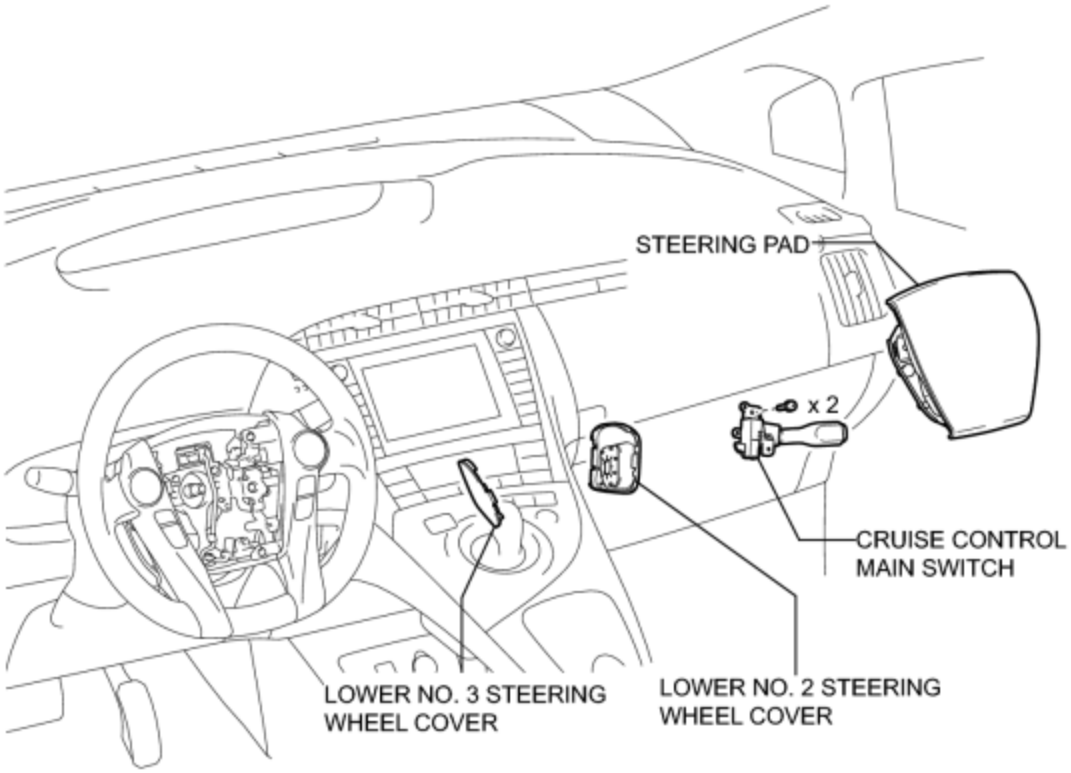



P

# ILLUSTRATION


STEERING PAD
x 2
CRUISE CONTROL
MAIN SWITCH
LOWER NO. 3 STEERING
WHEEL COVER
LOWER NO. 2 STEERING
WHEEL COVER

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE LOWER NO. 3 STEERING WHEEL COVER INFO

6. REMOVE LOWER NO. 2 STEERING WHEEL COVER INFO

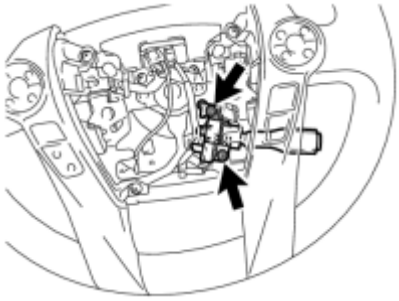
7. REMOVE STEERING PAD INFO

8. REMOVE CRUISE CONTROL MAIN SWITCH



P

(a) Disconnect the connector.



P

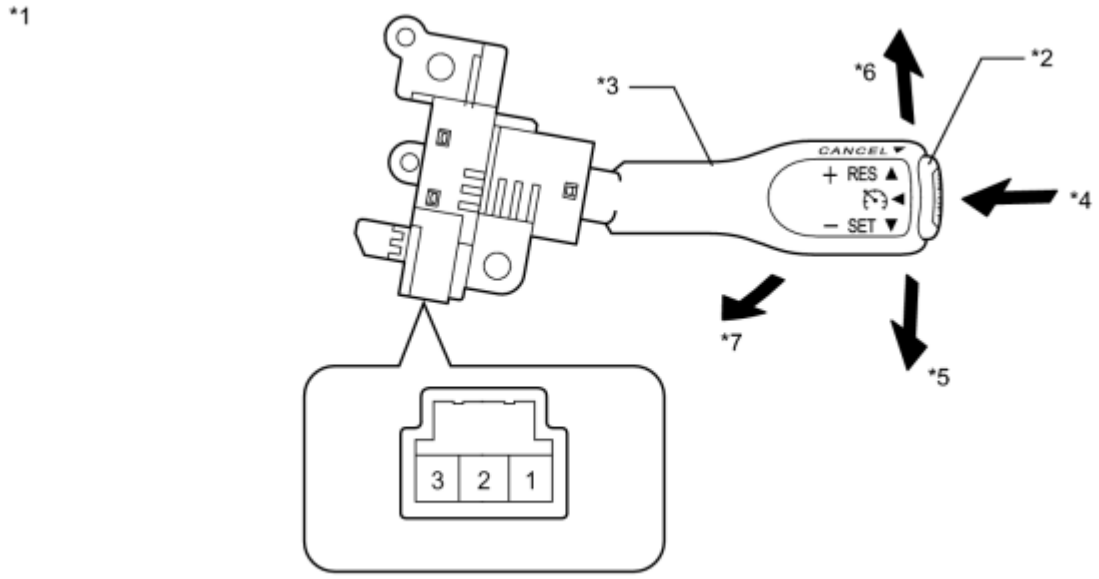
(b) Remove the 2 screws and cruise control main switch.

# INSPECTION

1. INSPECT CRUISE CONTROL MAIN SWITCH

(a) for cruise control system:

(1) Measure the resistance according to the value(s) in the table below.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Cruise Control Main Switch) | *2 | Main Switch |
| *3 | Lever | *4 | ON/OFF |
| *5 | - SET | *6 | + RES |
| *7 | CANCEL | - | - |

Standard Resistance:

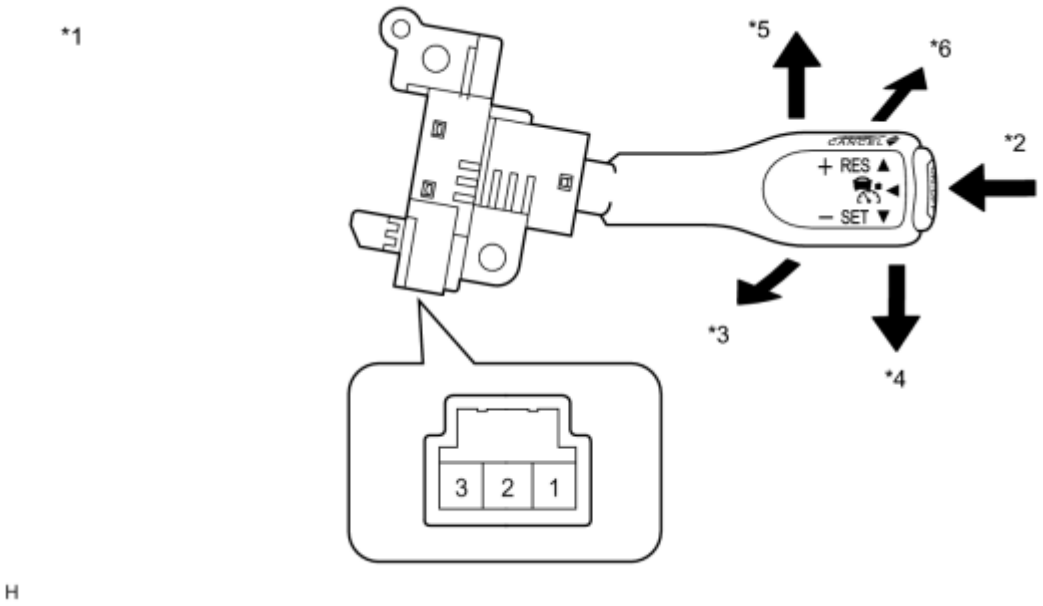
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 3 | Main Switch off*1 | 1 MΩ or higher |
| | Main Switch on | Below 2.5 Ω |
| | + RES | 235 to 245 Ω |
| | - SET | 617 to 643 Ω |
| | CANCEL | 1509 to 1571 Ω |

*1: Lever is in the neutral position

If the result is not as specified, replace the cruise control main switch.

(b) for dynamic radar cruise control system:

(1) Measure the resistance according to the value(s) in the table below.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Cruise Control Main Switch) | *2 | ON/OFF |
| *3 | CANCEL | *4 | - SET |
| *5 | + RES | *6 | MODE |

Standard Resistance:

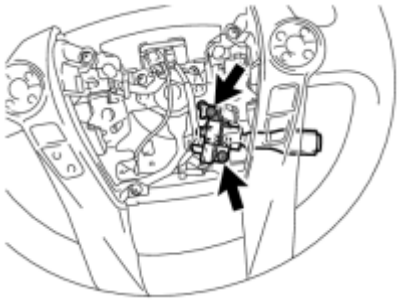
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2<br><br>1 - 3 | Main Switch off*1 | 1 MΩ or higher |
| 1 - 3 | Main switch on | Below 2.5 Ω |
| 1 - 2 | MODE | Below 2.5 Ω |
| 1 - 3 | + RES | 235 to 245 Ω |
| 1 - 3 | - SET | 617 to 643 Ω |
| 1 - 3 | CANCEL | 1509 to 1571 Ω |

*1: Lever is in the neutral position

If the result is not as specified, replace the cruise control main switch.

# INSTALLATION

1. INSTALL CRUISE CONTROL MAIN SWITCH



P

(a) Install the cruise control main switch with the 2 screws.



P

(b) Connect the connector.

2. INSTALL STEERING PAD INFO

3. INSTALL LOWER NO. 3 STEERING WHEEL COVER INFO

4. INSTALL LOWER NO. 2 STEERING WHEEL COVER INFO

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. INSTALL REAR NO. 3 FLOOR BOARD INFO

7. INSTALL REAR DECK FLOOR BOX INFO

8. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

9. INSPECT STEERING PAD INFO

10. INSPECT SRS WARNING LIGHT

(a) Inspect SRS warning light INFO.

# PRECAUTION

1. NOTICE FOR INITIALIZATION

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. HANDLING PRECAUTION FOR CRUISE CONTROL SYSTEM

(a) Turn the cruise control main switch (ON-OFF button) off when not using the cruise control system.

(b) Be careful as the vehicle speed increases when driving downhill with the cruise control system on.

(c) The +RES operation changes according to the cruise control system status. When the cruise control system is operating, the + function operates. When the cruise control system is not operating, the RES function operates.

(d) If the cruise main indicator light blinks while the cruise control system is operating, turn the cruise control main switch (ON-OFF button) off to reset the cruise control system. After the reset, if the cruise control main switch (ON-OFF button) cannot be turned on, or the cruise control system is canceled immediately after turning the cruise control main switch (ON-OFF button) on, the system may have a malfunction.

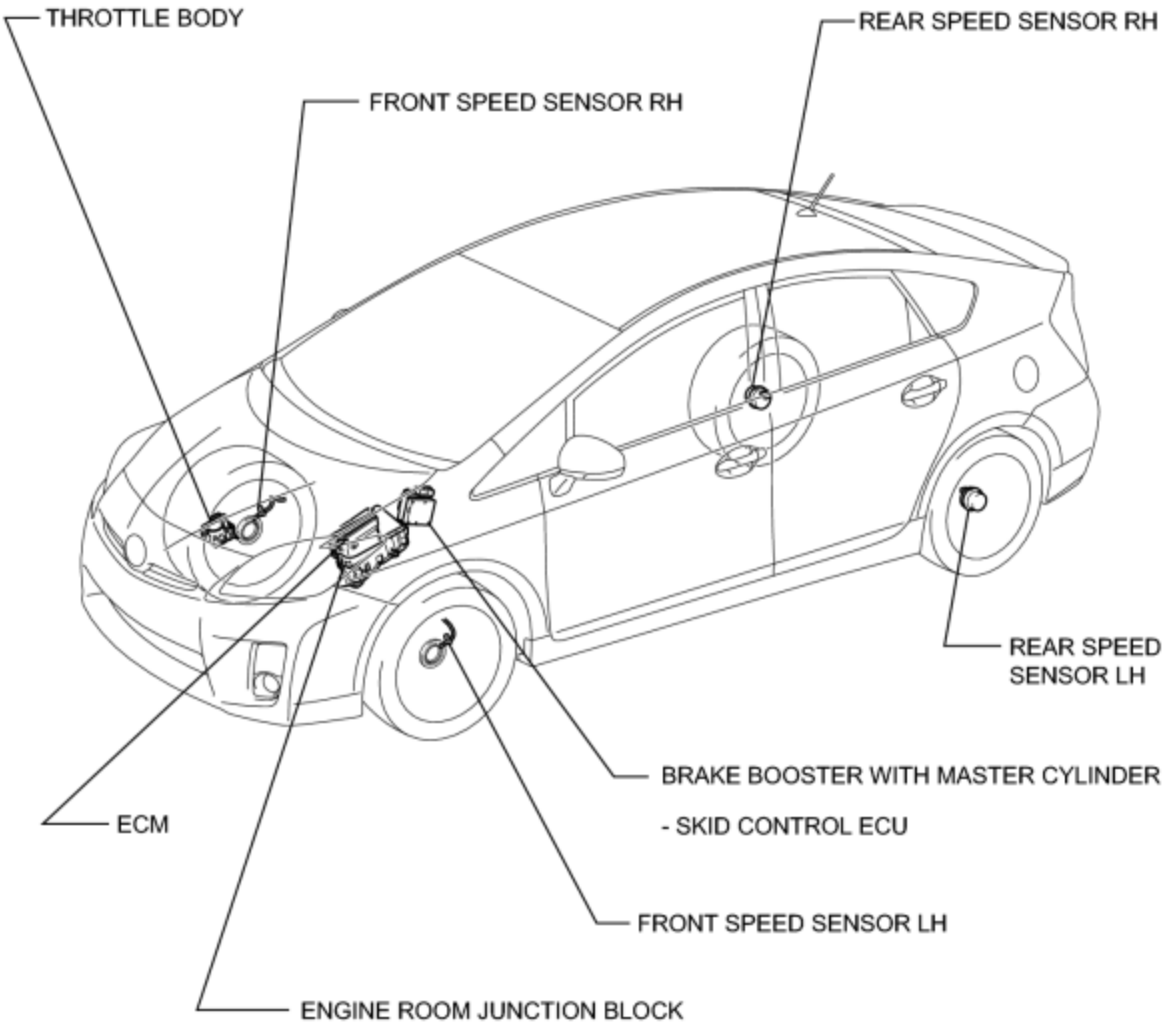
(e) Do not use the cruise control system where the road conditions are as follows:

- Heavy traffic
- Steep decline
- Roads with sharp turns
- Icy or snowy roads
- Slippery roads

(f) Do not use the cruise control system while towing.

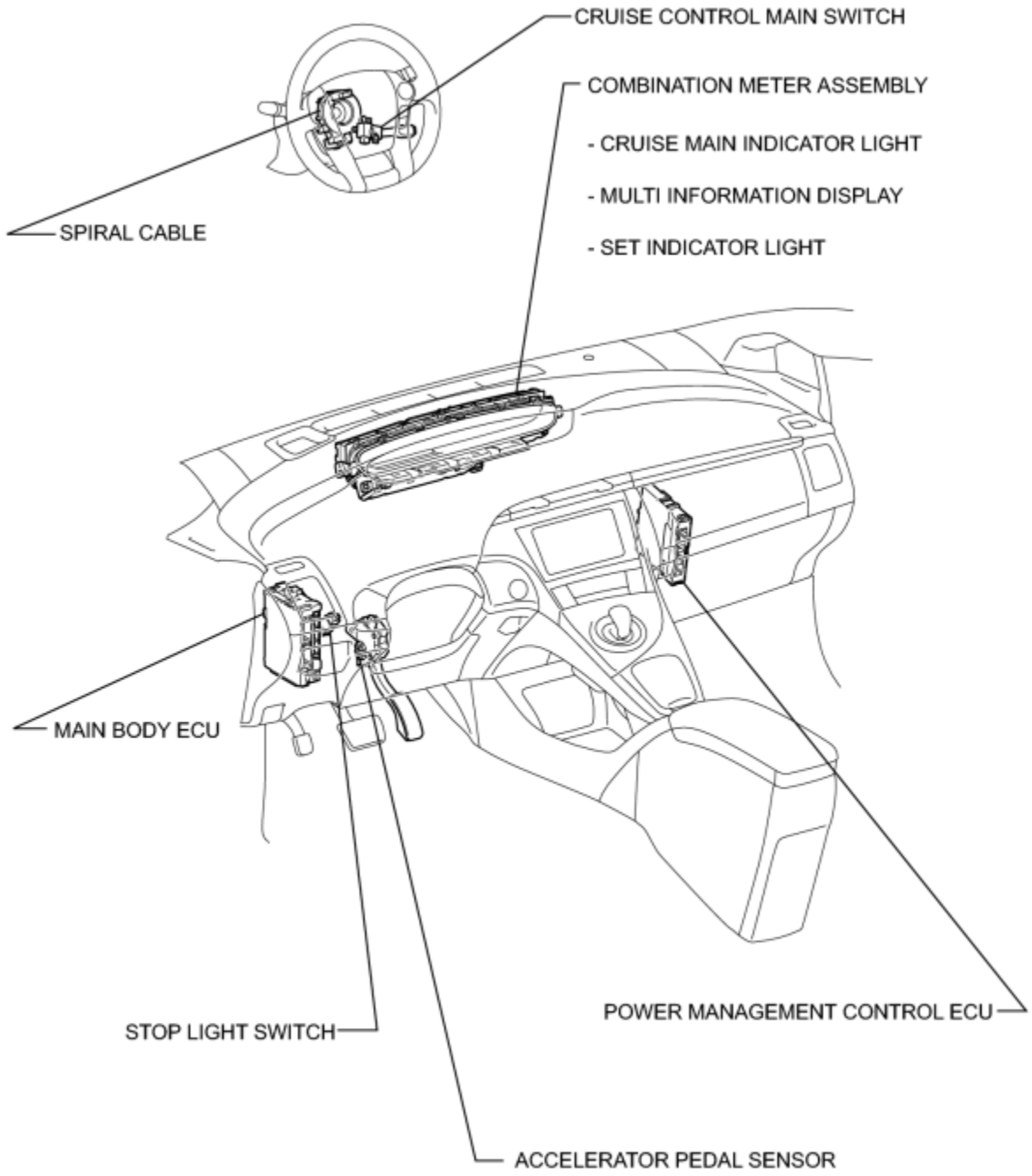
# PARTS LOCATION

# ILLUSTRATION



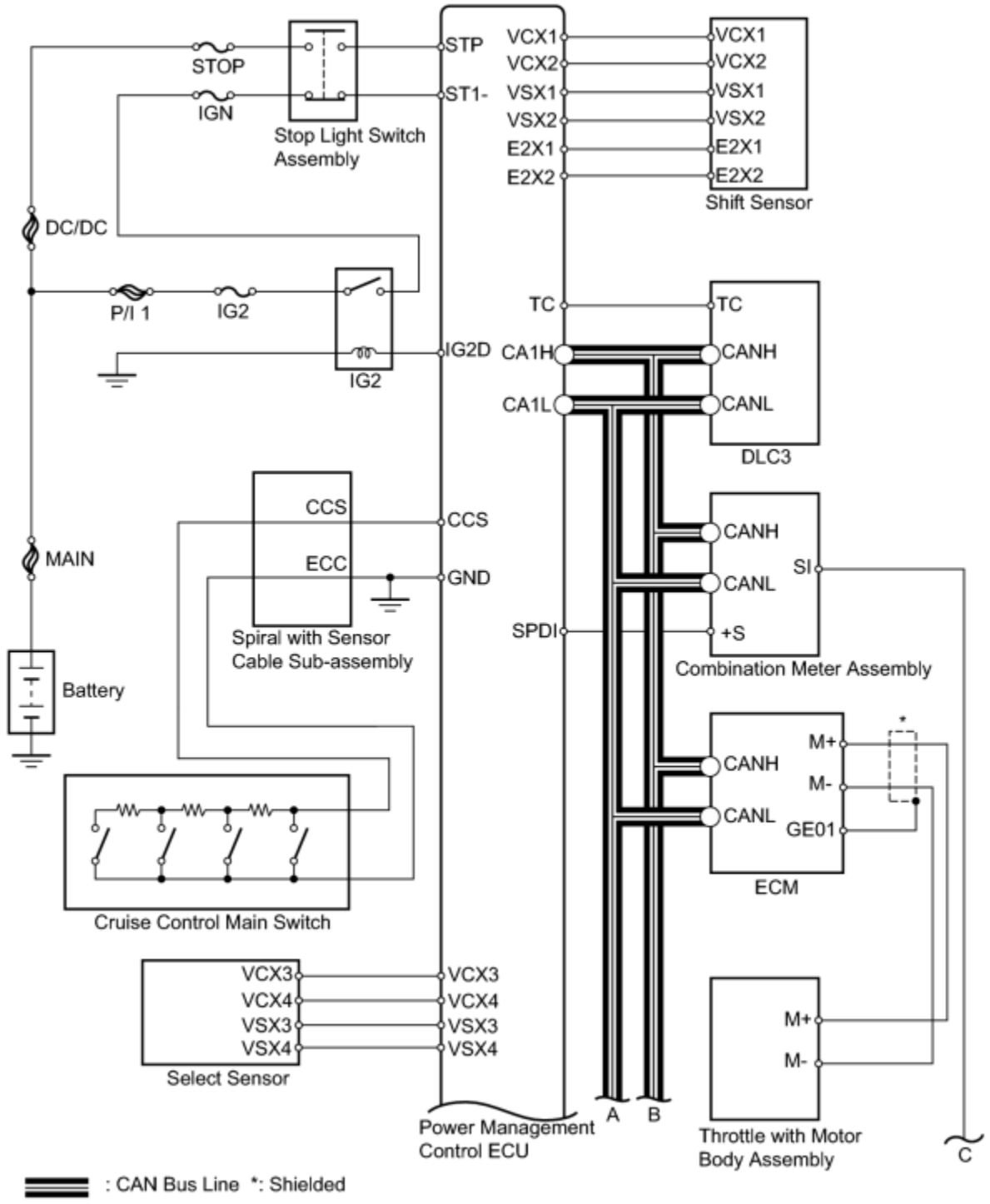

H

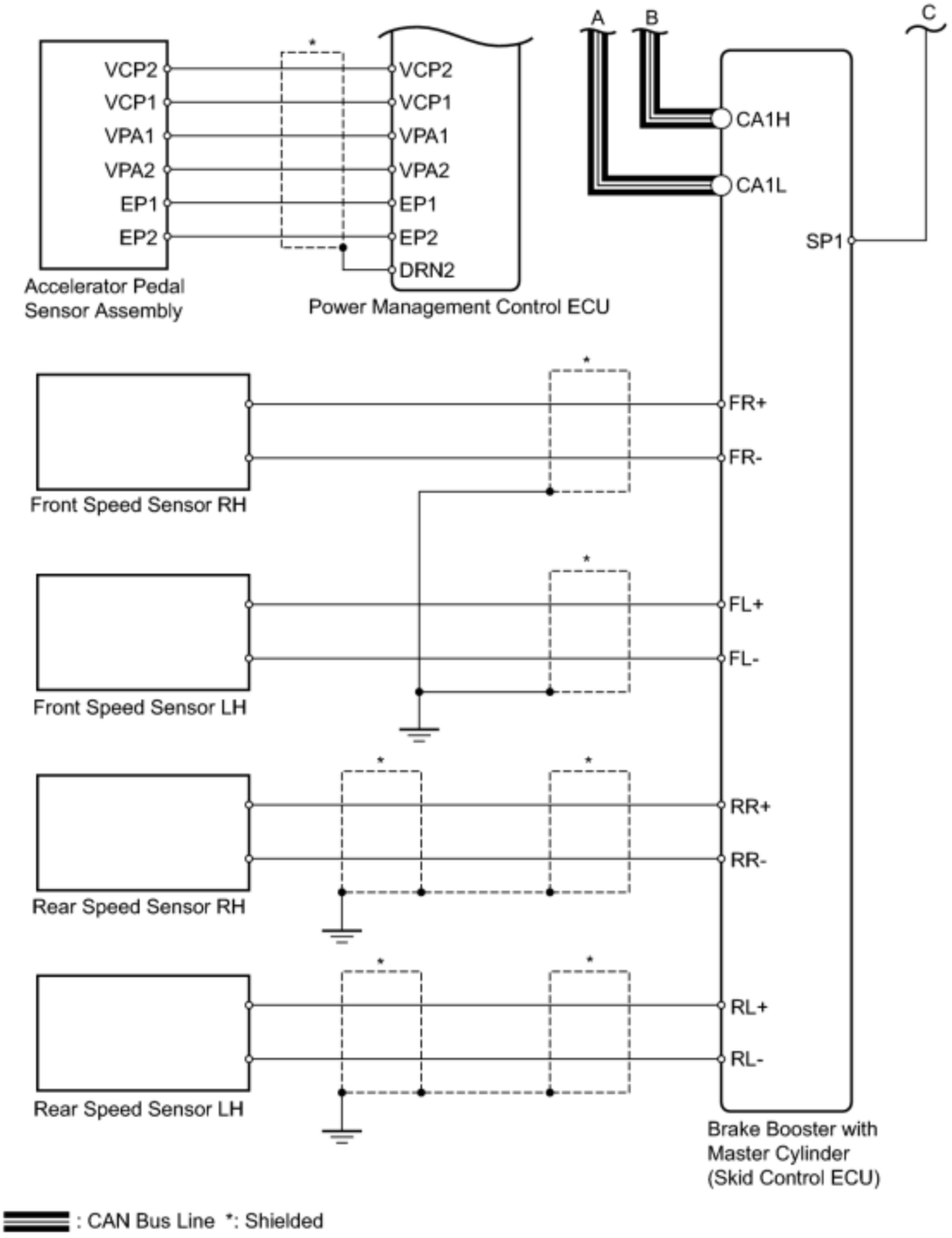
# ILLUSTRATION


CRUISE CONTROL MAIN SWITCH
COMBINATION METER ASSEMBLY
- CRUISE MAIN INDICATOR LIGHT
- MULTI INFORMATION DISPLAY
- SET INDICATOR LIGHT
SPIRAL CABLE
MAIN BODY ECU
STOP LIGHT SWITCH
POWER MANAGEMENT CONTROL ECU
ACCELERATOR PEDAL SENSOR

H

# SYSTEM DIAGRAM






c

**Communication Table**

| Sender | Receiver | Signal | Line |
|---|---|---|---|
| Power management control ECU | Combination meter assembly<br><br>(Cruise Main Indicator | • Cruise main indicator and SET indicator operation signal<br>• Cruise control diagnosis signal | CAN |

| Sender | Receiver | Signal | Line |
|---|---|---|---|
| | Light)<br><br>("SET" Indicator) | | |
| Brake booster with master cylinder (skid control ECU) | Power management control ECU | Electronically controlled brake system malfunction signal | CAN |
| Power management control ECU | ECM | Throttle actuator operation signal | CAN |
| ECM | Power management control ECU | Throttle position signal | CAN |

# SYSTEM DESCRIPTION

1. CRUISE CONTROL SYSTEM

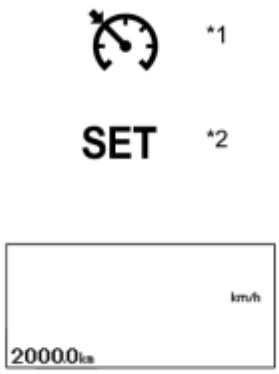
The cruise control system maintains constant vehicle speed. It enables the driver to adjust the vehicle speed by operating the cruise control main switch without using the accelerator pedal.

The power management control ECU receivers signals from each switch and sensor, and maintains constant vehicle speed by optimizing the use of the engine and motor driving force.

- The power management control ECU receives signals such as ON-OFF, - SET, + RES, and CANCEL from the cruise control main switch and executes the command.
- The power management control ECU illuminates the combination meter's cruise main indicator light when it receives a cruise control main switch (ON-OFF button) ON signal.

**Text in Illustration**

| | |
|---|---|
| *1 | Cruise Main Indicator Light |
| *2 | "SET" Indicator |




- The power management control ECU displays "SET" on the multi-information display when constant speed control is started by pushing the cruise control main switch to "- SET".
- The power management control ECU cancels cruise control operation when the brake pedal is depressed and the power management control ECU receives a stop light switch signal.
- The power management control ECU cancels cruise control operation when the shift lever is moved from D to N or B position, and the power management control ECU receives a shift position sensor signal.

2. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is set at approximately 40 km/h (25 mph). The cruise control system cannot be set when the vehicle speed is below the low speed limit. Cruise control operation will

be automatically canceled but the stored vehicle speed will be retained when the vehicle speed drops below the low speed limit of 40 km/h (25 mph) while the cruise control is in operation.

(b) High speed limit

The highest possible limit of the speed setting range is set at approximately 200 km/h (125 mph). The cruise control system cannot be set when the driving vehicle speed is over the high speed limit. Also, + RES cannot be used to increase speed over the high speed limit.

3. CRUISE CONTROL OPERATION

The cruise control main switch operates 7 functions: SET, -, TAP-DOWN, RES, +, TAP-UP, and CANCEL. The SET, TAP-DOWN, and - functions, and the RES, TAP-UP, and + functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while it is being operated in the direction of each arrow and turns off after being released.

(a) SET CONTROL

Vehicle speed is stored and constant speed control is maintained when pushing the cruise control main switch to - SET while driving with the main switch on (the cruise main indicator light and "SET" indicator come on), and the vehicle speed is within the set speed range (between the low and high speed limits).

(b) - CONTROL

The power management control ECU decreases the cruise control demand speed and controls the engine and motor driving force to decelerate the vehicle when - SET on the cruise control main switch is pressed and held while the cruise control system is in operation. When the cruise control main switch is released from - SET, vehicle speed is stored and constant speed control is maintained.

(c) TAP-DOWN CONTROL

When tapping down the cruise control main switch to - SET (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed decreases each time by approximately 1.6 km/h (1 mph). When the cruise control main switch is released from - SET and the difference between the driving and stored vehicle speeds is more than 5 km/h (3 mph), the vehicle speed is stored and constant speed control is maintained.

(d) + CONTROL

The power management control ECU increases the cruise control demand speed and controls the engine and motor driving force to accelerate the vehicle when pushing and holding the cruise control main switch to + RES while the cruise control system is in operation.

When the cruise control main switch is released from + RES, vehicle speed is stored and constant speed control is maintained.

(e) TAP-UP CONTROL

When tapping up the cruise control main switch to + RES (for approximately 0.6 seconds) while the cruise control system is in operation, the stored vehicle speed increases each time by approximately 1.6 km/h (1 mph).

However, when the difference between the driving and the stored vehicle speeds is more than 5 km/h (3 mph), the stored vehicle speed will not be changed.

(f) RES CONTROL

If cruise control operation was canceled with the stop light switch assembly or the CANCEL switch, and if driving speed is within the limit range, pushing the cruise control main switch to + RES restores vehicle speed memorized at the time of cancellation, and maintains constant speed control.

(g) MANUAL CANCEL CONTROL

Performing any of the following cancels the cruise control system while it is operating (the stored vehicle speed in the ECM is maintained).

- Depressing the brake pedal
- Moving the shift lever from D to N or B position
- Pushing the cruise control main switch to CANCEL
- Turning the cruise control main switch (ON-OFF button) off (the stored vehicle speed in the ECM is not maintained)

4. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (fail-safe) 

.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the cruise control system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, replace or recharge the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 3. | CHECK COMMUNICATION FUNCTION OF CONTROLLER AREA NETWORK (CAN)* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B INFO GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 4. | CHECK FOR DTC* |

Refer to DTC Check / Clear INFO.

(a) Check for DTCs and note any codes that are output.

(b) Clear the DTCs.

(c) Recheck for DTCs. Try to reproduce the DTCs by duplicating the conditions indicated by the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC does not reoccur | A |

| Result | Proceed to |
|---|---|
| DTC reoccurs | B |

B ▶ INFO GO TO DTC CHART

A ▼

| | |
|---|---|
| 5. | PROBLEM SYMPTOMS TABLE |

Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| 6. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO

(b) Data List / Active Test INFO

NEXT ▼

| | |
|---|---|
| 7. | ADJUST, REPAIR OR REPLACE |

NEXT ▼

| | |
|---|---|
| 8. | CONFIRMATION TEST |

NEXT ▶ **END**

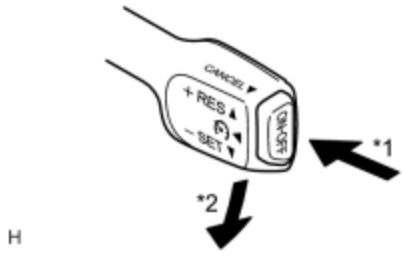
# ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

(a) Inspect the SET function.

**Text in Illustration**

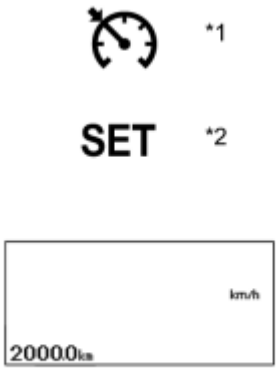
| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |




(1) Turn the cruise control main switch (ON-OFF button) on.

(2) Check that the cruise main indicator light illuminates on the combination meter assembly.

(3) Drive at a speed of between 40 km/h (25 mph) and 200 km/h (125 mph).




(4) Push the cruise control main switch to - SET.

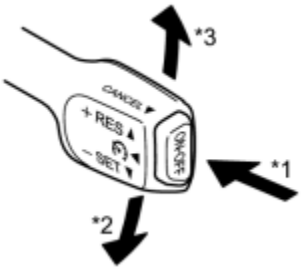
## Text in Illustration

| | |
|---|---|
| *1 | Cruise Main Indicator Light |
| *2 | "SET" Indicator |

(5) Check that "SET" is indicated on the multi-information display.

(6) After releasing the switch, check that the vehicle cruises at the set speed.

(b) Inspect the + function.




## Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |
| *3 | + RES |

(1) Turn the cruise control main switch (ON-OFF button) on.

(2) Drive at the required speed (40 km/h (25 mph) or higher).

(3) Push the cruise control main switch to - SET.

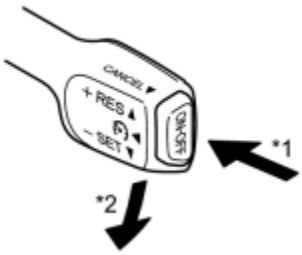
(4) Check that vehicle speed increases while the cruise control main switch is pushed to + RES, and that the vehicle cruises at the newly set speed when the switch is released.

(5) Push the cruise control main switch to + RES and then release it immediately. Check that vehicle speed increases by approximately 1.6 km/h (1 mph) (tap-up control).

(c) Inspect the - function.

## Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |




H

(1) Turn the cruise control main switch (ON-OFF button) on.

(2) Drive at a speed of between 40 km/h (25 mph) and 200 km/h (125 mph).

(3) Push the cruise control main switch to - SET.

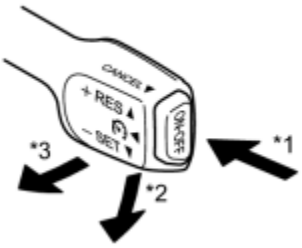
(4) Check that vehicle speed decreases while the cruise control main switch is pushed to - SET, and the vehicle cruises at the newly set speed when the switch is released.

(5) Push the cruise control main switch to - SET, and then release it immediately. Check that vehicle speed decreases by approximately 1.6 km/h (1 mph) (tap-down control).

(d) Inspect the CANCEL function.

## Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |




| | |
|---|---|
| *3 | CANCEL |

(1) Turn the cruise control main switch (ON-OFF button) on.

(2) Drive at a speed of between 40 km/h (25 mph) and 200 km/h (125 mph).

(3) Push the cruise control main switch to - SET.

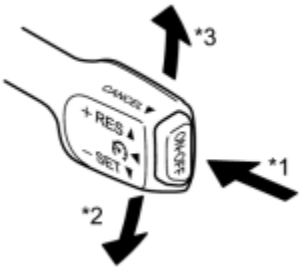
(4) When performing any one of the following, check that the operation of the cruise control system is cancelled, normal driving resumes and "SET" on the multi-information display goes off.

- Depressing the brake pedal
- Moving the shift lever from D to N or selecting 3rd, 2nd, or 1st gear with the shift lever in S
- Turning the cruise control main switch off
- Pulling the cruise control main switch to CANCEL

(e) Inspect the RES function.

# Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |
| *3 | + RES |




(1) Turn the cruise control main switch (ON-OFF button) on.

(2) Drive at a speed of between 40 km/h (25 mph) and 200 km/h (125 mph).

(3) Push the cruise control main switch to - SET.

(4) Cancel cruise control operation by performing any of the above operations (other than turning the main switch off).

(5) After pushing the cruise control main switch to "+ RES" at a speed of more than 40 km/h (25 mph), check that the vehicle resumes the speed set prior to the cancellation and that "SET" is also displayed on the multi-information display.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

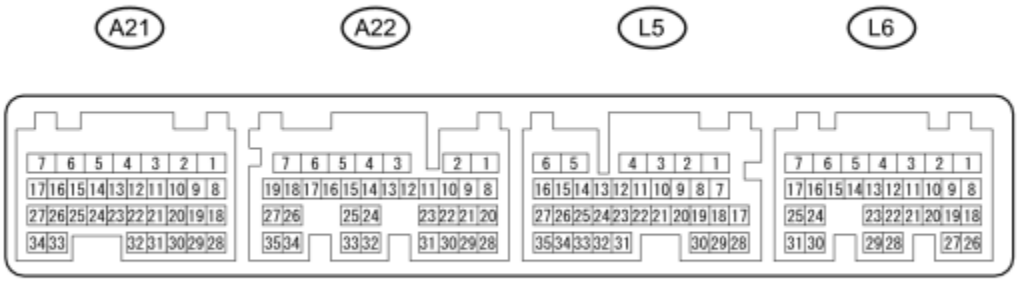
**Cruise Control System**

| Symptom | Suspected Area | See page |
|---|---|---|
| The cruise control main switch cannot be turned on. | Cruise control switch circuit | INFO |
| | CRUISE main indicator light circuit | INFO |
| | Power management control ECU | INFO |
| Vehicle speed setting cannot be performed (the cruise main indicator light on the combination meter illuminates when the main switch is turned on, but turns off when SET function is operating). | Cruise control switch circuit | INFO |
| | Power management control ECU | INFO |
| Vehicle speed setting cannot be performed (the cruise main indicator light on the combination meter illuminates when the main switch is turned on, and remains illuminated when SET function is operating). | Stop light switch circuit | INFO |
| | Vehicle speed sensor circuit | INFO |
| | Cruise control switch circuit | INFO |
| | Hybrid control system | INFO |
| | Power management control ECU | INFO |
| The cruise control is canceled while it is operating. | Stop light switch circuit | INFO |
| | Hybrid control system | INFO |
| | Electronically controlled brake system | INFO |
| | Cruise control switch circuit | INFO |
| | Vehicle speed sensor circuit | INFO |
| | Power management control ECU | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| Pulling back on the control main switch does not cancel the cruise control. (The cruise main indicator light remains on.) | Cruise control switch circuit | INFO |
| | Power management control ECU | INFO |
| Pulling back on the control main switch does not cancel the cruise control. (The cruise main indicator light goes off.) | Power management control ECU | INFO |
| The cruise control is not canceled when vehicle speed drops below the low speed limit. (The cruise main indicator light remains on.) | Vehicle speed sensor circuit | INFO |
| | Power management control ECU | INFO |
| The cruise control is not canceled when vehicle speed drops below the low speed limit. (The cruise main indicator light goes off.) | Power management control ECU | INFO |
| Depressing the brake pedal does not cancel the cruise control. (The cruise main indicator light remains on.) | Stop light switch circuit | INFO |
| | Power management control ECU | INFO |
| Depressing the brake pedal does not cancel the cruise control. (The cruise indicator main light goes off.) | Power management control ECU | INFO |
| Moving the shift lever does not cancel the cruise control. (The cruise main indicator light remains on.) | Hybrid control system | INFO |
| | Power management control ECU | INFO |
| Moving the shift lever does not cancel the cruise control. (The cruise indicator main light goes off.) | Power management control ECU | INFO |
| Hunting (Speed is not constant.) | Vehicle speed sensor circuit | INFO |
| | SFI system | INFO |
| | Power management control ECU | INFO |
| The cruise main indicator light remains blinking. | TC and CG terminal circuit | INFO |
| | Power management control ECU | INFO |
| The "SET" indicator does not comes on (SET function operate normally) | Cruise SET indicator light circuit | INFO |
| | Power management control ECU | INFO |

# TERMINALS OF ECU

1. CHECK POWER MANAGEMENT CONTROL ECU

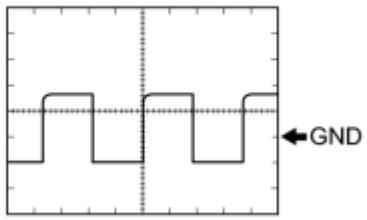



| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A22-7 (ST1-) - L5-6 (E1) | R - BR | Stop light switch signal | Power switch on (IG), Brake pedal released | 7.5 to 14 V |
| A22-7 (ST1-) - L5-6 (E1) | R - BR | Stop light switch signal | Power switch on (IG), Brake pedal depressed | Below 1 V |
| A22-23 (STP) - L5-6 (E1) | L - BR | Stop light switch signal | Brake pedal released | Below 1 V |
| A22-23 (STP) - L5-6 (E1) | L - BR | Stop light switch signal | Brake pedal depressed | 7.5 to 14 V |
| L5-6 (E1) - Body ground | BR - Body ground | Earth (ground) circuit of power management control ECU | Always | Below 1 Ω |
| L5-11(TC) - L5-6 (E1) | P - BR | Terminal TC of DLC3 | Power switch on (IG) | 11 to 14 V |
| L5-11(TC) - L5-6 (E1) | P - BR | Terminal TC of DLC3 | Terminals TC and CG of DLC3 connected | Below 1 V |
| L5-14 (SPDI) - L5-6 (E1) | V - BR | Vehicle speed signal | Driving at 20 km/h (12 mph) | Pulse generation<br><br>(see waveform 1) |
| L6-22 (CCS) - L5-6 (E1) | R - BR | Cruise control main switch circuit | Power switch on (IG) | 10 to 14 V |
| L6-22 (CCS) - L5-6 (E1) | R - BR | Cruise control main switch circuit | Power switch on (IG), MAIN switch on | Below 1 V |
| L6-22 (CCS) - L5-6 (E1) | R - BR | Cruise control main switch circuit | Power switch on (IG), + RES switch on | 2.3 to 4.0 V |
| L6-22 (CCS) - L5-6 (E1) | R - BR | Cruise control main switch circuit | Power switch on (IG), - SET switch on | 4.5 to 7.1 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L6-22 (CCS) - L5-6 (E1) | R - BR | Cruise control main switch circuit | Power switch on (IG), CANCEL switch on | 6.6 to 10.1 V |
| L6-24 (CA1L) - L5-6 (E1) | W - BR | CAN communication line | Power switch on (IG) | Pulse generation<br><br>(see waveform 2) |
| L6-25 (CA1H) - L5-6 (E1) | B - BR | CAN communication line | Power switch on (IG) | Pulse generation<br><br>(see waveform 3) |

(a) WAVEFORM 1

(1) Vehicle speed signal



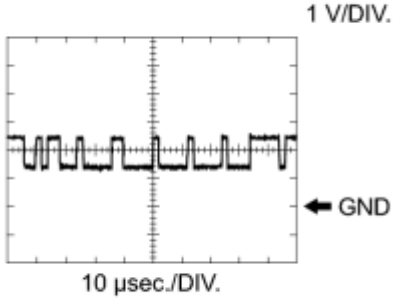

c

| Power Management Control ECU Terminal Name | Between SPDI and E1 |
|---|---|
| Tester Range | 5 V/DIV., 20 ms./DIV. |
| Condition | Driving at 20 km/h (12 mph) |

- The wavelength becomes shorter as the vehicle speed increases.
- Depending on the vehicle, the output waveform voltage may rise to 12 V if influenced by optionally installed systems.

(b) WAVEFORM 2

(1) CAN communication signal




| Power Management Control ECU Terminal Name | Between CA1L and E1 |
|---|---|
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

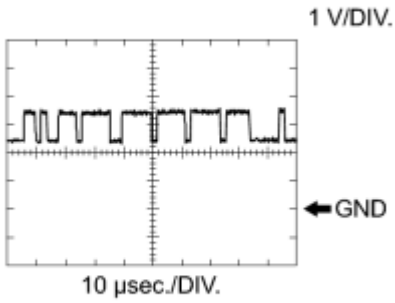
T

The waveform varies depending on the CAN communication signal.

(c) WAVEFORM 3

(1) CAN communication signal

| Power Management Control ECU Terminal | Between CA1H and E1 |
|---|---|




| Name | |
|---|---|
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform varies depending on the CAN communication signal.

T

# DIAGNOSIS SYSTEM

1. DESCRIPTION

The power management control ECU controls the cruise control system of the vehicle. The data and DTCs relating to the cruise control system can be read from the DLC3 of the vehicle. If either DTC or CRUISE OK is not displayed on the multi-information display on the combination meter when checking for DTCs, there may be a problem with either the combination meter or the CAN communication system. Use the Techstream to check and solve the problem.

HINT:

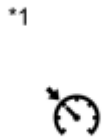
If a vehicle speed sensor, stop light switch or any other related part malfunctions, the power management control ECU cancels cruise control operation automatically.

2. CHECK DLC3

(a) Check the DLC3 INFO.

3. CHECK INDICATOR

(a) Turn the power switch on (IG).



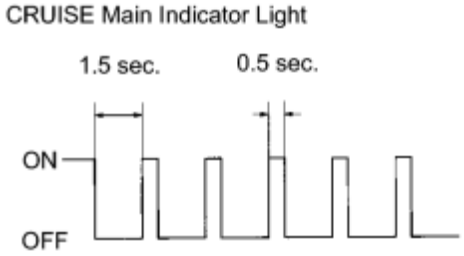

## Text in Illustration

| | |
|---|---|
| *1 | Cruise Main Indicator Light |

(b) Check that the CRUISE main indicator light turns on when the cruise control switch (ON-OFF button) is turned on, and that the indicator light turns off when the control switch (ON-OFF button) is turned off.

HINT:

- If the indicator check result is not normal, proceed to troubleshooting for the cruise main indicator light circuit INFO.
-




If a malfunction occurs in the speed sensor or stop light switch, etc., during cruise control driving, the power management control ECU activates the AUTO CANCEL of the cruise control and turns on and

off the CRUISE main indicator light to inform the driver of a malfunction. At the same time, the malfunction is stored in memory as a diagnostic trouble code.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Tune the Techstream on.

(d) Enter the following menus: Powertrain / Cruise Control / Trouble Codes.

(e) Read the DTCs.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Cruise Control / Trouble Codes.

(e) Clear the DTCs.

# FAIL-SAFE CHART

HINT:

If the following conditions are detected while cruise control is in operation, the system clears the stored vehicle speed in the hybrid vehicle control ECU and cancels the cruise control operation.

| Vehicle Condition | Auto Cancel Condition | Re-operation Condition |
|---|---|---|
| Cruise main indicator light blinks | • There is problem with input circuit of stop light switch circuit<br>• There is problem with cancel circuit<br>• There is problem with electronically controlled brake system<br>• There is open or short in stop light switch circuit<br>• Communication stop between brake booster with master cylinder (skid control ECU) and power management control ECU<br>• There is problem with hybrid vehicle control system | • Turn cruise control main switch on again<br>• Turn power switch off then on (IG) again |
| Cruise main indicator light remains on (Cruise control is canceled) | • Vehicle speed is lower than low speed limit (approximately. 40 km/h (25 mph)) while running with cruise control on<br>• Electronically controlled brake system operates | Push cruise control main switch to + RES |
| | • Vehicle speed is lower than stored speed by approximately 16 km/h (10 mph) or more | Push cruise control main switch to - SET |

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Cruise Control / Data List.

(e) According to the display on the Techstream, read the Data List.

**Cruise Control (Power Management Control ECU)**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| CCS Vehicle Spd | Vehicle speed/min.: 0 km/h (0 mph), max.: 255 km/h (159 mph) | Actual vehicle speed is displayed | - |
| CCS Mem Vehicle Spd | Vehicle speed/min.: 0 km/h (0 mph), max.: 255 km/h (159 mph) | Actual vehicle speed stored in memory | - |
| Cruise Control | Cruise control/ON or OFF | ON: Cruise control activated<br><br>OFF: Cruise control deactivated | - |
| Main SW M-CPU | Cruise control switch (M-CPU)/ON or OFF | ON: Cruise main switch on<br><br>OFF: Cruise main switch off | - |
| CCS Ready M-CPU | Cruise control system standby condition (M-CPU)/ON or OFF | Each time main switch is pushed, ON/OFF changes | - |
| CCS Indicator M-CPU | Cruise main indicator (M-CPU)/ON or OFF | ON: Cruise main indicator light on<br><br>OFF: Cruise main indicator light off | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Cancel Switch | CANCEL switch/ON or OFF | ON: CANCEL switch on<br>OFF: CANCEL switch off | - |
| SET/COAST Switch | - SET switch/ON or OFF | ON: - SET switch on<br>OFF: - SET switch off | - |
| RES/ACC Switch | + RES switch/ON or OFF | ON: + RES switch on<br>OFF: + RES switch off | - |
| Stop Light SW M-CPU | Stop light switch signal (Main CPU)/ON or OFF | ON: Brake pedal depressed<br>OFF: Brake pedal released | - |
| Cruise Operation Status | Shift position signal (D position)/ON or OFF | ON: Shift lever in D<br>OFF: Shift lever not in D | - |
| Cruise Request Driving Force | Cruise control driving force signal/min.: -51.2 kN, max.: 51.2 kN | Actual driving force | - |
| # Codes | Number of present trouble codes/min.: 0, max.: 255 | Number of DTCs displayed | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) According to the display on the Techstream, perform the "Active Test".

**Combination Meter**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Lamp Cruise | Cruise main indicator light | ON / OFF | - |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is displayed during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

**Cruise Control System**

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| P0571 | Brake Switch "A" Circuit | - Stop light switch assembly<br>- Stop light switch assembly circuit<br>- Power management control ECU | INFO |
| P0575 | Cruise Control Input Circuit | - Power management control ECU | INFO |
| P1578 | Brake System Malfunction | - Electronically controlled brake system | INFO |
| U0122 | Lost Communication with Vehicle Dynamics Control Module | - Brake booster with master cylinder (skid control ECU)<br>- CAN communication system<br>- Power management control ECU | INFO |

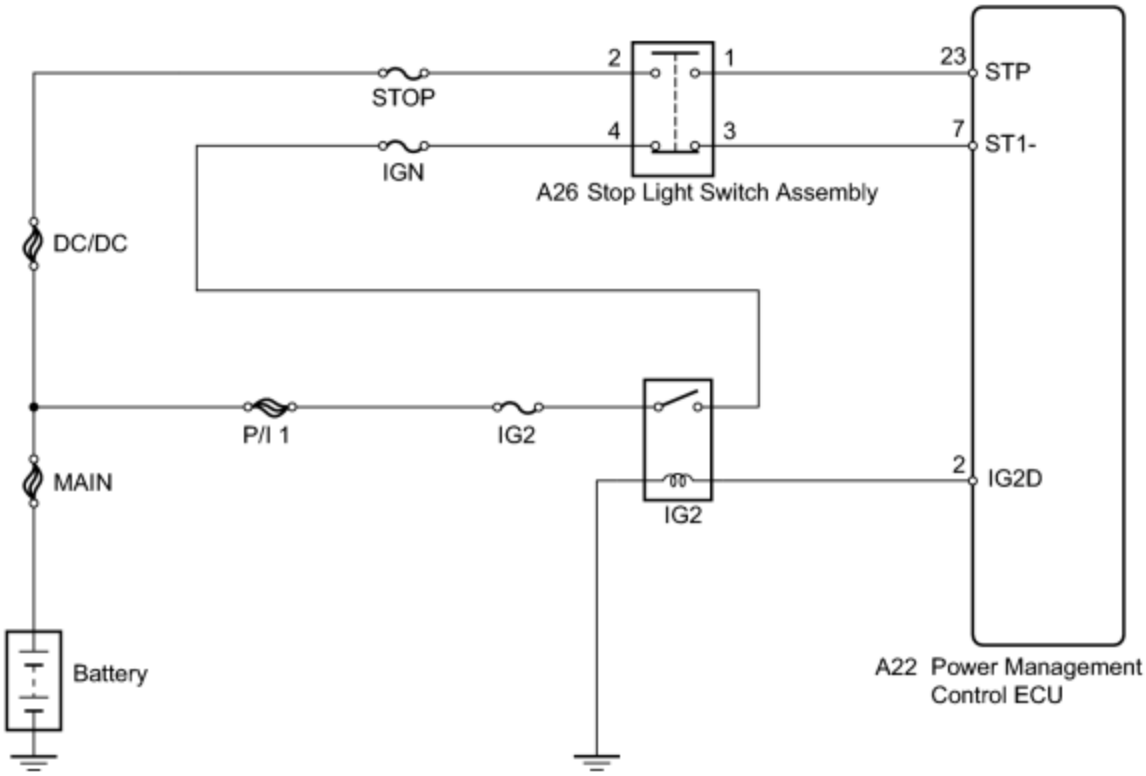
| DTC | P0571 | Brake Switch "A" Circuit |
|---|---|---|

# DESCRIPTION

When the brake pedal is depressed, the stop light switch assembly sends a signal to the power management control ECU. When the power management control ECU receives this signal, it cancels the cruise control. The fail-safe function operates to enable normal driving even if there is a malfunction in the stop light signal circuit. Cruise control cancellation occurs when voltage is applied to terminal STP. When the brake is applied, voltage is normally applied to terminal STP of the power management control ECU through the STOP fuse and the stop light switch assembly, and the power management control ECU turns the cruise control off.

| DTC | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0571 | Voltage of STP signal and that of ST1- signal of power management control ECU are less than 1 V for 0.5 seconds or more | • Stop light switch assembly<br>• Stop light switch assembly circuit<br>• Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

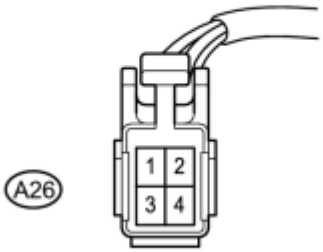
NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT STOP LIGHT SWITCH ASSEMBLY (POWER SOURCE) |

*1




(a) Disconnect the stop light switch assembly connector.

N

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-2 - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |

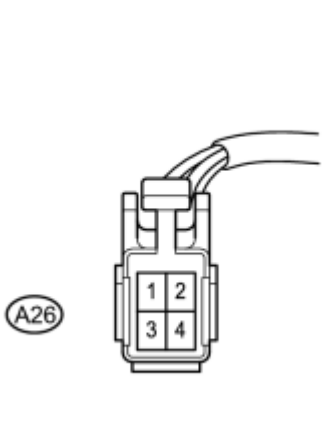
(c) Reconnect the stop light switch assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - BATTERY)

OK ▼

| | |
|---|---|
| 2. | INSPECT STOP LIGHT SWITCH ASSEMBLY (POWER SOURCE) |

(a) Disconnect the stop light switch assembly connector.




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A26-4 - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |

(d) Reconnect the stop light switch assembly connector.

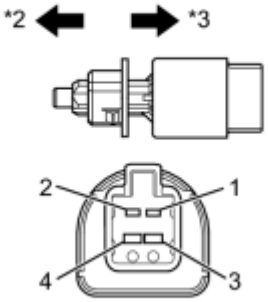
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - IG2 RELAY)

OK ▼

| | |
|---|---|
| 3. | INSPECT STOP LIGHT SWITCH ASSEMBLY |

(a) Remove the stop light switch assembly INFO.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Switch pin not pushed | Below 1 Ω |
| 3 - 4 | Switch pin not pushed | 10 kΩ or higher |
| 1 - 2 | Switch pin pushed | 10 kΩ or higher |
| 3 - 4 | Switch pin pushed | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Stop Light Switch Assembly) |
| *2 | Not pushed |
| *3 | Pushed |

(c) Reinstall the stop light switch assembly INFO.

NG ▶ REPLACE STOP LIGHT SWITCH ASSEMBLY

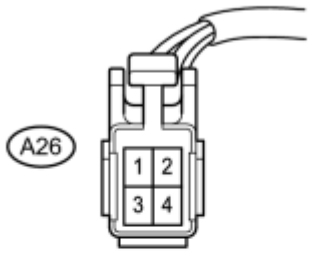
OK

▼

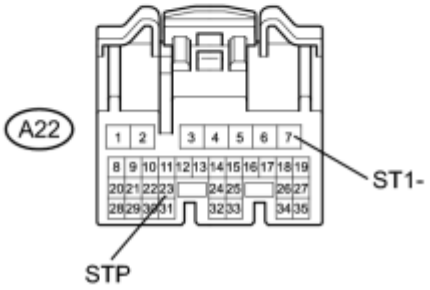
| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - STOP LIGHT SWITCH ASSEMBLY) |

(a) Disconnect the power management control ECU connector.

*1




*2




(b) Disconnect the stop light switch assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A22-23 (STP) - A26-1 | Always | Below 1 Ω |
| A22-7 (ST1-) - A26-3 | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A22-23 (STP) or A26-1 - Body ground | Always | 10 kΩ or higher |
| A22-7 (ST1-) or A26-3 - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Reconnect the stop light switch assembly connector.

(e) Reconnect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - STOP LIGHT SWITCH ASSEMBLY)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| DTC | P0575 | Cruise Control Input Circuit |
|---|---|---|

# DESCRIPTION

This DTC indicates the internal abnormalities of the power management control ECU.

| DTC | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0575 | When both of the following conditions are met:<br>• STP signals input to the power management control ECU supervisory CPU and control ECU are different for 0.15 seconds or more<br>• 0.4 seconds have passed after cruise cancel input signal (STP input) is input to the power management control ECU | Power management control ECU |

HINT:

The power management control ECU receives signals from each sensor to control all functions of the cruise control system. When a trouble code is detected, the fail-safe function activates and remains on until the power switch is turned off.

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | READ OUTPUT DTC (P0575) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch (ON-OFF button) on.

(3) Push the -SET switch to activate the cruise control.

(f) Enter the following menus: Powertrain / Cruise Control / Trouble Codes.

(g) Read the DTCs.

Result:

| Result | Proceed to |
| --- | --- |
| DTC is not output | A |
| DTC P0575 is output | B |

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▶ **USE SIMULATION METHOD TO CHECK**

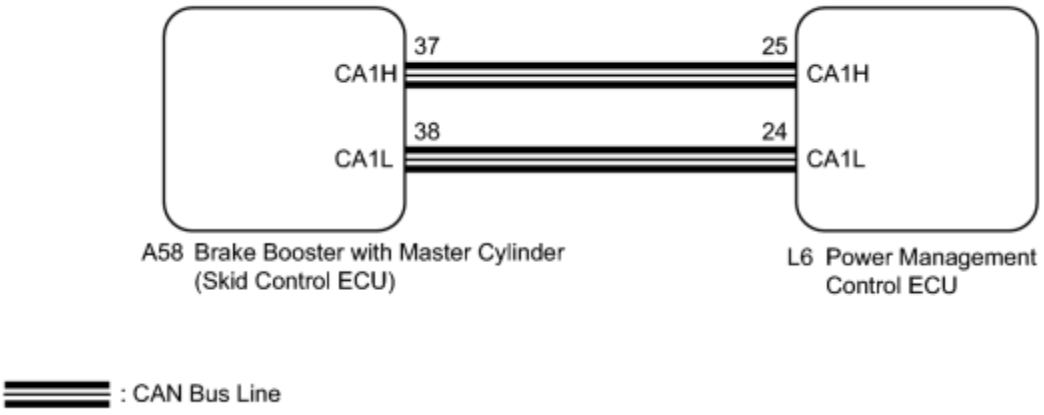
| | | |
|---|---|---|
| DTC | P1578 | Brake System Malfunction |

# DESCRIPTION

This DTC is output when the electronically controlled brake system has a problem. Check the electronically controlled brake system when this DTC is output.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P1578 | The power management control ECU receives a brake system error signal for 0.2 sec. or more while the cruise control is in operation | Electronically controlled brake system |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

This circuit uses CAN communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system are output.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC (ELECTRONICALLY CONTROLLED BRAKE SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

(e) Read the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM

A

| | |
|---|---|
| 2. | CHECK WHETHER DTC OUTPUT RECORDS (CRUISE CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch (ON-OFF button) on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Cruise Control / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P1578 is output | B |

B REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 3. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECORDS (CRUISE CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch (ON-OFF button) on.

(3) Push the -SET switch to activate the cruise control.

(f) Enter the following menus: Powertrain / Cruise Control / Trouble Codes.

(g) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P1578 is output | B |

B REPLACE POWER MANAGEMENT CONTROL ECU

A **END**

| DTC | U0122 | Lost Communication with Vehicle Dynamics Control Module |
|---|---|---|

# DESCRIPTION

The vehicle speed sensor sends the vehicle speed signal to the brake booster with master cylinder (skid control ECU), and then it is sent to the power management control ECU.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0122 | While power switch is on (IG), communication stop between brake booster with master cylinder (skid control ECU) and power management control ECU continues for 2.6 seconds or more | • Brake booster with master cylinder (skid control ECU)<br>• CAN communication system<br>• Power management control ECU |

# INSPECTION PROCEDURE

Refer to CAN Communication System INFO.

# PROCEDURE

| 1. | CHECK CAN COMMUNICATION SYSTEM |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Select "Bus Check" from the "System Select".

(c) Select "Communication Malfunction DTC" from the "Bus Check" screen, and then select "Enter".

Result:

| Result | Proceed to |
|---|---|
| CAN communication system DTC is not output | A |
| CAN communication system DTC is output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

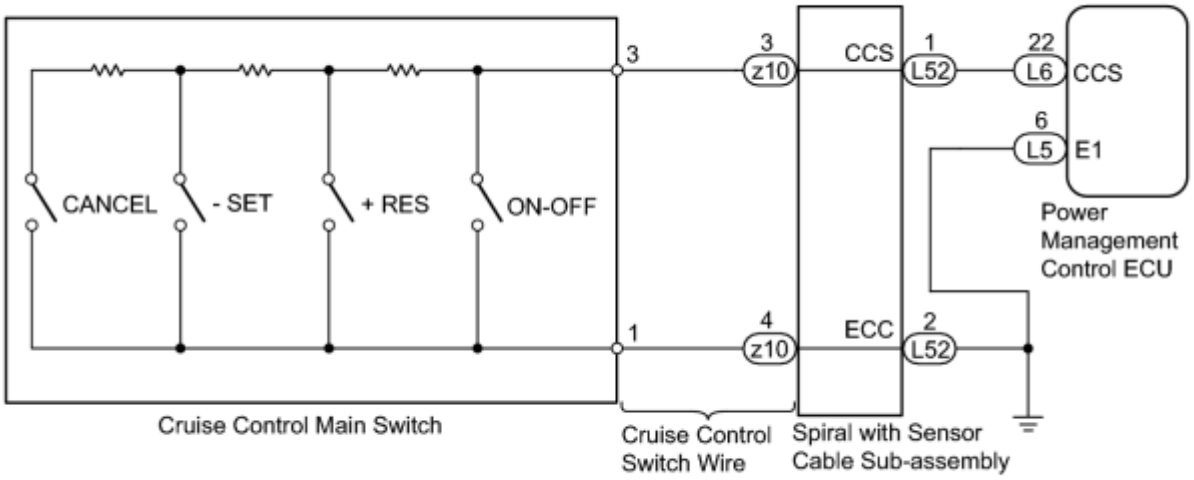
A ▶ **USE SIMULATION METHOD TO CHECK**

| Cruise Control Switch Circuit |
|---|

# DESCRIPTION

The cruise control main switch operates 7 functions: SET, -, TAP-DOWN, RES, +, TAP-UP, and CANCEL. The SET, TAP-DOWN, and - functions, and the RES, TAP-UP, and + functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while it is being operated it in the direction of each arrow and turns off after being released. The internal contact point of the cruise control main switch is turned on with the switch operation. Then the power management control ECU reads the voltage value that has been changed by the switch operation to control SET, -, RES, +, and CANCEL.

# WIRING DIAGRAM

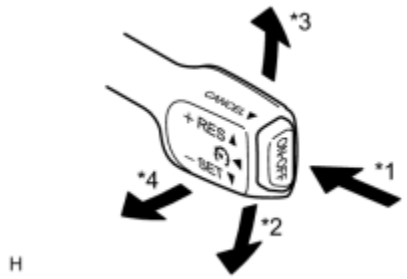



# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.




(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Cruise Control / Data List.

(e) Check the Data List for proper functioning of the cruise control main switch.

**Cruise Control (Power Management Control ECU)**

| Techstream Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Main SW M-CPU | Cruise control switch (Main CPU)/ON or OFF | ON: Cruise main switch (ON-OFF button) on<br><br>OFF: Cruise main switch (ON-OFF button) off | - |
| Cancel Switch | CANCEL switch signal/ON or OFF | ON: CANCEL switch on<br><br>OFF: CANCEL switch off | - |
| SET/COAST Switch | - SET switch signal/ON or OFF | ON: - SET switch on<br><br>OFF: - SET switch off | - |
| RES/ACC Switch | + RES switch signal/ON or OFF | ON: + RES switch on<br><br>OFF: + RES switch off | - |

**Text in Illustration**

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |
| *3 | + RES |
| *4 | CANCEL |

OK:

When the cruise control main switch is operated, the display changes as shown above.

**Result**

| Result | Proceed to |
|---|---|
| OK | A |
| NG (All items are defective) | B |
| NG (1 to 3 items are defective) | C |

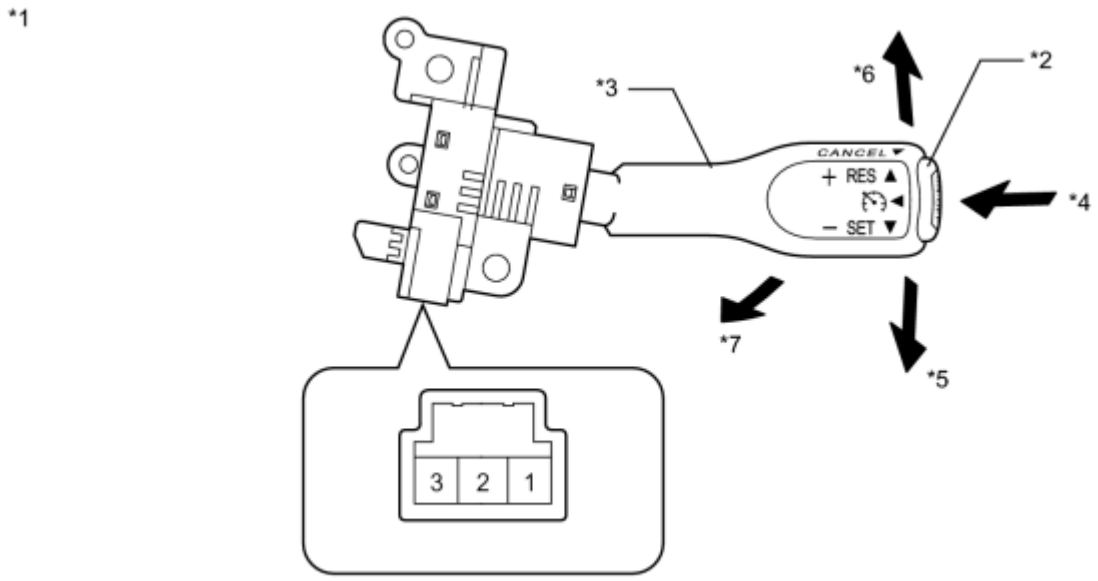
C REPLACE CRUISE CONTROL MAIN SWITCH

B INSPECT CRUISE CONTROL MAIN SWITCH

A **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | INSPECT CRUISE CONTROL MAIN SWITCH |

(a) Remove the cruise control main switch INFO.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 3 | Main switch off*1 | 1 MΩ or higher |
| | Main switch on | Below 2.5 Ω |
| | + RES | 235 to 245 Ω |
| | - SET | 617 to 643 Ω |
| | CANCEL | 1509 to 1571 Ω |

*1: The cruise control main switch lever is in the neutral position.

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Cruise Control Main Switch) | *2 | Main Switch |
| *3 | Lever | *4 | ON-OFF |
| *5 | - SET | *6 | + RES |
| *7 | CANCEL | - | - |

(c) Install the cruise control main switch INFO.

NG ▶ REPLACE CRUISE CONTROL MAIN SWITCH

OK

▼

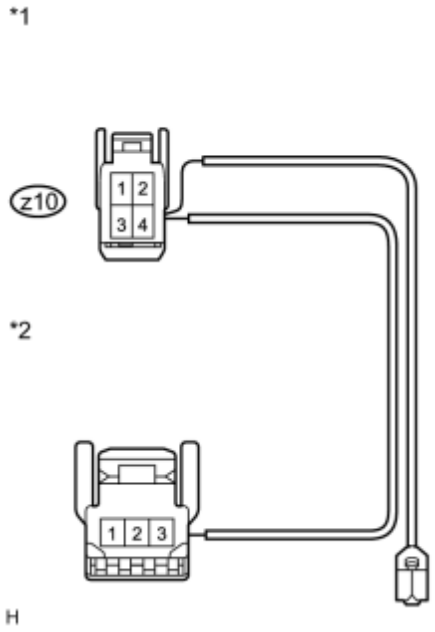
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CRUISE CONTROL MAIN SWITCH - SPIRAL CABLE SUB-ASSEMBLY) |

(a) Disconnect the connector from the spiral with sensor cable sub-assembly.

(b) Disconnect the connector from the cruise control main switch.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Cruise control main switch side connector terminal 3 - z10-3 | Always | Below 1 Ω |
| Cruise control main switch side connector terminal 1 - z10-4 | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |
| *2 | Front view of wire harness connector<br><br>(to Cruise Control Main Switch) |

(d) Reconnect the connector to the cruise control main switch.

(e) Reconnect the connector to the spiral with sensor cable sub-assembly.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (CRUISE CONTROL MAIN SWITCH - SPIRAL CABLE SUB-ASSEMBLY)

OK

▼

| 4. | CHECK SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY |
|---|---|

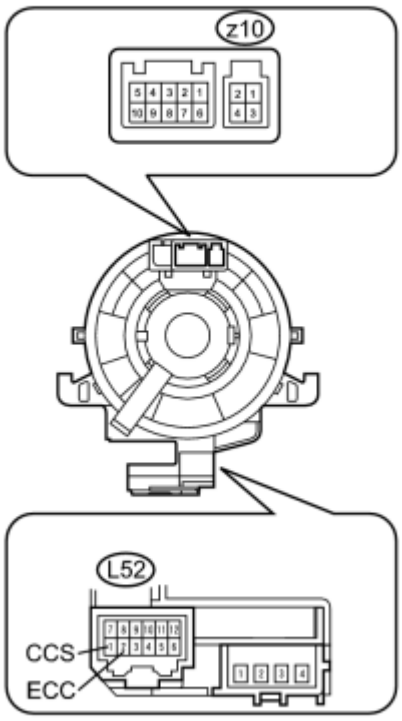
NOTICE:

The spiral with sensor cable sub-assembly is an important part of the SRS airbag system. Incorrect removal or installation of the spiral with sensor cable sub-assembly may cause airbag deployment. Be sure to read the page shown in the brackets.

*1

(a) Remove the spiral with sensor cable sub-assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z10-3 - L52-1 (CCS) | The spiral with sensor cable sub-assembly is centered | Below 1 Ω |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the left | |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the right | |
| z10-4 - L52-2 (ECC) | The spiral with sensor cable sub-assembly is centered | Below 1 Ω |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the left | |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the right | |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Spiral with Sensor Cable Sub-assembly) |

HINT:

The spiral with sensor cable sub-assembly makes a maximum of approximately 5 rotations.

(c) Remove the spiral with sensor cable sub-assembly INFO.

NG ▶ REPLACE SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (SPIRAL CABLE SUB-ASSEMBLY - POWER MANAGEMENT CONTROL ECU) |

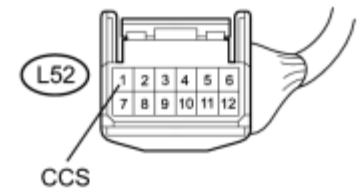
(a) Disconnect the power management control ECU connector.

(b) Disconnect the spiral with sensor cable sub-assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

*1

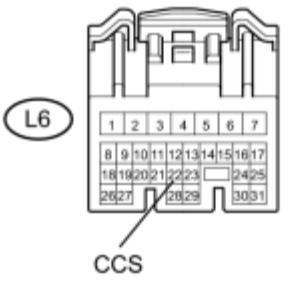



| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-1 (CCS) - L6-22 (CCS) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-1 (CCS) or L6-22 (CCS) - Body ground | Always | 10 kΩ or higher |

*2




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Reconnect the spiral with sensor cable sub-assembly connector.

(e) Reconnect the power management control ECU connector.

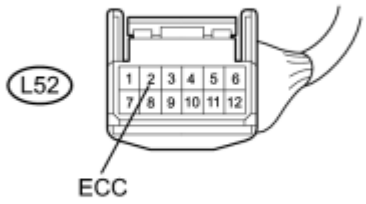
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL CABLE SUB-ASSEMBLY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - BODY GROUND) |

*1




(a) Disconnect the spiral with sensor cable sub-assembly connector.

c

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-2 (ECC) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |

(c) Reconnect the spiral with sensor cable sub-assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - BODY GROUND)

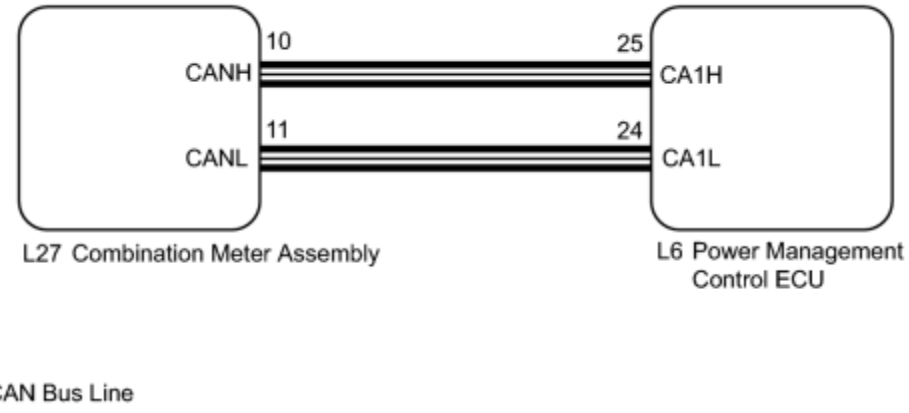
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| Cruise Main Indicator Light Circuit |
|---|

# DESCRIPTION

- The power management control ECU detects a cruise control switch signal and sends it to the combination meter assembly through CAN. Then the cruise main indicator light comes on.
- The cruise main indicator light circuit uses CAN for communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the cruise main indicator light by performing the Active Test.

**Combination Meter**

| Techstream Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Lamp Cruise | Cruise main indicator light | ON / OFF | - |

OK:

The display changes as shown above according to Active Test operation.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE
OK
▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Cruise Control / Data List.

(e) Check the Data List for proper functioning of the cruise main indicator light.

**Cruise Control**

| Techstream Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| CCS Indicator M-CPU | Cruise main indicator (M-CPU)/ON or OFF | ON: Cruise main indicator light on<br><br>OFF: Cruise main indicator light off | - |

OK:

The display changes as shown above according to cruise control main switch operation.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| Cruise SET Indicator Light Circuit |
|---|

# DESCRIPTION

- The power management control ECU detects a cruise control switch signal and sends it to the combination meter assembly through CAN. Then the SET indicator light comes on.
- The SET indicator light circuit uses CAN for communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

# WIRING DIAGRAM

Refer to "Cruise Main Indicator Light Circuit" INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the SET indicator light by performing the Active Test.

**Combination Meter**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Lamp SET | CRUISE SET indicator light | SET indicator light BLINK / OFF | - |

OK:

The SET indicator light blinks or goes off according to Techstream operation.

NG ▶ REPLACE NO.3 METER CIRCUIT PLATE
OK
▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Cruise Control / Data List.

(e) According to the display on tester, read the Data List.

**Cruise control**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| SET/COAST Switch | - SET switch / ON or OFF | ON: - SET switch ON<br><br>OFF: - SET switch off | - |

OK:

The display changes as shown above according to cruise control main switch operation.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

TC and CG Terminal Circuit

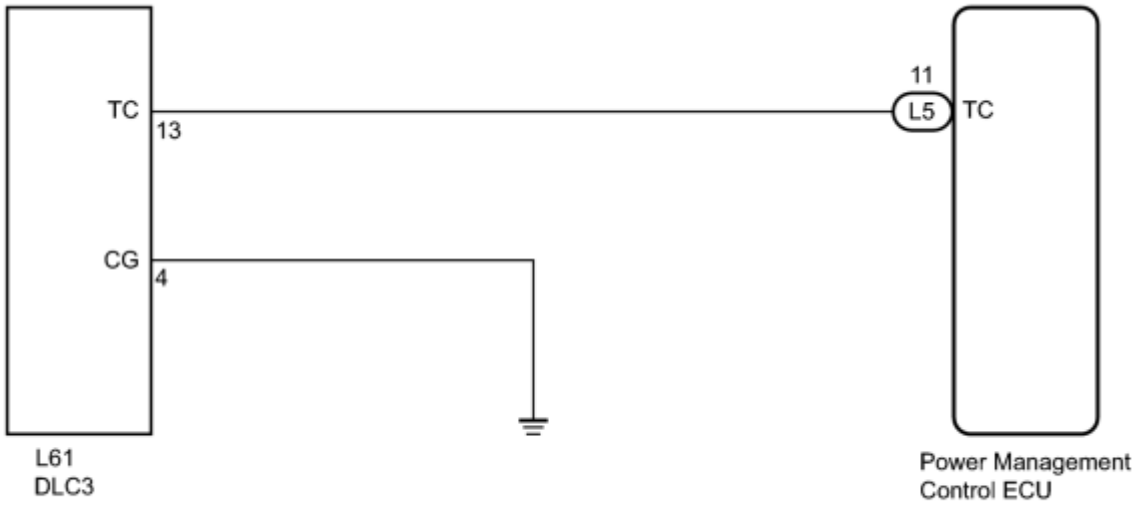
# DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the system to enter self-diagnostic mode. If a malfunction is present, the cruise main indicator light will blink.

HINT:

When a particular warning light remains blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (TERMINAL TC of DLC3 - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the power management control ECU connector.

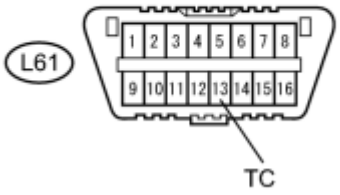
(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

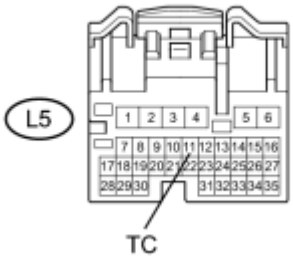
| Tester Connection | Condition | Specified Condition |
|---|---|---|

| | | |
|---|---|---|
| L5-11 (TC) - L61-13 (TC) | Always | Below 1 Ω |

*1




*2




**Text in Illustration**

| | |
|---|---|
| *1 | DLC3 |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

(c) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - POWER MANAGEMENT CONTROL ECU)

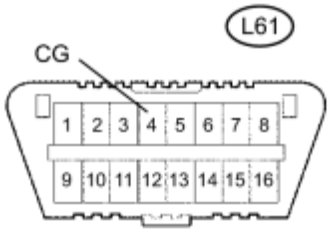
OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (TERMINAL CG of DLC3 - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-4 (CG) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - BODY GROUND)

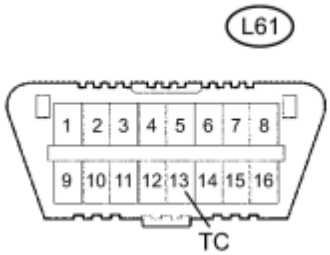
OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TERMINAL TC of DLC3 - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-13 (TC) - Body ground | Always | 10 kΩ or higher |

## Text in Illustration

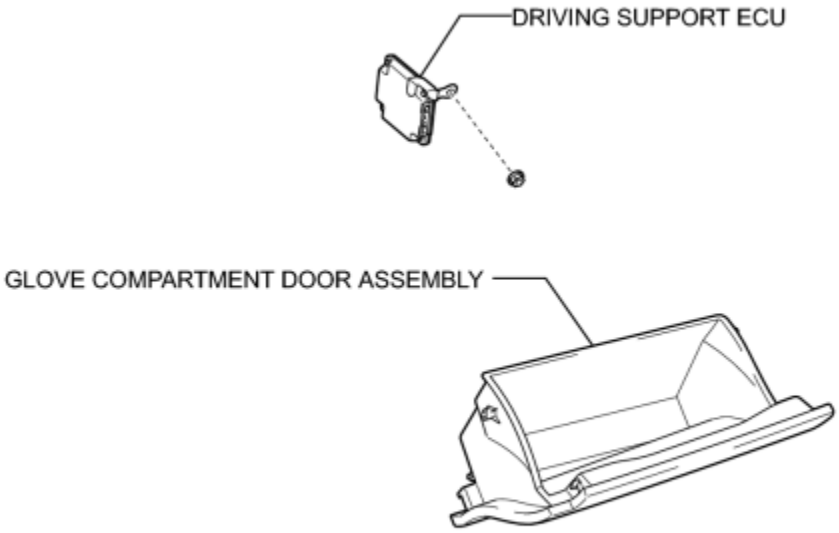
| | |
|---|---|
| *1 | DLC3 |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR OR EACH ECU

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# COMPONENTS

# ILLUSTRATION




P

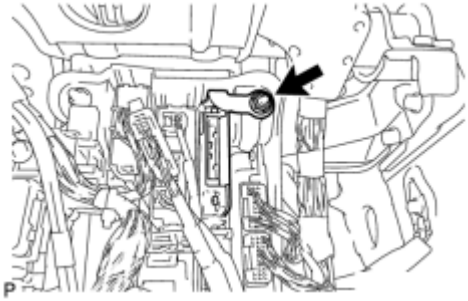
# REMOVAL

1. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO

2. REMOVE DRIVING SUPPORT ECU



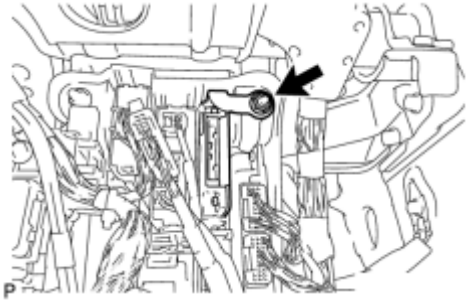
(a) Disconnect the connector.



(b) Remove the nut and driving support ECU.

# INSTALLATION

1. INSTALL DRIVING SUPPORT ECU



(a) Install the driving support ECU with the nut.

NOTICE:

Do not install the driving support ECU if it has been damaged or impacted in any way.



(b) Connect the connector.

2. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

# PRECAUTION

1. NOTICE FOR INITIALIZATION

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

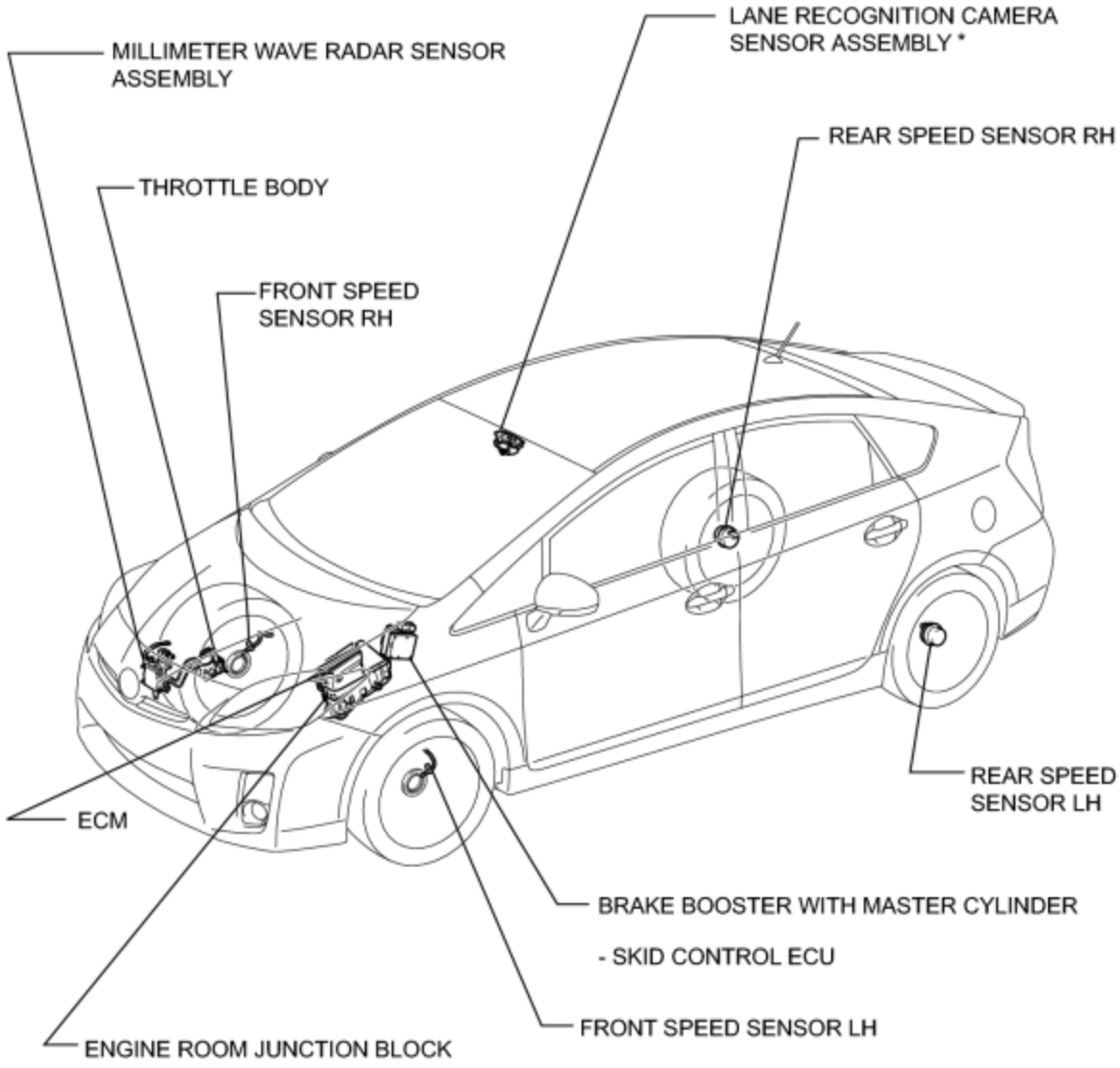
2. HANDLING PRECAUTION FOR DYNAMIC RADAR CRUISE CONTROL SYSTEM

Keep in mind the following points when inspecting the dynamic radar cruise control system.

- As there is a limitation on the vehicle-to-vehicle distance controlling capability, do not overly rely on the dynamic radar cruise control system.
- Do not neglect to pay constant attention to the vehicle-to-vehicle distance and the traffic conditions when using the dynamic radar cruise control system. Decelerate with the brake pedal, or accelerate with the accelerator pedal, according to the situation, to keep an appropriate distance with the vehicle in front.
- When the vehicle in front decelerates rapidly or another vehicle moves in front of the vehicle, decelerating in time to avoid a collision may not be possible without additional braking.
- The dynamic radar cruise control system is designed to assist in maintaining an appropriate distance with the vehicle in front. However, the system alone is not sufficient. It is imperative that the driver pays attention at all times.
- The millimeter wave radar sensor can automatically detect dirt on the sensor face and inform the driver, but dirt may not always be detected. Keep the sensor face clean.
- The dynamic radar cruise control system does not work, or give vehicle-approaching warning, for vehicles which are stopped or driving at significantly slower speeds. Always pay attention to those other vehicles.
- The millimeter wave radar sensor detection area is narrow at close range, so detection of a vehicle moving just in front may be delayed, or a motorcycle running on the side of the same lane may not be detected. The distance to the vehicle in front may not be maintained properly due to these reasons.
- Even if + (ACCEL) is operated to increase the set vehicle speed, the vehicle does not accelerate because the speed is controlled in accordance with the speed of the vehicle in front while driving with the vehicle-to-vehicle distance control mode on (follow-up cruising). However, as the set vehicle speed has been increased by + (ACCEL) operation, the vehicle keeps accelerating to the set speed when there is no vehicle in front. Check the set speed with the set vehicle speed indication on the display.
- The controlled vehicle distance may be shorter than the set vehicle distance when cruising on a long downhill road.
- The cruise control main switch (ON-OFF button) must be turned off and then on if all of the following occur: 1) the cruise main indicator light blinks, 2) the master warning light illuminates at the same time as a "pong" sound, and 3) the fail message is shown on the multi-information display.
- The vehicle-approaching warning buzzer does not sound in the constant speed control mode because the presence of the vehicle in front and the distance to it are not judged as in the vehicle-to-vehicle distance control mode. Pay attention to the distance to the vehicle in front.
- The dynamic radar cruise control system has 2 cruise control modes: constant speed control mode and vehicle-to-vehicle distance control mode. Confirm which mode is selected when using the dynamic radar cruise control system.

# PARTS LOCATION

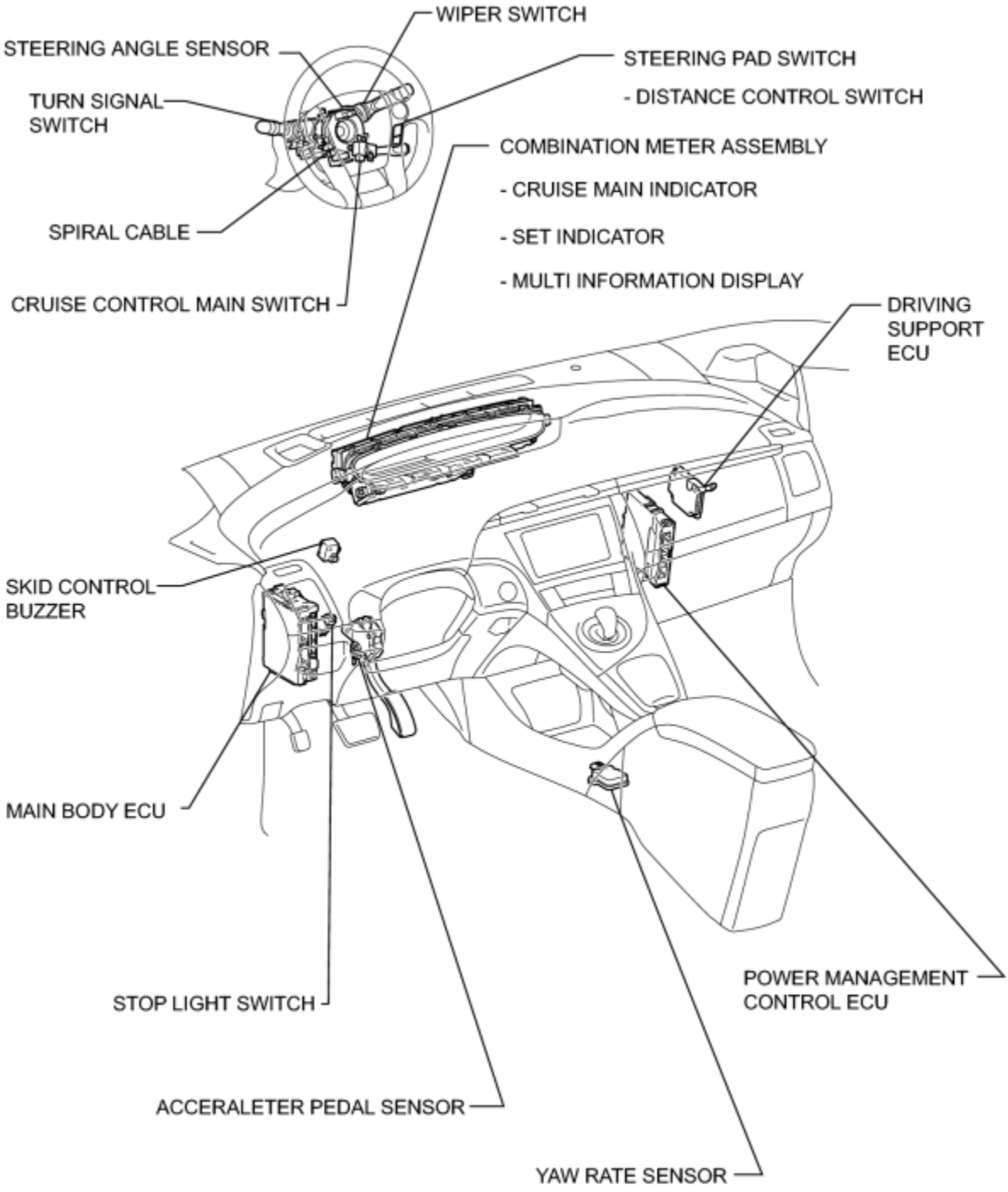
# ILLUSTRATION




*: with Lane Keeping Assist System

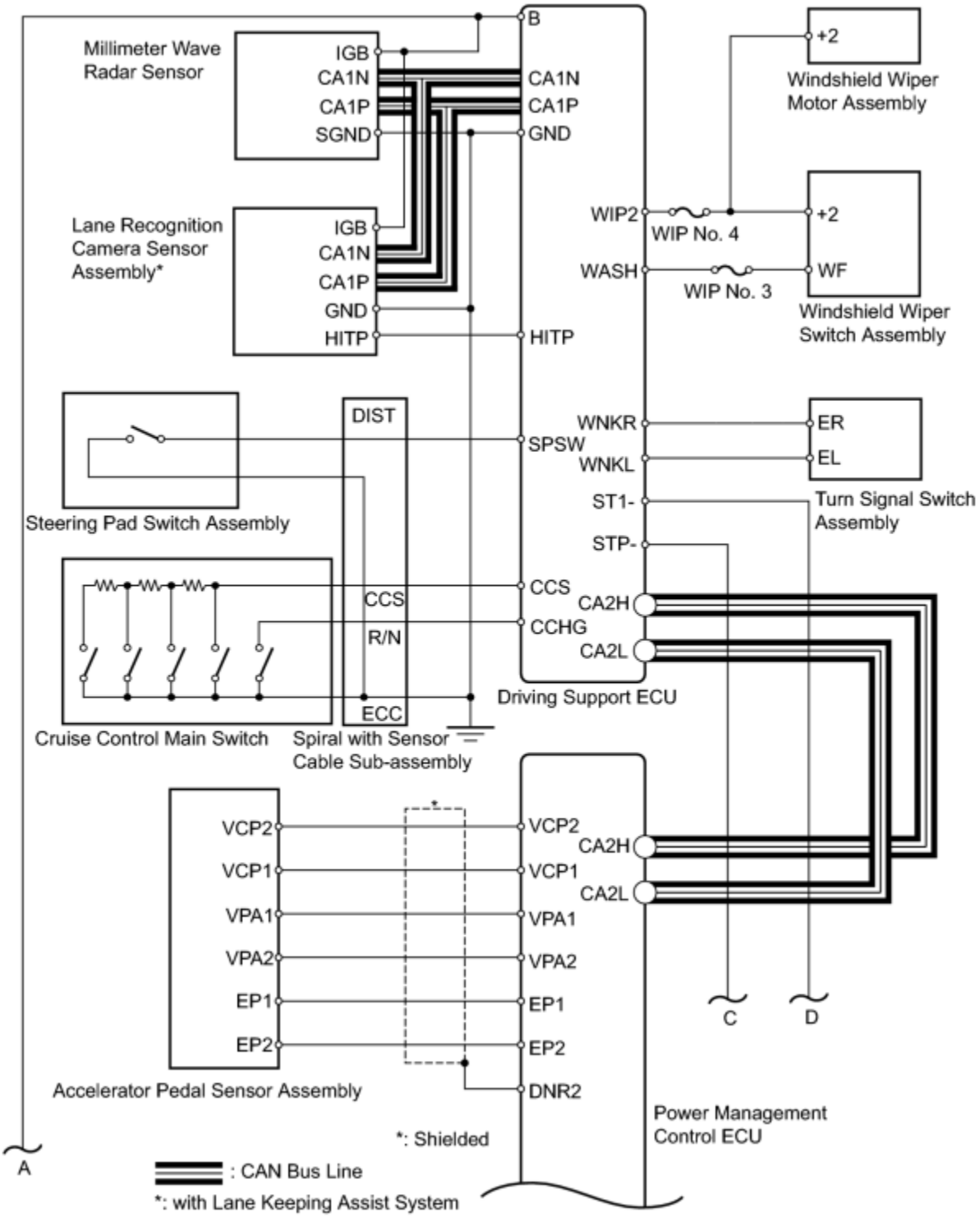
H

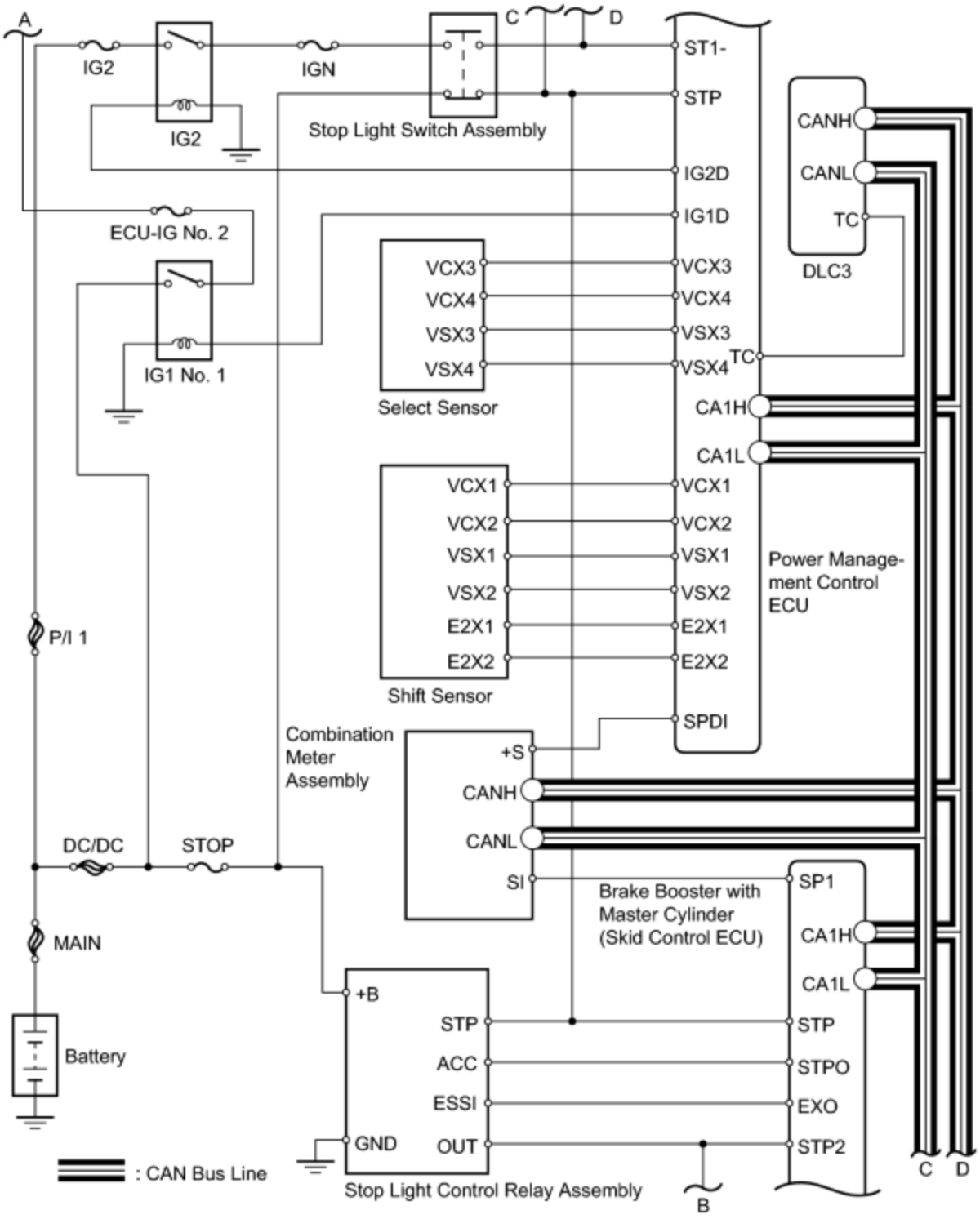
# ILLUSTRATION

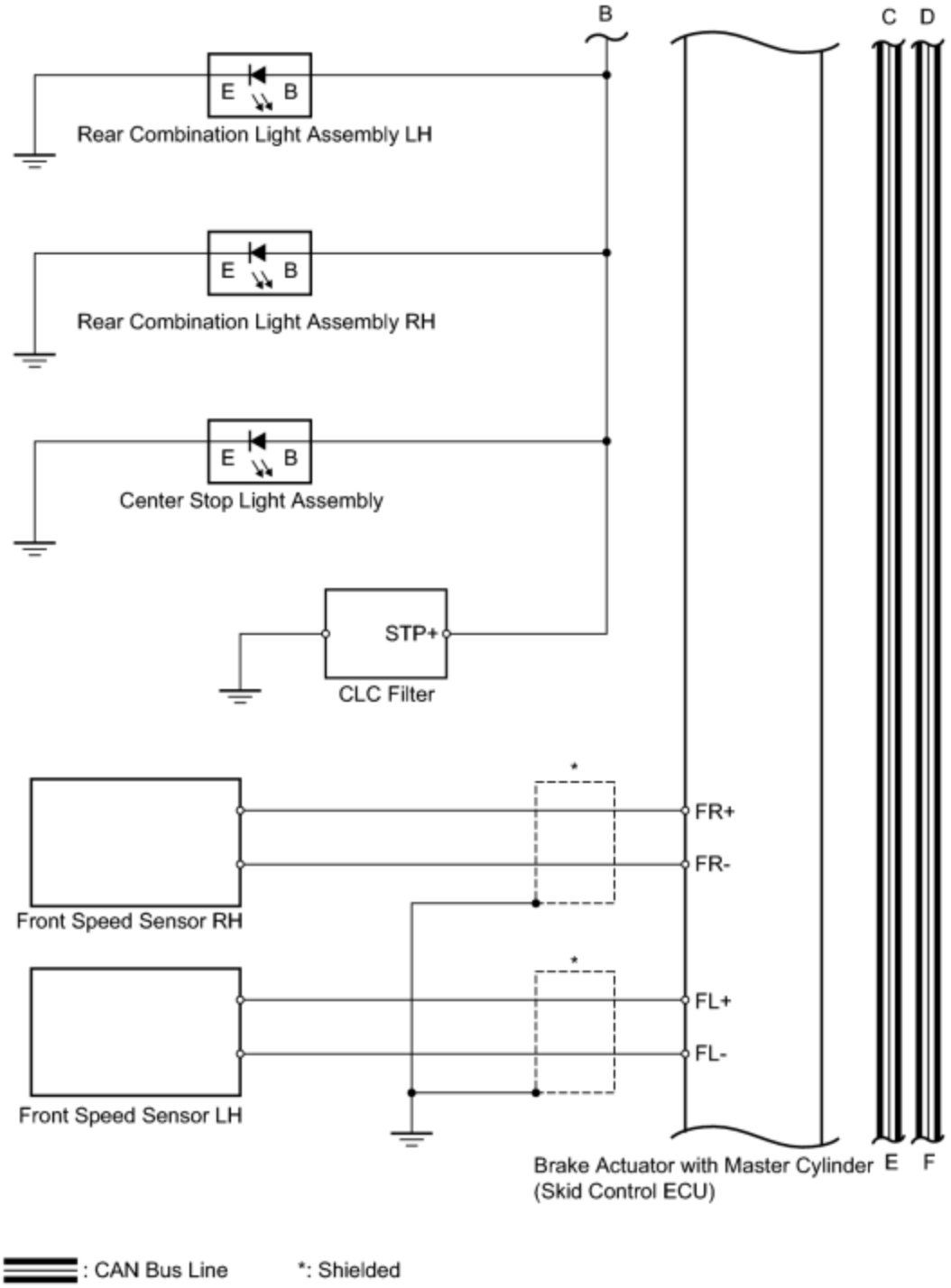

WIPER SWITCH
STEERING ANGLE SENSOR
STEERING PAD SWITCH
- DISTANCE CONTROL SWITCH
TURN SIGNAL SWITCH
COMBINATION METER ASSEMBLY
- CRUISE MAIN INDICATOR
- SET INDICATOR
- MULTI INFORMATION DISPLAY
SPIRAL CABLE
CRUISE CONTROL MAIN SWITCH
DRIVING SUPPORT ECU
SKID CONTROL BUZZER
MAIN BODY ECU
POWER MANAGEMENT CONTROL ECU
STOP LIGHT SWITCH
ACCERALETER PEDAL SENSOR
YAW RATE SENSOR

H

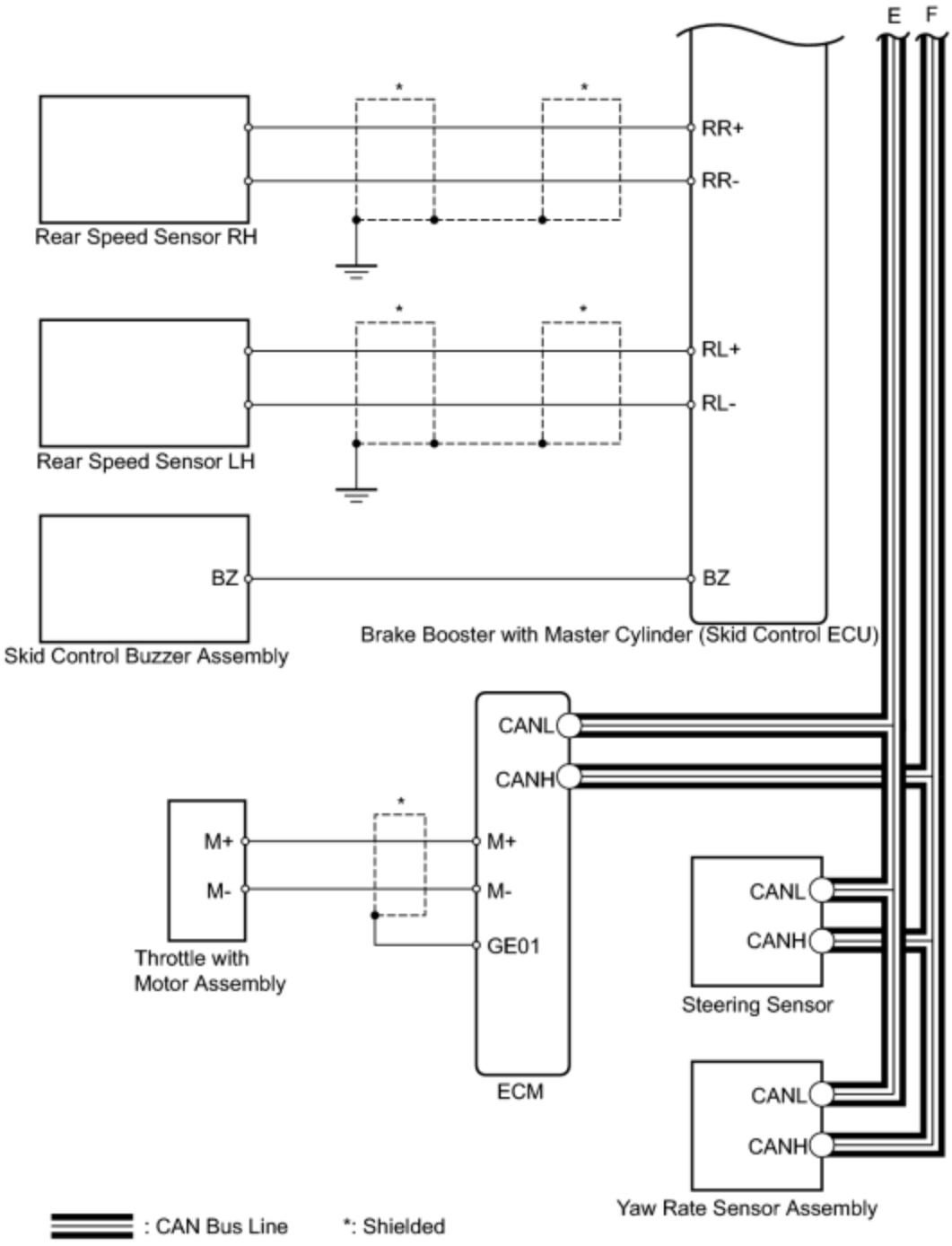
# SYSTEM DIAGRAM




A
IG2
IG2
IGN
C
D
Stop Light Switch Assembly
ST1-
STP
IG2D
IG1D
CANH
CANL
TC
DLC3
ECU-IG No. 2
IG1 No. 1
VCX3
VCX4
VSX3
VSX4
Select Sensor
VCX3
VCX4
VSX3
VSX4
TC
CA1H
CA1L
VCX1
VCX2
VSX1
VSX2
E2X1
E2X2
Shift Sensor
VCX1
VCX2
VSX1
VSX2
E2X1
E2X2
Power Management Control ECU
SPDI
P/I 1
Combination Meter Assembly
+S
CANH
CANL
SI
DC/DC
STOP
Brake Booster with Master Cylinder (Skid Control ECU)
SP1
CA1H
CA1L
MAIN
+B
STP
ACC
ESSI
GND
OUT
STP
STPO
EXO
STP2
Battery
: CAN Bus Line
Stop Light Control Relay Assembly
B
C
D




: CAN Bus Line *: Shielded




c

**Communication Table**

| Sender | Receiver | Signal | Line |
|---|---|---|---|
| Power Management Control ECU | Driving Support ECU | Actual driving force signal | CAN |
| | | Accelerator pedal idle position signal | |
| | | Accelerator pedal position signal | |

| Sender | Receiver | Signal | Line |
|---|---|---|---|
| | | Shift position signal (D and R) | |
| | | Cruise control operation signal | |
| | | Cruise control cancel demand signal | |
| | | Hybrid control system malfunction signal | |
| | | SFI system malfunction signal | |
| Driving Support ECU | Power Management Control ECU | Target driving force signal | CAN |
| | | Forward vehicle relative speed | |
| Brake Booster with Master Cylinder (Skid Control ECU) | Driving Support ECU | Speed signal | CAN |
| | | Speed sensor signal | |
| | | Vehicle acceleration signal | |
| | | Brake control operation signal | |
| | | Electronically controlled brake system malfunction signal | |
| | | Speed sensor warning signal | |
| | | Stop light switch control relay malfunction signal | |
| | | Skid control buzzer malfunction signal | |
| | | Cruise control cancel demand signal | |
| | | Yaw rate sensor zero point signal | |
| Driving Support ECU | Brake Booster with Master Cylinder (Skid Control ECU) | Skid control buzzer operate demand signal | CAN |
| | | Brake control demand signal | |
| Driving Support ECU | Combination Meter Assembly | Vehicle approach warning signal | CAN |
| | | Forward vehicle detection signal | |
| | | Cruise control diagnosis signal | |
| | | Vehice-to-vehicle distance signal | |
| | | Dirt present on millimeter wave radar sensor signal | |
| | | Bad weather detection signal | |
| | | Vehice-to-vehicle distance control signal | |
| | | Vehice-to-vehicle distance control check mode signal | |
| | | Vehice-to-vehicle distance control standby signal | |
| | | Constant speed cruise signal | |

| Sender | Receiver | Signal | Line |
|---|---|---|---|
| | | Cruise indicator light operation signal | |
| | | Cruise control warning signal | |
| | | Dynamic radar cruise warning signal | |
| | | Cruise control vehicle speed signal | |
| | | Millimeter wave radar sensor beam axis deviation signal | |
| | | Country specification information signal | |
| Combination Meter Assembly | Driving Support ECU | Country specification information signal | CAN |
| Main Body ECU | Driving Support ECU | Country specification information signal | CAN |
| Yaw Rate Signal | Driving Support ECU | Yaw rate signal | CAN |
| | | Yaw rate sensor malfunction signal | |
| Steering Sensor (Built into Spiral with Sensor Cable Sub-assembly) | Driving Support ECU | +B open circuit malfunction signal | CAN |
| | | Steering sensor malfunction signal | |
| | | Steering angle signal | |
| | | Steering signal zero point signal | |

# SYSTEM DESCRIPTION

1. GENERAL

(a) The dynamic radar cruise control system has two cruise control modes: constant speed control mode and vehicle-to-vehicle distance control mode.

- Vehicle-to-vehicle distance control mode is always selected when starting the dynamic radar cruise control system.
- Operation of constant speed control mode is the same as that for a conventional cruise control system.

(b) This system maintains the vehicle running at the speed that the driver has set, as long as there are no vehicles ahead. Then, the system maintains the vehicle distance that has been set by the driver. If the system detects a vehicle driving at a slower speed ahead while the driver is driving at a constant speed, it closes the throttle valve to decelerate. If further deceleration is required, the system controls the brake actuator in order to apply the brakes. Thereafter, if there are no vehicles ahead within the set vehicle-to-vehicle distance because either the vehicle ahead or the driver has changed lanes, the system accelerates slowly to reach the set vehicle speed and resumes driving at the constant speed.

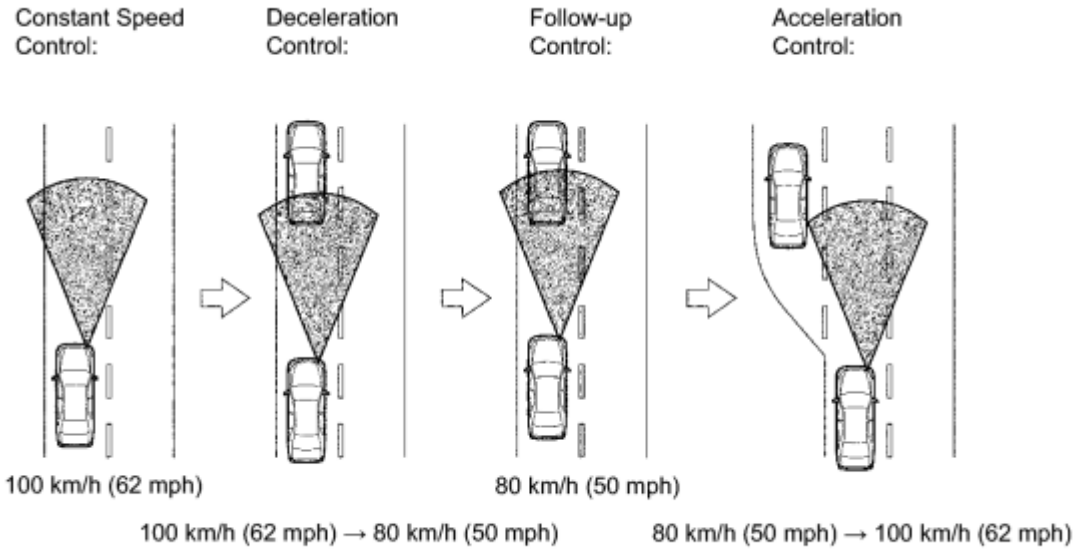
(c) Constant speed control mode is designed to maintain a constant cruising speed. The vehicle-to-vehicle distance control mode is designed to control cruising at a constant speed function, deceleration cruising function, follow-up cruising function, and acceleration cruising function.

(d) The millimeter wave radar sensor and the driving support ECU control the system while the vehicle-to-vehicle distance control mode is operating, and send signals to each actuator and ECU.

(e) In vehicle-to-vehicle distance control mode, the dynamic radar cruise control system receives signals from the yaw rate sensor and the steering angle sensor. Based on these signals, the system then estimates curve radius and compensates for information on the preceding vehicle while turning. It can also compensate using brake control when approaching another vehicle.

(f) This system judges the presence of a vehicle in front and the distance to it based on the signals from the radar sensor while vehicle-to-vehicle distance control mode is in operating. Using this information, the system informs the driver of any danger with the warning buzzer, performs brake control, and turns on the stop light when approaching the vehicle in front.

(g) The following illustration shows a control example under the following conditions: own vehicle speed is 100 km/h (62 mph) and the speed of the vehicle in front is 80 km/h (50 mph). Setting of the vehicle distance can be changed to 3 distances by operating the distance control switch (distance control switch): long (approximately 50 m (160 ft.)), middle (approximately 40 m (130 ft.)), and short (approximately 30 m (100 ft.)) when the vehicle speed is approximately 80 km/h (50 mph).




HINT:

- Vehicle distance increases and decreases in accordance with vehicle speed.
- Controlling condition is indicated on the multi-information display in the combination meter.

2. FUNCTION OF MAIN COMPONENTS

| Item | Outline |
|---|---|
| Combination Meter Assembly (Cruise main indicator Light) | • Comes on when the main switch (ON-OFF button) is on<br>• If the driving support ECU detects a malfunction, this light flashes to warn the driver |
| Combination Meter Assembly (Master Warning Light) | If the driving support ECU detects an automatic cancel signal while the vehicle is operating under cruise control, this light comes on to inform the driver |
| Combination Meter Assembly (Buzzer) | If the driving support ECU detects an automatic cancel signal while the vehicle is operating under cruise control, this buzzer sounds only once to inform the driver |
| Combination Meter Assembly (Multi-information Display) | • The driving support ECU displays "SET" on the multi-information display when constant speed control is started by pushing the cruise control main switch to "- SET".<br>• While the system is in vehicle-to-vehicle distance control mode, the multi-information display receives signals from the driving support ECU, in order to display system conditions in the graphic area<br>• If the driving support ECU detects a malfunction signal while the vehicle is operating under cruise control, a warning message will be displayed in the warning area to inform the driver |
| Cruise Control Main Switch (ON-OFF button) | Turns the cruise control system on or off |

| Item | Outline |
|---|---|
| Cruise Control Main Switch (Control Switch) | • Vehicle speed setting, deceleration setting, preset speed resumption, acceleration setting, and cancel signals are output to the driving support ECU through the operation of this switch<br>• Switches the control mode: constant speed control mode and vehicle-to-vehicle distance control mode |
| Steering Pad Switch (Vehicle-to-vehicle Distance Control Switch) | While the system is in vehicle-to-vehicle distance control mode, the driver can operate the steering pad switch (vehicle-to-vehicle distance control switch) to select the vehicle-to-vehicle distance in three stages: long, middle, and short |
| Stop Light Switch Assembly | Detects the depression of the brake pedal and transmits its signal to the ECM |
| Windshield Wiper Switch | Transmits wiper control switch information to the driving support ECU |
| Millimeter Wave Radar Sensor | Radiates radar rays forward, uses the reflected rays for detecting the presence of a vehicle in front, vehicle-to-vehicle distance, and relative speed, and transmits this information to the driving support ECU |
| Steering Angle Sensor | Detects the angle and direction of steering and transmits its signal to the driving support ECU |
| Vehicle Speed Sensor (SP1) | A vehicle speed signal which is output from the brake booster with master cylinder (skid control ECU) is sent to the driving support ECU |
| Yaw Rate Sensor | Detects the yaw rate of the vehicle and transmits its signal to the driving support ECU |
| Brake Booster with Master Cylinder (Skid Control ECU) | • Actuates the brakes in accordance with signals from the brake booster with master cylinder (skid control ECU)<br>• While the system is in vehicle-to-vehicle distance control mode, the brake booster with master cylinder (skid control ECU) actuates the brake actuator in accordance with a brake request signal received from the driving support ECU<br>• Upon receiving a signal from the driving support ECU, the brake booster with master cylinder (skid control ECU) sounds the skid control buzzer |
| Skid Control Buzzer | This buzzer sounds upon receiving a signal from the brake booster with master cylinder (skid control ECU) |
| Power Management Control ECU | Controls the dynamic radar cruise control system in accordance with signals from switches, sensors, and the driving support ECU |
| Throttle Position Sensor and Motor | Upon receiving a signal from the ECM, the throttle control motor actuates the throttle valve |
| Driving Support ECU | • While the system is in vehicle-to-vehicle distance control mode, the driving support ECU detects a vehicle in front based on a signal from the millimeter wave radar sensor. Then, the driving support ECU calculates the acceleration or deceleration rate in order to attain the target vehicle-to-vehicle distance, and outputs a request signal to the ECM and brake booster with master cylinder (skid control ECU)<br>• If the driving support ECU detects a malfunction in the dynamic radar cruise control system, it will store DTCs (Diagnostic Trouble Codes) |

3. LIMIT CONTROL

(a) Low speed limit

The lowest possible limit of the speed setting range is set at approximately 40 km/h (25 mph). The cruise control system cannot be set when the driving vehicle speed is below the low speed limit. Cruise control operation will be automatically canceled when the vehicle speed decreases below the low speed limit of 40 km/h (25 mph) while the cruise control is operating.

(b) High speed limit (constant speed control mode)

The highest possible limit of the speed setting range is set at approximately 200 km/h (125 mph). The cruise control system will be set at the high speed limit when the cruise control is set and the vehicle speed is over the high speed limit. Also, + RES cannot be used to increase speed over the high speed limit.

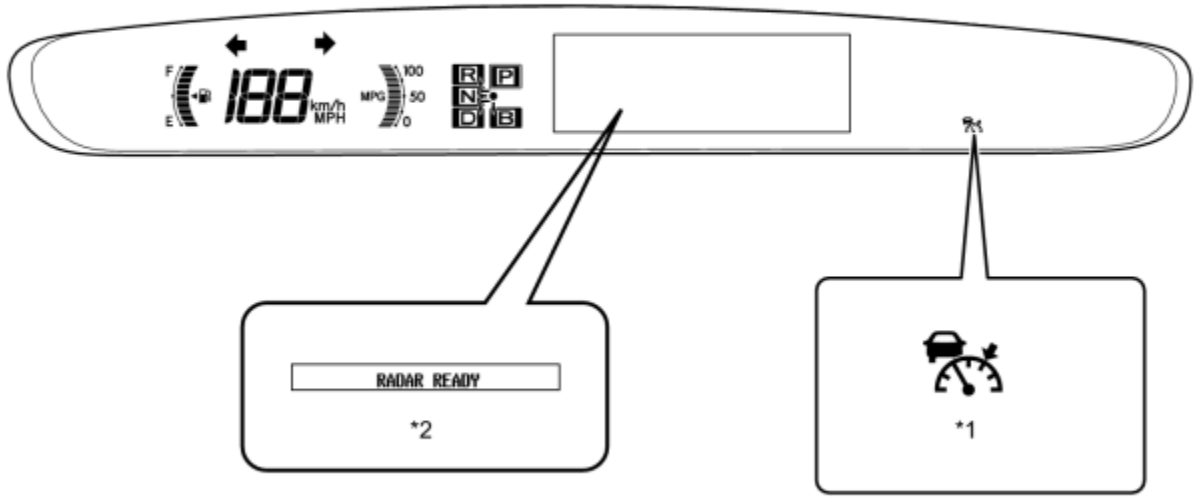
(c) High speed limit (vehicle-to-vehicle distance control mode)

The highest possible limit of the speed setting range is set at approximately 170 km/h (105 mph).

4. CRUISE CONTROL OPERATION

The cruise control main switch operates 8 functions: SET, - (COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, CANCEL, and MODE. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP, and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while operating it in the direction of each arrow and turns off after releasing it. The dynamic radar cruise control system has two cruise control modes: the constant speed control mode and vehicle-to-vehicle distance control mode.

- The vehicle-to-vehicle distance control mode is always selected when starting up the dynamic radar cruise control system (cruise main indicator light and "RADAR READY" indicator comes on).




H

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) | *2 | "RADAR READY" Indicator |

- Operation of the constant speed control mode is the same as that for a conventional cruise control system.

(a) MODE CONTROL

Pushing the switch to MODE for more than 1 second while driving with the cruise control main switch ON-OFF button on ("RADAR READY" is on) switches the mode to constant speed control mode.

(b) SET CONTROL (Constant speed control mode)

The vehicle speed is stored and constant speed control is maintained when pushing the switch to - SET while driving with the vehicle speed within the set speed range (between the low and high speed limits) after pushing the cruise control main switch ON-OFF button on, and entering constant speed control mode (cruise main indicator light and "SET" indicator comes on).

# Text in Illustration




| | |
|---|---|
| *1 | Cruise Main Indicator Light<br><br>(Constant speed control mode) |
| *2 | "SET" Indicator |




(c) SET CONTROL (Vehicle-to-vehicle distance control mode)




The vehicle speed is stored and vehicle-to-vehicle distance control is maintained when pushing the switch to - SET while driving with the cruise control main switch on ("RADAR READY" is on), and vehicle speed is within the set speed range (between the low and high speed limits) (cruise main indicator light and "SET" indicator comes on).




## Text in Illustration

| | |
|---|---|
| *1 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) |
| *2 | "SET" Indicator |

(d) - (COAST) CONTROL (Constant speed control mode)

The power management control ECU decreases the cruise control demand speed and controls the engine and motor driving force to decelerate the vehicle when - SET on the cruise control main switch is pressed and held while the cruise control system is operating. When the cruise control main switch is released from - SET, vehicle speed is stored and constant speed control is maintained.

(e) - (COAST) CONTROL (Vehicle-to-vehicle distance control mode)

When the cruise control main switch is held to - SET while the cruise control system is operating, the stored vehicle speed decreases by approximately 5 km/h or 5 mph per second.

(f) TAP-DOWN - (CONTROL) (Constant speed control mode)

When tapping down the cruise control main switch to - SET (for approximately 0.6 seconds or less) while the constant speed control mode is operating, the stored vehicle speed decreases each time by approximately 1.6 km/h (1 mph). When the cruise control main switch is released from - SET and the difference between the driving and stored vehicle speeds is more than 5 km/h (3 mph), the driving vehicle speed is stored and constant speed control is maintained.

(g) TAP-DOWN CONTROL (Vehicle-to-vehicle distance control mode)

When tapping down the cruise control main switch to - SET (for approximately 0.6 seconds or less) while the vehicle-to-vehicle distance control mode is operating, the stored vehicle speed decreases each time by approximately 1.6 km/h or 1 mph.

(h) + (ACCEL) CONTROL (Constant speed control mode)

The power management control ECU increases the cruise control demand speed and controls the engine and motor driving force to accelerate the vehicle when + RES on the cruise control main switch is pressed and held while the cruise control system is operating.

When the cruise control main switch is released from + RES, vehicle speed is stored and constant speed control is maintained.

(i) + (ACCEL) CONTROL (Vehicle-to-vehicle distance control mode)

When + RES on the cruise control main switch is pressed and held while vehicle-to-vehicle distance control mode is operating, the stored vehicle speed increases by approximately 5 km/h or 5 mph per second. Pushing the cruise control main switch to + RES while following the vehicle in front with the vehicle-to-vehicle distance control mode does not increase the actual vehicle speed, but changes only the set vehicle speed.

(j) TAP-UP CONTROL (Constant speed control mode)

When tapping up the cruise control main switch to + RES (approximately 0.6 seconds or less) while the constant speed control mode is operating, the stored vehicle speed increases each time by approximately 1.6 km/h (1 mph). However, when the difference between the driving and the stored vehicle speeds is more than 5 km/h (3 mph), the stored vehicle speed will not be changed.

(k) TAP-UP CONTROL (Vehicle-to-vehicle distance control mode)

When tapping up the cruise control main switch to + RES (for approximately 0.6 seconds or less) while vehicle-to-vehicle distance control mode is operating, the stored vehicle speed increases each time by approximately 1.6 km/h or 1 mph.

(l) MANUAL CANCEL CONTROL

Performing any of the following cancels the cruise control system while it is operating (the stored vehicle speed in the driving support ECU is maintained).

- Depressing the brake pedal
- Moving the shift lever from D to N or, selecting 3rd, 2nd, or 1st range with the shift lever in S
- Pushing the cruise control main switch to CANCEL
- Turning the cruise control main switch off (the stored vehicle speed in the driving support ECU is not maintained)

(m) RES (RESUME) CONTROL

If the cruise control operation was canceled by the stop light switch, CANCEL switch, or shift lever operation, and if driving speed is within the set speed range, pushing the cruise control main switch to + RES restores the vehicle speed memorized at the time of cancellation, and maintains constant speed control. In constant speed control mode, once the vehicle speed drops below the low speed limit, RESUME operation is possible after accelerating past the low speed limit and pushing the cruise control main switch to + RES.

5. BRAKE CONTROL

The driving support ECU determines the distance to the vehicle in front, relative speed, target decreasing speed, and deceleration rate. Based on these data, the ECU transmits a brake demand signal to the brake booster with master cylinder (skid control ECU) via the driving support ECU.

6. AUTO CANCEL (FAIL-SAFE)

This system has an automatic cancellation function (fail-safe) INFO.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the dynamic radar cruise control system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, replace or recharge the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 3. | CHECK COMMUNICATION FUNCTION OF CONTROLLER AREA NETWORK (CAN)* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B INFO GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 4. | CHECK FOR DTC* |

Refer to DTC Check / Clear INFO.

(a) Check for DTCs and note any codes that are output.

(b) Clear the DTCs.

(c) Recheck for DTCs. Try to prompt the DTCs by duplicating the conditions indicated by the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC does not reoccur | A |

| Result | Proceed to |
|---|---|
| DTC reoccurs | B |

B ▶ INFO GO TO DTC CHART

A ▼

| | |
|---|---|
| 5. | PROBLEM SYMPTOMS TABLE |

Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in problem symptoms table | A |
| Fault is listed in problem symptoms table | B |

B ▶ Go to step 8

A ▼

| | |
|---|---|
| 6. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO

(b) Data List / Active Test INFO

NEXT ▼

| | |
|---|---|
| 7. | ADJUST, REPAIR OR REPLACE |

NOTICE:

When the millimeter wave radar sensor is replaced with a new one, adjustment of the radar sensor beam axis must be performed INFO.

NEXT ▼

| | |
|---|---|
| 8. | CONFIRMATION TEST |

NEXT ▶ **END**

# ROAD TEST

1. PROBLEM SYMPTOM CONFIRMATION

HINT:

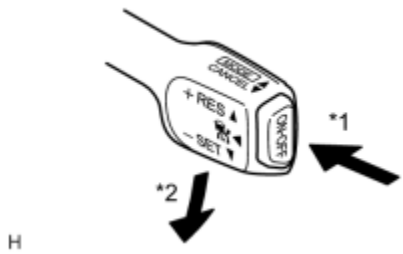
The dynamic radar cruise control system has two cruise control modes: the constant speed control mode and vehicle-to-vehicle distance control mode.

- The vehicle-to-vehicle distance control mode is always selected when starting up the dynamic radar cruise control system.
- Operation of the constant speed control mode is the same as that for a conventional cruise control system.

(a) Inspect the SET function.

**Text in Illustration**

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |




(1) Turn the main switch on.

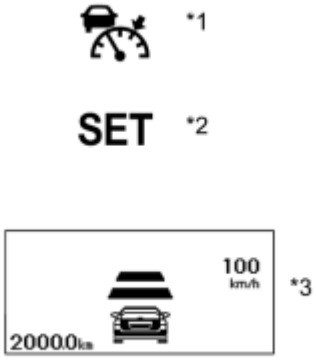
(2) Check that the cruise main indicator light illuminates on the combination meter assembly.

(3) Drive at a speed between 50 km/h (30 mph) and 170 km/h (105 mph).

(4) Push the cruise control main switch to - SET.

## Text in Illustration

| | |
|---|---|
| *1 | Cruise Main Indicator Light |
| *2 | "SET" Indicator |
| *3 | Multi-information Display |



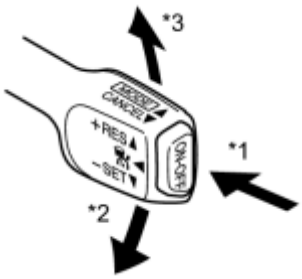

(5) Check that "SET" is indicated on the multi-information display.

(6) After releasing the switch, check that the vehicle cruises at the set speed.

(b) Inspect the + (ACCEL) function.

## Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |
| *3 | + RES |




(1) Turn the main switch on.

(2) Drive at a speed between 50 km/h (30 mph) and 170 km/h (105 mph).

(3) Push the cruise control main switch to - SET.

(4) Check that vehicle speed increases while the cruise control main switch is pushed to + RES, and that the vehicle cruises at the newly set speed when the switch is released.

(5) Push the cruise control main switch to + RES and then release it immediately. Check that vehicle speed increases* (tap-up control).

HINT:

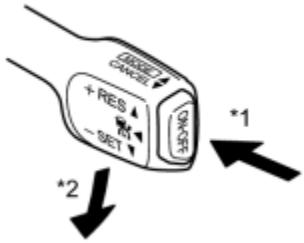
*: Constant speed control mode: increases by 1.6 km/h (1.0 mph); vehicle-to-vehicle distance control mode: increases by 1 km/h or 1 mph.

(c) Inspect the - (COAST) function.

## Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |

| | |
|---|---|
| *2 | - SET |




H

(1) Turn the main switch on.

(2) Drive at a speed between 50 km/h (30 mph) and 170 km/h (105 mph).

(3) Push the cruise control main switch to - SET.

(4) Check that vehicle speed decreases while the cruise control main switch is pushed to - SET, and the vehicle cruises at the newly set speed when the switch is released.

(5) Push the cruise control main switch to - SET, and then release it immediately. Check that vehicle speed decreases* (tap-down control).

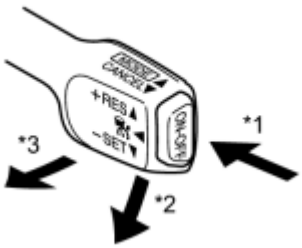
HINT:

*: Constant speed control mode: decreases by 1.6 km/h (1.0 mph); vehicle-to-vehicle distance control mode: decreases by 1.6 km/h or 1 mph.

(d) Inspect the CANCEL function.

# Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |
| *3 | CANCEL |




(1) Turn the main switch on.

(2) Drive at a speed between 50 km/h (30 mph) and 170 km/h (105 mph).

(3) Push the cruise control main switch to - SET.

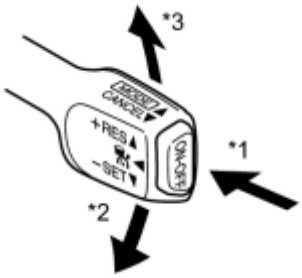
(4) When performing any one of the following, check that the cruise control system is canceled and that the normal driving mode is reset.

- Depressing the brake pedal
- Moving the shift lever from D to N or selecting shift lever in B
- Turning the main switch off
- Pulling the cruise control main switch to CANCEL

(e) Inspect the RES (RESUME) function.

# Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |




| | |
|---|---|
| *3 | + RES |

(1) Turn the main switch on.

(2) Drive at a speed between 50 km/h (30 mph) and 170 km/h (105 mph).

(3) Push the cruise control main switch to - SET.

(4) Cancel the cruise control system by performing any of the above operations (other than turning the main switch off).

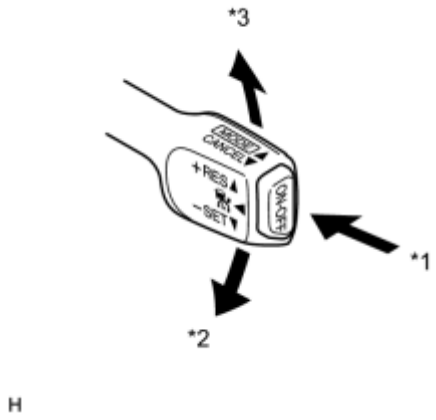
(5) After pushing the cruise control main switch to "+ RES" at a driving speed of more than 40 km/h (25 mph), check that the vehicle resumes the speed set prior to the cancellation and that "SET" is also displayed on the multi-information display.

HINT:

The stored vehicle speed is retained even if vehicle speed drops below 40 km/h (25 mph) once. The previously stored vehicle speed can be resumed by pushing the cruise control main switch to + RES when vehicle speed returns to approximately 40 km/h (25 mph) or more.

# OPERATION CHECK

1. INPUT SIGNAL CHECK



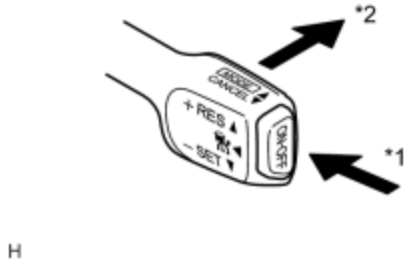

(a) Connect the Techstream to the DLC3.

(b) Check the cruise control main switch using the Data List function of the Techstream (ON-OFF, - SET and + RES).

## Text in Illustration

| | |
|---|---|
| *1 | ON/OFF |
| *2 | - SET |
| *3 | + RES |

2. INSPECT MODE SWITCH




(a) Turn the power switch on (IG).

**Text in Illustration**

| | |
|---|---|
| *1 | ON/OFF |
| *2 | MODE |

(b) Turn the cruise control main switch on. Then push the main switch to MODE for 1 second or more to change to the constant speed control mode. Check that "RADAR READY" goes off on the display.

(c) Check that the cruise main indicator light (vehicle-to-vehicle distance control mode) goes off and the cruise main indicator light (constant speed control mode) illuminates.

## Text in Illustration

| | |
|---|---|
| *1 | Multi-information Display |




| | |
|---|---|
| *2 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) |
| *3 | Cruise Main Indicator Light<br><br>(Constant speed control mode) |

NOTICE:

Do not push any other switches before pushing the main switch to MODE. If another switch is pushed, turn the main switch off and repeat the procedure above.

HINT:

If a malfunction is detected, turn the power switch off and repeat the procedure above.

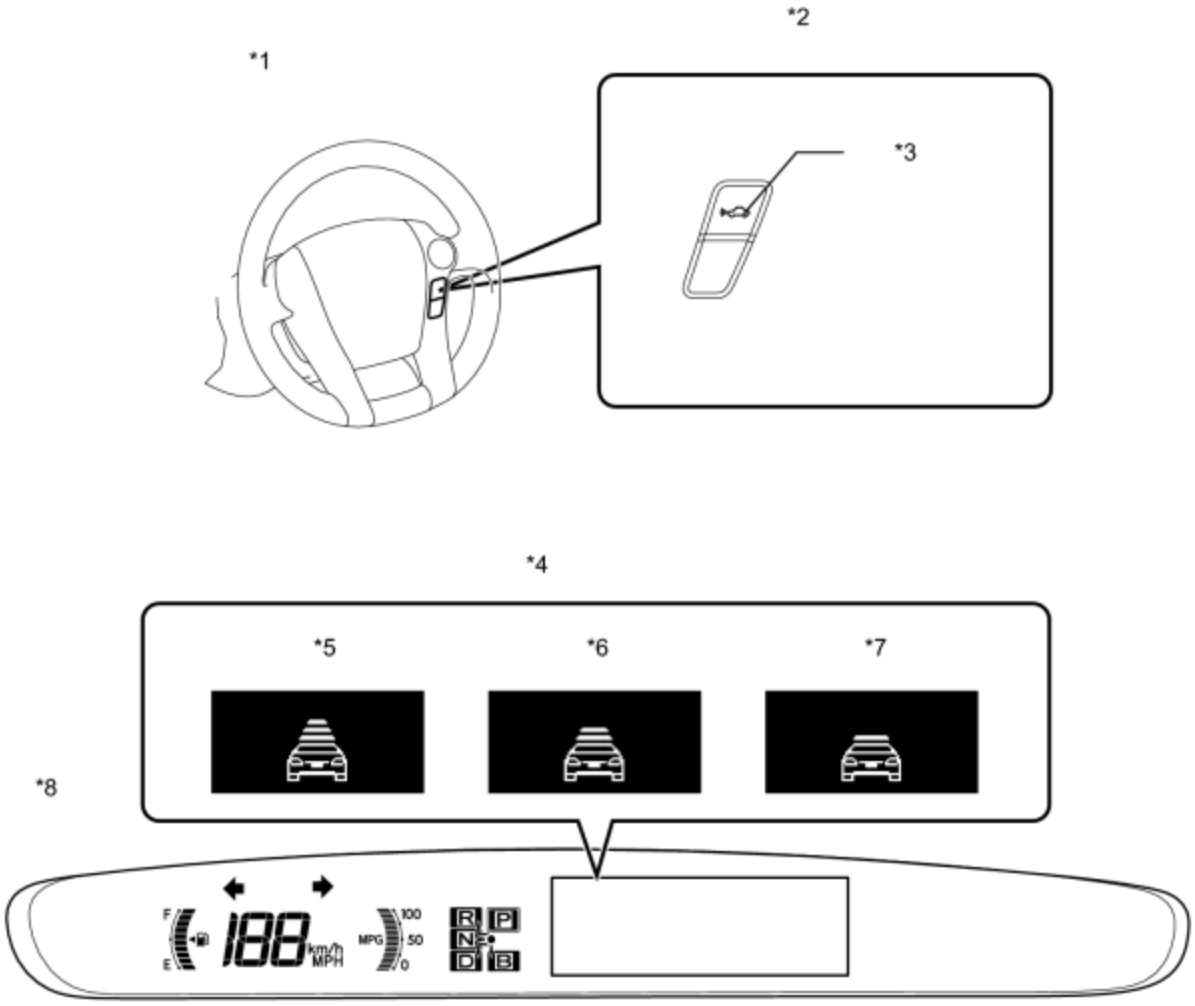
3. INSPECT STEERING PAD SWITCH ASSEMBLY

(a) Turn the power switch on (IG).

(b) Turn the cruise control main switch (ON-OFF button) on.

(c) Turn on the vehicle-to-vehicle distance control switch of the steering pad switch.

(d) Check that the indication of the vehicle-to-vehicle distance, which is shown on the multi-information display on the combination meter, changes from long to middle to short in that order.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Steering Wheel | *2 | Steering Pad Switch |
| *3 | Distance Control Switch | *4 | Multi-information Display |
| *5 | Long | *6 | Middle |
| *7 | Short | *8 | Combination Meter |

HINT:

The indication is automatically set to long each time the engine is started.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**Dynamic Radar Cruise Control System**

| Symptom | Suspected Area | See page |
|---|---|---|
| The cruise control main switch (ON-OFF button) cannot be turned on. | Driving support ECU power source circuit | INFO |
| | Cruise control switch circuit | INFO |
| | CRUISE main indicator light circuit | INFO |
| | Power management control ECU | INFO |
| | Driving support ECU | INFO |
| Setting cannot be changed between constant speed control mode and vehicle-to-vehicle distance control mode. | Cruise control switch circuit | INFO |
| | Combination meter assembly | INFO |
| | Driving support ECU | INFO |
| Set distance cannot be changed. | Distance control switch circuit | INFO |
| | Combination meter assembly | INFO |
| | Driving support ECU | INFO |
| Setting cannot be canceled in vehicle-to-vehicle distance control mode. | Combination meter assembly | INFO |
| | Millimeter wave radar sensor assembly | INFO |
| | Driving support ECU | INFO |
| Vehicle speed setting cannot be performed. (The cruise main indicator light on combination meter illuminates when main switch is turned on, but turns off when operating SET function.) | Cruise control switch circuit | INFO |
| | Driving support ECU | INFO |
| Vehicle speed setting cannot be performed with the constant speed mode. (The cruise main indicator light on combination meter illuminates when main switch is turned on, and remains on when operating SET function is | Stop light switch circuit | INFO |
| | Vehicle speed sensor circuit | INFO |

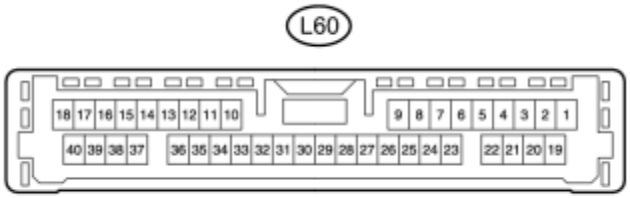
| Symptom | Suspected Area | See page |
|---|---|---|
| operating.) | Cruise control switch circuit | INFO |
| | Hybrid control system | INFO |
| | Driving support ECU | INFO |
| Vehicle speed setting cannot be performed with the vehicle-to-vehicle distance control mode. (The cruise main indicator light on combination meter illuminates when main switch is turned on, and remains on when SET function is operating.) | Millimeter wave radar sensor | INFO |
| | Stop light switch circuit | INFO |
| | Vehicle speed sensor circuit | INFO |
| | Cruise control switch circuit | INFO |
| | Hybrid control system | INFO |
| | Wiper signal circuit | INFO |
| | Electronically controlled brake system | INFO |
| While vehicle is driven with cruise control on, the control is canceled. | Stop light switch circuit | INFO |
| | Hybrid control system | INFO |
| | Electronically controlled brake system | INFO |
| | Cruise control switch circuit | INFO |
| | Vehicle speed sensor circuit | INFO |
| | Wiper signal circuit | INFO |
| | Driving support ECU | INFO |
| Pulling back on the control main switch does not cancel the cruise control. (The cruise main indicator light remains on.) | Cruise control switch circuit | INFO |
| | Driving support ECU | INFO |
| Pulling back on the control main switch does not cancel the cruise control. (The cruise main indicator light goes off.) | Driving support ECU | INFO |
| The cruise control is not canceled when vehicle speed drops below the low speed limit. (The cruise main indicator light remains on.) | Vehicle speed sensor circuit | INFO |
| | Driving support ECU | INFO |
| The cruise control is not canceled when vehicle speed drops below the low speed limit. (The cruise main indicator light goes off.) | Driving support ECU | INFO |
| Depressing the brake pedal does not cancel the cruise control. (The cruise main indicator light remains on.) | Stop light switch circuit | INFO |
| | Driving support ECU | INFO |
| Depressing the brake pedal does not cancel the cruise control. (The cruise main indicator light goes off.) | Driving support ECU | INFO |
| Vehicle speed cannot be canceled with wiper HI. (The cruise main indicator | Wiper signal circuit | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| light remains on.) | Driving support ECU | INFO |
| Vehicle speed cannot be canceled with wiper HI. (The cruise main indicator light goes off.) | Driving support ECU | INFO |
| Moving the shift lever does not cancel the cruise control. (The cruise main indicator light remains on.) | Hybrid control system | INFO |
| | Driving support ECU | INFO |
| Moving the shift lever does not cancel the cruise control. (The cruise main indicator light goes off.) | Driving support ECU | INFO |
| Hunting (Speed is not constant.) | Vehicle speed sensor circuit | INFO |
| | SFI system | INFO |
| | Hybrid control system | INFO |
| | Driving support ECU | INFO |
| Even though front millimeter wave radar sensor is not dirty, CLEAN RADAR SENSOR is displayed | Millimeter wave radar sensor assembly is dirty | - |
| | Adjust front millimeter wave radar sensor assembly | INFO |
| | Millimeter wave radar sensor assembly | INFO |
| No information on the multi-information display | Combination meter assembly | INFO |
| Beam axis of millimeter wave radar sensor cannot be adjusted (completed). | Check position, distance and angle of reflector | INFO |
| | Check installation of millimeter wave radar sensor | INFO |
| | Millimeter wave radar sensor assembly | INFO |
| | Driving support ECU | INFO |
| Alarm buzzer does not sound. | Skid control buzzer circuit | INFO |
| | Electronically controlled brake system | INFO |
| | Millimeter wave radar sensor assembly | INFO |
| | Driving support ECU | INFO |
| No brake control (when decelerating) | Electronically controlled brake system | INFO |
| | Driving support ECU | INFO |
| The SET indicator light does not illuminate (SET function operates normally) | Cruise SET indicator light circuit | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Driving support ECU | INFO |
| The cruise main indicator light remains blinking | TC and CG terminal circuit | INFO |
| | Driving support ECU | INFO |

# TERMINALS OF ECU

1. CHECK DRIVING SUPPORT ECU



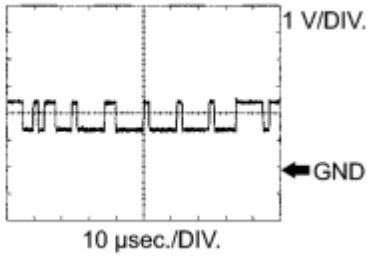

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L60-6 (SPSW) - L60-25 (GND) | R - W-B | Steering pad switch signal<br><br>(distance control signal) | Power switch on (IG)<br><br>Distance control switch off | 10 to 14 V |
| L60-6 (SPSW) - L60-25 (GND) | R - W-B | Steering pad switch signal<br><br>(distance control signal) | Power switch on (IG)<br><br>Distance control switch on | 6 to 7 V |
| L60-10 (CCHG) - L60-25 (GND) | G - W-B | Cruise control main switch signal | Power switch on (IG),<br><br>MODE switch off | 10 to 14 V |
| L60-10 (CCHG) - L60-25 (GND) | G - W-B | Cruise control main switch signal | Power switch on (IG),<br><br>MODE switch on | Below 1 V |
| L60-17 (CA2L) - L60-25 (GND) | W - W-B | CAN communication signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 1) |
| L60-18 (CA1N) - L60-25 (GND) | L - W-B | CAN communication signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 2) |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG) | 10 to 14 V |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG),<br><br>CANCEL switch | 6.6 to 10.1 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | on | |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG),<br><br>-SET switch on | 4.5 to 7.1 V |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG),<br><br>+RES switch on | 2.3 to 4.0 V |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG),<br><br>Main switch on | Below 1 V |
| L60-24 (HITP) - L60-25 (GND) | G - W-B | CAN signal<br><br>(Hi temperature) | Power switch on (IG) | - |
| L60-25 (GND) - Body ground | W-B - Body ground | Earth (ground circuit of driving support ECU) | Always | Below 1 Ω |
| L60-27 (STP-) - L60-25 (GND) | Y - W-B | Stop light signal | Brake pedal released | Below 1 V |
| L60-27 (STP-) - L60-25 (GND) | Y - W-B | Stop light signal | Brake pedal depressed | 7.5 to 14 V |
| L60-28 (ST1-) - L60-25 (GND) | R - W-B | Stop light signal | Power switch on (IG),<br><br>Brake pedal released | 7.5 to 14 V |
| L60-28 (ST1-) - L60-25 (GND) | R - W-B | Stop light signal | Power switch on (IG),<br><br>Brake pedal depressed | Below 1 V |
| L60-30 (+B) - L60-25 (GND) | B - W-B | Power source | Power switch on (IG) | 11 to 14 V |
| L60-32 (WIP2) - L60-25 (GND) | P - W-B | Wiper switch signal | Power switch on (IG),<br><br>Wiper switch off | Below 1 V |
| L60-32 (WIP2) - L60-25 (GND) | P - W-B | Wiper switch signal | Power switch on (IG),<br><br>Wiper switch LO position | 6 to 7 V |
| L60-32 (WIP2) - L60-25 (GND) | P - W-B | Wiper switch signal | Power switch on | 11 to 14 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | (IG),<br><br>Wiper switch HI position | |
| L60-39 (CA2H) - L60-25 (GND) | B - W-B | CAN communication signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 3) |
| L60-40 (CA1P) - L60-25 (GND) | Y - W-B | CAN communication signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 4) |

(a) WAVEFORM 1

(1) CAN communication signal



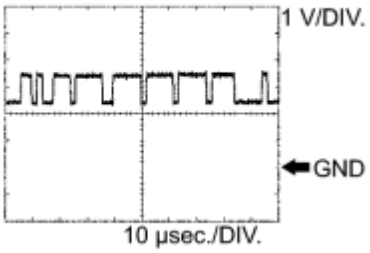

| | |
|---|---|
| Driving support ECU Terminal Name | Between CA2L and GND |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform varies depending on the CAN communication signal.

(b) WAVEFORM 2

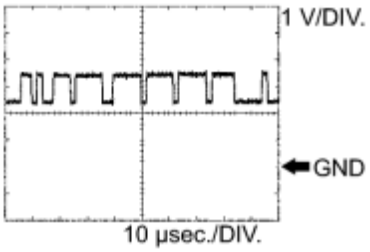
(1) CAN communication signal




| | |
|---|---|
| Driving support ECU Terminal Name | Between CA1N and GND |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

(c) WAVEFORM 3

(1) CAN communication signal

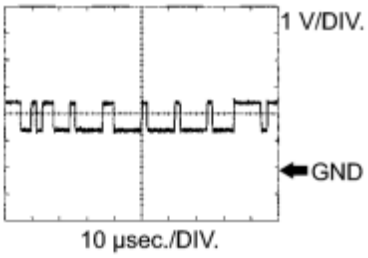



| | |
|---|---|
| Driving support ECU Terminal Name | Between CA2H and GND |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform varies depending on the CAN communication signal.

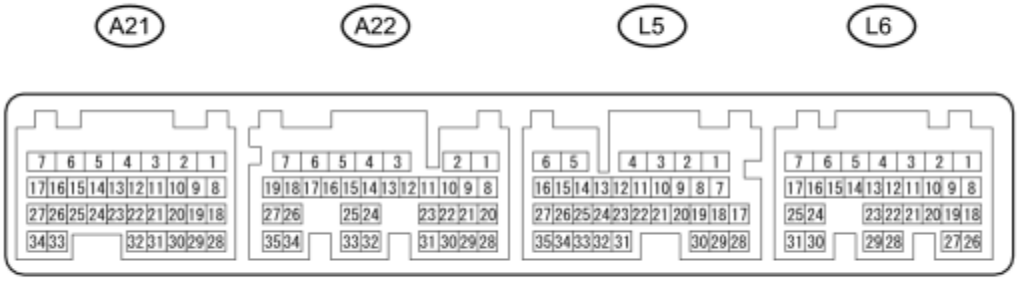
(d) WAVEFORM 4




(1) CAN communication signal

| | |
|---|---|
| Driving support ECU Terminal Name | Between CA1P and GND |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

2. CHECK POWER MANAGEMENT CONTROL ECU

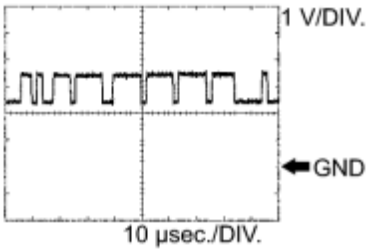



| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-6 (E1) - Body ground | BR - Body ground | Earth (ground) circuit of power management control ECU | Always | Below 1 Ω |
| L5-11 (TC) - L5-6 (E1) | P - BR | Terminal TC of DLC3 | Power switch on (IG) | 11 to 14 V |
| L5-11 (TC) - L5-6 (E1) | P - BR | Terminal TC of DLC3 | Terminals TC and CG of DLC3 connected | Below 1 V |
| L5-34 (CA2H) - L5-6 (E1) | P - BR | CAN communication line | Power switch on (IG) | Pulse generation (see waveform 1) |
| L5-35 (CA2L) - L5-6 (E1) | V - BR | CAN communication line | Power switch on (IG) | Pulse generation (see waveform 2) |
| L6-24 (CA1L) - L5-6 (E1) | W - BR | CAN communication line | Power switch on (IG) | Pulse generation |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | | (see waveform 2) |
| L6-25 (CA1H) - L5-6 (E1) | B - BR | CAN communication line | Power switch on (IG) | Pulse generation<br><br>(see waveform 1) |

(a) WAVEFORM 1

(1) CAN communication signal



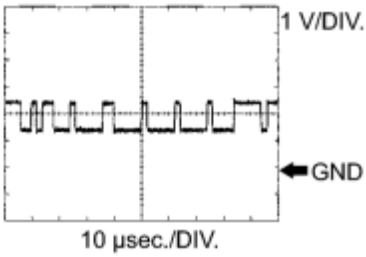

| | |
|---|---|
| Power management control ECU Terminal Name | Between CA1H - E1 or CA2H - E1 |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform varies depending on the CAN communication signal.

(b) WAVEFORM 2

(1) CAN communication signal




| | |
|---|---|
| Power management control ECU Terminal Name | Between CA1L - E1 or CA2L - E1 |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform varies depending on the CAN communication signal.

# DIAGNOSIS SYSTEM

1. DIAGNOSIS FUNCTION

(a) The diagnosis function makes the master warning light and the multi-information display come on, and the cruise main indicator light blinks as shown in the illustration. When a malfunction occurs in the dynamic radar cruise control system, the DTCs are stored in the driving support ECU.

**Text in Illustration**

| | |
|---|---|
| *1 | Multi-information Display |
| *2 | Master Warning Light |
| *3 | Cruise Main Indicator Light<br><br>(Constant speed control mode) |
| *4 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) |

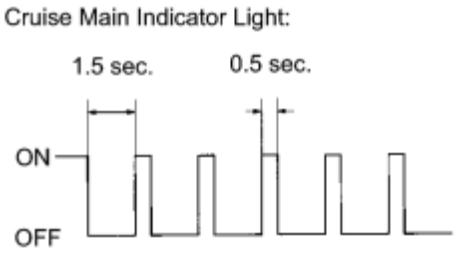
HINT:

During constant speed control mode, the cruise main indicator light (constant speed control mode) flashes. During vehicle-to-vehicle distance control, the cruise main indicator light (vehicle-to-vehicle distance control mode) flashes.




NOTICE:

The master warning light goes off if the system returns to normal condition.




2. DESCRIPTION

(a) The driving support ECU controls the dynamic radar cruise control system of the vehicle. The data and DTCs relating to the dynamic radar cruise control system can be read from the DLC3 of the vehicle. If either DTC or CRUISE OK is not displayed on the multi-information display on the combination meter assembly when checking for DTCs, there may be a problem with either the combination meter or the CAN communication system. Use the Techstream to check and solve the problem.

3. CHECK DLC3

(a) Check the DLC3 INFO.

4. CHECK INDICATOR




(a) Turn the power switch on (IG).

## Text in Illustration

| | |
|---|---|
| *1 | Multi-information Display |
| *2 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) |

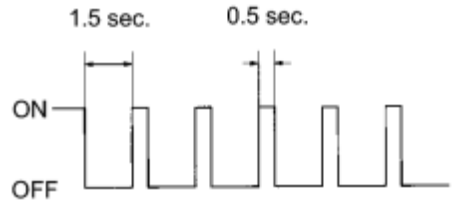
(b) Check that the cruise main indicator light and RADAR READY indicator come on when the main switch ON-OFF button is pushed on, and that the indicator light and the indicator go off when the ON-OFF button is pushed off.

HINT:

- If the indicator check result shows a problem, proceed to troubleshooting the combination meter assembly.
- If a malfunction occurs in the vehicle speed sensors, the stop light switch assembly, or other related parts during cruise control driving, the ECU actuates AUTO CANCEL of the cruise control and blinks the cruise main indicator light. This indicator light informs the driver of the malfunction. At the same

time, the malfunction is stored as a diagnostic trouble code.

Cruise Main Indicator Light:



# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(e) Read the DTCs.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(e) Clear the DTCs.

# FAIL-SAFE CHART

1. Constant speed control mode and vehicle-to-vehicle distance control mode:

If the following conditions are detected while the dynamic radar cruise control system is operating, the system clears the stored vehicle speed in the ECM and cancels the dynamic radar cruise control operation.

HINT:

During constant speed control mode, the cruise main indicator light (constant speed control mode) flashes. During vehicle-to-vehicle distance control, the cruise main indicator light (vehicle-to-vehicle distance control mode) flashes.




## Text in Illustration

| | |
|---|---|
| *1 | Multi-information Display |
| *2 | Master Warning Light |
| *3 | Cruise Main Indicator Light<br><br>(Constant speed control mode) |
| *4 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) |

| Vehicle Condition | Auto Cancel Condition | Fail-safe Deactivation Condition |
|---|---|---|
| • Cruise main indicator light blinks<br>• Master warning light comes on<br>• "CHECK CRUISE SYSTEM" is displayed<br>• "Pong" warning sound is heard | Millimeter wave radar sensor or driving support ECU country specification information malfunction | Turn cruise control main switch (ON-OFF button) on again |

2. Vehicle-to-vehicle distance control mode:

If the following conditions are detected while the dynamic radar cruise control system is operating, the system clears the stored vehicle speed in the ECM and cancels the dynamic radar cruise control operation.




## Text in Illustration

| | |
|---|---|
| *1 | Multi-information Display |
| *2 | Master Warning Light |
| *3 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) |

| Vehicle Condition | Auto Cancel Condition | Fail-safe Deactivation Condition |
|---|---|---|
| • Cruise main indicator light blinks<br>• Master warning light comes on<br>• "CHECK CRUISE SYSTEM" is displayed<br>• "Pong" warning sound is heard | • Open or short in stop light switch circuit<br>• Problem with vehicle speed signal<br>• There is problem with millimeter wave radar sensor<br>• Beam axis of millimeter wave radar sensor deviates<br>• Other than condition above dynamic radar cruise control system malfunction<br>• Malfunction in the hybrid vehicle control system | Power switch on (IG) again |

3. Vehicle-to-vehicle distance control mode:

If the following conditions are detected while the dynamic radar cruise control system is operating, the system maintains the stored vehicle speed in the ECM and cancels the dynamic radar cruise control operation.




## Text in Illustration

| | |
|---|---|
| *1 | Multi-information Display |
| *2 | Master Warning Light |
| *3 | Cruise Main Indicator Light<br><br>(Vehicle-to-vehicle distance control mode) |

| Vehicle Condition | Auto Cancel Condition | Fail-safe Deactivation Condition |
|---|---|---|
| • Master warning light | There is dirt on millimeter wave radar | Recover from condition on left |

| | | |
|---|---|---|
| comes on<br>• Cruise main indicator light blinks<br>• "CLEAN RADAR SENSOR" is displayed<br>• "Pong" warning sound is heard | sensor | (RESUME operation is possible after recovery) |
| • Cruise main indicator light blinks<br>• Master warning light comes on<br>• "CRUISE NOT AVAILABLE " is displayed<br>• "Pong" warning sound is heard | • Wiper switch is in HI position<br>• Millimeter wave radar sensor is least sensitive because of bad weather such as rain, fog, snow, and sandstorms | • Recover from condition on left (RESUME operation is possible after recovery)<br>• Turn cruise control main switch on again |

4. Constant speed control mode and vehicle-to-vehicle distance control mode:

If the following conditions are detected while the dynamic radar cruise control system is operating, the system clears the stored vehicle speed and cancels the dynamic radar cruise control operation.

| Vehicle Condition | Auto Cancel Condition | Fail-safe Deactivation Condition |
|---|---|---|
| Cruise main indicator light goes off | • Vehicle speed is lower than low speed limit (approximately 40 km/h (25 mph)) while cruise control is operating<br>• Constant Speed Control Mode:<br><br>Vehicle speed is lower than stored vehicle speed by 16 km/h (10 mph) or more while cruise control is operating | Push the cruise control main switch to + RES |

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Entire the following menus: Powertrain / Radar Cruise / Data List.

(e) According to the display on the Techstream, read the "Data List".

**Radar Cruise**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Cruise Control Main Switch | Cruise control switch signal/ON or OFF | ON: Main switch on<br><br>OFF: Main switch off | - |
| RES/ACC Switch | +RES switch signal/ON or OFF | ON: +RES switch on<br><br>OFF: +RES switch off | - |
| SET/COAST Switch | -SET switch signal/ON or OFF | ON: -SET switch on<br><br>OFF: -SET switch off | - |
| Distance Control Switch | Distance control switch signal/ON or OFF | ON: Distance control switch on<br><br>OFF: Distance control switch off | - |
| PCS Brake OFF Switch | Pre-collision cancel switch status/ON or OFF | ON: Pre-collision cancel switch on<br><br>OFF: Pre-collision cancel switch off | - |
| Cruise Control | Cruise control system operation | ON: Cruise control system | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | signal/ON or OFF | operating<br><br>OFF: Cruise control system not operating | |
| Constant Speed Mode | Constant speed mode signal/ON or OFF | ON: Dynamic radar cruise control system is in constant speed mode<br><br>OFF: Dynamic radar cruise control system is in vehicle-to-vehicle distance control mode | - |
| Cruise Control Mode | Cruise control mode signal/All Spd, Hi Spd or Normal | All Spd: Vehicle-to-vehicle distance control mode (w/ full-speed following function)<br><br>Hi Spd: Vehicle-to-vehicle distance control mode (w/o full-speed following function)<br><br>Normal: Constant speed mode | - |
| CCS Mem Vehicle Spd | Cruise control memorized speed/min.: 0 km/h (0 mph), max.: 320 km/h (199 mph) | Memorized speed: Cruise control activated | - |
| Vehicle Distance | Distance to vehicle in front/min.: 0 m (0 ft.), max.: 255 m (836.65 ft.) | Actual distance to vehicle | - |
| Stop Light SW 1 (M CPU) | Stop light switch (Main-CPU) signal/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Stop Light SW 1 (S CPU) | Stop light switch (Sub-CPU) signal/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Stop Light SW 2 (M CPU) | Stop light switch (Main-CPU) signal/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Wiper (Hi) | Windshield wiper switch Hi signal/ON or OFF | ON: Windshield wiper switch Hi position<br><br>OFF: Windshield wiper switch except Hi position | - |
| Wiper (Lo) | Windshield wiper switch Lo signal/ON or OFF | ON: Windshield wiper switch Lo position<br><br>OFF: Windshield wiper switch except Lo position | - |
| Tail Light | Tail light switch signal/ON or OFF | ON: Tail light switch on<br><br>OFF: Tail light switch off | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vhcl Spd Calc-Whl Spd | Vehicle speed/min.: -327 km/h (-203 mph), max.: 327 km/h (204 mph) | Actual vehicle speed | - |
| Vhcl Spd-Brake ECU | Vehicle speed/min.: -327 km/h (-203 mph), max.: 327 km/h (204 mph) | Actual vehicle speed | - |
| Invalid Whl Spd Sens Num | Invalid wheel speed sensor/min.: 0, max.: 255 | Actual invaild wheel speed sensor | - |
| Rear Whl Spd LH Sensor | Rear speed sensor LH signal/Normal or Abnormal | Normal: Rear speed sensor LH is normal<br><br>Abnormal: Rear speed sensor LH is abnormal | - |
| Rear Whl Spd RH Sensor | Rear speed sensor RH signal/Normal or Abnormal | Normal: Rear speed sensor RH is normal<br><br>Abnormal: Rear speed sensor RH is abnormal | - |
| Front Whl Spd LH Sensor | Front speed sensor LH signal/Normal or Abnormal | Normal: Front speed sensor LH is normal<br><br>Abnormal: Front speed sensor LH is abnormal | - |
| Front Whl Spd RH Sensor | Front speed sensor RH signal/Normal or Abnormal | Normal: Front speed sensor RH is normal<br><br>Abnormal: Front speed sensor RH is abnormal | - |
| Vehicle Acceleration | Vehicle acceleration/min.: -5 m/s2, max.: 5 m/s2 | Actual vehicle acceleration | - |
| Whl Spd/Deceleration Sen | Wheel speed sensor/Deceleration sensor signal/Avail or Not Avail | Avail: Wheel speed sensor/Deceleration sensor availed<br><br>Not Avail: Wheel speed sensor/Deceleration sensor not availed | - |
| Closed Throttle Position | Accelerator pedal idle position signal/ON or OFF | ON: Accelerator pedal released<br><br>OFF: Accelerator pedal depressed | - |
| Yaw Rate Sensor | Yaw rate value/min.: -100 deg/s, max.: 100 deg/s | Actual yaw rate value | - |
| Deceleration Sensor 1 | Deceleration value/min.: -14.7 m/s2, max.: 14.7 m/s2 | Actual deceleration value | - |
| Deceleration Sensor 2 | Deceleration value/min.: -14.7 m/s2, max.: 14.7 m/s2 | Actual deceleration value | - |
| Tar Accel for ACC | Target vehicle acceleration for vehicle-to-vehicle distance control mode/min.: -5.12 | Actual target vehicle acceleration | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | m/s2, max.: 5.12 m/s2 | | |
| Tar Accel for CCS | Target vehicle acceleration for constant speed mode/min.: -5.12 m/s2, max.: 5.12 m/s2 | Actual target vehicle acceleration | - |
| Request Driving Force | Cruise control system request driving force/min.: -65536 N, max.: 65534 N | Actual request driving force | - |
| ECM/PCM Command | Origin of the driving force request/Pedal, None or DS | Pedal: Accelerator pedal depressed<br><br>None: Driving force not requested<br><br>DS: Radar cruise control system operating | - |
| Max Val of Available DF | Maximum value of available driving force/min.: -65536 N, max.: 65534 N | Actual available driving force maximum value | - |
| Min Val of Available DF | Minimum value of available driving force/min.: -65536 N, max.: 65534 N | Actual available driving force minimum value | - |
| Forward Vhcl Relative Spd | Vehicle ahead relative speed/min.: -128 m/s, max.: 127 m/s | Actual vehicle ahead relative speed | - |
| Vehicle Approach Warning | Forward vehicle approach warning signal/ON or OFF | ON: Forward vehicle approach<br><br>OFF: Forward vehicle not approach | - |
| Vhcl Stability Ctrl Buzz | Skid control buzzer operation signal/ON or OFF | ON: Skid control buzzer operating<br><br>OFF: Skid control buzzer not operating | - |
| Brk Rqst to Elec Ctrl Brk | Braking request to brake control/Not Ctrl, None, Exist, None , Exist or Disable | Driving support ECU control demand | - |
| Forward Vehicle Detect | Vehicle ahead detection signal/Detect or No Dtct | Detect: Vehicle ahead detected<br><br>No Dtct: Vehicle ahead not detected | - |
| CCS Main SW-Ready | Dynamic radar cruise control system standby condition/ON or OFF | ON: Dynamic radar cruise control system standby<br><br>OFF: Dynamic radar cruise control system not standby | - |
| CCS System Check | Multi-information display "Cruise Control System Check" display signal/ON or OFF | ON: "Cruise Control System Check" displayed<br><br>OFF: "Cruise Control System Check" not displayed | - |
| FRS-Dirt | Memorized dirt on millimeter wave radar sensor history | ON: Dirt on millimeter wave radar | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | sensor history memorized<br><br>OFF: Dirt on millimeter wave radar sensor history not memorized | |
| Bad Wthr Hist(F Radar Sen) | Memorized millimeter wave radar sensor bad weather history/ON or OFF | ON: Millimeter wave radar sensor bad weather history memorized<br><br>OFF: Millimeter wave radar sensor bad weather history not memorized | - |
| Frnt Radar Sens Temp Hi | Millimeter wave radar sensor high temperature abnormality/ON or OFF | ON: Millimeter wave radar sensor abnormal<br><br>OFF: Millimeter wave radar sensor normal | - |
| CCS Cancel by Low Spd | Dynamic radar cruise control system (constant speed mode) low speed cancel signal/ON or OFF | ON: Low speed cancel signal ON<br><br>OFF: Low speed cancel signal OFF | - |
| Cancl CCS by Com Delay | Dynamic radar cruise control system (constant speed mode) cancel signal/ON or OFF | ON: Cancel signal ON<br><br>OFF: Cancel signal OFF | - |
| Cancl CCS by RAM Malfnc | Dynamic radar cruise control system (constant speed mode) cancel signal/ON or OFF | ON: Cancel signal ON<br><br>OFF: Cancel signal OFF | - |
| A-CCS Cancl-Radar/Wip | Dynamic radar cruise control system (vehicle-to vehicle distance control mode) cancel signal/ON or OFF | ON: Cancel signal ON<br><br>OFF: Cancel signal OFF | - |
| Country# (F Radar Sens) | Millimeter wave radar sensor country signal/JPN, NA, EURO, AUS SAFC, OTHER, TWN, CHINA, THAI, GCC, NOFIX | Actual country code | - |
| Steering Angle | Steering angle/min.: -3072 deg, max.: 3070.5 deg | Actual steering angle | - |
| Zero Point Angle Sens | Zero point steeromg angle sensor/min.: -3072 deg, max.: 3070.5 deg | Actual zero point steering angle | - |
| Radar | Millimeter wave radar sensor operation signal/Emission or Stop | Emission: Millimeter wave radar sensor signal sent<br><br>Stop: Millimeter wave radar sensor signal stopped | - |
| #Codes | Number of present trouble codes/min.: 0, max.: 255 | Number of DTCs displayed | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Test allows relays, VSVs, actuators and parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Test early in troubleshooting is one way to save diagnostic time. Data List information can be display while performing Active Test.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) For Cruise Main Indicator Light (Combination Meter):

Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) For Skid Control Buzzer (ABS/VSC/TRAC):

Enter the following menus: Chassis / ABS/VSC/ TRAC / Active Test.

(f) Perform Active Test according to the display on the tester.

HINT:

The power switch must be turned on (IG) to proceed with the Active Test using the Techstream.

**Combination Meter**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Lamp Cruise | Cruise main indicator light<br><br>(Constant speed control mode) | OFF or ON | Confirm that the vehicle is stopped with engine idling |
| Indicat. Radar Cruise | Cruise main indicator light<br><br>(Vehicle-to-vehicle distance control mode) | OFF or ON | Confirm that the vehicle is stopped with engine idling |

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Buzzer | Skid control buzzer | Buzzer ON/OFF | Buzzer can be heard |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is displayed during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

**Dynamic Radar Cruise Control System**

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| C1A01 | Driving Support ECU | Driving support ECU | INFO |
| C1A02 | Vehicle Information Not Obtained | - Driving support ECU<br>- Main body ECU | INFO |
| C1A03 | Driving Support ECU Internal Logical Error | Driving support ECU | INFO |
| C1A05 | Stop Light Switch Circuit | - Stop light switch assembly<br>- Stop light switch circuit<br>- Driving support ECU | INFO |
| C1A06 | Stop Light Switch Input Circuit | Driving support ECU | INFO |
| C1A0A | Front Radar Sensor Region Code Mismatch | - Millimeter wave radar sensor assembly<br>- Main body ECU<br>- Driving support ECU | INFO |
| C1A0C | Object Recognition Camera Region Code Mismatch | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |
| C1A10 | Front Radar Sensor | - Millimeter wave radar sensor assembly<br>- Driving support ECU | INFO |
| C1A11 | Front Radar Sensor Incorrect Axial Gap | - Millimeter wave radar sensor assembly<br>- Driving support ECU | INFO |
| C1A14 | Front Radar Sensor Beam Axis Not Adjusted | - Millimeter wave radar sensor assembly<br>- Driving support ECU | INFO |
| C1A20 | Object Recognition ECU | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |
| C1A22 | Object Recognition Camera Incorrect Axial Gap | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| C1A23 | Object Recognition Camera Initialization Incomplete | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |
| C1A40 | ENG / EHV Device | - Hybrid control system<br>- Power management control ECU<br>- SFI system<br>- ECM<br>- Driving support ECU | INFO |
| C1A41 | Brake Request Value Mismatch between ENG / EHV and Driving Support ECU | - Electronically controlled brake system<br>- Hybrid control system<br>- Power management control ECU<br>- Brake booster with maser cylinder (skid control ECU)<br>- Driving support ECU | INFO |
| C1A4A | Skid Control Buzzer Circuit | - Electronically controlled brake system<br>- Driving support ECU | INFO |
| C1A4B | Stop Light Relay Circuit | - Stop light control relay<br>- Stop light control relay circuit<br>- Brake booster with maser cylinder (skid control ECU) | INFO |
| C1A50 | Brake System | - Electronically controlled brake system<br>- Driving support ECU | INFO |
| P1615 | Communication Error from Distance Control ECU to HV ECU | - Driving support ECU<br>- Power management control ECU | INFO |
| U0122 | Lost Communication with Vehicle Dynamics Control Module | - Brake booster with maser cylinder (skid control ECU)<br>- CAN communication system<br>- Driving support ECU | INFO |
| U0123 | Lost Communication with Yaw Rate Sensor Module | - Yaw rate sensor | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | - CAN communication system<br>- Driving support ECU | |
| U0126 | Lost Communication with Steering Angle Sensor Module | - Steering angle sensor<br>- CAN communication system<br>- Driving support ECU | INFO |
| U0235 | Lost Communication with Cruise Control Front Distance Range Sensor | - Millimeter wave radar sensor assembly<br>- Millimeter wave radar sensor circuit<br>- Driving support ECU | INFO |
| U0293 | Lost Communication with HV ECU | - Power management control ECU<br>- CAN communication system<br>- Driving support ECU<br>- Brake booster with maser cylinder (skid control ECU) | INFO |
| U1104 | Lost Communication with Driving Support ECU | - Driving support ECU<br>- CAN communication system<br>- Millimeter wave radar sensor assembly<br>- Power management control ECU<br>- Brake booster with maser cylinder (skid control ECU) | INFO |
| U1119 | Lost Communication with Object Recognition ECU (CAN) | - Lane recognition camera sensor assembly<br>- CAN communication system<br>- Driving support ECU | INFO |

| DTC | C1A01 | Driving Support ECU |
|---|---|---|

# DESCRIPTION

This DTC indicates the internal abnormalities of the driving support ECU.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A01 | While power switch is on (IG) and dynamic radar cruise control system is operating, | Driving |

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| | driving support ECU detects an internal malfunction for 1 sec. | support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ OUTPUT DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A01 is output | B |

B REPLACE DRIVING SUPPORT ECU

A **USE SIMULATION METHOD TO CHECK**

| DTC | C1A02 | Vehicle Information Not Obtained |
|---|---|---|

# DESCRIPTION

When the driving support ECU is replaced with a new one, it acquires the country specification information (destination, steering wheel position, etc.) from the main body ECU. When the country specification information in the driving support ECU and main body ECU do not match, DTC C1A02 is output.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A02 | While power switch is on (IG) and dynamic radar cruise control system is operating, driving support ECU does not receive vehicle destination information | • Driving support ECU<br>• Main body ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK CAN COMMUNICATION SYSTEM |
|---|---|

(a) Select the "CAN Bus Check" from the "System Selection Menu" screen on the Techstream.

(b) Select "Communication Malfunction DTC" from the "CAN Bus Check" screen, and then select "Enter".

OK:

CAN communication system DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM

OK ▼

| 2. | CHECK WHETHER DTC OUTPUT RECURS |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A02 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| DTC | C1A03 | Driving Support ECU Internal Logical Error |
| DTC | C1A06 | Stop Light Switch Input Circuit |

# DESCRIPTION

This DTC indicates the internal abnormalities of the driving support ECU.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A03 | Cruise control input signal abnormal | Driving support ECU |
| C1A06 | Stop light switch input signal abnormal | Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ OUTPUT DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A03 or C1A06 is output | B |

B REPLACE DRIVING SUPPORT ECU

A **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| DTC | C1A05 | Stop Light Switch Circuit |
| DTC | C1A4B | Stop Light Relay Circuit |

# DESCRIPTION

When the brake pedal is depressed, the stop light switch sends a signal to the driving support ECU. Upon receiving the signal, the driving support ECU cancels the dynamic radar cruise control system. Even if there is a malfunction in the stop light signal circuit while the cruise control is operating, normal driving is maintained due to the fail-safe function. Dynamic radar cruise control is canceled when positive battery voltage is applied to terminal STP-.

When the brake pedal is released, positive voltage is applied to terminal ST1- of the driving support ECU through the IGN fuse and the stop light switch, and the driving support ECU operates the dynamic radar cruise control.

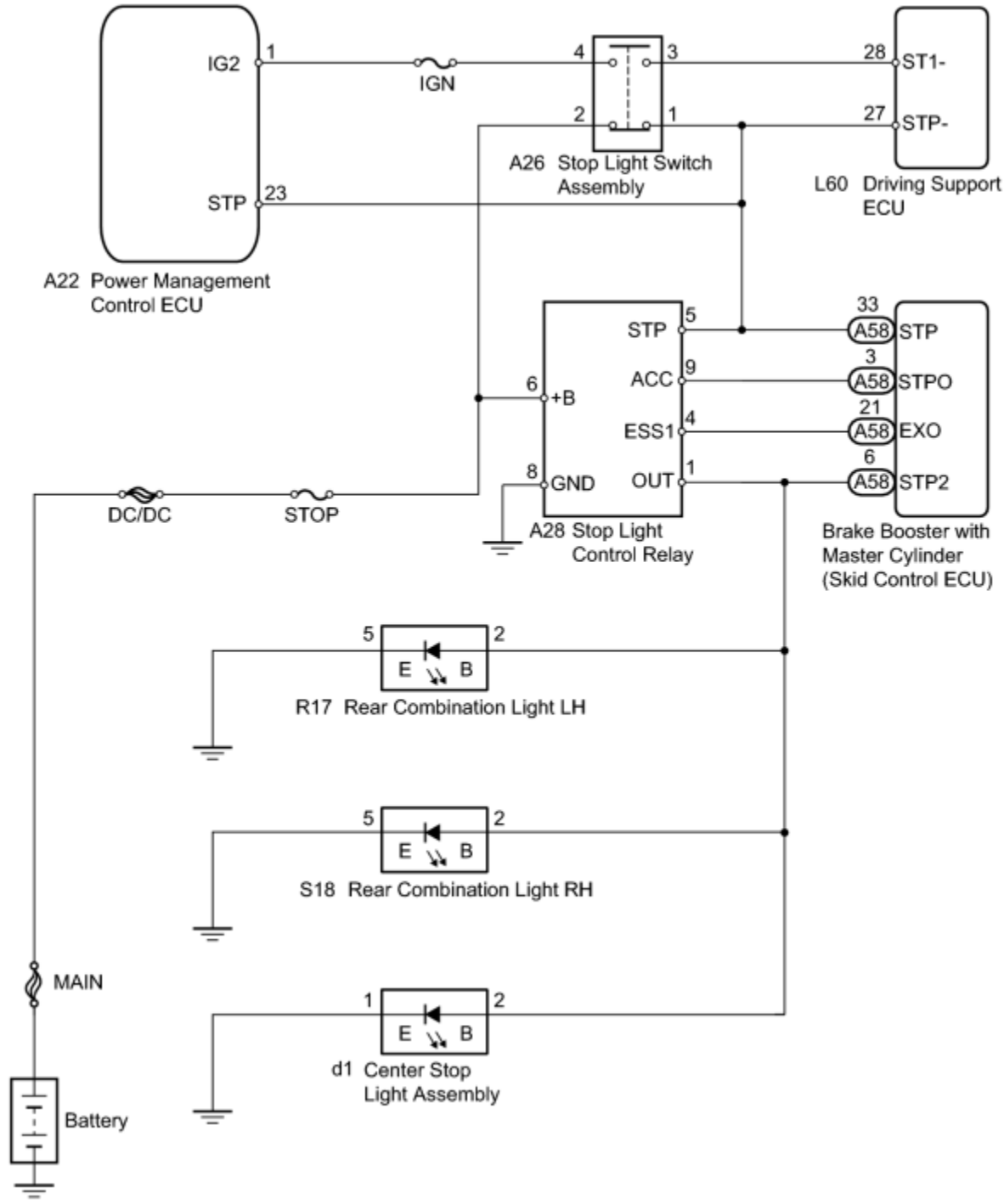
The brake booster with master cylinder (skid control ECU) receives a signal from the driving support ECU and operates the brake actuator. The brake booster with master cylinder (skid control ECU) operates the brake actuator and at the same time illuminates the stop lights by operating the stop light control relay.

The stop light switch assembly sends a brake pedal operation signal to the driving support ECU.

After receiving the signal, the ECM performs fail-safe control by canceling the cruise control function.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A05 | Voltages of terminals ST1- and STP- of driving support ECU are both below 1 V for 1 second | • Stop light switch assembly<br>• Stop light switch circuit<br>• Driving support ECU |
| C1A4B | This trouble code is stored when the brake booster with master cylinder (skid control ECU) detects a malfunction in the stop light control relay circuit for 1 second while the dynamic cruise control is operating. | • Stop light control relay<br>• Stop light control relay circuit<br>• Brake booster with master cylinder (Skid control ECU) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (STOP LIGHT SWITCH ASSEMBLY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Data List.

(e) Check the Data List for proper functioning of the stop light switch.

**Radar Cruise**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stop Light SW 1 (M CPU) | Stop light switch (Main-CPU) signal/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Stop Light SW 1 (S CPU) | Stop light switch (Sub-CPU) signal/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Stop Light SW 2 (M CPU) | Stop light switch (Main-CPU) signal/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |

OK:

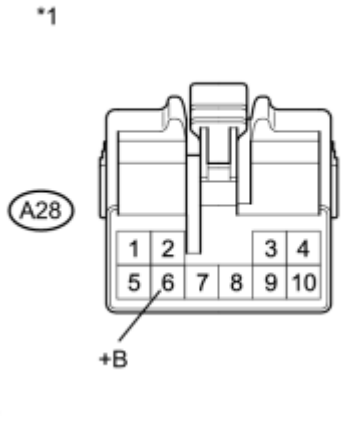
Display changes according to brake pedal operation described in above table.

NG ▶ CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - POWER SOURCE)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (STOP LIGHT CONTROL RELAY POWER SOURCE) |

(a) Disconnect the stop light control relay connector.




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A28-6 (+B) - Body ground | Always | 11 to 14 V |

**Text in Illustration**

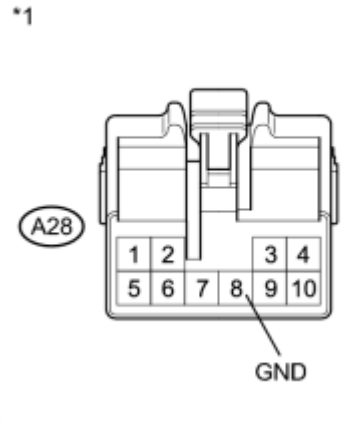
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Control Relay) |

(c) Reconnect the stop light control relay connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CONTROL RELAY - STOP FUSE)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (STOP LIGHT CONTROL RELAY - BODY GROUND) |




(a) Disconnect the stop light control relay connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A28-8 (GND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

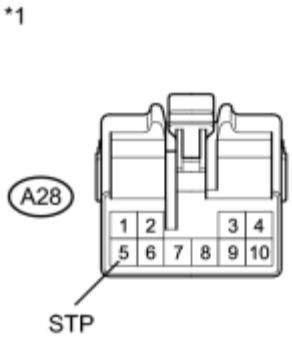
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Control Relay) |

(c) Reconnect the stop light control relay connector.

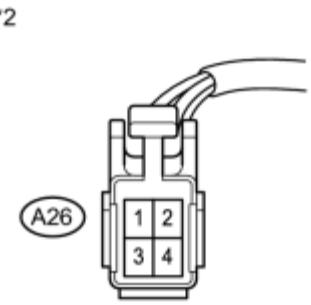
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CONTROL RELAY - BODY GROUND)

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (STOP LIGHT CONTROL RELAY - STOP LIGHT SWITCH ASSEMBLY) |




(a) Disconnect the stop light control relay connector.




(b) Disconnect the stop light switch assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-1 - A28-5 (STP) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-1 or A28-5 (STP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Control Relay) |
| *2 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |

(d) Reconnect the stop light switch assembly connector.

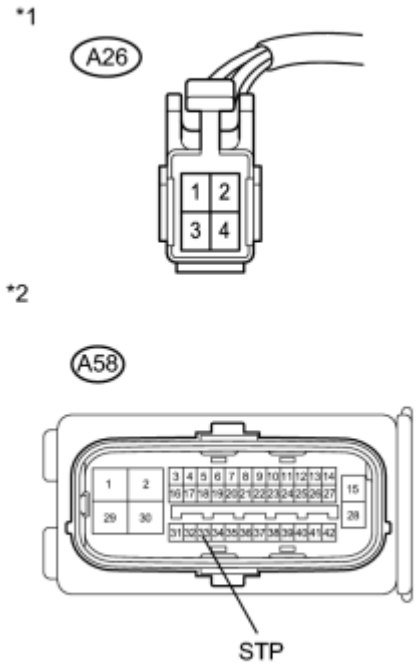
(e) Reconnect the stop light control relay connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CONTROL RELAY - STOP LIGHT SWITCH ASSEMBLY)

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - SKID CONTROL ECU) |

(a) Disconnect the stop light switch assembly connector.




(b) Disconnect the brake booster with master cylinder (skid control ECU) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-1 - A58-33 (STP) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-1 or A58-33 (STP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Brake Booster with Master Cylinder (Skid Control ECU)) |

(d) Reconnect the stop light switch assembly connector.

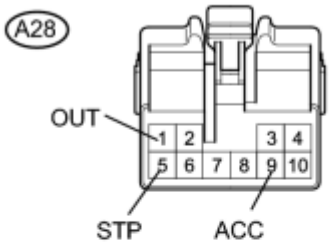
(e) Reconnect the brake booster with master cylinder (skid control ECU) connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - SKID CONTROL ECU)

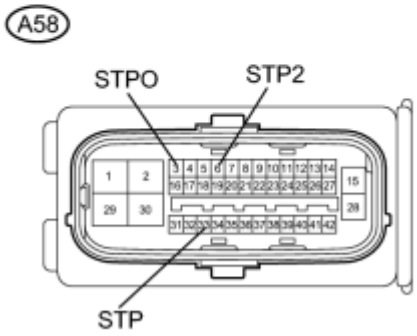
OK ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (STOP LIGHT CONTROL RELAY - SKID CONTROL ECU) |

*1




*2




(a) Disconnect the stop light control relay connector.

(b) Disconnect the brake booster with master cylinder (skid control ECU) connectors.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A28-1 (OUT) - A58-6 (STP2) | Always | Below 1 Ω |
| A28-5 (STP) - A58-33 (STP) | Always | Below 1 Ω |
| A28-9 (ACC) - A58-3 (STP0) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A28-1 (OUT) or A58-6 (STP2) - Body ground | Always | 10 kΩ or higher |
| A28-5 (STP) or A58-33 (STP) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A28-9 (ACC) or A58-3 (STP0) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Control Relay) |
| *2 | Front view of wire harness connector<br><br>(to Brake Booster with Master Cylinder (Skid Control ECU)) |

(d) Reconnect the stop light control relay connector.

(e) Reconnect the brake booster with master cylinder (skid control ECU) connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT CONTROL RELAY - SKID CONTROL ECU)

OK ▼

| | |
|---|---|
| 7. | INSPECT STOP LIGHT CONTROL RELAY |

(a) Inspect the stop light control relay INFO.

NG ▶ REPLACE STOP LIGHT CONTROL RELAY

OK ▼

| | |
|---|---|
| 8. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER (SKID CONTROL ECU) |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT ▼

| | |
|---|---|
| 9. | CHECK WHETHER DTC OUTPUT RECORDS (DTC C1A05 OR C1A4B) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A05 or C104B is output | B |

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **END**

| | |
|---|---|
| 10. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▼

| | |
|---|---|
| 11. | CHECK WHETHER DTC OUTPUT RECORDS (DTC C1A05 OR C1A4B) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

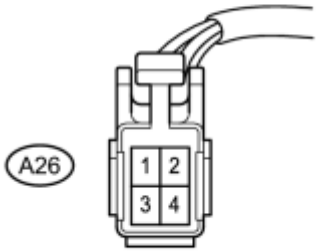
| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A05 or C104B is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **END**

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - POWER SOURCE) |

*1




(a) Disconnect the stop light switch assembly connector.

N

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-2 - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |

(c) Reconnect the stop light switch assembly connector.

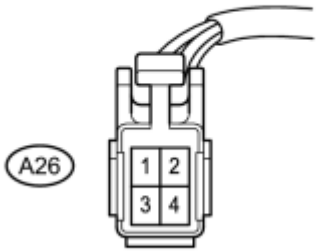
NG ▶ CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - STOP LIGHT CONTROL RELAY)

OK ▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - POWER SOURCE) |

(a) Disconnect the stop light switch assembly connector.

*1




N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-4 - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |

(d) Reconnect the stop light switch assembly connector.

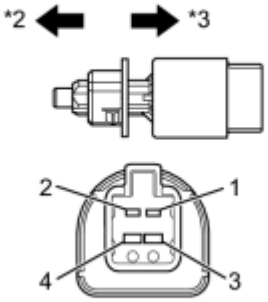
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - POWER MANAGEMENT CONTROL ECU)

OK ▼

| | |
|---|---|
| 14. | INSPECT STOP LIGHT SWITCH ASSEMBLY |

(a) Remove the stop light switch assembly INFO.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Switch pin not pushed | Below 1 Ω |
| 3 - 4 | Switch pin not pushed | 10 kΩ or higher |
| 1 - 2 | Switch pin pushed | 10 kΩ or higher |
| 3 - 4 | Switch pin pushed | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Stop Light Switch Assembly) |
| *2 | Not pushed |
| *3 | Pushed |

(c) Install the stop light switch assembly INFO.

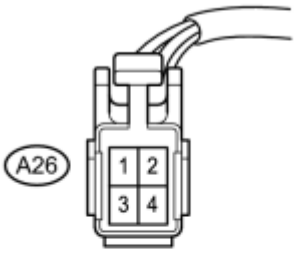
NG ▶ REPLACE STOP LIGHT SWITCH ASSEMBLY

OK ▼

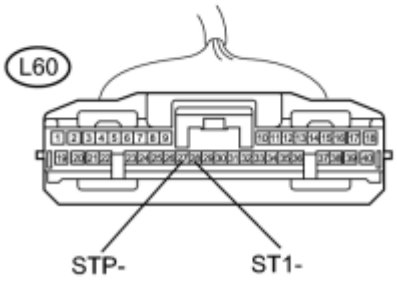
| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - DRIVING SUPPORT ECU) |

(a) Disconnect the stop light switch assembly connector.

*1




*2




(b) Disconnect the driving support ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A26-3 - L60-28 (ST1-) | Always | Below 1 Ω |
| A26-1 - L60-27 (STP-) | Always | Below 1 Ω |

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A26-3 or L60-28 (ST1-) - Body ground | Always | 10 kΩ or higher |
| A26-1 or L60-27 (STP-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(d) Reconnect the stop light switch assembly connector.

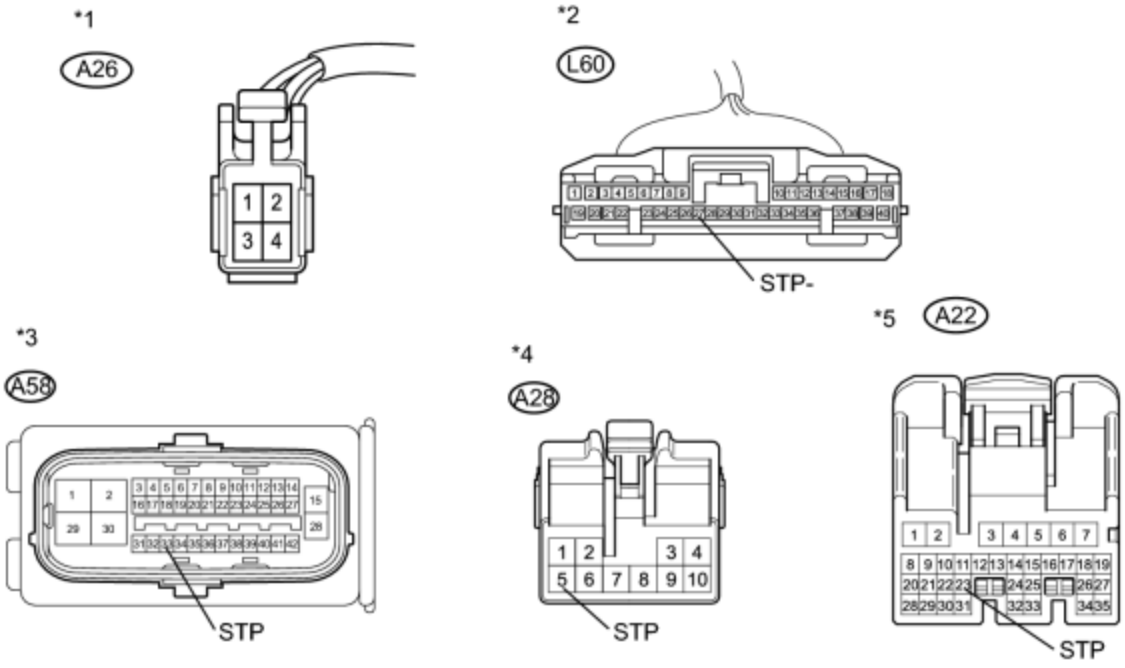
(e) Reconnect the driving support ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - DRIVING SUPPORT ECU)

OK ▼

| | |
|---|---|
| 16. | CHECK HARNESS AND CONNECTOR |

(a) Disconnect the stop light switch assembly connector.




(b) Disconnect the driving support ECU connector.

(c) Disconnect the stop light control relay connector.

(d) Disconnect the brake booster with master cylinder (skid control ECU) connector.

(e) Disconnect the power management control ECU connector.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A26-1 or L60-27 (STP-) - Body ground | Always | 10 kΩ or higher |
| A26-1 or A58-33 (STP) - Body ground | Always | 10 kΩ or higher |
| A26-1 or A28-5 (STP) - Body ground | Always | 10 kΩ or higher |
| A26-1 or A22-23 (STP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) | *2 | Front view of wire harness connector<br><br>(to Driving Support ECU) |
| *3 | Front view of wire harness connector<br><br>(to Brake Booster with Master Cylinder (Skid Control ECU)) | *4 | Front view of wire harness connector<br><br>(to Stop Light Control Relay) |
| *5 | Front view of wire harness connector<br><br>(to Power Management Control ECU) | - | - |

(g) Reconnect the stop light switch assembly connector.

(h) Reconnect the driving support ECU connector.

(i) Reconnect the power management control ECU connector.

(j) Reconnect the stop light control relay connector.

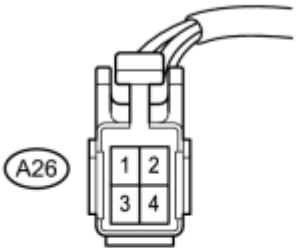
(k) Reconnect the brake booster with master cylinder (skid control ECU) connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE DRIVING SUPPORT ECU**

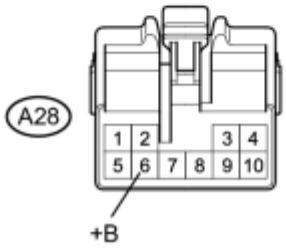
| | |
|---|---|
| 17. | CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - STOP LIGHT CONTROL RELAY) |

(a) Disconnect the stop light switch assembly connector.

*1




*2




(b) Disconnect the stop light control relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A26-2 or A28-6 (+B) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Stop Light Control Relay) |

(d) Reconnect the stop light switch assembly connector.

(e) Reconnect the stop light control relay connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - STOP LIGHT CONTROL RELAY)

OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - BATTERY)**

| | | |
|---|---|---|
| DTC | C1A0A | Front Radar Sensor Region Code Mismatch |

# DESCRIPTION

The driving support ECU uses the millimeter wave radar sensor and lane recognition camera sensor to detect obstacles in front of the vehicle.

When the millimeter wave radar sensor assembly is replaced with a new one, it acquires the country specification information from the driving support ECU. Also, when the driving support ECU is replaced with a new one, it receives the country specification information from the main body ECU. When the country specification information in the sensor and ECU do not match, DTC C1A0A is output.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A0A | While power switch is on (IG), country specification information in driving support ECU and front millimeter wave radar sensor do not match for 1 second | • Millimeter wave radar sensor assembly<br>• Main body ECU<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the millimeter wave radar sensor is replaced with a new one, adjustment of the radar sensor beam axis must be performed INFO.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Data List / Country# (F Radar Sens).

(e) Read the Data List and check the country specification information of the front millimeter wave radar sensor and vehicle.

**Radar Cruise**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Country# (F | Millimeter wave radar sensor country signal/JPN, NA, EURO, | Actual country | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Radar Sens) | AUS, SAFC, OTHER, TWN, CHINA, THAI, GCC, NOFIX | code | |

**Result**

| Result | Proceed to |
|---|---|
| Country specification information for vehicle and millimeter wave radar sensor match | A |
| Country specification information for vehicle and millimeter wave radar sensor do not match | B |

B ▶ REPLACE MILLIMETER WAVE RADAR SENSOR ASSEMBLY

A ▼

| | |
|---|---|
| 2. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A0A) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A0A is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **END**

| DTC | C1A0C | Object Recognition Camera Region Code Mismatch |
|---|---|---|

# DESCRIPTION

w/ Lane-keeping Assist System

When the lane recognition camera sensor assembly is replaced with a new one, it acquires the country specification information from the driving support ECU. The lane recognition camera sensor assembly has information about the market it is intended for use in (country specification information such as the destination, steering wheel position etc.). When a new camera sensor is installed and the country specification information does not match that of the driving support ECU, the ECU stores DTC C1A0C.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A0C | While initial check is running, power switch is on (IG) and system is operating, country specification information in driving support ECU and lane recognition camera sensor assembly do not match | • Lane recognition camera sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the lane recognition camera sensor assembly is replaced with a new one, adjust the lane recognition camera sensor assembly INFO.

# PROCEDURE

| 1. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |
|---|---|

(a) Replace lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor assembly INFO.

NEXT

| 2. | CHECK DTC OUTPUT |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| DTC | C1A10 | Front Radar Sensor |

# DESCRIPTION

The driving support ECU uses the millimeter wave radar sensor and lane recognition camera sensor to detect obstacles in front of the vehicle.

When the driving support ECU receives information that there is a malfunction in the millimeter wave radar sensor assembly, DTC C1A10 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A10 | While power switch is on (IG), driving support ECU receives information that there is malfunction in millimeter wave radar sensor assembly for 1 second | • Millimeter wave radar sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the millimeter wave radar sensor is replaced with a new one, adjustment of the front sensor beam axis must be performed INFO.

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE MILLIMETER WAVE RADAR SENSOR ASSEMBLY |

(a) Replace the millimeter wave radar sensor assembly INFO.

NEXT

| | |
|---|---|
| 2. | ADJUST MILLIMETER WAVE RADAR SENSOR ASSEMBLY |

(a) Adjust the millimeter wave radar sensor assembly INFO.

NEXT

| | |
|---|---|
| 3. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A10 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **END**

| | | |
|---|---|---|
| DTC | C1A11 | Front Radar Sensor Incorrect Axial Gap |
| DTC | C1A14 | Front Radar Sensor Beam Axis Not Adjusted |

# DESCRIPTION

The driving support ECU uses the millimeter wave radar sensor and lane recognition camera sensor to detect obstacles in front of the vehicle.

When the vehicle is determined to be driving in a straight line or on a slow curve based on signals from the yaw rate sensor, the millimeter wave radar sensor assembly performs a self diagnosis to check if the sensor beam axis is deviated from the vehicle movement direction. When the millimeter wave radar sensor assembly's beam axis is deviated, the driving support ECU detects this, and outputs DTC C1A11.

After installing a new millimeter wave radar sensor assembly, if the sensor beam axis adjustment is not performed, DTC C1A14 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A11 | While power switch is on (IG) and after driving at approximately 50 km/h (31 mph) for 10 hours, driving support ECU determines that aim of front millimeter wave radar sensor's beam axis is deviated | • Millimeter wave radar sensor assembly<br>• Driving support ECU |
| C1A14 | Driving at 10 km/h (6 mph) or more while front millimeter wave radar sensor's axis adjustment has not been performed | • Millimeter wave radar sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | ADJUST FRONT MILLIMETER WAVE RADAR SENSOR |

(a) Adjust the front millimeter wave radar sensor INFO.

NEXT

| | |
|---|---|
| 2. | CHECK WHETHER DTC OUTPUT RECURS (C1A11 OR C1A14) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A11 or C1A14 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU
A ▶ **END**

| | | |
|---|---|---|
| DTC | C1A20 | Object Recognition ECU |

# DESCRIPTION

w/ Lane-keeping Assist System

When the driving support ECU receives information that there is a malfunction in the lane recognition camera sensor assembly, DTC C1A20 is output.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A20 | While power switch is on (IG), driving support ECU receives information that there is malfunction in lane recognition camera sensor assembly for 1 second or more | • Lane recognition camera sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the lane recognition camera sensor assembly is replaced with a new one, adjust the lane recognition camera sensor assembly INFO.

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Replace the lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor assembly INFO.

NEXT

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU
A ▶ **END**

| | | |
|---|---|---|
| DTC | C1A22 | Object Recognition Camera Incorrect Axial Gap |
| DTC | C1A23 | Object Recognition Camera Initialization Incomplete |

# DESCRIPTION

w/ Lane-keeping Assist System

If the driving support ECU determines that the lane recognition camera sensor assembly axis is deviated, DTC C1A22 is stored. Also, if the lane recognition camera sensor assembly beam axis adjustment is not performed after installing the lane recognition camera sensor assembly, DTC C1A23 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A22 | While power switch is on (IG), driving support ECU detects lane recognition camera sensor assembly beam axis deviation for 1 second or more | • Lane recognition camera sensor assembly<br>• Driving support ECU |
| C1A23 | While power switch is on (IG), driving support ECU detects that lane recognition camera sensor assembly adjustment has not been completed for 1 second or more | • Lane recognition camera sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the lane recognition camera sensor assembly is replaced with a new one, adjust the lane recognition camera sensor assembly INFO.

# PROCEDURE

| | |
|---|---|
| 1. | ADJUST LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Adjust the lane recognition camera sensor assembly INFO.

NEXT

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY

A ▶ **END**

| | |
|---|---|
| 3. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Replace the lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor assembly INFO.

NEXT ▼

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **END**

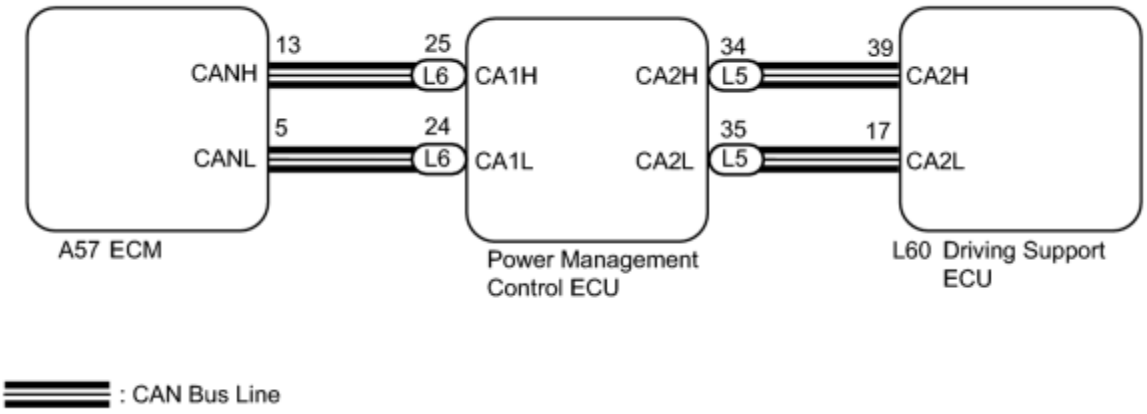
| | | |
|---|---|---|
| DTC | C1A40 | ENG / EHV Device |

# DESCRIPTION

When the driving support ECU receives a hybrid control system or SFI system malfunction signal from the power management control ECU or ECM via the CAN communication line, DTC C1A40 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A40 | While power switch is on (IG), hybrid control system or SFI system malfunction signal is detected for 1 second | • Hybrid control system<br>• Power management control ECU<br>• SFI system<br>• ECM<br>• Driving support ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ OUTPUT DTC (HYBRID CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B GO TO HYBRID CONTROL SYSTEM

A

| | |
|---|---|
| 2. | READ OUTPUT DTC (SFI SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B GO TO SFI SYSTEM

A

| | |
|---|---|
| 3. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A40) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A40 is output | B |

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 4. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▼

| | |
|---|---|
| 5. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A40) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |

| Result | Proceed to |
|---|---|
| DTC C1A40 is output | B |

B ▶ REPLACE ECM
A ▶ **END**

| | |
|---|---|
| 6. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT
▼

| | |
|---|---|
| 7. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A40) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A40 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU
A ▶ **END**

| DTC | C1A41 | Brake Request Value Mismatch between ENG / EHV and Driving Support ECU |
|---|---|---|

# DESCRIPTION

The brake booster with master cylinder (skid control ECU) receives brake control request signals from the power management control ECU and driving support ECU.

When the request signals received from the power management control ECU and driving support ECU are not consistent, the brake booster with master cylinder (skid control ECU) determines that a malfunction has occurred and sends a malfunction signal to the driving support ECU.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A41 | While power switch is on (IG), brake request signal from power management control ECU and driving support ECU are inconsistent for 1 second | • Electronically controlled brake system<br>• Hybrid control system<br>• Power management control ECU<br>• Brake booster with master cylinder (Skid control ECU)<br>• Driving support ECU |

# WIRING DIAGRAM

Refer to DTC C1A50 INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | READ OUTPUT DTC (ELECTRONICALLY CONTROLLED BRAKE SYSTEM) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM

A ▼

| | |
|---|---|
| 2. | READ OUTPUT DTC (HYBRID CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ GO TO HYBRID CONTROL SYSTEM

A ▼

| | |
|---|---|
| 3. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A41) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A41 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 4. | REPLACE DRIVING SUPPORT ECU |

(a) Replace the driving support ECU INFO.

NEXT ▼

| | |
|---|---|
| 5. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A41) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A41 is output | B |

B ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER

A ▶ **END**

| | |
|---|---|
| 6. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT

| | |
|---|---|
| 7. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A41) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A41 is output | B |

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▶ **END**

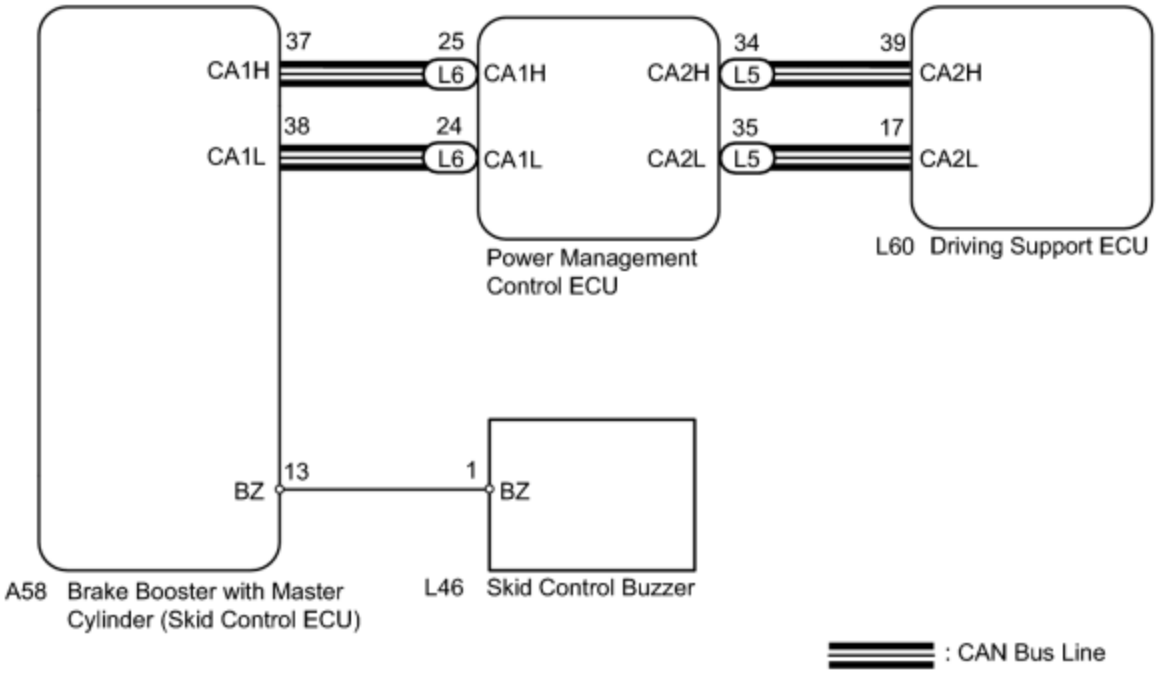
| DTC | C1A4A | Skid Control Buzzer Circuit |
|---|---|---|

# DESCRIPTION

The driving support ECU sends a sounding signal to the brake booster with master cylinder (skid control ECU) to sound the skid control buzzer.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A4A | While power switch is on (IG), skid control buzzer circuit malfunction signal is received by brake booster with master cylinder (skid control ECU) for 1 second | • Electronically controlled brake system<br>• Driving support ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (SKID CONTROL BUZZER) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / ABS/VSC/TRAC / Active Test / Buzzer.

(e) Perform the Active Test.

OK:

Skid control buzzer sounds.

NG ▶ GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM
OK
▼

| | |
|---|---|
| 2. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A4A) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A4A is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU
A ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 3. | REPLACE DRIVING SUPPORT ECU |

(a) Replace the driving support ECU INFO.

NEXT

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A4A) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A4A is output | B |

B ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER
A ▶ **END**

| | |
|---|---|
| 5. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT

| | |
|---|---|
| 6. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A4A) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A4A is output | B |

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **END**

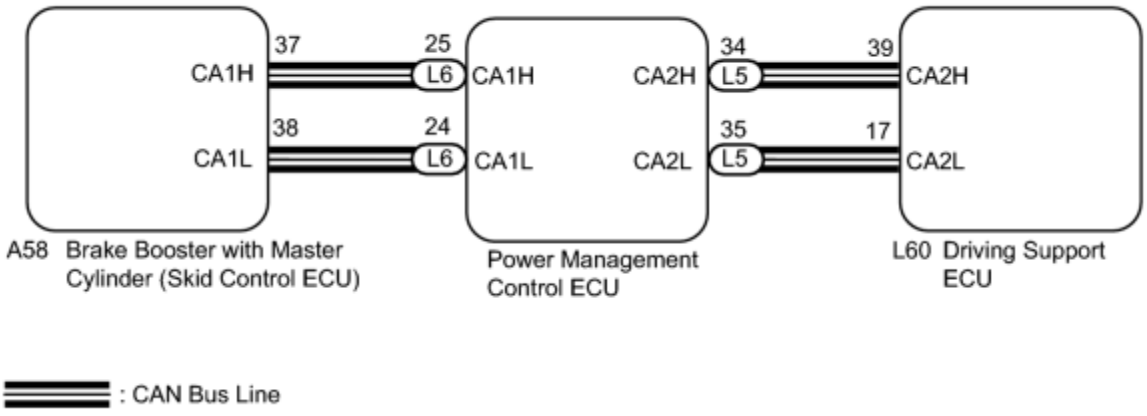
| | | |
|---|---|---|
| DTC | C1A50 | Brake System |

# DESCRIPTION

When the driving support ECU receives an electronically controlled brake system malfunction signal from the brake booster with master cylinder (skid control ECU) via the CAN communication line, DTC C1A50 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A50 | When signal malfunction from brake booster with master cylinder (skid control ECU) continues for 1 second while dynamic radar cruise control is operating | • Electronically controlled brake system<br>• Driving support ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ OUTPUT DTC (ELECTRONICALLY CONTROLLED BRAKE SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM

A

| | |
|---|---|
| 2. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A50) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A50 is output | B |

B REPLACE DRIVING SUPPORT ECU

A **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 3. | REPLACE DRIVING SUPPORT ECU |

(a) Replace the driving support ECU INFO.

NEXT

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (DTC C1A50) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A50 is output | B |

B ▶ REPLACE BRAKE BOOSTER WITH MASTER CYLINDER
A ▶ **END**

| | |
|---|---|
| 5. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT

| | |
|---|---|
| 6. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC C1A50 is output | B |

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **END**

| DTC | P1615 | Communication Error from Distance Control ECU to HV ECU |
|---|---|---|

# DESCRIPTION

This DTC is stored when a communication error occurs between the driving support ECU and power management control ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P1615 | All of the following conditions are met<br><br>(a) Power switch on (IG)<br><br>(b) Communication error between driving support ECU and power management control ECU for 0.5 seconds or more | • Driving support ECU<br>• Power management control ECU |

# WIRING DIAGRAM

Refer to DTC C1A40 INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | READ OUTPUT DTC (DYNAMIC RADAR CRUISE CONTROL SYSTEM) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ GO TO DTC CHART

A ▼

| 2. | CHECK WHETHER DTC OUTPUT RECURS (DTC P1615) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off.

(f) Turn the power switch on (IG).

(g) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P1615 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 3. | REPLACE DRIVING SUPPORT ECU |

(a) Replace the driving support ECU INFO.

NEXT ▼

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (DTC P1615) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off.

(f) Turn the power switch on (IG).

(g) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
| --- | --- |
| DTC is not output | A |
| DTC P1615 is output | B |

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▶ **END**

| | | |
|---|---|---|
| DTC | U0122 | Lost Communication with Vehicle Dynamics Control Module |
| DTC | U0123 | Lost Communication with Yaw Rate Sensor Module |
| DTC | U0126 | Lost Communication with Steering Angle Sensor Module |
| DTC | U0293 | Lost Communication with HV ECU |
| DTC | U1104 | Lost Communication with Driving Support ECU |

# DESCRIPTION

These DTCs are output when a communication malfunction occurs between the sensors and ECUs.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0122 | While dynamic radar cruise control is either preparing for operation or operating and power switch is on (IG), communication stop from brake booster with master cylinder (skid control ECU) to driving support ECU continues for 1 second or more | • Brake booster with master cylinder (Skid control ECU)<br>• CAN communication system<br>• Driving support ECU |
| U0123 | While dynamic radar cruise control is either preparing for operation or operating and power switch is on (IG), communication stop from yaw rate sensor to driving support ECU continues for 1 second or more | • Yaw rate sensor<br>• CAN communication system<br>• Driving support ECU |
| U0126 | While dynamic radar cruise control is either preparing for operation or operating and power switch is on (IG), communication stop from steering angle sensor to driving support ECU continues for 1 second or more | • Steering angle sensor<br>• CAN communication system<br>• Driving support ECU |
| U0293 | While dynamic radar cruise control is either preparing for operation or operating and power switch is on (IG), communication stop from power management control ECU to driving support ECU or brake booster with master cylinder (skid control ECU) continues for 1 second or more | • Power management control ECU<br>• CAN communication system<br>• Driving support ECU<br>• Brake booster with master cylinder (Skid control ECU) |
| U1104 | While dynamic radar cruise control is either preparing for operation or operating and power switch is on (IG), communication stop from driving support ECU to millimeter wave radar sensor assembly, power management control ECU or brake booster with master cylinder (skid control ECU) continues for 1 second or more | • Driving support ECU<br>• CAN communication system<br>• Millimeter wave radar sensor assembly<br>• Power management control ECU<br>• Brake booster with |

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| | | master cylinder (Skid control ECU) |

# WIRING DIAGRAM

Refer to System Diagram INFO.

Refer to U0235 INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ OUTPUT DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC U1104 is output | A |
| DTCs other than U1104 are output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK CAN COMMUNICATION SYSTEM |

(a) Select "CAN Bus Check" from the "System Selection Menu" screen on the Techstream.

(b) Select "Communication Malfunction DTC" from the "CAN Bus Check" screen, and then select "Enter".

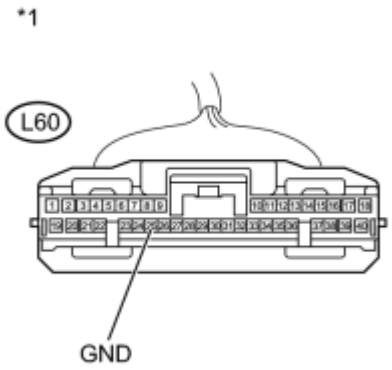
OK:

Communication system is normal.

NG ▶ GO TO CAN COMMUNICATION SYSTEM

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (DRIVING SUPPORT ECU - BODY GROUND) |




(a) Disconnect the driving support ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-25 (GND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(c) Reconnect the driving support ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - BODY GROUND)

OK ▼

| | |
|---|---|
| 4. | REPLACE DRIVING SUPPORT ECU |

(a) Replace the driving support control ECU INFO.

NEXT ▼

| | |
|---|---|
| 5. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC U1104 is output | B |

B ▶ REPLACE MILLIMETER WAVE RADAR SENSOR ASSEMBLY
A ▶ **END**

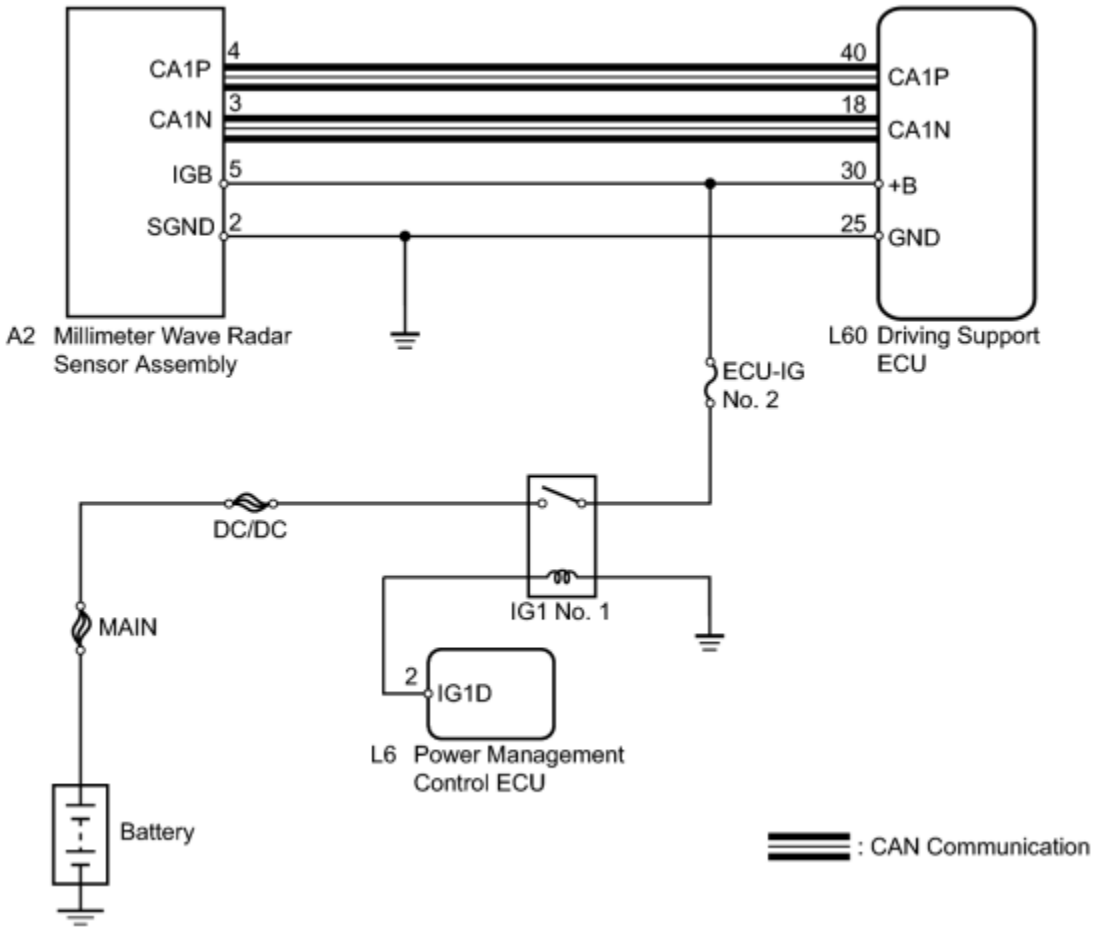
| DTC | U0235 | Lost Communication with Cruise Control Front Distance Range Sensor |
|---|---|---|

# DESCRIPTION

The millimeter wave radar sensor and driving support ECU transmit the data for general vehicle control and diagnosis function along the communication line. The millimeter wave radar sensor assembly transmits information about the vehicle in front to the driving support ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0235 | The seat belt control ECU detects a communication error signal (from the millimeter wave radar sensor assembly to the driving support ECU) for 1 second or more while the dynamic radar cruise control is operating | • Millimeter wave radar sensor assembly<br>• Millimeter wave radar sensor circuit<br>• Driving support ECU |

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

When the millimeter wave radar sensor is replaced with a new one, adjustment of the radar sensor beam axis must be performed INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Select "CAN Bus Check" from the "System Selection Menu" screen on the Techstream.

(b) Select "Communication Malfunction DTC" from the "CAN Bus Check" screen, and then select "Enter".

OK:

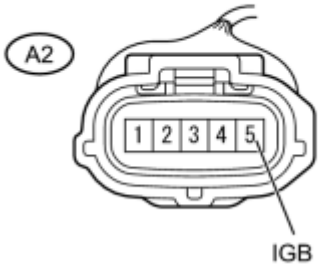
Communication system is normal.

NG ▶ GO TO CAN COMMUNICATION CIRCUIT

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MILLIMETER WAVE RADAR SENSOR POWER SOURCE) |

*1




(a) Disconnect the millimeter wave radar sensor assembly connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A2-5 (IGB) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Millimeter Wave Radar Sensor Assembly) |

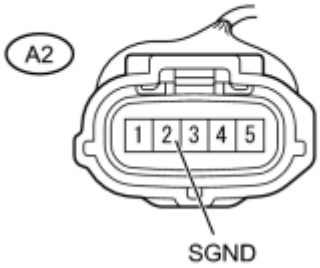
(d) Reconnect the millimeter wave radar sensor assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MILLIMETER WAVE RADAR SENSOR ASSEMBLY - IG1 NO. 1 RELAY)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (MILLIMETER WAVE RADAR SENSOR ASSEMBLY - BODY GROUND) |

*1




(a) Disconnect the millimeter wave radar sensor assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A2-2 (SGND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Millimeter Wave Radar Sensor Assembly) |

(c) Reconnect the millimeter wave radar sensor assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MILLIMETER WAVE RADAR SENSOR ASSEMBLY - BODY GROUND)

OK ▼

| | |
|---|---|
| 4. | REPLACE MILLIMETER WAVE RADAR SENSOR ASSEMBLY |

(a) Replace the millimeter wave radar sensor assembly INFO.

(b) Adjust the millimeter wave radar sensor assembly INFO.

NEXT

| | |
|---|---|
| 5. | CHECK WHETHER DTC OUTPUT RECURS (DTC U0235) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC U0235 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **END**

| DTC | U1119 | Lost Communication with Object Recognition ECU (CAN) |
|---|---|---|

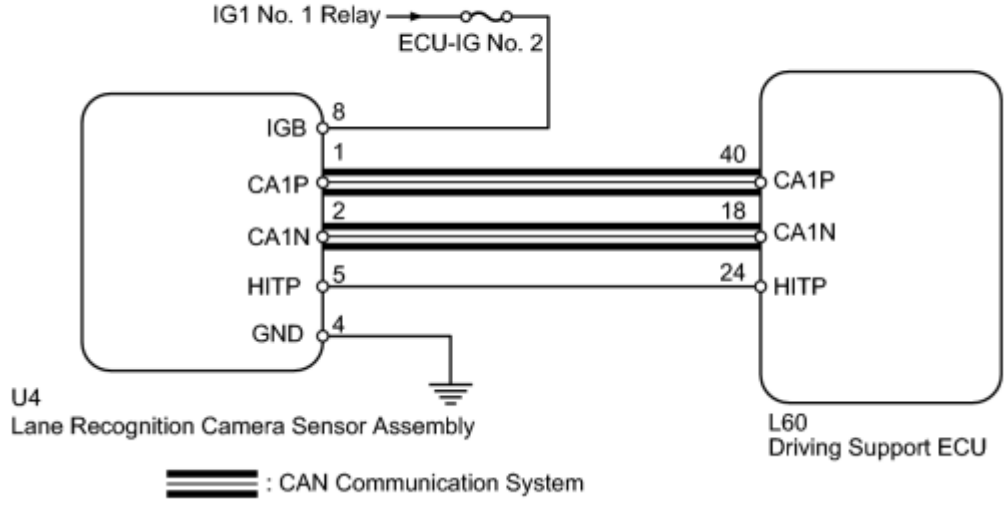
# DESCRIPTION

with Lane-keeping Assist System.

Because of the location of the lane recognition camera assembly, it is subject to high temperatures. If the lane recognition camera sensor assembly becomes too hot, the power source is shut down to protect the system. At that time CAN communication also stops. However, in order to inform the driving support ECU that CAN communication has not stopped because of a CAN communication error, on/off signals are periodically sent from the HITP terminal.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| U1119 | While power switch is on (IG), communication stop between lane recognition camera sensor and driving support ECU continues for 1 second or more | • Lane recognition camera sensor assembly<br>• CAN communication system<br>• Driving support ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

This circuit uses CAN communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system are output.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC U1119 is output | A |
| DTC other than U1119 is output | B |

B ▶ GO TO CAN COMMUNICATION CIRCUIT

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Pre-Collision 2/ Data List / Recog ECU H Temp Hist.

(e) Confirm the judgment history.

Pre-Collision 2:

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Recog ECU H Temp Hist | Object recognition ECU temperature condition history/ ON or OFF | ON: History exists<br><br>OFF: No history | - |

Result:

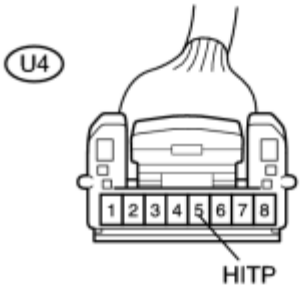
| Result | Proceed to |
|---|---|
| ON is displayed | A |
| OFF is displayed | B |

B ▶ CHECK CAN COMMUNICATION SYSTEM

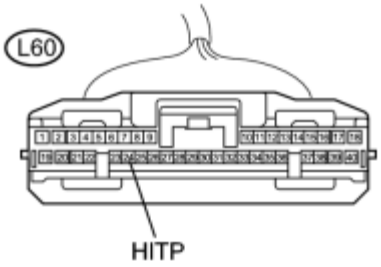
A ▼

| | |
|---|---|
| 3. | CHECK HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - LANE RECOGNITION CAMERA SENSOR) |

*1




*2




(a) Disconnect the driving support ECU connector and lane recognition camera sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Condition | Condition | Specified Condition |
|---|---|---|

| Tester Condition | Condition | Specified Condition |
|---|---|---|
| U4-5 (HITP) - L60-24 (HITP) | Always | Below 1 Ω |
| U4-5 (HITP) or L60-24 (HITP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Lane Recognition Camera Sensor Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(c) Reconnect the connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - LANE RECOGNITION CAMERA SENSOR)

OK ▶ **REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY**

| | |
|---|---|
| 4. | REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - LANE RECOGNITION CAMERA SENSOR) |

(a) Repair or replace harness or connector.

NEXT ▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC U1119 is not output | A |
| DTC U1119 is output | B |

B ▶ GO TO CAN COMMUNICATION CIRCUIT
A ▶ **END**

| | |
|---|---|
| 6. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check CAN communication system INFO.

NG ▶ GO TO CAN COMMUNICATION CIRCUIT
OK
▼

| | |
|---|---|
| 7. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Replace the lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor INFO.

NEXT
▼

| | |
|---|---|
| 8. | CHECK DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTCs INFO.

(d) Perform the following to make sure that the DTC detection conditions are met.

HINT:

If the detection conditions are not met, the malfunction cannot be detected.

(1) Drive the vehicle at a speed of 40 km/h (25 mph) or more.

(2) Turn the cruise control main switch on.

(3) Push the -SET switch to activate the cruise control.

(e) Enter the following menus: Powertrain / Radar Cruise / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
| --- | --- |
| DTC U1119 is not output | A |
| DTC U1119 is output | B |

B ▶ REPLACE DRIVING SUPPORT ECU

A ▶ **END**

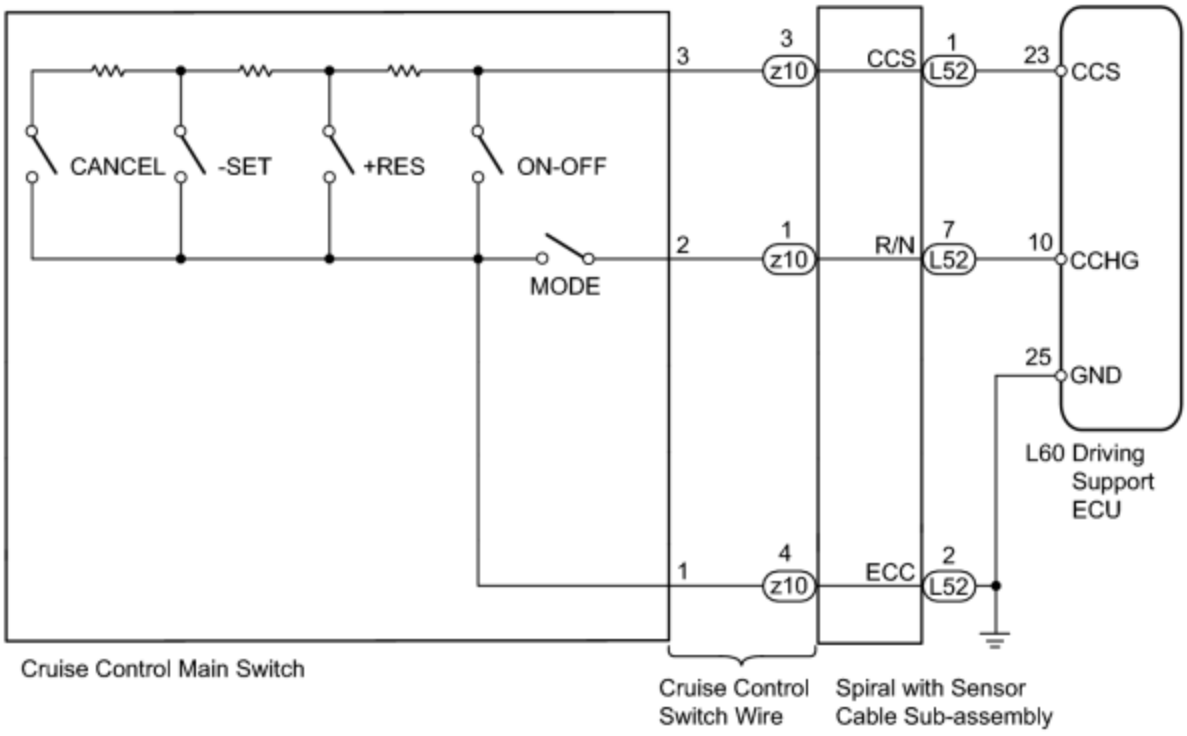
Cruise Control Switch Circuit

# DESCRIPTION

The cruise control main switch operates 8 functions: SET, -(COAST), TAP-DOWN, RES (RESUME), + (ACCEL), TAP-UP, CANCEL, and MODE. The SET, TAP-DOWN, and - (COAST) functions, and the RES (RESUME), TAP-UP, and + (ACCEL) functions are operated with the same switch. The cruise control main switch is an automatic return type switch which turns on only while it is being operated it in the direction of each arrow and turns off after being released. The internal contact points of the cruise control main switch are turned on with the switch operation. The driving support ECU then reads the voltage value that has been changed by the switch operation to control MODE, SET, - (COAST), RES (RESUME), + (ACCEL), and CANCEL. The dynamic radar cruise control system has two cruise control modes: constant speed control mode and vehicle-to-vehicle distance control mode.

- Vehicle-to-vehicle distance control mode is always selected when starting up the dynamic radar cruise control system.
- The operation of constant speed control mode is the same as that for a conventional cruise control system.

# WIRING DIAGRAM

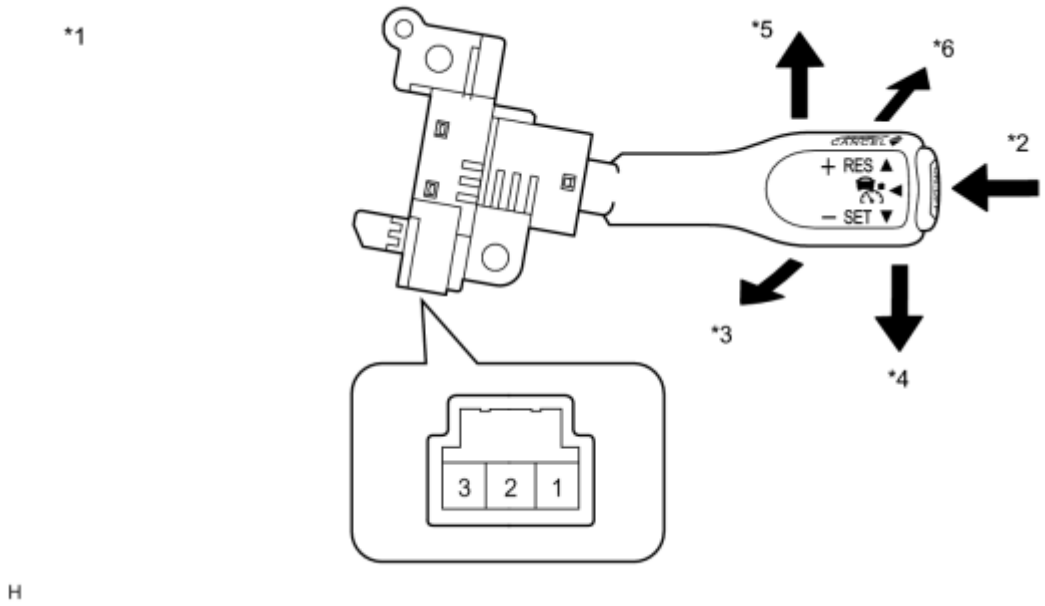


# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT CRUISE CONTROL MAIN SWITCH |

(a) Remove the cruise control main switch INFO.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Cruise Control Main Switch) | *2 | ON-OFF |
| *3 | CANCEL | *4 | -SET |
| *5 | +RES | *6 | MODE |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2<br><br>1 - 3 | Main switch off*1 | 1 MΩ or higher |
| 1 - 3 | Main switch on | Below 2.5 Ω |
| 1 - 2 | MODE | Below 2.5 Ω |
| 1 - 3 | + RES | 235 to 245 Ω |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 3 | - SET | 617 to 643 Ω |
| 1 - 3 | CANCEL | 1509 to 1571 Ω |

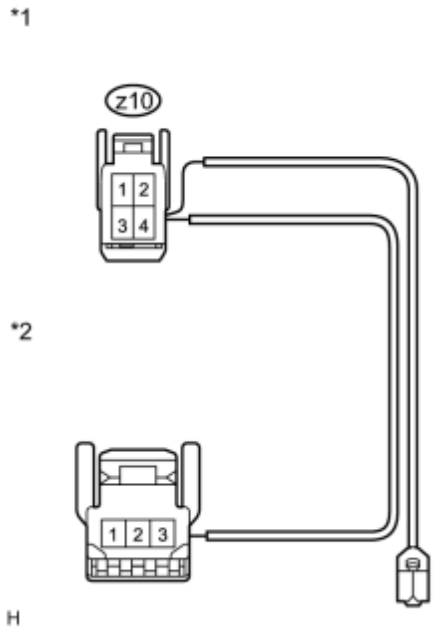
*1: The cruise control main switch lever is in the neutral position.

(c) Reinstall the cruise control main switch INFO.

NG ▶ REPLACE CRUISE CONTROL MAIN SWITCH

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - CRUISE CONTROL MAIN SWITCH) |




(a) Disconnect the connector from the spiral with sensor cable sub-assembly.

(b) Disconnect the connector from the cruise control main switch.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Cruise control main switch side connector terminal 1 - z10-4 | Always | Below 1 Ω |
| Cruise control main switch side connector terminal 2 - z10-1 | Always | Below 1 Ω |
| Cruise control main switch side connector terminal 3 - z10-3 | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Cruise Control Main Switch) |

(d) Reconnect the connector to the spiral with sensor cable sub-assembly.

(e) Reconnect the connector to the cruise control main switch.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL CABLE SUB-ASSEMBLY - CRUISE CONTROL MAIN SWITCH)

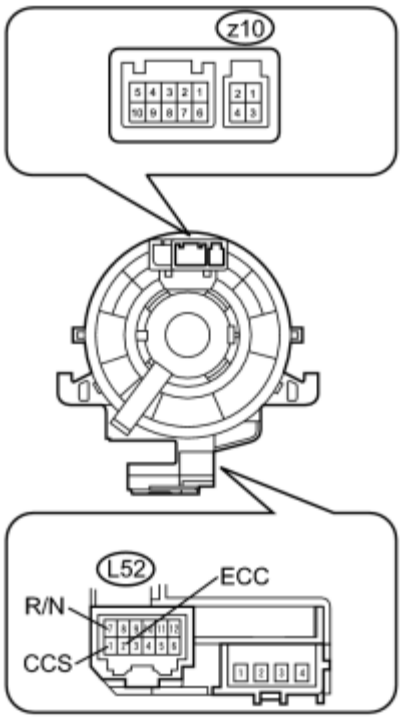
OK ▼

| | |
|---|---|
| 3. | INSPECT SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY |

NOTICE:

The spiral with sensor cable sub-assembly is an important part of the SRS airbag system. Incorrect removal or installation of the spiral with sensor cable sub-assembly may cause airbag deployment. Be sure to read the page shown in the brackets.

*1




(a) Remove the spiral with sensor cable sub-assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z10-1 - L52-7 (R/N) | The spiral with sensor cable sub-assembly is centered | Below 1 Ω |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the left | |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the right | |
| z10-3 - L52-1 (CCS) | The spiral with sensor cable sub-assembly is centered | Below 1 Ω |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the left | |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the right | |
| z10-4 - L52-2 (ECC) | The spiral with sensor cable sub-assembly is centered | Below 1 Ω |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the left | |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the right | |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Spiral with Sensor Cable Sub-assembly) |

HINT:

The spiral with sensor cable sub-assembly makes a maximum of approximately 5 rotations.

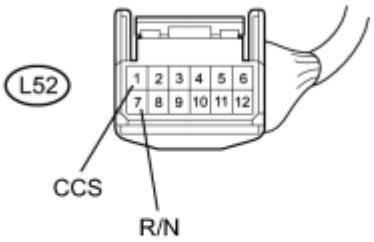
(c) Install the spiral with sensor cable sub-assembly INFO.

NG ▶ REPLACE SPIRAL WITH CABLE SUB-ASSEMBLY
OK
▼

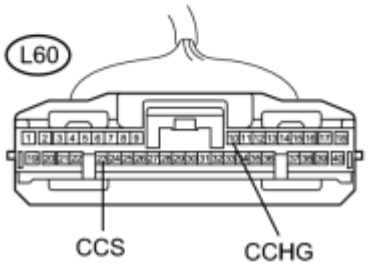
| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - DRIVING SUPPORT ECU) |

(a) Disconnect the driving support ECU connector.

*1




*2




(b) Disconnect the spiral with sensor cable sub-assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-23 (CCS) - L52-1 (CCS) | Always | Below 1 Ω |
| L60-10 (CCHG) - L52-7 (R/N) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-23 (CCS) or L52-1 (CCS) - Body ground | Always | 10 kΩ or higher |
| L60-10 (CCHG) or L52-7 (R/N) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |
| *2 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

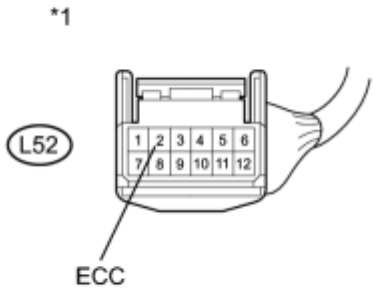
(d) Reconnect the driving support driving support ECU connector.

(e) Reconnect the spiral with sensor cable sub-assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - DRIVING SUPPORT ECU)

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - BODY GROUND) |




(a) Disconnect the spiral with sensor cable sub-assembly connector.

c

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-2 (ECC) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |

(c) Reconnect the spiral with sensor cable sub-assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - BODY GROUND)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

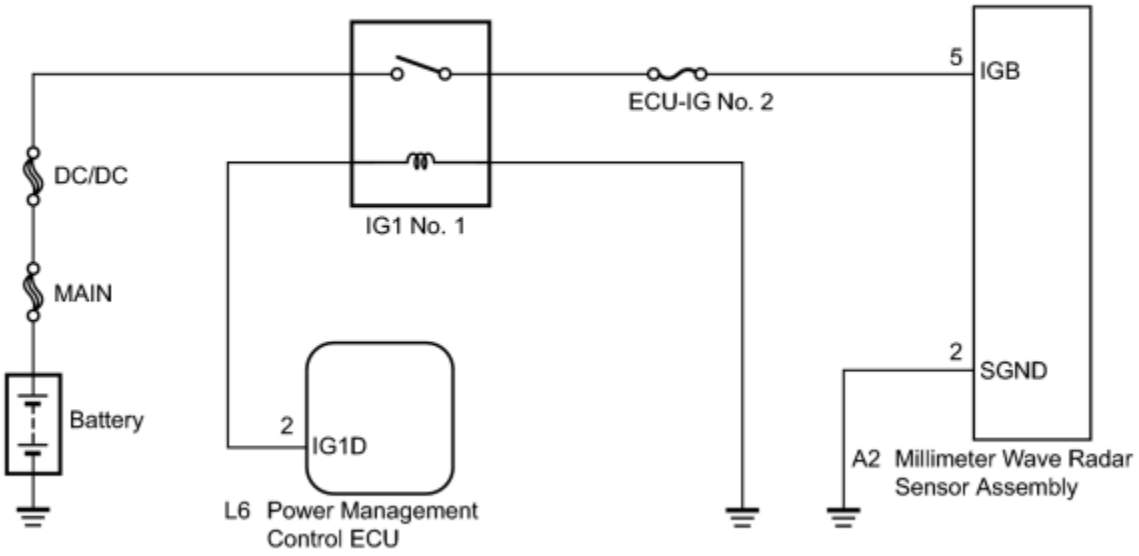
Millimeter Wave Radar Sensor Power Source Circuit

# DESCRIPTION

When the power switch is turned on (IG), battery voltage is applied to terminal IGB of the millimeter wave radar sensor assembly.

This circuit provides power to the millimeter wave radar sensor. The millimeter wave radar sensor emits radio waves towards an object in front and measures the distance and direction of the object by receiving the beam reflections. Based on the reflections, the sensor calculates the difference in speed between the vehicle and the object in front. This data is transmitted to the distance control ECU.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

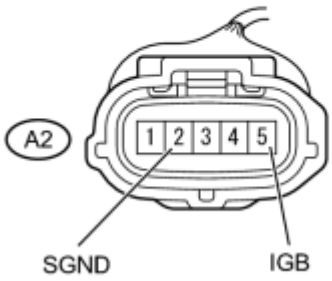
# PROCEDURE

| | |
|---|---|
| 1. | CHECK MILLIMETER WAVE RADAR SENSOR ASSEMBLY (IGB VOLTAGE) |

(a) Disconnect the millimeter wave radar sensor assembly connector.

(b) Turn the power switch on (IG).

*1




(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A2-5 (IGB) - A2-2 (SGND) | Power switch on (IG) | 10 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Millimeter Wave Radar Sensor Assembly) |

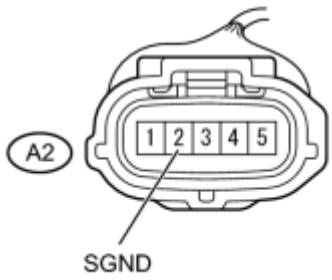
(d) Reconnect the millimeter wave radar sensor assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (MILLIMETER WAVE RADAR SENSOR ASSEMBLY - BODY GROUND)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MILLIMETER WAVE RADAR SENSOR ASSEMBLY - BODY GROUND) |

*1




(a) Disconnect the millimeter wave radar sensor assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A2-2 (SGND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| | (to Millimeter Wave Radar Sensor Assembly) |

(c) Reconnect the millimeter wave radar sensor assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MILLIMETER WAVE RADAR SENSOR ASSEMBLY - BODY GROUND)

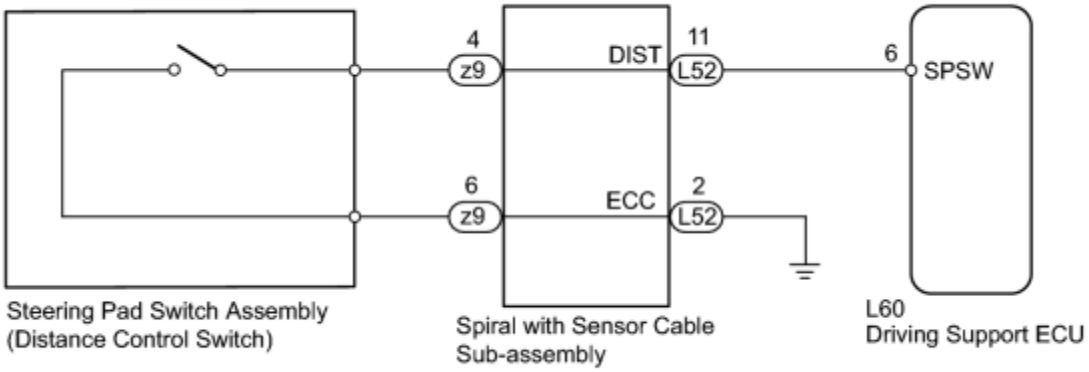
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (MILLIMETER WAVE RADAR SENSOR ASSEMBLY - IG1 NO. 1 RELAY)**

| |
|---|
| Distance Control Switch Circuit |

# DESCRIPTION

The distance control switch sets vehicle-to-vehicle distance control mode. The distance control switch is installed in the steering pad switch assembly. The vehicle-to-vehicle distance set value can be changed by operating the steering pad switch assembly (distance control switch) while the dynamic radar cruise control system is operating.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (DISTANCE CONTROL SWITCH) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Cruise / Data List / Distance Control Switch.

(e) Check the Data List proper functioning of the distance control switch.

Radar Cruise:

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Distance Control Switch | Distance control switch signal/ON or OFF | ON: Distance control switch on<br><br>OFF: Distance control switch off | - |

OK:

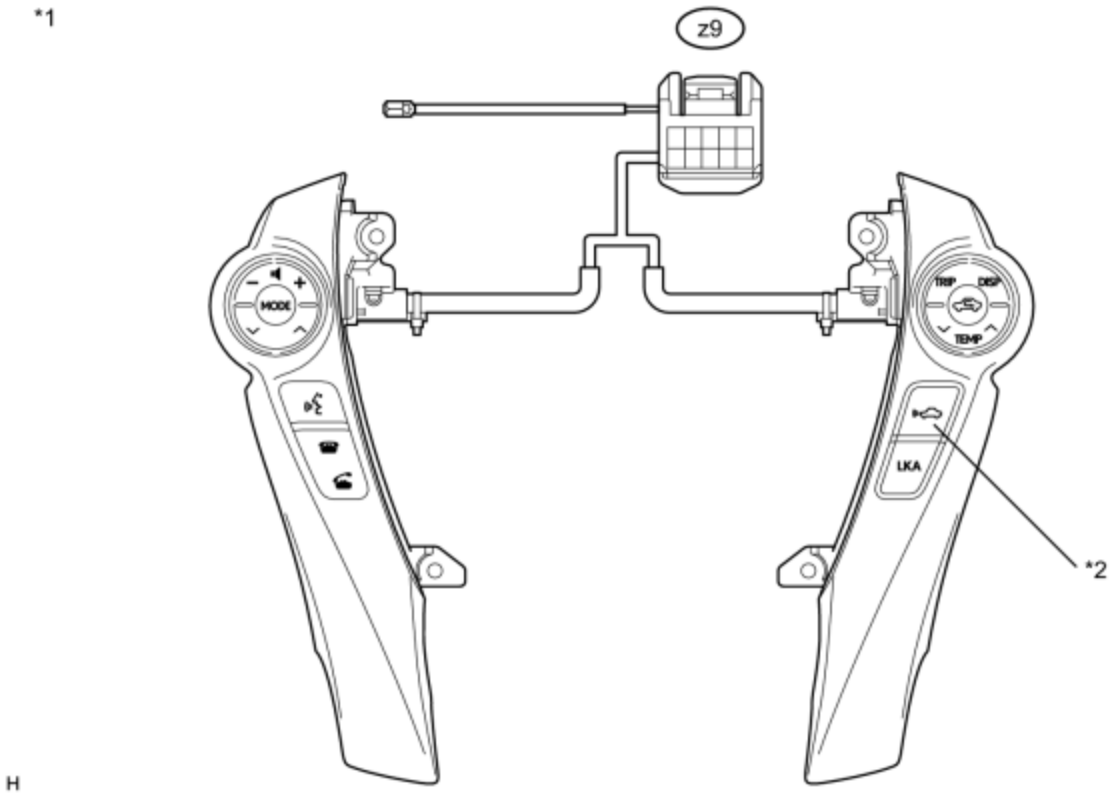
When the distance control switch is operated, the display changes in accordance with switch operation.

NG ▶ INSPECT STEERING PAD SWITCH ASSEMBLY

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | INSPECT STEERING PAD SWITCH ASSEMBLY |

(a) Remove the steering pad switch assembly INFO.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected | *2 | Distance Control Switch |

| | | | |
|---|---|---|---|
| | (Steering Pad Switch Assembly) | | |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z9-4 - z9-6 | Distance control switch ON | Below 2.5 Ω |
| z9-4 - z9-6 | Distance control switch OFF | 10 kΩ or higher |

(c) Install the steering pad switch assembly INFO.

NG ▶ REPLACE STEERING PAD SWITCH ASSEMBLY

OK

▼

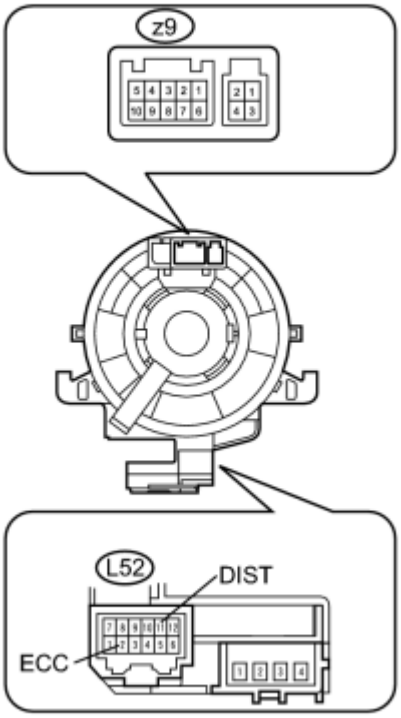
| | |
|---|---|
| 3. | INSPECT SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY |

NOTICE:

The spiral with sensor cable sub-assembly is an important part of the SRS airbag system. Incorrect removal or installation of the spiral with sensor cable sub-assembly may cause airbag deployment. Be sure to read the page shown in the brackets.

(a) Remove the spiral with sensor cable sub-assembly INFO.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z9-4 - L52-11 (DIST) | The spiral with sensor cable sub-assembly is centered | Below 1 Ω |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the left | |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the right | |
| z9-6 - L52-2 (ECC) | The spiral with sensor cable sub-assembly is centered | Below 1 Ω |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the left | |
| | The spiral with sensor cable sub-assembly position is 2.5 rotations to the right | |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Spiral with Sensor Cable Sub-assembly) |

HINT:

The spiral with sensor cable sub-assembly makes a maximum of approximately 5 rotations.

(c) Install the spiral with sensor cable sub-assembly INFO.

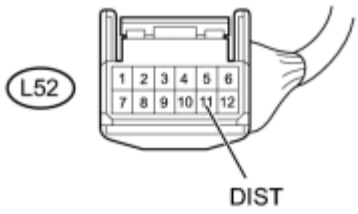
NG ▶ REPLACE SPIRAL WITH CABLE SUB-ASSEMBLY

OK

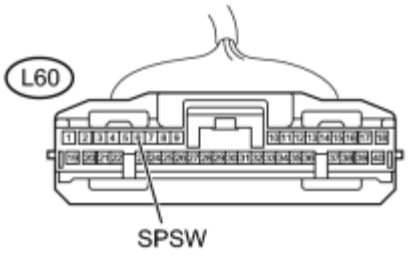
▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - DRIVING SUPPORT ECU) |

*1




*2




(a) Disconnect the driving support ECU connector.

(b) Disconnect the spiral with sensor cable sub-assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-6 (SPSW) - L52-11 (DIST) | Always | Below 1 Ω |
| L60-6 (SPSW) or L52-11 (DIST) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |
| *2 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(d) Reconnect the driving support ECU connector.

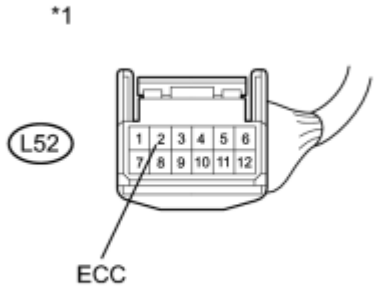
(e) Reconnect the spiral with sensor cable sub-assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - DRIVING SUPPORT ECU)

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - BODY GROUND) |




(a) Disconnect the spiral with sensor cable sub-assembly connector.

c

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-2 (ECC) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |

(c) Reconnect the spiral with sensor cable sub-assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY - BODY GROUND)

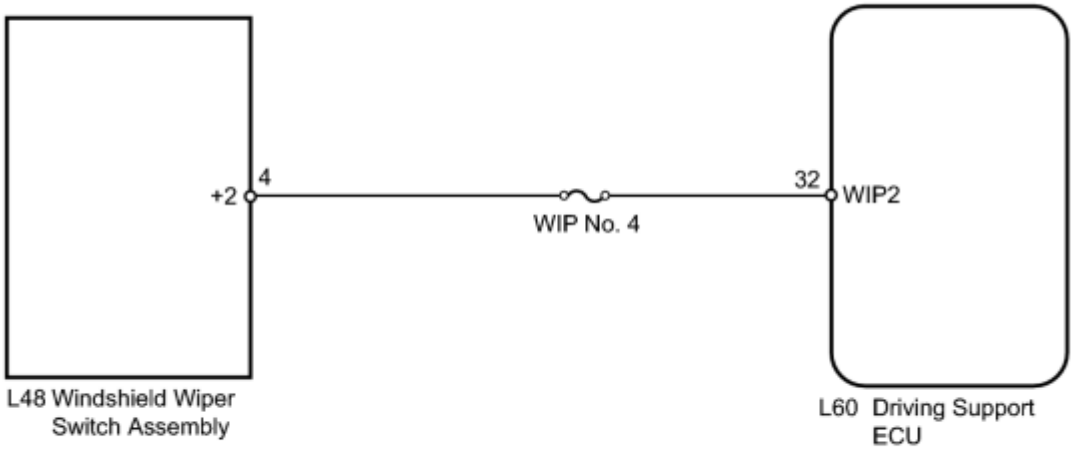
OK ▶ **REPLACE DRIVING SUPPORT ECU**

| Wiper Signal Circuit |
|---|

# DESCRIPTION

When the driving support ECU detects that the wipers are operating at high speed, the dynamic radar cruise control system will be canceled.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

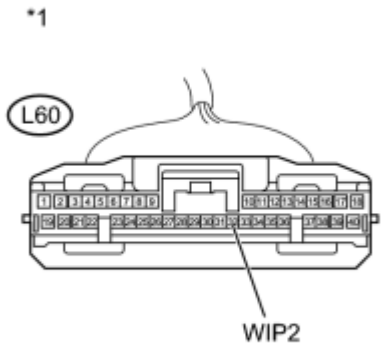
NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT DRIVING SUPPORT ECU |

(a) Disconnect the driving support ECU connector.




(b) Turn the power switch on (IG).

(c) Set the windshield wiper switch assembly to the HI position.

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-32 (WIP2) - Body ground | Power switch on (IG)<br><br>Windshield wiper switch assembly Hi position | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

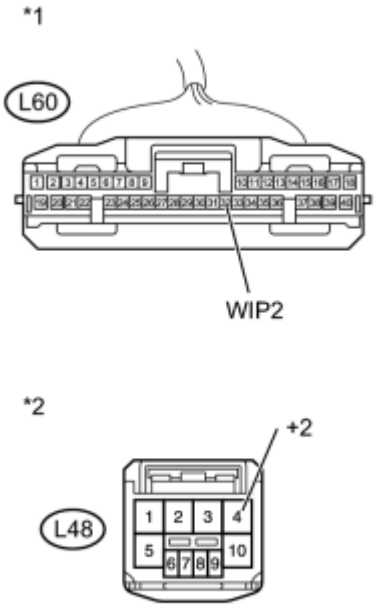
(e) Reconnect the driving support ECU connector.

NG ▶ CHECK HARNESS AND CONNECTOR (DRIVING SUPPORT CONTROL ECU - WINDSHIELD WIPER SWITCH)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (DRIVING SUPPORT CONTROL ECU - WINDSHIELD WIPER SWITCH) |

(a) Disconnect the driving support ECU connector.




(b) Disconnect the windshield wiper switch assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-32 (WIP2) - L48-4 (+2) | Always | Below 1 Ω |

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-32 (WIP2) or L48-4 (+2) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |
| *2 | Front view of wire harness connector<br><br>(to Windshield Wiper Switch Assembly) |

(d) Reconnect the driving support ECU connector.

(e) Reconnect the windshield wiper switch assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT CONTROL ECU - WINDSHIELD WIPER SWITCH)

OK ▶ **GO TO WIPER AND WASHER SYSTEM**

| Cruise Main Indicator Light Circuit |
|---|

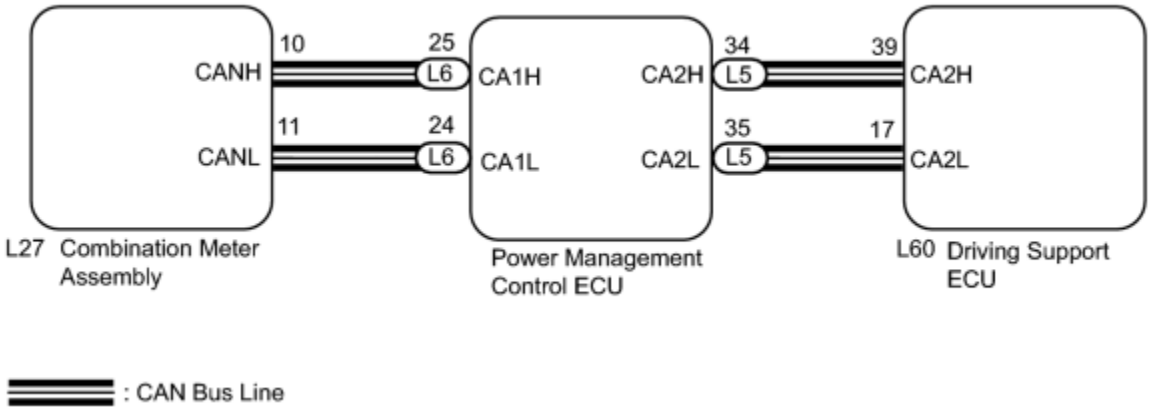
# DESCRIPTION

When the cruise control main switch is turned on, the cruise main indicator light and "RADAR READY" indicator come on. This indicates the control condition (presence or absence of a vehicle in front, vehicle-to-vehicle distance, and set vehicle speed) and fail-safe state through the CAN communication system. The master warning light and cruise main indicator light come on and vehicle-to-vehicle distance information is displayed on the combination meter assembly as the alarm buzzer sounds. Items such as "Clean Radar Sensor", "Cruise not Available", "Check Cruise System", and "Radar Cruise Ready" are displayed on the multi-information display on the combination meter assembly when the driving support ECU detects signals from each sensor and actuator and sends them to the combination meter assembly via CAN.

HINT:

If the vehicle in front in the same lane significantly decreases vehicle speed or another vehicle moves in front of your vehicle, adequate deceleration cannot be applied by the cruise control system and the vehicle-to-vehicle distance will shorten. At this time, the system sounds the buzzer and the master warning light blinks to warn the driver. Each indicator in the dynamic radar cruise control uses CAN for communication. Therefore, if there are any malfunctions in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the cruise main indicator light by performing Active Test.

**Combination Meter**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Lamp Cruise | Cruise main indicator light<br><br>(Constant speed control mode) | OFF or ON | Confirm that the vehicle is stopped with engine idling |
| Indicat. Radar Cruise | Cruise main indicator light<br><br>(Vehicle-to-vehicle distance control mode) | OFF or ON | Confirm that the vehicle is stopped with engine idling |

OK:

The display changes in accordance with Active Test operation.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Data List.

(e) Check the Data List for proper functioning of the cruise main indicator light.

**Radar Cruise**

| Techstream Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Cruise Control Main Switch | Cruise control switch signal/ON or OFF | ON: Main switch on<br><br>OFF: Main switch off | - |

OK:

When the cruise control main switch is operated, the display changes in accordance with switch operation.

NG ▶ REPLACE DRIVING SUPPORT ECU

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| Cruise SET Indicator Light Circuit |
|---|

# DESCRIPTION

- The driving support ECU detects a cruise control switch signal and sends it to the combination meter assembly through CAN. Then the SET indicator light comes on.
- The SET indicator light circuit uses CAN for communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

# WIRING DIAGRAM

Refer to "Cruise Main Indicator Light Circuit" INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the SET indicator light by performing the Active Test.

**Combination Meter**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Lamp SET | CRUISE SET indicator light | SET indicator light BLINK / OFF | - |

OK:

The SET indicator light blinks or goes off according to Techstream operation.

NG ▶ REPLACE NO.3 METER CIRCUIT PLATE
OK
▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Radar Cruise / Data List.

(e) According to the display on tester, read the Data List.

**Radar Cruise**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| SET/COAST Switch | - SET switch / ON or OFF | ON: - SET switch ON<br><br>OFF: - SET switch off | - |

OK:

The display changes as shown above according to cruise control main switch operation.

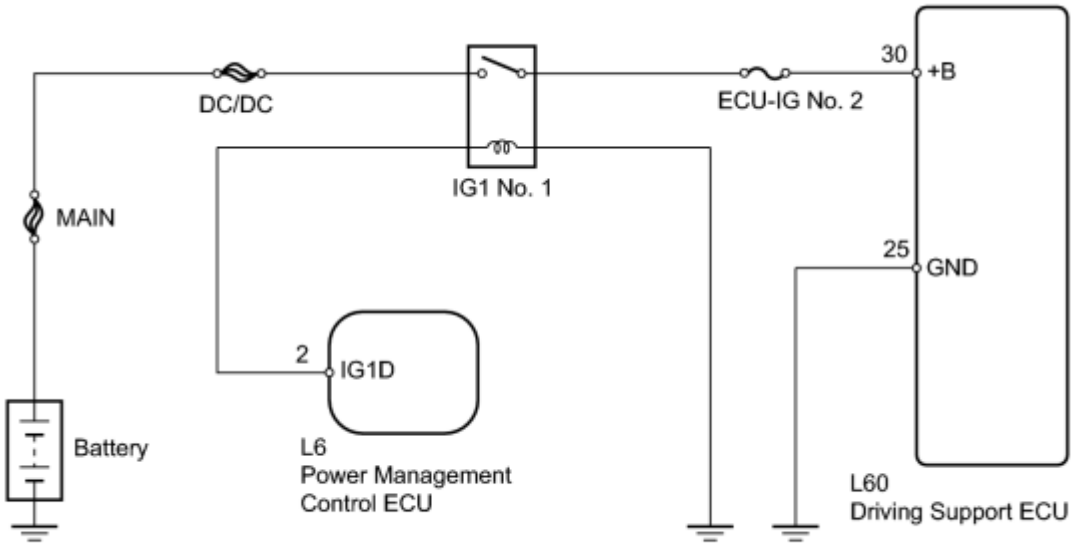
NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| ECU Power Source Circuit |
|---|

# DESCRIPTION

- The driving support ECU assembly controls the cruise control system based on information sent from switches, sensors and ECUs.
- The power management control ECU sends current to the IG1 No. 1 relay. This closes the contact points in the relay so that power is supplied to the driving support ECU +B terminal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

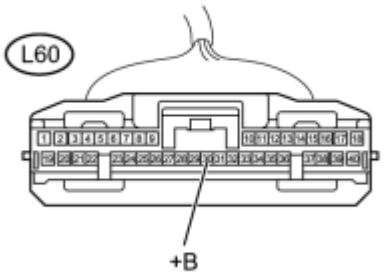
Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DRIVING SUPPORT ECU (+B VOLTAGE) |

(a) Disconnect the driving support ECU connector.

*1




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L60-30 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

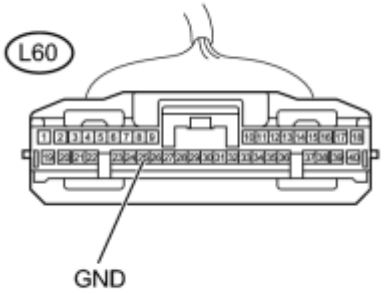
(d) Reconnect the driving support ECU connector.

NG ▶ INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (DRIVING SUPPORT ECU - BODY GROUND) |

*1




(a) Disconnect the driving support ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-25 (GND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

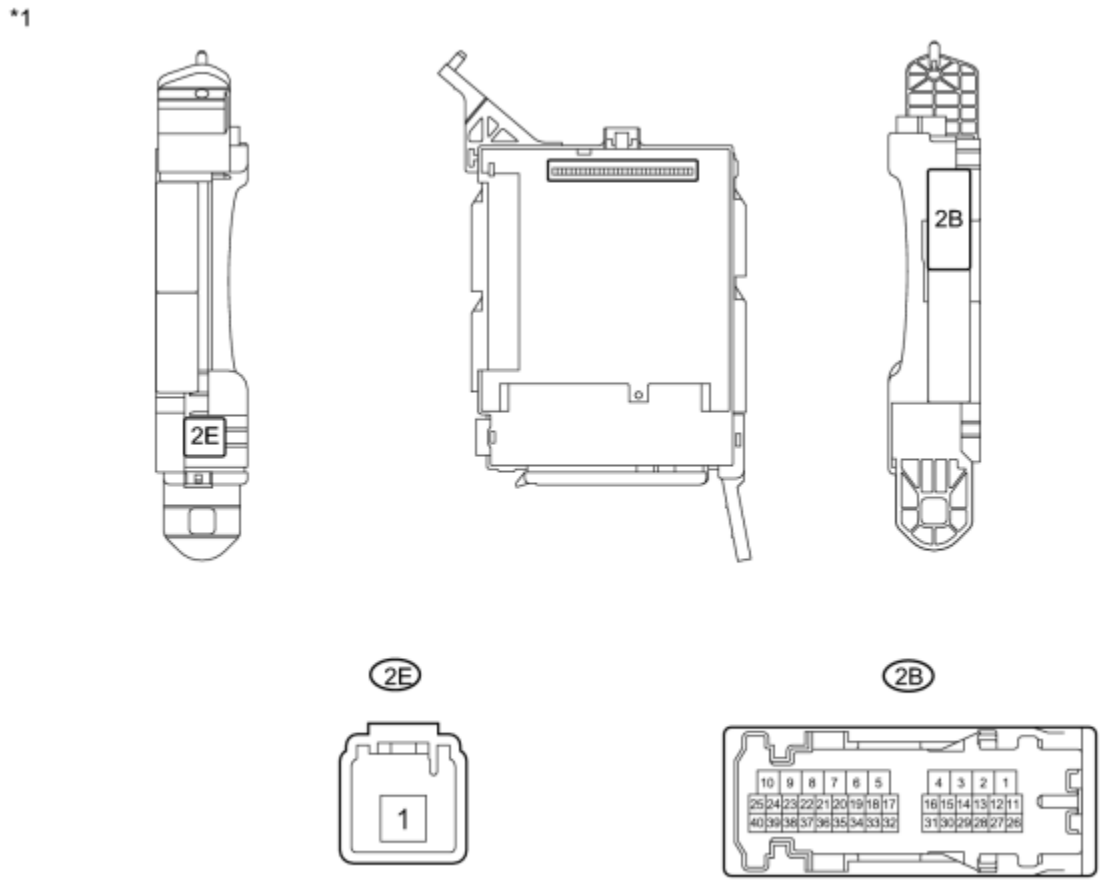
(c) Reconnect the driving support ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - BODY GROUND)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 3. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Remove the instrument panel junction block assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2E-1 - 2B-16 | Always | 10 kΩ or higher |
| 2E-1 - 2B-16 | Battery voltage applied between terminals 2B-25 and 2B-6 | Below 1 Ω |

**Text in Illustration**

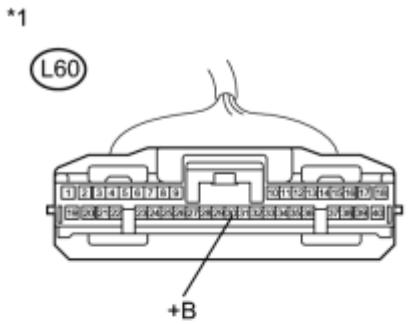
| | | | |
|---|---|---|---|
| *1 | Instrument Panel Junction Block Assembly | - | - |

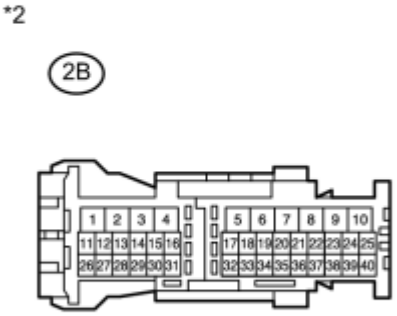
(c) Reinstall the instrument panel junction block assembly.

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (DRIVING SUPPORT ECU - INSTRUMENT PANEL JUNCTION BLOCK) |




(a) Disconnect the driving support ECU connector.

(b) Disconnect the instrument panel junction block assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-30 (+B) - 2B-16 | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |
| *2 | Instrument Panel Junction Block |

(d) Reconnect the instrument panel junction block assembly connector.

(e) Reconnect the driving support ECU connector.

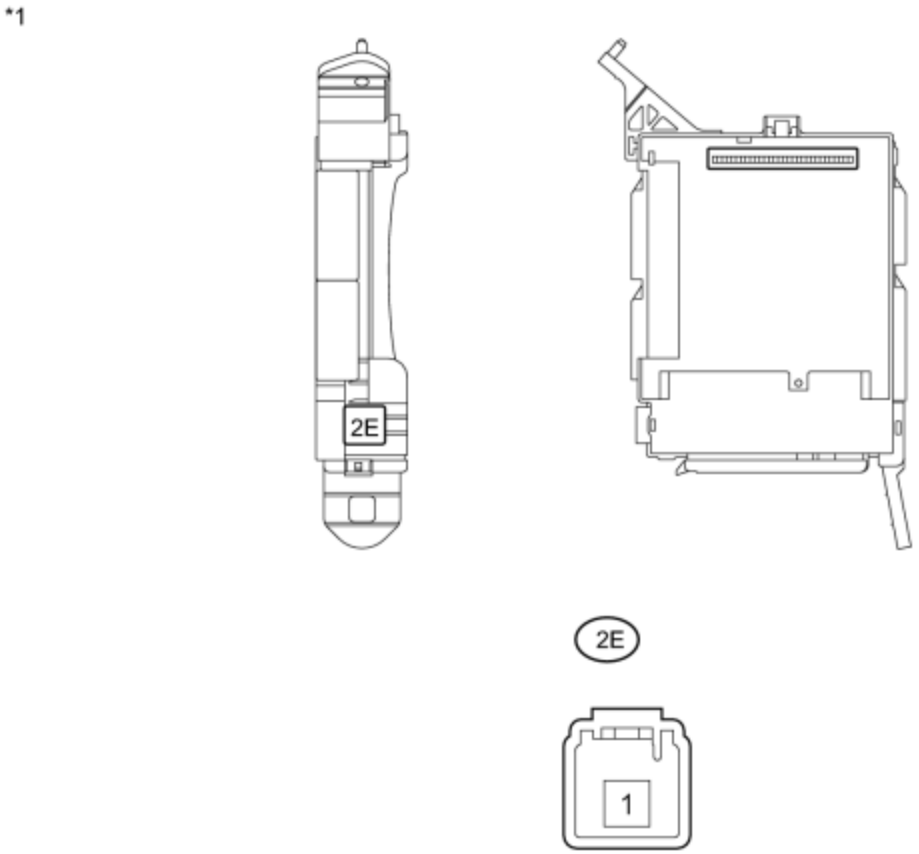
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - INSTRUMENT

PANEL JUNCTION BLOCK)

OK

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK POWER SOURCE CIRCUIT) |

(a) Disconnect the instrument panel junction block assembly connector.




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 2E-1 - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Instrument Panel Junction Block Assembly | - | - |

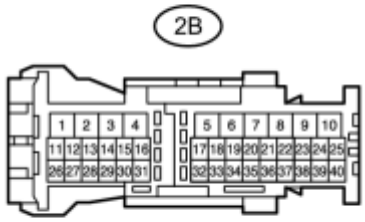
(c) Reconnect the instrument panel junction block assembly connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BATTERY)

OK ↓

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND) |

*1




(a) Disconnect the instrument panel junction block assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-6 - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Instrument Panel Junction Block Assembly |

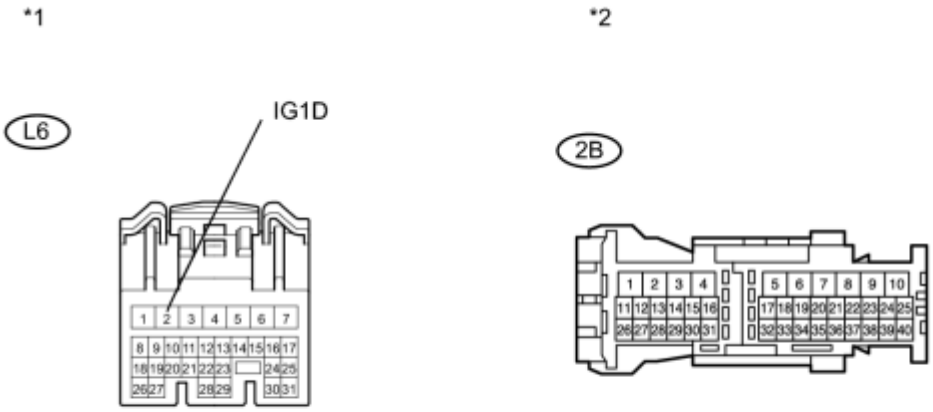
(c) Reconnect the instrument panel junction block assembly connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND)

OK ↓

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INSTRUMENT PANEL J/B ASSEMBLY) |

(a) Disconnect the power management control ECU connector.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Management Control ECU) | *2 | Instrument Panel Junction Block Assembly |

(b) Disconnect the instrument panel junction block assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-25 - L6-2 (IG1D) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-25 or L6-2 (IG1D) - Body ground | Always | 10 kΩ or higher |

(d) Reconnect the power management control ECU connector.

(e) Reconnect the instrument panel junction block assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - INSTRUMENT PANEL J/B ASSEMBLY)

OK ▶ **GO TO SMART KEY SYSTEM**

| TC and CG Terminal Circuit |
|---|

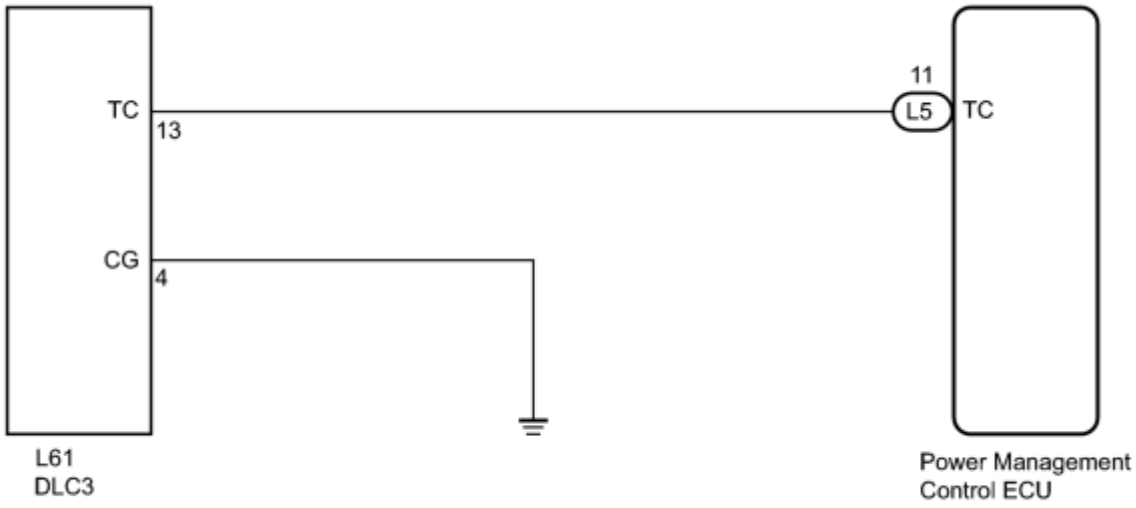
# DESCRIPTION

Connecting terminals TC and CG of the DLC3 causes the system to enter self-diagnostic mode. If a malfunction is present, the cruise main indicator light will blink.

HINT:

When a particular warning light remains blinking, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in the relevant ECU is suspected.

# WIRING DIAGRAM

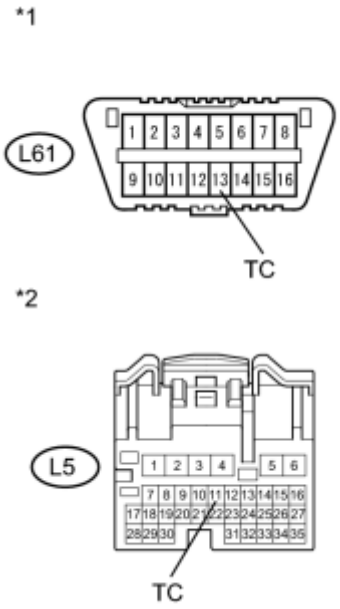



# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (TERMINAL TC of DLC3 - ECM) |

(a) Disconnect the power management control ECU connector.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-11 (TC) - L61-13 (TC) | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | DLC3 |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

(c) Reconnect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - POWER MANAGEMENT CONTROL ECU)

OK

▼

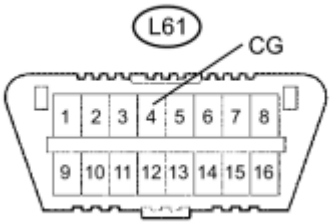
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (TERMINAL CG of DLC3 - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-4 (CG) - Body ground | Always | Below 1 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DLC3 - BODY GROUND)

OK

▼

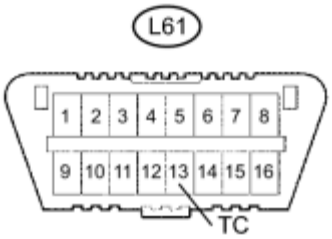
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TERMINAL TC of DLC3 - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-13 (TC) - Body ground | Always | 10 kΩ or higher |

*1




## Text in Illustration

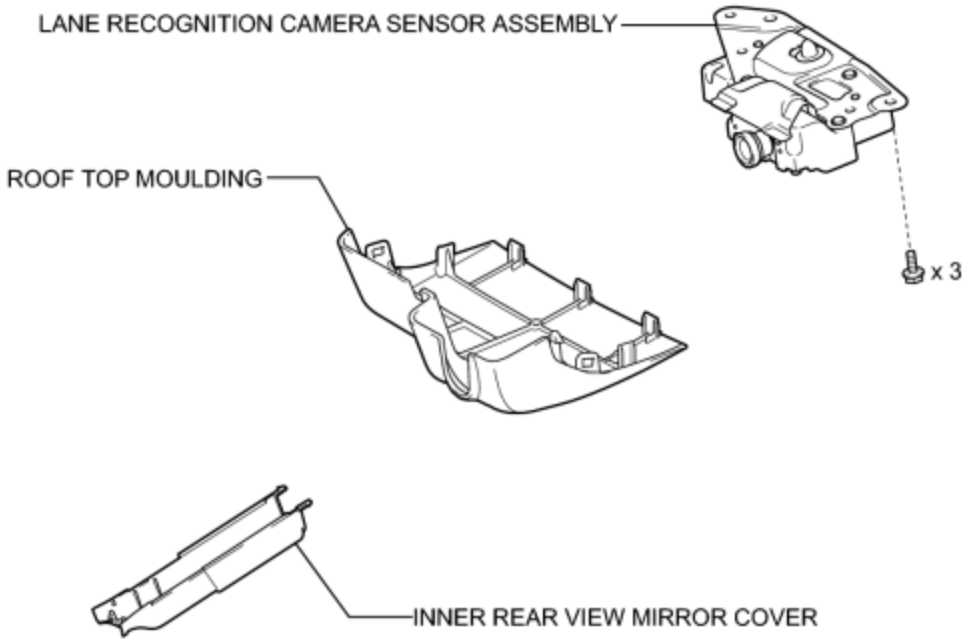
| | |
|---|---|
| *1 | DLC3 |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR OR EACH ECU

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# COMPONENTS

# ILLUSTRATION

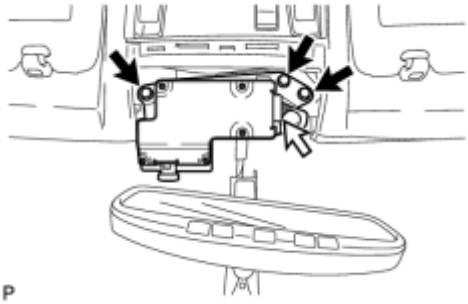



P

# REMOVAL

1. REMOVE INNER REAR VIEW MIRROR COVER INFO

2. REMOVE ROOF TOP MOULDING INFO




3. REMOVE LANE RECOGNITION CAMERA SENSOR ASSEMBLY

(a) Disconnect the connector.

(b) Remove the 3 bolts.

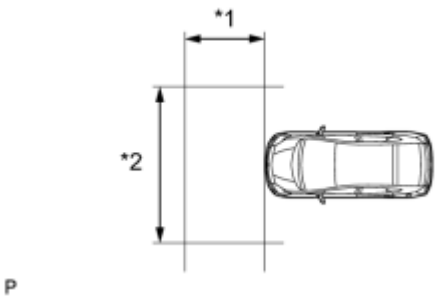
(c) Detach the clip and remove the lane recognition camera sensor assembly.

# ADJUSTMENT

HINT:

If the lane recognition camera sensor is replaced or removed and installed, or the toe-in is adjusted, perform the lane recognition camera sensor adjustment.

1. ADJUST LANE RECOGNITION CAMERA SENSOR ASSEMBLY




**Text in Illustration**

| | |
|---|---|
| *1 | 1.5 m or more |
| *2 | 3 m or more |

- Make sure there are no black and white patterned objects in front of the vehicle.
- Be sure to perform the measurement on a level surface that is free of obstacles and extends 1.5 m (4.92 ft.) or more in front of the vehicle.
- Make sure that there is no wind when performing the measurement.
- Check that there are no reflective materials in the surroundings or on the ground within a 3 m (9.84 ft.) x 3 m (9.84 ft.) area in front of the vehicle.
- Perform the inspection in a bright area.

(a) Prepare for beam axis learning.

(1) Move the vehicle to a level surface.

(2) Make sure the engine oil in the vehicle is at the specified level.

(3) Make sure the engine coolant in the vehicle is at the specified level.

(4) Make sure the fuel tank is full.

(5) Make sure the spare tire is in the vehicle.

(6) Make sure the standard tools are in the vehicle.

(7) Make sure nobody is in the vehicle.

(8) Make sure no extra loads are in the vehicle.

(9) Adjust the tire pressures to the specified pressure.

(10) Clean the windshield.

(11) If the lens of the lane recognition camera sensor is dirty, apply a small amount of lens cleaner to a clean and soft cloth, and clean the lens.

(b) Perform the front wheel alignment adjustment.

(1) Perform the front wheel alignment adjustment INFO.

NOTICE:

Perform this procedure as accurately as possible.

(c) Perform the rear wheel alignment adjustment.

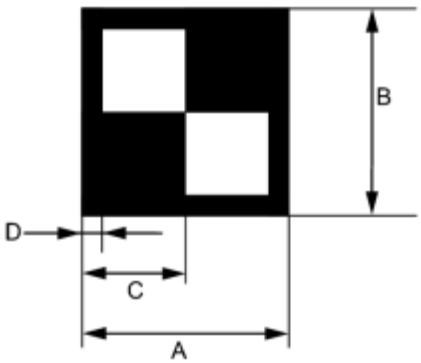
(1) Perform the rear wheel alignment adjustment INFO.

NOTICE:

- Perform this procedure as accurately as possible.

(d) Create a target sheet.

(1) Print or copy the illustration . Check that the dimensions are +/- 5 mm (0.197 in.) of the ones in the table below.




P

Dimension:

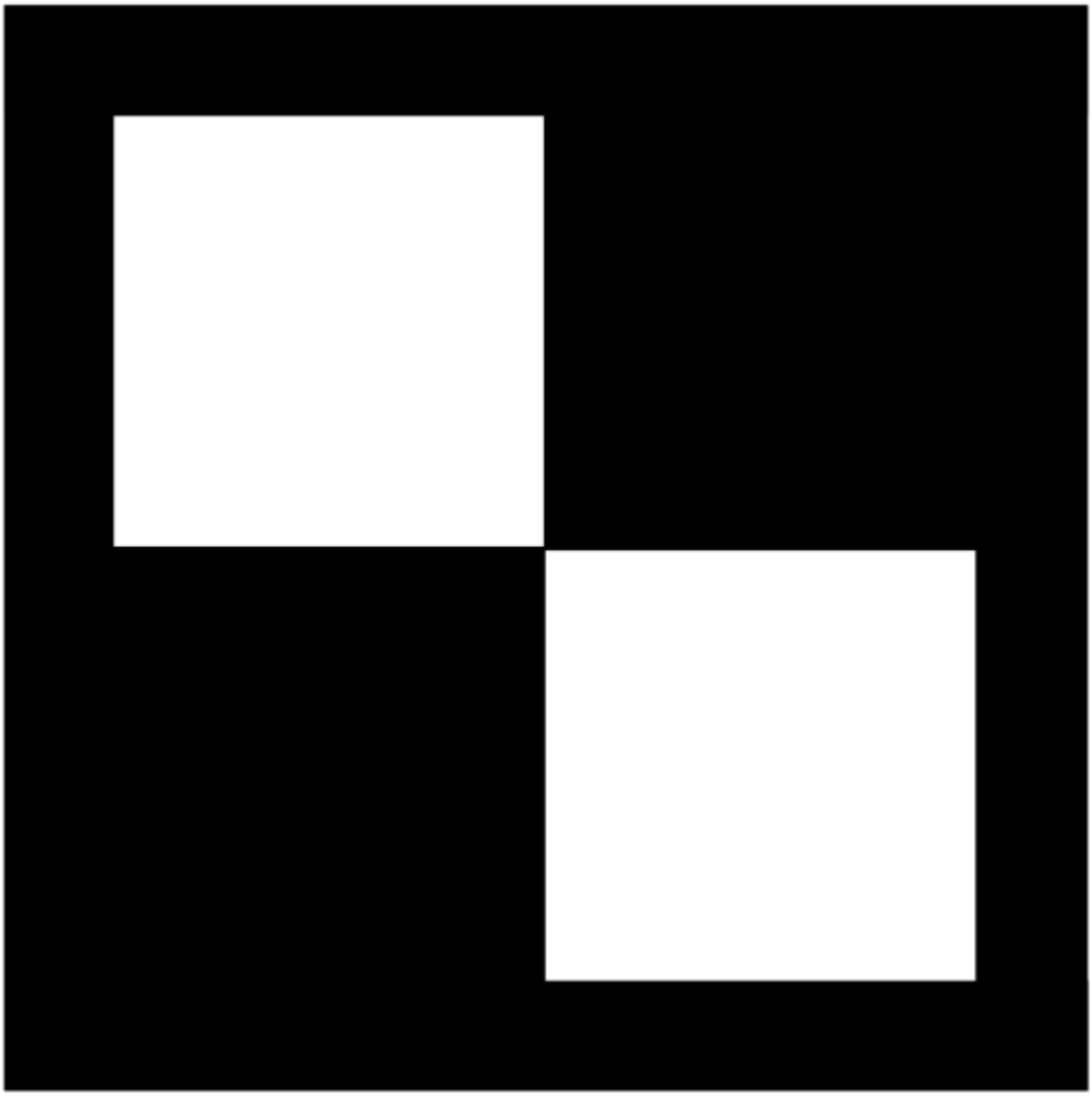
| Area | Specification |
|---|---|
| A | 160 mm (6.30 in.) |
| B | 160 mm (6.30 in.) |
| C | 80 mm (3.15 in.) |

| Area | Specification |
|---|---|
| D | 16 mm (0.630 in.) |

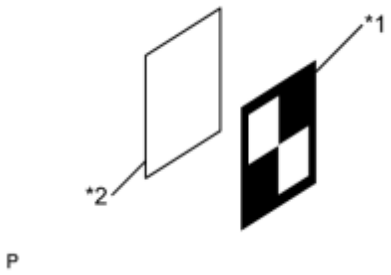
NOTICE:

- Make sure that the black areas of the target sheet it not glossy.
- Make sure that the borders of the black and white areas on the target sheet it straight, and are not warped or blurry.

If the print or copy's dimensions are not as specified, adjust settings and reprint or recopy so that the print or copy's dimensions are as specified.



(e) Attach the target sheet.




P

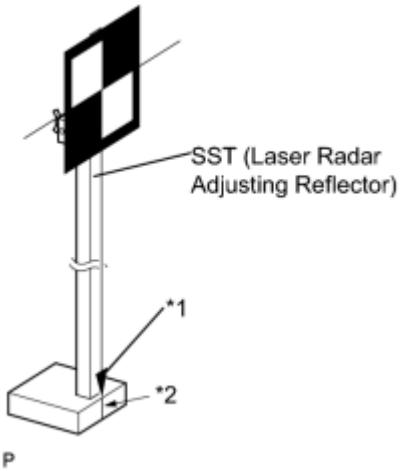
**Text in Illustration**

| | |
|---|---|
| *1 | Target Sheet |
| *2 | Cardboard, etc. |

(1) Place the prepared target sheet on a piece of cardboard of the same size with the black area on the top right, as shown in the illustration. Then use double-sided tape to fix the target sheet in place.

NOTICE:

Do not attach reflective tape, such as transparent adhesive tape, etc. to the target face, as this may affect target recognition.




P

(2) Hang a weight with a pointed tip from the center of the target sheet. Then, with double-sided tape, attach the target sheet to the reflector so that the weight aligns with the mark-off line of SST (laser radar adjusting reflector).

SST: 09870-60000

09870-60010

09870-60020

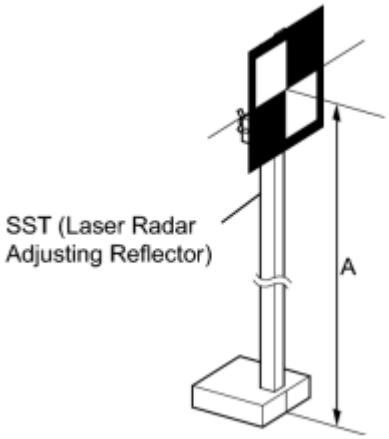
# Text in Illustration

| | |
|---|---|
| *1 | Pointed Tip Weight |
| *2 | Mark-off Line |

- Perform this procedure as accurately as possible.
- Attach the target sheet so that it is horizontal with the ground.

(3) Move the reflector up and down to position the center of the target at the height shown in the illustration, and fix it in place.

Dimension A:




P

986 mm (3.23 ft.)

SST: 09870-60000

09870-60010

09870-60020

NOTICE:

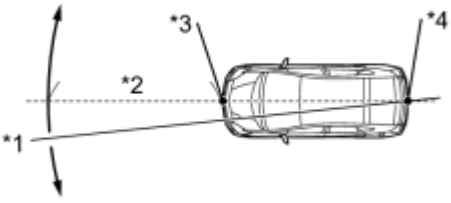
Perform this procedure as accurately as possible.

(f) Measure the target placement point.

NOTICE:

- Do not place black and white patterned objects near the target.
- Face the vehicle toward a wall with no patterns, or make sure the background behind the target has no patterns.
- Perform this procedure as accurately as possible.
- Do not place reflective materials in the area behind the target.
- Make sure the distance between the target and wall is within 3 m (9.84 ft.).
- Make sure the target's shadow is not on the wall, as the camera may have a recognition error.

(1) From the center of the front and back bumpers (center of the emblems), hang a weight with a pointed tip, and mark the front bumper center point A and the rear bumper center point B on the ground.




P

# Text in Illustration

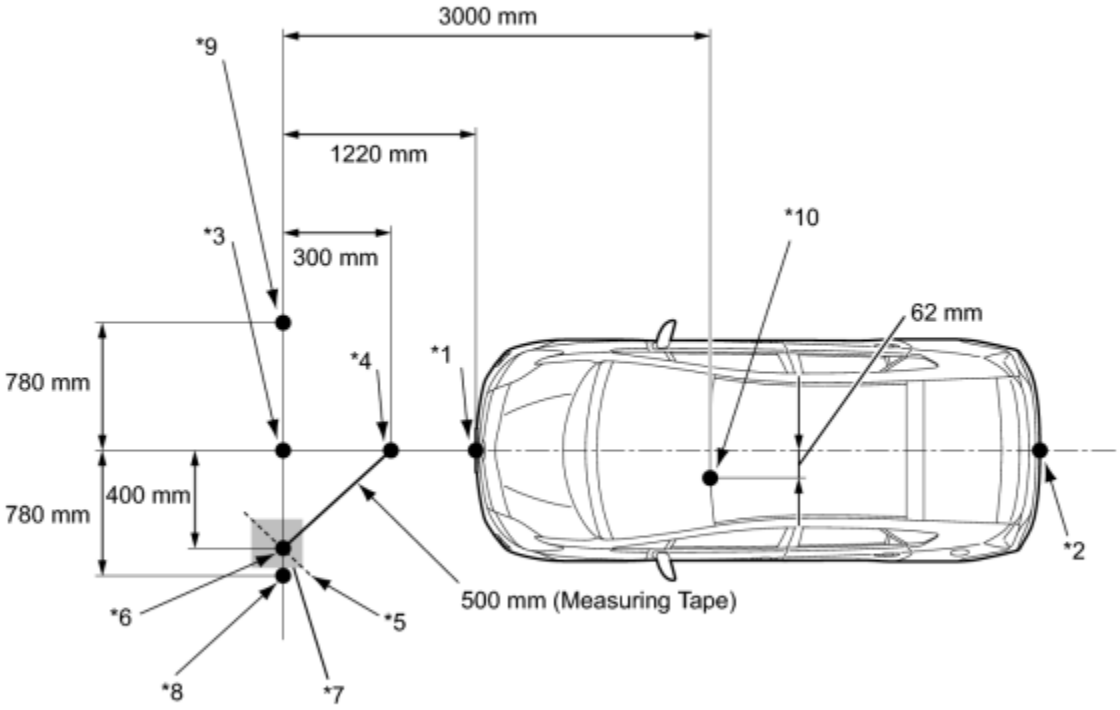
| | |
|---|---|
| *1 | Line |
| *2 | Approx. 2 m |
| *3 | Point A |
| *4 | Point B |

(2) Draw a line that connects points A and B, and extend the line approximately 2 m (6.56 ft.) beyond the front of the vehicle.

HINT:

Secure the end of a string to point B. Then hold the other end of the string approximately 2 m (6.56 ft.) in front of the vehicle, and move it to the left or right to align the string with point A to make a straight line.

(3) Mark point C 1220 mm (4.00 ft.) from the front bumper center point A (placement point 1).




P

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Point A | *2 | Point B |
| *3 | Placement Point 1 Point C | *4 | Point D |
| *5 | Line E | *6 | Point F |
| *7 | Place Tape (Gray Area) Approx. 400 mm from Point C | *8 | Placement Point 2 Point G |
| *9 | Placement Point 3 Point H | *10 | Lane Recognition Camera Sensor Position |

(4) From point C, move 300 mm (11.8 in.) towards the front bumper center point A and mark point D.

(5) From point C, place marking tape at the point 400 mm (1.30 ft.) perpendicular to the line that connects points A and B.

NOTICE:

Place the tape so that there is plenty of surface area along the perpendicular line.

(6) Using a measuring tape of 5 m (16.41 ft.) or more, and point D as the center point, draw the part of a 500 mm (1.64 ft.) circle that overlaps the marking tape (line E).

(7) Mark point F where the following intersect: 1) from point C, the point that is 400 mm (1.30 ft.) perpendicular from the line that connects point A and B; and 2) line E.

(8) Set the measuring tape from point C to F. Then mark point G 780 mm (2.56 ft.) from point C (line extending from point C to F) (placement point 2).

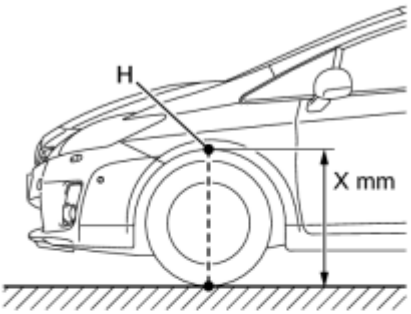
(9) Set the measuring tape from point F to C. Then mark point H 780 mm (2.56 ft.) beyond point C (placement point 3).

(10) Set a string between points G and H, and draw a line on the ground (target placement line).

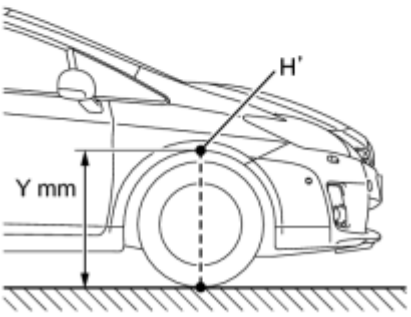
(g) Measure lane recognition camera sensor height.

NOTICE:

- Do not place black and white patterned objects near the target.
- Face the vehicle toward a wall with no patterns, or make sure the background behind the target has no patterns.
- Perform this procedure as accurately as possible.
- Do not place reflective materials in the area behind the target.
- Make sure the distance between the target and wall is within 3 m (9.84 ft.).
- Make sure the target's shadow is not on the wall, as the camera may have a recognition error.




(1) Measure the distance (X mm or in.) from the ground to point H for the front left wheel arch.




P

(2) Measure the distance (Y mm or in.) from the ground to point H' for the front right wheel arch.

(3) The average of the 2 distances (X mm or in, Y mm or in.) plus 617 mm (2.03 ft.) is the height of the lane recognition camera sensor.

(h) Memorize camera/target position.

NOTICE:

- Close all doors.
- Perform the procedure with no one in the vehicle.
- During the procedure, do not lean on the vehicle.
- Turn on the clearance lights.
- Do not turn on the headlights.

(1) When using the Techstream:

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG).*1
3. Turn the Techstream on.
4. Select "Chassis" from the display screen.
5. Select "Lane Keeping Assist" from the display screen.
6. Select "Utility" from the display screen.
7. Select "Camera/target position memory".

   HINT:

   A buzzer will sound for 1 second.

8. Follow the Techstream display, and continue with the adjustment.

(2) Input the measured height of the lane recognition camera sensor and the horizontal position of the camera "-62 mm (-2.44 in.)" into the input screen. Then press the "Enter" button on the display screen.

(3) Input "3000 mm (9.833 ft.)" for the distance from the camera to the target and "986 mm (3.23 ft.)" for the height of the target into the input screen. Then press the "Enter" button on the display screen.

(4) Press the "Exit" button to finish the camera/target position memory mode.

NOTICE:

If "Error Camera/target position memory" is displayed on the screen, press the "Try Again" button, and repeat from procedure *1 again.

(i) Perform beam axis learning.

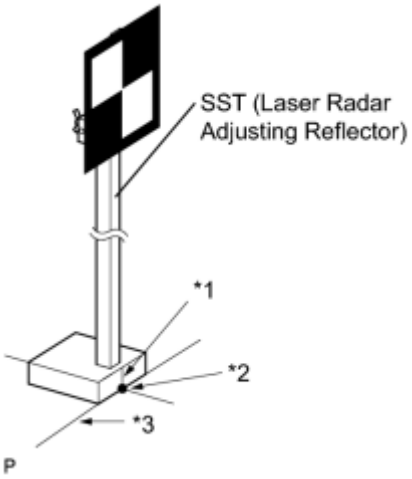
(1) Select "Chassis" from the display screen.

(2) Select "Lane Keeping Assist" from the display screen.*1

(3) Select "Utility" from the display screen.

(4) Select "Camera Axis Adjust" from the display screen.

(5) Follow the Techstream display, and continue with the adjustment.

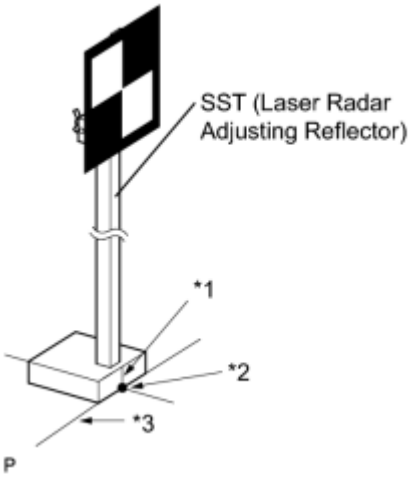



(6) Align the target sheet with the target placement line, and align the mark-off line with placement point 1 (point C).

## Text in Illustration

| | |
|---|---|
| *1 | Mark-off Line |
| *2 | Point C |
| *3 | Target Placement Line |

(7) Check that the screen displays beam axis learning for target 1, then press the "Enter" button on the display screen.




(8) Align the target sheet with the target placement line, and align the mark-off line with placement point 2 (point G).

## Text in Illustration

| | |
|---|---|
| *1 | Mark-off Line |
| *2 | Point G |
| *3 | Target Placement Line |

(9) Check that the screen displays beam axis learning for target 2, then press the "Enter" button on the display screen.

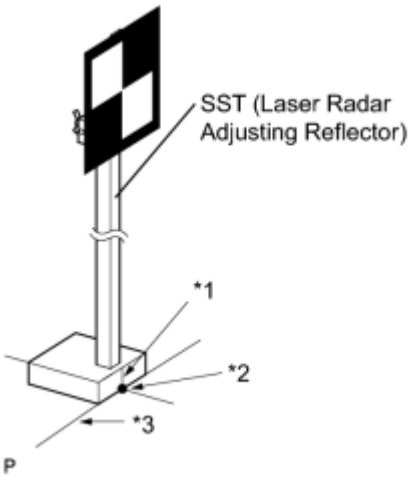
NOTICE:

Within 3 minutes after the screen displays the beam axis learning for target 2, move the target and press the "Enter" button on the display screen.

(10) Align the target sheet with the target placement line, and align the mark-off line with placement point 3 (point H).

## Text in Illustration

| | |
|---|---|
| *1 | Mark-off Line |
| *2 | Point H |
| *3 | Target Placement Line |




(11) Check that the screen displays beam axis learning for target 3, then press the "Enter" button on the display screen.

NOTICE:

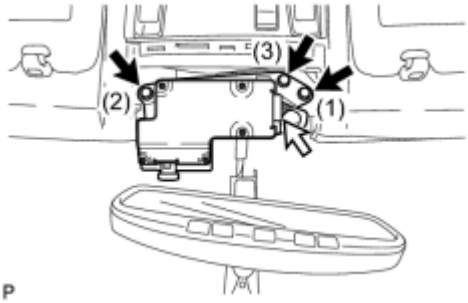
Within 3 minutes after the screen displays the beam axis learning for target 3, move the target and press the "Enter" button on the display screen.

(12) Press the "Exit" button to finish the beam axis learning mode.

## If "Error camera axis adjust" is displayed on the screen, press the "Exit" button. Then after checking the conditions below, turn the power switch on (IG) and off, and repeat from procedure *1 again.

- Height of the target.
- Distance from lane recognition camera sensor to target.
- Orientation of target (black area positioned on top right).
- If surrounding area is bright enough.
- If black and white patterned objects are placed near the target.

# INSTALLATION




1. INSTALL LANE RECOGNITION CAMERA SENSOR ASSEMBLY

(a) Attach the lane recognition camera sensor assembly with the clip.

(b) Temporarily install the lane recognition camera sensor assembly with the 3 bolts.

(c) Tighten the 3 bolts in the order shown in the illustration to install the lane recognition camera sensor assembly.

(d) Connect the connector.

2. INSTALL ROOF TOP MOULDING INFO

3. INSTALL INNER REAR VIEW MIRROR COVER INFO

4. ADJUST LANE RECOGNITION CAMERA SENSOR ASSEMBLY INFO

# PRECAUTION

1. NOTICE FOR INITIALIZATION

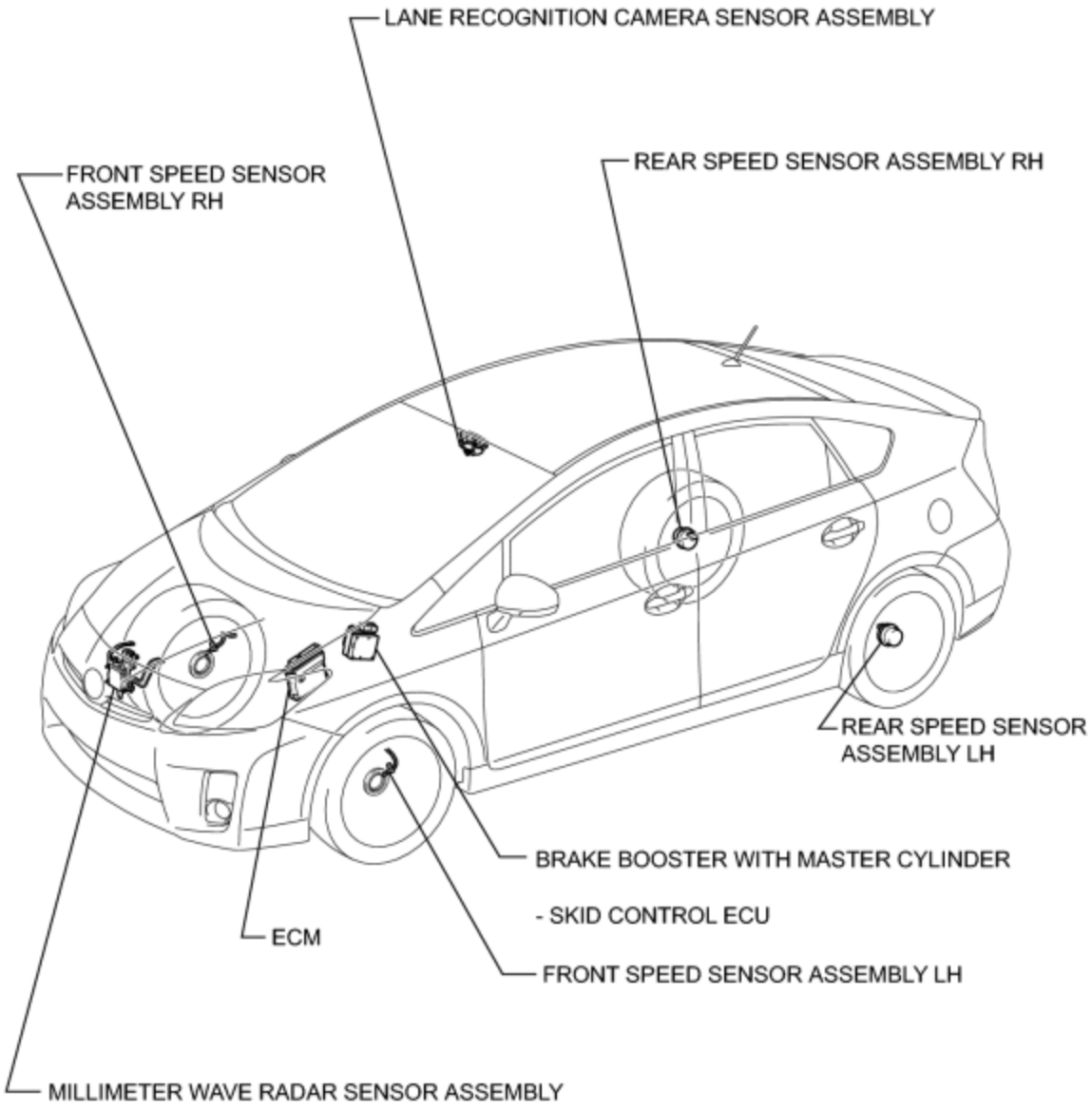
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

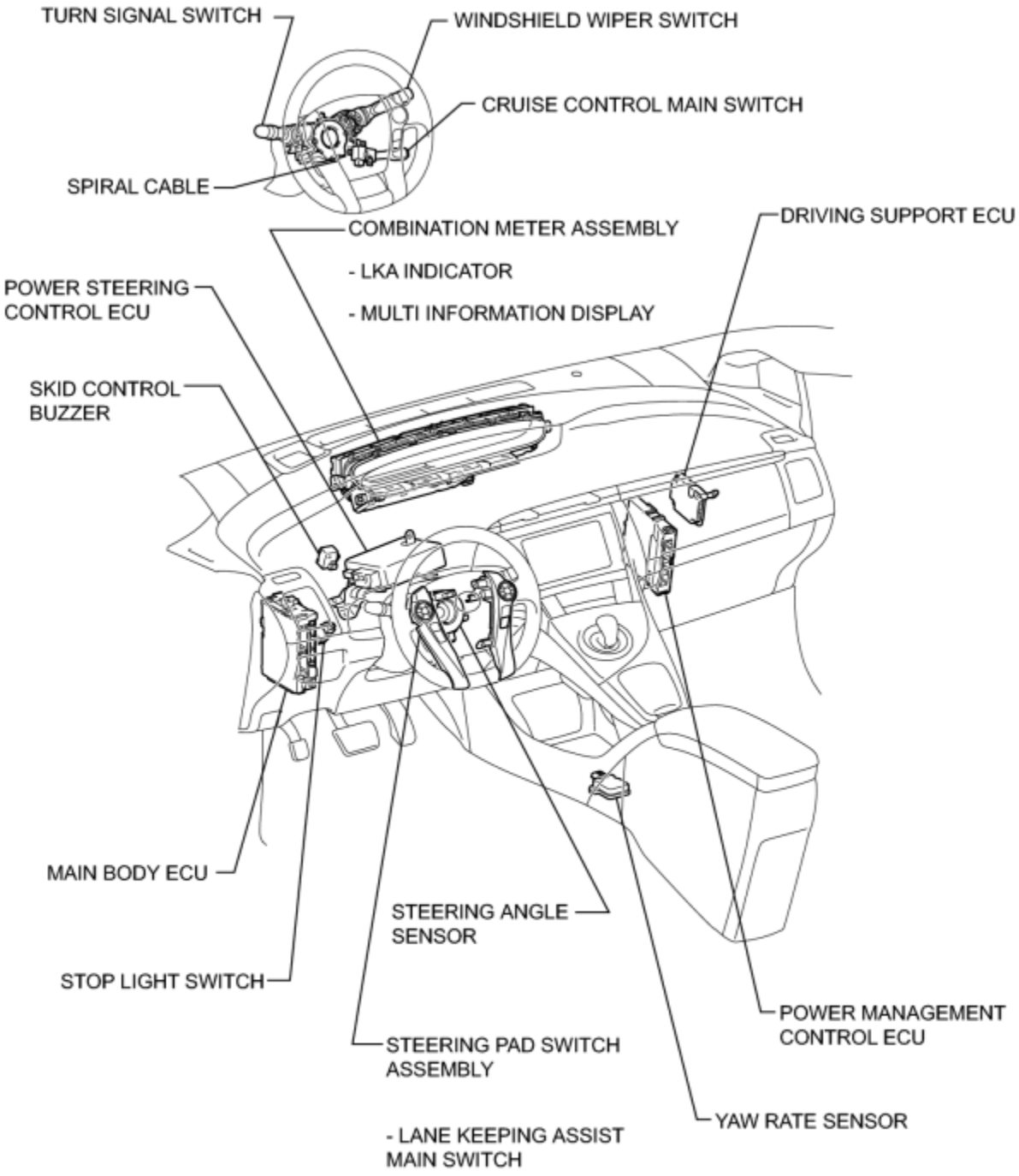
# PARTS LOCATION

# ILLUSTRATION



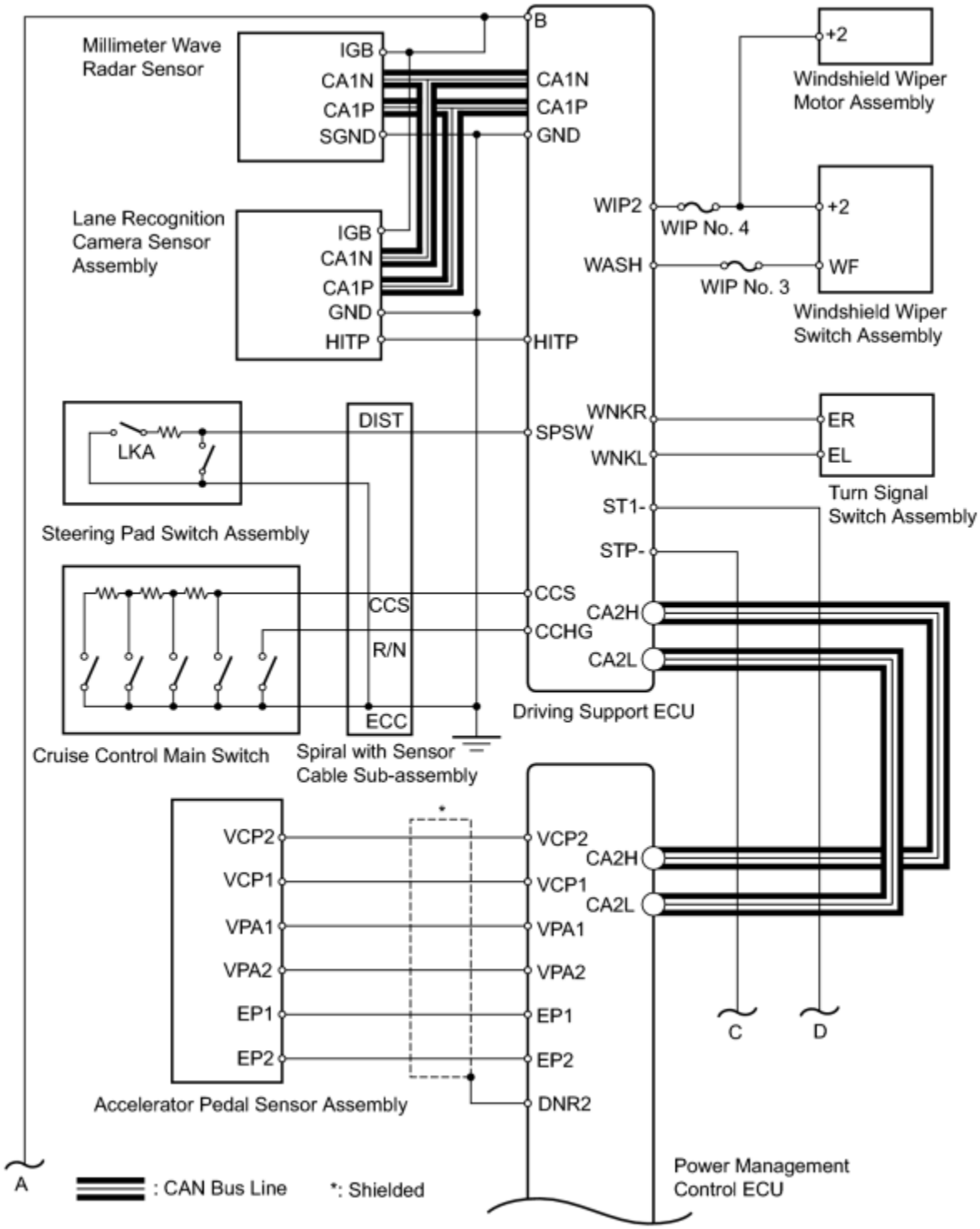

H

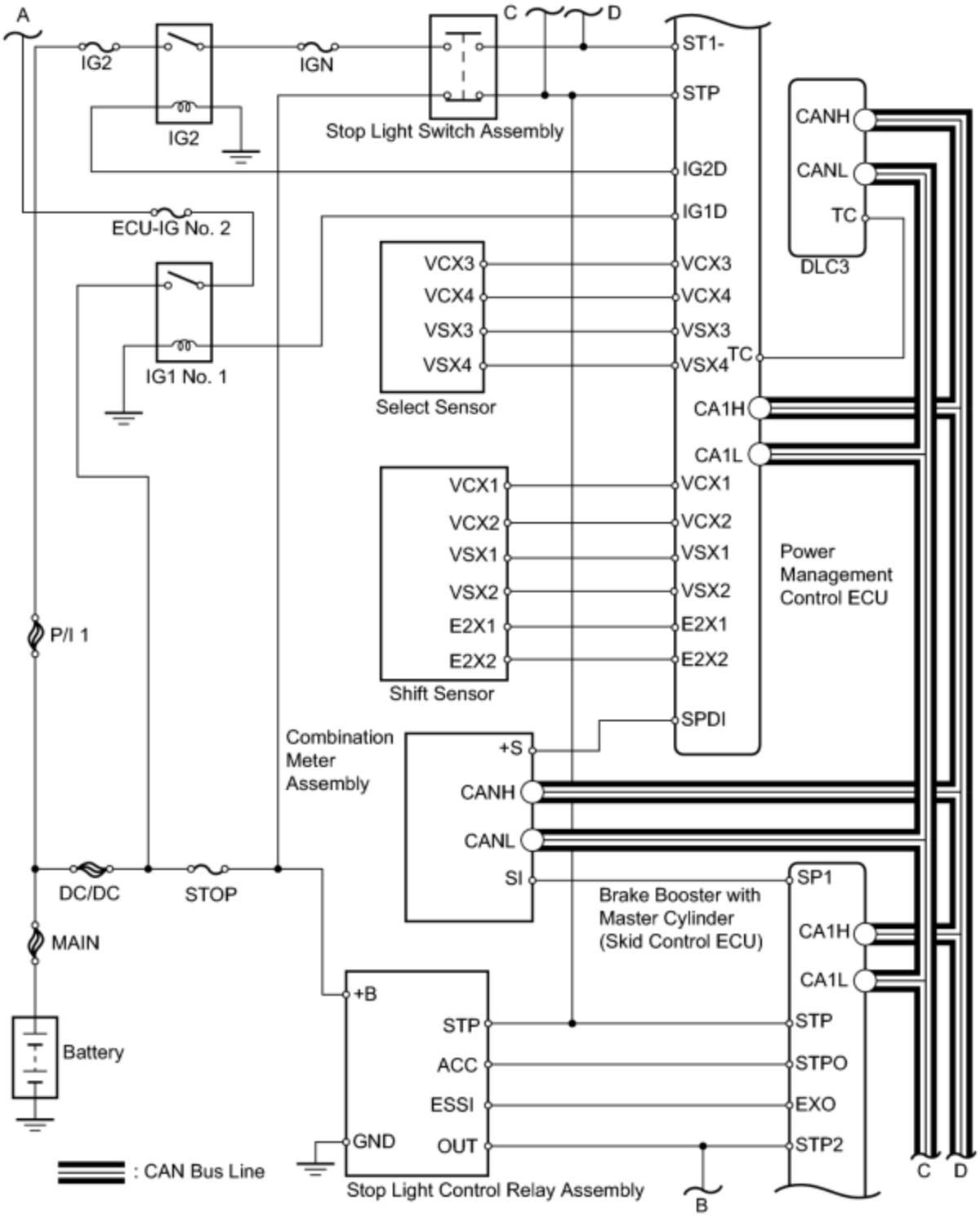
# ILLUSTRATION

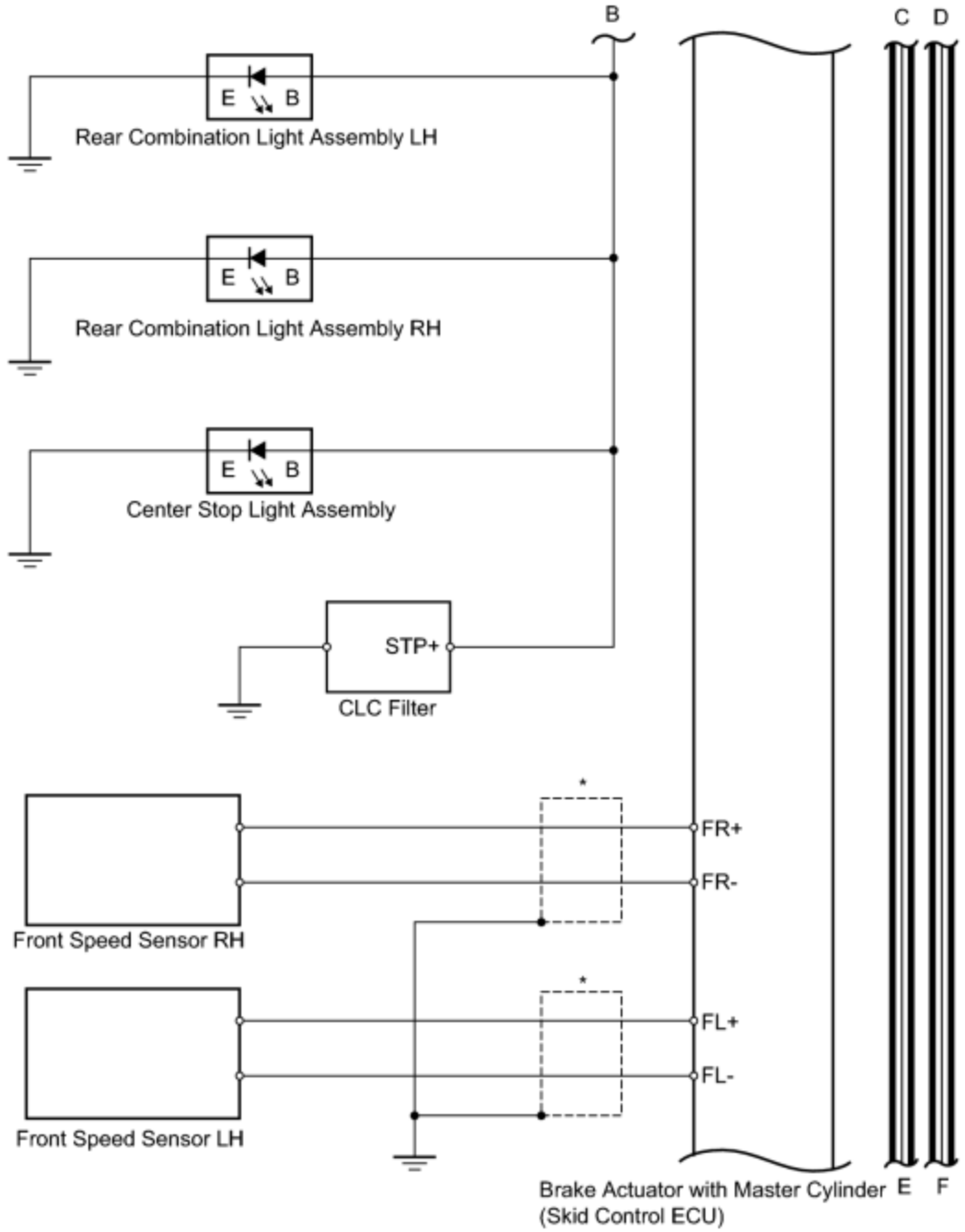

TURN SIGNAL SWITCH
WINDSHIELD WIPER SWITCH
CRUISE CONTROL MAIN SWITCH
SPIRAL CABLE
COMBINATION METER ASSEMBLY
- LKA INDICATOR
- MULTI INFORMATION DISPLAY
DRIVING SUPPORT ECU
POWER STEERING CONTROL ECU
SKID CONTROL BUZZER
MAIN BODY ECU
STEERING ANGLE SENSOR
STOP LIGHT SWITCH
POWER MANAGEMENT CONTROL ECU
STEERING PAD SWITCH ASSEMBLY
YAW RATE SENSOR
- LANE KEEPING ASSIST MAIN SWITCH

H

# SYSTEM DIAGRAM

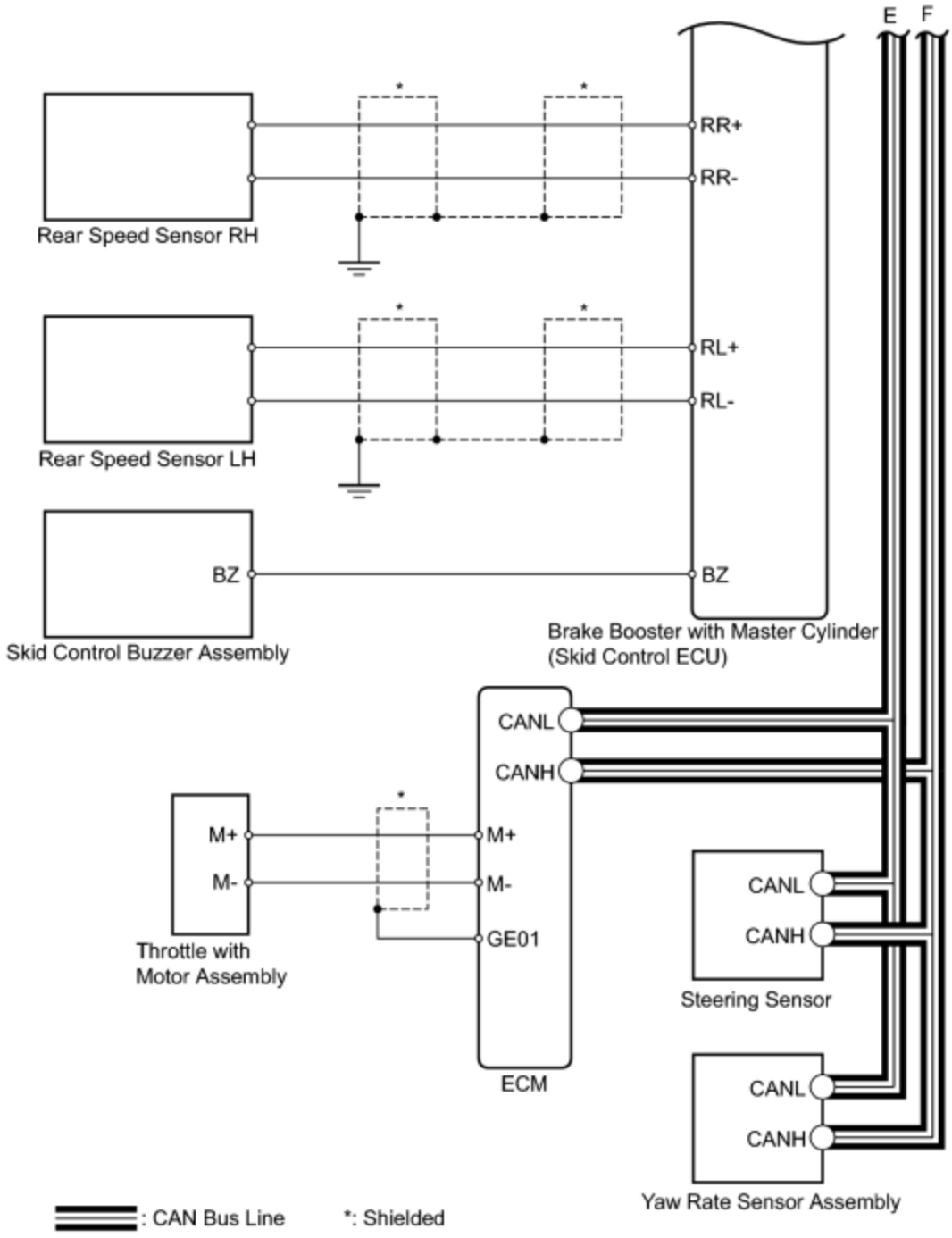



A
IG2
IG2
IGN
C
D
ST1-
STP
Stop Light Switch Assembly
CANH
CANL
TC
DLC3
IG2D
IG1D
ECU-IG No. 2
IG1 No. 1
VCX3
VCX4
VSX3
VSX4
Select Sensor
VCX3
VCX4
VSX3
VSX4
TC
CA1H
CA1L
VCX1
VCX2
VSX1
VSX2
E2X1
E2X2
Shift Sensor
VCX1
VCX2
VSX1
VSX2
E2X1
E2X2
Power
Management
Control ECU
SPDI
P/I 1
Combination
Meter
Assembly
+S
CANH
CANL
SI
DC/DC
STOP
MAIN
Brake Booster with
Master Cylinder
(Skid Control ECU)
SP1
CA1H
CA1L
+B
STP
ACC
ESSI
GND
OUT
STP
STPO
EXO
STP2
Battery
: CAN Bus Line
Stop Light Control Relay Assembly
B
C
D




: CAN Bus Line

*: Shielded




c

**Communication Table**

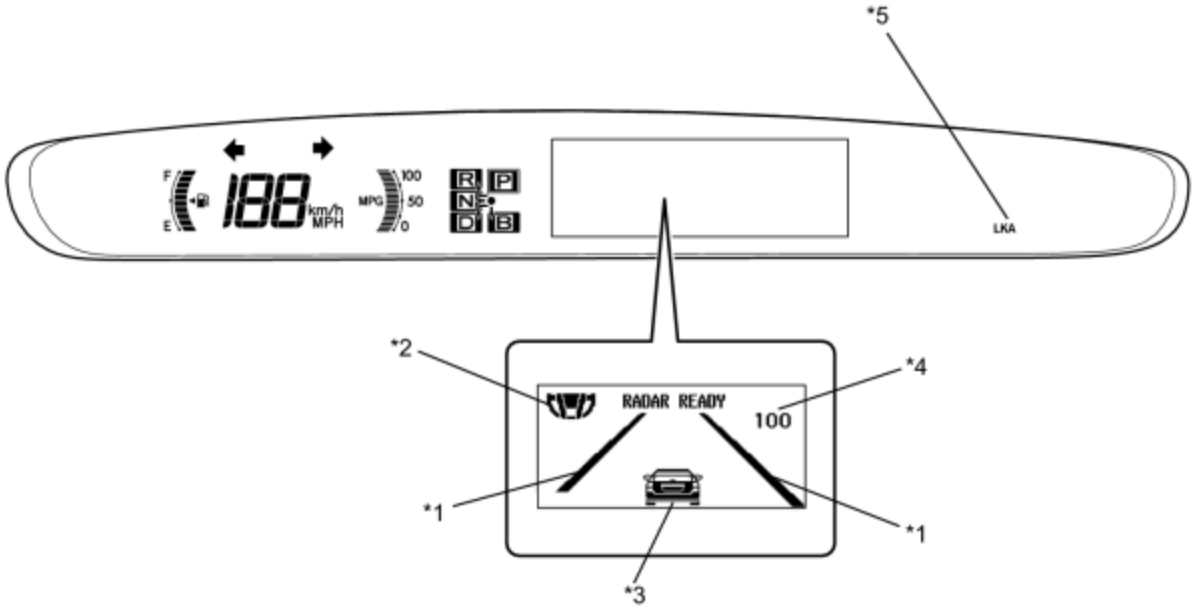
| Sender ECU | Receiver ECU | Signal | Line |
|---|---|---|---|
| Driving support ECU | Combination meter | • LKA indicator light signal<br>• Lane-keeping assist system malfunction signal<br>• Warning buzzer signal<br>• Cruise control signal | CAN |

| Sender ECU | Receiver ECU | Signal | Line |
|---|---|---|---|
| | | • Multi-information display signal | |
| Power management control ECU | Driving support ECU | • Accelerator pedal position signal<br>• Shift position signal (D and R)<br>• Cruise control operation signal<br>• Cruise control cancel demand signal<br>• Hybrid control system malfunction signal<br>• SFI system malfunction signal | CAN |
| Driving support ECU | Power management control ECU | Target driving force signal | CAN |
| Millimeter wave radar sensor | Driving support ECU | Distance to vehicle in front signal | CAN |
| Brake booster with master cylinder (skid control ECU) | Driving support ECU | • Vehicle speed signal<br>• Yaw rate sensor malfunction signal<br>• Stop light control relay malfunction signal<br>• Skid control buzzer malfunction signal<br>• Vehicle stability control signal | CAN |
| Main body ECU | Driving support ECU | Vehicle specification information<br><br>(destination, steering wheel position) | CAN |
| Power steering control ECU | Driving support ECU | Steering assist signal | CAN |
| Lane-recognition camera sensor assembly | Driving support ECU | White line signal | CAN |
| Driving support ECU | Power steering control ECU | Torque assist demand signal | CAN |
| Driving support ECU | Brake booster with master cylinder (skid control ECU) | Skid control buzzer sound signal | CAN |

# SYSTEM DESCRIPTION

1. LANE-KEEPING ASSIST DESCRIPTION

(a) The lane-keeping assist system uses an image of the road from the lane-recognition camera sensor to detect the lane markers for the lane that the vehicle is in. If the system detects that the vehicle is about to move out of its lane, it uses the warning buzzer, multi-information display and steering assistance to warn the driver.




H

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | White lines | *2 | Steering wheel |
| *3 | Radar cruise display | *4 | Radar cruise set vehicle speed |
| *5 | LKA Indicator | - | - |

- White lines
  - The white line indicate the condition of the lane keeping assist system.
    i. Lines are not displayed: Lane keeping assist system is off.
    ii. Thin lines are displayed: Lane keeping assist system is off.
    iii. Thick lines are displayed: Lane keeping assist system is operating.
- Steering wheel
  - When the steering wheel is displayed, this indicates that the lane keeping assist function is operating.
- Radar cruise display
  - Indicates operation conditions for radar cruise
- Radar cruise set vehicle speed

- Indicates the set vehicle speed when the radar cruise is activated

However, in the following conditions, the lane-keeping assist system may not function normally.

- Vehicle is near toll booths or similar areas
- Road has no lane marker
- Lane marker are cracked
- Road has yellow lines
- There is a shadow on either of the lane marker
- As a result of reflections, road surface is bright
- Road with reflective surface similar to concrete road
- Area where brightness changes suddenly, such as entrances and exits of tunnels or similar area
- Bright light directed at sensor
- Incline of road varies, winding road or other type of road where road surface is irregular
- Bad weather
- Frozen or snowy roads
- Road surface with water or other liquid

2. SYSTEM OPERATION

(a) Lane departure warning function:

The lane departure warning function operates when the lane-keeping assist switch is on, the vehicle speed is 48 km/h (30 mph) or more, and lane markers on the road surface are detected. With the lane departure warning function operating, if the vehicle is about to move out of the lane and this is detected by the driving support ECU, the ECU uses the warning buzzer and the multi-information display to warn the driver. Also, the ECU uses the electronic power steering system's motor to apply steering force and give suggestions to the driver for lane departure avoidance.

HINT:

This function only provides suggestions for lane departure avoidance. This function does not automatically move the vehicle within a lane.

| Lane Departure Warning Function Operation Stop Condition | Restart Condition |
|---|---|
| When vehicle speed is less than 48 km/h (30 mph) | When vehicle speed is 48 km/h (30 mph) |
| When turn signal light switch is operated | When turn signal light switch is turned off |
| When steering force above a specified amount is applied | When steering force above a specified amount is not applied |
| When windshield wiper switch is set to Lo or Hi | When windshield wiper switch is turned off |
| When lane recognition camera sensor cannot detect lane marker | When lane recognition camera sensor can detect lane marker |
| While brake pedal operation is being detected | After brake pedal operation is completed |
| After lane departure warning has been issued | When the vehicle is back to its lane, or a few seconds have passed since warning was executed |

(b) Lane-keeping assist function:

The lane-keeping assist function operates when the lane-keeping assist switch is ON, the vehicle speed is approximately 72 to 180 km/h (45 to 112 mph) and the dynamic radar cruise control system is ON. With the lane-keeping assist function operating, steering assistance is provided for the driver according to the driving conditions so that the vehicle stays near the midpoint of a lane. When the vehicle cannot be maintained within a lane and this is detected by the driving support ECU, the ECU uses the warning buzzer and the multi-information display to warn the driver. During the lane-keeping assist function operation, if any of the following conditions occurs, the lane-keeping assist function will stop operating. If the condition is no longer detected, the lane-keeping assist function will automatically start operating again.

| Lane-keeping Assist Function Operation Stop Condition | Restart Condition |
|---|---|
| When lane recognition camera sensor cannot detect lane marker | When lane recognition camera sensor can detect lane marker |
| When vehicle speed is not within 72 to 180 km/h (45 to 112 mph) | When vehicle speed is within 72 to 180 km/h (45 to 112 mph) |
| When turn signal light switch is operated | When turn signal light switch is turned off |
| When windshield wiper switch is set to Lo or Hi | When windshield wiper switch is turned off |
| When steering force above a specified amount is applied | When steering force above specified amount is not detected |
| When steering force above a specified amount does not occur* | When steering operation is detected |
| When changing lanes | When driving within a lane is confirmed |

HINT:

*: This refers to situations where the vehicle is driven for 15 seconds or more on a lane that is straight; or 5 seconds or more on a curved road (curve radius 1000 m (3281 ft.) or less).

During the lane-keeping assist function operation, if any of the following conditions is detected, the lane-keeping assist function will stop operating.

- When dynamic radar cruise control system is canceled*
- When lane-keeping assist switch is turned off
- When object recognition camera sensor's interior temperature is 70°C (158°F) or more
- When lane-keeping assist system is malfunctioning

  HINT:

  *: During the lane-keeping assist function operation, if the dynamic radar cruise control system is canceled, the lane-keeping assist system will change from the lane-keeping assist function to the lane departure warning function.

3. LKA INDICATOR LIGHT

The LKA indicator light is built into the combination meter. It informs the driver of the operational condition or malfunctions of the lane keeping assist system.

| LKA Indicator | System Condition |
|---|---|
| Off | Not activated |
| On | Activated |
| Blink | Malfunction |

4. FUNCTION OF MAIN COMPONENTS

| Item | Outline |
|---|---|
| Power steering control ECU | • Based on signal from driving support ECU, power steering control ECU applies steering force<br>• Sends driver's steering operation information to driving support ECU |
| Brake booster with master cylinder (skid control ECU) | • Receives buzzer operation signal from driving support ECU, and sends it to skid control buzzer.<br>• Sends vehicle speed information to driving support ECU |
| Steering angle sensor | Detects driver's steering torque and transmits its signal to power steering control ECU |
| Yaw rate sensor | Detects yaw rate of vehicle and transmits its signal to driving support ECU |
| Combination meter (LKA indicator light) | • Turns on when lane-keeping assist switch is on<br>• If driving support ECU detects malfunction, this light flashes to warn driver |
| Combination meter (Warning buzzer) | When lane-keeping assist system detects malfunction, warning buzzer sounds once to inform driver |
| Cruise control main switch | Turns cruise control system on / off |
| Stop light switch assembly | Detects depressing of brake pedal and transmits its signal to driving support ECU |
| Skid control buzzer | This buzzer sounds upon receiving signal from brake booster with master cylinder (skid control ECU) |
| Vehicle speed sensor | Sends vehicle speed signal to brake booster with master cylinder (skid control ECU), and then it is sent to driving support ECU |
| Driving support ECU | • Based on lane marker information and information from other functions, driving support ECU sends signals to electronic power steering control ECU so that it applies steering force<br>• Controls multi-information display and buzzer sound condition<br>• Monitors lane-keeping assist malfunctions, and records diagnostic information |
| Lane-recognition camera sensor | Obtains an image of the road in front of the vehicle. An internal image processor generates information such as lane width, road curvature, yaw angle and the amount of vehicle offset from the center of the lane, and this information is sent to the driving support ECU. |
| Millimeter wave radar sensor | Detects a preceding vehicle and calculates the distance to the preceding vehicle. |
| Lane keeping assist main switch | Activates or deactivates the system. |

| Item | Outline |
| --- | --- |
| Windshield wiper switch | Sends the operation condition of the windshield wiper switch to the driving support ECU. |
| Turn signal switch | Sends the operation condition of the turn signal switch to the driving support ECU. |
| Combination meter | • Controls the multi-information display and illumination of the LKA indicator in accordance with the respective display request signals from the driving support ECU.<br>• Sounds the meter buzzer in accordance with the buzzer request signal from the driving support ECU. |
| Multi-information display | Displays the operating condition of the system. |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the lane-keeping assist system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

| | |
|---|---|
| 3. | CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN Communication System is functioning normally.

**Result**

| Result | Proceed to |
|---|---|
| CAN communication system DTC is not output | A |
| CAN communication system DTC is output | B |

B INFO Go to CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 4. | CHECK FOR DTC* |

(a) Check for DTCs INFO.

(b) Clear the DTCs INFO.

(c) Recheck for DTCs INFO.

**Result**

| Result | Proceed to |
|---|---|
| DTC does not reoccur | A |
| DTC reoccurs | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| 5. | PROBLEM SYMPTOMS TABLE |

(a) Problem symptoms table INFO.

**Result**

| Result | Proceed to |
|---|---|
| Fault is not listed in problem symptoms table | A |
| Fault is listed in problem symptoms table | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| 6. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO.

(b) Data List / Active Test INFO.

NEXT ▼

| | |
|---|---|
| 7. | REPAIR OR REPLACE |

NEXT ▼

| | |
|---|---|
| 8. | CONFIRMATION TEST |

NEXT ▶ **END**

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

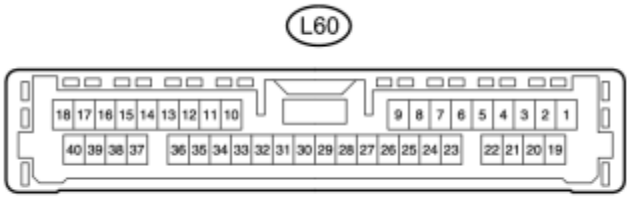
**Lane-keeping Assist System**

| Symptom | Suspected Area | See page |
|---|---|---|
| Lane-keeping assist system does not operate | Main switch circuit | INFO |
| | Lane-recognition camera sensor assembly | INFO |
| | Harness and connector | - |
| | Driving support ECU | INFO |
| LKA indicator light is abnormal (Does not turn on) | Indicator light circuit | INFO |
| | Main switch circuit | INFO |
| | Combination meter | INFO |
| | Driving support ECU | INFO |
| LKA indicator light is abnormal (Remains on) | Indicator light circuit | INFO |
| | Main switch circuit | INFO |
| | Combination meter | INFO |
| | Driving support ECU | INFO |
| Lane-keeping assist system is not canceled even when turn signal light switch is operated | Turn signal light switch | INFO |
| | Harness or connector | - |
| | Driving support ECU | INFO |
| Lane-keeping assist system is not canceled even when windshield wiper switch is operated (Lo or Hi) | Windshield wiper switch | INFO |
| | Harness or connector | - |
| | Driving support ECU | INFO |
| Increase in cases that driver can see line marker but system cannot detect lane markers | Windshield glass is dirty | - |
| | Lane recognition camera sensor is dirty | - |
| | Adjust object recognition camera sensor | INFO |
| | Driving support ECU | INFO |
| Lane-keeping assist system is operating, but no operation condition is displayed on multi-information display in combination meter | Combination meter | INFO |
| | Driving support ECU | INFO |
| Buzzer does not sound even when lane markers are lost during lane departure warning function | Skid control buzzer | INFO |
| | Brake booster with master | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | cylinder (skid control ECU) | |
| | Driving support ECU | INFO |
| Lane-keeping assist system cannot detect line marker during nighttime | Headlight | INFO |
| | Driving support ECU | INFO |

# TERMINALS OF ECU

1. CHECK DRIVING SUPPORT ECU




(a) Measure the voltage and/or resistance according to the value(s) in the table below.

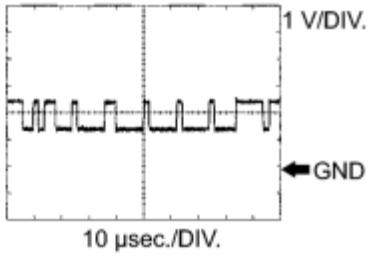
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L60-6 (SPSW) - L60-25 (GND) | R - W-B | Steering pad switch signal<br><br>(Lane keeping assist main switch signal) | Power switch on (IG)<br><br>Lane keeping assist main switch off | 10 to 14 V |
| L60-6 (SPSW) - L60-25 (GND) | R - W-B | Steering pad switch signal<br><br>(Lane keeping assist main switch signal) | Power switch on (IG)<br><br>Lane keeping assist main switch on | 6 to 7 V |
| L60-10 (CCHG) - L60-25 (GND) | G - W-B | Cruise control main switch signal | Power switch on (IG)<br><br>MODE switch on | Below 1 V |
| L60-10 (CCHG) - L60-25 (GND) | G - W-B | Cruise control main switch signal | Power switch on (IG)<br><br>MODE switch off | 10 to 14 V |
| L60-9 (WASH) - L60-25 (GND) | V - W-B | Washer switch signal | Power switch on (IG)<br><br>Washer switch off | 10 to 14 V |
| L60-9 (WASH) - L60-25 (GND) | V - W-B | Washer switch signal | Power switch on (IG)<br><br>Washer switch on | Below 1 V |
| L60-17 (CA2L) - L60-25 (GND) | W - W-B | CAN communication signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 1) |
| L60-18 (CA1N) - L60-25 (GND) | L - W-B | CAN communication signal | Power switch on (IG) | Pulse generation |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | | (See waveform 2) |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG) | 10 to 14 V |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG), CANCEL switch on | 6.6 to 10.1 V |
| L60-23 (CCS) - L60-25 (GND) | V - W-B | Cruise control main switch signal | Power switch on (IG), Main switch on | Below 1 V |
| L60-24 (HITP) - L60-25 (GND) | G - W-B | CAN signal (Hi temperature) | Power switch on (IG) | 10 to 14 V |
| L60-30 (B) - Body ground | B - Body ground | Power supply | Always | 11 to 14 V |
| L60-25 (GND) - Body ground | W-B - Body ground | Body ground | Always | Below 1 Ω |
| L60-27 (STP-) - Body ground | Y - Body ground | Stop light switch assembly signal input | Depress brake pedal | 7.5 to 14 V |
| L60-27 (STP-) - Body ground | Y - Body ground | Stop light switch assembly signal input | Release brake pedal | Below 1 V |
| L60-28 (ST1-) - Body ground | R - Body ground | Stop light switch assembly signal input | Power switch on (IG), release brake pedal | 7.5 to 14 V |
| L60-28 (ST1-) - Body ground | R - Body ground | Stop light switch assembly signal input | Power switch on (IG), depress brake pedal | Below 1 V |
| L60-30 (+B) - L60-25 (GND) | B - W-B | Power source | Power switch on (IG) | 11 to 14 V |
| L60-32 (WIP2) - L60-25 (GND) | P - W-B | Wiper switch signal | Power switch on (IG), Wiper switch off | Below 1 V |
| L60-32 (WIP2) - L60-25 (GND) | P - W-B | Wiper switch signal | Power switch on (IG), Wiper switch LO position | 6 to 7 V |
| L60-32 (WIP2) - L60-25 (GND) | P - W-B | Wiper switch signal | Power switch on (IG), Wiper switch HI position | 10 to 14 V |
| L60-34 (WNKR) - L60-25 (GND) | B -W-B | Winker R signal | Power switch on (IG) Winker off | 10 to 14 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L60-34 (WNKR) - L60-25 (GND) | B - W-B | Winker R signal | Power switch on (IG)<br><br>Winker R | Below 1 V |
| L60-35 (WNKL) - L60-25 (GND) | P - W-B | Winker L signal | Power switch on (IG)<br><br>Winker off | 10 to 14 V |
| L60-35 (WNKL) - L60-25 (GND) | P - W-B | Winker L signal | Power switch on (IG)<br><br>Winker L | Below 1 V |
| L60-39 (CA2H) - L60-25 (GND) | B - W-B | CAN communication signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 3) |
| L60-40 (CA1P) - L60-25 (GND) | Y - W-B | CAN communication signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 4) |

(b) WAVEFORM 1

(1) CAN communication signal



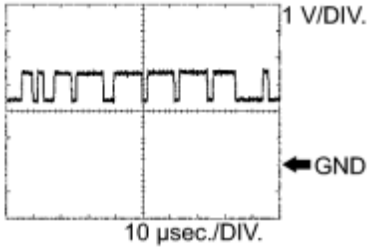

| | |
|---|---|
| Driving support ECU Terminal Name | Between CA2L and GND |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform varies depending on the CAN communication signal.

(c) WAVEFORM 2

(1) CAN communication signal

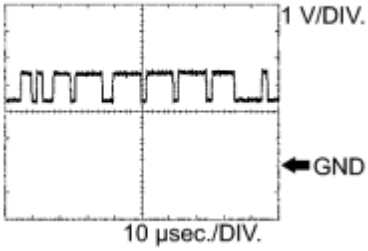



| | |
|---|---|
| Driving support ECU Terminal Name | Between CA1N and GND |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

(d) WAVEFORM 3

(1) CAN communication signal

| | |
|---|---|
| Driving support ECU Terminal Name | Between CA2H and GND |

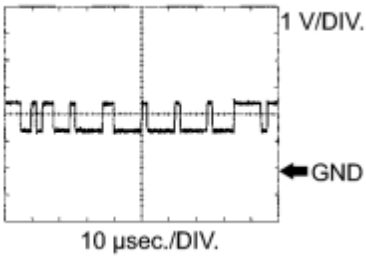



| | |
|---|---|
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform varies depending on the CAN communication signal.

(e) WAVEFORM 4




(1) CAN communication signal

| | |
|---|---|
| Driving support ECU Terminal Name | Between CA1P and GND |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Power switch on (IG) |

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(e) Read the DTCs.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(e) Clear the DTCs.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows values or status of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Using the Techstream, enter the following menus:

(1) Select: All ECUs / (desired menu) / Data List /

(e) Check the values by referring to the table below.

**Radar Cruise**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Country# (F Radar Sens) | Millimeter wave radar sensor country signal / JPN, NA, EURO, AUS, SAFC, OTHER TWN, CHINA, THAI, GCC, NOFIX | Actual country code | - |

**Lane Keeping Assist**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wiper Information | Wiper operation status / Unoperate, Oil off, Mist, Washer, Unknown, Lo, Hi | The respective operational status displayed | - |
| LKA Indicator | LKA indicator light signal / Nothing, Blink, Light | Light: LKA indicator light turns on<br><br>Nothing: LKA indicator light turns off<br><br>Blink: LKA indicator light blinking | - |
| LKA System | Lane-keeping assist system indicator / | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Indicator | Unknown, Check, Disable, Adjust | | |
| LKA Main SW | Lane-keeping assist main switch signal / ON or OFF | ON: Lane-keeping assist main switch is ON<br><br>OFF: Lane-keeping assist main switch is OFF | - |
| Head Light | Head light signal / ON or OFF | Head light signal status | - |
| Head Light (High Beam) | Head Light (Hi Beam) signal / ON or OFF | Head Light (Hi Beam) signal status | - |
| Turn Light RH | Turn Light RH signal / ON or OFF | Turn Light RH signal status | - |
| Turn Light LH | Turn Light LH signal / ON or OFF | Turn Light LH signal status | - |
| Left Lane Type | Left lane type signal / Dashed or Solid | Dashed: Left lane dashed<br><br>Solid: Left lane solid | - |
| Right Lane Type | Right lane type signal / Dashed or Solid | Dashed: Right lane dashed<br><br>Solid: Right lane solid | - |
| Lane Undetectable | Lane undetectable signal / Undetectable or Detect | Undetectable: Lane undetectable<br><br>Detect: Lane detected | - |
| Left Lane Detection | Left lane detection signal / Undetectable or Detect | Undetectable: Left lane undetectable<br><br>Detect: Left lane detected | - |
| Right Lane Detection | Right lane detection signal / Undetectable or Detect | Undetectable: Right lane undetectable<br><br>Detect: Right lane detected | - |
| Left Lane Change | Left lane change signal / ON or OFF | ON: When left lane change is performed<br><br>OFF: When left lane change is not performed | - |
| Right Lane Change | Right lane change signal / ON or OFF | ON: When right lane change is performed<br><br>OFF: When right lane change is not performed | - |
| Lane Position | Lane position / min.: -327.68 m, max.: 327.67 m | Actual lane position | - |
| Lane Width | Lane width / min.: 0 m, max.: 655.35 m | Actual lane width | - |
| Small Steering Force Demand | Small steering force demand signal / ON or OFF | ON: Steering assist function operates | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | OFF: Steering assist function does not operate | |
| Lane-Keeping Assist Demand | Lane-keeping assist demand signal / ON or OFF | ON: Lane-keeping assist function operates<br><br>OFF: Lane-keeping assist function does not operate | - |
| Skid Control Buzzer Demand | Skid control buzzer demand signal / ON or OFF | ON: Skid control buzzer sounds<br><br>OFF: Skid control buzzer does not sound | - |
| Target Steering Wheel Torque | Target steering wheel torque / min.: -100 N*m, max.: 100 N*m | Actual steering wheel torque | - |
| Left Lane Indicator | Left lane recognition signal / Nothing, Heavy, Closing or H blink | Nothing: Left lane indicator is not shown<br><br>Heavy: Left lane indicator is fully shown<br><br>Closing: Only left lane indicator outline is shown<br><br>H blink: Left lane indicator is blinking | - |
| Right Lane Indicator | Right lane recognition signal / Nothing, Heavy, Closing or H blink | Nothing: Right lane indicator is not shown<br><br>Heavy: Right lane indicator is fully shown<br><br>Closing: Only right lane indicator outline is shown<br><br>H blink: Right lane indicator is blinking | - |
| Steering Indicator | Meter display signal of lane-keeping assist function / Nothing, Light or Blink | Nothing: Steering wheel assistance is not displayed<br><br>Light: Steering wheel assistance is displayed<br><br>Blink: Steering wheel assistance is blinking | - |
| LKA Abnormal Buzzer | Lane-keeping assist system abnormal buzzer signal / ON or OFF | ON: Lane-keeping assist system abnormal | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | OFF: Lane-keeping assist system normal | |
| Lane Detection Impossible Buz | Lane-keeping detection impossible buzzer signal / Nothing, Light or Blink | Light: Lane-keeping detection impossible buzzer sounds<br><br>Nothing: Lane-keeping detection impossible buzzer does not sound<br><br>Blink: Ready indicator turns blink | - |
| Ready Indicator | Ready indicator light signal / Nothing, Light or Blink | Nothing: Ready indicator turns on<br><br>Blink: Ready indicator turns off<br><br>Light: Ready indicator turns blinking | - |
| LKA Temporarily Disable | Lane-keeping assist system temporarily disabled signal / ON or OFF | ON: Lane-keeping assist system is temporarily disabled<br><br>OFF: Lane-keeping assist system is operating | - |
| EPS Trq Sens Output | EPS torque sensor output signal / -7 N/m to 7 N/m | The torque sensor output signal status displayed | - |
| The Number of DTCs | Number of DTCs / min.: 0, max.: 255 | Actual number of DTCs | - |

**ABS/VSC/TRAC**

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle Speed | Vehicle speed/ min.: 0 km/h (0 mph), max.: 326.4 km/h (204 mph) | Actual vehicle speed is displayed | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Test allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Test early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Test.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Using the Techstream, enter the following menus:

(1) Select: All ECUs / (desired menu) / Active Test /

(e) Perform the Active Test by referring to the table below.

**Combination Meter**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Drift From The Lane | LKA indicator light ON / OFF | ON / OFF | - |

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnosis Note |
|---|---|---|---|
| Buzzer | Skid control buzzer sounds | ON / OFF | - |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is displayed during the DTC check, inspect the trouble area listed for that code. For details of the code, refer to the "See page" below.

**Lane-keeping Assist System**

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| C1A01 | Driving Support ECU | - Driving support ECU | INFO |
| C1A02 | Vehicle Information Not Obtained | - Driving support ECU<br>- Main body ECU | INFO |
| C1A05 | Stop Light Switch Circuit | - Stop light switch assembly<br>- Stop light switch assembly circuit<br>- Harness or connector<br>- Driving support ECU | INFO |
| C1A06 | Stop Light Switch Input Circuit | - Driving support ECU | INFO |
| C1A0C | Object Recognition Camera Region Code Mismatch | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |
| C1A20 | Object Recognition ECU | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |
| C1A22 | Object Recognition Camera Incorrect Axial Gap | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |
| C1A23 | Object Recognition Camera Initialization Incomplete | - Lane recognition camera sensor assembly<br>- Driving support ECU | INFO |
| C1A45 | Vehicle Speed Sensor | - Vehicle speed sensor<br>- Brake booster with master cylinder (skid control ECU)<br>- CAN communication system<br>- Driving support ECU | INFO |
| C1A46 | Yaw Rate Sensor | - Yaw rate sensor<br>- Brake booster with master cylinder (skid | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | control ECU)<br><br>- Driving support ECU | |
| C1A4A | Skid Control Buzzer Circuit | - Skid control buzzer<br><br>- Skid control buzzer circuit<br><br>- Brake booster with master cylinder (skid control ECU)<br><br>- Driving support ECU | INFO |
| C1A70 | Power Steering Control System | - Power steering system<br><br>- CAN communication system<br><br>- Driving support ECU | INFO |
| C1A71 | Power Steering Control Torque | - Power steering system<br><br>- CAN communication system<br><br>- Driving support ECU | INFO |
| U0122 | Lost Communication with Vehicle Dynamics Control Module | - Brake booster with master cylinder (skid control ECU)<br><br>- CAN communication system<br><br>- Driving support ECU | INFO |
| U0123 | Lost Communication with Yaw Rate Sensor Module | - Yaw rate sensor<br><br>- CAN communication system<br><br>- Driving support ECU | INFO |
| U0131 | Lost Communication with Power Steering Control Module | - Power steering control ECU<br><br>- CAN communication system<br><br>- Driving support ECU | INFO |
| U1104 | Lost Communication with Driving Support ECU | - Driving support ECU<br><br>- CAN communication system<br><br>- Brake booster with master cylinder (skid control ECU)<br><br>- Lane recognition camera sensor assembly | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | - Power steering control ECU | |
| U1119 | Lost Communication with Object Recognition ECU (CAN) | - Lane recognition camera sensor assembly<br>- CAN communication system<br>- Driving support ECU<br>- Harness or connector | INFO |

| | | |
|---|---|---|
| DTC | C1A01 | Driving Support ECU |

# DESCRIPTION

The driving support ECU uses the lane-recognition camera sensor assembly to detect obstacles in front of the vehicle and the direction that the driver's head is facing.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A01 | While initial check is running, power switch is on (IG) and system is operating, driving support ECU detects an internal malfunction for 1 second or more | Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTC INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle and operate lane keeping assist control.

(f) Recheck for DTCs INFO.

OK:

DTC C1A01 is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU

OK ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| DTC | C1A02 | Vehicle Information Not Obtained |

# DESCRIPTION

When the driving support ECU is replaced with a new one, it acquires the country specification information (destination, steering wheel position, etc.) from the main body ECU. When the country specification information in the driving support ECU and main body ECU do not match, DTC C1A02 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A02 | Inconsistent vehicle specification information between the main body ECU and driving support ECU continues for 1 second or more | • Driving support ECU<br>• Main body ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM) |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch on (IG).

(d) Recheck for DTCs INFO.

OK:

DTC C1A02 is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM
OK ▶ **REPLACE DRIVING SUPPORT ECU**

| DTC | C1A05 | Stop Light Switch Circuit |
|---|---|---|

# DESCRIPTION

When the brake pedal is depressed, the stop light switch assembly sends signal to the driving support ECU.

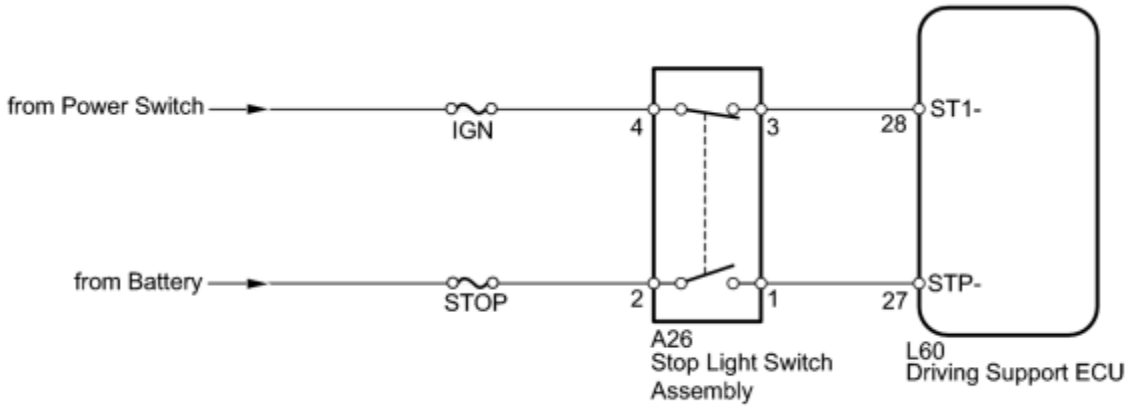
Receiving the signal, the driving support ECU cancels the dynamic radar cruise control system. Even if there is a malfunction in the stop light signal circuit while the cruise control is operating, normal driving is maintained due to fail-safe function.

When the brake pedal is depressed, positive voltage is applied to terminal STP- of the driving support ECU through the STOP fuse and the stop light switch assembly, and the driving support ECU cancels the cruise control.

When the brake pedal is released, positive voltage is applied to terminal ST1- of the driving support ECU through the IGN fuse and the stop light switch assembly, and the driving support ECU operates the dynamic radar cruise control.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A05 | When vehicle speed is 50 km/h (31 mph) or more with lane-keeping assist switch on, voltages of terminals ST1- and STP- of driving support ECU are both below 1 V for 0.5 sec. or more | • Stop light switch assembly<br>• Stop light switch assembly circuit<br>• Harness or connector<br>• Driving support ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

- STP signal conditions can be checked using the Techstream.

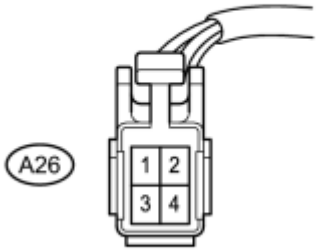
a. Connect the power switch on (IG).
b. Turn the power switch on (IG).
c. Enter the following menus: Powertrain / Radar Cruise / Data List / Stop Light SW 1 (M-CPU).
d. Check the STP signal when the brake pedal is depressed and released.

| Brake Pedal Operation | Tester Display |
|---|---|
| Depressed | ON |
| Released | OFF |

# PROCEDURE

| | |
|---|---|
| 1. | CHECK STOP LIGHT SWITCH ASSEMBLY (TERMINAL VOLTAGE) |

*1




(a) Disconnect the stop light switch assembly connector.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A26-2 - Body ground | Power switch on (IG) | 9 to 14 V |
| A26-4 - Body ground | Power switch on (IG) | 9 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| | (to Stop Light Switch Assembly) |

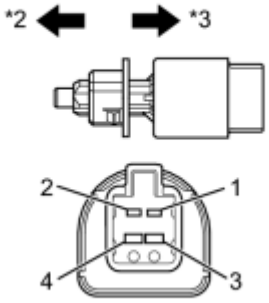
(d) Reconnect the stop light switch assembly connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT FOR STOP LIGHT SWITCH ASSEMBLY)

OK ↓

| | |
|---|---|
| 2. | INSPECT STOP LIGHT SWITCH ASSEMBLY |

*1




(a) Disconnect the stop light switch assembly connector.

(b) Remove the stop light switch assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Position | Specified Condition |
|---|---|---|
| 1 - 2 | Switch pin not pushed | Below 1 Ω |
| | Switch pin pushed | 10 kΩ or higher |
| 3 - 4 | Switch pin not pushed | 10 kΩ or higher |
| | Switch pin pushed | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Stop Light Switch Assembly) |
| *2 | Not pushed |
| *3 | Pushed |

(d) Reinstall the stop light switch assembly.

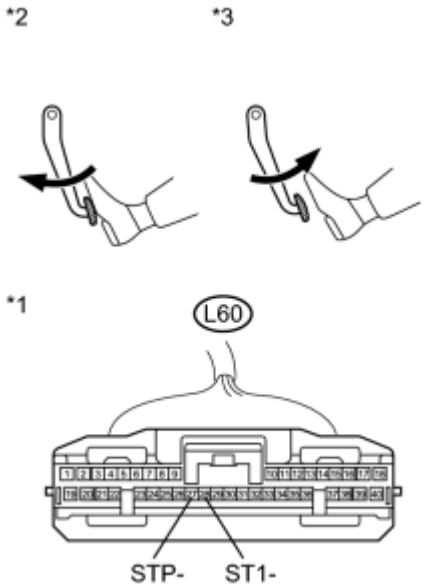
(e) Reconnect the stop light switch assembly connector.

NG ▶ REPLACE STOP LIGHT SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 3. | CHECK DRIVING SUPPORT ECU (STP- AND ST1 - VOLTAGE) |




(a) Disconnect the driving support ECU connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Position | Specified Condition |
|---|---|---|
| L60-27 (STP-) - Body ground | Released | Below 1.5 V |
| | Depressed | 7.5 to 14 V |
| L60-28 (ST1-) - Body ground | Released | 7.5 to 14 V |
| | Depressed | Below 1.5 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |
| *2 | Brake Pedal Depressed |
| *3 | Brake Pedal Released |

(d) Reconnect the driving support ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE DRIVING SUPPORT ECU**

| DTC | C1A06 | Stop Light Switch Input Circuit |
|---|---|---|

# DESCRIPTION

This DTC indicates the internal abnormal items of the driving support ECU.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A06 | Stop light switch assembly input signal abnormal<br><br>(driving support ECU internal circuit) | Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK DTC OUTPUT |
|---|---|

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle and operate lane keeping assist control.

(f) Recheck for DTCs INFO.

OK:

DTC C1A06 is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU

OK ▶ **USE SIMULATION METHOD TO CHECK**

| DTC | C1A0C | Object Recognition Camera Region Code Mismatch |
|---|---|---|

# DESCRIPTION

When the lane recognition camera sensor assembly is replaced with a new one, it acquires the country specification information from the driving support ECU. The lane recognition camera sensor assembly has information about the market it is intended for use in (country specification information such as the destination, steering wheel position etc.). When a new camera sensor is installed and the country specification information does not match that of the driving support ECU, the ECU stores DTC C1A0C.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A0C | While initial check is running, power switch is on (IG) and system is operating, country specification information in driving support ECU and lane recognition camera sensor assembly do not match | • Lane recognition camera sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the lane recognition camera sensor assembly is replaced with a new one, adjust the lane recognition camera sensor assembly INFO.

# PROCEDURE

| 1. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |
|---|---|

(a) Replace lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor assembly INFO.

NEXT

| 2. | CHECK DTC OUTPUT |
|---|---|

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC C1A0C is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| | | |
|---|---|---|
| DTC | C1A20 | Object Recognition ECU |

# DESCRIPTION

When the driving support ECU receives information that there is a malfunction in the lane recognition camera sensor assembly, DTC C1A20 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A20 | When vehicle speed is 50 km/h (31 mph) or more with lane-keeping assist switch on, driving support ECU receives information that there is malfunction in lane recognition camera sensor assembly for 1 second or more | • Lane recognition camera sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the lane recognition camera sensor assembly is replaced with a new one, adjust the lane recognition camera sensor assembly INFO.

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Replace the lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor assembly INFO.

NEXT

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC C1A20 is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| | | |
|---|---|---|
| DTC | C1A22 | Object Recognition Camera Incorrect Axial Gap |
| DTC | C1A23 | Object Recognition Camera Initialization Incomplete |

# DESCRIPTION

If the driving support ECU determines that the lane recognition camera sensor assembly axis is deviated, DTC C1A22 is output. Also, if the lane recognition camera sensor assembly beam axis adjustment is not performed after installing the lane recognition camera sensor assembly, DTC C1A23 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A22 | When vehicle speed is 50 km/h (31 mph) or more with lane-keeping main switch is on, driving support ECU detects lane recognition camera sensor assembly beam axis deviation for 1 second or more | • Lane recognition camera sensor assembly<br>• Driving support ECU |
| C1A23 | When vehicle speed is 50 km/h (31 mph) or more with lane-keeping main switch is on, driving support ECU detects that lane recognition camera sensor assembly adjustment has not been completed for 1 second or more | • Lane recognition camera sensor assembly<br>• Driving support ECU |

# INSPECTION PROCEDURE

NOTICE:

When the lane recognition camera sensor assembly is replaced with a new one, adjust the lane recognition camera sensor assembly INFO.

# PROCEDURE

| | |
|---|---|
| 1. | ADJUST LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Adjust the lane recognition camera sensor assembly INFO.

NEXT

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC is not output.

NG ▶ REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY
OK ▶ **END**

| | |
|---|---|
| 3. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Replace the lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor assembly INFO.

NEXT
▼

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| | | |
|---|---|---|
| DTC | C1A45 | Vehicle Speed Sensor |

# DESCRIPTION

The driving support ECU receives vehicle speed signals from the brake booster with master cylinder (skid control ECU) via the CAN communication line to control the lane-keeping assist system. When the driving support ECU receives information that there is a malfunction in the vehicle speed sensor, DTC C1A45 is stored.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A45 | When vehicle speed is 50 km/h (31 mph) or more with lane-keeping assist switch on, malfunction in vehicle speed sensor is received from brake booster with master cylinder (skid control ECU) | • Vehicle speed sensor<br>• Brake booster with master cylinder (skid control ECU)<br>• CAN communication system<br>• Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM) |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Check for DTCs.

OK:

CAN communication system DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM

OK ▼

| | |
|---|---|
| 2. | CHECK FOR DTC (ELECTRONICALLY CONTROLLED BRAKE SYSTEM) |

(a) Clear the DTCs INFO.

(b) Turn the power switch off.

(c) Turn the power switch on (IG).

(d) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(e) Check DTCs for electrical controlled brake system INFO.

OK:

DTC C0200/31, C0205/32, C0210/33 or C0215/34 is not output.

NG ▶ GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM
OK
▼

| | |
|---|---|
| 3. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT
▼

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC C1A45 is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| | | |
|---|---|---|
| DTC | C1A46 | Yaw Rate Sensor |

# DESCRIPTION

The brake booster with master cylinder (skid control ECU) receives vehicle stability signals from the yaw rate sensor and sends the signals to the driving support ECU. If the brake booster with master cylinder (skid control ECU) detects that the yaw rate sensor is malfunctioning, the brake booster with master cylinder (skid control ECU) sends a malfunction signal to the driving support ECU and outputs DTC C1A46. Also, when DTC C1A46 is stored, the brake booster with master cylinder (skid control ECU) stores DTC at the same time.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A46 | While vehicle speed is 50 km/h (31 mph) or more, malfunction signal from brake booster with master cylinder (skid control ECU), yaw rate sensor to driving support ECU is detected for 1 second or more | • Yaw rate sensor<br>• Brake booster with master cylinder (skid control ECU)<br>• Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC (ELECTRONICALLY CONTROLLED BRAKE SYSTEM) |

(a) Check for DTCs (electronically controlled brake system) INFO.

OK:

Electronically controlled brake system DTC is not output.

NG ▶ GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM
OK
▼

| | |
|---|---|
| 2. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder INFO.

NEXT
▼

| | |
|---|---|
| 3. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC C1A46 is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| | | |
|---|---|---|
| DTC | C1A4A | Skid Control Buzzer Circuit |

# DESCRIPTION

If the vehicle is about to move out of the lane markers while the lane-keeping assist function is operating, the driving support ECU sends a sounding signal to the brake booster with master cylinder (skid control ECU) to sound the skid control buzzer in order to warn the driver.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A4A | While power switch is on (IG), skid control buzzer circuit malfunction signal is received by brake booster with master cylinder (skid control ECU) for 1 second or more | • Skid control buzzer<br>• Skid control buzzer circuit<br>• Brake booster with master cylinder (skid control ECU)<br>• Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (SKID CONTROL BUZZER) |

(a) Using the Techstream, enter the following menus: Chassis / ABS/VSC/TRAC / Active Test / Buzzer.

(b) Perform Active Test.

**ABS/VSC/TRAC**

| Tester Display | Test Part | Control Range | Diagnosis Note |
|---|---|---|---|
| Buzzer | Skid control buzzer sounds | ON / OFF | - |

OK:

Skid control buzzer sounds.

NG ▶ GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM

OK ▼

| | |
|---|---|
| 2. | REPLACE BRAKE BOOSTER WITH MASTER CYLINDER |

(a) Replace the brake booster with master cylinder (skid control ECU) INFO.

NEXT ▼

| | |
|---|---|
| 3. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Recheck for DTCs.

OK:

DTC C1A4A is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| DTC | C1A70 | Power Steering Control System |
|---|---|---|

# DESCRIPTION

When the lane departure warning function operates, the driving support ECU sends a signal to the power steering control ECU to operate the steering motor.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A70 | When vehicle speed is 50 km/h (31 mph) or more with lane-keeping assist switch on, malfunction signal of power steering system is input to driving support ECU | • Power steering system<br>• CAN communication system<br>• Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK FOR DTC (POWER STEERING SYSTEM) |
|---|---|

(a) Check for DTCs (power steering system) INFO.

OK:

Power steering system DTC is not output.

HINT:

If DTC C1A70 is output even after troubleshooting the power steering system, replace the driving support ECU.

NG ▶ GO TO POWER STEERING SYSTEM
OK
▼

| 2. | REPLACE POWER STEERING CONTROL ECU |
|---|---|

(a) Replace the power steering control ECU INFO.

NEXT
▼

| 3. | CHECK DTC OUTPUT |
|---|---|

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC C1A70 is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| DTC | C1A71 | Power Steering Control Torque |
|---|---|---|

# DESCRIPTION

When the lane departure warning function operates, the driving support ECU sends a signal to the power steering control ECU to operate the steering motor.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1A71 | When lane keeping assist switch is on and vehicle speed is 50 km/h (31 mph) or more, driving support ECU receives torque abnormally signal from steering control system | • Power steering system<br>• CAN communication system<br>• Driving support ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK DTC OUTPUT (CAN COMMUNICATION SYSTEM) |
|---|---|

(a) Check for DTCs (CAN communication system) INFO.

OK:

CAN communication system DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM

OK ▼

| 2. | CHECK FOR DTC (POWER STEERING SYSTEM) |
|---|---|

(a) Check for DTCs (power steering system) INFO.

OK:

Power steering system DTC is not output.

HINT:

If DTC C1A71 is output even after troubleshooting the power steering system, replace the driving support ECU.

NG ▶ GO TO POWER STEERING SYSTEM

OK

| | |
|---|---|
| 3. | REPLACE POWER STEERING CONTROL ECU |

(a) Replace the power steering control ECU INFO.

NEXT

| | |
|---|---|
| 4. | CHECK FOR DTC |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle at a speed of 50 km/h (31 mph) or more, and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC C1A71 is not output.

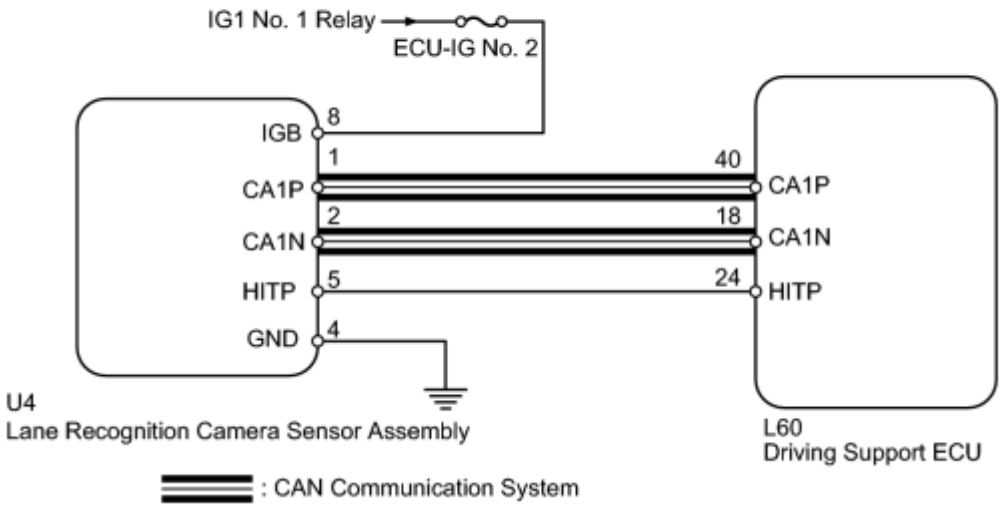
NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| | | |
|---|---|---|
| DTC | U0122 | Lost Communication with Vehicle Dynamics Control Module |
| DTC | U0123 | Lost Communication with Yaw Rate Sensor Module |
| DTC | U0131 | Lost Communication with Power Steering Control Module |
| DTC | U1104 | Lost Communication with Driving Support ECU |

# DESCRIPTION

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0122 | While power switch is on (IG), communication stop from brake booster with master cylinder (skid control ECU) to driving support ECU continues for 1 second or more | • Brake booster with master cylinder (skid control ECU)<br>• CAN communication system<br>• Driving support ECU |
| U0123 | While power switch is on (IG), communication stop from yaw rate sensor to driving support ECU continues for 1 second or more | • Yaw rate sensor<br>• CAN communication system<br>• Driving support ECU |
| U0131 | While power switch is on (IG), communication stop from power steering control ECU to driving support ECU continues for 1 second or more | • Power steering control ECU<br>• CAN communication system<br>• Driving support ECU |
| U1104 | While power switch is on (IG), communication stop from driving support ECU to skid control ECU assembly, lane recognition camera sensor assembly or power steering control ECU continues for 1 second or more | • Driving support ECU<br>• CAN communication system<br>• Brake booster with master cylinder (skid control ECU)<br>• Lane recognition camera sensor assembly<br>• Power steering control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

This circuit uses CAN communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system are output.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC U1104 is output | A |
| DTC other than U1104 is output | B |

B ▶ GO TO CAN COMMUNICATION CIRCUIT

A ▼

| | |
|---|---|
| 2. | CHECK CAN COMMUNICATION SYSTEM |

(a) Select "CAN Bus Check" from the "System Selection Menu" screen on the Techstream.

(b) Select "Communication Malfunction DTC" from the "CAN Bus Check" screen, and then select "Enter".

OK:

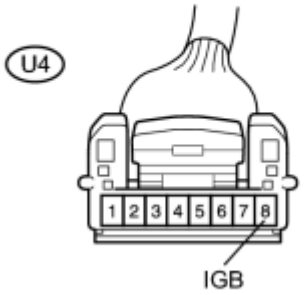
CAN communication is normal.

NG ▶ GO TO CAN COMMUNICATION CIRCUIT

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (LANE RECOGNITION CAMERA SENSOR ASSEMBLY POWER SOURCE) |

*1




N

(a) Disconnect the lane recognition camera sensor assembly connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| U4-8 (IGB) - Body ground | Power switch on (IG) | 10 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Lane Recognition Camera Sensor Assembly) |

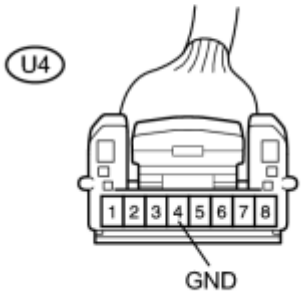
(d) Reconnect the recognition camera sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IGB CIRCUIT)

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (LANE RECOGNITION CAMERA SENSOR ASSEMBLY GND CIRCUIT) |

*1




(a) Disconnect the lane recognition camera sensor assembly connector.

N

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| U4-4 (GND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Lane Recognition Camera Sensor Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GND CIRCUIT)

OK ▼

| | |
|---|---|
| 5. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Replace the lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera assembly INFO.

NEXT ▼

| | |
|---|---|
| 6. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC is not output.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

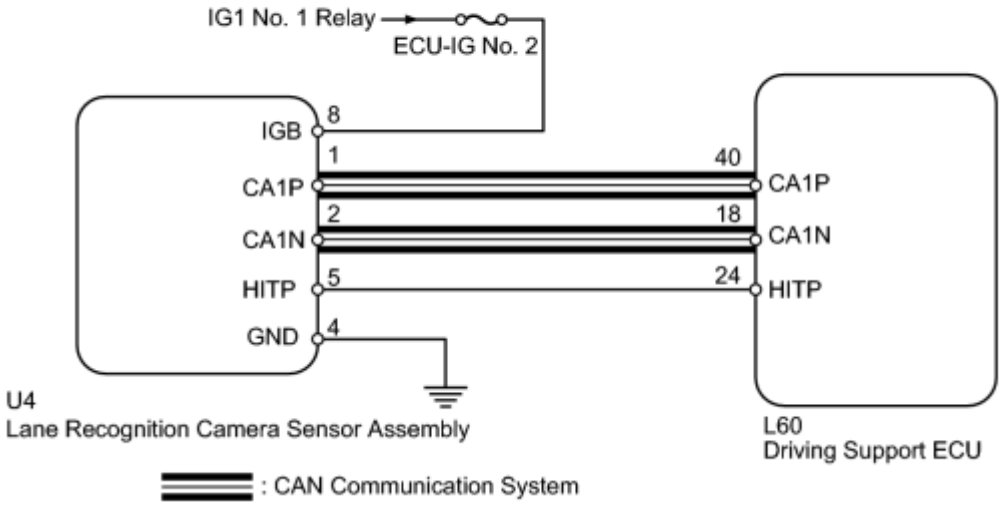
| DTC | U1119 | Lost Communication with Object Recognition ECU (CAN) |
|---|---|---|

# DESCRIPTION

Because of the location of the lane recognition camera assembly, it is subject to high temperatures. If the lane recognition camera sensor assembly becomes too hot, the power source is shut down to protect the system. At that time CAN communication also stops. However, in order to inform the driving support ECU that CAN communication has not stopped because of a CAN communication error, on/off signals are periodically sent from the HITP terminal.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| U1119 | When vehicle speed is 50 km/h (31 mph) or more with lane-keeping main switch is on, communication stop from lane recognition camera sensor to driving support ECU continues for 1 second or more | • Lane recognition camera sensor<br>• CAN communication system<br>• Driving support ECU<br>• Harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

This circuit uses CAN communication. Therefore, if there are any malfunctions in the communication circuit, one or more DTCs in the CAN communication system are output.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC U1119 is output | A |
| DTC other than U1119 is output | B |

B ▶ GO TO CAN COMMUNICATION CIRCUIT

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: All ECUs / Pre-Collision 2/ Data List / Recog ECU H Temp Hist.

(e) Confirm the judgment history.

Pre-Collision 2:

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Recog ECU H Temp Hist | Object recognition ECU temperature condition history/ ON or OFF | ON: History exists<br><br>OFF: No history | - |

Result:

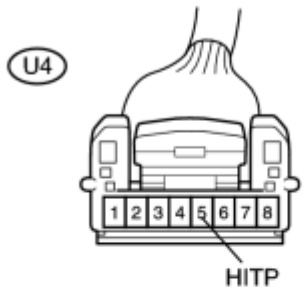
| Result | Proceed to |
|---|---|
| ON is displayed | A |
| OFF is displayed | B |

B ▶ CHECK CAN COMMUNICATION SYSTEM

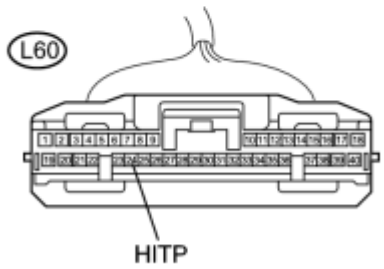
A

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (DRIVING SUPPORT ECU - LANE RECOGNITION CAMERA SENSOR) |

*1




*2




(a) Disconnect the driving support ECU connector and lane recognition camera sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| U4-5 (HITP) - L60-24 (HITP) | Always | Below 1 Ω |
| U4-5 (HITP) or L60-24 (HITP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Lane Recognition Camera Sensor Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(c) Reconnect the connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - LANE

RECOGNITION CAMERA SENSOR)

OK ▶ **REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY**

| | |
|---|---|
| 4. | REPAIR OR REPLACE HARNESS OR CONNECTOR (DRIVING SUPPORT ECU - LANE RECOGNITION CAMERA SENSOR) |

(a) Repair or replace harness or connector.

NEXT ▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTC INFO.

(c) Turn the power switch off.

(d) Start the engine.

(e) Drive the vehicle and operate lane keeping assist control.

(f) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC U1119 is not output | A |
| DTC U1119 is output | B |

B ▶ GO TO CAN COMMUNICATION CIRCUIT

A ▶ **END**

| | |
|---|---|
| 6. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check CAN communication system INFO.

NG ▶ GO TO CAN COMMUNICATION CIRCUIT

OK ▼

| | |
|---|---|
| 7. | REPLACE LANE RECOGNITION CAMERA SENSOR ASSEMBLY |

(a) Replace the lane recognition camera sensor assembly INFO.

(b) Adjust the lane recognition camera sensor assembly INFO.

NEXT ▼

| | |
|---|---|
| 8. | CHECK DTC OUTPUT |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Trouble Codes.

(b) Clear the DTCs INFO.

(c) Turn the power switch off.

(d) Turn the power switch on (IG).

(e) Drive the vehicle and operate lane keeping assist control.

(f) Recheck for DTCs.

OK:

DTC is not output.

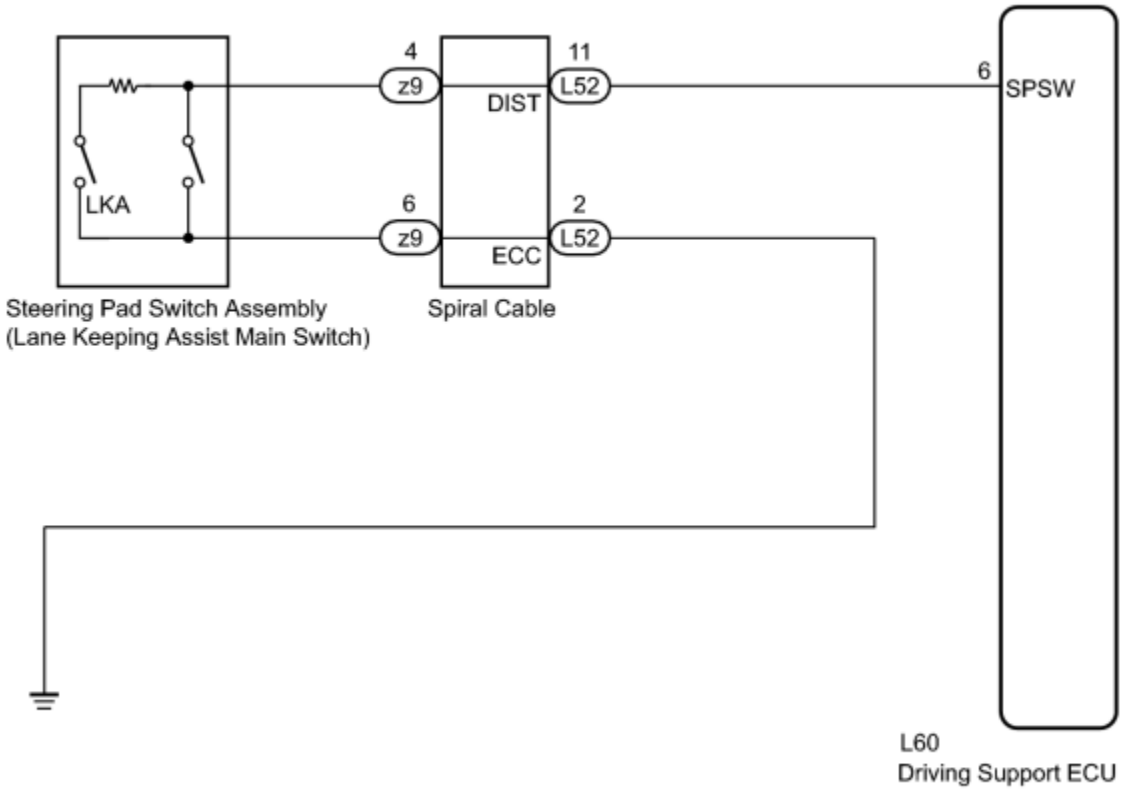
NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **END**

| Main Switch Circuit |
|---|

# DESCRIPTION

The driving support ECU receives lane-keeping assist main switch ON/OFF signal from the steering pad switch assembly.

# WIRING DIAGRAM



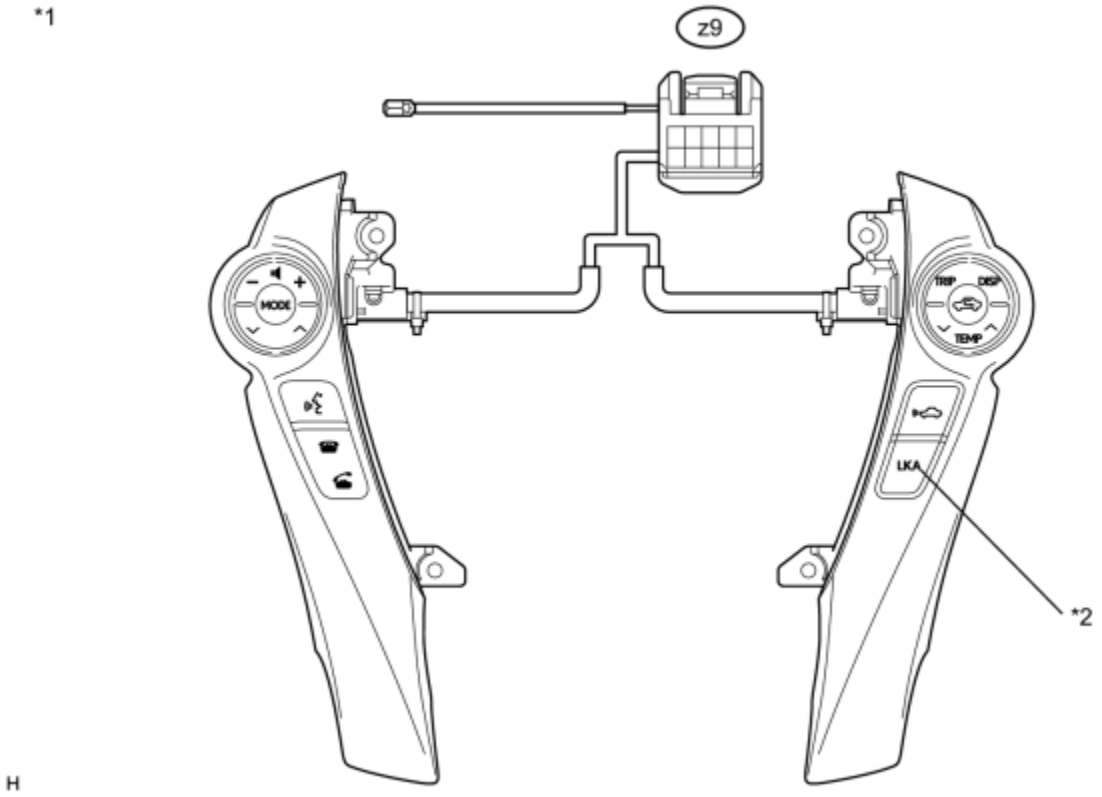

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | INSPECT STEERING PAD SWITCH ASSEMBLY |
|---|---|

(a) Remove the steering pad switch INFO.

(b) Disconnect the z9 connector from the spiral cable.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Steering Pad Switch Assembly) | *2 | Lane Keeping Assist Main Switch |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z9-4 - z9-6 | Lane keeping assist main switch ON | Below 2.5 Ω |
| z9-4 - z9-6 | Lane keeping assist main switch OFF | 10 kΩ or higher |

(d) Reconnect the connector.

(e) Reinstall the steering pad switch INFO.

NG ▶ REPLACE STEERING PAD SWITCH ASSEMBLY

OK

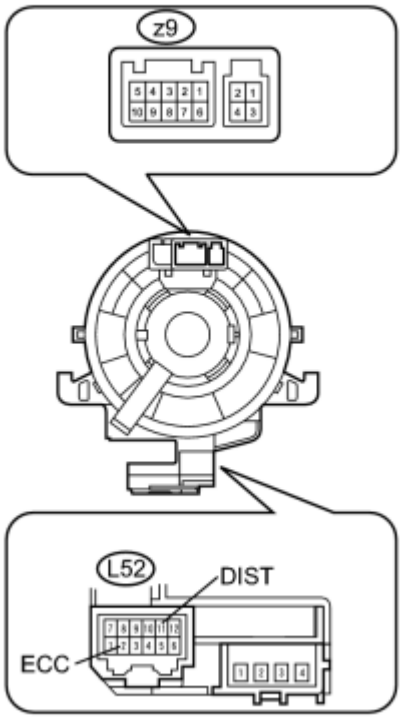
▼

| | |
|---|---|
| 2. | CHECK AND REPLACE SPIRAL CABLE SUB-ASSEMBLY |

NOTICE:

The spiral cable is an important part of the SRS airbag system. Incorrect removal or installation of the spiral cable may cause airbag deployment. Be sure to read the page shown in the brackets.

*1




(a) Remove the spiral cable sub-assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z9-4 - L52-11 (DIST) | The spiral cable position is center | Below 1 Ω |
| | The spiral cable position is 2.5 rotations to the left | |
| | The spiral cable position is 2.5 rotations to the right | |
| z9-6 - L52-2 (ECC) | The spiral cable position is center | Below 1 Ω |
| | The spiral cable position is 2.5 rotations to the left | |
| | The spiral cable position is 2.5 rotations to the right | |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected |

| | |
|---|---|
| | (Spiral Cable Sub-assembly) |

HINT:

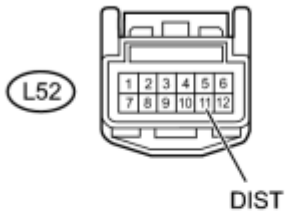
The spiral cable makes a maximum of approximately 5 rotations.

(c) Install the spiral cable sub-assembly INFO.

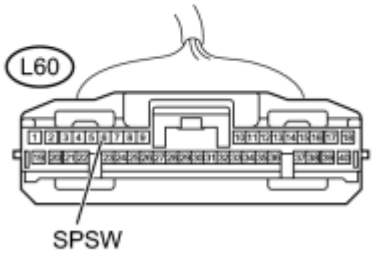
NG ▶ REPLACE SPIRAL CABLE SUB-ASSEMBLY
OK
▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SPIRAL CABLE - DRIVING SUPPORT ECU) |

*1




*2




(a) Disconnect the driving support ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-11 (DIST) - L60-6 (SPSW) | Always | Below 1 Ω |
| L52-11 (DIST) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector |

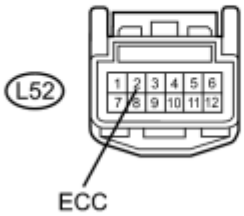
| | |
|---|---|
| | (to Spiral Cable Sub-assembly) |
| *2 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(c) Reconnect the driving support ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (SPIRAL CABLE - DRIVING SUPPORT ECU)
OK
▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (BODY GROUND CIRCUIT) |

*1




(a) Disconnect the spiral cable connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-2 (ECC) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral Cable Sub-assembly) |

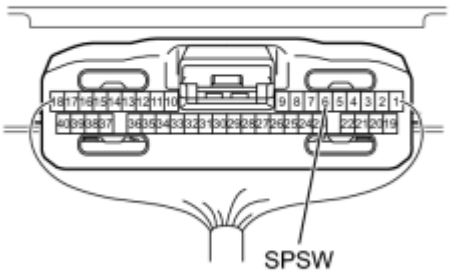
(c) Reconnect the connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (BODY GROUND CIRCUIT)
OK
▼

| | |
|---|---|
| 5. | INSPECT DRIVING SUPPORT ECU |

(a) Turn the power switch on (IG).

*1




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L60-6 (SPSW) - Body ground | • Power switch on (IG)<br>• Lane keeping assist main switch ON | 6 to 7 V |
| | • Power switch on (IG)<br>• Lane keeping assist main switch OFF | 10 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Driving Support ECU) |

NG ▶ REPLACE DRIVING SUPPORT ECU

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| |
|---|
| Indicator Circuit |

# DESCRIPTION

- When the driving support ECU detects a lane-keeping assist main switch signal, it sends the signal to the combination meter via CAN communication. Then the LKA indicator light turns on.
- The LKA indicator light circuit uses CAN communication. If there is a malfunction in this circuit, check for DTCs in the CAN communication system before troubleshooting this circuit.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (LKA INDICATOR LIGHT) |

(a) Select the Active Test, use the Techstream to generate a control command, and then check that the LKA indicator light illuminates.

**Combination Meter**

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Drift From The Lane | LKA indicator light | ON / OFF | - |

OK:

LKA indicator light turns on / turns off.

NG ▶ REPLACE NO. 3 METER CIRCUIT PLATE

OK ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (LKA INDICATOR LIGHT) |

(a) Using the Techstream, enter the following menus: All ECUs / Lane Keeping Assist / Data List / LKA Indicator.

(b) Check the Data List for proper functioning of the LKA indicator light.

**Lane Keeping Assist**

| Tester Display | Test Details | Normal Condition | Diagnostic Note |
|---|---|---|---|
| LKA Indicator | LKA indicator light signal / ON or OFF | ON: LKA indicator light turns on<br><br>OFF: LKA indicator light turns off | - |

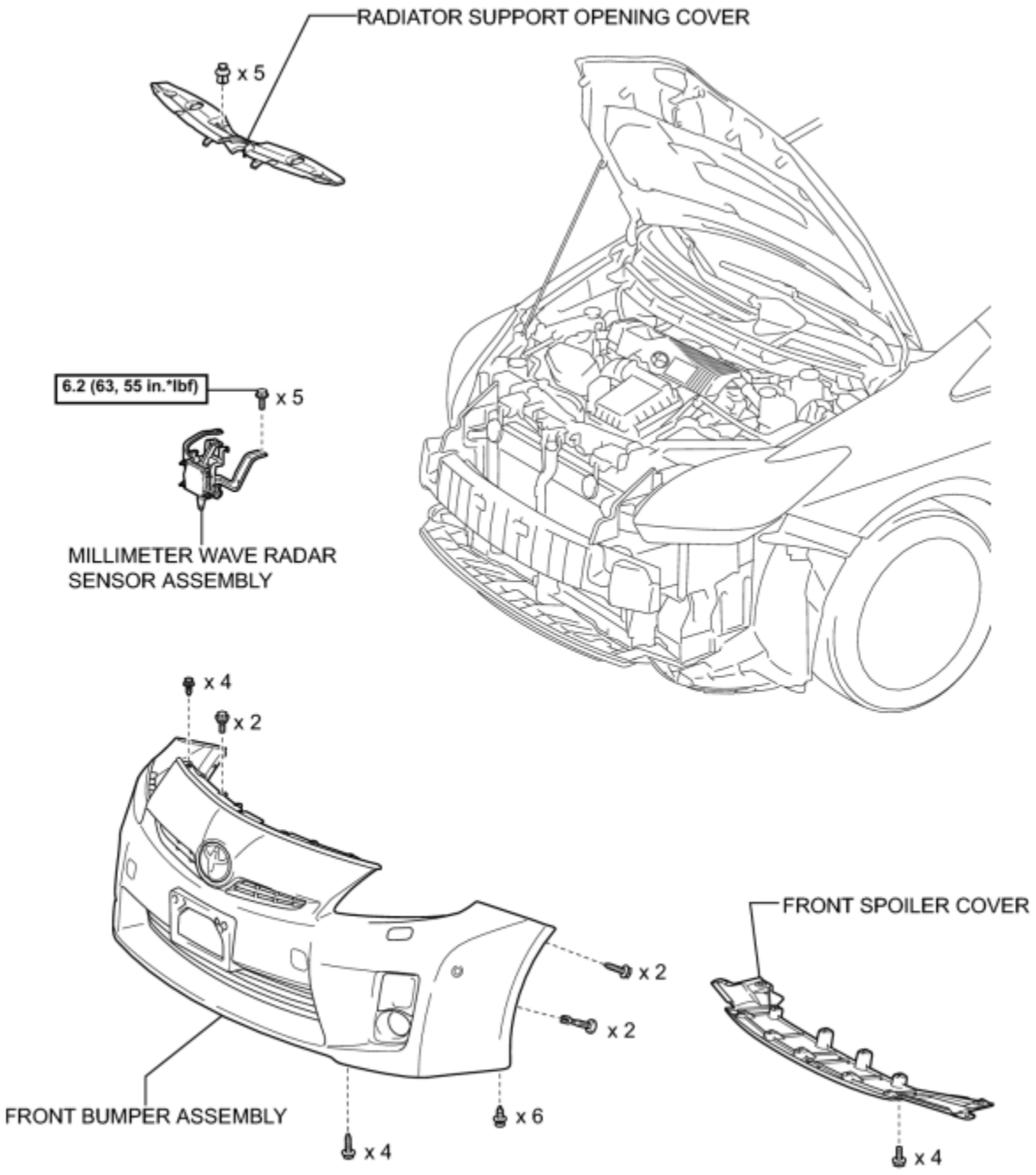
OK:

LKA indicator light turns on / turns off.

NG ▶ REPLACE DRIVING SUPPORT ECU
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

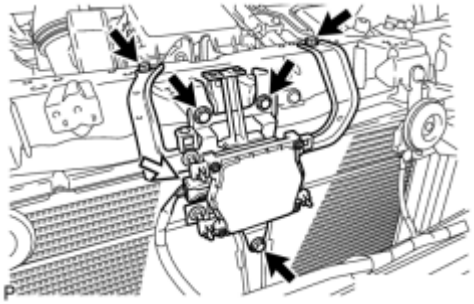
P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE MILLIMETER WAVE RADAR SENSOR ASSEMBLY

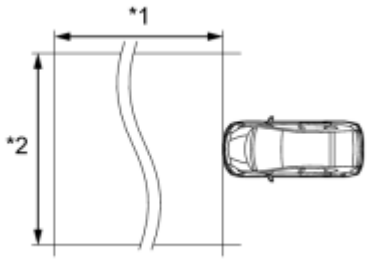


(a) Disconnect the connector.

(b) Remove the 5 bolts and millimeter wave radar sensor assembly.

# ADJUSTMENT

1. ADJUST MILLIMETER WAVE RADAR SENSOR ASSEMBLY




P

**Text in Illustration**

| | |
|---|---|
| *1 | Approx. 10 m |
| *2 | Approx. 14 m |

CAUTION:

Exposure to radio frequency emissions is hazardous to your health. It is hazardous to your health to be within 20 cm (7.87 in.) of the device's radio frequency aperture.

NOTICE:

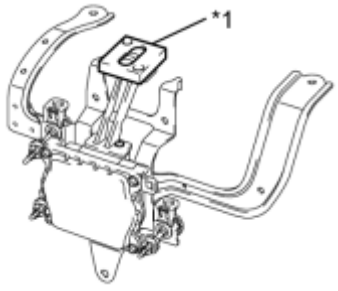
- This device complies with FCC radio frequency emission regulations.
- Perform measurements on a level surface.
- Make sure that no large pieces of metal are within a 10 m (32.8 ft.) x 14 m (45.9 ft.) area in front of the vehicle. If possible, the surrounding area should also be free of large metal objects.

(a) Before adjusting the radar beam axis, prepare the vehicle as follows.

(1) Check the tire pressure and adjust it if necessary.

(2) Remove all excess weight from the vehicle (luggage, heavy objects, etc.).

(b) Check and adjust the vertical direction of the radar sensor.




P

**Text in Illustration**

| | |
|---|---|
| *1 | Level |

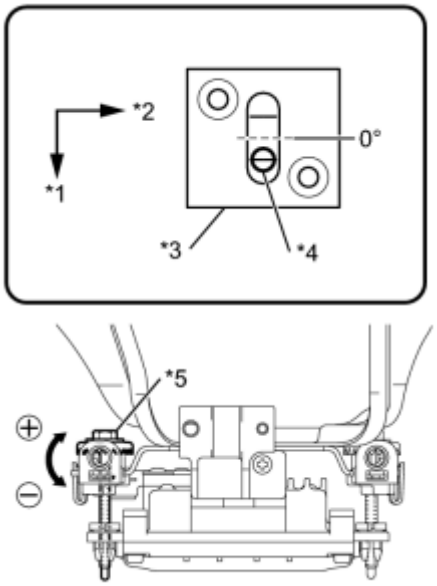
(1) Remove dust, oil and foreign matter from the radar sensor's level rack.

(2) Set a level on the radar sensor's level rack.

(3) Check that the level's air bubble is within the red frame.

# Text in Illustration

| | |
|---|---|
| *1 | FR |
| *2 | LH |
| *3 | Level |
| *4 | Air Bubble |
| *5 | Bolt A |




P

OK:

Level's air bubble is within the red frame.

If the bubble is not within the red frame, use a screwdriver to adjust the bolt A until the air bubble is within the red frame.

- The adjustable range within the level's red frame is +/-0.2°.
- The target angle is +0.2° (upward angle of 0.2°).

Result:

| Adjustment Direction | Adjustment Procedure | Adjustment Angl |
|---|---|---|
| Vertical adjustment | Upward direction: Turn bolt A to negative (-) side | For every 1.4 rotations adjustment bolt, sensor moves about 1° |
| | Downward direction: Turn bolt A to positive (+) side | |

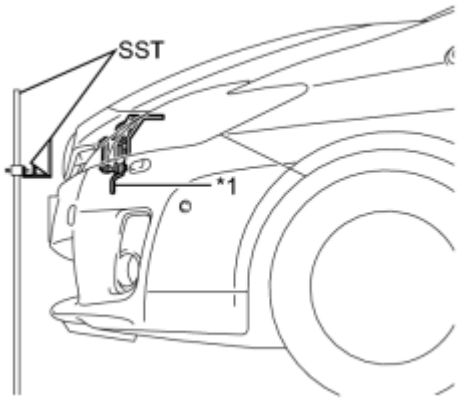
(c) Adjust the reflector height.

# Text in Illustration

| | |
|---|---|
| *1 | Millimeter Wave Radar Sensor |

(1) Adjust the reflector so that the center of SST reflector is the same

height as the millimeter wave radar sensor.




P

SST: 09870-60000

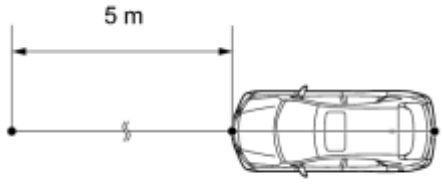
09870-60010

SST: 09870-60040

HINT:

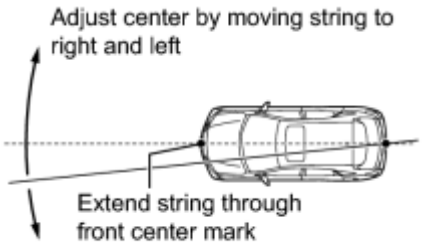
Prepare a 10 m (32.8 ft.) string, string with a sharp-pointed weight (plumb bob), and 5 m (16.4 ft.) tape measure.

(d) Place the reflector.




P

(1) Hang the string (with weight) from the center of the vehicle's rear emblem. Mark the vehicle's rear center point on the ground. Repeat for the front of the vehicle.



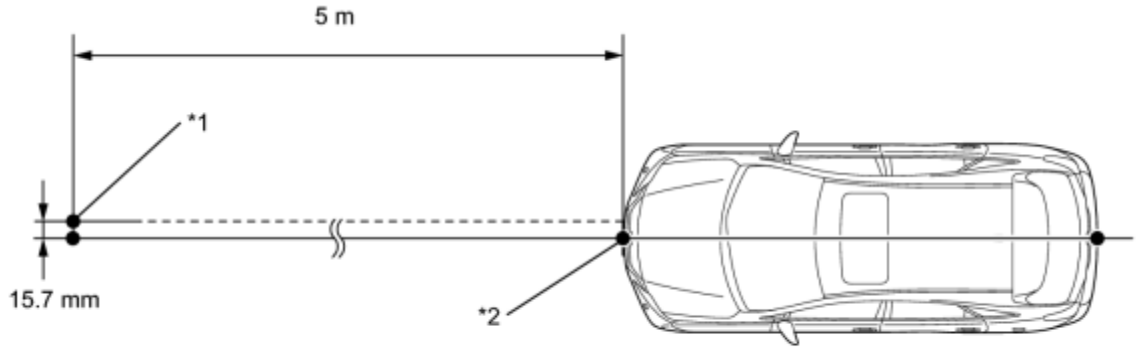

P

(2) Set one end of the 10 m (32.8 ft.) string on the vehicle's rear center point. Run the string over the vehicle's front center point to a position 5 m (16.4 ft.) beyond the vehicle's front center point, as shown in the illustration. Mark the 5 m (16.4 ft.) position.

(3) Using a tape measure, measure 15.7 mm (0.618 in.) to the right of the 5 m (16.4 ft.) position. Place the reflector at that position.

NOTICE:

Perform the operation as precisely as possible.




P

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Reflector Placement Point | *2 | Millimeter Wave Radar Sensor Position |

(e) Check the radar beam axis.

(1) When using the Techstream:

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG).
3. Turn the Techstream on, and turn the cruise control main switch on.
4. Select "Connect to Vehicle".
5. Select each item on the display screen and proceed to the next screen.
6. Under "System Selection Menu", select "Radar Cruise".
7. Select "Utility".
8. Select "Beam Axis Adjustment" and proceed to the next screen.

   HINT:

   A buzzer will sound for 1 second.

9. Follow the Techstream display, and continue with the adjustment.

   CAUTION:

   Do not come within 20 cm (7.87 in.) of the radar sensor.

   NOTICE:

   - Turn the cruise control main switch on before pressing "Next".
   - Make sure there is at least 20 cm (7.87 in.) between the radar sensor and any nearby individuals.

(2) Check the following items on the laser cruise divergence data screen.

NOTICE:

While using the Techstream beam axis adjustment mode, the actual direction and angle of the radar sensor may be different from the Techstream data. In such a case, the deviation is displayed on the combination meter's multi-information display.

1. Confirm that the distance value is approximately 5 m (16.4 ft.).

   HINT:

   - A value between 0.0 m (0.0 ft.) and 6.3 m (20.7 ft.) should be indicated.
   - If the distance is 0.0 m (0.0 ft.), the sensor cannot detect the target. Reconfirm that there is no metal in the specified area in front of the vehicle (refer to the Notice at the beginning of this adjustment procedure).
2. Confirm that the left/right side value is between 0.0 m (0.0 ft.) and 6.3 m (20.7 ft.).

   HINT:

   If the distance is 0.0 m (0.0 ft.), the sensor cannot detect the target. Reconfirm that there is no metal in the specified area in front of the vehicle (refer to the Notice at the beginning of this adjustment procedure).

(f) Check and adjust the horizontal direction of the radar sensor.

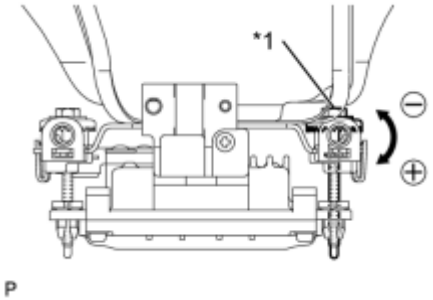
(1) Check that the divergence of the radar beam axis is 0°.

Standard:

0° (Both right and left)

If the axis is not as specified, use a screwdriver to adjust the bolt B until the divergence of the radar beam axis is 0°.

(2) Based on the measured divergence of the beam axis, turn and adjust the bolt B for horizontal adjustment of the millimeter wave radar sensor using a screwdriver.




## Text in Illustration

| | |
|---|---|
| *1 | Bolt B |

Result:

| Adjustment Direction | Adjustment Procedure | Adjustment Angle |
|---|---|---|
| Horizontal adjustment | Right direction: Turn bolt B to positive (+) side. | For every 2.5 rotations of adjustment bolt, sensor moves about 1° |
| | Left direction: Turn bolt B to negative (-) side. | |

- If "LEFT SIDE: 1.0°" is displayed, the divergence is 1.0° in the left direction. Turn the bolt B approximately 2.5 turns to the negative (-) side.
- If the value does not change to 0°, it is possible that the sensor is aiming at something different. Reconfirm that there are no reflective materials in the surrounding area.

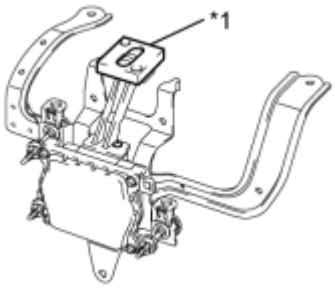
(3) Select "Next". The driving learning value is automatically reset.

HINT:

A buzzer will sound for 10 seconds or more.

(4) Disconnect the Techstream from the DLC3.

(g) Recheck and readjust the vertical direction of the radar sensor.




P

(1) Set a level on the radar sensor's level rack.

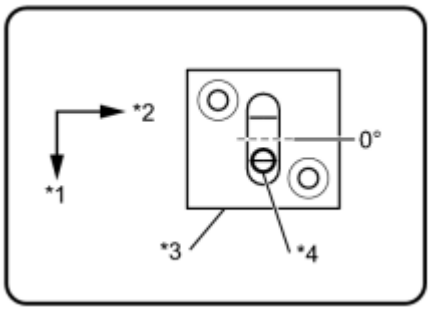
## Text in Illustration

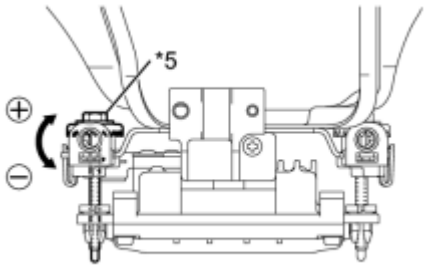
| | |
|---|---|
| *1 | Level |

(2) Check that the level's air bubble is within the red frame.

## Text in Illustration

| | |
|---|---|
| *1 | FR |
| *2 | LH |
| *3 | Level |
| *4 | Air Bubble |
| *5 | Bolt A |




P

OK:

Level's air bubble is within the red frame.

If the bubble is not within the red frame, use a screwdriver to adjust the bolt A until the level's air bubble is within the red frame.

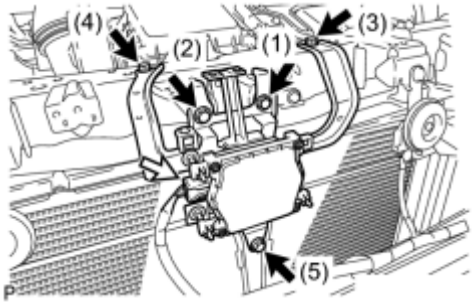
- The adjustable range within the red frame is +/-0.2°.
- The target angle is +0.2° (upward angle of 0.2°).

Result:

| Adjustment Direction | Adjustment Procedure | Adjustment Angl |
|---|---|---|
| Vertical adjustment | Upward direction: Turn bolt A to negative (-) side | For every 1.4 rotations adjustment bolt, sensor moves about 1° |
| | Downward direction: Turn bolt A to positive (+) side | |

# INSTALLATION

1. INSTALL MILLIMETER WAVE RADAR SENSOR ASSEMBLY




(a) Tighten the 5 bolts on the millimeter wave radar sensor assembly.

Torque: **6.2 N·m (63 kgf·cm, 55in·lbf)**

HINT:

Tighten the bolts in the order indicated in the illustration.

(b) Connect the connector.

2. INSTALL FRONT BUMPER ASSEMBLY INFO

3. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

4. PREPARE VEHICLE FOR FOG LIGHT AIMING ADJUSTMENT INFO

5. PREPARE FOR FOG LIGHT AIMING INFO

6. INSPECT FOG LIGHT AIMING INFO

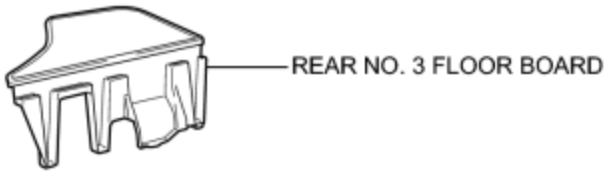
7. ADJUST FOG LIGHT AIMING INFO

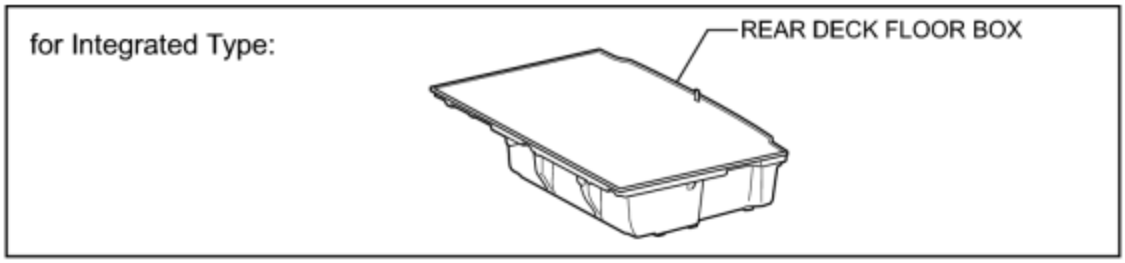
8. ADJUST MILLIMETER WAVE RADAR SENSOR ASSEMBLY INFO

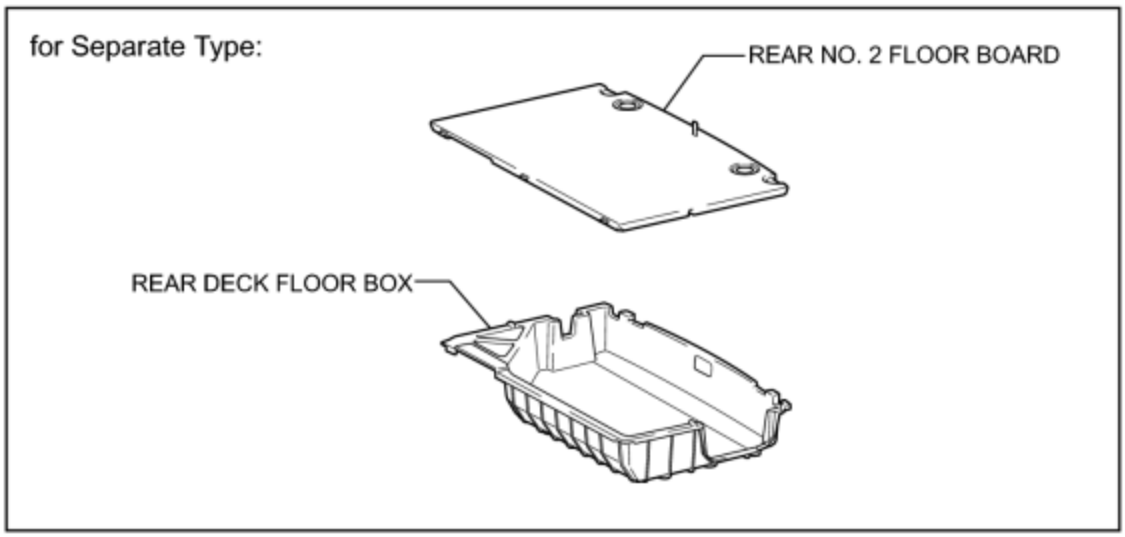
9. INSTALL RADIATOR SUPPORT OPENING COVER INFO

# COMPONENTS

# ILLUSTRATION

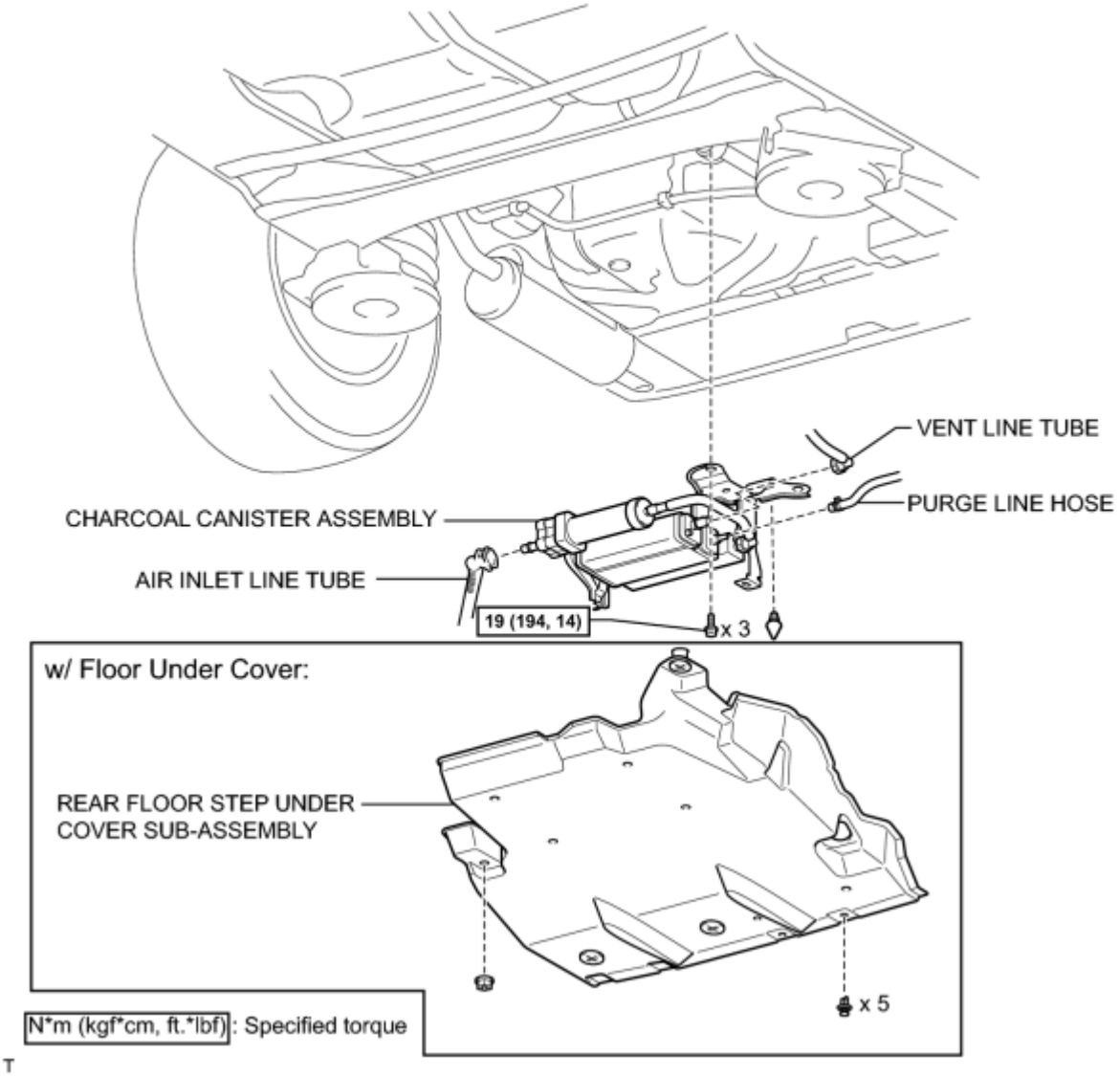



P

# ILLUSTRATION


VENT LINE TUBE
PURGE LINE HOSE
CHARCOAL CANISTER ASSEMBLY
AIR INLET LINE TUBE
19 (194, 14)
x 3
w/ Floor Under Cover:
REAR FLOOR STEP UNDER COVER SUB-ASSEMBLY
x 5
N*m (kgf*cm, ft.*lbf): Specified torque

T

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

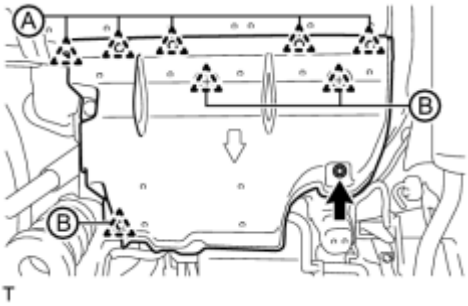
3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE REAR FLOOR STEP UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)




(a) Remove the 5 clips (A) and nut.

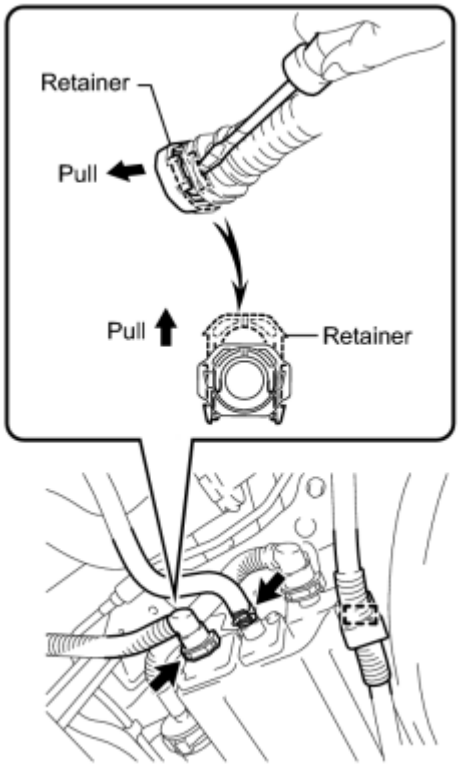
(b) Disconnect the 3 clips (B) and remove the rear floor step under cover sub-assembly.

6. REMOVE CHARCOAL CANISTER ASSEMBLY

(a) Using a screwdriver, pry up the retainer.

HINT:

Do not remove the retainer.

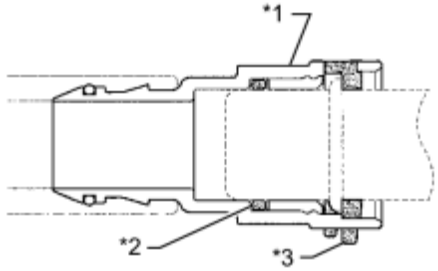



P

(b) Disconnect the tube clamp, purge line hose and vent line tube.

NOTICE:

- Remove any dirt or foreign matter on the vent line tube connector before performing this work.

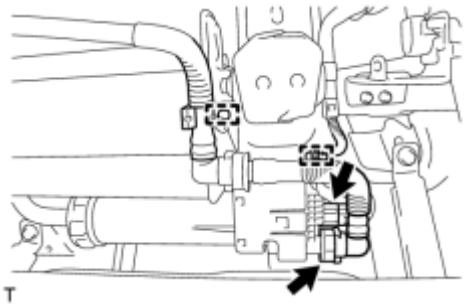



P

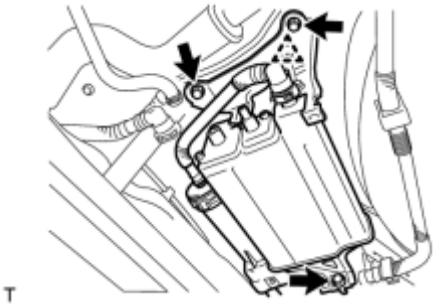
**Text in Illustration**

| | |
|---|---|
| *1 | Vent Line Tube Connector |
| *2 | O-ring |
| *3 | Retainer |

- Do not allow any scratches or foreign matter on the parts when disconnecting them as the vent line tube connector has an O-ring that seals the pipe.
- Perform this work by hand. Do not use any tools.
- Do not forcibly bend, twist or turn the nylon tube.
- Protect the disconnected part by covering it with a plastic bag after disconnecting the vent line tube.
- If the vent line tube connector and pipe are stuck, push and pull to release them.



(c) Disconnect the tube clamp, wire harness clamp and connector air inlet line tube.

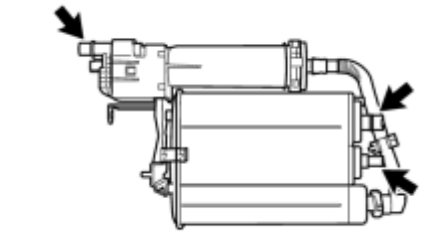


(d) Remove the 3 bolts, clip and charcoal canister assembly.

# INSPECTION

1. INSPECT CHARCOAL CANISTER ASSEMBLY

(a) Visually check the charcoal canister assembly.



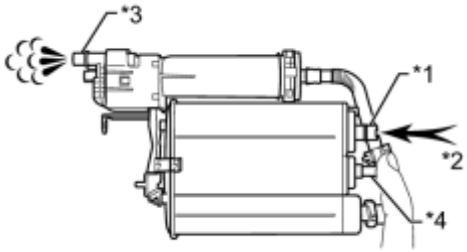
T

(1) Visually check the charcoal canister for cracks or damage.

If cracks or damage are found, replace the charcoal canister assembly.

(b) Check canister operation.

(1) With the purge port closed, blow 5 kPa (0.1 kgf/cm2, 0.7 psi) of air into the vent port, and check that air flows from the air inlet port.



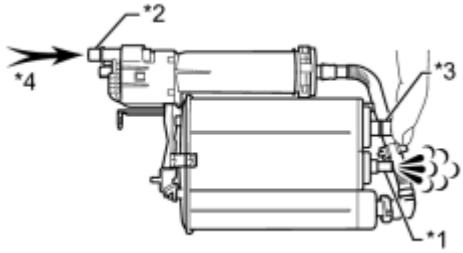

T

## Text in Illustration

| | |
|---|---|
| *1 | Vent Port |
| *2 | Air |
| *3 | Air Inlet Port |
| *4 | Purge Port |

If the result is not as specified, replace the charcoal canister assembly.

(2) With the vent port closed, blow 5 kPa (0.1 kgf/cm2, 0.7 psi) of air into the air inlet port, and check that air flows from the purge port.



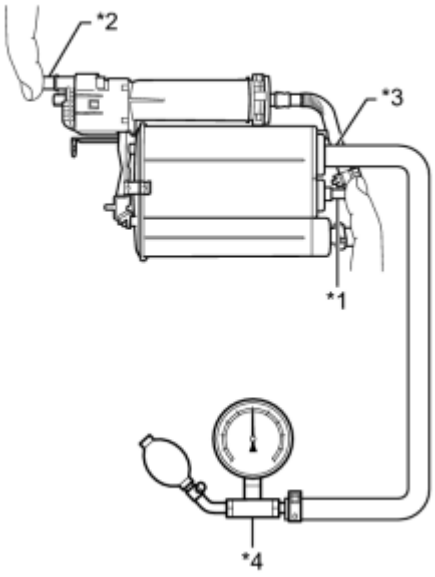

T

## Text in Illustration

| | |
|---|---|
| *1 | Purge Port |
| *2 | Air Inlet Port |
| *3 | Vent Port |
| *4 | Air |

If the result is not as specified, replace the charcoal canister assembly.

(c) Check for air leaks.




T

(1) Connect a pressure gauge to the vent port of the charcoal canister.

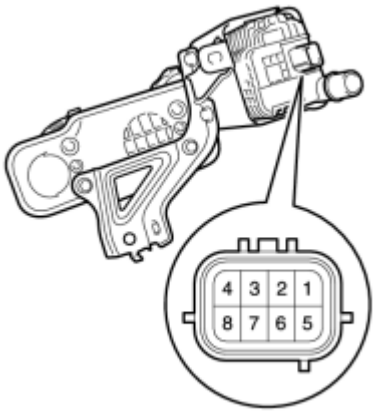
## Text in Illustration

| | |
|---|---|
| *1 | Purge Port |
| *2 | Air Inlet Port |
| *3 | Vent Port |
| *4 | Pressure Gauge |

(2) With the purge port and the air inlet port closed, apply 20 kPa (150 mmHg, 5.91 in.Hg) of pressurized air into the vent port, then confirm that pressure is retained for 1 minute.

If the result is not as specified, replace the charcoal canister assembly.

(d) Check the leak detection pump.




T

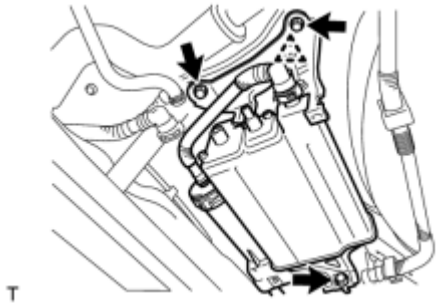
(1) Connect a positive (+) lead of the battery to terminal 5 and a negative (-) lead to terminal 1.

(2) Check that a clicking sound is heard from the leak detection pump.

If the result is not as specified, replace the charcoal canister assembly.

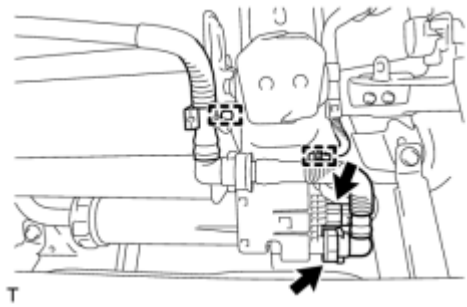
# INSTALLATION

1. INSTALL CHARCOAL CANISTER ASSEMBLY

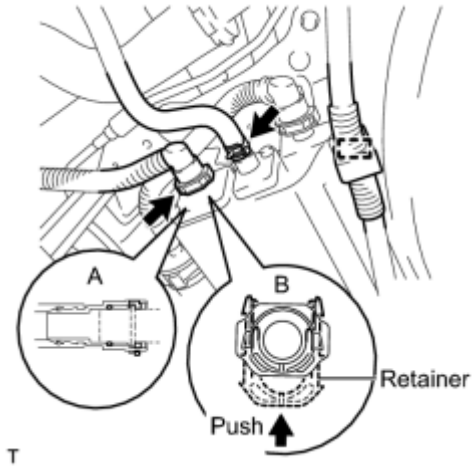


(a) Install the charcoal canister assembly with the 3 bolts and clip.

Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**



(b) Connect the air inlet line tube, connector, tube clamp and wire harness clamp.




(c) Connect the vent line tube.

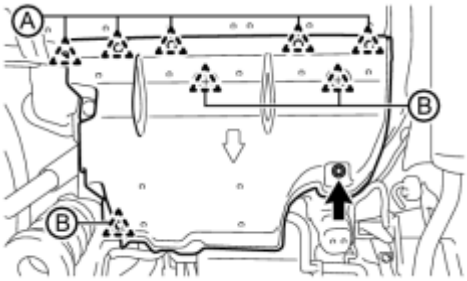
(1) Connect the pipe to the fuel tube connector, as shown in A in the illustration. Then push up the retainer to lock the claws, as shown in B in the illustration.

- Check that there are no scratches or foreign matter around the connected parts of the vent line tube connector and pipe before performing this work.
- After connecting the vent line tube, check that the vent line tube is securely connected by pulling the vent line tube connector and pipe.

(d) Connect the purge line hose and tube clamp.

2. INSTALL REAR FLOOR STEP UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover)

(a) Connect the 3 clips (B).




T

(b) Install the rear floor step under cover sub-assembly with the nut and 5 clips (A).

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

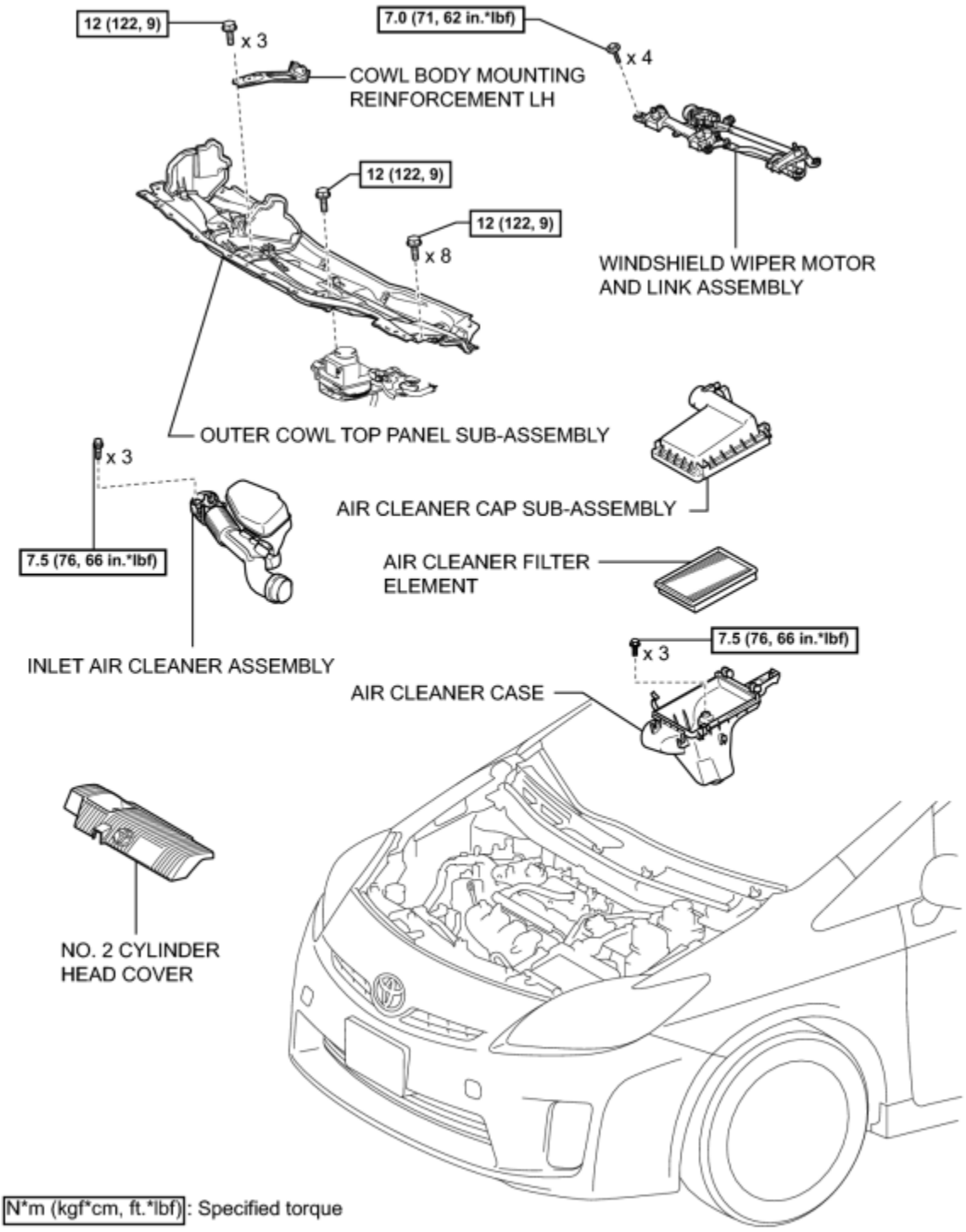
4. INSTALL REAR NO. 3 FLOOR BOARD INFO

5. INSTALL REAR DECK FLOOR BOX INFO

6. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

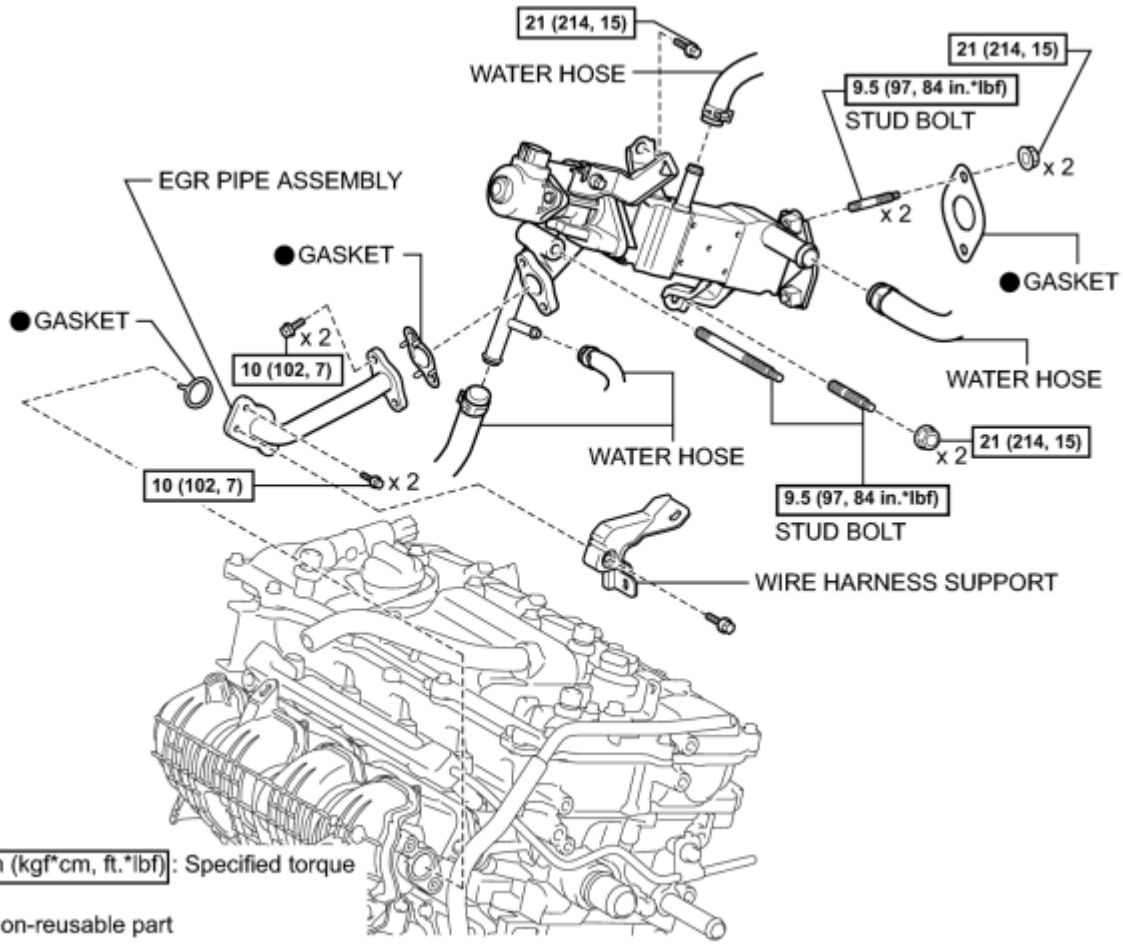
# COMPONENTS

# ILLUSTRATION



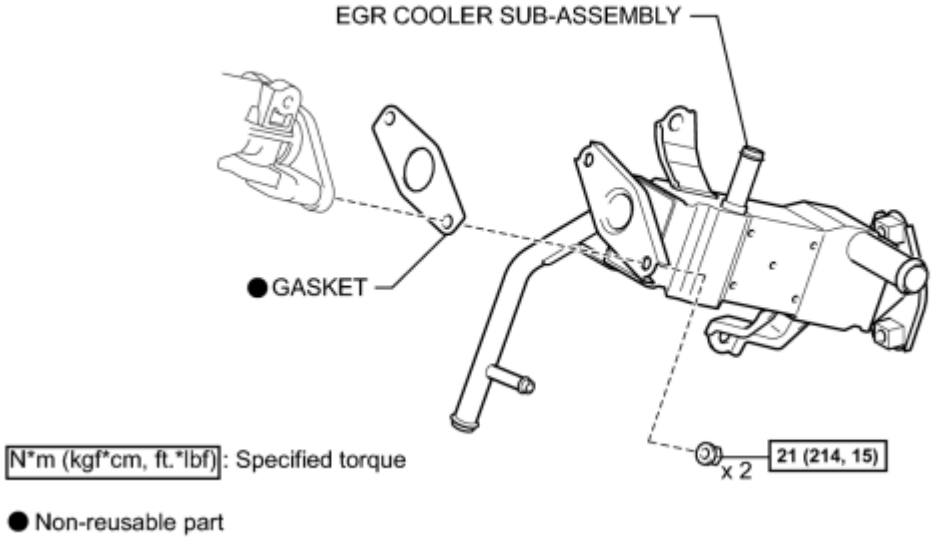

c

# ILLUSTRATION




T

# ILLUSTRATION




T

# REMOVAL

1. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

(a) Remove the windshield wiper motor and link assembly INFO.

2. REMOVE COWL BODY MOUNTING REINFORCEMENT LH INFO

3. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

4. DRAIN COOLANT (for Engine) INFO

5. REMOVE NO. 2 CYLINDER HEAD COVER INFO

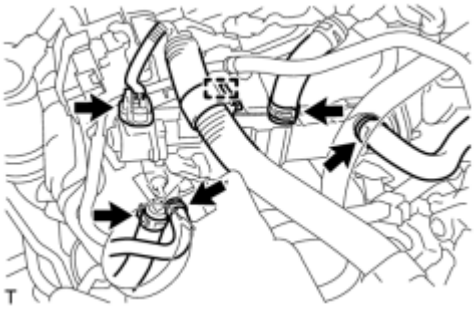
6. REMOVE AIR CLEANER CAP SUB-ASSEMBLY INFO

7. REMOVE INLET AIR CLEANER ASSEMBLY INFO

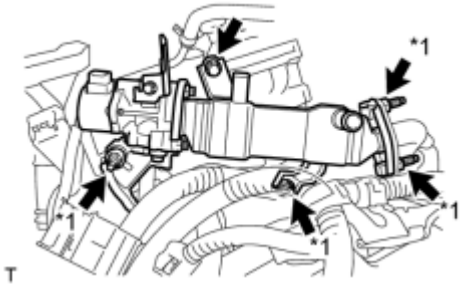
8. REMOVE AIR CLEANER CASE INFO

9. REMOVE EGR PIPE ASSEMBLY INFO

10. REMOVE EGR COOLER SUB-ASSEMBLY



(a) Disconnect the connector, wire harness clamp and 4 water hoses.




(b) Remove the 4 nuts and bolt.

## Text in Illustration

| | |
|---|---|
| *1 | Stud Bolt and Nut |

(c) Using an E8 "TORX" wrench, remove the 4 stud bolts and EGR valve with cooler assembly.

(d) Remove the gasket.

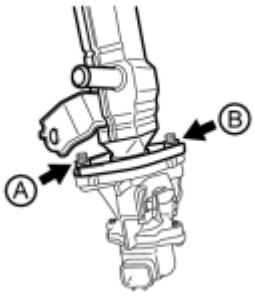


(e) Remove the 2 nuts, EGR cooler sub-assembly and gasket.

T

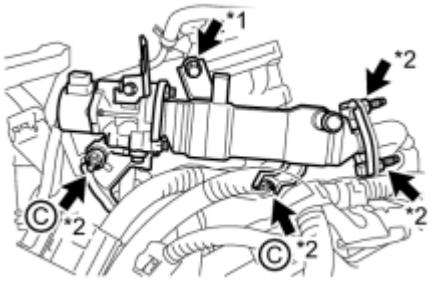
# INSTALLATION

1. INSTALL EGR COOLER SUB-ASSEMBLY




(a) Temporarily install the EGR cooler sub-assembly with the 2 nuts (A and B).

## Text in Illustration




| | |
|---|---|
| *1 | Bolt |
| *2 | Stud Bolt and Nut |

(b) Set a new gasket and EGR valve with cooler assembly.

(c) Using an E8 "TORX" wrench, install the 4 stud bolts.

Torque: **9.5 N·m (97 kgf·cm, 84in·lbf)**

(d) Temporarily install the 2 nuts (C) and bolt.

(e) Tighten the nut (A).

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

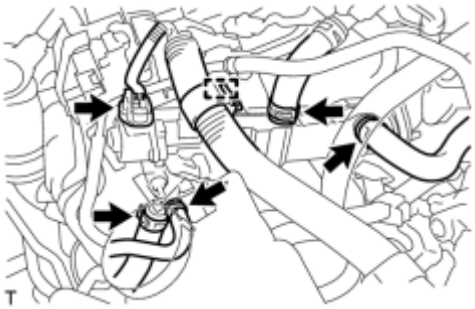
(f) Tighten the 3 nuts (B and C) and bolt.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

NOTICE:

Make sure that all installation surfaces of the EGR valve with cooler assembly are in even contact when tightening the bolts and nuts.

(g) Connect the connector, wire harness clamp and 4 water hoses.



2. INSTALL EGR PIPE ASSEMBLY INFO

3. INSTALL AIR CLEANER CASE INFO

4. INSTALL INLET AIR CLEANER ASSEMBLY INFO

5. INSTALL AIR CLEANER CAP SUB-ASSEMBLY INFO

6. INSTALL NO. 2 CYLINDER HEAD COVER INFO

7. ADD COOLANT (for Engine) INFO

8. INSPECT FOR COOLANT LEAK (for Engine) INFO

9. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

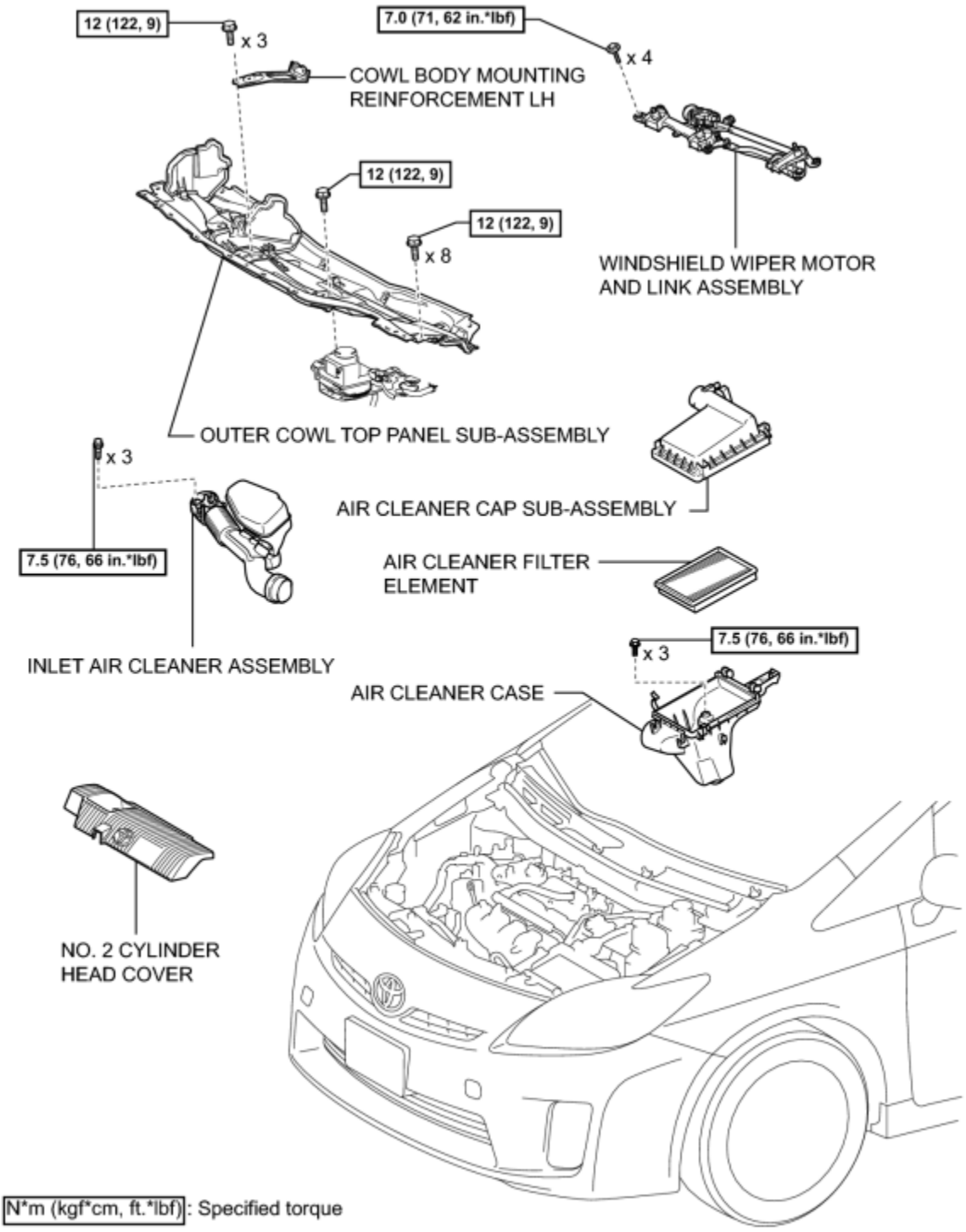
10. INSTALL COWL BODY MOUNTING REINFORCEMENT LH INFO

11. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

(a) Install the windshield wiper motor and link assembly INFO.

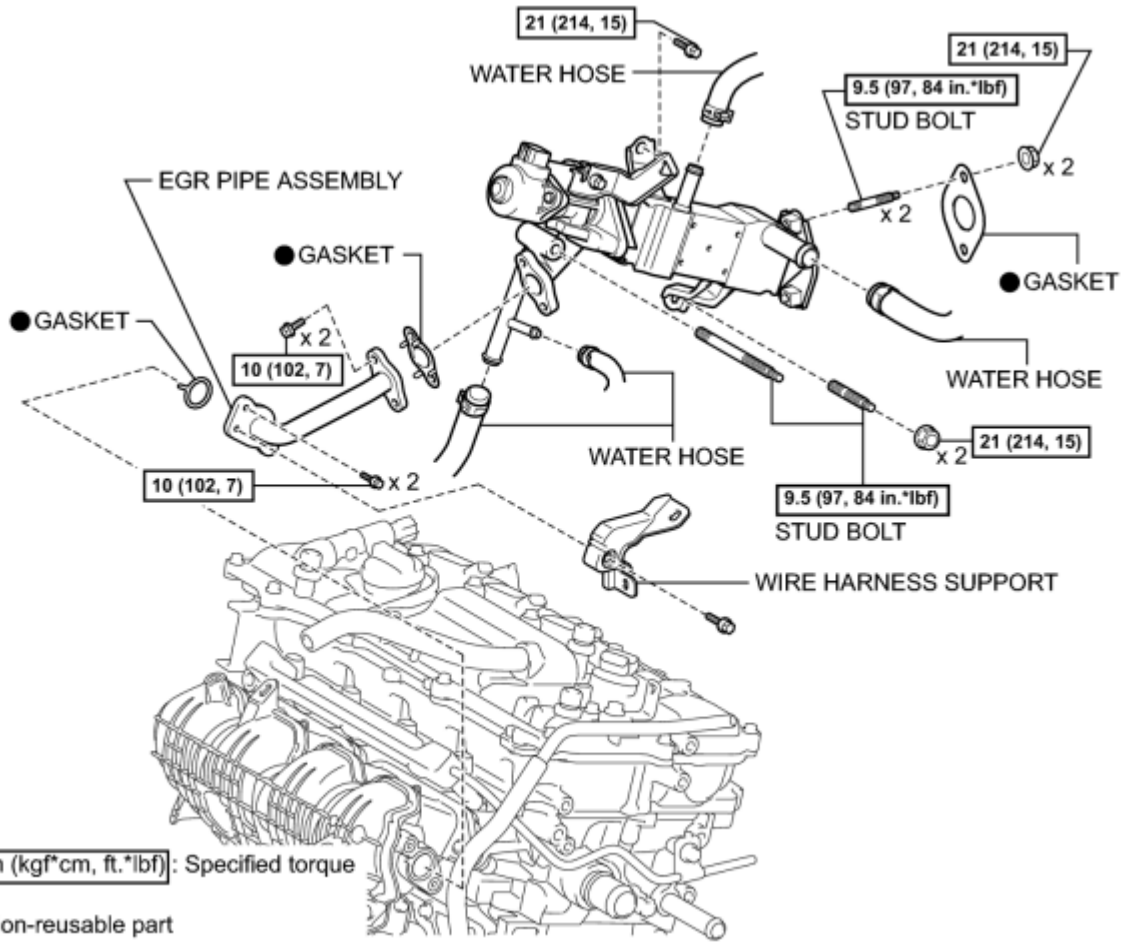
# COMPONENTS

# ILLUSTRATION



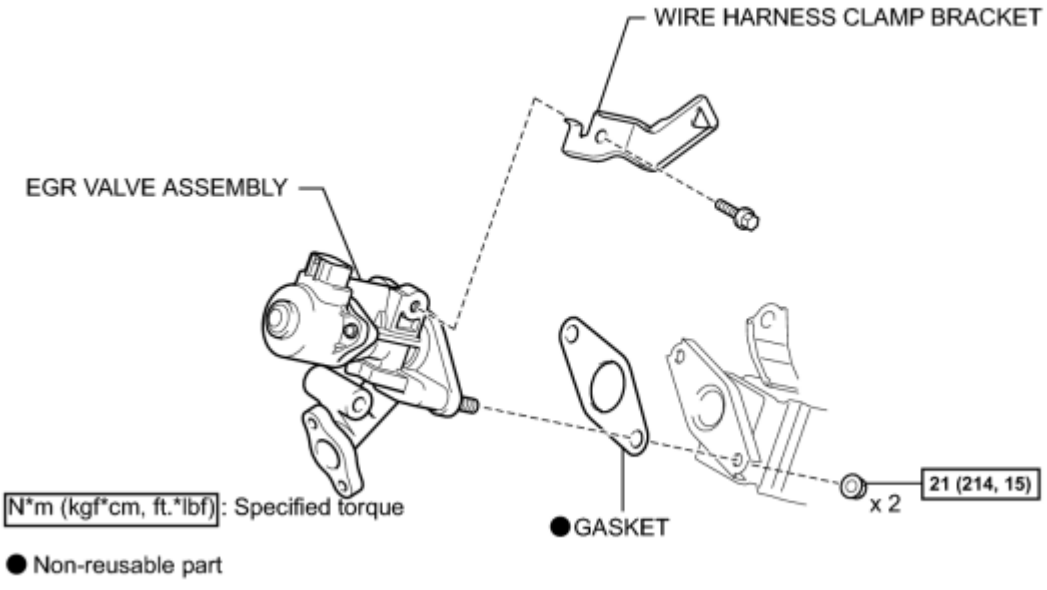

c

# ILLUSTRATION




T

# ILLUSTRATION




T

# REMOVAL

1. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

(a) Remove the windshield wiper motor and link assembly INFO.

2. REMOVE COWL BODY MOUNTING REINFORCEMENT LH INFO

3. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

4. DRAIN COOLANT (for Engine) INFO

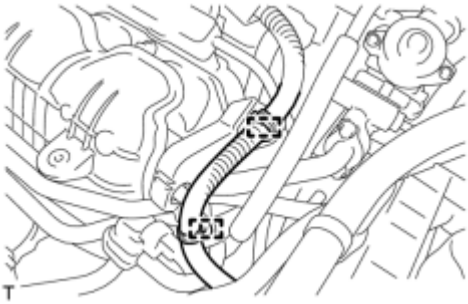
5. REMOVE NO. 2 CYLINDER HEAD COVER INFO

6. REMOVE AIR CLEANER CAP SUB-ASSEMBLY INFO

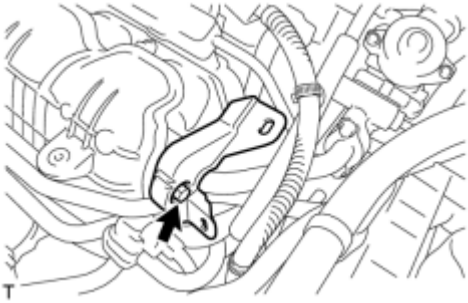
7. REMOVE INLET AIR CLEANER ASSEMBLY INFO

8. REMOVE AIR CLEANER CASE INFO

9. REMOVE EGR PIPE ASSEMBLY

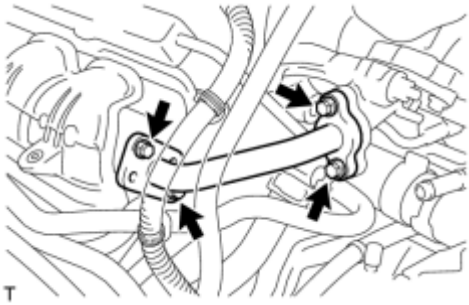


(a) Disconnect the 2 wire harness clamps.

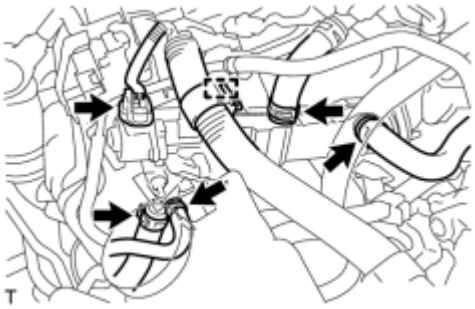


(b) Remove the bolt and wire harness support.

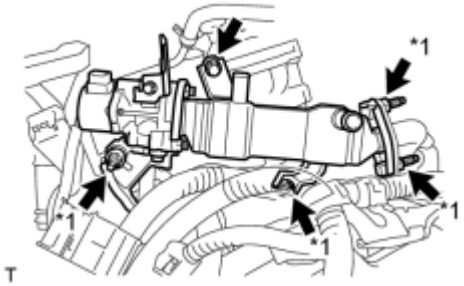
(c) Remove the 4 bolts, EGR pipe assembly and 2 gaskets.



10. REMOVE EGR VALVE ASSEMBLY



(a) Disconnect the connector, wire harness clamp and 4 water hoses.



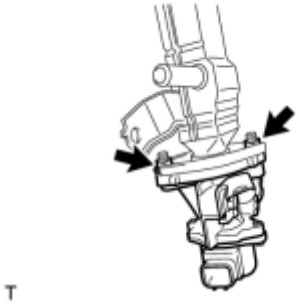

(b) Remove the 4 nuts and bolt.

## Text in Illustration

| | |
|---|---|
| *1 | Stud Bolt and Nut |

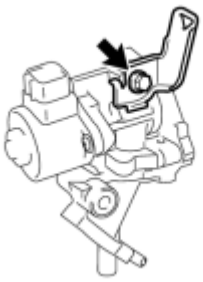
(c) Using an E8 "TORX" wrench, remove the 4 stud bolts and EGR valve with cooler assembly.

(d) Remove the gasket.



(e) Remove the 2 nuts, EGR valve assembly and gasket.

11. REMOVE WIRE HARNESS CLAMP BRACKET

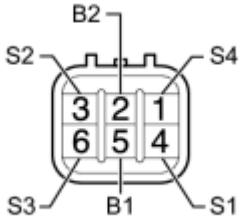


T

(a) Remove the bolt and wiring harness clamp bracket.

# INSPECTION

1. INSPECT EGR VALVE ASSEMBLY




(a) Measure the resistance according to the value(s) in the table below.

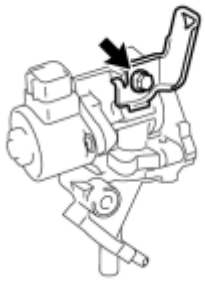
## Standard Resistance

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 5 (B1) - 4 (S1) | 20°C (68°F) | 18 to 22 Ω |
| 5 (B1) - 6 (S3) | 20°C (68°F) | 18 to 22 Ω |
| 2 (B2) - 1 (S4) | 20°C (68°F) | 18 to 22 Ω |
| 2 (B2) - 3 (S2) | 20°C (68°F) | 18 to 22 Ω |

If the result is not as specified, replace the EGR valve assembly.

# INSTALLATION

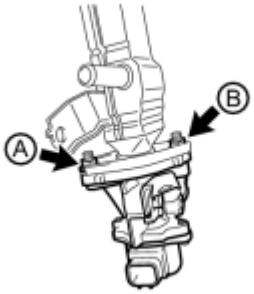
1. INSTALL WIRE HARNESS CLAMP BRACKET



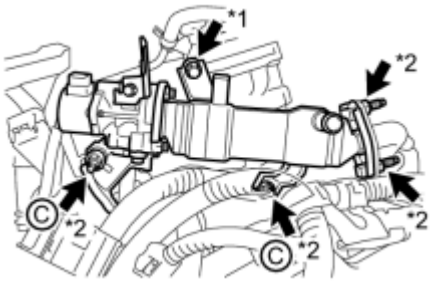
T

(a) Install the wiring harness clamp bracket with the bolt.

2. INSTALL EGR VALVE ASSEMBLY




(a) Temporarily install the EGR valve assembly with the 2 nuts (A and B).




## Text in Illustration

| | |
|---|---|
| *1 | Bolt |
| *2 | Stud Bolt and Nut |

(b) Set a new gasket and EGR valve with cooler assembly.

(c) Using an E8 "TORX" wrench, install the 4 stud bolts.

Torque: **9.5 N·m (97 kgf·cm, 84in·lbf)**

(d) Temporarily install the 2 nuts (C) and bolt.

(e) Tighten the nut (A).

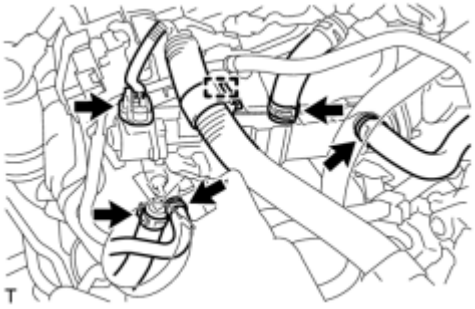
Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

(f) Tighten the 3 nuts (B and C) and bolt.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

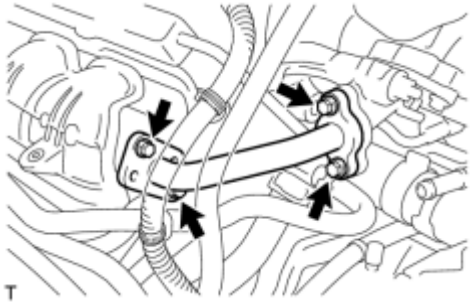
NOTICE:

Make sure that all installation surfaces of the EGR valve with cooler assembly are in even contact when tightening the bolts and nuts.



(g) Connect the connector, wire harness clamp and 4 water hoses.

3. INSTALL EGR PIPE ASSEMBLY

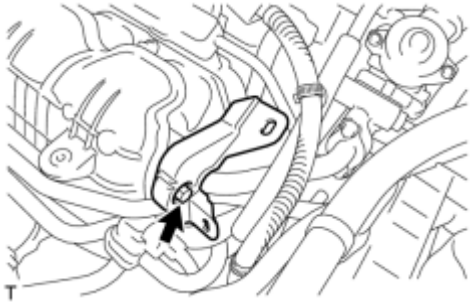


(a) Install 2 new gaskets and EGR pipe assembly with the 4 bolts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

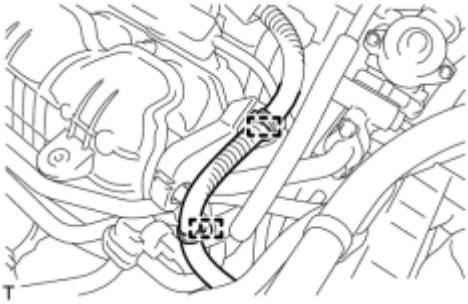
NOTICE:

Make sure to tighten the 4 bolts evenly until the flanges of the EGR pipe assembly contact with the installation surfaces.



(b) Install the wire harness support with the bolt.

(c) Connect the 2 wire harness clamps.



4. INSTALL AIR CLEANER CASE INFO

5. INSTALL INLET AIR CLEANER ASSEMBLY INFO

6. INSTALL AIR CLEANER CAP SUB-ASSEMBLY INFO

7. INSTALL NO. 2 CYLINDER HEAD COVER INFO

8. ADD COOLANT (for Engine) INFO

9. INSPECT FOR COOLANT LEAK (for Engine) INFO

10. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

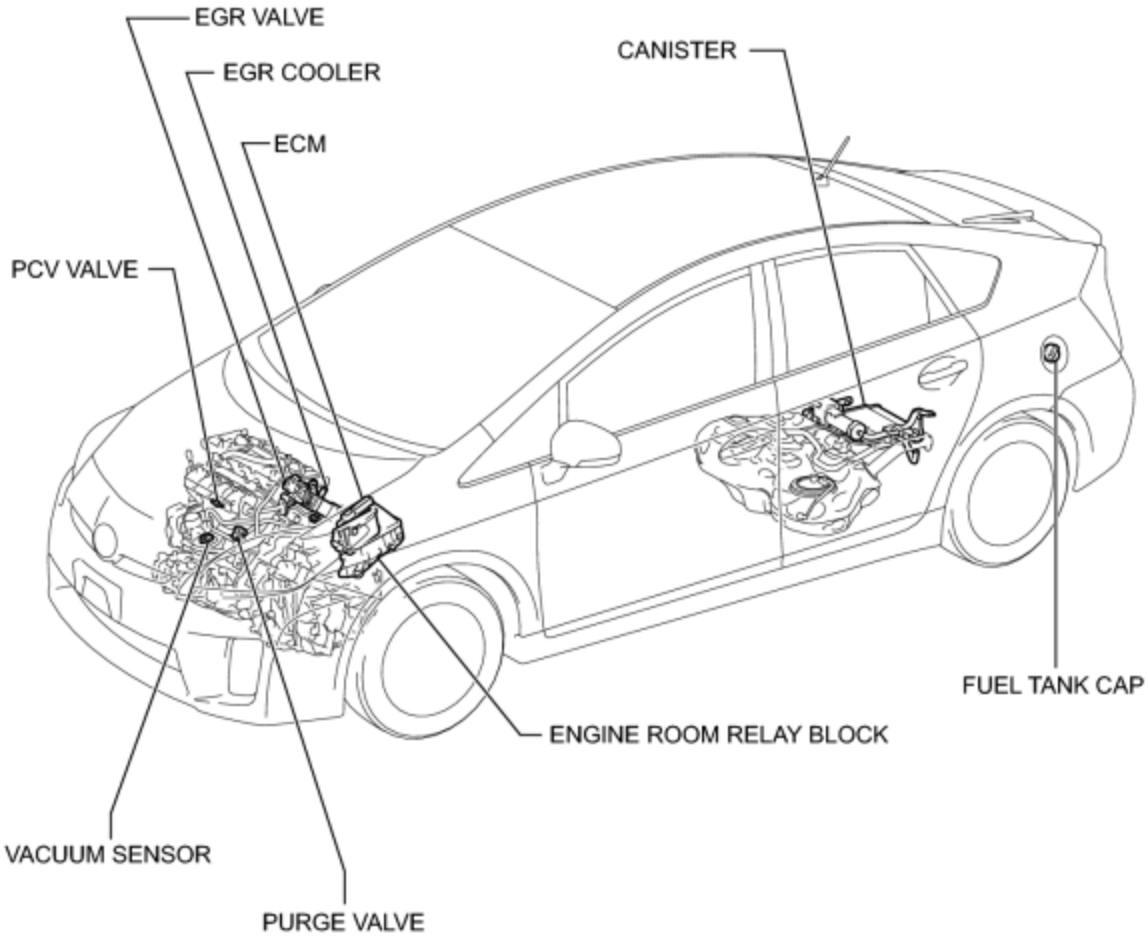
11. INSTALL COWL BODY MOUNTING REINFORCEMENT LH INFO

12. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

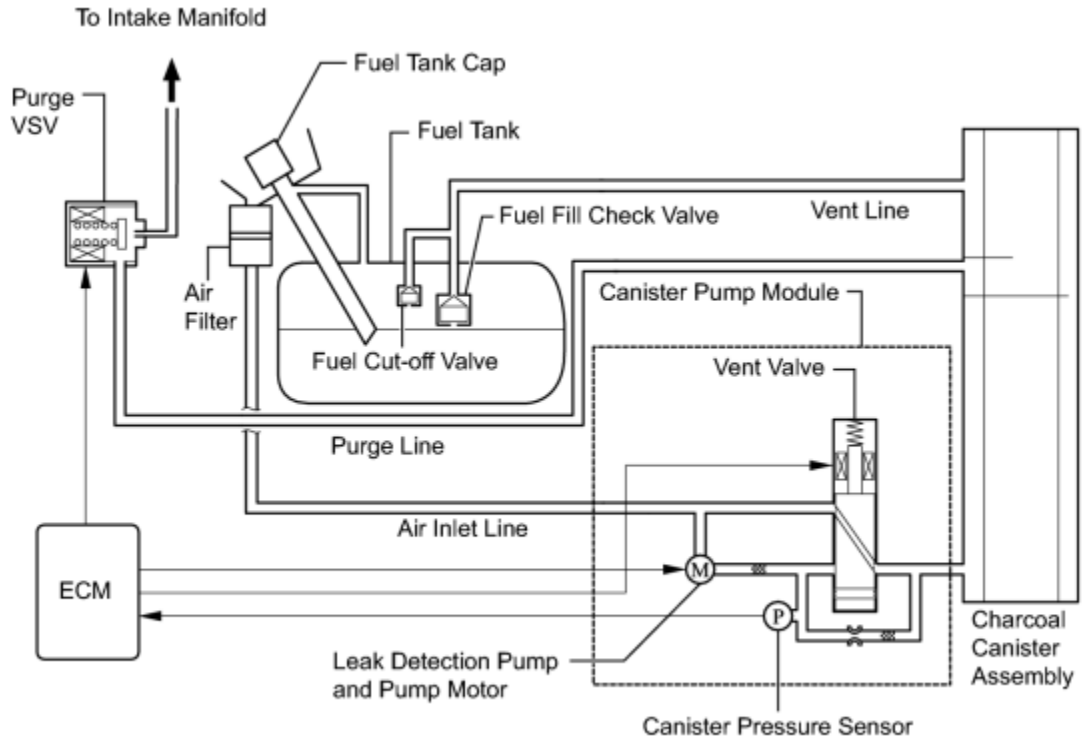
(a) Install the windshield wiper motor and link assembly INFO.

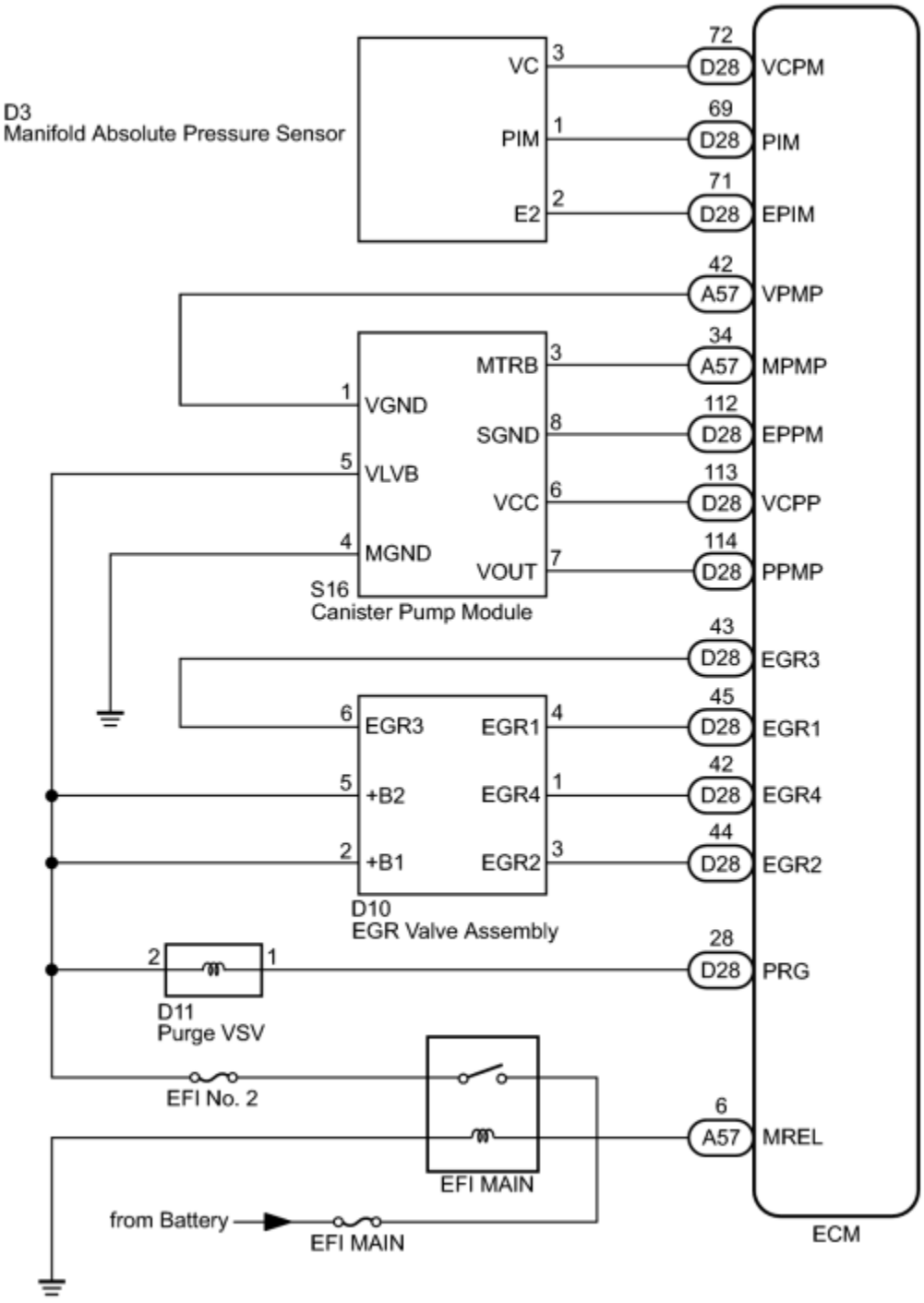
# PARTS LOCATION

# ILLUSTRATION



# SYSTEM DIAGRAM




D3
Manifold Absolute Pressure Sensor
VC
PIM
E2
3
1
2
72
69
71
D28
VCPM
PIM
EPIM
42
A57
VPMP
MTRB
VGND
SGND
VLVB
VCC
MGND
VOUT
S16
Canister Pump Module
34
112
113
114
MPMP
EPPM
VCPP
PPMP
43
D28
EGR3
45
42
44
EGR1
EGR4
EGR2
D10
EGR Valve Assembly
28
PRG
D11
Purge VSV
EFI No. 2
6
MREL
EFI MAIN
from Battery
EFI MAIN
ECM

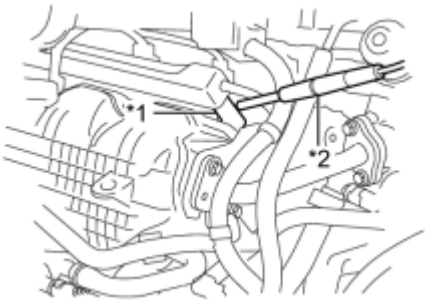
# ON-VEHICLE INSPECTION

1. CHECK FUEL CUT RPM

(a) Put the engine in inspection mode INFO.

(b) Start and warm up the engine.

(c) Increase the engine speed to at least 2500 rpm.




(d) Use a sound scope to check for injector operating sounds.

## Text in Illustration

| | |
|---|---|
| *1 | Injector |
| *2 | Sound Scope |

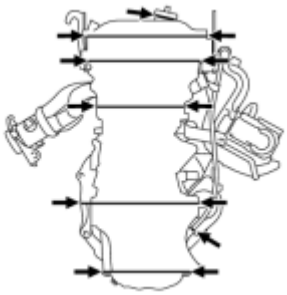
(e) When the accelerator pedal is released, check that injector operating sounds stop momentarily (at 2500 rpm or higher) and then resume (at 1200 rpm).

Standard:

| Item | Specified Condition |
|---|---|
| Fuel cut off rpm | 2500 rpm |
| Fuel injection restart rpm | 1200 rpm |

If the result is not as specified, check the injectors, wiring and ECM.

2. VISUALLY INSPECT HOSES, CONNECTIONS AND GASKETS



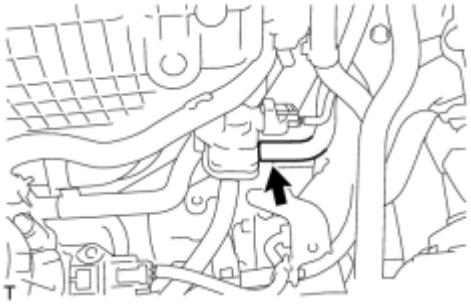

(a) Visually check that the hoses, connections and gaskets have no cracks, leaks or damage.

- Detachment or other problems with the engine oil dipstick, filler cap, ventilation hose and other components may cause the engine to run improperly.
- Air suction caused by disconnections, looseness or cracks in any part of the air induction system between the throttle body and cylinder head will cause an engine failure or engine malfunction.

If any defects are found, replace parts as necessary.

3. INSPECT EVAPORATIVE EMISSION CONTROL SYSTEM

(a) Connect the Techstream to the DLC3.



(b) Disconnect the fuel vapor feed hose from the purge valve shown in the illustration.

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Enter the following menus: Powertrain / Engine and ECT / Active Test / Activate the VSV for Evap Control.

(f) Check that vacuum occurs at the purge valve port.

(g) If vacuum does not occur, check the following items.

HINT:

- VSV (for canister purge)
- Clogging in the fuel vapor feed hose connecting the intake air surge tank and VSV
- Voltage from the ECM PRG terminal

(h) Exit Active Test mode and reconnect the fuel vapor feed hose.

(i) Enter the following menus: Powertrain / Engine and ECT / Data List / EVAP Purge VSV.

(j) Warm up the engine and drive the vehicle.

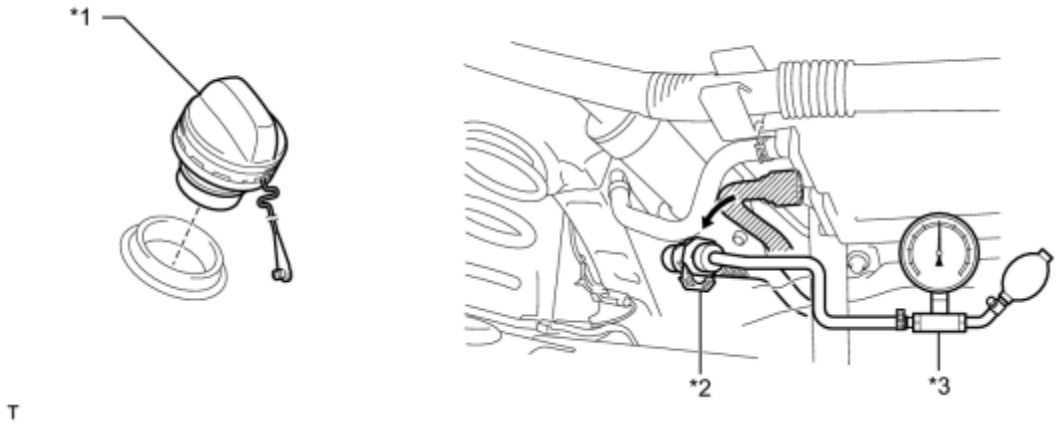
(k) Confirm that the purge valve opens.

If the result is not as specified, replace the purge valve, wire harness or ECM.

4. CHECK FUEL TANK AND VENT LINE

(a) Disconnect the vent line hose from the canister.

(b) Connect the pressure gauge to the vent line hose.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Fuel Tank Cap | *2 | Vent Line Hose |
| *3 | Pressure Gauge | - | - |

(c) Apply 4 kPa (0.04 kgf/cm$^2$, 0.6 psi) of pressure to the vent line of the fuel tank.

HINT:

Perform this inspection with the fuel tank less than 90% full. When the fuel tank is full, the fuel fill check valve closes and the pressure is released through the 2 mm orifice. As a result, when the fuel tank cap is removed, the pressure does not decrease smoothly.

(d) Check that the fuel tank pressure is maintained for some time, and does not decrease immediately.

HINT:

If the pressure decreases immediately, one of the following may apply:

- The fuel tank cap is not completely tightened.
- The fuel tank cap is damaged.
- Air is leaking from the vent line.
- The fuel tank is damaged.

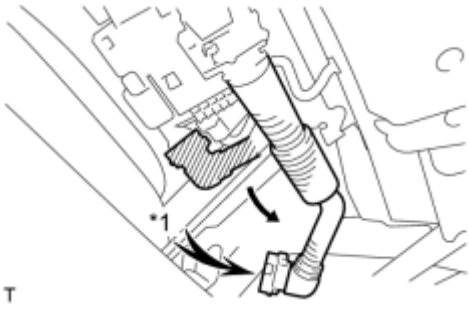
(e) When the fuel tank cap is removed, check that the pressure is released smoothly.

HINT:

If the pressure does not drop, replace the fuel tank assembly.

(f) Reconnect the vent line hose to the canister.

5. INSPECT AIR INLET LINE




(a) Disconnect the air inlet line hose from the charcoal canister.

## Text in Illustration

| | |
|---|---|
| *1 | Air |

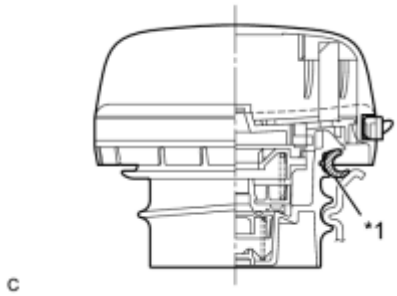
(b) Check that air flows freely into the air inlet line.

If air does not flow freely into the air inlet line, repair or replace the air inlet line hose.

(c) Reconnect the air inlet line hose to the charcoal canister.

# INSPECTION

1. INSPECT FUEL TANK CAP ASSEMBLY




(a) Visually check that the cap and gasket are not deformed or damaged.

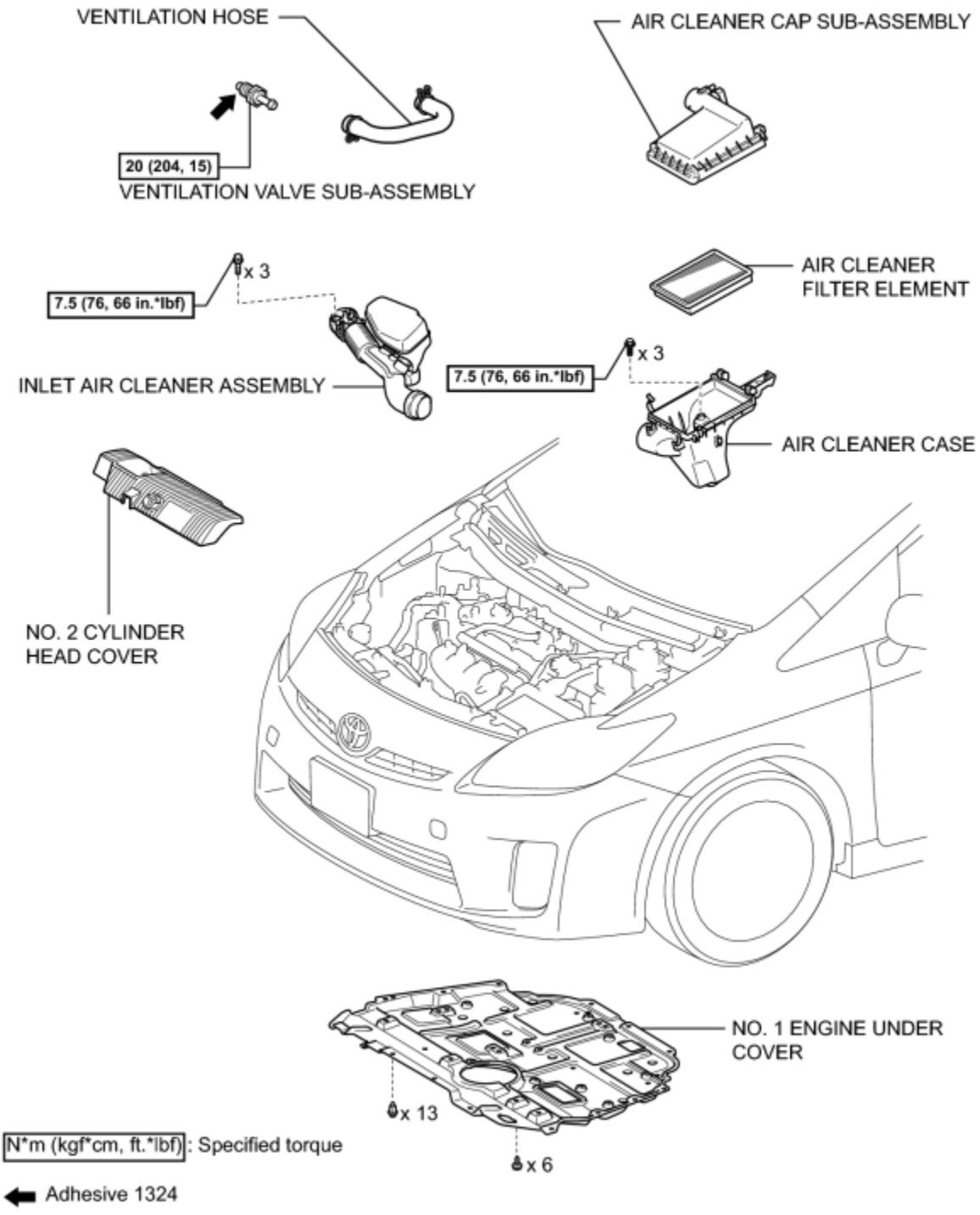
If the result is not as specified, replace the fuel tank cap assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Gasket |

# COMPONENTS

# ILLUSTRATION




c

# REMOVAL

1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

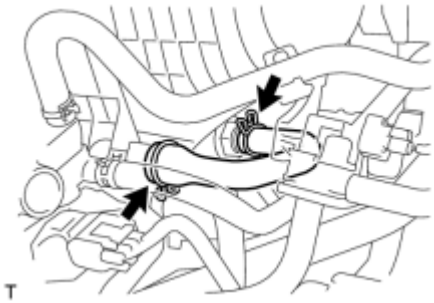
2. REMOVE AIR CLEANER CAP SUB-ASSEMBLY INFO

3. REMOVE INLET AIR CLEANER ASSEMBLY INFO

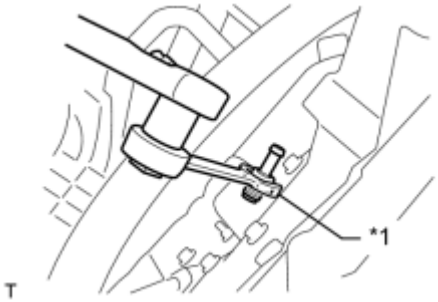
4. REMOVE AIR CLEANER CASE INFO

5. REMOVE NO. 1 ENGINE UNDER COVER

6. REMOVE VENTILATION VALVE SUB-ASSEMBLY



(a) Remove the ventilation hose from the ventilation valve sub-assembly.




(b) Using a ball joint lock nut wrench (22 mm), remove the ventilation valve sub-assembly.

## Text in Illustration

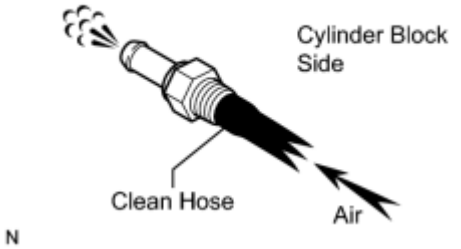
| | |
|---|---|
| *1 | Ball Joint Lock Nut Wrench (22 mm) |

# INSPECTION

1. INSPECT VENTILATION VALVE SUB-ASSEMBLY

(a) Install a clean hose to the ventilation valve sub-assembly.

(b) Check the ventilation valve sub-assembly operation.




N

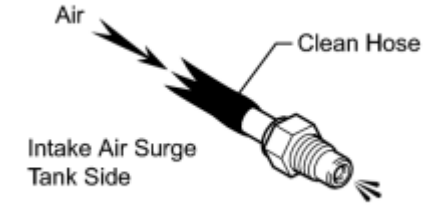
(1) Blow air into the cylinder block side, and check that air passes through easily.

CAUTION:

Do not suck air through the valve.

Petroleum substances inside the valve are hazardous to your health.

If the result is not as specified, replace the ventilation valve sub-assembly.




N

(2) Blow air into the intake air surge tank side, and check that air passes through with difficulty.

CAUTION:

Do not suck air through the valve.

Petroleum substances inside the valve are hazardous to your health.

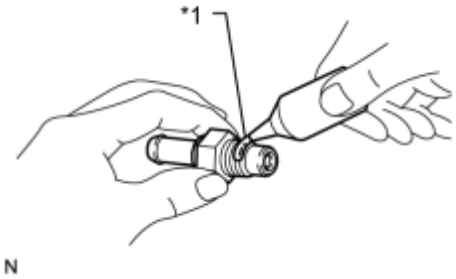
If the result is not as specified, replace the ventilation valve sub-assembly.

(c) Remove the clean hose from the ventilation valve sub-assembly.

# INSTALLATION

1. INSTALL VENTILATION VALVE SUB-ASSEMBLY

(a) Apply adhesive to 2 or 3 threads of the ventilation valve sub-assembly.



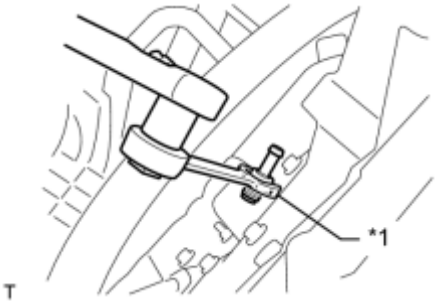

## Text in Illustration

| | |
|---|---|
| *1 | Adhesive 1324 |

Adhesive:

Toyota genuine adhesive 1324, three bond 1324 or equivalent

(b) Using a ball joint lock nut wrench (22 mm), install the ventilation valve sub-assembly.



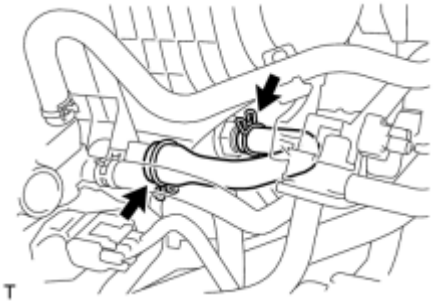

## Text in Illustration

| | |
|---|---|
| *1 | Ball Joint Lock Nut Wrench (22 mm) |

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

NOTICE:

Use the formula to calculate special torque values for situations where a ball joint lock nut wrench is combined with a torque wrench INFO.




(c) Install the ventilation hose to the ventilation valve sub-assembly.

2. INSTALL NO. 1 ENGINE UNDER COVER

3. INSTALL AIR CLEANER CASE INFO

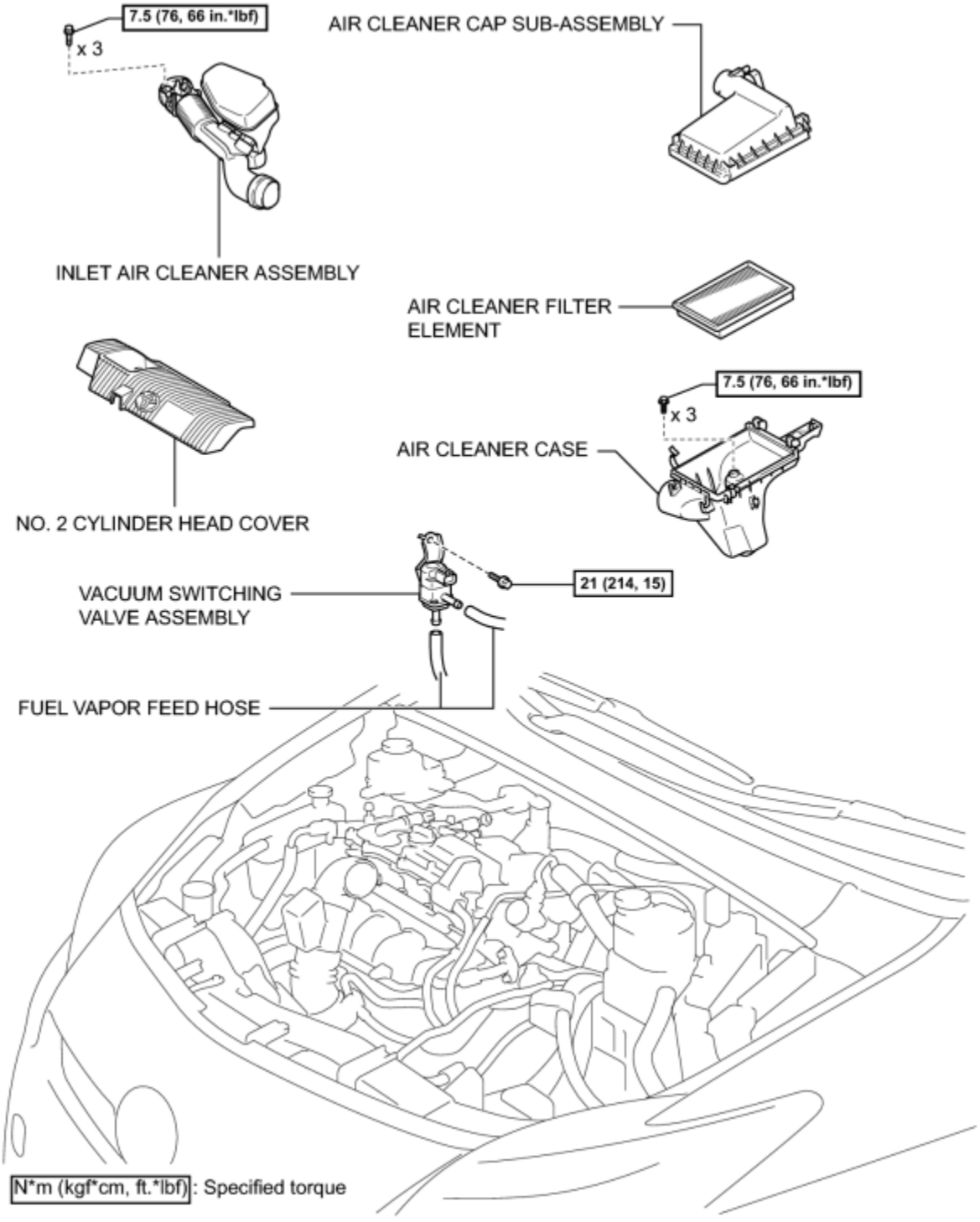
4. INSTALL INLET AIR CLEANER ASSEMBLY INFO

5. INSTALL AIR CLEANER CAP SUB-ASSEMBLY INFO

6. INSTALL NO. 2 CYLINDER HEAD COVER INFO

# COMPONENTS

# ILLUSTRATION




c

# REMOVAL

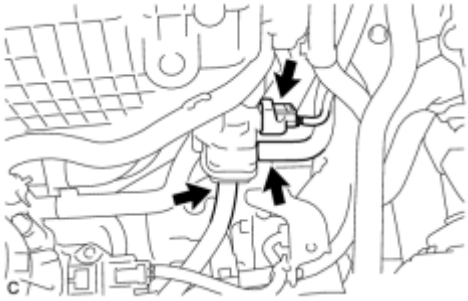
1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

2. REMOVE AIR CLEANER CAP SUB-ASSEMBLY INFO

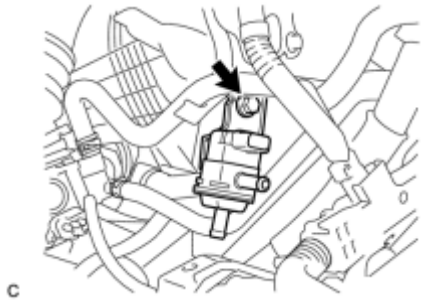
3. REMOVE INLET AIR CLEANER ASSEMBLY INFO

4. REMOVE AIR CLEANER CASE INFO

5. REMOVE VACUUM SWITCHING VALVE ASSEMBLY



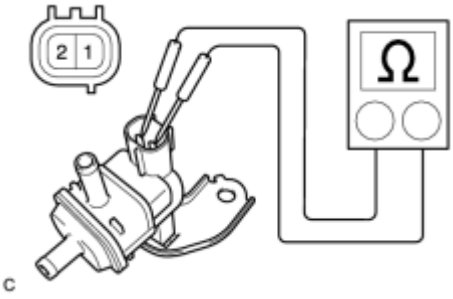
(a) Disconnect the connector and 2 fuel vapor feed hoses.



(b) Remove the bolt and vacuum switching valve assembly.

# INSPECTION

1. INSPECT VACUUM SWITCHING VALVE ASSEMBLY



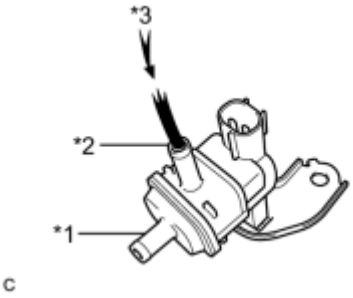

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 23 to 26 Ω |

If the result is not as specified, replace the vacuum switching valve assembly.

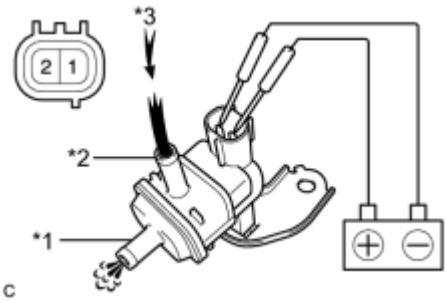
(b) Check operation of the vacuum switching valve assembly.




(1) Blow air into port E. Check that air does not come out of port F.

## Text in Illustration

| | |
|---|---|
| *1 | Port F |
| *2 | Port E |
| *3 | Air Blow |




(2) Apply battery voltage across the terminals.

## Text in Illustration

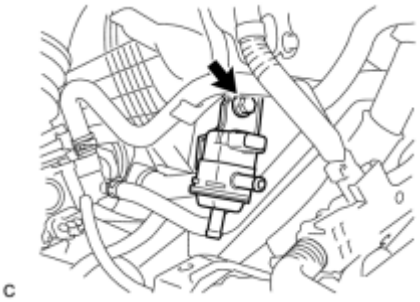
| | |
|---|---|
| *1 | Port F |
| *2 | Port E |
| *3 | Air Blow |

(3) Blow air into port E. Check that air comes out from port F.

If the result is not as specified, replace the vacuum switching valve assembly.

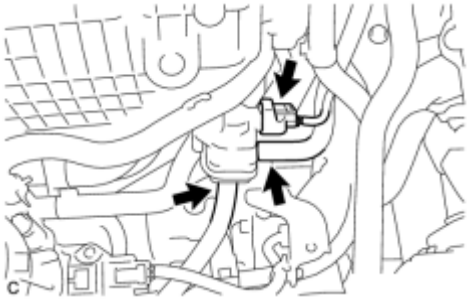
# INSTALLATION

1. INSTALL VACUUM SWITCHING VALVE ASSEMBLY




(a) Install the vacuum switching valve assembly with the bolt.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**




(b) Connect the 2 fuel vapor feed hoses and connector to the vacuum switching valve assembly.

(c) Connect the No. 1 vacuum switching valve connector.

2. INSTALL AIR CLEANER CASE INFO

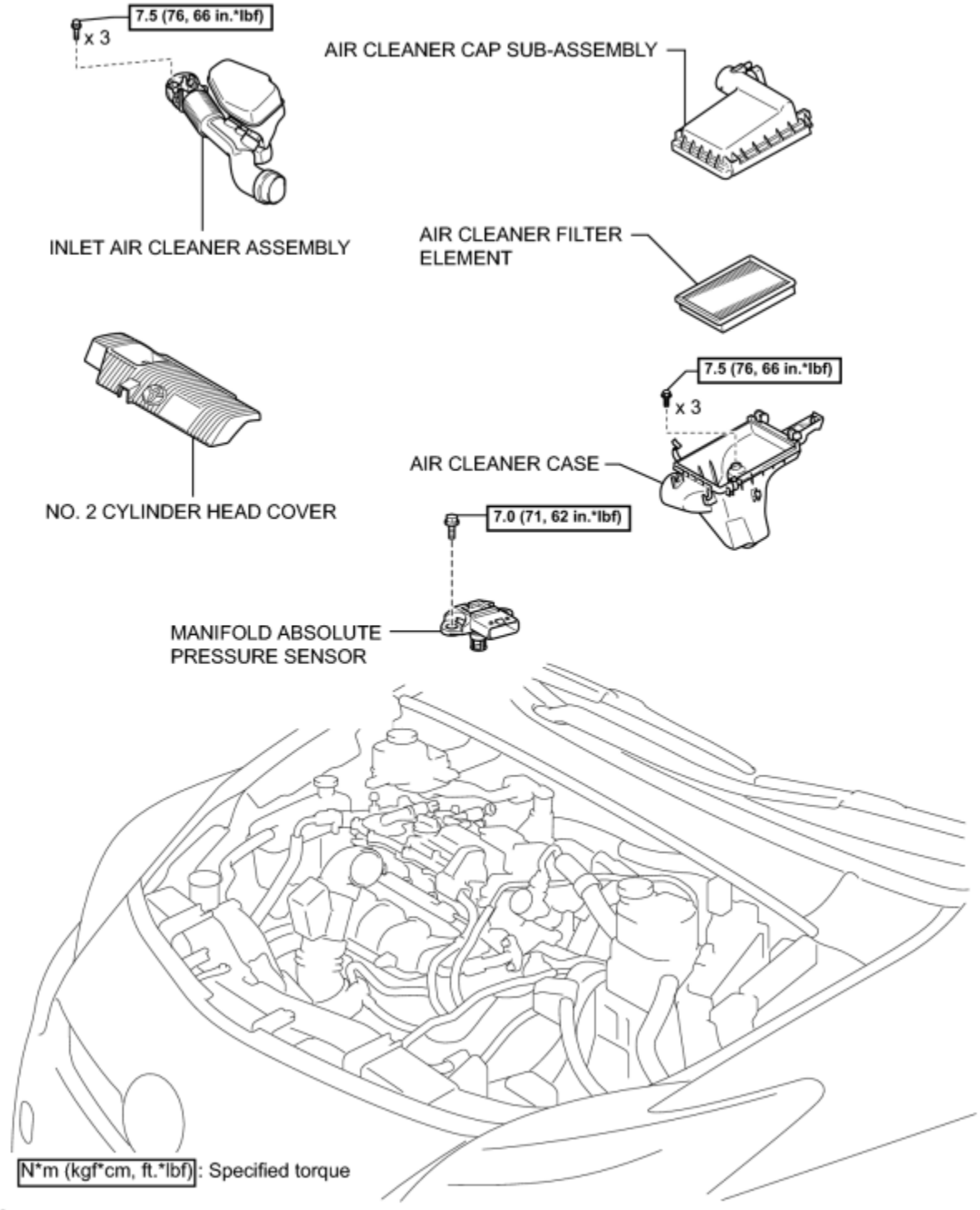
3. INSTALL INLET AIR CLEANER ASSEMBLY INFO

4. INSTALL AIR CLEANER CAP SUB-ASSEMBLY INFO

5. INSTALL NO. 2 CYLINDER HEAD COVER INFO

# COMPONENTS

# ILLUSTRATION




c

# REMOVAL

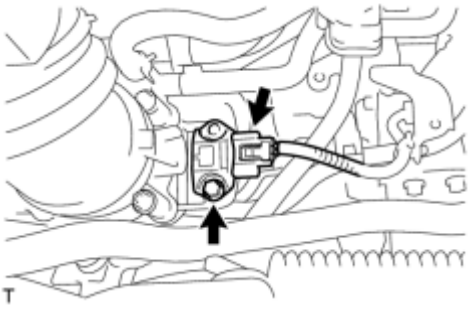
1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

2. REMOVE AIR CLEANER CAP SUB-ASSEMBLY INFO

3. REMOVE INLET AIR CLEANER ASSEMBLY INFO

4. REMOVE AIR CLEANER CASE INFO

5. REMOVE MANIFOLD ABSOLUTE PRESSURE SENSOR

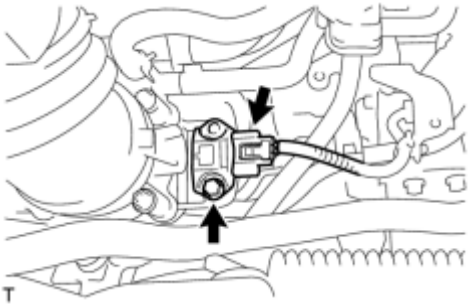


(a) Disconnect the connector.

(b) Remove the bolt and manifold absolute pressure sensor.

# INSTALLATION

1. INSTALL MANIFOLD ABSOLUTE PRESSURE SENSOR



(a) Install the manifold absolute pressure sensor with the bolt.

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**

(b) Connect the connector.

2. INSTALL AIR CLEANER CASE INFO

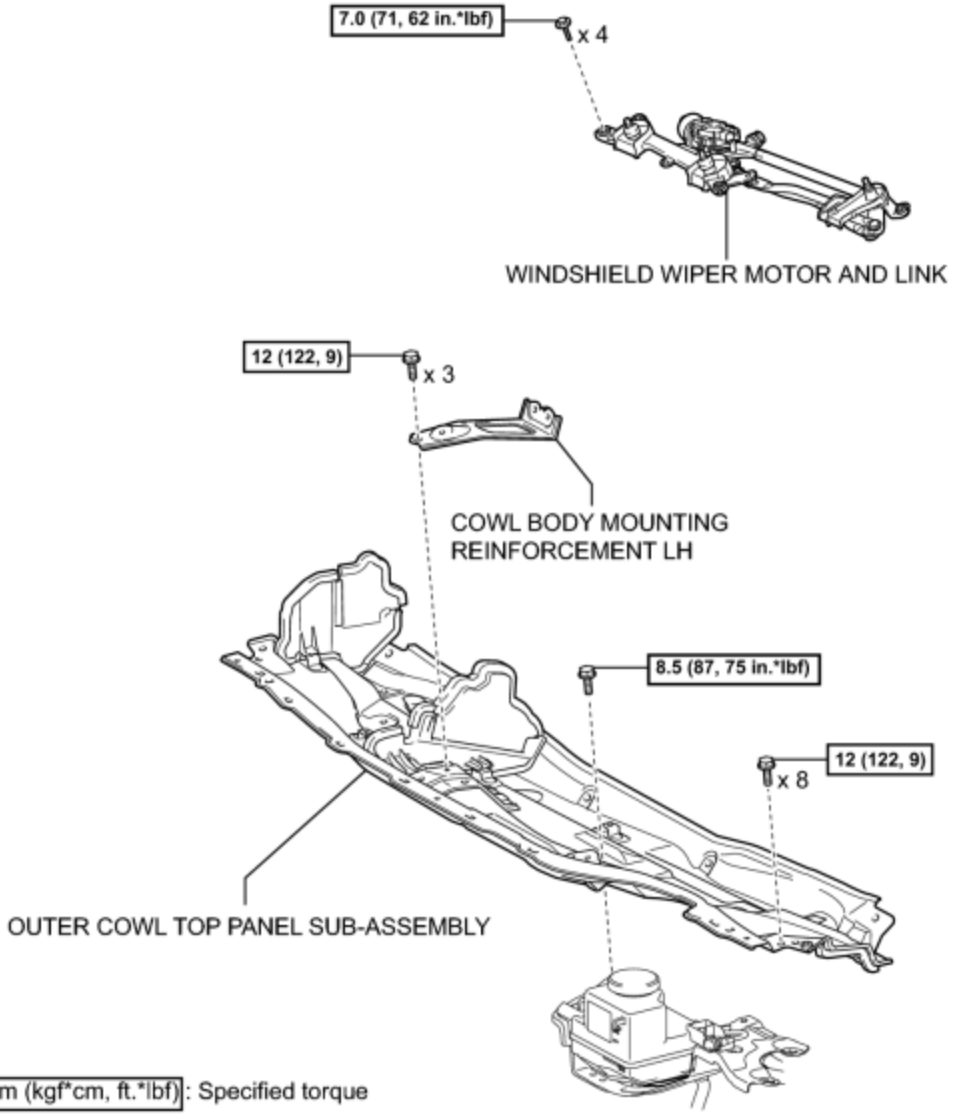
3. INSTALL INLET AIR CLEANER ASSEMBLY INFO

4. INSTALL AIR CLEANER CAP SUB-ASSEMBLY INFO

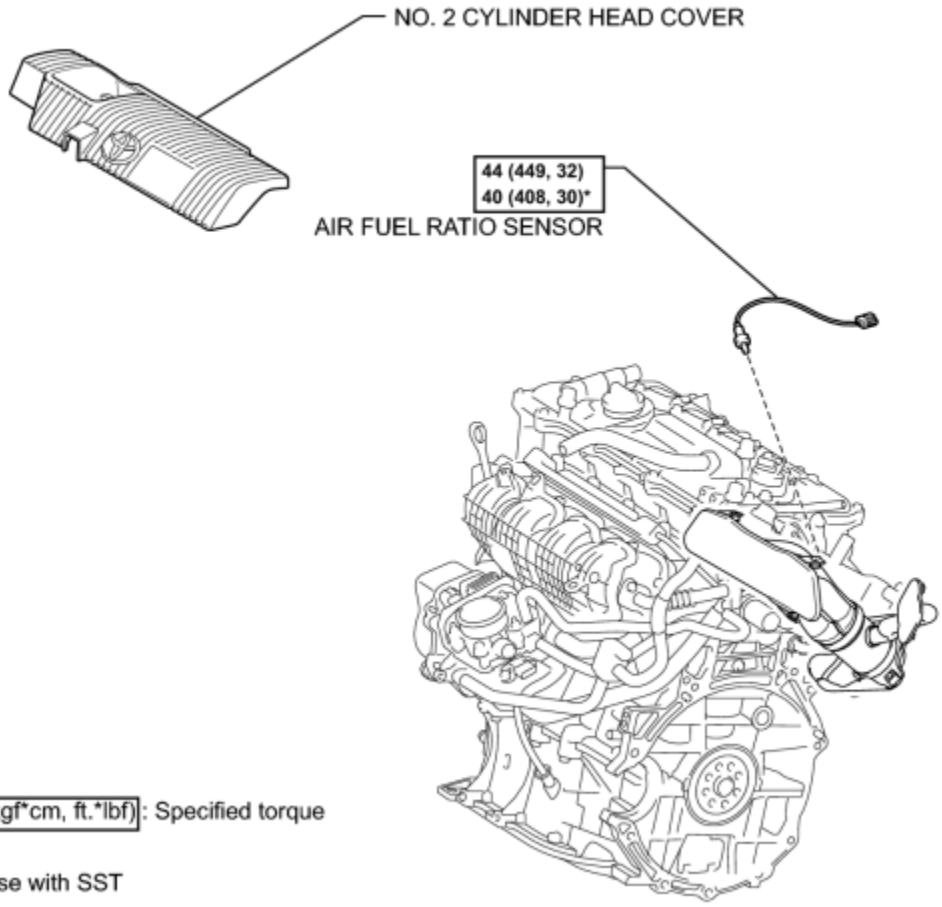
5. INSTALL NO. 2 CYLINDER HEAD COVER INFO

# COMPONENTS

# ILLUSTRATION




# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

* For use with SST

# REMOVAL

1. REMOVE WINDSHIELD WIPER MOTOR AND LINK

(a) Remove the windshield wiper motor and link INFO.

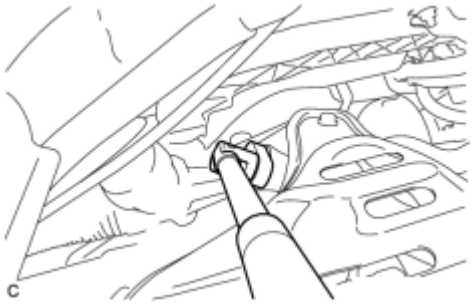
2. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

3. REMOVE NO. 2 CYLINDER HEAD COVER INFO

4. REMOVE AIR FUEL RATIO SENSOR




(a) Disconnect the air fuel ratio sensor connector and clamp.

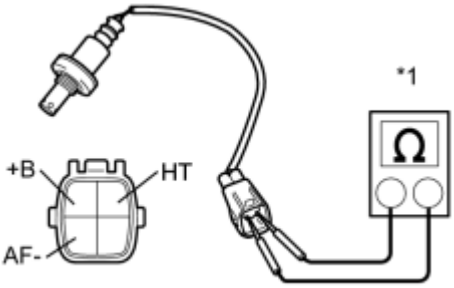



(b) Using SST, remove the air fuel ratio sensor.

SST: 09224-00010

# INSPECTION

1. INSPECT AIR FUEL RATIO SENSOR




## Text in Illustration

| | |
|---|---|
| *1 | Ohmmeter |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (HT) - (+B) | 20°C (68°F) | 1.8 to 3.4 Ω |
| (HT) - (AF-) | - | 10 kΩ or higher |

If the result is not as specified, replace the air fuel ratio sensor.

# INSTALLATION

1. INSTALL AIR FUEL RATIO SENSOR



(a) Using SST, install the air fuel ratio sensor.

SST: 09224-00010

without SST - Torque: **44 N·m (449 kgf·cm, 32ft·lbf)**

with SST - Torque: **40 N·m (408 kgf·cm, 30ft·lbf)**

- The "with SST" torque value is effective when using SST with a fulcrum length of 30 mm (1.18 in.).
- The "with SST" torque value is effective when using a torque wrench with a fulcrum length of 300 mm (11.81 in.) INFO.
- This torque value is effective when SST is parallel to the torque wrench.



(b) Connect the air fuel ratio sensor connector and clamp.

2. INSTALL NO. 2 CYLINDER HEAD COVER INFO

3. INSPECT FOR EXHAUST GAS LEAK

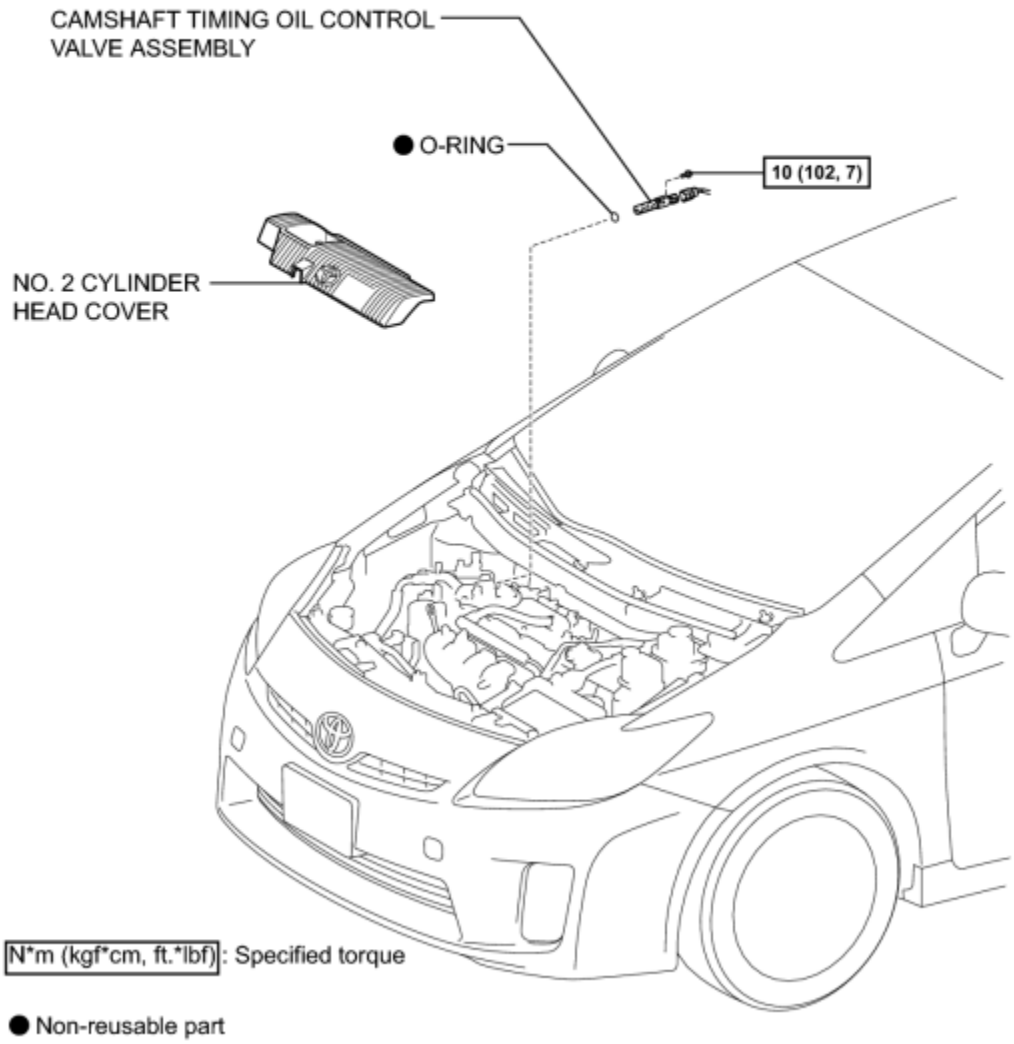
4. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

5. INSTALL WINDSHIELD WIPER MOTOR AND LINK

(a) Install the windshield wiper motor and link INFO.

# COMPONENTS

# ILLUSTRATION



# ON-VEHICLE INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

(a) Connect the Techstream to the DLC3.

(b) Turn the Techstream on.

(c) Set the vehicle to the inspection mode INFO.

(d) Start the engine.

(e) Inspect the oil control valve.

(1) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(2) Check the engine speed when the oil control valve is operated using the Techstream with the engine coolant temperature at 50°C (122°F) or less.

HINT:

- When performing the Active Test, the air conditioning should be on.
- Engine coolant temperature when the engine is started should be 30°C (86°F) or less.

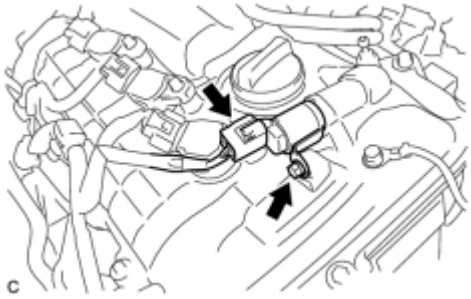
Standard:

| Control Range | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Rough idle or engine stalls (soon after oil control valve switched from OFF to ON) |

# REMOVAL

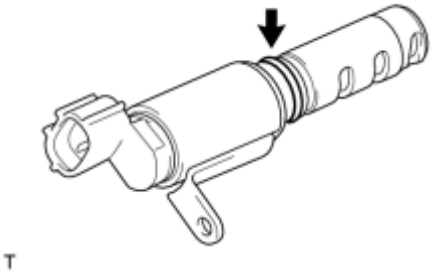
1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

2. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY




(a) Disconnect the camshaft timing oil control valve assembly connector.

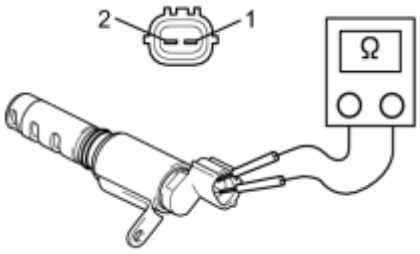
(b) Remove the bolt and remove the camshaft timing oil control valve assembly.




(c) Remove the O-ring from the camshaft timing oil control valve assembly.

# INSPECTION

1. INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY



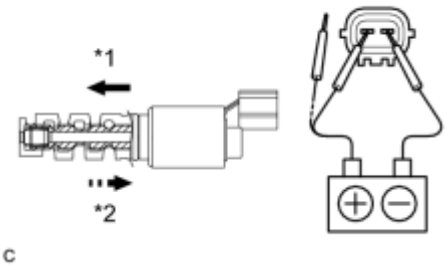

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 6.9 to 7.9 Ω |

If the result is not as specified, replace the oil control valve assembly.

(b) Check the operation.




(1) Connect a positive (+) battery lead to terminal 1 and a negative (-) lead to terminal 2, and check the movement of the valve.

## Text in Illustration

| | |
|---|---|
| *1 | When Applied |
| *2 | When Cut Off |

NOTICE:

Confirm that the valve moves freely and does not stick in any position.

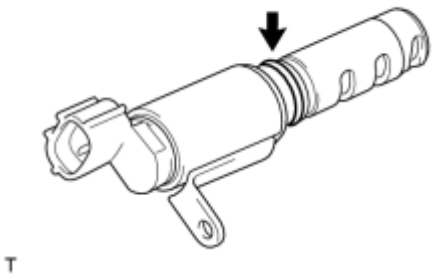
If necessary, replace the camshaft timing oil control valve assembly.

HINT:

Accumulation of foreign matter can cause minor pressure leaks. Minor pressure leaks will cause the camshaft to advance or retard, and this will cause a DTC to be set.

# INSTALLATION

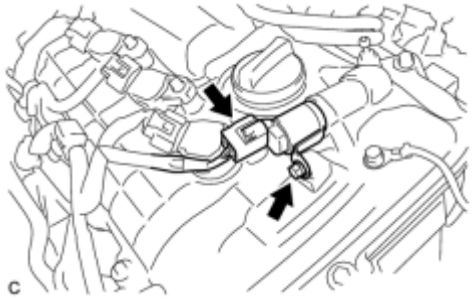
1. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY




(a) Apply a light coat of engine oil to a new O-ring and install it onto the camshaft timing oil control valve assembly.

NOTICE:

Do not twist the O-ring.




(b) Install the camshaft timing oil control valve assembly and wire harness bracket with the bolt.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

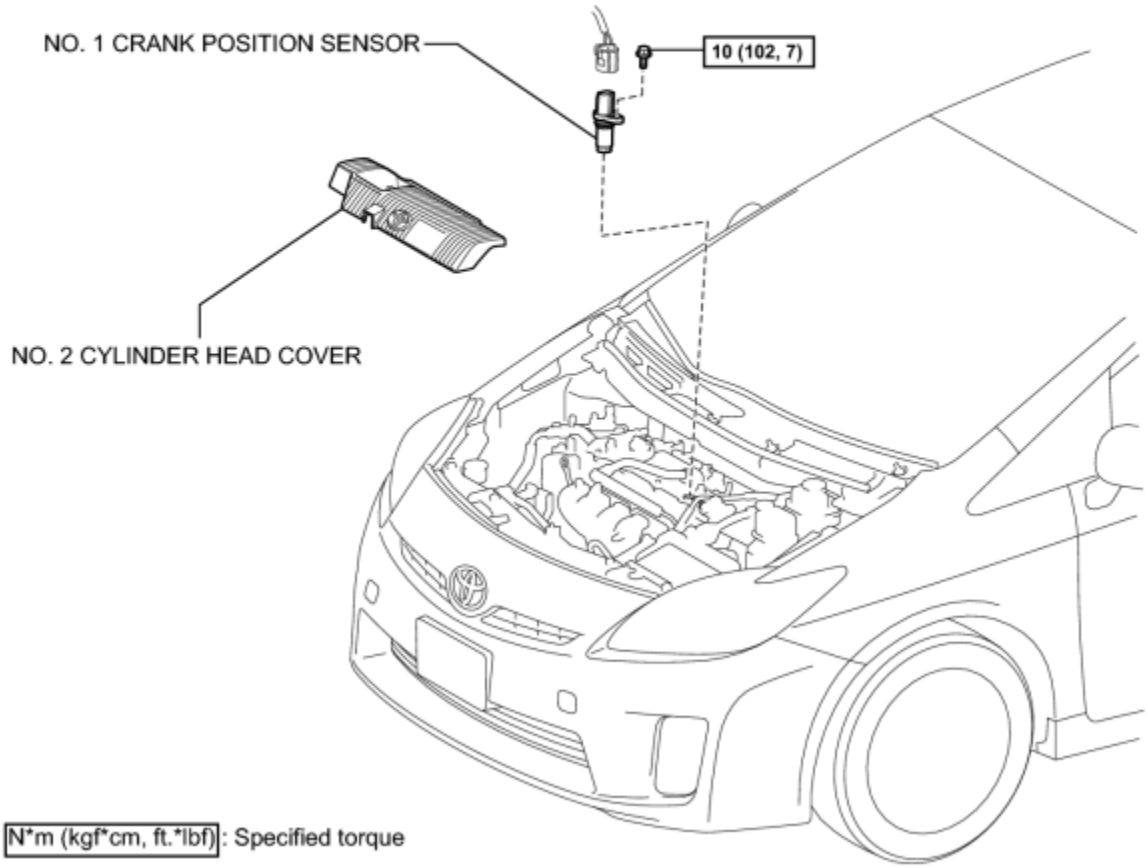
(c) Connect the camshaft timing oil control valve assembly connector.

2. INSPECT FOR OIL LEAK

3. INSTALL NO. 2 CYLINDER HEAD COVER INFO

# COMPONENTS

# ILLUSTRATION



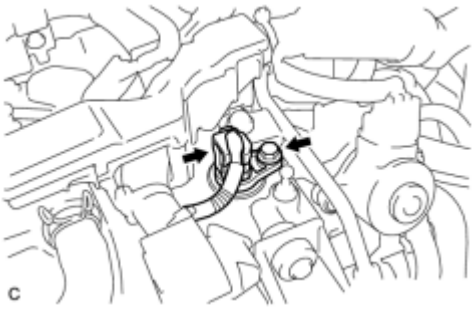
# REMOVAL

HINT:

Although the part name refers to the No. 1 crank position sensors, this procedure is for the camshaft position sensors.

1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

2. REMOVE NO. 1 CRANK POSITION SENSOR




(a) Disconnect the No. 1 crank position sensor connector.

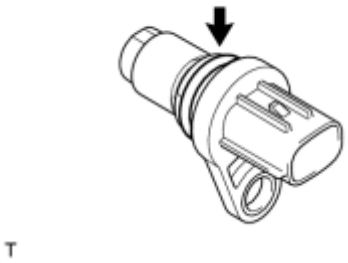
(b) Remove the bolt and No. 1 crank position sensor.

# INSTALLATION

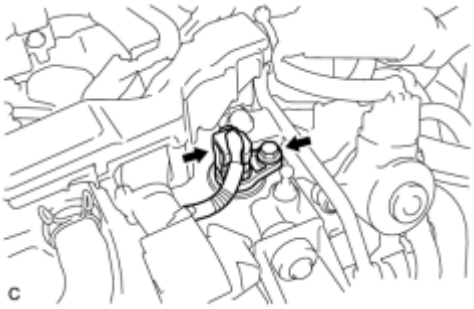
HINT:

Although the part name refers to the No. 1 crank position sensors, this procedure is for the camshaft position sensors.

1. INSTALL NO. 1 CRANK POSITION SENSOR




(a) Apply a light coat of engine oil to the O-rings on the No. 1 crank position sensors.




(b) Install the No. 1 crank position sensor with the bolt.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

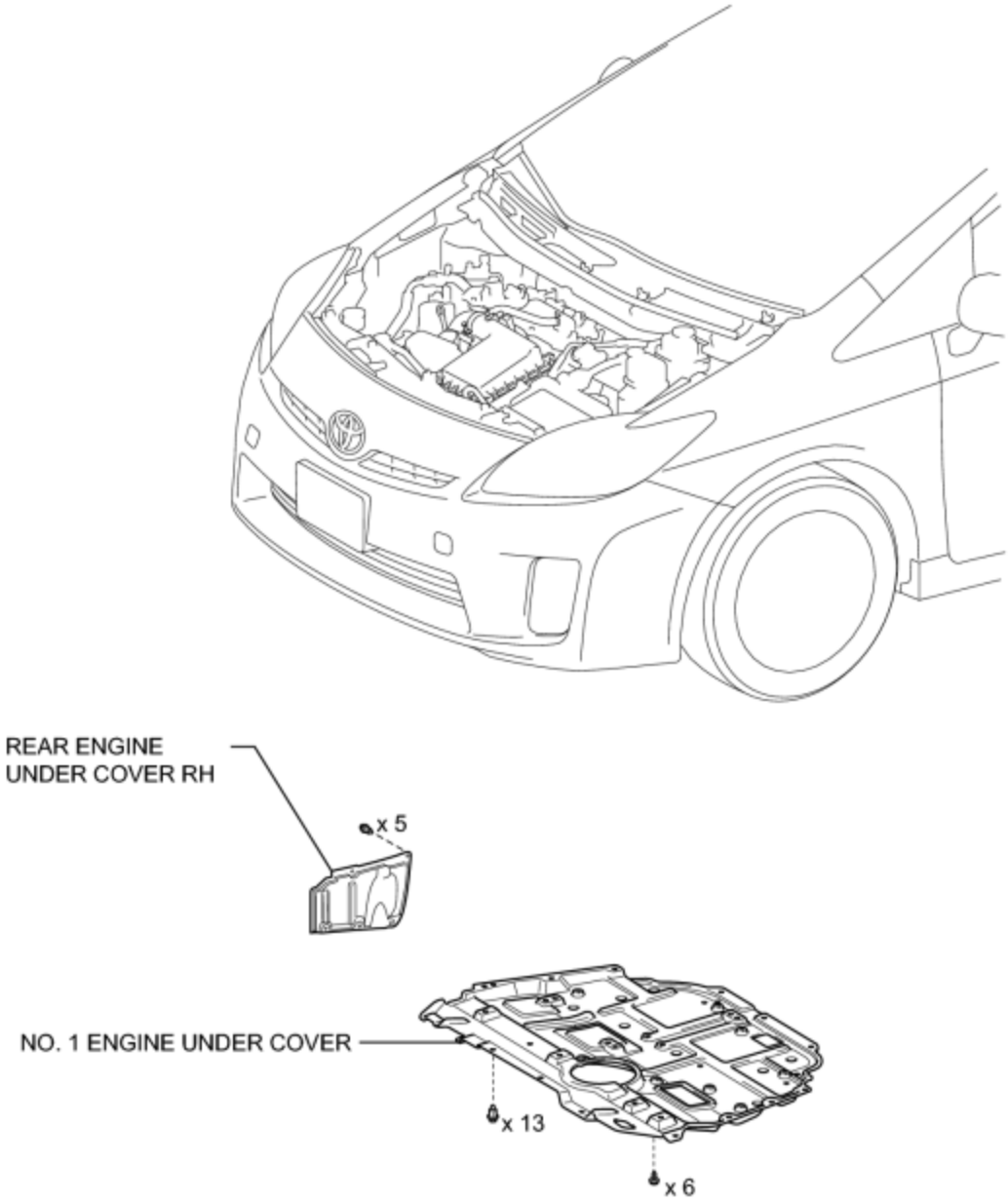
(c) Connect the No. 1 crank position sensor connector.

2. INSPECT FOR OIL LEAK

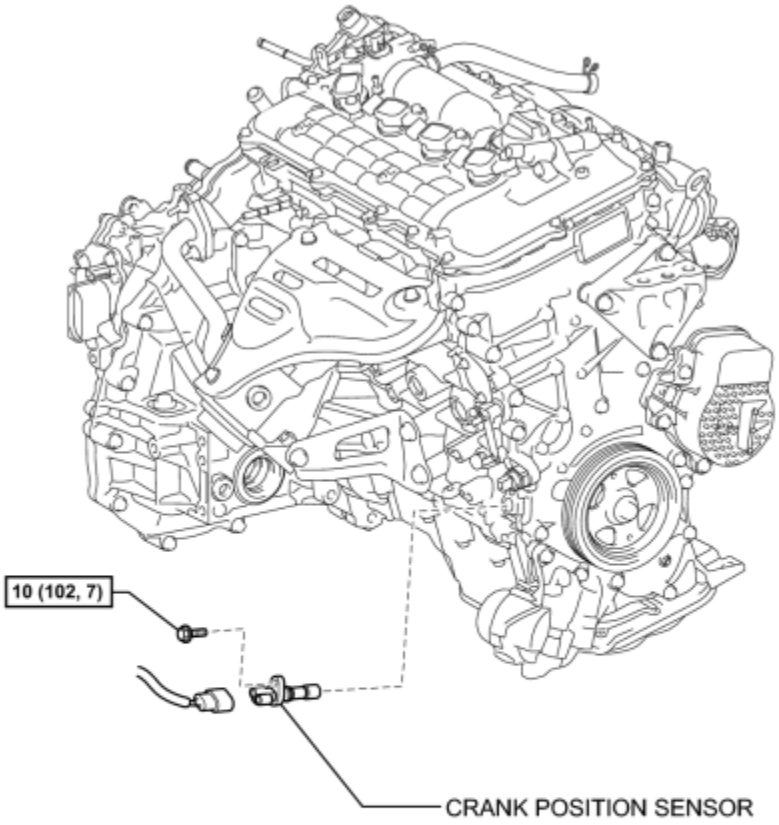
3. INSTALL NO. 2 CYLINDER HEAD COVER INFO

## COMPONENTS

## ILLUSTRATION




## ILLUSTRATION



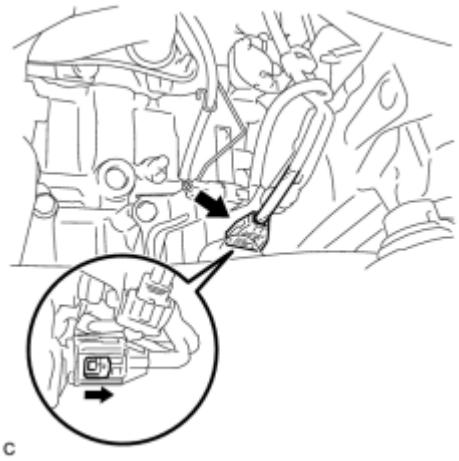

N*m (kgf*cm, ft.*lbf): Specified torque

# REMOVAL

1. REMOVE REAR ENGINE UNDER COVER RH

2. REMOVE NO. 1 ENGINE UNDER COVER

3. REMOVE CRANK POSITION SENSOR




(a) Disconnect the crank position sensor connector.

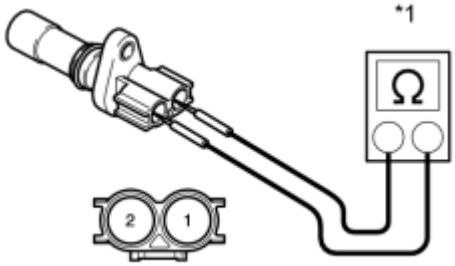



(b) Remove the bolt and crank position sensor.

# INSPECTION

1. INSPECT CRANK POSITION SENSOR

(a) Measure the resistance according to the value(s) in the table below.




## Text in Illustration

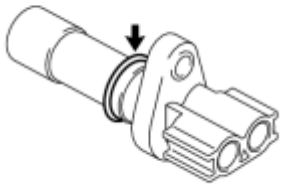
| | |
|---|---|
| *1 | Ohmmeter |

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | -10 to 50°C (14 to 122°F) | 1850 to 2450 Ω |

# INSTALLATION

1. INSTALL CRANK POSITION SENSOR



(a) Apply a light coat of engine oil to the O-ring on the crank position sensor.

(b) Install the crank position sensor with the bolt.



Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

Connect the crank position sensor connector.



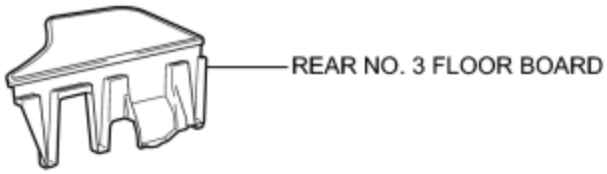
2. INSPECT FOR OIL LEAK

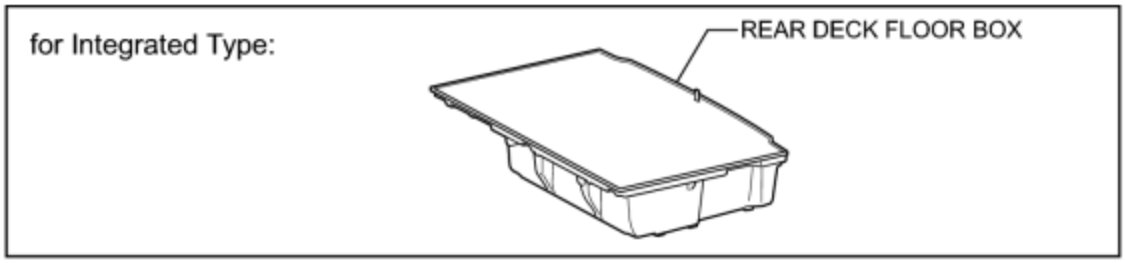
3. INSTALL NO. 1 ENGINE UNDER COVER

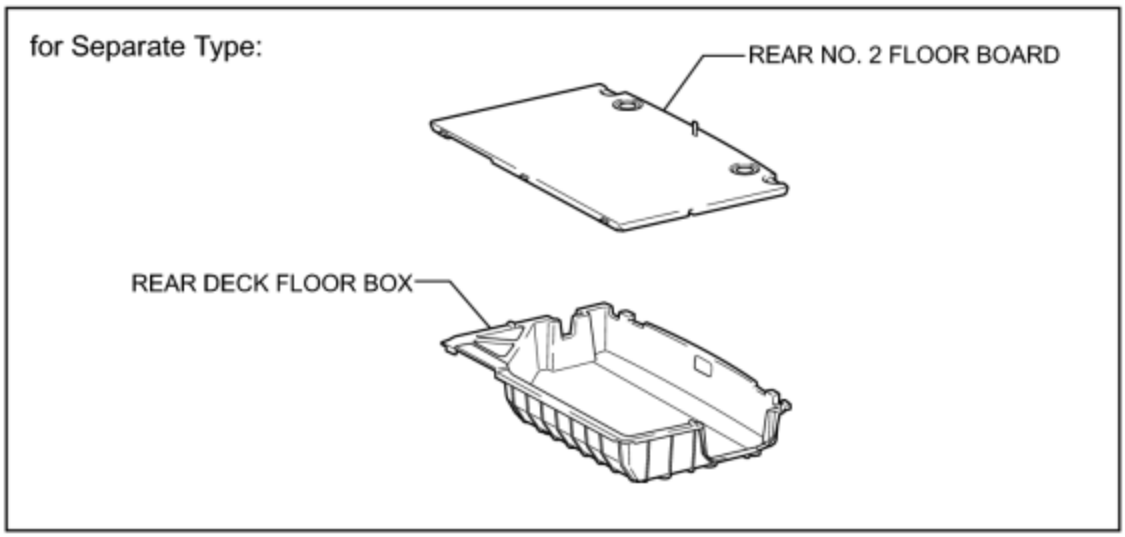
4. INSTALL REAR ENGINE UNDER COVER RH

# COMPONENTS

# ILLUSTRATION

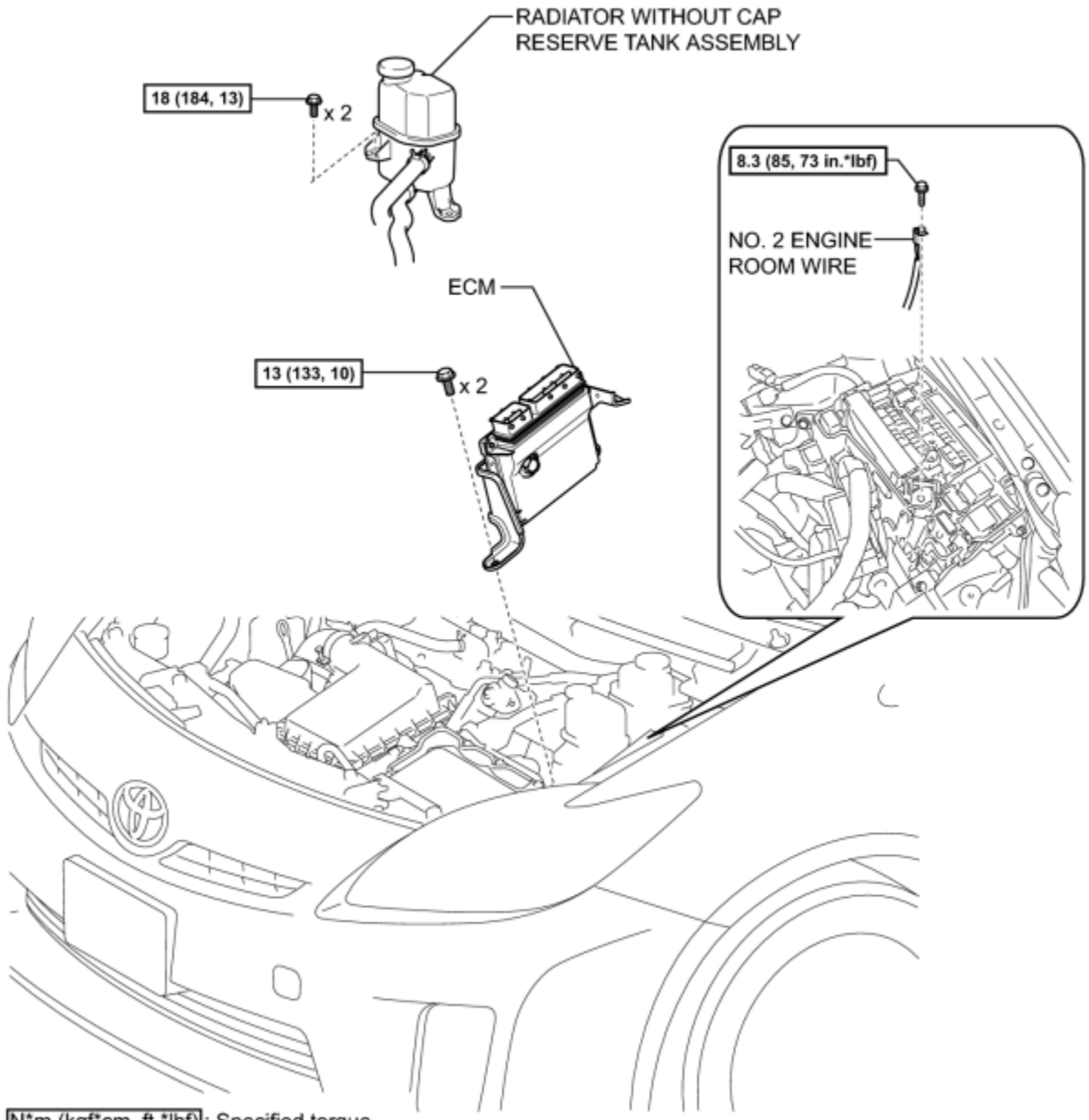



P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

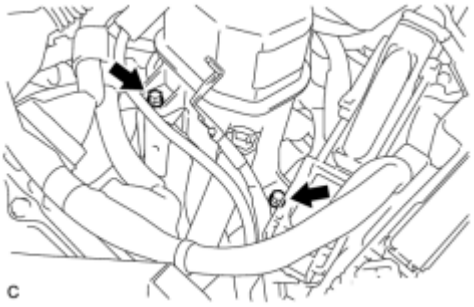
3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

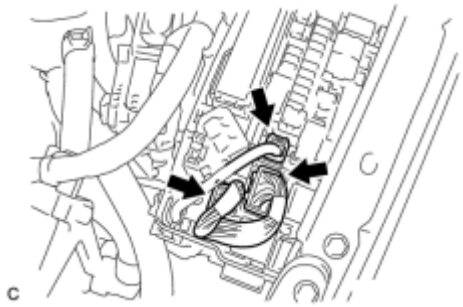
5. SEPARATE RADIATOR WITHOUT CAP RESERVE TANK ASSEMBLY




(a) Remove the 2 bolts and separate the radiator without cap reserve tank assembly.

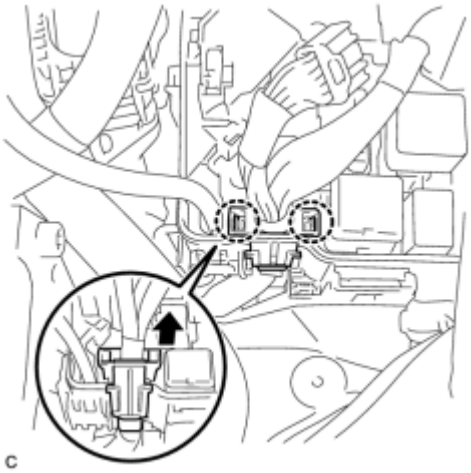
6. REMOVE ECM

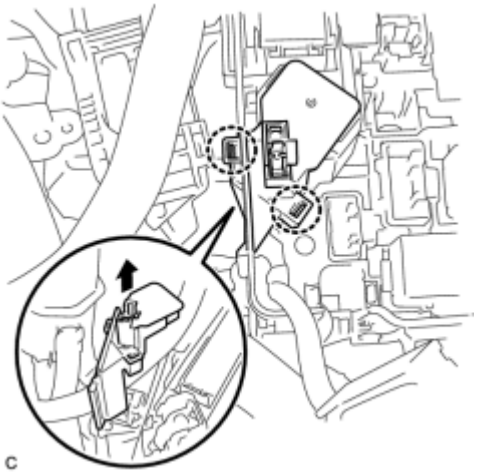
(a) Remove the No. 1 relay block cover.




(b) Disconnect the 3 wire harness connectors.

(c) Disengage the 2 claws, push up the engine room wire harness and separate it from the engine room relay block.



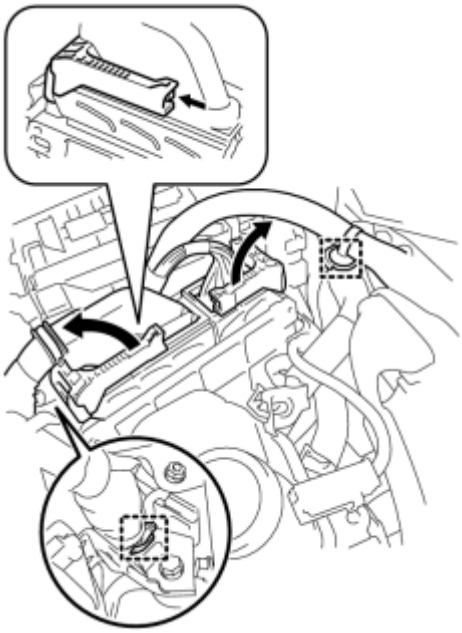

(d) Disengage the 2 claws and push up the side cover to remove it.




(e) Loosen the bolt and separate the No. 2 engine room wire.

(f) Disconnect the 2 ECM connectors.

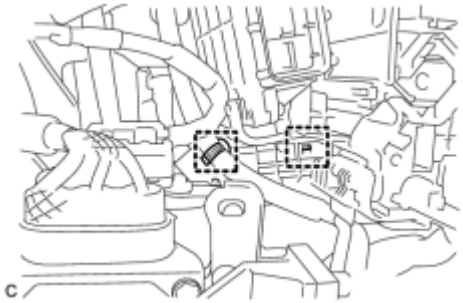
(1) Disconnect the 2 wire harness clamps.



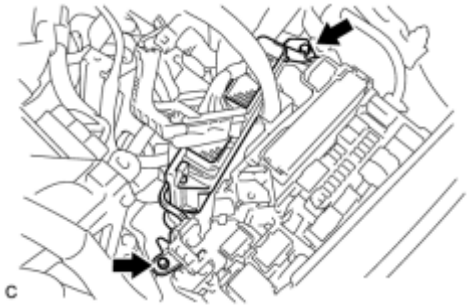
(2) Push the locks on the 2 levers, then raise the levers, and disconnect the 2 ECM connectors.

NOTICE:

After disconnecting the connectors, make sure that dirt, water or other foreign matter does not contact the connecting parts of the connectors.



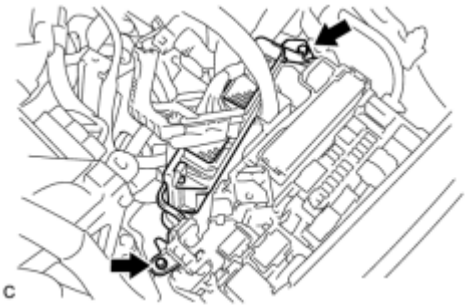
(g) Separate the 2 wire harness clamps.



(h) Remove the 2 bolts and ECM with 2 ECM brackets.

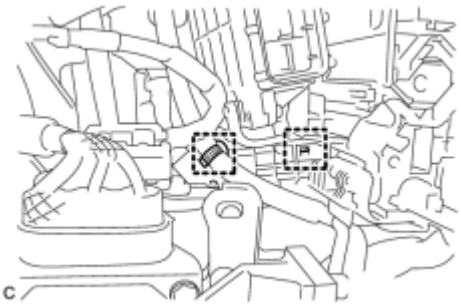
# INSTALLATION

1. INSTALL ECM



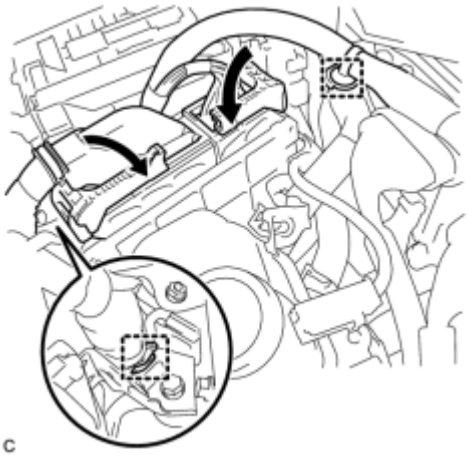
(a) Install the ECM with the 2 bolts.

Torque: **13 N·m (133 kgf·cm, 10ft·lbf)**



(b) Install the 2 wire harness clamps.

(c) Connect the 2 ECM connectors.



(1) Connect the 2 ECM connectors and lower the 2 levers.

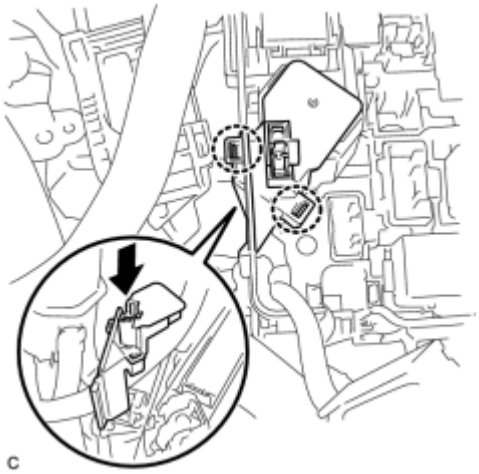
- When connecting the connectors, make sure that dirt, water or other foreign matter does not get caught between the connectors and other parts.
- Make sure that the 2 levers are securely locked.

(2) Install the 2 wire harness clamps.

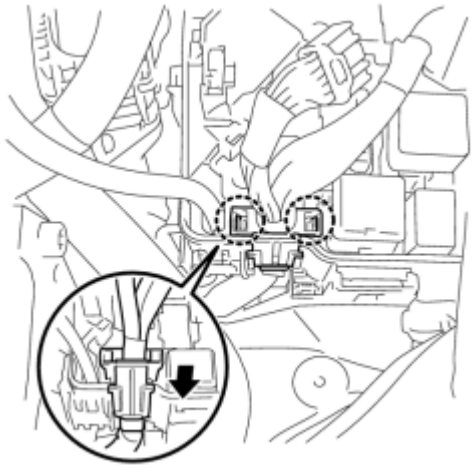
(d) Install the No. 2 engine room wire with the bolt.

Torque: **8.3 N·m (85 kgf·cm, 73in·lbf)**

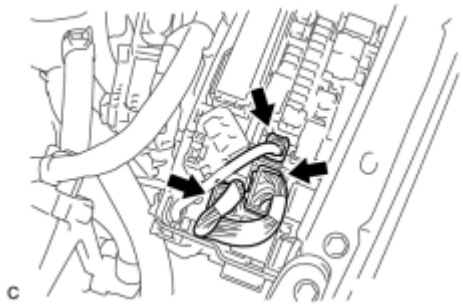



(e) Slide the side cover down and engage the 2 claws to install it.



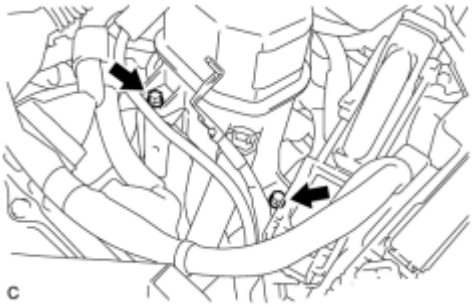
(f) Slide the engine room wire harness down and engage the 2 claws to install it.




(g) Connect the 3 wire harness connectors.

(h) Install the No. 1 relay block cover.

2. INSTALL RADIATOR WITHOUT CAP RESERVE TANK ASSEMBLY




(a) Install the radiator without cap reserve tank assembly with the 2 bolts.

Torque: **18 N·m (184 kgf·cm, 13ft·lbf)**

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

4. INSTALL REAR NO. 3 FLOOR BOARD INFO

5. INSTALL REAR DECK FLOOR BOX INFO

6. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

7. PERFORM INITIALIZATION

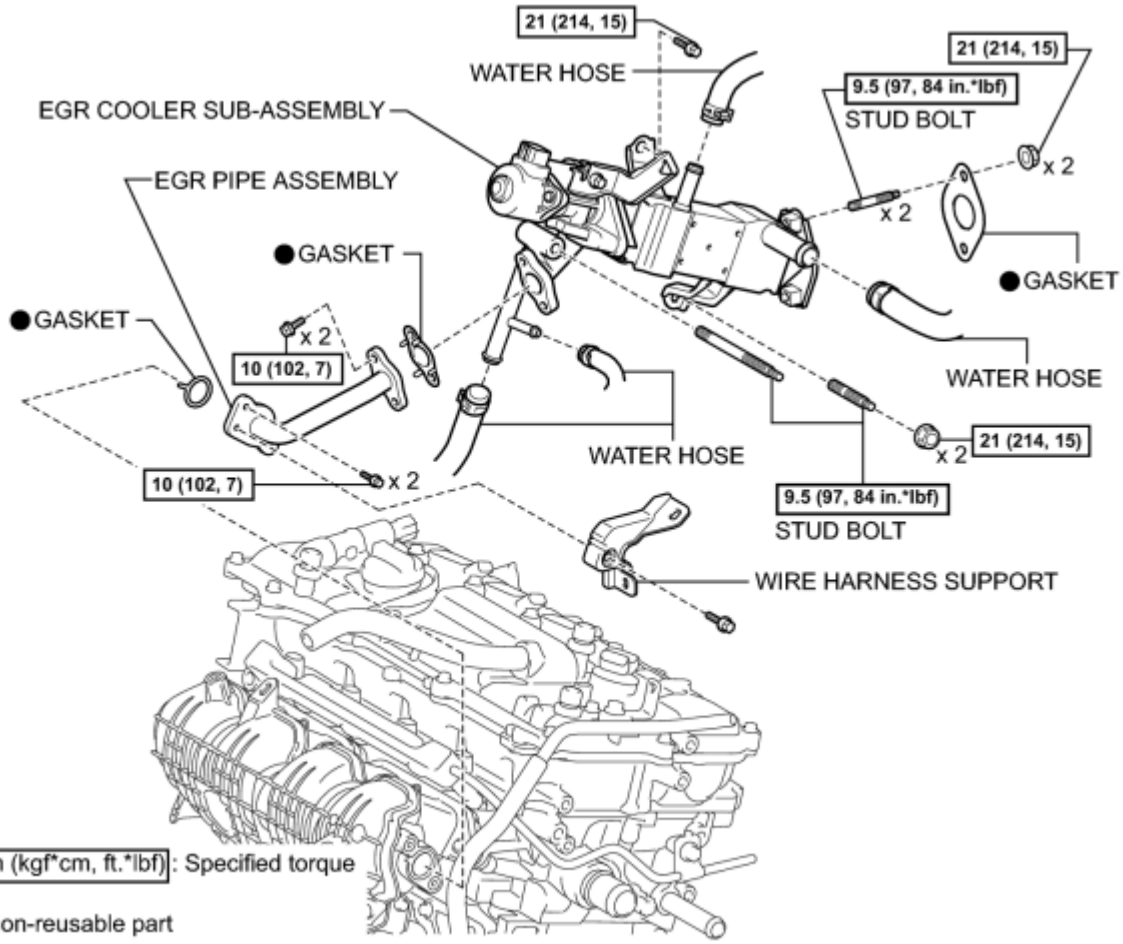
HINT:

Initialization cannot be completed by only disconnecting and reconnecting the cable of the negative (-) battery terminal.

(a) Perform Initialization when replacing the ECM INFO.

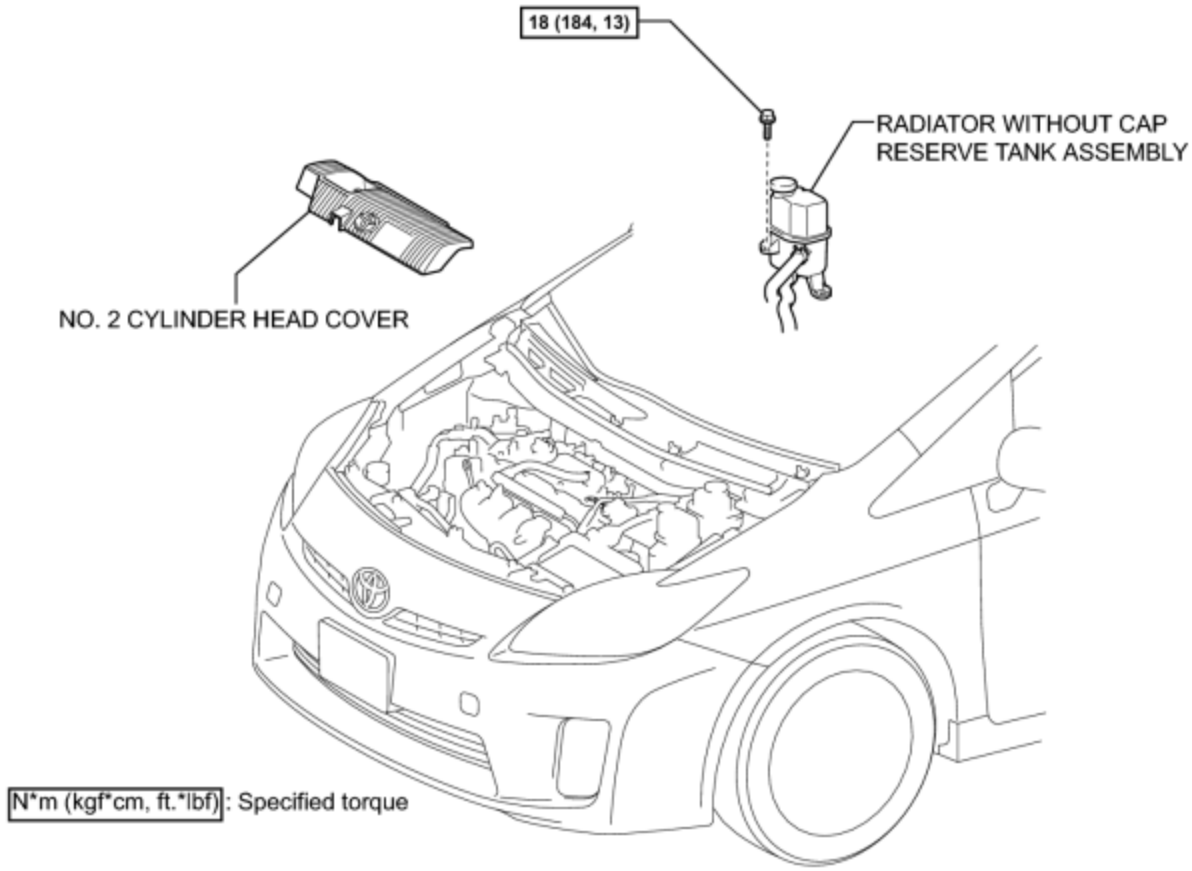
# COMPONENTS

# ILLUSTRATION

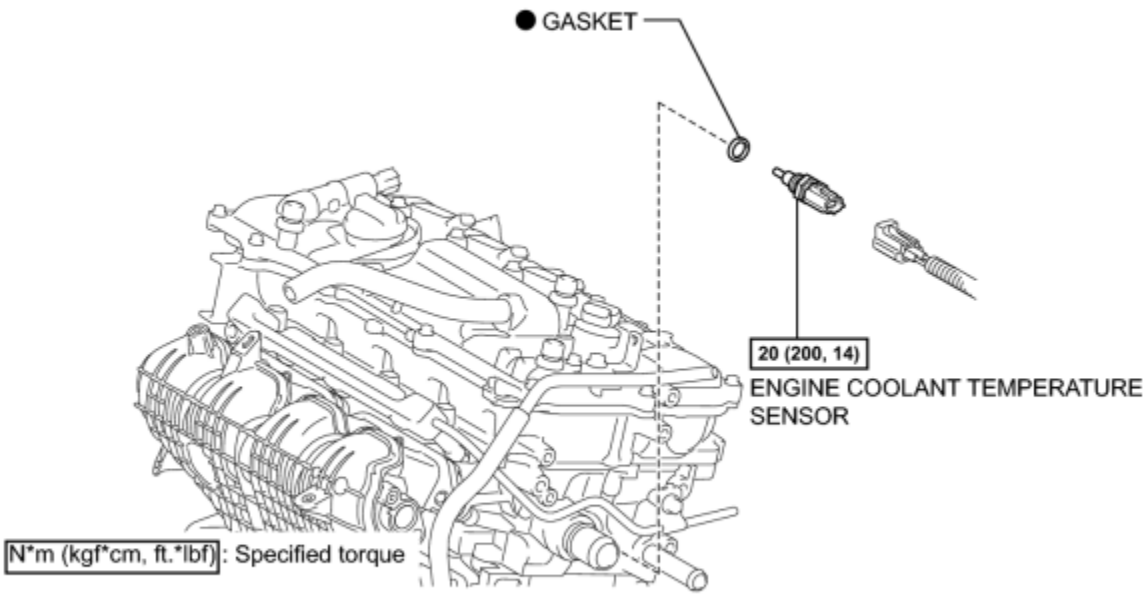



T

# ILLUSTRATION




# ILLUSTRATION




● Non-reusable part

# REMOVAL

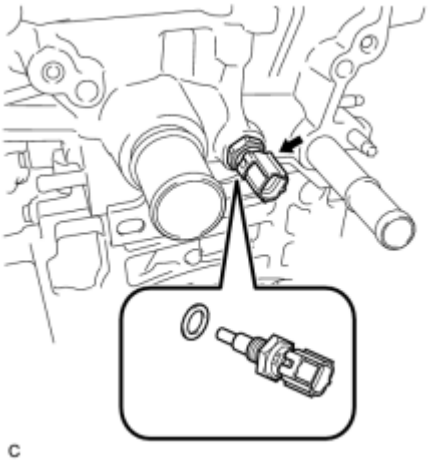
1. REMOVE EGR WITH COOLER PIPE SUB-ASSEMBLY

(a) Remove the EGR with cooler pipe sub-assembly INFO.

2. REMOVE RADIATOR WITHOUT CAP RESERVE TANK ASSEMBLY INFO

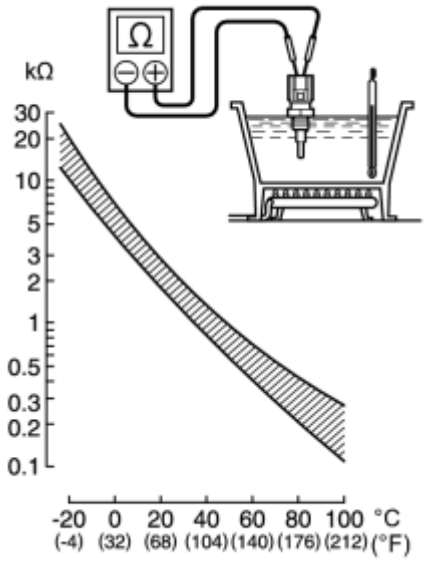
3. REMOVE ENGINE COOLANT TEMPERATURE SENSOR

(a) Disconnect the engine coolant temperature sensor connector.




(b) Remove the engine coolant temperature sensor.

# INSPECTION




1. INSPECT ENGINE COOLANT TEMPERATURE SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Condition | Specified Condition |
|---|---|
| Approximately 20°C (68°F) | 2.32 to 2.59 kΩ |
| Approximately 80°C (176°F) | 0.310 to 0.326 kΩ |

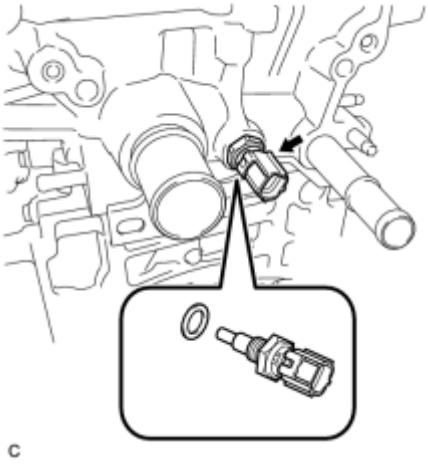
NOTICE:

When checking the engine coolant temperature sensor in water, keep the terminals dry. After the check, dry the sensor.

If the resistance is not as specified, replace the engine coolant temperature sensor.

# INSTALLATION

1. INSTALL ENGINE COOLANT TEMPERATURE SENSOR




(a) Install the engine coolant temperature sensor through a new gasket.

Torque: **20 N·m (200 kgf·cm, 14ft·lbf)**

(b) Connect the engine coolant temperature sensor connector.

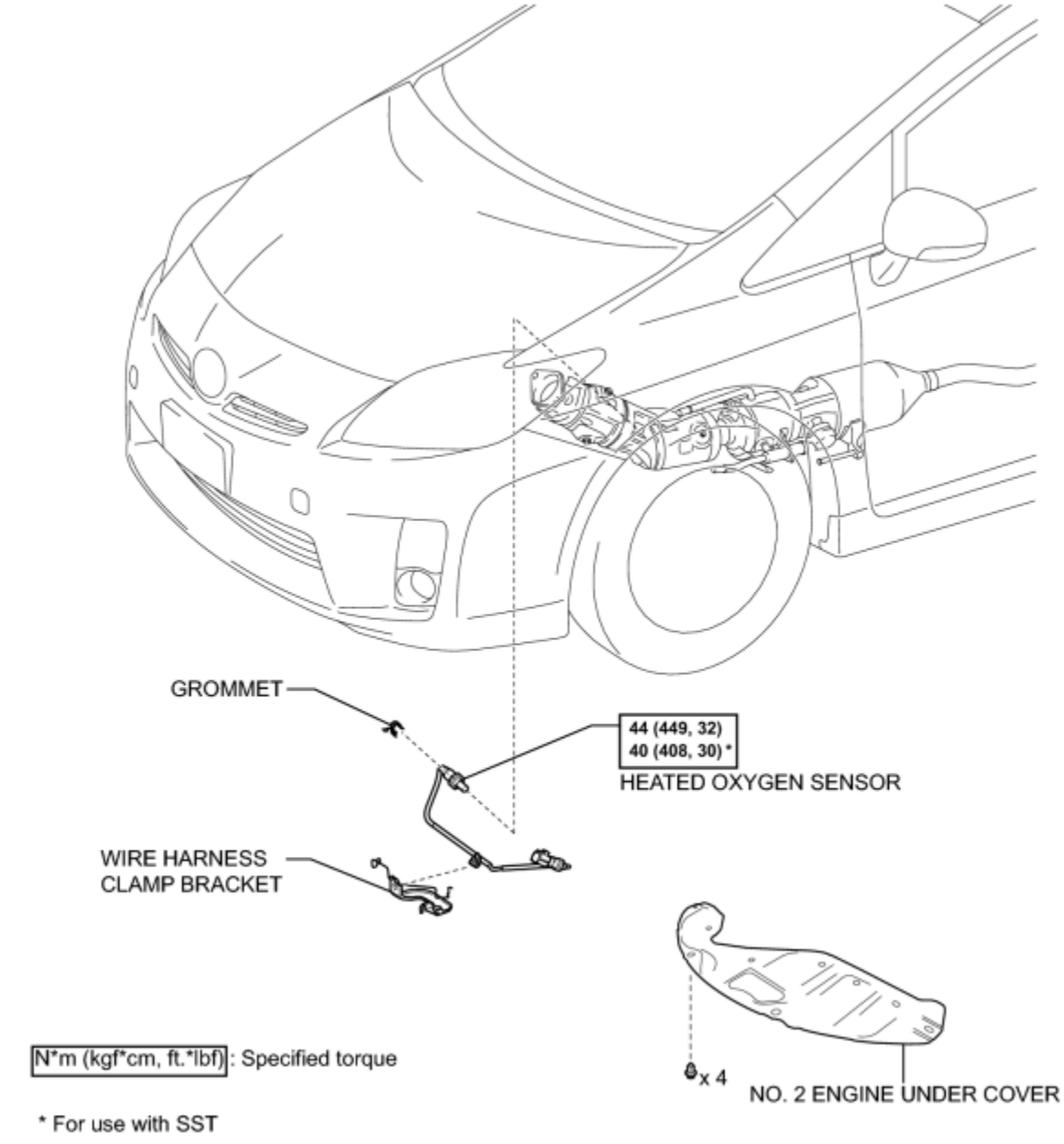
2. INSTALL RADIATOR WITHOUT CAP RESERVE TANK ASSEMBLY INFO

3. INSTALL EGR WITH COOLER PIPE SUB-ASSEMBLY

(a) Install the EGR with cooler pipe sub-assembly INFO.

# COMPONENTS

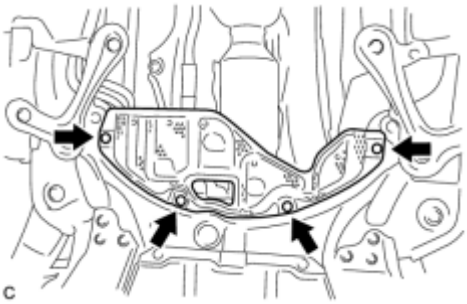
# ILLUSTRATION




c

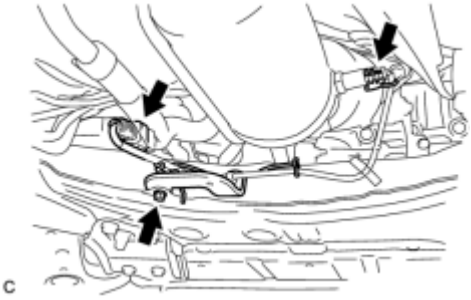
# REMOVAL

1. REMOVE NO. 2 ENGINE UNDER COVER



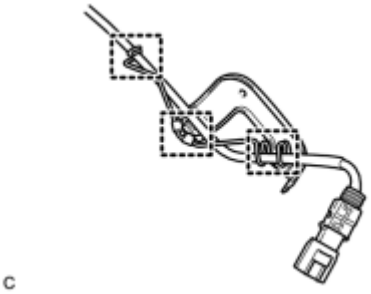
(a) Remove the 4 clips and No. 2 engine under cover.

2. REMOVE HEATED OXYGEN SENSOR



(a) Disconnect the heated oxygen sensor connector.

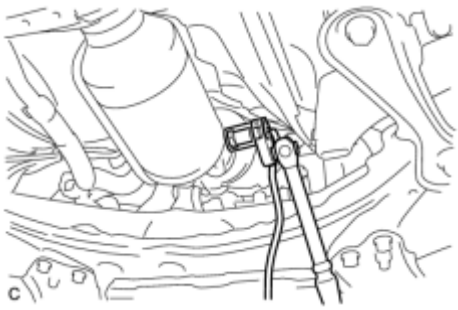
(b) Remove the grommet and pull the sensor connector out of the cabin through the floor panel.



(c) Remove the wire harness clamp bracket and disconnect the wire harness clamp.

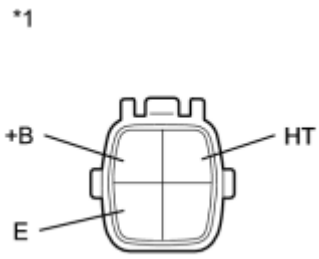
(d) Using SST, remove the heated oxygen sensor.

SST: 09224-00010


C

# INSPECTION

1. INSPECT HEATED OXYGEN SENSOR




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Heated Oxygen Sensor) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

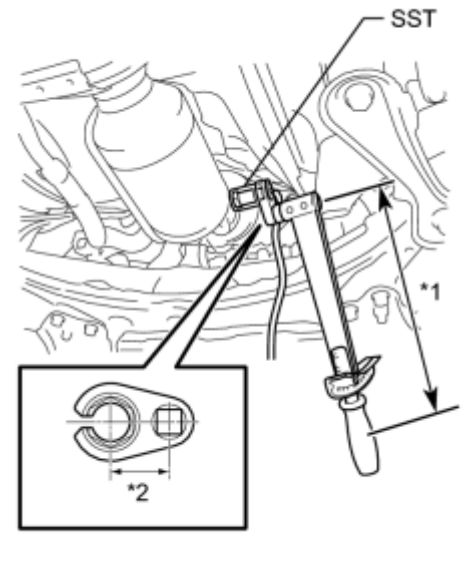
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (HT) - (+B) | 20°C (68°F) | 11 to 16 Ω |
| (HT) - (E) | - | 10 kΩ or higher |

If the result is not as specified, replace the heated oxygen sensor.

# INSTALLATION

1. INSTALL HEATED OXYGEN SENSOR

(a) Using SST, install the heated oxygen sensor onto the front exhaust pipe.




c

## Text in Illustration

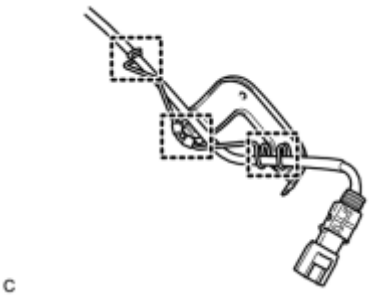
| | |
|---|---|
| *1 | Fulcrum Length |
| *2 | 30 mm |

SST: 09224-00010

without SST - Torque: **44 N·m (449 kgf·cm, 32ft·lbf)**

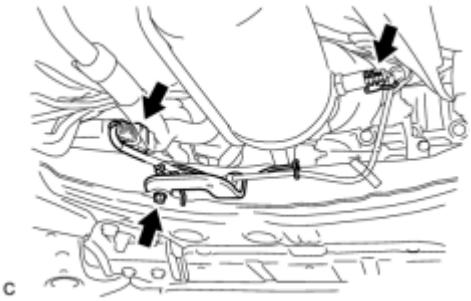
with SST - Torque: **40 N·m (408 kgf·cm, 30ft·lbf)**

- This torque value can be obtained by using a torque wrench with a fulcrum length of 300 mm (11.81 in.) and SST with a length of 30 mm (1.18 in.) INFO.
- This torque value is effective when SST is parallel to the torque wrench.



c

(b) Install the wire harness clamp bracket and connect the wire harness clamp.



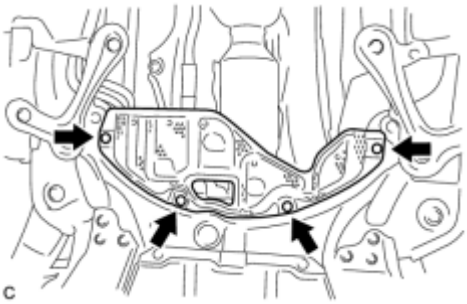
c

(c) Pass the sensor connector through the floor panel and install the grommet.

(d) Connect the heated oxygen sensor connector.

2. INSPECT FOR EXHAUST GAS LEAK

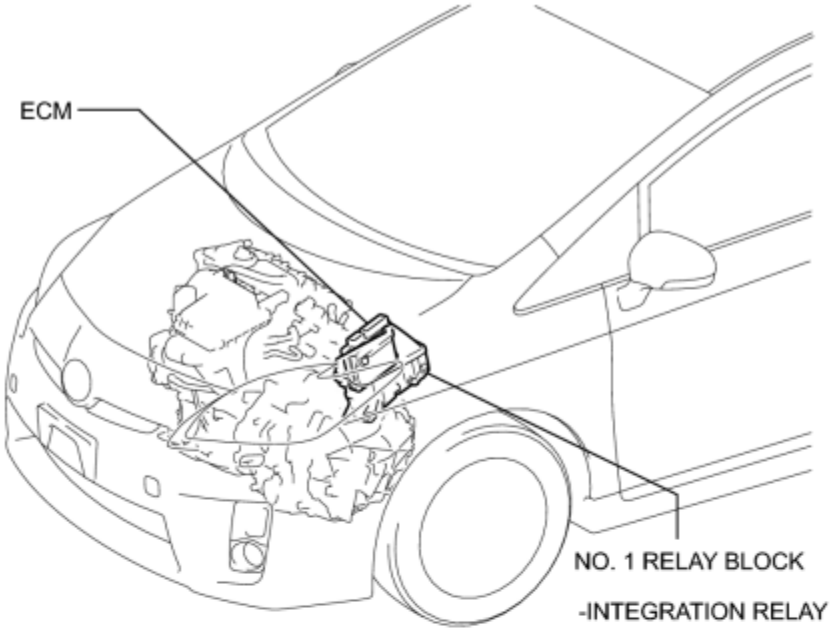
3. INSTALL NO. 2 ENGINE UNDER COVER

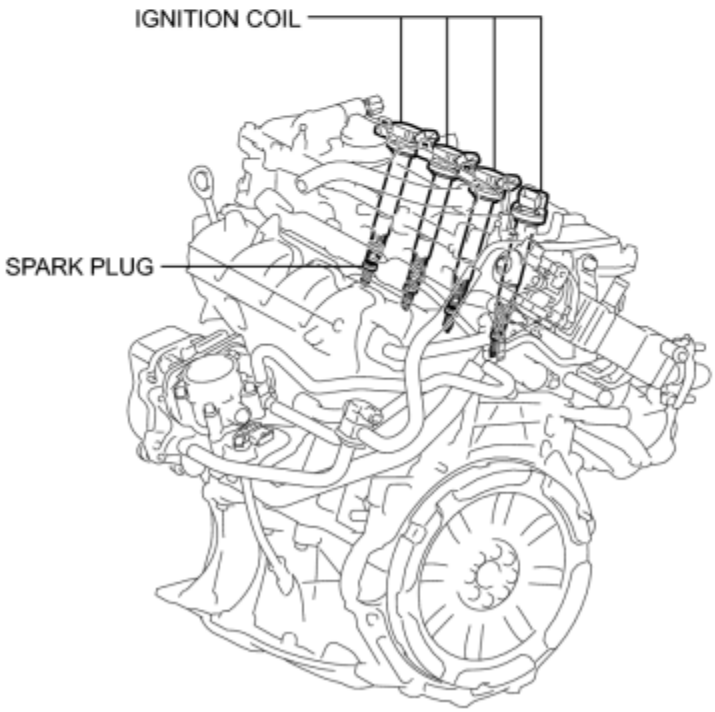



(a) Install the No. 2 engine under cover with the 4 clips.

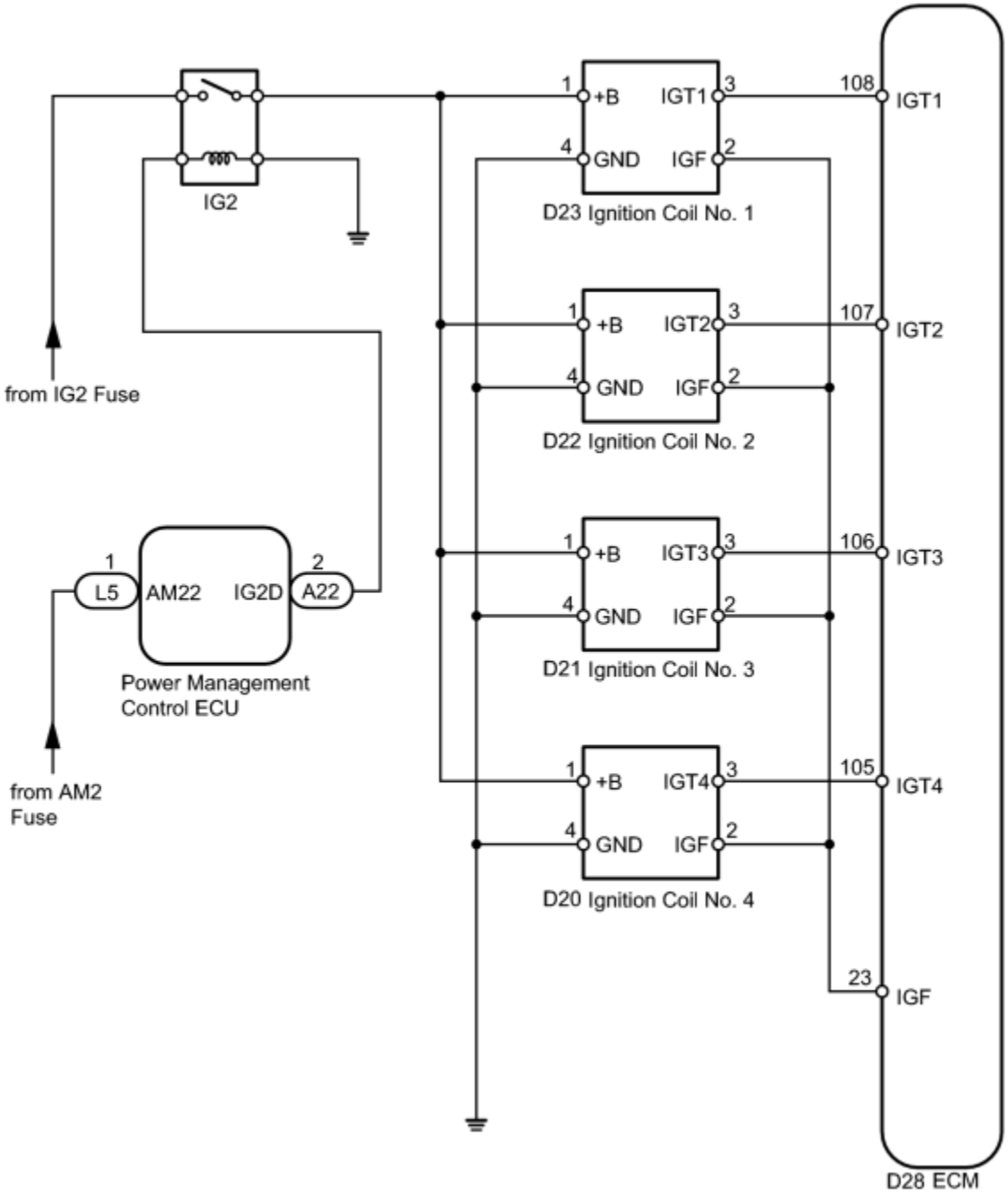
# PARTS LOCATION

# ILLUSTRATION



# SYSTEM DIAGRAM



# ON-VEHICLE INSPECTION

1. CHECK IGNITION COIL ASSEMBLY AND PERFORM SPARK TEST

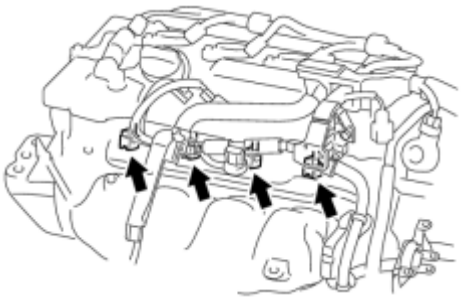
(a) Check for DTCs INFO.

NOTICE:

If any DTC is present, perform troubleshooting in accordance with the procedure for that DTC.

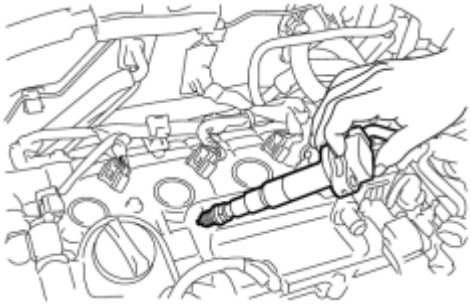
(b) Check that spark occurs.

(1) Remove the ignition coils and spark plugs INFO.



(2) Disconnect the 4 fuel injector connectors.

(3) Set the vehicle to the inspection mode INFO.



(4) Install the spark plug into the ignition coil, and then connect the ignition coil connector. (step 4)

(5) Ground the spark plug. (step 5)

(6) Check that spark occurs while the engine is being cranked. (step 6)

HINT:

Repeat steps 4 to 6 for each spark plug and ignition coil.

NOTICE:

- Ground the spark plugs when checking them.
- Replace any ignition coils that have been subjected to a physical impact.
- Do not crank the engine for more than 2 seconds.

If spark does not occur, perform the following procedure for the malfunctioning cylinder.

(c) Perform the following spark test procedure.

(1) Check that the ignition coil connector is securely connected.

Result:

| Result | Action |
|---|---|
| NG | Connect securely |
| OK | Go to next step |

(2) Perform a spark test.

1. Replace the ignition coil with a known good one.
2. Set the vehicle to the inspection mode INFO.
3. Perform the spark test again.

Result:

| Result | Action |
|---|---|
| NG | Go to next step |
| OK | Replace ignition coil |

(3) Perform a spark test.

1. Replace the spark plug with a known good one.
2. Set the vehicle to the inspection mode INFO.
3. Perform the spark test again.

Result:

| Result | Action |
|---|---|
| NG | Go to next step |
| OK | Replace the spark plug |

(4) Check the power supply.

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Ignition Coil) |

1. Turn the power switch on (IG).
2. Measure the voltage according to the value(s) in the table below.

*1

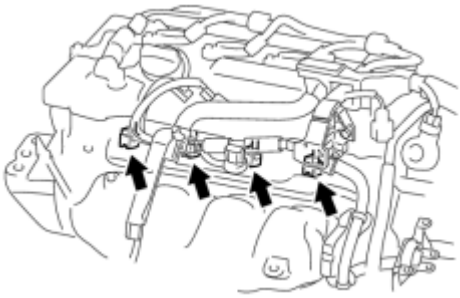
Standard Voltage:

| Tester Connection | Condition | Specified Cond |
|---|---|---|
| 1 (+B) - 4 (GND) | Power switch on (IG) | 11 to 14 V |




Result:

| Result | Action |
|---|---|
| NG | Check wiring between battery and ignition coil and check g circuit |
| OK | Replace the ECM INFO |



(5) Connect the 4 fuel injector connectors.

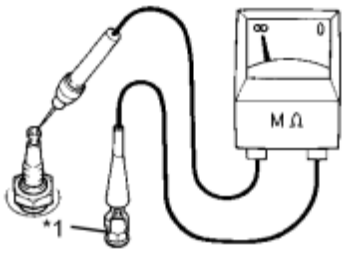
(6) Install the ignition coils and spark plugs INFO.

2. INSPECT SPARK PLUG

(a) Check the electrode.

## Text in Illustration

| | |
|---|---|
| *1 | Ground |




(1) Using a megohmmeter, measure the resistance.

Standard Resistance:

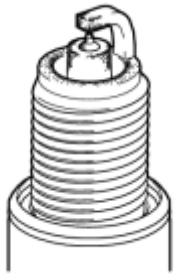
10 MΩ or more

If the result is 10 MΩ or less, clean the plug and measure the resistance again.

HINT:

If a megohmmeter is not available, perform the following simple inspection instead.

(b) Alternative inspection method:



P

(1) Quickly accelerate the engine to 4000 rpm 5 times.

(2) Remove each spark plug.

(3) Visually check the spark plug.

If the electrode is dry, the spark plug is functioning properly. If the electrode is damp, proceed to the next step.

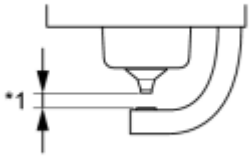
(c) Check the spark plug for any damage to its threads and insulator.

If there is any damage, replace the spark plug.

**Recommended Spark Plug**

| Manufacturer | Spark Plug Type |
|---|---|
| DENSO | SC20HR11 |

(d) Check the spark plug electrode gap.




P

# Text in Illustration

| | |
|---|---|
| *1 | Spark Plug Electrode Gap |

Maximum Electrode Gap for Used Spark Plug:

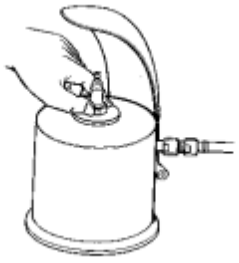
| Electrode Gap |
|---|
| 1.3 mm (0.0512 in.) |

If the gap is greater than the maximum, replace the spark plug.

Electrode Gap for New Spark Plug:

| Electrode Gap |
|---|
| 1.0 to 1.1 mm (0.0394 to 0.0433 in.) |

(e) Clean the spark plugs.



If the electrode has traces of wet carbon, clean the electrode with a spark plug cleaner and then dry it.

Standard air pressure:

588 kPa (6.0 kgf/cm$^2$, 85 psi)

Standard duration:

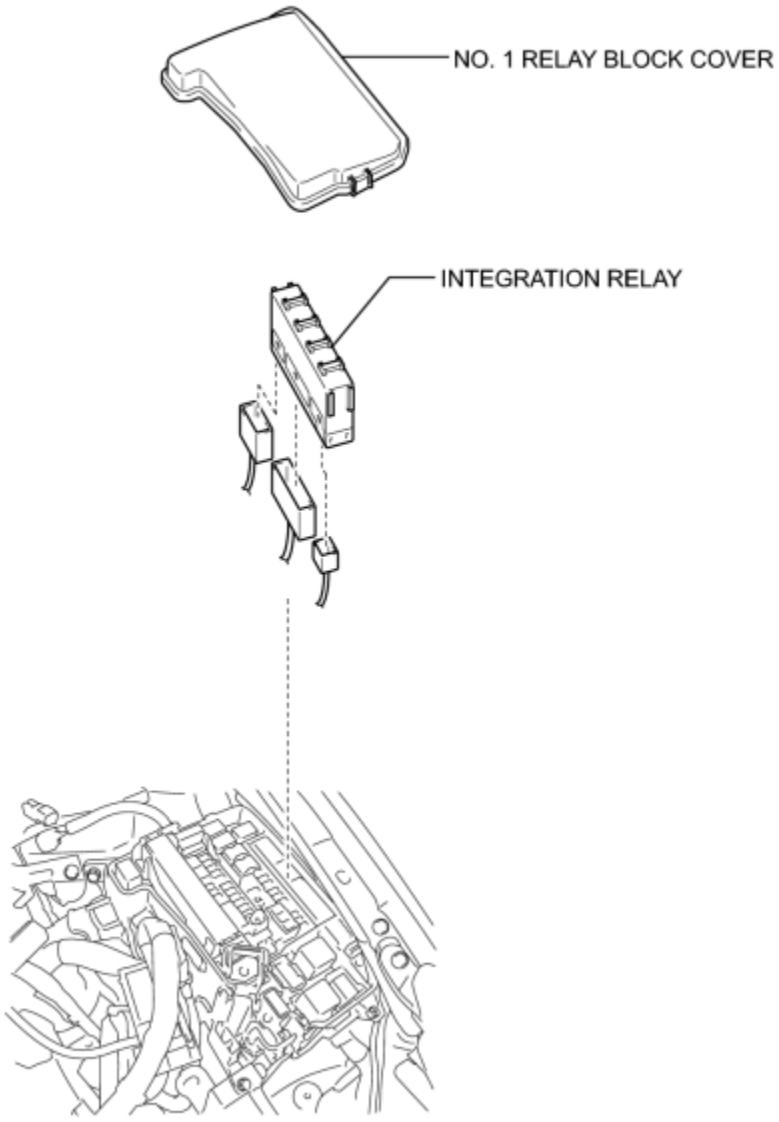
20 seconds or less.

HINT:

Only use the spark plug cleaner when the electrode is free of oil. If the electrode has traces of oil, use gasoline to clean off the oil before using the spark plug cleaner.

# COMPONENTS

# ILLUSTRATION

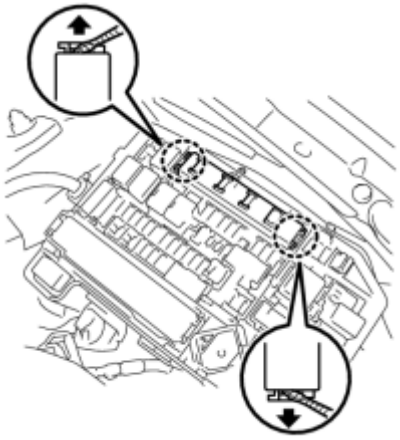



c

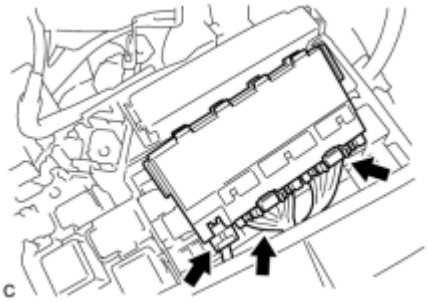
# REMOVAL

1. REMOVE NO. 1 RELAY BLOCK COVER

2. REMOVE NO.1 INTEGRATION RELAY



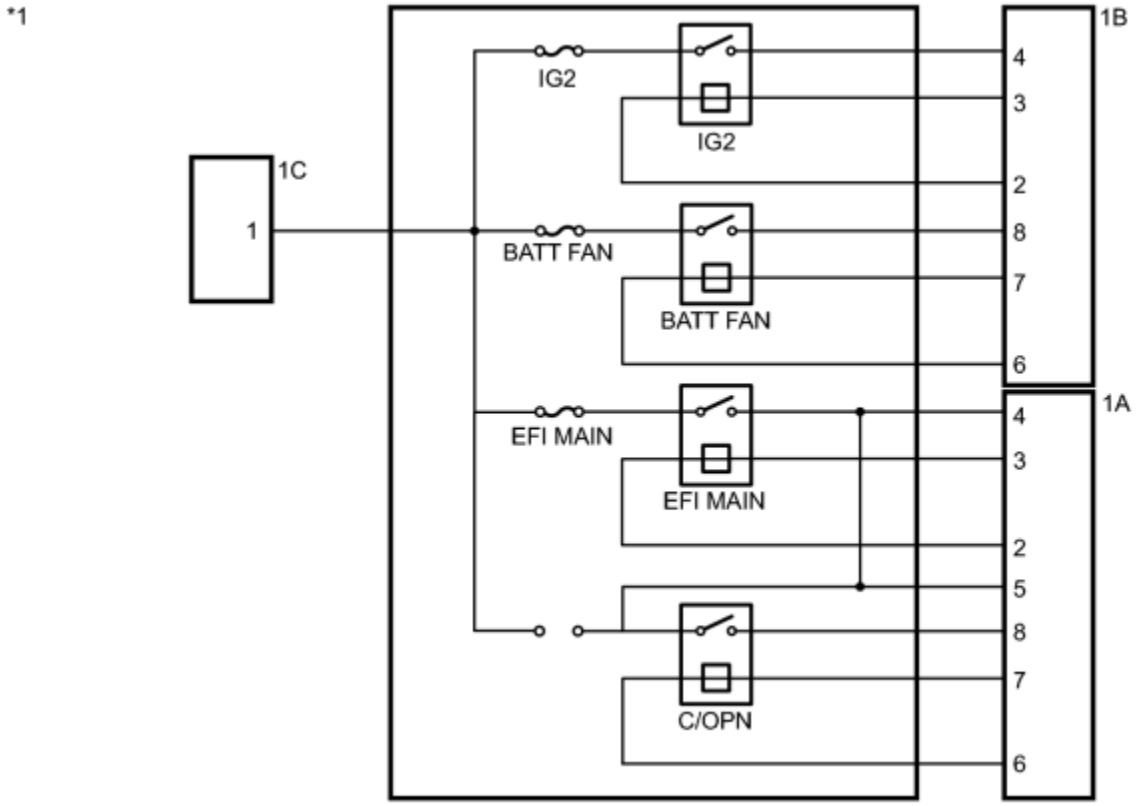
(a) Using a screwdriver with its tip wrapped in protective tape, disengage the 2 claws and disconnect the integration relay.




(b) Disconnect the 3 connectors and remove the integration relay.

# INSPECTION

1. INSPECT INTEGRATION NO.1 RELAY

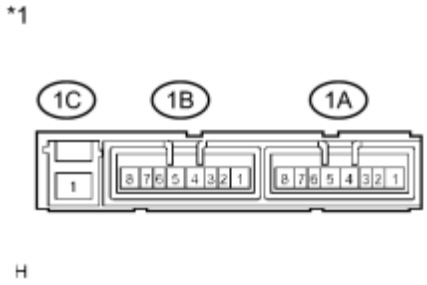



**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Integration Relay | - | - |

(a) IG2 RELAY:

(1) Measure the resistance according to the value(s) in the table below.




## Text in Illustration

| | |
|---|---|
| *1 | Integration Relay |

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Integration relay (1C-1) - Integration relay (1B-4) | Battery voltage is not applied between terminals 1B-3 and 1B-2 | 10 kΩ or higher |

| | | |
|---|---|---|
| Integration relay (1C-1) - Integration relay (1B-4) | Battery voltage is applied between terminals 1B-3 and 1B-2 | Below 1 Ω |

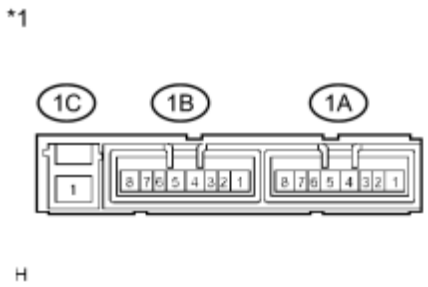
If the resistance is not as specified, replace the integration relay.

(b) EFI MAIN RELAY:

(1) Measure the resistance according to the value(s) in the table below.

## Text in Illustration

| | |
|---|---|
| *1 | Integration Relay |




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Integration relay (1C-1) - Integration relay (1A-4) | Battery voltage is not applied between terminals 1A-2 and 1A-3 | 10 kΩ or higher |
| Integration relay (1C-1) - Integration relay (1A-4) | Battery voltage is applied between terminals 1A-2 and 1A-3 | Below 1 Ω |

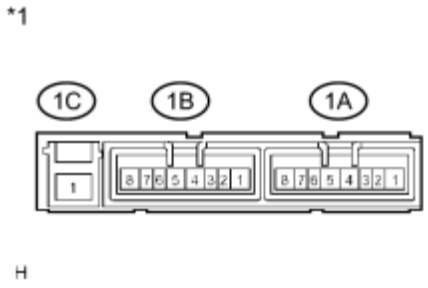
If the resistance is not as specified, replace the integration relay.

(c) C/OPN RELAY:

(1) Measure the resistance according to the value(s) in the table below.

## Text in Illustration

| | |
|---|---|
| *1 | Integration Relay |




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Integration relay (1A-5) - Integration relay (1A-8) | Battery voltage is not applied between terminals 1A-6 and 1A-7 | 10 kΩ or higher |
| Integration relay (1A-5) - Integration relay (1A-8) | Battery voltage is applied between terminals 1A-6 and 1A-7 | Below 1 Ω |

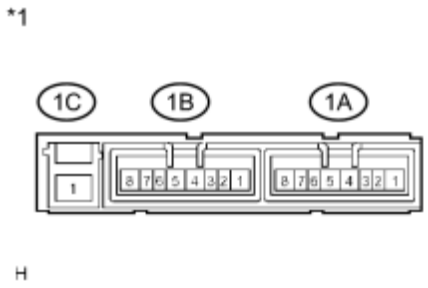
If the resistance is not as specified, replace the integration relay.

(d) BATT FAN RELAY:

(1) Measure the resistance according to the value(s) in the table below.

# Text in Illustration

| | |
|---|---|
| *1 | Integration Relay |



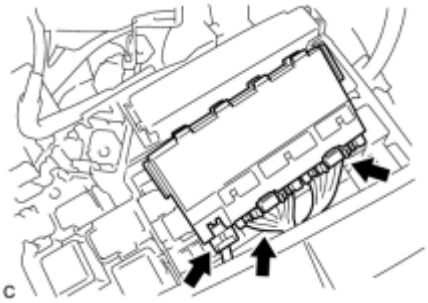

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Integration relay (1C-1) - Integration relay (1B-8) | Battery voltage is not applied between terminals 1B-7 and 1B-6 | 10 kΩ or higher |
| Integration relay (1C-1) - Integration relay (1B-8) | Battery voltage is applied between terminals 1B-7 and 1B-6 | Below 1 Ω |

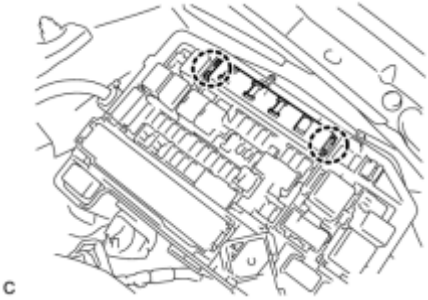
If the resistance is not as specified, replace the integration relay.

# INSTALLATION

1. INSTALL NO.1 INTEGRATION RELAY



(a) Connect the 3 connectors.

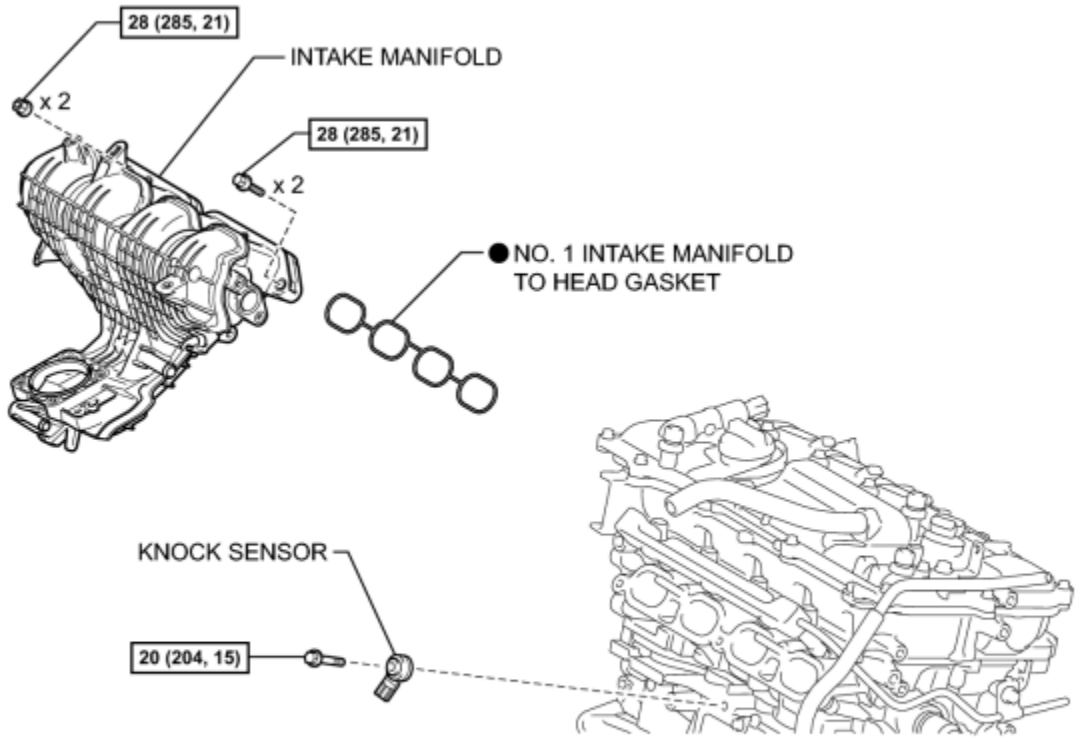


(b) Attach the integration relay to the engine room relay block.

2. REMOVE NO. 1 RELAY BLOCK COVER

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

# REMOVAL

1. REMOVE INTAKE MANIFOLD

(a) Remove the intake manifold INFO.

2. REMOVE KNOCK SENSOR

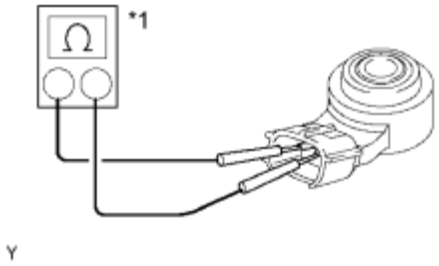
(a) Disconnect the knock sensor connector.




(b) Remove the bolt and remove the knock sensor.

# INSPECTION

1. INSPECT KNOCK SENSOR




Y

## Text in Illustration

| | |
|---|---|
| *1 | Ohmmeter |

(a) Measure the resistance according to the value(s) in the table below.

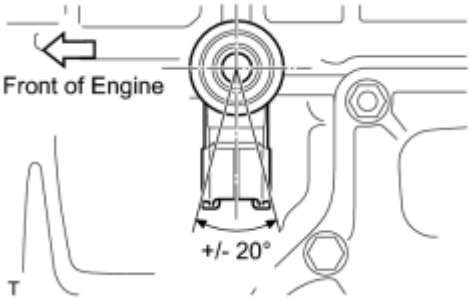
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 120 to 280 kΩ |

If the result is not as specified, replace the knock sensor.

# INSTALLATION

1. INSTALL KNOCK SENSOR




(a) Install the knock sensor with the bolt as shown in the illustration.

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

NOTICE:

Make sure that the knock control sensor is in the correct position.

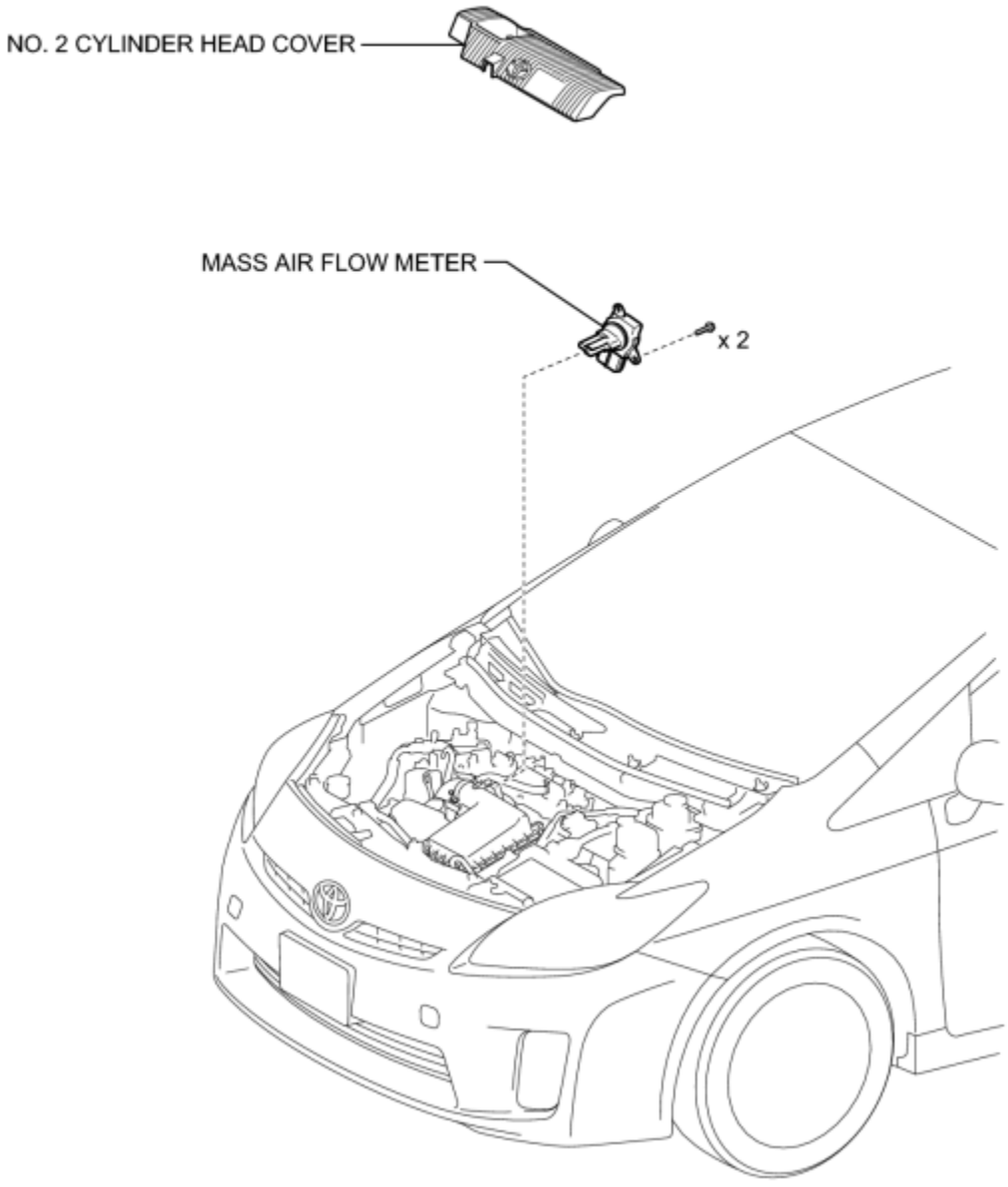
(b) Connect the knock sensor connector.

2. INSTALL INTAKE MANIFOLD

(a) Install the intake manifold INFO.

# COMPONENTS

# ILLUSTRATION



# ON-VEHICLE INSPECTION

NOTICE:

- Perform the mass air flow meter inspection in accordance with the following procedure.
- Replace the mass air flow meter only when foreign matter adheres to the sensor and the MAF value in the Data List (with the engine stopped) is not within the normal operating range.

1. INSPECT MASS AIR FLOW METER

(a) Read the values using the Techstream (MAF).

NOTICE:

- Perform the inspection with the vehicle indoors and on a level surface.
- Perform the inspection of the mass air flow meter while it is installed into the air cleaner case (installed on the vehicle).
- During the test, do not use an exhaust air duct on the exhaust pipe.

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG) (do not run the engine).

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Data List / MAF.

(5) Wait 30 seconds, and read the values on the Techstream.

Standard Condition:

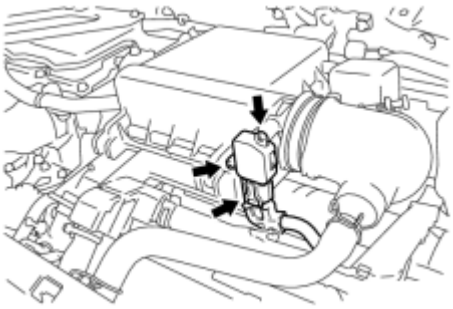
| Tester Display | Condition | Standard Condition |
|---|---|---|
| MAF | • Engine not running<br>• 30 seconds after power switch is turned on (IG) | Less than 0.25 g/sec |

- If the result is not as specified, replace the mass air flow meter.
- If the result is within the specified range, remove and inspect the mass air flow meter INFO.

# REMOVAL

1. REMOVE NO. 2 CYLINDER HEAD COVER INFO

2. REMOVE MASS AIR FLOW METER

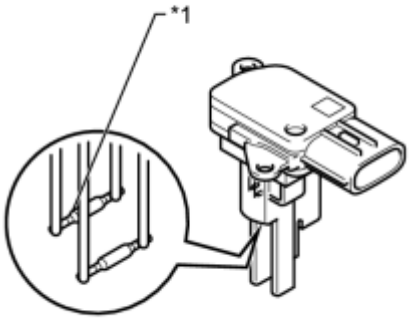


(a) Disconnect the mass air flow meter connector.

(b) Remove the 2 screws and the mass air flow meter.

# INSPECTION

1. INSPECT MASS AIR FLOW METER




(a) Perform a visual check for any foreign matter on the platinum hot wire (heater) of the mass air flow meter shown in the illustration.

## Text in Illustration

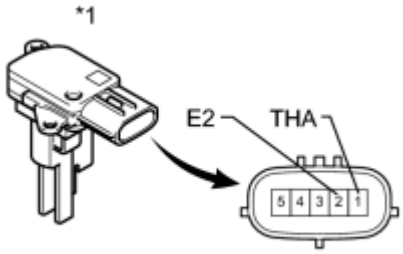
| | |
|---|---|
| *1 | Platinum Hot Wire (Heater) |

Result:

There is no foreign matter.

If the result is not as specified, replace the mass air flow meter.

(b) Measure the resistance according to the value(s) in the table below.




## Text in Illustration

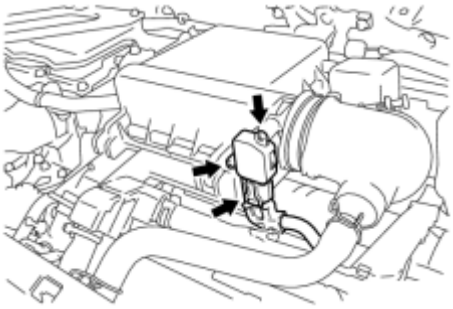
| | |
|---|---|
| *1 | Mass Air Flow Meter |

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (THA) - 2 (E2) | -20°C (-4°F) | 13.6 to 18.4 kΩ |
| | 20°C (68°F) | 2.21 to 2.69 kΩ |
| | 60°C (140°F) | 0.49 to 0.67 kΩ |

# INSTALLATION

1. INSTALL MASS AIR FLOW METER



(a) Install the mass air flow meter with the 2 screws.

NOTICE:

Make sure that the O-ring is not cracked or does not jump out of position during installation.

(b) Connect the mass air flow meter connector.

2. INSTALL NO. 2 CYLINDER HEAD COVER INFO

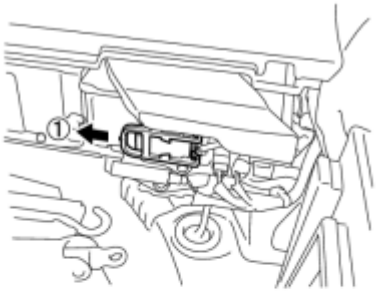
# PRECAUTION

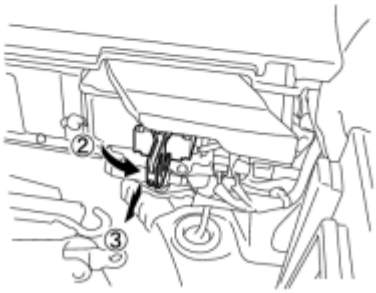
1. PRECAUTIONS FOR INSPECTING HYBRID CONTROL SYSTEM

(a) Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

NOTICE:

After removing the service plug grip, turning the power switch on (READY) may cause a malfunction. Do not turn the power switch on (READY) unless instructed by the repair manual.




C

(b) After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

2. NOTICE FOR HYBRID CONTROL SYSTEM ACTIVATION

(a) When the warning light is illuminated, or the auxiliary battery has been disconnected and reconnected, attempting to turn the power switch on (READY) may not start the system (the system may not enter the READY-on state) on the first attempt. If so, turn the power switch off and reattempt to start the hybrid system.

3. FOR USING TECHSTREAM

CAUTION:

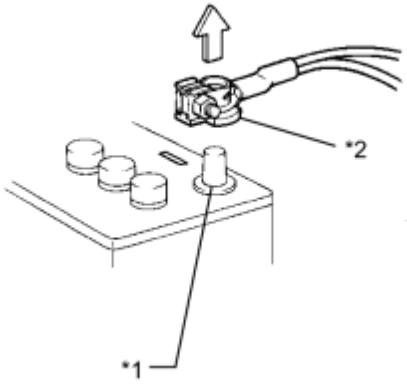
Observe the following items for safety reasons:

- Before using the Techstream, read the instruction manual.
- Prevent the Techstream cable from being caught on the pedals, shift lever or steering wheel when driving with the Techstream connected to the vehicle.
- When driving the vehicle for testing purposes using the Techstream, 2 persons are required. One is for driving the vehicle, and the other operates the Techstream.

4. DISCONNECTING AND RECONNECTING NEGATIVE BATTERY CABLE

(a) Before performing work on electronic components, disconnect the cable from the negative (-) battery terminal to prevent damage to the electrical system or electrical components.

## Text in Illustration




| | |
|---|---|
| *1 | Negative (-) Battery Terminal |
| *2 | Cable |

(b) Before disconnecting and reconnecting the battery cable, turn the power switch off and the headlight switch off. Then loosen the terminal nut completely. Do not damage the cable or terminal.

(c) When the battery cable is disconnected, the clock and radio settings and stored DTCs are cleared. Therefore, before disconnecting the battery cable, make a note of them.

- When the cable is disconnected from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.

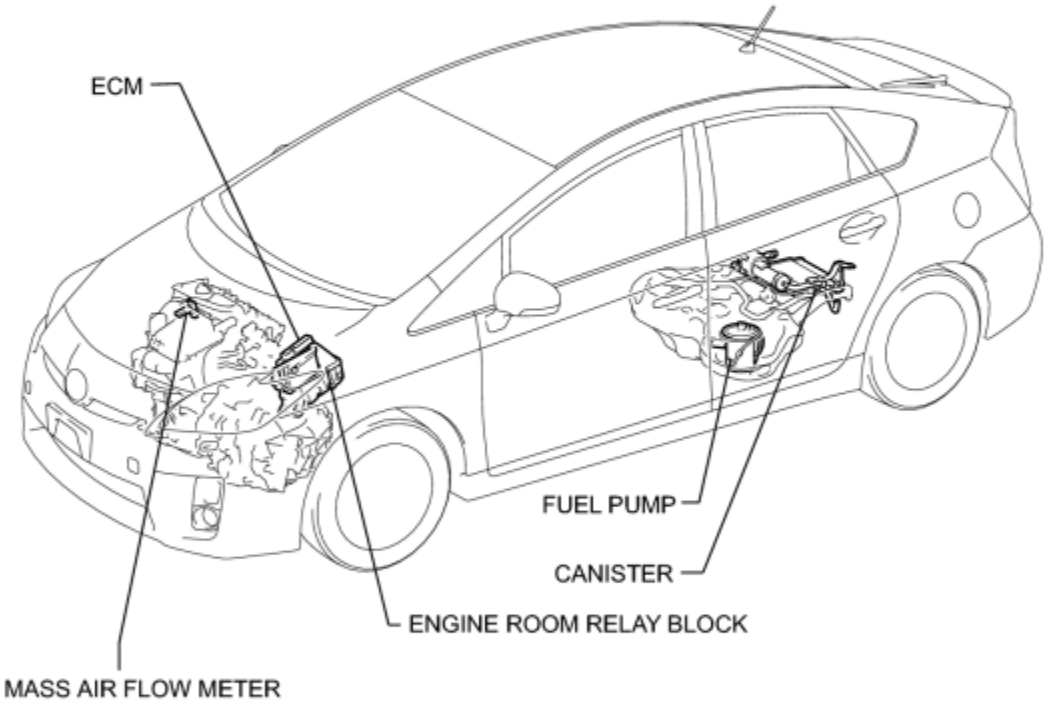
| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

# DEFINITION OF TERMS

| Term | Definition |
|---|---|
| Monitor Description | Description of what the ECM monitors and how it detects malfunctions (monitoring purpose and its details). |
| Related DTCs | A group of diagnostic trouble codes that are output by the ECM based on the same malfunction detection logic. |
| Typical Enabling Condition | Preconditions that allow the ECM to detect malfunctions.<br><br>With all preconditions satisfied, the ECM sets DTCs when monitored value(s) exceeds malfunction threshold(s). |
| Sequence of Operation | Order of monitor priority, applied if multiple sensors and components are involved in a single malfunction detection process.<br><br>Each sensor and component is monitored in turn, when previous detection operation has completed. |
| Required Sensor/Components | The sensors and components used by the ECM to detect each malfunction. |
| Frequency of Operation | The number of times the ECM checks for each malfunction during each driving cycle.<br><br>"Once per driving cycle" means ECM only performs checks for that malfunction once during a single driving cycle.<br><br>"Continuous" means the ECM performs checks for that malfunction whenever enabling conditions are met. |
| Duration | Minimum time for which the ECM must detect a continuous deviation in monitored value(s) in order to set a DTC. Timing begins when Typical Enabling Conditions met. |
| Malfunction Thresholds | The value beyond which the ECM determines malfunctions exist and sets DTCs. |
| MIL Operation | Timing of MIL illumination after a malfunction is detected.<br><br>"Immediate" means the ECM illuminates the MIL as soon as a malfunction is detected.<br><br>"2 driving cycle" means the ECM illuminates the MIL if the same malfunction is detected a second time during the next sequential driving cycle. |

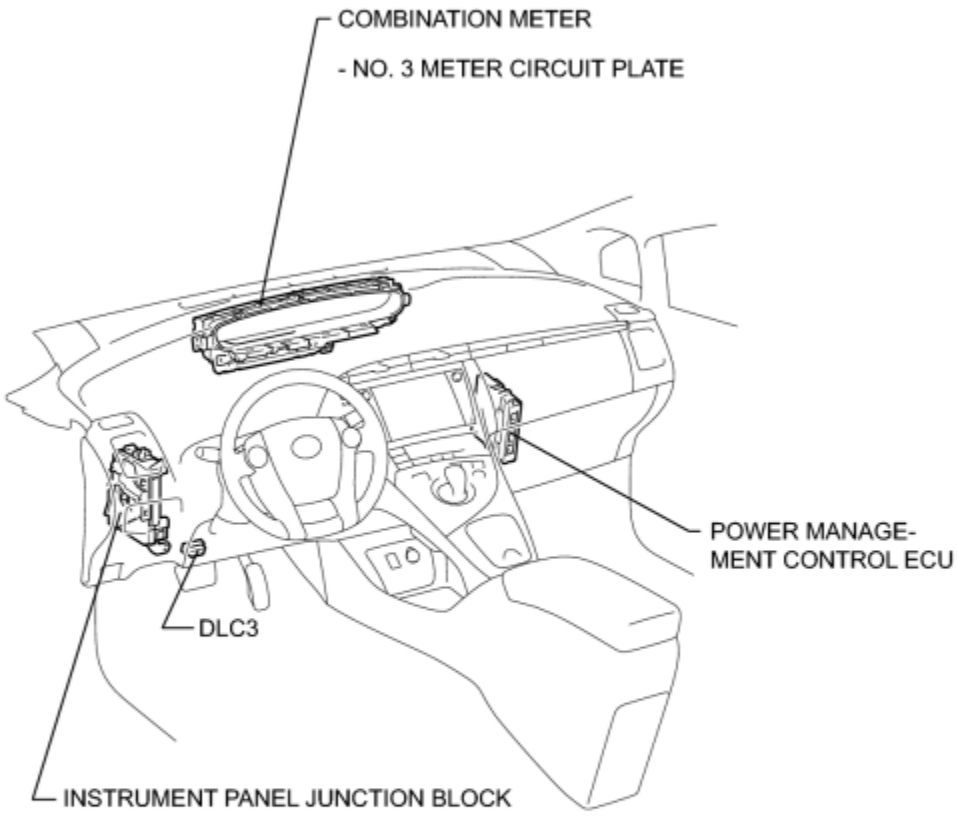
# PARTS LOCATION

# ILLUSTRATION



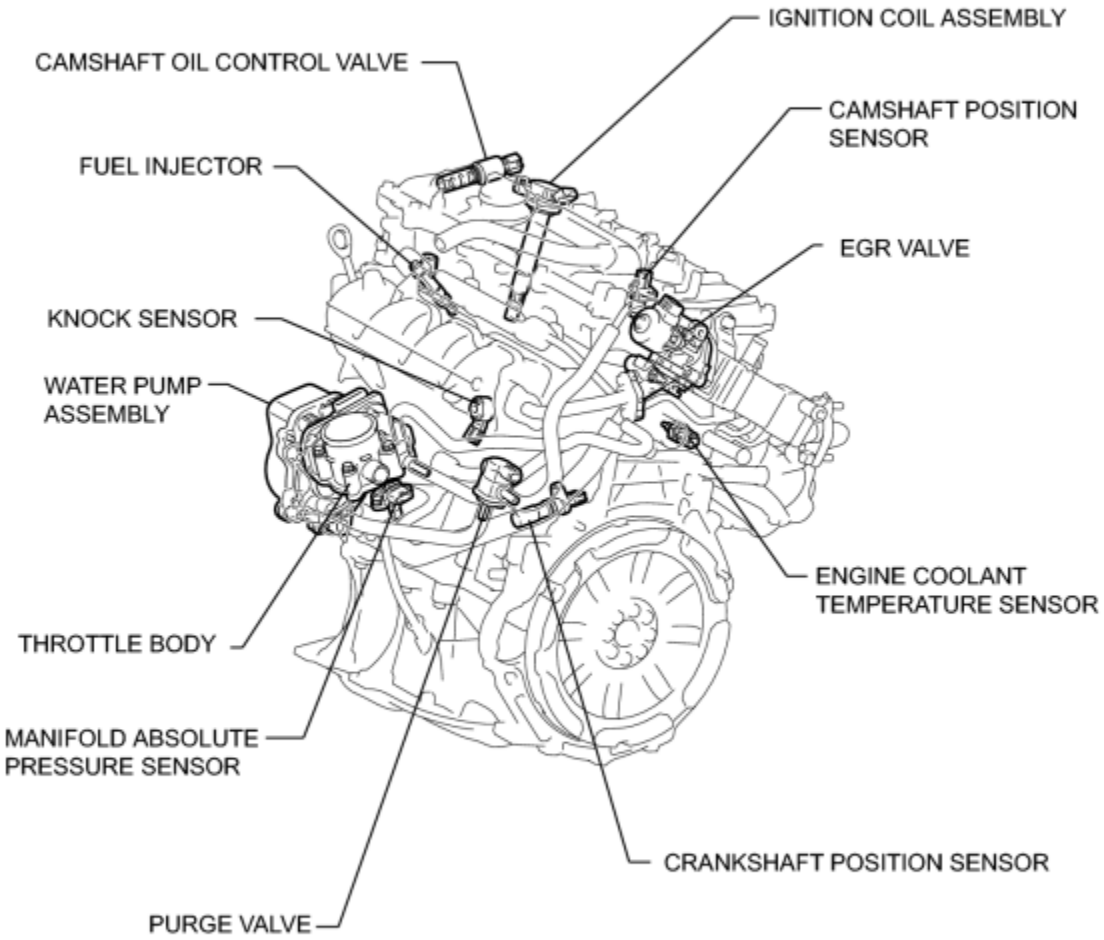

P

# ILLUSTRATION




P

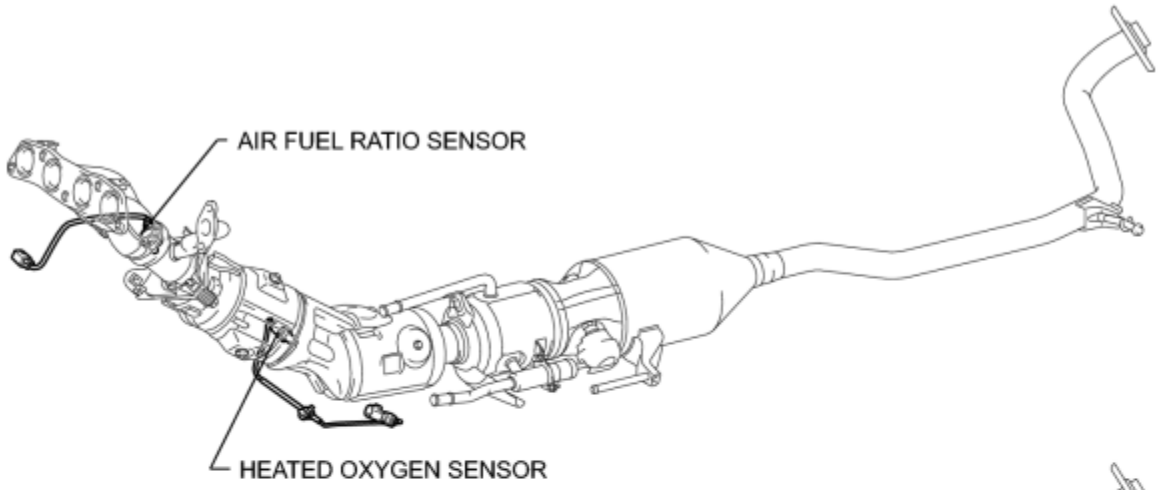
# ILLUSTRATION



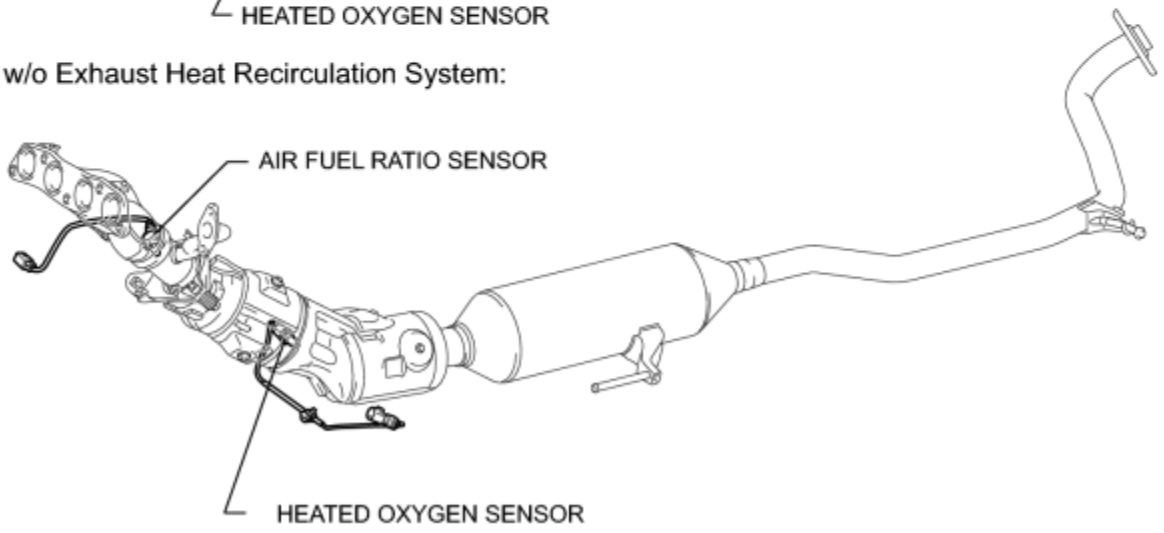

P

# ILLUSTRATION

w/ Exhaust Heat Recirculation System:

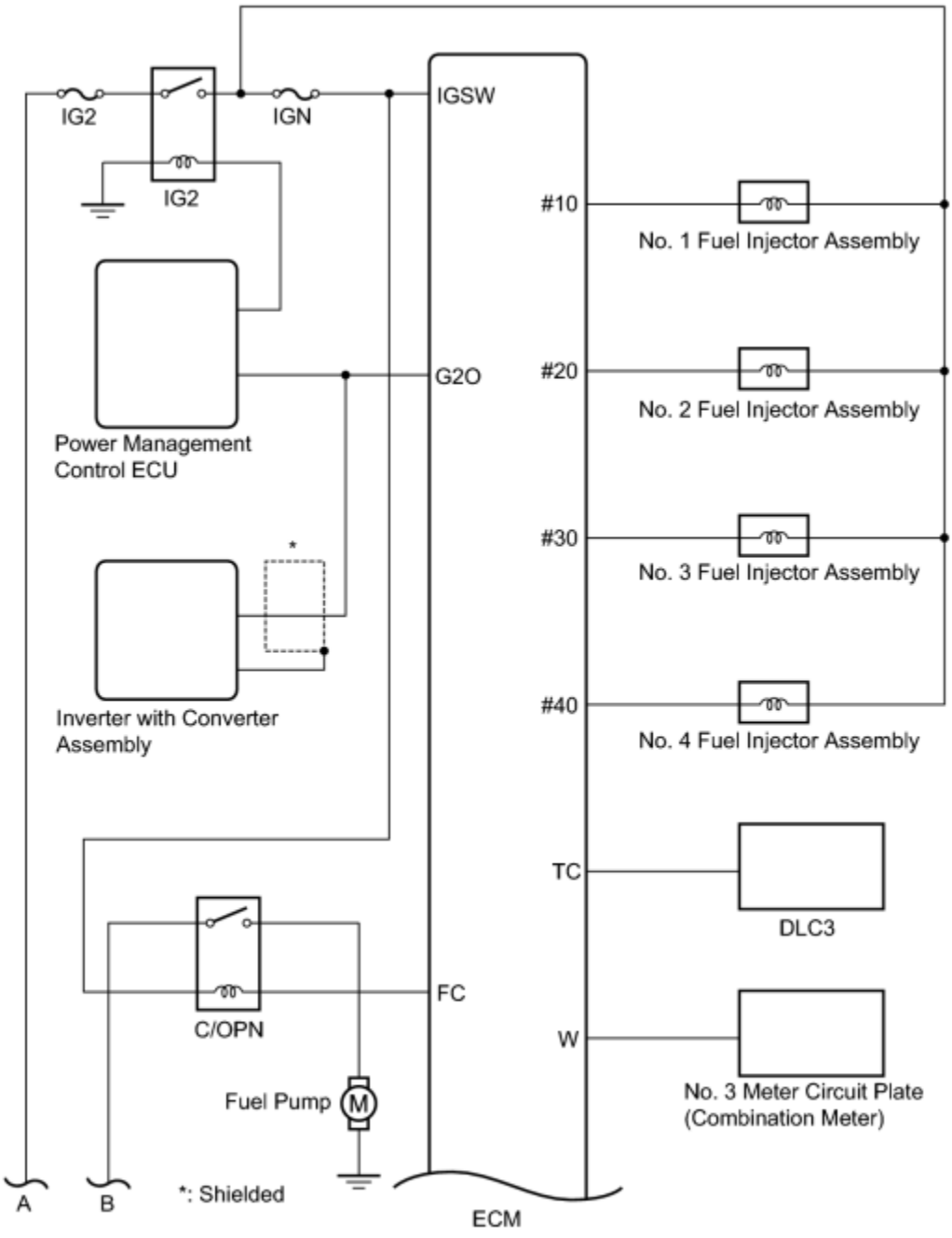


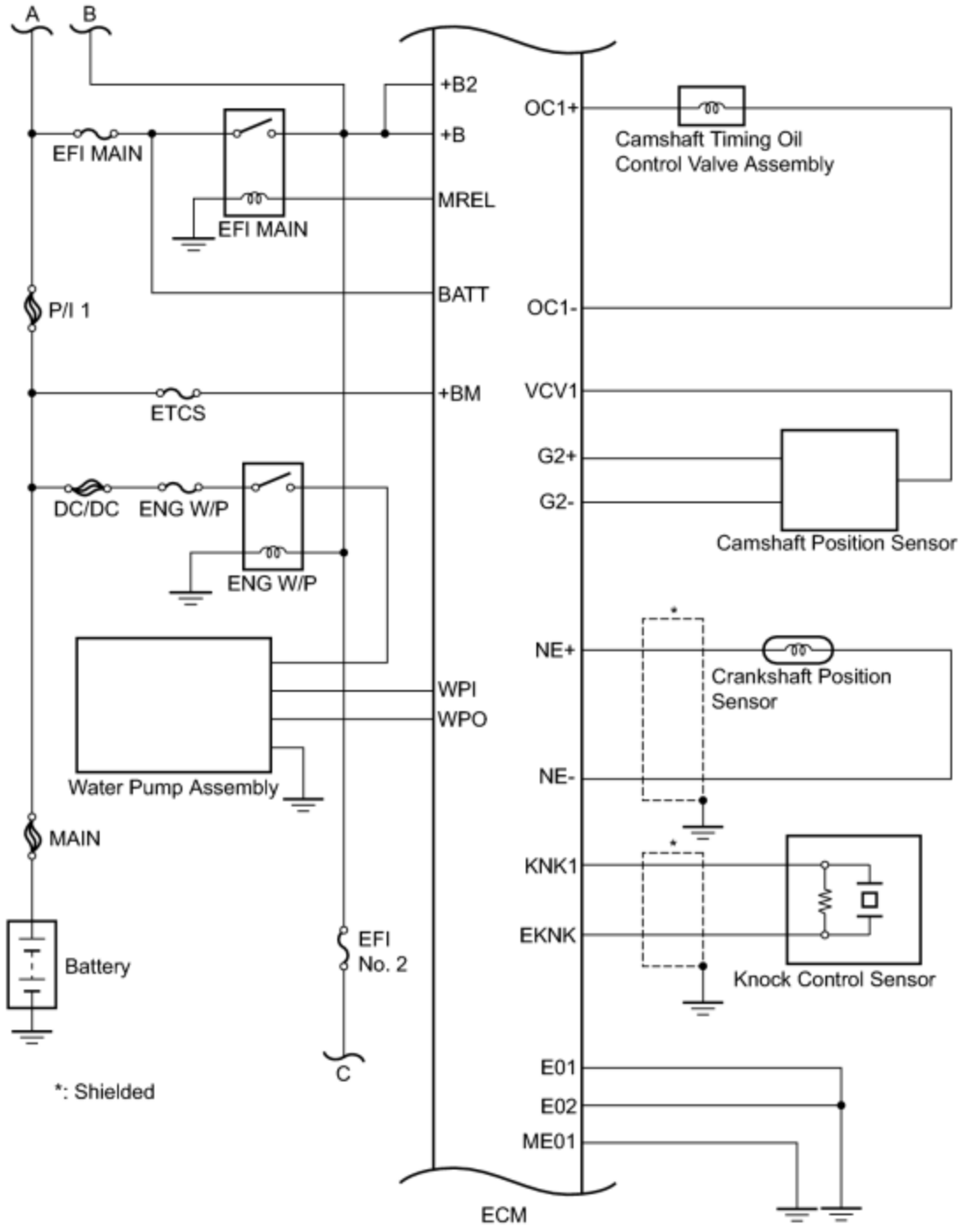

w/o Exhaust Heat Recirculation System:

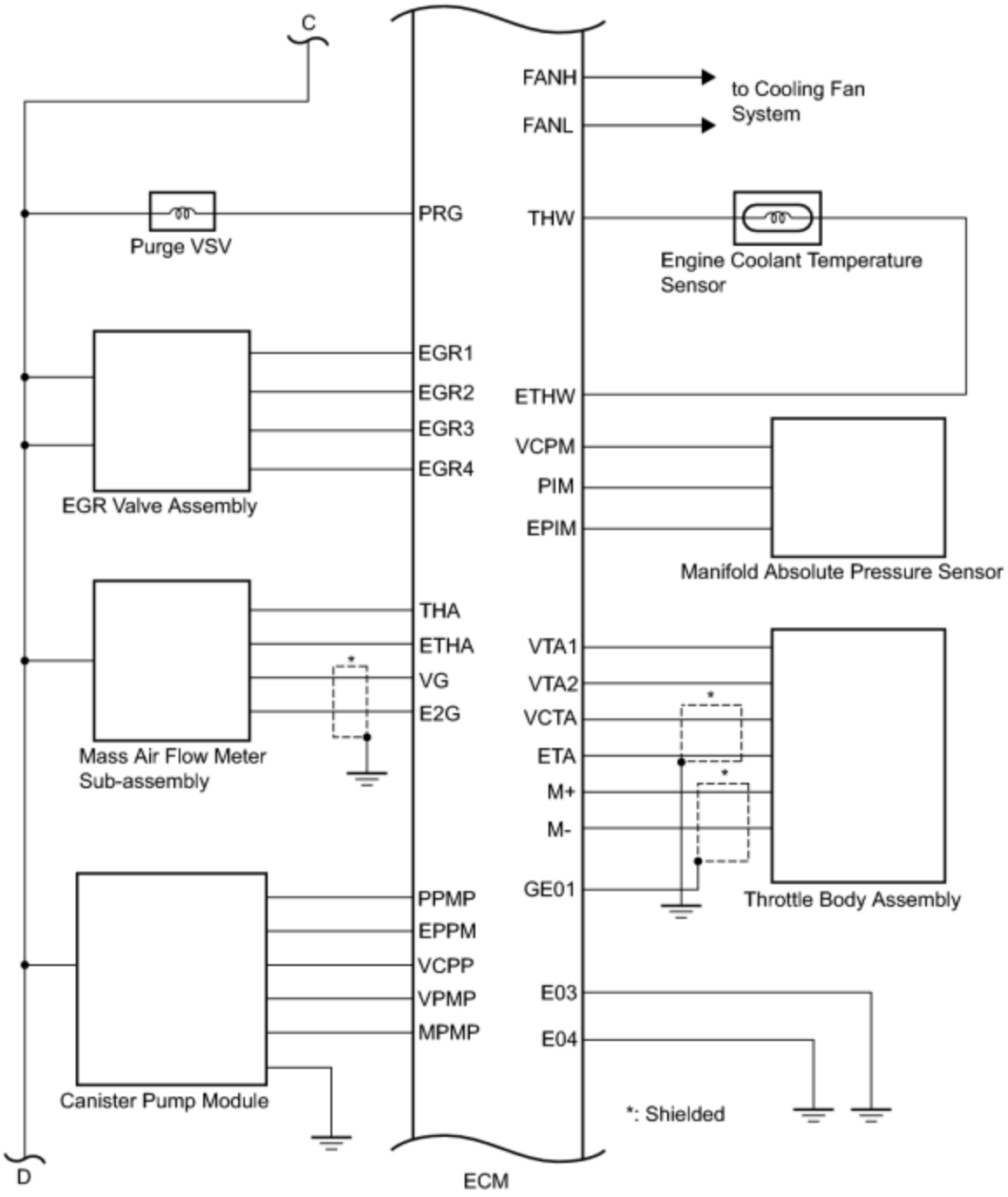


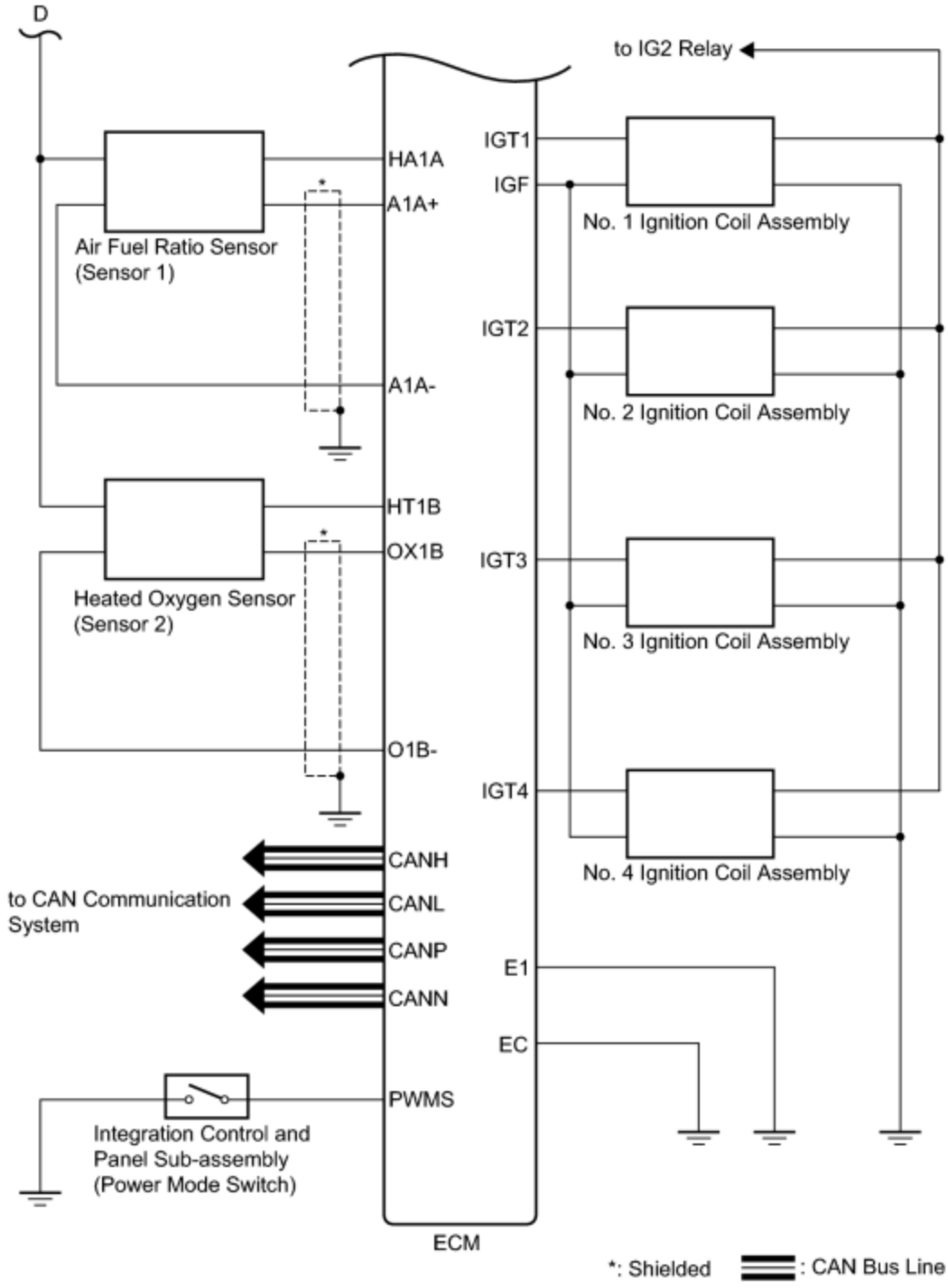

P

# SYSTEM DIAGRAM




A
B
+B2
+B
MREL
BATT
+BM
EFI MAIN
EFI MAIN
P/I 1
ETCS
DC/DC
ENG W/P
ENG W/P
WPI
WPO
Water Pump Assembly
MAIN
Battery
EFI
No. 2
C
*: Shielded
OC1+
OC1-
Camshaft Timing Oil
Control Valve Assembly
VCV1
G2+
G2-
Camshaft Position Sensor
NE+
NE-
Crankshaft Position
Sensor
KNK1
EKNK
Knock Control Sensor
E01
E02
ME01
ECM


C
FANH
FANL
to Cooling Fan System
PRG
THW
Purge VSV
Engine Coolant Temperature Sensor
EGR1
EGR2
EGR3
EGR4
ETHW
VCPM
PIM
EPIM
EGR Valve Assembly
Manifold Absolute Pressure Sensor
THA
ETHA
VG
E2G
VTA1
VTA2
VCTA
ETA
M+
M-
Mass Air Flow Meter Sub-assembly
Throttle Body Assembly
GE01
PPMP
EPPM
VCPP
VPMP
MPMP
E03
E04
Canister Pump Module
*: Shielded
D
ECM


D
to IG2 Relay
HA1A
A1A+
A1A-
Air Fuel Ratio Sensor
(Sensor 1)
HT1B
OX1B
O1B-
Heated Oxygen Sensor
(Sensor 2)
CANH
CANL
CANP
CANN
to CAN Communication
System
PWMS
Integration Control and
Panel Sub-assembly
(Power Mode Switch)
IGT1
IGF
No. 1 Ignition Coil Assembly
IGT2
No. 2 Ignition Coil Assembly
IGT3
No. 3 Ignition Coil Assembly
IGT4
No. 4 Ignition Coil Assembly
E1
EC
ECM
*: Shielded
: CAN Bus Line

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

*: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT



| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

NEXT



| | |
|---|---|
| 3. | CONNECT TECHSTREAM TO DLC3 |

HINT:

If the display indicates a communication fault in the Techstream, inspect the DLC3.

NEXT



| | |
|---|---|
| 4. | CHECK DTC AND FREEZE FRAME DATA* |

HINT:

Record or print DTCs and freeze frame data, if necessary.

NEXT



| | |
|---|---|
| 5. | CLEAR DTC AND FREEZE FRAME DATA* |

NEXT



| | |
|---|---|
| 6. | CONDUCT VISUAL INSPECTION |

NEXT



| | |
|---|---|
| 7. | SELECT CHECK MODE DIAGNOSIS* |

NEXT

| | |
|---|---|
| 8. | CONFIRM PROBLEM SYMPTOMS |

HINT:

If the engine does not start, first perform the "Check DTC" procedures and "Conduct Basic Inspection" procedures below.

| Result | Proceed to |
|---|---|
| Malfunction does not occur | A |
| Malfunction occurs | B |

B GO TO STEP 10

A

| | |
|---|---|
| 9. | SIMULATE SYMPTOMS |

HINT:

Refer to Problem Symptoms Table INFO.

NEXT

| | |
|---|---|
| 10. | CHECK DTC* |

HINT:

Refer to DTC Check / Clear.

| Result | Proceed to |
|---|---|
| Trouble code | A |
| No code | B |

B GO TO STEP 12

A

| | |
|---|---|
| 11. | REFER TO DTC CHART |

HINT:

Refer to Diagnostic Trouble Code Chart INFO.

NEXT

| | |
|---|---|
| 12. | CONDUCT BASIC INSPECTION |

HINT:

Refer to Basic Inspection INFO.

| Result | Proceed to |
|---|---|
| Malfunctioning parts not confirmed | A |
| Malfunctioning parts confirmed | B |

B GO TO STEP 17

A

| | |
|---|---|
| 13. | REFER TO PROBLEM SYMPTOMS TABLE |

HINT:

Refer to Problem Symptoms Table INFO.

| Result | Proceed to |
|---|---|
| Malfunctioning circuit confirmed | A |
| Malfunctioning parts confirmed | B |

B GO TO STEP 17

A

| | |
|---|---|
| 14. | CHECK ECM POWER SOURCE CIRCUIT |

HINT:

Refer to ECM Power Source Circuit INFO.

NEXT

| | |
|---|---|
| 15. | CONDUCT CIRCUIT INSPECTION |

| Result | Proceed to |
|---|---|
| Malfunction not confirmed | A |

| Result | Proceed to |
|---|---|
| Malfunction confirmed | B |

B GO TO STEP 18

A

| | |
|---|---|
| 16. | CHECK FOR INTERMITTENT PROBLEMS |

NEXT

| | |
|---|---|
| 17. | CONDUCT PARTS INSPECTION |

NEXT

| | |
|---|---|
| 18. | IDENTIFY PROBLEM |

NEXT

| | |
|---|---|
| 19. | ADJUST AND/OR REPAIR |

NEXT

| | |
|---|---|
| 20. | CONDUCT CONFIRMATION TEST |

NEXT **END**

# CHECK FOR INTERMITTENT PROBLEMS

HINT:

Inspect the vehicle's ECM using check mode. Intermittent problems are easier to detect with the Techstream when the ECM is in check mode. In check mode, the ECM uses 1 trip detection logic, which is more sensitive to malfunctions than normal mode (default), which uses 2 trip detection logic.

1. Clear DTCs INFO.
2. Switch the ECM from normal mode to check mode using the Techstream INFO.
3. Perform a simulation test INFO.
4. Check and wiggle the harness(es), connector(s) and terminal(s) INFO.

# BASIC INSPECTION

When a malfunction is not confirmed by the DTC check, troubleshooting should be carried out in all circuits considered to be possible causes of the problem. In many cases, by carrying out the basic engine check shown in the following flowchart, the location of the problem can be found quickly and efficiently. Therefore, using this check is essential when troubleshooting the engine.

| | |
|---|---|
| 1. | CHECK BATTERY VOLTAGE |

NOTICE:

Carry out this check with the engine stopped and the power switch off.

Result:

| Result | Proceed to |
|---|---|
| 11 V or more | OK |
| Below 11 V | NG |

NG ▶ CHARGE OR REPLACE BATTERY

OK

▼

| | |
|---|---|
| 2. | CHECK WHETHER ENGINE CRANKS |

NG ▶ INFO PROCEED TO PROBLEM SYMPTOMS TABLE

OK

▼

| | |
|---|---|
| 3. | CHECK WHETHER ENGINE STARTS |

NG ▶ GO TO STEP 6

OK

▼

| | |
|---|---|
| 4. | CHECK AIR FILTER |

(a) Visually check that the air filter is not excessively contaminated with dirt or oil.

NG ▶ REPLACE AIR FILTER

OK

▼

| | |
|---|---|
| 5. | CHECK IDLING SPEED |

NG → TROUBLESHOOT IDLING SPEED AND PROCEED TO NEXT STEP

OK

▼

| | |
|---|---|
| 6. | CHECK FUEL PRESSURE |

NG → TROUBLESHOOT FUEL PRESSURE AND PROCEED TO NEXT STEP

OK

▼

| | |
|---|---|
| 7. | CHECK FOR SPARK |

NG → TROUBLESHOOT SPARK AND PROCEED TO NEXT STEP

OK → INFO **PROCEED TO PROBLEM SYMPTOMS TABLE**

# CHECKING MONITOR STATUS

The purpose of the monitor result (mode 06) is to allow access to the results for on-board diagnostic monitoring tests of specific components/systems that are not continuously monitored. Examples are the catalyst, evaporative emission (EVAP) and thermostat.

The monitor result allows the OBD II scan tool to display the monitor status, test value, minimum test limit and maximum test limit. These data are displayed after the vehicle has been driven to run the monitor.

When the test value is not between the minimum test limit and maximum test limit, the ECM (PCM) interprets this as a malfunction. When the component is not malfunctioning, if the difference of the test value and test limit is very small, the component will malfunction in the near future.

Perform the following instruction to view the monitor status. Although these instruction reference the Toyota diagnostic tester, it can be checked using a generic OBD II scan tool. Refer to your scan tool operator's manual for specific procedures.

1. PERFORM MONITOR DRIVE PATTERN

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear DTCs INFO.

(e) Run the vehicle in accordance with the applicable drive pattern described in Readiness Monitor Drive Pattern INFO. Do not turn the power switch off.

NOTICE:

The test results will be lost if the power switch is turned off.

2. ACCESS MONITOR RESULT

(a) Enter the following menus: Powertrain / Engine and ECT / Monitor / Result. The monitor status appears after the component name.

- Pass: The component is functioning normally.
- Fail: The component is malfunctioning.

(b) Confirm that the component is either Pass or Fail.

(c) Select the component and press ENTER. The accuracy test value appears if the monitor status is either Pass or Fail.

3. CHECK COMPONENT STATUS

(a) Compare the test value with the minimum test limit (MIN LIMIT) and maximum test limit (MAX LIMIT).

(b) If the test value is between the minimum test limit and maximum test limit, the component is functioning normally. If not, the component is malfunctioning. The test value is usually significantly higher or lower than the test limit. If the test value is on the borderline of the test limit, the component will malfunction in the near future.

HINT:

The monitor result might on rare occasions be PASS even if the malfunction indicator lamp (MIL) is illuminated. This indicates the system malfunctioned on a previous driving cycle. This might be caused by an intermittent problem.

4. MONITOR RESULT INFORMATION

If you use a generic scan tool, multiply the value by the scaling value listed below.

**Advance Intake Side**

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| $35 | $81 | Multiply by 0.01 | Second | Forced movement of oil control valve time |

**Exhaust Gas Recirculation System**

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| $31 | $BD | Multiply by 0.01 | kPa | Delta Manifold Absolute Pressure |

**Air Fuel Ratio Sensor (Sensor 1)**

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| $01 | $8E | Multiply by 0.001 | V | Air fuel ratio sensor deterioration level |
| $01 | $91 | Multiply by 0.004 | mA | Air fuel ratio sensor current |

**Heated Oxygen Sensor (Sensor 2)**

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| $02 | $07 | Multiply by 0.001 | V | Minimum sensor voltage |
| $02 | $08 | Multiply by 0.001 | V | Maximum sensor voltage |
| $02 | $8B | Multiply by 0.001 | Seconds | 0.35 - 0.2 V sensor switch time |
| $02 | $8D | Multiply by 0.001 | Seconds | Duration that sensor voltage drops to 0.2 V during fuel-cut |
| $02 | $8F | Multiply by 0.0003 | g | Maximum oxygen storage capacity |

**Catalyst**

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| $21 | $A9 | Multiply by 0.0003 | No dimension | Oxygen storage capacity of catalyst |

**EVAP**

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| $3D | $C9 | Multiply by 0.001 | kPa | Test value for small leak (P0456) |
| $3D | $CA | Multiply by 0.001 | kPa | Test value for gross leak (P0455) |
| $3D | $CB | Multiply by 0.001 | kPa | Test value for leak detection pump OFF stuck (P2401) |
| $3D | $CD | Multiply by 0.001 | kPa | Test value for leak detection pump ON stuck (P2402) |
| $3D | $CE | Multiply by 0.001 | kPa | Test value for vent valve OFF stuck (P2420) |
| $3D | $CF | Multiply by 0.001 | kPa | Test value for vent valve ON stuck (P2419) |
| $3D | $D0 | Multiply by 0.001 | kPa | Test value for reference orifice low flow (P043E) |
| $3D | $D1 | Multiply by 0.001 | kPa | Test value for reference orifice high flow (P043F) |
| $3D | $D4 | Multiply by 0.001 | kPa | Test value for purge VSV close stuck (P0441) |
| $3D | $D5 | Multiply by 0.001 | kPa | Test value for purge VSV open stuck (P0441) |
| $3D | $D7 | Multiply by 0.001 | kPa | Test value for purge flow insufficient (P0441) |

**Misfire**

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| $A1 | $0B | Multiply by 1 | Time | Total EWMA misfire count of all cylinders in last ten driving cycles<br><br>EWMA: Exponential Weighted Moving Average |
| $A1 | $0C | Multiply by 1 | Time | • When power switch on (IG), total misfire count of all cylinders in last driving cycle is displayed.<br>• While engine is running, total misfire count of all cylinders in current driving cycle is displayed. |
| $A2 | $0B | Multiply by 1 | Time | Total EWMA misfire count of cylinder 1 in last ten driving cycles |
| $A2 | $0C | Multiply by 1 | Time | • When power switch on (IG), total misfire count of cylinder 1 in last driving cycle is displayed.<br>• While engine is running, total misfire count of cylinder 1 in current driving cycle is displayed. |
| $A3 | $0B | Multiply by 1 | Time | Total EWMA misfire count of cylinder 2 in last ten driving cycles |
| $A3 | $0C | Multiply by 1 | Time | • When power switch on (IG), total misfire count of cylinder 2 in last driving cycle is displayed.<br>• While engine is running, total misfire count of cylinder 2 in current driving cycle is displayed. |
| $A4 | $0B | Multiply by 1 | Time | Total EWMA misfire count of cylinder 3 in last ten driving cycles |
| $A4 | $0C | Multiply | Time | • When power switch on (IG), total misfire count of cylinder 3 in |

| Monitor ID | Test ID | Scaling | Unit | Description |
|---|---|---|---|---|
| | | by 1 | | last driving cycle is displayed.<br>• While engine is running, total misfire count of cylinder 3 in current driving cycle is displayed. |
| $A5 | $0B | Multiply by 1 | Time | Total EWMA misfire count of cylinder 4 in last ten driving cycles |
| $A5 | $0C | Multiply by 1 | Time | • When power switch on (IG), total misfire count of cylinder 4 in last driving cycle is displayed.<br>• While engine is running, total misfire count of cylinder 4 in current driving cycle is displayed. |

# READINESS MONITOR DRIVE PATTERN

1. PURPOSE OF READINESS TESTS

- The On-Board Diagnostic (OBD II) system is designed to monitor the performance of emission related components, and indicate any detected abnormalities using DTCs (Diagnostic Trouble Codes). Since various components need to be monitored during different driving conditions, the OBD II system is designed to run separate monitoring programs called Readiness Monitors.
- To view the status, enter the following menus: Powertrain / Engine and ECT / Monitor / Status2.
- When the status of a Readiness Monitor reads Complete, the necessary conditions have been met for running the performance tests for that Readiness Monitor.
- A generic OBD II scan tool can also be used to view the Readiness Monitor status.

HINT:

Many state Inspection and Maintenance (I/M) programs require the status of vehicle Readiness Monitors to show Complete before beginning emission tests.

- The Readiness Monitors will be reset to Incomplete if:

  - The ECM has lost battery power or blown a fuse.
  - DTCs have been cleared.
  - The conditions for running the Readiness Monitor have not been met.

- If a Readiness Monitor status shows Incomplete, follow the appropriate Readiness Monitor Drive Pattern to change the status to Complete.

CAUTION:

Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

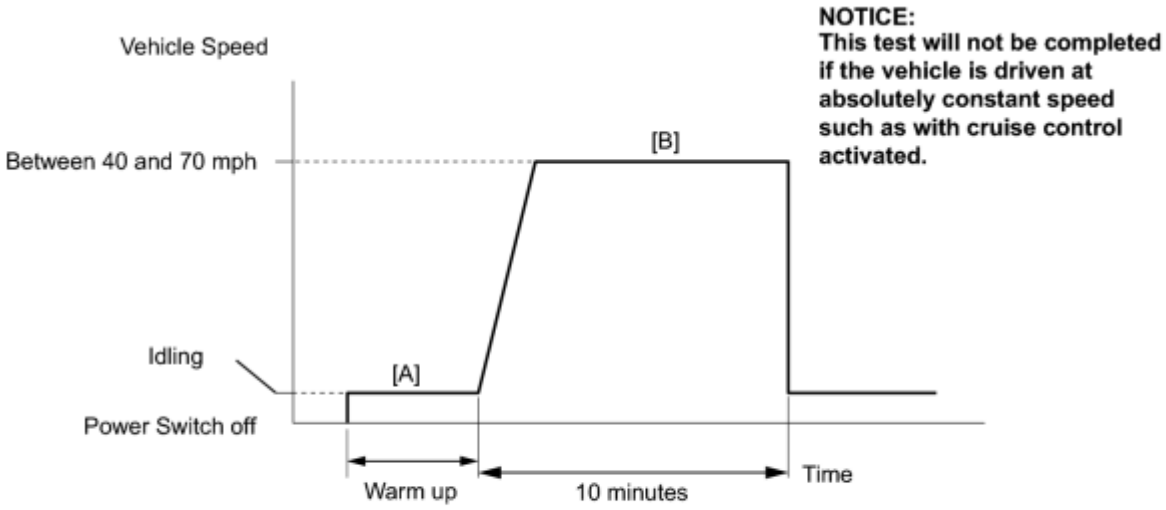
NOTICE:

These drive patterns represent the fastest method of satisfying all conditions necessary to achieve complete status for each specific Readiness Monitor.

In the event of a drive pattern being interrupted (possibly due to factors such as traffic conditions), the drive pattern can be resumed. In most cases, the Readiness Monitor will still achieve complete status upon completion of the drive pattern.

To ensure completion of the Readiness Monitors, avoid sudden changes in vehicle load and speed (driving up and down hills and/or sudden acceleration).

2. CATALYST MONITOR (ACTIVE AIR FUEL RATIO CONTROL TYPE)




(Note: Even when vehicle stops during drive pattern, test can be resumed.)

(a) Preconditions

- The monitor will not run unless:
  - The MIL is OFF.

(b) Drive Pattern

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Clear DTCs (if set) INFO.

(5) Put the engine in inspection mode INFO.

(6) Start the engine and warm it up [A].

(7) Drive the vehicle at between 40 mph and 70 mph (64 km/h and 113 km/h) for at least 10 minutes [B].

(c) Monitor Status

Check the Readiness Monitor status displayed on the Techstream.

If the status does not switch to Complete, extend the driving time.

3. EVAP SYSTEM MONITOR (KEY OFF TYPE)

(a) Preconditions

- The monitor will not run unless:

  - The fuel tank is less than 90% full.
  - The altitude is less than 8000 ft. (2438 m).
  - The vehicle is stationary.
  - The engine coolant temperature is between 4.4°C and 35°C (40°F and 95°F).
  - The intake air temperature is between 4.4°C and 35°C (40°F and 95°F).
  - The vehicle was driven in a city area (or on a free-way) for 10 minutes or more.

(b) Monitor Conditions

(1) Turn the power switch off and wait for 5 to 10 hours.

HINT:

Do not start the engine until checking Readiness Monitor status. If the engine is started, the step described above must be repeated.

(c) Monitor Status

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

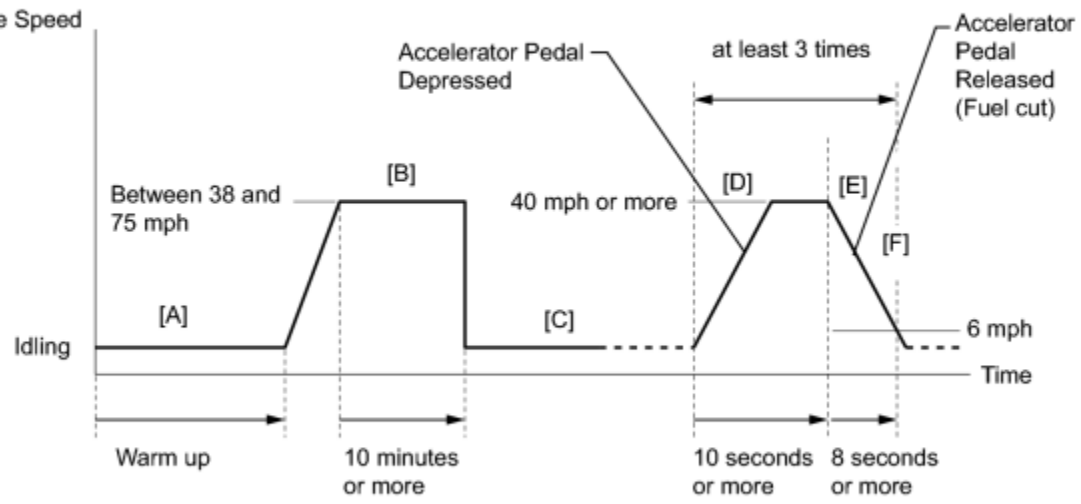
(4) Check the Readiness Monitor status displayed on the Techstream.

- If the status does not switch to Complete, restart the engine, make sure that the preconditions have been met, and then perform the Monitor Conditions again.

4. AIR FUEL RATIO AND HEATED OXYGEN SENSOR MONITORS (ACTIVE AIR FUEL RATIO CONTROL TYPE)

Monitor Drive Pattern

Engine Coolant Temperature: 75°C or more




P

(a) Preconditions

- The monitor will not run unless:
  - 2 minutes or more have elapsed since the engine was started.
  - The engine coolant temperature is 75°C (167°F) or more.
  - Cumulative driving time at a vehicle speed of 30 mph (48 km/h) or more exceeds 6 minutes.
  - Air fuel ratio feedback control is performed.

(b) Drive Pattern for front air fuel ratio sensor and heated oxygen sensor

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Clear DTCs INFO.

(5) Put the engine in inspection mode INFO.

(6) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) [A].

(7) Drive the vehicle at between 38 mph (60 km/h) and 75 mph (120 km/h) for at least 10 minutes [B].

(8) Move the shift lever to B [C].

(9) Accelerate the vehicle to 40 mph (64 km/h) or more by depressing the accelerator pedal for at least 10 seconds [D].

(10) Soon after performing step [D] above, release the accelerator pedal for at least 8 seconds without depressing the brake pedal, in order to execute fuel-cut control [E].

(11) Allow the vehicle to decelerate until the vehicle speed declines to less than 6 mph (10 km/h) [F].

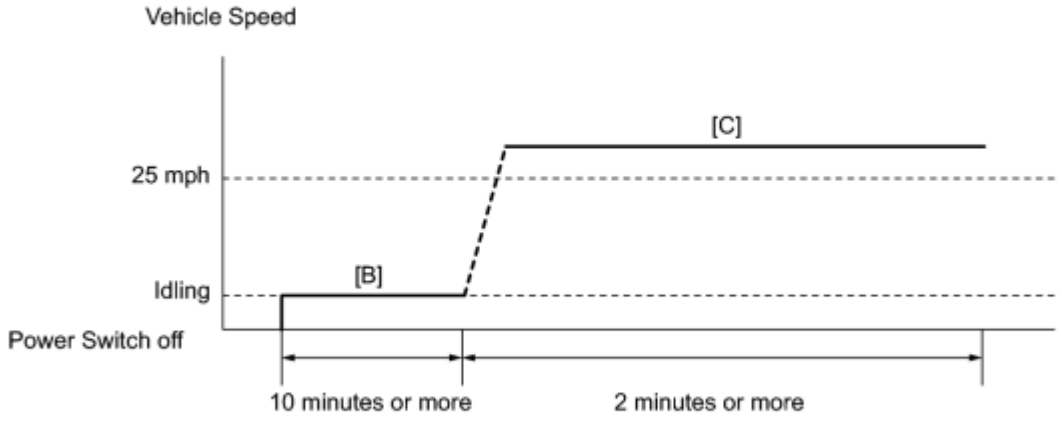
(12) Repeat steps from [D] through [F] above at least 3 times in one driving cycle [G].

(c) Monitor Status

(1) Check the Readiness Monitor status displayed on the Techstream.

(2) If the status does not switch to Complete, make sure that the preconditions have been met, and then perform steps from [A] through [G] in Drive Pattern above.

5. AIR FUEL RATIO AND HEATED OXYGEN SENSOR HEATER MONITORS (FRONT AIR FUEL RATIO AND REAR HEATED OXYGEN SENSOR TYPE)




Y

(a) Preconditions

- The monitor will not run unless:
  - The MIL is OFF.

(b) Drive Pattern

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Clear DTCs (if set) INFO.

(5) Put the engine in inspection mode INFO.

(6) Start the engine [A].

(7) Allow the engine to idle for 10 minutes or more [B].

(8) Drive the vehicle at 25 mph (40 km/h) or more for at least 2 minutes [C].

(c) Monitor Status

(1) Check the Readiness Monitor status displayed on the Techstream.

If the status does not switch to Complete, make sure that the preconditions have been met, and repeat steps [A] to [C] described in the Drive Pattern above.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

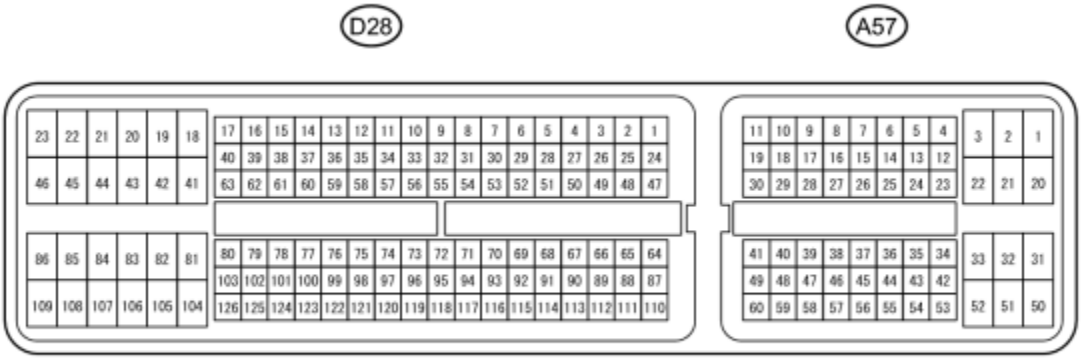
**SFI System**

| Symptom | Suspected Area | See page |
|---|---|---|
| Engine does not crank (Does not start) | Engine immobiliser system | INFO |
| | Hybrid control system | INFO |
| | VC output circuit | INFO |
| | Smart key system | INFO |
| No initial combustion (Does not start) | ECM power source circuit | INFO |
| | VC output circuit | INFO |
| | Crankshaft position sensor | INFO |
| | Fuel pump control circuit | INFO |
| | Ignition system | INFO |
| | Fuel injector circuit | INFO |
| | Valve timing | INFO |
| Engine cranks normally but difficult to start | Fuel pump control circuit | INFO |
| | Fuel pump | INFO |
| | Engine coolant temperature sensor | INFO |
| | Ignition system | INFO |
| | Fuel injector assembly | INFO |
| | EGR valve assembly | INFO |
| | Compression | INFO |
| | Fuel injector circuit | INFO |
| | Intake system | INFO |
| | Throttle body assembly | INFO |
| | EGR valve assembly | INFO |
| Incomplete intermittent combustion occurs (Does not start) | Fuel pump control circuit | INFO |
| | Fuel pump | INFO |
| | Fuel line | - |
| | Ignition system | INFO |
| | Fuel injector assembly | INFO |
| | EGR valve assembly | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Crankshaft position sensor | INFO |
| | Valve timing | INFO |
| High engine idle speed | Throttle body assembly | INFO |
| | Intake system | INFO |
| | Engine coolant temperature sensor | INFO |
| | PCV system | INFO |
| | ECM power source circuit | INFO |
| Low engine idle speed (Poor idle) | Fuel pump control circuit | INFO |
| | Throttle body assembly | INFO |
| | Intake system | INFO |
| | PCV system | INFO |
| Engine stalls on deceleration | Idle speed (refer to "Low engine speed") | INFO |
| | EGR valve assembly | INFO |
| Rough idle | Compression | INFO |
| | Air fuel ratio sensor | INFO |
| | Heated oxygen sensor | INFO |
| | Mass air flow meter sub-assembly | INFO |
| | Manifold absolute pressure sensor | INFO |
| | Ignition system | INFO |
| | Fuel line | - |
| | Valve timing | INFO |
| | Fuel pump | INFO |
| | Intake system | INFO |
| | PCV system | INFO |
| | EGR valve assembly | INFO |
| Hunting | PCV system | INFO |
| | Air fuel ratio sensor | INFO |
| | Mass air flow meter sub-assembly | INFO |
| Hesitation/Poor acceleration | Fuel line | - |
| | Fuel pump | INFO |
| | Valve timing | INFO |
| | Mass air flow meter sub-assembly | INFO |
| | Throttle body assembly | INFO |
| | Knock control sensor | INFO |
| Surging (Poor driveability) | Fuel line | - |
| | Fuel pump control circuit | INFO |
| | Fuel pump | INFO |
| | Ignition system | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Fuel injector assembly | INFO |
| Engine stalls soon after starting | Mass air flow meter sub-assembly | INFO |
| | Intake system | INFO |
| | Manifold absolute pressure sensor | INFO |
| | Fuel line | - |
| | Valve timing | INFO |
| | EGR valve assembly | INFO |
| Engine coolant temperature indicator light illuminate | Engine coolant leaks | INFO |
| | Water pump assembly | INFO |
| Unable/difficult to refuel | Canister | INFO |

# TERMINALS OF ECM




HINT:

The standard normal voltage between each pair of the ECM terminals is shown in the table below. The appropriate conditions for checking each pair of the terminals are also indicated. The result of checks should be compared with the standard normal voltage for that pair of the terminals, and displayed in the "Specified Condition" column. The illustration above can be used as a reference to identify the ECM terminal locations.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A57-20 (BATT) - D28-104 (E1) | R - BR | Battery (for measuring battery voltage and for ECM memory) | Always | 11 to 14 V |
| A57-2 (+B) - D28-104 (E1) | B - BR | Power source of ECM | Power switch on (IG) | 11 to 14 V |
| A57-1 (+B2) - D28-104 (E1) | B - BR | Power source of ECM | Power switch on (IG) | 11 to 14 V |
| A57-3 (+BM) - D28-104 (E1) | GR - BR | Power source of throttle actuator | Always | 11 to 14 V |
| D28-108 (IGT1) - D28-104 (E1) | GR - BR | Ignition coil assembly (ignition signal) | Idling | Pulse generation (see waveform 1) |
| D28-107 (IGT2) - D28-104 (E1) | W - BR | | | |
| D28-106 (IGT3) - D28-104 (E1) | G - BR | | | |
| D28-105 (IGT4) - D28-104 (E1) | Y - BR | | | |
| D28-23 (IGF) - D28-104 (E1) | L - BR | Ignition coil assembly (ignition confirmation signal) | Power switch on (IG) | 4.5 to 5.5 V |
| | | | Idling | Pulse generation |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | | (see waveform 1) |
| D28-74 (NE+) - D28-120 (NE-) | B - W | Crankshaft position sensor | Idling with warm engine | Pulse generation<br><br>(see waveform 2) |
| D28-76 (G2+) - D28-122 (G2-) | B - W | Camshaft position sensor | Idling with warm engine | Pulse generation<br><br>(see waveform 2) |
| D28-85 (#10) - D28-109 (E01) | Y - BR | Fuel injector assembly | Power switch on (IG) | 11 to 14 V |
| D28-84 (#20) - D28-109 (E01) | B - BR | | | |
| D28-83 (#30) - D28-109 (E01) | L - BR | | Idling | Pulse generation<br><br>(see waveform 3) |
| D28-82 (#40) - D28-109 (E01) | R - BR | | | |
| D28-18 (HA1A) - D28-46 (E04) | Y - W-B | Air fuel ratio sensor (sensor 1) heater | Power switch on (IG) | 11 to 14 V |
| | | | Idling with warm engine | Pulse generation<br><br>(see waveform 4) |
| D28-103 (A1A+) - D28-104 (E1) | Y - BR | Air fuel ratio sensor (sensor 1) | Idling | 3.3 V*1 |
| D28-126 (A1A-) - D28-104 (E1) | BR - BR | Air fuel ratio sensor (sensor 1) | Idling | 3.0 V*1 |
| D28-41 (HT1B) - D28-86 (E03) | BR - BR | Heated oxygen sensor (sensor 2) heater | Power switch on (IG) | 11 to 14 V |
| | | | Idling | Below 3.0 V |
| D28-125 (OX1B) - D28-102 (O1B-) | L - P | Heated oxygen sensor (sensor 2) | Engine speed maintained at 2500 rpm for 2 minutes after warming up engine | Pulse generation<br><br>(see waveform 5) |
| D28-87 (KNK1) - D28-110 (EKNK) | B - W | Knock control sensor | Engine speed maintained at 4000 rpm after warming up engine | Pulse generation<br><br>(see waveform 6) |
| D28-64 (THW) - | P - BR | Engine coolant temperature | Idling, Engine coolant | 0.2 to 1.0 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| D28-65 (ETHW) | | sensor | temperature 80°C (176°F) | |
| D28-116 (THA) - D28-93 (ETHA) | P - BR | Intake air temperature sensor (built into mass air flow meter sub-assembly) | Idling, Intake air temperature 20°C (68°F) | 0.5 to 3.4 V |
| D28-94 (VG) - D28-117 (E2G) | B - W | Mass air flow meter sub-assembly | Idling, shift lever in N, A/C switch OFF | 0.5 to 3.0 V |
| A57-36 (W) - D28-104 (E1) | LG - BR | MIL | Power switch on (IG) (MIL goes on) | Below 3.0 V |
| | | | Idling | 11 to 14 V |
| D28-90 (VTA1) - D28-111 (ETA) | Y - G | Throttle position sensor (for engine control) | Power switch on (IG),<br>Accelerator pedal released<br>(Throttle valve fully closed) | 0.5 to 1.1 V |
| D28-89 (VTA2) - D28-111 (ETA) | B - G | Throttle position sensor (for sensor malfunction detection) | Power switch on (IG),<br>Accelerator pedal released<br>(Throttle valve fully closed) | 2.1 to 3.1 V |
| D28-88 (VCTA) - D28-111 (ETA) | R - G | Power source of sensor (specific voltage) | Power switch on (IG) | 4.5 to 5.5 V |
| D28-21 (M+) - D28-19 (ME01) | L - BR | Throttle actuator | Idling with warm engine | Pulse generation<br>(see waveform 7) |
| D28-20 (M-) - D28-19 (ME01) | P - BR | Throttle actuator | Idling with warm engine | Pulse generation<br>(see waveform 8) |
| D28-28 (PRG) - D28-104 (E1) | V - BR | Purge VSV | Power switch on (IG) | 11 to 14 V |
| | | | Idling, under purge control | Pulse generation<br>(see waveform 9) |
| A57-8 (FC) - D28-104 (E1) | R - BR | Fuel pump control | Power switch on (IG) | 11 to 14 V |
| | | | Idling | Below 1.5 V |
| A57-7 (TC) - D28-104 (E1) | P - BR | Terminal TC of DLC3 | Power switch on (IG) | 11 to 14 V |
| D28-36 (OC1+) - D28-59 (OC1-) | Y - G | Camshaft timing oil control valve assembly | Idling | Pulse generation<br>(see |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | | waveform 10) |
| A57-13 (CANH) - D28-104 (E1) | P - BR | CAN communication line | Engine stopped and power switch on (IG) | Pulse generation (see waveform 11) |
| A57-5 (CANL) - D28-104 (E1) | V - BR | CAN communication line | Engine stopped and power switch on (IG) | Pulse generation (see waveform 12) |
| A57-12 (CANP) - D28-104 (E1) | B - BR | CAN communication line | Engine stopped and power switch on (IG) | Pulse generation (see waveform 11) |
| A57-4 (CANN) - D28-104 (E1) | W - BR | CAN communication line | Engine stopped and power switch on (IG) | Pulse generation (see waveform 12) |
| A57-28 (IGSW) - D28-104 (E1) | W - BR | Power switch | Power switch on (IG) | 11 to 14 V |
| A57-6 (MREL) - D28-104 (E1) | G - BR | EFI MAIN relay | Power switch on (IG) | 11 to 14 V |
| D28-99 (VCV1) - D28-104 (E1) | R - BR | Power source of camshaft position sensor | Power switch on (IG) | 4.5 to 5.5 V |
| A57-10 (WPO) - D28-104 (E1) | L - BR | Water pump assembly | Idling with warm engine | Pulse generation (see waveform 13) |
| A57-11 (WPI) - D28-104 (E1) | G - BR | Water pump assembly | Idling with warm engine | Pulse generation (see waveform 14) |
| D28-72 (VCPM) - D28-71 (EPIM) | L - Y | Manifold absolute pressure sensor | Power switch on (IG) | 4.5 to 5.5 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| D28-69 (PIM) - D28-71 (EPIM) | B - Y | Manifold absolute pressure sensor | Power switch on (IG) | 4.0 to 5.5 V |
| D28-45 (EGR1) - D28-104 (E1) | R - BR | EGR valve assembly | Idling with warm engine | Pulse generation (see waveform 15) |
| D28-44 (EGR2) - D28-104 (E1) | V - BR | EGR valve assembly | Idling with warm engine | Pulse generation (see waveform 15) |
| D28-43 (EGR3) - D28-104 (E1) | Y - BR | EGR valve assembly | Idling with warm engine | Pulse generation (see waveform 15) |
| D28-42 (EGR4) - D28-104 (E1) | LG - BR | EGR valve assembly | Idling with warm engine | Pulse generation (see waveform 15) |
| D28-48 (G2O) - D28-104 (E1) | Y - BR | Camshaft position signal | Idling | Pulse generation (see waveform 16) |
| A57-22 (FANH) - D28-104 (E1) | LG - BR | Cooling fan relay | Power switch on (IG) | 11 to 14 V |
| A57-21 (FANL) - D28-104 (E1) | L - BR | Cooling fan relay | Power switch on (IG) | 11 to 14 V |
| A57-46 (PWMS) - D28-104 (E1) | G - BR | Power mode switch | Power switch on (IG), Power mode switch off | 11 to 14 V |
| | | | Power switch on (IG), Power mode switch on | 0 to 1.5 V |
| D28-104 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| D28-109 (E01) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| D28-81 (E02) - | W-B - | Ground | Always | Below 1 Ω |

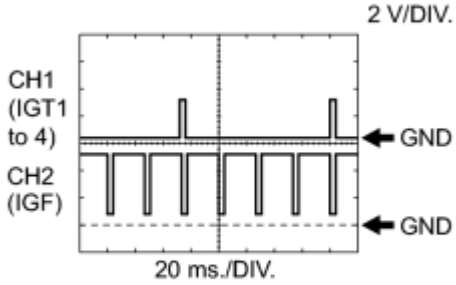
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Body ground | Body ground | | | |
| D28-86 (E03) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| D28-46 (E04) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| A57-32 (EC) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| D28-22 (GE01) - D28-104 (E1) | W-B - BR | Shield earth (ground) circuit of throttle actuator | Always | Below 1 V |
| A57-42 (VPMP) - D28-104 (E1) | B - BR | Vent valve (built into canister pump module) | Power switch on (IG) | 11 to 14 V |
| A57-34 (MPMP) - D28-104 (E1) | L - BR | Leak detection pump (built into canister pump module) | Leak detection pump OFF | Below 3 V |
| | | | Leak detection pump ON | 11 to 14 V |
| D28-113 (VCPP) - D28-112 (EPPM) | GR - LG | Power source for canister pressure sensor (specific voltage) | Power switch on (IG) | 4.5 to 5.5 V |
| D28-114 (PPMP) - D28-112 (EPPM) | W - LG | Canister pressure sensor (built into canister pump module) | Power switch on (IG) | 3 to 3.6 V |

HINT:

*1: The ECM terminal voltage is constant regardless of the output voltage from the sensor.

1. WAVEFORM 1

## Igniter IGT Signal (from ECM to Igniter) and Igniter IGF Signal (from Igniter to ECM)




| | |
|---|---|
| ECM Terminal Name | Between IGT (1 to 4) and E1<br><br>Between IGF and E1 |
| Tester Range | 2 V/DIV., 20 ms./DIV. |
| Condition | Idling |

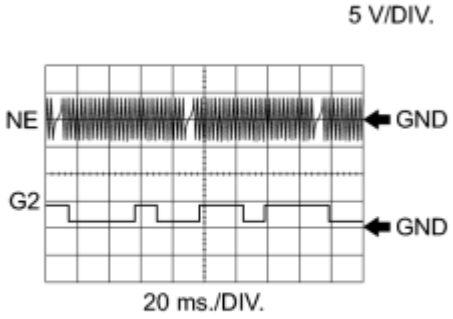
HINT:

The wavelength becomes shorter as the engine speed increases.

2. WAVEFORM 2

## Crankshaft Position Sensor and Camshaft

## Position Sensor Signal



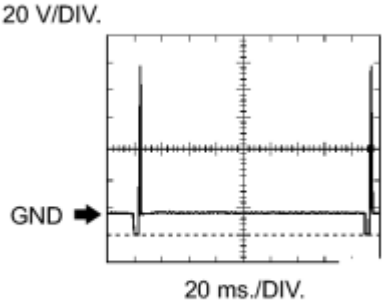

| | |
|---|---|
| ECM Terminal Name | Between NE+ and NE-<br><br>Between G2+ and G2- |
| Tester Range | 5 V/DIV., 20 ms./DIV. |
| Condition | Idling with warm engine |

HINT:

The wavelength becomes shorter as the engine speed increases.

3. WAVEFORM 3

## No. 1 (to No. 4) Fuel Injector Assembly Signal



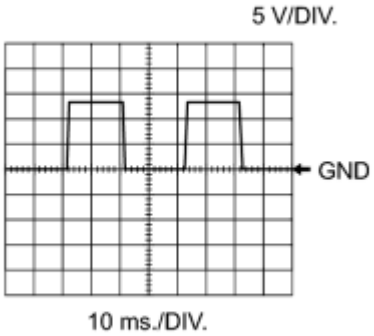

| | |
|---|---|
| ECM Terminal Name | Between #10 (to #40) and E01 |
| Tester Range | 20 V/DIV., 20 ms./DIV. |
| Condition | Idling |

HINT:

The wavelength becomes shorter as the engine speed increases.

4. WAVEFORM 4

## Air Fuel Ratio Sensor (Sensor 1) Heater Signal




| | |
|---|---|
| ECM Terminal Name | Between HA1A and E04 |
| Tester Range | 5 V/DIV., 10 ms./DIV. |
| Condition | Idling with warm engine |

HINT:

Y

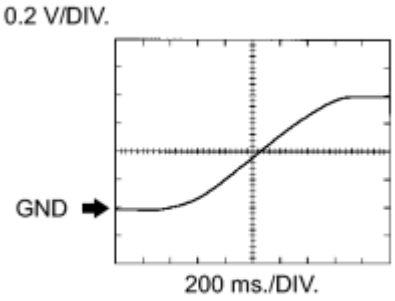
The wavelength varies in accordance with the engine operating condition.

5. WAVEFORM 5

## Heated Oxygen Sensor (Sensor 2) Signal

| | |
|---|---|
| ECM Terminal Name | Between OX1B and O1B- |
| Tester Range | 0.2 V/DIV. 200 ms./DIV. |
| Condition | Engine speed maintained at 2500 rpm for 2 minutes |

| | |
|---|---|
| | after warming up engine |

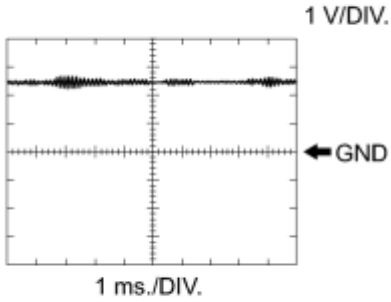



HINT:

In the Data List, the items O2S B1 S2 show the values input to the ECM from the heated oxygen sensor.

6. WAVEFORM 6

## Knock Control Sensor Signal



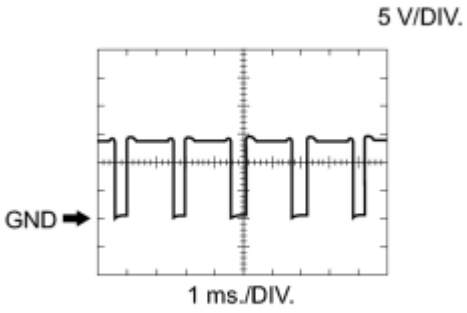

| | |
|---|---|
| ECM Terminal Name | Between KNK1 and EKNK |
| Tester Range | 1 V/DIV., 1 ms./DIV. |
| Condition | Engine speed maintained at 4000 rpm after engine warming engine |

- The wavelength becomes shorter as the engine speed increases.
- The waveforms and amplitudes displayed differ slightly depending on the vehicle condition.

T

7. WAVEFORM 7

## Throttle Actuator Positive Terminal Signal




| | |
|---|---|
| ECM Terminal Name | Between M+ and ME01 |
| Tester Range | 5 V/DIV., 1 ms./DIV. |
| Condition | Idling with warm engine |

HINT:

The duty ratio varies depending on the throttle actuator operation.

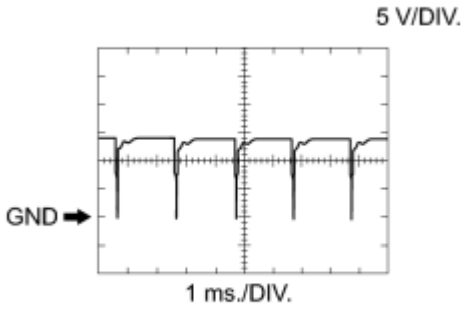
T

8. WAVEFORM 8

## Throttle Actuator Negative Terminal Signal

| | |
|---|---|
| ECM Terminal Name | Between M- and ME01 |
| Tester Range | 5 V/DIV., 1 ms./DIV. |

| | |
|---|---|
| Condition | Idling with warm engine |



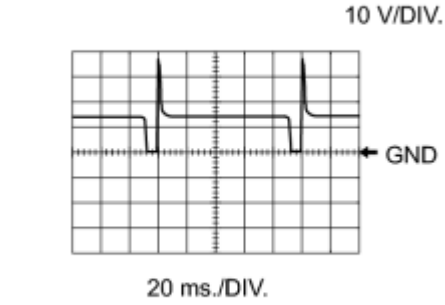

T

HINT:

The duty ratio varies depending on the throttle actuator operation.

9. WAVEFORM 9

# Purge VSV



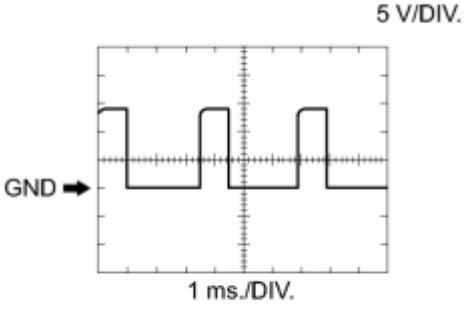

Y

| | |
|---|---|
| ECM Terminal Name | Between PRG and E1 |
| Tester Range | 10 V/DIV., 20 ms./DIV. |
| Condition | Idling, under purge control |

HINT:

If the waveform is not similar to the illustration, check the waveform again after idling for 10 minutes or more.

10. WAVEFORM 10




T

# Camshaft Timing Oil Control Valve Assembly Signal

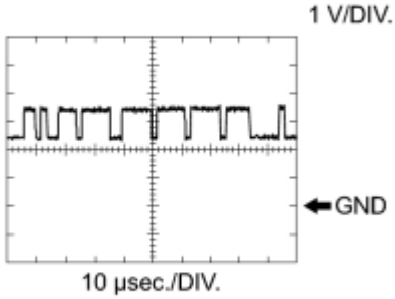
| | |
|---|---|
| ECM Terminal Name | Between OC1+ and OC1- |
| Tester Range | 5 V/DIV., 1 ms./DIV. |
| Condition | Idling |

11. WAVEFORM 11

# CAN Communication Signal (Reference)

| | |
|---|---|
| ECM Terminal Name | Between CANH and E1, CANP and E1 |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Engine stopped and power switch on (IG) |

HINT:

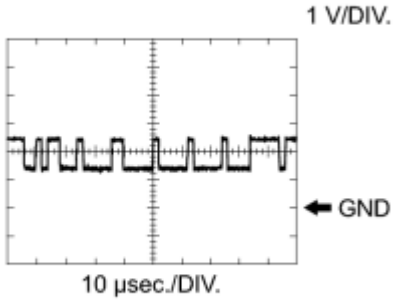



The waveform varies depending on the CAN communication signal.

T

12. WAVEFORM 12

## CAN Communication Signal (Reference)




| | |
|---|---|
| ECM Terminal Name | Between CANL and E1, CANN and E1 |
| Tester Range | 1 V/DIV., 10 µsec./DIV. |
| Condition | Engine stopped and power switch on (IG) |

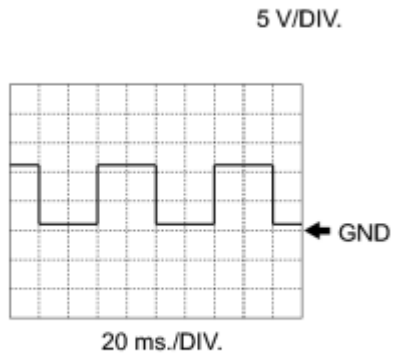
HINT:

The waveform varies depending on the CAN communication signal.

T

13. WAVEFORM 13

## Water Pump Assembly Signal (from ECM to Water Pump Assembly)




| | |
|---|---|
| ECM Terminal Name | Between WPO and E1 |
| Tester Range | 5 V/DIV., 20 ms./DIV. |
| Condition | Idling with warm engine |

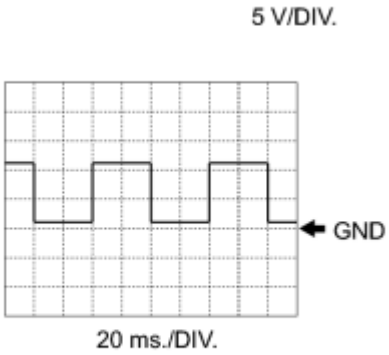
HINT:

The wavelength becomes shorter as the water pump speed increases.

14. WAVEFORM 14

## Water Pump Assembly Signal (from Water Pump Assembly to ECM)

| | |
|---|---|
| ECM Terminal Name | Between WPI and E1 |
| Tester Range | 5 V/DIV., 20 ms./DIV. |

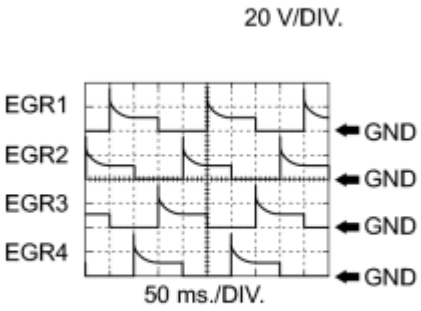



| | |
|---|---|
| Condition | Idling with warm engine |

HINT:

The wavelength becomes shorter as the water pump speed increases.

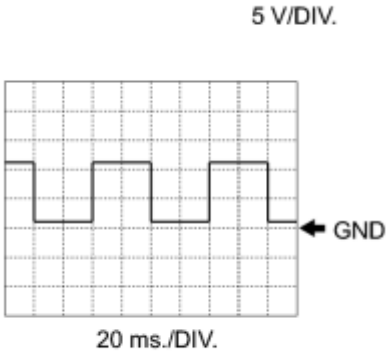
15. WAVEFORM 15




## EGR Valve Assembly Signal

| | |
|---|---|
| ECM Terminal Name | Between EGR1 and E1, EGR2 and E1, EGR3 and E1, EGR4 and E1 |
| Tester Range | 20 V/DIV., 50 ms./DIV. |
| Condition | Idling with warm engine |

16. WAVEFORM 16




## Camshaft Revolution Signal from ECM to Power Management Control ECU and Inverter with Converter Assembly (MG ECU)

| | |
|---|---|
| ECM Terminal Name | Between G2O and E1 |
| Tester Range | 5 V/DIV., 20 ms./DIV. |
| Condition | Idling |

HINT:

The wavelength becomes shorter as the engine speed increases.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

- When troubleshooting OBD II (On-Board Diagnostics) vehicles, an OBD II scan tool (complying with SAE J1987) must be connected to the DLC3 (Data Link Connector 3) of the vehicle. Various data in the vehicle ECM (Engine Control Module) can be then read.
- OBD II regulations require that the vehicle on-board computer illuminates the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction in:




a. The emission control system and components.
b. The powertrain control components (which affect vehicle emissions).
c. The computer itself.

- In addition, the applicable DTCs prescribed by SAE J2012 are recorded in the ECM memory. If the malfunction does not recur in 3 consecutive trips, the MIL turns off automatically but the DTCs remain recorded in the ECM memory.
- To check the DTCs, connect the Techstream to the DLC3. The Techstream displays DTCs, freeze frame data, and a variety of the engine data. The DTCs and freeze frame data can be cleared with the Techstream. In order to enhance OBD function on vehicles and develop the Off-Board diagnosis system, Controller Area Network (CAN) communication is used in this system. CAN is a network which uses a pair of data transmission lines spanning multiple computers and sensors. It allows for high speed communications between the systems and simplification of the wire harness connections.

2. NORMAL MODE AND CHECK MODE

The diagnosis system operates in normal mode during normal vehicle use. In normal mode, 2 trip detection logic is used to ensure accurate detection of malfunctions. Check mode is also available as an option for technicians. In check mode, 1 trip detection logic is used for simulating malfunction symptoms and increasing the system's ability to detect malfunctions, including intermittent problems (the Techstream only).

3. 2 TRIP DETECTION LOGIC

- When a malfunction is first detected, the malfunction is temporarily stored in the ECM memory (1st trip). If the same malfunction is detected during the subsequent drive cycle, the MIL is illuminated (2nd trip).

4. DLC3 (Data Link Connector 3)

(a) Check DLC3 INFO.

5. FREEZE FRAME DATA

- The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

6. BATTERY VOLTAGE

Standard voltage:

11 to 14 V

- If voltage is below 11 V, replace or recharge the battery.

7. MIL (Malfunction Indicator Lamp)

(a) The MIL illuminates when the power switch is first turned on (IG) (the engine is not running).

(b) The MIL should turn off when the engine is started. If the MIL remains illuminated, the diagnosis system has detected a malfunction or abnormality in the system.

HINT:

If the MIL does not illuminate when the power switch is first turned on (IG), check the MIL circuit INFO.

8. ALL READINESS

HINT:

- With "ALL READINESS", you can check whether or not the DTC judgment has been completed by using the Techstream.
- You should check "ALL READINESS" after simulating malfunction symptoms or for validation after finishing repairs.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Perform the DTC judgment driving pattern to run the DTC judgment.

(h) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(i) Input the DTCs to be confirmed.

(j) Check the DTC judgment result.

**Techstream**

| Techstream Display | Description |
|---|---|
| NORMAL | • DTC judgment completed<br>• System normal |
| ABNORMAL | • DTC judgment completed<br>• System abnormal |
| INCOMPLETE | • DTC judgment not completed<br>• Perform the driving pattern after confirming the DTC enabling conditions |
| UNKNOWN | • Unable to perform DTC judgment<br>• Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

# DTC CHECK / CLEAR

NOTICE:

When the diagnosis system is changed from normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode are cleared. Before changing modes, always check and make a note of DTCs and freeze frame data.

HINT:

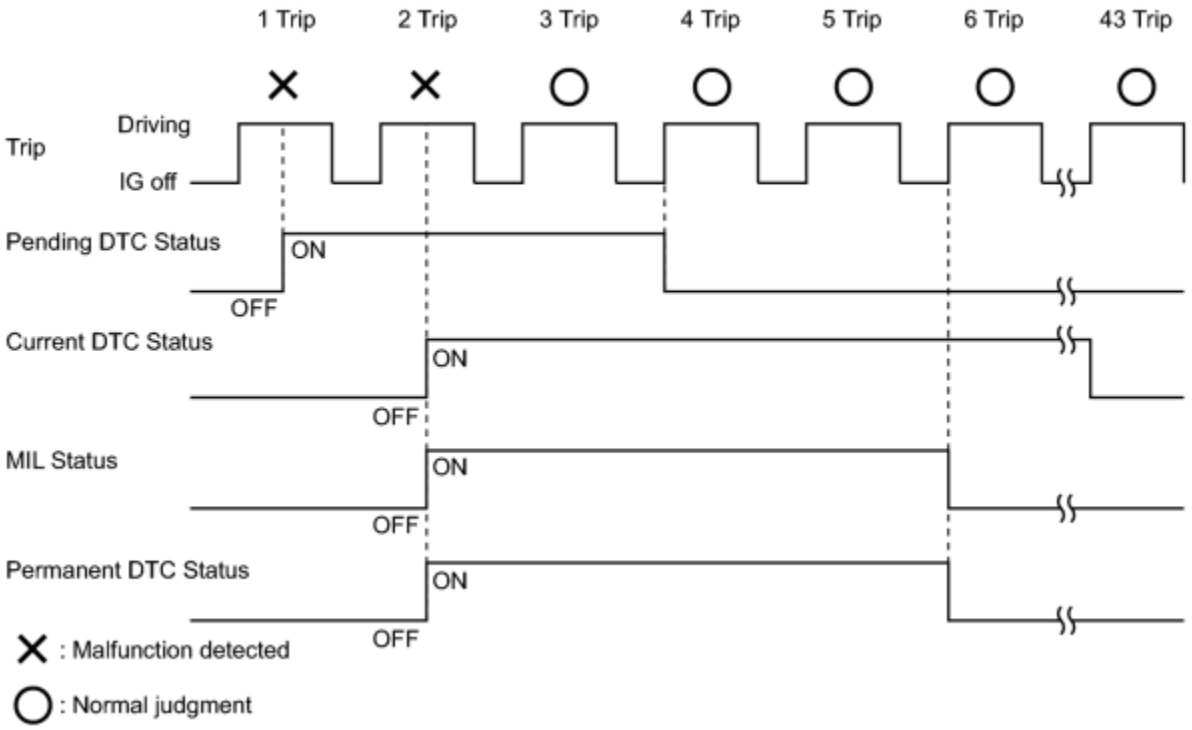
- DTCs which are stored in the ECM can be displayed on the Techstream. The Techstream can display the current, pending and permanent DTCs.
- If a malfunction is detected during the current driving cycle, current and permanent DTCs are stored.
- Some DTCs are not stored if the ECM does not detect the same malfunction again during a second consecutive driving cycle. However, such malfunctions, detected on only one occasion, are stored as pending DTCs.
- Current and pending DTCs can be cleared by using the Techstream or by disconnecting the cable from the negative battery terminal. However, permanent DTCs cannot be cleared using either of these two methods.
- After clearing current DTCs using the Techstream (or by disconnecting the cable from the negative battery terminal), permanent DTCs can be cleared when the system is determined to be normal for the relevant DTCs and then the universal trip is performed. The driving pattern to obtain a normal judgment is described under the "Confirmation Driving Pattern" for the respective DTC.

**2 Trip Detection Examples**

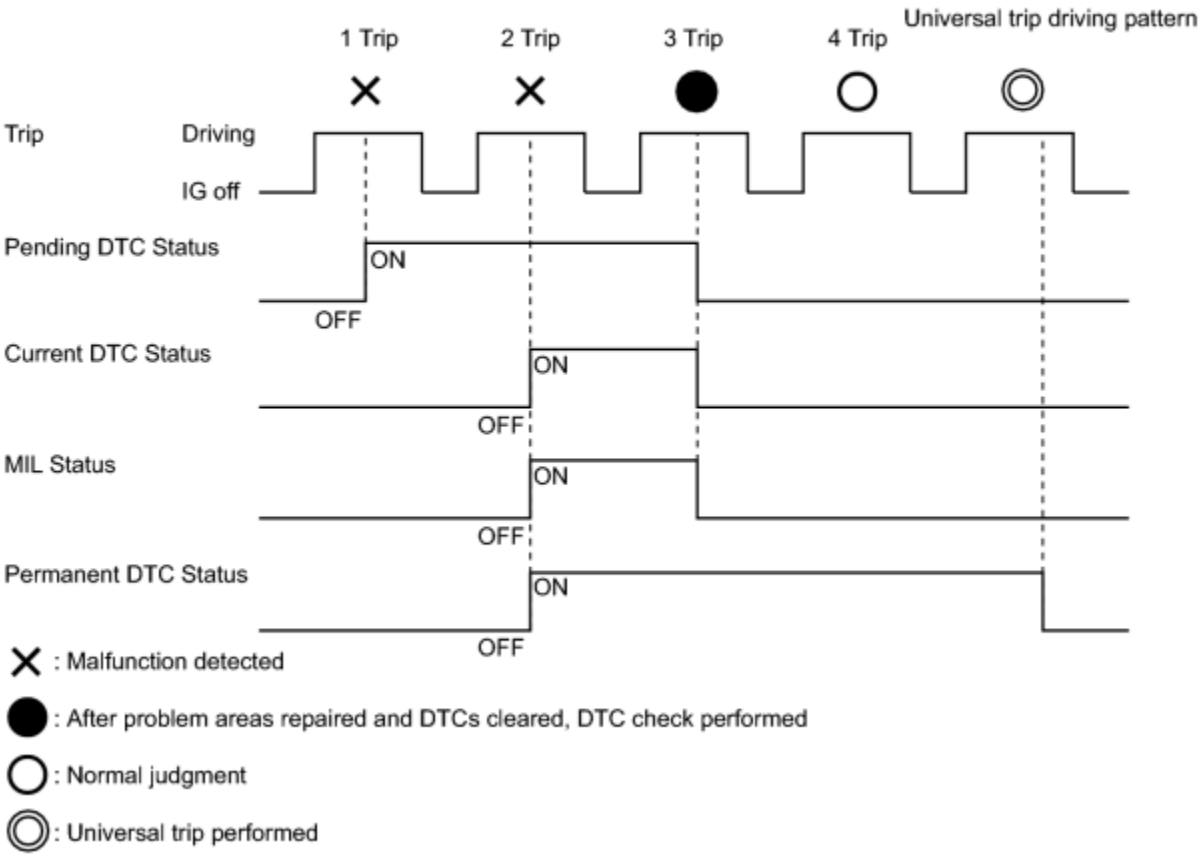
| | | |
|---|---|---|
| Pending DTC | Store condition | Malfunction detected |
| | Clear condition | System determined to be normal<br>or<br>DTCs cleared using Techstream<br>or<br>Cable disconnected from negative (-) battery terminal |
| Current DTC | Store condition | Malfunction detected (2nd trip) |
| | Clear condition | No malfunctions in 40 driving cycles<br>or<br>DTCs cleared using Techstream<br>or<br>Cable disconnected from negative (-) battery terminal |
| Permanent | Store | Malfunction detected (2nd trip) |

| | | |
|---|---|---|
| DTC | condition | |
| | Clear condition | Power switch turned to on (IG) after normal judgment obtained in 3 consecutive driving cycles<br><br>or<br><br>After DTCs cleared using Techstream or cable disconnected from negative (-) battery terminal, normal judgment obtained and universal trip performed (not for misfire and fuel system DTCs)<br><br>or<br><br>After DTCs cleared using Techstream or cable disconnected from negative (-) battery terminal, malfunction not detected when universal trip driving performed (misfire and fuel system DTCs) |
| MIL | ON | Malfunction detected (2nd trip) |
| | OFF | Power switch turned to on (IG) after normal judgment obtained in 3 consecutive driving cycles<br><br>or<br><br>DTCs cleared using Techstream<br><br>or<br><br>Cable disconnected from negative (-) battery terminal |

2 Trip Detection Examples



2 Trip Detection Examples (Instance when DTCs were cleared midway through by using the Techstream or by disconnecting the cable from the negative battery terminal)




HINT:

- Obtaining a normal judgment and performing a universal trip driving pattern can be done in the same driving cycle or in different driving cycles.
- It is unnecessary to obtain a normal judgment if the DTCs are misfire or fuel system DTCs.

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Check the DTC(s) and freeze frame data, and then write them down.

(f) Check the details of the DTC(s) INFO.

2. CLEAR DTC (Pending and Current DTC)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Clear the DTCs.

3. CLEAR DTC (Pending and Current DTC without using Techstream)

(a) Perform either of the following operations:

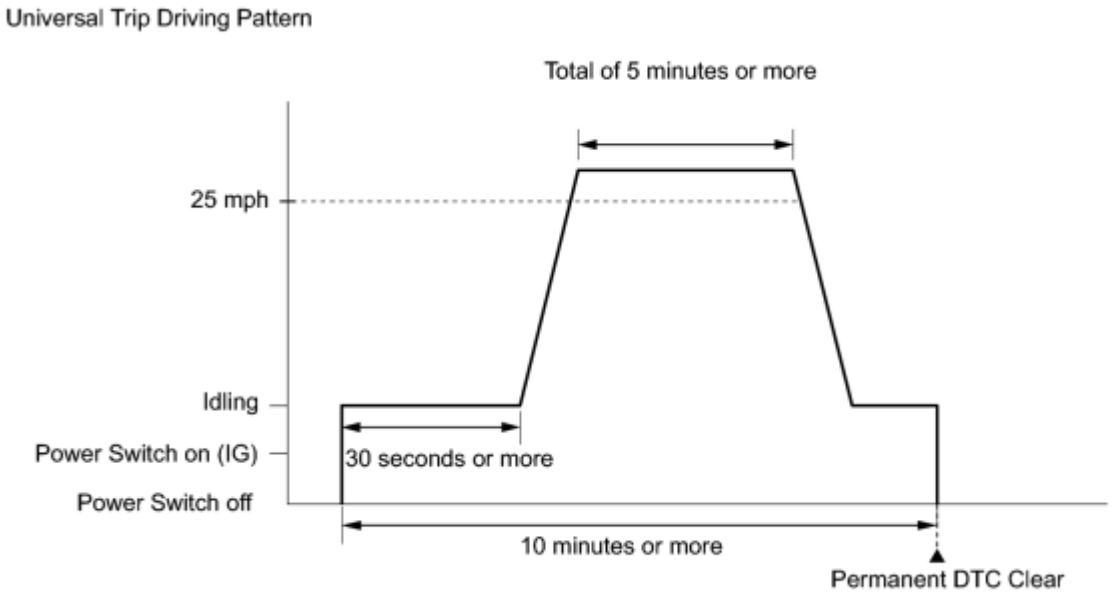
(1) Disconnect the cable from the negative (-) battery terminal for more than 1 minute.

(2) Remove the EFI MAIN and ETCS fuses from the engine room relay block located inside the engine compartment for more than 1 minute.

4. CLEAR PERMANENT DTC

HINT:

Even if the following procedure is not performed, permanent DTCs are cleared by obtaining a normal judgment during 3 consecutive driving cycles.




(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Check if permanent DTCs are stored.

HINT:

If permanent DTCs are not output, it is not necessary to continue this procedure.

(f) Clear DTCs.

(g) Perform the respective confirmation driving patterns in order to obtain a normal judgment for the output DTCs.

HINT:

- Confirmation driving patterns do not need to be performed for misfire and fuel system DTCs.
- For the confirmation driving pattern, refer to the procedures for the relevant DTC INFO.

(h) Perform the universal trip.

HINT:

The driving pattern to obtain a normal judgment and the universal trip driving can be performed consecutively in the same driving cycle.

1. Put the engine in inspection mode INFO.
2. Idle the engine for 30 seconds or more.
3. Drive the vehicle at 25 mph (40 km/h) or more for a total of 5 minutes or more.

   HINT:

   It is possible to complete the drive pattern even if the vehicle decelerates to less than 25 mph (40 km/h) during the driving cycle provided that the vehicle is driven at 25 mph (40 km/h) or more for a total of 5 minutes.

4. Allow 10 minutes or more to elapse from the time the engine is started.

(i) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(j) Check that the permanent DTCs have been cleared.

HINT:

The permanent DTCs are cleared when the universal trip is completed.

# FREEZE FRAME DATA

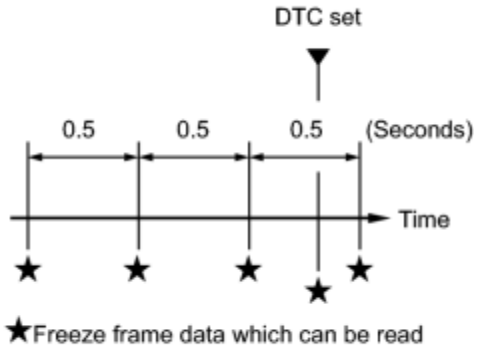
1. DESCRIPTION

- The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was moving or stationary, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

HINT:

If it is impossible to replicate the problem even though a DTC is detected, confirm the freeze frame data.

- The ECM records engine conditions in the form of freeze frame data every 0.5 seconds. Using the Techstream, five separate sets of freeze frame data, including the data values at the time when the DTC was set, can be checked.




- 3 data sets before the DTC was set.
- 1 data set when the DTC was set.
- 1 data set after the DTC was set.

2. LIST OF FREEZE FRAME DATA

| Tester Display | Measurement Item | Diagnostic Note |
|---|---|---|
| Vehicle Speed | Vehicle speed | Speed indicated on speedometer |
| Engine Speed | Engine speed | - |
| Calculate Load | Calculated load by ECM | - |
| Vehicle Load | Vehicle load | Load percentage in terms of maximum intake air flow amount |
| MAF | Air flow rate from mass air flow meter sub-assembly | If value approximately 0.0 gm/sec:<br>• Mass air flow meter sub-assembly power source circuit open<br>• VG circuit open or short |

| Tester Display | Measurement Item | Diagnostic Note |
|---|---|---|
| | | If value 271.0 gm/sec or more:<br>• E2G circuit open |
| Atmosphere Pressure | Atmosphere pressure | - |
| MAP | Intake manifold pressure | - |
| Coolant Temp | Engine coolant temperature | • If value -40°C (-40°F): sensor circuit open<br>• If value 140°C (284°F): sensor circuit shorted |
| Intake Air | Intake air temperature | • If value -40°C (-40°F): sensor circuit open<br>• If value 140°C (284°F): sensor circuit shorted |
| Engine Run Time | Engine run time | - |
| Initial Engine Coolant Temp | Initial engine coolant temperature | Service data |
| Initial Intake Air Temp | Initial intake air temperature | Service data |
| Battery Voltage | Battery voltage | - |
| Throttle Sensor Volt % | Throttle sensor positioning | Recognition value for throttle opening angle on ECM |
| Throttl Sensor #2 Volt % | Absolute throttle sensor positioning #2 | Recognition value for throttle opening angle on ECM |
| Throttle Sensor Position | Throttle sensor positioning | Recognition value for throttle opening angle on ECM |
| Throttle Motor DUTY | Throttle actuator | - |
| Injector (Port) | Injection direction for cylinder 1 | - |
| Injection Volum (Cylinder1) | Injection volume (Cylinder 1) | Quantity of fuel injection volume for 10 times |
| Fuel Pump/Speed Status | Fuel pump/status | Active Test support data |
| Vacuum Pump | Key-off EVAP system leak detection pump status | Active Test support data |
| EVAP (Purge) VSV | Purge VSV control duty ratio | Order signal from ECM |
| Evap Purge Flow | Ratio of evaporative purge flow to intake air volume | Service data |
| Purge Density Learn Value | Learning value of purge density | Service data |

| Tester Display | Measurement Item | Diagnostic Note |
|---|---|---|
| EVAP System Vent Valve | Key-off EVAP system vent valve status | Active Test support data |
| EVAP Purge VSV | Purge VSV status for EVAP control | Active Test support data |
| Purge Cut VSV Duty | Purge cut vacuum switching valve duty ratio | - |
| Target Air-Fuel Ratio | Ratio compared to stoichiometric level | - |
| AF Lambda B1S1 | Short-term fuel trim associated with bank 1 sensor 1 | - |
| AFS Voltage B1S1 | Air fuel ratio sensor output voltage for bank 1 sensor 1 | Performing Control the Injection Volume or Control the Injection Volume for A/F Sensor function of Active Test enables technician to check output voltage of sensors |
| AFS Current B1S1 | Air fuel ratio sensor output current for bank 1 sensor 1 | Value becomes higher when fuel-cut executed under high engine speed |
| A/F Heater Duty #1 | Air fuel ratio sensor heater duty ratio | - |
| O2S B1S2 | Heated oxygen sensor output voltage for bank 1 sensor 2 | Performing Control the Injection Volume or Control the Injection Volume for A/F Sensor function of Active Test enables technician to check output voltage of sensors |
| O2S Impedance B1S2 | Heated oxygen sensor impedance (bank 1 sensor 2) | - |
| O2 Heater B1S2 | Heated oxygen sensor operation | - |
| O2 Heater Curr Val B1S2 | Heated oxygen sensor current | - |
| Short FT #1 | Short-term fuel trim of bank 1 | Short-term fuel compensation used to maintain air fuel ratio at stoichiometric air fuel ratio |
| Long FT #1 | Long-term fuel trim of bank 1 | Overall fuel compensation carried out in long-term to compensate continual deviation of short-term fuel trim from central value |
| Total FT #1 | Total fuel trim | - |
| Fuel System Status #1 | Fuel system status (bank 1) | • OL (Open Loop): Has not yet satisfied conditions to go closed loop<br>• CL (Closed Loop): Using air fuel ratio sensor as feedback for fuel control<br>• OLDrive: Open loop due to driving conditions (fuel enrichment)<br>• OLFault: Open loop due to detected system fault<br>• CLFault: Closed loop but air fuel ratio sensor, which |

| Tester Display | Measurement Item | Diagnostic Note |
|---|---|---|
| | | is used for fuel control, malfunctioning |
| Fuel System Status #2 | Fuel system status (bank 2) (Unused) | • OL (Open Loop): Has not yet satisfied conditions to go closed loop<br>• CL (Closed Loop): Using air fuel ratio sensor as feedback for fuel control<br>• OLDrive: Open loop due to driving conditions (fuel enrichment)<br>• OLFault: Open loop due to detected system fault<br>• CLFault: Closed loop but air fuel ratio sensor, witch is used for fuel control, malfunctioning |
| IGN Advance | Ignition timing advance for cylinder 1 | - |
| Knock Feedback Value | Feedback value of knocking | Service data |
| Knock Correct Learn Value | Correction learning value of knocking | Service data |
| Target EGR Position | Target EGR position | - |
| EGR Step Position | EGR step position | - |
| VVT Control Status #1 | VVT control (bank 1) status | Active Test support data |
| Catalyst Temp B1S1 | Catalyst temperature (associated sensor 1) | - |
| Catalyst Temp B1S2 | Catalyst temperature (associated sensor 2) | - |
| Closed Throttle Position SW | Closed throttle position switch | - |
| Fuel Cut Condition | Fuel cut condition ON or OFF | - |
| TC Terminal | TC terminal status | - |
| Time after DTC Cleared | Time since DTCs cleared | - |
| Distance from DTC Cleared | Distance traveled since DTCs cleared | - |
| Warmup Cycle Cleard DTC | Warm-up cycles since DTCs cleared | Number of warm-up cycles since DTCs cleared |
| Dist Batt Cable Disconnect | Accumulated distance from battery cable disconnected | - |

| Tester Display | Measurement Item | Diagnostic Note |
|---|---|---|
| IG OFF Elapsed Time | Cumulative time after power switch off | - |
| TC and TE1 | TC and CG (TE1) terminals of DLC3 | Active Test support data |
| Ignition Trig. Count | Ignition counter to calculated misfire count | - |
| Cylinder #1 Misfire Count | Misfire count for cylinder 1 | - |
| Cylinder #2 Misfire Count | Misfire count for cylinder 2 | - |
| Cylinder #3 Misfire Count | Misfire count for cylinder 3 | - |
| Cylinder #4 Misfire Count | Misfire count for cylinder 4 | - |
| All Cylinders Misfire Count | All cylinders misfire count | - |
| Misfire RPM | Average engine speed when misfire occurs | - |
| Misfire Load | Average engine load when misfire occurred | - |
| Electric Fan Motor | Electric cooling fan motor | Active Test support data |
| Idle Fuel Cut Prohibit | Prohibition of fuel cut at idle | - |
| Idle Fuel Cut | Fuel cut idle | ON: When throttle valve fully closed and engine speed over 2800 rpm |
| FC TAU | FC TAU | Fuel cut being performed under very light load to prevent engine combustion from becoming incomplete |
| Communication with HV | Status of the communication with power management control ECU | - |
| Communication with Brake | Status of the communication with skid control ECU | - |
| Comm with Air Conditioner | Status of the communication with air conditioning amplifier assembly | - |
| Requested Engine Torque | Requested engine torque | Flag information for hybrid vehicle |
| HV Target Engine Speed | HV target engine speed | Flag information for hybrid vehicle |
| Actual Engine Torque | Actual engine torque | Flag information for hybrid vehicle |
| Engine Run Time | Engine run time | Flag information for hybrid vehicle |
| Request Engine | Request engine run time | Flag information for hybrid vehicle |

| Tester Display | Measurement Item | Diagnostic Note |
|---|---|---|
| Run Time | | |
| Judge Time Engine Ignition | Judgment time for engine ignition | Flag information for hybrid vehicle |
| Judge Time Engine Output | Judgment time for time until engine output | Flag information for hybrid vehicle |
| ISC Learning | Idle speed control learning | Flag information for hybrid vehicle |
| F/C for Engine Stop Req | Fuel cut for engine stop request | Flag information for hybrid vehicle |
| Engine Independent | Engine independent operation | Flag information for hybrid vehicle |
| Racing Operation | Racing operation | Flag information for hybrid vehicle |
| Request Warm-up | Request engine warm up | Flag information for hybrid vehicle |
| Engine Independent Control | Engine independent control operation | Flag information for hybrid vehicle |
| Elec Water Pump Target Spd | Electronic water pump target speed | - |
| Elec Water Pump Spd | Electronic water pump speed | - |
| ISC Learning Value | Idle speed control leaning value | Flag information for hybrid vehicle |

# CHECK MODE PROCEDURE

Compared to normal mode, check mode is more sensitive to malfunctions. Therefore, check mode can detect malfunctions that cannot be detected in normal mode.

NOTICE:

All the stored DTCs and freeze frame data are cleared if: 1) the ECM is changed from normal mode to check mode or vice versa; or 2) the power switch is turned from on (IG) to on (ACC) or off while in check mode. Before changing modes, always check and note any DTCs and freeze frame data.

1. CHECK MODE PROCEDURE

(a) Check and ensure the following conditions:

(1) Battery voltage 11 V or more.

(2) Throttle valve fully closed.

(3) Push the P position switch.

(4) A/C switch off.

(b) Turn the power switch off.

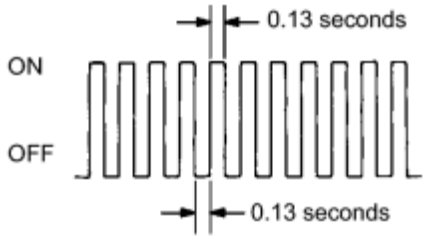
(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Powertrain / Engine and ECT / Utility / Check Mode.

(g) Switch the ECM from normal mode to check mode.




(h) Make sure that the MIL flashes as shown in the illustration.

(i) Turn the power switch on (READY).

(j) Make sure that the MIL turns off.

(k) Simulate that the conditions of the malfunction described by the customer.

(l) Check DTCs and freeze frame data using the Techstream.

# FAIL-SAFE CHART

If any of the following DTCs are set, the ECM enters fail-safe mode to allow the vehicle to be driven temporarily or stops fuel injection.

| DTC | Component | Fail-safe Operation | Fail-safe Deactivation Condition |
|---|---|---|---|
| P0031<br>P0032<br>P101D | Air fuel ratio sensor heater | ECM turns off air fuel ratio sensor heater | Power switch off |
| P0037<br>P0038<br>P102D | Heated oxygen sensor heater | ECM turns off heated oxygen sensor heater | Power switch off |
| P0102<br>P0103 | Mass air flow meter sub-assembly | ECM calculates ignition timing according to engine speed and throttle valve position | Pass condition detected |
| P0106<br>P0107<br>P0108 | Manifold absolute pressure sensor | ECM turns off EGR valve operate | Pass condition detected |
| P0112<br>P0113 | Intake air temperature sensor | ECM estimates intake air temperature to be 20°C (68°F) | Pass condition detected |
| P0115<br>P0117<br>P0118 | Engine coolant temperature sensor | ECM estimates engine coolant temperature to be 80°C (176°F) | Pass condition detected |
| P0120<br>P0121<br>P0122<br>P0123<br>P0220<br>P0222<br>P0223 | Electronic throttle control system | ECM cuts off throttle actuator current and throttle valve returns to the 5.5° throttle position by return spring<br>The ECM stops the engine and the vehicle can be driven using solely the hybrid system<br>*1 | Pass condition detected and then power switch turned off |

| DTC | Component | Fail-safe Operation | Fail-safe Deactivation Condition |
|---|---|---|---|
| P0604<br>P0606<br>P0607<br>P060A<br>P060B<br>P060E<br>P0657<br>P2102<br>P2103<br>P2111<br>P2112<br>P2118<br>P2119<br>P2135 | | | |
| P0327<br>P0328 | Knock control sensor | ECM sets ignition timing to maximum retard | Power switch off |
| P0351 to P0354 | Ignition coil assembly<br>(Igniter) | ECM cuts fuel | Pass condition detected |
| P0401 | EGR valve assembly | ECM assumes that EGR valve is closed, so that ignition timing controlled to a safe value | Pass condition detected |
| P0403 | EGR valve assembly | ECM assumes that EGR valve is closed, so that ignition timing controlled to a safe value | Pass condition detected |
| P216B | Water pump assembly | Output duty ratio of the WPO terminal repeats a cycle of 0% for 30 seconds and then 85% for 5 seconds*2 | Power switch off |
| P261C | Water pump assembly | Output duty ratio of the WPO terminal remains at 0%*2 | Power switch off |
| P261D | Water pump assembly | Output duty ratio of the WPO terminal remains at 0%*2 | Power switch off |

HINT:

- *1: The vehicle can be driven slowly when the accelerator pedal is depressed firmly and slowly.
- *2: When the coolant temperature reaches 105°C (221°F), the engine is stopped and the hybrid system is solely used to driving vehicle.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under Normal Condition are reference only. Do not depend solely on these values when determining whether or not a part is faulty.

(a) Warm up the engine.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Powertrain / Engine and ECT / Data List.

(g) According to the display on the Techstream, read the Data List.

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle Speed | Vehicle speed:<br><br>Min.: 0 mph (0 km/h),<br><br>Max.: 159 mph (255 km/h) | Actual vehicle speed | Speed indicated on speedometer |
| Engine Speed | Engine speed:<br><br>Min.: 0 rpm, Max.: 16383 rpm | 950 to 1050 rpm: Idling | - |
| Calculate Load | Calculated load by ECM:<br><br>Min.: 0%, Max.: 100% | • 20 to 40%: Idling<br><br>• 15 to 35%: Running without load (2500 rpm) | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle Load | Vehicle load:<br><br>Min.: 0%, Max.: 25700% | Actual vehicle load | Load percentage in terms of maximum intake air flow amount |
| MAF | Air flow rate from mass air flow meter sub-assembly:<br><br>Min.: 0 gm/sec, Max.: 655.35 gm/sec | 1 to 3 gm/sec: Idling<br><br>4.5 to 8.5 gm/sec: Running without load (2500 rpm) | If value approximately 0.0 gm/sec:<br>• Mass air flow meter sub-assembly power source circuit open<br>• VG circuit open or short<br>If value 271.0 gm/sec or more:<br>• E2G circuit open |
| Atmosphere Pressure | Atmospheric pressure:<br><br>Min.: 0 kPa (0 mmHg), Max.: 255 kPa (1913 mmHg) | Equivalent to atmospheric pressure | - |
| MAP | Intake manifold pressure:<br><br>Min.: 0 kPa (0 mmHg), ( Max.: 255 kPa (1913 mmHg) | • 80 to 110 kPa (600 to 826 mmHg): Power switch on (IG)<br>• 20 to 40 kPa (150 to 300 mmHg): Idling | - |
| Coolant Temp | Engine coolant temperature:<br><br>Min.: -40°C (-40°F),<br><br>Max.: 215°C (419°F) | 80 to 100°C (176 to 212°F):<br><br>After warming up | • If value -40°C (-40°F): sensor circuit open<br>• If value 140°C (284°F) or more: sensor circuit shorted |
| Intake Air | Intake air temperature:<br><br>Min.: -40°C (-40°F),<br><br>Max.: 140°C (284°F) | Equivalent to ambient air temperature | • If value -40°C (-40°F): sensor circuit open<br>• If value 140°C (284°F): sensor circuit shorted |
| Engine Run Time | Engine run time:<br><br>Min.: 0 s (second),<br><br>Max.: 65535 s (seconds) | Time since engine started | - |
| Initial Engine | Initial engine coolant | Coolant temperature when | Service data |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Coolant Temp | temperature:<br><br>Min.: -40°C (-40°F),<br><br>Max.: 119.3°C (246.8°F) | engine started | |
| Initial Intake Air Temp | Initial intake air temperature:<br><br>Min.: -40°C (-40°F),<br><br>Max.: 119.3°C (246.8°F) | Intake air temperature when engine started | Service data |
| Battery Voltage | Battery voltage:<br><br>Min.: 0 V, Max.: 65.535 V | 11 to 16 V: Idling | - |
| Throttle Sensor Volt % | Throttle valve opening percentage according to throttle position sensor:<br><br>Min.: 0%, Max.: 100% | 10 to 22%: Accelerator pedal released | Value calculated based on the voltage at terminal VTA1 |
| Throttl Sensor #2 Volt % | Throttle valve opening percentage according to throttle position sensor No. 2:<br><br>Min.: 0%, Max.: 100% | 42 to 62%: Accelerator pedal released | Value calculated based on the voltage at terminal VTA2 |
| System Guard | System guard:<br><br>ON or OFF | - | Electronic throttle control system service data |
| Throttle Idle Position | Whether or not throttle position sensor detecting idling:<br><br>ON or OFF | • ON: Accelerator pedal released<br>• OFF: Accelerator pedal fully depressed | - |
| Throttle Require Position | Required throttle position:<br><br>Min.: 0 V, Max.: 5 V | 0.5 to 1.1 V: Idling | - |
| Throttle Sensor Position*1 | Throttle position sensor: | 0%: Accelerator pedal released | Recognition value for throttle opening angle on ECM |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: 0%, Max.: 100% | | |
| Throttle Position No. 1 | Throttle position sensor No. 1 output voltage:<br><br>Min.: 0 V, Max.: 4.98 V | - | Electronic throttle control system service data |
| Throttle Position No. 2 | Throttle position sensor No. 2 output voltage:<br><br>Min.: 0 V, Max.: 4.98 V | - | Electronic throttle control system service data |
| Throttle Position No. 1 | Throttle position sensor No. 1:<br><br>Min.: 0 V, Max.: 5 V | • 0.5 to 1.1 V: Accelerator pedal released<br><br>• 0.6 to 1.4 V: Fail-safe operating | - |
| Throttle Position No. 2 | Throttle position sensor No. 2:<br><br>Min.: 0 V, Max.: 5 V | • 2.1 to 3.1 V: Accelerator pedal released<br><br>• 2.1 to 3.1 V: Fail-safe operating | - |
| Throttle Position Command | Throttle position command value:<br><br>Min.: 0 V, Max.: 4.9804 V | 0.5 to 4.8 V | - |
| Throttle Sens Open Pos #1 | Throttle sensor opener position No. 1:<br><br>Min.: 0 V, Max.: 4.9804 V | 0.6 to 1.4 V | Electronic throttle control system service data |
| Throttle Sens Open Pos #2 | Throttle sensor opener position No. 2:<br><br>Min.: 0 V, Max.: 4.9804 V | 1.7 to 2.5 V | Electronic throttle control system service data |
| Throttle Motor Current | Throttle actuator current: | 0 to 3.0 A: Idling | Electronic throttle control system service data |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: 0 A, Max.: 20 A | | |
| Throttle Motor DUTY | Throttle actuator:<br><br>Min.: 0%, Max.: 100% | 10 to 22%: Idling after engine warmed up | Electronic throttle control system service data |
| Throttle Motor Current | Throttle actuator current:<br><br>Min.: 0 A, Max.: 19.92 A | 0 to 3.0 A: Idling | - |
| Throttle Motor Open Duty | Throttle actuator open duty ratio:<br><br>Min.: 0%, Max.: 255% | 0 to 40%: Idling | When accelerator pedal depressed, duty ratio increased |
| Throttle Motor Close Duty | Throttle actuator close duty ratio:<br><br>Min.: 0%, Max.: 255% | 0 to 40%: Idling | When accelerator pedal released quickly, duty ratio increased |
| Throttle Motor Duty (Open) | Throttle actuator duty ratio (open):<br><br>Min.: 0%, Max.: 255% | 0 to 40%: Idling | Electronic throttle control system service data |
| Throttle Motor Duty (Close) | Throttle actuator duty ratio (close):<br><br>Min.: 0%, Max.: 255% | 0 to 40%: Idling | Electronic throttle control system service data |
| Throttle Fully Close Learn | Throttle valve fully closed<br><br>(learned value):<br><br>Min.: 0 V, Max.: 5 V | 0.4 to 1.0 V: Accelerator pedal released | - |
| +BM Voltage | +BM voltage:<br><br>Min.: 0, Max.: 19.92 V | 11 to 16 V: Power switch on (IG) and system normal | Electronic throttle control system service data |
| Actuator Power Supply | Actuator power supply<br><br>ON or OFF | ON: Idling | - |
| Injector (Port) | Injection duration for | 1000 to 3000 µs: Idling | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | cylinder 1:<br><br>Min.: 0 µs, Max.: 65535 µs | | |
| Injection Volum (Cylinder1) | Injection volume (Cylinder 1):<br><br>Min.: 0 ml, Max.: 2.047 ml | 0.03 to 0.13 ml: Idling | Quantity of fuel injection volume for 10 times |
| Fuel Pump/Speed Status | Fuel pump status:<br><br>ON or OFF | - | Active Test support data |
| Vacuum Pump | Key-off EVAP system leak detection pump status:<br><br>ON or OFF | - | Active Test support data |
| EVAP (Purge) VSV | EVAP (Purge) VSV control duty:<br><br>Min.: 0%, Max.: 100% | 0 to 50%: Idling, under purge control | Order signal from ECM |
| Evap Purge Flow | Ratio of evaporative purge flow to intake air volume:<br><br>Min.: 0%, Max.: 399.9% | 0 to 10%: Idling | Service data |
| Purge Density Learn Value | Learning value of purge density:<br><br>Min.: -200, Max.: 199.993% | -40 to 10: Idling | Service data |
| Vapor Pressure Pump | Vapor pressure:<br><br>Min.: 0 kPa (0 mmHg),<br><br>Max.: 1441.77 kPa (10815.979 mmHg) | Approximately 100 kPa (750 mmHg) (absolute):<br><br>Power switch on (IG) | EVAP system pressure monitored by canister pressure sensor |
| Vapor pressure (calculated) | Vapor pressure (calculated):<br><br>Min.: -720.896 kPa (-5408.072 mmHg), | Approximately 100 kPa (750 mmHg) (absolute):<br><br>Power switch on (IG) | EVAP system pressure monitored by canister pressure sensor |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Max.: 720.874 kPa (5407.070 mmHg) | | |
| EVAP System Vent Valve | Key-off EVAP system vent valve status:<br><br>ON or OFF | - | Active Test support data |
| EVAP Purge VSV | Purge VSV status for EVAP control:<br><br>ON or OFF | - | Active Test support data |
| Purge Cut VSV Duty | Purge cut VSV duty:<br><br>Min.: 0%, Max.: 399.9% | - | - |
| Target Air-Fuel Ratio | Ratio compared to stoichiometric level:<br><br>Min.: 0, Max.: 1.99 | 0.8 to 1.2: Idling | - |
| AF Lambda B1 S1 | Short-term fuel trim associated with bank 1 sensor 1:<br><br>Min.: 0, Max.: 1.99 | • Value less than 1 (0.000 to 0.999) = Rich<br>• Stoichiometric air fuel ratio = 1<br>• Value greater than 1 (1.001 to 1.99) = Lean | - |
| AFS Voltage B1 S1 | Air fuel ratio sensor output voltage for bank 1 sensor 1:<br><br>Min.: 0 V, Max.: 7.99 V | 2.6 to 3.8 V: Idling, engine warmed up | Performing Control the Injection Volume or Control the Injection Volume for A/F Sensor function of Active Test enables technician to check output voltage of sensors |
| AFS Current B1 S1 | Air fuel ratio sensor output current for bank 1 sensor 1:<br><br>Min.: -128 mA, Max.: 127.99 mA | -0.5 to 0.5 mA: Idling, engine warmed up | Value becomes higher when fuel-cut executed under high engine speed |
| A/F Heater Duty #1 | Air fuel ratio heater duty ratio for bank 1:<br><br>Min.: 0%, Max.: 399.9% | 0 to 100% | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| O2S B1 S2 | Heated oxygen sensor output voltage for bank 1 sensor 2:<br><br>Min.: 0 V, Max.: 1.275 V | 0.0 to 0.9 V:<br><br>Driving at 44 mph (70 km/h) | Performing Control the Injection Volume or Control the Injection Volume for A/F Sensor function of Active Test enables technician to check output voltage of sensors |
| O2S Impedance B1S2 | Heated oxygen sensor impedance (bank 1 sensor 2):<br><br>Min.: 0 ohm, Max.: 21247.67 ohm | 5 to 15000 ohm:<br><br>After driving for 10 minutes or more in urban area | - |
| O2 Heater B1S2 | Heated oxygen sensor heater for bank 1 sensor 2:<br><br>Not Act or Active | - | - |
| O2 Heater Curr Val B1S2 | Heated oxygen sensor current for bank 1 sensor 2:<br><br>Min.: 0 A, Max.: 4.9 A | - | - |
| Short FT #1 | Short-term fuel trim of bank 1:<br><br>Min.: -100%, Max.: 99.2% | -20 to 20% | Short-term fuel compensation used to maintain air fuel ratio at stoichiometric air fuel ratio |
| Long FT #1 | Long-term fuel trim of bank 1:<br><br>Min.: -100%, Max.: 99.2% | -20 to 20% | Overall fuel compensation carried out long-term to compensate continual deviation of short-term fuel trim from central value |
| Total FT #1 | Total fuel trim of bank 1<br><br>Average value for fuel trim system of bank 1:<br><br>Min.: -0.5, Max.: 0.496 | -0.28 to 0.2: Idling | - |
| Fuel System Status #1 | Fuel system status (bank 1):<br><br>OL or CL or OLDrive or OLFault or CLFault | CL: Idling after warming up | • OL (Open Loop): Has not yet satisfied conditions to go closed loop<br><br>• CL (Closed Loop): Using air |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | | fuel ratio sensor as feedback for fuel control<br>• OLDrive: Open loop due to driving conditions (fuel enrichment)<br>• OLFault: Open loop due to detected system fault<br>• CLFault: Closed loop but air fuel ratio sensor, which used for fuel control malfunctioning |
| Fuel System Status #2 | Fuel system status (bank 2):<br>OL or CL or OLDrive or OLFault or CLFault | Unused | • OL (Open Loop): Has not yet satisfied conditions to go closed loop<br>• CL (Closed Loop): Using air fuel ratio sensor as feedback for fuel control<br>• OLDrive: Open loop due to driving conditions (fuel enrichment)<br>• OLFault: Open loop due to detected system fault<br>• CLFault: Closed loop but air fuel ratio sensor, which used for fuel control malfunctioning |
| IGN Advance | Ignition timing advance for No. 1 cylinder:<br>Min.: -64 deg., Max.: 63.5 deg. | BTDC 0 to 16 deg.: Idling | - |
| Knock Feedback Value | Feedback value of knocking:<br>Min.: -1024 CA, Max.: 1024.0 CA | -20 to 0°CA:<br>Driving at 44 mph (70 km/h) | Service data |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Knock Correct Learn Value | Correction learning value of knocking:<br><br>Min.: -1024 CA, Max.: 1024.0 CA | 0 to 22°CA:<br><br>Driving at 44 mph (70 km/h) | Service data |
| Target EGR Position | Target EGR position:<br><br>Min.: 0%, Max.: 100% | 0%: Idling | - |
| EGR Step Position | EGR step position:<br><br>Min.: 0 step, Max.: 120 step | 0 step: Idling | - |
| VVT Control Status #1 | VVT control (bank 1) status:<br><br>ON or OFF | - | Active Test support data |
| VVT Aim Angle #1*2 | VVT aim angle (bank 1):<br><br>Min.: 0%, Max.: 399.9% | 0 to 100% | VVT duty signal value during intrusive operation |
| VVT Change Angle #1*2 | VVT change angle (bank 1):<br><br>Min.: 0 DegFR, Max.: 639.9 DegFR | 0 to 56 DegFR: Idling | Displacement angle during intrusive operation |
| VVT OCV Duty #1*2 | VVT camshaft timing oil control valve assembly operation duty:<br><br>Min.: 0%, Max.: 399.9% | 0 to 100% | Requested duty value for intrusive operation |
| VN Turbo Type | Variable nozzle turbo type:<br><br>Not Avl or Commo or Vacuum or CAN Com | Not Avl (Unused) | - |
| Catalyst Temp B1 S1 | Catalyst temperature (associated with sensor 1):<br><br>Min.: -40°C (-40°F),<br><br>Max.: 6513.5°C | Close to catalyst inlet temperature | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | (11756.3°F) | | |
| Catalyst Temp B1 S2 | Catalyst temperature (associated with sensor 2):<br><br>Min.: -40°C (-40°F),<br><br>Max.: 6513.5°C (11756.3°F) | Close to catalyst outlet temperature | - |
| Closed Throttle Position SW | Closed throttle position switch:<br><br>ON or OFF | • ON: Throttle fully closed<br><br>• OFF: Throttle open | - |
| Fuel Cut Condition | Fuel cut determination flag:<br><br>ON or OFF | - | - |
| Check Mode | Check mode:<br><br>ON or OFF | ON: Check mode ON | INFO |
| Misfire Test Result | Check mode result for misfire monitor:<br><br>Compl or Incmpl | - | - |
| OXS1 Test Result | Check mode result for heated oxygen sensor (bank 1):<br><br>Compl or Incmpl | - | - |
| A/F Test Results #1 | Check mode result for air fuel ratio sensor (bank 1)<br><br>Compl or Incmpl | - | - |
| Complete Parts Monitor | Comprehensive component monitor:<br><br>Not Avl or Avail | - | - |
| Fuel System Monitor | Fuel system monitor:<br><br>Not Avl or Avail | - | - |
| Misfire Monitor | Misfire monitor:<br><br>Not Avl or Avail | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| EGR/VVT Monitor | EGR monitor:<br><br>Not Avl or Avail | - | - |
| EGR/VVT Monitor | EGR monitor:<br><br>Compl or Incmpl | - | - |
| O2S(A/FS) Heater Monitor | O2S (A/FS) heater monitor:<br><br>Not Avl or Avail | - | - |
| O2S(A/FS) Heater Monitor | O2S (A/FS) heater monitor:<br><br>Compl or Incmpl | - | - |
| O2S(A/FS) Monitor | O2S (A/FS) monitor:<br><br>Not Avl or Avail | - | - |
| O2S(A/FS) Monitor | O2S (A/FS) monitor:<br><br>Compl or Incmpl | - | - |
| A/C Monitor | A/C monitor:<br><br>Not Avl or Avail | - | - |
| A/C Monitor | A/C monitor:<br><br>Compl or Incmpl | - | - |
| 2nd Air Monitor | 2nd air monitor:<br><br>Not Avl or Avail | - | - |
| 2nd Air Monitor | 2nd air monitor:<br><br>Compl or Incmpl | - | - |
| EVAP Monitor | EVAP monitor:<br><br>Not Avl or Avail | - | - |
| EVAP Monitor | EVAP monitor:<br><br>Compl or Incmpl | - | - |
| Heated Catalyst Monitor | Heated catalyst monitor:<br><br>Not Avl or Avail | - | - |
| Heated Catalyst Monitor | Heated catalyst | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | monitor:<br><br>Compl or Incmpl | | |
| Catalyst Monitor | Catalyst monitor:<br><br>Not Avl or Avail | - | - |
| Catalyst Monitor | Catalyst monitor:<br><br>Compl or Incmpl | - | - |
| Component Monitor ENA | Comprehensive component monitor:<br><br>Unable or Enable | - | - |
| Component Monitor CMPL | Comprehensive component monitor:<br><br>Compl or Incmpl | - | - |
| Fuel System Monitor ENA | Fuel system monitor:<br><br>Unable or Enable | - | - |
| Fuel System Monitor CMPL | Fuel system monitor:<br><br>Compl or Incmpl | - | - |
| Misfire Monitor ENA | Misfire monitor:<br><br>Unable or Enable | - | - |
| Misfire Monitor CMPL | Misfire monitor:<br><br>Compl or Incmpl | - | - |
| EGR/VVT Monitor ENA | EGR monitor:<br><br>Unable or Enable | - | - |
| EGR/VVT Monitor CMPL | EGR monitor:<br><br>Compl or Incmpl | - | - |
| Heater Monitor ENA | O2S (A/FS) heater monitor:<br><br>Unable or Enable | - | - |
| Heater Monitor CMPL | O2S (A/FS) heater monitor:<br><br>Compl or Incmpl | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| O2S(A/FS) Monitor ENA | O2S (A/FS) monitor:<br><br>Unable or Enable | - | - |
| O2S(A/FS) Monitor CMPL | O2S (A/FS) monitor:<br><br>Compl or Incmpl | - | - |
| A/C Monitor ENA | A/C monitor:<br><br>Unable or Enable | - | - |
| A/C Monitor CMPL | A/C monitor:<br><br>Compl or Incmpl | - | - |
| 2nd Air Monitor ENA | 2nd air monitor:<br><br>Unable or Enable | - | - |
| 2nd Air Monitor CMPL | 2nd air monitor:<br><br>Compl or Incmpl | - | - |
| EVAP Monitor ENA | EVAP monitor:<br><br>Unable or Enable | - | - |
| EVAP Monitor CMPL | EVAP monitor:<br><br>Compl or Incmpl | - | - |
| Heated Cat Monitor ENA | Heated catalyst monitor:<br><br>Unable or Enable | - | - |
| Heated Cat Monitor CMPL | Heated catalyst monitor:<br><br>Compl or Incmpl | - | - |
| Catalyst Monitor ENA | Catalyst monitor:<br><br>Unable or Enable | - | - |
| Catalyst Monitor CMPL | Catalyst monitor:<br><br>Compl or Incmpl | - | - |
| TC Terminal | TC terminal status:<br><br>ON or OFF | - | - |
| # Codes (Include History) | Number of emission related DTCs: | 0: No emission related DTC detected | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: 0<br><br>Max.: 255 | | |
| MIL | MIL status:<br><br>ON or OFF | ON: MIL ON | - |
| MIL ON Run Distance | Distance traveled since MIL turned ON:<br><br>Min.: 0 km (0 mile),<br><br>Max.: 65535 km (40724 mile) | Distance since DTC detected | - |
| Running Time from MIL ON | Running time since MIL turned ON:<br><br>Min.: 0 min,<br><br>Max.: 65535 min | Equivalent to running time since MIL turned on | - |
| Time after DTC Cleared | Time since DTCs cleared:<br><br>Min.: 0 min,<br><br>Max.: 65535 min | Equivalent to time since DTCs cleared | - |
| Distance from DTC Cleared | Distance traveled since DTCs cleared:<br><br>Min.: 0 km (0 mile),<br><br>Max.: 65535 km (40724 mile) | Equivalent to distance driven since DTCs cleared | - |
| Warmup Cycle Cleard DTC | Warm-up cycles since DTCs cleared:<br><br>Min.: 0, Max.: 255 | - | Number of warm-up cycles since DTCs cleared |
| Dist Batt Cable Disconnect | Distance from battery cable disconnected:<br><br>Min.: 0 km (0 mile), Max.: 65535 km (40724 mile) | - | - |
| IG OFF Elapsed Time | Time after power switch off:<br><br>Min.: 0 min, Max.: | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | 655350 min | | |
| OBD Requirements | OBD requirement | OBD2 | - |
| Number of Emission DTC | Emission related DTCs<br><br>Min.: 0<br><br>Max.: 127 | - | Number of emission related DTCs |
| TC and TE1 | TC and CG (TE1) terminals of DLC3:<br><br>ON or OFF | - | Active Test support data |
| Ignition Trig. Count | Ignition counter for calculated misfire rate:<br><br>Min.: 0, Max.: 65535 | 0 to 400 | - |
| Cylinder #1 Misfire Count | Misfire count of cylinder 1:<br><br>Min.: 0, Max.: 255 | 0 | - |
| Cylinder #2 Misfire Count | Misfire count of cylinder 2:<br><br>Min.: 0, Max.: 255 | 0 | - |
| Cylinder #3 Misfire Count | Misfire count of cylinder 3:<br><br>Min.: 0, Max.: 255 | 0 | - |
| Cylinder #4 Misfire Count | Misfire count of cylinder 4:<br><br>Min.: 0, Max.: 255 | 0 | - |
| All Cylinders Misfire Count | All cylinders misfire count:<br><br>Min.: 0, Max.: 255 | 0 | - |
| Misfire RPM | Average of engine speed when misfire occurs:<br><br>Min.: 0 rpm, Max.: 6375 rpm | 0 rpm: Misfire 0 | - |
| Misfire Load | Average of engine load when misfire | 0 g/rev: Misfire 0 | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | occurred:<br><br>Min.: 0 g/rev, Max.: 3.98 g/rev | | |
| Electric Fan Motor | Electric cooling fan motor:<br><br>ON or OFF | ON: Electric cooling fan motor operating | Active Test support data |
| Idle Fuel Cut Prohibit | Idle fuel cut prohibit:<br><br>ON or OFF | - | - |
| Idle Fuel Cut | Fuel cut idle:<br><br>ON or OFF | ON: Fuel cut operating | Idle Fuel Cut = "ON" when throttle valve fully closed and engine speed over 2800 rpm |
| FC TAU | Fuel cut TAU (Fuel cut with very light load):<br><br>ON or OFF | ON: Fuel cut operating | Fuel cut being performed during very light load to prevent incomplete engine combustion |
| Communication with HV | Status of communication with the power management control ECU:<br><br>Comm or No Comm | Comm: Power switch on (IG) | - |
| Communication with Brake | Status of communication with the skid control ECU:<br><br>Comm or No Comm | Comm: Power switch on (IG) | - |
| Comm with Air Conditioner | Status of communication with the air conditioning amplifier assembly:<br><br>Comm or No Comm | Comm: Power switch on (IG) | - |
| Model Code | Model code | - | Identifies model code:<br><br>ZVW3## |
| Engine Type | Engine type | - | Identifies engine type:<br><br>2ZRFXE |
| Cylinder Number | Cylinder number: | - | Identifies number of cylinders: |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: 0, Max.: 255 | | 4 |
| Destination | Destination | - | Identifies destination:<br><br>A (America) |
| Model Year | Model year:<br><br>Min.: 1900, Max.: 2155 | - | Identifies model year:<br><br>2010 |
| System Identification | System identification | - | Identifies engine system:<br><br>HV (Hybrid) |
| Engine Speed of Cyl #1 | Engine speed for cylinder 1:<br><br>Min.: 0 rpm, Max.: 51199 rpm | - | Output only when Check the Cylinder Compression performed using Active Test<br><br>51199 rpm: Active Test not performed |
| Engine Speed of Cyl #2 | Engine speed for cylinder 2:<br><br>Min.: 0 rpm, Max.: 51199 rpm | - | Output only when Check the Cylinder Compression performed using Active Test<br><br>51199 rpm: Active Test not performed |
| Engine Speed of Cyl #3 | Engine speed for cylinder 3:<br><br>Min.: 0 rpm, Max.: 51199 rpm | - | Output only when Check the Cylinder Compression performed using Active Test<br><br>51199 rpm: Active Test not performed |
| Engine Speed of Cyl #4 | Engine speed for cylinder 4:<br><br>Min.: 0 rpm, Max.: 51199 rpm | - | Output only when Check the Cylinder Compression performed using Active Test<br><br>51199 rpm: Active Test not performed |
| Av Engine Speed of All Cyl | Engine speed for all cylinders:<br><br>Min.: 0 rpm, Max.: 51199 rpm | - | Output only when Check the Cylinder Compression performed using Active Test<br><br>51199 rpm: Active Test not performed |
| Requested Engine Torque | Requested engine torque:<br><br>Min.: 0 kW, Max.: 16383.75 kW | 0 to 73 kW | Flag information for hybrid vehicle |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| HV Target Engine Speed | Hybrid target engine speed:<br><br>Min.: 0 rpm, Max.: 6375 rpm | 0 to 5200 rpm | Flag information for hybrid vehicle |
| Actual Engine Torque | Actual engine torque:<br><br>Min.: -32768 Nm, Max.: 32768 Nm | Actual engine torque | Flag information for hybrid vehicle |
| Engine Run Time | Engine run time:<br><br>Min.: 0 s (seconds), Max.: 255 s (seconds) | 0 to 255 s | Flag information for hybrid vehicle |
| Request Engine Run Time | Request engine run time:<br><br>Min.: 0 s (seconds), Max.: 25.5 s (seconds) | 0 to 25.5 s | Flag information for hybrid vehicle |
| Judge Time Engine Ignition | Judgment time for complete explosion of ignition:<br><br>Min.: 0 s (seconds), Max.: 25.5 s (seconds) | 0 to 25.5 s | Flag information for hybrid vehicle |
| Judge Time Engine Output | Judgment time for time until engine output:<br><br>Min.: 0 s (seconds), Max.: 25.5 s (seconds) | 0 to 25.5 s | Flag information for hybrid vehicle |
| ISC Learning | Idle speed control learning:<br><br>Compl or Incmpl | - | Flag information for hybrid vehicle |
| F/C for Engine Stop Req | Fuel cut for engine stop request:<br><br>ON or OFF | - | Flag information for hybrid vehicle |
| Engine Independent | Engine independent operation:<br><br>Not Opr or Operate | - | Flag information for hybrid vehicle |
| Racing Operation | Racing operation:<br><br>Not Opr or Operate | - | Flag information for hybrid vehicle |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Request Warm-up | Request engine warm up:<br><br>Not Req or Request | - | Flag information for hybrid vehicle |
| Engine Independent Control | Engine independent control operation:<br><br>Not Opr or Operate | - | Flag information for hybrid vehicle |
| Elec Water Pump Target Spd | Electronic water pump target speed<br><br>Min.: 0 rpm, Max.: 6375 rpm | - | - |
| Elec Water Pump Spd | Electronic water pump speed<br><br>Min.: 0 rpm, Max.: 6375 rpm | - | - |
| ISC Learning Value | Idle speed control learning value:<br><br>Min.: 0 L/s, Max.: 79.998 L/s | 0.5 to 6.1 L/s | Flag information for hybrid vehicle |

HINT:

- Normal condition: If no idling conditions are specified, the shift lever should be in N or P, and the A/C switch and all accessory switches should be off.
- *1: Excluding throttle valve opening percentage due to Idle Speed Control (ISC).
- *2: Values are only displayed when performing the Active Tests: Control the VVT Linear (Bank1). For other Active Tests, the value will be 0.

2. ACTIVE TEST

HINT:

Using the Techstream to perform the Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Warm up the engine.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test.

(g) According to the display on the Techstream, perform the Active Test.

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Control the Injection Volume | Change injection volume | -12.5 to 24.8% | • All injectors tested at the same time<br>• Perform test at less than 3000 rpm<br>• Injection volume can be changed in 1% graduations within control range |
| Control the Injection Volume for A/F Sensor | Change injection volume | Lower by 12.5% or increase by 25% | • Perform test at less than 3000 rpm<br>• Control the Injection Volume for A/F Sensor enables checking and graphing of air fuel ratio sensor and heated oxygen sensor voltage outputs<br>• When conducting the test, select the following items: Active Test / Control the Injection Volume for A/F Sensor / Data List / AFS Voltage B1S1 and O2S B1S2 |
| Control the EGR Step Position | Open or close EGR valve | From 0 to 110 steps | • EGR valve fully closed at step position 0, and fully open at step position 110<br>• Amount of EGR gas, flowing into intake manifold, varies in accordance with EGR valve opening angle |
| Activate the VSV for Evap Control | Activate purge VSV control | ON/OFF | - |
| Control the Fuel Pump / Speed | Activate fuel pump (C/OPN Relay) | ON/OFF | Test possible when following conditions met:<br>• Power switch on (IG)<br>• Engine is stopped |
| Connect the TC and TE1 | Turn on and off TC and CG (TE1) connection | ON/OFF | • ON: TC and TE1 connected<br>• OFF: TC and TE1 disconnected |

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Control the Idle Fuel Cut Prohibit | Prohibit idling fuel cut control | ON/OFF | Idling fuel-cut turned ON when throttle valve fully closed and engine speed over 2800 rpm |
| Control the Electric Cooling Fan | Control electric cooling fan motor | ON/OFF | - |
| Control the ETCS Open/Close Slow Speed | Throttle actuator | Closed/Open | Test possible when following conditions met:<br>• Power switch on (IG)<br>• Engine is stopped<br>• Accelerator pedal fully depressed (Accelerator pedal position: 58 degrees or more) |
| Control the ETCS Open/Close Fast Speed | Throttle actuator | Closed/Open | |
| Control the VVT Linear (Bank1) | Control VVT (bank 1) | Between -128 and 127%<br><br>This value added to present camshaft timing oil control valve control duty<br><br>100%: Maximum advance<br><br>-100%: Maximum retard | • Engine stall or rough idle when VVT actuator operated by 100%.<br>• Test possible during idle. |
| Control the VVT System (Bank1) | Turn on and off intake camshaft timing oil control valve assembly | ON/OFF | • Engine stalls or idles roughly when camshaft timing oil control valve assembly turned on<br>• Normal engine running or idling when camshaft timing oil control valve assembly off<br>• Test possible during idle. |
| Activate the Vacuum Pump | Leak detection pump | ON/OFF | - |
| Activate the VSV for Vent Valve | Vent valve | ON/OFF | - |
| Control the Cylinder #1 Fuel Cut | Cylinder #1 injector fuel cut | ON/OFF | Test possible while vehicle stopped and engine idling |
| Control the Cylinder #2 Fuel Cut | Cylinder #2 injector fuel cut | ON/OFF | |
| Control the | Cylinder #3 injector | ON/OFF | |

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Cylinder #3 Fuel Cut | fuel cut | | |
| Control the Cylinder #4 Fuel Cut | Cylinder #4 injector fuel cut | ON/OFF | |
| Control the All Cylinder Fuel Cut | All cylinder fuel cut | ON/OFF | |
| Check the Cylinder Compression* | Check the cylinder compression pressure<br><br>(measure engine speed for each cylinder) | ON/OFF | Fuel injection and ignition stop in all cylinders |
| Activate the Electric Water Pump | Water pump assembly speed control | 0 to 44800 rpm | Test possible when either of the following condition is met:<br><br>• Engine coolant temperature is Below 100°C (212°F)<br>• Not in inspection mode. |

HINT:

*: While the Active Test item Check the Cylinder Compression is being performed, if one cylinder's speed is higher than the others, that cylinder's compression pressure can be concluded to be lower than the others.

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Put the engine in inspection mode INFO.
4. Start the engine and warm it up.
5. Turn the power switch off.
6. Turn the power switch on (IG) and turn the Techstream on.
7. Put the engine in inspection mode INFO.

   HINT:

   Do not start the engine.

8. Enter the following menus: Powertrain / Engine and ECT / Active Test / Check the Cylinder Compression.

   HINT:

   If the results are not displayed normally, select the display items from the Data List before performing the Active Test. Enter the following menus: Powertrain / Engine and ECT / Compression / Engine Speed of Cyl #1 to #4 and Av Engine Speed of All Cyl.

9. While the engine is not running, press the RIGHT or LEFT button to change the Check the Cylinder Compression to ON.
10. Start the engine.
11. Monitor the engine speed (Engine Speed of Cyl #1 to #4, Av Engine Speed of All Cyl) displayed on the Techstream.

    HINT:

    At first, the Techstream display will show each cylinder's engine speed measurement to be extremely high. After the engine started, each cylinder's engine speed measurement will change to the actual engine speed.

    NOTICE:

    - When the Check the Cylinder Compression Active Test is ON and the engine will start.
    - If the Check the Cylinder Compression Active Test needs to be performed after it is turned ON and performed once, press EXIT to return to the Active Test menu screen. Then perform the Check the Cylinder Compression Active Test again.
    - Use a fully-charged battery.

3. SYSTEM CHECK

HINT:

Performing a System Check in the Utility menu enables the system, which consists of multiple actuators, to be operated without removing any parts. In addition, it can show whether or not any DTCs are set, and can detect potential malfunctions in the system.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Utility.

(e) Perform the System Check by referring to the table below.

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Evaporative System Check<br><br>(Automatic Mode) | Perform 5 steps in order to operate EVAP key-off monitor automatically | 35°C (95°F) or less | • If no DTCs in Pending after performing this test, system functioning normally<br>• Refer to EVAP System INFO |
| Evaporative System Check<br><br>(Manual Mode) | Perform 5 steps in order to operate EVAP key-off monitor manually | 35°C (95°F) or less | • Used to detect malfunctioning parts<br>• Refer to EVAP System INFO |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

Parameters listed in the chart may not be exactly the same as your readings due to the type of instrument or other factors. If a trouble code is displayed during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

*1: The MIL flashes when a catalyst damaging misfire is detected

*2: Only for MEXICO models

**SFI System**

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| P0010 | Camshaft Position "A" Actuator Circuit (Bank 1) | - Open or short in camshaft timing oil control valve assembly circuit<br><br>- Camshaft timing oil control valve assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0011 | Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1) | - Valve timing<br><br>- Camshaft timing oil control valve assembly<br><br>- Oil control valve filter<br><br>- Camshaft timing gear assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0012 | Camshaft Position "A" - Timing Over-Retarded (Bank 1) | - Valve timing<br><br>- Camshaft timing oil control valve assembly<br><br>- Oil control valve filter<br><br>- Camshaft timing gear assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0016 | Crankshaft Position - Camshaft Position Correlation | - Valve timing | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | (Bank 1 Sensor A) | - Camshaft timing oil control valve assembly<br><br>- Oil control valve filter<br><br>- Camshaft timing gear assembly (for intake camshaft)<br><br>- ECM | | | | |
| P0031 | Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1) | - Open in air fuel ratio sensor (sensor 1) heater circuit<br><br>- Air fuel ratio sensor heater (sensor 1)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0032 | Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1) | - Short in air fuel ratio sensor (sensor 1) heater circuit<br><br>- Air fuel ratio sensor heater (sensor 1)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0037 | Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2) | - Open in heated oxygen sensor (sensor 2) heater circuit<br><br>- Heated oxygen sensor (sensor 2) heater<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0038 | Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2) | - Short in heated oxygen sensor (sensor 2) heater circuit<br><br>- Heated oxygen sensor (sensor 2) heater<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0101 | Mass Air Flow Circuit Range / Performance Problem | - Mass air flow meter sub-assembly | Comes on | DTC stored | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - Intake system<br>- PCV hose connections<br>- EGR valve assembly | | | | |
| P0102 | Mass or Volume Air Flow Circuit Low Input | - Open or short in mass air flow meter sub-assembly circuit<br>- Mass air flow meter sub-assembly<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0103 | Mass or Volume Air Flow Circuit High Input | - Open or short in mass air flow meter sub-assembly circuit<br>- Mass air flow meter sub-assembly<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0106 | Manifold Absolute Pressure / Barometric Pressure Circuit Range / Performance Problem | - Intake system<br>- Manifold absolute pressure sensor | Comes on | DTC stored | - | INFO |
| P0107 | Manifold Absolute Pressure / Barometric Pressure Circuit Low Input | - Open or short in manifold absolute pressure sensor circuit<br>- Manifold absolute pressure sensor<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0108 | Manifold Absolute Pressure / Barometric Pressure Circuit High Input | - Open or short in manifold absolute pressure sensor circuit<br>- Manifold absolute pressure sensor<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0111 | Intake Air Temperature Sensor Gradient Too High | Mass air flow meter sub-assembly | Comes on | DTC stored | - | INFO |
| P0112 | Intake Air Temperature Circuit Low Input | - Short in intake air | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | temperature sensor circuit<br><br>- Intake air temperature sensor (built into mass air flow meter sub-assembly)<br><br>- ECM | | | | |
| P0113 | Intake Air Temperature Circuit High Input | - Open in intake air temperature sensor circuit<br><br>- Intake air temperature sensor (built into mass air flow meter sub-assembly)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0115 | Engine Coolant Temperature Circuit Malfunction | - Open or short in engine coolant temperature sensor circuit<br><br>- Engine coolant temperature sensor<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0116 | Engine Coolant Temperature Circuit Range / Performance Problem | - Water inlet with thermostat sub-assembly<br><br>- Engine coolant temperature sensor | Comes on | DTC stored | Applies | INFO |
| P0117 | Engine Coolant Temperature Circuit Low Input | - Short in engine coolant temperature sensor circuit<br><br>- Engine coolant temperature sensor<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0118 | Engine Coolant Temperature Circuit High Input | - Open in engine coolant temperature sensor circuit<br><br>- Engine coolant temperature sensor<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P011B | Engine Coolant Temperature / Intake Air Temperature Correlation | - Intake air temperature sensor<br><br>- Engine coolant | Comes on | DTC stored | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | temperature sensor<br><br>- ECM | | | | |
| P0120 | Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction | - Throttle position sensor (built into throttle body assembly)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0121 | Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem | - Throttle position sensor (built into throttle body assembly)<br><br>- Throttle position sensor circuit<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0122 | Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input | - Throttle position sensor (built into throttle body assembly)<br><br>- Short in VTA1 circuit<br><br>- Open in VC circuit<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0123 | Throttle / Pedal Position Sensor / Switch "A" Circuit High Input | - Throttle position sensor (built into throttle body assembly)<br><br>- Open in VTA1 circuit<br><br>- Open in E2 circuit<br><br>- Short between VC and VTA1 circuits<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0125 | Insufficient Coolant Temperature for Closed Loop Fuel Control | - Cooling system<br><br>- Engine coolant temperature sensor<br><br>- Water inlet with thermostat sub-assembly | Comes on | DTC stored | Applies | INFO |
| P0128 | Coolant Thermostat (Coolant Temperature Below | - Water inlet with | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | Thermostat Regulating Temperature) | thermostat sub-assembly<br><br>- Cooling system<br><br>- Engine coolant temperature sensor<br><br>- ECM | | | | |
| P0136 | Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2) | - Open or short in heated oxygen sensor (sensor 2) circuit<br><br>- Heated oxygen sensor (sensor 2)<br><br>- Heated oxygen sensor heater (sensor 2)<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- Gas leaks from exhaust system<br><br>- EGR valve assembly | Comes on | DTC stored | - | INFO |
| P0137 | Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2) | - Open or short in heated oxygen sensor (sensor 2)<br><br>- Heated oxygen sensor (sensor 2)<br><br>- Heated oxygen sensor heater (sensor 2)<br><br>- Gas leak from exhaust system<br><br>- EGR valve assembly | Comes on | DTC stored | Applies | INFO |
| P0138 | Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2) | - Short in heated oxygen sensor (sensor 2) circuit<br><br>- Heated oxygen sensor (sensor 2)<br><br>- EGR valve assembly | Comes on | DTC stored | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - ECM<br><br>- Air fuel ratio sensor (sensor 1) | | | | |
| P0139 | Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 2) | - Short in heated oxygen sensor (sensor 2) circuit<br><br>- Heated oxygen sensor (sensor 2)<br><br>- EGR valve assembly<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P0141 | Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2) | - Open or short in heated oxygen sensor (sensor 2) heater circuit<br><br>- Heated oxygen sensor (sensor 2) heater<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P0171 | System Too Lean (Bank 1) | - Intake system<br><br>- Fuel injector assembly<br><br>- Mass air flow meter sub-assembly<br><br>- Engine coolant temperature sensor<br><br>- Fuel pressure<br><br>- Gas leaks from exhaust system<br><br>- Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- PCV valve and hose<br><br>- PCV hose connections | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - EGR valve assembly<br><br>- ECM | | | | |
| P0172 | System Too Rich (Bank 1) | - Fuel injector assembly<br><br>- Mass air flow meter sub-assembly<br><br>- Engine coolant temperature sensor<br><br>- Ignition system<br><br>- Fuel pressure<br><br>- Gas leaks from exhaust system<br><br>- Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- EGR valve assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0220 | Throttle / Pedal Position Sensor / Switch "B" Circuit | - Throttle position sensor (built into throttle body assembly)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0222 | Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input | - Throttle position sensor (built into throttle body assembly)<br><br>- Short in VTA2 circuit<br><br>- Open in VC circuit<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0223 | Throttle / Pedal Position Sensor / Switch "B" Circuit High Input | - Throttle position sensor (built into throttle body assembly) | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - Open in VTA2 circuit<br>- Open in E2 circuit<br>- Short between VC and VTA2 circuits<br>- ECM | | | | |
| P0300 | Random / Multiple Cylinder Misfire Detected | - Open or short in engine wire harness<br>- Connector connection<br>- Vacuum hose connections<br>- Ignition system<br>- Fuel injector assembly<br>- Fuel pressure<br>- Mass air flow meter sub-assembly<br>- Engine coolant temperature sensor<br>- Compression pressure<br>- Valve timing<br>- PCV valve and hose<br>- PCV hose connections<br>- Intake system<br>- EGR valve assembly<br>- ECM | Comes on / Blinks*1 | DTC stored | Applies | INFO |
| P0301 | Cylinder 1 Misfire Detected | - Open or short in engine wire harness<br>- Connector connection<br>- Vacuum hose connections | Comes on / Blinks*1 | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - Ignition system<br>- Fuel injector assembly<br>- Fuel pressure<br>- Mass air flow meter sub-assembly<br>- Engine coolant temperature sensor<br>- Compression pressure<br>- Valve timing<br>- PCV valve and hose<br>- PCV hose connections<br>- Intake system<br>- EGR valve assembly<br>- ECM | | | | |
| P0302 | Cylinder 2 Misfire Detected | - Open or short in engine wire harness<br>- Connector connection<br>- Vacuum hose connections<br>- Ignition system<br>- Fuel injector assembly<br>- Fuel pressure<br>- Mass air flow meter sub-assembly<br>- Engine coolant temperature sensor<br>- Compression pressure | Comes on / Blinks*1 | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - Valve timing<br>- PCV valve and hose<br>- PCV hose connections<br>- Intake system<br>- EGR valve assembly<br>- ECM | | | | |
| P0303 | Cylinder 3 Misfire Detected | - Open or short in engine wire harness<br>- Connector connection<br>- Vacuum hose connections<br>- Ignition system<br>- Fuel injector assembly<br>- Fuel pressure<br>- Mass air flow meter sub-assembly<br>- Engine coolant temperature sensor<br>- Compression pressure<br>- Valve timing<br>- PCV valve and hose<br>- PCV hose connections<br>- Intake system<br>- EGR valve assembly<br>- ECM | Comes on / Blinks*1 | DTC stored | Applies | INFO |
| P0304 | Cylinder 4 Misfire Detected | - Open or short in engine wire harness | Comes on / Blinks*1 | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - Connector connection<br>- Vacuum hose connections<br>- Ignition system<br>- Fuel injector assembly<br>- Fuel pressure<br>- Mass air flow meter sub-assembly<br>- Engine coolant temperature sensor<br>- Compression pressure<br>- Valve timing<br>- PCV valve and hose<br>- PCV hose connections<br>- Intake system<br>- EGR valve assembly<br>- ECM | | | | |
| P0327 | Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor) | - Short in knock control sensor circuit<br>- Knock control sensor<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0328 | Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor) | - Open in knock control sensor circuit<br>- Knock control sensor<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0335 | Crankshaft Position Sensor "A" Circuit | - Open or short in crankshaft position sensor circuit<br>- Crankshaft position sensor | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - No. 1 crankshaft position sensor plate<br><br>- ECM | | | | |
| P0340 | Camshaft Position Sensor Circuit Malfunction | - Open or short in camshaft position sensor circuit<br><br>- Camshaft position sensor<br><br>- Intake camshaft<br><br>- Jumped tooth of timing chain for intake camshaft<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0342 | Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor) | - Open or short in camshaft position sensor circuit<br><br>- Camshaft position sensor<br><br>- Intake camshaft<br><br>- Jumped tooth of timing chain for intake camshaft<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0343 | Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor) | - Open or short in camshaft position sensor circuit<br><br>- Camshaft position sensor<br><br>- Intake camshaft<br><br>- Jumped tooth of timing chain for intake camshaft<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0351 | Ignition Coil "A" Primary / Secondary Circuit | - Ignition system<br><br>- Open or short in IGF or IGT1 circuit between ignition coil assembly and ECM<br><br>- No. 1 ignition coil | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | assembly<br><br>- ECM | | | | |
| P0352 | Ignition Coil "B" Primary / Secondary Circuit | - Ignition system<br><br>- Open or short in IGF or IGT2 circuit between ignition coil assembly and ECM<br><br>- No. 2 ignition coil assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0353 | Ignition Coil "C" Primary / Secondary Circuit | - Ignition system<br><br>- Open or short in IGF or IGT3 circuit between ignition coil assembly and ECM<br><br>- No. 3 ignition coil assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0354 | Ignition Coil "D" Primary / Secondary Circuit | - Ignition system<br><br>- Open or short in IGF or IGT4 circuit between ignition coil assembly and ECM<br><br>- No. 4 ignition coil assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0401 | Exhaust Gas Recirculation Flow Insufficient Detected | - EGR valve assembly<br><br>- EGR passage<br><br>- EGR with cooler pipe sub-assembly<br><br>- Manifold absolute pressure sensor | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - ECM | | | | |
| P0403 | Exhaust Gas Recirculation Control Circuit | - Open or short in EGR circuit<br><br>- EGR valve assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0420 | Catalyst System Efficiency Below Threshold (Bank 1) | - Gas leaks from exhaust system<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- Heated oxygen sensor (sensor 2)<br><br>- Front exhaust pipe assembly (TWC: Front and rear catalyst)<br><br>- EGR valve assembly | Comes on | DTC stored | Applies | INFO |
| P043E | Evaporative Emission System Reference Orifice Clog Up | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P043F | Evaporative Emission System Reference Orifice High Flow | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P0441 | Evaporative Emission Control System Incorrect Purge Flow | - Purge VSV<br><br>- Purge VSV circuit (between purge VSV and ECM)<br><br>- Leakage from EVAP line (between purge VSV and intake manifold)<br><br>- EVAP line clogged | Comes on | DTC stored | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | (between purge VSV and canister)<br><br>- EGR valve assembly<br><br>- ECM | | | | |
| P0443*2 | Evaporative Emission Control System Purge Control Valve Circuit | - Open or short in purge VSV circuit<br><br>- Purge VSV<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0451 | Evaporative Emission Control System Pressure Sensor Range / Performance | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P0452 | Evaporative Emission Control System Pressure Sensor / Switch Low Input | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P0453 | Evaporative Emission Control System Pressure Sensor / Switch High Input | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P0455 | Evaporative Emission Control System Leak Detected (Gross Leak) | - Fuel cap (loose)<br><br>- Leakage from EVAP line (canister - fuel tank)<br><br>- Leakage from EVAP line (purge VSV - canister)<br><br>- Leakage from canister pump module<br><br>- Leakage from fuel tank | Comes on | DTC stored | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - Leakage from canister | | | | |
| P0456 | Evaporative Emission Control System Leak Detected (Very Small Leak) | - Fuel cap (loose)<br>- Leakage from EVAP line (canister - fuel tank)<br>- Leakage from EVAP line (purge VSV - canister)<br>- Leakage from canister pump module<br>- Leakage from fuel tank<br>- Leakage from canister | Comes on | DTC stored | - | INFO |
| P0505 | Idle Control System Malfunction | - Electronic throttle control system<br>- Intake system<br>- PCV hose connections<br>- EGR valve assembly<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P050A | Cold Start Idle Air Control System Performance | - Throttle body assembly<br>- Mass air flow meter sub-assembly<br>- PCV system<br>- Air cleaner filter element sub-assembly<br>- Intake system<br>- VVT system<br>- EGR valve assembly<br>- ECM | Comes on | DTC stored | - | INFO |
| P050B | Cold Start Ignition Timing Performance | - Throttle body assembly<br>- Mass air flow meter sub- | Comes on | DTC stored | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | assembly<br><br>- Intake system<br><br>- PCV hose connections<br><br>- VVT system<br><br>- Air cleaner filter element sub-assembly<br><br>- EGR valve assembly<br><br>- ECM | | | | |
| P0560 | System Voltage | - Open in back up power source circuit<br><br>- Battery<br><br>- Battery terminals<br><br>- EFI MAIN fuse<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P0604 | Random Access Memory (RAM) | ECM | Comes on | DTC stored | Applies | INFO |
| P0606 | ECM / PCM Processor | ECM | Comes on | DTC stored | Applies | INFO |
| P0607 | Control Module Performance | - ECM<br><br>- Heated oxygen sensor<br><br>- Exhaust gas leak | Comes on | DTC stored | Applies | INFO |
| P060A | Internal Control Module Monitoring Processor Performance | ECM | Comes on | DTC stored | Applies | INFO |
| P060B | Internal Control Module A/D Processing Performance | ECM | Comes on | DTC stored | Applies | INFO |
| P060E | Internal Control Module Throttle Position Performance | ECM | Comes on | DTC stored | Applies | INFO |
| P062F | Internal Control Module EEPROM Error | ECM | Comes on | DTC stored | Applies | INFO |
| P0657 | Actuator Supply Voltage Circuit / Open | ECM | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| P101D | A/F Sensor Heater Circuit Performance Bank 1 Sensor 1 Stuck ON | ECM | Comes on | DTC stored | Applies | INFO |
| P102D | O2 Sensor Heater Circuit Performance Bank 1 Sensor 2 Stuck ON | ECM | Comes on | DTC stored | Applies | INFO |
| P106A | Evaporative Emission System Pressure Sensor - Manifold Absolute Pressure Correlation | - Canister pressure sensor (canister assembly)<br>- Manifold absolute pressure sensor | Comes on | DTC stored | - | INFO |
| P2102 | Throttle Actuator Control Motor Circuit Low | - Open in throttle actuator circuit<br>- Throttle actuator<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2103 | Throttle Actuator Control Motor Circuit High | - Short in throttle actuator circuit<br>- Throttle actuator<br>- Throttle valve<br>- Throttle body assembly<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2111 | Throttle Actuator Control System - Stuck Open | - Throttle actuator<br>- Throttle body assembly<br>- Throttle valve<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2112 | Throttle Actuator Control System - Stuck Closed | - Throttle actuator<br>- Throttle body assembly<br>- Throttle valve<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2118 | Throttle Actuator Control Motor Current Range / Performance | - Open in electronic throttle control system power source circuit | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - Battery<br><br>- Battery terminals<br><br>- ETCS fuse<br><br>- ECM | | | | |
| P2119 | Throttle Actuator Control Throttle Body Range / Performance | - Electronic throttle control system<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2135 | Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation | - Short between VTA1 and VTA2 circuits<br><br>- Throttle position sensor (built into throttle body assembly)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2195 | Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1) | - Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- Air fuel ratio sensor (sensor 1) heater<br><br>- Air fuel ratio sensor heater circuit<br><br>- Intake system<br><br>- Fuel pressure<br><br>- Fuel injector assembly<br><br>- EGR valve assembly<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P2196 | Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1) | - Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor | Comes on | DTC stored | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | (sensor 1)<br><br>- Air fuel ratio sensor (sensor 1) heater<br><br>- Air fuel ratio sensor heater circuit<br><br>- Intake system<br><br>- Fuel pressure<br><br>- Fuel injector assembly<br><br>- EGR valve assembly<br><br>- ECM | | | | |
| P2237 | Oxygen (A/F) Sensor Pumping Current Circuit / Open (Bank 1 Sensor 1) | - Open in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2238 | Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1) | - Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2239 | Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1) | - Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2252 | Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1) | - Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | (sensor 1)<br><br>- ECM | | | | |
| P2253 | Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1) | - Open or short in air fuel ratio sensor (sensor 1) circuit<br><br>- Air fuel ratio sensor (sensor 1)<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2401 | Evaporative Emission System Leak Detection Pump Control Circuit Low | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P2402 | Evaporative Emission System Leak Detection Pump Control Circuit High | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P2419 | Evaporative Emission System Switching Valve Control Circuit Low | - Canister pump module<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P2420 | Evaporative Emission System Switching Valve Control Circuit High | - Canister pump module (0.02 inch orifice, vacuum pump, vent valve)<br><br>- Connector/wire harness (canister pump module - ECM)<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P2610 | ECM / PCM Internal Engine Off Timer Performance | ECM | Comes on | DTC stored | Applies | INFO |
| P261B | Coolant Pump "B" Control Malfunction | - Open or short in water | Comes on | DTC stored | Applies | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | pump assembly circuit<br><br>- Water pump assembly<br><br>- ECM | | | | |
| P261C | Short in Coolant Pump "B" Control Circuit | - Short in water pump assembly circuit<br><br>- Water pump assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P261D | Open in Coolant Pump "B" Control Circuit | - Open in water pump assembly circuit<br><br>- Water pump assembly<br><br>- ECM | Comes on | DTC stored | Applies | INFO |
| P2A00 | A/F Sensor Circuit Slow Response (Bank 1 Sensor 1) | - Air fuel ratio sensor<br><br>- Air fuel ratio sensor heater<br><br>- EGR valve assembly<br><br>- ECM | Comes on | DTC stored | - | INFO |
| P3190 | Poor Engine Power | - Intake system<br><br>- Throttle body assembly<br><br>- Fuel pressure<br><br>- Engine<br><br>- Mass air flow meter sub-assembly<br><br>- Out of fuel<br><br>- Engine coolant temperature sensor<br><br>- Crankshaft position sensor<br><br>- Camshaft position sensor<br><br>- EGR valve assembly | Comes on | DTC stored | Applies | INFO |

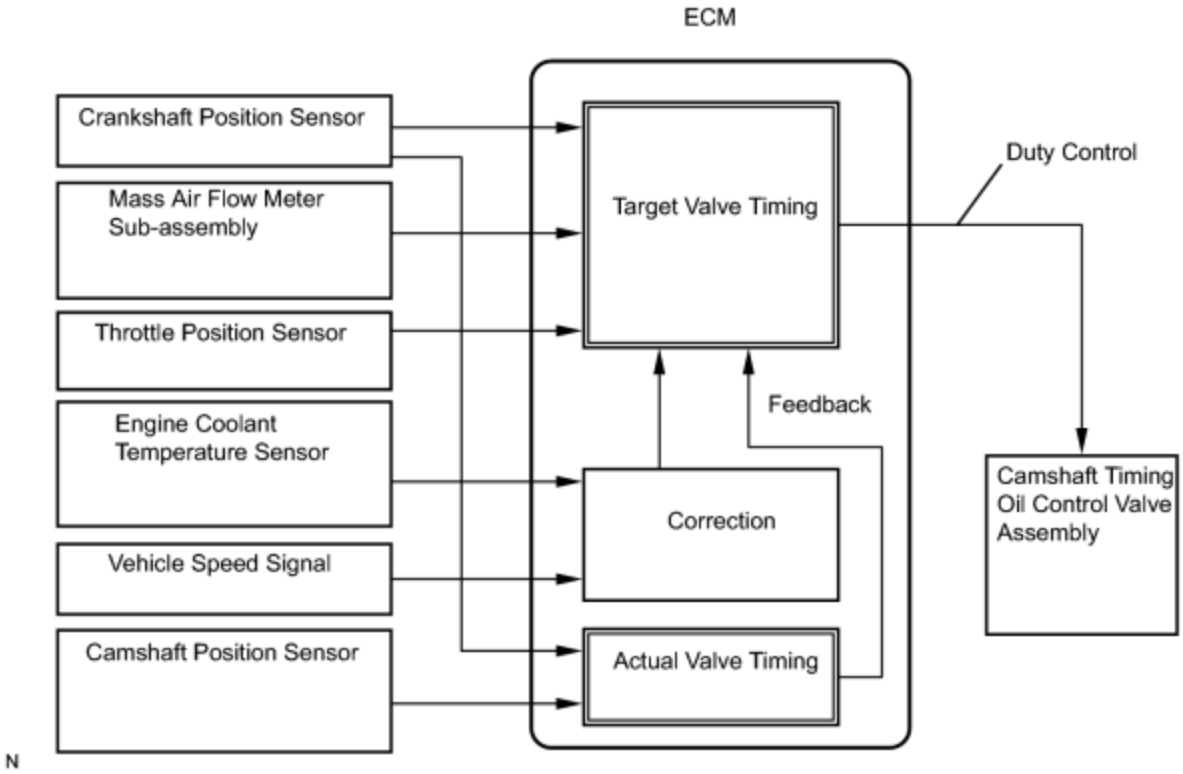
| DTC Code | Detection Item | Trouble Area | MIL | Memory | DTC for Mexico Models | See page |
|---|---|---|---|---|---|---|
| | | - ECM | | | | |
| P3191 | Engine does not Start | - Intake system<br>- Throttle body assembly<br>- Fuel pressure<br>- Engine<br>- Mass air flow meter sub-assembly<br>- Out of fuel<br>- Engine coolant temperature sensor<br>- Crankshaft position sensor<br>- Camshaft position sensor<br>- EGR valve assembly<br>- ECM | Comes on | DTC stored | Applies | INFO |
| P3193 | Fuel Run Out | - Out of fuel<br>- ECM | Does not come on | DTC stored | Applies | INFO |
| U0293 | Lost Communication with HV ECU | - Wire harness<br>- Power management control ECU | Comes on | DTC stored | Applies | INFO |

| DTC | P0010 | Camshaft Position "A" Actuator Circuit (Bank 1) |
|---|---|---|

# DESCRIPTION

The VVT (variable valve timing) system adjusts the intake valve timing to improve driveability. The engine oil pressure turns the VVT controller to adjust the valve timing.

The camshaft timing oil control valve assembly is a solenoid valve and switches the engine oil line. The valve moves when the ECM applies the 12 V to the solenoid. The ECM changes the energizing time to the solenoid (duty-cycle) in accordance with the camshaft position, crankshaft position, throttle position, etc.




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0010 | Open or short in camshaft timing oil control valve assembly circuit<br><br>(1 trip detection logic) | • Open or short in camshaft timing oil control valve assembly circuit<br>• Camshaft timing oil control valve assembly<br>• ECM |

# MONITOR DESCRIPTION

This DTC is designed to detect open or short circuits in the camshaft timing oil control valve assembly circuit. If the camshaft timing oil control valve's duty-cycle is excessively high or low while the engine is running, the ECM will illuminate the MIL and set the DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0010: Camshaft timing oil control valve range check (bank 1) |
| Required Sensors/Components (Main) | Camshaft timing oil control valve assembly |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 1 second |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| All of the following conditions are met | A, B, C and D |
| A. Starter | OFF |
| B. Power switch | On (IG) |
| C. Time after power switch off to on (IG) | 0.5 seconds or more |
| D. Either of the following condition is met | (a) or (b) |
| (a) All of the following conditions are met | 1, 2 and 3 |
| 1. Battery voltage | 11 to 13 V |
| 2. CPU commanded duty | Less than 70% |
| 3. Current cut status | Not cut |
| (b) All of the following conditions are met | 4, 5 and 6 |
| 4. Battery voltage | 13 V or more |
| 5. CPU commanded duty | Less than 80% |
| 6. Current cut status | Not cut |

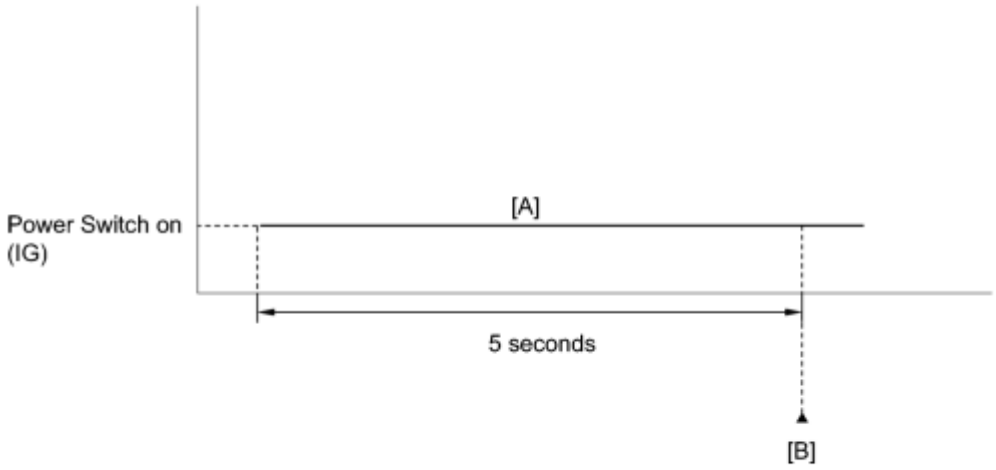
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| VVT oil control valve condition | No operation record |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| VVT oil control valve condition | Operation record |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 5 seconds [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0010.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

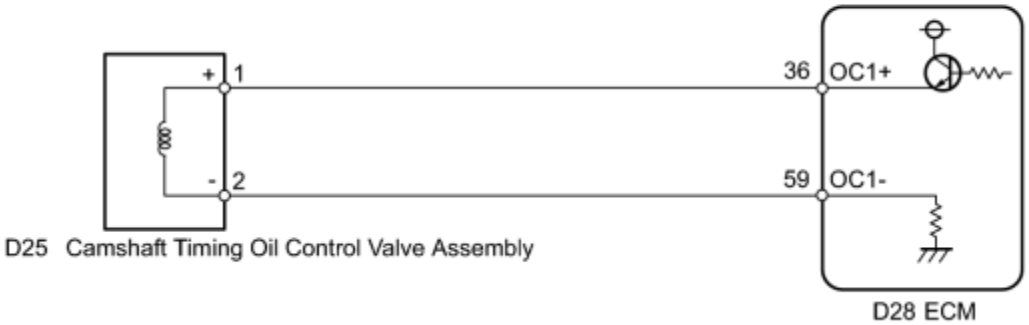
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




Y

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if

the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Warm up the engine.

(g) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(h) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

HINT:

If the result is not acceptable, cool the engine and perform the Active Test again.

(i) Start the engine when the engine coolant temperature is 30°C (86°F) or less.

(j) Turn the Techstream on.

(k) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(l) Check the engine speed while operating the camshaft timing oil control valve assembly (for intake camshaft) using the Techstream with the engine coolant temperature is 50°C (122°F) or less.

Result:

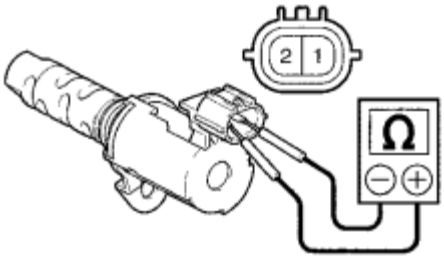
| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

NG ▶ INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY |

*1




(a) Remove the camshaft timing oil control valve assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 6.9 to 7.9 Ω |

**Text in Illustration**

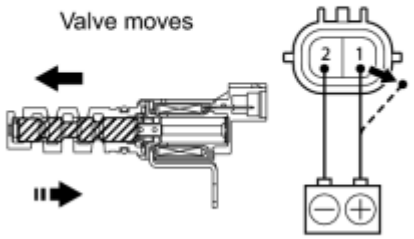
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Camshaft Timing Oil Control Valve Assembly) |

(c) Connect the positive (+) battery terminal to terminal 1 and connect the negative (-) battery terminal to terminal 2. Check the valve operation.

OK:

Valve moves quickly.

Component without harness connected:
(Camshaft Timing Oil Control Valve Assembly)




Y

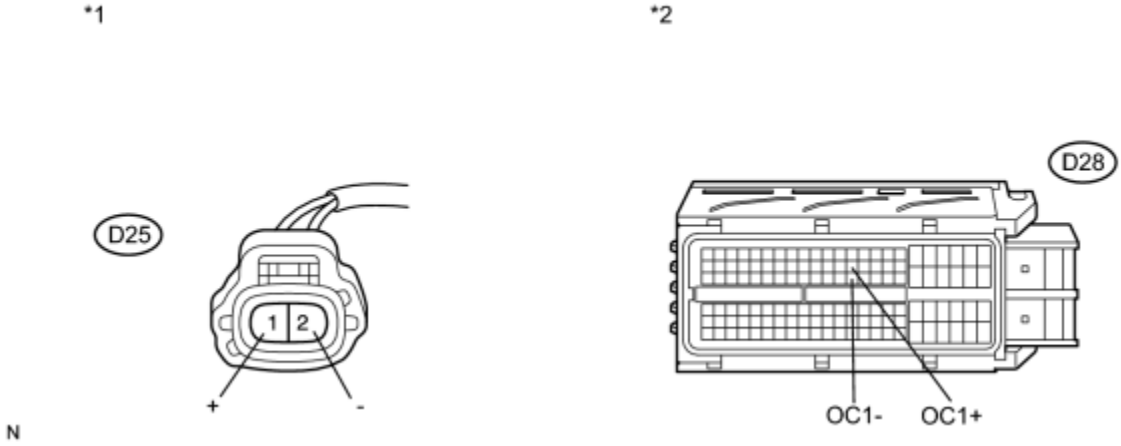
(d) Reinstall the camshaft timing oil control valve assembly.

NG ▶ REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY - ECM) |

(a) Disconnect the camshaft timing oil control valve assembly connector.




N

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D25-1 (+) - D28-36 (OC1+) | Always | Below 1 Ω |
| D25-2 (-) - D28-59 (OC1-) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D25-1 (+) or D28-36 (OC1+) - Body ground | Always | 10 kΩ or higher |
| D25-2 (-) or D28-59 (OC1-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Camshaft Timing Oil Control Valve Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the camshaft timing oil control valve assembly connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY - ECM)

OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0011 | Camshaft Position "A" - Timing Over-Advanced or System Performance (Bank 1) |
| DTC | P0012 | Camshaft Position "A" - Timing Over-Retarded (Bank 1) |

# DESCRIPTION

Refer to DTC P0010 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0011 | Valve timing is not adjusted in valve timing advance range<br><br>(1 trip detection logic) | • Valve timing<br>• Camshaft timing oil control valve assembly<br>• Oil control valve filter<br>• Camshaft timing gear assembly<br>• ECM |
| P0012 | Valve timing is not adjusted in valve timing retard range<br><br>(2 trip detection logic) | |

# MONITOR DESCRIPTION

The ECM optimizes the intake valve timing using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the camshaft timing oil control valve assembly and the VVT controller. The ECM sends a target duty-cycle control signal to the camshaft timing oil control valve assembly. This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.

If the difference between the target and actual intake valve timing is large, and changes in the actual intake valve timing are small, the ECM interprets this as a VVT controller stuck malfunction and sets a DTC.

- Example:
- A DTC is set when the following conditions "A" and "B" are met:

  a. It takes 5 seconds or more to change the valve timing by 5°CA (Condition "A").
  b. After the above condition is met, the camshaft timing oil control valve is forcibly activated for 10 seconds (Condition "B").

- The monitor will run if all of the following conditions are met:
- DTC P0011 (Advanced Cam Timing) is subject to 1 trip detection logic.
- DTC P0012 (Retarded Cam Timing) is subject to 2 trip detection logic.
- These DTCs indicate that the VVT controller cannot operate properly due to camshaft timing oil control valve assembly malfunctions or the presence of foreign objects in the camshaft timing oil control valve assembly.

  - The engine is warm (the engine coolant temperature is 75°C (167°F) or more).
  - The vehicle has been driven at 47 mph (75 km/h) or more.
  - The engine has idled for 30 seconds or more.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0011: Advanced camshaft timing<br><br>P0012: Retarded camshaft timing |
| Required Sensors/Components (Main) | Camshaft timing oil control valve and VVT controller |
| Required Sensors/Components (Related) | Crankshaft position sensor<br><br>Camshaft position sensor<br><br>Engine coolant temperature sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | Within 10 seconds |
| MIL Operation | Advanced camshaft timing: Immediately<br><br>Retarded camshaft timing: 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0010 (Camshaft timing oil control valve assembly Bank 1)<br><br>P0016 (VVT System Bank 1 - Misalignment)<br><br>P0102, P0103 (Mass Air Flow Meter sub-assembly)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0335 (Crankshaft Position Sensor) |
| Battery voltage | 11 V or more |
| Engine RPM | 500 to 4000 rpm |
| Engine coolant temperature | 75 to 100°C (167 to 212°F) |

# TYPICAL MALFUNCTION THRESHOLDS

**Advanced Camshaft Timing**

| | |
|---|---|
| All of the following conditions are met | - |
| Deviation of actual valve timing and target valve timing | More than 5°CA (crankshaft angle) |
| Valve timing | No change at advanced valve timing |

**Retarded Camshaft Timing**

| | |
|---|---|
| All of the following conditions are met | - |
| Deviation of actual valve timing and target valve timing | More than 5°CA (crankshaft angle) |
| Valve timing | No change at retarded valve timing |

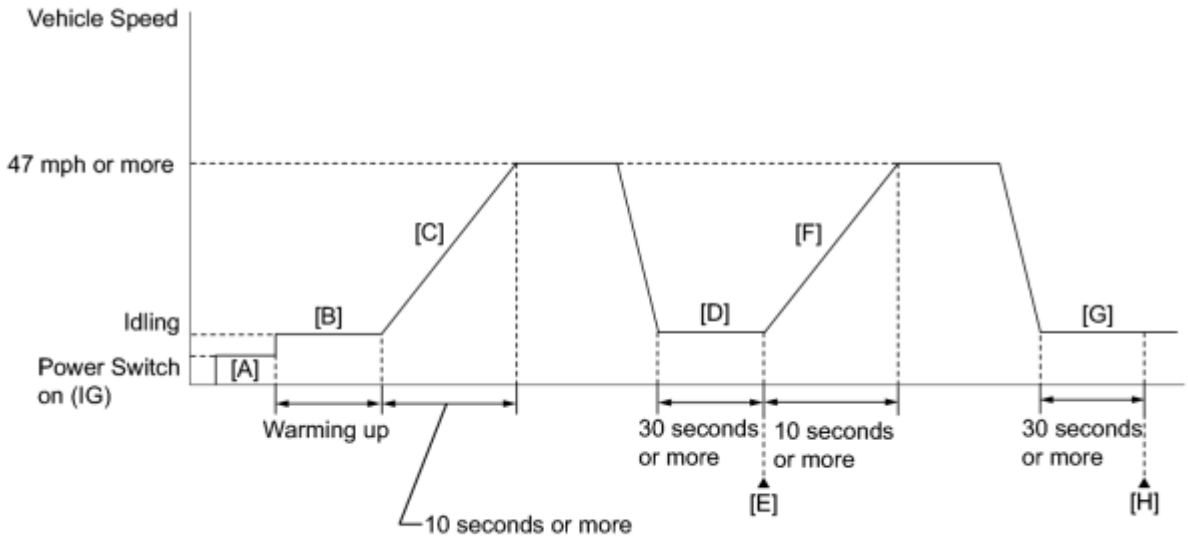
If the difference between the target and actual camshaft timing is greater than the specified value, the ECM operates the VVT actuator (camshaft timing oil control valve assembly).

Then, the ECM monitors the camshaft timing change for 10 seconds.

# MONITOR RESULT

Refer to Checking Monitor Status INFO.

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.

   HINT:

   - P0011 is output:

     Clear the DTC without using the Techstream.

   - P0012 is output:

Clear the DTC with using the Techstream.

4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more [B].
8. Accelerate the vehicle to 47 mph (75 km/h) or more for 10 seconds or more [C].
9. Idle the engine for 30 seconds or more [D].
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
11. Read the pending DTC [E].
12. If a pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P0011 or P0012.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [F] through [H].

16. Accelerate the vehicle to 47 mph (75 km/h) or more for 10 seconds or more [F].
17. Idle the engine for 30 seconds or more [G].
18. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
19. Input the DTC: P0011 or P0012.

20. Check the DTC judgment result again [H].

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

21. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P0010 INFO.

# INSPECTION PROCEDURE

NOTICE:

DTC P0011 or P0012 may be set when foreign objects in the engine oil are caught in some parts of the system. The DTC will remain set even if the system returns to normal after a short time. Foreign objects are filtered out by the oil filter.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0011 OR P0012) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0011 or P0012 is output | A |
| DTC P0011 or P0012 and other DTCs are output | B |

HINT:

If any DTCs other than P0011 or P0012 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Warm up the engine.

(g) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(h) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

HINT:

If the result is not acceptable, cool the engine and perform the Active Test again.

(i) Start the engine when the engine coolant temperature is 30°C (86°F) or less.

(j) Turn the Techstream on.

(k) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(l) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream with the engine coolant temperature at 50°C (122°F) or less.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

NG ▶ INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 3. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0011 OR P0012) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine and warm it up.

(g) Driving the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(i) Read the pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0011 or P0012 is output | B |

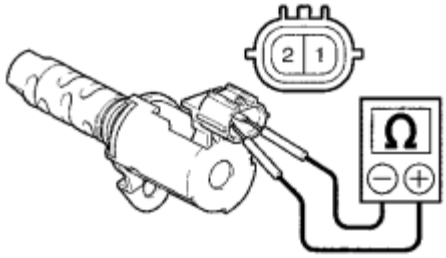
B ▶ ADJUST VALVE TIMING

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 4. | INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY |

(a) Remove the camshaft timing oil control valve assembly INFO.

*1




(b) Measure the resistance according to the value(s) in the table below.

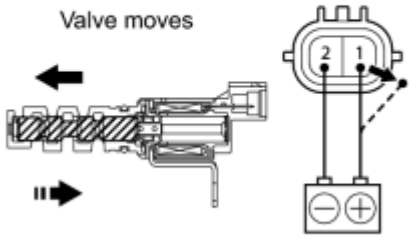
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 6.9 to 7.9 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Camshaft Timing Oil Control Valve Assembly) |

Component without harness connected:
(Camshaft Timing Oil Control Valve Assembly)




(c) Connect the positive (+) battery terminal to terminal 1 and connect the negative (-) battery terminal to terminal 2. Check the valve operation.

OK:

Valve moves quickly.

Y

(d) Reinstall the camshaft timing oil control valve assembly INFO.

NG ▶ REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

OK ▼

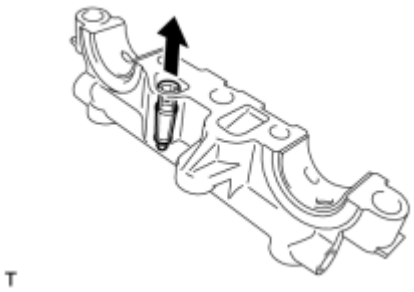
| | |
|---|---|
| 5. | INSPECT CAMSHAFT TIMING GEAR ASSEMBLY (FOR INTAKE CAMSHAFT) |

(a) Inspect the camshaft timing gear assembly (for intake camshaft) INFO.

NG ▶ REPLACE CAMSHAFT TIMING GEAR ASSEMBLY (FOR INTAKE CAMSHAFT)

OK ▼

| | |
|---|---|
| 6. | INSPECT OIL CONTROL VALVE FILTER |



T

(a) Remove the oil control valve filter INFO.

(b) Check that the filter is not clogged.

OK:

Filter is not clogged.

(c) Reinstall the oil control valve filter INFO.

NG ▶ REPLACE OIL CONTROL VALVE FILTER

OK ▼

| | |
|---|---|
| 7. | ADJUST VALVE TIMING |

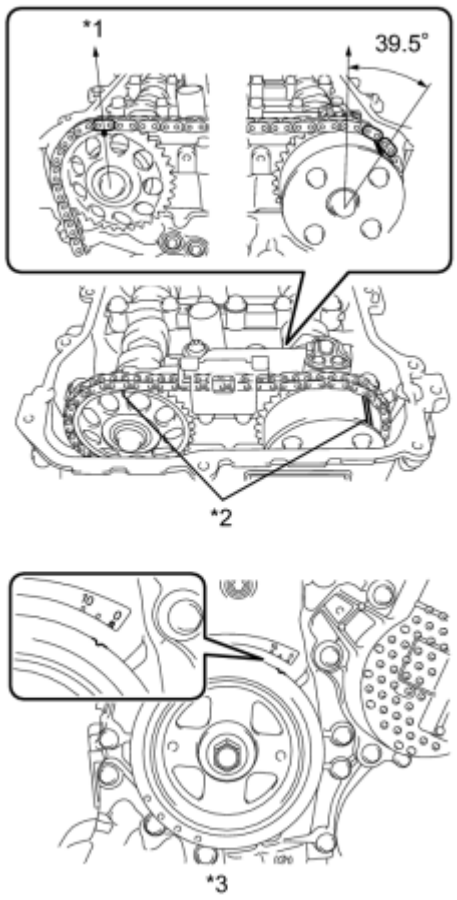
HINT:

There are no marks on the cylinder head to match-up for the purpose of checking valve timing. Valve timing can only be inspected by lining up the colored plates on the timing chain with the marks on the pulleys. It may be necessary to remove and reinstall the chain to match-up the alignment marks INFO.

# Text in Illustration

| | |
|---|---|
| *1 | Top |
| *2 | Alignment Mark |
| *3 | No. 1 Cylinder at TDC Compression |

NEXT ▼




C

| | |
|---|---|
| 8. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0011 OR P0012) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine and warm it up.

(g) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(i) Read the pending DTCs.

Result:

| Result | Proceed to |
|---|---|

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0011 or P0012 is output | B |

B ▶ REPLACE ECM

A ▶ **END**

| DTC | P0016 | Crankshaft Position - Camshaft Position Correlation (Bank 1 Sensor A) |
|---|---|---|

# DESCRIPTION

The ECM optimizes the valve timing by using the VVT (Variable Valve Timing) system to control the intake camshaft. The VVT system includes the ECM, the camshaft timing oil control valve assembly and the VVT controller (camshaft timing gear assembly). The ECM sends a target duty-cycle control signal to the camshaft timing oil control valve assembly.

This control signal regulates the oil pressure supplied to the VVT controller. The VVT controller can advance or retard the intake camshaft.

| DTC No. | Detection Condition | Trouble Area |
|---|---|---|
| P0016 | Deviation in crankshaft position sensor signal and camshaft position sensor signal<br><br>(2 trip detection logic) | • Valve timing<br>• Camshaft timing oil control valve assembly<br>• Oil control valve filter<br>• Camshaft timing gear assembly (for intake camshaft)<br>• ECM |

# MONITOR DESCRIPTION

To monitor the correlation of the intake camshaft position and crankshaft position, the ECM checks the VVT learning value while the engine is idling. The VVT learning value is calibrated based on the camshaft position and crankshaft position. The intake valve timing is set to the most retarded angle while the engine is idling. If the VVT learning value is out of specified range in consecutive driving cycles, the ECM illuminates the MIL and sets the DTC P0016.

This DTC indicates that the intake camshaft has been installed toward the crankshaft at an incorrect angle, caused by factors such as the timing chain having jumped a tooth.

This monitor begins to run after the engine has idled for 5 minutes.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0016: Camshaft Timing Misalignment at idling |
| Required Sensors/Components (Main) | VVT actuator |
| Required Sensors/Components (Related) | Camshaft position sensor<br><br>Crankshaft position sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | Within 60 seconds |
| MIL Operation | 2 driving cycles |

| | |
|---|---|
| Sequence of Operation | None |

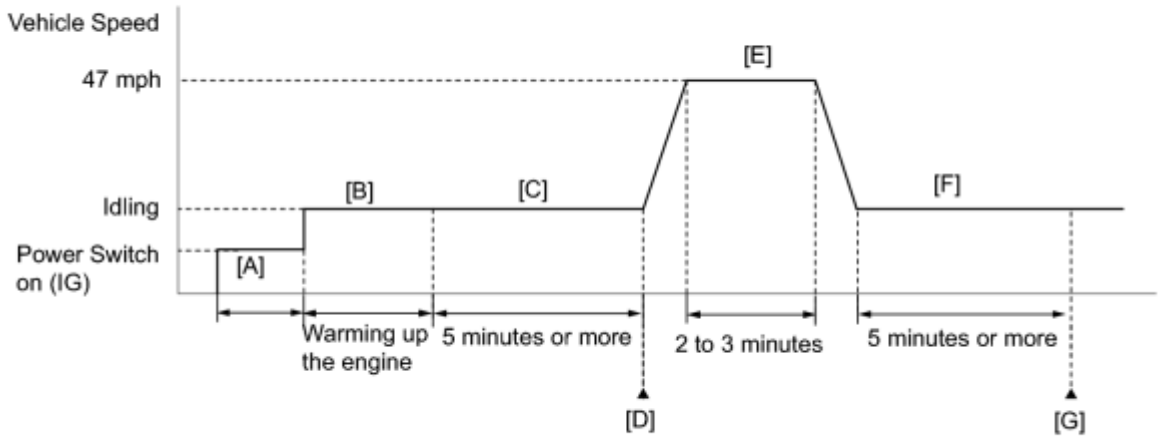
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0010 (VVT Oil Control Valve Bank 1)<br><br>P0102, P0103 (Mass Air Flow Meter Sub-assembly)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0335 (Crankshaft Position Sensor) |
| Engine RPM | 900 to 1100 rpm |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| One of the following conditions is met | - |
| VVT learning value at maximum retarded valve timing | Less than 22°CA (crankshaft angle) |
| VVT learning value at maximum retarded valve timing | More than 47°CA (crankshaft angle) |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.

5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher [B].
8. Idle the engine for 5 minutes or more [C].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
10. Read the pending DTC [D].
11. If a pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0016.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [E] through [G].

15. Drive the vehicle at 47 mph (75 km/h) for 2 to 3 minutes [E].
16. Idle the engine for 5 minutes or more [F].
17. Check the DTC judgment result [G].

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

18. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. Freeze frame data records the engine conditions when malfunctions are detected. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0016) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0016 is output | A |
| DTC P0016 and other DTCs are output | B |

HINT:

If any DTCs other than P0016 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Warm up the engine.

(g) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(h) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

HINT:

If the result is not acceptable, cool the engine and perform the Active Test again.

(i) Start the engine when the engine coolant temperature is 30°C (86°F) or less.

(j) Turn the Techstream on.

(k) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(l) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream with the engine coolant temperature at 50°C (122°F) or less.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

NG ▶ INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 3. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0016) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine and warm it up.

(g) Driving the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(i) Read the pending DTCs.

Result:

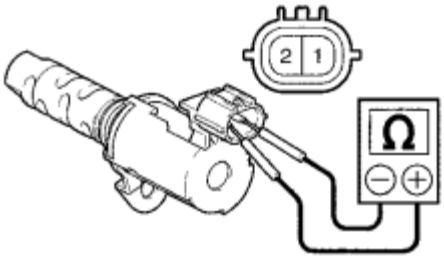
| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0016 is output | B |

B ▶ ADJUST VALVE TIMING

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 4. | INSPECT CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY |

*1




(a) Remove the camshaft timing oil control valve assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

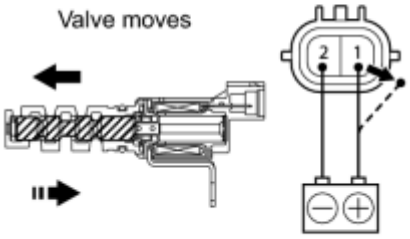
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 6.9 to 7.9 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Camshaft Timing Oil Control Valve Assembly) |

Component without harness connected:
(Camshaft Timing Oil Control Valve Assembly)




Y

(c) Connect the positive (+) battery terminal to terminal 1 and connect the negative (-) battery terminal to terminal 2. Check the valve operation.

OK:

Valve moves quickly.

(d) Reinstall the camshaft timing oil control valve assembly INFO.

NG ▶ REPLACE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

OK ▼

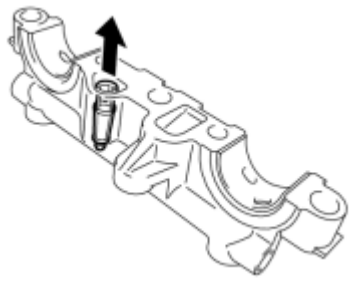
| | |
|---|---|
| 5. | INSPECT CAMSHAFT TIMING GEAR ASSEMBLY |

(a) Inspect the camshaft timing gear assembly (for intake camshaft) INFO.

NG ▶ REPLACE CAMSHAFT TIMING GEAR ASSEMBLY

OK ▼

| | |
|---|---|
| 6. | INSPECT OIL CONTROL VALVE FILTER |



T

(a) Remove the oil control valve filter INFO.

(b) Check that the filter is not clogged.

OK:

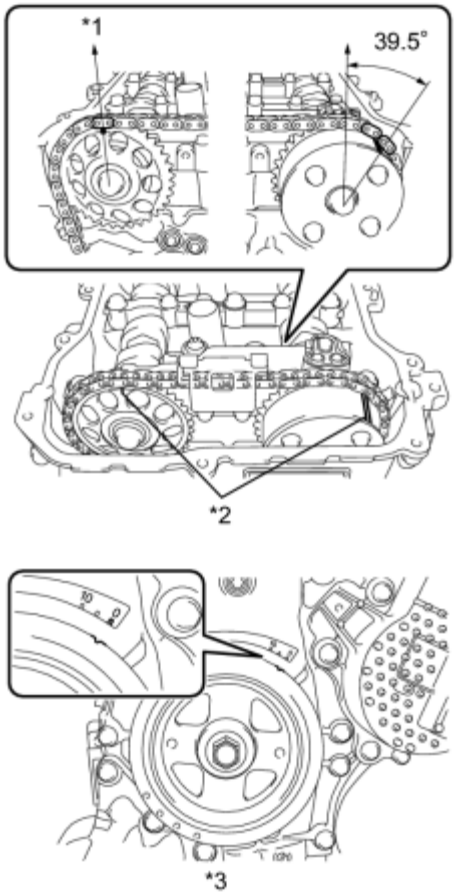
Filter is not clogged.

(c) Reinstall the oil control valve filter INFO.

NG ▶ REPLACE OIL CONTROL VALVE FILTER

OK ▼

| | |
|---|---|
| 7. | ADJUST VALVE TIMING |




HINT:

There are no marks on the cylinder head to match-up for the purpose of checking valve timing. Valve timing can only be inspected by lining up the colored plates on the timing chain with the marks on the pulleys. It may be necessary to remove and reinstall the chain to match-up the alignment marks INFO.

## Text in Illustration

| | |
|---|---|
| *1 | Top |
| *2 | Alignment Mark |
| *3 | No. 1 Cylinder at TDC Compression |

NEXT ▼

| | |
|---|---|
| 8. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0016) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine and warm it up.

(g) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(i) Read the pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0016 is output | B |

B ▶ REPLACE ECM

A ▶ **END**

| | | |
|---|---|---|
| DTC | P0031 | Oxygen (A/F) Sensor Heater Control Circuit Low (Bank 1 Sensor 1) |
| DTC | P0032 | Oxygen (A/F) Sensor Heater Control Circuit High (Bank 1 Sensor 1) |
| DTC | P101D | A/F Sensor Heater Circuit Performance Bank 1 Sensor 1 Stuck ON |

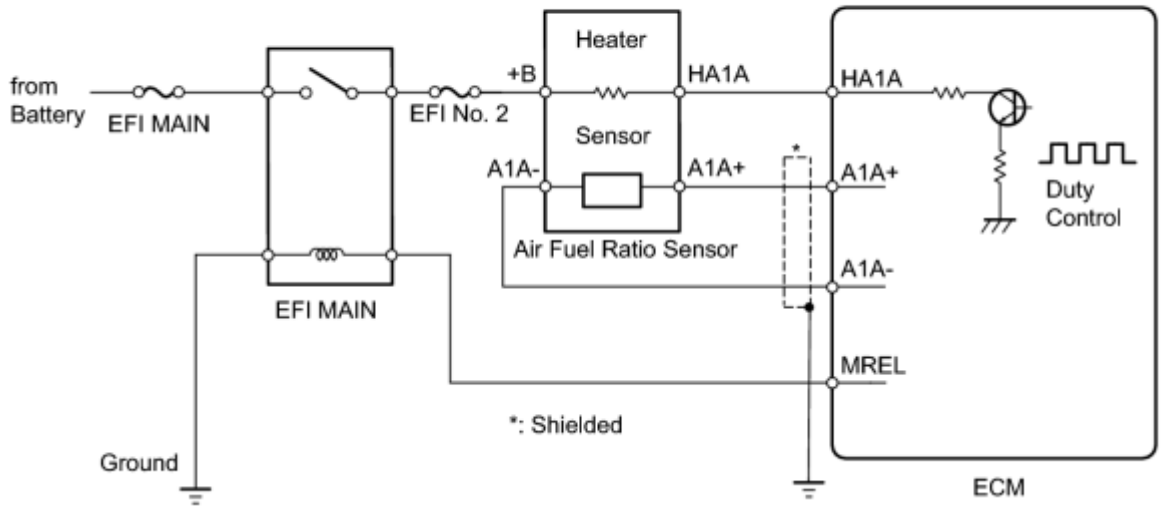
# DESCRIPTION

Refer to DTC P2195 INFO.

HINT:

- When either of these DTCs is set, the ECM enters fail-safe mode. The ECM turns off the air fuel ratio sensor heater in fail-safe mode. Fail-safe mode continues until the power switch is turned off.
- Although the DTC titles say the oxygen sensor, these DTCs relate to the air fuel ratio sensor.
- Sensor 1 refers to the sensor mounted in front of the Three-way catalytic converter and located near the engine assembly.
- The ECM uses pulse width modulation to adjust the current through the heater. The air fuel ratio sensor heater circuit uses a relay on the +B side of the circuit.

Reference (System Diagram of Sensor 1):




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0031 | The heater current is less than the specified value while the heater is operating (1 trip detection logic). | • Open in air fuel ratio sensor (sensor 1) heater circuit<br>• Air fuel ratio sensor heater (sensor 1)<br>• ECM |
| P0032 | An air fuel ratio sensor heater current failure (1 trip detection logic). | • Short in air fuel ratio sensor (sensor 1) heater circuit<br>• Air fuel ratio sensor heater (sensor 1) |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | | • ECM |
| P101D | The heater current is higher than the specified value while the heater is not operating (1 trip detection logic). | ECM |

HINT:

- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

# MONITOR DESCRIPTION

The ECM uses information from the air fuel ratio sensor to regulate the air fuel ratio and keep it close to the stoichiometric level. This maximizes the ability of the three-way catalytic converter to purify the exhaust gases.

The air fuel ratio sensor detects oxygen levels in the exhaust gas and transmits the information to the ECM. The inner surface of the sensor element is exposed to the outside air. The outer surface of the sensor element is exposed to the exhaust gas. The sensor element is made of platinum coated zirconia and includes an integrated heating element.

The zirconia element generates a small voltage when there is a large difference in the oxygen concentrations between the exhaust gas and outside air. The platinum coating amplifies this voltage generation.

The air fuel ratio sensor is more efficient when heated. When the exhaust gas temperature is low, the sensor cannot generate useful voltage signals without supplementary heating. The ECM regulates the supplementary heating using a duty-cycle approach to adjust the average current in the sensor heater element. If the heater current is outside the normal range, the signal transmitted by the air fuel ratio sensor becomes inaccurate, as a result, the ECM is unable to regulate air fuel ratio properly.

When the current in the air fuel ratio sensor heater is outside the normal operating range, the ECM interprets this as a malfunction in the sensor heater and sets a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0031: Air fuel ratio sensor heater open/short (Low electrical current)<br><br>P0032: Air fuel ratio sensor heater open/short (High electrical current)<br><br>P101D: Air fuel ratio sensor heater performance |
| Required Sensors/Components (Main) | Air fuel ratio sensor heater |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 10 seconds: P0031 |

| | |
|---|---|
| | 10.24 seconds: P0032<br><br>1 second: P101D |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**P0031:**

| | |
|---|---|
| Battery voltage | 10.5 V or more |
| Time after engine start | 10 seconds or more |
| Active heater OFF control | Not operating |
| Active heater ON control | Not operating |
| Heater output duty | 50% or more |

**P0032:**

| | |
|---|---|
| Battery voltage | 10.5 V or more |
| Time after engine start | 10 seconds or more |
| Active heater OFF control | Not operating |
| Active heater ON control | Not operating |
| Heater output duty | More than 0% |

**P101D:**

| | |
|---|---|
| Battery voltage | 10.5 V or more |
| Time after engine start | 10 seconds or more |
| Air fuel ratio sensor heater duty-cycle ratio | 10 to 60% |
| Air fuel ratio sensor heater ON current | 0.8 A or more |
| Air fuel ratio sensor heater range check low current fail (P0031) | Not detected |
| Active heater OFF control | Not operating |
| Active heater ON control | Not operating |

# TYPICAL MALFUNCTION THRESHOLDS

**P0031:**

| | |
|---|---|
| Air fuel ratio sensor heater ON current | Less than 0.8 A |

**P0032:**

| | |
|---|---|
| Air fuel ratio sensor heater output | ON |
| Hybrid IC high current limiter monitor input | Fail |

**P101D:**

| | |
|---|---|
| Air fuel ratio sensor heater OFF current | More than 11 A |
| Active heater OFF control flag for ON stuck | ON |
| Hybrid IC high current limiter monitor input | Fail |

# COMPONENT OPERATING RANGE

**P0031:**

| | |
|---|---|
| Air fuel ratio sensor heater ON current | 0.8 A or more |

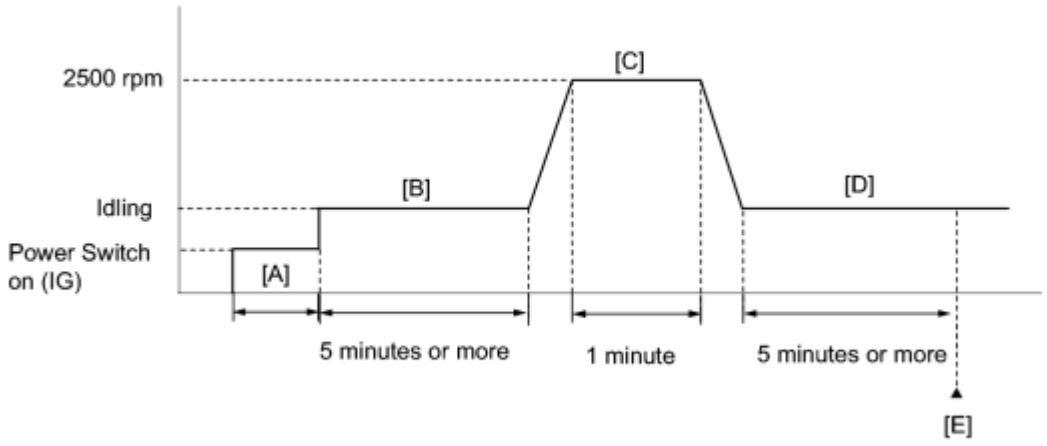
**P0032:**

| | |
|---|---|
| All of the following conditions are met | - |
| 1. Air fuel ratio sensor heater output | ON |
| 2. Hybrid IC high current limiter monitor input | Pass |

**P101D:**

| | |
|---|---|
| Air fuel ratio sensor heater OFF current | 11 A or less |

# CONFIRMATION DRIVING PATTERN



1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and idle it for 5 minutes or more [B].
8. With the vehicle stationary, depress the accelerator pedal and maintain an engine speed of 2500 rpm for 1 minute [C].
9. Idle the engine for 5 minutes or more [D].
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
11. Read the DTC [E].
12. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P0031, P0032, or P101D.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] through [D] again.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

    HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

18. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P2195 INFO.

# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE) |

*1




(a) Disconnect the air fuel ratio sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (HA1A) - 2 (+B) | 20°C (68°F) | 1.8 to 3.4 Ω |
| 1 (HA1A) - 4 (A1A-) | Always | 10 kΩ or higher |

**Text in Illustration**

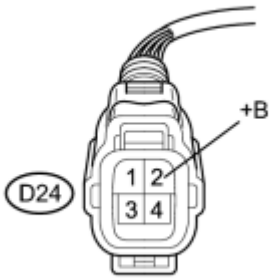
| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Air Fuel Ratio Sensor) |

(c) Reconnect the air fuel ratio sensor connector.

NG ▶ REPLACE AIR FUEL RATIO SENSOR
OK
▼

| | |
|---|---|
| 2. | CHECK TERMINAL VOLTAGE (POWER SOURCE) |

*1




(a) Disconnect the air fuel ratio sensor connector.

c

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D24-2 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Fuel Ratio Sensor) |

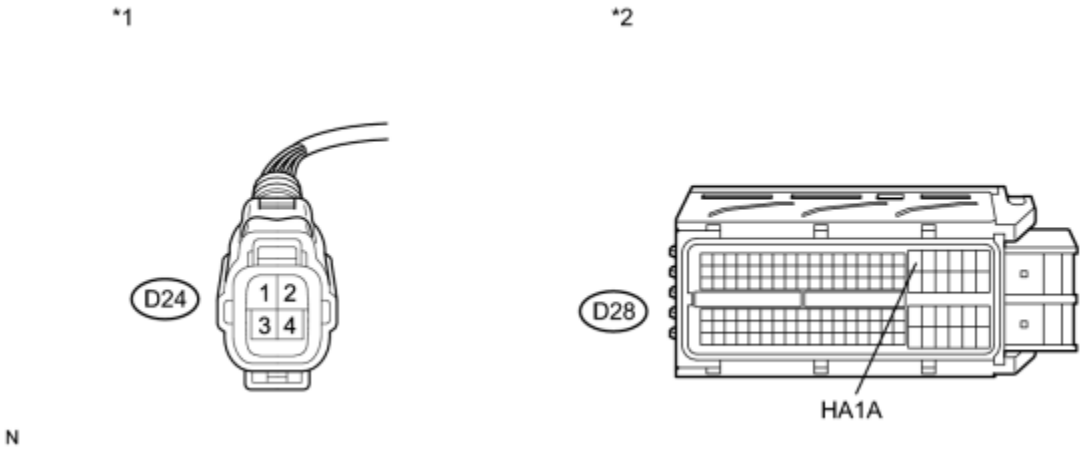
(d) Reconnect the air fuel ratio sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AIR FUEL RATIO SENSOR - EFI MAIN RELAY)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR - ECM) |

(a) Disconnect the air fuel ratio sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) - D28-18 (HA1A) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) or D28-18 (HA1A) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Fuel Ratio Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the air fuel ratio sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AIR FUEL RATIO SENSOR - ECM)

OK

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0031 OR P0032) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine.

(g) Allow the engine to idle for 5 minutes or more.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(i) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0031, P0032 or P101D is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | P0037 | Oxygen Sensor Heater Control Circuit Low (Bank 1 Sensor 2) |
| DTC | P0038 | Oxygen Sensor Heater Control Circuit High (Bank 1 Sensor 2) |
| DTC | P0141 | Oxygen Sensor Heater Circuit Malfunction (Bank 1 Sensor 2) |
| DTC | P102D | O2 Sensor Heater Circuit Performance Bank 1 Sensor 2 Stuck ON |

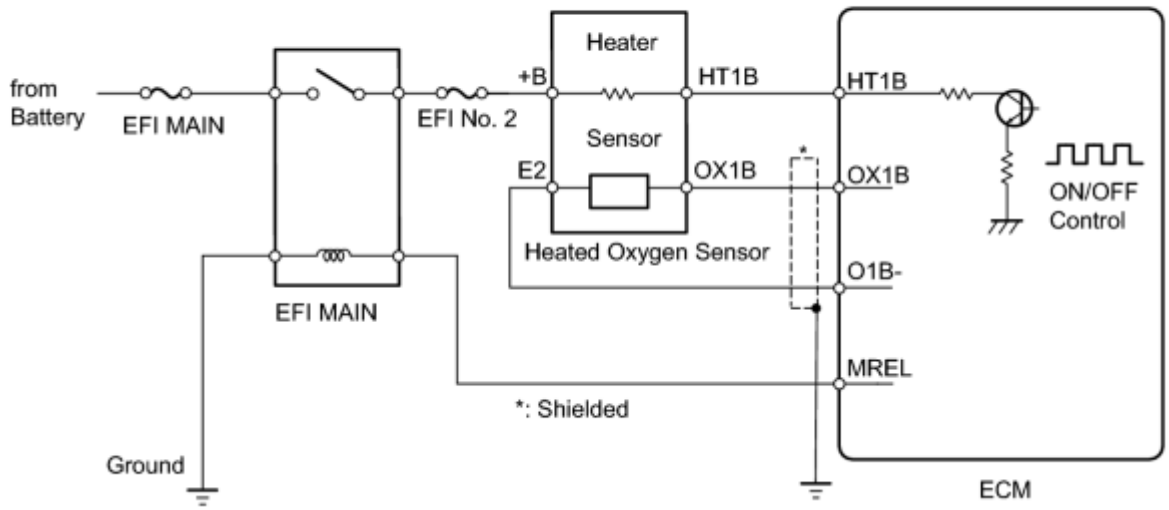
# DESCRIPTION

Refer to DTC P0136 INFO.

HINT:

- Sensor 2 refers to the sensor mounted behind the three-way catalytic converter and located far from the engine assembly.
- When any of these DTCs are set, the ECM enters fail-safe mode. The ECM turns off the heated oxygen sensor heater in fail-safe mode. Fail-safe mode continues until the power switch is turned off.
- The ECM uses pulse width modulation to adjust the current through the heater. The heated oxygen sensor heater circuit uses a relay on the +B side of the circuit.

Reference (System Diagram of Sensor 2):




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0037 | The heater current less than the specified value while the heater is operating (1 trip detection logic). | • Open in heated oxygen sensor (sensor 2) heater circuit<br>• Heated oxygen sensor (sensor 2) heater<br>• ECM |
| P0038 | The heater current is higher than the specified value while the heater is operating (1 trip detection logic). | • Short in heated oxygen sensor (sensor 2) heater circuit<br>• Heated oxygen sensor (sensor 2) heater |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | | • ECM |
| P0141 | The cumulative heater resistance correction value exceeds the threshold (2 trip detection logic). | • Open or short in heated oxygen sensor (sensor 2) heater circuit<br>• Heated oxygen sensor (sensor 2) heater<br>• ECM |
| P102D | The heater current is higher than the specified value while the heater is not operating (1 trip detection logic). | ECM |

HINT:

- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

# MONITOR DESCRIPTION

The sensing portion of the heated oxygen sensor has a zirconia element which is used to detect the oxygen concentration in the exhaust gas. If the zirconia element is at the appropriate temperature, and the difference between the oxygen concentrations surrounding the inside and outside surfaces of the sensor is large, the zirconia element generates voltage signals. In order to increase the oxygen concentration detecting capacity of the zirconia element, the ECM supplements the heat from the exhaust with heat from a heating element inside the sensor.

## Heated Oxygen Sensor Heater Range Check (P0037, P0038 and P102D):

- The ECM monitors the current applied to the heated oxygen sensor heater to check the heater for malfunctions.

If the heater current is outside the normal range, the signal transmitted by the heated oxygen sensor becomes inaccurate. When the current in the heated oxygen sensor heater is outside the normal operating range, the ECM interprets this as a malfunction in the sensor heater and stores a DTC.

## Heated Oxygen Sensor Heater Performance (P0141):

- After the accumulated heater ON time exceeds 100 seconds, the ECM calculates the heater resistance using battery voltage and the current applied to the heater. If the resistance is above the threshold value, the ECM determines that there is a malfunction in the heated oxygen sensor heater and stores DTC P0141.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0037: Heated oxygen sensor heater (sensor 2) open/short (Low |

| | |
|---|---|
| | electrical current)<br><br>P0038: Heated oxygen sensor heater (sensor 2) open/short (High electrical current)<br><br>P0141: Heated oxygen sensor heater performance (sensor 2)<br><br>P102D: Heated oxygen sensor heater ON stuck (sensor 2) |
| Required sensors/Components (Main) | Heated oxygen sensor heater (sensor 2) |
| Required sensors/Components (Related) | - |
| Frequency of operation | Continuous: P0037, P0038, P102D<br><br>Once per driving cycle: P0141 |
| Duration | 0.5 seconds: P0037, P102D<br><br>1 second: P0038<br><br>10 seconds: P0141 |
| MIL operation | Immediately: P0037, P0038, P102D<br><br>2 driving cycles: P0141 |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**P0037 (Case 1)**

| | |
|---|---|
| Battery voltage | 10.5 V or more |
| Engine | Running |
| Starter | OFF |
| Catalyst active air fuel ratio control | Not operating |
| Time after heater ON | 10 seconds or more |
| Learned heater OFF current operation | Complete |
| Heater OFF current learned value | Acquired |
| Heated oxygen sensor heater high current fail (P0038) | Not detected |

**P0037 (Case 2)**

| | |
|---|---|
| Battery voltage | 10.5 V or more |

| | |
|---|---|
| Time after heater ON | 10 seconds or more |
| Learned heater OFF current operation | Complete |
| Heated oxygen sensor heater OFF current | More than 3.5 A |
| Hybrid IC high current limiter port | Fail |
| Heated oxygen sensor heater high current fail (P0038) | Not detected |

**P0038**

| | |
|---|---|
| Battery voltage | 10.5 V or more |
| Engine | Running |
| Starter | OFF |
| Catalyst active air fuel ratio control | Not operating |
| Time after heater ON | 10 seconds or more |
| Learned heater OFF current operation | Complete |

**P0141 (Case 1)**

| | |
|---|---|
| Heated oxygen sensor heater circuit fail (P0037 and P0038) | Not detected |
| Battery voltage | 10.5 V or more |
| Fuel cut | OFF |
| Time after fuel cut ON to OFF | 30 seconds or more |
| Accumulated heater ON time | 100 seconds or more |
| Learned heater OFF current operation | Complete |

**P0141 (Case 2)**

| | |
|---|---|
| Duration that rear heated oxygen sensor impedance is less than 15 kΩ | 2 seconds or more |

**P102D**

| | |
|---|---|
| Battery voltage | 10.5 V or more |
| Time after heater ON | 10 seconds or more |
| Learned heater OFF current operation | Complete |
| Heated oxygen sensor heater OFF current | More than 3.5 A |
| Hybrid IC high current limiter port | Fail |
| Heated oxygen sensor heater high current fail (P0038) | Not detected |

# TYPICAL MALFUNCTION THRESHOLDS

**P0037 (Case 1)**

| | |
|---|---|
| Heater ON current - Learned heater OFF current | 0.3 A or less |

**P0037 (Case 2)**

| | |
|---|---|
| Heated oxygen sensor heater ON current | 1 A or less |

**P0038**

| | |
|---|---|
| Hybrid IC high current limiter port | Fail |
| Heated oxygen sensor heater output | ON |

**P0141**

| | |
|---|---|
| Accumulated heater resistance | Varies with sensor element temperature (Example: Higher than 23 Ω) |

**P102D**

| | |
|---|---|
| Heated oxygen sensor heater ON current | Higher than 1 A |

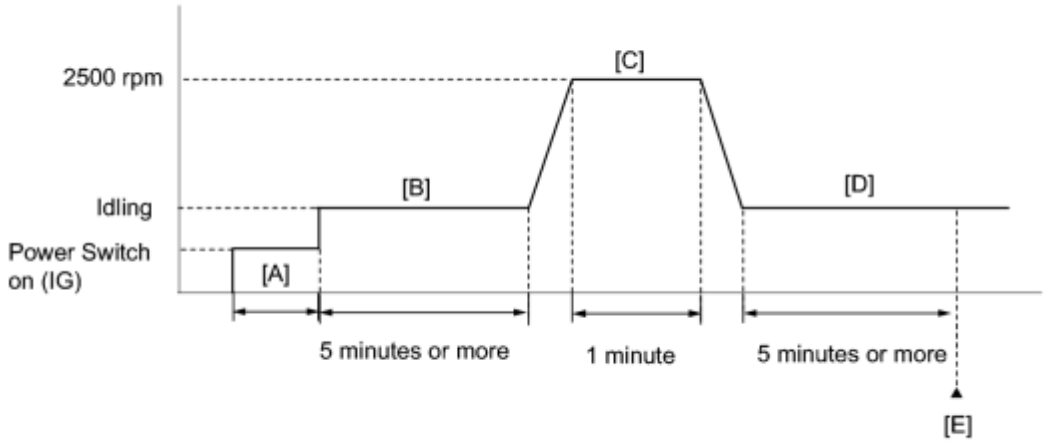
# COMPONENT OPERATING RANGE

| | |
|---|---|
| Heated oxygen sensor heater current | 0.4 to 1 A (when engine idles, heated oxygen sensor warmed up and battery voltage 11 to 14 V) |

# MONITOR RESULT

- Refer to Checking Monitor Status INFO.

# CONFIRMATION DRIVING PATTERN



1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and idle it for 5 minutes or more [B].
8. With the vehicle stationary, depress the accelerator pedal and maintain an engine speed of 2500 rpm for 1 minute [C].
9. Idle the engine for 5 minutes or more [D].
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
11. Read the pending DTC [E].
12. If a pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P0037, P0038, P0141, or P102D.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] through [D] again.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

18. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P0136 INFO.

# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

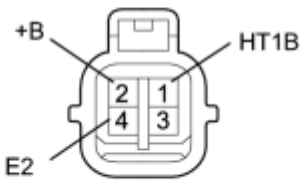
HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE) |

*1




(a) Disconnect the heated oxygen sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (HT1B) - 2 (+B) | 20°C (68°F) | 11 to 16 Ω |
| 1 (HT1B) - 4 (E2) | Always | 10 kΩ or higher |

**Text in Illustration**

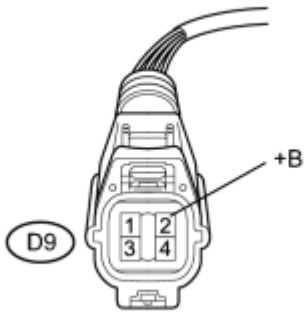
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Heated Oxygen Sensor (Sensor 2)) |

(c) Reconnect the heated oxygen sensor connector.

NG ▶ REPLACE HEATED OXYGEN SENSOR
OK
▼

| | |
|---|---|
| 2. | CHECK TERMINAL VOLTAGE (POWER SOURCE) |

*1




(a) Disconnect the heated oxygen sensor connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D9-2 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of harness connector<br><br>( to Heated Oxygen Sensor (Sensor 2)) |

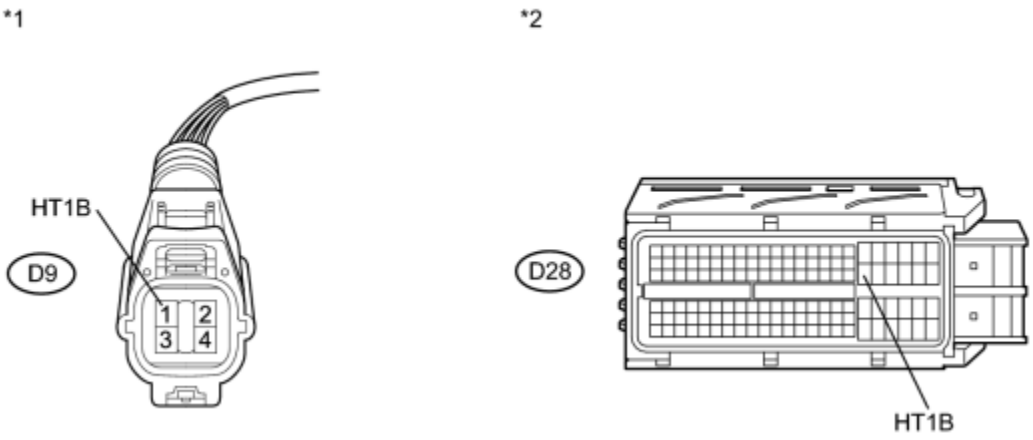
(d) Reconnect the heated oxygen sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (HEATED OXYGEN SENSOR - EFI MAIN RELAY)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM) |

(a) Disconnect the heated oxygen sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D9-1 (HT1B) - D28-41 (HT1B) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D9-1 (HT1B) or D28-41 (HT1B) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of harness connector<br><br>(to Heated Oxygen Sensor (Sensor 2)) | *2 | Front view of harness connector<br><br>(to ECM) |

(d) Reconnect the heated oxygen sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (HEATED OXYGEN SENSOR - ECM)

OK

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0037, P0038, P0141 OR P0101D) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine.

(g) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(i) Read the pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0037, P0038, P0141 or P102D is output | B |

B REPLACE ECM

A **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | P0101 | Mass Air Flow Circuit Range / Performance Problem |
|---|---|---|

# DESCRIPTION

Refer to DTC P0102 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0101 | Conditions (a), (b), (c), (d) and (e) continue for more than 10 seconds (2 trip detection logic):<br><br>(a) Engine running<br><br>(b) Engine coolant temperature 70°C (158°F) or higher<br><br>(c) Throttle position sensor voltage 0.2 to 2 V<br><br>(d) Average engine load value ratio less than 0.829, or more than 1.153 (varies with estimated engine load)<br><br>Average engine load value ratio = Average engine load based on mass air flow meter output / Average engine load estimated from driving conditions<br><br>(e) Average air fuel ratio less than -20%, or more than 20% | • Mass air flow meter sub-assembly<br>• Intake system<br>• PCV hose connections<br>• EGR valve assembly |

# MONITOR DESCRIPTION

The mass air flow meter sub-assembly is a sensor that measures the amount of air flowing through the throttle valve. The ECM uses this information to determine the fuel injection time and to provide an appropriate air fuel ratio. Inside the mass air flow meter sub-assembly, there is a heated platinum wire which is exposed to the flow of intake air. By applying a specific electrical current to the wire, the ECM heats it to a specific temperature. The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant current value, the ECM varies the voltage applied to the mass air flow meter sub-assembly. The voltage level is proportional to the air flow through the sensor, and the ECM uses it to calculate the intake air volume.

The ECM monitors the average engine load value ratio to check the mass air flow meter sub-assembly for malfunctions. The average engine load value ratio is obtained by comparing the average engine load calculated from the mass air flow meter sub-assembly output to the average engine load estimated from the driving conditions, such as the engine speed and the throttle opening angle. If the average engine load value ratio is below the threshold value, the ECM determines that the intake air volume is low, and if the average engine load value ratio is above the threshold value, the ECM determines that the intake air volume is high.

If this is detected in 2 consecutive driving cycles, the MIL is illuminated and the DTC is set.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0101: Mass air flow meter rationality |
| Required Sensors/Components (Main) | Mass air flow meter sub-assembly |
| Required Sensors/Components (Related) | Crankshaft position sensor<br><br>Camshaft position sensor<br><br>Engine coolant temperature sensor<br><br>Throttle position sensor |
| Frequency of Operation | Continuous |
| Duration | 10 times |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Time after engine starts | 5 seconds or more |
| Battery voltage | 10.5 V or more |
| Throttle position (Throttle position sensor voltage) | 0.2 to 2 V |
| Estimated Load | 30 to 70% |
| Engine coolant temperature | 70°C (158°F) or more |
| Mass air flow meter circuit (P0102, P0103) | OK |
| Intake air temperature sensor circuit (P0112, P0113) | OK |
| Engine coolant temperature sensor circuit (P0115, P0117, P0118) | OK |
| Crankshaft position sensor circuit (P0335) | OK |
| Throttle position sensor circuit (P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135) | OK |
| EVAP system pressure sensor circuit (P0452, P0453) | OK |
| EVAP leak detection pump (P2401, P2402) | OK |
| EVAP system vent valve (P2419, P2420) | OK |

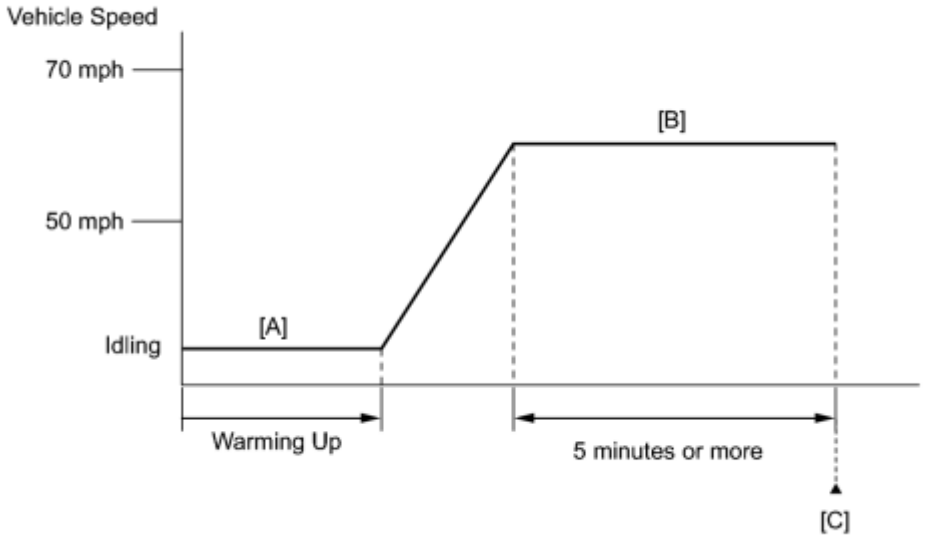
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Both of the following conditions 1 and 2 are met | - |
| 1. Averaged engine load value ratio | Less than 0.829, or more than 1.153 (varies with estimated engine load) |
| 2. Averaged air fuel ratio | Less than -20%, or more than 20% |

# WIRING DIAGRAM

Refer to DTC P0102 INFO.

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG).
3. Turn the Techstream on.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
5. Turn the power switch off and wait for 30 seconds.
6. Turn the power switch on (IG) and turn the Techstream on.
7. Put the engine in inspection mode INFO.
8. Start the engine and warm it up until the engine coolant temperature reaches 70°C (158°F) or higher [A].
9. Drive the vehicle at approximately 50 mph (80 km/h) to 70 mph (112 km/h) for 5 minutes or more [B].

   HINT:

   Drive while keeping the engine load as stable as possible.

10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
11. Read the pending DTC [C].
12. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P0101.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
18. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0101) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0101 is output | A |
| DTC P0101 and other DTCs are output | B |

HINT:

If any DTCs other than P0101 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks from the intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 3. | CHECK PCV HOSE CONNECTIONS |

(a) Check the PCV hose connections.

OK:

PCV hose is connected correctly and is not damaged.

NG ▶ REPAIR OR REPLACE PCV HOSE

OK

| | |
|---|---|
| 4. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | **EGR Step Position (Active Test)** | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE MASS AIR FLOW METER SUB-ASSEMBLY

A ▼

| | |
|---|---|
| 5. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 6. | REPLACE MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Replace the mass air flow meter sub-assembly INFO.

NEXT ▼

| | |
|---|---|
| 7. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P0101.

(l) Check the DTC judgment result.

NEXT ▶ **END**

| | | |
|---|---|---|
| DTC | P0102 | Mass or Volume Air Flow Circuit Low Input |
| DTC | P0103 | Mass or Volume Air Flow Circuit High Input |

# DESCRIPTION

The mass air flow meter sub-assembly is a sensor that measures the amount of air flowing through the throttle valve.

The ECM uses this information to determine the fuel injection time and to provide the appropriate air fuel ratio.

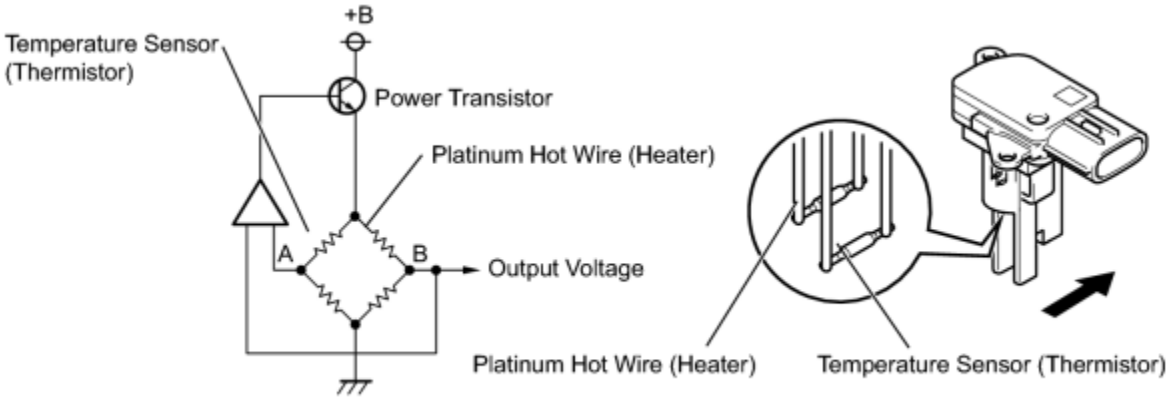
Inside the mass air flow meter sub-assembly, there is a heated platinum wire which is exposed to the flow of intake air by applying a specific electrical current to the wire.

The flow of incoming air cools both the wire and an internal thermistor, affecting their resistance. To maintain a constant temperature value of the hot wire, current is applied to these components in the mass air flow meter sub-assembly. The voltage level is proportional to the airflow through the sensor, and the ECM uses it to calculate the intake air volume.

The circuit is constructed so that the platinum hot wire and the temperature sensor create a bridge circuit, and the power transistor is controlled so that the potentials of A and B remain equal to maintain the predetermined temperature.

HINT:

When either of these DTCs are set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is calculated by the ECM, according to the engine speed and throttle valve position. Fail-safe mode continues until a pass condition is detected.




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0102 | Mass air flow meter voltage less than 0.2 V for 3 seconds<br><br>(1 trip detection logic) | • Open or short in mass air flow meter sub-assembly circuit<br>• Mass air flow meter sub-assembly<br>• ECM |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0103 | Mass air flow meter voltage more than 4.9 V for 3 seconds<br><br>(1 trip detection logic) | • Open or short in mass air flow meter sub-assembly circuit<br>• Mass air flow meter sub-assembly<br>• ECM |

HINT:

When any of these DTCs are set, check the air-flow rate by entering the following menus: Powertrain / Engine and ECT / Data List / MAF.

| Mass Air Flow Rate (gm/sec) | Malfunction |
|---|---|
| Approximately 0.0 | • Open in mass air flow meter sub-assembly power source circuit<br>• Open or short in VG circuit |
| 271.0 or more | Open in E2G circuit |

# MONITOR DESCRIPTION

If there is a defect in the mass air flow meter sub-assembly or an open or short circuit, the voltage level deviates from the normal operating range. The ECM interprets this deviation as a malfunction in the mass air flow meter sub-assembly circuit and sets a DTC.

Example:

When the sensor output voltage remains less than 0.2 V, or more than 4.9 V, for more than 3 seconds, the ECM sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 3 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0102: Mass air flow meter range check (Low voltage)<br><br>P0103: Mass air flow meter range check (High voltage) |
| Required Sensors/Components (Main) | Mass air flow meter sub-assembly |
| Required Sensors/Components (Related) | Crankshaft position sensor<br><br>Throttle position sensor |
| Frequency of Operation | Continuous |
| Duration | 3 seconds |
| MIL Operation | Immediately: Engine speed less than 4000 rpm<br><br>2 driving cycles: Engine speed 4000 rpm or more |

| | |
|---|---|
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

# TYPICAL MALFUNCTION THRESHOLDS

**P0102:**

| | |
|---|---|
| Mass air flow meter voltage | Less than 0.2 V |

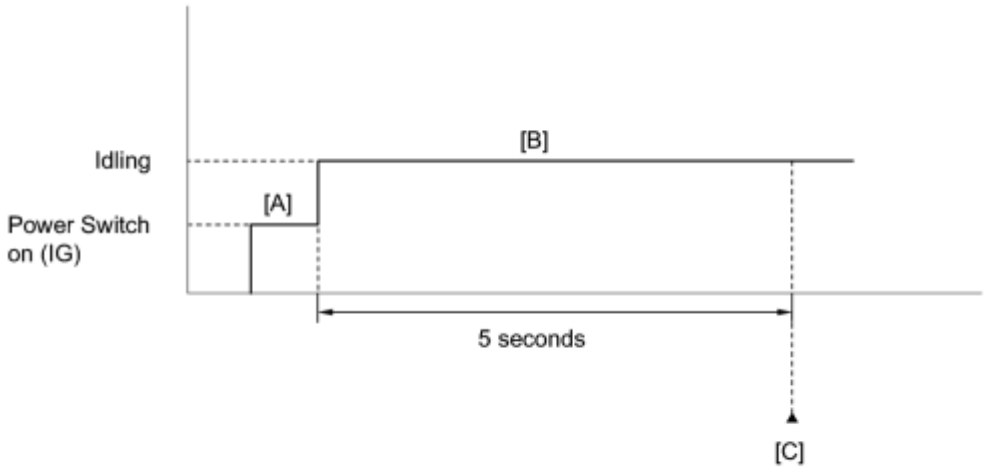
**P0103:**

| | |
|---|---|
| Mass air flow meter voltage | More than 4.9 V |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Mass air flow meter voltage | Between 0.2 V and 4.9 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].

6. Put the engine in inspection mode INFO.
7. Start the engine.
8. Idle the engine for 5 seconds [B].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTC [C].
11. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0102 or P0103.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

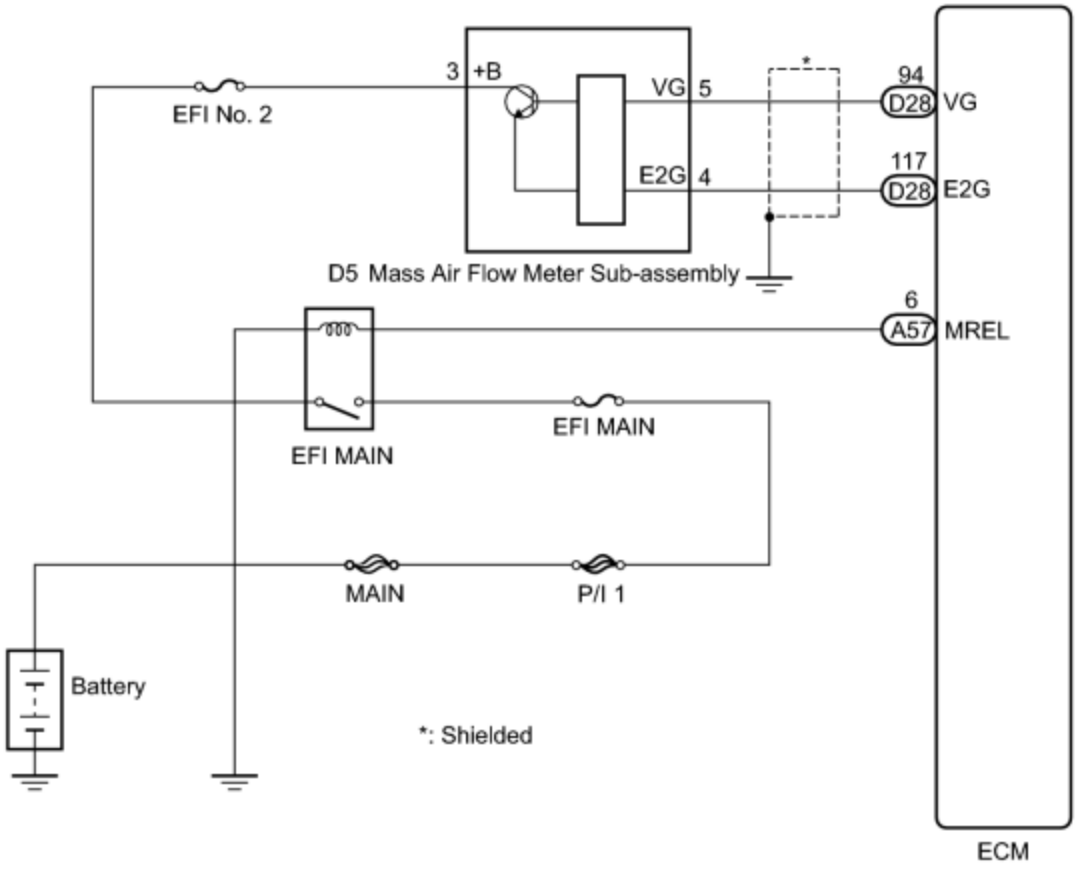
17. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.

- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




c

# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | READ DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0102 is output | A |
| DTC P0103 is output | B |

B ▶ CHECK HARNESS AND CONNECTOR (SENSOR GROUND)

A ▼

| | |
|---|---|
| 2. | INSPECT MASS AIR FLOW METER SUB-ASSEMBLY (POWER SOURCE VOLTAGE) |

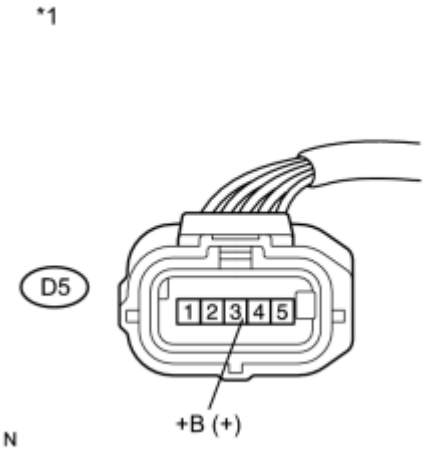
(a) Disconnect the mass air flow meter sub-assembly connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D5-3 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |




**Text in Illustration**

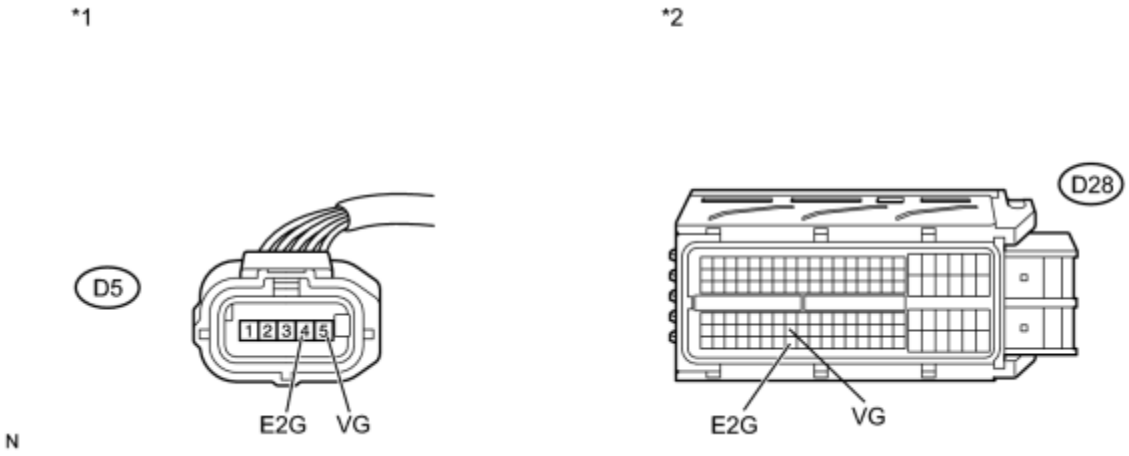
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Mass Air Flow Meter Sub-assembly) |

(d) Reconnect the mass air flow meter sub-assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (EFI MAIN RELAY - MASS AIR FLOW METER SUB-ASSEMBLY)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM) |




(a) Disconnect the mass air flow meter sub-assembly connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D5-5 (VG) - D28-94 (VG) | Always | Below 1 Ω |
| D5-4 (E2G) - D28-117 (E2G) | | |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D5-5 (VG) or D28-94 (VG) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Mass Air Flow Meter Sub-assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the mass air flow meter sub-assembly connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)

OK ▼

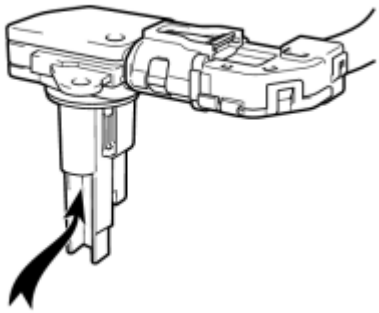
| | |
|---|---|
| 4. | INSPECT MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Perform On-vehicle inspection INFO.

(b) Perform Inspection INFO.

(c) Inspect the function of the mass air flow meter sub-assembly.

(1) Remove the mass air flow meter sub-assembly with the connector connected.



P

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Turn the Techstream on.

(5) Enter the following menus: Powertrain / Engine and ECT / Data List / MAF.

(6) Blow air to the mass air flow meter sub-assembly and check that the intake air amount reading changes.

OK:

The reading changes.

NG ▶ REPLACE MASS AIR FLOW METER SUB-ASSEMBLY
OK ▶ **REPLACE ECM**

| 5. | CHECK HARNESS AND CONNECTOR (SENSOR GROUND) |
|---|---|

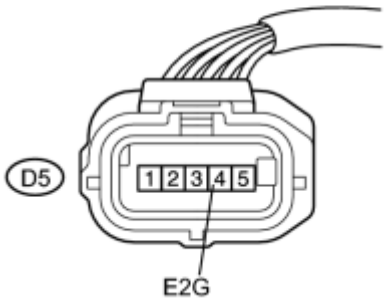
(a) Disconnect the mass air flow meter meter sub-assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D5-4 (E2G) - Body ground | Always | Below 1 Ω |




N

**Text in Illustration**

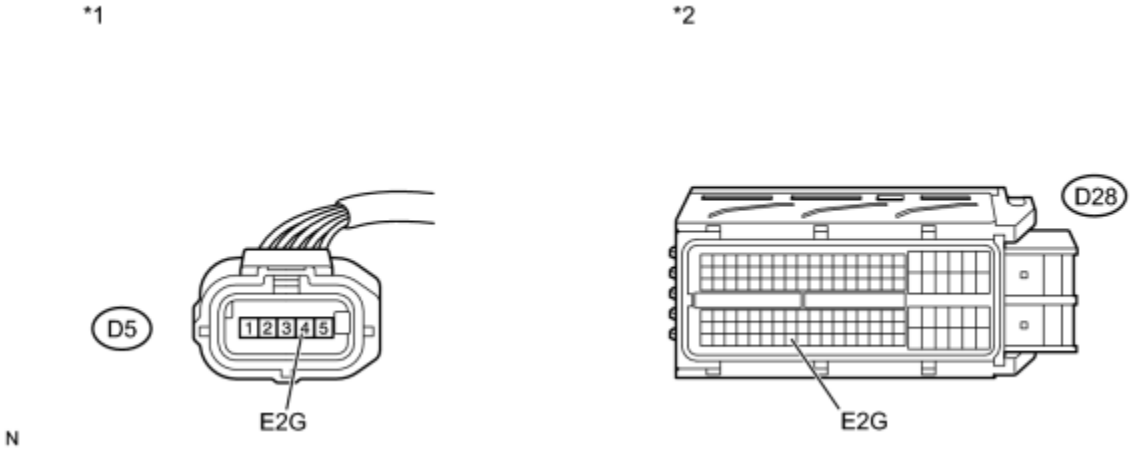
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Mass Air Flow Meter Sub-assembly) |

(c) Reconnect the mass air flow meter sub-assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)
OK ▶ **REPLACE MASS AIR FLOW METER SUB-ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM) |

(a) Disconnect the mass air flow meter sub-assembly connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D5-4 (E2G) - D28-117 (E2G) | Always | Below 1 Ω |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Mass Air Flow Meter Sub-assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the mass air flow meter sub-assembly connector.

(e) Reconnect the ECM connector.

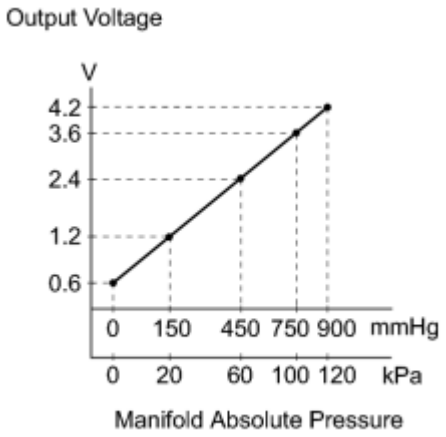
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)

OK ▶ **REPLACE ECM**

| DTC | P0106 | Manifold Absolute Pressure / Barometric Pressure Circuit Range / Performance Problem |
|---|---|---|

# DESCRIPTION

The manifold absolute pressure sensor detects pressure inside the intake manifold as an absolute pressure with a built-in sensor and outputs a voltage. Based on the voltage from the manifold absolute pressure sensor, the ECM controls the EGR, purge VSV, and detects errors in the pressure sensor using the changes in pressure.




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0106 | Difference between the intake manifold pressures after and before the engine start remains more than -3kPa (-22.5 mmHg) for 6 seconds or more (2 trip detection logic). | • Intake system<br>• Manifold absolute pressure sensor |

# MONITOR DESCRIPTION

The manifold absolute pressure sensor detects the intake manifold pressure as a voltage using a built-in sensor. The ECM calculates intake manifold pressure based on this voltage and also calculates the EGR valve and purge VSV opening amount according to changes in the intake manifold pressure. When the atmospheric pressure drops below the intake manifold pressure by 3 kPa (22.5 mmHg) or more, the ECM interprets this as a malfunction in the manifold absolute pressure sensor and sets P0106.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0106: Manifold absolute pressure sensor stuck |
| Required Sensor/Components (Main) | Manifold absolute pressure sensor |
| Required Sensor/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 6 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0010 (Camshaft timing oil control valve assembly Bank 1)<br><br>P0011 (VVT System Bank 1 - Advance)<br><br>P0012 (VVT System Bank 1 - Retard)<br><br>P0016 (VVT System Bank 1 - Misalignment)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0401 (EGR System (Closed))<br><br>P106A (Evaporative Emission Control System Pressure Sensor - Manifold Pressure Sensor Correlation) |
| Battery voltage | 10.5 V or more |
| Engine coolant temperature | 30°C (86°F) or more |
| Intake air temperature | -10°C (14°F) or more |
| Engine speed | 1000 rpm or more |
| Throttle position | Less than 2° |
| EGR active open for repair | Not activated |
| EGR duty | 20 steps or more |
| Atmospheric pressure | 76 kPa (570 mmHg) or more |

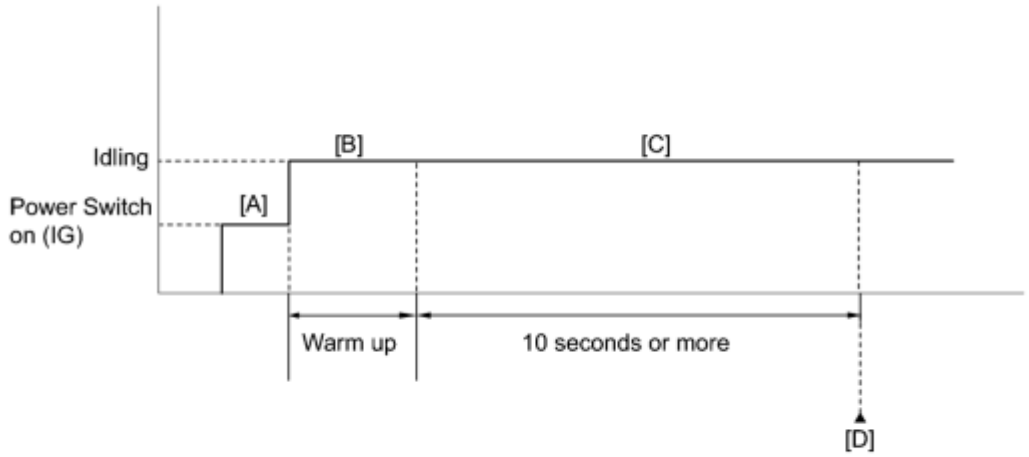
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Difference between manifold absolute pressure sensor and atmospheric pressure | More than -3 kPa (-22.5 mmHg) |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Difference between manifold absolute pressure sensor and atmospheric pressure | -3 kPa (-22.5 mmHg) or less |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up (until the engine coolant temperature is 75°C (167°F) or higher) [B].
8. Move the shift lever to N.
9. Idle the engine for 10 seconds or more [C].
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
11. Read Pending DTC [D].
12. If the pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P0106.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed |

| Techstream Display | Description |
|---|---|
| | ○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [C] again.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

18. If the test result is INCOMPLETE or UNKNOWN, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTC OUTPUT (IN ADDITION TO P0106) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(d) Read the DTCs.

**Result**

| Result | Proceed to |
|---|---|
| DTC P0106 is output | A |
| DTC P0106 and other DTCs are output | B |

HINT:

If any DTCs other than P0106 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (MANIFOLD ABSOLUTE PRESSURE SENSOR) |

(a) Connect the Techstream to the DLC3.

(b) Put the engine in inspection mode INFO.

(c) Start the engine and warm it up.

(d) Turn the Techstream on.

(e) Enter the following menus: Powertrain / Engine and ECT / Data List / MAP.

(f) Read the MAP value at idling and 2500 rpm.

Standard:

| Engine condition | Tester Display |
|---|---|
| Power switch on (IG) | 80 to 110 kPa |
| Idling | 28 to 48 kPa |
| 2500 rpm | 22 to 50 kPa |

NG ▶ CHECK INTAKE SYSTEM

OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 3. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

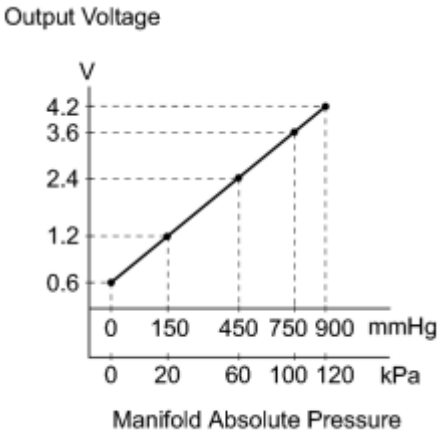
No leaks in the intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM
OK ▶ **REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR**

| | | |
|---|---|---|
| DTC | P0107 | Manifold Absolute Pressure / Barometric Pressure Circuit Low Input |
| DTC | P0108 | Manifold Absolute Pressure / Barometric Pressure Circuit High Input |

# DESCRIPTION

The manifold absolute pressure sensor detects pressure inside the intake manifold as an absolute pressure with a built-in sensor and outputs a voltage. Based on the voltage from the vacuum sensor, the ECM controls the EGR, purge VSV, and corrects any errors in the pressure sensor due to changes in pressure.




| DTC No. | DTC Detecting Condition | Trouble Area |
|---|---|---|
| P0107 | The output voltage from the manifold absolute pressure sensor less than 0.5 V for 0.5 seconds. (1 trip detection logic) | • Open or short in manifold absolute pressure sensor circuit<br>• Manifold absolute pressure sensor<br>• ECM |
| P0108 | The output voltage from the manifold absolute pressure sensor more than 4.5 V for 0.5 seconds. (1 trip detection logic) | • Open or short in manifold absolute pressure sensor circuit<br>• Manifold absolute pressure sensor<br>• ECM |

HINT:

- DTC P0107 and P0108 are detected when the power switch is on (IG) for approximately 5 seconds.
- When DTC P0107 or P0108 is detected, check the manifold absolute pressure by selecting Powertrain / Engine and ECT / Data List / MAP on the Techstream.

| Manifold Absolute Pressure (kPa) | Malfunction |
|---|---|
| Approximately 0 | • PIM circuit short |
| 130 or more | • VC circuit open or short<br>• PIM circuit open<br>• E2 circuit open |

| Manifold Absolute Pressure (kPa) | Malfunction |
|---|---|
| | • ECM |

# MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the manifold absolute pressure. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a malfunction in the manifold absolute pressure sensor and sets a DTC.

Example:

When the sensor output voltage remains less than 0.5 V, or more than 4.5 V for 0.5 seconds, the ECM sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0107: Manifold absolute pressure sensor range check (Low voltage)<br><br>P0108: Manifold absolute pressure sensor range check (High voltage) |
| Required Sensor/Components (Main) | Manifold absolute pressure sensor |
| Required Sensor/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 0.5 seconds |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Starter | Off |
| Time after starter on to off | 2 seconds or more |

# TYPICAL MALFUNCTION THRESHOLDS

**P0107**

| | |
|---|---|
| Manifold absolute pressure sensor voltage | Less than 0.5 V |

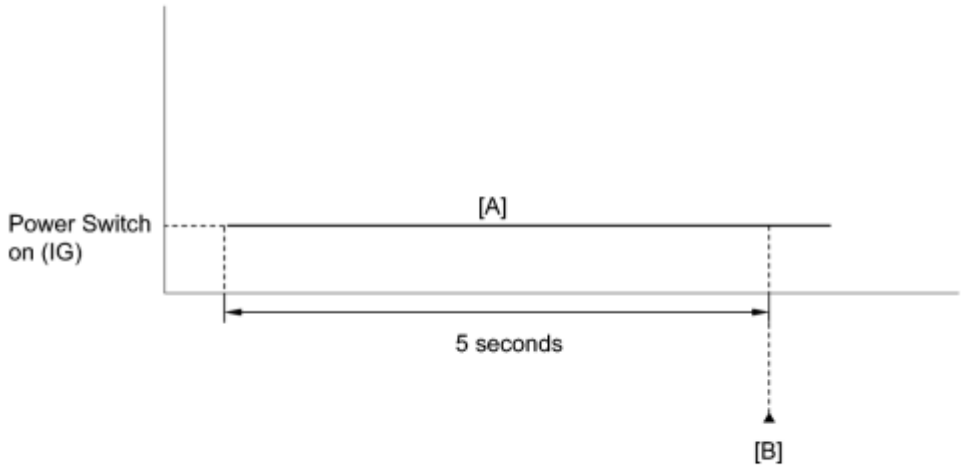
**P0108**

| | |
|---|---|
| Manifold absolute pressure sensor voltage | More than 4.5 V |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Manifold absolute pressure sensor voltage | 0.5 V or more, and 4.5 V or less |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Wait 5 seconds.
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0107 or P0108.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |

| Techstream Display | Description |
| --- | --- |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

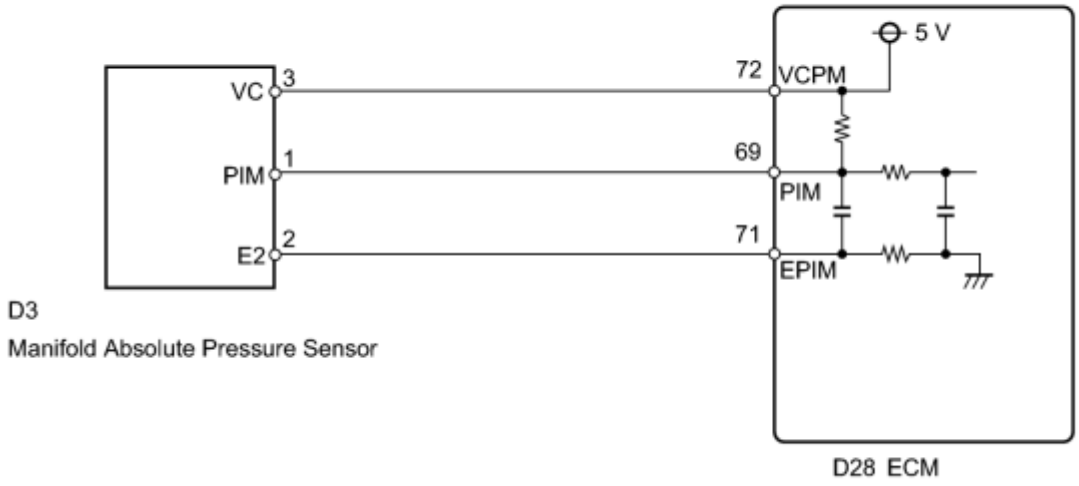
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




c

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (MAP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / MAP.

(e) Read the MAP value.

OK:

Same value as the actual atmospheric pressure.

HINT:

- Standard atmospheric pressure is 101 kPa. For every 100 m (328 ft.) increase in altitude, pressure drops by 1 kPa. The pressure also varies due to the weather (high atmospheric pressure, low atmospheric pressure).
- Also, check "Atmosphere Pressure" in the Data List.

NG ▶ CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR)
OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR) |

(a) Disconnect the manifold absolute pressure sensor connector.

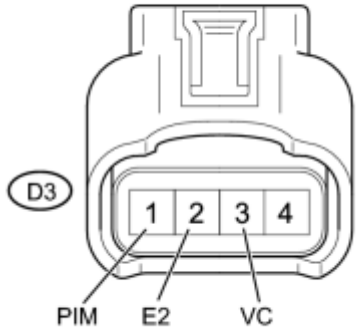
(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D3-3 (VC) - D3-2 (E2) | Power switch on (IG) | 4.5 to 5.5 V |
| D3-1 (PIM) - D3-2 (E2) | Power switch on (IG) | 4.0 to 5.0 V |

*1




c

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Manifold Absolute Pressure Sensor) |

(d) Reconnect the manifold absolute pressure sensor connector.

Result:

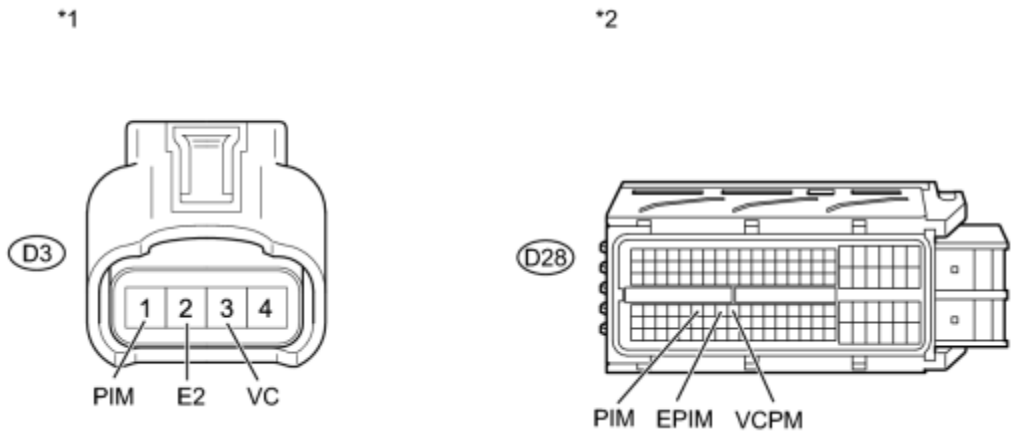
| Result | Proceed to |
|---|---|
| Outside standard range | A |
| Within standard range | B |

B ▶ REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR

A ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (MANIFOLD ABSOLUTE PRESSURE SENSOR - ECM) |

(a) Disconnect the manifold absolute pressure sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D3-3 (VC) - D28-72 (VCPM) | Always | Below 1 Ω |
| D3-2 (E2) - D28-71 (EPIM) | | |
| D3-1 (PIM) - D28-69 (PIM) | | |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D3-3 (VC) or D28-72 (VCPM) - Body ground | Always | 10 kΩ or higher |
| D3-2 (E2) or D28-71 (EPIM) - Body ground | | |
| D3-1 (PIM) or D28-69 (PIM) - Body ground | | |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Manifold Absolute Pressure Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the manifold absolute pressure sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MANIFOLD ABSOLUTE PRESSURE SENSOR - ECM)

OK ▶ **REPLACE ECM**

| | |
|---|---|
| 4. | REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR |

(a) Replace the manifold absolute pressure sensor INFO.

NEXT

| | |
|---|---|
| 5. | CHECK WHETHER DTC OUTPUT RECURS (P0107 OR P0108) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Clear the DTC and turn the power switch off.

(d) Turn the power switch on (IG) and wait for 5 seconds.

(e) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0107 or P0108 is output | B |

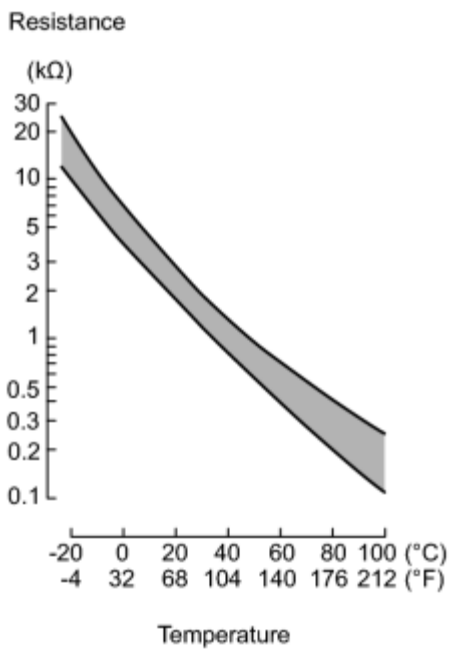
B ▶ REPLACE ECM

A ▶ **END**

| DTC | P0111 | Intake Air Temperature Sensor Gradient Too High |
|---|---|---|

# DESCRIPTION

Fig. 1:




- The intake air temperature sensor, mounted in the mass air flow meter sub-assembly, monitors the intake air temperature. The intake air temperature sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the intake air temperature becomes low, the resistance of the thermistor increases. When the temperature becomes high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (See Fig. 1).
- The intake air temperature sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R which is located inside the ECM.
- Resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes, according to changes in the intake air temperature, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0111 | When either of following conditions are met (2 trip detection logic):<br>• In duration between engine warmed up and next engine starts, change in intake air temperature sensor output below threshold<br>• During engine warming up after cold engine starts, change in intake air temperature sensor output bellow threshold | Mass air flow meter sub-assembly |

# MONITOR DESCRIPTION

## After warm engine stopped

The ECM monitors the intake air temperature variation in the period from when the engine was warmed up on the previous trip until the next engine start. If the change in the intake air temperature sensor output is less than the threshold, it is determined that a malfunction has occurred in the intake air temperature sensor. When this is detected, the MIL is illuminated and the DTC is set.

## After a cold engine in started

The monitor runs when the engine is started cold after 5 hours or more have elapsed since the engine stopped. If the intake air temperature sensor output variation until the engine has warmed up completely is less than the threshold, it is determined that a malfunction has occurred in the intake air temperature sensor. When this is detected in 2 consecutive driving cycles, the MIL is illuminated and the DTC is set.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0111: Intake air temperature sensor rationality (After engine stop)<br><br>P0111: Intake air temperature sensor rationality (After cold engine start) |
| Required Sensors/Components (Main) | Intake air temperature sensor |
| Required Sensors/Components (Sub) | - |
| Frequency of Operation | Once per driving cycle |
| Duration | 5 hours or more |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**After Engine Stop**

| | |
|---|---|
| Time after engine start | 10 seconds or more |
| Battery voltage | 10.5 V or more |
| Intake air temperature circuit (P0112, P0113) | OK |
| Engine coolant temperature sensor circuit (P0115, P0117, P0118) | OK |
| Mass air flow meter circuit (P0102, P0103) | OK |
| Accumulated mass air flow amount before engine stop | 3036 g or more |
| Key-off duration | 30 minutes |
| Engine coolant temperature when 30 minutes elapsed after engine stop | -40°C (-40°F) or more |

**After Cold Engine Start**

| | |
|---|---|
| Key-off duration | 5 hours |
| Time after engine start | 10 seconds or more |
| Intake air temperature circuit (P0112, P0113) | OK |
| Engine coolant temperature sensor circuit (P0115, P0117, P0118) | OK |
| Mass air flow meter circuit (P0102, P0103) | OK |
| Engine coolant temperature | 70°C (158°F) or more |
| Accumulated mass air flow amount | 3036 g or more |
| Either of the following conditions 1 or 2 is met: | - |
| 1. Duration while engine load is low | 120 seconds or more |
| 2. Duration while engine load is high | 10 seconds or more |

# TYPICAL MALFUNCTION THRESHOLDS

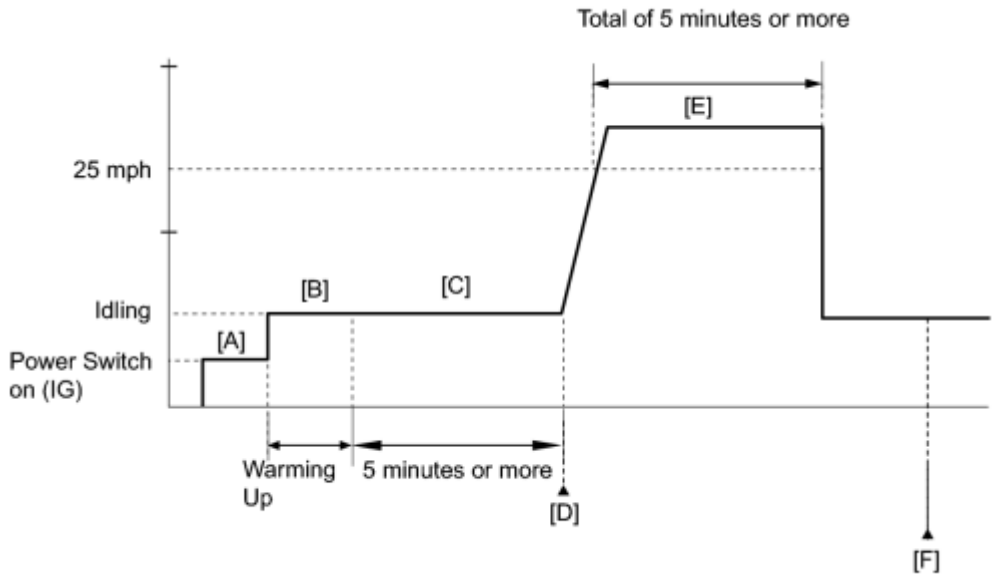
**After Engine Stop**

| | |
|---|---|
| Intake air temperature change | Less than 1°C (1.8°F) |

**After Cold Engine Start**

| | |
|---|---|
| Intake air temperature change | Less than 1°C (1.8°F) |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.

4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher [B].
8. Idle the engine for 5 minutes or more [C].

HINT:

During steps [A] through [C], if the change in the intake air temperature is below 1°C (2°F), the intake air temperature sensor (mass air flow meter sub-assembly) is malfunctioning. It is not necessary to continue this procedure.

9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
10. Read the pending DTC [D].
11. If a pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0111.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [E] and [F].

15. Drive the vehicle at 25 mph (40 km/h) or more for a total of 5 minutes or more [E].
16. Check the DTC judgment result again [F].
17. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
18. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
19. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P0112 INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0111) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0111 and other DTCs are output | A |
| DTC P0111 is output | B |

HINT:

If any DTCs other than P0111 are output, troubleshoot those DTCs first.

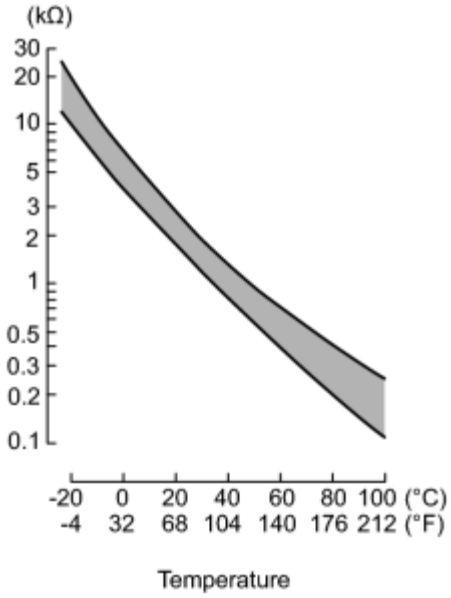
B REPLACE MASS AIR FLOW METER SUB-ASSEMBLY

A ▶ **GO TO DTC CHART**

| | | |
|---|---|---|
| DTC | P0112 | Intake Air Temperature Circuit Low Input |
| DTC | P0113 | Intake Air Temperature Circuit High Input |

# DESCRIPTION

Fig. 1:




- The intake air temperature sensor, mounted in the mass air flow meter sub-assembly, monitors the intake air temperature. The intake air temperature sensor has a built-in thermistor with a resistance that varies according to the temperature of the intake air. When the intake air temperature becomes low, the resistance of the thermistor increases. When the temperature becomes high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes (see Fig. 1).
- The intake air temperature sensor is powered by a 5 V supply from the THA terminal of the ECM, via resistor R which is located inside the ECM.
- Resistor R and the intake air temperature sensor are connected in series. When the resistance value of the intake air temperature sensor changes, according to changes in the intake air temperature, the voltage at terminal THA also varies. Based on this signal, the ECM increases the fuel injection volume when the engine is cold to improve driveability.

HINT:

When either DTC P0112 or P0113 is set, the ECM enters fail-safe mode. During fail-safe mode, the intake air temperature is estimated to be 20°C (68°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0112 | Short in intake air temperature sensor circuit for 0.5 seconds<br><br>(1 trip detection logic) | • Short in intake air temperature sensor circuit<br>• Intake air temperature sensor (built into mass air flow meter sub-assembly)<br>• ECM |
| P0113 | Open in intake air temperature sensor circuit for 0.5 seconds<br><br>(1 trip detection logic) | • Open in intake air temperature sensor circuit<br>• Intake air temperature sensor (built into mass air flow meter sub-assembly)<br>• ECM |

HINT:

When any of these DTCs are set, check the intake air temperature by entering the following menus: Powertrain / Engine and ECT / Intake Air.

| Temperature Displayed | Malfunction |
|---|---|
| -40°C (-40°F) | Open circuit |
| 140°C (284°F) | Short circuit |

# MONITOR DESCRIPTION

The ECM monitors the sensor voltage and uses this value to calculate the intake air temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a malfunction in the intake air temperature sensor and sets a DTC.

Example:

If the sensor output voltage is more than 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the intake air temperature sensor circuit, and sets DTC P0113. Conversely, if the output voltage is less than 0.18 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0112.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0112: Intake Air Temperature sensor range check (Low voltage)<br><br>P0113: Intake air temperature sensor range check (High voltage) |
| Required Sensors/Components (Main) | Intake air temperature sensor |

| | |
|---|---|
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 0.5 seconds |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Battery voltage | 8 V or more |
| Power switch | On (IG) |

# TYPICAL MALFUNCTION THRESHOLDS

**P0112**

| | |
|---|---|
| Intake air temperature sensor voltage | Less than 0.18 V |

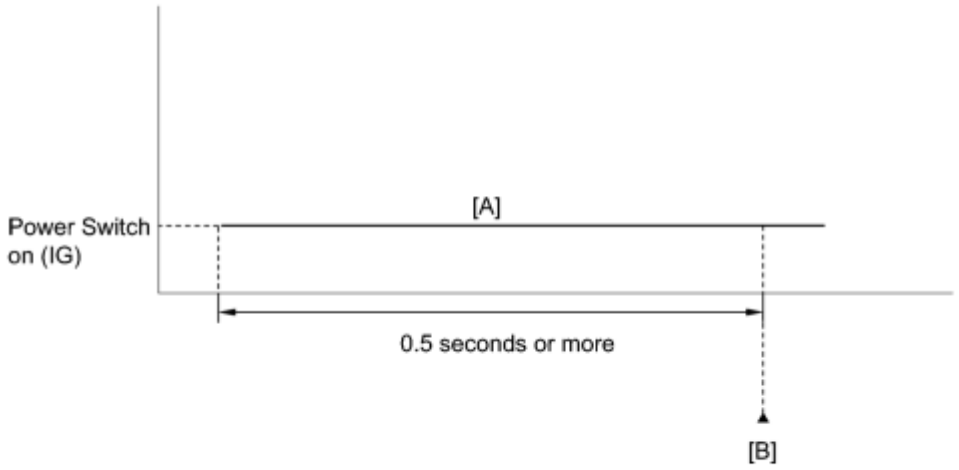
**P0113**

| | |
|---|---|
| Intake air temperature sensor voltage | More than 4.91 V |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Intake air temperature sensor voltage | 0.18 to 4.91 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 0.5 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0112 or P0113.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

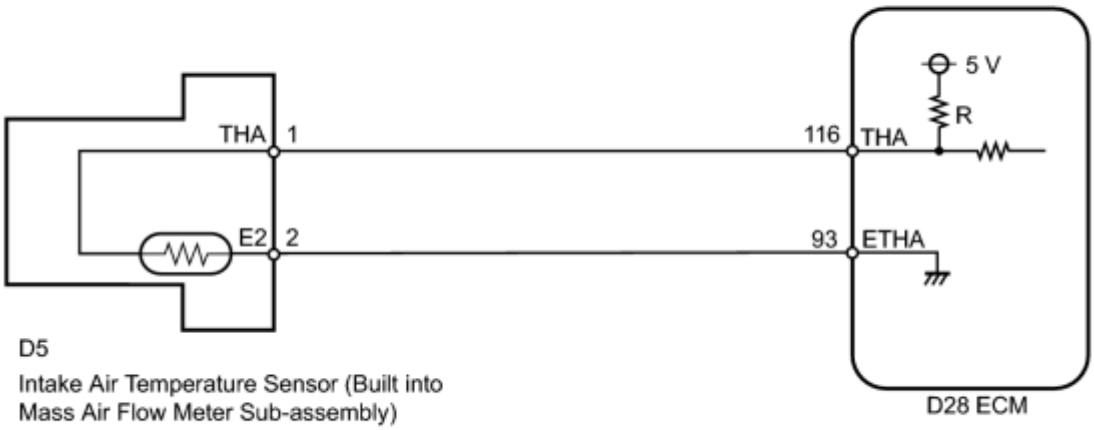
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (INTAKE AIR TEMPERATURE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Intake Air.

(e) Read the value displayed on the Techstream.

OK:

Same as actual intake air temperature.

Result:

| Result | Proceed to |
|---|---|
| -40°C (-40°F) | A |
| 140°C (284°F) | B |
| Same as actual intake air temperature | C |

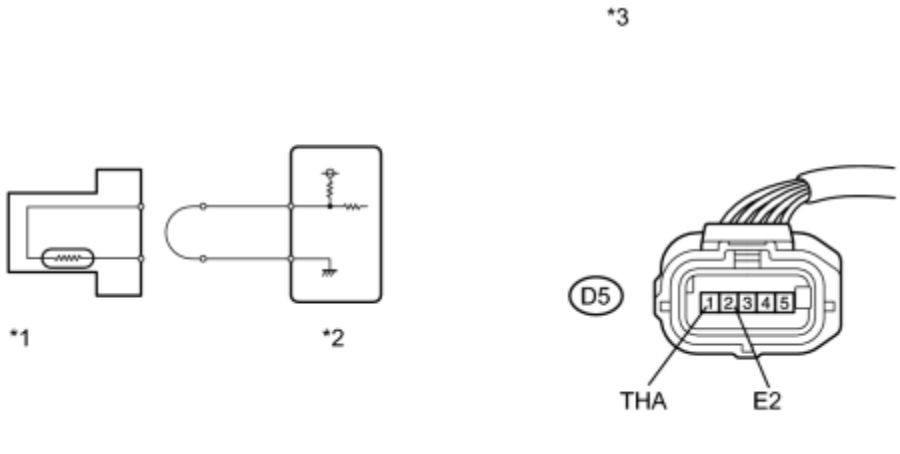
HINT:

- If there is an open circuit, the Techstream indicates -40°C (-40°F).
- If there is a short circuit, the Techstream indicates 140°C (284°F).

C ▶ CHECK FOR INTERMITTENT PROBLEMS
B ▶ READ VALUE USING TECHSTREAM (CHECK FOR SHORT IN WIRE HARNESS)
A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (CHECK FOR OPEN IN WIRE HARNESS) |

(a) Confirm good connection at the mass air flow meter sub-assembly.




N

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Mass Air Flow Meter Sub-assembly | *2 | ECM |
| *3 | Front view of wire harness connector<br><br>(to Mass Air Flow Meter Sub-assembly) | - | - |

(b) Disconnect the mass air flow meter sub-assembly connector.

(c) Connect terminals THA and E2 of the mass air flow meter sub-assembly connector on the wire harness side.

(d) Connect the Techstream to the DLC3.

(e) Turn the power switch on (IG).

(f) Turn the Techstream on.

(g) Enter the following menus: Powertrain / Engine and ECT / Data List / Intake Air.

(h) Read the value displayed on the Techstream.

Standard:

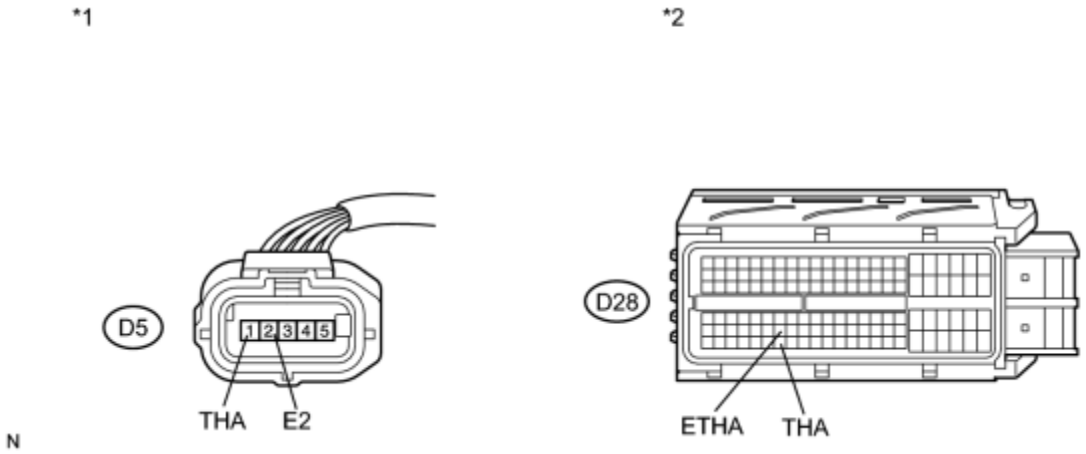
140°C (284°F)

(i) Reconnect the mass air flow meter sub-assembly connector.

NG ▶CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)
OK ▶**REPLACE MASS AIR FLOW METER SUB-ASSEMBLY**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM) |

(a) Disconnect the mass air flow meter sub-assembly connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D5-1 (THA) - D28-116 (THA) | Always | Below 1 Ω |
| D5-2 (E2) - D28-93 (ETHA) | Always | Below 1 Ω |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Mass Air Flow Meter Sub-assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the mass air flow meter sub-assembly connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)

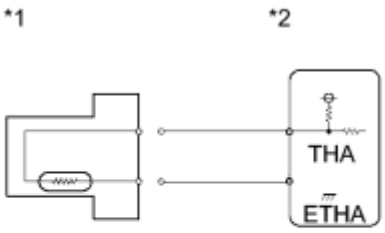
OK ▶ **REPLACE ECM**

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (CHECK FOR SHORT IN WIRE HARNESS) |

(a) Disconnect the mass air flow meter sub-assembly connector.

# Text in Illustration

| | |
|---|---|
| *1 | Mass Air Flow Meter Sub-assembly |
| *2 | ECM |




(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Powertrain / Engine and ECT / Intake Air.

(f) Read the value displayed on the Techstream.

Standard value:

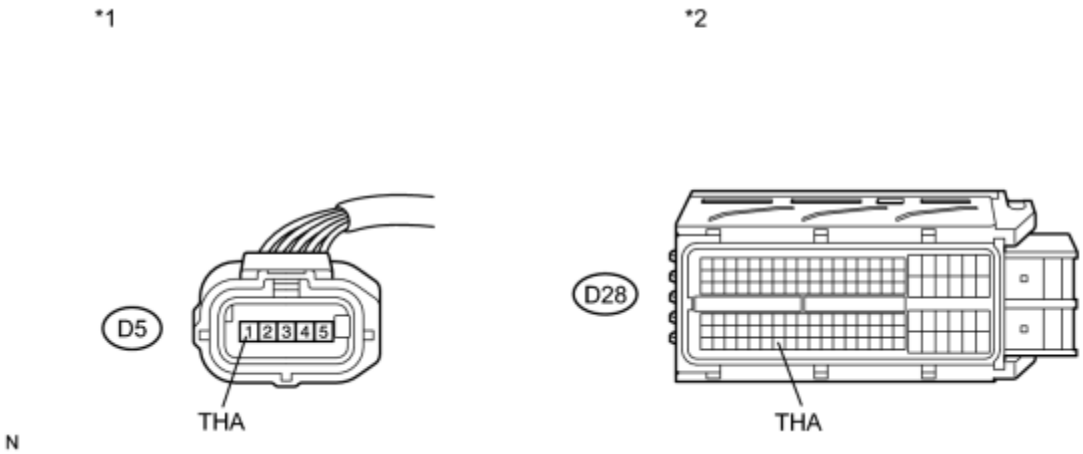
-40°C (-40°F)

(g) Reconnect the mass air flow meter sub-assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)
OK ▶ **REPLACE MASS AIR FLOW METER SUB-ASSEMBLY**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM) |

(a) Disconnect the mass air flow meter sub-assembly connector.



(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D5-1 (THA) or D28-116 (THA) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Mass Air Flow Meter Sub-assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the mass air flow meter sub-assembly connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MASS AIR FLOW METER SUB-ASSEMBLY - ECM)

OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0115 | Engine Coolant Temperature Circuit Malfunction |
| DTC | P0117 | Engine Coolant Temperature Circuit Low Input |
| DTC | P0118 | Engine Coolant Temperature Circuit High Input |

# DESCRIPTION

A thermistor, whose resistance value varies according to the engine coolant temperature, is built into the engine coolant temperature sensor.

The structure of the sensor and its connection to the ECM are the same as those of the intake air temperature sensor.

HINT:

When any of DTCs P0115, P0117 and P0118 are set, the ECM enters fail-safe mode. During fail-safe mode, the engine coolant temperature is estimated to be 80°C (176°F) by the ECM. Fail-safe mode continues until a pass condition is detected.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0115 | Open or short in engine coolant temperature sensor circuit for 0.5 seconds (1 trip detection logic) | • Open or short in engine coolant temperature sensor circuit<br>• Engine coolant temperature sensor<br>• ECM |
| P0117 | Short in engine coolant temperature sensor circuit for 0.5 seconds (1 trip detection logic) | • Short in engine coolant temperature sensor circuit<br>• Engine coolant temperature sensor<br>• ECM |
| P0118 | Open in engine coolant temperature sensor circuit for 0.5 seconds (1 trip detection logic) | • Open in engine coolant temperature sensor circuit<br>• Engine coolant temperature sensor<br>• ECM |

HINT:

When any of these DTCs are set, check the engine coolant temperature by entering the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.

| Temperature Displayed | Malfunction |
|---|---|
| -40°C (-40°F) | Open circuit |
| 140°C (284°F) or more | Short circuit |

# MONITOR DESCRIPTION

The engine coolant temperature sensor is used to monitor the engine coolant temperature. The engine coolant temperature sensor has a thermistor with a resistance that varies according to the temperature of the engine coolant. When the coolant temperature becomes low, the resistance in the thermistor increases. When the temperature becomes high, the resistance drops. These variations in resistance are reflected in the output voltage from the sensor. The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. When the sensor output voltage deviates from the normal operating range, the ECM interprets this as a fault in the engine coolant temperature sensor circuit and sets a DTC.

Example:

If the sensor output voltage is more than 4.91 V for 0.5 seconds or more, the ECM determines that there is an open in the engine coolant temperature sensor circuit, and sets DTC P0118. Conversely, if the voltage output is less than 0.14 V for 0.5 seconds or more, the ECM determines that there is a short in the sensor circuit, and sets DTC P0117.

If the malfunction is not repaired successfully, a DTC is set 0.5 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0115: Engine coolant temperature sensor range check (Chattering)<br>P0117: Engine coolant temperature sensor range check (Low voltage)<br>P0118: Engine coolant temperature sensor range check (High voltage) |
| Required Sensors/Components (Main) | Engine coolant temperature sensor |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 0.5 seconds |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

# TYPICAL MALFUNCTION THRESHOLDS

**P0115**

| | |
|---|---|
| Engine coolant temperature sensor voltage | Less than 0.14 V, or more than 4.91 V |

**P0117**

| | |
|---|---|
| Engine coolant temperature sensor voltage | Less than 0.14 V |

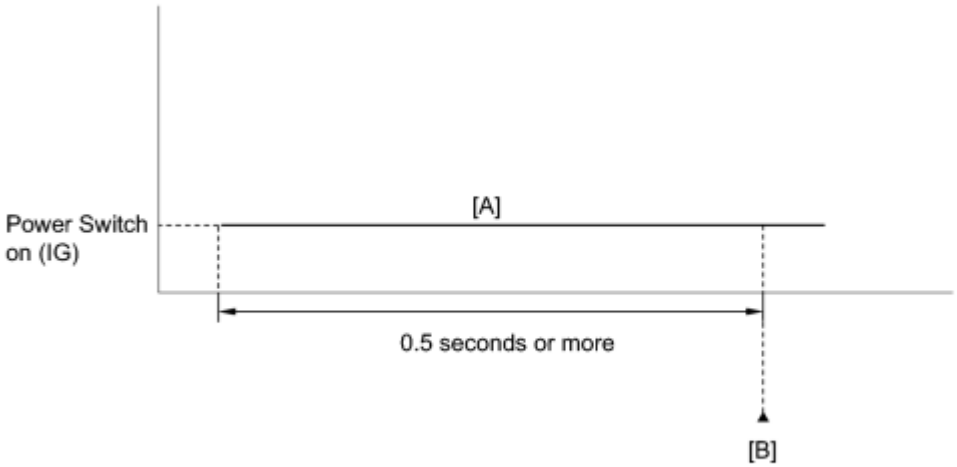
**P0118**

| | |
|---|---|
| Engine coolant temperature sensor voltage | More than 4.91 V |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Engine coolant temperature sensor voltage | 0.14 to 4.91 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 0.5 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0115, P0117 or P0118.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed |

| Techstream Display | Description |
|---|---|
| | ○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

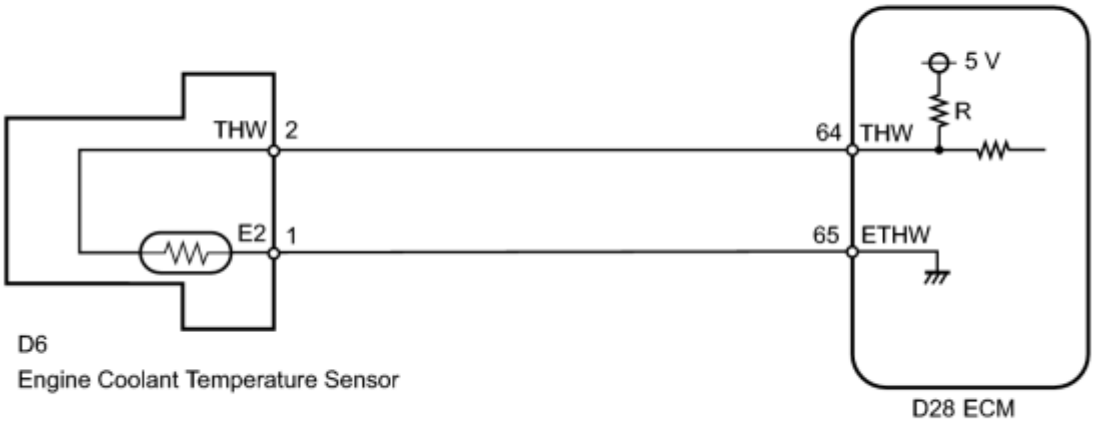
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (ENGINE COOLANT TEMPERATURE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.

(e) Read the value displayed on the Techstream.

Standard value:

Between 80°C and 100°C (167°F and 212°F) with warm engine.

Result:

| Result | Proceed to |
|---|---|
| -40°C (-40°F) | A |
| 140°C (284°F) or more | B |
| Between 80°C and 100°C (176°F and 212°F) | C |

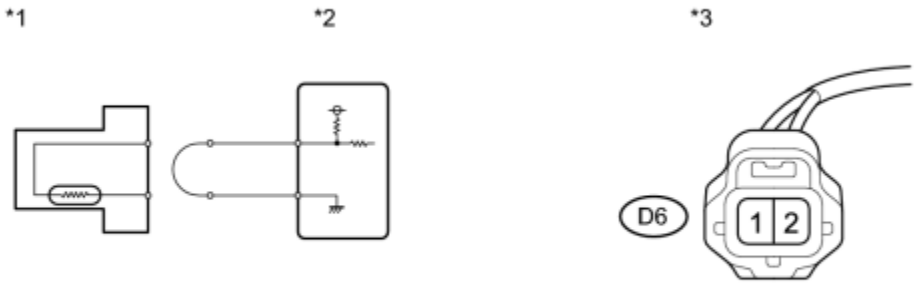
HINT:

- If there is an open circuit, the Techstream indicates -40°C (-40°F).
- If there is a short circuit, the Techstream indicates 140°C (284°F) or more.

C CHECK FOR INTERMITTENT PROBLEMS
B READ VALUE USING TECHSTREAM (CHECK FOR SHORT IN WIRE HARNESS)
A

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (CHECK FOR OPEN IN WIRE HARNESS) |

(a) Confirm good connection at the engine coolant temperature sensor connector.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Engine Coolant Temperature Sensor | *2 | ECM |
| *3 | Front view of wire harness connector<br><br>(to Engine Coolant Temperature Sensor) | - | - |

(b) Disconnect the engine coolant temperature sensor connector.

(c) Connect terminals THW and E2 of the engine coolant temperature sensor connector on the wire harness side.

(d) Connect the Techstream to the DLC3.

(e) Turn the power switch on (IG).

(f) Turn the Techstream on.

(g) Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.

(h) Read the value displayed on the Techstream.

Standard:

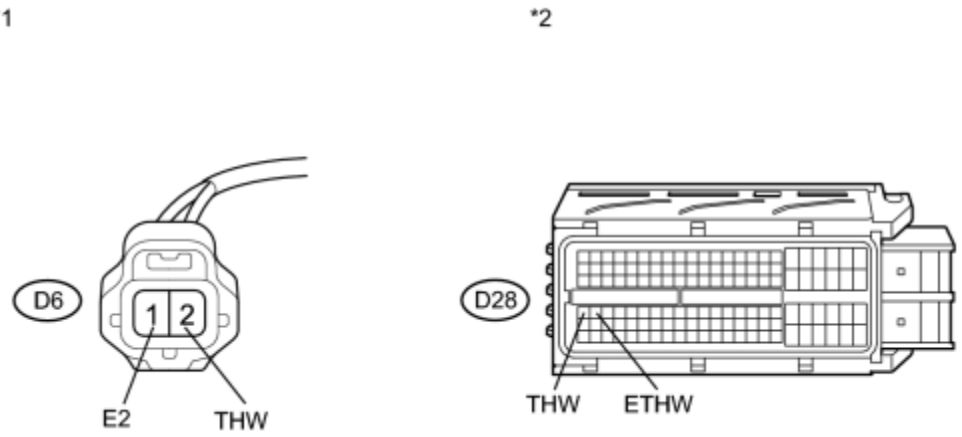
140°C (284°F) or more

(i) Reconnect the engine coolant temperature sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)
OK ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM) |

(a) Disconnect the engine coolant temperature sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D6-2 (THW) - D28-64 (THW) | Always | Below 1 Ω |
| D6-1 (E2) - D28-65 (ETHW) | Always | Below 1 Ω |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Engine Coolant Temperature Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

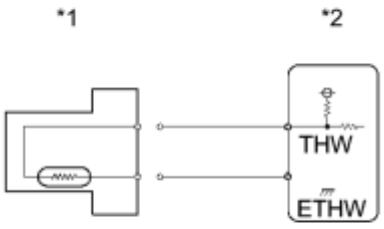
(d) Reconnect the engine coolant temperature sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)

OK ▶ **REPLACE ECM**

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (CHECK FOR SHORT IN WIRE HARNESS) |




(a) Disconnect the engine coolant temperature sensor connector.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Coolant Temperature Sensor |
| *2 | ECM |

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.

(f) Read the value displayed on the Techstream.

Standard value:

-40°C (-40°F)

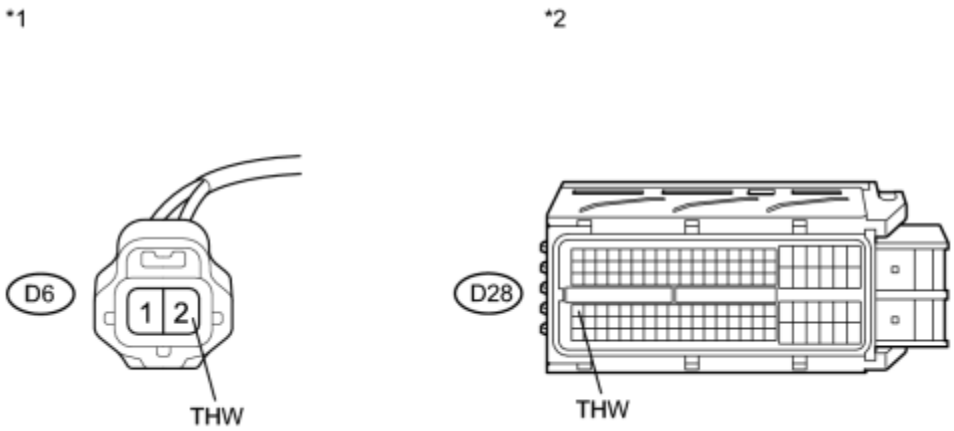
(g) Reconnect the engine coolant temperature sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)

OK ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM) |

(a) Disconnect the engine coolant temperature sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D6-2 (THW) or D28-64 (THW) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Engine Coolant Temperature Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the engine coolant temperature sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE COOLANT TEMPERATURE SENSOR - ECM)

OK ▶ **REPLACE ECM**

| DTC | P0116 | Engine Coolant Temperature Circuit Range / Performance Problem |
|---|---|---|

# DESCRIPTION

Refer to DTC P0115 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0116 | When either of the following conditions is met (2 trip detection logic):<br>• During engine warm up after cold engine starts, change in engine coolant temperature sensor output is below threshold<br>• In duration between warmed engine stopped and next cold engine starts, change in engine coolant temperature sensor output below threshold | • Water inlet with thermostat sub-assembly<br>• Engine coolant temperature sensor |
| | For Mexico Models:<br><br>Case 1:<br><br>Engine coolant temperature between 35°C and 60°C (95°F and 140°F) when engine started, and conditions (a) and (b) met (2 trip detection logic)<br><br>• (a) Vehicle driven at varying speeds (accelerated and decelerated)<br>• (b) Engine coolant temperature remains within 3°C (5.4°F) of initial engine coolant temperature<br><br>Case 2:<br><br>Engine coolant temperature more than 60°C (140°F) when engine started, and conditions (a) and (b) met (6 trip detection logic)<br><br>• (a) Vehicle driven at varying speeds (accelerated and decelerated)<br>• (b) Engine coolant temperature measurements remain within 1°C (1.8°F) of initial engine coolant temperature on 6 successive occasions | • Water inlet with thermostat sub-assembly<br>• Engine coolant temperature sensor |

# MONITOR DESCRIPTION

## Engine Coolant Temperature Sensor Cold Start Monitor

The monitor runs when the engine is started cold. If the change in engine coolant temperature sensor output until the engine warmed up completely is less than the threshold, it is determined that a malfunction has occurred in the engine coolant temperature sensor. When this is detected in 2 consecutive driving cycles, the MIL is illuminated and the DTC is set.

## Engine Coolant Temperature Sensor Soak Monitor

The ECM compares the engine coolant temperature when the warmed engine is stopped and when the engine is started on the next trip when more than 5 hours has elapsed since the engine was stopped. If the change in engine coolant temperature sensor output is less than the threshold, it is determined that a malfunction has occurred in the engine coolant temperature sensor. When this is detected in 2 consecutive driving cycles, the MIL is illuminated and the DTC is set.

## Engine Coolant Temperature Sensor High Side Stuck Monitor (only for Mexico models)

The ECM monitors the sensor voltage and uses this value to calculate the engine coolant temperature. If the sensor voltage output deviates from the normal operating range, the ECM interprets this deviation as a malfunction in the engine coolant temperature sensor and sets the DTC.

### Examples:

- Upon starting the engine, the engine coolant temperature is between 35°C and 60°C (95°F and 140°F). If after driving for 250 seconds, the engine coolant temperature remains within 3°C (5.4°F) of the starting temperature, the DTC is set (2 trip detection logic).
- Upon starting the engine, the engine coolant temperature is over 60°C (140°F). If after driving for 250 seconds, the ECM remains within 1°C (1.8°F) of the starting temperature, the DTC is set (6 trip detection logic).

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0116: Engine coolant temperature sensor cold start monitor<br><br>P0116: Engine coolant temperature sensor soak monitor |
| Required Sensors/Components (Main) | Engine coolant temperature sensor |
| Required Sensors/Components (Related) | None |
| Frequency of Operation | Once per driving cycle |
| Duration | 5 hours or more |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**Engine Coolant Temperature Sensor Cold Start Monitor**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Battery voltage | 10.5 V or more |
| Time after engine start | 1 second or more |
| Engine coolant temperature at engine start | Less than 60°C (140°F) |
| Engine coolant temperature circuit (P0115, P0117, P0118, P0125) | OK |

| | |
|---|---|
| Intake air temperature sensor circuit (P0112, P0113) | OK |
| Engine coolant pump circuit (P261B, P261C, P261D) | OK |
| Thermostat fail (P0128) | Not detected |
| Soak time | 0 second or more |
| Accumulated mass air flow | 969 g or more |
| Fuel cut | OFF |
| Difference between engine coolant temperature at engine start and intake air temperature | Less than 40°C (72°F) |

**Engine Coolant Temperature Sensor Soak Monitor**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Battery voltage | 10.5 V or more |
| Engine | Running |
| Engine coolant temperature circuit (P0115, P0117, P0118, P0125) | OK |
| Intake air temperature circuit (P0112, P0113) | OK |
| Engine coolant pump circuit (P261B, P261C, P261D) | OK |
| Thermostat fail (P0128) | Not detected |
| Soak time | 5 hours or more |
| Either of the following condition (a) or (b) is met | - |
| (a) Engine coolant temperature | 60°C (140°F) or more |
| (b) Accumulated mass air flow | 1920 g or more |

# TYPICAL MALFUNCTION THRESHOLDS

**Engine Coolant Temperature Sensor Cold Start Monitor**

| | |
|---|---|
| Engine coolant temperature sensor value change | Less than 5°C (9°F) |

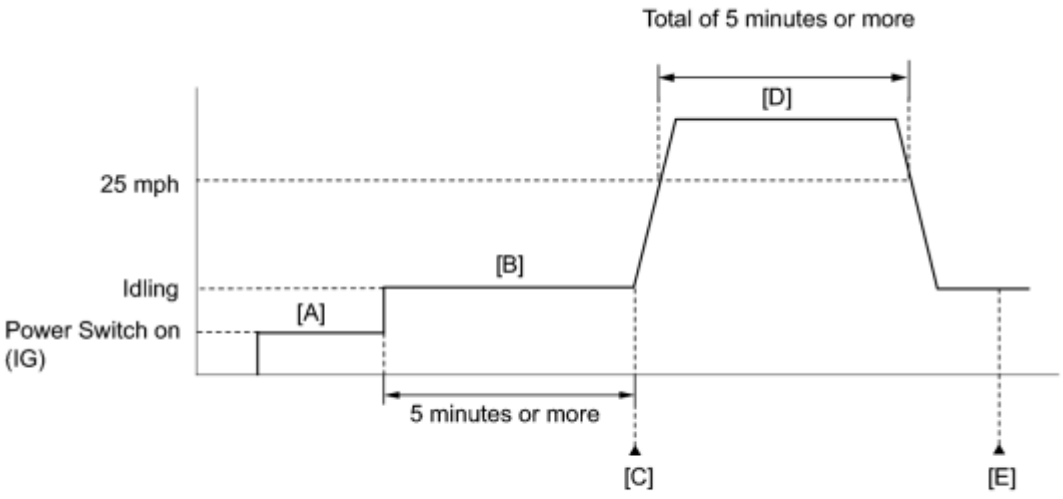
**Engine Coolant Temperature Sensor Soak Monitor**

| | |
|---|---|
| Difference between current engine coolant temperature sensor value and previous engine coolant temperature sensor value when engine stopped | Less than 5°C (9°F) |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Engine coolant temperature | Engine coolant temperature sensor value changes in accordance with actual engine coolant temperature |

# CONFIRMATION DRIVING PATTERN




HINT: Start the engine when the engine coolant temperature is 60°C (140°F) or less

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / Coolant Temp.
4. Check that the engine coolant temperature is 60°C (140°F) or less.
5. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
6. Turn the power switch off and wait for 30 seconds.
7. Turn the power switch on (IG) and turn the Techstream on [A].
8. Start the engine and idle it for 5 minutes or more [B].

   HINT:

   If the engine coolant temperature does not change by 5°C (9°F) or higher, the engine coolant temperature sensor is malfunctioning. It is not necessary to continue this procedure.

9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
10. Read the pending DTC [C].
11. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0116.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |

| Techstream Display | Description |
|---|---|
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [D] and [E].

15. Drive the vehicle at 25 mph (40 km/h) or more for a total of 5 minutes or more [D].

    HINT:

    In the event of the drive pattern being interrupted (possibly due to factors such as traffic conditions), the drive pattern can be resumed.

16. Check the DTC judgment result again [E].

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0117, P0118 or P0125 is set simultaneously with DTC P0116, the engine coolant temperature sensor may have an open or a short circuit. Troubleshoot those DTCs first.

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0116) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0116 is output | A |
| DTC P0116 and other DTCs are output | B |

HINT:

If any DTCs other than P0116 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | INSPECT WATER INLET WITH THERMOSTAT SUB-ASSEMBLY |

(a) Remove the water inlet with thermostat sub-assembly INFO.

(b) Measure the valve opening temperature of the water inlet with thermostat sub-assembly.

Standard value:

80 to 84°C (176 to 183°F)

HINT:

In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

(c) Reinstall the water inlet with thermostat sub-assembly INFO.

NG ▶ REPLACE WATER INLET WITH THERMOSTAT SUB-ASSEMBLY
OK ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

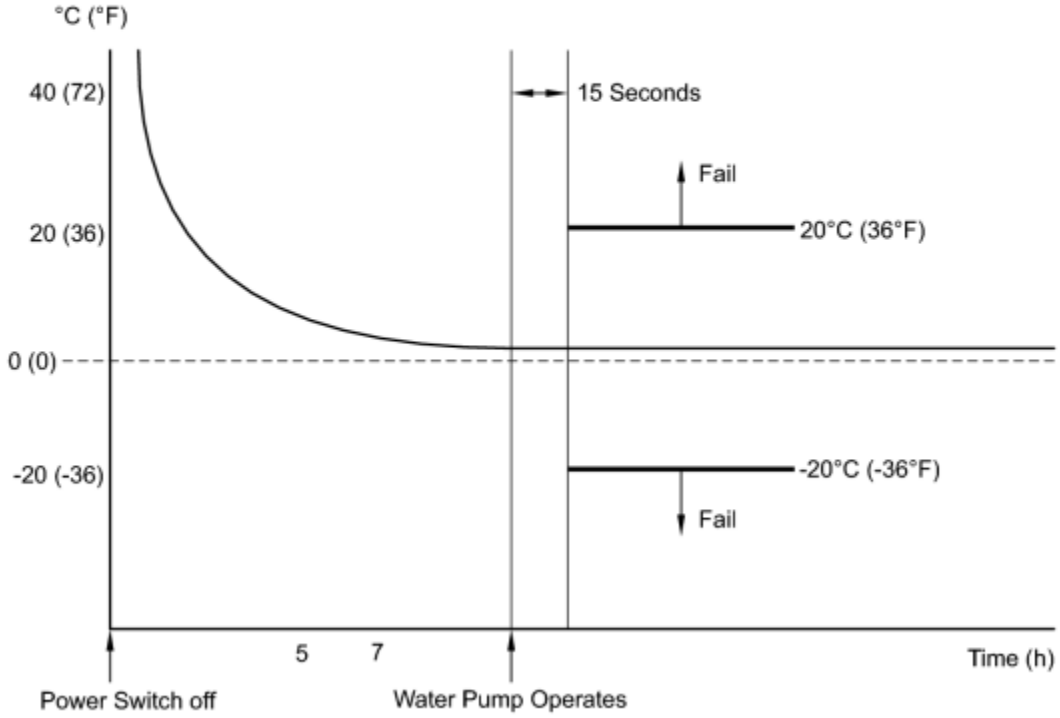
| DTC | P011B | Engine Coolant Temperature / Intake Air Temperature Correlation |
|---|---|---|

# DESCRIPTION

The engine has two temperature sensors, an engine coolant temperature sensor and an intake air temperature sensor, to detect the temperature while the engine is operating. A thermistor, whose resistance value varies according to the temperature, is built into each sensor. When the temperature is low, the resistance of the thermistor increases. When the temperature is high, the resistance drops. These variations in resistance are transmitted to the ECM as voltage changes. Based on these temperature signals output from the sensors, the ECM determines the fuel injection duration and the ignition timing to control the engine.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P011B | • All of following conditions are met:<br><br>(2 trip detection logic)<br><br>a. Battery voltage 10.5 V or more<br>b. 7 hours or more elapsed from engine stops on previous trip<br>c. 15 seconds after water pump operates<br>d. Minimum intake air temperature after engine starts more than -10°C (14°F)<br>e. Average engine coolant temperature before engine starts more than -10°C (14°F)<br>f. Difference between readings of engine coolant temperature and intake air temperature greater than 20°C (36°F) | • Intake air temperature sensor<br>• Engine coolant temperature sensor<br>• ECM |

Difference Between Engine Coolant Temperature and Intake Air Temperature




HINT:

- Waiting is required to prevent the temperature of the engine from affecting the readings. If the engine has been operated recently, it will not be possible to accurately compare the readings.
- For diagnosis, in order to duplicate the detection conditions of the DTC, it is necessary to park the vehicle for 7 hours. Parking the vehicle for 7 hours ensures that the actual temperature of the engine coolant temperature and intake air temperature are very similar. When the vehicle has been parked for less than 7 hours, differences in the readings may exist, this does not necessarily indicate a fault.

# MONITOR DESCRIPTION

The ECM monitors the difference between the engine coolant temperature and the intake air temperature when the engine is started cold to detect the engine temperature conditions accurately. The monitor runs when the engine started cold after 7 hours or more has elapsed since the engine was stopped (power switch turned off) on the previous trip. If the difference between the engine coolant temperature and the intake air temperature on a cold start exceeds 20°C (36°F), the ECM interprets this as a malfunction in the engine coolant temperature sensor circuit and intake air temperature sensor circuit, and sets the DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P011B: Engine coolant temperature / Intake air temperature sensor correlation |
| Required Sensors/Components (Main) | Engine coolant temperature sensor<br><br>Intake air temperature sensor |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Once per driving cycle |
| Duration | 7 hours or more |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

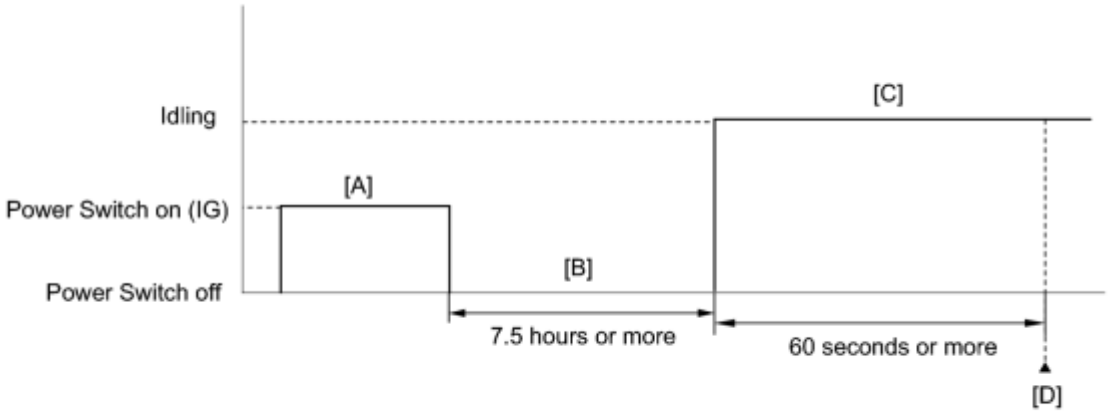
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| All of the following conditions are met | - |
| Soak time | 7 hours or more |
| Battery voltage | 10.5 V or more |
| Time after engine start | 0 second or more |
| Either of the following conditions is met | (a) or (b) |
| (a) Minimum intake air temperature after engine start | -10°C or more |
| (b) Engine coolant temperature before engine start | -10°C or more |
| Engine coolant temperature sensor circuit fail (P0115, P0117, P0118, P0125) | Not detected |
| Intake air temperature sensor circuit fail (P0112, P0113) | Not detected |
| Mass air flow meter circuit fail (P0102, P0103) | Not detected |
| Soak timer circuit fail (P2610) | Not detected |
| Engine coolant pump circuit fail (P261B, P261C, P261D) | Not detected |
| Engine coolant pump operation signal input | 15 seconds or more |
| Accumulated intake air | 141 g or more |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Deviated engine coolant temperature and intake air temperature | Less than -20°C (-36°F) or more than 20°C (36°F) |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO [A].
4. Turn the power switch off.
5. With the engine stopped, leave the vehicle as is for 7.5 hours or more [B].
6. Turn the power switch on (IG) and turn the Techstream on.
7. Put the engine in inspection mode INFO.
8. Start the engine and wait 60 seconds or more [C].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
10. Read the pending DTC [D].
11. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P011B.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed |

| Techstream Display | Description |
|---|---|
| | ○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] through [C] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO P011B) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P011B is output | A |
| DTC P011B and other DTCs are output | B |

HINT:

If any DTCs other than P011B are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (INTAKE AIR TEMPERATURE) |

(a) Leave the vehicle for 7 hours or more.

HINT:

It is necessary to leave the vehicle for 7 hours or more to allow conditions similar to the DTC detection conditions.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Powertrain / Engine and ECT / Intake Air.

(f) Read the value displayed on the Techstream.

OK:

The difference between the intake air temperature and the actual outside air temperature is within 10°C (18°F).

HINT:

Temperature readings on the vehicle's outside temperature gauge (if equipped) are not suitable for comparing to the intake air temperature reading. The outside temperature gauge has a significant delay built in to prevent temperature swings from being displayed on its display. Use an accurate thermometer to determine the outside air temperature.

NG ▶ REPLACE MASS AIR FLOW METER SUB-ASSEMBLY

OK

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (COOLANT TEMPERATURE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Coolant Temp.

(e) Read the value displayed on the Techstream.

OK:

The difference between the coolant temperature and the actual outside air temperature is within 10°C (18°F).

HINT:

If the result is not as specified, check if there are heat sources such as a block heater in the engine compartment.

NG ▶ REPLACE ENGINE COOLANT TEMPERATURE SENSOR
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0120 | Throttle / Pedal Position Sensor / Switch "A" Circuit Malfunction |
| DTC | P0121 | Throttle / Pedal Position Sensor / Switch "A" Circuit Range / Performance Problem |
| DTC | P0122 | Throttle / Pedal Position Sensor / Switch "A" Circuit Low Input |
| DTC | P0123 | Throttle / Pedal Position Sensor / Switch "A" Circuit High Input |
| DTC | P0220 | Throttle / Pedal Position Sensor / Switch "B" Circuit |
| DTC | P0222 | Throttle / Pedal Position Sensor / Switch "B" Circuit Low Input |
| DTC | P0223 | Throttle / Pedal Position Sensor / Switch "B" Circuit High Input |
| DTC | P2135 | Throttle / Pedal Position Sensor / Switch "A" / "B" Voltage Correlation |

# DESCRIPTION

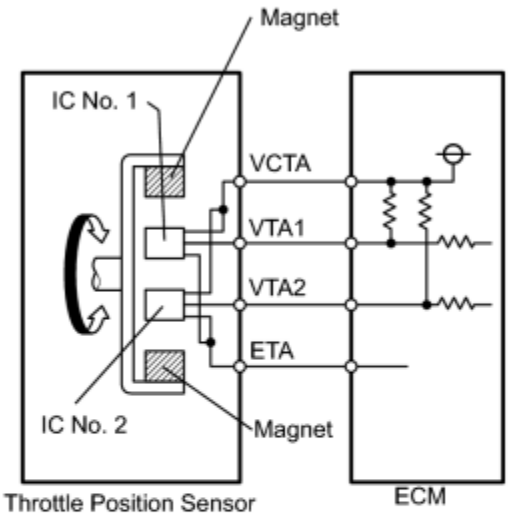
HINT:

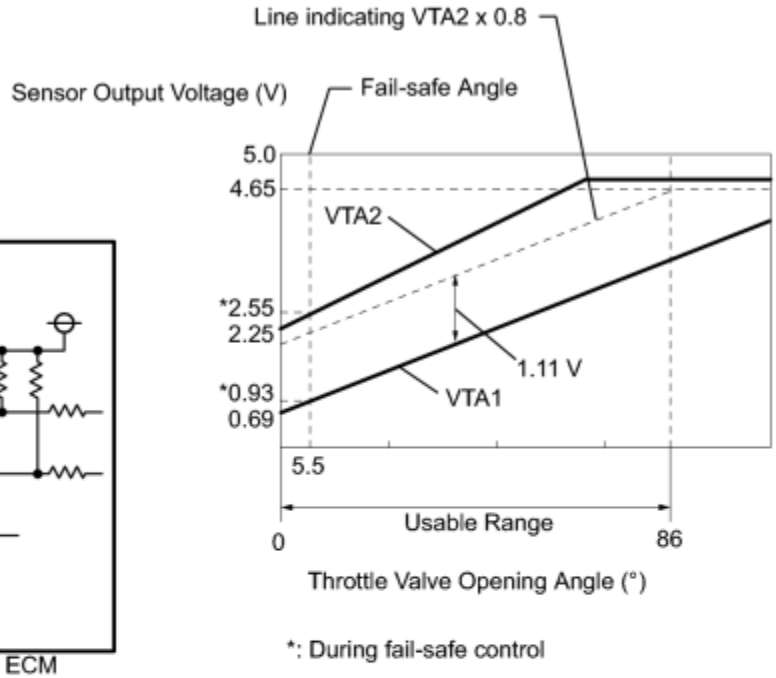
- These DTCs relate to the throttle position sensor.

The throttle position sensor is mounted on the throttle body assembly, and detects the opening angle of the throttle valve. This sensor is a non-contact type. It uses Hall-effect elements in order to yield accurate signals even in extreme conditions.

The throttle position sensor has 2 sensor circuits, each of which transmits a signal, VTA1 and VTA2. VTA1 is used to detect the throttle valve angle and VTA2 is used to detect malfunctions in VTA1. The sensor signal voltages vary between 0 V and 5 V in proportion to the throttle valve opening angle, and are transmitted to the VTA terminals of the ECM.

As the valve closes, the sensor output voltage decreases and as the valve opens, the sensor output voltage increases. The ECM calculates the throttle valve opening angle according to these signals and controls the throttle actuator in response to driver inputs. These signals are also used in calculations such as air fuel ratio correction, power enrichment correction and fuel-cut control.




Note:

The throttle valve opening angle detected by the sensor terminal VTA1 is expressed as a percentage.

Between 10% and 22%: Throttle valve fully closed

Between 64% and 96%: Throttle valve fully open

Approximately 18.6%: Fail safe angle (5.5°)

Features of sensor output:

The difference in voltage between VTA1 and VTA2 x 0.8 is approximately 1.11 V.

(VTA2 × 0.8 is approximately equal to VTA1 + 1.11 V)

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0120 | Output voltage of VTA1 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds or more<br><br>(1 trip detection logic) | • Throttle position sensor (built into throttle body assembly)<br>• ECM |
| P0121 | Difference between VTA1 and VTA2 voltages less than 0.8 V, or more than 1.6 V for 2 seconds<br><br>(1 trip detection logic) | • Throttle position sensor (built into throttle body assembly)<br>• Throttle position sensor circuit<br>• ECM |
| P0122 | Output voltage of VTA1 0.2 V or less for 2 seconds or more<br><br>(1 trip detection logic) | • Throttle position sensor (built into throttle body assembly)<br>• Short in VTA1 circuit |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | | • Open in VC circuit<br>• ECM |
| P0123 | Output voltage of VTA1 4.54 V or more for 2 seconds or more<br><br>(1 trip detection logic) | • Throttle position sensor (built into throttle body assembly)<br>• Open in VTA1 circuit<br>• Open in E2 circuit<br>• Short between VC and VTA1 circuits<br>• ECM |
| P0220 | Output voltage of VTA2 quickly fluctuates beyond lower and upper malfunction thresholds for 2 seconds or more<br><br>(1 trip detection logic) | • Throttle position sensor (built into throttle body assembly)<br>• ECM |
| P0222 | Output voltage of VTA2 1.75 V or less for 2 seconds or more<br><br>(1 trip detection logic) | • Throttle position sensor (built into throttle body assembly)<br>• Short in VTA2 circuit<br>• Open in VC circuit<br>• ECM |
| P0223 | Output voltage of VTA2 4.8 V or more, and VTA1 between 0.2 V and 2.02 V, for 2 seconds or more<br><br>(1 trip detection logic) | • Throttle position sensor (built into throttle body assembly)<br>• Open in VTA2 circuit<br>• Open in E2 circuit<br>• Short between VC and VTA2 circuits<br>• ECM |
| P2135 | Either condition (a) or (b) met (1 trip detection logic):<br><br>(a) Difference between output voltages of VTA1 and VTA2 0.02 V or less for 0.5 seconds or more | • Short between VTA1 and VTA2 circuits<br>• Throttle position sensor (built into |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | (b) Output voltage of VTA1 is 0.2 V or less, and VTA2 is 1.75 V or less, for 0.4 seconds or more | throttle body assembly)<br>• ECM |

# MONITOR DESCRIPTION

P0120, P0122, P0123, P0220, P0222, P0223, P2135

The ECM uses the throttle position sensor to monitor the throttle valve opening angle. There are several checks that the ECM performs to confirm the proper operation of the throttle position sensor.

- A specific voltage difference is expected between the sensor terminals, VTA1 and VTA2, for each throttle valve opening angle. If the difference between VTA1 and VTA2 is incorrect, the ECM interprets this as a malfunction in the sensor circuit, and sets a DTC.
- VTA1 and VTA2 each have a specific voltage range. If VTA1 or VTA2 is outside the normal operating range, the ECM interprets this as a malfunction in the sensor circuit, and sets a DTC.
- VTA1 and VTA2 should never be close to the same voltage level. If VTA1 is within 0.02 V of VTA2, the ECM determines that there is a short circuit in the sensor circuit, and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

P0121

This sensor transmits two signals: VTA1 and VTA2. VTA1 is used to detect the throttle opening angle and VTA2 is used to detect malfunctions in VTA1. The ECM performs several checks to confirm the proper operation of the throttle position sensor and VTA1.

For each throttle opening angle, a specific voltage difference is expected between the outputs of VTA1 and VTA2. If the output voltage difference between the two signals deviates from the normal operating range, the ECM interprets this as a malfunction in the throttle position sensor. The ECM illuminates the MIL and stores the DTC.

If the malfunction is not repaired successfully, the DTC is stored 2 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0120: Throttle position sensor 1 range check (Chattering)<br>P0121: Throttle position sensor rationality<br>P0122: Throttle position sensor 1 range check (Low voltage)<br>P0123: Throttle position sensor 1 range check (High voltage) |

| | |
|---|---|
| | P0220: Throttle position sensor 2 range check (Chattering)<br><br>P0222: Throttle position sensor 2 range check (Low voltage)<br><br>P0223: Throttle position sensor 2 range check (High voltage)<br><br>P2135: Throttle position sensor range check (Correlation) |
| Required Sensors/Components (Main) | Throttle position sensor |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 2 seconds: P0120, P0122, P0123, P0220, P0222 and P0223<br><br>Within 2 seconds: P0121<br><br>0.5 seconds: P2135 Case 1<br><br>0.4 seconds: P2135 Case 2 |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**P0120, P0122, P0123, P0220, P0222, P0223, P2135:**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Either of the following conditions A or B is met | - |
| Power switch on (IG) | 0.012 seconds or more |
| B. Electronic throttle actuator power | ON |

**P0121:**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Either of the following conditions A or B is set | - |
| A. Power switch | On (IG) |
| B. Electric throttle motor power | ON |
| Throttle position sensor malfunction (P0120, P0122, P0123, P0220, P0222, P0223, P2135) | Not detected |

# TYPICAL MALFUNCTION THRESHOLDS

**P0120**

| | |
|---|---|
| VTA1 voltage | 0.2 V or less, or 4.54 V or more |

**P0121**

| | |
|---|---|
| Either of the following conditions is set | - |
| Difference of throttle position sensor voltage between VTA1 and (VTA2 x 0.8) | Higher than 1.6 V |
| Difference of throttle position sensor voltage between VTA1 and (VTA2 x 0.8) | Lower than 0.8 V |

**P0122**

| | |
|---|---|
| VTA1 voltage | 0.2 V or less |

**P0123**

| | |
|---|---|
| VTA1 voltage | 4.54 V or more |

**P0220**

| | |
|---|---|
| Either of the following conditions is met | A or B |
| A. VTA2 voltage | 1.75 V or less |
| B. All of the following conditions are met | (a) and (b) |
| (a) VTA2 voltage | 4.8 V or more |
| (b) VTA1 voltage | 0.2 V or more, and 2.02 V or less |

**P0222**

| | |
|---|---|
| VTA2 voltage | 1.75 V or less |

**P0223**

| | |
|---|---|
| VTA2 voltage when VTA1 0.2 V or more, and 2.02 V or less | 4.8 V or more |

**P2135 Case 1**

| | |
|---|---|
| Difference between VTA1 and VTA2 voltages | 0.02 V or less |

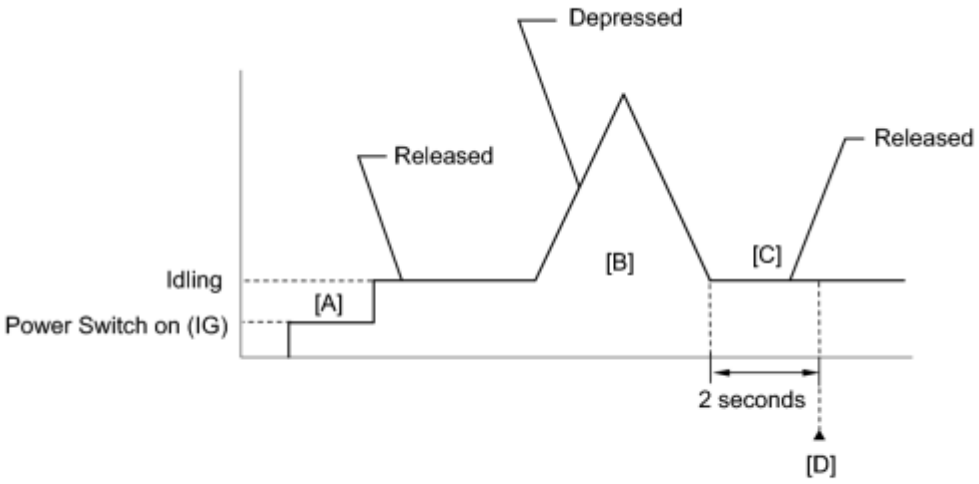
**P2135 Case 2**

| | |
|---|---|
| VTA1 voltage | 0.2 V or less |
| VTA2 voltage | 1.75 V or less |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| VTA1 voltage | 0.2 to 4.54 V |
| VTA2 voltage | 1.75 to 4.8 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. With the vehicle stationary, fully depress and release the accelerator pedal [B].
9. Idle the engine for 2 seconds or more [C].
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
11. Read the DTC [D].
12. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P0120, P0121, P0122, P0123, P0220, P0222, P0223 or P2135.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed |

| Techstream Display | Description |
| --- | --- |
| | ○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [B] and [C] again.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
18. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

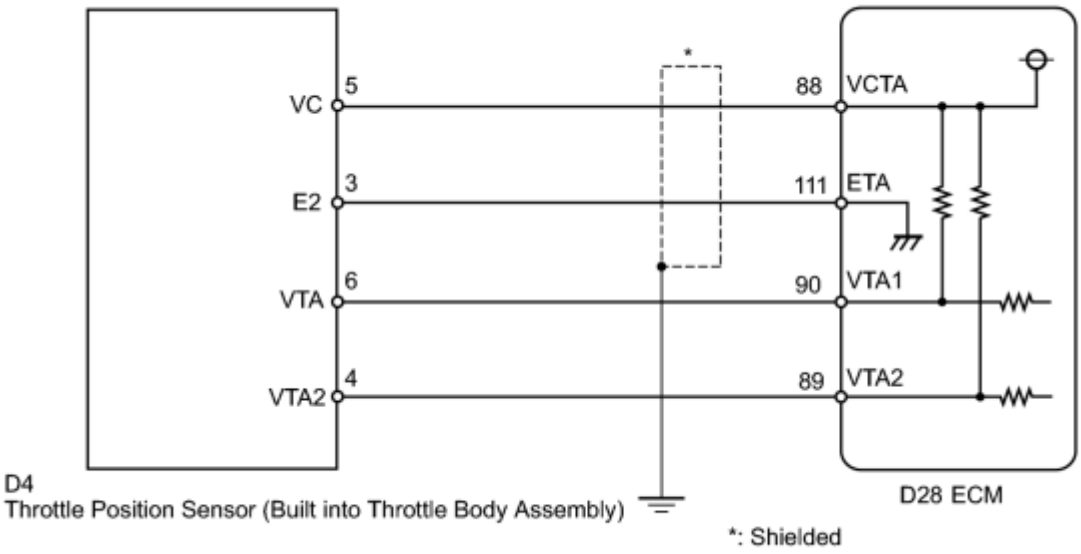
    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# FAIL-SAFE

When any of these DTCs, as well as other DTCs relating to electronic throttle control system malfunctions, are set, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator, and the throttle valve is returned to a 5.5° throttle angle by the return spring. The ECM stops the engine and the vehicle can be driven using solely the hybrid system. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly.

Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- DTC P0121 is stored when the voltages output from VTA1 and VTA2 are not consistent with the characteristics of the sensors. Therefore, check the Freeze Frame Data when this DTC is output. Use the following formula to confirm relative fluctuations in voltage.

  Features of sensor output:

  VTA2 x 0.8 is approximately equal to VTA1 + 1.11 V

  VTA1: Throttle Position No. 1

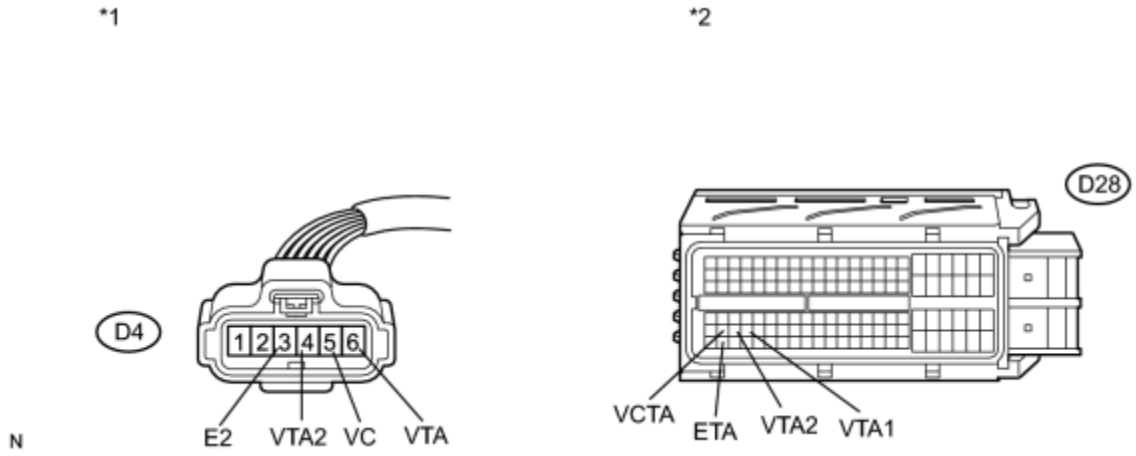
  VTA2: Throttle position No. 2

- If DTC P0121 is output, proceed to "CHECK HARNESS AND CONNECTOR (THROTTLE POSITION SENSOR - ECM)".
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (THROTTLE POSITION SENSOR - ECM) |

(a) Disconnect the throttle body assembly connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D4-5 (VC) - D28-88 (VCTA) | Always | Below 1 Ω |
| D4-6 (VTA) - D28-90 (VTA1) | Always | Below 1 Ω |
| D4-4 (VTA2) - D28-89 (VTA2) | Always | Below 1 Ω |
| D4-3 (E2) - D28-111 (ETA) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D4-5 (VC) or D28-88 (VCTA) - Body ground | Always | 10 kΩ or higher |
| D4-6 (VTA) or D28-90 (VTA1) - Body ground | Always | 10 kΩ or higher |
| D4-4 (VTA2) or D28-89 (VTA2) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Throttle Body Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

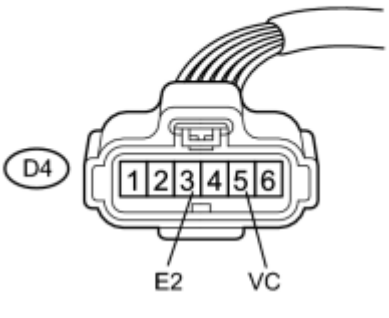
(d) Reconnect the throttle body assembly connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (THROTTLE POSITION SENSOR - ECM)
OK

| | |
|---|---|
| 2. | INSPECT ECM (VC VOLTAGE) |

*1




(a) Disconnect the throttle body assembly connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D4-5 (VC) - D4-3 (E2) | Power switch on (IG) | 4.5 to 5.5 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Throttle Body Assembly) |

(d) Reconnect the throttle body assembly connector.

NG ▶ REPLACE ECM
OK

| | |
|---|---|
| 3. | REPLACE THROTTLE BODY ASSEMBLY |

(a) Replace the throttle body assembly INFO.

NEXT

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (THROTTLE POSITION SENSOR DTCS) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine.

(g) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(i) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0120, P0121, P0122, P0123, P0220, P0222, P0223 and/or P2135 is output | A |
| DTC is not output | B |

B ▶ END

A ▶ **REPLACE ECM**

| DTC | P0125 | Insufficient Coolant Temperature for Closed Loop Fuel Control |
|---|---|---|

# DESCRIPTION

Refer to DTC P0115 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0125 | Engine coolant temperature does not reach closed-loop enabling temperature for 20 minutes (this period varies with engine start engine coolant temperature)<br><br>(2 trip detection logic) | • Cooling system<br>• Engine coolant temperature sensor<br>• Water inlet with thermostat sub-assembly |

# MONITOR DESCRIPTION

The resistance of the engine coolant temperature sensor varies in proportion to the actual engine coolant temperature. The ECM supplies a constant voltage to the sensor and monitors the signal output voltage of the sensor. The signal output voltage varies according to the changing resistance of the sensor. After the engine is started, the engine coolant temperature is monitored through this signal. If the engine coolant temperature sensor indicates that the engine is not yet warm enough for closed-loop fuel control, despite a specified period of time having elapsed since the engine was started, the ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.

Example:

The engine coolant temperature is 5°C (41°F) at engine start. After about 1 minute running time, the engine coolant temperature sensor still indicates that the engine is not warm enough to begin closed-loop fuel (air fuel ratio feedback) control. The ECM interprets this as a malfunction in the sensor or cooling system and sets the DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0125: Insufficient engine coolant temperature for closed-loop fuel control |
| Required Sensors/Components (Main) | Engine coolant temperature sensor<br><br>Thermostat<br><br>Cooling system |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Once per driving cycle |
| Duration | 85 seconds: Engine coolant temperature at engine start -3.33°C (26°F) or more |

| | |
|---|---|
| | 164 seconds: Engine coolant temperature at engine start -14.44 to -3.33°C (6 to 26°F)<br><br>1200 seconds: Engine coolant temperature at engine start less than -14.44°C (6°F) |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

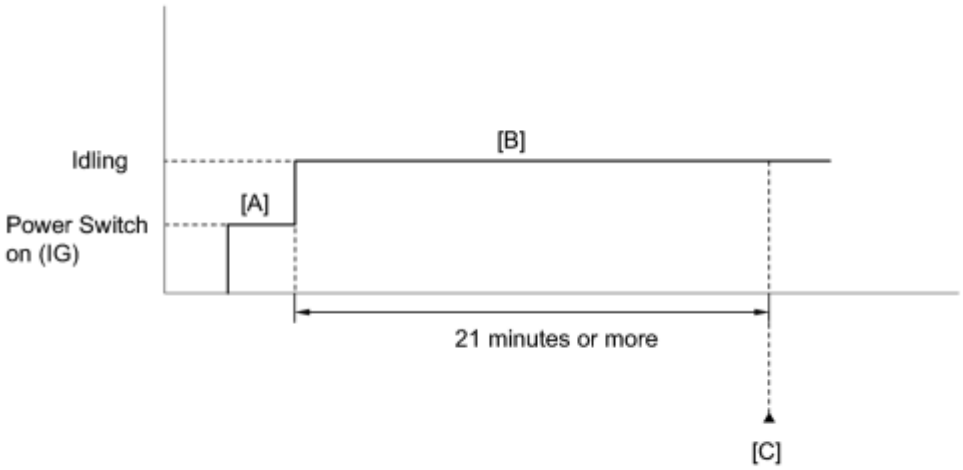
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Thermostat fail (P0128) | Not detected |
| Intake air temperature sensor circuit fail (P0112, P0113) | Not detected |
| Engine coolant temperature sensor circuit fail (P0115, P0117, P0118) | Not detected |
| Mass air flow meter circuit fail (P0102, P0103) | Not detected |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Time until actual engine coolant temperature reaches closed-loop fuel control enabling temperature | 85 seconds: Engine coolant temperature at engine start -3.33°C (26°F) or more<br><br>164 seconds: Engine coolant temperature at engine start -14.44 to -3.33°C (6 to 26°F)<br><br>1200 seconds: Engine coolant temperature at engine start less than -14.44°C (6°F) |

# CONFIRMATION DRIVING PATTERN




1. Leave the vehicle outside overnight.
2. Connect the Techstream to the DLC3.
3. Turn the power switch on (IG) and turn the Techstream on.
4. Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.
5. Check that the engine coolant temperature is 5°C (41°F) or less.
6. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
7. Turn the power switch off and wait for 30 seconds..
8. Turn the power switch on (IG) and turn the Techstream on [A].
9. Put the engine in inspection mode INFO.
10. Start the engine.
11. After starting the engine, wait 21 minutes or more [B].
12. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
13. Read the pending DTC [C].
14. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Input the DTC: P0125.
17. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |

| Techstream Display | Description |
|---|---|
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

18. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
19. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
20. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P0115 INFO.

# INSPECTION PROCEDURE

HINT:

- If any of DTCs P0115, P0116, P0117 or P0118 is set simultaneously with DTC P0125, the engine coolant temperature sensor may have an open or a short circuit. Troubleshoot those DTCs first.
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0125) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream ON.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0125 is output | A |
| DTC P0125 and other DTCs are output | B |

HINT:

If any DTCs other than P0125 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | INSPECT WATER INLET WITH THERMOSTAT SUB-ASSEMBLY |

(a) Remove the water inlet with thermostat sub-assembly INFO.

(b) Check the valve opening temperature of the water inlet with thermostat sub-assembly.

Standard value:

80 to 84°C (176 to 183°F)

HINT:

In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

(c) Reinstall the water inlet with thermostat sub-assembly INFO.

NG ▶ REPLACE WATER INLET WITH THERMOSTAT SUB-ASSEMBLY

OK ▼

| | |
|---|---|
| 3. | CHECK COOLING SYSTEM |

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG ▶ REPAIR OR REPLACE COOLING SYSTEM
OK ▶ **REPLACE ENGINE COOLANT TEMPERATURE SENSOR**

| DTC | P0128 | Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature) |
|---|---|---|

# DESCRIPTION

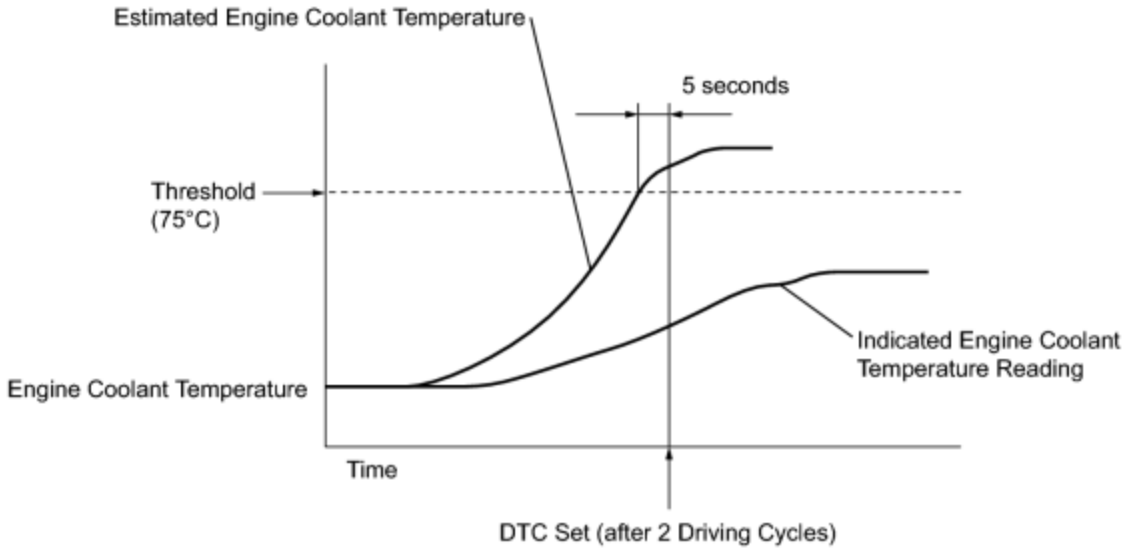
HINT:

- This DTC relates to the water inlet with thermostat sub-assembly.

This DTC is set when the engine coolant temperature does not reach 75°C (167°F) despite sufficient engine warm-up time having elapsed.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0128 | • Conditions (a), (b) and (c) are met for 5 seconds (2 trip detection logic):<br>• (a) Cold start<br>• (b) Engine warmed up<br>• (c) Engine coolant temperature less than 75°C (167°F) | • Water inlet with thermostat sub-assembly<br>• Cooling system<br>• Engine coolant temperature sensor<br>• ECM |

# MONITOR DESCRIPTION




Y

The ECM estimates the engine coolant temperature based on the starting temperature, engine loads, and engine speeds. The ECM then compares the estimated temperature with the actual engine coolant temperature. When

the estimated engine coolant temperature reaches 75°C (167°F), the ECM checks the actual engine coolant temperature. If the actual engine coolant temperature is less than 75°C (167°F), the ECM interprets this as a malfunction in the water inlet with thermostat sub-assembly or the engine cooling system and sets the DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0128: Coolant Thermostat |
| Required Sensors/Components (Main) | Thermostat<br><br>Engine coolant temperature sensor |
| Required Sensors/Components (Related) | Intake air temperature sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | 900 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

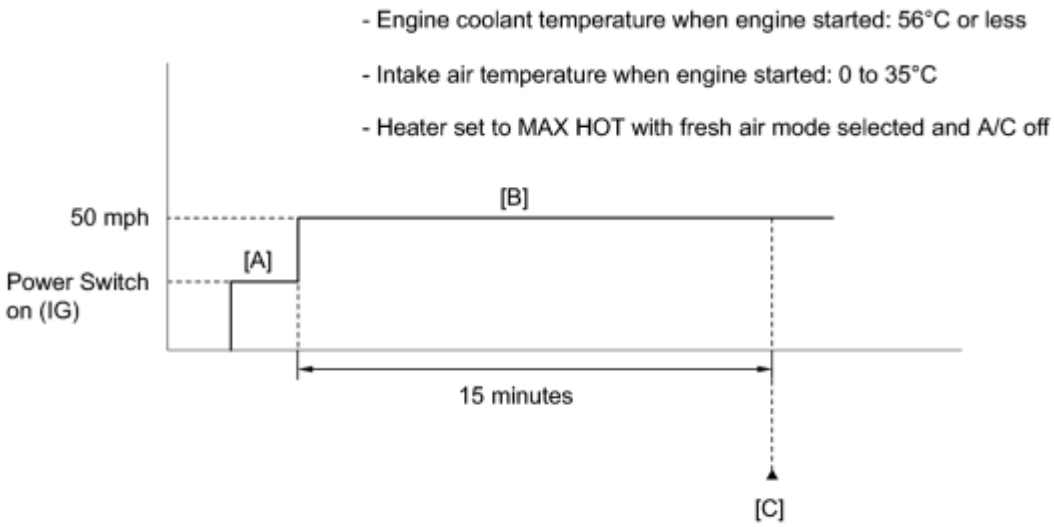
| | |
|---|---|
| Monitor runs whenever following DTCs not present | P0010 (VVT Oil Control Valve Bank 1)<br><br>P0011 (VVT System Bank 1 - Advance)<br><br>P0012 (VVT System Bank 1 - Retard)<br><br>P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor) |

| | |
|---|---|
| | P0340, P0342, P0343 (Camshaft Position Sensor)<br><br>P0351, P0352, P0353, P0354 (Igniter)<br><br>P0401 (EGR System (Closed))<br><br>P2195, P2196, P2237, P2238, P2239, P2252, P2253, P2A00 (Air Fuel Ratio Sensor - Sensor 1) |
| Battery voltage | 11 V or more |
| Either of the following conditions 1 or 2 is met: | - |
| 1. All of following conditions are met: | (a), (b) and (c) |
| (a) Engine coolant temperature at engine start - Intake air temperature at engine start | -15 to 7°C (-27 to 12.6°F) |
| (b) Engine coolant temperature at engine start | -10 to 56°C (14 to 133°F) |
| (c) Intake air temperature at engine start | -10 to 56°C (14 to 133°F) |
| 2. All of the following conditions are met: | (d), (e) and (f) |
| (d) Engine coolant temperature at engine start - Intake air temperature at engine start | More than 7°C (12.6°F) |
| (e) Engine coolant temperature at engine start | 56°C (133°F) or less |
| (f) Intake air temperature at engine start | -10°C (14°F) or more |
| Accumulated time at 80 mph (128 km/h) or more | Less than 20 seconds |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Duration that both of the following conditions (a) and (b) are met | 5 seconds or more |
| (a) Estimated engine coolant temperature | 75°C (167°F) or more |
| (b) Engine coolant temperature sensor output | Less than 75°C (167°F) |

# CONFIRMATION DRIVING PATTERN




1. Stop the engine and allow it to cool down.
2. Connect the Techstream to the DLC3.
3. Turn the power switch on (IG) and turn the Techstream on [A].
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
5. Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / Coolant Temp and Intake Air.
6. Check if "Coolant Temp" is 56°C (133°F) or less and "Intake Air" is between 0 and 35°C (32 and 95°F).
7. Put the engine in inspection mode INFO.
8. Set the heater to MAX HOT with fresh air mode selected and turn the A/C off.
9. Start the engine and drive the vehicle at 50 mph (80 km/h) for 15 minutes [B].

   HINT:

   - Data can be captured relatively easily by using the snapshot function in the Data List.
   - Enter the following menus: Data List / Function / Snap-shot configuration / Record time / 5 min.
   - Data capture can be started by using the target point. For example, setting the target point to an Accel of 90% and then racing the engine, etc. to raise the engine speed to a speed of 2500 rpm or more will cause data capture to start.
10. After driving the vehicle at 50 mph (80 kmh) and "Coolant Temp" stabilizes, check that "Coolant Temp" is 75°C (167°F) or higher [C].

    HINT:

    If "Coolant Temp" is below 75°C (167°F) while driving the vehicle at 50 mph (80 km/h), inspect the cooling system and thermostat.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0128) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0128 is output | A |
| DTC P0128 and other DTCs are output | B |

HINT:

If any DTCs other than P0128 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK COOLING SYSTEM |

(a) Check for defects in the cooling system that might cause the system to be too cold, such as abnormal radiator fan operation or any modifications.

NG ▶ REPAIR OR REPLACE COOLING SYSTEM

OK ▼

| | |
|---|---|
| 3. | INSPECT WATER INLET WITH THERMOSTAT SUB-ASSEMBLY |

(a) Remove the water inlet with thermostat sub-assembly INFO.

(b) Measure the valve opening temperature of the water inlet with thermostat.

Standard value:

80 to 84°C (176 to 183°F)

HINT:

In addition to the above check, confirm that the valve is completely closed when the temperature is below the standard.

(c) Reinstall the water inlet with thermostat sub-assembly INFO.

NG ▶ REPLACE WATER INLET WITH THERMOSTAT SUB-ASSEMBLY
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0136 | Oxygen Sensor Circuit Malfunction (Bank 1 Sensor 2) |
| DTC | P0137 | Oxygen Sensor Circuit Low Voltage (Bank 1 Sensor 2) |
| DTC | P0138 | Oxygen Sensor Circuit High Voltage (Bank 1 Sensor 2) |
| DTC | P0139 | Oxygen Sensor Circuit Slow Response (Bank 1 Sensor 2) |

# DESCRIPTION

HINT:

Sensor 2 refers to the sensor mounted behind the three-way catalytic converter and located far from the engine assembly.

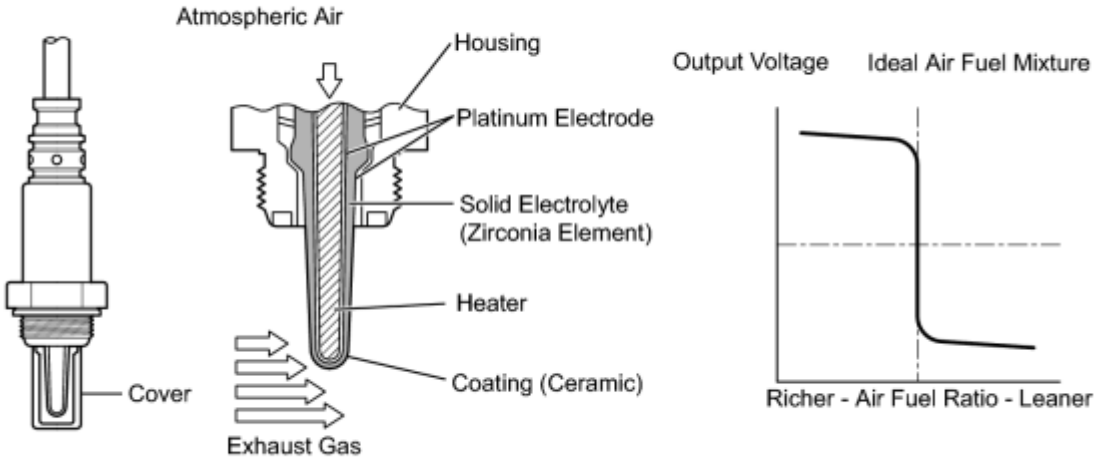
In order to obtain a high purification rate of the carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxide (NOx) components in the exhaust gas, a three-way catalytic converter is used. For the most efficient use of the three-way catalytic converter, the air fuel ratio must be precisely controlled so that it is always close to the stoichiometric air fuel level. For the purpose of helping the ECM to deliver accurate air fuel ratio control, a heated oxygen sensor is used.

The heated oxygen sensor is located behind the three-way catalytic converter, and detects the oxygen concentration in the exhaust gas. Since the sensor is integrated with the heater that heats the sensing portion, it is possible to detect the oxygen concentration even when the intake air volume is low (the exhaust gas temperature is low).

When the air fuel ratio becomes lean, the oxygen concentration in the exhaust gas is rich. The heated oxygen sensor informs the ECM that the post-three-way catalytic converter air fuel ratio is lean (low voltage, i.e. less than 0.45 V).

Conversely, when the air fuel ratio is richer than the stoichiometric air fuel level, the oxygen concentration in the exhaust gas becomes lean. The heated oxygen sensor informs the ECM that the post-three-way catalytic converter air fuel ratio is rich (high voltage, i.e. more than 0.45 V). The heated oxygen sensor has the property of changing its output voltage drastically when the air fuel ratio is close to the stoichiometric level.

The ECM uses the supplementary information from the heated oxygen sensor to determine whether the air fuel ratio after the three-way catalytic converter is rich or lean, and adjusts the fuel injection time accordingly. Thus, if the heated oxygen sensor is working improperly due to internal malfunctions, the ECM is unable to compensate for deviations in the primary air fuel ratio control.




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0136 | • Abnormal voltage output:<br><br>During active air fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic)<br><br>(a) Heated oxygen sensor voltage does not decrease to less than 0.21 V<br><br>(b) Heated oxygen sensor voltage does not increase to more than 0.59 V<br><br>• Low impedance:<br><br>Sensor impedance less than 5 Ω for 30 seconds or more when ECM presumes sensor to being warmed up and operating normally (2 trip detection logic) | • Open or short in heated oxygen sensor (sensor 2) circuit<br><br>• Heated oxygen sensor (sensor 2)<br>• Heated oxygen sensor heater (sensor 2)<br>• Air fuel ratio sensor (sensor 1)<br>• Gas leaks from exhaust system<br>• EGR valve assembly |
| P0137 | • Low voltage (open):<br><br>During active air fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic)<br><br>(a) Heated oxygen sensor voltage output less than 0.21 V<br><br>(b) Target air fuel ratio rich<br><br>• High impedance:<br><br>Sensor impedance 15 kΩ or more for more than 90 seconds or more when ECM presumes sensor to be warmed up and operating normally (2 trip detection logic) | • Open or short in heated oxygen sensor (sensor 2)<br><br>• Heated oxygen sensor (sensor 2)<br>• Heated oxygen sensor heater (sensor 2)<br>• Gas leak from exhaust system<br>• EGR valve assembly |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0138 | • High voltage (short):<br><br>During active air fuel ratio control, following conditions (a) and (b) met for certain period of time (2 trip detection logic)<br><br>(a) Heated oxygen sensor voltage output 0.59 V or more<br><br>(b) Target air fuel ratio lean<br><br>• Extremely high voltage (short):<br><br>Heated oxygen sensor voltage output exceeds 1.2 V for 10 seconds or more (2 trip detection logic) | • Short in heated oxygen sensor (sensor 2) circuit<br>• Heated oxygen sensor (sensor 2)<br>• EGR valve assembly<br>• ECM<br>• Air fuel ratio sensor (sensor 1) |
| P0139 | • Heated oxygen sensor (sensor 2) voltage does not drop to below 0.2 V immediately after fuel cut starts<br><br>• Heated oxygen sensor (voltage does not drop from 0.35 to 0.2 V immediately after air fuel cut starts. (2 trip detection logic)) | • Short in heated oxygen sensor (sensor 2) circuit<br>• Heated oxygen sensor (sensor 2)<br>• EGR valve assembly<br>• ECM |

**for Mexico Models**

| DTC No. | DTC Detection Conditions | Trouble Areas |
|---|---|---|
| P0136 | Not applicable | None |
| P0137 | • Low voltage (open):<br><br>During active air-fuel ratio control, both of the following conditions are met for a certain period of time (2 trip detection logic):<br><br>(a) The Heated oxygen sensor voltage output is below 0.21 V.<br><br>(b) The target air-fuel ratio is rich. | • Open in Heated oxygen sensor (sensor 2) circuit<br>• Heated oxygen sensor (sensor 2)<br>• Heated oxygen sensor heater (sensor 2)<br>• Gas leak from exhaust system<br>• EGR valve assembly |
| P0138 | Not applicable | None |
| P0139 | Not applicable | None |

# MONITOR DESCRIPTION

1. Active Air Fuel Ratio Control

The ECM usually performs air fuel ratio feedback control so that the air fuel ratio sensor output indicates a near stoichiometric air fuel level. This vehicle includes active air fuel ratio control in addition to regular air fuel ratio

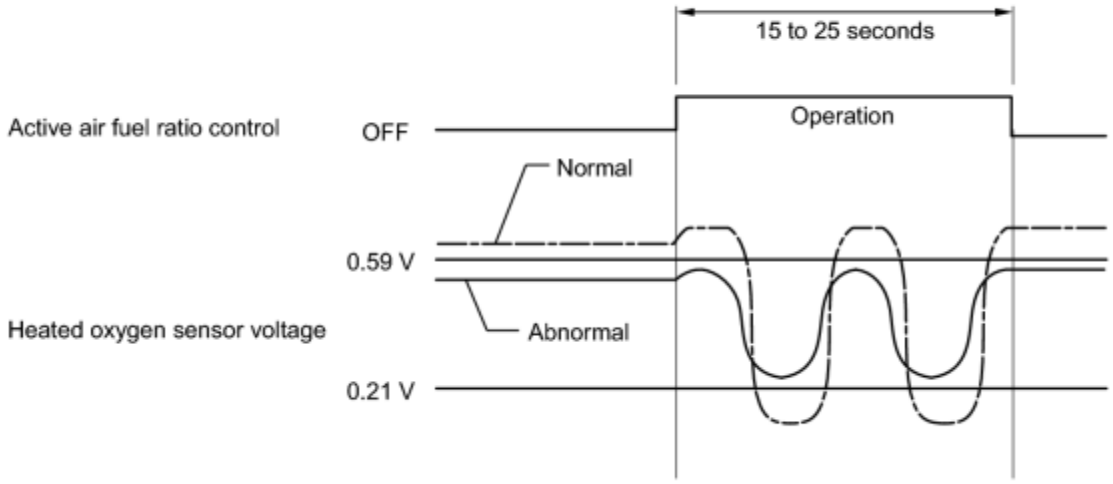
control. The ECM performs active air fuel ratio control to detect any deterioration in the three-way catalytic converter and heated oxygen sensor malfunctions (refer to the diagram below).

Active air fuel ratio control is performed for approximately 15 to 25 seconds while driving with a warm engine. During active air fuel ratio control, the air fuel ratio is forcibly regulated to become lean or rich by the ECM. If the ECM detects a malfunction, a DTC is set.

2. Abnormal Voltage Output of Heated Oxygen Sensor (DTC P0136)

While the ECM is performing active air fuel ratio control, the air fuel ratio is forcibly regulated to become rich or lean. If the sensor is not functioning properly, the voltage output variation is small. For example, when the heated oxygen sensor voltage does not decrease to less than 0.21 V or does not increase to more than 0.59 V during active air fuel ratio control, the ECM determines that the sensor voltage output is abnormal and sets DTCs P0136.

Heated Oxygen Sensor Circuit Malfunction (P0136: Abnormal Voltage)




Y

3. Open or Short in Heated Oxygen Sensor Circuit (DTCs P0137 or P0138)

During active air fuel ratio control, the ECM calculates the oxygen storage capacity * of the three-way catalytic converter by forcibly regulating the air fuel ratio to become rich or lean.

If the heated oxygen sensor has an open or short, or the voltage output of the sensor noticeably decreases, the oxygen storage capacity indicates an extraordinarily high value. Even if the ECM attempts to continue regulating the air fuel ratio to become rich or lean, the heated oxygen sensor output does not change.

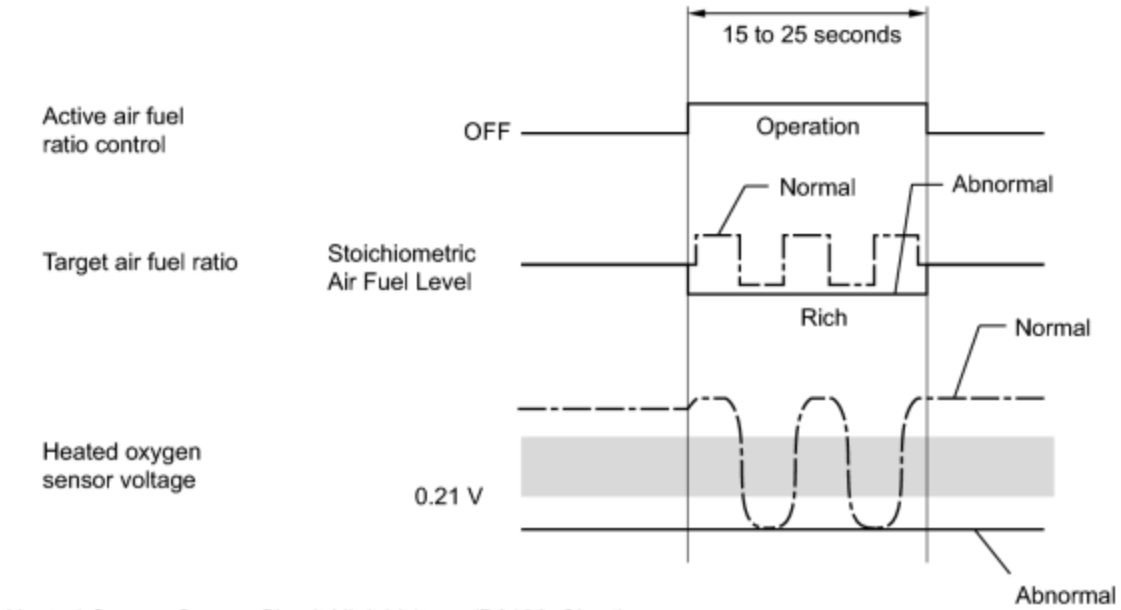
While performing active air fuel ratio control, when the target air fuel ratio is rich and the heated oxygen sensor voltage output is less than 0.21 V (lean), the ECM interprets this as an abnormally low sensor output voltage and sets DTC P0137. When the target air fuel ratio is lean and the voltage output is 0.59 V or more (rich) during active air fuel ratio control, the ECM determines that the sensor voltage output is abnormally high, and sets DTC P0138.

HINT:

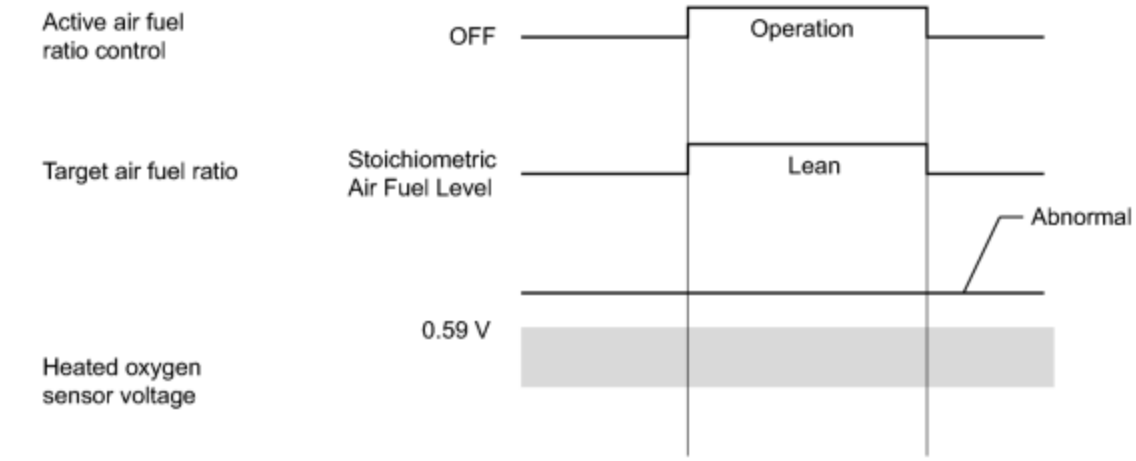
DTC P0138 is also set if the heated oxygen sensor voltage output is more than 1.2 V for 10 seconds or more.

*: The three-way catalytic converter has the capability to store oxygen. The oxygen storage capacity and the emission purification capacity of the three-way catalytic converter are mutually related. The ECM determines whether the catalyst has deteriorated, based on the calculated oxygen storage capacity value INFO.

Heated Oxygen Sensor Circuit Low Voltage (P0137: Open)




Heated Oxygen Sensor Circuit High Voltage (P0138: Short)

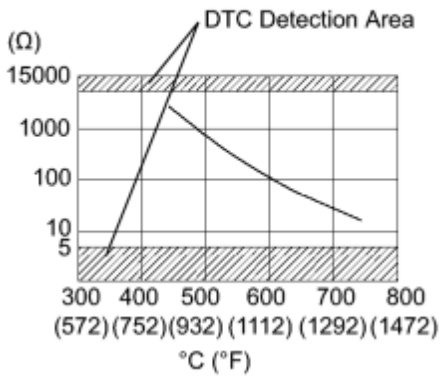



Y

4. High or Low Impedance of Heated Oxygen Sensor (DTCs P0136 or P0137)

During normal air fuel ratio feedback control, there are small variations in the exhaust gas oxygen concentration. In order to continuously monitor the slight variation of the heated oxygen sensor signal while the engine is running, the impedance* of the sensor is measured by the ECM. The ECM determines that there is a malfunction in the sensor when the measured

Relationship between element temperature and impedance:




impedance deviates from the standard range.

*: The effective resistance in an alternating current electrical circuit.

- The impedance cannot be measured using an ohmmeter.
- DTC P0136 indicates the deterioration of the heated oxygen sensor. The ECM sets the DTCs by calculating the impedance of the sensor when the typical enabling conditions are satisfied (2 driving cycles).
- DTC P0137 indicates an open or short circuit in the heated oxygen sensor (2 driving cycles). The ECM sets the DTCs when the impedance of the sensor exceeds the threshold of 15 kΩ.

5. Abnormal Voltage Output of Heated Oxygen Sensor During Fuel-cut (DTC P0139)

The sensor output voltage drops to below 0.2 V (extremely lean status) immediately when the vehicle decelerates and fuel cut is operating. If the voltage does not drop to below 0.2 V for 6 seconds or more, or the voltage does not drop from 0.35 to 0.2 V for 1 second, the ECM determines that the sensor response has deteriorated, illuminates the MIL and sets a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0136: Heated oxygen sensor output voltage (Output voltage)<br>P0136: Heated oxygen sensor impedance (Low impedance)<br>P0137: Heated oxygen sensor output voltage (Low voltage)<br>P0137: Heated oxygen sensor impedance (High impedance)<br>P0138: Heated oxygen sensor output voltage (High voltage)<br>P0138: Heated oxygen sensor output voltage (Extremely high)<br>P0139: Heated oxygen sensor output voltage during fuel cut |
| Required Sensors/Components (Main) | Heated oxygen sensor (sensor 2) |
| Required Sensors/Components (Related) | Crankshaft position sensor<br>Engine coolant temperature sensor<br>Mass air flow meter sub-assembly<br>Throttle position sensor |
| Frequency of Operation | Once per driving cycle: Active air fuel ratio control detection, Heated oxygen sensor output voltage during fuel cut<br>Continuous: Other |

| | |
|---|---|
| Duration | 20 seconds: Heated oxygen sensor output (Output voltage, High voltage, Low voltage)<br><br>30 seconds: Heated oxygen sensor impedance (Low impedance)<br><br>90 seconds: Heated oxygen sensor impedance (High impedance)<br><br>10 seconds: Heated oxygen sensor voltage (Extremely high)<br><br>6 seconds: Heated oxygen sensor voltage during fuel cut |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

## All

| | |
|---|---|
| Monitor runs whenever following DTCs not present | P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1)<br><br>P0037, P0038, P102D (Heated Oxygen Sensor Heater - Sensor 2)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0128 (Thermostat)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0401 (EGR System (Closed))<br><br>P0451, P0452, P0453 (EVAP System) |

| | |
|---|---|
| | P2195, P2196, P2237, P2238, P2239, P2252, P2253, P2A00 (Air Fuel Ratio Sensor - Sensor 1) |

**Heated Oxygen Sensor Output Voltage (Output Voltage, High Voltage and Low Voltage)**

| | |
|---|---|
| Active air fuel ratio control | Performing |
| Active air fuel ratio control begins when all of the following conditions are met: | - |
| Battery voltage | 11 V or more |
| Engine coolant temperature | 75°C (167°F) or more |
| Idling | OFF |
| Engine speed | Less than 4000 rpm |
| Air fuel ratio sensor status | Activated |
| Fuel system status | Closed loop |
| Fuel cut | OFF |
| Engine load | 10 to 70% |

**Heated Oxygen Sensor Impedance (Low Impedance)**

| | |
|---|---|
| Battery voltage | 11 V or more |
| Estimated sensor temperature | Less than 700°C (1292°F) |
| ECM monitor | Completed |
| DTC P0607 | Not set |

**Heated Oxygen Sensor Impedance (High Impedance)**

| | |
|---|---|
| Battery voltage | 11 V or more |
| Estimated sensor temperature | 450 to 750°C (842 to 1382°F) |
| DTC P0607 | Not set |

**Heated Oxygen Sensor Output Voltage (Extremely High)**

| | |
|---|---|
| Battery voltage | 11 V or more |
| Time after engine start | 2 seconds or more |

**Heated Oxygen Sensor Voltage During Fuel-cut**

| | |
|---|---|
| Engine coolant temperature | 75°C (167°F) or more |
| Estimated catalyst temperature | 400°C (752°F) or more |
| Fuel cut | ON |

# TYPICAL MALFUNCTION THRESHOLDS

**Heated Oxygen Sensor Output Voltage (Output Voltage)**

| | |
|---|---|
| Either of the following conditions is met: | 1 or 2 |
| 1. All of the following conditions (a), (b) and (c) are met | - |
| (a) Commanded air fuel ratio | 14.3 or less |
| (b) Heated oxygen sensor voltage | 0.21 to 0.59 V |
| (c) Oxygen storage capacity of catalyst | 2.1 g or more |
| 2. All of the following conditions (d), (e) and (f) are met | - |
| (d) Commanded air fuel ratio | 14.9 or more |
| (e) Heated oxygen sensor voltage | 0.21 to 0.59 V |
| (f) Oxygen storage capacity of catalyst | 2.1 g or more |

**Heated Oxygen Sensor Output Voltage (Low Voltage)**

| | |
|---|---|
| All of the following conditions (a), (b) and (c) are met | - |
| (a) Commanded air fuel ratio | 14.3 or less |
| (b) Heated oxygen sensor voltage | Less than 0.21 V |
| (c) Oxygen storage capacity of catalyst | 2.1 g or more |

**Heated Oxygen Sensor Output Voltage (High Voltage)**

| | |
|---|---|
| All of the following conditions (a), (b) and (c) are met | - |
| (a) Commanded air fuel ratio | 14.9 or more |
| (b) Heated oxygen sensor voltage | More than 0.59 V |
| (c) Oxygen storage capacity of catalyst | 2.1 g or more |

**Heated Oxygen Sensor Impedance (Low Impedance)**

| | |
|---|---|
| Duration of following condition | 30 seconds or more |
| Heated oxygen sensor impedance | Less than 5 Ω |

**Heated Oxygen Sensor Impedance (High Impedance)**

| | |
|---|---|
| Duration of following condition | 90 seconds or more |
| Heated oxygen sensor impedance | 15 kΩ or more |

**Heated Oxygen Sensor Output Voltage (Extremely High)**

| | |
|---|---|
| Duration of following condition | 10 seconds or more |
| Heated oxygen sensor output voltage | 1.2 V or more |

**Heated Oxygen Sensor Voltage During Fuel-cut**

| | |
|---|---|
| One of the following conditions is set | - |
| Duration until rear heated oxygen sensor voltage drops to 0.2 V during fuel cut | 6 seconds or more |
| Duration that rear heated oxygen sensor voltage drops from 0.35 to 0.2 V during fuel cut | 1 second or more |

# COMPONENT OPERATING RANGE

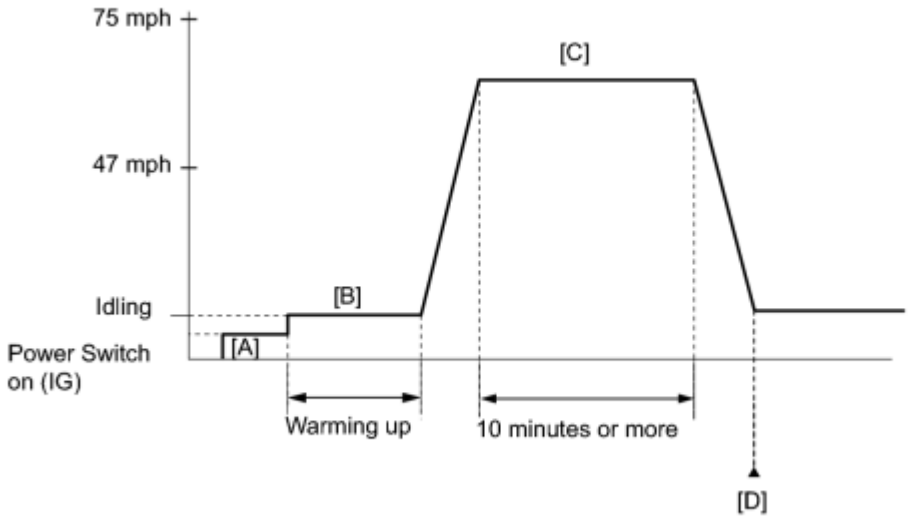
| | |
|---|---|
| Duration of following condition | 30 seconds or more |
| Heated oxygen sensor voltage | Varies between 0.1 V and 0.9 V |

# MONITOR RESULT

Refer to Checking Monitor Status INFO.

# CONFIRMATION DRIVING PATTERN

## P0136, P0137 and P0138




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher [B].
8. Drive the vehicle at 47 to 75 mph (75 to 120 km/h) for 10 minutes or more [C].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
10. Read the pending DTC [D].

11. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0136, P0137 or P0138.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

    CAUTION:

    When performing the confirmation driving pattern, obey all speed limits and traffic laws.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [C] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

    HINT:

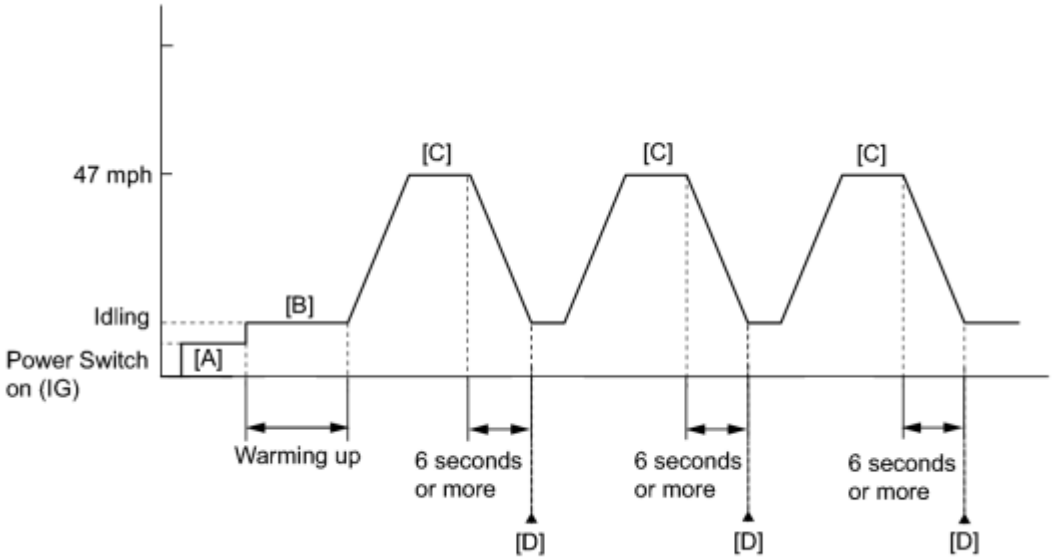
    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# P0139




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher [B].
8. Drive the vehicle at 47 mph (75 km/h), and then decelerate the vehicle by releasing the accelerator pedal for 6 seconds or more to perform the fuel-cut [C].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
10. Read the pending DTC [D].
11. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0139.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed |

| Techstream Display | Description |
|---|---|
| | ○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, move the shift lever to B and then perform step [C] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

HINT:

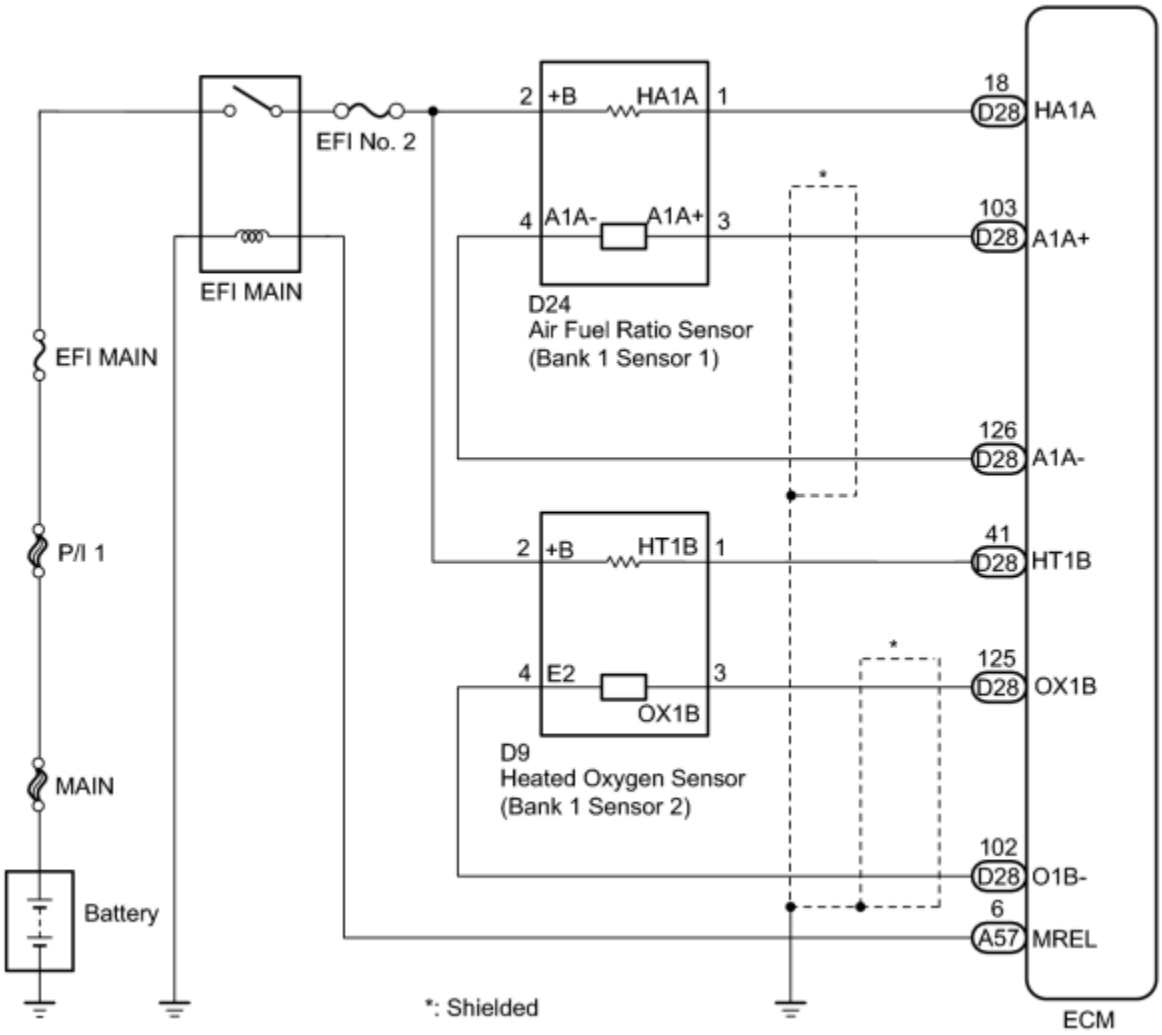
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be identified by performing the Control the Injection Volume for A/F Sensor function provided in the Active Test. The Control the Injection Volume for A/F Sensor function can help to determine whether the air fuel ratio sensor, heated oxygen sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the Control the Injection Volume for A/F Sensor operation using the Techstream.

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Put the engine in inspection mode INFO.
4. Start the engine.
5. Warm up the engine at an engine speed of 2500 rpm for approximately 90 seconds.

6. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
7. Perform the Active Test operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).
8. Monitor the voltage outputs of the air fuel ratio and heated oxygen sensors (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

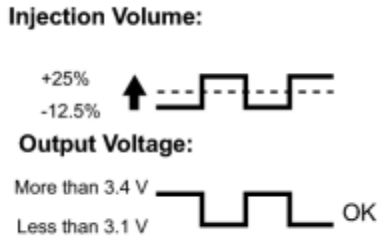
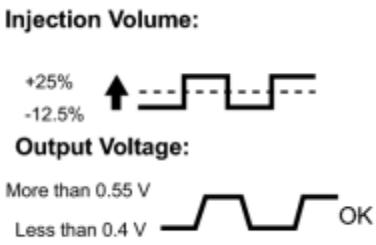
   HINT:

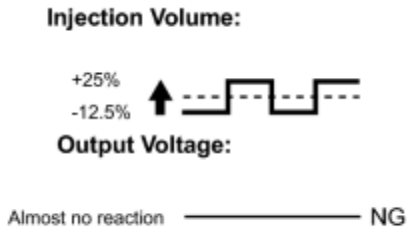
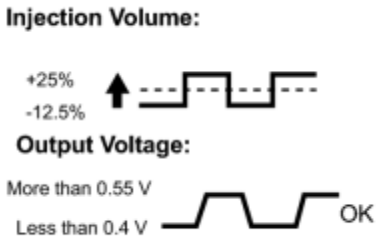
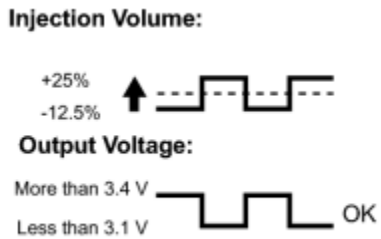
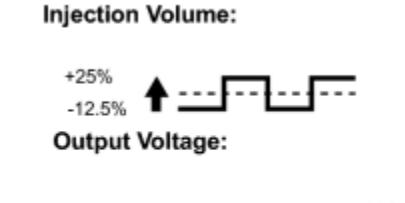
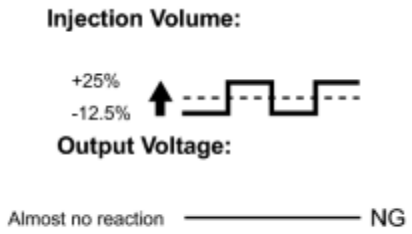
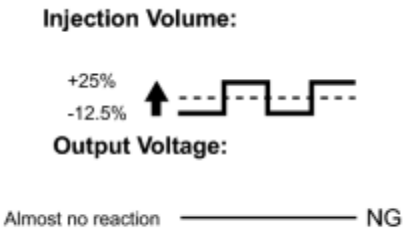
   - The Control the Injection Volume for A/F Sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
   - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

| Techstream Display (Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| AFS Voltage B1S1<br><br>(Air fuel ratio) | +25% | Rich | Less than 3.1 V |
| AFS Voltage B1S1<br><br>(Air fuel ratio) | -12.5% | Lean | More than 3.4 V |
| O2S B1S2<br><br>(Heated oxygen) | +25% | Rich | More than 0.55 V |
| O2S B1S2<br><br>(Heated oxygen) | -12.5% | Lean | Less than 0.4 V |

NOTICE:

The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| 1 |  |  | - |
| 2 | | | ○ Air fuel ratio sensor<br>○ Air fuel ratio sensor heater<br>○ Air fuel ratio sensor |

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| |  |  | circuit |
| 3 |  |  | ○ Heated oxygen sensor<br>○ Heated oxygen sensor heater<br>○ Heated oxygen sensor circuit<br>○ Exhaust gas leaks |
| 4 |  |  | ○ Fuel pressure<br>○ Exhaust gas leaks<br><br>(Air fuel ratio extremely lean or rich) |

- Following the Control the Injection Volume for A/F Sensor procedure enables technicians to check and graph the voltage outputs of both the air fuel ratio and heated oxygen sensors.
- To display the graph, enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor / A/F Control System / AFS Voltage B1S1 and O2S B1S2.

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

- If the OX1B wire from the ECM connector is short-circuited to the +B wire, DTC P0136 will be set.

# PROCEDURE

| | |
|---|---|
| 1. | READ DTC OUTPUT (DTC P0136, P0137, P0138 OR P0139) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0138 is output | A |
| DTC P0137 is output | B |
| DTC P0136 is output | C |
| DTC P0139 is output | D |

D ▶ READ VALUE USING TECHSTREAM
C ▶ READ VALUE USING TECHSTREAM (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR)
B ▶ CHECK EXHAUST GAS LEAK
A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / A/F Control System / O2S B1S2.

(e) Allow the engine to idle.

(f) Read the heated oxygen sensor output voltage while idling.

Result:

| Result | Proceed to |
|---|---|
| 1.0 V or more | A |

| Result | Proceed to |
|---|---|
| Less than 1.0 V | B |

B ▶ PERFORM ACTIVE TEST USING TECHSTREAM (INJECTION VOLUME)

A ▼

| | |
|---|---|
| 3. | INSPECT HEATED OXYGEN SENSOR (CHECK FOR SHORT) |

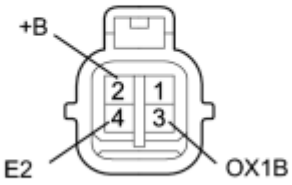
(a) Disconnect the heated oxygen sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (+B) - 4 (E2) | Always | 10 kΩ or higher |
| 2 (+B) - 3 (OX1B) | | |




**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Heated Oxygen Sensor) |

(c) Reconnect the heated oxygen sensor connector.

NG ▶ REPLACE HEATED OXYGEN SENSOR

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR |

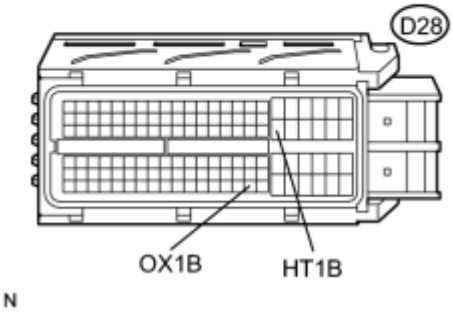
(a) Turn the power switch off and wait for 5 minutes or more.

(b) Disconnect the ECM connector.

*1

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):




N

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D28-41 (HT1B) - D28-125 (OX1B) | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (HEATED OXYGEN SENSOR - ECM)

OK ↓

| | |
|---|---|
| 5. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | **EGR Step Position (Active Test)** | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

NG ▶ INSPECT EGR VALVE ASSEMBLY
OK ▶ REPLACE ECM

| | |
|---|---|
| 6. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY
OK ▶ **REPLACE ECM**

| | |
|---|---|
| 7. | PERFORM ACTIVE TEST USING TECHSTREAM (INJECTION VOLUME) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume.

(g) Change the fuel injection volume using the Techstream and monitor the voltage output of air fuel ratio and heated oxygen sensors displayed on the Techstream.

HINT:

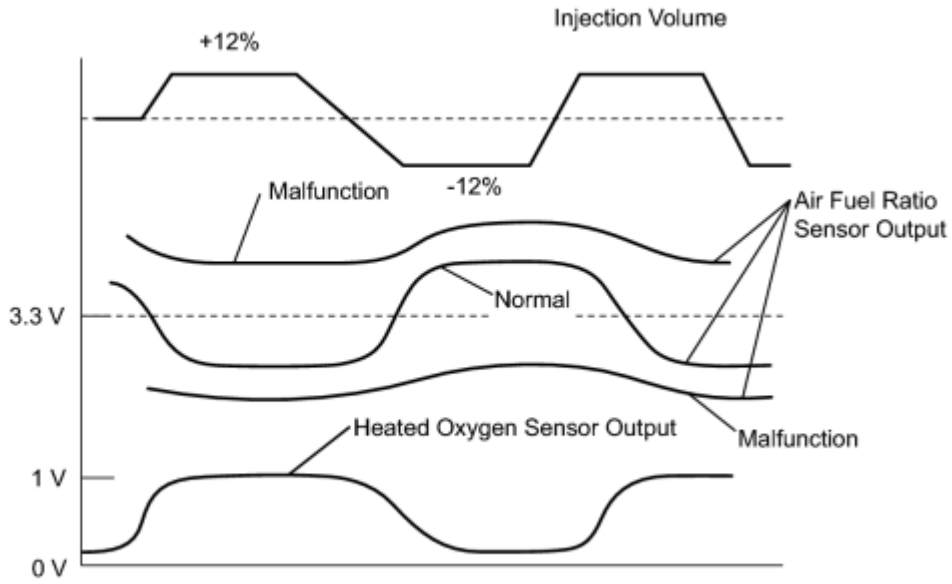
- Change the fuel injection volume within the range of -12% and +12%. The injection volume can be changed in 1% graduations within the range.
- The air fuel ratio sensor is displayed as AFS Voltage B1S1, and the heated oxygen sensor is displayed as O2S B1S2 on the Techstream.
- The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

Result:

| Techstream Display (Sensor) | Voltage Variation | Proceed to |
|---|---|---|
| AFS Voltage B1S1 (Air fuel ratio) | Alternates between more and less than 3.3 V | OK |
| | Remains at more than 3.3 V | NG |
| | Remains at less than 3.3 V | NG |

HINT:

A normal heated oxygen sensor voltage (O2S B1S2) reacts in accordance with increases and decreases in fuel injection volumes. When the air fuel ratio sensor voltage remains at either less or more than 3.3 V despite the heated oxygen sensor indicating a normal reaction, the air fuel ratio sensor is malfunctioning.




NG ▶ REPLACE AIR FUEL RATIO SENSOR

OK ▼

| 8. | INSPECT AIR FUEL RATIO SENSOR |
|---|---|

HINT:

This air fuel ratio sensor test is to check the air fuel ratio sensor current during the fuel-cut. When the sensor is normal, the sensor current will indicate below 3.0 mA in this test.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

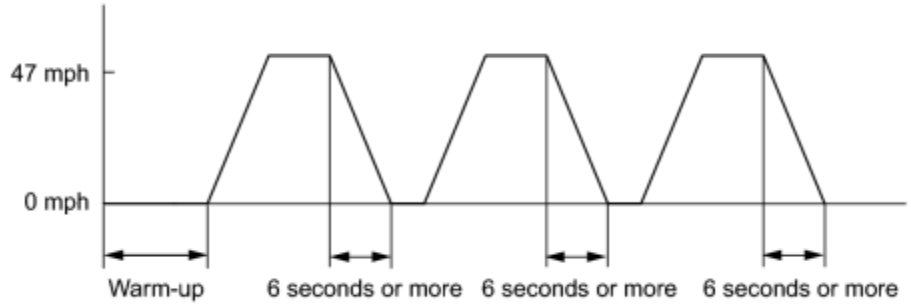
(e) Drive the vehicle according to the drive pattern listed below:

(1) Put the engine in inspection mode INFO.

(2) Warm up the engine until the engine coolant temperature reaches 75°C (167°F) or more.

(3) Drive the vehicle at 47 mph (75 km/h) or more and decelerate the vehicle for 6 seconds or more.

(4) Repeat the deceleration above at least 3 times.




(f) Enter the following menus: Powertrain / Engine and ECT / Monitor / O2 Sensor / Details.

(g) Confirm that RANGE B1S1 is either Pass or Fail. If the Techstream shows Incomplete, re-check RANGE B1S1 after performing the drive pattern.

(h) Select the RANGE B1S1.

(i) Read the Test Value.

Standard current:

Less than 3.0 mA

HINT:

If the Techstream shows Incomplete again, add the vehicle speed and move the shift lever to B to decelerate the vehicle.

NG ▶ REPLACE AIR FUEL RATIO SENSOR
OK ▶ REPLACE HEATED OXYGEN SENSOR

| | |
|---|---|
| 9. | READ VALUE USING TECHSTREAM (OUTPUT VOLTAGE OF HEATED OXYGEN SENSOR) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume.

(g) Change the fuel injection volume using the Techstream and monitor the voltage output of heated oxygen sensor displayed on the Techstream.

HINT:

- Change the fuel injection volume within the range of -12% and +12%. The injection volume can be changed in 1% graduations within the range.
- The heated oxygen sensor is displayed as O2S B1S2 on the Techstream.
- The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

Standard:

Fluctuates between 0.4 V or less and 0.55 V or more.

NG ▶ CHECK EXHAUST GAS LEAK

OK ▼

| | |
|---|---|
| 10. | PERFORM ACTIVE TEST USING TECHSTREAM (INJECTION VOLUME) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume.

(g) Change the fuel injection volume using the Techstream and monitor the voltage output of air fuel ratio and heated oxygen sensors displayed on the Techstream.

HINT:

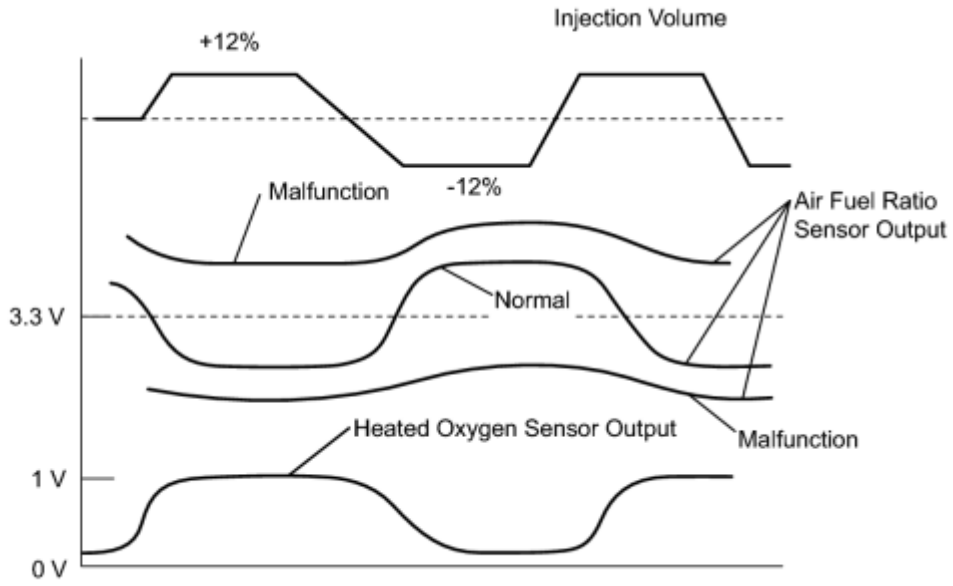
- Change the fuel injection volume within the range of -12% and +12%. The injection volume can be changed in 1% graduations within the range.
- The air fuel ratio sensor is displayed as AFS Voltage B1S1, and the heated oxygen sensor is displayed as O2S B1S2 on the Techstream.
- The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

Result:

| Techstream Display (Sensor) | Voltage Variation | Proceed to |
|---|---|---|
| AFS Voltage B1S1 (Air fuel ratio) | Alternates between more and less than 3.3 V | OK |
| | Remains at more than 3.3 V | NG |
| | Remains at less than 3.3 V | NG |

HINT:

A normal heated oxygen sensor voltage (O2S B1S2) reacts in accordance with increases and decreases in fuel injection volumes. When the air fuel ratio sensor voltage remains at either less or more than 3.3 V despite the heated oxygen sensor indicating a normal reaction, the air fuel ratio sensor is malfunctioning.




NG ▶ REPLACE AIR FUEL RATIO SENSOR

OK ▼

| | |
|---|---|
| 11. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | **EGR Step Position (Active Test)** | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

NG ▶ INSPECT EGR VALVE ASSEMBLY
OK ▶ CHECK EXTREMELY RICH OR LEAN ACTUAL AIR FUEL RATIO AND REPAIR CAUSE (FUEL INJECTOR ASSEMBLY, FUEL PRESSURE, GAS LEAK FROM SYSTEM)

| 12. | INSPECT EGR VALVE ASSEMBLY |
|---|---|

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY
OK ▶ **CHECK EXTREMELY RICH OR LEAN ACTUAL AIR FUEL RATIO AND REPAIR CAUSE**

**(FUEL INJECTOR ASSEMBLY, FUEL PRESSURE, GAS LEAK FROM SYSTEM)**

| | |
|---|---|
| 13. | CHECK EXHAUST GAS LEAK |

(a) Inspect for exhaust gas leaks from the exhaust manifold sub-assembly and exhaust pipes.

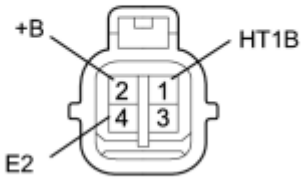
OK:

No gas leaks.

NG ▶ REPAIR OR REPLACE EXHAUST GAS LEAK POINT
OK
▼

| | |
|---|---|
| 14. | INSPECT HEATED OXYGEN SENSOR (HEATER RESISTANCE) |

*1




(a) Disconnect the heated oxygen sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (HT1B) - 2 (+B) | 20°C (68°F) | 11 to 16 Ω |
| 1 (HT1B) - 4 (E2) | Always | 10 kΩ or higher |

**Text in Illustration**

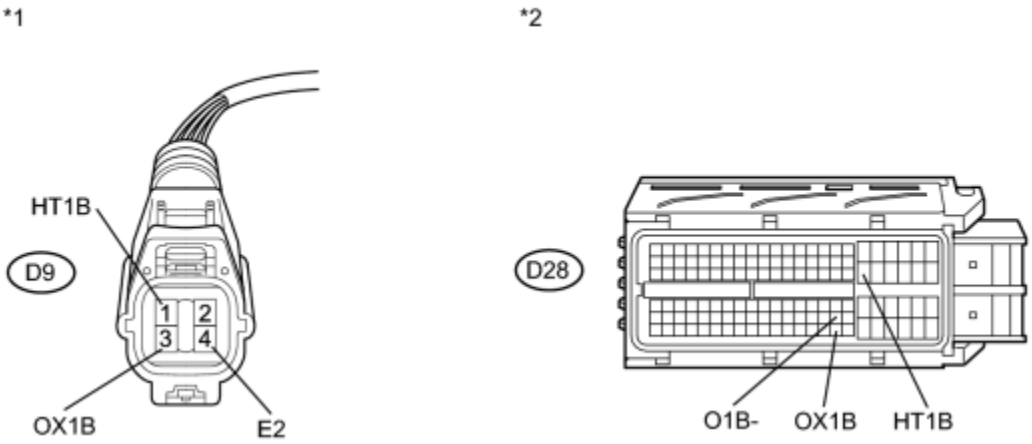
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Heated Oxygen Sensor (Sensor 2)) |

(c) Reconnect the heated oxygen sensor connector.

NG ▶ REPLACE HEATED OXYGEN SENSOR
OK
▼

| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (HEATED OXYGEN SENSOR - ECM) |

(a) Disconnect the heated oxygen sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D9-1 (HT1B) - D28-41 (HT1B) | Always | Below 1 Ω |
| D9-3 (OX1B) - D28-125 (OX1B) | | |
| D9-4 (E2) - D28-102 (O1B-) | | |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D9-1 (HT1B) or D28-41 (HT1B) - Body ground | Always | 10 kΩ or higher |
| D9-3 (OX1B) or D28-125 (OX1B) - Body ground | | |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Heated Oxygen Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the heated oxygen sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (HEATED OXYGEN SENSOR - ECM)

OK

| | |
|---|---|
| 16. | REPLACE HEATED OXYGEN SENSOR |

(a) Replace the heated oxygen sensor INFO.

NEXT

| | |
|---|---|
| 17. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the Techstream off.

(f) Turn the power switch off and wait for 30 seconds.

(g) Turn the power switch on (IG) and turn the Techstream on.

(h) Put the engine in inspection mode INFO.

(i) Start the engine and warm it up.

(j) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern for P0136, P0137or P0138.

NEXT

| | |
|---|---|
| 18. | CHECK WHETHER DTC OUTPUT RECURS (P0136, P0137 OR P0138) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(e) Input the DTCs: P0136, P0137 and P0138. Check the DTC judgement result is NORMAL. If it is INCOMPLETE, perform the drive pattern adding the vehicle speed.

Result:

| Result | Proceed to |
|---|---|
| ABNORMAL<br><br>(DTC P0136, P0137 or P0138 is output) | A |
| NORMAL<br><br>(DTC is not output) | B |

B ▶ END

A ▼

| | |
|---|---|
| 19. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

NG ▶ INSPECT EGR VALVE ASSEMBLY
OK ▶ REPLACE AIR FUEL RATIO SENSOR

| 20. | INSPECT EGR VALVE ASSEMBLY |
|---|---|

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY
OK ▶ **REPLACE AIR FUEL RATIO SENSOR**

| 21. | REPLACE AIR FUEL RATIO SENSOR |
|---|---|

(a) Replace the air fuel ratio sensor INFO.

NEXT ▼

| 22. | PERFORM CONFIRMATION DRIVING PATTERN |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the Techstream off.

(f) Turn the power switch off and wait for 30 seconds.

(g) Turn the power switch on (IG) and turn the Techstream on.

(h) Put the engine in inspection mode INFO.

(i) Start the engine and warm it up.

(j) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern for P0136, P0137or P0138.

NEXT

| | |
|---|---|
| 23. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0136 OR P0138) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(e) Input the DTCs: P0136 or P0138. Check the DTC judgement result is NORMAL. If it is INCOMPLETE, perform the drive pattern adding the vehicle speed.

Result:

| Result | Proceed to |
|---|---|
| ABNORMAL<br><br>(DTC P0136 or P0138 is output) | A |
| NORMAL<br><br>(DTC is not output) | B |

B END

A

| | |
|---|---|
| 24. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | **EGR Step Position (Active Test)** | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

NG ▶ INSPECT EGR VALVE ASSEMBLY
OK ▶ REPLACE HEATED OXYGEN SENSOR

| | |
|---|---|
| 25. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY
OK ▶ **REPLACE HEATED OXYGEN SENSOR**

| | |
|---|---|
| 26. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / A/F Control System / O2S B1S2.

(e) Allow the engine to idle.

(f) Read the heated oxygen sensor output voltage while idling.

Result:

| Result | Proceed to |
|---|---|
| 1.0 V or more | A |
| Less than 1.0 V | B |

B ▶ READ DTC OUTPUT (DTC P0139 IS OUTPUT AGAIN)

A ▼

| | |
|---|---|
| 27. | INSPECT HEATED OXYGEN SENSOR |

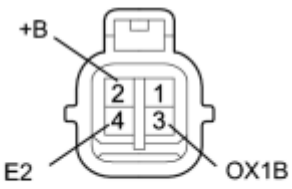
(a) Disconnect the heated oxygen sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (+B) - 4 (E2) | Always | 10 kΩ or higher |
| 2 (+B) - 3 (OX1B) | | |




**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Heated Oxygen Sensor) |

(c) Reconnect the heated oxygen sensor connector.

NG ▶ REPLACE HEATED OXYGEN SENSOR

OK ▼

| 28. | CHECK HARNESS OR CONNECTOR (CHECK FOR SHORT) |
|---|---|

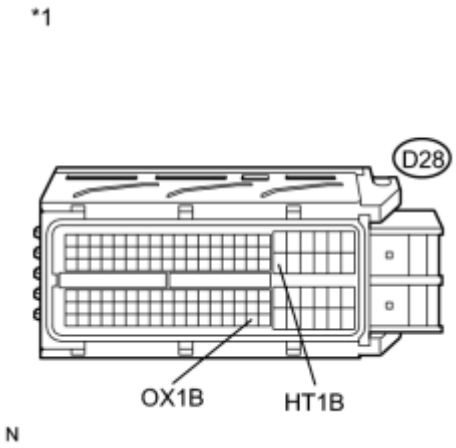
(a) Turn the power switch off and wait for 5 minutes or more.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D28-41 (HT1B) - D28-125 (OX1B) | Always | 10 kΩ or higher |




**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (HEATED OXYGEN SENSOR - ECM)

OK ▶ **REPLACE ECM**

| 29. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.

- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

NG ▶ INSPECT EGR VALVE ASSEMBLY
OK ▶ REPLACE ECM

| | |
|---|---|
| 30. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

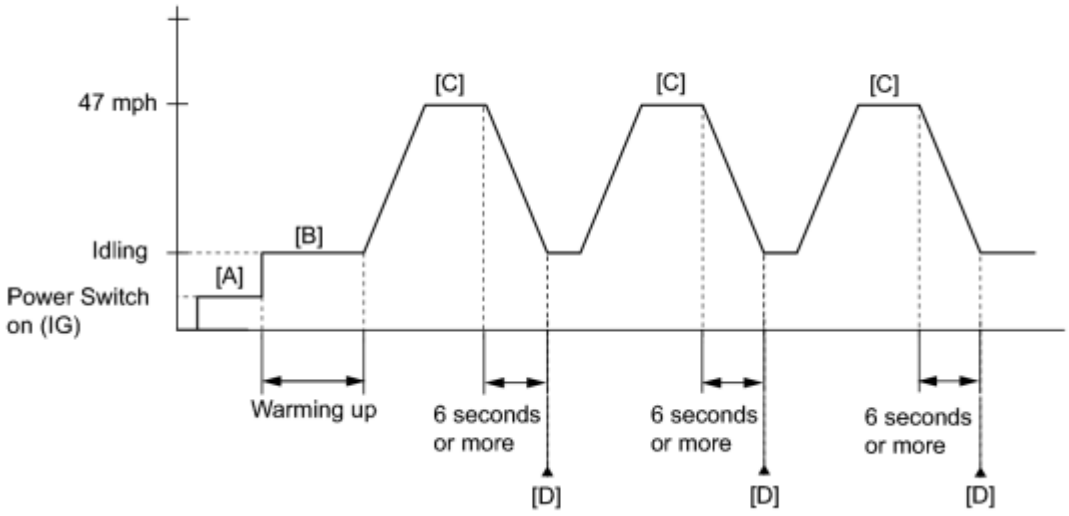
OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY
OK ▶ **REPLACE ECM**

| | |
|---|---|
| 31. | READ DTC OUTPUT (DTC P0139 IS OUTPUT AGAIN) |




(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Clear the DTC (even if no DTC are stored, perform the clear DTC procedure) INFO.

(d) Turn the power switch off and wait for 30 seconds.

(e) Turn the power switch on (IG) and turn the Techstream on [A].

(f) Put the engine in inspection mode INFO.

(g) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more [B].

(h) Drive the vehicle at 47 mph (75 km/h), and then decelerate the vehicle by releasing the accelerator pedal for 6 seconds or more to perform the fuel cut [C].

(i) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(j) Input DTC: P0139. Check the DTC Monitor is NORMAL. If DTC Monitor is INCOMPLETE, perform the drive pattern increasing the vehicle speed and move the shift lever in B to decelerate the vehicle.

Result:

| Result | Proceed to |
|---|---|
| ABNORMAL<br><br>(DTC P0139 is output) | A |

| Result | Proceed to |
|---|---|
| NORMAL<br><br>(DTC is not output) | B |

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 32. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| | (EGR valve is fully closed) | |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

NG ▶ INSPECT EGR VALVE ASSEMBLY
OK ▶ REPLACE HEATED OXYGEN SENSOR

| 33. | INSPECT EGR VALVE ASSEMBLY |
|---|---|

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY
OK ▶ **REPLACE HEATED OXYGEN SENSOR**

| | | |
|---|---|---|
| DTC | P0171 | System Too Lean (Bank 1) |
| DTC | P0172 | System Too Rich (Bank 1) |

# DESCRIPTION

The fuel trim is related to the feedback compensation value, not to the basic injection duration. The fuel trim consists of both the short-term and long-term fuel trim.

The short-term fuel trim is fuel compensation that is used to constantly maintain the air fuel ratio at stoichiometric levels. The signal from the air fuel ratio sensor indicates whether the air fuel ratio is rich or lean compared to the stoichiometric ratio. This triggers a reduction in the fuel injection volume if the air fuel ratio is rich and an increase in the fuel injection volume if it is lean.

Factors such as individual engine differences, wear over time and changes in operating environment cause short-term fuel trim to vary from the central value. The long-term fuel trim, which controls overall fuel compensation, compensates for long-term deviations in the fuel trim from the central value caused by the short-term fuel trim compensation.

If both the short-term and long-term fuel trim are lean or rich beyond predetermined values, it is interpreted as a malfunction, and the ECM illuminates the MIL and sets a DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0171 | With warm engine and stable air fuel ratio feedback, fuel trim considerably in error to lean side<br><br>(2 trip detection logic) | • Intake system<br>• Fuel injector assembly<br>• Mass air flow meter sub-assembly<br>• Engine coolant temperature sensor<br>• Fuel pressure<br>• Gas leaks from exhaust system<br>• Open or short in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• PCV valve and hose<br>• PCV hose connections<br>• EGR valve assembly<br>• ECM |
| P0172 | With warm engine and stable air fuel ratio feedback, fuel trim considerably in error to rich side<br><br>(2 trip detection logic) | • Fuel injector assembly<br>• Mass air flow meter sub-assembly<br>• Engine coolant temperature sensor<br>• Ignition system<br>• Fuel pressure<br>• Gas leaks from exhaust system<br>• Open or short in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• EGR valve assembly<br>• ECM |

HINT:

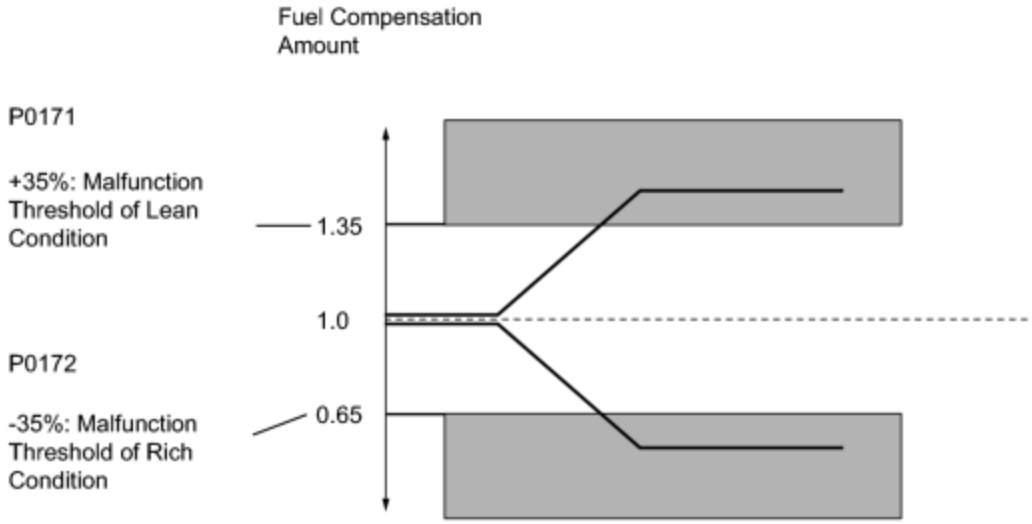
- When DTC P0171 is set, the actual air fuel ratio is on the lean side. When DTC P0172 is set, the actual air fuel ratio is on the rich side.
- If the vehicle runs out of fuel, the air fuel ratio is lean and DTC P0171 may be set. The MIL then illuminates.
- When the total of the short-term and long-term fuel trim values is within the malfunction threshold (and the engine coolant temperature is more than 75°C (167°F)), the system is functioning normally.

# MONITOR DESCRIPTION

Under closed-loop fuel control, a fuel injection volume that deviates from that estimated by the ECM causes changes in the long-term fuel trim compensation value. The long-term fuel trim is adjusted when there are persistent deviations in the short-term fuel trim value. Deviations from the ECM's estimated fuel injection volume also affect the average fuel trim learning value, which is a combination of the average short-term fuel trim (fuel feedback compensation value) and the average long-term fuel trim (learning value of the air fuel ratio). If the average fuel trim learning value exceeds a malfunction threshold, the ECM interprets this a fault in the fuel system and sets a DTC.

Example:

The average fuel trim learning value is +35% or more or -35% or less, the ECM interprets this as a fuel system malfunction.




Y

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0171: Fuel trim Lean (bank 1)<br><br>P0172: Fuel trim Rich (bank 1) |
| Required Sensors/Components (Main) | Fuel system |
| Required Sensors/Components (Related) | Air fuel ratio sensor<br><br>Mass air flow meter sub-assembly<br><br>Crankshaft position sensor |
| Frequency of Operation | Continuous |
| Duration | Within 10 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**Fuel-trim**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0010 (VVT Oil Control Valve Bank 1)<br><br>P0011 (VVT System Bank 1- Advance)<br><br>P0012 (VVT System Bank 1- Retard)<br><br>P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0340, P0342, P0343 (Camshaft Position Sensor)<br><br>P0351, P0352, P0353, P0354 (Igniter)<br><br>P0401 (EGR System (Closed)) |
| Fuel system status | Closed-loop |

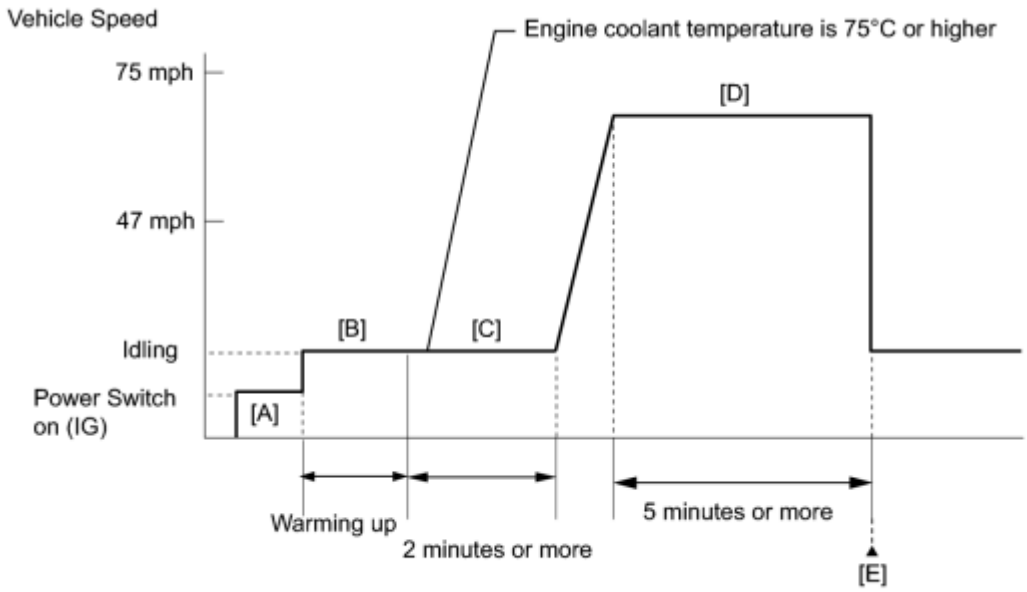
| | |
|---|---|
| Battery voltage | 11 V or more |
| Either of the following conditions 1 or 2 is set | - |
| 1. Engine speed | Less than 1100 rpm |
| 2. Intake air amount per revolution | 0.12 g/rev or more |
| Catalyst monitor | Not executed |

# TYPICAL MALFUNCTION THRESHOLDS

**Fuel-trim**

| | |
|---|---|
| Purge-cut | Executing |
| Either of the following conditions 1 or 2 is met | - |
| 1. Average between short-term fuel trim and long-term fuel trim | 35% or more (varies with engine coolant temperature) |
| 2. Average between short-term fuel trim and long-term fuel trim | -35% or less (varies with engine coolant temperature) |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.

7. Start the engine and warm it up (until the engine coolant temperature is 75°C (167°F) or higher) with all the accessories switched off [B].
8. With the engine warmed up, idle the engine for 2 minutes or more [C].
9. Drive the vehicle at between 47 and 75 mph (75 and 120 km/h) and at an engine speed of between 1400 and 3200 rpm for 5 minutes or more [D].
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
11. Read the pending DTC [E].
12. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P0171 or P0172.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

    CAUTION:

    When performing the confirmation driving pattern, obey all speed limits and traffic laws.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [C] through [D] again.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

18. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P2195 INFO.

# INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be identified by performing the Control the Injection Volume for A/F Sensor in the Active Test. The Control the Injection Volume for A/F Sensor function can help to determine whether the air fuel ratio sensor, heated oxygen sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the Control the Injection Volume for A/F Sensor operation using the Techstream.

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Put the engine in inspection mode INFO.
4. Start the engine.
5. Warm up the engine at an engine speed of 2500 rpm for approximately 90 seconds.
6. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
7. Perform the Active Test operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
8. Monitor the voltage outputs of the air fuel ratio and heated oxygen sensors (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

    HINT:

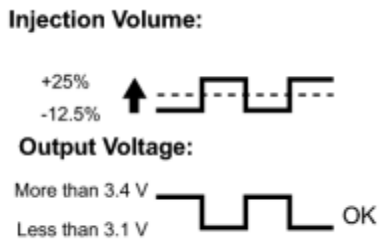
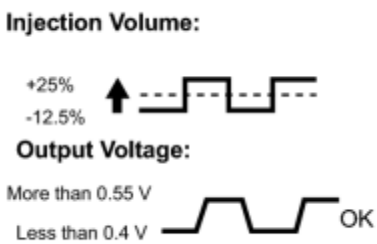
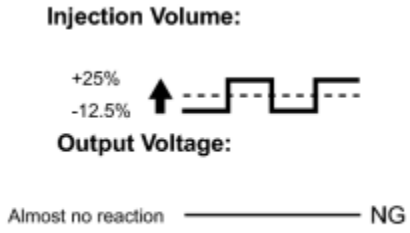
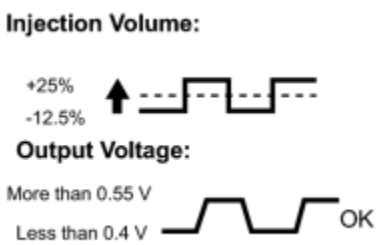
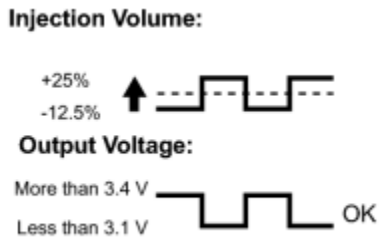
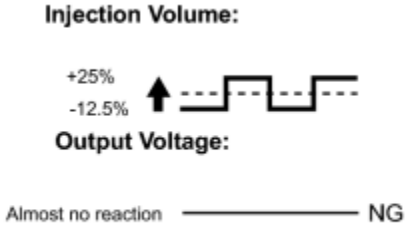
    - The Control the Injection Volume for A/F Sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
    - Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

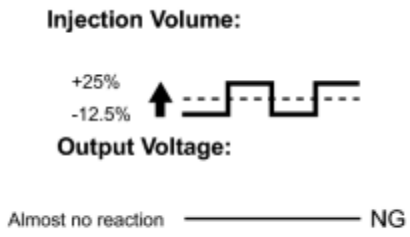
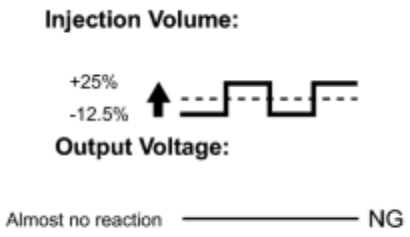
| Techstream Display (Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| AFS Voltage B1S1<br><br>(Air fuel ratio) | +25% | Rich | Less than 3.1 V |
| AFS Voltage B1S1<br><br>(Air fuel ratio) | -12.5% | Lean | More than 3.4 V |

| Techstream Display (Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| O2S B1S2<br><br>(Heated oxygen) | +25% | Rich | More than 0.55 V |
| O2S B1S2<br><br>(Heated oxygen) | -12.5% | Lean | Less than 0.4 V |

NOTICE:

The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| 1 |  |  | - |
| 2 |  |  | ○ Air fuel ratio sensor<br>○ Air fuel ratio sensor heater<br>○ Air fuel ratio sensor circuit |
| 3 |  |  | ○ Heated oxygen sensor<br>○ Heated oxygen sensor heater<br>○ Heated oxygen sensor circuit<br>○ Exhaust gas leaks |
| 4 | | | ○ Fuel pressure<br>○ Exhaust gas leaks<br><br>(Air fuel ratio extremely lean or rich) |

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| |  |  | |

- Following the Control the Injection Volume for A/F Sensor procedure enables technicians to check and graph the voltage outputs of both the air fuel ratio and heated oxygen sensors.
- To display the graph, enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor / A/F Control System / AFS Voltage B1S1 and O2S B1S2.

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A low air fuel ratio sensor voltage could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A high air fuel ratio sensor voltage could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0171 OR P0172) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0171 or P0172 is output | A |
| DTC P0171 or P0172 and other DTCs are output | B |

HINT:

If any DTCs other than P0171 or P0172 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK PCV HOSE CONNECTIONS |

(a) Inspect the PCV hose connections.

OK:

PCV hose is connected correctly and is not damaged.

NG ▶ REPAIR OR REPLACE PCV HOSE

OK ▼

| | |
|---|---|
| 3. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks in intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 4. | PERFORM ACTIVE TEST USING TECHSTREAM (AIR FUEL RATIO CONTROL) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Warm up the engine at an engine speed of 2500 rpm for approximately 90 seconds.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.

(g) Perform the Control the Injection Volume for A/F Sensor operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).

(h) Monitor the voltage outputs of the air fuel ratio sensor and the heated oxygen sensor (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

HINT:

- The Control the Injection Volume for A/F Sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.
- The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

Standard:

| **Techstream Display (Sensor)** | **Injection Volume** | **Status** | **Voltage** |
|---|---|---|---|
| AFS Voltage B1S1 (air fuel ratio) | +25% | Rich | Less than 3.1 V |
| | -12.5% | Lean | More than 3.4 V |
| O2S B1S2 (heated oxygen) | +25% | Rich | More than 0.55 V |
| | -12.5% | Lean | Less than 0.4 V |

**Result**

| **Status AFS Voltage B1S1** | **Status O2S B1S2** | **Air Fuel Ratio Condition and Air Fuel Ratio Sensor Condition** | **Misfire** | **Suspected Trouble Area** | **Proceed to** |
|---|---|---|---|---|---|
| Lean/Rich | Lean/Rich | Normal | - | - | C |
| Lean | Lean | Actual air fuel ratio lean | May occur | • PCV valve and hose<br>• PCV hose connections<br>• Fuel injector assembly blockage<br>• Gas leaks from exhaust system<br>• Intake system<br>• Fuel pressure<br>• Mass air flow meter sub-assembly<br>• Engine coolant temperature | A |

| Status<br><br>AFS Voltage B1S1 | Status<br><br>O2S B1S2 | Air Fuel Ratio Condition and<br><br>Air Fuel Ratio Sensor Condition | Misfire | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|---|
| | | | | sensor | |
| Rich | Rich | Actual air fuel ratio rich | - | • Fuel injector assembly leakage or blockage<br>• Gas leaks from exhaust system<br>• Ignition system<br>• Fuel pressure<br>• Mass air flow meter sub-assembly<br>• Engine coolant temperature sensor | |
| Lean | Lean/Rich | Air fuel ratio sensor malfunction | - | Air fuel ratio sensor | B |
| Rich | Lean/Rich | Air fuel ratio sensor malfunction | - | Air fuel ratio sensor | |

Lean: During Control the Injection Volume for A/F Sensor, the air fuel ratio sensor output voltage (AFS Voltage) is consistently more than 3.4 V, and the heated oxygen sensor output voltage (O2S) is consistently less than 0.4 V.

Rich: During Control the Injection Volume for A/F Sensor, the AFS Voltage is consistently less than 3.1 V, and the O2S is consistently more than 0.55 V.

Lean/Rich: During Control the Injection Volume for A/F Sensor of the Active Test, the output voltage of the heated oxygen sensor alternates correctly.

C ▶ PERFORM CONFIRMATION DRIVING PATTERN
B ▶ INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)
A ▼

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (COOLANT TEMP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.

(e) Read the Data List twice, when the engine is both cold and warmed up.

Standard value:

With cold engine: Same as ambient air temperature.

With warm engine: 80 to 100°C (176 to 212°F).

NG ▶ REPLACE ENGINE COOLANT TEMPERATURE SENSOR
OK
▼

| | |
|---|---|
| 6. | INSPECT MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Inspect the mass air flow meter sub-assembly INFO.

NG ▶ REPLACE MASS AIR FLOW METER SUB-ASSEMBLY
OK
▼

| | |
|---|---|
| 7. | CHECK FUEL PRESSURE |

(a) Check the fuel pressure INFO.

NG ▶ REPAIR OR REPLACE FUEL SYSTEM
OK
▼

| | |
|---|---|
| 8. | INSPECT FOR EXHAUST GAS LEAK |

(a) Inspect for exhaust gas leaks from the exhaust manifold sub-assembly and exhaust pipes.

OK:

No gas leaks.

NG ▶ REPAIR OR REPLACE EXHAUST SYSTEM
OK
▼

| | |
|---|---|
| 9. | CHECK SPARK AND IGNITION |

HINT:

- Refer to the ignition system inspection procedure INFO.
- If the spark plugs or ignition system malfunctions, engine misfires may occur. The misfire count can be read using the Techstream. Enter the following menus: Powertrain / Engine and ECT / Data List / Cylinder #1 Misfire Count (to Cylinder #4 Misfire Count).

NG ▶ REPAIR OR REPLACE IGNITION SYSTEM
OK
▼

| | |
|---|---|
| 10. | INSPECT FUEL INJECTOR ASSEMBLY (INJECTION AND VOLUME) |

HINT:

- Refer to the fuel injector inspection procedure INFO.
- If the injectors malfunction, engine misfires may occur. The misfire count can be read using the Techstream. Enter the following menus: Powertrain / Engine and ECT / Data List / Cylinder #1 Misfire Count (to Cylinder #4 Misfire Count).

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B ▶ PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION)

A ▶ **REPLACE FUEL INJECTOR ASSEMBLY**

| | |
|---|---|
| 11. | INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE) |

*1




(a) Disconnect the air fuel ratio sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (HA1A) - 2 (+B) | 20°C (68°F) | 1.8 to 3.4 Ω |
| 1 (HA1A) - 4 (A1A-) | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Air Fuel Ratio Sensor) |

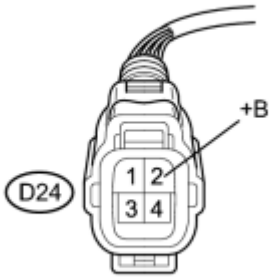
(c) Reconnect the air fuel ratio sensor connector.

NG ▶ REPLACE AIR FUEL RATIO SENSOR

OK

| | |
|---|---|
| 12. | CHECK TERMINAL VOLTAGE (POWER SOURCE OF AIR FUEL RATIO SENSOR) |

*1




(a) Disconnect the air fuel ratio sensor connector.

c

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D24-2 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Fuel Ratio Sensor) |

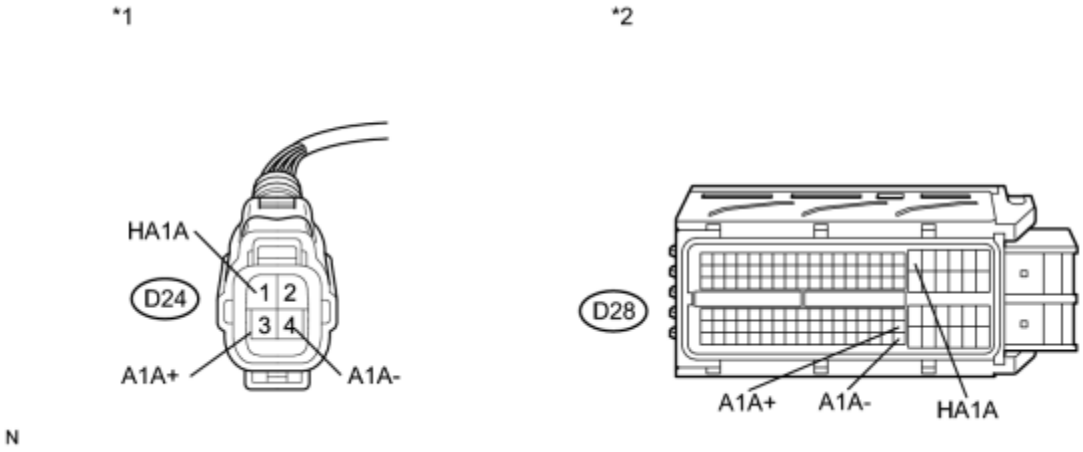
(d) Reconnect the air fuel ratio sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AIR FUEL RATIO SENSOR - EFI MAIN RELAY)

OK

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR - ECM) |

(a) Disconnect the air fuel ratio sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) - D28-18 (HA1A) | Always | Below 1 Ω |
| D24-3 (A1A+) - D28-103 (A1A+) | Always | Below 1 Ω |
| D24-4 (A1A-) - D28-126 (A1A-) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) or D28-18 (HA1A) - Body ground | Always | 10 kΩ or higher |
| D24-3 (A1A+) or D28-103 (A1A+) - Body ground | Always | 10 kΩ or higher |
| D24-4 (A1A-) or D28-126 (A1A-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Fuel Ratio Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the air fuel ratio sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AIR FUEL RATIO SENSOR - ECM)

OK ▼

| | |
|---|---|
| 14. | REPLACE AIR FUEL RATIO SENSOR |

(a) Replace the air fuel ratio sensor INFO.

NEXT

| | |
|---|---|
| 15. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the power and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P0171, P0172.

(l) Check the DTC judgment result.

Result:

| Result | Proceed to |
|---|---|
| ABNORMAL (DTC P0171 or P0172 is output) | A |
| NORMAL (DTC is not output) | B |

B END

A

| | |
|---|---|
| 16. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 17. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 18. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT ▼

| | |
|---|---|
| 19. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

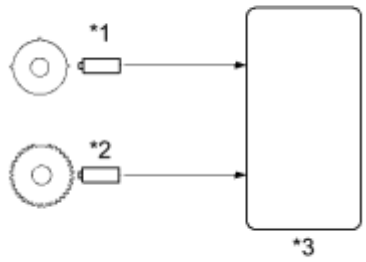
(k) Input the DTCs: P0171, P0172.

(l) Check the DTCs judgment result.

NEXT ▶ **END**

| | | |
|---|---|---|
| DTC | P0300 | Random / Multiple Cylinder Misfire Detected |
| DTC | P0301 | Cylinder 1 Misfire Detected |
| DTC | P0302 | Cylinder 2 Misfire Detected |
| DTC | P0303 | Cylinder 3 Misfire Detected |
| DTC | P0304 | Cylinder 4 Misfire Detected |

# DESCRIPTION




**Text in Illustration**

| | |
|---|---|
| *1 | Camshaft Position Sensor |
| *2 | Crankshaft Position Sensor |
| *3 | ECM |

When the engine misfires, high concentrations of hydrocarbons (HC) enter the exhaust gas. High HC concentration levels can cause an increase in exhaust emission levels. Extremely high concentrations of HC can also cause increases in the three-way catalytic converter temperature, which may cause damage to the three-way catalytic converter. To prevent this increase in emissions and to limit the possibility of thermal damage, the ECM monitors the misfire rate. When the temperature of the three-way catalytic converter reaches the point of thermal degradation, the ECM blinks the MIL. To monitor misfires, the ECM uses both the Camshaft Position (CMP) sensor and the Crankshaft Position (CKP) sensor. The camshaft position sensor is used to identify any misfiring cylinders and the crankshaft position sensor is used to measure variations in the crankshaft rotation speed. Misfires are counted when the crankshaft rotation speed variations exceed predetermined thresholds. If the misfire count exceeds the threshold levels, and could cause emission control system performance deterioration, the ECM illuminates the MIL and sets a DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0300 | When one of following conditions below is detected (2 trip detection logic): | • Open or short in engine wire harness<br>• Connector connection |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | • High temperature misfire occurs in three-way catalytic converter (MIL blinks)<br>• Emission deterioration misfire occurs (MIL illuminates)<br>• Simultaneous misfiring of several cylinders occurs | • Vacuum hose connections<br>• Ignition system<br>• Fuel injector assembly<br>• Fuel pressure<br>• Mass air flow meter sub-assembly<br>• Engine coolant temperature sensor<br>• Compression pressure<br>• Valve timing<br>• PCV valve and hose<br>• PCV hose connections<br>• Intake system<br>• EGR valve assembly<br>• ECM |
| P0301<br>P0302<br>P0303<br>P0304 | When one of following conditions below is detected (2 trip detection logic):<br>• High temperature misfire occurs in three-way catalytic converter (MIL blinks)<br>• Emission deterioration misfire occurs (MIL illuminates)<br>• Misfiring of specific cylinder occurs | |

When DTCs for misfiring cylinders are randomly set, but DTC P0300 is not set, it indicates that misfires have been detected in different cylinders at different times. DTC P0300 is only set when several misfiring cylinders are detected at the same time.

# MONITOR DESCRIPTION

The ECM illuminates the MIL and sets a DTC when either one of the following conditions, which could cause emission control system performance deterioration, is detected (2 trip detection logic).

- Within the first 1000 crankshaft revolutions of the engine starting, an excessive misfiring rate (approximately 20 to 50 misfires per 1000 crankshaft revolutions) occurs once.
- An excessive misfiring rate (approximately 20 to 50 misfires per 1000 crankshaft revolutions) occurs a total of 4 times.

The ECM flashes the MIL and sets a DTC when either one of the following conditions, which could cause the three-way catalytic converter damage, is detected (2 trip detection logic).

HINT:

If a catalyst damage misfire occurs, the monitor informs the driver by blinking the MIL (1 trip).

- In every 200 crankshaft revolutions at a high engine speed, the threshold misfiring percentage is recorded once.
- In every 200 crankshaft revolutions at a normal engine speed, the threshold misfiring percentage is recorded 3 times.

# Misfire Monitor for Mexico Models

The ECM illuminates the MIL and sets a DTC when either one of the following conditions, which could cause emission deterioration, is detected (2 trip detection logic).

- Within the first 1000 crankshaft revolutions of the engine starting, an excessive misfiring rate (approximately 1000 misfires per 1000 crankshaft revolutions) occurs once.
- An excessive misfiring rate (approximately 500 misfires per 1000 crankshaft revolutions) occurs a total of 4 times.

The ECM flashes the MIL and sets a DTC when the following condition, which could cause the three-way catalytic converter damage, is detected (2 trip detection logic).

- A catalyst damage misfire, which is monitored every 200 crankshaft revolutions, occurs 3 times.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0300: Multiple cylinder misfire<br><br>P0301: Cylinder 1 misfire<br><br>P0302: Cylinder 2 misfire<br><br>P0303: Cylinder 3 misfire<br><br>P0304: Cylinder 4 misfire |
| Required Sensors/Components (Main) | Crankshaft position sensor<br><br>Camshaft position sensor |
| Required Sensors/Components (Related) | Engine coolant temperature sensor<br><br>Intake air temperature sensor<br><br>Mass air flow meter sub-assembly |
| Frequency of Operation | Continuous |
| Duration | 1000 to 4000 crankshaft revolutions: Emission related misfire<br><br>200 to 600 crankshaft revolutions: Catalyst damaging misfire |
| MIL Operation | 2 driving cycles: Emission related misfire<br><br>MIL flashes immediately: Catalyst damaging misfire |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**Misfire**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0016 (VVT System Bank 1 - Misalignment)<br><br>P0102, P0103 (Mass Air Flow Meter) |

| | |
|---|---|
| | P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0327, P0328 (Knock Sensor)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0351, P0352, P0353, P0354 (Igniter) |
| Battery voltage | 8 V or more |
| VVT system | Not operated by scan tool |
| Engine speed | 850 to 5500 rpm |
| Either of the following conditions (a) or (b) is met | - |
| (a) Engine coolant temperature at engine start | More than -7°C (19°F) |
| (b) Engine coolant temperature | More than 20°C (68°F) |
| Fuel cut | OFF |

**Monitor Period of Emission-Related Misfire**

| | |
|---|---|
| First 1000 revolutions after engine start, or check mode | Crankshaft 1000 revolutions |
| Except above | Crankshaft 1000 revolutions x 4 |

**Monitor Period of Catalyst Damaging Misfire (MIL Blinks)**

| | |
|---|---|
| All of the following conditions 1, 2 and 3 are met | Crankshaft 200 revolutions x 3 |
| 1. Driving cycles | 1st |
| 2. Check mode | OFF |
| 3. Engine speed | Less than 3000 rpm |
| Except above | Crankshaft 200 revolutions |

# FOR MEXICO MODELS:

**Misfire: for Mexico models**

| | |
|---|---|
| The monitor will run whenever these DTCs are not present | P0016 (VVT System Bank 1 - Misalignment)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0327, P0328 (Knock Sensor)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0351, P0352, P0353, P0354 (Igniter) |
| Battery voltage | 8 V or more |
| VVT system | Not operated by scan tool |
| Engine speed | 850 to 5500 rpm |
| Engine coolant temperature sensor | More than 70°C (158°F) |
| Fuel cut | OFF |

**Monitor period of emission-related-misfire: for Mexico models**

| | |
|---|---|
| First 1000 revolutions after engine start, or check mode | Crankshaft 1000 revolutions |
| Except above | Crankshaft 1000 revolutions x 4 |

**Monitor period of catalyst-damaged-misfire (MIL blinks): for Mexico models**

| | |
|---|---|
| All of following conditions 1, 2 and 3 met | Crankshaft 200 revolutions |
| 1. Driving cycles | 1st |
| 2. Check mode | OFF |
| Except above | Crankshaft 200 revolutions x 3 |

# TYPICAL MALFUNCTION THRESHOLDS

**Monitor Period of Emission Related Misfire**

| | |
|---|---|
| Misfire rate | 2% or more |

**Monitor Period of Catalyst Damaging Misfire (MIL Blinks)**

| | |
|---|---|
| Number of misfire per 200 revolutions | 130 or more (varies with intake air amount per rpm) |

# FOR MEXICO MODELS:

**Monitor period of emission-related-misfire: for Mexico models**

| | |
|---|---|
| Misfire rate | 50.0% or more: for 1st 2000 revolutions<br><br>25.0% or more: after 1st 2000 revolutions |

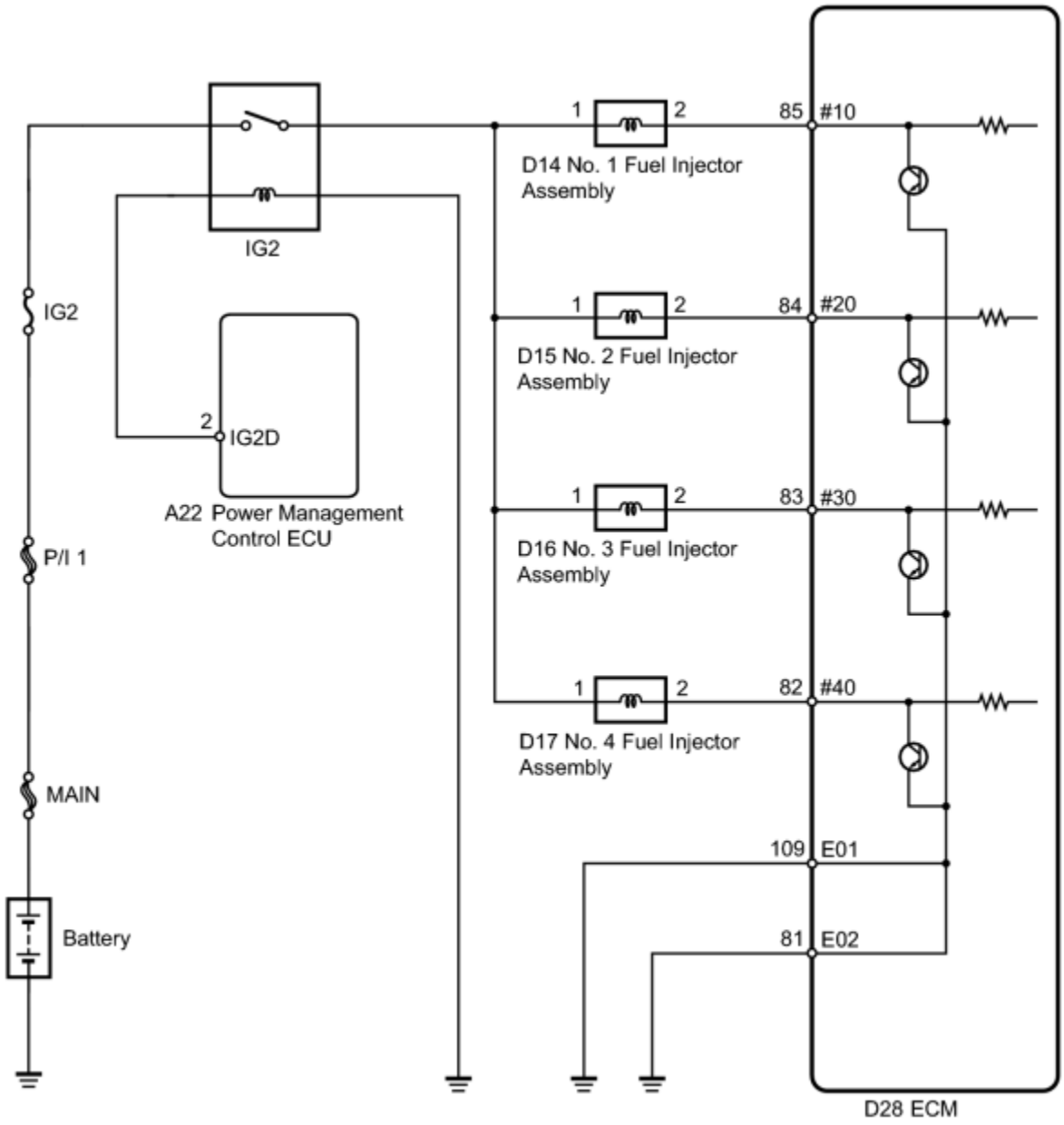
**Monitor period of catalyst-damaged-misfire (MIL blinks): for Mexico models**

| | |
|---|---|
| Number of misfire per 200 revolutions | 130 or more (varies with intake air amount and rpm) |
| Paired cylinder misfire (MIL blinks immediately) | Detected |

# MONITOR RESULT

Refer to Checking Monitor Status INFO.

# WIRING DIAGRAM




# CONFIRMATION DRIVING PATTERN

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG).
3. Turn the Techstream on.
4. Record the DTC(s) and freeze frame data.
5. Put the engine in inspection mode INFO.
6. Using the Techstream, switch the ECM from normal mode to check mode INFO.
7. Read the misfire counts of each cylinder, Cylinder #1 Misfire Count to Cylinder #4 Misfire Count, with the engine idling. If any misfire count is displayed, skip the following confirmation driving pattern.
8. Drive the vehicle several times with the conditions, such as engine speed and engine load, shown in Misfire RPM and Misfire Load in the Data List.

HINT:

In order to store misfire DTCs, it is necessary to operate the vehicle for the period of time shown in the table below, using the Misfire RPM and Misfire Load in the Data List.

| Engine Speed | Duration |
|---|---|
| Idling | 4 minutes or more |
| 1000 | 4 minutes and 30 seconds or more |
| 2000 | 2 minutes and 30 seconds or more |
| 3000 | 1 minute and 30 seconds or more |

9. Check whether misfires have occurred by checking DTCs and freeze frame data.

   HINT:

   Do not turn the power switch off until the stored DTC(s) and freeze frame data have been recorded. When the ECM returns to normal mode (default), the stored DTC(s), freeze frame data and other data will be cleared.

10. Record the DTC(s), freeze frame data and misfire counts.
11. Turn the power switch off and wait for at least 5 seconds.

# INSPECTION PROCEDURE

HINT:

- If any DTCs other than misfire DTCs are output, troubleshoot those DTCs first.
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.
- If the misfire does not recur when the vehicle is brought to the workshop, reproduce the conditions stored in the ECM as freeze frame data.
- If the misfire still cannot be reproduced even though the conditions stored in the ECM as freeze frame data have been reproduced, one of the following factors is considered to be a possible cause of the problem:
  a. There was insufficient fuel in the tank.
  b. Improper fuel is used.
  c. The spark plugs have been contaminated.
  d. The problem requires further diagnosis.
- After finishing repairs, check the misfire counts of the cylinders Cylinder #1 Misfire Count to Cylinder #4 Misfire Count.
- Be sure to confirm that no misfiring cylinder DTCs are set again by conducting the confirmation driving pattern after finishing repairs.
- When one of Short FT #1or Long FT #1 in the freeze frame data is outside the range of +/-20%, the air fuel ratio may be Rich (-20% or less) or Lean (+20% or more).
- When the Coolant Temp in the freeze frame data is less than 75°C (167°F), the misfire has occurred only while warming up the engine.

- An extremely imbalanced drive wheel which causes body vibration may cause misfire DTCs detection.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO MISFIRE DTCS) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

HINT:

Write down the indicated DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0300, P0301, P0302, P0303 and/or P0304 are output | A |
| DTC P0300, P0301, P0302, P0303 and/or P0304 and other DTCs are output | B |

HINT:

If any DTCs other than P0300, P0301, P0302, P0303 and/or P0304 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK PCV HOSE (HOSE CONNECTIONS) |

(a) Check the PCV hose connections.

OK:

PCV hose is correctly connected and is not damaged.

NG ▶ REPAIR OR REPLACE PCV HOSE

OK ▼

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (MISFIRE RPM AND MISFIRE LOAD) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Misfire RPM and Misfire Load.

(e) Read and note the Misfire RPM and Misfire Load values.

HINT:

The Misfire RPM and Misfire Load values indicate the vehicle conditions under which the misfire occurred.

NEXT

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (CYLINDER #1 MISFIRE COUNT, #2, #3 AND #4) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Enter the following menus: Powertrain / Engine and ECT / Data List / Cylinder #1 (to #4) Misfire Count.

(f) Read each value for Cylinder #1 (to #4) Misfire Count displayed on the Techstream. If no misfire counts occur in any cylinders, perform steps [A] and [B], and then check the misfire counts again.

(g) Drive the vehicle with the Misfire RPM and Misfire Load noted in the read value using the Techstream (Misfire RPM and Misfire Load) procedures above [A].

(h) Read Cylinder #1 (to #4) Misfire Count or the DTCs displayed on the Techstream [B].

Result:

| Misfire Count | Proceed to |
|---|---|
| Most misfires occur in only 1 or 2 cylinders | A |
| 3 cylinders or more have equal misfire counts | B |

HINT:

- If it is difficult to reproduce misfires for each cylinder, check the Data List item called Misfire Margin. Try to find vehicle driving conditions that lower the Misfire Margin value. Values above 30% are considered normal.
- If the freeze frame data record of the engine coolant temperature is below 75°C (167°F), it may only be possible to detect the misfire when the engine is cold.
- If the freeze frame data record of the Engine Run Time is below 120 seconds, the misfire may be detected immediately after the engine is started.

B ▶ CHECK INTAKE SYSTEM

A ▼

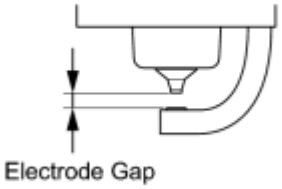
| | |
|---|---|
| 5. | INSPECT SPARK PLUG |

(a) Remove the ignition coil assembly and the spark plug of the misfiring cylinder.

(b) Check the electrode for carbon deposits.

**Recommended Spark Plug**

| Manufacturer | Product |
|---|---|
| DENSO | SC20HR11 |




P

(c) Measure the spark plug electrode gap.

Maximum Electrode Gap for Used Spark Plug:

1.3 mm (0.0512 in.)

If the gap is greater than the maximum, replace the spark plug.

Electrode Gap for New Spark Plug:

1.0 to 1.1 mm (0.0394 to 0.0433 in.)

(d) Reinstall the ignition coil assembly and spark plug.

NG ▶ REPLACE SPARK PLUG

OK ▼

| | |
|---|---|
| 6. | CHECK FOR SPARK (SPARK TEST) |

(a) Perform spark test INFO.

CAUTION:

Always disconnect all fuel injector assembly connectors.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark jumps across electrode gap.

NG ▶ CHANGE TO KNOWN GOOD SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER

OK

| | |
|---|---|
| 7. | CHECK CYLINDER COMPRESSION PRESSURE OF MISFIRING CYLINDER |

(a) Measure the cylinder compression pressure of the misfiring cylinder INFO.

NG ▶ CHECK ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION
OK

| | |
|---|---|
| 8. | CHECK FUEL INJECTOR ASSEMBLY (POWER SOURCE) |

*1




(a) Disconnect the fuel injector assembly connectors.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D14-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D15-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D16-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D17-1 - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

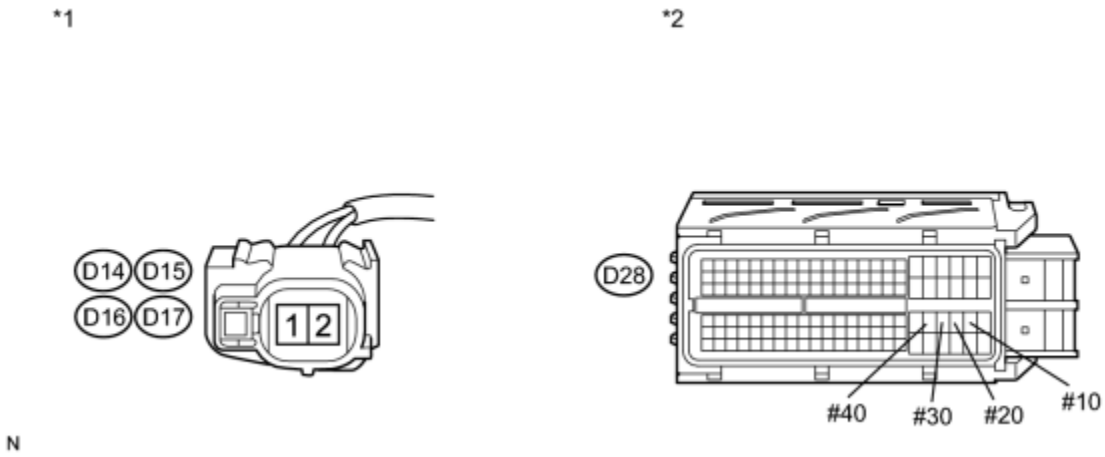
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Injector Assembly) |

(d) Reconnect the fuel injector assembly connectors.

NG ▶ CHECK FUEL INJECTOR CIRCUIT
OK

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (FUEL INJECTOR ASSEMBLY - ECM) |

(a) Disconnect the fuel injector assembly connectors.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-2 - D28-85 (#10) | Always | Below 1 Ω |
| D15-2 - D28-84 (#20) | Always | Below 1 Ω |
| D16-2 - D28-83 (#30) | Always | Below 1 Ω |
| D17-2 - D28-82 (#40) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-2 or D28-85 (#10) - Body ground | Always | 10 Ω or higher |
| D15-2 or D28-84 (#20) - Body ground | Always | 10 Ω or higher |
| D16-2 or D28-83 (#30) - Body ground | Always | 10 Ω or higher |
| D17-2 or D28-82 (#40) - Body ground | Always | 10 Ω or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Injector Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

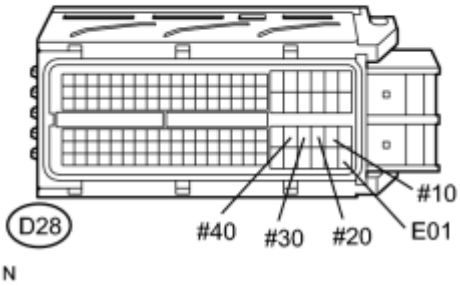
(d) Reconnect the fuel injector assembly connectors.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (FUEL INJECTOR ASSEMBLY - ECM)
OK
▼

| | |
|---|---|
| 10. | INSPECT ECM TERMINAL OF MISFIRING CYLINDER (#10, #20, #30 AND/OR #40 VOLTAGE) |

*1




(a) Disconnect the ECM connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-85 (#10) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |
| D28-84 (#20) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |
| D28-83 (#30) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |
| D28-82 (#40) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BODY GROUND)
OK
▼

| | |
|---|---|
| 11. | CHECK FUEL INJECTOR ASSEMBLY OF MISFIRING CYLINDER |

(a) Check the fu INFO ector assembly injection (whether fuel volume is high or low, and whether injection pattern is poor) .

NG ▶ REPLACE FUEL INJECTOR ASSEMBLY
OK
▼

| | |
|---|---|
| 12. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks in intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM
OK
▼

| | |
|---|---|
| 13. | INSPECT MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Inspect the mass air flow meter sub-assembly INFO.

NG ▶ REPLACE MASS AIR FLOW METER SUB-ASSEMBLY
OK
▼

| | |
|---|---|
| 14. | CHECK FUEL PRESSURE |

(a) Check the fuel pressure INFO.

NG ▶ CHECK FUEL LINE
OK
▼

| | |
|---|---|
| 15. | READ VALUE USING TECHSTREAM (COOLANT TEMP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.

(e) Read the Data List twice, when the engine is both cold and warmed up.

Standard value:

With cold engine:

Same as ambient air temperature.

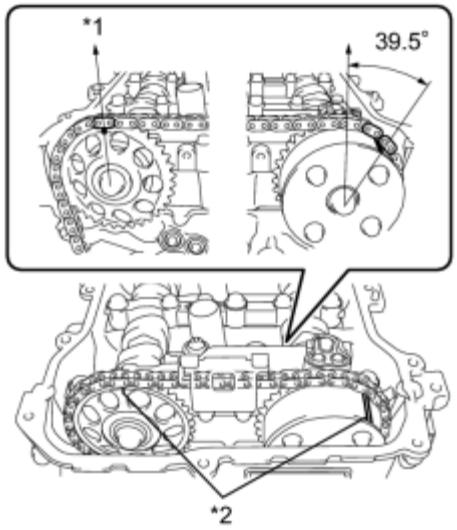
With warm engine:

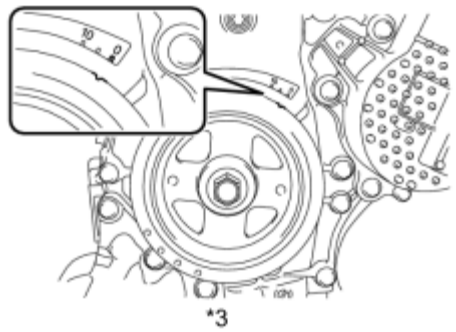
80 to 100°C (176 to 212°F).

NG ▶ REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK ▼

| | |
|---|---|
| 16. | ADJUST VALVE TIMING |




c

HINT:

There are no marks on the cylinder head to match-up for the purpose of checking valve timing. Valve timing can only be inspected by lining up the colored plates on the timing chain with the marks on the pulleys. It may be necessary to remove and reinstall the chain to match-up the alignment marks INFO.

## Text in Illustration

| | |
|---|---|
| *1 | Top |
| *2 | Alignment Mark |
| *3 | No. 1 Cylinder at TDC Compression |

NEXT ▼

| | |
|---|---|
| 17. | CHECK WHETHER DTC OUTPUT RECURS (P0300, P0301, P0302, P0303 OR P0304) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Perform confirmation driving pattern.

(e) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(f) Read the pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0300, P0301, P0302, P0303 or P0304 is output | A |
| DTC is not output | B |

B ▶ END

A ▼

| | |
|---|---|
| 18. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP | MAP value is 20 to 40 kPa (150 to | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| (Data List) | 300 mmHg)<br><br>(EGR valve is fully closed) | |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| 19. | INSPECT EGR VALVE ASSEMBLY |
|---|---|

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| 20. | REPLACE ECM |
|---|---|

(a) Replace the ECM INFO.

NEXT ▼

| 21. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTCs: P0300, P0301, P0302, P0303, P0304.

(l) Check the DTCs judgment result.

NEXT ▶ **END**

| | |
|---|---|
| 22. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks in intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 23. | INSPECT MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Inspect the mass air flow meter sub-assembly INFO.

NG ▶ REPLACE MASS AIR FLOW METER SUB-ASSEMBLY

OK ▼

| | |
|---|---|
| 24. | CHECK FUEL PRESSURE |

(a) Check the fuel pressure INFO.

NG ▶ CHECK FUEL LINE

OK ▼

| | |
|---|---|
| 25. | READ VALUE USING TECHSTREAM (COOLANT TEMP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.

(e) Read the Data List twice, when the engine is both cold and warmed up.

Standard value:

With cold engine:

Same as ambient air temperature.

With warm engine:

80 to 100°C (176 to 212°F).

NG ▶ REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK ▼

| | |
|---|---|
| 26. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ INSPECT SPARK PLUG

A ▼

| | |
|---|---|
| 27. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

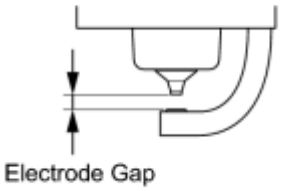
| | |
|---|---|
| 28. | INSPECT SPARK PLUG |

(a) Remove the ignition coil assembly and the spark plug of the misfiring cylinder.

(b) Check the electrode for carbon deposits.

**Recommended Spark Plug**

| Manufacturer | Product |
|---|---|
| DENSO | SC20HR11 |




P

(c) Measure the spark plug electrode gap.

Maximum Electrode Gap for Used Spark Plug:

1.3 mm (0.0512 in.)

If the gap is greater than the maximum, replace the spark plug.

Electrode Gap for New Spark Plug:

1.0 to 1.1 mm (0.0394 to 0.0433 in.)

(d) Reinstall the ignition coil assembly and spark plug.

NG ▶ REPLACE SPARK PLUG

OK ▼

| | |
|---|---|
| 29. | CHECK FOR SPARK (SPARK TEST) |

(a) Perform spark test INFO.

CAUTION:

Always disconnect all fuel injector assembly connectors.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark jumps across electrode gap.

NG ▶ CHANGE TO KNOWN GOOD SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER

OK ▼

| | |
|---|---|
| 30. | CHECK CYLINDER COMPRESSION PRESSURE OF MISFIRING CYLINDER |

(a) Measure the cylinder compression pressure of the misfiring cylinder INFO.

NG ▶ CHECK ENGINE TO DETERMINE CAUSE OF LOW COMPRESSION

OK

| | |
|---|---|
| 31. | CHECK FUEL INJECTOR ASSEMBLY (POWER SOURCE) |

*1




(a) Disconnect the fuel injector assembly connectors.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D14-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D15-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D16-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D17-1 - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

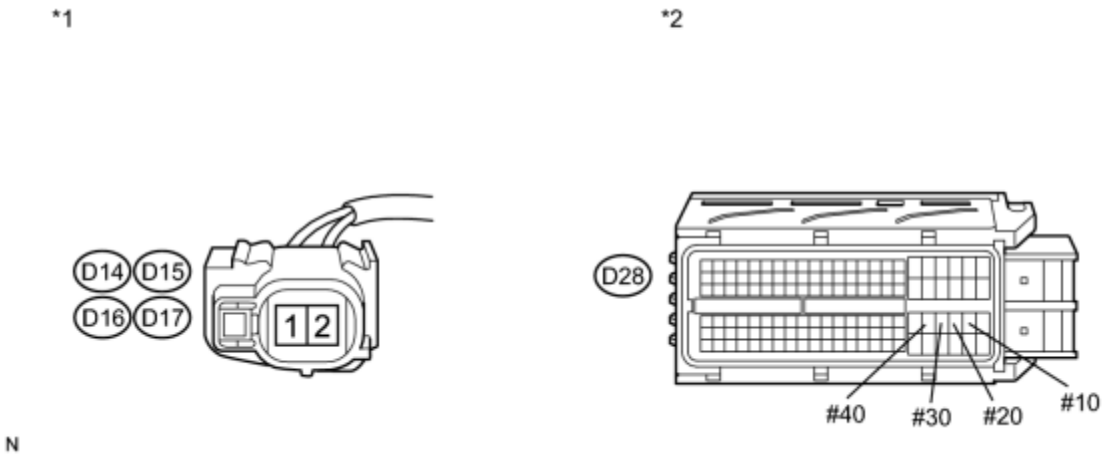
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Injector Assembly) |

(d) Reconnect the fuel injector assembly connectors.

NG ▶ CHECK FUEL INJECTOR CIRCUIT
OK

| | |
|---|---|
| 32. | CHECK HARNESS AND CONNECTOR (FUEL INJECTOR ASSEMBLY- ECM) |

(a) Disconnect the fuel injector assembly connectors.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-2 - D28-85 (#10) | Always | Below 1 Ω |
| D15-2 - D28-84 (#20) | Always | Below 1 Ω |
| D16-2 - D28-83 (#30) | Always | Below 1 Ω |
| D17-2 - D28-82 (#40) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-2 or D28-85 (#10) - Body ground | Always | 10 Ω or higher |
| D15-2 or D28-84 (#20) - Body ground | Always | 10 Ω or higher |
| D16-2 or D28-83 (#30) - Body ground | Always | 10 Ω or higher |
| D17-2 or D28-82 (#40) - Body ground | Always | 10 Ω or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Injector Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the fuel injector assembly connectors.

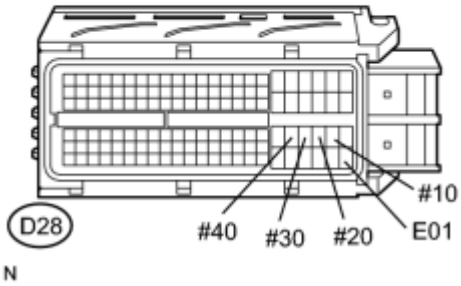
(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (FUEL INJECTOR ASSEMBLY - ECM)

OK

| | |
|---|---|
| 33. | INSPECT ECM TERMINAL OF MISFIRING CYLINDER (#10, #20, #30 AND/OR #40 VOLTAGE) |

*1




(a) Disconnect the ECM connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-85 (#10) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |
| D28-84 (#20) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |
| D28-83 (#30) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |
| D28-82 (#40) - D28-109 (E01) | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BODY GROUND)
OK

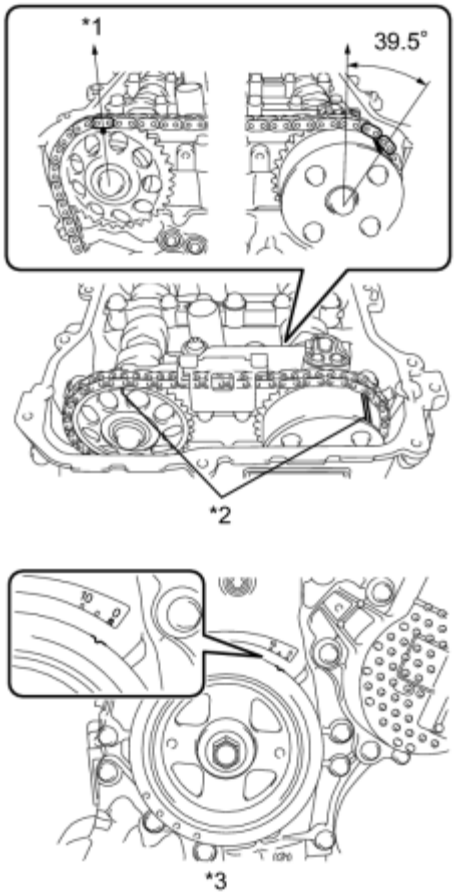
| | |
|---|---|
| 34. | CHECK FUEL INJECTOR ASSEMBLY OF MISFIRING CYLINDER |

(a) Check the fuel injector assembly injection (whether fuel volume is high or low, and whether injection pattern is poor) INFO.

NG ▶ REPLACE FUEL INJECTOR ASSEMBLY

OK

| | |
|---|---|
| 35. | ADJUST VALVE TIMING |




HINT:

There are no marks on the cylinder head to match-up for the purpose of checking valve timing. Valve timing can only be inspected by lining up the colored plates on the timing chain with the marks on the pulleys. It may be necessary to remove and reinstall the chain to match-up the alignment marks INFO.

## Text in Illustration

| | |
|---|---|
| *1 | Top |
| *2 | Alignment Mark |
| *3 | No. 1 Cylinder at TDC Compression |

NEXT

c

| | |
|---|---|
| 36. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0300, P0301, P0302, P0303 OR P0304) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Perform confirmation driving pattern.

(e) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(f) Read the pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0300, P0301, P0302, P0303 or P0304 is output | A |

| Result | Proceed to |
|---|---|
| DTC is not output | B |

B ▶ END

A ▼

| | |
|---|---|
| 37. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT ▼

| | |
|---|---|
| 38. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTCs: P0300, P0301, P0302, P0303, P0304.

(l) Check the DTCs judgment result.

NEXT ▶ **END**

| | |
|---|---|
| 39. | CHANGE TO KNOWN GOOD SPARK PLUG AND CHECK SPARK OF MISFIRING CYLINDER |

(a) Change the installed spark plug to a known good spark plug.

(b) Perform a spark test INFO.

CAUTION:

Always disconnect all fuel injector assembly connectors.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark jumps across electrode gap.

NG ▶ CHANGE TO KNOWN GOOD IGNITION COIL AND CHECK SPARK OF MISFIRING CYLINDER
OK ▶ **REPLACE SPARK PLUG**

| | |
|---|---|
| 40. | CHANGE TO KNOWN GOOD IGNITION COIL AND CHECK SPARK OF MISFIRING CYLINDER |

(a) Change the ignition coil assembly to a known good ignition coil assembly.

(b) Perform a spark test INFO.

CAUTION:

Always disconnect all fuel injector assembly connectors.

NOTICE:

Do not crank the engine for more than 2 seconds.

OK:

Spark jumps across electrode gap.

NG ▶ REPLACE ECM
OK ▶ **REPLACE IGNITION COIL ASSEMBLY**

| | |
|---|---|
| 41. | CHECK FUEL LINE |

(a) Check the fuel lines for leaks or blockage.

NG ▶ REPAIR OR REPLACE FUEL LINE
OK ▶ **REPLACE FUEL PUMP**

| | | |
|---|---|---|
| DTC | P0327 | Knock Sensor 1 Circuit Low Input (Bank 1 or Single Sensor) |
| DTC | P0328 | Knock Sensor 1 Circuit High Input (Bank 1 or Single Sensor) |

# DESCRIPTION

A flat type knock control sensor is used. Flat type knock control sensors (non-resonant type) have a structure that can detect vibrations over a wide band of frequencies: between approximately 6 kHz and 15 kHz.

Knock control sensors are fitted onto the engine block to detect engine knocking.

The knock control sensor contains a piezoelectric element which generates a voltage when it becomes deformed.

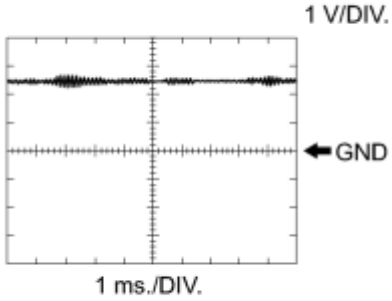
The voltage is generated when the engine block vibrates due to knocking. Occurrence of engine knocking can be suppressed by delaying the ignition timing.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0327 | Output voltage of knock control sensor less than 0.5 V for 1 second or more<br><br>(1 trip detection logic) | • Short in knock control sensor circuit<br>• Knock control sensor<br>• ECM |
| P0328 | Output voltage of knock control sensor more than 4.5 V for 1 second or more<br><br>(1 trip detection logic) | • Open in knock control sensor circuit<br>• Knock control sensor<br>• ECM |

HINT:

When either DTC P0327 or P0328 is set, the ECM enters fail-safe mode. During fail-safe mode, the ignition timing is delayed to its maximum retardation. Fail-safe mode continues until the power switch is turned off.

Reference: Inspection using an oscilloscope




T

The correct waveform is as shown.

| | |
|---|---|
| ECM Terminal Name | Between KNK1 and EKNK |
| Tester Range | 1 V/DIV., 1 ms./DIV. |
| Condition | Engine speed maintained at 4000 rpm after warming up engine |

# MONITOR DESCRIPTION

If the output voltage transmitted by the knock sensor remains low or high for more than 1 second, the ECM interprets this as a malfunction in the sensor circuit, and sets a DTC.

The monitor for DTCs P0327 and P0328 begins to run when 5 seconds have elapsed since the engine was started.

If the malfunction is not repaired successfully, DTC P0327 or P0328 is set 5 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0327: Knock sensor (bank 1) range check (Low voltage)<br><br>P0328: Knock sensor (bank 1) range check (High voltage) |
| Required Sensors/Components (Main) | Knock control sensor |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 1 second |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Battery voltage | 10.5 V or more |
| Time after engine start | 5 seconds or more |

# TYPICAL MALFUNCTION THRESHOLDS

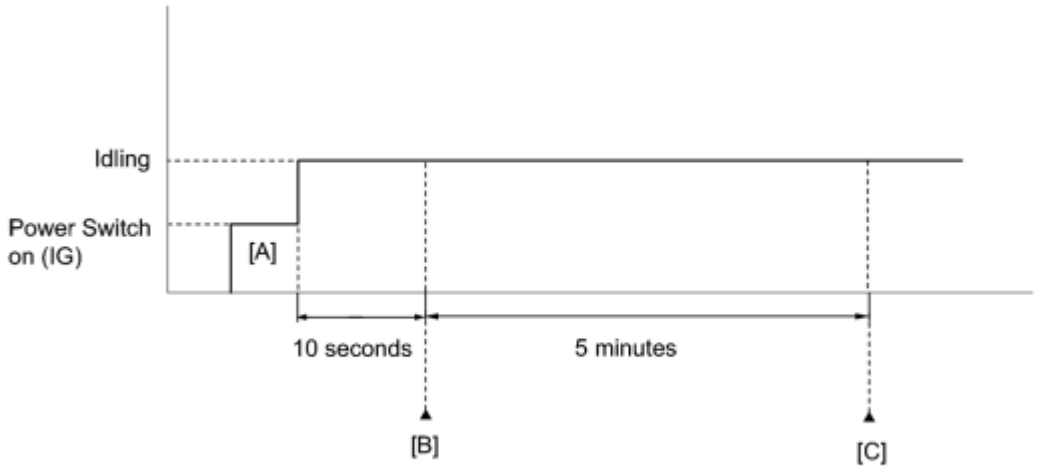
**Knock Sensor Range Check (Low Voltage) P0327**

| | |
|---|---|
| Knock sensor voltage | Less than 0.5 V |

**Knock Sensor Range Check (High Voltage) P0328**

| | |
|---|---|
| Knock sensor voltage | More than 4.5 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and wait 10 seconds.
8. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
9. Read the DTC [B].
10. If a DTC is output, the system is malfunctioning.

HINT:

If a DTC is not output, perform the following procedure.

11. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
12. Input the DTC: P0327 or P0328.
13. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, idle the engine for 5 minutes.

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
15. Check the judgment result [C].

HINT:

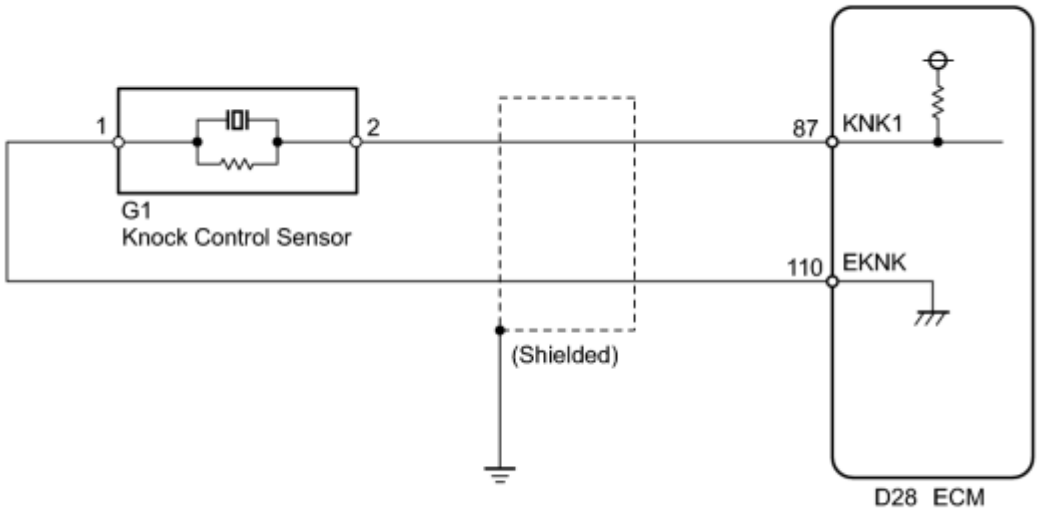
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

16. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




Y

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (KNOCK FEEDBACK VALUE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Warm up the engine.

(f) Enter the following menus: Powertrain / Engine and ECT / Knock Feedback Value.

(g) Read the value while driving the vehicle.

OK:

The value changes.

| | |
|---|---|
| Malfunction does not occur | Knock Feedback Value changes |
| Malfunctions occur | Knock Feedback Value does not change |

HINT:

The knock feedback value change can be confirmed by running the engine with a high load, for example, by activating the air conditioning system and racing the engine.

NG ▶ INSPECT ECM (KNK1 VOLTAGE)
OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | INSPECT ECM (KNK1 VOLTAGE) |

*1




(a) Disconnect the knock control sensor connector.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| G1-2 - G1-1 | Power switch on (IG) | 4.5 to 5.5 V |

**Text in Illustration**

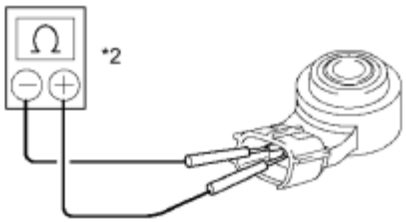
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Knock Control Sensor) |

(d) Reconnect the knock control sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (ECM - KNOCK CONTROL SENSOR)
OK
▼

| | |
|---|---|
| 3. | INSPECT KNOCK CONTROL SENSOR |

*1




(a) Remove the knock control sensor.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 120 to 280 kΩ |

**Text in Illustration**

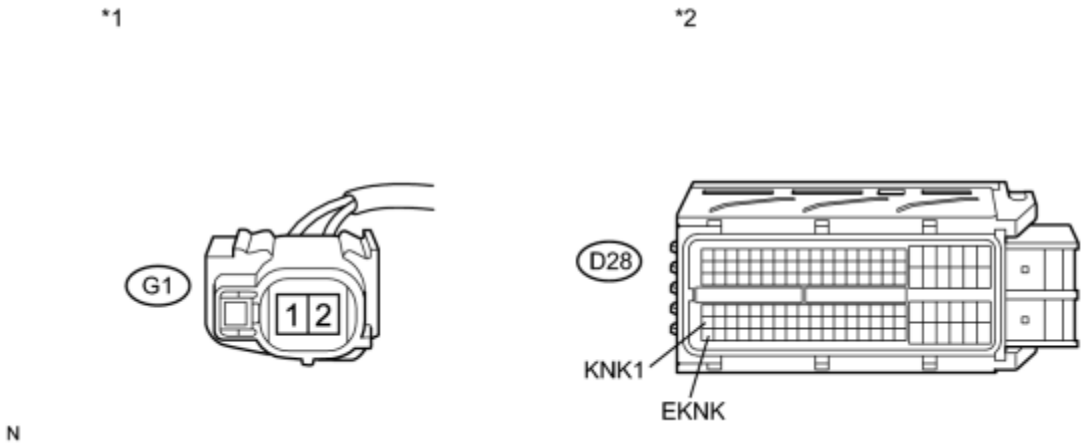
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Knock Control Sensor) |
| *2 | Ohmmeter |

(c) Reinstall the knock control sensor.

NG ▶ REPLACE KNOCK CONTROL SENSOR
OK ▶ **REPLACE ECM**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (ECM - KNOCK CONTROL SENSOR) |

(a) Disconnect the knock control sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| G1-2 - D28-87 (KNK1) | Always | Below 1 Ω |
| G1-1 - D28-110 (EKNK) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| G1-2 or D28-87 (KNK1) - Body ground | Always | 10 kΩ or higher |
| G1-1 or D28-110 (EKNK) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Knock Control Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the knock control sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - KNOCK CONTROL SENSOR)
OK ▶ **REPLACE ECM**

| DTC | P0335 | Crankshaft Position Sensor "A" Circuit |
|---|---|---|

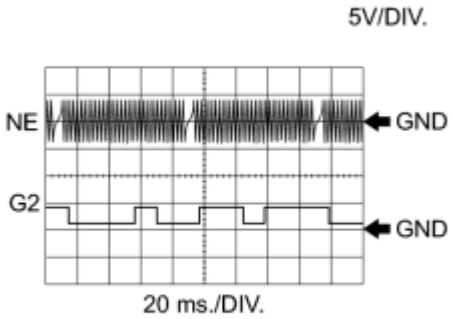
# DESCRIPTION

The crankshaft position sensor system consists of a crankshaft position sensor plate and a pickup coil.

The sensor plate has 34 teeth and is installed on the crankshaft. The pickup coil is made of wound copper wire, an iron core and magnet. The sensor plate rotates and, as each tooth passes by the pickup coil, a pulse signal is created. The pickup coil generates 34 signals per engine revolution. Based on these signals, the ECM calculates the crankshaft position and engine speed. Using these calculations, the fuel injection time and ignition timing are controlled.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0335 | When either of following conditions are met:<br><br>(1 trip detection logic)<br><br>• Missing crankshaft position sensor signal despite camshaft position sensor signal inputs normal after engine cranked<br><br>• No crankshaft position sensor signal to ECM | • Open or short in crankshaft position sensor circuit<br>• Crankshaft position sensor<br>• No. 1 crankshaft position sensor plate<br>• ECM |

- Reference: Inspection using an oscilloscope.




HINT:

- The correct waveform is as shown.
- G2+ is camshaft position sensor signals, and NE+ is the crankshaft position sensor signal.
- A failure of the ground for the shielding of the wiring may result in noisy waveforms.

| | |
|---|---|
| ECM Terminal Name | Between NE+ and NE-<br><br>Between G2+ and G2- |
| Tester Range | 5 V/DIV., 20 ms./DIV. |

| | |
|---|---|
| Condition | Idling with warm engine |

# MONITOR DESCRIPTION

If there is no signal from the crankshaft position sensor despite the engine rotating, the ECM interprets this as a malfunction of the sensor.

If the malfunction is not repaired successfully, a DTC is set 10 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0335: Crankshaft position sensor verify pulse input<br><br>P0335: Crankshaft position sensor range check or rationality |
| Required Sensors/Components (Main) | Crankshaft position sensor |
| Required Sensors/Components (Related) | Camshaft position sensor |
| Frequency of Operation | Continuous |
| Duration | 1.85 seconds: Verify pulses input (case 1)<br><br>15 seconds: Verify pulses input (case 2)<br><br>0.016 seconds: Range check or rationality |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**P0335: Crankshaft Position Sensor Verify Pulse Input (Case 1)**

| | |
|---|---|
| Time after power switch off to on (IG) | More than 0.5 seconds |
| Lost communication with power management control ECU | Not detected |

**P0335: Crankshaft Position Sensor Verify Pulse Input (Case 2)**

| | |
|---|---|
| Time after power switch off to on (IG) | More than 0.5 seconds |
| Engine speed | 600 rpm or less |
| Time after starter ON to OFF | 3 seconds or more |
| Lost communication with power management control ECU | Not detected |

**P0335: Crankshaft Position Sensor Range Check or Rationality**

| | |
|---|---|
| NE signal | Input |
| Time after starter OFF to ON | 2.5 seconds or more |
| Camshaft position sensor circuit fail (P0340, P0342, P0343) | Not detected |
| Number of camshaft position sensor signal pulse | 6 times or more |
| Battery voltage | 7 V or more |
| Lost communication with power management control ECU | Not detected |

# TYPICAL MALFUNCTION THRESHOLDS

**P0335: Crankshaft Position Sensor Verify Pulse Input (Case 1)**

| | |
|---|---|
| Engine speed signal | No signal |

**P0335: Crankshaft Position Sensor Verify Pulse Input (Case 2)**

| | |
|---|---|
| Engine speed signal | No signal |

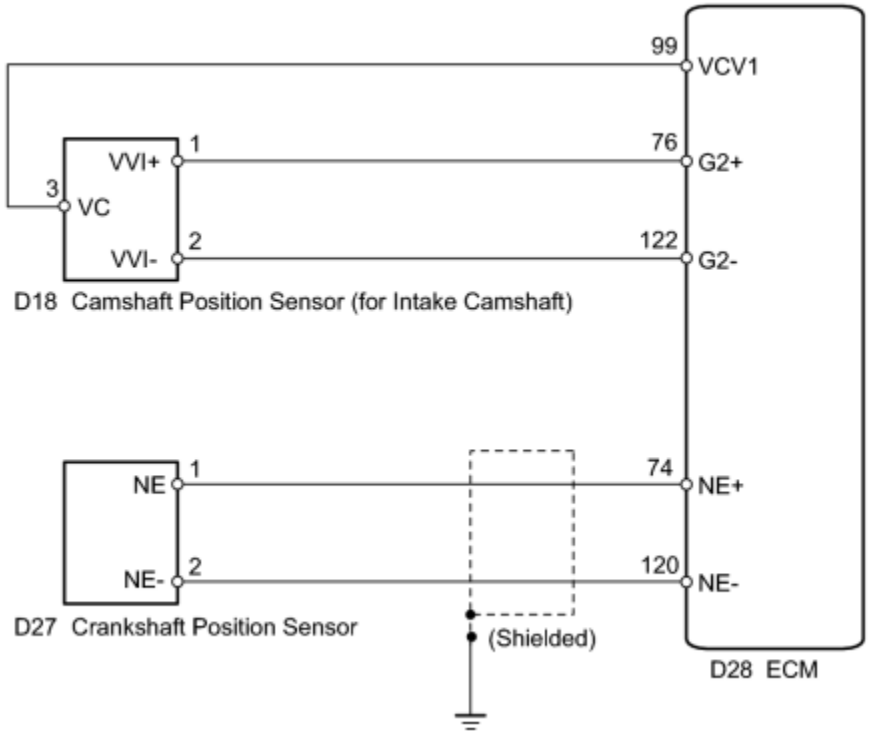
**P0335: Crankshaft Position Sensor Range Check or Rationality**

| | |
|---|---|
| Number of crankshaft position sensor signal pulse | 87 times or less, or 219 times or more |

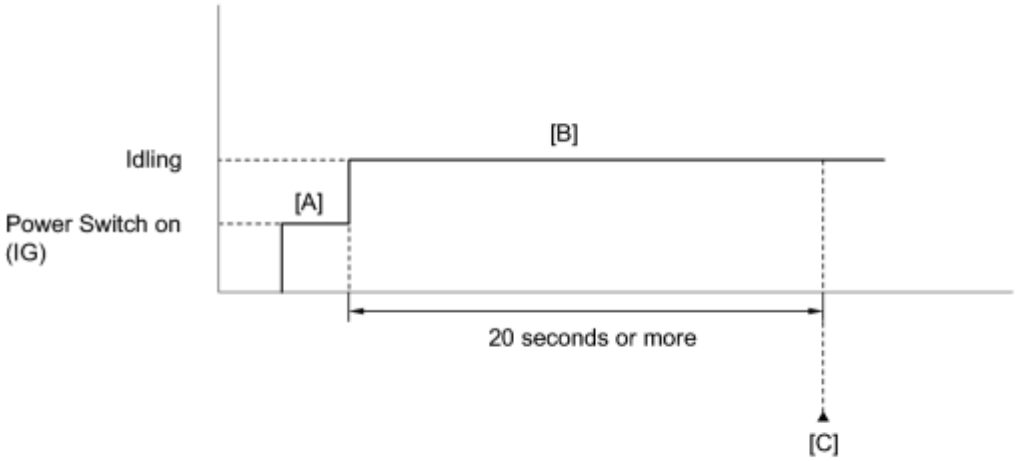
# COMPONENT OPERATING RANGE

| | |
|---|---|
| Crankshaft position sensor | • Crankshaft position sensor output voltage fluctuates while crankshaft revolving<br>• 34 crankshaft position sensor signals per crankshaft revolution |

# WIRING DIAGRAM




# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.

5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. Idle the engine for 20 seconds or more [B].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTC [C].
11. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0335.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

- If no problem is found through this diagnostic troubleshooting procedure, troubleshoot the engine mechanical systems.
- Check the engine speed. The engine speed can be checked using the Techstream. To check, follow the operation below:
  a. Connect the Techstream to the DLC3.
  b. Turn the power switch on (IG) and turn the Techstream on.
  c. Put the engine in inspection mode INFO.
  d. Start the engine.
  e. Enter the following menus: Powertrain / Engine and ECT / Data List / Engine Speed.
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (ENGINE SPEED) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Enter the following menus: Powertrain / Engine and ECT / Data List / Engine Speed.

(f) Start the engine.

(g) Read the values displayed on the Techstream while the engine is running.

OK:

Correct values are displayed.

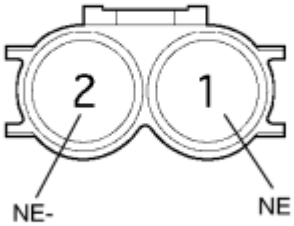
HINT:

- To check the engine speed change, display the graph on the Techstream.
- If the engine does not start, check the engine speed while cranking.
- If the engine speed indicated on the Techstream remains at zero (0), there may be an open or short in the crankshaft position sensor circuit.

NG ▶ INSPECT CRANKSHAFT POSITION SENSOR (RESISTANCE)
OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | INSPECT CRANKSHAFT POSITION SENSOR (RESISTANCE) |

*1




(a) Disconnect the crankshaft position sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (NE) - 2 (NE-) | Cold | 1630 to 2740 Ω |
| 1 (NE) - 2 (NE-) | Hot | 2065 to 3225 Ω |

HINT:

"Cold" and "Hot" mean the temperature of the coils themselves. "Cold" is from -10 to 50°C (14 to 122°F) and "Hot" is from 50 to 100°C (122 to 212°F).

If the resistance is not as specified, replace the sensor.

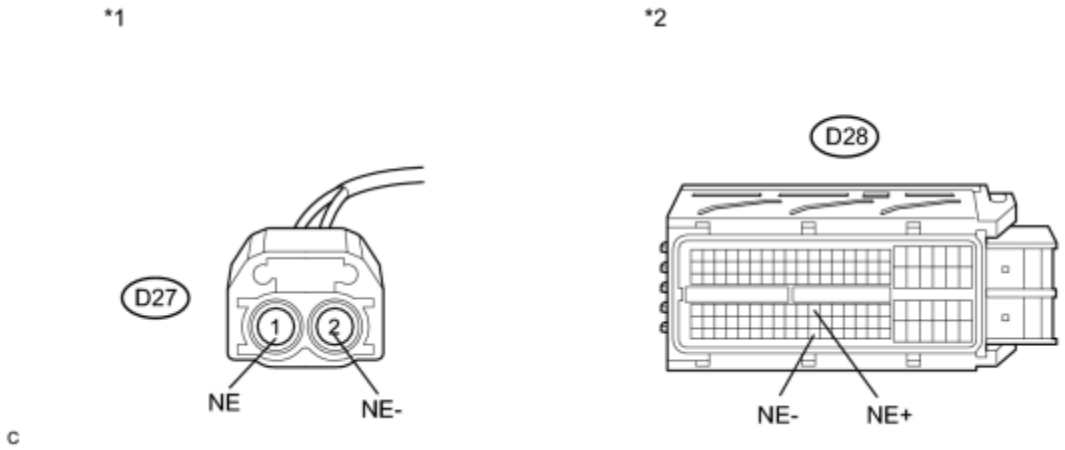
**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Crankshaft Position Sensor) |

(c) Reconnect the crankshaft position sensor connector.

NG ▶ REPLACE CRANKSHAFT POSITION SENSOR
OK
▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM) |




(a) Disconnect the crankshaft position sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D27-1 (NE) - D28-74 (NE+) | Always | Below 1 Ω |
| D27-2 (NE-) - D28-120 (NE-) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D27-1 (NE) or D28-74 (NE+) - Body ground | Always | 10 kΩ or higher |
| D27-2 (NE-) or D28-120 (NE-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Crankshaft Position Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the crankshaft position sensor connector.

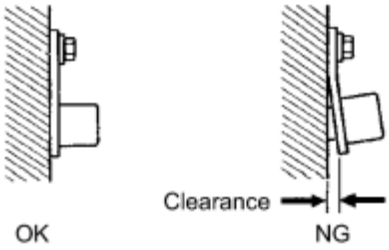
(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (CRANKSHAFT POSITION SENSOR - ECM)

OK ▼

| | |
|---|---|
| 4. | CHECK SENSOR INSTALLATION (CRANKSHAFT POSITION SENSOR) |

(a) Check the crankshaft position sensor installation.




OK:

Sensor is installed correctly.

NG ▶ SECURELY REINSTALL SENSOR

OK ▼

| | |
|---|---|
| 5. | INSPECT NO. 1 CRANKSHAFT POSITION SENSOR PLATE (TEETH OF SENSOR PLATE) |

(a) Check the teeth of the No. 1 crankshaft position sensor plate INFO.

OK:

Sensor plate does not have any cracks or deformation.

NG ▶ REPLACE NO. 1 CRANKSHAFT POSITION SENSOR PLATE

OK ▼

| | |
|---|---|
| 6. | REPLACE CRANKSHAFT POSITION SENSOR |

(a) Replace the crankshaft position sensor INFO.

NEXT ▼

| | |
|---|---|
| 7. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0335 is output | B |

HINT:

If the engine does not start, replace the ECM.

B ▶ REPLACE ECM
A ▶ **END**

| | | |
|---|---|---|
| DTC | P0340 | Camshaft Position Sensor Circuit Malfunction |
| DTC | P0342 | Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor) |
| DTC | P0343 | Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor) |

# DESCRIPTION

The camshaft position sensor for intake camshaft (G2 signal sensor) consists of a magnet and MR element.

The camshaft has a timing rotor for the camshaft position sensor. When the camshaft rotates, changes occur in the air gaps between the timing rotor and MR element, which affects the magnet. As a result, the resistance of the MRE material fluctuates. The camshaft position sensor converts the camshaft rotation data to pulse signals, and uses the pulse signals to determine the camshaft angle, which it sends to the ECM. Then the ECM uses this data to control fuel injection time and injection timing.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0340 | When ether of following conditions is met:<br>• No camshaft position sensor signal to ECM at engine speed 600 rpm or more (1 trip detection logic)<br>• Missing camshaft position sensor signal despite crankshaft position sensor inputs normal at engine speed of 600 rpm or more (1 trip detection logic) | • Open or short in camshaft position sensor circuit<br>• Camshaft position sensor<br>• Intake camshaft<br>• Jumped tooth of timing chain for intake camshaft<br>• ECM |
| P0342 | Output voltage of camshaft position sensor less than 0.3 V for 4 seconds<br>(1 trip detection logic) | • Open or short in camshaft position sensor circuit<br>• Camshaft position sensor<br>• Intake camshaft<br>• Jumped tooth of timing chain for intake camshaft<br>• ECM |
| P0343 | Output voltage of 4.7 V for 4 seconds<br>(1 trip detection logic) | • Open or short in camshaft position sensor circuit<br>• Camshaft position sensor<br>• Intake camshaft<br>• Jumped tooth of timing chain for intake camshaft<br>• ECM |

HINT:

DTC P0340 indicates a malfunction relating to the camshaft position sensor circuit (the wire harness between the ECM and camshaft position sensor, and the camshaft position sensor itself).

Reference: Inspection using an oscilloscope INFO.

# MONITOR DESCRIPTION

If no signal is transmitted by the camshaft position sensor despite the engine revolving, or the rotation of the camshaft and the crankshaft is not synchronized, the ECM interprets this as a malfunction of the sensor.

If the malfunction is not repaired successfully, the DTC is set 10 seconds after the engine is nest started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0340: Camshaft position sensor verify pulse input<br><br>P0342: Camshaft position sensor range check (Low voltage)<br><br>P0343: Camshaft position sensor range check (High voltage) |
| Required Sensors/Components (Main) | Camshaft position sensor |
| Required Sensors/Components (Related) | Crankshaft position sensor |
| Frequency of Operation | Continuous |
| Duration | 5 seconds: Camshaft position /sensor verify pulse input<br><br>4 seconds: Camshaft position sensor range check (Low voltage, high voltage) |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**P0340: Camshaft Position Sensor Verify Pulse Input**

| | |
|---|---|
| Engine speed | 600 rpm or more |
| Starter | OFF |
| Camshaft position sensor range check fail (P0342, P0343) | Not detected |
| Camshaft position sensor voltage | 0.3 to 4.7 V |
| Lost communication of power management control ECU (U0293) | Not detected |

**P0342, P0343: Camshaft Position Sensor Range Check (Low Voltage, High Voltage)**

| | |
|---|---|
| Starter | OFF |
| Time after power switch OFF to on (IG) | 2 seconds or more |
| Camshaft position sensor verify pulse input fail (P0340) | Not detected |

| | |
|---|---|
| Battery voltage | 8 V or more |

# TYPICAL MALFUNCTION THRESHOLDS

**P0340: Camshaft Position Sensor Verify Pulse Input**

| | |
|---|---|
| Camshaft position and crankshaft position alignment | Misalignment |
| Camshaft position sensor signal | No signal |

**P0342: Camshaft Position Sensor Range Check (Low Voltage)**

| | |
|---|---|
| Camshaft position sensor voltage | Less than 0.3 V |

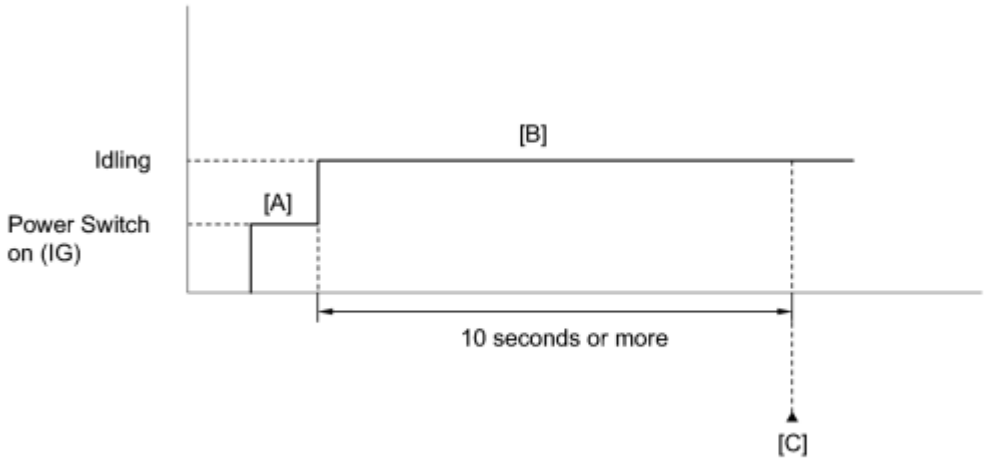
**P0343: Camshaft Position Sensor Range Check (High Voltage)**

| | |
|---|---|
| Camshaft position sensor voltage | More than 4.7 V |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Camshaft position sensor | Camshaft position sensor output voltage fluctuates while camshaft revolving<br><br>3 camshaft position sensor signals per 2 crankshaft revolutions |
| Camshaft position sensor voltage | 0.3 to 4.7 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.

2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. Idle the engine for 10 seconds or more [B].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTC [C].
11. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0340, P0342 or P0343.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P0335 INFO.

# INSPECTION PROCEDURE

HINT:

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.
- If no problem is found through this diagnostic troubleshooting procedure, troubleshoot the engine mechanical system.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0340, P0342 AND P0343) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0340, P0342 or P0343 is output | A |
| DTC P0340, P0342 or P0343 and other DTCs are output | B |

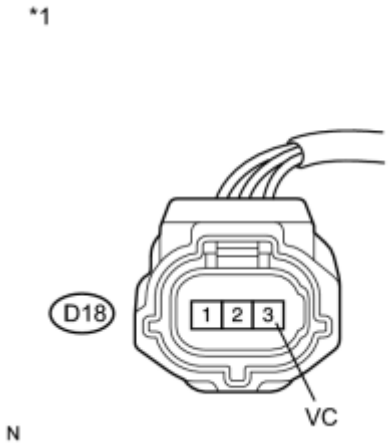
HINT:

If any DTCs other than P0340, P0342 and P0343 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | INSPECT CAMSHAFT POSITION SENSOR (POWER SOURCE) |




(a) Disconnect the camshaft position sensor connector.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D18-3 (VC) - Body ground | Power switch on (IG) | 4.5 to 5.0 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Camshaft Position Sensor) |

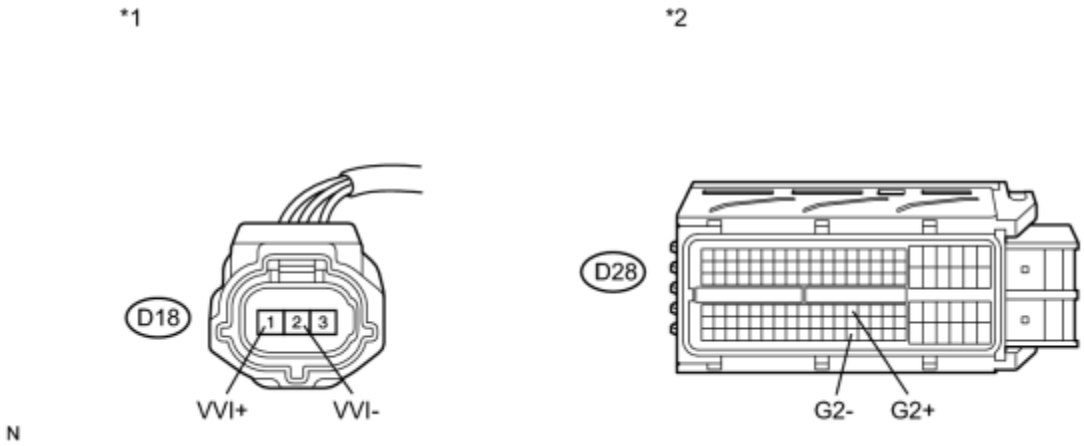
(d) Reconnect the camshaft position sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM) |

(a) Disconnect the camshaft position sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D18-1 (VVI+) - D28-76 (G2+) | Always | Below 1 Ω |
| D18-2 (VVI-) - D28-122 (G2-) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D18-1 (VVI+) or D28-76 (G2+) - Body ground | Always | 10 kΩ or higher |
| D18-2 (VVI-) or D28-122 (G2-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Camshaft Position Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the camshaft position sensor connector.

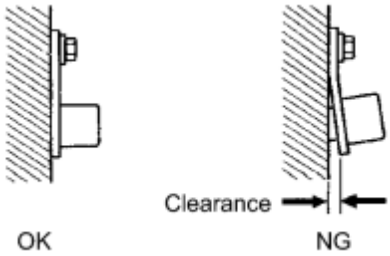
(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)

OK ▼

| | |
|---|---|
| 4. | CHECK SENSOR INSTALLATION (CAMSHAFT POSITION SENSOR) |

(a) Check the camshaft position sensor installation.




OK:

Sensor is installed correctly.

NG ▶ SECURELY REINSTALL SENSOR

OK ▼

| | |
|---|---|
| 5. | INSPECT INTAKE CAMSHAFT (TIMING ROTOR) |

(a) Check the timing rotor of the intake camshaft.

OK:

Camshaft timing rotor does not have any cracks or deformation.

NG ▶ REPLACE INTAKE CAMSHAFT

OK ▼

| | |
|---|---|
| 6. | REPLACE CAMSHAFT POSITION SENSOR |

(a) Replace the camshaft position sensor INFO.

NEXT ▼

| | |
|---|---|
| 7. | CHECK WHETHER DTC OUTPUT RECURS (P0340, P0342 OR P0343) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0340, P0342 or P0343 is output | A |
| DTC is not output | B |

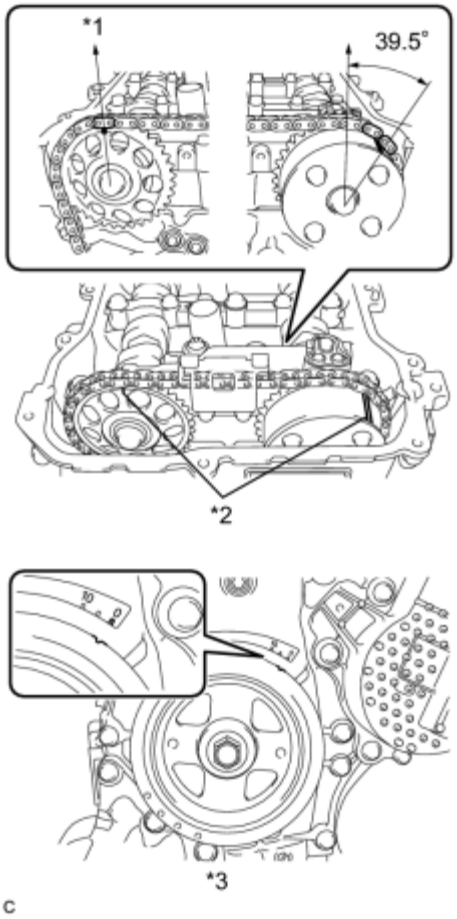
HINT:

If the engine does not start, replace the ECM.

B ▶ END

A ▼

| | |
|---|---|
| 8. | ADJUST VALVE TIMING |




HINT:

There are no marks on the cylinder head to match-up for the purpose of checking valve timing. Valve timing can only be inspected by lining up the colored plates on the timing chain with the marks on the pulleys. It may be necessary to remove and reinstall the chain to match-up the alignment marks INFO.

## Text in Illustration

| | |
|---|---|
| *1 | Top |
| *2 | Alignment Mark |
| *3 | No. 1 Cylinder at TDC Compression |

NEXT ▼

c

| | |
|---|---|
| 9. | CHECK WHETHER DTC OUTPUT RECURS (P0340, P0342 OR P0343) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0340, P0342 or P0343 is output | B |

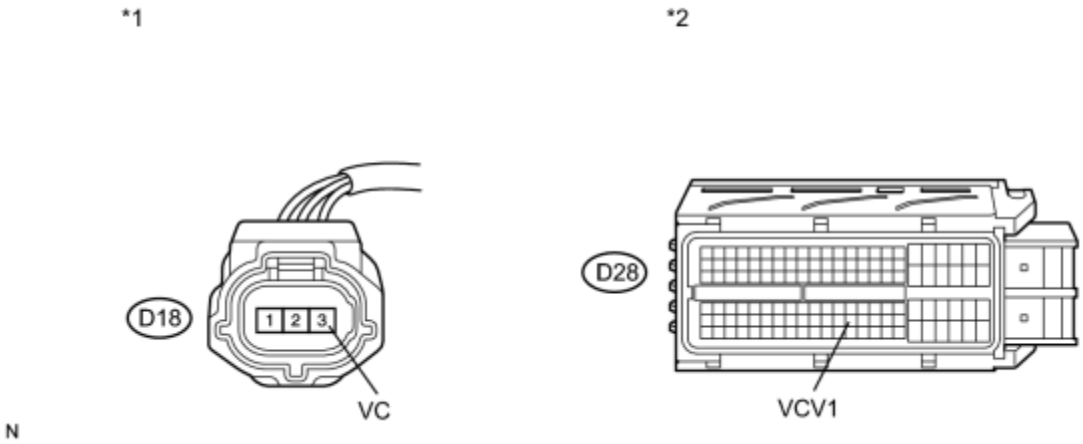
HINT:

If the engine does not start, replace the ECM.

B ▶ REPLACE ECM
A ▶ **END**

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM) |

(a) Disconnect the camshaft position sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D18-3 (VC) - D28-99 (VCV1) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D18-3 (VC) or D28-99 (VCV1) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Camshaft Position Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the camshaft position sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0351 | Ignition Coil "A" Primary / Secondary Circuit |
| DTC | P0352 | Ignition Coil "B" Primary / Secondary Circuit |
| DTC | P0353 | Ignition Coil "C" Primary / Secondary Circuit |
| DTC | P0354 | Ignition Coil "D" Primary / Secondary Circuit |

# DESCRIPTION

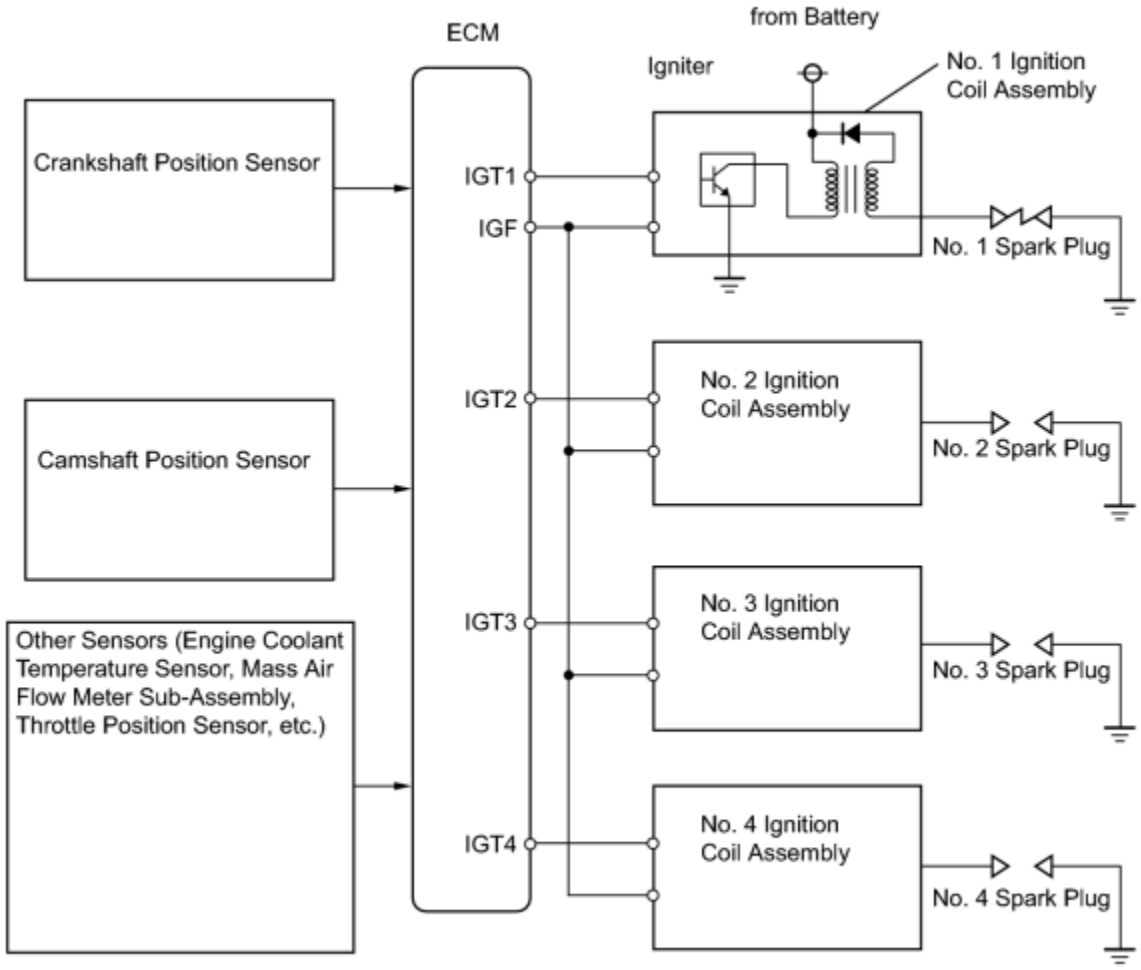
HINT:

- These DTCs indicate malfunctions relating to the primary circuit.
- If DTC P0351 is set, check the No. 1 ignition coil assembly circuit.
- If DTC P0352 is set, check the No. 2 ignition coil assembly circuit.
- If DTC P0353 is set, check the No. 3 ignition coil assembly circuit.
- If DTC P0354 is set, check the No. 4 ignition coil assembly circuit.

A Direct Ignition System (DIS) is used on this vehicle.

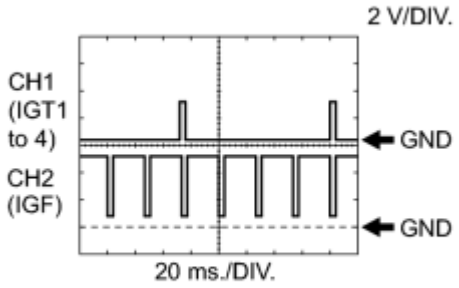
The DIS is an ignition system in which each cylinder is ignited by it's own ignition coil assembly and spark plug. The secondary wiring of each ignition coil generates a powerful voltage which is applied directly to each spark plug. The spark passes from the center electrode of the spark plug to the ground electrode.

The ECM determines the ignition timing and transmits the ignition (IGT) signals to each cylinder. Using the IGT signal, the ECM turns the power transistor inside the igniter on and off. The power transistor, in turn, switches on and off the current to the primary coil. When the current to the primary coil is cut off, a powerful voltage is generated in the secondary coil. This voltage is applied to the spark plugs, causing them to spark inside the cylinders. As the ECM cuts the current to the primary coil, the igniter sends back an ignition confirmation (IGF) signal to the ECM, for each cylinder ignition.




Y

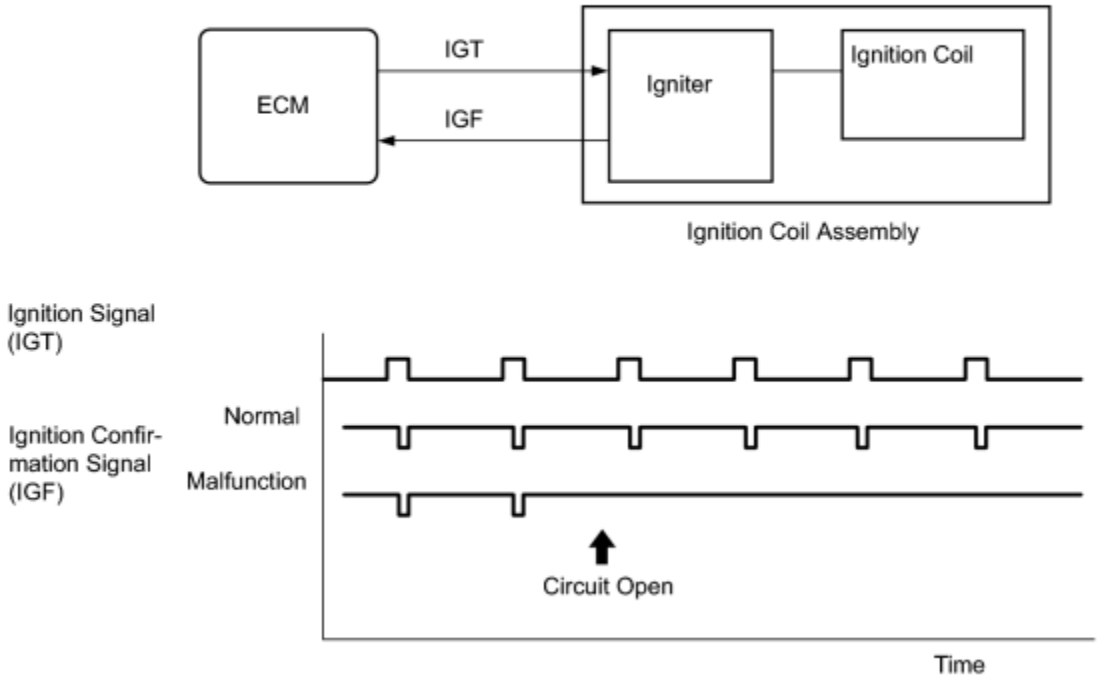
| DTC No. | DTC Detection Conditions | Trouble Areas |
|---|---|---|
| P0351<br>P0352<br>P0353<br>P0354 | No IGF signal to ECM while engine running<br>(1 trip detection logic) | • Ignition system<br>• Open or short in IGF or IGT circuit (1 to 4) between ignition coil assembly and ECM<br>• No. 1 to No. 4 ignition coil assemblies<br>• ECM |




- Reference: Inspection using an oscilloscope.
- While cranking or idling the engine, check the waveform between terminals IGT (1 to 4) and E1, and IGF and E1 of the ECM connector.

| | |
|---|---|
| ECM Terminal Name | Between IGT (1 to 4) and E1<br><br>Between IGF and E1 |
| Tester Range | 2 V/DIV., 20 ms./DIV. |
| Condition | Idling |

# MONITOR DESCRIPTION




Y

If the ECM does not receive any IGF signals despite transmitting the IGT signal, it interprets this as a fault in the igniter and sets a DTC.

If the malfunction is not repaired successfully, a DTC is set 1 second after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0351: Igniter (cylinder 1) malfunction<br>P0352: Igniter (cylinder 2) malfunction<br>P0353: Igniter (cylinder 3) malfunction<br>P0354: Igniter (cylinder 4) malfunction |
| Required Sensors/Components (Main) | Igniter |
| Required Sensors/Components (Related) | Crankshaft position sensor |
| Frequency of Operation | Continuous |
| Duration | 0.256 seconds |
| MIL Operation | Immediately |

| | |
|---|---|
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Either of the following conditions A or B is met | - |
| A. Engine speed | 1500 rpm or less |
| B. Starter | OFF |
| Either of the following conditions C or D met | - |
| C. Both of the following conditions (a) and (b) are met | - |
| (a) Engine speed | 500 rpm or less |
| (b) Battery voltage | 6 V or more |
| D. All of the following conditions (c), (d) and (e) are met | - |
| (c) Engine speed | More than 500 rpm |
| (d) Battery voltage | 10 V or more |
| (e) Number of sparks after CPU reset | 5 sparks or more |
| Lost communication with power management control ECU (U0293) | Not detected |

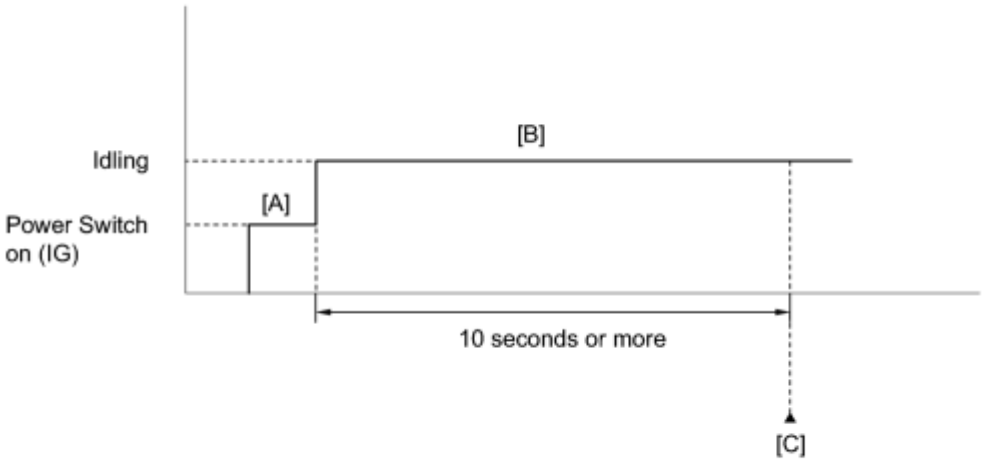
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| All of the following conditions are met | Conditions A, B and C |
| A. Ignition signal fail counter | More than 2 times |
| B. Time after condition A is met | 0.256 seconds or more |
| C. Ignition signal fail count after condition B is met | More than 2 times |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Confirmed ignition signal input when ignition signal is ON to OFF | 2 times |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. Idle the engine for 10 seconds or more [B].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTC [C].
11. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0351, P0352, P0353 or P0354.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed |

| Techstream Display | Description |
| --- | --- |
| | ○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

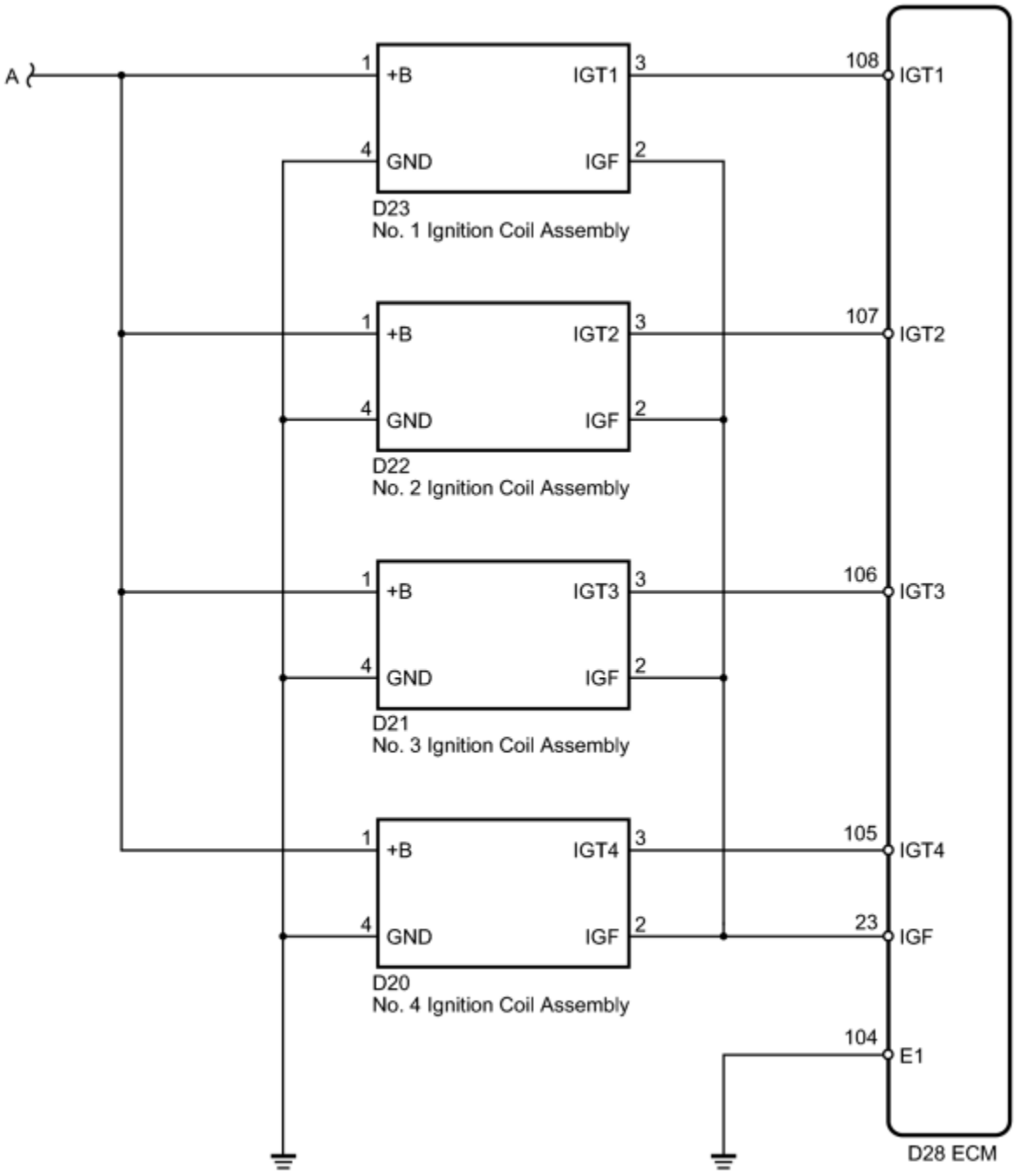
    HINT:

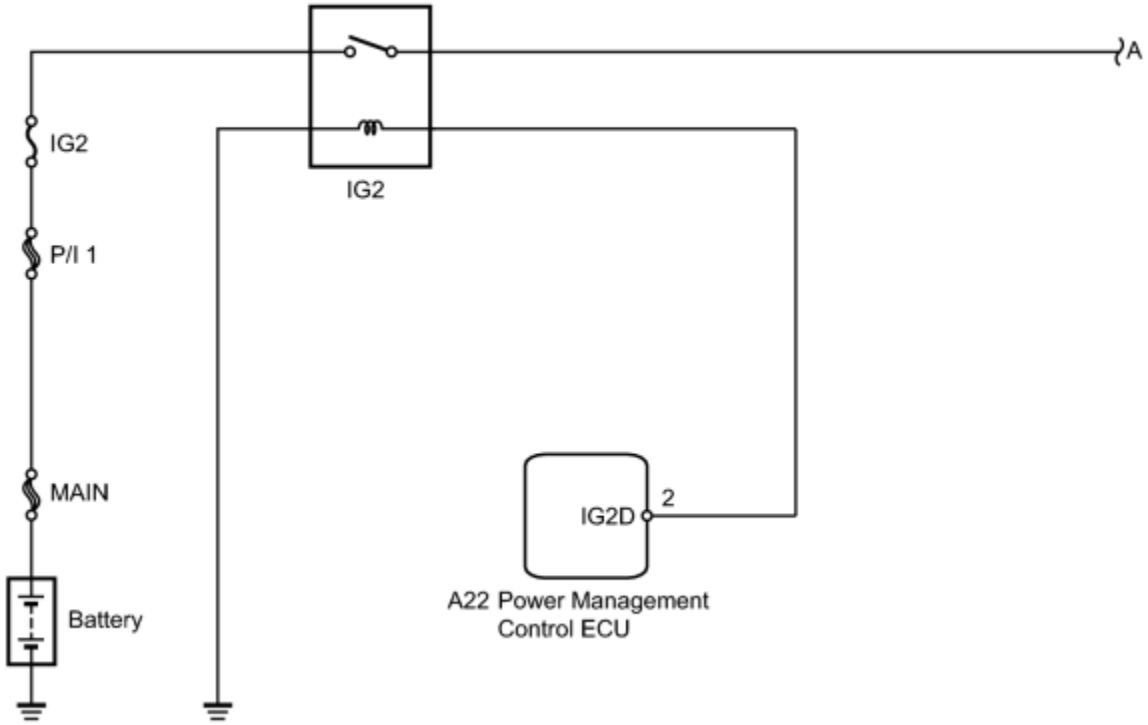
    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
17. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM


A
1
+B
IGT1
3
4
GND
IGF
2
D23
No. 1 Ignition Coil Assembly
1
+B
IGT2
3
4
GND
IGF
2
D22
No. 2 Ignition Coil Assembly
1
+B
IGT3
3
4
GND
IGF
2
D21
No. 3 Ignition Coil Assembly
1
+B
IGT4
3
4
GND
IGF
2
D20
No. 4 Ignition Coil Assembly
108
IGT1
107
IGT2
106
IGT3
105
IGT4
23
IGF
104
E1
D28 ECM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

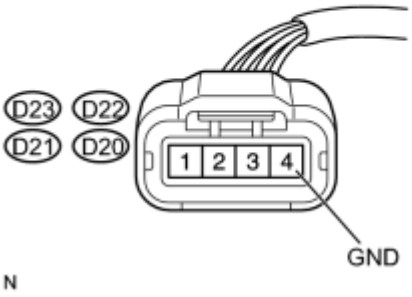
Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - BODY GROUND) |

(a) Disconnect the ignition coil assembly connectors.

*1




N

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D23-4 (GND) - Body ground | Always | Below 1 Ω |
| D22-4 (GND) - Body ground | Always | Below 1 Ω |
| D21-4 (GND) - Body ground | Always | Below 1 Ω |
| D20-4 (GND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Ignition Coil Assembly) |

(c) Reconnect the ignition coil assembly connectors.

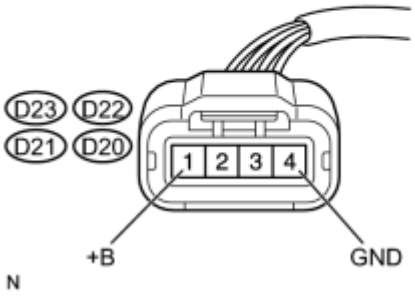
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IGNITION COIL ASSEMBLY - BODY GROUND)

OK ▼

| | |
|---|---|
| 2. | INSPECT IGNITION COIL ASSEMBLY (POWER SOURCE) |

(a) Disconnect the ignition coil assembly connectors.

*1




N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D23-1 (+B) - D23-4 (GND) | Power switch on (IG) | 11 to 14 V |
| D22-1 (+B) - D22-4 (GND) | Power switch on (IG) | 11 to 14 V |
| D21-1 (+B) - D21-4 (GND) | Power switch on (IG) | 11 to 14 V |
| D20-1 (+B) - D20-4 (GND) | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Ignition Coil Assembly) |

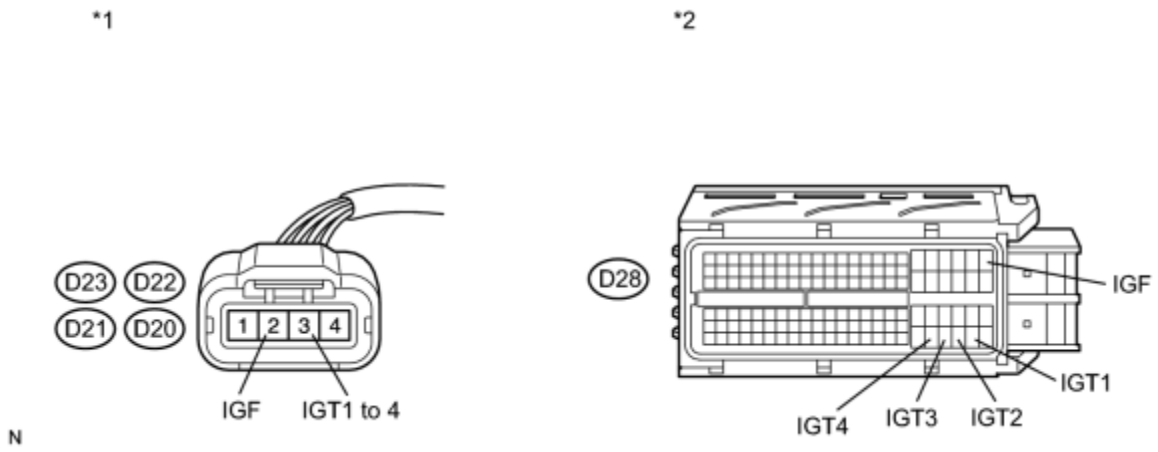
(d) Reconnect the ignition coil assembly connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IGNITION COIL ASSEMBLY - IG2 RELAY)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (IGNITION COIL ASSEMBLY - ECM) |

(a) Disconnect the ignition coil assembly connectors.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D23-2 (IGF) - D28-23 (IGF) | Always | Below 1 Ω |
| D22-2 (IGF) - D28-23 (IGF) | Always | Below 1 Ω |
| D21-2 (IGF) - D28-23 (IGF) | Always | Below 1 Ω |
| D20-2 (IGF) - D28-23 (IGF) | Always | Below 1 Ω |

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D23-3 (IGT1) - D28-108 (IGT1) | Always | Below 1 Ω |
| D22-3 (IGT2) - D28-107 (IGT2) | Always | Below 1 Ω |
| D21-3 (IGT3) - D28-106 (IGT3) | Always | Below 1 Ω |
| D20-3 (IGT4) - D28-105 (IGT4) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D23-2 (IGF) or D28-23 (IGF) - Body ground | Always | 10 kΩ or higher |
| D22-2 (IGF) or D28-23 (IGF) - Body ground | Always | 10 kΩ or higher |
| D21-2 (IGF) or D28-23 (IGF) - Body ground | Always | 10 kΩ or higher |
| D20-2 (IGF) or D28-23 (IGF) - Body ground | Always | 10 kΩ or higher |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D23-3 (IGT1) or D28-108 (IGT1) - Body ground | Always | 10 kΩ or higher |
| D22-3 (IGT2) or D28-107 (IGT2) - Body ground | Always | 10 kΩ or higher |
| D21-3 (IGT3) or D28-106 (IGT3) - Body ground | Always | 10 kΩ or higher |
| D20-3 (IGT4) or D28-105 (IGT4) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Ignition Coil Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

(e) Reconnect the ignition coil assembly connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (IGNITION COIL ASSEMBLY - ECM)

OK ▼

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (DTC P0351, P0352, P0353 OR P0354) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Shuffle arrangement of the ignition coil assemblies (among No. 1 to No. 4 cylinders).

NOTICE:

Do not shuffle the connectors.

(f) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| Same DTC output | A |
| Different ignition coil DTC output | B |

B ▶ REPLACE IGNITION COIL ASSEMBLY

A ▶ **REPLACE ECM**

| DTC | P0401 | Exhaust Gas Recirculation Flow Insufficient Detected |
|---|---|---|

# DESCRIPTION

Based on the driving conditions, the ECM regulates the volume of exhaust gas that is recirculated to the engine's combustion chambers and thus lowers the combustion temperature to reduce NOx emissions. The ECM monitors signals such as engine speed, coolant temperature, electric load, and vehicle speed. When the EGR permission conditions are fulfilled, the ECM controls the opening of the EGR valve linearly through signals to the EGR step motor.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0401 | Change in intake manifold pressure is small when the EGR valve is opened and closed during idle fuel cut operation.<br><br>(2 trip detection logic) | • EGR valve assembly<br>• EGR passage<br>• EGR with cooler pipe sub-assembly<br>• Manifold absolute pressure sensor<br>• ECM |

# MONITOR DESCRIPTION

The ECM monitors the pressure inside the intake manifold while opening and closing the EGR valve during fuel cut operation. If there is no change in the manifold absolute pressure sensor value, the ECM interprets this as a malfunction in the EGR valve assembly, illuminates the MIL and stores the DTC (2 trip detection logic).

# MONITOR STRATEGY

| | |
|---|---|
| Related DTC | P0401: EGR valve high flow rate / low flow rate |
| Required sensors / components (Main) | EGR valve assembly, manifold absolute pressure sensor |
| Required sensors / components (Related) | Engine coolant temperature sensor, vehicle speed sensor |
| Frequency of operation | Continuous |
| Duration | 3 seconds |
| MIL operation | 2 driving cycles |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

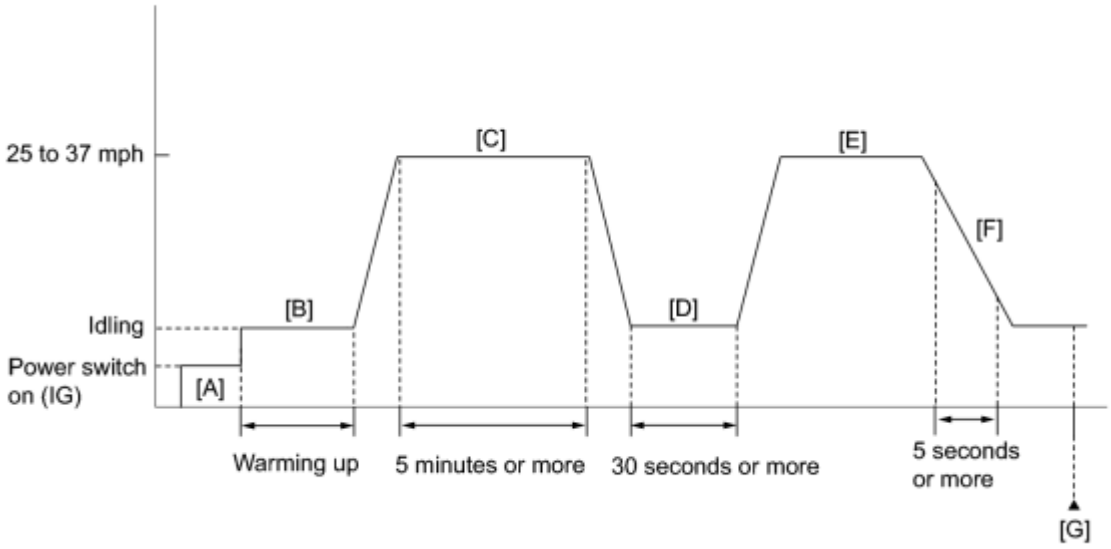
| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Time after engine started | 3 seconds or more |
| Time after engine fuel cut | 2000 msec or more |
| Engine speed | 950 to 1600 rpm |
| Vehicle speed | 12.5 mph (20 km/h) or more |

| | |
|---|---|
| Engine speed change | -20 to 20 rpm |
| Time after engine load becomes stable (HVAC, Brake, Lockup) | More than 1.2 sec |
| Engine coolant temperature | 70°C (158°F) or more |
| Battery voltage | 11 V or more |
| Intake air temperature | -10°C (14°F) or more |
| Atmospheric pressure | 76 kPa or more |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Manifold pressure change | Less than 1.0 kPa |
| At engine speed | 1050 rpm |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up until the engine coolant temperature reaches 70°C (158°F) or more [B].

   HINT:

   The A/C switch and all accessory switches should be off and shift lever in P or N.

8. Drive the vehicle at 25 to 37 mph (40 to 60 km/h) for 5 minutes or more [C].
9. Idle the engine for 30 seconds or more [D].

10. Accelerate the vehicle to 25 to 37 mph (40 to 60 km/h) with the shift lever in B [E].
11. Perform fuel cut operation for 5 seconds or more, with the accelerator pedal fully released [F].

    CAUTION:

    When performing the confirmation driving pattern, obey all speed limits and traffic laws.

    HINT:

    When fuel cut is operating "Idle Fuel Cut" in Data List is ON.

12. Enter the following menus: Powertrain / Engine and ECT / Monitor / Exhaust Gas Recirculation/VVT / Status2 [G].
13. Check that the Exhaust Gas Recirculation/VVT / Status2 monitor is Complete.

    HINT:

    If the monitor is Incomplete, perform the driving pattern again.

14. Enter the following menus: Powertrain / Engine and ECT / Monitor / Exhaust Gas Recirculation/VVT/Details.
15. Check the Details (EGR FLOW INSUFFICIENCY).

    HINT:

    Make sure that the value is between MIN and MAX.

16. If the monitor is still Incomplete, perform the following procedure.
17. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
18. Read Pending DTCs.
19. If a pending DTC is output, the system is malfunctioning,

    HINT:

    If a pending DTC is not output, perform the following procedure.

20. Enter the following menus: Power train / Engine and ECT / Utility / All Readiness.
21. Input the DTC: P0401.
22. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed |

| Techstream Display | Description |
|---|---|
| | ○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgement result shows NORMAL, the system is normal.
- If the DTC judgment result is INCOMPLETE or UNKNOWN and no pending DTC is output, accelerate the vehicle again at 25 to 37 mph (40 to 60 km/h) with the shift lever in B, perform fuel cut operation for 5 seconds or more with the accelerator pedal fully released, and check the DTC judgment result.

23. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

- By using the Control the EGR Step Position Active Test, the operation of the EGR valve can be checked.
- When the engine is idling steadily with the EGR valve fully closed, if the EGR valve is normal and it is opened using the Active Test, the Data List value changes as follows.

| Data List | Change in Data List when Number of Steps is Increased Using Control the EGR Step Position Active Test |
|---|---|
| Engine Speed | Idle becomes rough |
| MAP | Pressure rises |

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO P0401) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC P0401 is output | A |
| DTC P0401 and other DTCs are output | B |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off and shift lever in P or N.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position as follows.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling or engine stalls |
| MAP<br><br>(Data List) | - | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 3. | INSPECT EGR VALVE ASSEMBLY |

(a) Check if the EGR valve are clogged with deposits.

(b) Check if the EGR valve is closed.

OK:

EGR valve is closed and no deposits.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B ▶ CHECK FOR DEPOSIT (INTAKE PORT TO EGR VALVE ASSEMBLY)

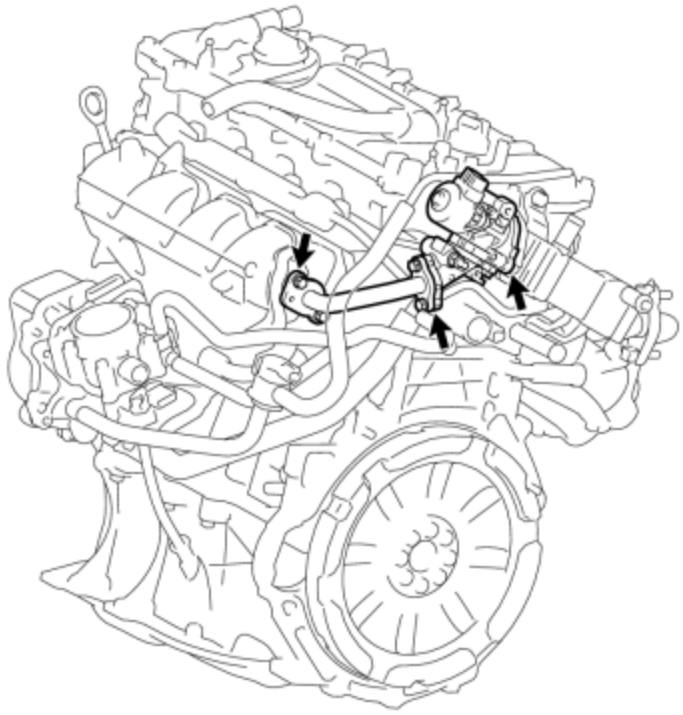
A ▼

| | |
|---|---|
| 4. | REPLACE EGR VALVE ASSEMBLY |

(a) Replace the EGR valve assembly INFO.

NEXT

| | |
|---|---|
| 5. | CHECK FOR DEPOSIT (INTAKE PORT TO EGR VALVE ASSEMBLY) |



P

(a) Check for exhaust leaks at each connection point.

(b) Check for cracks, damage, and clogs in the pipes between the intake manifold and the EGR valve assembly.

(c) This check may require the removal of components.

(d) Check if there is a built-up of deposits in the EGR valve of pipes.

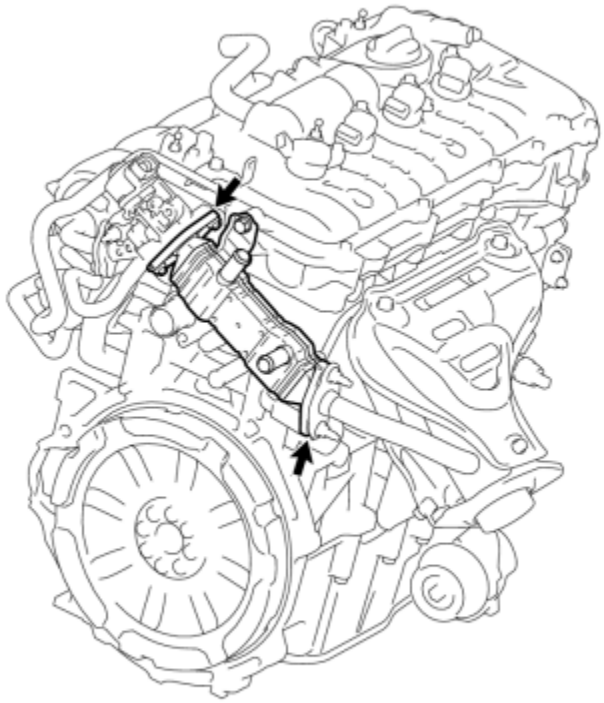
OK:

No deposits.

NG ▶ REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK

| | |
|---|---|
| 6. | CHECK FOR DEPOSIT (EXHAUST MANIFOLD SUB-ASSEMBLY TO EGR VALVE ASSEMBLY) |



P

(a) Check for exhaust leaks at each connection point.

(b) Check for cracks, damage, and clogs in the pipes between the exhaust manifold sub-assembly and the EGR valve assembly.

(c) This check may require the removal of components.

(d) Check if there is a built-up of deposits in the EGR valve of pipes.

OK:

No deposits.

NG ▶ REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK ▼

| | |
|---|---|
| 7. | INSPECT EGR WITH COOLER PIPE SUB-ASSEMBLY |

(a) Check for blockage of the EGR with cooler pipe sub-assembly.

NG ▶ REPAIR OR REPLACE EGR WITH COOLER PIPE SUB-ASSEMBLY

OK

| | |
|---|---|
| 8. | READ VALUE USING TECHSTREAM (MANIFOLD ABSOLUTE PRESSURE SENSOR) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / MAP.

(e) Read the MAP value.

Standard:

| Switch Condition | Techstream Display |
|---|---|
| Power switch on (IG) | 80 to 110 kPa (600 to 825 mmHg) |

(f) Put the engine in inspection mode INFO.

(g) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

(h) Enter the following menus: Powertrain / Engine and ECT / Data List / MAP.

(i) Read the MAP value when idling the engine with the A/C switch and all accessory switches should be off and shift lever in P or N.

Standard:

| Engine Condition | Techstream Display |
|---|---|
| Idling | Less than 80 kPa (600 mmHg) |

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED

A

| | |
|---|---|
| 9. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks in intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 10. | REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR |

(a) Replace the manifold absolute pressure sensor INFO.

NEXT ▼

| | |
|---|---|
| 11. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up until the engine coolant temperature reaches 70°C (158°F) or more.

HINT:

The A/C switch and all accessory switches should be off and shift lever in P or N.

(i) Drive the vehicle at 25 to 37 mph (40 to 60 km/h) with the shift lever in B.

CAUTION:

Strictly observe speed limits and traffic laws when performing the confirmation drive pattern.

(j) Perform fuel cut operation for 5 seconds or more with the accelerator pedal fully released.

HINT:

If the deceleration was not completed, perform the Confirmation Driving Pattern again.

(k) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(l) Read Pending DTC.

(m) If the pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

(n) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(o) Input the DTC: P0401.

(p) Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | • DTC judgment completed<br>• System normal |
| ABNORMAL | • DTC judgment completed<br>• System abnormal |
| INCOMPLETE | • DTC judgment not completed<br>• Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | • Unable to perform DTC judgment<br>• Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

If the pending DTC is not output and the DTC judgment result is INCOMPLETE or UNKNOWN, drive the vehicle again at 25 to 37 mph (40 to 60 km/h) with the shift lever in B, perform fuel cut operation for 5 seconds or more with the accelerator pedal fully released, and check the DTC judgment result.

NEXT ▶ **END**

| DTC | P0403 | Exhaust Gas Recirculation Control Circuit |
|---|---|---|

# DESCRIPTION

Refer to DTC P0401 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0403 | Open or short in EGR valve circuit<br><br>(1 trip detection logic) | • Open or short in EGR circuit<br>• EGR valve assembly<br>• ECM |

HINT:

DTC P0403 is set when the power switch is on (IG).

# MONITOR DESCRIPTION

This DTC is designed to detect an open or short in the EGR valve assembly circuit.

Example:

- If the EGR1, EGR2, EGR3 or EGR4 terminal output voltage is excessively low, but the step motor is still operating, the ECM determines that there is a short in the EGR valve assembly circuit , and sets the DTC.
- If the EGR1, EGR2, EGR3 or EGR4 terminal output voltage is excessively low, and the step motor is not operating, the ECM determines that there is an open in the EGR valve assembly circuit, and sets the DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0403: EGR valve circuit range check |
| Required sensors / components (Main) | EGR valve assembly |
| Required sensors / components (Related) | - |
| Frequency of operation | Continuous |
| Duration | 0.5 seconds |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

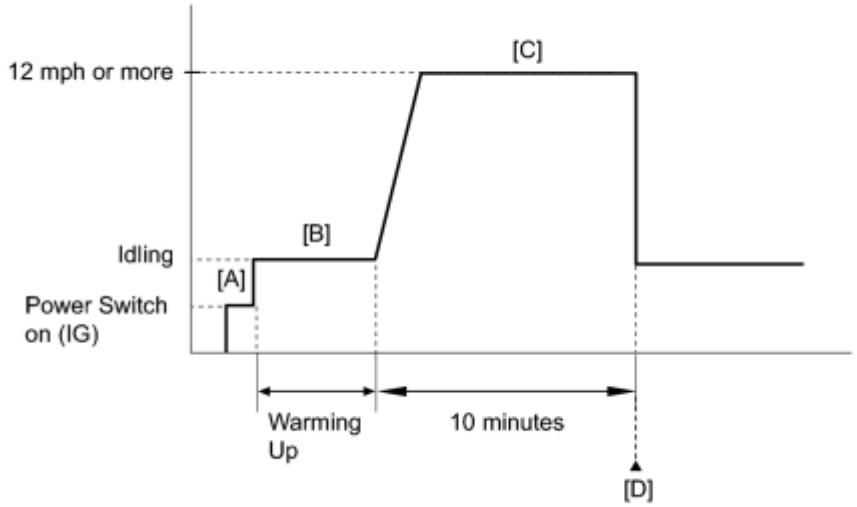
| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Engine | Running |
| Battery voltage | 10.5 V or more |

| | |
|---|---|
| Time after power switch off to on (IG) | More than 0.5 seconds |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| One of the following conditions is met: | Conditions A, B, C or D |
| A. All of the conditions are met: | Conditions 1 and 2 |
| 1. EGR1 output terminal voltage | Low voltage |
| 2. Either of the following conditions is met: | Condition (a) or (b) |
| (a) Step motor | Driving |
| (b) EGR1 | Not operating |
| B. All of the following conditions are met: | Conditions 3 and 4 |
| 3. EGR2 output terminal voltage | Low voltage |
| 4. Either of the following conditions is met: | Condition (c) or (d) |
| (c) Step motor | Driving |
| (d) EGR2 | Not operating |
| C. All of the following conditions are met: | Conditions 5 and 6 |
| 5. EGR3 output terminal voltage | Low voltage |
| 6. Either of the following conditions is met: | Condition (e) or (f) |
| (e) Step motor | Driving |
| (f) EGR3 | Not operating |
| D. All of the following conditions are met: | Conditions 7 and 8 |
| 7. EGR4 output terminal voltage | Low voltage |
| 8. Either of the following conditions is met: | Condition (g) or (h) |
| (g) Step motor | Driving |
| (h) EGR4 | Not operating |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up [B].
8. Drive the vehicle at 12 mph (20 km/h) or more for 10 minutes [C].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTCs [D].
11. If the DTC P0403 is output, the system is malfunction.

    HINT:

    If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P0403.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed |

| Techstream Display | Description |
| --- | --- |
| | ○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system has a normal.

15. If the test result is INCOMPLETE or UNKNOWN, drive the vehicle at 12 mph (20 km/h) or more for 10 minutes, and check the DTC judgment result.

    HINT:

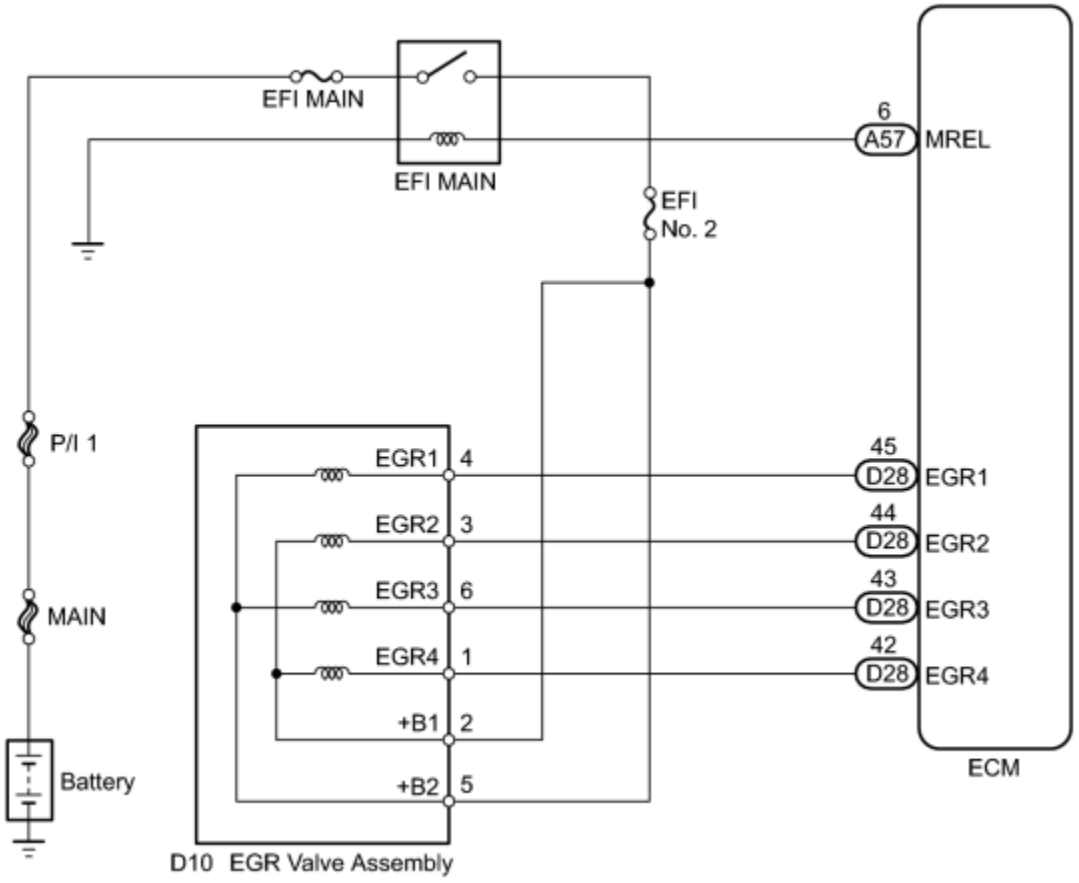
    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system has a normal.

16. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Within standard range | A |
| Outside of standard range | B |

B ▶ INSPECT EGR VALVE ASSEMBLY

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | INSPECT EGR VALVE ASSEMBLY |

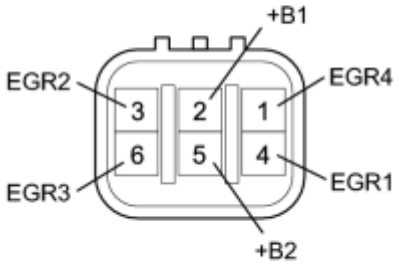
(a) Disconnect the EGR valve assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (+B1) - 3 (EGR2) | 20 °C (68 °F) | 20 to 22 Ω |
| 2 (+B1) - 1 (EGR4) | | |
| 5 (+B2) - 4 (EGR1) | | |
| 5 (+B2) - 6 (EGR3) | | |

*1




c

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(EGR Valve Assembly) |

(c) Reconnect the EGR valve assembly connector.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 3. | INSPECT EGR VALVE ASSEMBLY (+B1 OR +B2 VOLTAGE) |

(a) Disconnect the EGR valve assembly connector.

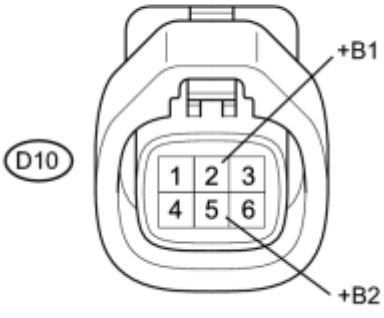
(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D10-2 (+B1) - Body ground | Power switch on (IG) | 11 to 14 V |
| D10-5 (+B2) - Body ground | | |

*1




c

## Text in Illustration

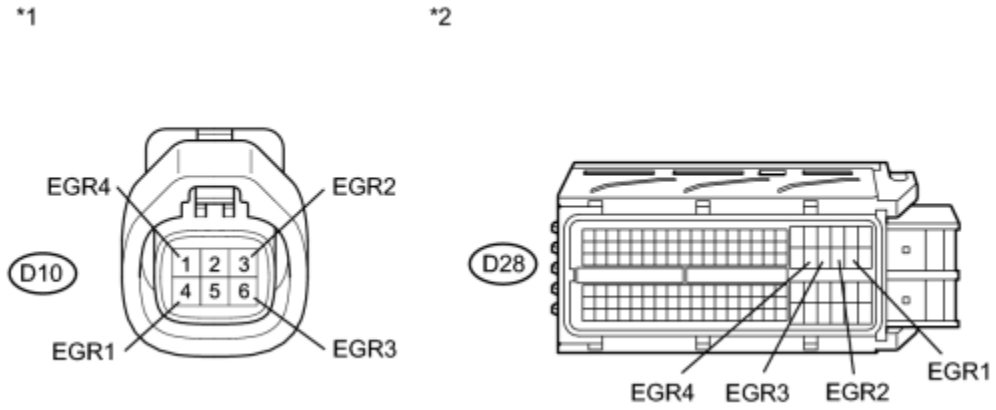
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to EGR Valve Assembly) |

(d) Reconnect the EGR valve assembly connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (EGR VALVE ASSEMBLY - EFI MAIN RELAY)

OK ↓

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (ECM - EGR VALVE ASSEMBLY) |




(a) Disconnect the EGR valve assembly connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D28-45 (EGR1) - D10-4 (EGR1) | Always | Below 1 Ω |
| D28-44 (EGR2) - D10-3 (EGR2) | | |
| D28-43 (EGR3) - D10-6 (EGR3) | | |
| D28-42 (EGR4) - D10-1 (EGR4) | | |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D28-45 (EGR1) or D10-4 (EGR1) - Body ground | Always | 10 kΩ or higher |
| D28-44 (EGR2) or D10-3 (EGR2) - Body ground | | |
| D28-43 (EGR3) or D10-6 (EGR3) - Body ground | | |
| D28-42 (EGR4) or D10-1 (EGR4) - Body ground | | |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to EGR Valve Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

(e) Reconnect the EGR valve assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - EGR VALVE ASSEMBLY)
OK
▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT RECORDS (DTC P0403) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Clear the DTCs INFO.

(d) Put the engine in inspection mode INFO.

(e) Start the engine warm it up.

(f) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0403 is output | B |

B ▶ REPLACE ECM
A ▶ **END**

| DTC | P0420 | Catalyst System Efficiency Below Threshold (Bank 1) |
|---|---|---|

# MONITOR DESCRIPTION

The ECM uses sensors mounted in front of and behind the three-way catalytic converter to monitor its efficiency.

The first sensor, the air fuel ratio sensor, sends pre-catalyst information to the ECM. The second sensor, the heated oxygen sensor, sends post-catalyst information to the ECM.

In order to detect any deterioration in the three-way catalytic converter, the ECM calculates the oxygen storage capacity of the three-way catalytic converter. This calculation is based on the voltage output of the heated oxygen sensor while performing active air fuel ratio control.

The oxygen storage capacity value is an indication of the oxygen storage capacity of the three-way catalytic converter. When the vehicle is being driven with a warm engine, active air fuel ratio control is performed for approximately 15 to 20 seconds. When it is performed, the ECM deliberately sets the air fuel ratio to lean or rich levels. If the cycle of the waveform for the heated oxygen sensor is long, the oxygen storage capacity is great. There is a direct correlation between the heated oxygen sensor and the oxygen storage capacity of the three-way catalytic converter.

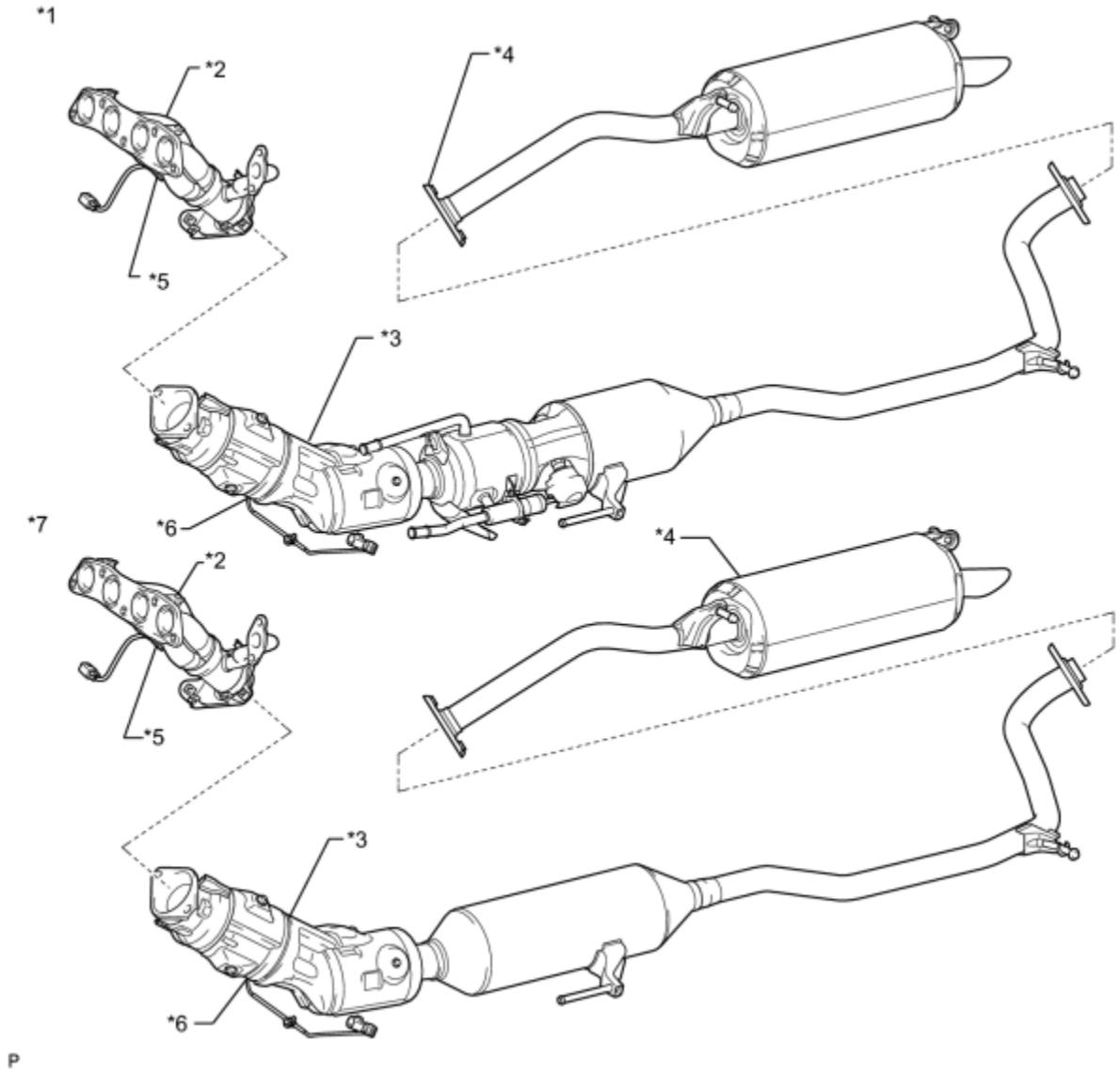
The ECM uses the oxygen storage capacity value to determine the state of the three-way catalytic converter. If any deterioration has occurred, it illuminates the MIL and sets the DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0420 | Oxygen storage capacity value smaller than standard value under active air fuel ratio control<br><br>(2 trip detection logic) | • Gas leaks from exhaust system<br>• Air fuel ratio sensor (sensor 1)<br>• Heated oxygen sensor (sensor 2)<br>• Front exhaust pipe assembly (TWC: Front and rear catalyst)<br>• EGR valve assembly |

HINT:

- Sensor 1 refers to the sensor closest to the engine assembly.
- Sensor 2 refers to the sensor farthest away from the engine assembly.

# CATALYST LOCATION




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | w/ Exhaust Heat Recirculation System | *2 | Exhaust Manifold Sub-assembly |
| *3 | Front Exhaust Pipe Assembly (TWC: Front and Rear Catalyst) | *4 | Tail Exhaust Pipe Assembly |
| *5 | Air Fuel Ratio Sensor (Sensor 1) | *6 | Heated Oxygen Sensor (Sensor 2) |
| *7 | w/o Exhaust Heat Recirculation System | - | - |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0420: Catalyst Deterioration |
| Required Sensors/Components (Main) | Air fuel ratio sensor<br><br>Heated oxygen sensor |

| | |
|---|---|
| Required Sensors/Components (Related) | Intake air temperature sensor<br><br>Mass air flow meter sub-assembly<br><br>Crankshaft position sensor<br><br>Engine coolant temperature sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | About 30 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs not present | P0010 (VVT Oil Control Valve Bank 1)<br><br>P0011 (VVT System Bank 1 - Advance)<br><br>P0012 (VVT System Bank 1 - Retard)<br><br>P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1)<br><br>P0037, P0038, P102D (Heated Oxygen Sensor Heater - Sensor 2)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0136, P0137, P0138, P0139 (Rear Oxygen sensor - Sensor 2)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0340, P0342, P0343 (Camshaft Position Sensor) |

| | |
|---|---|
| | P0351, P0352, P0353, P0354 (Igniter)<br><br>P0401 (EGR System (Closed))<br><br>P0607 (Heated Oxygen Sensor - Sensor 2)<br><br>P2195, P2196, P2237, P2238, P2239, P2252, P2253, P2A00 (Air Fuel Ratio Sensor - Sensor 1) |
| Battery voltage | 11 V or more |
| Intake air temperature | -10°C (14°F) or more |
| Engine coolant temperature | 75°C (167°F) or more |
| Atmospheric pressure | 76 kPa (570 mmHg) or more |
| Idling | OFF |
| Engine speed | Less than 4000 rpm |
| Air fuel ratio sensor | Activated |
| Fuel system status | Closed loop |
| Engine load | 10 to 70% |
| All of the following conditions are met | Conditions 1, 2 and 3 |
| 1. Mass air flow rate | 8 to 28 g/sec |
| 2. Front catalyst temperature (estimated) | 550 to 750°C (1022 to 1382°F) |
| 3. Rear catalyst temperature (estimated) | 450 to 700°C (842 to 1292°F) |
| Air fuel ratio sensor monitor | Completed |
| Rear Heated oxygen sensor monitor | Completed |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Oxygen storage capacity of catalyst | Less than 0.07 g |

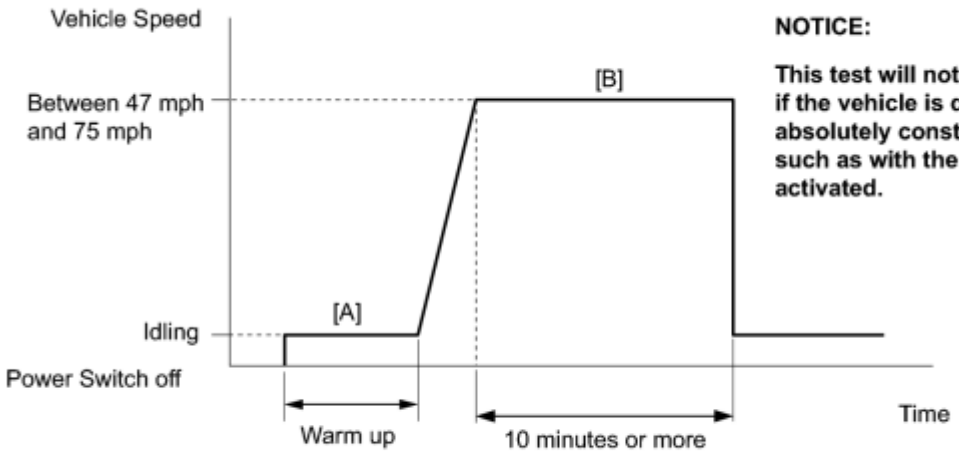
# MONITOR RESULT

Refer to Checking Monitor Status INFO.

# CONFIRMATION DRIVING PATTERN

HINT:

Performing this confirmation pattern will activate the catalyst monitor. This is very useful for verifying the completion of a repair.




(HINT: Even if vehicle stops during driving pattern, test can be resumed)

P

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG).
3. Turn the Techstream on.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
5. Turn the power switch off.
6. Turn the power switch on (IG) and turn the Techstream on.
7. Enter the following menus: Powertrain / Engine and ECT / Monitor.
8. Check that Catalyst Efficiency / Status2 is Incomplete.
9. Put the engine in inspection mode INFO.
10. Start the engine and warm it up (until the engine coolant temperature is 75°C (167°F) or higher) [A].
11. Drive the vehicle at between 47 and 75 mph (75 and 120 km/h) for at least 10 minutes or more [B].
12. Those items will change to Complete after completing the driving pattern.
13. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
14. Check if any DTCs (pending DTCs) are set.

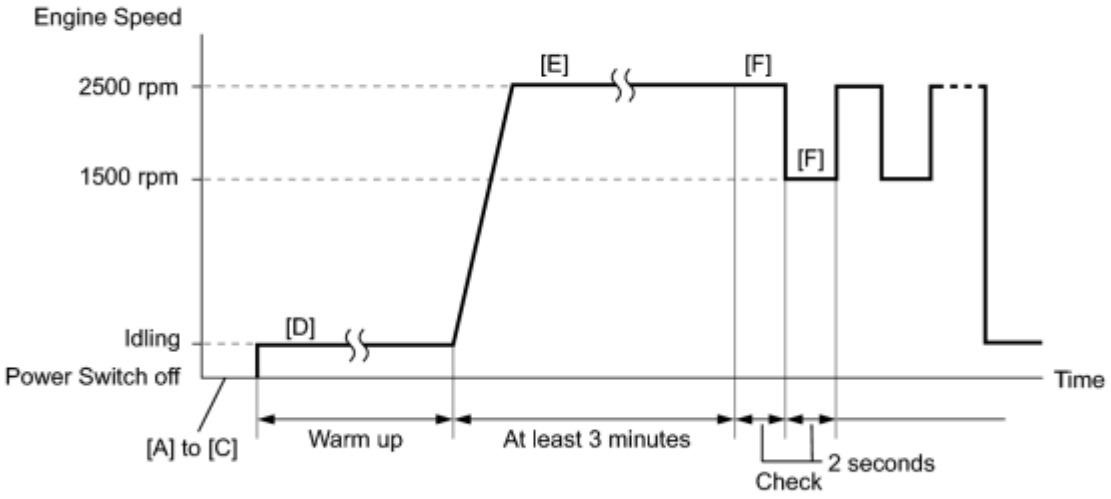
HINT:

If Catalyst does not change to Complete, and no pending DTCs are stored, extend the driving time.

# CONDITIONING FOR SENSOR TESTING

HINT:

Perform the operation with the engine speeds and time durations described below prior to checking the waveforms of the air fuel ratio sensor and heated oxygen sensor. This is in order to activate the sensors sufficiently to obtain the appropriate inspection results.

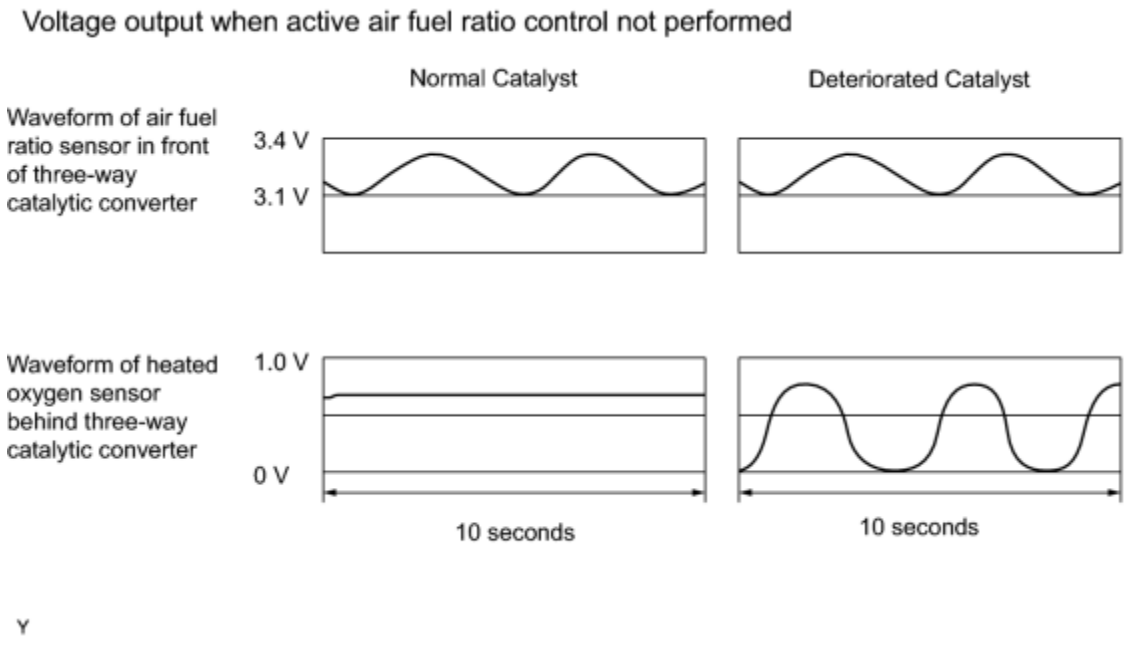



P

- (a) Connect the Techstream to the DLC3 [A].
- (b) Turn the power switch on (IG) and turn the Techstream on [B].
- (c) Put the engine in inspection mode INFO [C].
- (d) Start the engine and warm it up with all the accessories switched off until the engine coolant temperature stabilizes [D].
- (e) Run the engine at an engine speed of between 2500 rpm for at least 3 minutes [E].
- (f) While running the engine at 2500 rpm for 2 seconds and 1500 rpm for 2 seconds, check the waveforms of the air fuel ratio and heated oxygen sensors using the Techstream [F].

HINT:

- If either of the voltage outputs of the air fuel ratio or heated oxygen sensor does not fluctuate, or there is noise in the waveform of either sensor, the sensor may be malfunctioning.
- If the voltage outputs of both the sensors remain lean or rich, the air fuel ratio may be extremely lean or rich. In such cases, perform the Active Test operation by entering the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F sensor.
- If the three-way catalytic converter has deteriorated, the heated oxygen sensor (located behind the three-way catalytic converter) voltage output fluctuates up and down frequently, even under normal driving conditions (active air fuel ratio control is not performed).




# INSPECTION PROCEDURE

1. AIR FUEL RATIO CONTROL

HINT:

Malfunctioning areas can be identified by performing the Control the Injection Volume for A/F Sensor function provided in the Active Test. The Control the Injection Volume for A/F Sensor function can help to determine whether the air fuel ratio sensor, heated oxygen sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the Control the Injection Volume for A/F Sensor operation using the Techstream.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Warm up the engine at an engine speed of 2500 rpm for approximately 90 seconds.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.

(g) Perform the Active Test operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).

(h) Monitor the voltage outputs of the air fuel ratio and heated oxygen sensors (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

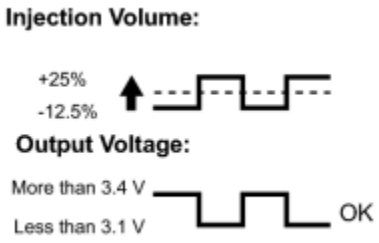
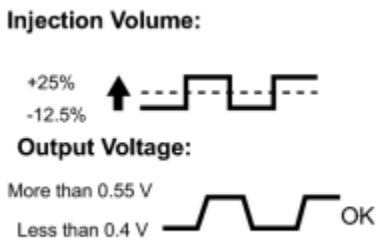
HINT:

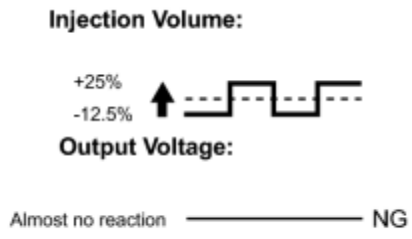
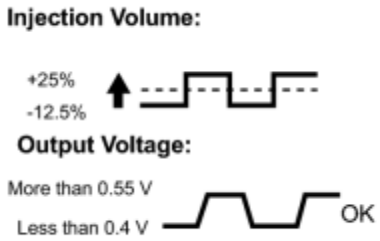
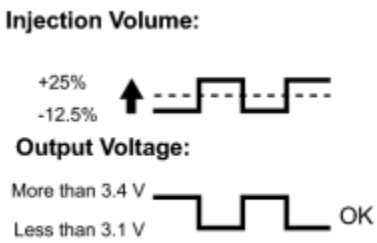
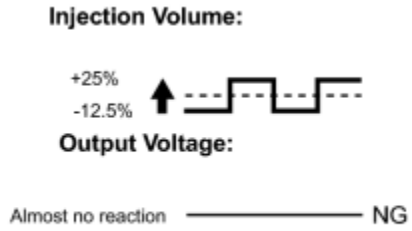
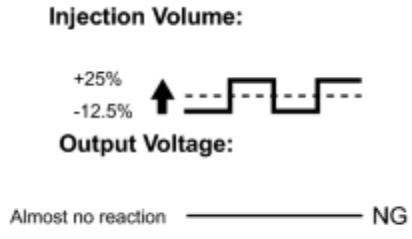
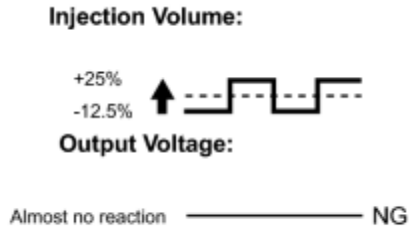
- The Control the Injection Volume for A/F Sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

| Techstream Display (Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| AFS Voltage B1S1<br><br>(Air fuel ratio) | +25% | Rich | Less than 3.1 V |
| AFS Voltage B1S1<br><br>(Air fuel ratio) | -12.5% | Lean | More than 3.4 V |
| O2S B1S2<br><br>(Heated oxygen) | +25% | Rich | More than 0.55 V |
| O2S B1S2<br><br>(Heated oxygen) | -12.5% | Lean | Less than 0.4 V |

NOTICE:

The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| 1 |  |  | - |
| 2 | | | • Air fuel ratio sensor<br>• Air fuel ratio sensor heater<br>• Air fuel ratio sensor circuit |

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| |  |  | |
| 3 |  |  | • Heated oxygen sensor<br>• Heated oxygen sensor heater<br>• Heated oxygen sensor circuit<br>• Exhaust gas leaks |
| 4 |  |  | • Fuel pressure<br>• Exhaust gas leaks<br><br>(Air fuel ratio extremely lean or rich) |

- Following the Control the Injection Volume for A/F Sensor procedure enables technicians to check and graph the voltage outputs of both the air fuel ratio and heated oxygen sensors.
- To display the graph, enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor / A/F Control System / AFS Voltage B1S1 and O2S B1S2.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0420) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0420 is output | A |
| DTC P0420 and other DTCs are output | B |

HINT:

If any DTCs other than P0420 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (AIR FUEL RATIO CONTROL) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Put the engine in inspection mode INFO.

(d) Start the engine and warm it up.

(e) Run the engine at an engine speed of 2500 rpm for approximately 90 seconds.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F sensor.

(g) Perform the Active Test operation with the engine in an idling condition (press the RIGHT or LEFT button to change the fuel injection volume).

(h) Monitor the voltage outputs of the air fuel ratio sensor and heated oxygen sensor (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

HINT:

- The Control the Injection Volume for A/F sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

  Standard:

| Techstream Display<br><br>(Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| AFS Voltage B1S1<br><br>(Air fuel ratio) | +25% | Rich | Less than 3.1 V |
| | -12.5% | Lean | More than 3.4 V |
| O2S B1S2<br><br>(Heated oxygen) | +25% | Rich | More than 0.55 V |
| | -12.5% | Lean | Less than 0.4 V |

Result:

| Status<br><br>AFS Voltage B1S1 | Status<br><br>O2S B1S2 | Air Fuel Ratio Condition and Air Fuel Ratio and<br><br>Heated Oxygen Sensors Condition | Misfire | Main Suspected Trouble Area | Proceed to |
|---|---|---|---|---|---|
| Lean/Rich | Lean/Rich | Normal | - | ○ Three-way catalytic converter<br>○ Gas leaks from exhaust system | A |
| Lean | Lean/Rich | Air fuel ratio sensor malfunction | - | ○ Air fuel ratio sensor | B |
| Rich | Lean/Rich | Air fuel ratio sensor malfunction | - | ○ Air fuel ratio sensor | |
| Lean/Rich | Lean | Heated oxygen sensor malfunction | - | ○ Heated oxygen sensor<br>○ Gas leaks from exhaust system | C |
| Lean/Rich | Rich | Heated oxygen sensor malfunction | - | ○ Heated oxygen sensor<br>○ Gas leaks from exhaust system | |
| Lean | Lean | Actual air fuel ratio lean | May occur | ○ Extremely rich or lean actual air fuel ratio<br>○ Gas leaks from exhaust system | D |
| Rich | Rich | Actual air fuel ratio rich | - | ○ Extremely rich or lean actual air fuel ratio<br>○ Gas leaks from exhaust system | |

Lean: During Control the Injection Volume for A/F sensor, the air fuel ratio sensor output voltage (AFS Voltage) is consistently more than 3.4 V, and the heated oxygen sensor output voltage (O2S) is consistently less than 0.4 V.

Rich: During the AFS Voltage is consistently less than 3.1 V, and the O2S is consistently more than 0.55 V.

Lean/Rich: During Control the Injection Volume for A/F sensor of the Active Test, the output voltage of the heated oxygen sensor alternates correctly.

- The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

D ▶ INSPECT FOR EXHAUST GAS LEAK
C ▶ INSPECT FOR EXHAUST GAS LEAK
B ▶ REPLACE AIR FUEL RATIO SENSOR (SENSOR 1)
A ▼

| | |
|---|---|
| 3. | INSPECT FOR EXHAUST GAS LEAK |

(a) Inspect for exhaust gas leaks from the exhaust manifold sub-assembly and exhaust pipes.

OK:

No gas leaks.

NG ▶ REPAIR OR REPLACE EXHAUST GAS LEAK POINT
OK ▼

| | |
|---|---|
| 4. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE FRONT EXHAUST PIPE ASSEMBLY (TWC: FRONT AND REAR CATALYST)

A ▼

| | |
|---|---|
| 5. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▶ **REPLACE FRONT EXHAUST PIPE ASSEMBLY (TWC: FRONT AND REAR CATALYST)**

| | |
|---|---|
| 6. | INSPECT FOR EXHAUST GAS LEAK |

(a) Inspect for exhaust gas leaks from the exhaust manifold sub-assembly and exhaust pipes.

OK:

No gas leaks.

NG ▶ REPAIR OR REPLACE EXHAUST GAS LEAK POINT
OK ▶ **REPLACE HEATED OXYGEN SENSOR (SENSOR 2)**

| | |
|---|---|
| 7. | INSPECT FOR EXHAUST GAS LEAK |

(a) Inspect for exhaust gas leaks from the exhaust manifold sub-assembly and exhaust pipes.

OK:

No gas leaks.

NG ▶ REPAIR OR REPLACE EXHAUST GAS LEAK POINT
OK
▼

| | |
|---|---|
| 8. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ CHECK ENGINE TO DETERMINE CAUSE OF EXTREMELY RICH OR LEAN ACTUAL AIR FUEL RATIO

A ▼

| | |
|---|---|
| 9. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▶ **CHECK ENGINE TO DETERMINE CAUSE OF EXTREMELY RICH OR LEAN ACTUAL AIR FUEL RATIO**

| | | |
|---|---|---|
| DTC | P043E | Evaporative Emission System Reference Orifice Clog Up |
| DTC | P043F | Evaporative Emission System Reference Orifice High Flow |
| DTC | P2401 | Evaporative Emission System Leak Detection Pump Control Circuit Low |
| DTC | P2402 | Evaporative Emission System Leak Detection Pump Control Circuit High |
| DTC | P2419 | Evaporative Emission System Switching Valve Control Circuit Low |

# DTC SUMMARY

| DTC No. | Monitoring Item | Malfunction Detection Condition | Trouble Area | Detection Timing | Detection Logic |
|---|---|---|---|---|---|
| P043E | 0.02 inch orifice clogged | P043E, P043F, P2401, P2402, P2419 are present when one of the following conditions is met during key-off EVAP monitor<br>• Reference orifice clogged<br>• Reference orifice high-flow<br>• Leak detection pump off malfunction<br>• Leak detection pump on malfunction<br>• Vent valve on (closed) malfunction | • Canister pump module<br>• Connector/wire harness (canister pump module - ECM)<br>• ECM | While power switch off | 2 trip |
| P043F | 0.02 inch orifice high-flow | | | | |
| P2401 | Leak detection pump stuck off | | | | |
| P2402 | Leak detection pump stuck on | | | | |
| P2419 | Vent valve stuck open (vent) | | | | |

HINT:

The 0.02 inch orifice is located inside the canister pump module.

# DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System INFO.

# INSPECTION PROCEDURE

Refer to the EVAP System INFO.

# MONITOR DESCRIPTION

5 hours*1 after the power switch is turned off, the leak detection pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

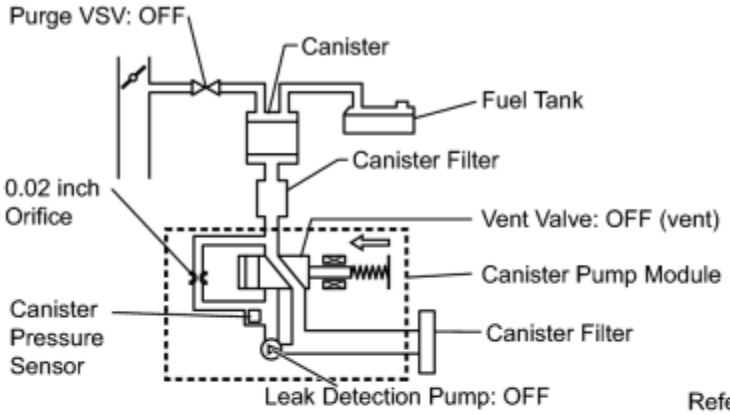
HINT:

*1: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the power switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the power switch is turned off, the monitor check starts 2.5 hours later.

| Sequence | Operation | Description | Duration |
|---|---|---|---|
| - | ECM activation | Activated by soak timer, 5, 7 or 9.5 hours after power switch turned off. | - |
| A | Atmospheric pressure measurement | Vent valve is turned off (vent) and EVAP system pressure is measured by ECM in order to register atmospheric pressure.<br><br>If pressure in EVAP system is not between 70 kPa and 112 kPa (525 mmHg and 840 mmHg), ECM cancels EVAP system monitor. | 60 seconds |
| B | First 0.02 inch leak pressure measurement | In order to determine 0.02 inch leak pressure standard, leak detection pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if leak detection pump and vent valve operate normally. | 360 seconds |
| C | EVAP system pressure measurement | Vent valve is turned on (closed) to shut EVAP system.<br><br>Negative pressure (vacuum) is created in EVAP system, and EVAP system pressure is then measured. Write down measured value as it will be used in leak check.<br><br>If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor. | 15 minutes*2 |
| D | Purge VSV monitor | Purge VSV is opened and then EVAP system pressure is measured by ECM.<br><br>Large increase indicates normal. | 10 seconds |
| E | Second 0.02 inch leak pressure measurement | After second 0.02 inch leak pressure measurement, leak check is performed by comparing first and second 0.02 inch leak pressure standards.<br><br>If stabilized system pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system is leaking. | 60 seconds |
| F | Final check | Atmospheric pressure is measured and then monitoring result is recorded by ECM. | - |

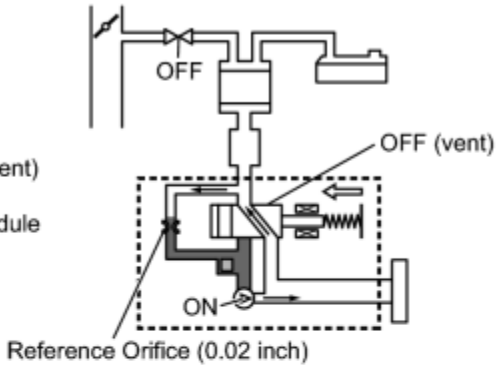
*2: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

Operation A: Atmospheric Pressure Measurement

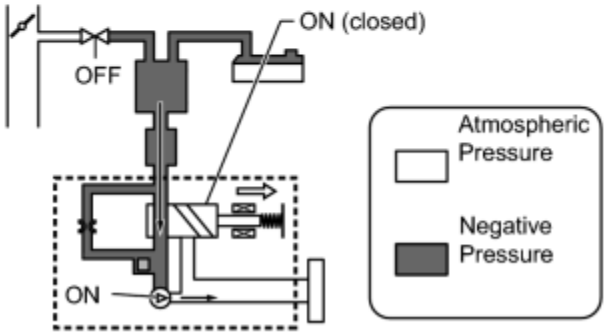



Operation B, E:

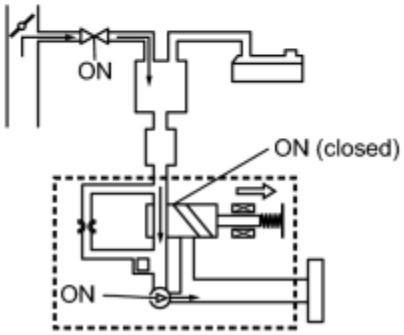
0.02 inch Leak Pressure Measurement




Operation C: EVAP System Pressure Measurement

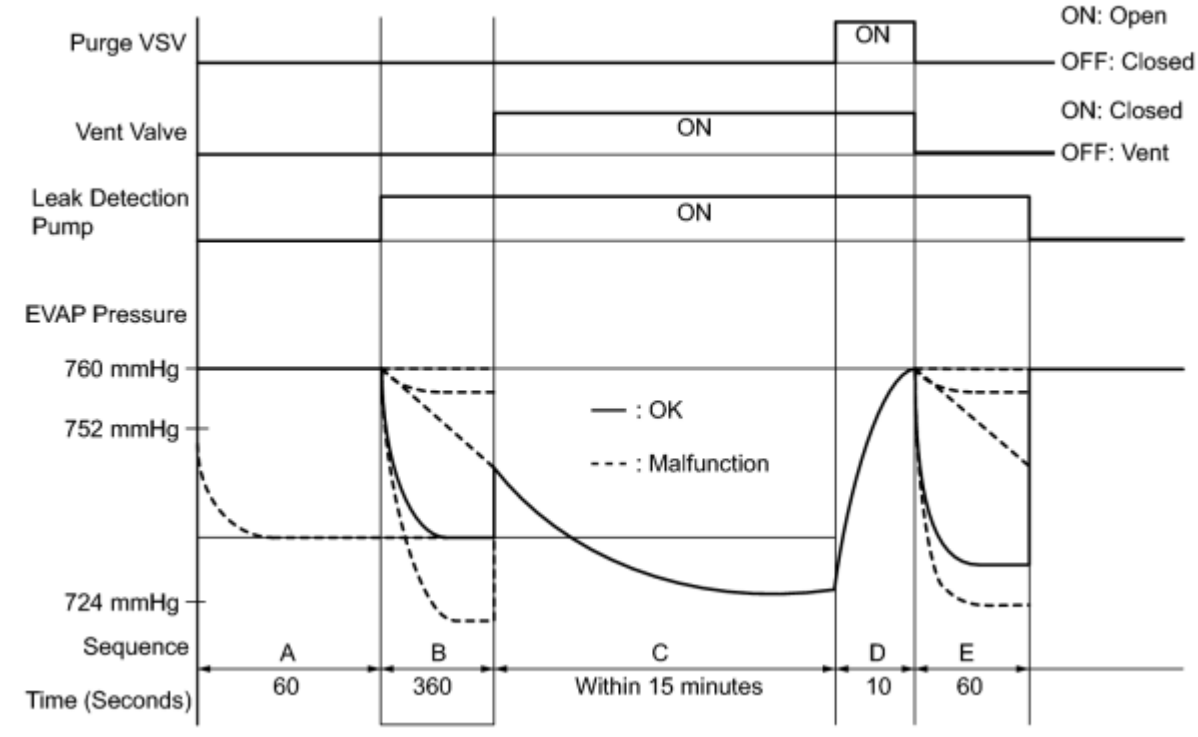



Operation D: Purge VSV Monitor




c

EVAP Pressure during EVAP key-off monitor




Y

The leak detection pump creates negative pressure through the reference orifice. When the system is normal, the EVAP pressure is in 724 to 752 mmHg* and saturated within a minute.

If not, the ECM interprets this as a malfunction. The ECM will illuminate the MIL and set DTC if this malfunction is detected in consecutive driving cycle.

*: Typical value

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P043E: 0.02 inch reference orifice low-flow (built-in canister pump module)<br><br>P043F: 0.02 inch reference orifice high-flow (built-in canister pump module)<br><br>P2401: Leak detection pump stuck off<br><br>P2402: Leak detection pump stuck on<br><br>P2419: Vent valve stuck open (vent) |
| Required Sensors / Components | Canister pump module |
| Frequency of Operation | Once per driving cycle |
| Duration | Within 2 minutes |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

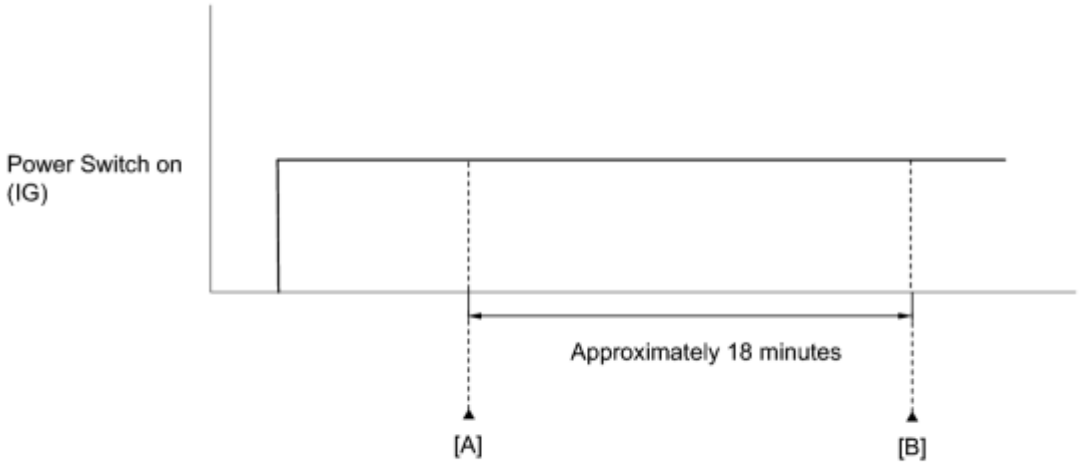
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Atmospheric pressure | 70 to 112 kPa (525 to 840 mmHg) |
| Battery voltage | 10.5 V or more |
| Vehicle speed | Below 2.5 mph (4 km/h) |
| Power switch | OFF |
| Time after key off | 5, 7 or 9.5 hours |
| Canister pressure sensor malfunction (P0452 and P0453) | Not detected |
| Purge VSV | Not operated by scan tool |
| Vent valve | Not operated by scan tool |
| Leak detection pump | Not operated by scan tool |
| Both of the following conditions are met before key off: | Conditions 1 and 2 |
| 1. Duration that vehicle has been driven | 5 minutes or more |
| 2. EVAP purge operation | Performed |
| Engine coolant temperature | 4.4 to 35°C (40 to 95°F) |
| Intake air temperature | 4.4 to 35°C (40 to 95°F) |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| One of the following conditions is met: | - |
| EVAP pressure just after reference pressure measurement start | More than -0.25 kPa (-1.875 mmHg) |
| Reference pressure | Less than -4.85 kPa (-36.384 mmHg) |
| Reference pressure | -1.057 kPa (-7.929 mmHg) or more |
| Reference pressure | Not saturated within 60 seconds |
| Difference between first reference pressure and second reference pressure | 0.9 kPa (6.751 mmHg) or more |

# CONFIRMATION DRIVING PATTERN




NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 5 steps performed automatically by the Techstream. It takes a maximum of approximately 18 minutes.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.
- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the Evaporative System Check, keep the fuel temperature below 35°C (95°F).

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Automatic Mode [A].

7. After the Evaporative System Check is completed, check for All Readiness by entering the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
8. Read the Pending DTC [B].
9. If a pending DTC is output, the system is malfunctioning.

   HINT:

   If a pending DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All readiness.
11. Input the DTC: P043E, P043F, P2401, P2402 or P2419.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

   HINT:

   - If the judgment result shows ABNORMAL, the system has a malfunction.
   - If the judgment result shows NORMAL, the system is normal.
   - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# MONITOR RESULT

Refer to Checking Monitor Status 

.

| DTC | P0441 | Evaporative Emission Control System Incorrect Purge Flow |
|---|---|---|

# DTC SUMMARY

| DTC No. | Monitoring Item | Malfunction Detection Condition | Trouble Area | Detection Timing | Detection Logic |
|---|---|---|---|---|---|
| P0441 | Purge VSV stuck open | Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure is measured. 0.02 inch leak pressure standard is measured at start and end of leak check.<br><br>If stabilized pressure is higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that purge VSV is stuck open. | • Purge VSV<br>• Purge VSV circuit (between purge VSV and ECM)<br>• Leakage from EVAP line (between purge VSV and intake manifold)<br>• EVAP line clogged (between purge VSV and canister)<br>• EGR valve assembly<br>• ECM | While power switch off | 2 trip |
| P0441 | Purge VSV stuck closed | After EVAP leak check is performed, purge VSV is turned on (open), and atmospheric air is introduced into EVAP system. 0.02 inch leak pressure standard is measured at the start and end of leak check.<br><br>If pressure does not return to near atmospheric pressure, ECM determines that purge valve is stuck closed. | | While power switch off | 2 trip |
| P0441 | Purge flow | While engine running, the following conditions are successively met:<br><br>• Negative pressure is not created in EVAP system when purge VSV is turned on (open)<br>• EVAP system pressure change is less than 0.15 kPa (1.13 mmHg) when vent valve is turned on (closed)<br>• Atmospheric pressure change before and after purge flow monitor is less than 0.1 kPa (0.75 mmHg) | | While power switch off | 2 trip |

# DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System INFO.

# INSPECTION PROCEDURE

Refer to the EVAP System INFO.

# MONITOR DESCRIPTION

The 2 monitors, key-off and purge flow, are used to detect malfunctions relating to DTC P0441. The key-off monitor is initiated by the ECM internal timer, known as the soak timer, 5 hours*1 after the power switch is turned off. The purge flow monitor runs while the engine is running.

1. KEY-OFF MONITOR

5 hours*1 after the power switch is turned off, the electric leak detection pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

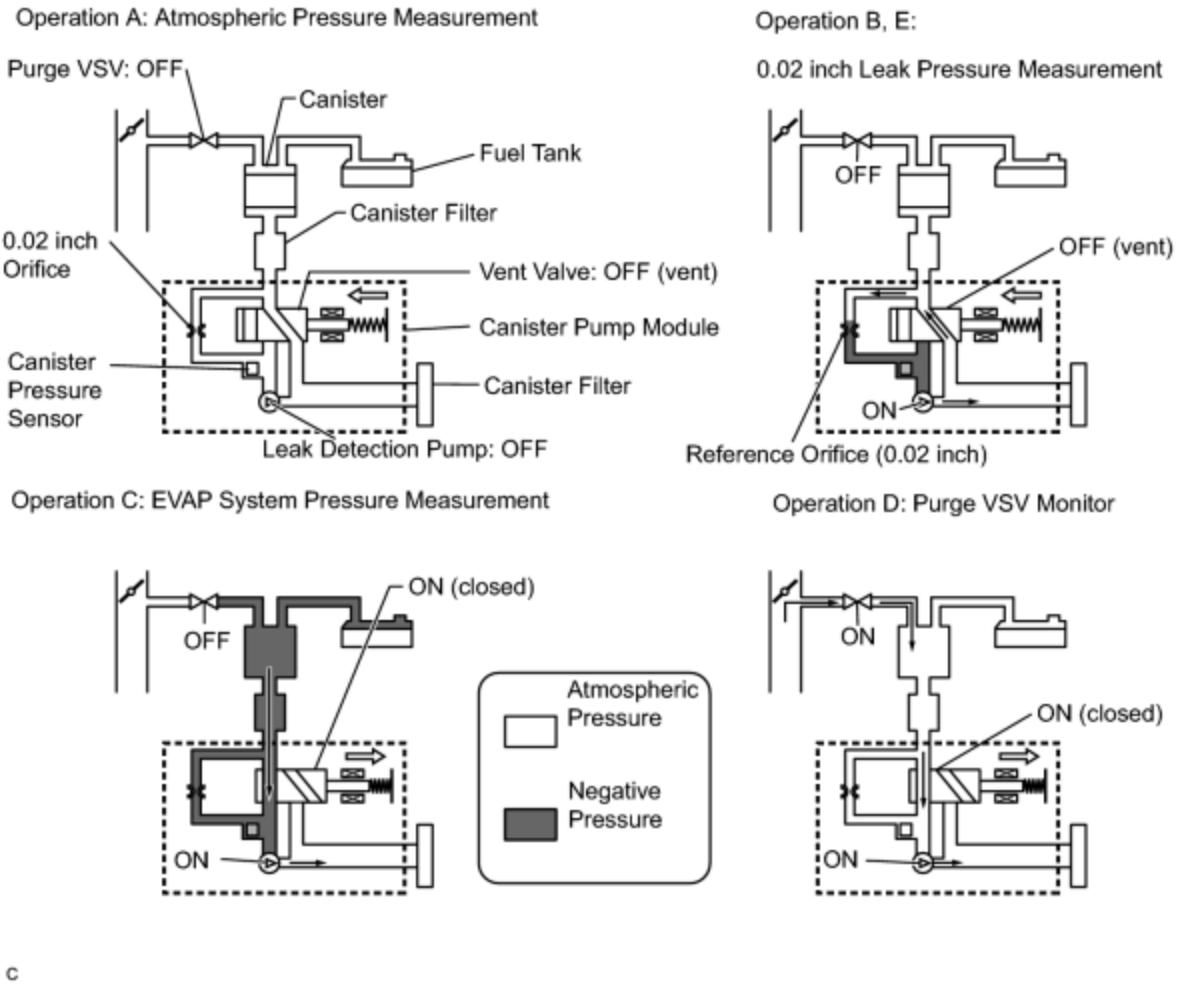
HINT:

*1: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the power switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the power switch is turned off, the monitor check starts 2.5 hours later.

| Sequence | Operation | Description | Duration |
|---|---|---|---|
| - | ECM activation | Activated by soak timer, 5, 7 or 9.5 hours after power switch turned off. | - |
| A | Atmospheric pressure measurement | Vent valve is turned off (vent) and EVAP system pressure is measured by ECM in order to register atmospheric pressure.<br><br>If pressure in EVAP system is not between 70 kPa and 112 kPa (525 mmHg and 840 mmHg), ECM cancels EVAP system monitor. | 60 seconds |
| B | First 0.02 inch leak pressure measurement | In order to determine 0.02 inch leak pressure standard, leak detection pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if leak detection pump and vent valve operate normally. | 360 seconds |
| C | EVAP system pressure measurement | Vent valve is turned on (closed) to shut EVAP system.<br><br>Negative pressure (vacuum) is created in EVAP system, and EVAP system pressure is then measured.<br><br>Write down measured value as it will be used in leak check.<br><br>If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor. | 15 minutes*2 |
| D | Purge VSV monitor | Purge VSV is opened and then EVAP system pressure is measured by ECM.<br><br>A large increase indicates normal. | 10 seconds |
| E | Second 0.02 inch leak pressure | After a second 0.02 inch leak pressure measurement, leak check is performed by comparing first and second 0.02 inch leak pressure | 60 seconds |

| Sequence | Operation | Description | Duration |
|---|---|---|---|
| | measurement | standards.<br><br>If stabilized system pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system leaking. | |
| F | Final check | Atmospheric pressure is measured and then monitor result is recorded by ECM. | - |

*2: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

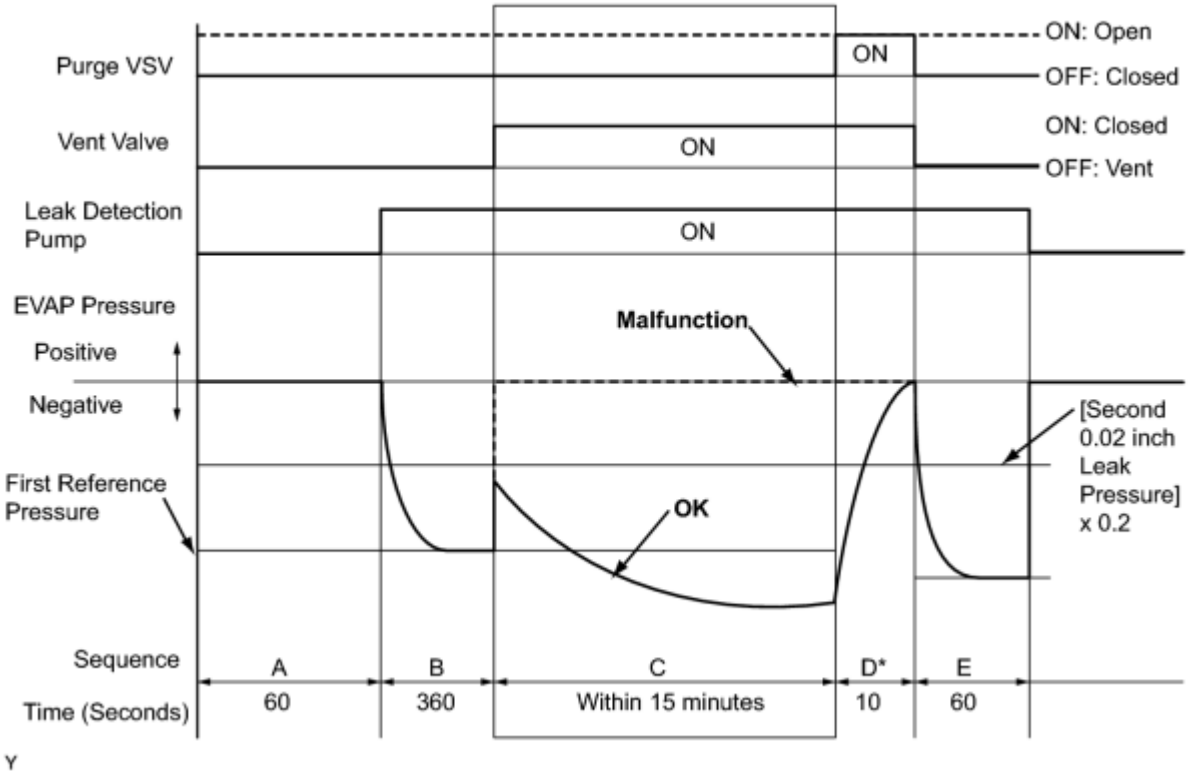



c

(a) Purge VSV stuck open

In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The EVAP system pressure is then measured by the ECM using the canister pressure sensor. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2], the ECM interprets this as the purge VSV being stuck open. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when Purge Stuck Open:



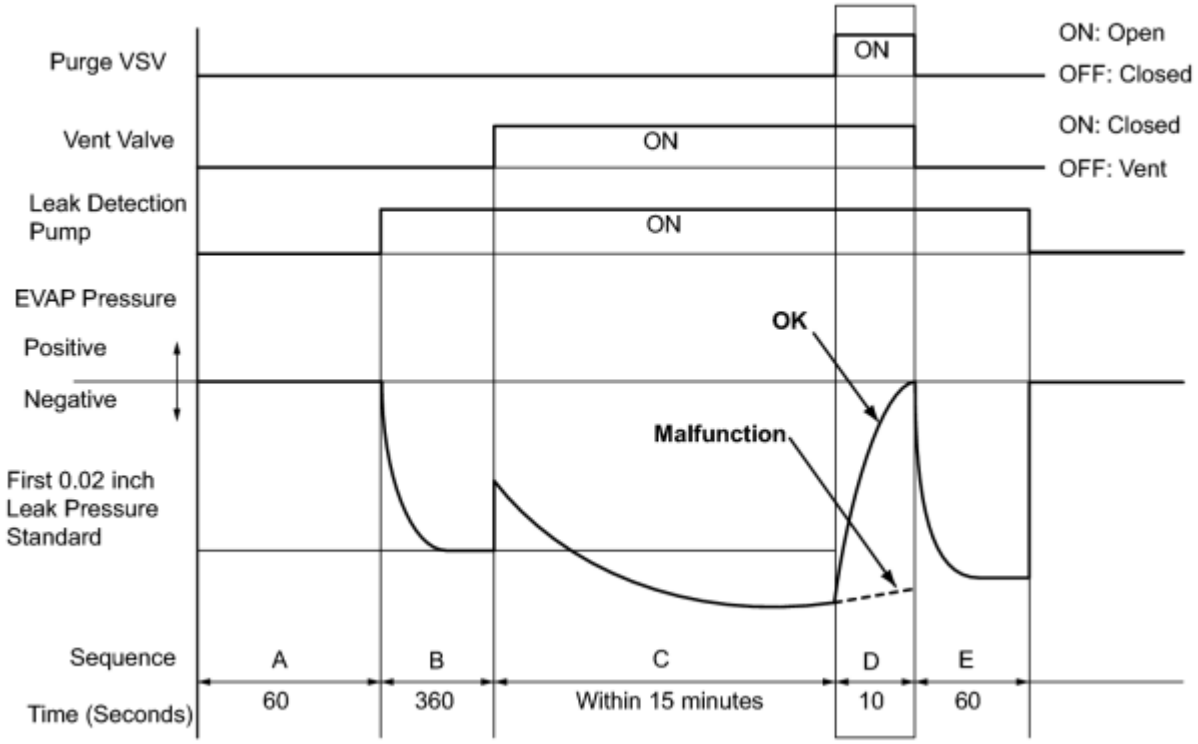

HINT:

*: DTC P0441 may be stored if the hose between the purge VSV and canister is disconnected during evaporative emission control system operation.

(b) Purge VSV stuck closed

In operation D, the canister pressure sensor measures the EVAP (Evaporative Emission) system pressure. The pressure measurement for purge VSV monitor begins when the purge VSV is turned on (open) after the EVAP leak check. When the measured pressure indicates an increase of 0.3 kPa (2.25 mmHg) or more, the purge VSV is functioning normally. If the pressure does not increase, the ECM interprets this as the purge VSV being stuck closed. The ECM illuminates the MIL and sets the DTC (2 trip detection logic).

EVAP Pressure when Purge VSV Stuck Closed:

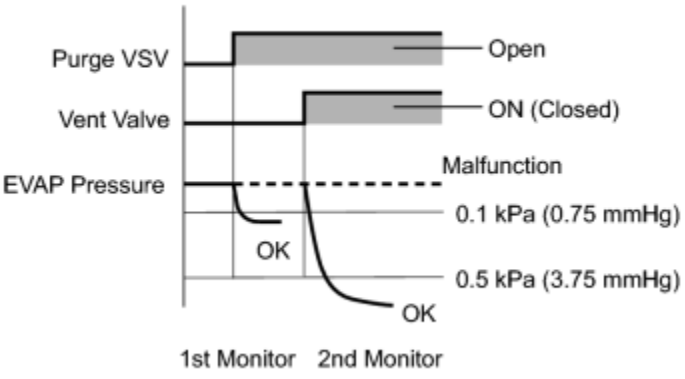



Y

2. PURGE FLOW MONITOR

The purge flow monitor consists of the 2 step monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

EVAP Pressure During Purge Flow Monitor:




Y

- The 1st monitor

  While the engine is running and the purge VSV is on (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.

- The 2nd monitor

The vent valve is turned on (closed) and the EVAP pressure is then measured. If the variation in the pressure is less than 0.5 kPa (3.75 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after conduction of the purge flow monitor, is measured by the ECM.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0441: Purge VSV stuck open<br><br>P0441: Purge VSV stuck clised<br><br>P0441: Purge flow |
| Required Sensors/Components | Purge VSV<br><br>Canister pump module |
| Frequency of Operation | Once per driving cycle |
| Duration | Within 10 minutes: Purge flow<br><br>Within 15 minutes: Purge VSV stuck open, Purge VSV stuck closed |
| MIL operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**Key-off Monitor**

| | |
|---|---|
| Atmospheric pressure | 70 to 112 kPa (525 to 840 mmHg) |
| Battery voltage | 10.5 V or more |
| Vehicle speed | Below 2.5 mph (4 km/h) |
| Power switch | OFF |
| Time after key off | 5, 7 or 9.5 hours |
| Canister pressure sensor malfunction (P0452 and P0453) | Not detected |
| Purge VSV | Not operated by scan tool |
| Vent valve | Not operated by scan tool |
| Leak detection pump | Not operated by scan tool |
| Both of the following conditions are met before key off: | Conditions 1 and 2 |

| | |
|---|---|
| 1. Duration that vehicle has been driven | 5 minutes or more |
| 2. EVAP purge operation | Performed |
| Engine coolant temperature | 4.4 to 35°C (40 to 95°F) |
| Intake air temperature | 4.4 to 35°C (40 to 95°F) |

**Purge Flow Monitor**

| | |
|---|---|
| Engine | Running |
| Engine coolant temperature | 4.4°C (40°F) or more |
| Intake air temperature | 4.4°C (40°F) or more |
| Canister pressure sensor malfunction | Not detected |
| Purge VSV | Not operated by scan tool |
| EVAP system check | Not operated by scan tool |
| Atmospheric pressure | 70 to 112 kPa (525 to 840 mmHg) |
| Battery voltage | 10 V or more |
| Purge duty cycle | 8 % or more |

# TYPICAL MALFUNCTION THRESHOLDS

**Purge VSV Stuck Open**

| | |
|---|---|
| EVAP pressure when vacuum introduction is complete | Higher than reference pressure x 0.2 |

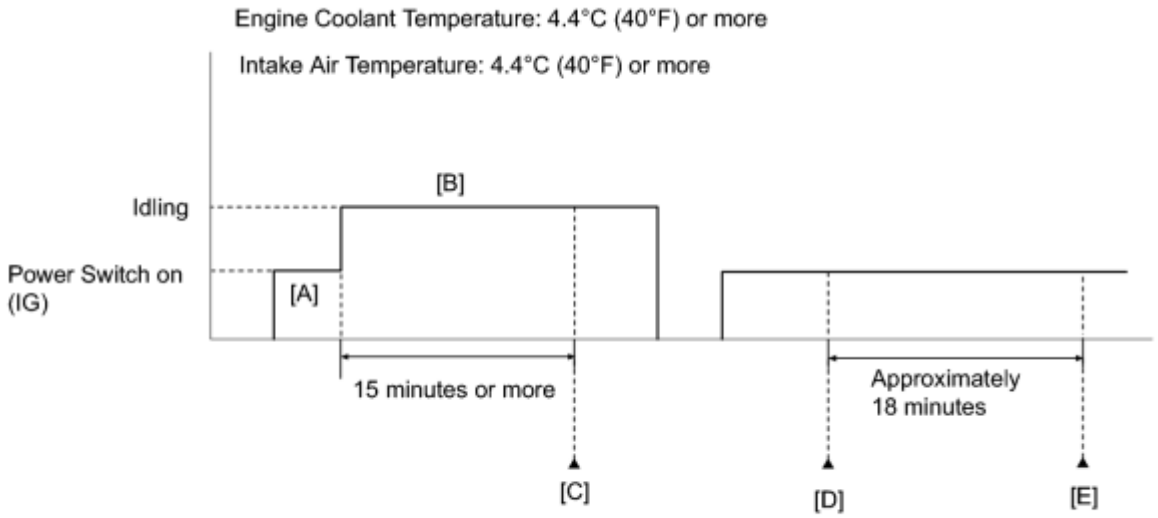
**Purge VSV Stuck Closed**

| | |
|---|---|
| EVAP pressure change after purge VSV is open | Less than 0.3 kPa (2.25 mmHg) |

**Purge Flow**

| | |
|---|---|
| Both of the following conditions are met: | Conditions 1 and 2 |
| 1. EVAP pressure change when purge flow is started | Less than 0.1 kPa (0.75 mmHg) |
| 2. EVAP pressure change during purge flow when EVAP pressure | Less than 0.5 kPa (3.75 mmHg) |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and wait 15 minutes or more [B].
8. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes/ Pending.
9. Read the pending DTC [C].
10. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

11. Enter the following menus: Powertrain / Engine and ECT / Utility / All readiness.
12. Input the DTC: P0441.
13. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |

| Techstream Display | Description |
|---|---|
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 5 steps performed automatically by the Techstream. It takes a maximum of approximately 18 minutes.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.
- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the Evaporative System Check, keep the fuel temperature below 35°C (95°F).

14. Turn the power switch on (IG) and turn the Techstream on.
15. Clear the DTCs (even if no DTCs are stored, perform the clear the DTC operation) INFO.
16. Turn the power switch off.
17. Turn the power switch on (IG) and turn the Techstream on.
18. Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Automatic Mode [D].
19. After the Evaporative System is completed, check for All Readiness by entering the following menus: Powertrain / Engine and ECT / Trouble Codes / pending.
20. Read the pending DTC [E].
21. If a pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

22. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
23. Input the DTC: P0441.
24. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's |

| Techstream Display | Description |
| --- | --- |
| | memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [B] and [D].

25. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
26. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

27. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# MONITOR RESULT

Refer to Checking Monitor Status INFO.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
| --- | --- |
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0441) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC P0441 is output | A |
| DTC P0441 and other DTCs are output | B |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ GO TO EVAP SYSTEM

A ▼

| | |
|---|---|
| 3. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▶ **GO TO EVAP SYSTEM**

| DTC | P0443 | Evaporative Emission Control System Purge Control Valve Circuit |
|---|---|---|

# DESCRIPTION

HINT:

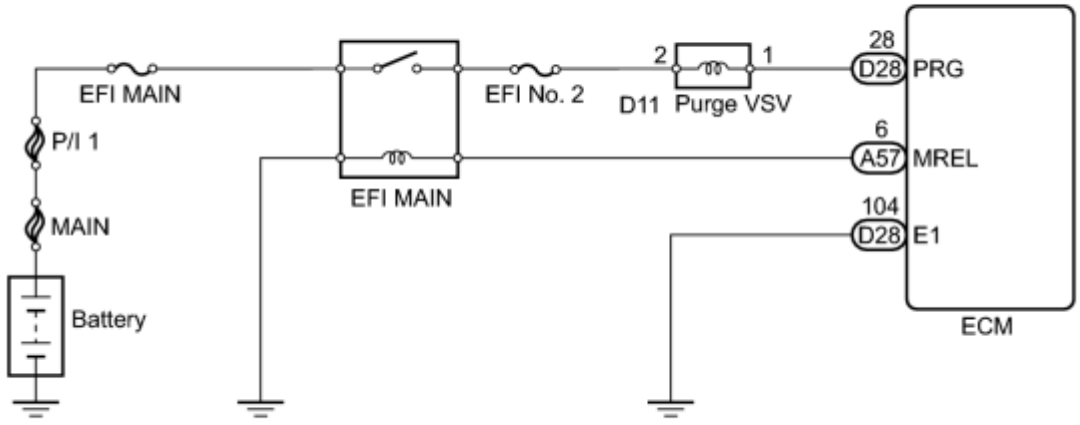
This DTC P0443 is applicable to Mexico models only.

To reduce hydrocarbons (HC) emissions, evaporated fuel from the fuel tank is routed through the canister to the intake manifold for combustion in the cylinders.

The ECM changes the duty signal to the purge VSV so that the intake quantity of hydrocarbons (HC) emissions is appropriate for the driving conditions (engine load, engine speed, vehicle speed, etc.) after the engine is warmed up.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0443 | All of the following conditions (a) and (b) are met (1 trip detection logic)<br><br>(a) The target control value and actual control value do not match for 10 seconds or more.<br><br>(b) The target control value and actual control value is detected 80 times or more | • Open or short in purge VSV circuit<br>• Purge VSV<br>• ECM |

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

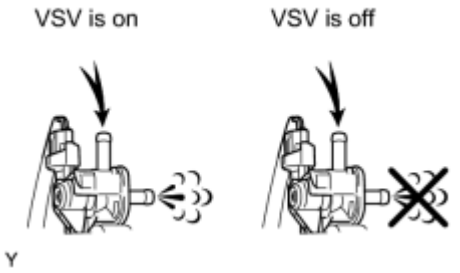
Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (PURGE VSV) |




(a) Connect the Techstream to the DLC3.

(b) Remove the canister side vacuum hose from the purge VSV.

(c) Turn the power switch on (IG) and turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Activate the VSV for Evap Control.

(g) Check if air is sucked into the port when operating the purge VSV using the Techstream.

OK:

| Techstream Operation | Specified Condition |
|---|---|
| Purge VSV is on | Suction of air |
| Purge VSV is off | No suction of air |

NG ▶ INSPECT PURGE VSV

OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

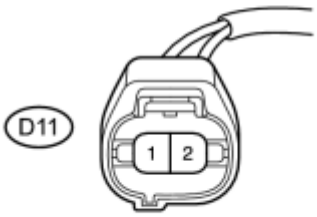
| | |
|---|---|
| 2. | INSPECT PURGE VSV |

(a) Inspect the purge VSV INFO.

NG ▶ REPLACE PURGE VSV
OK
▼

| | |
|---|---|
| 3. | INSPECT PURGE VSV (POWER SOURCE) |

*1




(a) Disconnect the purge VSV connector.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D11-2 - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

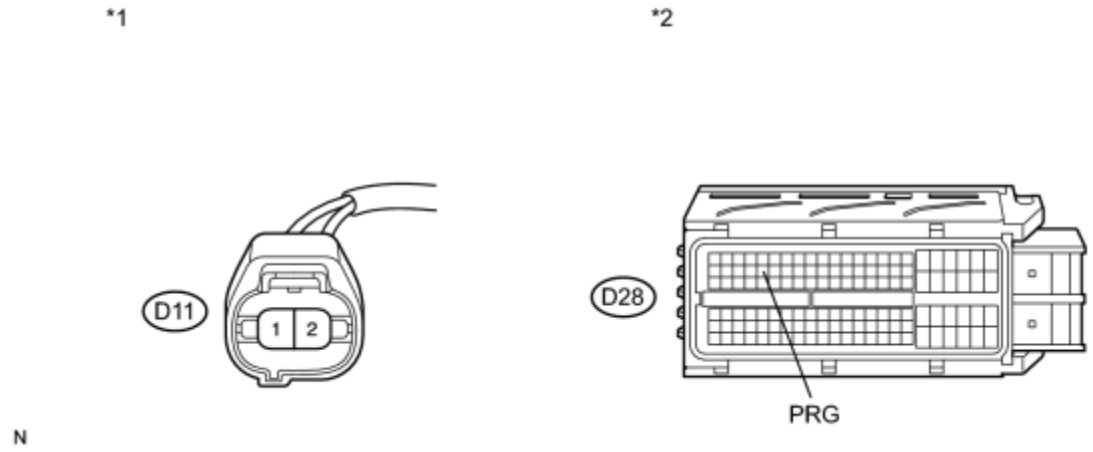
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Purge VSV) |

(d) Reconnect the purge VSV connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (PURGE VSV - EFI MAIN RELAY)
OK
▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM) |

(a) Disconnect the purge VSV connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D11-1 (Purge VSV) - D28-28 (PRG) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D11-1 (Purge VSV) or D28-28 (PRG) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Purge VSV) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the purge VSV connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (PURGE VSV - ECM)
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0451 | Evaporative Emission Control System Pressure Sensor Range / Performance |
| DTC | P0452 | Evaporative Emission Control System Pressure Sensor / Switch Low Input |
| DTC | P0453 | Evaporative Emission Control System Pressure Sensor / Switch High Input |

# DTC SUMMARY

| DTC No. | Monitoring Item | Malfunction Detection Condition | Trouble Area | Detection Timing | Detection Logic |
|---|---|---|---|---|---|
| P0451 | Canister pressure sensor abnormal voltage fluctuation | Sensor output voltage fluctuates frequently in a certain time period. | • Canister pump module<br>• Connector/wire harness (canister pump module - ECM)<br>• ECM | • EVAP monitoring (power switch off)<br>• Engine running | 2 trip |
| P0452 | Canister pressure sensor low input | EVAP pressure sensor less than 42.11 kPa (316 mmHg) for 0.5 seconds. | | • Power switch on (IG)<br>• EVAP monitoring (power switch off) | 1 trip |
| P0453 | Canister pressure sensor high input | EVAP pressure sensor more than 123.761 kPa (928.5 mmHg) for 0.5 seconds. | | • Power switch on (IG)<br>• EVAP monitoring (power switch off) | 1 trip |

HINT:

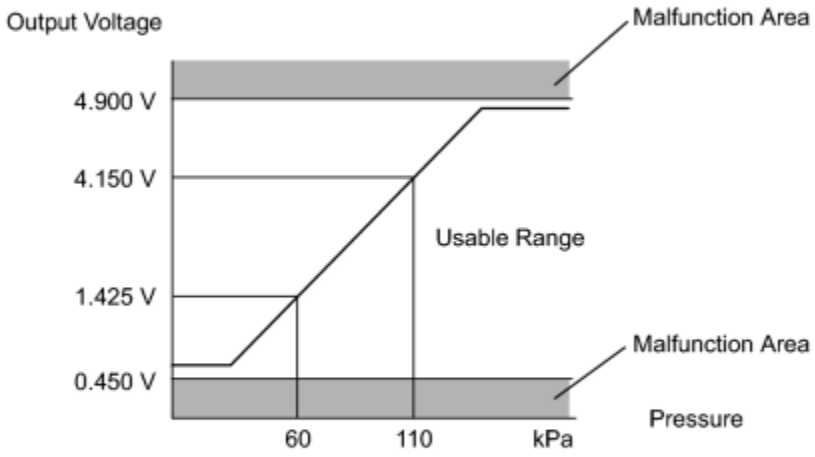
The canister pressure sensor is built into the canister pump module.

# DESCRIPTION

The description can be found in the EVAP (Evaporative Emission) System INFO.

# MONITOR DESCRIPTION

**Canister Pressure Sensor Specification:**




HINT:

Standard atmospheric pressure is 101.3 kPa

1. DTC P0451: Canister pressure sensor abnormal voltage fluctuation

   If the canister pressure sensor voltage output fluctuates rapidly for 10 seconds, the ECM stops the EVAP system monitor. The ECM interprets this as the canister pressure sensor voltage fluctuating, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC.

   (Malfunction is detected by 2 trip detection logic.)

2. DTC P0452: Canister pressure sensor voltage low

   If the canister pressure sensor voltage output (pressure) is below 0.45 V (42.11 kPa (316 mmHg)), the ECM interprets this as an open or short circuit in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

3. DTC P0453: Canister pressure sensor voltage high

   If the canister pressure sensor voltage output (pressure) is 4.9 V (123.761 kPa (928.5 mmHg) or more, the ECM interprets this as an open or short circuit in the canister pressure sensor or its circuit, and stops the EVAP system monitor. The ECM then illuminates the MIL and sets the DTC (1 trip detection logic).

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0451: Evaporative emission control system canister pressure sensor noise<br><br>P0452: Evaporative emission control system canister pressure sensor/switch low |

| | |
|---|---|
| | input<br><br>P0453: Evaporative emission control system canister pressure sensor/switch high input |
| Required Sensors / Components | Canister pump module |
| Frequency of Operation | Continuous |
| Duration | 15 seconds: P0451<br><br>0.5 seconds: P0452, P0453 |
| MIL Operation | Immediately: P0452, P0453<br><br>2 driving cycles: P0451 |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**P0451**

| | |
|---|---|
| Atmospheric pressure | 70 to 112 kPa (525 to 840 mmHg) |
| Battery voltage | 10.5 V or more |
| Intake air temperature | 4.4 to 50°C (40 to 122°F) |
| Canister pressure sensor malfunction (P0452, P0453) | Not detected |
| Either of the following conditions 1 or 2 is met: | - |
| 1. Engine condition | Running |
| 2. Time after key-off | 5, 7 or 9.5 hours |

**P0452 and P0453**

| | |
|---|---|
| Power switch | On (IG) |
| Battery voltage | 8 V or more |

# TYPICAL MALFUNCTION THRESHOLDS

**P0451**

| | |
|---|---|
| Frequency that EVAP pressure change is 0.3 kPa (2.25 mmHg) or more | 10 times or more in 10 seconds |

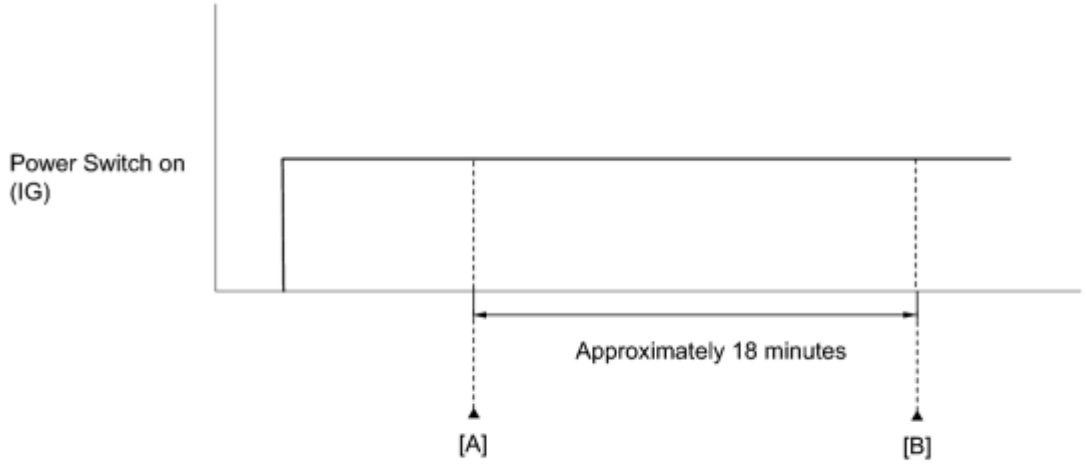
**P0452: Canister Pressure Sensor Low Voltage**

| | |
|---|---|
| EVAP pressure | Less than 42.11 kPa (316 mmHg) |

**P0453: Canister Pressure Sensor High Voltage**

| | |
|---|---|
| EVAP pressure | More than 123.761 kPa (928.5 mmHg) |

# CONFIRMATION DRIVING PATTERN




NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 5 steps performed automatically by the Techstream. It takes a maximum of approximately 18 minutes.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.
- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the Evaporative System Check, keep the fuel temperature below 35°C (95°F).

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Enter the following menus: Powertrain / Engine and ECT / Data List / Intake Air.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
5. Turn the power switch off and wait for 30 seconds.
6. Turn the power switch on (IG) and turn the Techstream on.
7. Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Automatic Mode [A].
8. After the Evaporative System Check is completed, check for All Readiness by entering the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
9. Read the pending DTC [B].

10. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

11. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
12. Input the DTC: P0451, P0452 or P0453.
13. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
15. Check the judgment result.

    HINT:

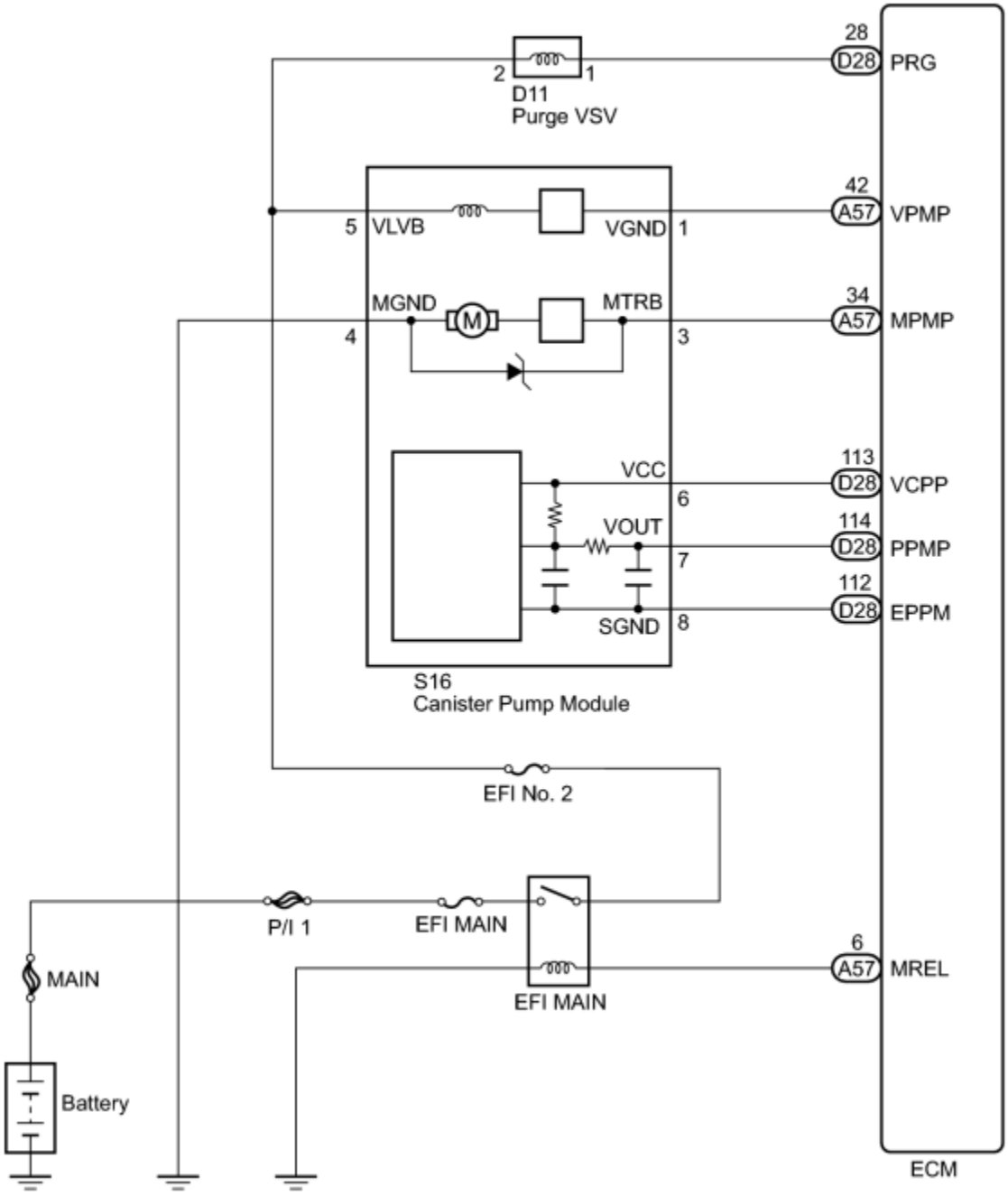
    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

16. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




c

# INSPECTION PROCEDURE

NOTICE:

- When a vehicle is brought into the workshop, leave it as it is. Do not change the vehicle condition. For example, do not tighten the fuel cap.
- Do not disassemble the canister pump module.

- The Techstream is required to conduct the following diagnostic troubleshooting procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CONFIRM DTC AND EVAP PRESSURE |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) (do not start the engine).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

(f) Enter the following menus: Powertrain / Engine / Data List / Vapor Pressure Pump.

(g) Read the EVAP (Evaporative Emission) pressure displayed on the Techstream.

Result:

| Display (DTC Output) | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| P0451 | - | Canister pressure sensor | C |
| P0452 | Less than 45 kPa (338 mmHg) | • Wire harness/connector (ECM - canister pressure sensor)<br>• Canister pressure sensor<br>• Short in ECM circuit | A |
| P0453 | More than 120 kPa (900 mmHg) | • Wire harness/connector (ECM - canister pressure sensor)<br>• Canister pressure sensor<br>• Open in ECM circuit | B |

C ▶ GO TO EVAP SYSTEM

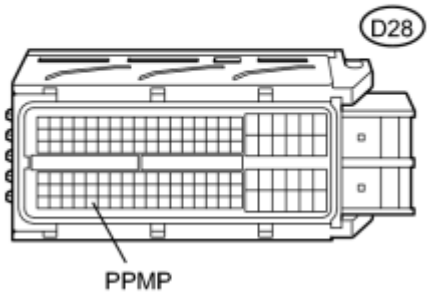
B ▶ CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM)

A ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM) |

(a) Turn the power switch off.

*1




N

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

Result:

| Tester Connection | Condition | Specified Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| D28-114 (PPMP) - Body ground | Always | Below 10 Ω | • Wire harness/connector (ECM - canister pressure sensor)<br>• Short in canister pressure sensor circuit | A |
| | | 10 kΩ or higher | • Wire harness/connector (ECM - canister pressure sensor)<br>• Short in ECM circuit | B |

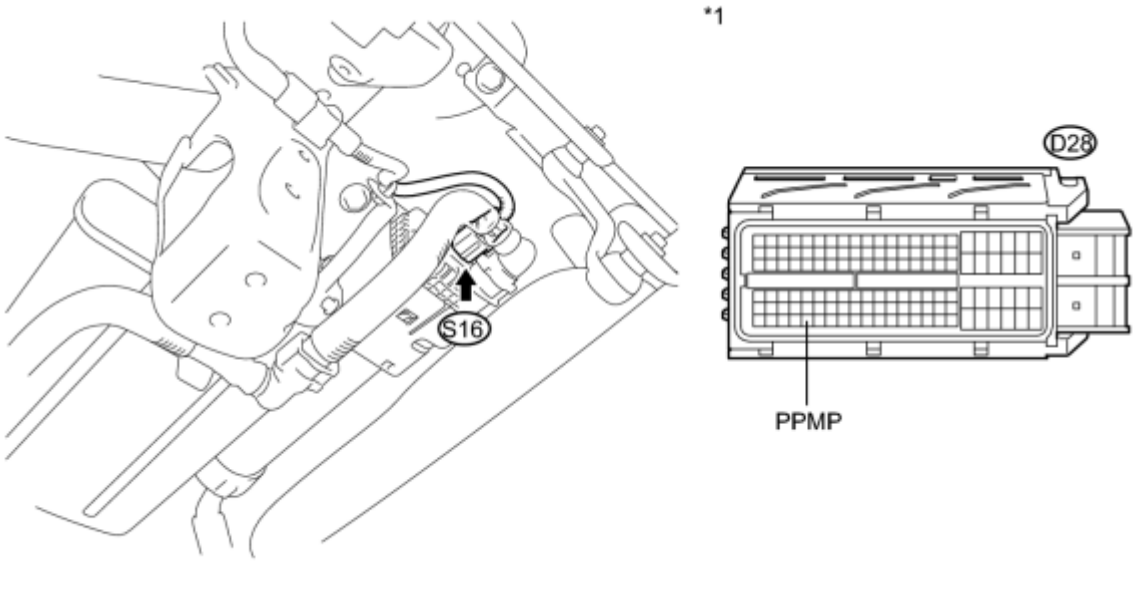
(d) Reconnect the ECM connector.

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM) |

(a) Disconnect the canister pump module connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

Result:

| Tester Connection | Condition | Specified Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| D28-114 (PPMP) - Body ground | Always | 10 kΩ or higher | Short in canister pressure sensor circuit | A |
| | | Below 10 Ω | Short in wire harness/connector (ECM - Canister pressure sensor) | B |

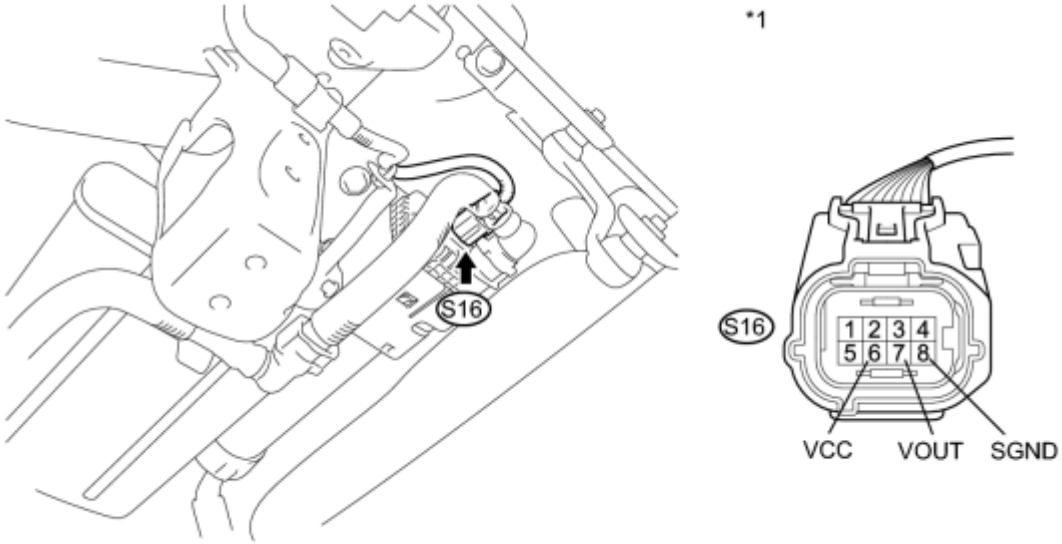
(d) Reconnect the canister pump module connector.

(e) Reconnect the ECM connector.

B ▶REPAIR OR REPLACE HARNESS OR CONNECTOR (CANISTER PUMP MODULE - ECM)
A ▶REPLACE CANISTER

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM) |

(a) Disconnect the canister pump module connector.




c

(b) Turn the power switch on (IG).

(c) Measure the voltage and resistance according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S16-6 (VCC) - Body ground | Power switch on (IG) | 4.5 to 5.5 V |
| S16-7 (VOUT) - Body ground | Power switch on (IG) | 4.5 to 5.5 V |

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S16-8 (SGND) - Body ground | Always | Below 100 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Canister Pump Module) |

Result:

| Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|
| Voltage and resistance within standard ranges | Open in canister pressure sensor circuit | A |

| Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|
| Voltage and resistance outside standard ranges | Open in wire harness/connector (ECM - canister pressure sensor) | B |

(d) Reconnect the canister pump module connector.

B REPAIR OR REPLACE HARNESS OR CONNECTOR (CANISTER PUMP MODULE - ECM)

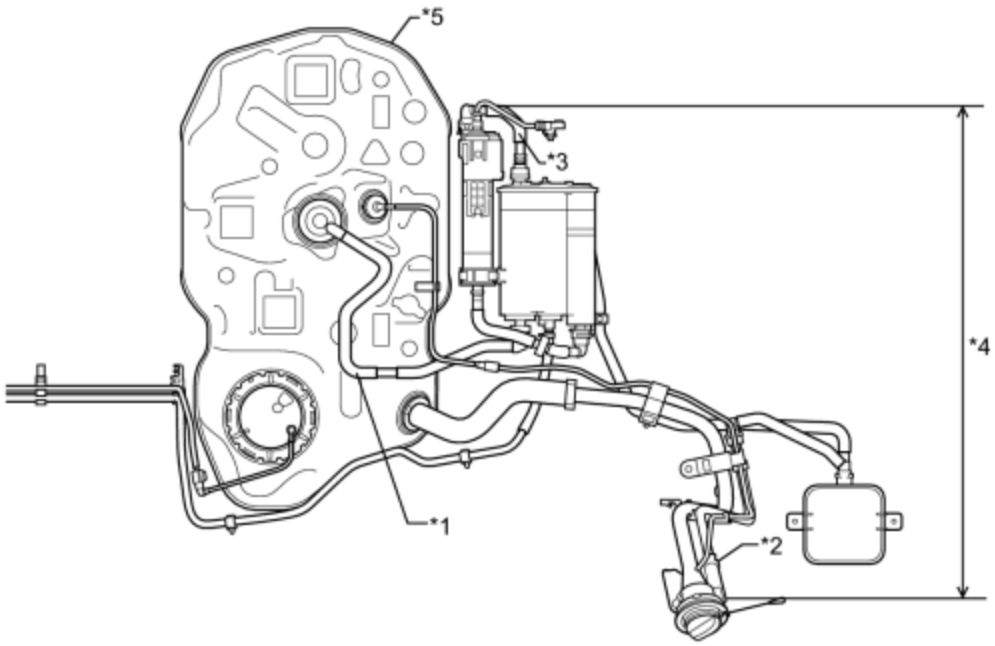
A

| | |
|---|---|
| 5. | REPLACE CANISTER |

(a) Replace the canister INFO.

NOTICE:

When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Fuel Tank Vent Hose | *2 | Air Inlet Port |
| *3 | Vent Hose | *4 | Inspection Area (Check for Disconnection and/or cracks) |

| | | | |
|---|---|---|---|
| *5 | Fuel Tank | - | - |

NEXT CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

| | |
|---|---|
| 6. | REPAIR OR REPLACE HARNESS OR CONNECTOR (CANISTER PUMP MODULE - ECM) |

HINT:

If the exhaust tail pipe assembly has been removed, go to the next step before reinstalling it.

NEXT CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR)

| | |
|---|---|
| 7. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT

| | |
|---|---|
| 8. | CHECK WHETHER DTC OUTPUT RECURS (AFTER REPAIR) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Start the engine and warm it up.

(h) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(i) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(j) Input the DTC: P0451, P0452 or P0453.

(k) Check the DTC judgment result.

HINT:

If DTC judgment result is NORMAL, the repair has been successfully completed.

NEXT **END**

| | | |
|---|---|---|
| DTC | P0455 | Evaporative Emission Control System Leak Detected (Gross Leak) |
| DTC | P0456 | Evaporative Emission Control System Leak Detected (Very Small Leak) |

# DTC SUMMARY

| DTC No. | Monitoring Item | Malfunction Detection Condition | Trouble Area | Detection Timing | Detection Logic |
|---|---|---|---|---|---|
| P0455 | EVAP gross leak | Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure is measured. 0.02 inch leak pressure standard is measured at start and end of leak check.<br><br>If stabilized pressure is higher than [second 0.02 inch leak pressure standard x 0.2], ECM determines that EVAP system has a large leak. | • Fuel cap (loose)<br>• Leakage from EVAP line (canister - fuel tank)<br>• Leakage from EVAP line (purge VSV - canister)<br>• Leakage from canister pump module<br>• Leakage from fuel tank<br>• Leakage from canister | While power switch off | 2 trip |
| P0456 | EVAP small leak | Leak detection pump creates negative pressure (vacuum) in EVAP system and EVAP system pressure is measured. 0.02 inch leak pressure standard measured at start and end of leak check.<br><br>If stabilized pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system has a small leak. | | While power switch off | 2 trip |

# DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System INFO.

# INSPECTION PROCEDURE

Refer to the EVAP System INFO.

# MONITOR DESCRIPTION

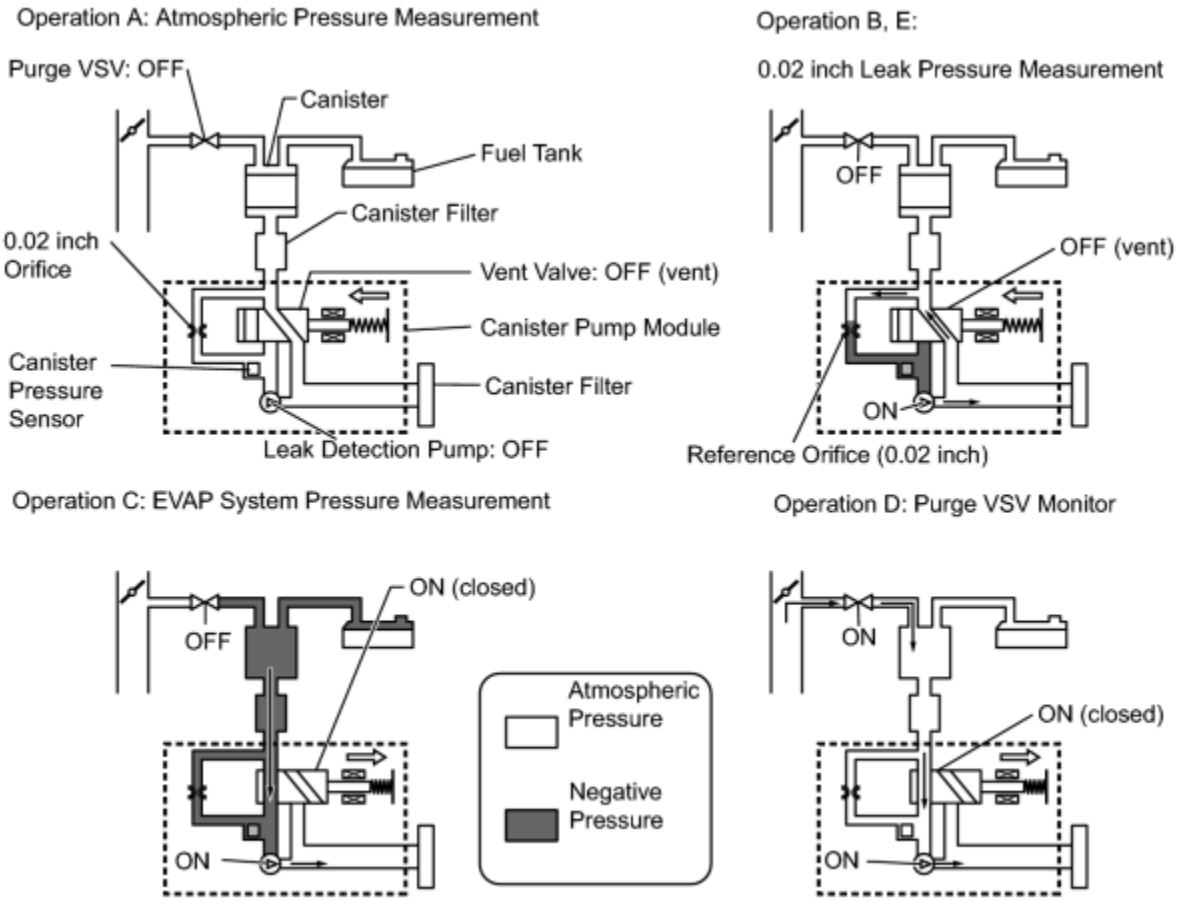
5 hours*1 after the power switch is turned off, the leak detection pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

HINT:

*1: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the power switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the power switch is turned off, the monitor check starts 2.5 hours later.

| Sequence | Operation | Description | Duration |
|---|---|---|---|
| - | ECM activation | Activated by soak timer, 5, 7 or 9.5 hours after power switch is turned off. | - |
| A | Atmospheric pressure measurement | Vent valve is turned off (vent) and EVAP system pressure is measured by ECM in order to register atmospheric pressure.<br><br>If pressure in EVAP system is not between 70 kPa and 112 kPa (525 mmHg and 840 mmHg), ECM cancels EVAP system monitor. | 60 seconds |
| B | First 0.02 inch leak pressure measurement | In order to determine 0.02 inch leak pressure standard, leak detection pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if leak detection pump and vent valve operate normally. | 360 seconds |
| C | EVAP system pressure measurement | Vent valve is turned on (closed) to shut EVAP system.<br><br>Negative pressure (vacuum) is created in EVAP system, and EVAP system pressure is then measured.<br><br>Write down measured value as it will be used in leak check.<br><br>If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor. | 15 minutes*2 |
| D | Purge VSV monitor | Purge VSV is opened and then EVAP system pressure is measured by ECM.<br><br>Large increase indicates normal. | 10 seconds |
| E | Second 0.02 inch leak pressure measurement | After second 0.02 inch leak pressure measurement, leak check is performed by comparing first and second 0.02 inch leak pressure standards.<br><br>If stabilized system pressure is higher than second 0.02 inch leak pressure standard, ECM determines that EVAP system is leaking. | 60 seconds |
| F | Final check | Atmospheric pressure is measured and then monitoring result is recorded by ECM. | - |

*2: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.



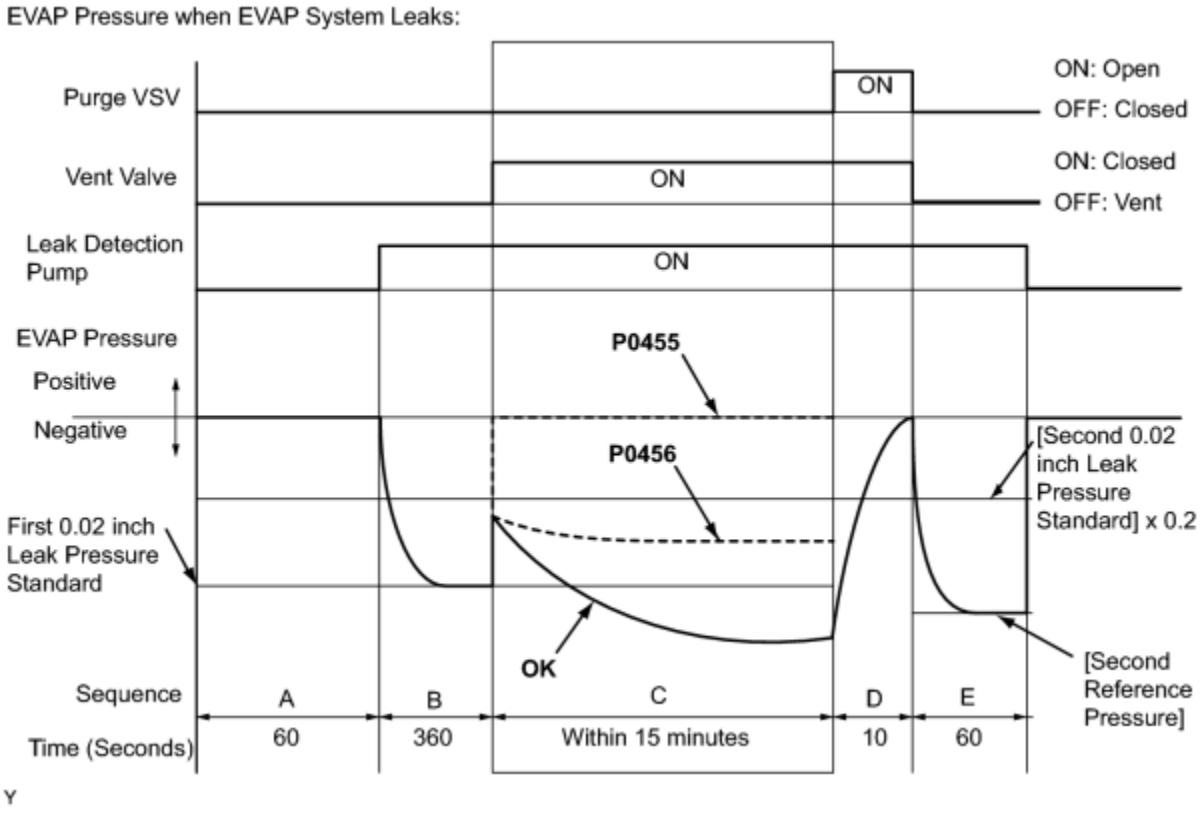

c

1. P0455: EVAP (Evaporative Emission) gross leak

   In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than [second 0.02 inch leak pressure standard x 0.2] (near atmospheric pressure), the ECM determines that the EVAP system has a large leak, illuminates the MIL and sets the DTC (2 trip detection logic).

2. P0456: EVAP very small leak

   In operation C, the leak detection pump creates negative pressure (vacuum) in the EVAP system and the EVAP system pressure is measured. If the stabilized system pressure is higher than second 0.02 inch leak pressure standard, the ECM determines that the EVAP system has a small leak, illuminates the MIL and sets the DTC (2 trip detection logic).




# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0455: Gross leak detected<br><br>P0456: Very small leak (0.02 inch hole) detected |
| Required Sensors / Components | Purge VSV and canister pump module |
| Frequency of Operation | Once per driving cycle |
| Duration | Within 15 minutes |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**P0455, P0456**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Atmospheric pressure | 70 to 112 kPa (525 to 840 mmHg) |
| Battery voltage | 10.5 V or more |
| Vehicle speed | Below 2.5 mph (4 km/h) |
| Power switch | OFF |
| Time after key off | 5, 7 or 9.5 hours |
| Canister pressure sensor malfunction (P0452 and P0453) | Not detected |

| | |
|---|---|
| Purge VSV | Not operated by scan tool |
| Vent valve | Not operated by scan tool |
| Leak detection pump | Not operated by scan tool |
| Both of the following conditions are met before key off: | Conditions 1 and 2 |
| 1. Duration that vehicle has been driven | 5 minutes or more |
| 2. EVAP purge operation | Performed |
| Engine coolant temperature | 4.4 to 35°C (40 to 95°F) |
| Intake air temperature | 4.4 to 35°C (40 to 95°F) |

# TYPICAL MALFUNCTION THRESHOLDS

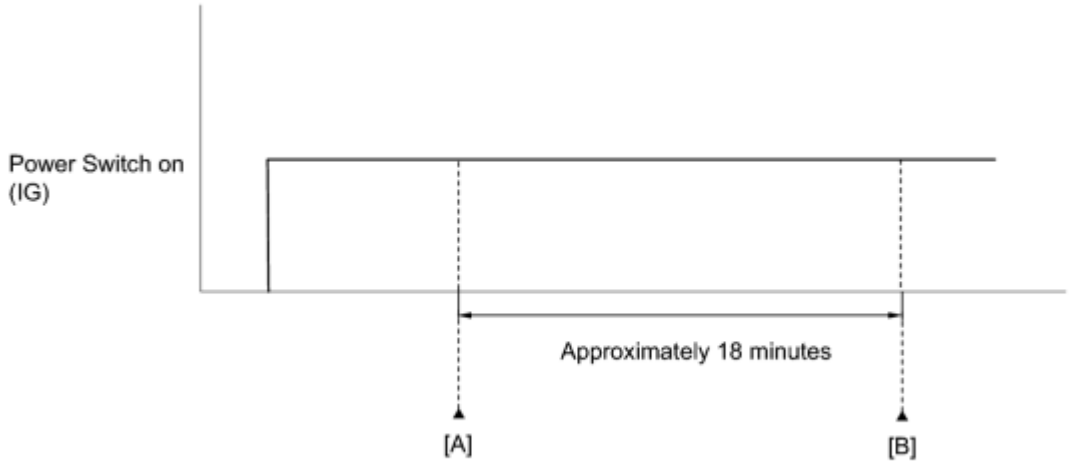
**P0455: EVAP gross leak**

| | |
|---|---|
| EVAP pressure when vacuum introduction is complete | Higher than reference pressure x 0.2 |

**P0456: EVAP 0.02 inch leak**

| | |
|---|---|
| EVAP pressure when vacuum introduction is complete | Between reference pressure and reference pressure x 0.2 |

# CONFIRMATION DRIVING PATTERN




NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 5 steps performed automatically by the Techstream. It takes a maximum of approximately 18 minutes.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.

- Do not run the engine during this operation.
- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the Evaporative System Check, keep the fuel temperature below 35°C (95°F).

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Automatic Mode [A].
7. After the Evaporative System Check is completed, check for All Readiness by entering the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
8. Read the pending DTC [B].
9. If a pending DTC is output, the system is malfunctioning.

   HINT:

   If a pending DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0455 or P0456.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

   HINT:

   - If the judgment result shows ABNORMAL, the system has a malfunction.
   - If the judgment result shows NORMAL, the system is normal.
   - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# MONITOR RESULT

Refer to Checking Monitor Status INFO.

| DTC | P0505 | Idle Control System Malfunction |
|---|---|---|

# DESCRIPTION

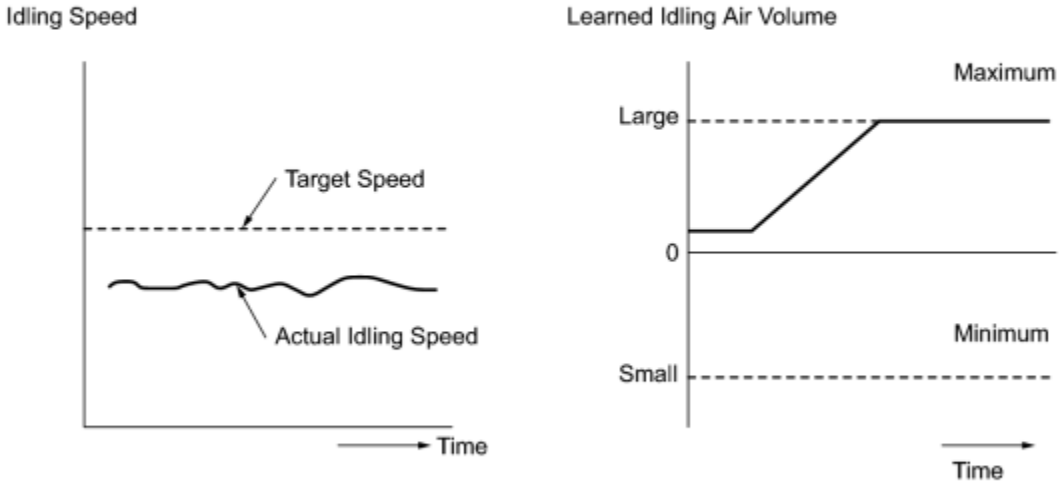
The idle speed is controlled by the electronic throttle control system. The electronic throttle control system is comprised of: 1) the one valve type throttle body; 2) a throttle actuator, which operates the throttle valve; 3) a throttle position sensor, which detects the opening angle of the throttle valve; 4) an accelerator pedal position sensor, which detects the accelerator pedal position; and 5) the ECM, which controls the electronic throttle control system. Based on the target idle speed, the ECM controls the throttle actuator to provide the proper throttle valve opening angle.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0505 | Idling speed continues to vary greatly from target idling speed (2 trip detection logic) | • Electronic throttle control system<br>• Intake system<br>• PCV hose connections<br>• EGR valve assembly<br>• ECM |

# MONITOR DESCRIPTION

The ECM monitors the idle speed and idle air flow volume to conduct Idle Speed Control (ISC). The ECM determines that the idle speed control system is malfunctioning if the following conditions apply:

- The learned idle air flow volume remains at the maximum or minimum volume for 5 seconds or more during a drive cycle.
- After driving at a vehicle speed of 34.175 mph (55 km/h) or more, the actual engine idle speed varies from the target idle speed by less than -100 rpm or 150 rpm or more, 5 times or more during a driving cycle, the ECM illuminates the MIL and sets the DTC.




Y

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0505: Idle speed control function |
| Required Sensors/Components (Main) | Electronic throttle control system |
| Required Sensors/Components (Related) | Crankshaft position sensor<br>Engine coolant temperature sensor<br>Vehicle speed sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | 10 minutes (Idling after warming up) |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

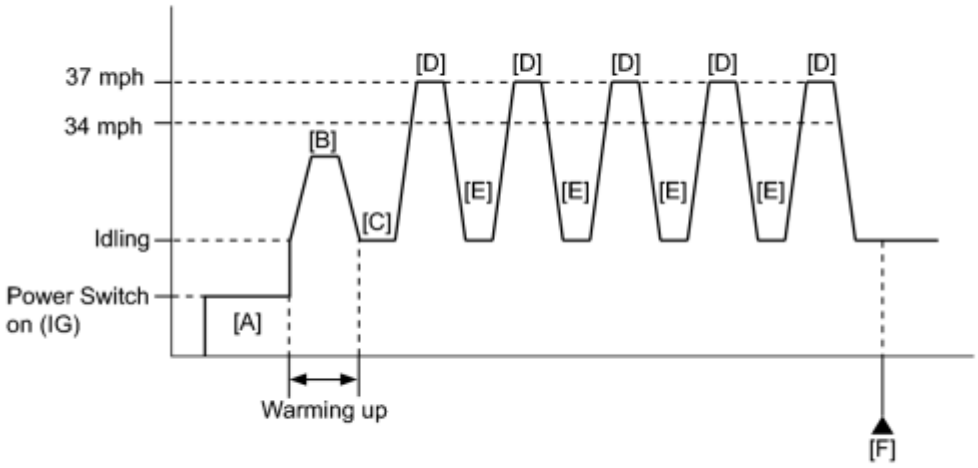
| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0010 (VVT Oil Control Valve Bank 1)<br>P0011 (VVT System Bank 1 - Advance)<br>P0012 (VVT System Bank 1 - Retard) |

| | |
|---|---|
| | P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0340, P0342, P0343 (Camshaft Position Sensor)<br><br>P0351, P0352, P0353, P0354 (Igniter)<br><br>P0401 (EGR System (Closed))<br><br>P0451, P0452, P0453 (EVAP System)<br><br>P2195, P2196, P2237, P2238, P2239, P2252, P2253, P2A00 (Air Fuel Ratio Sensor - Sensor 1) |
| Engine | Running |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Either of the following conditions is met | Condition 1 or 2 |
| 1. Frequency that both of the following conditions (a) and (b) are met | 5 times or more |
| (a) Engine rpm - Target engine rpm | Less than -100 rpm, or 150 rpm or more |
| (b) Vehicle condition | Stop after vehicle was driven at 34.375 mph (56 km/h) or more |
| 2. Frequency that both of the following conditions (a) and (b) are met | Once |
| (a). Engine rpm - Target engine rpm | Less than -100 rpm, or 150 rpm or more |
| (b) Idle air control flow rate learning valve | 0.5 L/sec or less, or 6.1 L/sec or more |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Enter the following menus: Powertrain / Engine and ECT / Data List / Coolant Temp.
4. Make sure that the coolant temperature is 60°C (140°F) or less [A].

   HINT:

   If the coolant temperature is 60°C (140°F) or more, the engine may stop when idling. Make sure to keep the coolant temperature at 60°C (140°F) or less during the driving pattern.

5. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
6. Put the engine in inspection mode INFO.
7. Start the engine and drive the vehicle until the coolant temperature reaches 70°C (158°F) [B].
8. Stop the vehicle (0 mph (0 km/h)) [C].
9. Accelerate the vehicle to 34 to 37 mph (55 to 60 km/h) or more, and then idle the engine [D].

   HINT:

   If the vehicle speed reaches more than 37 mph (60 km/h), the engine may stop while decelerating.

10. Stop the vehicle (0 mph (0 km/h)) [E].
11. Repeat steps [D] and [E] for 5 times or more.
12. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
13. Read the pending DTC [F].
14. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Input the DTC: P0505.
17. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, repeat steps [D] and [E] for 5 times or more.

18. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
19. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

20. If the test result is INCOMPLETE or UNKNOWN, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If a permanent DTC is not output, the system is normal.

# INSPECTION PROCEDURE

HINT:

- The following conditions may also cause DTC P0505 to be set:
  a. The floor carpet overlapping slightly onto the accelerator pedal, causing the accelerator pedal to be slightly depressed and therefore the throttle valve position to be slightly open.
  b. The accelerator pedal being not fully released.

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P0505) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0505 is output | A |
| DTC P0505 and other DTCs are output | B |

HINT:

If any DTCs other than P0505 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK PCV HOSE CONNECTIONS |

(a) Check the PCV hose connections.

OK:

PCV hose is connected correctly and is not damaged.

NG ▶ REPAIR OR REPLACE PCV HOSE

OK ▼

| | |
|---|---|
| 3. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks from the intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 4. | INSPECT THROTTLE BODY ASSEMBLY (VISUALLY CHECK THROTTLE VALVE) |

(a) Check for contamination between the throttle valve and the housing and then check that the throttle valve moves smoothly.

OK:

Throttle valve is not contaminated with foreign objects and moves smoothly.

NG ▶ REPLACE THROTTLE BODY ASSEMBLY

OK ▼

| | |
|---|---|
| 5. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 6. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 7. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT ▼

| | |
|---|---|
| 8. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P0505.

(l) Check the DTC judgment result.

NEXT ▶ **END**

| DTC | P050A | Cold Start Idle Air Control System Performance |
|---|---|---|

# MONITOR DESCRIPTION

This monitor will run when the engine is started at an engine coolant temperature of -10 to 50°C (14 to 122°F). The DTC can be set after the engine idles for 13 seconds (2 trip detection logic).

The DTC is designed to monitor the idle air control at cold start. When the engine is started at an engine coolant temperature of lower than 50°C (122°F), the ECM measures the accumulated mass air flow at idle. If it does not reach the specified level within 10 seconds, the ECM interprets this as a malfunction. The MIL is illuminated and a DTC is set when the malfunction is detected in consecutive driving cycles (2 trip detection logic).

The electronic throttle control system controls the idle speed. The electronic throttle control system operates the throttle actuator to open and close the throttle valve, and adjusts the intake air amount to achieve the target idle speed.

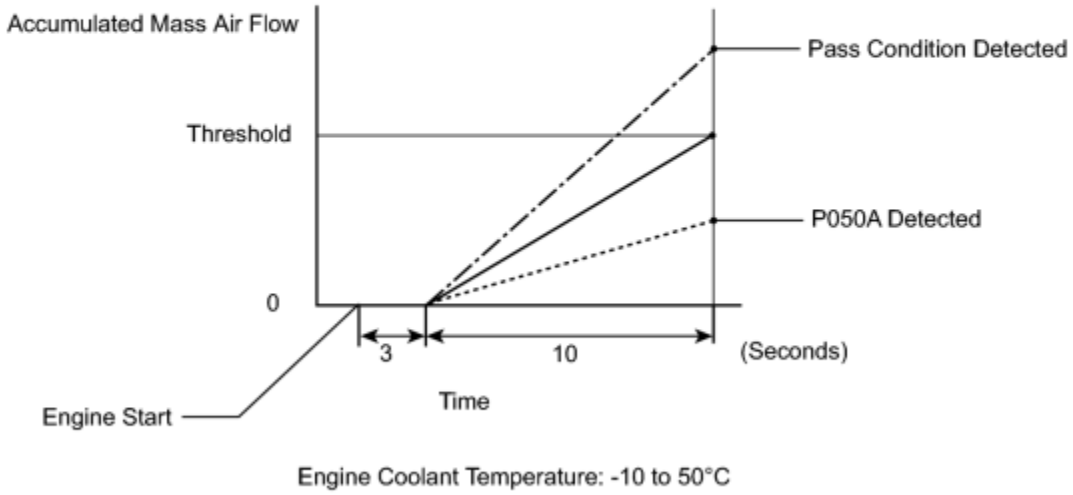
NOTICE:

When the negative battery terminal is disconnected during inspection or repairs, the idle speed control (ISC) learned values are cleared. Idle speed control learning needs to be performed before this DTC can be stored. To perform idle speed control learning, the engine must be warmed up by allowing it to idle for 5 minutes. For idle speed control learning to be successful, when the engine is started to warm it up, there must be at least 10 seconds of idling with the coolant temperature below 50°C (122°F) before allowing it to continue running for the 5 minute learning period.

HINT:

The idle speed control learning is performed when the engine is warmed up and has been idling for 5 minutes.

P050A Detection Logic:




Engine Coolant Temperature: -10 to 50°C

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P050A | Insufficient mass air flow at cold start<br><br>(2 trip detection logic) | • Throttle body assembly<br>• Mass air flow meter sub-assembly<br>• PCV system<br>• Air cleaner filter element sub-assembly<br>• Intake system<br>• VVT system<br>• EGR valve assembly<br>• ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P050A: Idle speed control problem at cold |
| Required Sensors/Components (Main) | Mass air flow meter sub-assembly |
| Required Sensors/Components (Related) | Engine coolant temperature sensor, throttle position sensor, vehicle speed sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | 10 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

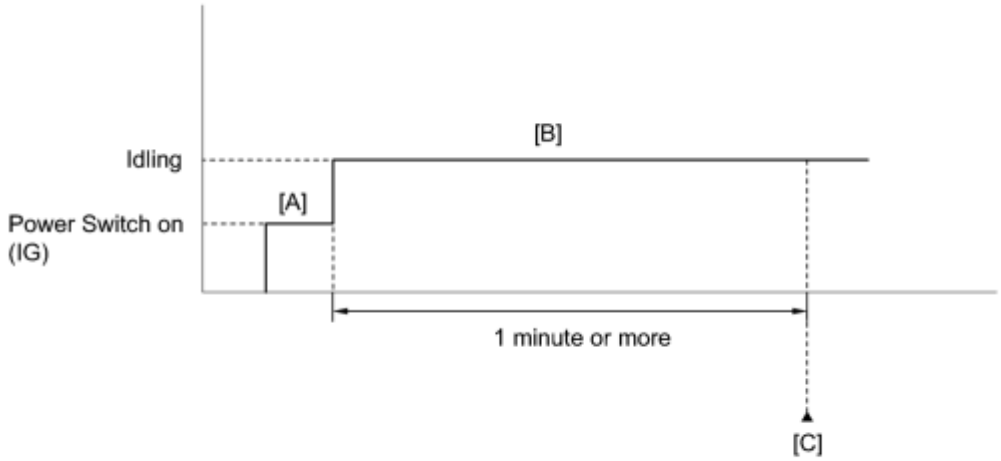
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0010 (VVT Oil Control Valve Bank 1)<br><br>P0011 (VVT System Bank 1- Advance)<br><br>P0012 (VVT System Bank 1- Retard)<br><br>P0016 (VVT System Bank 1 - Misalignment)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0340, P0342, P0343 (Camshaft Position Sensor)<br><br>P0351, P0352, P0353, P0354 (Igniter)<br><br>P0401 (EGR System (Closed))<br><br>P2195, P2196, P2237, P2238, P2239, P2252, P2253, P2A00 (Air Fuel Ratio Sensor - Sensor 1) |
| Battery voltage | 8 V or more |
| Time after engine start | 0 second or more |
| Starter | OFF |
| Engine coolant temperature at engine start | -10°C (14°F) or more |
| Engine coolant temperature | -10 to 50°C (14 to 122°F) |
| Engine idling time | 3 second or more |
| Fuel-cut | OFF |
| Vehicle speed | Less than 37.5 mph (60 km/h) |
| Atmospheric pressure | 76 kPa (570 mmHg) or more |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Accumulated mass air flow | Less than 42.5 g (varies with engine coolant temperature) |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / Coolant Temp.
7. Check that "Coolant Temp" in the Data List is within the range of -10 to 50°C (14 to 122°F).
8. Put the engine in inspection mode INFO.
9. Start the engine and warm it up until the coolant temperature is the same as the coolant temperature in the freeze frame data.
10. Idle the engine for 1 minute or more [B].
11. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
12. Read the pending DTC [C].
13. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
15. Input the DTC: P050A.
16. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed |

| Techstream Display | Description |
|---|---|
| | ○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, idle the engine for 3 minutes, let the engine cool down, and then perform steps [A] through [B].

17. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
18. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

19. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P050A) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P050A is output | A |
| DTC P050A and other DTCs are output | B |

HINT:

If any DTCs other than P050A are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (FUEL TRIM) |

HINT:

Calculate the total fuel trim values to check the characteristic deviation of the mass air flow meter sub-assembly.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Short FT #1 and Long FT #1.

(e) Read the values displayed on the Techstream.

(f) Add together the Short FT #1 and Long FT #1 values to obtain the total Fuel Trim.

OK:

Total of Short FT #1 and Long FT #1 values is between -20% and 20%.

NG ▶ CHECK PCV HOSE

OK ▼

| | |
|---|---|
| 3. | INSPECT THROTTLE BODY ASSEMBLY |

(a) Check that there are no deposits around the throttle valve.

OK:

No deposits around the throttle valve.

NG ▶ REPAIR OR REPLACE THROTTLE BODY ASSEMBLY

OK ▼

| | |
|---|---|
| 4. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR VALVE STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | **EGR Step Position (Active Test)** | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling | Steady idling | Idling changes from steady to rough idling |

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| condition | | |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 5. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 6. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT ▶ CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED

| | |
|---|---|
| 7. | REPAIR OR REPLACE THROTTLE BODY ASSEMBLY |

(a) Repair or replace the throttle body assembly INFO.

NEXT ▶ CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED

| | |
|---|---|
| 8. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

NOTICE:

In this operation, the engine must be cold (the same level as the engine coolant temperature recorded in the freeze frame data).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P050A.

(l) Check the DTC judgment result.

NEXT ▶ **END**

| | |
|---|---|
| 9. | CHECK PCV HOSE |

(a) Check the PCV hose connections.

OK:

PCV hose is connected correctly and is not damaged.

NG ▶ REPAIR OR REPLACE PCV HOSE

OK ▼

| | |
|---|---|
| 10. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks from the intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 11. | CHECK AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY |

(a) Visually check that the air cleaner filter element sub-assembly is not excessively contaminated with dirt or oil.

OK:

The air cleaner filter element sub-assembly is not excessively contaminated with dirt or oil.

NG ▶ REPLACE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

OK ▼

| | |
|---|---|
| 12. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR VALVE POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY)

A ▼

| | |
|---|---|
| 13. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 14. | PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Turn the Techstream on.

(g) Warm up the engine.

(h) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(i) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

HINT:

If the result is not acceptable, cool the engine and perform the Active Test again.

(j) Start the engine when the engine coolant temperature is 30°C (86°F) or less.

(k) Turn the Techstream on.

(l) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(m) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream with the engine coolant temperature at 50°C (122°F) or less.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

NG ▶ CHECK AND REPAIR VVT SYSTEM

OK ▼

| | |
|---|---|
| 15. | REPLACE MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Replace the mass air flow meter sub-assembly INFO.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050A)

| | |
|---|---|
| 16. | REPAIR OR REPLACE PCV HOSE |

(a) Repair or replace the PCV hose.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050A)

| | |
|---|---|
| 17. | REPAIR OR REPLACE INTAKE SYSTEM |

(a) Repair or replace the intake system.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050A)

| | |
|---|---|
| 18. | REPLACE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY |

(a) Replace the air cleaner filter element sub-assembly.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050A)

| | |
|---|---|
| 19. | REPLACE EGR VALVE ASSEMBLY |

(a) Replace the EGR valve assembly INFO.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050A)

| | |
|---|---|
| 20. | CHECK AND REPAIR VVT SYSTEM |

HINT:

Check the VVT system.

NEXT ▼

| | |
|---|---|
| 21. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050A) |

NOTICE:

In this operation, the engine must be cold (the same level as the engine coolant temperature recorded in the freeze frame data).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P050A.

(l) Check the DTC judgment result.

NEXT ▶ **END**

| DTC | P050B | Cold Start Ignition Timing Performance |
|---|---|---|

# DESCRIPTION

This monitor will run when the engine is started at -10 to 50°C (14 to 122°F) of the engine coolant temperature. The DTC can be set after the engine idles for 13 seconds or more (2 trip detection logic).

The DTC is designed to monitor the idle air control at cold start. When the engine is started at lower than 50°C (122°F) of the engine coolant temperature, the ECM measures the accumulated mass air flow at idle. If it does not reach the criteria within 10 seconds, the ECM interprets this as a malfunction. The MIL is illuminated and a DTC is set when the malfunction is detected in consecutive driving cycles (2 trip detection logic).

The electronic throttle control system controls the idle speed. The electrical throttle control system operates the throttle actuator to open and close the throttle valve, and adjusts the intake air amount to achieve the target idle speed.

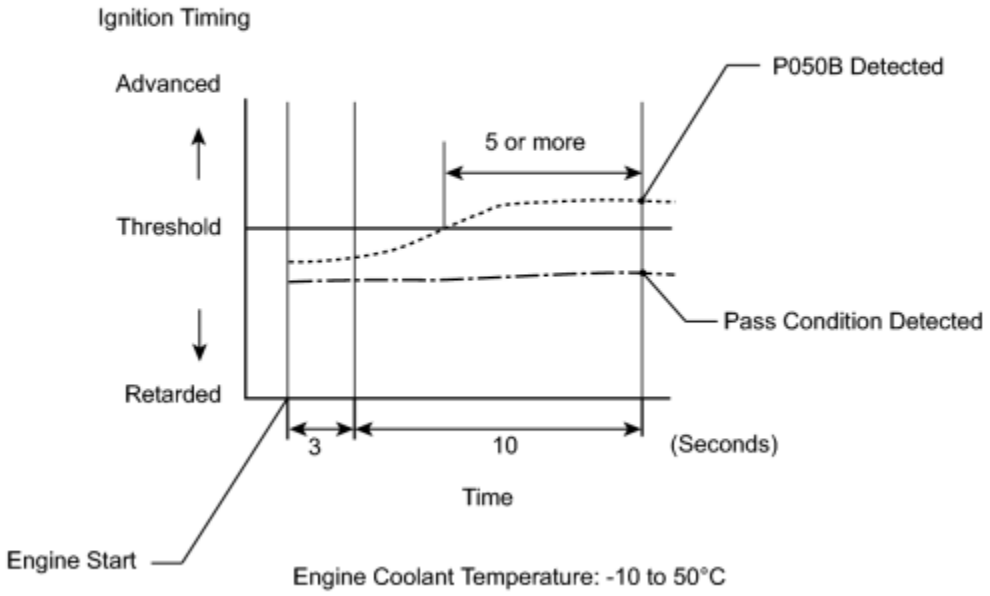
NOTICE:

When the negative (-) battery terminal is disconnected during inspection or repairs, the idle speed control learned values are cleared. Idle speed control learning is performed when the engine has been warmed up and idled for 5 minutes because this DTC cannot be set after the idle speed control learned values are cleared.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P050B | Ignition timing retard value insufficient for 5 seconds or more for 10 seconds of P050A monitoring duration at cold start (2 trip detection logic) | • Throttle body assembly<br>• Mass air flow meter sub-assembly<br>• Intake system<br>• PCV hose connections<br>• VVT system<br>• Air cleaner filter element sub-assembly<br>• EGR valve assembly<br>• ECM |

# MONITOR DESCRIPTION

P050B Detection Logic:




# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P050B: Idle ignition timing problem at cold |
| Required Sensors / Components (Main) | Mass air flow meter sub-assembly |
| Required Sensors / Components (Related) | Engine coolant temperature sensor, throttle position sensor, vehicle speed sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | 10 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

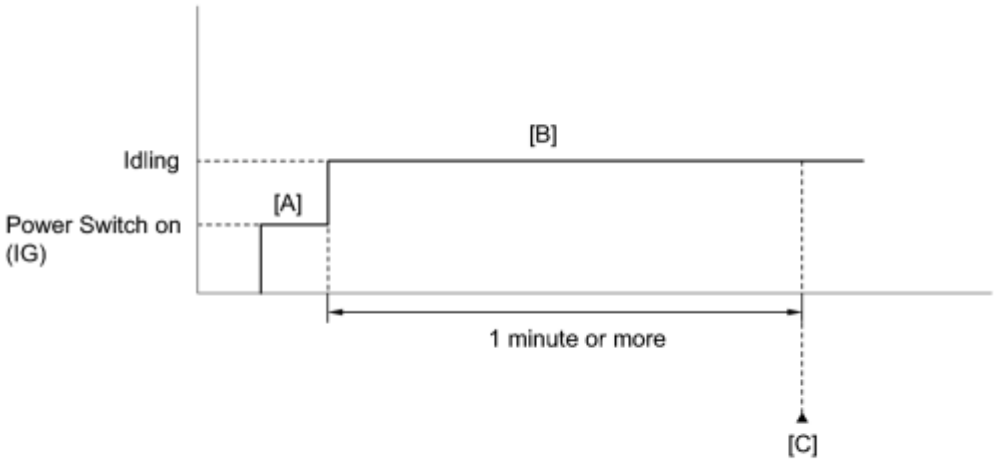
| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0010 (VVT Oil Control Valve Bank 1)<br>P0011 (VVT System Bank 1- Advance)<br>P0012 (VVT System Bank 1- Retard)<br>P0016 (VVT System Bank 1 - Misalignment) |

| | |
|---|---|
| | P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0340, P0342, P0343 (Camshaft Position Sensor)<br><br>P0351, P0352, P0353, P0354 (Igniter)<br><br>P0401 (EGR System (Closed))<br><br>P2195, P2196, P2237, P2238, P2239, P2252, P2253, P2A00 (Air Fuel Ratio Sensor - Sensor 1) |
| Battery voltage | 8 V or more |
| Time after engine start | 3 seconds or more |
| Starter | OFF |
| Engine coolant temperature at engine start | -10°C (14°F) or more |
| Engine coolant temperature | -10 to 50°C (14 to 122°F) |
| Engine idling time | 0 second or more |
| Fuel-cut | OFF |
| Vehicle speed | Less than 37.5 mph (60 km/h) |
| Atmospheric pressure | 76 kPa (570 mmHg) or more |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Accumulated time when ignition timing retard is cut off | 5 seconds or more |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Enter the following menus: Powertrain / Engine and ECT / Data List / All Data / Coolant Temp.
7. Check that "Coolant Temp" in the Data List is within the range of -10 to 50°C (14 to 122°F).
8. Put the engine in inspection mode INFO.
9. Start the engine and warm it up until the coolant temperature is the same as the coolant temperature in the freeze frame data.
10. Idle the engine for 1 minute or more [B].
11. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
12. Read the pending DTC [C].
13. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
15. Input the DTC: P050B.
16. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |

| Techstream Display | Description |
|---|---|
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, idle the engine for 3 minutes, let the engine cool down, and then perform steps [A] through [B].

17. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
18. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
19. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

- DTC P050B may be set when the engine shows the symptom as listed below. If necessary, check the trouble area as listed below.

| Symptom | Factor | Trouble Area |
|---|---|---|
| Low idle speed at engine cold. | Excessive engine friction | Engine oil deterioration |
| Rough idle at engine cold. | Abnormal combustion | Fuel quality |

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P050B) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following the menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P050B is output | A |
| DTC P050B and other DTCs are output | B |

HINT:

If any DTCs other than P050B are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (FUEL TRIM) |

HINT:

Calculate the total fuel trim values to check the characteristic deviation of the mass air flow meter sub-assembly.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Enter the following menus: Powertrain / Engine and ECT / Active Test / Short FT #1 and Long FT #1.

(f) Read the values displayed on the Techstream at engine idle.

(g) Add together the Short FT #1 and Long FT #1 values to obtain the total fuel trim.

OK:

Total of Short FT #1 and Long FT #1 values is between -20 % and 20 %.

NG ▶ CHECK PCV HOSE (HOSE CONNECTIONS)

OK

▼

| | |
|---|---|
| 3. | CHECK THROTTLE BODY ASSEMBLY |

(a) Check for deposits around the throttle valve and throttle valve condition.

OK:

No deposits around throttle valve and throttle valve moves smoothly.

NG ▶ REPAIR OR REPLACE THROTTLE BODY ASSEMBLY

OK

▼

| | |
|---|---|
| 4. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| | |
|---|---|
| - | **EGR Step Position (Active Test)** |

| | 0 Steps | 0 to 30 Steps |
|---|---|---|
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 5. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 6. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT ▶ CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B)

| | |
|---|---|
| 7. | REPAIR OR REPLACE THROTTLE BODY ASSEMBLY |

(a) Repair or replace the throttle body assembly INFO.

NEXT

| | |
|---|---|
| 8. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B) |

NOTICE:

In this operation, the engine must be cold (the same level as the engine coolant temperature recorded in the freeze frame data).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P050B.

(l) Check the DTC judgment result.

NEXT ▶ **END**

| | |
|---|---|
| 9. | CHECK PCV HOSE (HOSE CONNECTIONS) |

(a) Check the PCV hose connections.

OK:

PCV hose is connected correctly and is not damaged.

NG ▶ REPAIR OR REPLACE PCV HOSE

OK

| | |
|---|---|
| 10. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks in intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 11. | CHECK AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY |

(a) Visually check that the air cleaner filter element sub-assembly is not excessively contaminated with dirt or oil.

OK:

Air cleaner filter element sub-assembly is not excessively contaminated with dirt or oil.

NG ▶ REPLACE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

OK ▼

| | |
|---|---|
| 12. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY)

A ▼

| | |
|---|---|
| 13. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 14. | PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Turn the Techstream on.

(g) Warm up the engine.

(h) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(i) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

HINT:

If the result is not acceptable, cool the engine and perform the Active Test again.

(j) Start the engine when the engine coolant temperature is 30°C (86°F) or less.

(k) Turn the Techstream on.

(l) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the VVT System (Bank 1).

(m) Check the engine speed while operating the camshaft timing oil control valve assembly using the Techstream with the engine coolant temperature at 50°C (122°F) or less.

Result:

| Techstream Operation | Specified Condition |
|---|---|
| OFF | Normal engine speed |
| ON | Engine idles roughly or stalls<br><br>(soon after camshaft timing oil control valve assembly switched from OFF to ON) |

NG ▶ CHECK AND REPAIR VVT SYSTEM

OK ▼

| | |
|---|---|
| 15. | REPLACE MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Replace the mass air flow meter sub-assembly INFO.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B)

| | |
|---|---|
| 16. | REPAIR OR REPLACE PCV HOSE |

(a) Repair or replace the PCV hose.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B)

| | |
|---|---|
| 17. | REPAIR OR REPLACE INTAKE SYSTEM |

(a) Repair or replace the intake system.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B)

| | |
|---|---|
| 18. | REPLACE AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY |

(a) Replace the air cleaner filter element sub-assembly.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B)

| | |
|---|---|
| 19. | REPLACE EGR VALVE ASSEMBLY |

(a) Replace the EGR valve assembly INFO.

NEXT ▶CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B)

| | |
|---|---|
| 20. | CHECK AND REPAIR VVT SYSTEM |

(a) Check and repair the VVT system.

NEXT ▼

| | |
|---|---|
| 21. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED (DTC P050B) |

NOTICE:

In this operation, the engine must be cold (the same level as the engine coolant temperature recorded in the freeze frame data).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P050B.

(l) Check the DTC judgment result.

NEXT ▶ **END**

| | | |
|---|---|---|
| DTC | P0560 | System Voltage |

# MONITOR DESCRIPTION

The battery supplies electricity to the ECM even when the power switch is off. This power allows the ECM to store data such as DTC history, freeze frame data and fuel trim values. If the battery voltage falls below a minimum level, the memory is cleared and the ECM determines that there is a malfunction in the power supply circuit. The next time the engine is started, the ECM illuminates the MIL and sets the DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0560 | Open in ECM back up power source circuit<br><br>(1 trip detection logic) | • Open in back up power source circuit<br>• Battery<br>• Battery terminals<br>• EFI MAIN fuse<br>• ECM |

HINT:

If DTC P0560 is set, the ECM does not store other DTCs or the data stored in the ECM may be partly cleared.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0560: ECM system voltage |
| Required Sensors/Components (Main) | ECM |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 3 seconds |
| MIL Operation | Immediately (MIL illuminated after next engine start) |
| Sequence of Operation | None |

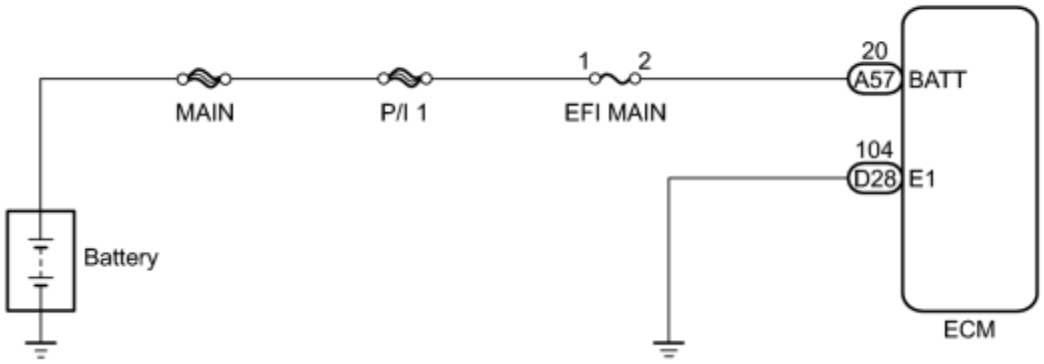
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

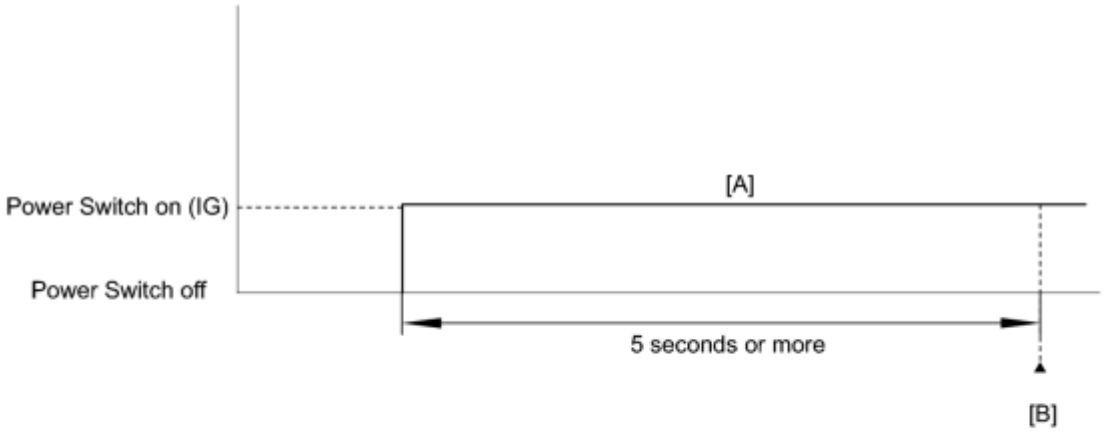
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| ECM power source | Less than 3.5 V |

# WIRING DIAGRAM




# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 5 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

HINT:

If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0560.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

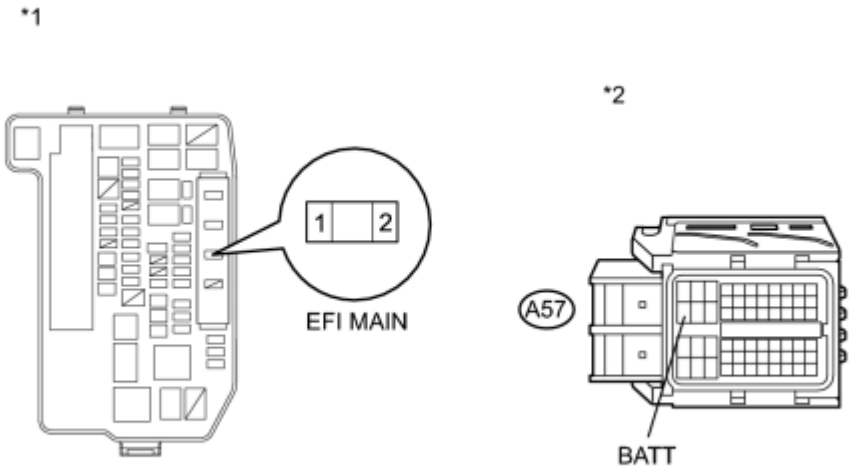
HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (ECM - EFI MAIN FUSE) |

(a) Disconnect the negative battery terminal.




(b) Disconnect the positive battery terminal.

(c) Remove the EFI MAIN fuse from the engine room relay block.

(d) Disconnect the ECM connector.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| EFI MAIN fuse (2) - A57-20 (BATT) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| EFI MAIN fuse (2) or A57-20 (BATT) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Engine Room Relay Block | *2 | Front view of wire harness connector<br><br>(to ECM) |

(f) Reinstall the EFI MAIN fuse.

(g) Reconnect the ECM connector.

(h) Reconnect the positive battery terminal.

(i) Reconnect the negative battery terminal.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - EFI MAIN FUSE)
OK
▼

| | |
|---|---|
| 2. | INSPECT BATTERY |

(a) Check that the battery is not discharged or weak.

OK:

Battery is not discharged or weak.

NG ▶ CHARGE OR REPLACE BATTERY
OK
▼

| | |
|---|---|
| 3. | CHECK BATTERY TERMINAL |

(a) Check that the battery terminals are not loose or corroded.

OK:

Battery terminals are not loose or corroded.

NG ▶ REPAIR OR REPLACE BATTERY TERMINAL
OK
▼

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and turn the Techstream off.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Wait for 5 seconds.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(i) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P0560 is output | A |
| DTC is not output | B |

B ▶ CHECK FOR INTERMITTENT PROBLEMS

A ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0604 | Random Access Memory (RAM) |

# MONITOR DESCRIPTION

The ECM continuously monitors its internal memory status. This self-check ensures that the ECM is functioning properly. It is diagnosed by internal "mirroring" of the main CPU and sub CPU to detect Random Access Memory (RAM) errors. If outputs from these CPUs are different and deviate from the standards, the ECM will illuminate the MIL and set the DTC immediately.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0604 | ECM RAM errors | ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0604: ECM RAM error |
| Required sensors/Components (Main) | ECM |
| Required sensors/Components (Related) | None |
| Frequency of operation | Continuous |
| Duration | 6 times |
| MIL operation | Immediately |
| Sequence of operation | None |

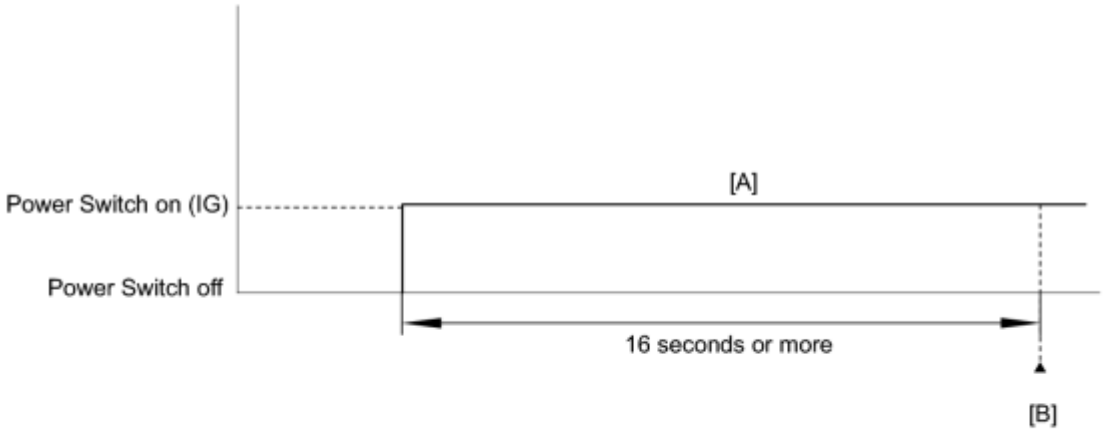
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| RAM mirror check | Fail |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 16 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0604.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
| --- | --- |
| 1. | READ OUTPUT DTC (DTC P0604) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and turn the Techstream off.

(f) Disconnect the Techstream.

(g) Disconnect the cable from the battery negative (-) terminal and wait for 1 minute.

(h) Connect the cable to the battery negative (-) terminal.

(i) Connect the Techstream to the DLC3.

(j) Turn the power switch on (IG).

(k) Wait 16 seconds or more.

(l) Turn the Techstream on.

(m) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(n) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0604 is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | P0606 | ECM / PCM Processor |

# MONITOR DESCRIPTION

The ECM continuously monitors its main and sub CPUs. This self-check ensures that the ECM is functioning properly. If outputs from the CPUs are different and deviate from the standards, the ECM will illuminate the MIL and set the DTC immediately.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0606 | ECM main CPU error | ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTC | P0606: ECM range check |
| Required sensors/Components (Main) | ECM |
| Required sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | Within 1 second |
| MIL Operation | Immediately |
| Sequence of Operation | None |

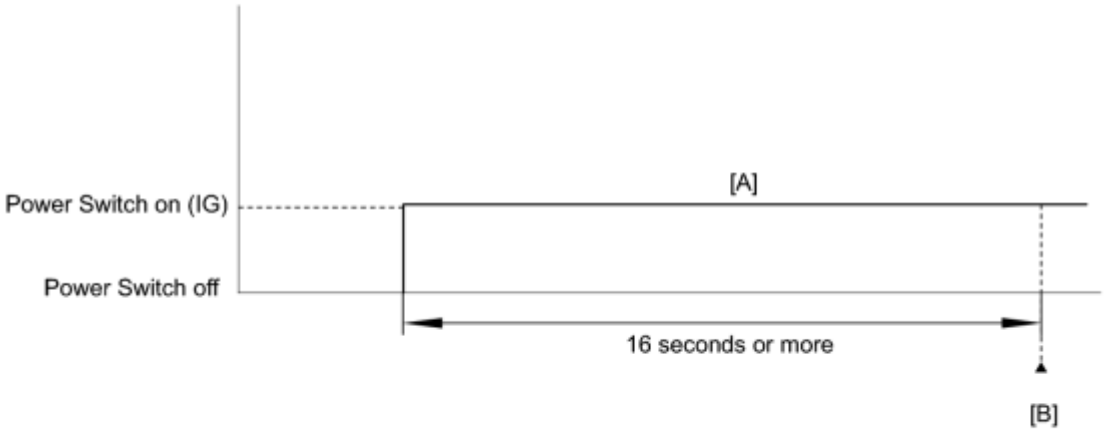
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever the following DTCs are not present | None |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Either of the following conditions is met: | Condition A or B |
| A. DMA communication | No response |
| B. Watching from monitoring processor | Not toggle |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 16 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P0606.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
| --- | --- |
| 1. | READ OUTPUT DTC (DTC P0606) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and turn the Techstream off.

(f) Disconnect the Techstream.

(g) Disconnect the cable from the battery negative (-) terminal and wait for 1 minute.

(h) Connect the cable to the battery negative (-) terminal.

(i) Connect the Techstream to the DLC3.

(j) Turn the power switch on (IG).

(k) Wait 16 seconds or more.

(l) Turn the Techstream on.

(m) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(n) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0606 is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | P0607 | Control Module Performance |

# MONITOR DESCRIPTION

The ECM continuously monitors its internal processors (CPUs) and heated oxygen sensor transistors. This self-check ensures that the ECM is functioning properly.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0607 | • ECM CPUs malfunction<br>• Heated oxygen sensor transistor (built into the ECM) malfunctions | • ECM<br>• Heated oxygen sensor<br>• Exhaust gas leak |
| | For Mexico models:<br><br>ECM CPU error | • ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0607: Control Module Performance |
| Required Sensors/Components (Main) | ECM |
| Required Sensors/Components (Related) | Heated oxygen sensor |
| Frequency of Operation | Continuous |
| Duration | 60 seconds |
| MIL Operation | Immediately |
| Sequence of Operation | None |

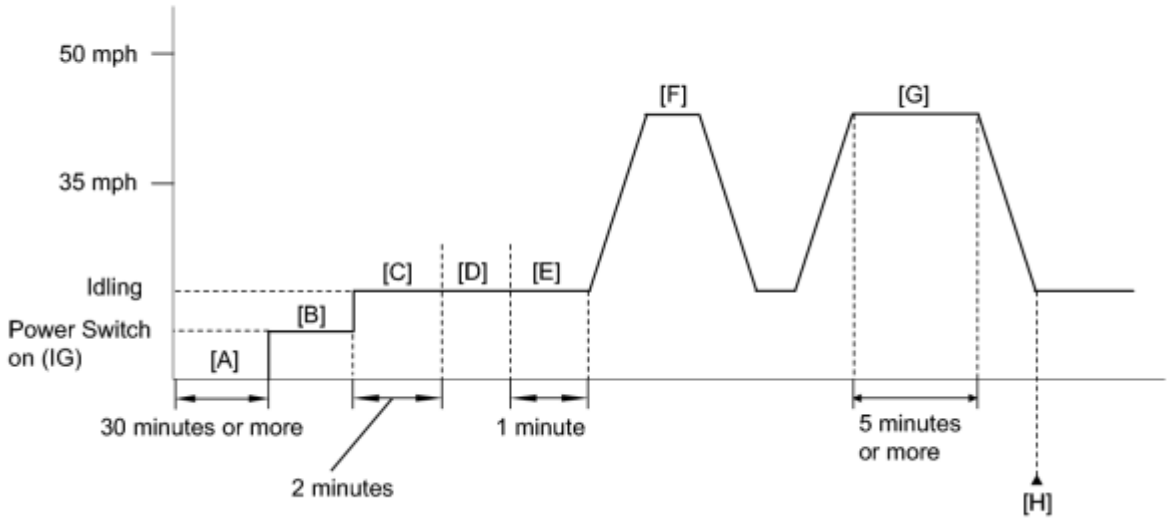
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever the following DTCs are not stored | None |
| Engine | Running |
| Estimated heated oxygen sensor temperature | 450 to 750°C (842 to 1382°F) |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Heated oxygen sensor transistors | Fail |

# CONFIRMATION DRIVING PATTERN




1. Stop the engine for 30 minutes or more [A].
2. Connect the Techstream to the DLC3.
3. Turn the power switch on (IG) and turn the Techstream on.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
5. Turn the power switch off and wait for 30 seconds.
6. Turn the power switch on (IG) and turn the Techstream on [B].
7. Put the engine in inspection mode INFO.
8. Start the engine, and wait 2 minutes [C].
9. Warm up the engine until the engine coolant temperature is 75°C (167°F) or higher [D].
10. Idle the engine for 1 minute [E].
11. Accelerate the vehicle to 50 mph (80 km/h) and stop the vehicle [F].
12. Drive the vehicle at 35 to 50 mph (56 to 80 km/h) for 5 minutes or more [G].
13. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
14. Read the pending DTC [H].
15. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Input the DTC: P0607, P0136, P0137 or P0138.
18. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed |

| Techstream Display | Description |
|---|---|
| | ○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [D] through [G].

19. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
20. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

21. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| P0607 and P0136, P0137 or P0138 are output | A |
| P0607 is output | B |

B ▶ CHECK FOR EXHAUST GAS LEAK

A ▼

| | |
|---|---|
| 2. | INSPECT DTC (P0136, P0137 OR P0138) |

(a) Inspect the P0136, P0137 or P0138 flowchart.

HINT:

- If P0136 is output, troubleshoot for that DTC first INFO. Then proceed to "INSPECT ECM".
- If P0137 is output, troubleshoot for that DTC first INFO. Then proceed to "INSPECT ECM".
- If P0138 is output, troubleshoot for that DTC first INFO. Then proceed to "INSPECT ECM".
- If DTC P0607 and P0136, P0137 or P0138 are output, the output voltage of the heated oxygen sensor may remain close to 0 V or become high (around 1 V or more).

NEXT ▶ INSPECT ECM

| | |
|---|---|
| 3. | CHECK FOR EXHAUST GAS LEAK |

(a) Put the engine in inspection mode INFO.

(b) Allow the engine to idle and rev the engine.

(c) Check for exhaust gas leaks around the heated oxygen sensor.

If any exhaust gas leaks are present, repair them and proceed to "PERFORM CONFIRMATION DRIVING PATTERN". If no exhaust gas leaks are present, proceed to "PERFORM CONFIRMATION DRIVING PATTERN".

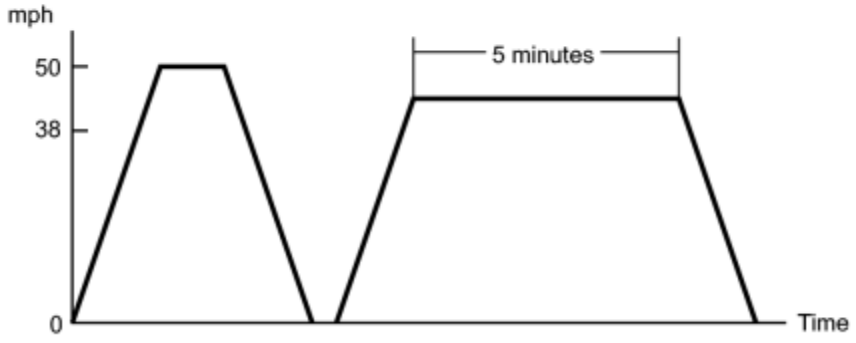
HINT:

- If no exhaust gas leaks are present, a malfunction in the heated oxygen sensor circuit is suspected.
- If any exhaust gas leaks are present around the heated oxygen sensor, noise appears in the output voltage of the heated oxygen sensor.

NEXT ▼

| | |
|---|---|
| 4. | PERFORM CONFIRMATION DRIVING PATTERN |

Engine Coolant Temperature: 75°C or more




(a) Clear the DTC INFO.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG) and turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Warm up the engine until the engine coolant temperature becomes 75°C (167°F) or more.

(g) Perform the driving pattern.

(1) Accelerate the vehicle to 50 mph (80 km/h) and stop the vehicle.

(2) Drive the vehicle between 38 and 50 mph (60 and 80 km/h) for 5 minutes.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(i) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| P0607 and P0136, P0137 or P0138 are output | A |
| Only P0607 | B |
| No DTC output | C |

C ▶ INSPECT ECM
B ▶ REPLACE ECM
A ▼

| | |
|---|---|
| 5. | INSPECT DTC (P0136, P0137 OR P0138) |

(a) Inspect the P0136, P0137 or P0138 flowchart.

HINT:

- If P0136 is output, troubleshoot for that DTC first INFO. Then proceed to "INSPECT ECM".
- If P0137 is output, troubleshoot for that DTC first INFO. Then proceed to "INSPECT ECM".
- If P0138 is output, troubleshoot for that DTC first INFO. Then proceed to "INSPECT ECM".
- If DTC P0607 and P0136, P0137 or P0138 are output, the output voltage of the heated oxygen sensor may remain close to 0 V or become high (around 1 V or more).

NEXT

| | |
|---|---|
| 6. | INSPECT ECM |

(a) Clear the DTC INFO.

(b) Stop the engine and wait for 30 minutes.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG) and turn the Techstream on.

(e) Put the engine in inspection mode INFO.

(f) Start the engine and allow it to idle for 2 minutes.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(h) Check the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| P0607 is output | B |

B ▶ REPLACE ECM
A ▶ **END**

| DTC | P060A | Internal Control Module Monitoring Processor Performance |
|---|---|---|

# MONITOR DESCRIPTION

The main CPU and sub CPU of the ECM communicate with each other. The main CPU monitors the communications and WDC pulses from the sub CPU. When the signal malfunctions below deviate, the DTC is stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P060A | ECM sub CPU error | ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P060A: ECM CPU error |
| Required sensors/Components (Main) | ECM |
| Required sensors/Components (Related) | - |
| Frequency of operation | Continuous |
| Duration | Within 1 second |
| MIL operation | Immediately |
| Sequence of operation | None |

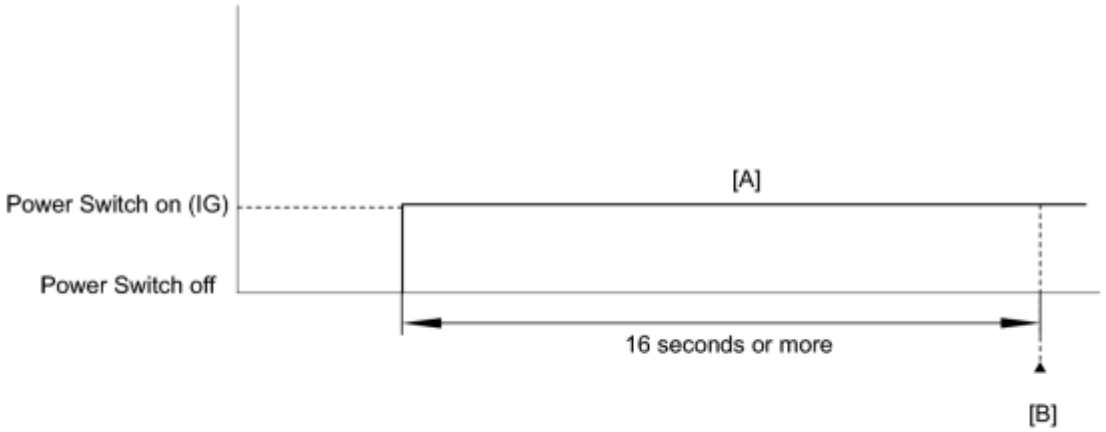
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Either of the following conditions is met | Condition 1 or 2 |
| 1. All of the following conditions are met | Condition (a), (b) and (c) |
| (a) CPU reset | 1 time or more |
| (b) Leaned throttle position | 2.6 V or more |
| (c) Electronic throttle actuator | OFF |
| 2. CPU reset | 2 times or more |
| Either of the following conditions is met | Condition 3 or 4 |
| 3. DMA communication error | Detected |
| 4. Watching from Monitoring Processor not toggle | 0.88 seconds or more |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 16 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P060A.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
| --- | --- |
| 1. | READ OUTPUT DTC (DTC P060A) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and turn the Techstream off.

(f) Disconnect the Techstream.

(g) Disconnect the cable from the battery negative (-) terminal and wait for 1 minute.

(h) Connect the cable to the battery negative (-) terminal.

(i) Connect the Techstream to the DLC3.

(j) Turn the power switch on (IG).

(k) Wait 16 seconds or more.

(l) Turn the Techstream on.

(m) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(n) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P060A is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | P060B | Internal Control Module A/D Processing Performance |
|---|---|---|

# DESCRIPTION

This DTC is output when a communication error occurs in the ECM.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P060B | ECM main CPU communication error | ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P060B: ECM main CPU communication error |
| Required sensors/components (Main) | ECM |
| Required sensors/components (Related) | - |
| Frequency of operation | Continuous |
| Duration | 2 times: AD converter<br><br>30 times: Knock control circuit |
| MIL operation | Immediately |
| Sequence of operation | None |

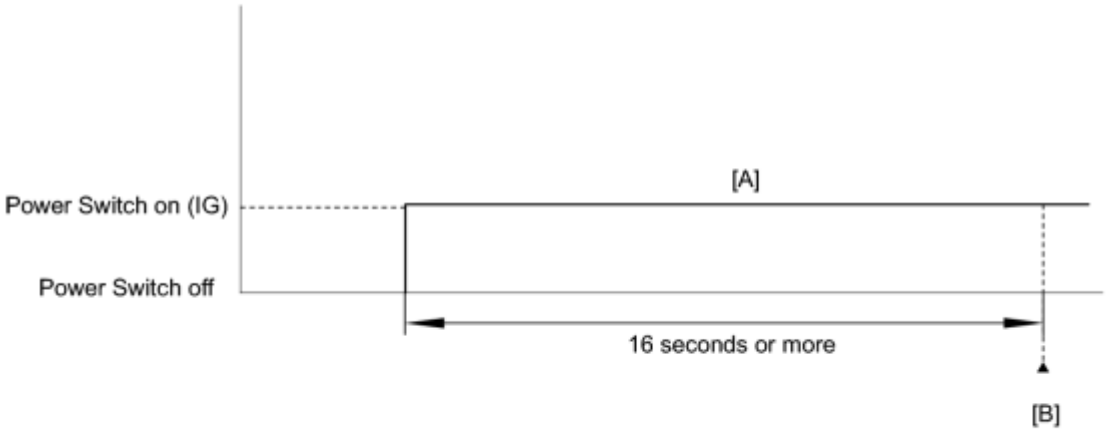
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| One of the following conditions is met: | (a) or (b) |
| (a) AD converter | Fail |
| (b) Knock sensor circuit | Fail |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 16 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P060B.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
| --- | --- |
| 1. | READ OUTPUT DTC (DTC P060B) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off.

(f) Turn the Techstream off.

(g) Disconnect the Techstream.

(h) Disconnect the cable from the negative (-) battery terminal and wait for 1 minute.

(i) Connect the cable to the negative (-) battery terminal.

(j) Connect the Techstream to the DLC3.

(k) Turn the power switch on (IG).

(l) Wait 16 seconds or more.

(m) Turn the Techstream on.

(n) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(o) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P060B is output | B |
| DTC P060B and P0327 or P0328 are output | C |

C ▶ GO TO DTC (P0327 AND P0328)
B ▶ REPLACE ECM
A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | P060E | Internal Control Module Throttle Position Performance |

# MONITOR DESCRIPTION

The ECM monitors the input signals of the No. 1 throttle position sensor. When the ECM monitors the input signal of the No. 1 throttle position sensor, if the input signal and control signal deviate, the DTC is stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P060E | ECM main CPU error | ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P060E: Internal control module, Throttle position |
| Required sensors/Components (Main) | ECM |
| Required sensors/Components (Related) | - |
| Frequency of operation | Continuous |
| Duration | 1 second |
| MIL operation | Immediately |
| Sequence of operation | None |

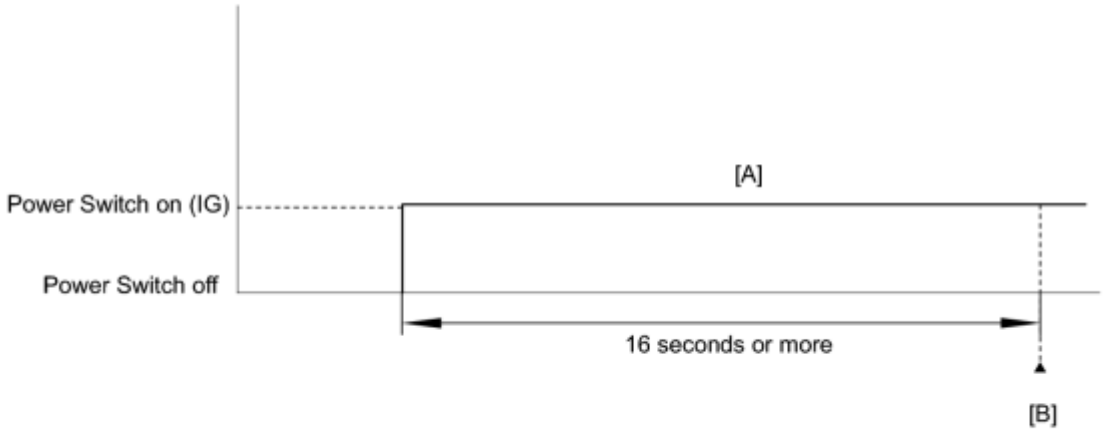
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever the following DTCs are not present | None |
| DMA communication error | Not detected |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Difference of main throttle position and sub throttle position | 0.3 V or more |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 16 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P060E.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
| --- | --- |
| 1. | READ OUTPUT DTC (DTC P060E) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and turn the Techstream off.

(f) Disconnect the Techstream.

(g) Disconnect the cable from the battery negative (-) terminal and wait for 1 minute.

(h) Connect the cable to the battery negative (-) terminal.

(i) Connect the Techstream to the DLC3.

(j) Turn the power switch on (IG).

(k) Wait 16 seconds or more.

(l) Turn the Techstream on.

(m) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(n) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P060E is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | P062F | Internal Control Module EEPROM Error |
|---|---|---|

# DESCRIPTION

The ECM monitors its internal operation and stores this DTC when it detects an internal malfunction.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P062F | An ECM internal error (EEPROM) | ECM |

# MONITOR DESCRIPTION

The ECM monitors its internal operation. If the internal operation is malfunctioning, the ECM illuminates the MIL and stores a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P062F: Internal control module EEPROM error |
| Required sensors/Components (Main) | ECM |
| Required sensors/Components (Related) | - |
| Frequency of operation | Once per driving cycle |
| Duration | 11 seconds |
| MIL operation | Immediately |
| Sequence of operation | None |

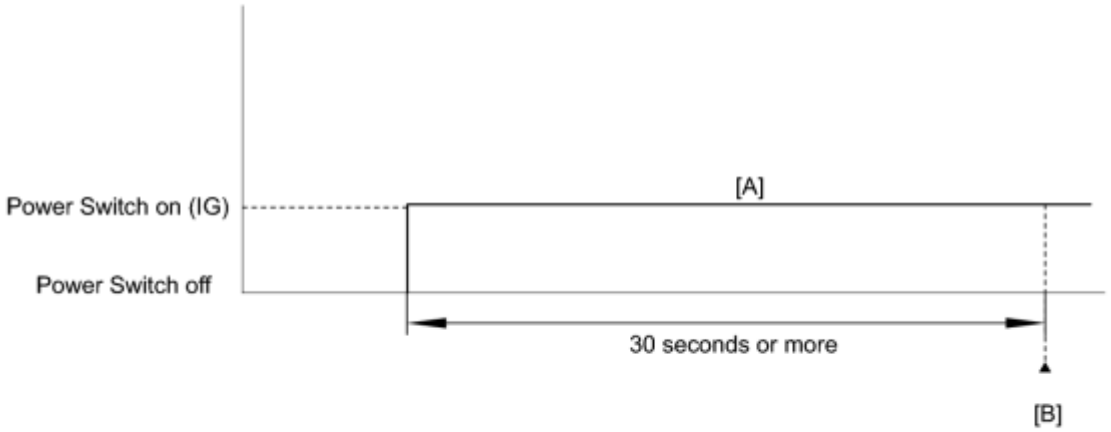
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Time after engine start | 10 seconds or more |
| Battery voltage | 8 V or more |
| Power switch | On (IG) |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Permanent fault code data | Mismatch (3 times or more) |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 30 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P062F.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
| --- | --- |
| 1. | READ OUTPUT DTC (DTC P062F) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and turn the Techstream off.

(f) Disconnect the Techstream.

(g) Disconnect the cable from the negative (-) battery terminal and wait for 1 minute.

(h) Connect the cable to the negative (-) battery terminal.

(i) Connect the Techstream to the DLC3.

(j) Turn the power switch on (IG).

(k) Wait 30 seconds or more.

(l) Turn the Techstream on.

(m) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(n) Read the DTCs.

**Result**

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P062F is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | P0657 | Actuator Supply Voltage Circuit / Open |

# MONITOR DESCRIPTION

The ECM monitors the output voltage to the throttle actuator. This self-check ensures that the ECM is functioning properly. The output voltage is usually 0 V when the power switch is turned off. If the output voltage is higher than 7 V when the power switch is turned off, the ECM will illuminate the MIL and set the DTC the next time the power switch is turned on (IG).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0657 | Throttle actuator power supply error | ECM |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0657: Electronic throttle control system power supply |
| Required sensors/Components (Main) | ECM |
| Required sensors/Components (Related) | Throttle actuator |
| Frequency of operation | Once per driving cycle |
| Duration | 1 second |
| MIL operation | Immediately |
| Sequence of operation | None |

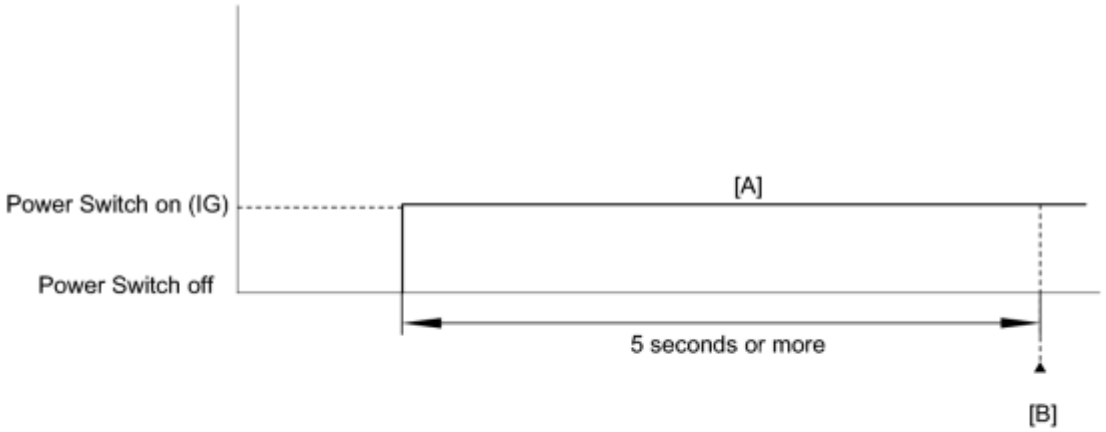
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Throttle actuator power supply voltage | 7 V or more |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Power switch | On (IG) to off |
| Electric throttle actuator power supply | ON |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and turn the Techstream off.
5. Wait for 30 seconds.
6. Turn the power switch on (IG) and turn the Techstream on.
7. Wait 5 seconds or more [A].
8. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
9. Read the DTC [B].
10. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

11. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
12. Input the DTC: P0657.
13. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |

| Techstream Display | Description |
|---|---|
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [A] again.

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
15. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

16. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | READ OUTPUT DTC (DTC P0657) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and turn the Techstream off.

(f) Disconnect the Techstream.

(g) Disconnect the cable from the battery negative (-) terminal and wait for 1 minute.

(h) Connect the cable to the battery negative (-) terminal.

(i) Turn the power switch on (IG) for 10 seconds.

(j) Turn the power switch off.

(k) Connect the Techstream to the DLC3.

(l) Turn the power switch on (IG).

(m) Wait 5 seconds or more.

(n) Turn the Techstream on.

(o) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(p) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P0657 is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | P106A | Evaporative Emission System Pressure Sensor - Manifold Absolute Pressure Correlation |
|---|---|---|

# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P106A | The difference between the pressure of the canister pressure sensor (Vapor Pressure Pump*) and manifold absolute pressure sensor (MAP*) is 7 kPa (52.50 mmHg) or more<br><br>(2 trip detection logic) | • Canister pressure sensor (canister assembly)<br>• Manifold absolute pressure sensor |

HINT:

*: Data List Name

# MONITOR DESCRIPTION

Tis DTC is designed to detect a deviation in the output characteristics of a pressure sensor.

The pressure of the canister pressure sensor and manifold absolute pressure sensor is monitored 55 minutes after the power switch is turned off. If there is a difference in the pressures, the MIL is illuminated (2 trip detection logic).

HINT:

Correct judgment may not be possible when the altitude is 13124 ft (4000 m) or more.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTC | P106A: Absolute pressure sensor rationality |
| Required sensors/Components (Main) | Canister pressure sensor<br><br>Manifold absolute pressure sensor |
| Required sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | Within 65 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

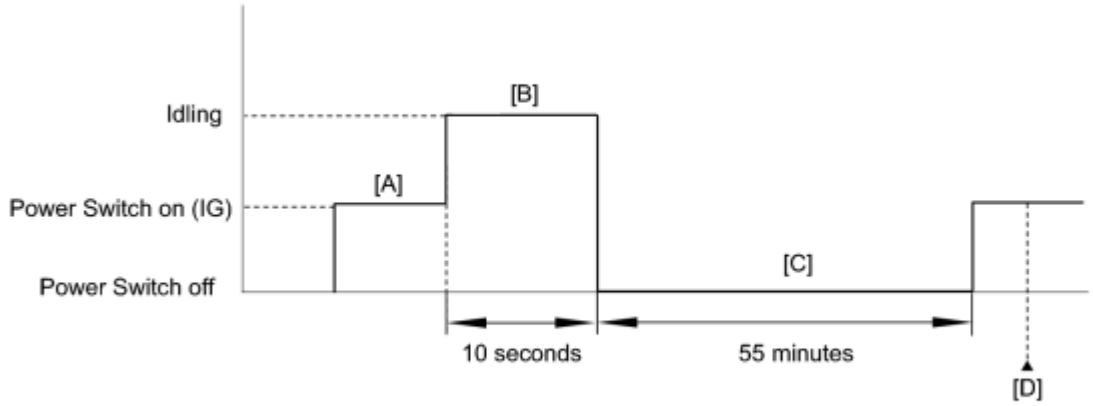
| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0106, P0107, P0108 (Manifold Absolute Pressure) |

| | |
|---|---|
| | P0401 (EGR System (Closed))<br><br>P0452, P0453 (Evaporative Emission System Pressure Sensor) |
| Arrive at after engine stop | 50 minutes |
| Time after ECM started by soak-timer | 60 seconds or more |
| Battery voltage | 10.5 V or more |
| Intake air temperature | -10°C (14°F) or more |
| Engine coolant temperature sensor | -10°C (14°F) or more |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Difference between EVAP pressure and manifold absolute pressure | 7.442 kPa (55.83 mmHg) or more |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the Clear DTC procedure) INFO [A].
4. Put the engine in inspection mode INFO.
5. Start the engine and Idle for 10 seconds [B]
6. Turn the power switch off and wait for 30 seconds.
7. Leave the power switch off for 55 minutes [C]
8. Connect the Techstream to the DLC3.
9. Turn the power switch on (IG) and turn the Techstream on.
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
11. Read the pending DTC [D].
12. If a pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P106A.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [B] through [C].

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

18. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO P106A) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

**Result**

| Result | Proceed to |
|---|---|
| DTC P106A is output | A |
| DTC P106A and other DTCs are output | B |

HINT:

If any DTCs other than P106A are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (VAPOR PRESSURE PUMP AND MAP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / Vapor Pressure Pump and MAP.

(e) Compare the Vapor Pressure Pump and MAP data from the Data List with day's atmospheric pressure*.

HINT:

- *: Standard atmospheric pressure is 101 kPa (760 mmHg) at sea level. The atmospheric pressure decreases by approximately 1 kPa (7.5 mmHg) for every 100 m of elevation increase. Atmospheric

pressure is also affected by weather conditions. The Atmosphere pressure listed in the Data List cannot be used as a reference for this check.

- If you do not know the atmospheric pressure refer to the Vapor Pressure Pump value of other vehicles in the workshop and check the difference in pressure.

**Result**

| Result | Proceed to |
|---|---|
| If the Vapor Pressure Pump value differs from the atmospheric pressure by +/- 3.5 kPa (+/- 26.25 mmHg) or more | A |
| If the MAP value differs from the atmospheric pressure by +/- 3.5 kPa (+/- 26.25 mmHg) or more | B |

B ▶ REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR

A ▼

| | |
|---|---|
| 3. | REPLACE CANISTER |

(a) Replace the canister INFO.

NEXT ▶ CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED

| | |
|---|---|
| 4. | REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR |

(a) Replace the manifold absolute pressure sensor INFO.

NEXT ▼

| | |
|---|---|
| 5. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and the Techstream on.

(c) Enter the following menus: Powertrain / Engine and ECT / Data List / MAP and Vapor Pressure Pump.

(d) Confirm that the difference between Vapor Pressure Pump and MAP are 3.5 kPa (+/- 26.25 mmHg) or less.

NEXT ▶ **END**

| | | |
|---|---|---|
| DTC | P2102 | Throttle Actuator Control Motor Circuit Low |
| DTC | P2103 | Throttle Actuator Control Motor Circuit High |

# DESCRIPTION

The throttle actuator is operated by the ECM and opens and closes the throttle valve using gears.

The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body assembly. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to appropriately control the throttle actuator and monitor the throttle opening angle as the ECM responds to driver inputs.

HINT:

This electronic throttle control system does not use a throttle cable.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P2102 | Both of the following conditions continue for 2 seconds (1 trip detection logic):<br><br>(a) Throttle actuator duty ratio is 80% or more<br><br>(b) Throttle actuator current is below 0.5 A | • Open in throttle actuator circuit<br>• Throttle actuator<br>• ECM |
| P2103 | Either condition is met (1 trip detection logic):<br><br>• Hybrid IC diagnosis signal fails<br>• Hybrid IC current limiter port fails | • Short in throttle actuator circuit<br>• Throttle actuator<br>• Throttle valve<br>• Throttle body assembly<br>• ECM |

# MONITOR DESCRIPTION

The ECM monitors the electrical current through the electronic actuator, and detects malfunctions and open circuits in the throttle actuator based on this value. If the current is outside the standard range, the ECM determines that there is a malfunction in the throttle actuator. In addition, if the throttle valve does not function properly (for example, stuck on), the ECM determines that there is a malfunction. The ECM then illuminates the MIL and stores a DTC.

# Example:

- When the electrical current is below 0.5 A and the throttle actuator duty ratio exceeds 80%, the ECM interprets this as the current being outside the standard range, illuminates the MIL and stores a DTC.
- If the malfunction is not repaired successfully, a DTC is stored when the engine is quickly revved to a high engine speed several times after the engine has idled for 5 seconds after engine start.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P2102: Throttle actuator current (low current)<br><br>P2103: Throttle actuator current (high current) |
| Required Sensors / Components (Main) | Throttle actuator (throttle body assembly) |
| Required Sensors / Components (Related) | None |
| Frequency of Operation | Continuous |
| Duration | P2102: 2 seconds<br><br>P2103: 25 times |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**P2102**

| | |
|---|---|
| Throttle actuator | ON |
| Duty-cycle ratio to open throttle actuator | 80% or more |
| Throttle actuator power supply | 8 V or higher |
| Motor current change during latest 0.016 seconds | Less than 0.2 A |

**P2103**

| | |
|---|---|
| Throttle actuator | ON |
| Either of the following conditions 1 or 2 is met: | - |
| 1. Throttle actuator power supply | 8 V or higher |
| 2. Throttle actuator power | ON |

# TYPICAL MALFUNCTION THRESHOLDS

**P2102**

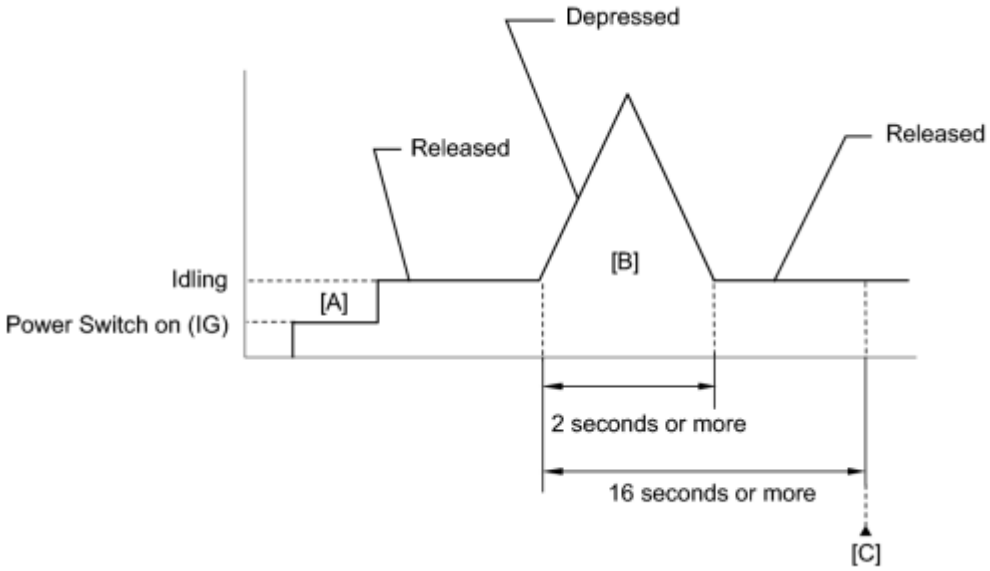
| | |
|---|---|
| Throttle actuator current | Below 0.5 A |

**P2103**

| | |
|---|---|
| Either of the following conditions is met: | Condition 1 or 2 |

| | |
|---|---|
| 1. Hybrid IC diagnosis signal | Fail |
| 2. Hybrid IC current limiter monitor port | Fail |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. With the vehicle stationary, fully depress the accelerator pedal and quickly release it [B].
9. Check that 16 seconds or more have elapsed from the instant when the accelerator pedal is first depressed.
10. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
11. Read the DTC [C].
12. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Input the DTC: P2102 or P2103.
15. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed |

| Techstream Display | Description |
|---|---|
| | ○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
18. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

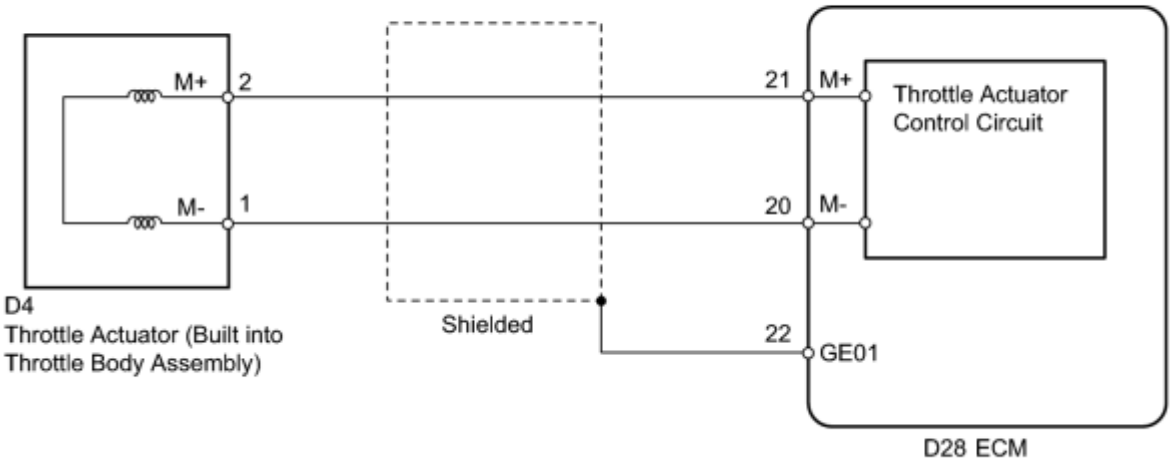
    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# FAIL-SAFE

When either of these DTCs, as well as other DTCs relating to electronic throttle control system malfunctions is stored, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator, and the throttle valve is returned to a 5.5° throttle angle by the return spring. The ECM stops the engine and the vehicle can be driven using solely the hybrid system. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly.

Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

# WIRING DIAGRAM




Y

# INSPECTION PROCEDURE

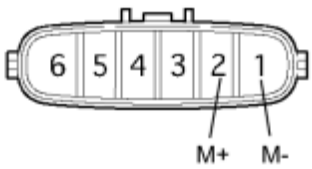
HINT:

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- The throttle actuator current (Throttle Motor Current) and the throttle actuator duty ratio (Throttle Motor Duty (Open) / Throttle Motor Duty (Close)) can be read using the Techstream. However, the ECM shuts off the throttle actuator current when the electronic throttle control system malfunctions.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT THROTTLE BODY ASSEMBLY (RESISTANCE OF THROTTLE ACTUATOR) |

*1




(a) Disconnect the throttle body assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (M+) - 1 (M-) | 20°C (68°F) | 0.3 to 100 Ω |

**Text in Illustration**

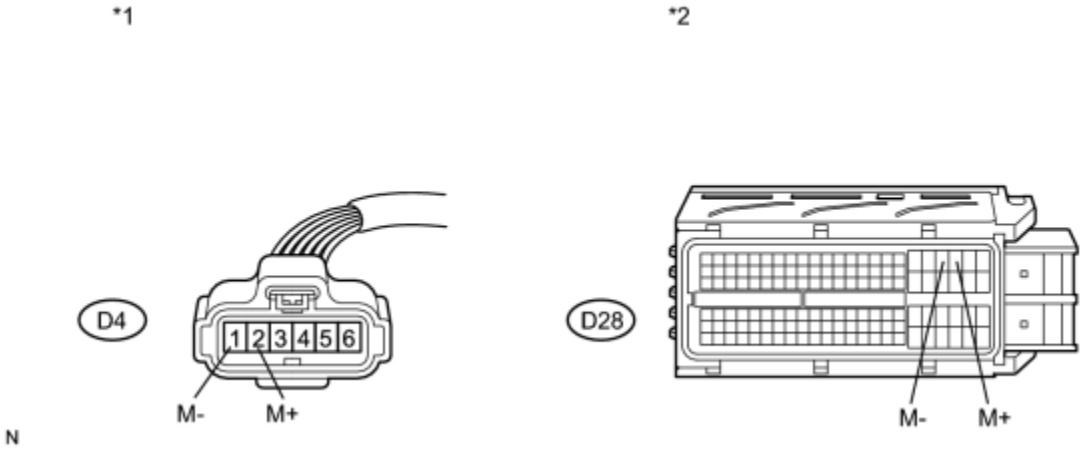
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Throttle Body Assembly) |

(c) Reconnect the throttle body assembly connector.

NG ▶ REPLACE THROTTLE BODY ASSEMBLY
OK
▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (THROTTLE BODY ASSEMBLY - ECM) |

(a) Disconnect the throttle body assembly connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D4-2 (M+) - D28-21 (M+) | Always | Below 1 Ω |
| D4-1 (M-) - D28-20 (M-) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D4-2 (M+) or D28-21 (M+) - Body ground | Always | 10 kΩ or higher |
| D4-1 (M-) or D28-20 (M-) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Throttle Body Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

(e) Reconnect the throttle body assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (THROTTLE BODY ASSEMBLY - ECM)
OK
▼

| | |
|---|---|
| 3. | INSPECT THROTTLE BODY ASSEMBLY (VISUALLY CHECK THROTTLE VALVE) |

(a) Check for foreign objects between the throttle valve and the housing.

OK:

No foreign objects between throttle valve and housing.

NG ▶ REMOVE FOREIGN OBJECT AND CLEAN THROTTLE BODY ASSEMBLY
OK
▼

| | |
|---|---|
| 4. | INSPECT THROTTLE BODY ASSEMBLY (THROTTLE VALVE) |

(a) Check if the throttle valve opens and closes smoothly.

OK:

Throttle valve opens and closes smoothly.

NG ▶ REPLACE THROTTLE BODY ASSEMBLY
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P2111 | Throttle Actuator Control System - Stuck Open |
| DTC | P2112 | Throttle Actuator Control System - Stuck Closed |

# DESCRIPTION

The throttle actuator is operated by the ECM, and opens and closes the throttle valve using gears. The opening angle of the throttle valve is detected by the throttle position sensor, which is mounted on the throttle body assembly. The throttle position sensor provides feedback to the ECM. This feedback allows the ECM to appropriately control the throttle actuator and monitor the throttle opening angle as the ECM responds to driver inputs.

HINT:

This electronic throttle control system does not use a throttle cable.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P2111 | The ECM signals the throttle actuator to close, but the actuator is stuck<br><br>(1 trip detection logic) | • Throttle actuator<br>• Throttle body assembly<br>• Throttle valve<br>• ECM |
| P2112 | The ECM signals the throttle actuator to open, but the actuator is stuck<br><br>(1 trip detection logic) | • Throttle actuator<br>• Throttle body assembly<br>• Throttle valve<br>• ECM |

# MONITOR DESCRIPTION

The ECM determines that there is a malfunction in the electronic throttle control system when the throttle valve remains at the fixed angle despite a high drive current from the ECM. The ECM illuminates the MIL and stores a DTC.

If the malfunction is not repaired successfully, a DTC is stored when the accelerator pedal is fully depressed and released quickly (to fully open and close the throttle valve) after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P2111: Throttle actuator stuck open<br><br>P2112: Throttle actuator stuck closed |
| Required Sensors / Components (Main) | Throttle actuator (throttle body assembly) |
| Required Sensors / Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 0.5 seconds |

| | |
|---|---|
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**P2111 (Throttle Actuator Stuck Open)**

| | |
|---|---|
| All of the following conditions are met: | - |
| System guard* judge condition | ON |
| Throttle actuator current | 2 A or more |
| Duty-cycle to close throttle | 80% or more |

**P2112 (Throttle Actuator Stuck Closed)**

| | |
|---|---|
| All of the following conditions are met: | - |
| System guard* judge condition | ON |
| Throttle actuator current | 2 A or more |
| Duty-cycle to open throttle | 80% or more |

| | |
|---|---|
| *: System guard is ON when the following conditions set: | - |
| Throttle actuator | ON |
| Throttle actuator duty calculation | Executing |
| Throttle position sensor fail | Not detected |
| Throttle actuator current-cut operation | Not executing |
| Throttle actuator power supply | 4 V or more |
| Throttle actuator fail | Not detected |

# TYPICAL MALFUNCTION THRESHOLDS

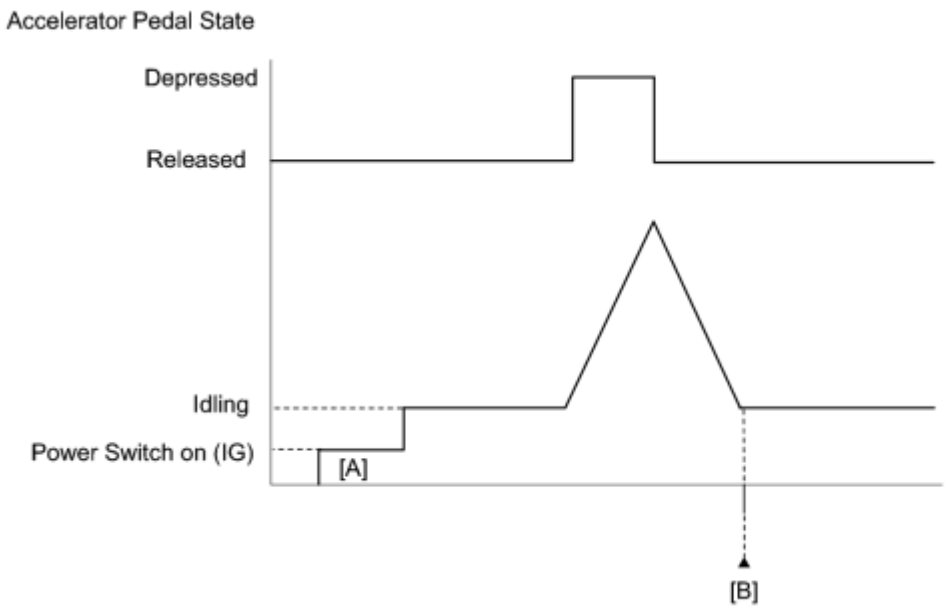
**P2111 (Throttle Actuator Stuck Open)**

| | |
|---|---|
| Throttle position sensor voltage change | No change |

**P2112 (Throttle Actuator Stuck Closed)**

| | |
|---|---|
| Throttle position sensor voltage change | No change |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and fully depress and release the accelerator pedal quickly (to fully open and close the throttle valve).
8. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
9. Read the DTC [B].
10. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

11. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
12. Input the DTC: P2111 or P2112.
13. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed |

| Techstream Display | Description |
| --- | --- |
| | ○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, fully depress and release the accelerator pedal quickly.

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
15. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
16. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# FAIL-SAFE

When either of these DTCs, as well as other DTCs relating to electronic throttle control system malfunctions is stored, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator, and the throttle valve is returned to a 5.5° throttle angle by the return spring. The ECM stops the engine and the vehicle can be driven using solely the hybrid system. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly.

Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

# WIRING DIAGRAM

Refer to DTC P2102 INFO.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT THROTTLE BODY ASSEMBLY (VISUALLY CHECK THROTTLE VALVE) |

(a) Check for contamination between the throttle valve and the housing. If necessary, clean the throttle body assembly. And check that the throttle valve moves smoothly.

OK:

Throttle valve is not contaminated with foreign objects and moves smoothly.

NG ▶ REPLACE THROTTLE BODY ASSEMBLY

OK ▼

| | |
|---|---|
| 2. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2111 OR P2112) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine, and fully depress and release the accelerator pedal quickly (to fully open and close the throttle valve).

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(h) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P2111 or P2112 is output | B |

B ▶ REPLACE ECM

A ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| DTC | P2118 | Throttle Actuator Control Motor Current Range / Performance |
|---|---|---|

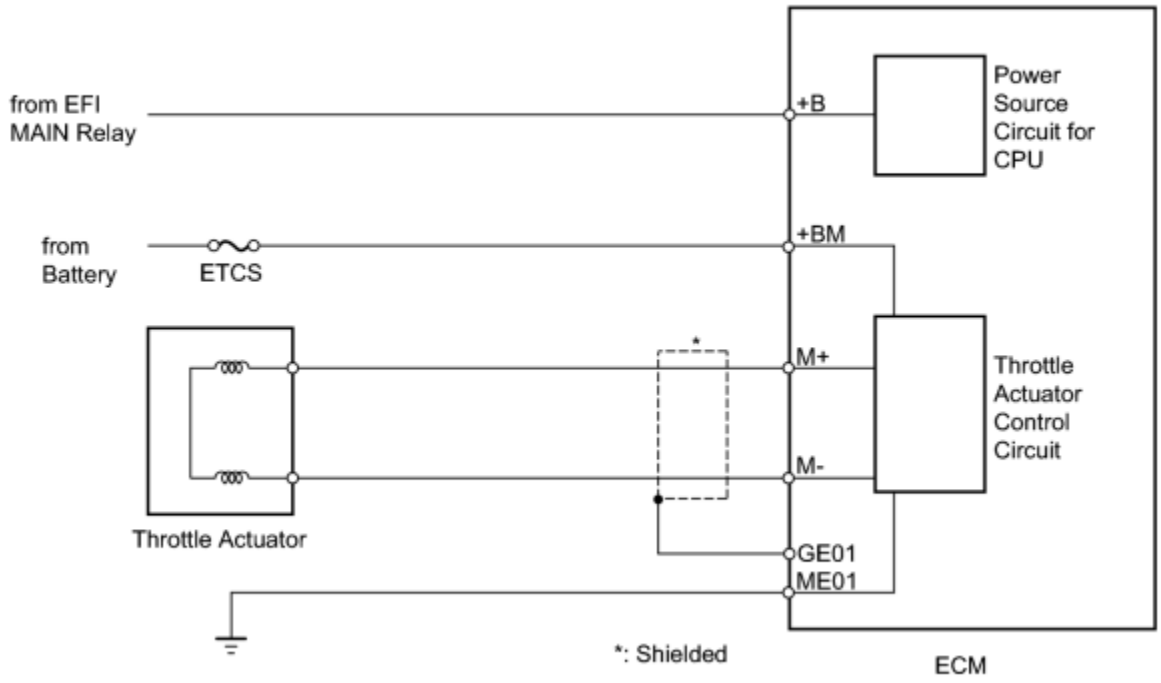
# DESCRIPTION

The electronic throttle control system has a dedicated power supply circuit. The voltage (+BM) is monitored and when it is low (below 4 V), the ECM determines that there is a malfunction in the electronic throttle control system and cuts off the current to the throttle actuator.

When the voltage becomes unstable, the electronic throttle control system itself becomes unstable. For this reason, when the voltage is low, the current to the throttle actuator is cut. If repairs are made and the system returns to normal, turn the power switch off. The ECM then allows the current to flow to the throttle actuator so that it can be restarted.

HINT:

This electronic throttle control system does not use a throttle cable.




Y

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P2118 | An open in electronic throttle control system power source (+BM) circuit<br><br>(1 trip detection logic) | • Open in electronic throttle control system power source circuit<br>• Battery<br>• Battery terminals<br>• ETCS fuse<br>• ECM |

# MONITOR DESCRIPTION

The ECM monitors the battery supply voltage applied to the throttle actuator.

When the power supply voltage (+BM) drops below 4 V for 0.8 seconds or more, the ECM interprets this as an open in the power supply circuit (+BM). The ECM illuminates the MIL and stores the DTC.

If the malfunction is not repaired successfully, the DTC is stored 5 seconds after the engine is next started.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P2118: Throttle actuator power supply |
| Required Sensors / Components (Main) | Throttle actuator, throttle valve (throttle body assembly), ETCS fuse |
| Required Sensors / Components (Related) | None |
| Frequency of Operation | Continuous |
| Duration | 0.8 seconds |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Battery voltage | 8 V or higher |
| Electronic throttle actuator power | ON |

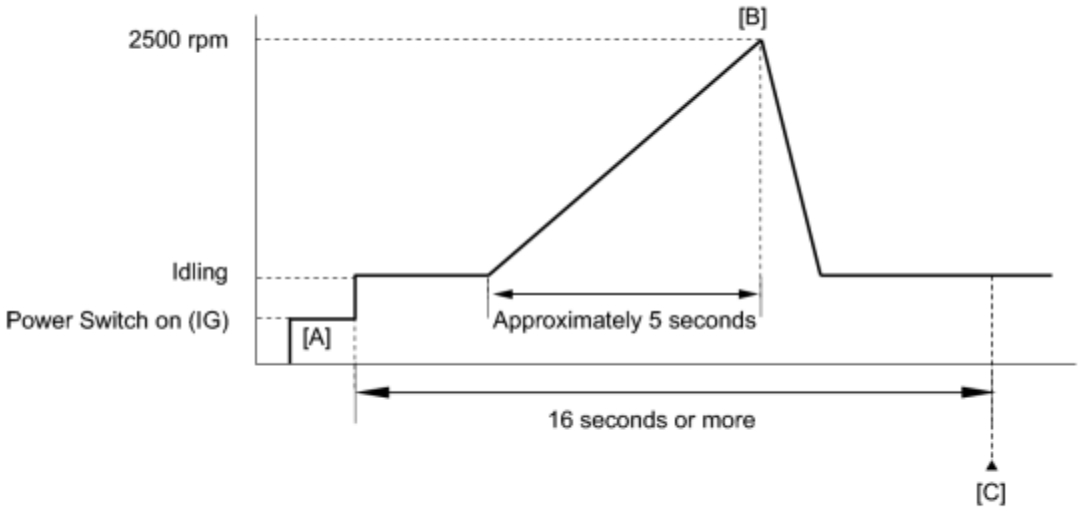
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Throttle actuator power supply voltage (+BM) | Below 4 V |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Throttle actuator power supply voltage (+BM) | 11 to 14 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. Slowly depress the accelerator pedal, raise the engine speed to approximately 2500 rpm for approximately 5 seconds, and then idle the engine [B].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTC [C].
11. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P2118.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |

| Techstream Display | Description |
| --- | --- |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [B] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

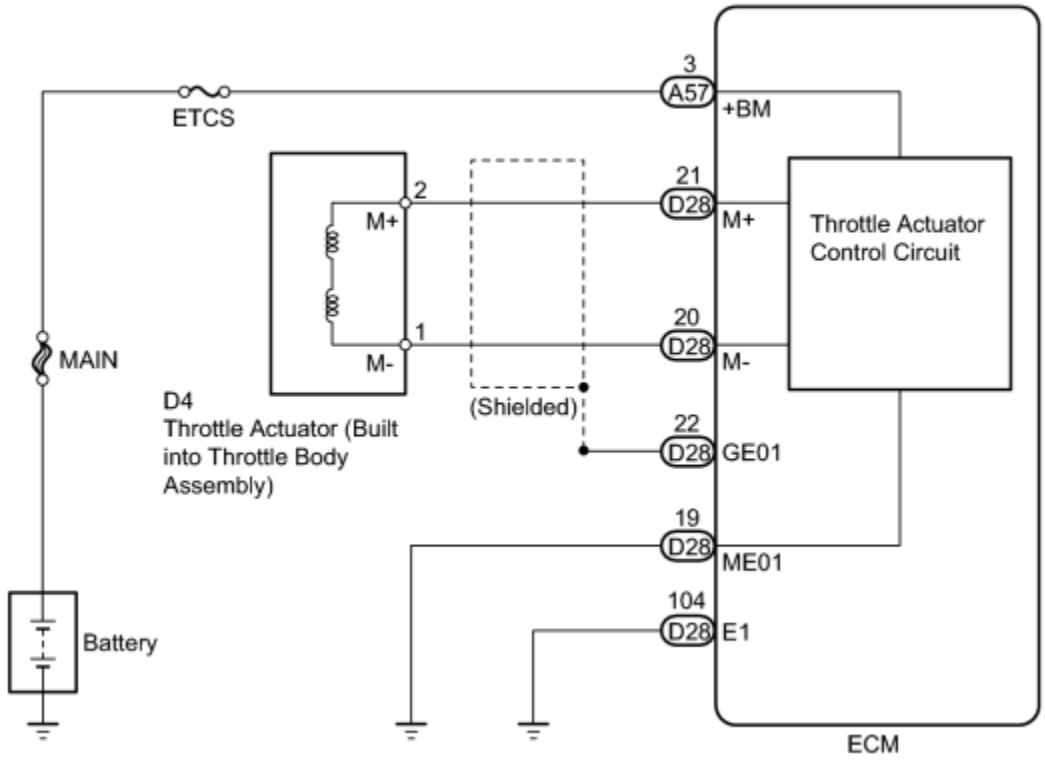
HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# FAIL-SAFE

When this DTC or other DTCs relating to electronic throttle control system malfunctions, are stored, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator, and the throttle valve is returned to a 5.5° throttle angle by the return spring. The ECM stops the engine and the vehicle can be driven using solely the hybrid system. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly. Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (+BM VOLTAGE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Data List / +BM voltage.

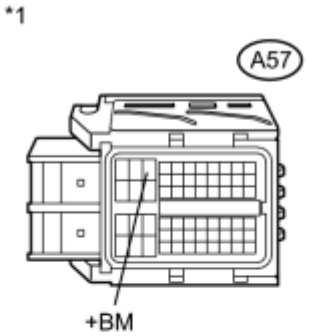
(e) Read the value displayed on the Techstream.

Standard Voltage:

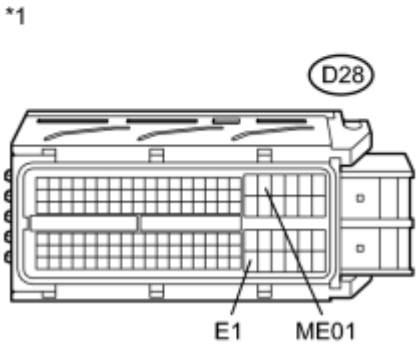
11 to 14 V

NG ▶ CHECK HARNESS AND CONNECTOR (ECM - BATTERY, BODY GROUND)
OK ▶ **CHECK FOR INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (ECM - BATTERY, BODY GROUND) |




(a) Disconnect the ECM connectors.




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A57-3 (+BM) - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D28-19 (ME01) - Body ground | Always | Below 1 Ω |
| D28-104 (E1) - Body ground | Always | Below 1 Ω |

(d) Reconnect the ECM connectors.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BATTERY, BODY GROUND)
OK ▶ **REPLACE ECM**

| DTC | P2119 | Throttle Actuator Control Throttle Body Range / Performance |
|---|---|---|

# DESCRIPTION

The electronic throttle control system is composed of the throttle actuator, throttle position sensor, accelerator pedal position sensor, and ECM. The ECM operates the throttle actuator to regulate the throttle valve in response to driver inputs. The throttle position sensor detects the opening angle of the throttle valve, and provides the ECM with feedback so that the throttle valve can be appropriately controlled by the ECM.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P2119 | Throttle valve opening angle continues to vary greatly from the target opening angle (1 trip detection logic) | • Electronic throttle control system<br>• ECM |

# MONITOR DESCRIPTION

The ECM determines the actual opening angle of the throttle valve from the throttle position sensor signal. The actual opening angle is compared to the target opening angle commanded by the ECM. If the difference between these 2 values is outside the standard range, the ECM interprets this as a malfunction in the electronic throttle control system. The ECM then illuminates the MIL and stores the DTC.

If the malfunction is not repaired successfully, the DTC is stored when the accelerator pedal is quickly released (to close the throttle valve) after the engine speed reaches 5000 rpm by depressing the accelerator pedal (fully open the throttle valve).

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P2119: Electronic throttle control system malfunction |
| Required Sensors / Components (Main) | Throttle actuator (throttle body assembly) |
| Required Sensors / Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 1 second |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

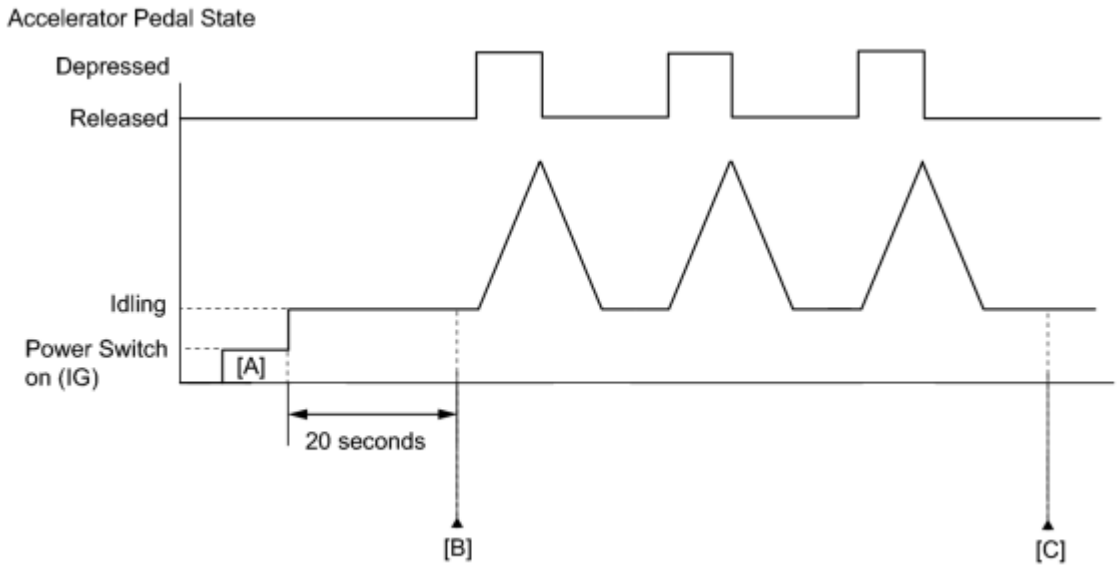
| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| System guard* judge condition | ON |
| *System guard is ON when the following conditions set | - |
| Throttle actuator | ON |
| Throttle actuator duty calculation | Executing |

| | |
|---|---|
| Throttle position sensor fail | Not detected |
| Throttle actuator current-cut operation | Not executing |
| Throttle actuator power supply | 4 V or more |
| Throttle actuator fail | Not detected |

## TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Either of the following conditions A or B is met | - |
| A. Commanded closed throttle position - current closed throttle position | 0.3 V or higher for 1 second |
| B. Commanded open throttle position - current open throttle position | 0.3 V or higher for 0.6 seconds |

## CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. Idle the engine for 20 seconds.
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTC [B].
11. If a DTC is output, the system is malfunctioning.

    HINT:

    If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P2119.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, fully depress and release the accelerator pedal 3 times.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# FAIL-SAFE

When this DTC, as well as other DTCs relating to electronic throttle control system malfunctions is stored, the ECM enters fail-safe mode. During fail-safe mode, the ECM cuts the current to the throttle actuator, and the throttle valve is returned to a 5.5° throttle angle by the return spring. The ECM stops the engine and the vehicle can be driven using solely the hybrid system. If the accelerator pedal is depressed firmly and gently, the vehicle can be driven slowly. Fail-safe mode continues until a pass condition is detected, and the power switch is then turned off.

# WIRING DIAGRAM

Refer to DTC P2102 INFO.

# INSPECTION PROCEDURE

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2119) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2119 is output | A |
| DTC P2119 and other DTCs are output | B |

HINT:

If any DTCs other than P2119 are output, troubleshoot those DTCs first.

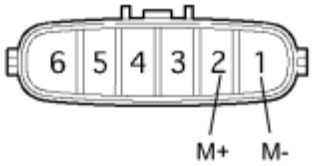
B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | INSPECT THROTTLE BODY ASSEMBLY (RESISTANCE OF THROTTLE ACTUATOR) |

(a) Disconnect the throttle body assembly connector.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (M+) - 1 (M-) | 20°C (68°F) | 0.3 to 100 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Throttle Body Assembly) |

(c) Reconnect the throttle body assembly connector.

NG ▶ REPLACE THROTTLE BODY ASSEMBLY

OK ▼

| | |
|---|---|
| 3. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT ▼

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2119) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Allow the engine to idle for 20 seconds or more.

(g) Fully depress and release the accelerator pedal 3 times quickly.

(h) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(i) Read the DTCs.

HINT:

The output voltage of the throttle position sensor can be checked using the Techstream. Variations in the output voltage indicate that the throttle actuator is in operation. To check the output voltage using the Techstream, enter the following menus: Powertrain / Engine and ECT / Data List / Throttle Position No. 1.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P2119 is output | B |

B ▶ REPLACE THROTTLE BODY ASSEMBLY
A ▶ **END**

| | | |
|---|---|---|
| DTC | P2195 | Oxygen (A/F) Sensor Signal Stuck Lean (Bank 1 Sensor 1) |
| DTC | P2196 | Oxygen (A/F) Sensor Signal Stuck Rich (Bank 1 Sensor 1) |

# DESCRIPTION

HINT:

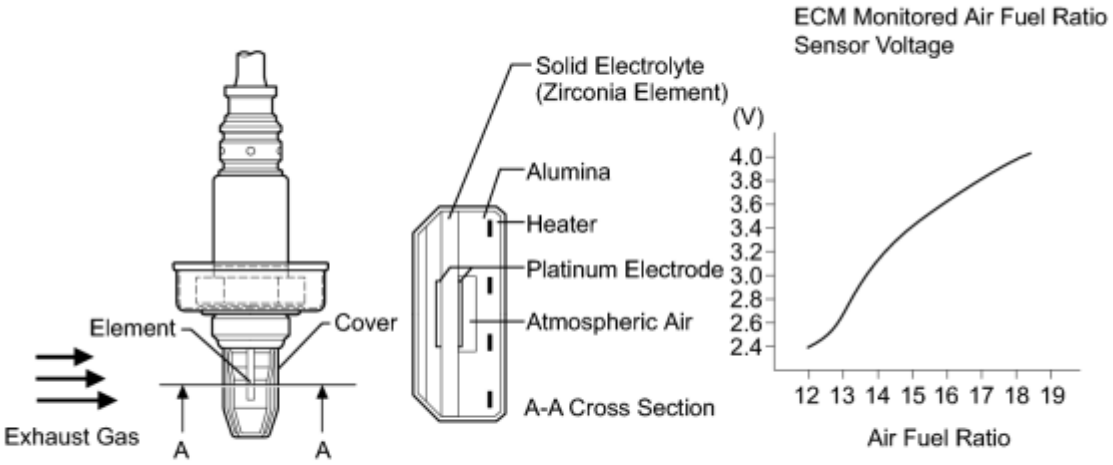
- Although the DTC titles say oxygen sensor, these DTCs relate to the air fuel ratio sensor.
- Sensor 1 refers to the sensor mounted in front of the three-way catalytic converter and located near the engine assembly.

The air fuel ratio sensor generates a voltage* that corresponds to the actual air fuel ratio. This sensor voltage is used to provide the ECM with feedback so that it can control the air fuel ratio. The ECM determines the deviation from the stoichiometric air fuel ratio level, and regulates the fuel injection time. If the air fuel ratio sensor malfunctions, the ECM is unable to control the air fuel ratio accurately.

The air fuel ratio sensor is the planar type and is integrated with the heater, which heats the solid electrolyte (zirconia element). This heater is controlled by the ECM. When the intake air volume is low (the exhaust gas temperature is low), a current flows into the heater to heat the sensor, in order to facilitate accurate oxygen concentration detection. In addition, the sensor and heater portions are the narrow type. The heat generated by the heater is conducted to the solid electrolyte through the alumina, therefore the sensor activation is accelerated.

In order to obtain a high purification rate of the carbon monoxide (CO), hydrocarbons (HC) and nitrogen oxide (NOx) components in the exhaust gas, a three-way catalytic converter is used. For the most efficient use of the three-way catalytic converter, the air fuel ratio must be precisely controlled so that it is always close to the stoichiometric level.

*: Value changes inside the ECM. Since the air fuel ratio sensor is a current output element, the current is converted into a voltage inside the ECM. Any measurements taken at the air fuel ratio sensor or ECM connectors will show a constant voltage.




c

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P2195 | Conditions (a) and (b) continue for 5 seconds or more (2 trip detection logic)<br>• (a) Air fuel ratio sensor voltage more than 3.8 V<br>• (b) Heated oxygen sensor voltage rises from less than 0.21 V to 0.59 V or more | • Open or short in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• Air fuel ratio sensor (sensor 1) heater<br>• Air fuel ratio sensor heater circuit<br>• Intake system<br>• Fuel pressure<br>• Fuel injector assembly<br>• EGR valve assembly<br>• ECM |
| | While fuel-cut operation performed (during vehicle deceleration), air fuel ratio sensor current is 3.6 mA or more for 3 seconds (2 trip detection logic) | • Air fuel ratio sensor (sensor 1)<br>• EGR valve assembly<br>• ECM |
| P2196 | Conditions (a) and (b) continue for 5 seconds or more (2 trip detection logic)<br>• (a) Air fuel ratio sensor voltage less than 2.8 V<br>• (b) Heated oxygen sensor voltage falls from 0.59 V or more to less than 0.21 V | • Open or short in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• Air fuel ratio sensor (sensor 1) heater<br>• Air fuel ratio sensor heater circuit<br>• Intake system |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | | • Fuel pressure<br>• Fuel injector assembly<br>• EGR valve assembly<br>• ECM |
| | While fuel-cut operation performed (during vehicle deceleration), air fuel ratio sensor current is less than 1.0 mA for 3 seconds (2 trip detection logic) | • Air fuel ratio sensor (sensor 1)<br>• EGR valve assembly<br>• ECM |

HINT:

- When any of these DTCs are set, check the air fuel ratio sensor voltage output by entering the following menus on the Techstream: Powertrain / Engine and ECT / Data List / All Data / AFS Voltage B1S1.
- Short-term fuel trim values can also be read using the Techstream.
- The ECM regulates the voltages at the A1A+ and A1A- terminals of the ECM to a constant level. Therefore, the air fuel ratio sensor voltage output cannot be confirmed without using the Techstream.
- If an air fuel ratio sensor malfunction is detected, the ECM sets a DTC.

# MONITOR DESCRIPTION

## Sensor Voltage Detection Monitor

Under the air fuel ratio feedback control, if the air fuel ratio sensor voltage output indicates rich or lean for a certain period of time, the ECM determines that there is a malfunction in the air fuel ratio sensor. The ECM illuminates the MIL and stores a DTC.

Example:

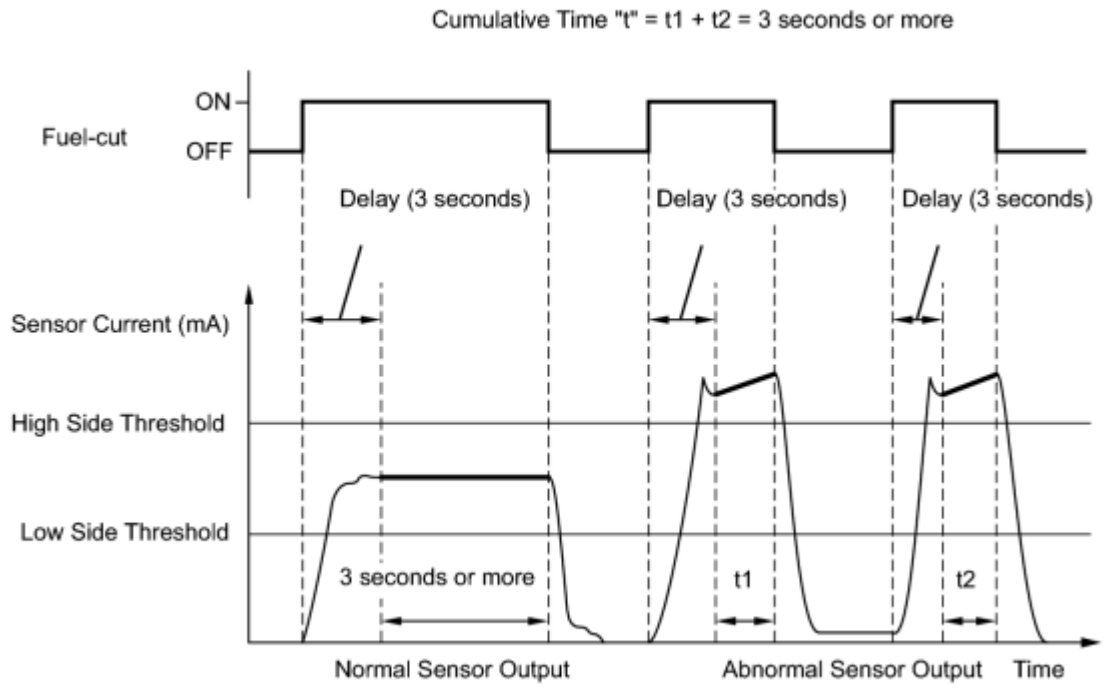
If the air fuel ratio sensor voltage output is below 2.8 V (very rich condition) and heated oxygen sensor output voltage falls from 0.59 V or more to less than 0.21 V for 5 seconds, the ECM stores DTC P2196. Alternatively, if the air fuel ratio sensor voltage output is higher than 3.8 V (very lean condition) and heated oxygen sensor output voltage rises from less than 0.21 V to 0.59 V or more for 5 seconds, DTC P2195 is stored.

## Sensor Current Detection Monitor

A rich air fuel mixture causes a low air fuel ratio sensor current, and a lean air fuel mixture causes a high air fuel ratio sensor current. Therefore, the sensor output becomes low during acceleration, and it becomes high during deceleration with the throttle valve fully closed. The ECM monitors the air fuel ratio sensor current during fuel-cut and detects any abnormal current values.

If the air fuel ratio sensor output is 3.6 mA or higher for more than 3 seconds of cumulative time, the ECM interprets this as a malfunction in the air fuel ratio sensor and stores DTC P2195 (stuck on high side). If the air fuel ratio sensor output is below 1.57 mA for more than 3 seconds of cumulative time, the ECM stores DTC P2196 (stuck on low side).

Air Fuel Ratio Sensor Current Monitor




N

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P2195: Air fuel ratio sensor (Bank 1) signal stuck lean<br><br>P2196: Air fuel ratio sensor (Bank 1) signal stuck rich |
| Required Sensors/Components (Main) | Air fuel ratio sensor |
| Required Sensors/Components (Related) | Heated oxygen sensor |
| Frequency of Operation | Continuous |
| Duration | 5 seconds: Sensor voltage detection monitor<br><br>3 seconds: Sensor current detection monitor |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**ALL**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1) |

| | |
|---|---|
| | P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0128 (Thermostat)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0401 (EGR System (Closed))<br><br>P0451, P0452, P0453 (EVAP System)<br><br>P0505 (Idle speed control) |

**Sensor Voltage Detection Monitor (Lean Side Malfunction P2195)**

| | |
|---|---|
| Time after engine start | 30 seconds or more |
| Fuel system status | Closed-loop |

**Sensor Voltage Detection Monitor (Rich Side Malfunction P2196)**

| | |
|---|---|
| Time after engine start | 30 seconds or more |
| Fuel system status | Closed-loop |

**Sensor Current Detection Monitor (P2195, P2196)**

| | |
|---|---|
| Battery voltage | 11 V or more |
| Atmospheric pressure | 76 kPa (570 mmHg) or higher |
| Air fuel ratio sensor status | Activated |
| Engine coolant temperature | 75°C (167°F) or more |
| Continuous time of fuel cut | 3 to 10 seconds |
| Delay time after EGR valve closed | 2 seconds or more |

# TYPICAL MALFUNCTION THRESHOLDS

**Sensor Voltage Detection Monitor (Lean Side Malfunction P2195)**

| | |
|---|---|
| Heated oxygen sensor output voltage | Rises from less than 0.21 V to 0.59 V or more |
| Air fuel ratio sensor voltage | More than 3.8 V |

**Sensor Voltage Detection Monitor (Rich Side Malfunction P2196)**

| | |
|---|---|
| Heated oxygen sensor output voltage | Falls from 0.59 V or more to less than 0.21 V |
| Air fuel ratio sensor voltage | Less than 2.8 V |

**Sensor Current Detection Monitor (High Side Malfunction P2195)**

| | |
|---|---|
| Air fuel ratio sensor current | 3.6 mA or more |

**Sensor Current Detection Monitor (Low Side Malfunction P2196)**

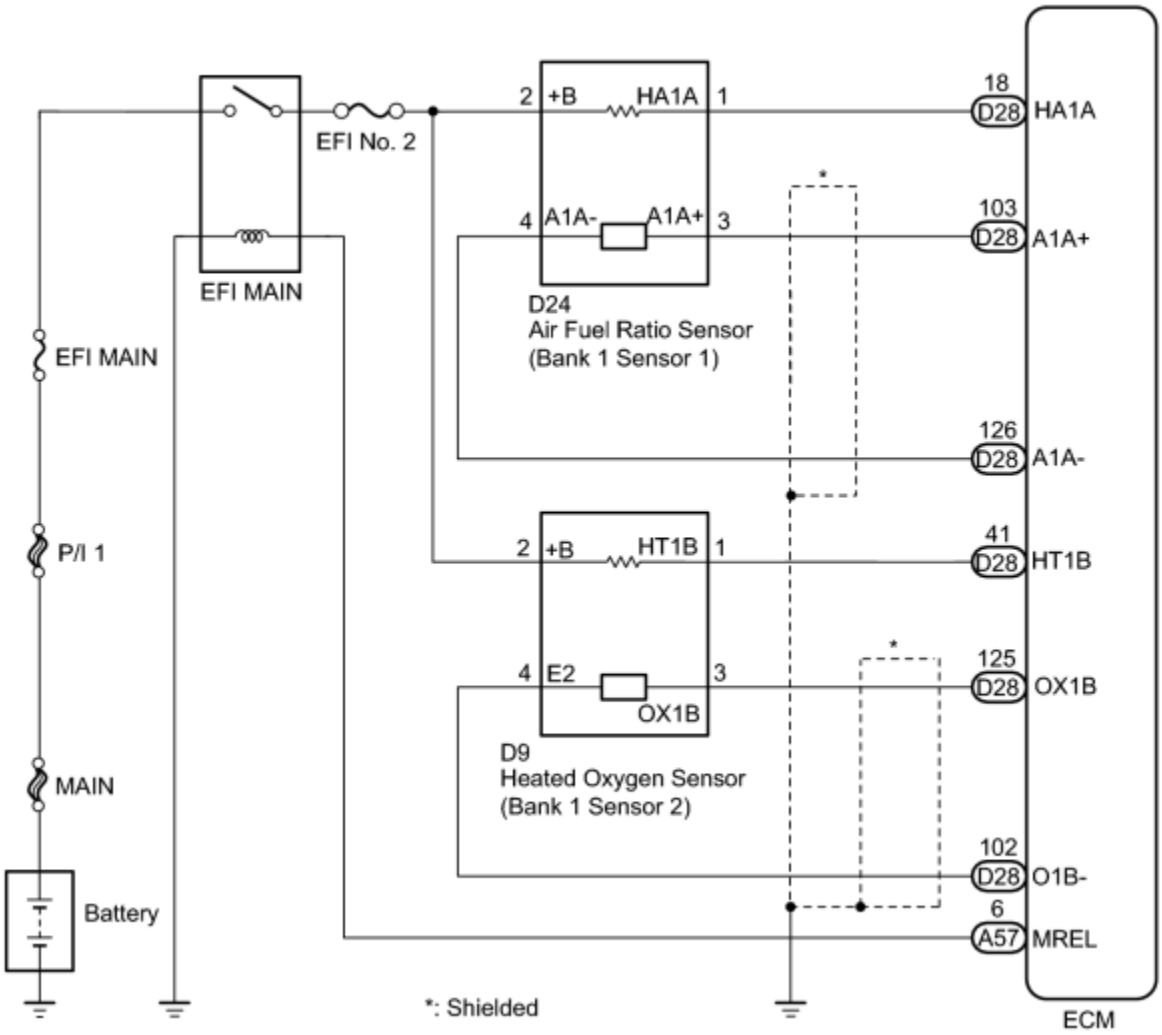
| | |
|---|---|
| Air fuel ratio sensor current | Less than 1.57 mA |

# MONITOR RESULT

Refer to Checking Monitor Status 

.

# WIRING DIAGRAM



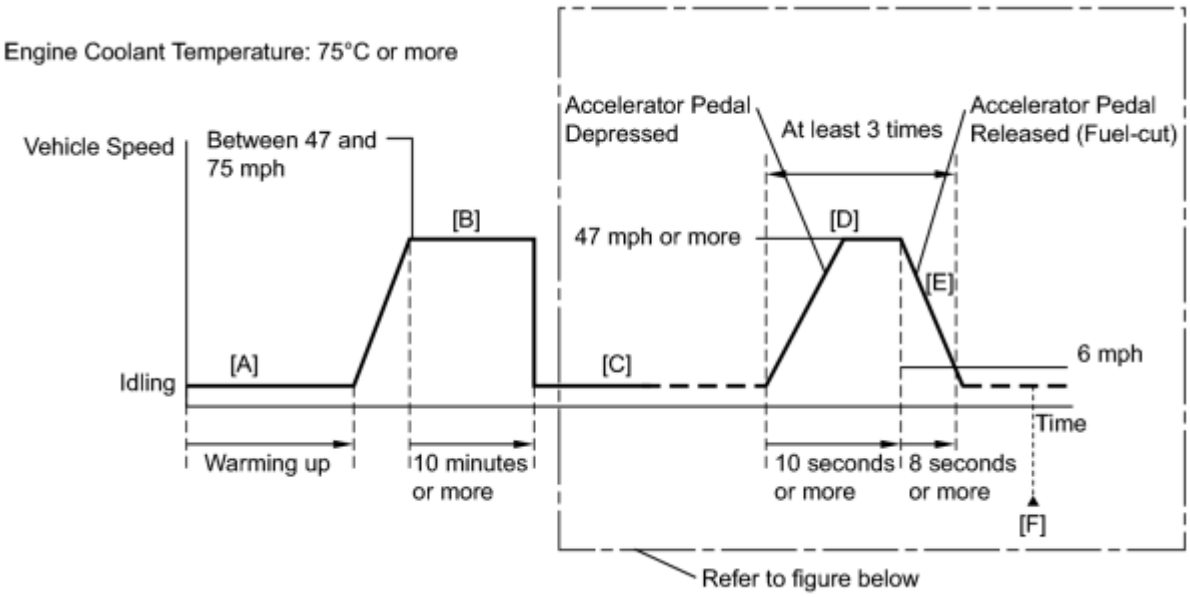

# CONFIRMATION DRIVING PATTERN

CAUTION:

Strictly observe posted speed limits, traffic laws, and road conditions when performing these drive patterns.

HINT:

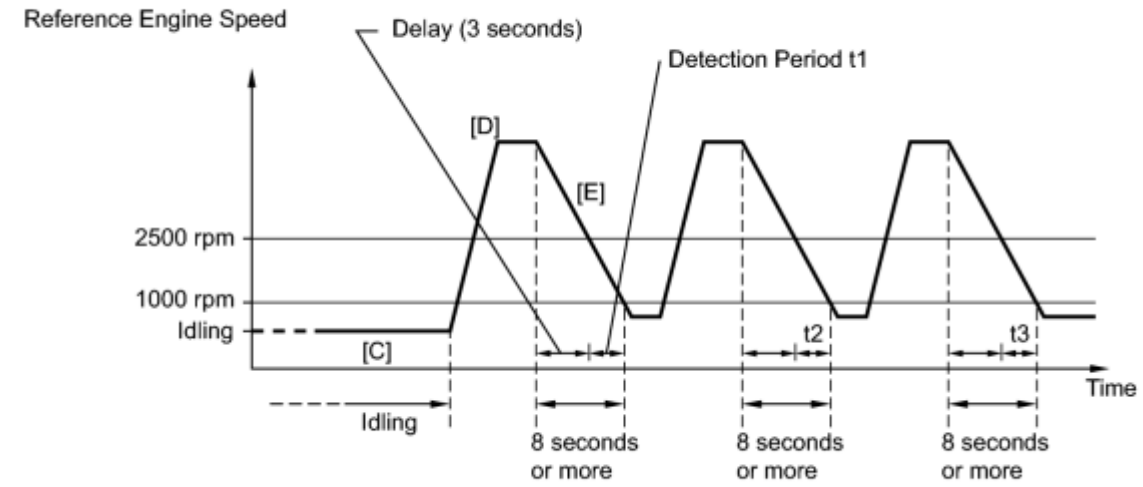
This confirmation driving pattern is used in the "Perform Confirmation Driving Pattern" procedure of the following diagnostic troubleshooting procedure.




N

Driving Pattern Detail for [C] through [F]:

Cumulative Detection Period "t" = t1 + t2 + t3 = 3 seconds or more




N

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG).
3. Turn the Techstream on.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
5. Turn the power switch off and wait for 30 seconds.
6. Turn the power switch on (IG) and turn the Techstream on.
7. Put the engine in inspection mode INFO.
8. Start the engine, and warm it up until the engine coolant temperature reaches 75°C (167°F) or higher [A].
9. On the Techstream, enter the following menus to check the fuel-cut status: Powertrain / Engine and ECT / Data List / All Data / Idle Fuel Cut.
10. Drive the vehicle at between 47 and 75 mph (75 and 120 km/h) for at least 10 minutes [B].

CAUTION:

When performing the confirmation driving pattern, obey all speed limits and traffic laws.

11. Move the shift lever in B [C].
12. Accelerate the vehicle to 47 mph (75 km/h) or more by depressing the accelerator pedal for at least 10 seconds [D].
13. Soon after performing step [D] above, release the accelerator pedal for at least 8 seconds without depressing the brake pedal in order to execute fuel-cut control [E].

HINT:

Fuel-cut is performed when the following conditions are met:

- Accelerator pedal is fully released.
- Engine speed is 2500 rpm or more (fuel injection returns at 1000 rpm).

14. Allow the vehicle to decelerate until the vehicle speed decreases to less than 6 mph (10 km/h).
15. Repeat steps [C] through [E] above at least 3 times in one driving cycle.
16. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
17. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
18. Read the pending DTC [F].
19. If a pending DTC is output, the system is malfunctioning.

HINT:

If a pending DTC is not output, perform the following procedure.

20. Input the DTC: P2195 or P2196.
21. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [B] through [E].

22. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
23. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

24. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be identified by performing the Control the Injection Volume for A/F Sensor function provided in the Active Test. The Control the Injection Volume for A/F Sensor function can help to determine whether the air fuel ratio sensor, heated oxygen sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the Control the Injection Volume for A/F Sensor operation using the Techstream.

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Put the engine in inspection mode INFO.
4. Start the engine.
5. Turn the Techstream on.
6. Warm up the engine at an engine speed of 2500 rpm for approximately 90 seconds.
7. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
8. Perform the Active Test operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
9. Monitor the output voltages of the air fuel ratio and heated oxygen sensors (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

HINT:

- The Control the Injection Volume for A/F Sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.

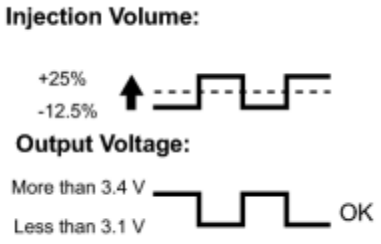
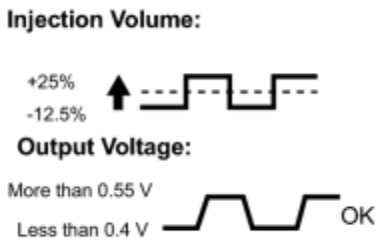
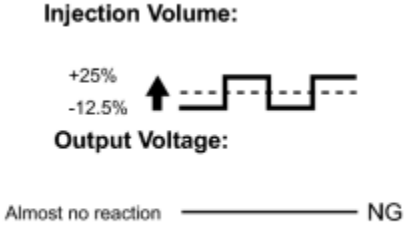
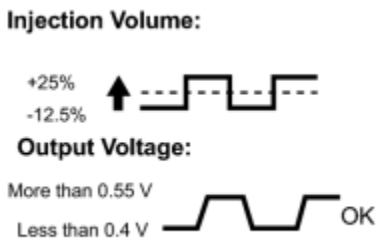
- Each sensor reacts in accordance with increases in the fuel injection volume.

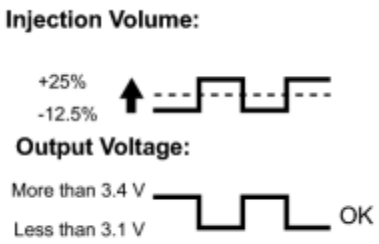
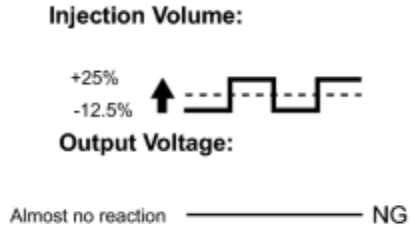
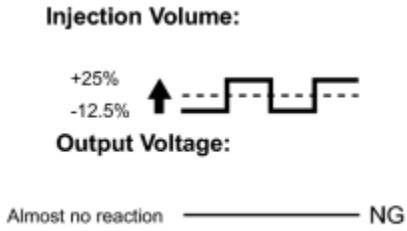
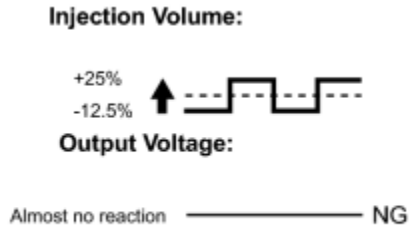
| Techstream Display<br><br>(Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|

| Techstream Display (Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| AFS Voltage B1S1 (Air fuel ratio) | +25% | Rich | Less than 3.1 V |
| AFS Voltage B1S1 (Air fuel ratio) | -12.5% | Lean | More than 3.4 V |
| O2S B1S2 (Heated oxygen) | +25% | Rich | More than 0.55 V |
| O2S B1S2 (Heated oxygen) | -12.5% | Lean | Less than 0.4 V |

NOTICE:

The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

| Case | Air Fuel Ratio Sensor (Sensor 1) Output Voltage | Heated Oxygen Sensor (Sensor 2) Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| 1 |  |  | - |
| 2 |  |  | • Air fuel ratio sensor<br>• Air fuel ratio sensor heater<br>• Air fuel ratio sensor circuit |
| 3 | | | • Heated oxygen sensor<br>• Heated oxygen sensor heater<br>• Heated oxygen sensor circuit |

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| |  |  | • Exhaust gas leaks |
| 4 |  |  | • Fuel pressure<br>• Exhaust gas leaks<br><br>(Air fuel ratio extremely lean or rich) |

- Following the Control the Injection Volume for A/F Sensor procedure enables technicians to check and graph the voltage outputs of both the air fuel ratio and heated oxygen sensors.
- To display the graph, enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor / A/F Control System / AFS Voltage B1S1 and O2S B1S2.

HINT:

- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.
- A low air fuel ratio sensor voltage could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.
- A high air fuel ratio sensor voltage could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO P2195 OR P2196) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2195 or P2196 is output | A |
| DTC P2195 or P2196 and other DTCs are output | B |

HINT:

If any DTCs other than P2195 and P2196 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CONFIRM IF VEHICLE HAS RUN OUT OF FUEL IN PAST |

(a) Has the vehicle run out of fuel in the past?

NO ▶ READ VALUE USING TECHSTREAM (TEST VALUE OF AIR FUEL RATIO SENSOR)

YES ▶ **DTC CAUSED BY RUNNING OUT OF FUEL**

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (TEST VALUE OF AIR FUEL RATIO SENSOR) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Allow the vehicle to drive in accordance with the drive pattern described in the Confirmation Driving Pattern.

(g) Enter the following menus: Powertrain / Engine and ECT / Monitor / O2 Sensor / Status 2.

(h) Check that the Status 2 of O2 Sensor is Complete.

If the status is still Incomplete, perform the drive pattern increasing the vehicle speed and using the second gear to decelerate the vehicle.

(i) Enter the following menus: Powertrain / Engine and ECT / Monitor / O2 Sensor / Details / RANGE B1 S1.

(j) Check the test value of the air fuel ratio sensor output current during fuel-cut.

Result:

| Result | Proceed to |
|---|---|
| Within normal range (1.57 mA or higher, and below 3.6 mA) | A |
| Outside normal range (Below 1.57 mA, or 3.6 mA or higher) | B |

B ▶ REPLACE AIR FUEL RATIO SENSOR

A ▼

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (OUTPUT VOLTAGE OF AIR FUEL RATIO SENSOR) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG) and turn the Techstream on.

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Warm up the air fuel ratio sensor at an engine speed of 2500 rpm for 90 seconds.

(f) Enter the following menus: Powertrain / Engine and ECT / Data List / AFS Voltage B1S1 and Engine Speed, then press the Record button.

(g) Check the air fuel ratio sensor voltage 3 times, when the engine is in each of the following conditions:

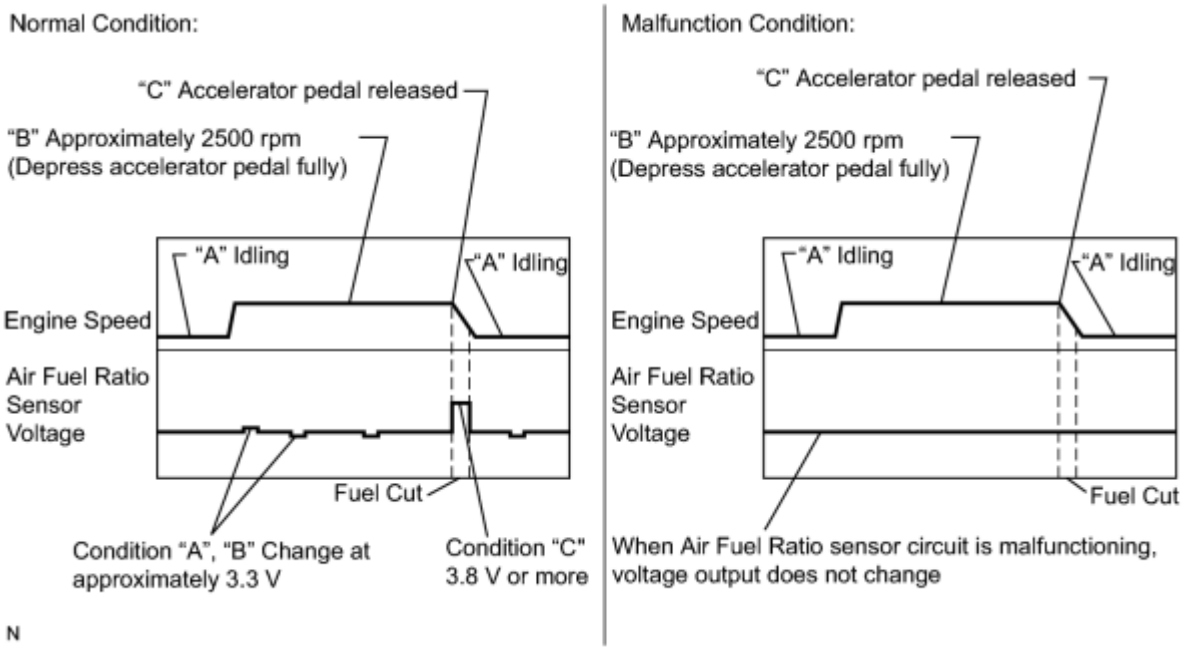
- (1) While idling (check for at least 30 seconds) (Step "A").
- (2) At an engine speed of approximately 2500 rpm (without any sudden changes in engine speed) (Step "B").
- (3) The engine speed is raised to 2500 rpm and then the accelerator pedal is quickly released so that the throttle valve is fully closed (Step "C").

Standard Voltage:

| Condition | Air Fuel Ratio Sensor Voltage Variation | Reference |
|---|---|---|
| Steps "A" and "B" | Changes at approximately 3.3 V | Between 3.1 V and 3.4 V |
| Step "C" | Increases to 3.8 V or higher | This occurs during engine deceleration<br><br>(when fuel-cut performed) |

HINT:

For more information, see the diagrams below.




HINT:

- If the output voltage of the air fuel ratio sensor remains at approximately 3.3 V (see Malfunction Condition diagram) under any conditions, including those above, the air fuel ratio sensor may have an open circuit. (This will also happen if the air fuel ratio sensor heater has an open circuit.)
- If the output voltage of the air fuel ratio sensor remains at either approximately 3.8 V or higher, or below 2.8 V (see Malfunction Condition diagram) under any conditions, including those above, the air fuel ratio sensor may have a short circuit.
- The ECM stops fuel injection (fuel cut) during engine deceleration. This causes a lean condition and results in a momentary increase in the air fuel ratio sensor output voltage.
- When the vehicle is driven:

  The output voltage of the air fuel ratio sensor may be below 2.8 V during fuel enrichment. For the vehicle, this translates to a sudden increase in speed with the accelerator pedal fully depressed when trying to overtake another vehicle. The air fuel ratio sensor is functioning normally.

- The air fuel ratio sensor is a current output element; therefore, the current is converted into a voltage inside the ECM. Measuring the voltage at the connectors of the air fuel ratio sensor or ECM will show a constant voltage result.

NG ▶ INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE)

OK ▼

| | |
|---|---|
| 5. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle referring to the Confirmation Driving Pattern.

NEXT

| | |
|---|---|
| 6. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(e) Read the Pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2195 or P2196 is output | A |
| DTC is not output | B |

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 7. | REPLACE AIR FUEL RATIO SENSOR |

(a) Replace the air fuel ratio sensor INFO.

NEXT

| | |
|---|---|
| 8. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle referring to the Confirmation Driving Pattern.

NEXT

| | |
|---|---|
| 9. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(e) Read the Pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2195 or P2196 is output | A |
| DTC is not output | B |

B END

A

| | |
|---|---|
| 10. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 11. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 12. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT

| | |
|---|---|
| 13. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P2195 or P2196.

(l) Check the DTC judgment result.

NEXT **END**

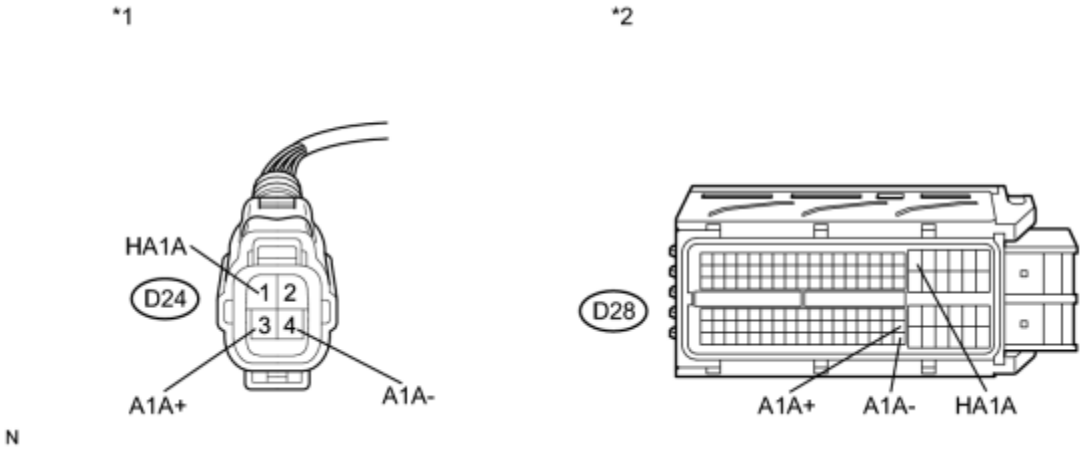
| | |
|---|---|
| 14. | INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE) INFO |

NG REPLACE AIR FUEL RATIO SENSOR

OK

| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR - ECM) |

(a) Disconnect the air fuel ratio sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) - D28-18 (HA1A) | Always | Below 1 Ω |
| D24-3 (A1A+) - D28-103 (A1A+) | | |
| D24-4 (A1A-) - D28-126 (A1A-) | | |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) or D28-18 (HA1A) - Body ground | Always | 10 kΩ or higher |
| D24-3 (A1A+) or D28-103 (A1A+) - Body ground | | |
| D24-4 (A1A-) or D28-126 (A1A-) - Body ground | | |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Fuel Ratio Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the air fuel ratio sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AIR FUEL RATIO SENSOR - ECM)

OK ▼

| | |
|---|---|
| 16. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks from the intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM
OK
▼

| | |
|---|---|
| 17. | CHECK FUEL PRESSURE |

(a) Check the fuel pressure INFO.

NG ▶ REPAIR OR REPLACE FUEL SYSTEM
OK
▼

| | |
|---|---|
| 18. | INSPECT FUEL INJECTOR ASSEMBLY |

(a) Check the fuel injector assembly injection (whether fuel volume is high or low, and whether injection pattern is poor) INFO.

NG ▶ REPLACE FUEL INJECTOR ASSEMBLY
OK
▼

| | |
|---|---|
| 19. | REPLACE AIR FUEL RATIO SENSOR |

(a) Replace the air fuel ratio sensor INFO.

NEXT
▼

| | |
|---|---|
| 20. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle referring to the Confirmation Driving Pattern.

NEXT

| | |
|---|---|
| 21. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(e) Read the Pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2195 or P2196 is output | A |
| DTC is not output | B |

B ▶ END

A

| | |
|---|---|
| 22. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 23. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 24. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT

| | |
|---|---|
| 25. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P2195 or P2196.

(l) Check the DTC judgment result.

NEXT **END**

| | |
|---|---|
| 26. | REPLACE AIR FUEL RATIO SENSOR |

(a) Replace the air fuel ratio sensor INFO.

NEXT

| | |
|---|---|
| 27. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle referring to the Confirmation Driving Pattern.

NEXT

| | |
|---|---|
| 28. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2195 OR P2196) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(e) Read the Pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P2195 or P2196 is output | B |

B REPLACE ECM

A **CHECK FOR INTERMITTENT PROBLEMS**

| | | |
|---|---|---|
| DTC | P2237 | Oxygen (A/F) Sensor Pumping Current Circuit / Open (Bank 1 Sensor 1) |
| DTC | P2238 | Oxygen (A/F) Sensor Pumping Current Circuit Low (Bank 1 Sensor 1) |
| DTC | P2239 | Oxygen (A/F) Sensor Pumping Current Circuit High (Bank 1 Sensor 1) |
| DTC | P2252 | Oxygen (A/F) Sensor Reference Ground Circuit Low (Bank 1 Sensor 1) |
| DTC | P2253 | Oxygen (A/F) Sensor Reference Ground Circuit High (Bank 1 Sensor 1) |

# DESCRIPTION

HINT:

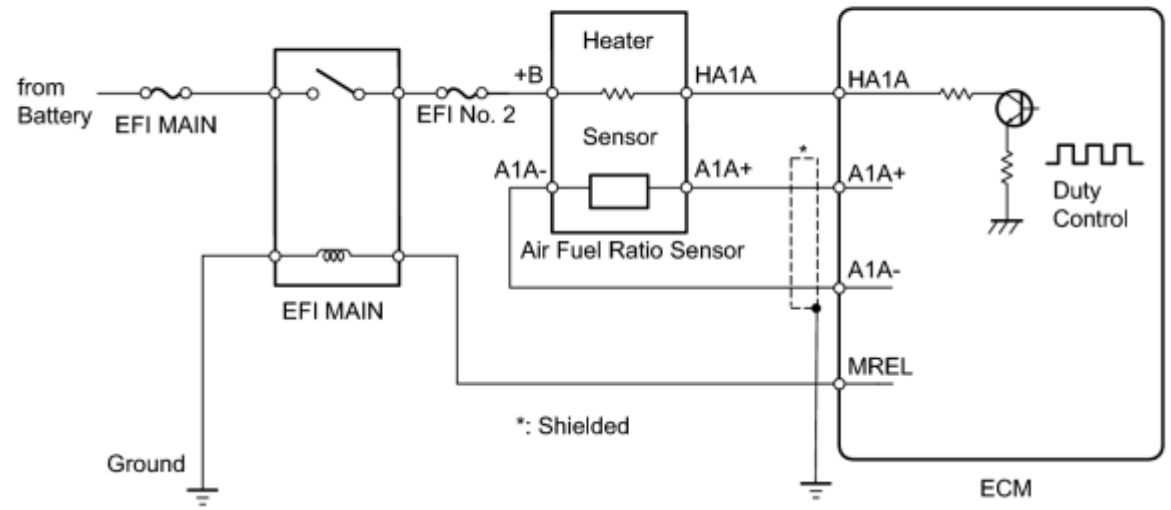
- Although the DTC titles say oxygen sensor, these DTCs relate to the air fuel ratio sensor.
- Sensor 1 refers to the sensor mounted in front of the three-way catalytic converter and located near the engine assembly.

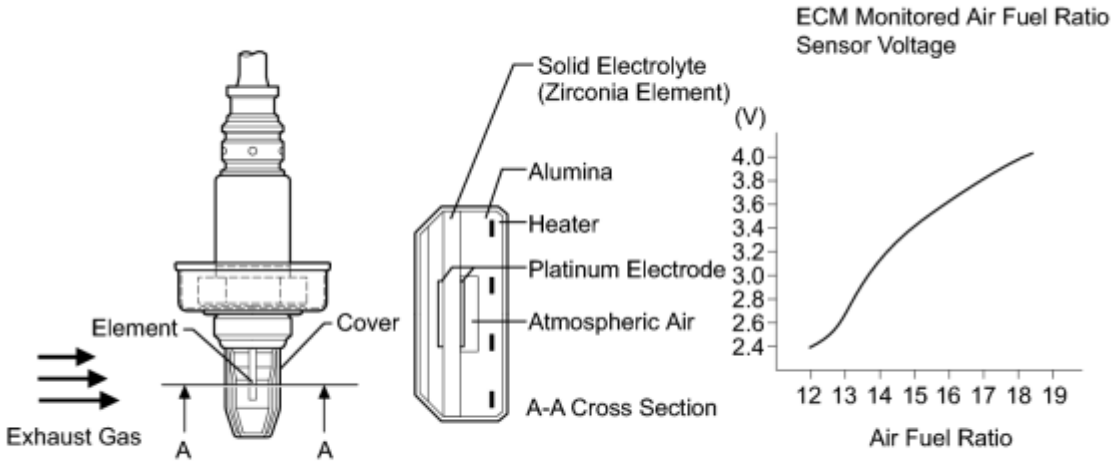
The air fuel ratio sensor, which is located between the exhaust manifold and catalyst, consists of alloyed metal elements and a heater.

Depending on the engine operating conditions, the heater heats the sensor elements to activate them. Battery voltage is applied to the heater and the sensor ground is controlled by the ECM using a duty ratio.

The sensor elements convert the oxygen concentration in the exhaust gas into voltage values to output. Based on the voltage, the ECM determines the air fuel ratio and regulates the fuel injection volume depending on the air fuel ratio and engine operating conditions. The voltage changes between 0.6 V and 4.5 V while the engine is running. If the air fuel ratio is lean, which means the oxygen concentration in the exhaust gas is high, the voltage is high. If the air fuel ratio is rich, which means the oxygen concentration in the exhaust gas is low, the voltage is low.

Reference (System Diagram of Sensor 1):






c

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P2237 | Open in the circuit between terminals A1A+ and A1A- of the air fuel ratio sensor while engine is running<br><br>(2 trip detection logic) | • Open in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• ECM |
| P2238 | Any of the following conditions are met<br><br>(2 trip detection logic)<br><br>• Air fuel ratio sensor output drops while engine is running.<br><br>• Voltage at terminal A1A+ voltage is 0.5 V or less.<br><br>• Voltage difference between terminals A1A+ and A1A- voltage is 0.1 V or less. | • Open or short in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• ECM |
| P2239 | A1A+ voltage is more than 4.5 V<br><br>(2 trip detection logic) | • Open or short in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• ECM |
| P2252 | A1A- voltage is 0.5 V or less<br><br>(2 trip detection logic) | • Open or short in air fuel ratio sensor (sensor 1) circuit<br>• Air fuel ratio sensor (sensor 1)<br>• ECM |
| P2253 | A1A- voltage is more than 4.5 V | • Open or short in air fuel ratio sensor (sensor 1) circuit |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | (2 trip detection logic) | • Air fuel ratio sensor (sensor 1)<br>• ECM |

# MONITOR DESCRIPTION

These DTCs are output when there is an open or short in the air fuel ratio sensor circuit, or if air fuel ratio sensor output drops. To detect these problems, the voltage of the air fuel ratio sensor is monitored when turning the power switch on (IG), and the admittance (admittance is an electrical term that indicates the ease of flow of current) is checked while driving. If the voltage of the air fuel ratio sensor is between 0.5 V and 4.5 V, it is considered normal. If the voltage is out of the specified range, or the admittance is less than the standard value, the ECM will determine that there is a malfunction in the air fuel ratio sensor. If the same malfunction is detected in next driving cycle, the MIL will be illuminated and a DTC will be stored.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P2237: Air fuel ratio sensor open circuit between A1A+ and A1A-<br><br>P2238: Air fuel ratio sensor short circuit between A1A+ and A1A-<br><br>P2238: Air fuel ratio sensor short circuit between A1A+ and GND<br><br>P2238: Air fuel ratio sensor low impedance<br><br>P2239: Air fuel ratio sensor short circuit between A1A+ and +B<br><br>P2252: Air fuel ratio sensor short circuit between A1A- and GND<br><br>P2253: Air fuel ratio sensor short circuit between A1A- and +B |
| Required Sensors/Components (Main) | Air fuel ratio sensor |
| Required Sensors/Components (Related) | Engine coolant temperature sensor<br><br>Crankshaft position sensor |
| Frequency of Operation | Continuous |
| Duration | 10 seconds: P2237 (Air fuel ratio sensor open circuit between A1A+ and A1A-), P2238 (Air fuel ratio sensor low impedance)<br><br>5 seconds: Others |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**P2237 and P2238**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0128 (Thermostat)<br><br>P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0401 (EGR System (Closed))<br><br>P0451, P0452, P0453 (EVAP System)<br><br>P0505 (Idle speed control) |

**Other**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**P2237 (Air Fuel Ratio Sensor Open Circuit Between A1A+ and A1A-)**

| | |
|---|---|
| Estimated sensor temperature | 450 to 550°C (842 to 1022°F) |
| Engine | Running |
| Battery voltage | 11 V or more |

**P2238 (Air Fuel Ratio Sensor Low Impedance)**

| | |
|---|---|
| Estimated sensor temperature | 700 to 800 °C (1292 to 1472°F) |
| Engine coolant temperature | 10°C (50°F) or higher |
| Fuel cut | No executed |

**Other**

| | |
|---|---|
| Battery voltage | 11 V or more |
| Power switch | On (IG) |
| Time after power switch is off to on (IG) | 5 seconds or more |

# TYPICAL MALFUNCTION THRESHOLDS

**P2237 (Air Fuel Ratio Sensor Open Circuit Between A1A+ and A1A-)**

| | |
|---|---|
| Air fuel ratio sensor admittance | Below 0.002 1/Ω |

**P2238 (Air Fuel Ratio Sensor Low Impedance)**

| | |
|---|---|
| Air fuel ratio sensor admittance | Below 0.022 1/Ω |

**P2238 (Air Fuel Ratio Sensor Short Circuit Between A1A+ and GND)**

| | |
|---|---|
| A1A+ terminal voltage | 0.5 V or less |

**P2239 (Air Fuel Ratio Sensor Short Circuit Between A1A+ and +B)**

| | |
|---|---|
| A1A+ terminal voltage | More than 4.5 V |

**P2252 (Air Fuel Ratio Sensor Short Circuit Between A1A- and GND)**

| | |
|---|---|
| A1A- terminal voltage | 0.5 V or less |

**P2253 (Air Fuel Ratio Sensor Short Circuit Between A1A- and +B)**

| | |
|---|---|
| A1A- terminal voltage | More than 4.5 V |

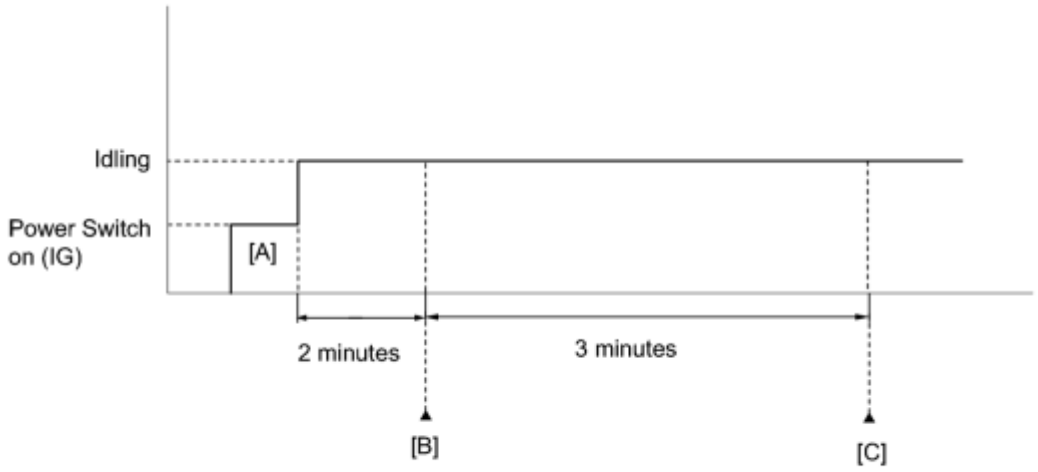
**P2238 (Air Fuel Ratio Sensor Short Circuit Between A1A+ and A1A-)**

| | |
|---|---|
| Difference between A1A+ terminal and A1A- terminal voltage | 0.1 V or less |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Air fuel ratio sensor admittance | 0.002 1/Ω or more |
| A1A+ terminal voltage | 0.5 to 4.5 V |
| A1A- terminal voltage | 0.5 to 4.5 V |
| Difference between A1A+ and A1A- terminal voltages | 0.1 to 0.8 V |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and wait 2 minutes.
8. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
9. Read the pending DTC [B].
10. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

11. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
12. Input the DTC: P2237, P2238, P2239, P2252 or P2253.
13. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed |

| Techstream Display | Description |
| --- | --- |
| | ○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, idle the engine for 3 minutes.

14. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
15. Check the judgment result [C].

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

16. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to DTC P2195 INFO.

# INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be identified by performing the Control the Injection Volume for A/F Sensor in the Active Test. The Control the Injection Volume for A/F Sensor function can help to determine whether the air fuel ratio sensor, heated oxygen sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the Control the Injection Volume for A/F Sensor operation using the Techstream.

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Put the engine in inspection mode INFO.
4. Start the engine.
5. Warm up the engine at 2500 rpm for approximately 90 seconds.

6. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
7. Perform Active Test operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
8. Monitor the output voltages of the air fuel ratio and heated oxygen sensors (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

HINT:

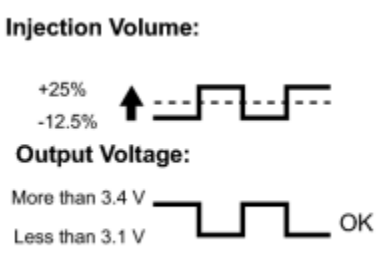
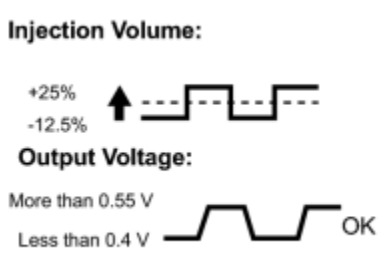
- The Control the Injection Volume for A/F Sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.

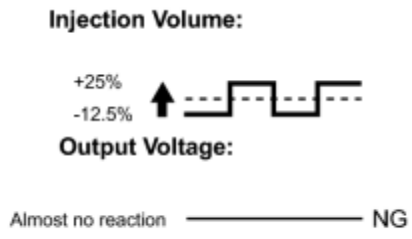
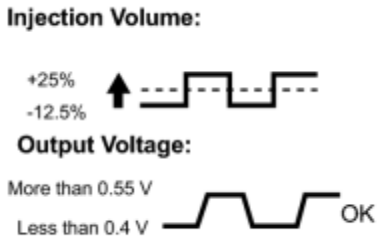
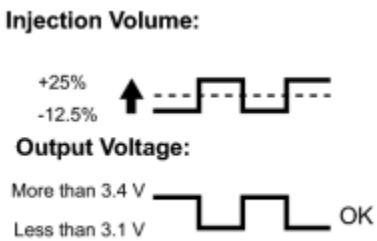
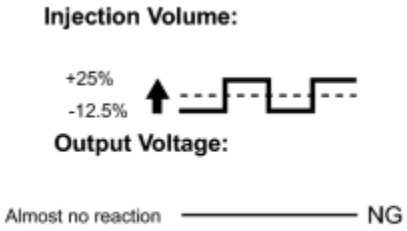
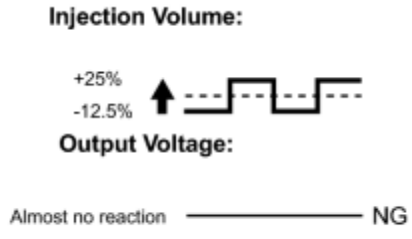
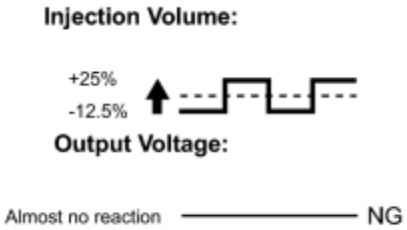
- Each sensor reacts in accordance with increases and decreases in the fuel injection volume.

| Techstream Display (Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| AFS Voltage B1S1 (Air fuel ratio) | +25% | Rich | Less than 3.1 V |
| AFS Voltage B1S1 (Air fuel ratio) | -12.5% | Lean | More than 3.4 V |
| O2S B1S2 (Heated oxygen) | +25% | Rich | More than 0.55 V |
| O2S B1S2 (Heated oxygen) | -12.5% | Lean | Less than 0.4 V |

NOTICE:

The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

| Case | Air Fuel Ratio Sensor (Sensor 1) Output Voltage | Heated Oxygen Sensor (Sensor 2) Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| 1 |  |  | - |
| 2 | | | • Air fuel ratio sensor |

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| |  |  | • Air fuel ratio sensor heater<br>• Air fuel ratio sensor circuit |
| 3 |  |  | • Heated oxygen sensor<br>• Heated oxygen sensor heater<br>• Heated oxygen sensor circuit<br>• Exhaust gas leaks |
| 4 |  |  | • Fuel pressure<br>• Exhaust gas leaks<br><br>(Air fuel ratio extremely lean or rich) |

- Performing Control the Injection Volume for A/F Sensor enables technicians to check and graph the output voltages of both the air fuel ratio and heated oxygen sensors.
- To display the graph, enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor / AFS Voltage B1S1 and O2S B2S1.

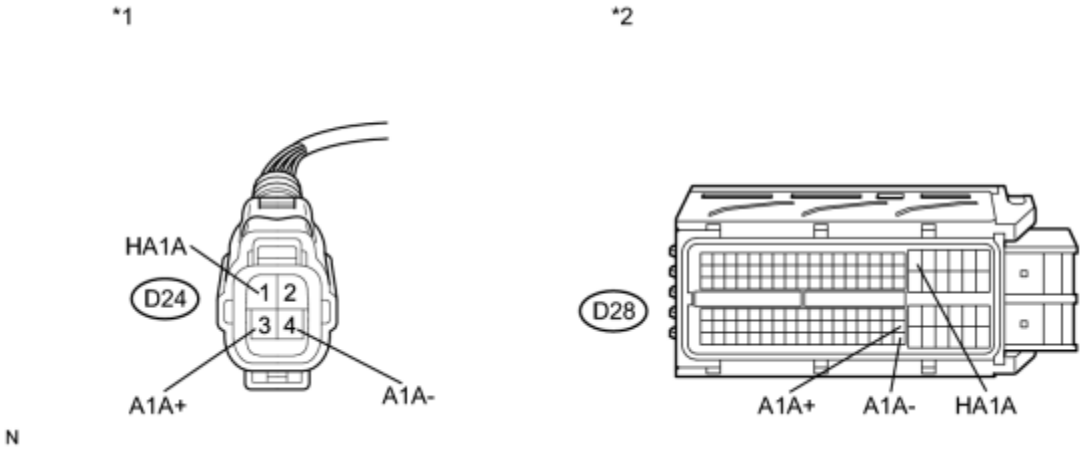
HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR - ECM) |

(a) Disconnect the air fuel ratio sensor connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) - D28-18 (HA1A) | Always | Below 1 Ω |
| D24-3 (A1A+) - D28-103 (A1A+) | | |
| D24-4 (A1A-) - D28-126 (A1A-) | | |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D24-1 (HA1A) or D28-18 (HA1A) - Body ground | Always | 10 kΩ or higher |
| D24-3 (A1A+) or D28-103 (A1A+) - Body ground | | |
| D24-4 (A1A-) or D28-126 (A1A-) - Body ground | | |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Fuel Ratio Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the air fuel ratio sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AIR FUEL RATIO SENSOR - ECM)

OK ▼

| | |
|---|---|
| 2. | REPLACE AIR FUEL RATIO SENSOR |

(a) Replace the air fuel ratio sensor INFO.

NEXT

| | |
|---|---|
| 3. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle referring to the Confirmation Driving Pattern.

NEXT

| | |
|---|---|
| 4. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(e) Read the Pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC P2237, P2238, P2239, P2252 or P2253 is output | B |

B ▶ REPLACE ECM

A ▶ **END**

| DTC | P2420 | Evaporative Emission System Switching Valve Control Circuit High |
|---|---|---|

# DTC SUMMARY

| DTC No. | Monitoring Item | DTC Detection Condition | Trouble Area | Detection Timing | Detection Logic |
|---|---|---|---|---|---|
| P2420 | Vent valve stuck open (vent) | The following condition is met during key-off EVAP monitor<br>• EVAP pressure change when vent valve is closed (ON) less than 2.3 mmHg | • Canister pump module (0.02 inch orifice, vacuum pump, vent valve)<br>• Connector/wire harness (canister pump module - ECM)<br>• ECM | Power switch off | 2 trip |

HINT:

The vent valve is built into the canister pump module.

# DESCRIPTION

The circuit description can be found in the EVAP (Evaporative Emission) System INFO.

# INSPECTION PROCEDURE

Refer to the EVAP System INFO.

# MONITOR DESCRIPTION

5 hours*1 after the power switch is turned off, the leak detection pump creates negative pressure (vacuum) in the EVAP (Evaporative Emission) system. The ECM monitors for leaks and actuator malfunctions based on the EVAP pressure.

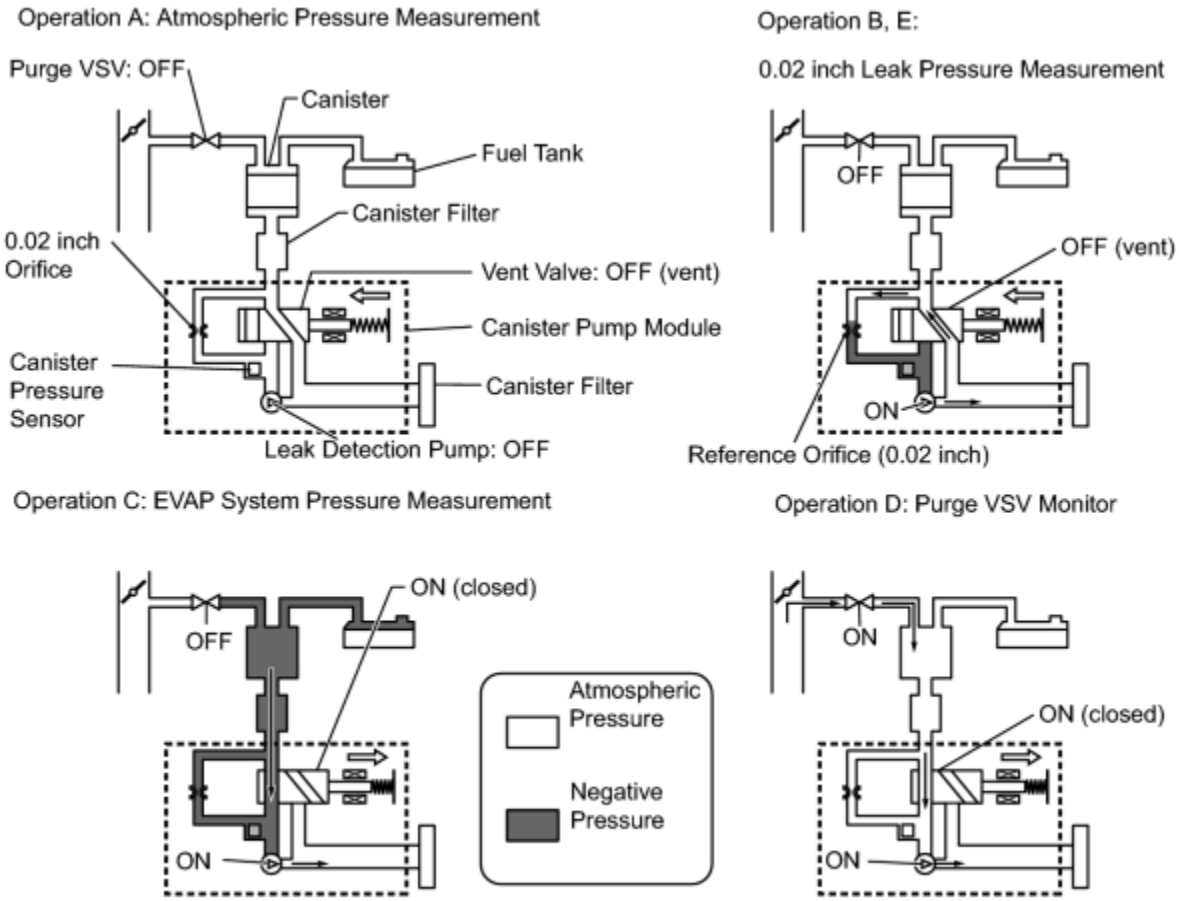
HINT:

*1: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the power switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the power switch is turned off, the monitor check starts 2.5 hours later.

| Sequence | Operation | Description | Duration |
|---|---|---|---|
| - | ECM activation | Activated by soak timer, 5 hours (7 or 9.5 hours) after power switch is turned off. | - |
| A | Atmospheric pressure measurement | Vent valve is turned off (vent) and EVAP system pressure is measured by ECM in order to register atmospheric pressure.<br><br>If pressure in EVAP system is not between 70 kPa and 112 kPa | 60 seconds |

| Sequence | Operation | Description | Duration |
|---|---|---|---|
| | | (525 mmHg and 840 mmHg), ECM cancels EVAP system monitor. | |
| B | First 0.02 inch leak pressure measurement | In order to determine 0.02 inch leak pressure standard, vacuum pump creates negative pressure (vacuum) through 0.02 inch orifice and then ECM checks if vacuum pump and vent valve operate normally. | 360 seconds |
| C | EVAP system pressure measurement | Vent valve is turned on (closed) to shut EVAP system.<br><br>Negative pressure (vacuum) is created in EVAP system, and then EVAP system pressure is measured. Write down measured value as they will be used in leak check.<br><br>If EVAP pressure does not stabilize within 15 minutes, ECM cancels EVAP system monitor. | 15 minutes*2 |
| D | Purge VSV monitor | Purge VSV is opened and then EVAP system pressure is measured by ECM.<br><br>Large increase indicates normal. | 10 seconds |
| E | Second 0.02 inch leak pressure measurement | After second 0.02 inch leak pressure measurement, leak check is performed by comparing first and second 0.02 inch leak pressure standards.<br><br>If stabilized system pressure is higher than second 0.02 inch leak pressure standard, ECM determines that there is a leak in EVAP system. | 60 seconds |
| F | Final check | Atmospheric pressure is measured and then monitoring result is recorded by ECM. | - |

*2: If only a small amount of fuel is in the fuel tank, it takes longer for the EVAP pressure to stabilize.

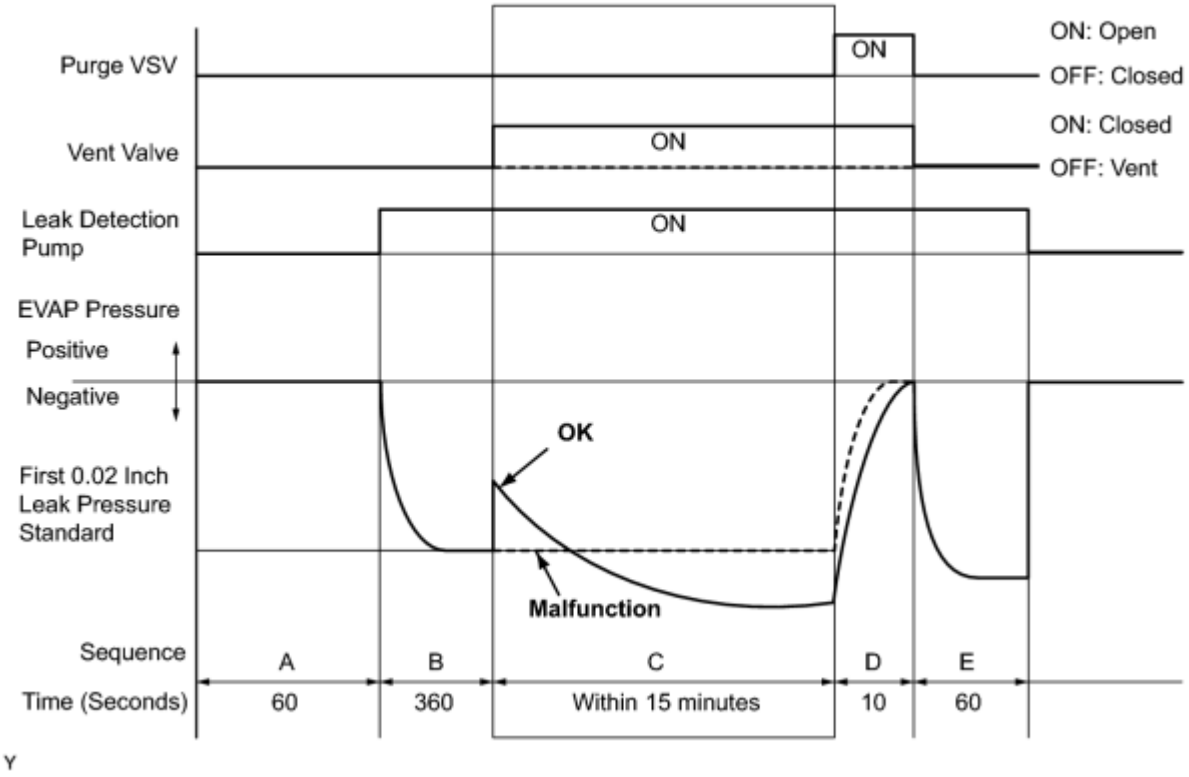



c

P2420: Vent valve stuck open (vent)

In operation C, the vent valve turns on (closed) and the EVAP system pressure is then measured by the ECM, using the canister pressure sensor, to conduct an EVAP leak check. If the pressure does not increase when the vent valve is open, the ECM interprets this as the vent valve being stuck open. The ECM illuminates the MIL and sets the DTC.

EVAP Pressure when Vent Valve Stuck OFF:




# MONITOR STRATEGY

| | |
|---|---|
| Related DTC | P2420: Vent valve stuck open |
| Required Sensors/Components | Purge VSV and canister pump module |
| Frequency of Operation | Once per driving cycle |
| Duration | Within 2 minutes (varies with amount of fuel in tank) |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Atmospheric pressure | 70 to 112 kPa (525 to 840 mmHg) |
| Battery voltage | 10.5 V or more |
| Vehicle speed | Below 2.5 mph (4 km/h) |
| Power switch | OFF |
| Time after key off | 5, 7 or 9.5 hours |
| Canister pressure sensor malfunction (P0452 and P0453) | Not detected |
| Purge VSV | Not operated by scan tool |
| Vent valve | Not operated by scan tool |

| | |
|---|---|
| Leak detection pump | Not operated by scan tool |
| Both of the following conditions are met before key off | Conditions 1 and 2 |
| 1. Duration that vehicle has been driven | 5 minutes or more |
| 2. EVAP purge operation | Performed |
| Engine coolant temperature | 4.4 to 35°C (40 to 95°F) |
| Intake air temperature | 4.4 to 35°C (40 to 95°F) |

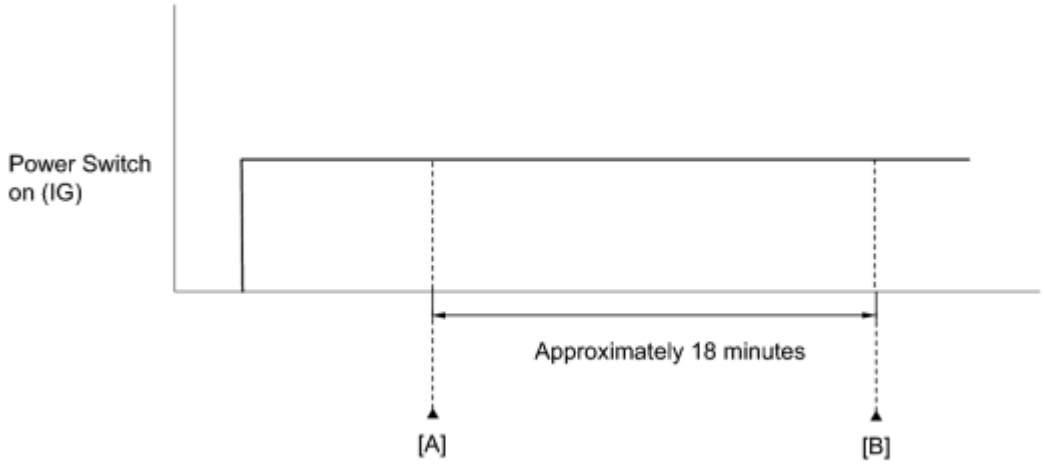
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| EVAP pressure change after vent valve on | Less than 0.3 kPa (2.25 mmHg) |

# MONITOR RESULT

Refer to Checking Monitor Status INFO.

# CONFIRMATION DRIVING PATTERN




NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 5 steps performed automatically by the Techstream. It takes a maximum of approximately 18 minutes.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.
- When the temperature of the fuel is 35°C (95°F) or higher, a large amount of vapor forms and any check results become inaccurate. When performing the Evaporative System Check, keep the fuel temperature below 35°C (95°F).

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Automatic Mode [A].
7. After the "Evaporative System Check" is completed, check for All Readiness by entering the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
8. Read the pending DTC [B].
9. If a pending DTC is output, the system is malfunctioning.

   HINT:

   If a pending DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: P2420.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

   HINT:

   - If the judgment result shows ABNORMAL, the system has a malfunction.
   - If the judgment result shows NORMAL, the system is normal.
   - If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B].

13. If the test result is UNKNOWN, enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
14. Read Pending DTCs.

   HINT:

   If a pending DTC is output, the system is malfunctioning.

15. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

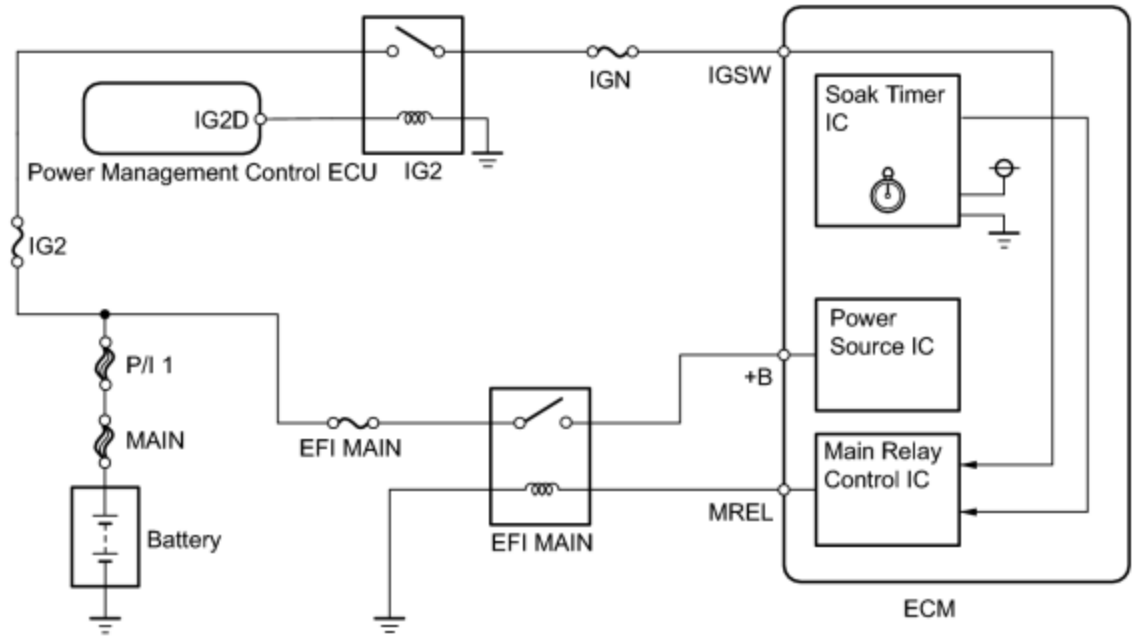
| DTC | P2610 | ECM / PCM Internal Engine Off Timer Performance |
|---|---|---|

# DTC SUMMARY

| DTC No. | Monitoring Item | Malfunction Detection Condition | Trouble Area | Detection Timing | Detection Logic |
|---|---|---|---|---|---|
| P2610 | Soak timer (built into ECM) | ECM internal malfunction | ECM | Engine running | 2 trip |

# DESCRIPTION

The soak timer operates after the power switch is turned off. When a certain amount of time has elapsed after turning the power switch off, the soak timer activates the ECM to perform malfunction checks witch can only be performed after the engine is stopped. The soak timer is built into the ECM.




# MONITOR DESCRIPTION

If the soak timer activates the ECM even though only a short amount of time has elapsed since the power switch was turned off, or if the soak timer does not activate the ECM even though a considerable amount of time has elapsed since the power switch was turned off, the ECM determines that the soak timer is malfunctioning, illuminates the MIL and stores a DTC the next time the power switch is turned on (IG).

While the engine is running, the ECM monitors the synchronization of the soak timer and the CPU clock. If these two are not synchronized, the ECM interprets this as a malfunction, illuminates the MIL and sets the DTC (2 trip detection logic).

# MONITOR STRATEGY

| | |
|---|---|
| Related DTC | P2610: ECM internal engine off timer performance |
| Required Sensors / Components | ECM |
| Frequency of Operation | Once per driving cycle |
| Duration | 10 minutes |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All:**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |

**Case 1:**

| | |
|---|---|
| Power switch | On (IG) |
| Engine | Running |
| Battery voltage | 8 V or more |
| CPU clock elapsed time | 10 minutes or more |

**Case 2:**

| | |
|---|---|
| Internal engine OFF timer (elapsed time from engine stop) | 10 minutes or more |
| Battery voltage | 8 V or more |
| Power switch | On (IG) |

**Case 3:**

| | |
|---|---|
| Internal engine OFF timer (elapsed time from engine stop) | 10 minutes or more |
| Battery voltage | 8 V or more |
| Power switch | On (IG) |

# TYPICAL MALFUNCTION THRESHOLDS

**Case 1:**

| | |
|---|---|
| Internal engine OFF timer (elapsed time from engine start) | Less than 7 minutes, or more than 13 minutes |

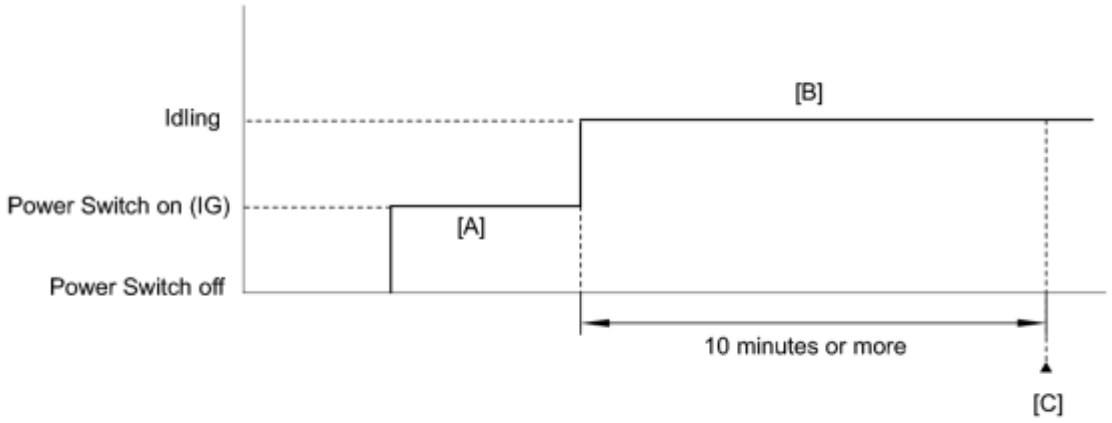
**Case 2:**

| | |
|---|---|
| ECM had the started record by internal engine OFF timer | Yes |

**Case 3:**

| | |
|---|---|
| ECM had the started record by internal engine OFF timer | No |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine.
8. Idle the engine for 10 minutes or more [B].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
10. Read the pending DTC [C].
11. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P2610.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform step [B] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
17. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

HINT:

- DTC P2610 is set if an internal ECM problem is detected. Diagnostic procedures are not required. ECM replacement is required.
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT

| | |
|---|---|
| 2. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Put the engine in inspection mode INFO.

(f) Start the engine and wait for 10 minutes or more.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(h) If no pending DTC is displayed, the repair has been successfully completed.

NEXT **END**

| | | |
|---|---|---|
| DTC | P261B | Coolant Pump "B" Control Malfunction |
| DTC | P261C | Short in Coolant Pump "B" Control Circuit |
| DTC | P261D | Open in Coolant Pump "B" Control Circuit |

# DESCRIPTION

The ECM controls the water pump assembly by calculating the necessary amount of coolant flow based on engine coolant temperature, engine speed and vehicle speed information. The speed of the water pump assembly is controlled steplessly using duty cycle signal sent from the ECM. This optimal control enhances warm-up performance and reduces cooling losses, thus reducing the specific fuel consumption of the engine.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P261B | Water pump speed is less than 900 rpm while the water pump assembly is operating (1 trip detection logic) | • Open or short in water pump assembly circuit<br>• Water pump assembly<br>• ECM |
| P261C | Water pump output voltage is less than specified value while the water pump assembly is operating (1 trip detection logic) | • Short in water pump assembly circuit<br>• Water pump assembly<br>• ECM |
| P261D | Water pump output voltage is higher than specified value while the water pump assembly is operating (1 trip detection logic) | • Open in water pump assembly circuit<br>• Water pump assembly<br>• ECM |

# MONITOR DESCRIPTION

The ECM calculates the speed of the water pump assembly using a duty cycle signal sent from the water pump assembly. When the speed of the water pump assembly becomes less than 900 rpm while it is operating, the ECM detects the malfunction and stores DTC P261B.

The water pump assembly operates steplessly based on a duty cycle signal sent from the ECM. The ECM monitors the current of the water pump assembly. If actual drive duty cycle ratio does not correspond to the target drive duty cycle , the ECM detects the malfunction and stores DTC P261C and P261D.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P261B: Engine coolant pump circuit performance<br><br>P261C: Engine coolant pump circuit range check (low voltage)<br><br>P261D: Engine coolant pump circuit range check (high voltage) |

| | |
|---|---|
| Required Sensors/Components (Main) | Water pump assembly |
| Required Sensors/Components (Related) | - |
| Frequency of Operation | Continuous |
| Duration | 15 seconds: Engine coolant pump circuit performance<br><br>3 seconds: Engine coolant pump circuit range check (low voltage, high voltage) |
| MIL Operation | Immediately |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

**All**

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Battery voltage | 8 V or more |
| Power switch | On (IG) |
| Time after power switch off to on (IG) | 0.5 seconds or more |

**P261B: Engine Coolant Pump Circuit Performance**

| | |
|---|---|
| Output signal duty ratio | 40% or more |
| Monitor synchronism monitor status | Enable |
| Engine coolant temperature | -10°C (14 °F) or more |
| Engine coolant temperature circuit circuit fail (P0115, P0117, P0118) | Not detected |
| Engine coolant pump circuit range check low voltage fail (P261C) | Not detected |
| Engine coolant pump circuit range check high voltage fail (P261D) | Not detected |

**P261C, P261D: Engine Coolant Pump Circuit Range Check (Low Voltage, High Voltage)**

| | |
|---|---|
| Output signal duty ratio | 40 to 60% |
| Engine coolant pump circuit performance fail (P261B) | Not detected |
| Engine coolant pump output terminal voltage monitor counter | 0.08 seconds or more |

# TYPICAL MALFUNCTION THRESHOLDS

**P261B: Engine Coolant Pump Circuit Performance**

| | |
|---|---|
| Motor speed | Less than 900 rpm |

**P261C: Engine Coolant Pump Circuit Range Check (Low Voltage)**

| | |
|---|---|
| Current engine coolant pump output terminal voltage | Low |
| Engine coolant pump output monitor | Fail |

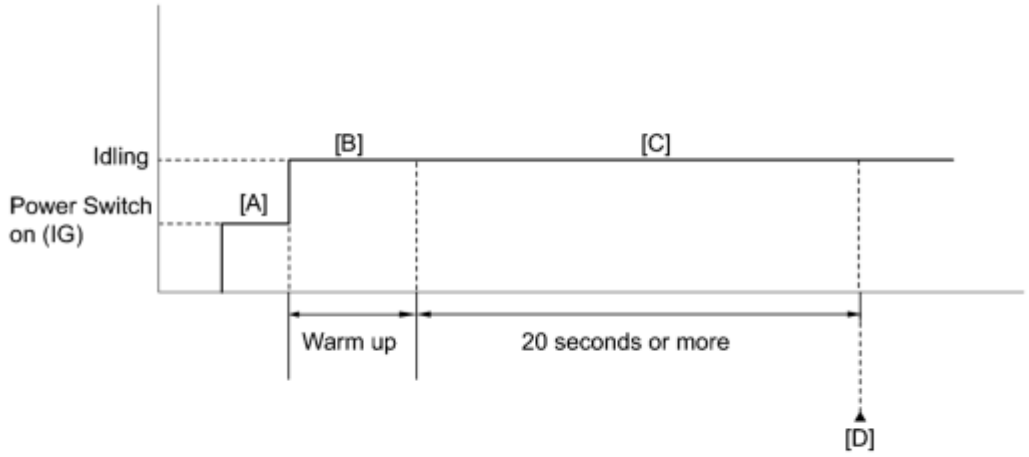
**P261D: Engine Coolant Pump Circuit Range Check (High Voltage)**

| | |
|---|---|
| Current engine coolant pump output terminal voltage | High |
| Engine coolant pump output monitor | Fail |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Motor speed | 900 rpm or more |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on [A].
6. Put the engine in inspection mode INFO.
7. Start the engine and warm it up (until the engine coolant temperature is 75°C (167°F) or higher) [B].
8. Idle the engine for 20 seconds or more [C].
9. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
10. Read the DTC [D].
11. If the DTC is output, the system is malfunctioning.

HINT:

If a DTC is not output, perform the following procedure.

12. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
13. Input the DTC: P261B, P261C or P261D.
14. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [C] again.

15. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
16. Check the judgment result.

HINT:

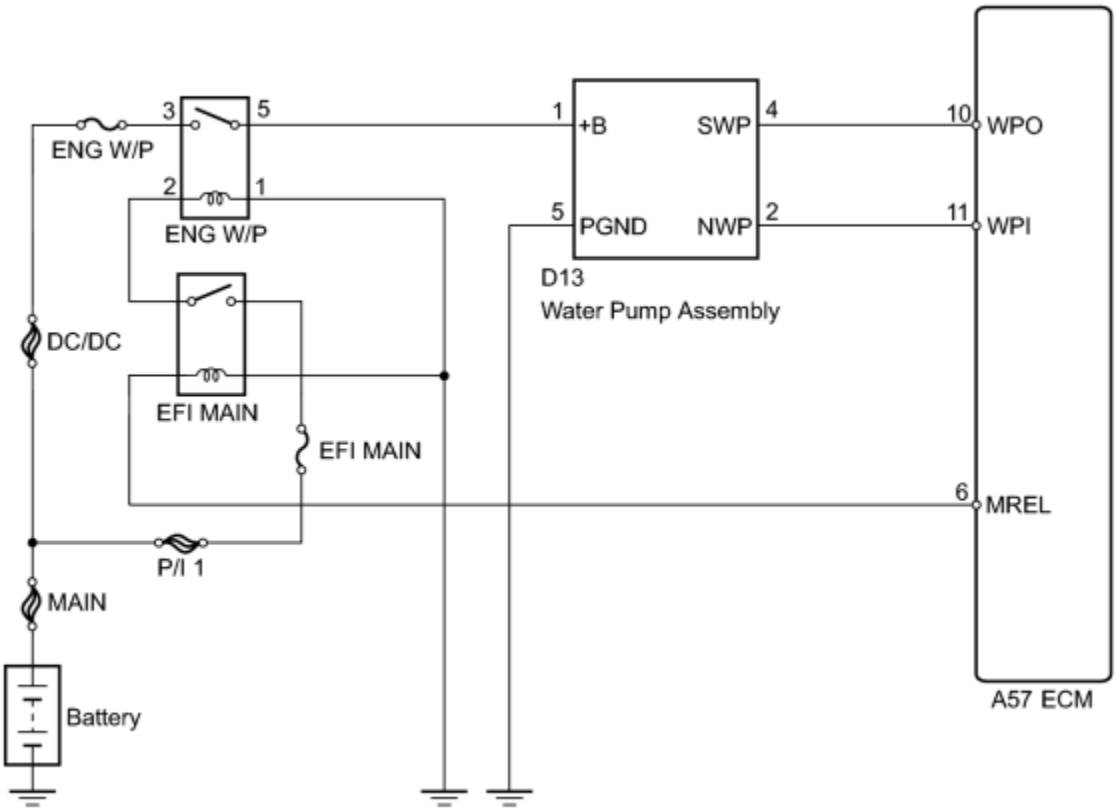
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

17. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVATE THE ELECTRIC WATER PUMP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Activate the Electric Water Pump.

(g) Touch the water pump and check that the pump is operating (vibrating).

OK:

The water pump is operating (vibrating).

NG ▶ CHECK WATER PUMP ASSEMBLY (POWER SOURCE)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (WATER PUMP ASSEMBLY - ECM) |

HINT:

Confirm a good connection at the water pump assembly and ECM connectors.

(a) Disconnect the water pump assembly connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D13-2 (NWP) - A57-11 (WPI) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D13-4 (SWP) - A57-10 (WPO) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D13-2 (NWP) or A57-11 (WPI) - Body ground | Always | 10 kΩ or higher |
| D13-4 (SWP) or A57-10 (WPO) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Water Pump Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the water pump assembly connector.

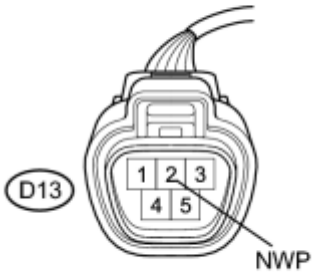
(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (WATER PUMP ASSEMBLY - ECM)

OK ▼

| | |
|---|---|
| 3. | CHECK ECM (WPI VOLTAGE) |

*1




(a) Disconnect the water pump assembly connector.

c

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D13-2 (NWP) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Water Pump Assembly) |

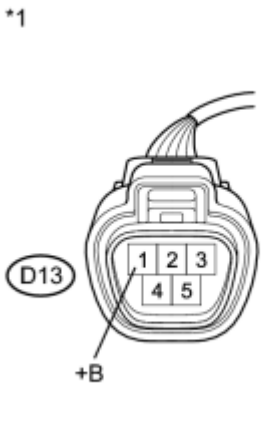
(d) Reconnect the water pump assembly connector.

NG ▶ REPLACE ECM
OK ▶ **REPLACE WATER PUMP ASSEMBLY**

| | |
|---|---|
| 4. | CHECK WATER PUMP ASSEMBLY (POWER SOURCE) |

HINT:

Confirm a good connection at the water pump assembly and ECM connectors.




(a) Disconnect the water pump assembly connector.

c

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D13-1 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Water Pump Assembly) |

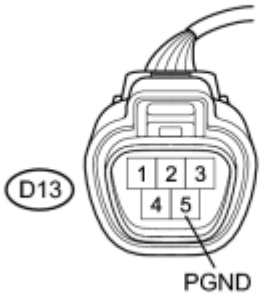
(d) Reconnect the water pump assembly connector.

NG ▶ INSPECT ENG W/P RELAY

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (WATER PUMP ASSEMBLY - BODY GROUND) |

*1




(a) Disconnect the water pump assembly connector.

c

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D13-5 (PGND) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Water Pump Assembly) |

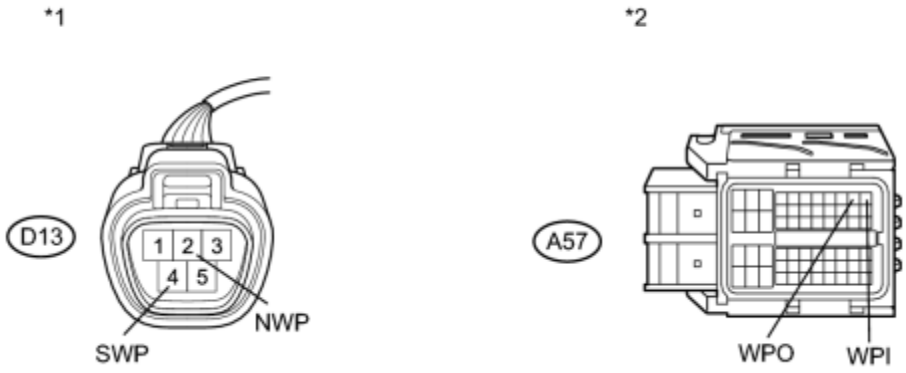
(c) Reconnect the water pump assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (WATER PUMP ASSEMBLY - BODY GROUND)

OK ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (WATER PUMP ASSEMBLY - ECM) |

(a) Disconnect the water pump assembly connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D13-2 (NWP) - A57-11 (WPI) | Always | Below 1 Ω |
| D13-4 (SWP) - A57-10 (WPO) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D13-2 (NWP) or A57-11 (WPI) - Body ground | Always | 10 kΩ or higher |
| D13-4 (SWP) or A57-10 (WPO) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Water Pump Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the water pump assembly connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (WATER PUMP ASSEMBLY - ECM)

OK ▼

| | |
|---|---|
| 7. | REPLACE WATER PUMP ASSEMBLY |

(a) Replace the water pump assembly INFO.

NEXT

| | |
|---|---|
| 8. | CHECK WHETHER DTC OUTPUT RECURS (DTC P261B, P261C OR P261D) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on.

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(f) Enter the following menus: Powertrain / Engine and ECT / Trouble codes.

(g) Read the DTCs.

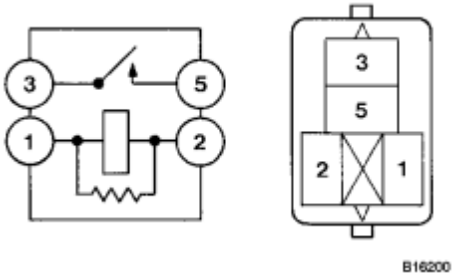
Result:

| Result | Proceed to |
|---|---|
| DTC P261B, P261C or P261D is output | A |
| DTC is not output | B |

B ▶ END

A ▶ **REPLACE ECM**

| | |
|---|---|
| 9. | INSPECT ENG W/P RELAY |




(a) Remove the ENG W/P relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | No battery voltage applied between terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Battery voltage applied between terminals 1 and 2 | Below 1 Ω |

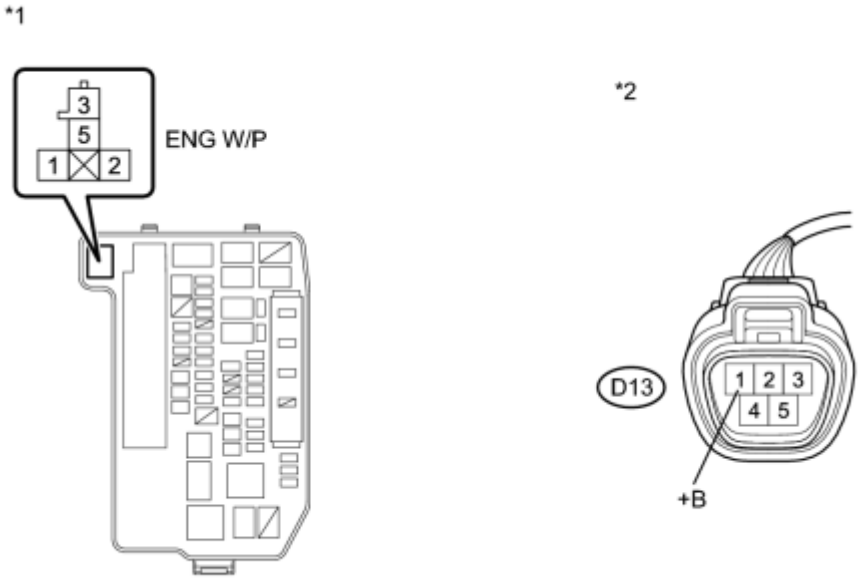
(c) Reinstall the ENG W/P relay to the engine room relay block.

NG ▶ REPLACE ENG W/P RELAY

OK

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (ENG W/P RELAY - WATER PUMP ASSEMBLY) |

(a) Remove the ENG W/P relay from the engine room relay block.




(b) Disconnect the water pump assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| ENG W/P relay terminal 5 - D13-1 (+B) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| ENG W/P relay terminal 5 or D13-1 (+B) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Engine Room Relay Block | *2 | Front view of wire harness connector<br><br>(to Water Pump Assembly) |

(d) Reinstall the ENG W/P relay to the engine room relay block.

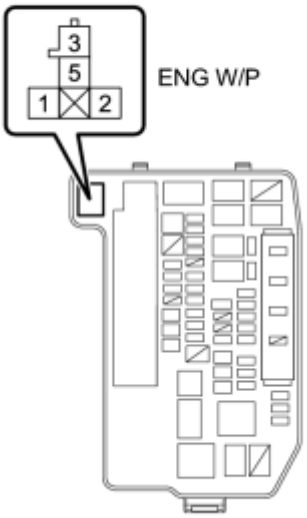
(e) Reconnect the water pump assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - WATER PUMP ASSEMBLY)

OK ▼

| | |
|---|---|
| 11. | CHECK ENG W/P RELAY (POWER SOURCE) |

*1




(a) Remove the ENG W/P relay from the engine room relay block.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| ENG W/P relay terminal 3 - Body ground | Always | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Relay Block |

(c) Reinstall the ENG W/P relay to the engine room relay block.

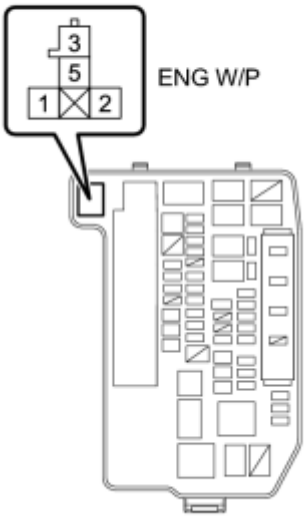
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - BATTERY)

OK ▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (ENG W/P RELAY - BODY GROUND) |

(a) Remove the ENG W/P relay from the engine room relay block.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| ENG W/P relay terminal 1 - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Relay Block |

(c) Reinstall the ENG W/P relay to the engine room relay block.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - BODY GROUND)
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (ENG W/P RELAY - EFI MAIN RELAY)**

| DTC | P2A00 | A/F Sensor Circuit Slow Response (Bank 1 Sensor 1) |
|---|---|---|

# DESCRIPTION

HINT:

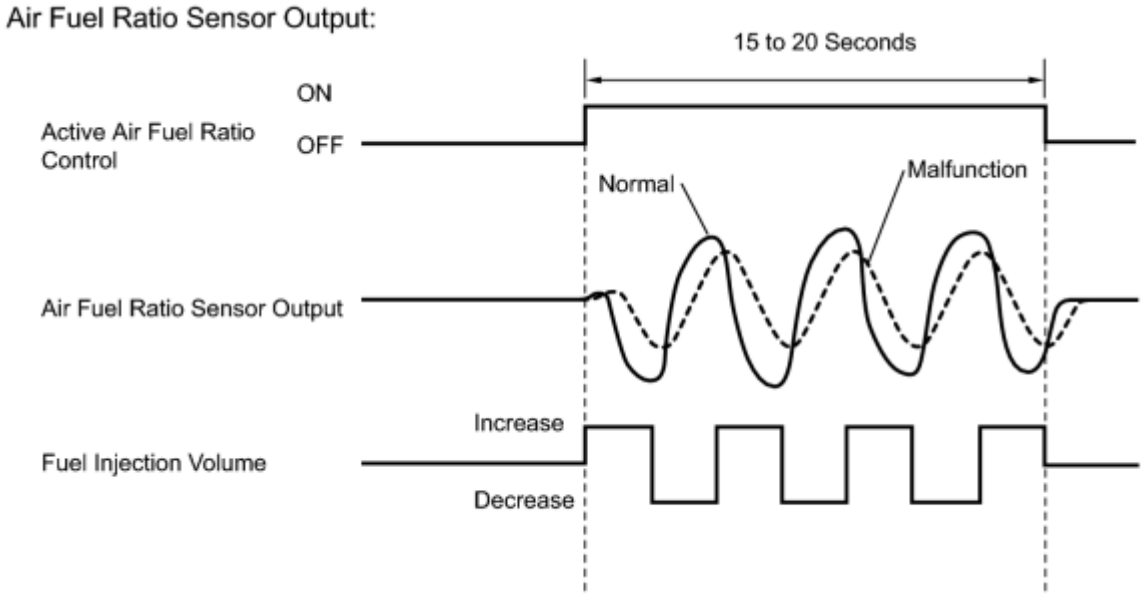
- Refer to DTC P2195 INFO.
- Sensor 1 refers to the sensor mounted in front of the three-way catalytic converter and located near the engine assembly.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P2A00 | Calculated value for air fuel ratio sensor response rate deterioration level is less than threshold (2 trip detection logic) | • Air fuel ratio sensor<br>• Air fuel ratio sensor heater<br>• EGR valve assembly<br>• ECM |

# MONITOR DESCRIPTION

After the engine is warmed up, the ECM performs air fuel ratio feedback control to maintain the air fuel ratio at the stoichiometric level. In addition, active A/F control is performed for approximately 15 to 20 seconds after preconditions are met in order to measure the air fuel ratio sensor response rate. During active A/F control, the ECM forcibly increases and decreases the injection volume a certain amount, based on the stoichiometric air fuel ratio learned during normal air fuel ratio control, and measures the air fuel ratio sensor response rate. The ECM receives a signal from the air fuel ratio sensor while performing active A/F control and uses it to calculate the air fuel ratio sensor response rate deterioration level.

If the value for air fuel ratio sensor response rate deterioration level is beyond the threshold, the ECM interprets this as a malfunction and sets the DTC.



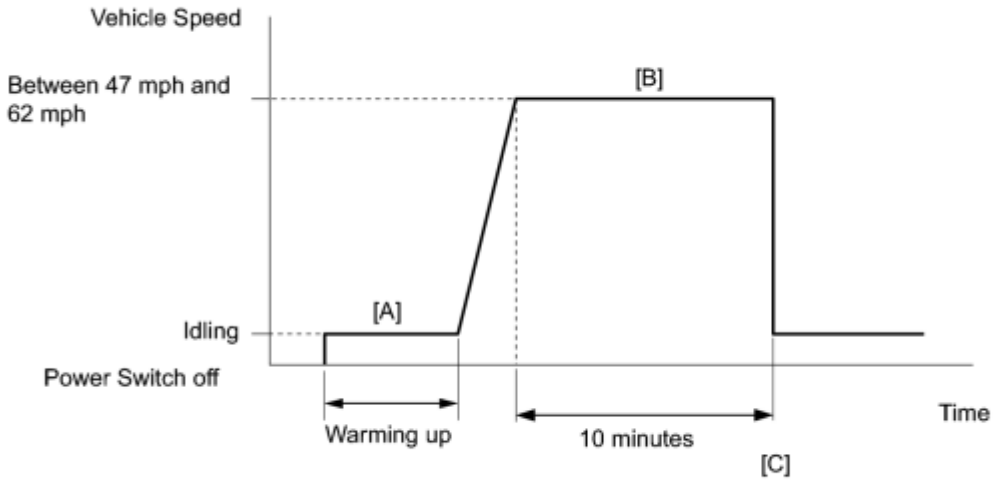

Y

# CONFIRMATION DRIVING PATTERN

HINT:

This confirmation driving pattern is used in the "Perform Confirmation Driving Pattern" procedure of the following diagnostic troubleshooting procedure.

Performing this confirmation pattern will activate the air fuel ratio sensor response monitor.




P

1. Connect the Techstream to the DLC3.
2. Turn the power switch on ((IG).

3. Turn the Techstream on.
4. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
5. Turn the power switch off and wait for 30 seconds.
6. Turn the power switch on (IG) and turn the Techstream on.
7. Enter the following menus: Powertrain / Engine and ECT / Monitor / O2 Sensor.
8. Check that the Status2 of O2 Sensor is Incomplete.
9. Put the engine in inspection mode INFO.
10. Start the engine and warm it up (until the engine coolant temperature is 75°C (167°F) or higher) [A].
11. Drive the vehicle at a constant speed of between 47 and 62 mph (75 and 100 km/h) for 10 minutes [B].
12. Those items will change to Complete after completing the drive pattern.
13. If the values indicated on the Techstream do not change, perform Readiness Monitor Drive Pattern for the air fuel ratio sensor and heated oxygen sensor INFO.
14. Check the monitor result values on the Techstream by entering the following menus: Powertrain / Engine and ECT / Monitor / O2 Sensor / Details / RANGE B1S1.
15. Note the value of the Monitor Result.
16. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.
17. Read the pending DTC [C].
18. If a pending DTC is output, the system is malfunctioning.

    HINT:

    If a pending DTC is not output, perform the following procedure.

19. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
20. Input the DTC: P2A00.
21. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment<br>○ Number of DTCs which do not fulfill DTC preconditions has reached ECU memory limit |

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.
    - If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [B] again.
22. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

23. Check the judgment result.

    HINT:

    - If the judgment result shows ABNORMAL, the system has a malfunction.
    - If the judgment result shows NORMAL, the system is normal.

24. If the test result is INCOMPLETE or UNKNOWN and no pending DTC is output, perform a universal trip and check for permanent DTCs INFO.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P2A00: Air fuel ratio sensor (bank 1) slow response |
| Required Sensors/Components (Main) | Air fuel ratio sensor |
| Required Sensors/Components (Related) | Vehicle speed sensor, Crankshaft position sensor |
| Frequency of Operation | Once per driving cycle |
| Duration | 15 to 20 seconds |
| MIL Operation | 2 driving cycles |
| Sequence of Operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | P0016 (VVT System Bank 1 - Misalignment)<br><br>P0031, P0032, P101D (Air Fuel Ratio Sensor Heater - Sensor 1)<br><br>P0102, P0103 (Mass Air Flow Meter)<br><br>P0107, P0108 (Manifold Absolute Pressure)<br><br>P0112, P0113 (Intake Air Temperature Sensor)<br><br>P0115, P0117, P0118 (Engine Coolant Temperature Sensor)<br><br>P0120, P0121, P0122, P0123, P0220, P0222, P0223, P2135 (Throttle Position Sensor)<br><br>P0125 (Insufficient Engine Coolant Temperature for Closed Loop Fuel Control)<br><br>P0128 (Thermostat) |

| | |
|---|---|
| | P0171, P0172 (Fuel System)<br><br>P0301, P0302, P0303, P0304 (Misfire)<br><br>P0335 (Crankshaft Position Sensor)<br><br>P0401 (EGR System (Closed))<br><br>P0451, P0452, P0453 (EVAP System)<br><br>P0505 (Idle speed control) |
| Active air fuel ratio control | Performing |
| Active air fuel ratio control performed when following conditions met | - |
| Battery voltage | 11 V or more |
| Engine coolant temperature | 75°C (167°F) or more |
| Idling | OFF |
| Engine speed | Less than 4000 rpm |
| Air fuel ratio sensor status | Activated |
| Fuel-cut | OFF |
| Engine load | 10 to 70% |
| Catalyst monitor | Not yet |
| Mass air flow | 4.5 to 12 gm/sec |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Response rate deterioration level | Less than 0.17 V |

# MONITOR RESULT

Refer to Checking Monitor Status INFO.

# WIRING DIAGRAM

Refer to DTC P2195 INFO.

# INSPECTION PROCEDURE

HINT:

Malfunctioning areas can be identified by performing the Control the Injection Volume for A/F Sensor in the Active Test. The Control the Injection Volume for A/F Sensor function can help to determine whether the air fuel ratio sensor, heated oxygen sensor and other potential trouble areas are malfunctioning.

The following instructions describe how to conduct the Control the Injection Volume for A/F Sensor operation using the Techstream.

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Put the engine in inspection mode INFO.
4. Start the engine.
5. Warm up the engine at an engine speed of 2500 rpm for approximately 90 seconds.
6. Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor.
7. Perform the Active Test operation with the engine idling (press the RIGHT or LEFT button to change the fuel injection volume).
8. Monitor the output voltages of the air fuel ratio and heated oxygen sensors (AFS Voltage B1S1 and O2S B1S2) displayed on the Techstream.

HINT:

- The Control the Injection Volume for A/F Sensor operation lowers the fuel injection volume by 12.5% or increases the injection volume by 25%.

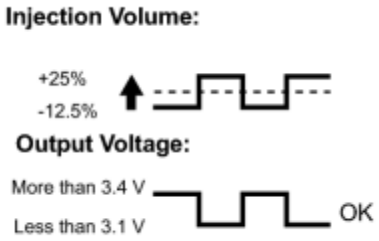
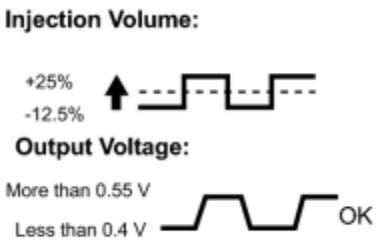
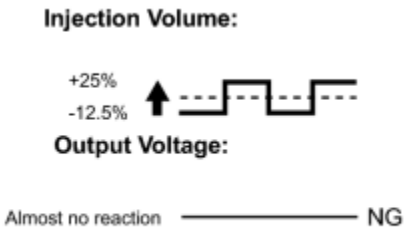
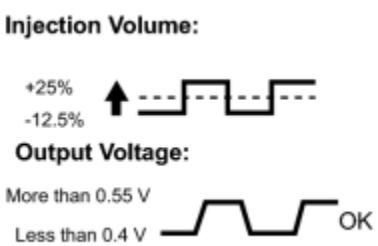
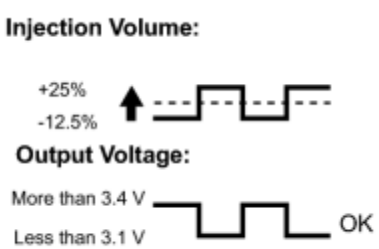
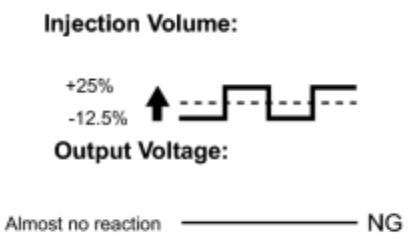
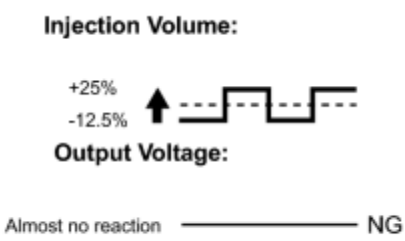
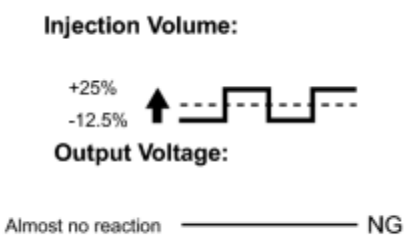
- Each sensor reacts in accordance with increases in the fuel injection volume.

| Techstream Display (Sensor) | Injection Volume | Status | Voltage |
|---|---|---|---|
| AFS Voltage B1S1 (Air fuel ratio) | +25% | Rich | Less than 3.1 V |
| AFS Voltage B1S1 (Air fuel ratio) | -12.5% | Lean | More than 3.4 V |
| O2S B1S2 (Heated oxygen) | +25% | Rich | More than 0.55 V |
| O2S B1S2 (Heated oxygen) | -12.5% | Lean | Less than 0.4 V |

NOTICE:

The air fuel ratio sensor has an output delay of a few seconds and the heated oxygen sensor has a maximum output delay of approximately 20 seconds.

| Case | Air Fuel Ratio Sensor (Sensor 1) Output Voltage | Heated Oxygen Sensor (Sensor 2) Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| 1 | | | - |

| Case | Air Fuel Ratio Sensor (Sensor 1)<br><br>Output Voltage | Heated Oxygen Sensor (Sensor 2)<br><br>Output Voltage | Main Suspected Trouble Area |
|---|---|---|---|
| |  |  | |
| 2 |  |  | • Air fuel ratio sensor<br>• Air fuel ratio sensor heater<br>• Air fuel ratio sensor circuit |
| 3 |  |  | • Heated oxygen sensor<br>• Heated oxygen sensor heater<br>• Heated oxygen sensor circuit<br>• Exhaust gas leaks |
| 4 |  |  | • Fuel pressure<br>• Exhaust gas leaks<br><br>(Air fuel ratio extremely lean or rich) |

- Performing Control the Injection Volume for A/F Sensor enables technicians to check and graph the voltage outputs of both the air fuel ratio and heated oxygen sensors.
- To display the graph, enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Injection Volume for A/F Sensor / A/F Control System / AFS Voltage B1S1 and O2S B1S2.

HINT:

- DTC P2A00 may also be set when the air fuel ratio remains rich or lean.
- A low air fuel ratio sensor voltage could be caused by a rich air fuel mixture. Check for conditions that would cause the engine to run rich.

- A high air fuel ratio sensor voltage could be caused by a lean air fuel mixture. Check for conditions that would cause the engine to run lean.
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P2A00) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2A00 is output | A |
| DTC P2A00 and other DTCs are output | B |

HINT:

If any DTCs other than P2A00 are output, troubleshoot those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | INSPECT AIR FUEL RATIO SENSOR (HEATER RESISTANCE) INFO |

NG ▶ REPLACE AIR FUEL RATIO SENSOR

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (AIR FUEL RATIO SENSOR - ECM) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AIR FUEL RATIO SENSOR - ECM)

OK ▼

| | |
|---|---|
| 4. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle referring to the Confirmation Driving Pattern.

NEXT

| | |
|---|---|
| 5. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(e) Read the Pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2A00 is output | A |
| DTC is not output | B |

B CHECK FOR INTERMITTENT PROBLEMS

A

| | |
|---|---|
| 6. | REPLACE AIR FUEL RATIO SENSOR |

(a) Replace the air fuel ratio sensor INFO.

NEXT

| | |
|---|---|
| 7. | PERFORM CONFIRMATION DRIVING PATTERN |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs.

(e) Put the engine in inspection mode INFO.

(f) Drive the vehicle referring to the Confirmation Driving Pattern.

NEXT

| | |
|---|---|
| 8. | CHECK WHETHER DTC OUTPUT RECURS (DTC P2A00) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(e) Read the Pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC P2A00 is output | A |
| DTC is not output | B |

B ▶ END

A

| | |
|---|---|
| 9. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.

- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | **0 Steps** | **0 to 30 Steps** |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 10. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 11. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT

| | |
|---|---|
| 12. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine and warm it up.

(i) Drive the vehicle in accordance with the driving pattern described in the Confirmation Driving Pattern.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P2A00.

(l) Check the DTC judgment result.

NEXT **END**

| | | |
|---|---|---|
| DTC | P3190 | Poor Engine Power |
| DTC | P3191 | Engine does not Start |
| DTC | P3193 | Fuel Run Out |

# DESCRIPTION

From the power management control ECU, the ECM receives data such as power output required for the engine (required output), estimated torque produced by the engine (estimated torque), engine speed of control target (target speed), and whether the engine is in start mode or not. Then, based on the required output and target speed, the ECM calculates a target torque that is to be produced by the engine and compares it with the estimated torque. If the estimated torque is very low compared with the target torque, or the engine start mode continues for the specific duration calculated by the coolant temperature, an abnormal condition is detected.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P3190 | Following conditions continue at a fixed engine speed or a fixed length of time (1 trip detection logic):<br>• Communication with power management control ECU is normal<br>• Engine speed is a fixed value or more<br>• Engine start mode is not active<br>• Target torque is a fixed value<br>• Ratio of estimated torque against target torque is less than 20% | • Intake system<br>• Throttle body assembly<br>• Fuel pressure<br>• Engine<br>• Mass air flow meter sub-assembly<br>• Out of fuel<br>• Engine coolant temperature sensor<br>• Crankshaft position sensor<br>• Camshaft position sensor<br>• EGR valve assembly<br>• ECM |
| P3191 | Following conditions continue at a fixed engine speed or a fixed length of time (1 trip detection logic):<br>• Communication with power management control ECU is normal<br>• Engine speed is a fixed value or more<br>• Engine start mode is active<br>• Engine start no-determination for 100 engine revolutions or more, and 6 seconds or more | • Intake system<br>• Throttle body assembly<br>• Fuel pressure<br>• Engine<br>• Mass air flow meter sub-assembly<br>• Out of fuel<br>• Engine coolant temperature sensor<br>• Crankshaft position sensor<br>• Camshaft position sensor<br>• EGR valve assembly<br>• ECM |
| P3193 | Following conditions are met (1 trip detection logic):<br>• Fuel low level signal input into ECM<br>• Detection condition for P3190 or P3191 is satisfied | • Out of fuel<br>• ECM |

# MONITOR DESCRIPTION

The ECM and power management control ECU are connected by a communication line called CAN. The ECM sends engine speed data and other data to the power management control ECU while the power management control ECU sends the information such as a requirement for the engine power to the ECM using the CAN communication line. When the communication between the ECM and power management control ECU is normal and the following items become a specified condition, the ECM illuminates the MIL and sets a DTC.

1. Engine speed
2. Target torque
3. Ratio of target torque against estimated torque
4. Fuel level

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P3190: Poor engine power<br><br>P3191: Engine does not start |
| Required sensors/components | Main sensors: Crankshaft position sensor<br><br>Related sensors: Power management control ECU |
| Frequency of operation | Continuous |
| Duration | 100 engine revolutions or 6 seconds |
| MIL operation | Immediately (MIL illumination) |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Fuel cut operation | Not operated |
| Engine speed | 650 rpm or more (varies with engine coolant temperature) |
| Communication with power management control ECU | No malfunction |

# TYPICAL MALFUNCTION THRESHOLDS

**P3190**

| | |
|---|---|
| Time for low engine torque | 100 engine revolutions or more, and 6 seconds or more<br><br>(varies with engine coolant temperature) |
| Fuel level | Not empty |

| | |
|---|---|
| Engine start no-determination time (receive from power management control ECU) | 100 engine revolutions or more, and 6 seconds or more<br><br>(varies with engine coolant temperature) |
| Fuel level | Not empty |

# INSPECTION PROCEDURE

HINT:

- Repeating this inspection for symptom confirmation may cause the SOC to drop, preventing the system from entering the READY-on state. In this case, use the THS charger to charge the HV battery.
- Cranking the engine once causes the SOC to drop approximately 1%.
- Charging the HV battery once (10 minutes) using the THS charger restores the SOC approximately 2%.
- Charging the HV battery using the THS charger takes approximately 10 minutes when the battery temperature is 25°C (77°F) or approximately 30 minutes when the battery temperature is 0°C (32°F).
- The THS charger is a supplemental charging device that charges the HV battery enough to enable the engine to start (the vehicle can enter the READY-on state).
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, whether the air-fuel ratio was lean or rich, as well as other data recorded at the time of a malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK ANY OTHER DTCS OUTPUT (IN ADDITION TO DTC P3190, P3191 AND/OR P3193) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch ON (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Read the DTCs.

**Result**

| Result | Proceed to |
|---|---|
| DTC P3190, P3191 and/or P3193 are output | A |
| DTC P3190, P3191 and/or P3193, and other DTCs are output | B |

HINT:

If any other codes besides P3190, P3191 and/or P3193 are output, perform troubleshooting for those DTCs first.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK ANY OTHER DTC OUTPUT BY HYBRID CONTROL SYSTEM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch ON (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Read the DTCs.

**Result**

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| Hybrid control system DTC is output | B |

B ▶ GO TO HYBRID CONTROL SYSTEM (DTC CHART)

A ▼

| | |
|---|---|
| 3. | CHECK SHORTAGE OF FUEL |

NG ▶ REFILL FUEL

OK ▼

| | |
|---|---|
| 4. | CHECK INTAKE SYSTEM |

(a) Check the intake system for vacuum leaks INFO.

OK:

No leaks in intake system.

NG ▶ REPAIR OR REPLACE INTAKE SYSTEM

OK ▼

| | |
|---|---|
| 5. | CHECK FOR UNUSUAL NOISE OR VIBRATION WHEN STARTING ENGINE OR REVVING UP |

OK:

Unusual noise and vibration do not occur.

NG ▶ REPAIR OR REPLACE MALFUNCTIONING PART

OK

| | |
|---|---|
| 6. | CHECK FUEL PRESSURE |

(a) Check the fuel pressure INFO.

NG ▶ CHECK FUEL LINE

OK

| | |
|---|---|
| 7. | INSPECT FREEZE FRAME DATA |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT Trouble Codes / Freeze Frame Data.

(e) Calculate the requested torque* and compare it with Actual Engine Torque.

HINT:

*: The requested torque is calculated by putting "Requested Engine Torque" and "HV Target Engine Speed" from the freeze frame data into the following formula:

Requested torque = Requested Engine Torque (kW) / HV Target Engine Speed (rpm) x 6112

Standard:

Actual Engine Torque is 60% or more of the request torque.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B ▶ INSPECT MASS AIR FLOW METER SUB-ASSEMBLY

A

| | |
|---|---|
| 8. | INSPECT THROTTLE BODY ASSEMBLY |

(a) Inspect the throttle body assembly INFO.

NG ▶ REPLACE THROTTLE BODY ASSEMBLY

OK

| | |
|---|---|
| 9. | INSPECT MASS AIR FLOW METER SUB-ASSEMBLY |

(a) Inspect the mass air flow meter sub-assembly INFO.

NG ▶ REPLACE MASS AIR FLOW METER SUB-ASSEMBLY

OK ▼

| | |
|---|---|
| 10. | INSPECT ENGINE COOLANT TEMPERATURE SENSOR |

(a) Inspect the engine coolant temperature sensor INFO.

NG ▶ REPLACE ENGINE COOLANT TEMPERATURE SENSOR

OK ▼

| | |
|---|---|
| 11. | INSPECT CRANKSHAFT POSITION SENSOR |

(a) Inspect the crankshaft position sensor INFO.

NG ▶ REPLACE CRANKSHAFT POSITION SENSOR

OK ▼

| | |
|---|---|
| 12. | REPLACE CAMSHAFT POSITION SENSOR |

(a) Replace the camshaft position sensor INFO.

NEXT ▼

| | |
|---|---|
| 13. | CHECK WHETHER DTC OUTPUT RECURS (DTC P3190, P3191 OR P3193) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine.

(i) Allow the engine to idle for 10 seconds or more.

(j) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

(k) Read the pending DTCs.

Result:

| Result | Proceed to |
|---|---|
| P3190, P3191 or P3193 is output | A |
| DTC is not output | B |

B ▶ END

A ▼

| | |
|---|---|
| 14. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE EGR STEP POSITION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Put the engine in inspection mode INFO.

(e) Start the engine and warm it up until the engine coolant temperature reaches 75°C (167°F) or more.

HINT:

The A/C switch and all accessory switches should be off.

(f) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the EGR Step Position.

(g) Confirm the Throttle Idle Position is ON and check the engine idling condition and MAP values in the Data List while performing the Active Test.

HINT:

- Do not leave the EGR valve open for 10 seconds or more during the Active Test.
- Be sure to return the EGR valve to step 0 when the Active Test is completed.
- Do not open the EGR valve 30 steps or more during the Active Test.

OK:

MAP and idling condition change in response to EGR step position when Throttle Idle Position is ON in Data List.

Standard:

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |

| - | EGR Step Position (Active Test) | |
|---|---|---|
| | 0 Steps | 0 to 30 Steps |
| Idling condition | Steady idling | Idling changes from steady to rough idling |
| MAP<br><br>(Data List) | MAP value is 20 to 40 kPa (150 to 300 mmHg)<br><br>(EGR valve is fully closed) | MAP value is at least +10 kPa (75 mmHg) higher than when EGR valve is fully closed |

HINT:

During Active Test, if the idling condition does not change in response to EGR step position, then there is probably a malfunction in the EGR valve.

Result:

| Result | Proceed to |
|---|---|
| Outside of standard range | A |
| Within standard range | B |

B ▶ REPLACE ECM

A ▼

| | |
|---|---|
| 15. | INSPECT EGR VALVE ASSEMBLY |

(a) Remove the EGR valve assembly INFO.

(b) Check if the EGR valve is stuck open.

OK:

EGR valve is tightly closed.

(c) Reinstall the EGR valve assembly INFO.

NG ▶ REPLACE EGR VALVE ASSEMBLY

OK ▼

| | |
|---|---|
| 16. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT ▼

| | |
|---|---|
| 17. | CONFIRM WHETHER MALFUNCTION HAS BEEN SUCCESSFULLY REPAIRED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTC INFO.

(e) Turn the power switch off and wait for 30 seconds.

(f) Turn the power switch on (IG) and turn the Techstream on.

(g) Put the engine in inspection mode INFO.

(h) Start the engine.

(i) Allow the engine to idle for 10 seconds or more.

(j) Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.

(k) Input the DTC: P3190, P3191 or P3193.

(l) Check the DTC judgment result.

NEXT ▶ **END**

| | |
|---|---|
| 18. | CHECK FUEL LINE |

(a) Check the fuel lines for leaks or blockage.

NG ▶ REPAIR OR REPLACE FUEL LINE
OK ▶ **REPLACE FUEL PUMP**

| | | |
|---|---|---|
| DTC | U0293 | Lost Communication with HV ECU |

# MONITOR DESCRIPTION

The Controller Area Network (CAN) is a serial data communication system for real-time application. It is a multiplex communication system designed for on-vehicle use that provides a superior communication speed of 500 kbps and a capability to detect malfunctions. Through the combination of the CANH and CANL bus lines, the CAN is able to maintain communication based on differential voltage.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0293 | Communication with power management control ECU is interrupted<br><br>(1 trip detection logic) | • Wire harness<br>• Power management control ECU |

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | U0293: Lost communication with power management control ECU |
| Required Sensors/Components (Main) | ECM |
| Frequency of Operation | Continuous |
| Duration | 0.576 seconds |
| MIL Operation | Immediately |
| Sequence of Operation | None |

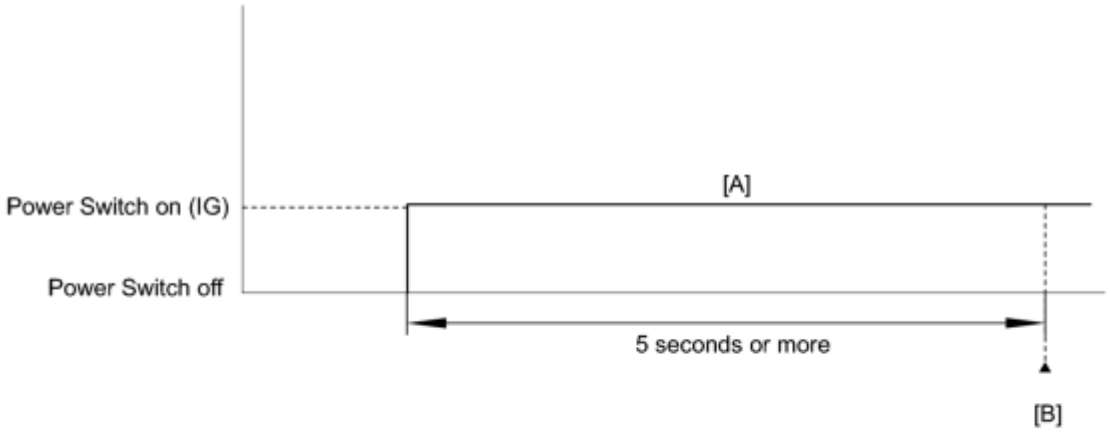
# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| Monitor runs whenever following DTCs are not present | None |
| Battery Voltage | 10.5 V or more (0.5 seconds or more) |
| Power switch | On (IG) (0.5 seconds or more) |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Communication signal | No signal from power management control ECU |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure) INFO.
4. Turn the power switch off and wait for 30 seconds.
5. Turn the power switch on (IG) and turn the Techstream on.
6. Wait 5 seconds or more [A].
7. Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.
8. Read the DTC [B].
9. If a DTC is output, the system is malfunctioning.

   HINT:

   If a DTC is not output, perform the following procedure.

10. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
11. Input the DTC: U0293.
12. Check the DTC judgment result.

| Techstream Display | Description |
|---|---|
| NORMAL | ○ DTC judgment completed<br>○ System normal |
| ABNORMAL | ○ DTC judgment completed<br>○ System abnormal |
| INCOMPLETE | ○ DTC judgment not completed<br>○ Perform driving pattern after confirming DTC enabling conditions |
| UNKNOWN | ○ Unable to perform DTC judgment |

| Techstream Display | Description |
| --- | --- |
| | ○ Number of DTCs which do not fulfill DTC preconditions has reached ECU's memory limit |

HINT:

- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.
- If the judgment result shows INCOMPLETE or UNKNOWN, perform steps [B] again.

13. Enter the following menus: Powertrain / Engine and ECT / Utility / All Readiness.
14. Check the judgment result.

HINT:

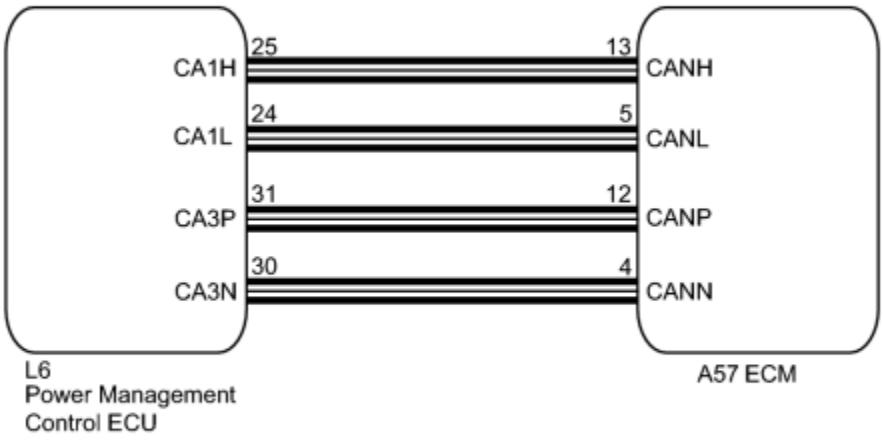
- If the judgment result shows ABNORMAL, the system has a malfunction.
- If the judgment result shows NORMAL, the system is normal.

15. If the test result is INCOMPLETE or UNKNOWN and no DTC is output, perform a universal trip and check for permanent DTCs INFO.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




: CAN Bus Line

# INSPECTION PROCEDURE

Refer to the CAN Communication System INFO.

# RELATED DTCS

| DTC | Monitoring Item | See page |
|---|---|---|
| P043E | Reference orifice clogged (built into canister pump module) | INFO |
| P043F | Reference orifice high-flow (built into canister pump module) | |
| P0441 | • Purge VSV (Vacuum Switching Valve) stuck closed<br>• Purge VSV stuck open<br>• Purge flow | INFO |
| P0451 | Canister pressure sensor (built into canister pump module) signal noise | INFO |
| P0452 | Canister pressure sensor (built into canister pump module) voltage low | |
| P0453 | Canister pressure sensor (built into canister pump module) voltage high | |
| P0455 | EVAP gross leak | INFO |
| P0456 | EVAP small leak | |
| P2401 | Leak detection pump stuck OFF (built into canister pump module) | INFO |
| P2402 | Leak detection pump stuck ON (built into canister pump module) | |
| P2419 | Vent valve stuck closed (built into canister pump module) | INFO |
| P2420 | Vent valve stuck open (vent) (built into canister pump module) | INFO |
| P2610 | Soak timer (built into ECM) | INFO |

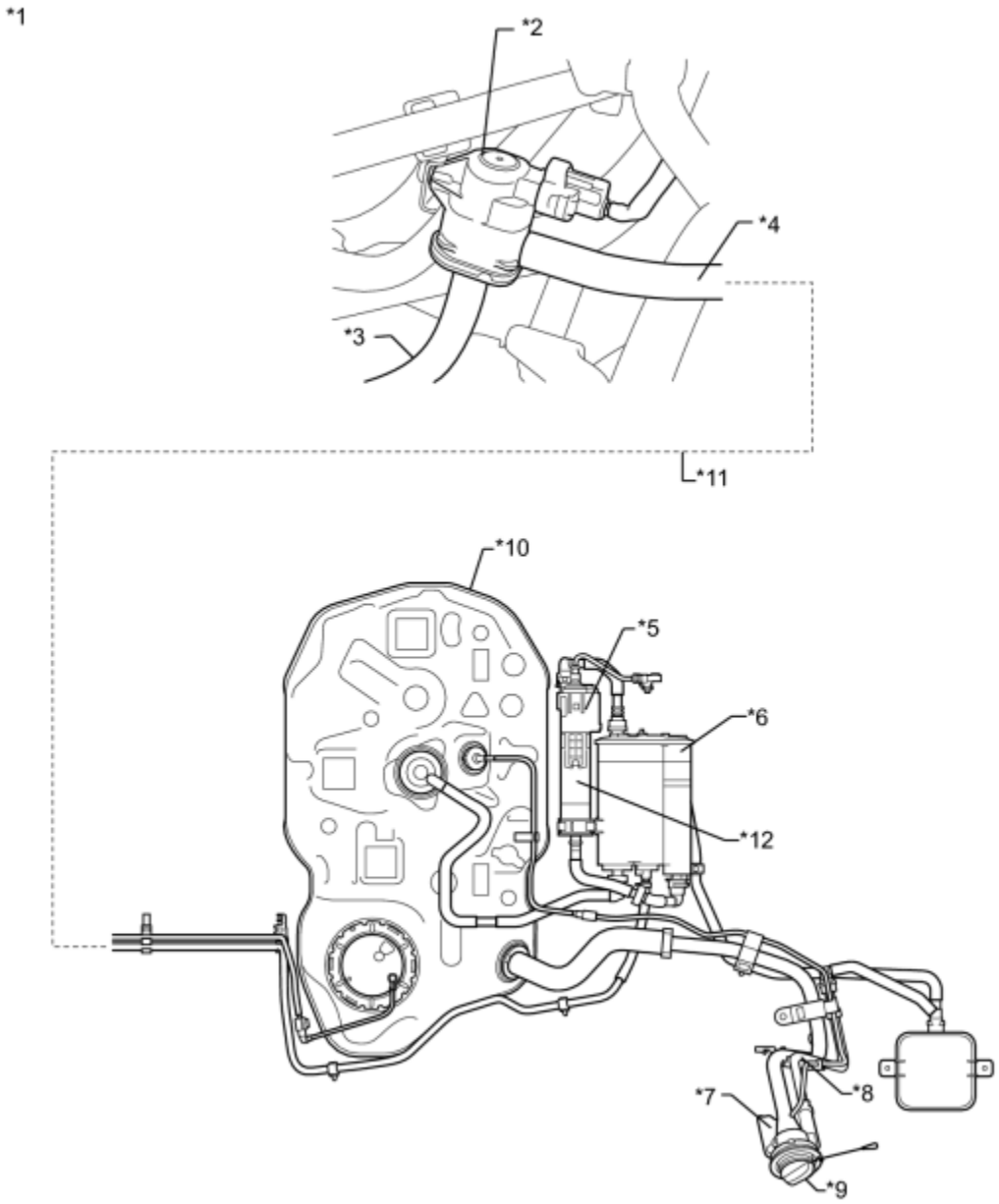
If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

| DTCs / Malfunctioning Areas | P043E P043F | P0441 | P0451 | P0452 | P0453 | P0455 | P0456 | P2401 P2402 | P2419 | P2420 |
|---|---|---|---|---|---|---|---|---|---|---|
| Reference orifice clogged | ● | | | | | | | ● | ● | |
| Reference orifice high-flow | ● | | | | | | | ● | ● | |
| Purge VSV stuck open | | ● | | | | ● | | | | |
| Purge VSV stuck closed | | ● | | | | | | | | |
| Canister pressure sensor signal noise | | | ● | | | | | | | |
| Canister pressure sensor low output | | | | ● | | | | | | |
| Canister pressure sensor high output | | | | | ● | | | | | |
| Gross leak | | ● | | | | ● | | | | |
| Small leak | | | | | | | ● | | | |
| Leak detection pump stuck OFF | ● | | | | | | | ● | ● | |
| Leak detection pump stuck ON | ● | | | | | | | ● | ● | |
| Vent valve stuck closed | ● | | | | | | | ● | ● | |
| Vent valve stuck open (vent) | | | | | | | | | | ● |

NOTICE:

If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

# DESCRIPTION




c

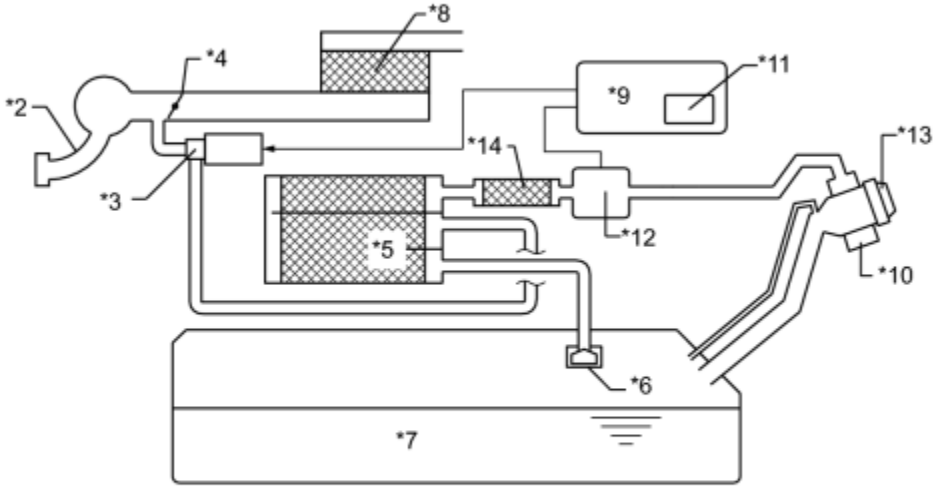
**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Location of EVAP (Evaporative Emission) System | *2 | Purge VSV |
| *3 | EVAP Hose (to Intake Manifold) | *4 | EVAP Hose (from Canister) |
| *5 | Canister Pump Module | *6 | Canister |
| *7 | Canister Filter | *8 | Air Inlet Port |
| *9 | Fuel Cap | *10 | Fuel Tank |
| *11 | Purge Line | *12 | No. 2 Canister Filter |

HINT:

The canister pressure sensor, the leak detection pump and the vent valve are built into the canister pump module.

*1




c

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | EVAP System Circuit | *2 | Intake Manifold |
| *3 | Purge VSV | *4 | Throttle Valve |
| *5 | Canister | *6 | Cut-off Valve |
| *7 | Fuel Tank | *8 | Air Cleaner |
| *9 | ECM | *10 | Canister Filter |
| *11 | Soak Timer | *12 | Canister Pump Module |
| *13 | Fuel Cap | *14 | No. 2 Canister Filter |

NOTICE:

In this vehicle's EVAP system, turning on the vent valve does not seal off the EVAP system. To check for leaks in the EVAP system, disconnect the air inlet vent hose and apply pressure from the atmospheric side of the canister.

While the engine is running, if a predetermined condition (closed-loop, etc.) is met, the purge VSV is opened by the ECM and stored fuel vapors in the canister are purged into the intake manifold. The ECM changes the duty cycle of the purge VSV to control purge flow volume.

The purge flow volume is also determined by the intake manifold pressure. Atmospheric pressure is allowed into the canister through the vent valve to ensure that the purge flow is maintained when negative pressure (vacuum) is applied to the canister.

The following two monitors run to confirm the appropriate EVAP system operation.

1. Key-off monitor

This monitor checks for EVAP (evaporative emission) system leaks and canister pump module malfunctions. The monitor starts 5 hours* after the power switch is turned off. At least 5 hours are required for the fuel to cool down to stabilize the EVAP pressure, thus making the EVAP system monitor more accurate.

The leak detection pump creates negative pressure (vacuum) in the EVAP system and the pressure is measured. Finally, the ECM monitors for leaks from the EVAP system, and malfunctions in both the canister pump module and purge VSV based on the EVAP pressure.

HINT:

*: If the engine coolant temperature is not below 35°C (95°F) 5 hours after the power switch is turned off, the monitor check starts 2 hours later. If it is still not below 35°C (95°F) 7 hours after the power switch is turned off, the monitor check starts 2.5 hours later.

2. Purge flow monitor

The purge flow monitor consists of the 2 monitors. The 1st monitor is conducted every time and the 2nd monitor is activated if necessary.

- The 1st monitor

  While the engine is running and the purge VSV (Vacuum Switching Valve) is on (open), the ECM monitors the purge flow by measuring the EVAP pressure change. If negative pressure is not created, the ECM begins the 2nd monitor.

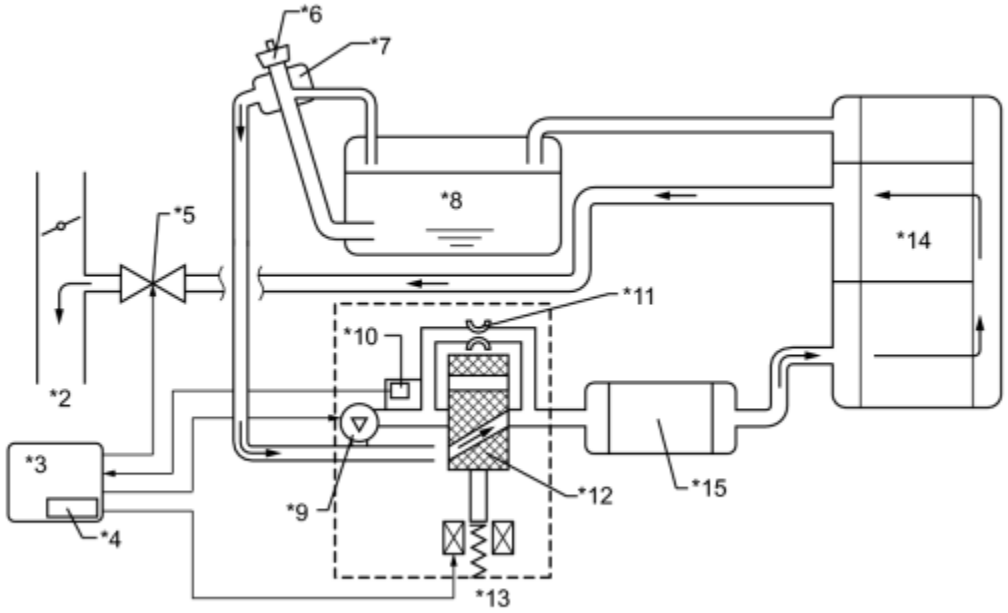
- The 2nd monitor

  The vent valve is turned off (open) and the EVAP pressure is measured. If the variation in the pressure is less than 0.15 kPa (1.13 mmHg), the ECM interprets this as the purge VSV being stuck closed, and illuminates the MIL and sets DTC P0441 (2 trip detection logic).

Atmospheric pressure check:

In order to ensure reliable malfunction detection, the variation between the atmospheric pressures, before and after the purge flow monitor, is measured by the ECM.

*1



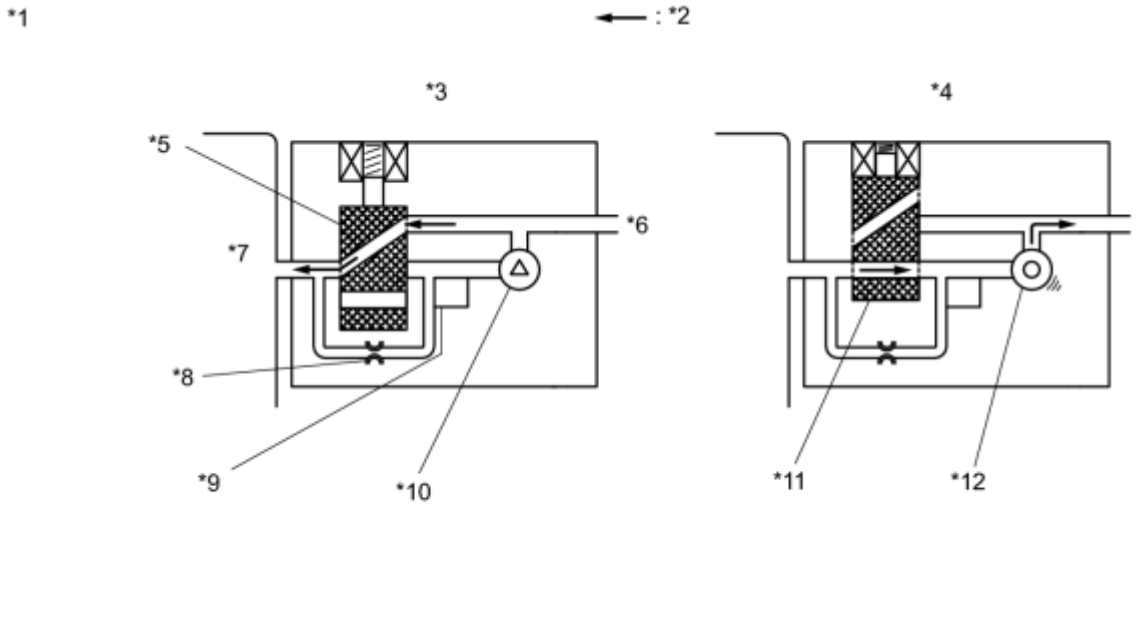

c

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | EVAP Purge Flow | *2 | to Intake Manifold |
| *3 | ECM | *4 | Soak Timer |
| *5 | Purge VSV (on) | *6 | Fuel Cap |
| *7 | Canister Filter | *8 | Fuel Tank |
| *9 | Leak Detection Pump (off) | *10 | Canister Pressure Sensor |
| *11 | Reference Orifice (0.02 inch) | *12 | Vent Valve (off) |
| *13 | Canister Pump Module | *14 | Canister |
| *15 | No. 2 Canister Filter | - | - |

| Component | Operation |
|---|---|
| Canister | Contains activated charcoal to absorb EVAP (evaporative emissions) generated in fuel tank. |
| Cut-off valve | Located in fuel tank. Valve floats and closes when fuel tank is 100% full. |
| Purge VSV (Vacuum Switching Valve) | Opens or closes line between canister and intake manifold. ECM uses purge VSV to control EVAP purge flow. In order to discharge EVAP absorbed by canister to intake manifold, ECM opens purge VSV. EVAP discharge volume to intake manifold controlled by purge VSV duty cycle (current-carrying time) (Open: on; Closed: off). |
| Soak timer | Built into ECM. To ensure accurate EVAP monitor, measures 5 hours (+/-15 min) after power switch is turned off. This allows fuel to cool down, stabilizing EVAP pressure. When approximately 5 hours elapsed, ECM activates (refer to fig. 3). |
| Canister pump module | Consists of (a) to (d) below. Canister pump module cannot be disassembled. |

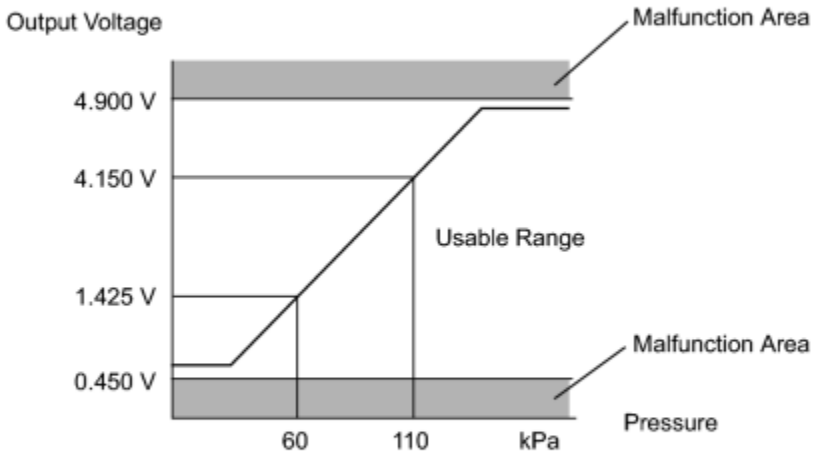
| Component | Operation |
|---|---|
| (a) Vent valve | Vents and closes EVAP system. When ECM turns valve on, EVAP system is closed. When ECM turns valve off, EVAP system is vented. Negative pressure (vacuum) is created in EVAP system to check for EVAP leaks by closing purge VSV, turning on vent valve (closing it) and operating leak detection pump (refer to fig. 1). |
| (b) Canister pressure sensor | Indicates pressure as voltage. ECM supplies regulated 5 V to canister pressure sensor, and uses feedback from sensor to monitor EVAP system pressure (refer to fig. 2). |
| (c) Leak detection pump | Creates negative pressure (vacuum) in EVAP system for leak check. |
| (d) Reference orifice | Has opening with 0.02 inch diameter. Vacuum is produced through orifice by closing purge VSV, turning off vent valve and operating leak detection pump to monitor reference pressure. Reference pressure indicates small leak of EVAP. |




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Canister Pump Module (fig. 1) | *2 | Airflow |
| *3 | Condition: Purge Flow | *4 | Condition: Leak Check |
| *5 | Vent Valve: off (vent) | *6 | to Canister Filter (Atmosphere) |
| *7 | Canister | *8 | Reference Orifice (0.02 Inch) |
| *9 | Canister Pressure Sensor | *10 | Leak Detection Pump: off |
| *11 | Vent Valve: on (closed) | *12 | Leak Detection Pump: on |

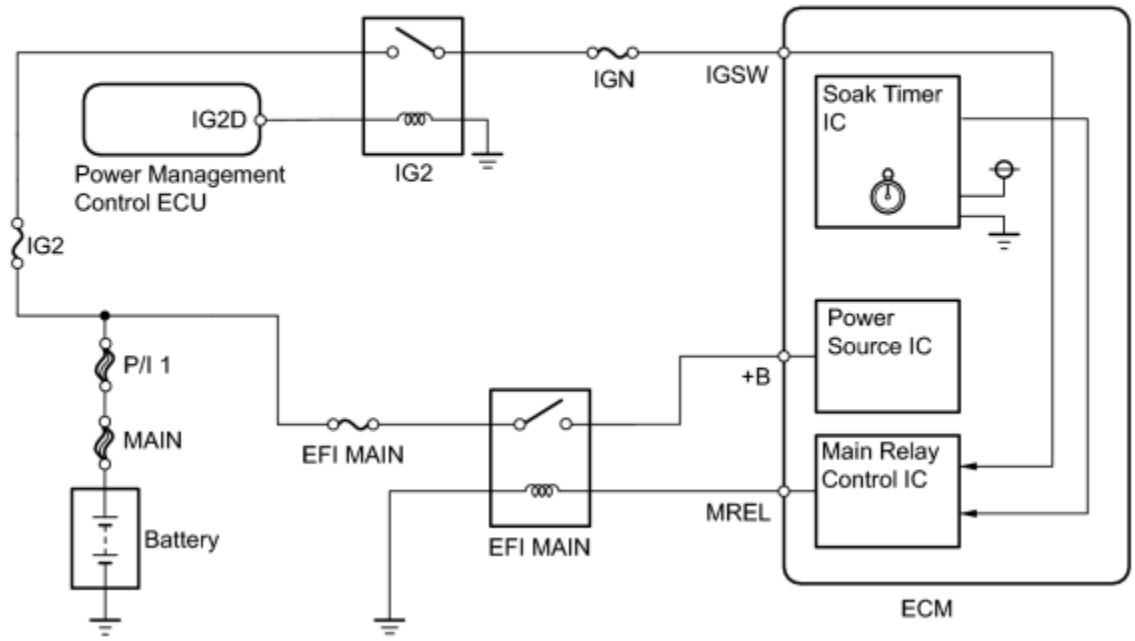
Canister Pressure Sensor Specification (fig. 2)



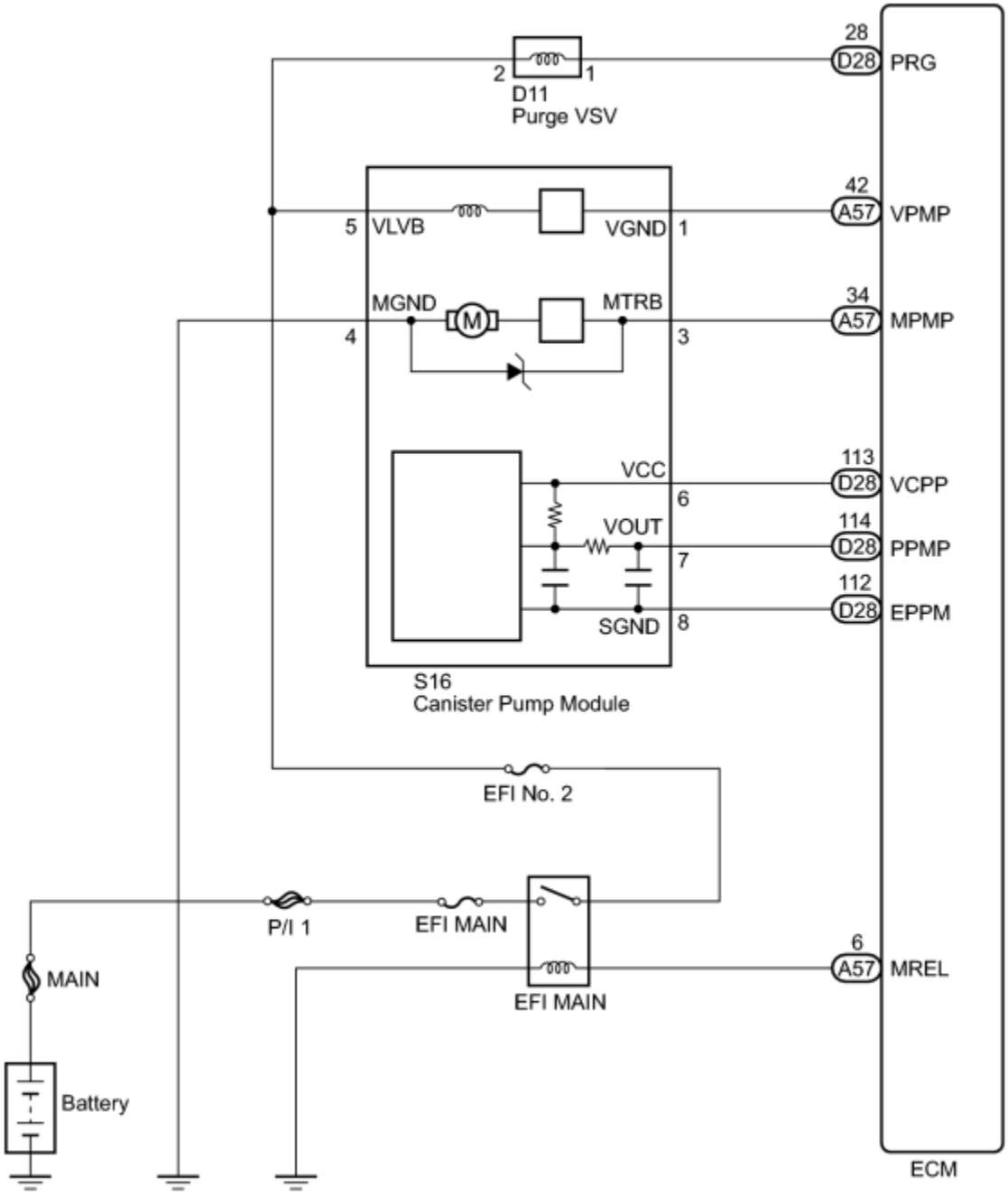

HINT:

Standard atmospheric pressure is 101.3 kPa

Soak Timer Circuit (fig. 3)




# WIRING DIAGRAM




c

# INSPECTION PROCEDURE

NOTICE:

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- The Techstream is required to conduct the following diagnostic troubleshooting procedure.

HINT:

- Using Techstream monitor results enables the EVAP (evaporative emission) system to be confirmed.
- Read freeze frame data using the Techstream. The ECM records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can help determine if the vehicle was moving or stationary, if the engine was warmed up or not, if the air fuel ratio was lean or rich, and other data from the time the malfunction occurred.

# PROCEDURE

| | |
|---|---|
| 1. | CONFIRM DTC |

(a) Turn the power switch off and wait for 10 seconds.

(b) Turn the power switch on (IG).

(c) Turn the power switch off and wait for 10 seconds.

(d) Connect the Techstream to the DLC3.

(e) Turn the power switch on (IG).

(f) Turn the Techstream on.

(g) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(h) Confirm DTCs and freeze frame data.

If any EVAP system DTCs are set, the malfunctioning area can be determined using the table below.

NOTICE:

If the reference pressure difference between the first and second checks is greater than the specification, all the DTCs relating to the reference pressure (P043E, P043F, P2401, P2402 and P2419) are stored.

| DTCs / Malfunctioning Areas | P043E P043F | P0441 | P0451 | P0452 | P0453 | P0455 | P0456 | P2401 P2402 | P2419 | P2420 |
|---|---|---|---|---|---|---|---|---|---|---|
| Reference orifice clogged | ● | | | | | | | ● | ● | |
| Reference orifice high-flow | ● | | | | | | | ● | ● | |
| Purge VSV stuck open | | ● | | | | ● | | | | |
| Purge VSV stuck closed | | ● | | | | | | | | |
| Canister pressure sensor signal noise | | | ● | | | | | | | |
| Canister pressure sensor low output | | | | ● | | | | | | |
| Canister pressure sensor high output | | | | | ● | | | | | |
| Gross leak | | ● | | | | ● | | | | |
| Small leak | | | | | | | ● | | | |
| Leak detection pump stuck OFF | ● | | | | | | | ● | ● | |
| Leak detection pump stuck ON | ● | | | | | | | ● | ● | |
| Vent valve stuck closed | ● | | | | | | | ● | ● | |
| Vent valve stuck open (vent) | | | | | | | | | | ● |

NEXT

| | |
|---|---|
| 2. | PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION) |

NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 5 steps performed automatically by the Techstream. It takes a maximum of approximately 18 minutes.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.
- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the Evaporative System Check, keep the fuel temperature below 35°C (95°F).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Automatic Mode.

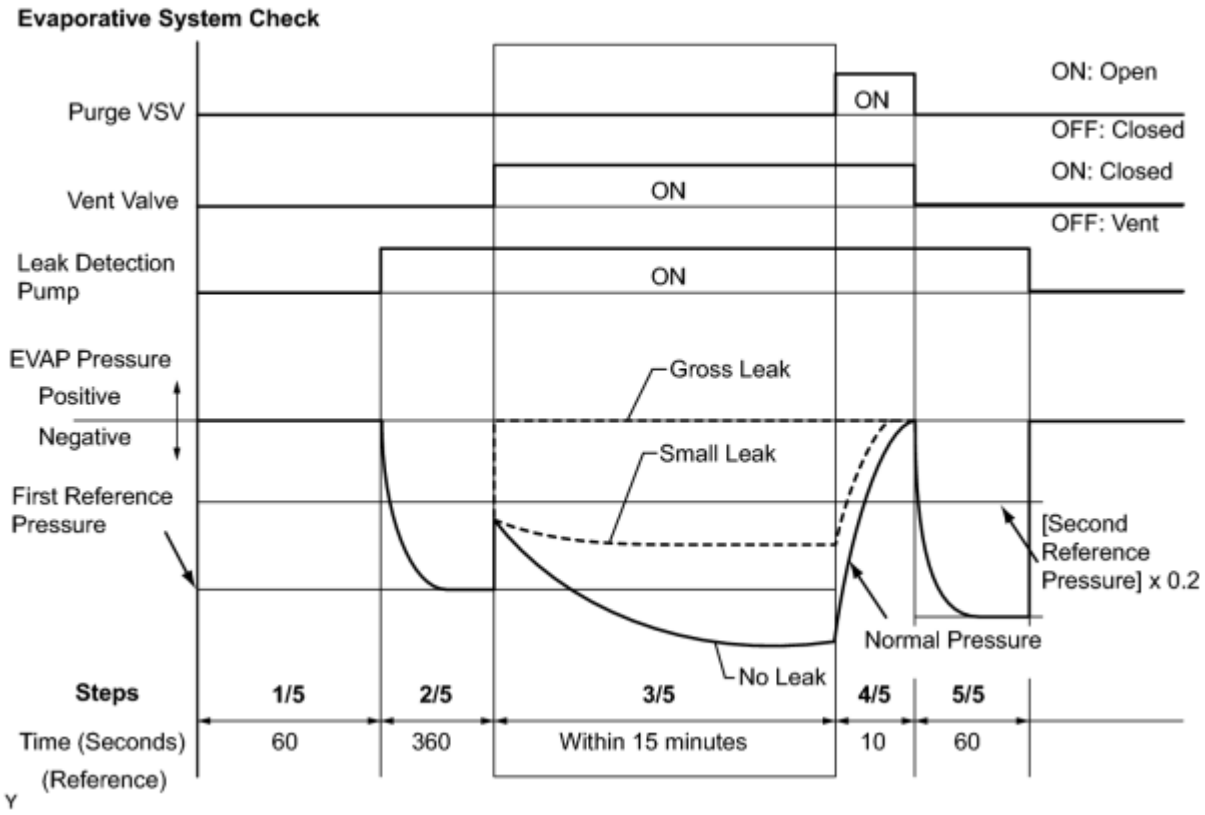
(f) After the Evaporative System Check is completed, check for pending DTCs by entering the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

HINT:

If no pending DTCs are displayed, perform the Monitor Confirmation (see "Diagnostic Help" menu). After this confirmation, check for pending DTCs. If no DTCs are displayed, the EVAP system is normal.

NEXT

| | |
|---|---|
| 3. | PERFORM EVAPORATIVE SYSTEM CHECK (MANUAL OPERATION) |




NOTICE:

- In the Evaporative System Check (Manual Mode), perform the series of 5 Evaporative System Check steps manually using the Techstream.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine during this operation.

- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing the Evaporative System Check, keep the fuel temperature below 35°C (95°F).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

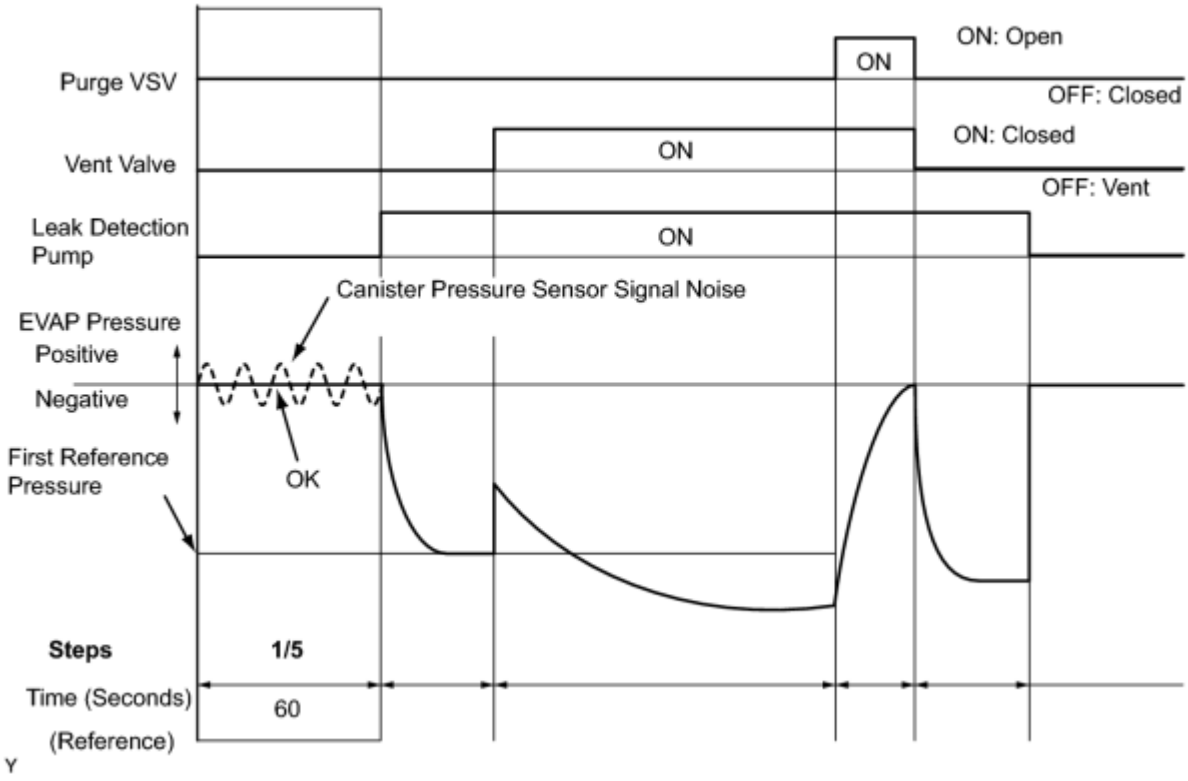
(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Manual Mode.

NEXT

| | |
|---|---|
| 4. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 1/5) |




(a) Check the EVAP pressure in step 1/5.

Result:

| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| - | Virtually no variation in EVAP pressure | Not yet determined | A |

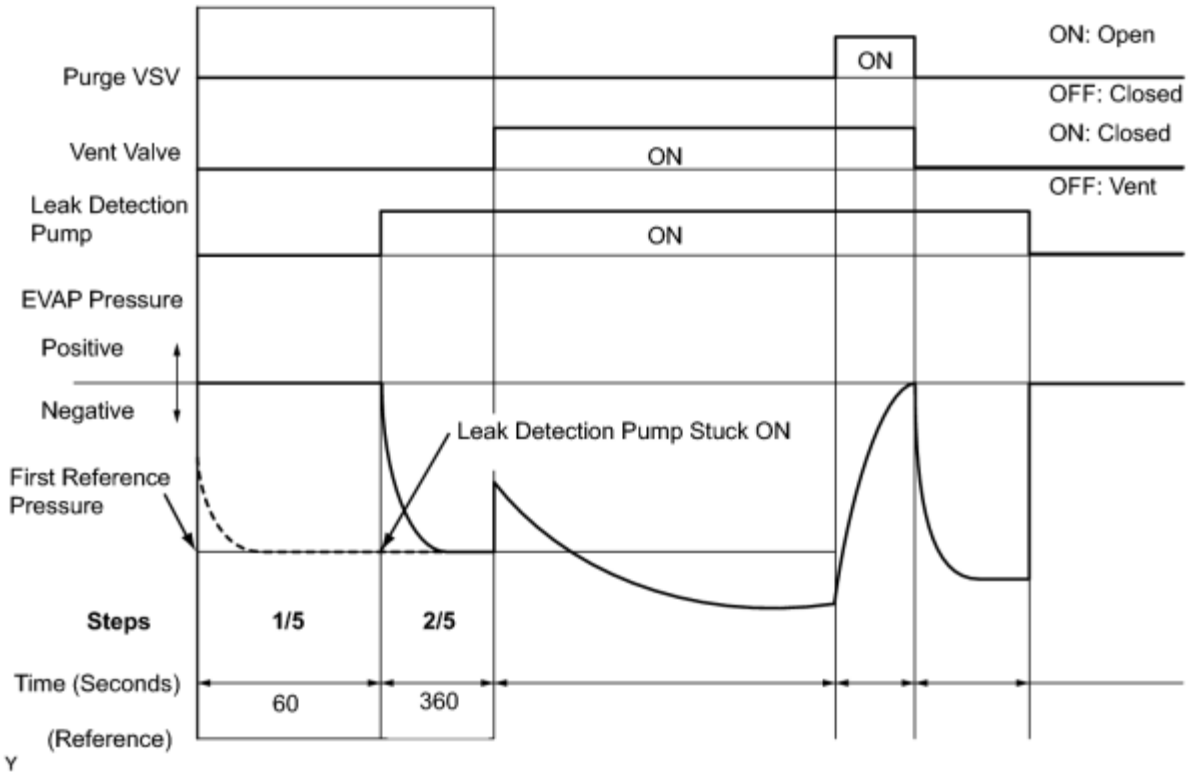
| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| P0451 | EVAP pressure fluctuates by +/-0.3 kPa (2.25 mmHg) or more | Canister pressure sensor signal noise | B |

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "Confirm DTC" procedure above.

B ▶ REPLACE CANISTER

A ▼

| | |
|---|---|
| 5. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 1/5 TO 2/5) |




(a) Check the EVAP pressure in steps 1/5 and 2/5.

Result:

| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| - | Virtually no variation in EVAP pressure during step 1/5. Then decreases to reference pressure | Not yet determined | A |
| P2402 | Small difference between EVAP pressures during steps 1/5 and 2/5 | Leak detection pump stuck ON | B |

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "Confirm DTC" procedure above.

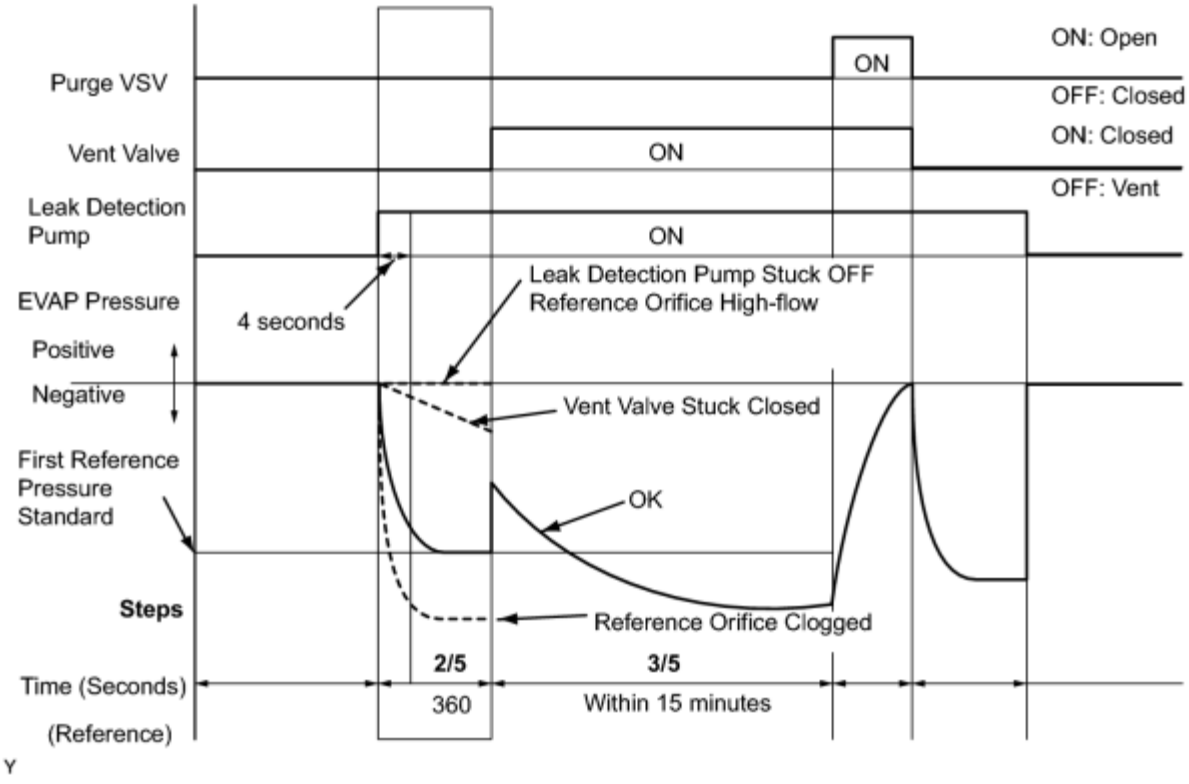
HINT:

The first reference pressure is the value determined in step 2/5.

B ▶ PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVE THE VACUUM PUMP)

A ▼

| | |
|---|---|
| 6. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 2/5) |




HINT:

Make a note of the pressures checked in steps A and B below.

- (a) Check the EVAP pressure 4 seconds after the leak detection pump is activated* (Step A).

*: The leak detection pump begins to operate as step 1/5 finishes and step 2/5 starts.

- (b) Check the EVAP pressure again when it has stabilized. This pressure is the reference pressure (Step B).

Result:

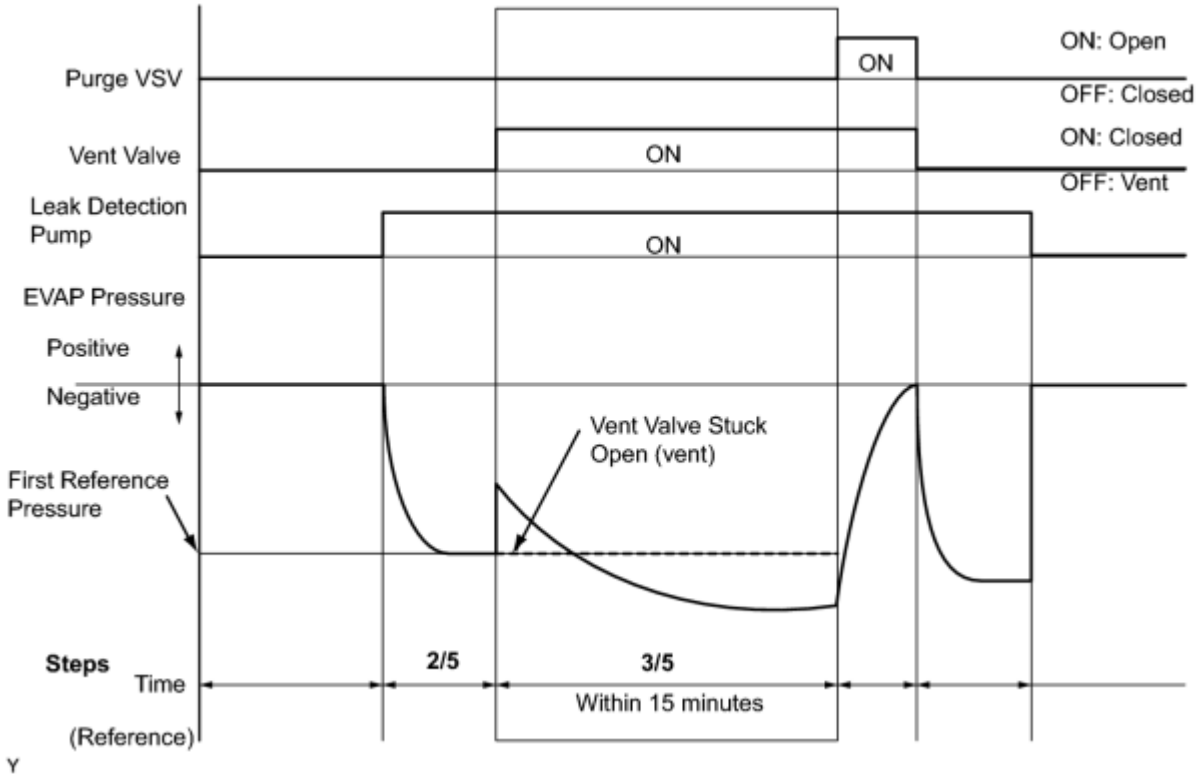
| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|

| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| - | EVAP pressure in step B between -4.85 kPa and -1.057 kPa (-36.38 mmHg and -7.93 mmHg) | Not yet determined | A |
| P043F and P2401 | EVAP pressure in step B -1.057 kPa (-7.93 mmHg) or more | • Reference orifice high-flow<br>• Leak detection pump stuck OFF | B |
| P043E | EVAP pressure in step B below -4.85 kPa (-36.38 mmHg) | Reference orifice clogged | C |
| P2419 | EVAP pressure in step A more than -1.057 kPa (-7.93 mmHg) | Vent valve stuck closed | D |

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "Confirm DTC" procedure above.

D ▶INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION)
C ▶REPLACE CANISTER
B ▶PERFORM EVAPORATIVE SYSTEM CHECK (STEP 3/5)
A ▼

| | |
|---|---|
| 7. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 2/5 TO 3/5) |




(a) Check the EVAP pressure in step 3/5.

Result:

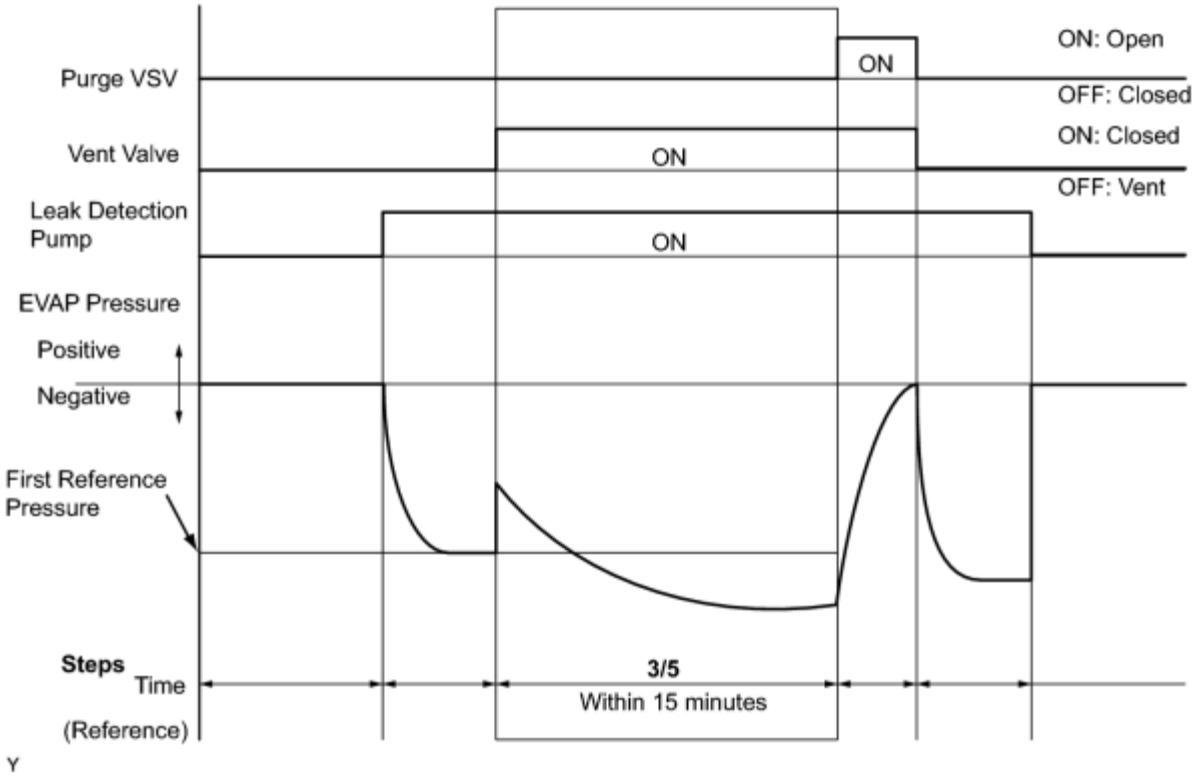
| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| - | EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 2/5 to step 3/5 | Not yet determined | A |
| P2420 | No variation in EVAP pressure despite proceeding from step 2/5 to step 3/5 | Vent valve stuck open (vent) | B |

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "Confirm DTC" procedure above.

B ▶ INSPECT CANISTER PUMP MODULE (POWER SOURCE FOR VENT VALVE)

A ▼

| | |
|---|---|
| 8. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 3/5) |




(a) Wait until the EVAP pressure change is less than 0.1 kPa (0.75 mmHg) for 30 seconds.

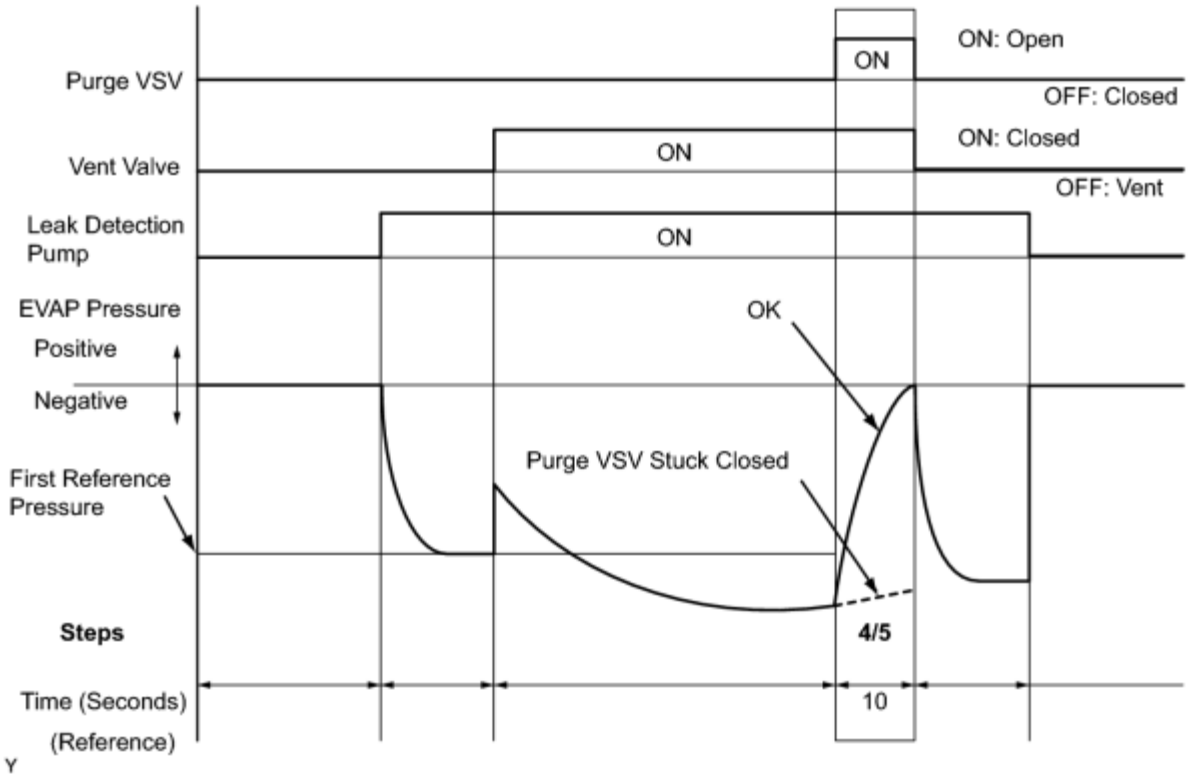
(b) Measure the EVAP pressure and record it.

HINT:

A few minutes are required for the EVAP pressure to become saturated. When there is little fuel in the fuel tank, it takes up to 15 minutes.

NEXT

| | |
|---|---|
| 9. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 4/5) |




(a) Check the EVAP pressure in step 4/5.

Result:

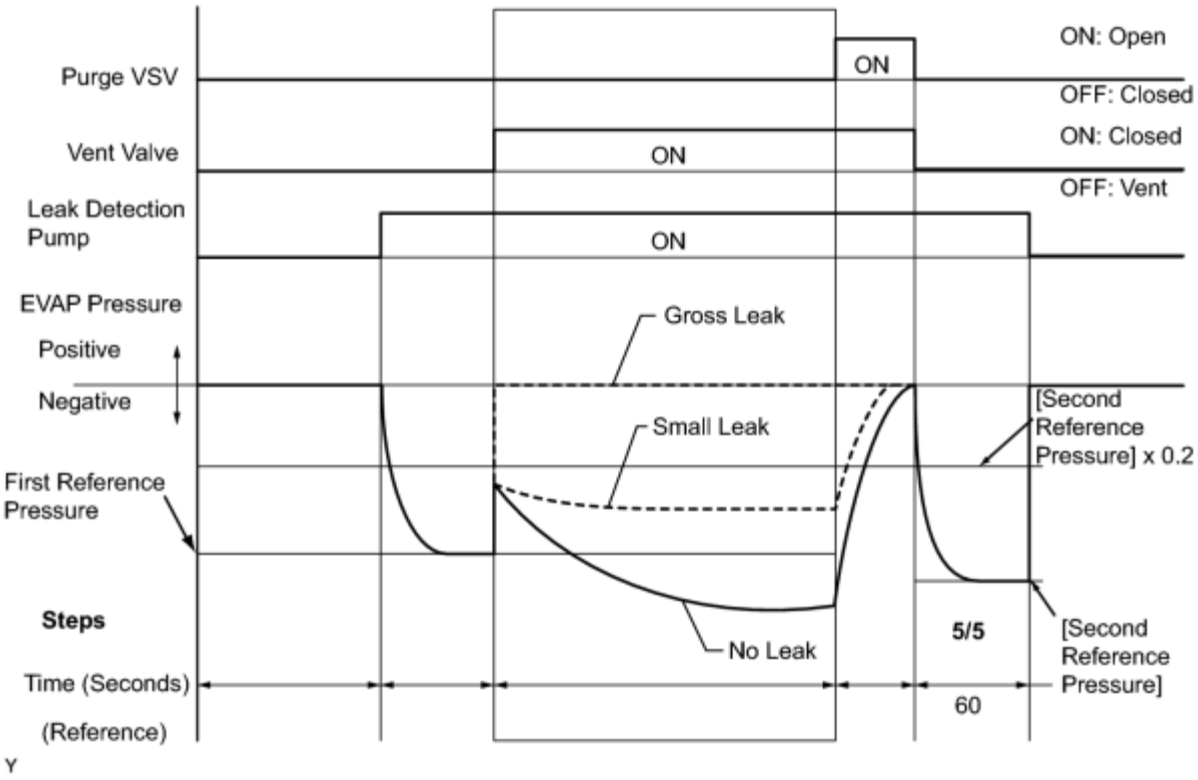
| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| - | EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5 | Not yet determined | A |
| P0441 | EVAP pressure increases by 0.3 kPa (2.25 mmHg) or more within 10 seconds of proceeding from step 3/5 to step 4/5 | Problems in EVAP hose between purge VSV and intake manifold | B |
| P0441 | Variation in EVAP pressure less than 0.3 kPa (2.25 mmHg) for 10 seconds, after proceeding from step 3/5 to step 4/5 | Purge VSV stuck closed | C |

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "Confirm DTC" procedure above.

C ▶ PERFORM ACTIVE TEST USING TECHSTREAM (PURGE VSV)
B ▶ CHECK EVAP HOSE (PURGE VSV - INTAKE AIR SURGE TANK ASSEMBLY)

A

| | |
|---|---|
| 10. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 5/5) |




(a) Check the EVAP pressure in step 5/5.

(b) Compare the EVAP pressure in step 3/5 and the second reference pressure (step 5/5).

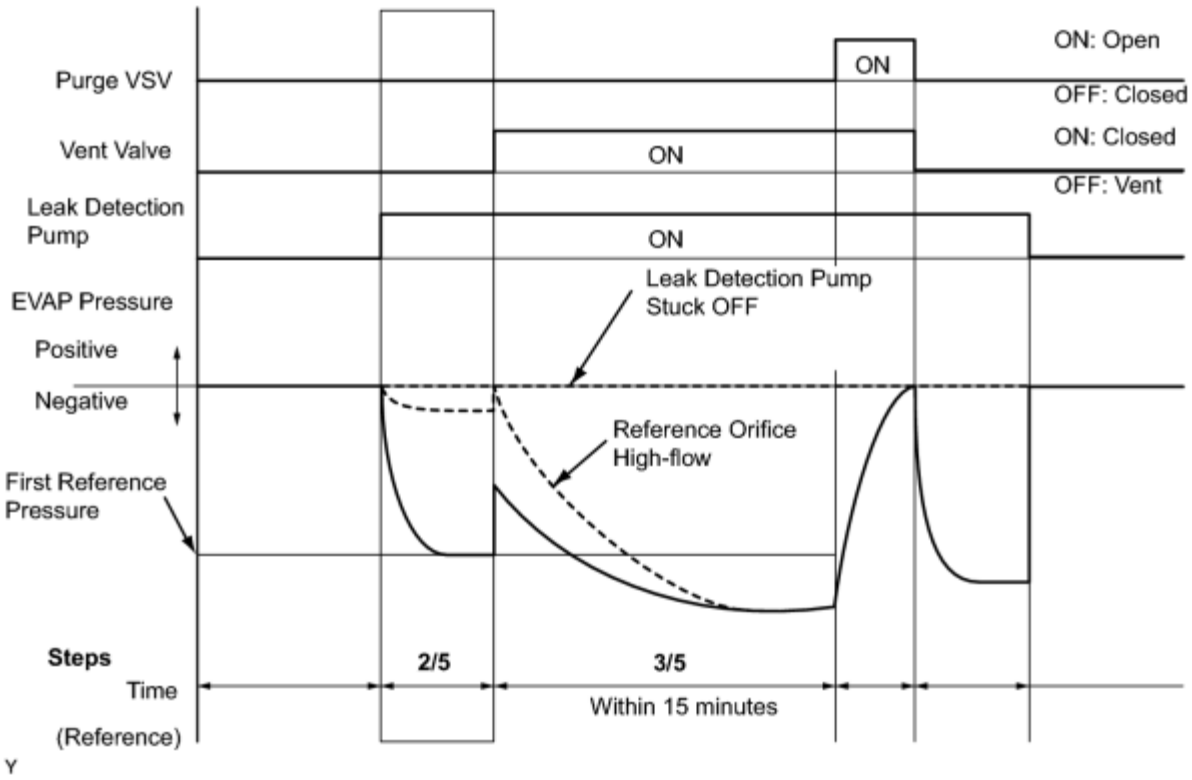
Result:

| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| - | EVAP pressure from step 3/5 lower than second reference pressure (step 5/5) | Not yet determined (no leakage from EVAP system) | A |
| P0441 and P0455 | EVAP pressure from step 3/5 higher than [second reference pressure (step 5/5) x 0.2] | • Purge VSV stuck open<br>• EVAP gross leak | B |
| P0456 | EVAP pressure from step 3/5 higher than second reference pressure (step 5/5) | EVAP small leak | B |

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "Confirm DTC" procedure above.

B PERFORM ACTIVE TEST USING TECHSTREAM (PURGE VSV)
A REPAIR OR REPLACE PARTS AND COMPONENTS INDICATED BY OUTPUT DTCS

| | |
|---|---|
| 11. | PERFORM EVAPORATIVE SYSTEM CHECK (STEP 3/5) |




(a) Check the EVAP pressure in step 3/5.

Result:

| DTC* | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| P043F | EVAP pressure less than [reference pressure] measured in step 2/5 | Reference orifice high-flow | A |
| P2401 | EVAP pressure almost same as [reference pressure] measured in step 2/5 | Leak detection pump stuck off | B |

*: These DTCs are already present in the ECM when the vehicle arrives and are confirmed in the "Confirm DTC" procedure above.

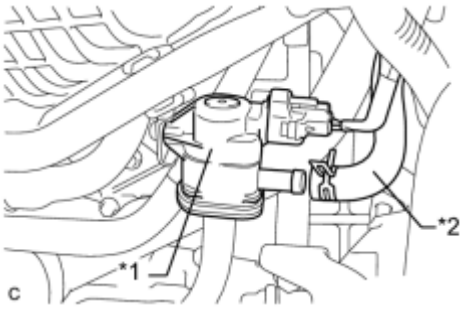
HINT:

The first reference pressure is the value determined in step 2/5.

B ▶PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVE THE VACUUM PUMP)
A ▶REPLACE CANISTER

| | |
|---|---|
| 12. | PERFORM ACTIVE TEST USING TECHSTREAM (PURGE VSV) |

(a) Enter the following menus: Powertrain / Engine and ECT / Active Test / Activate the VSV for EVAP Control.




(b) Disconnect the hose (connected to the canister) from the purge VSV.

**Text in Illustration**

| | |
|---|---|
| *1 | Purge VSV |
| *2 | Hose (to canister) |

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Using the Techstream, turn off the purge VSV (Activate the VSV for Evap Control: OFF).

(f) Use your finger to confirm that the purge VSV has no suction.

(g) Using the Techstream, turn on the purge VSV (Activate the VSV for Evap Control: ON).

(h) Use your finger to confirm that the purge VSV has suction.

Result:

| Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|
| No suction when purge VSV turned off, and suction applied when turned on | Purge VSV normal | A |
| Suction applied when purge VSV turned off | Purge VSV stuck open | B |
| No suction when purge VSV turned on | • Purge VSV stuck closed<br>• Problems with EVAP hose between purge VSV and intake manifold | C |

(i) Reconnect the hose.

C ▶ CHECK EVAP HOSE (PURGE VSV - INTAKE AIR SURGE TANK ASSEMBLY)
B ▶ INSPECT PURGE VSV
A ▼

| | |
|---|---|
| 13. | CHECK FUEL TANK CAP ASSEMBLY |

(a) Check that the fuel cap is correctly installed and confirm that the fuel cap meets OEM specifications.

(b) Tighten the fuel cap until a few click sounds are heard.

HINT:

If an EVAP tester is available, check the fuel cap using the Techstream.

1. Remove the fuel cap and install it onto a fuel cap adapter.
2. Connect an EVAP tester pump hose to the adapter, and pressurize the cap to 3.2 to 3.7 kPa (24 to 28 mmHg) using an EVAP tester pump.
3. Seal the adapter and wait for 2 minutes.
4. Check the pressure. If the pressure is 2 kPa (15 mmHg) or more, the fuel cap is normal.

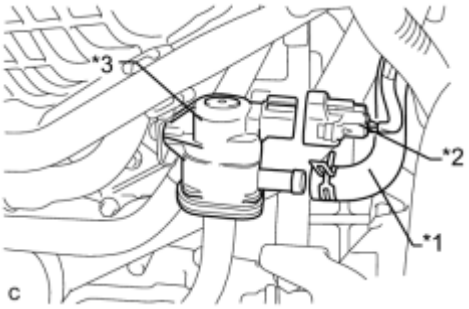
Result:

| Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|
| Fuel cap correctly installed | - | A |
| Fuel cap loose | • Fuel cap improperly installed<br>• Defective fuel cap<br>• Fuel cap does not meet OEM specifications | B |
| No fuel cap | - | C |

(c) Reinstall the fuel cap.

C ▶REPLACE FUEL TANK CAP ASSEMBLY
B ▶CORRECTLY REINSTALL OR REPLACE FUEL TANK CAP ASSEMBLY
A ▶LOCATE EVAP LEAK PART

| | |
|---|---|
| 14. | INSPECT PURGE VSV |




(a) Turn the power switch off.

(b) Disconnect the purge VSV connector.

**Text in Illustration**

| | |
|---|---|
| *1 | Hose (to canister) |
| *2 | Connector |
| *3 | Purge VSV |

(c) Disconnect the hose (connected to the canister) from the purge VSV.

(d) Turn the power switch on (IG).

(e) Put the engine in inspection mode INFO.

(f) Start the engine.

(g) Use your finger to confirm that the purge VSV has no suction.

Result:

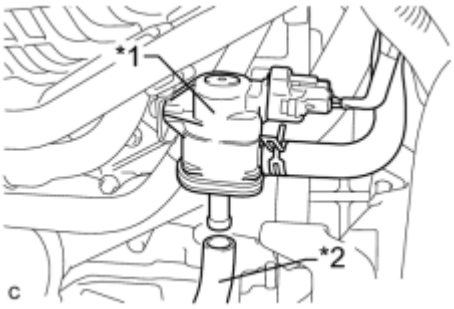
| Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|
| No suction | ECM | A |
| Suction applied | Purge VSV | B |

(h) Reconnect the purge VSV connector.

(i) Reconnect the hose.

B ▶REPLACE PURGE VSV
A ▶REPLACE ECM

| | |
|---|---|
| 15. | CHECK EVAP HOSE (PURGE VSV - INTAKE AIR SURGE TANK ASSEMBLY) |




(a) Disconnect the hose (connected to the intake manifold sub-assembly) from the purge VSV.

## Text in Illustration

| | |
|---|---|
| *1 | Purge VSV |
| *2 | Hose (to Intake Manifold Sub-assembly) |

(b) Put the engine in inspection mode INFO.

(c) Start the engine.

(d) Use your finger to confirm that the hose has suction.

Result:

| Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|
| Suction applied | EVAP hose between purge VSV and intake air surge tank assembly normal | A |
| No suction | • Intake manifold port<br>• EVAP hose between purge VSV and intake manifold sub-assembly | B |

(e) Reconnect the hose.

B ▶ INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)

A ▼

| | |
|---|---|
| 16. | INSPECT PURGE VSV |

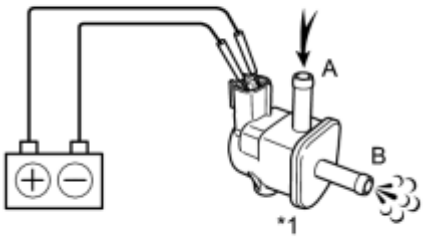
(a) Remove the purge VSV.

(b) Apply battery voltage to the terminals of the purge VSV.

**Text in Illustration**

| | |
|---|---|
| *1 | Purge VSV |

(c) Using an air gun, confirm that air flows from port A to port B.




Result:

| Test Result | Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| Air flows | Battery voltage is applied to purge VSV terminals | Purge VSV normal | A |
| No air flow | Battery voltage is applied to purge VSV terminals | Purge VSV | B |

(d) Install the purge VSV.

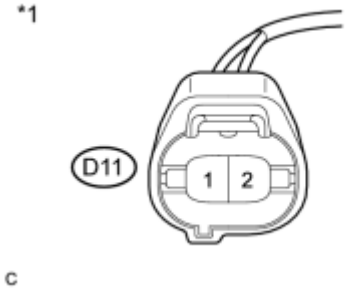
B ▶ REPLACE PURGE VSV

A ▼

| | |
|---|---|
| 17. | CHECK HARNESS AND CONNECTOR (POWER SOURCE OF PURGE VSV) |

(a) Disconnect the purge VSV connector.

(b) Turn the power switch on (IG).




(c) Measure the voltage according to the value(s) in the table below.

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Purge VSV) |

Result:

| Tester Connection | Switch Condition | Specified Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| D11-2 - Body ground | Power switch on (IG) | 11 to 14 V | Normal | A |
| | | Other than result above | Wire harness or connectors between purge VSV and ECM | B |

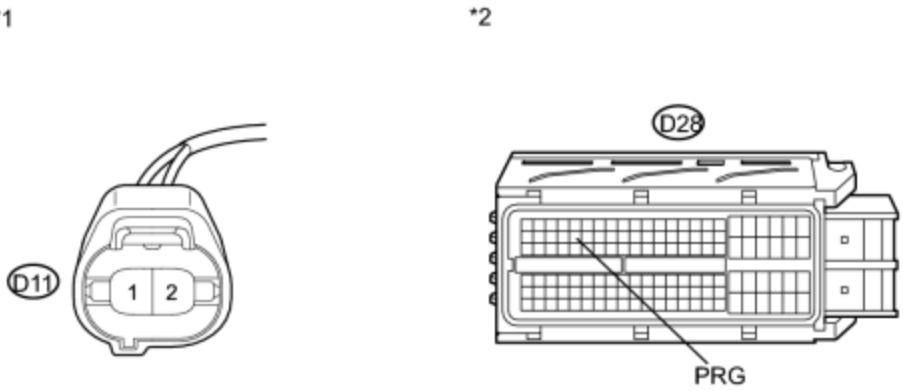
(d) Reconnect the purge VSV connector.

B ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

A ▼

| | |
|---|---|
| 18. | CHECK HARNESS AND CONNECTOR (PURGE VSV - ECM) |

(a) Disconnect the ECM connector and the purge VSV connector.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D11-1 - D28-28 (PRG) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D11-1 or D28-28 (PRG) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Purge VSV) | *2 | Front view of wire harness connector<br><br>(to ECM) |

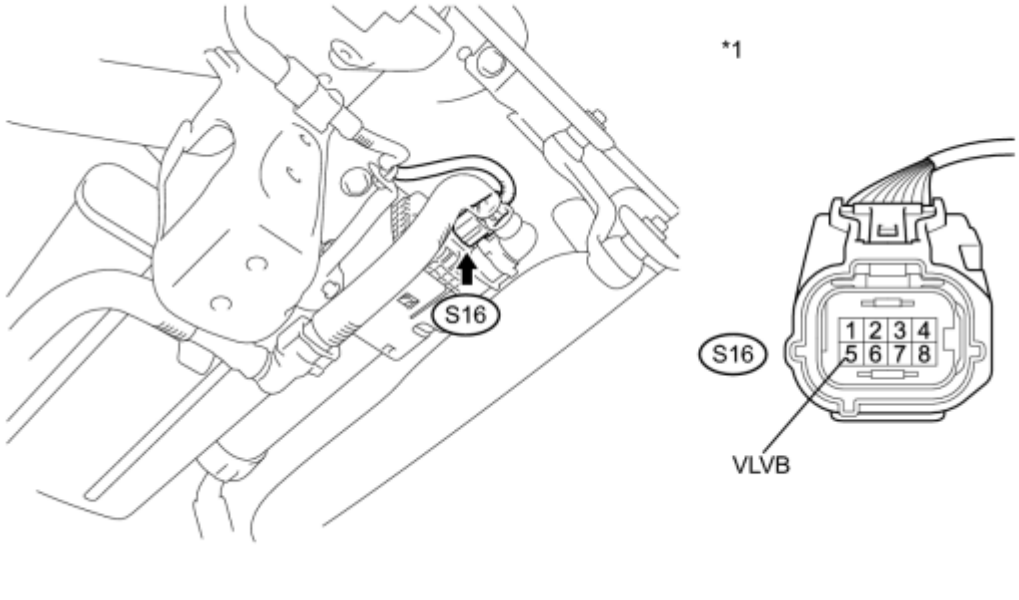
(c) Reconnect the purge VSV connector.

(d) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ REPLACE ECM

| | |
|---|---|
| 19. | INSPECT CANISTER PUMP MODULE (POWER SOURCE FOR VENT VALVE) |

(a) Turn the power switch off.




c

(b) Disconnect the canister pump module connector.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Result:

| Tester Connection | Switch Condition | Specified Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| S16-5 (VLVB) - Body ground | Power switch on (IG) | 11 to 14 V | 1. Wire harness between vent valve and ECM<br>2. Vent valve<br>3. ECM | A |

| Tester Connection | Switch Condition | Specified Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| | | Below 3 V | Power source wire harness of vent valve | B |

**Text in Illustration**

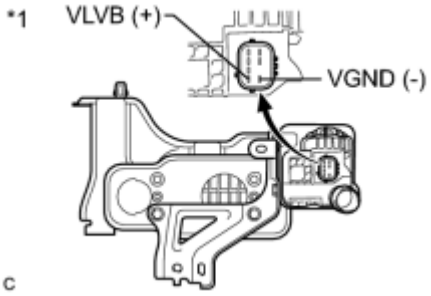
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Canister Pump Module) |

(e) Reconnect the canister pump module connector.

B ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

A ▼

| | |
|---|---|
| 20. | INSPECT CANISTER PUMP MODULE (VENT VALVE OPERATION) |




(a) Turn the power switch off.

(b) Disconnect the canister pump module connector.

(c) Apply battery voltage to the VLVB and VGND terminals of the canister pump module.

(d) Touch the canister pump module to confirm the vent valve operation.

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Canister Pump Module) |

Result:

| Condition | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| Apply battery voltage to terminals S16-5 (VLVB) and S16-1 (VGND) | Operating | 1. Wire harness between vent valve and ECM<br><br>2. ECM | A |

| Condition | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|
| | Not operating | Vent valve | B |

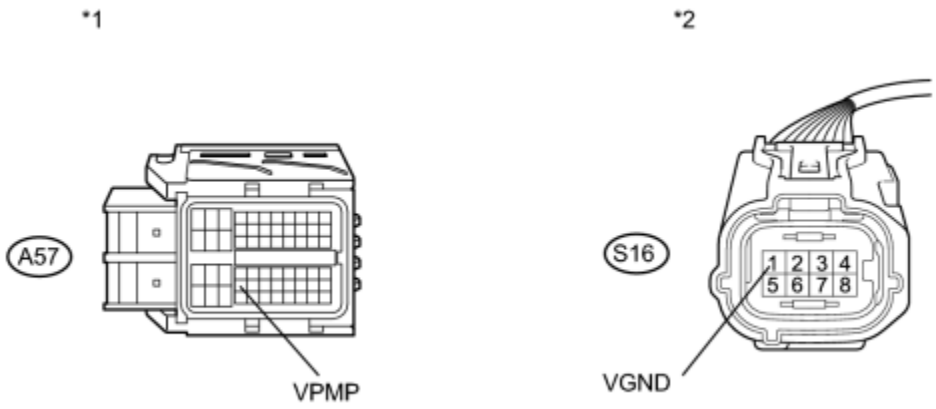
(e) Reconnect the canister pump module connector.

B ▶ REPLACE CANISTER

A ▼

| | |
|---|---|
| 21. | CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE) |

(a) Disconnect the ECM connector.




(b) Disconnect the canister pump module connector.

(c) Measure the resistance according to the value(s) in the table below.

Result:

| Tester Connection | Condition | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| A57-42 (VPMP) - S16-1 (VGND) | Always | Below 1 Ω | ECM | A |
| | | 10 kΩ or higher | Wire harness between ECM and canister pump module | B |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) | *2 | Front view of wire harness connector<br><br>(to Canister Pump Module) |

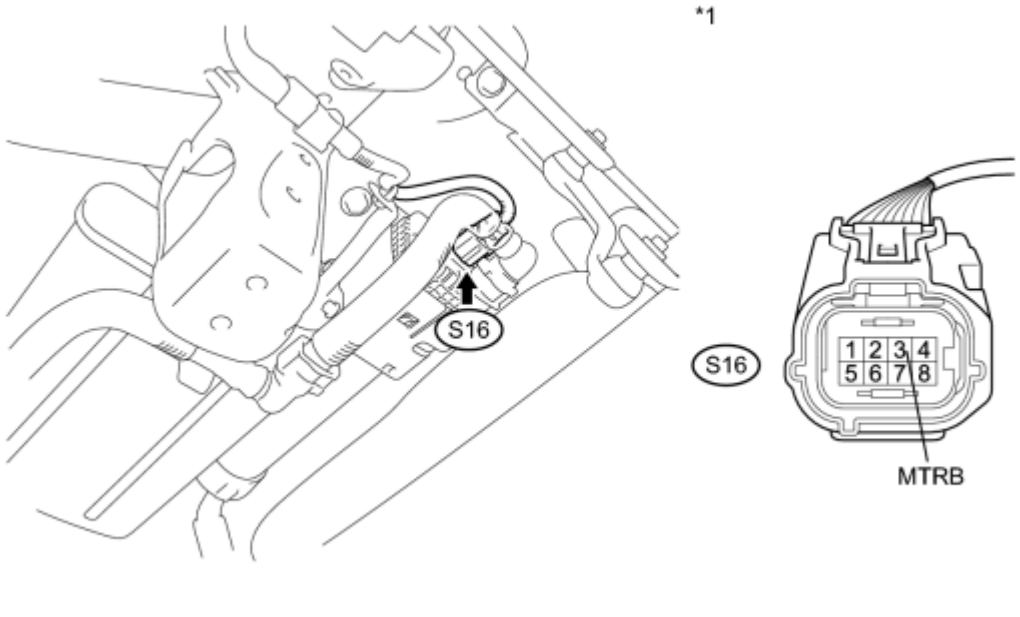
(d) Reconnect the ECM connector.

(e) Reconnect the canister pump module connector.

B REPAIR OR REPLACE HARNESS OR CONNECTOR
A REPLACE ECM

| | |
|---|---|
| 22. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVE THE VACUUM PUMP) |

(a) Turn the power switch off.




(b) Disconnect the canister pump module connector.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Engine / Active Test / Activate the Vacuum Pump.

(e) Measure the voltage according to the value(s) in the table below.

Result:

| Tester Connection | Condition | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| S16-3 (MTRB) - Body ground | Leak detection pump on and off<br><br>(Active Test ON and OFF) | Below 3 V when OFF<br><br>11 to 14 V when ON | 1. Wire harness between leak detection pump and body ground<br>2. Leak detection pump | A |
| | | Below 3 V when OFF and ON | 1. Wire harness between leak detection pump and ECM | B |

| Tester Connection | Condition | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| | | | 2. ECM | |
| | | 11 to 14 V when OFF and ON | ECM | C |

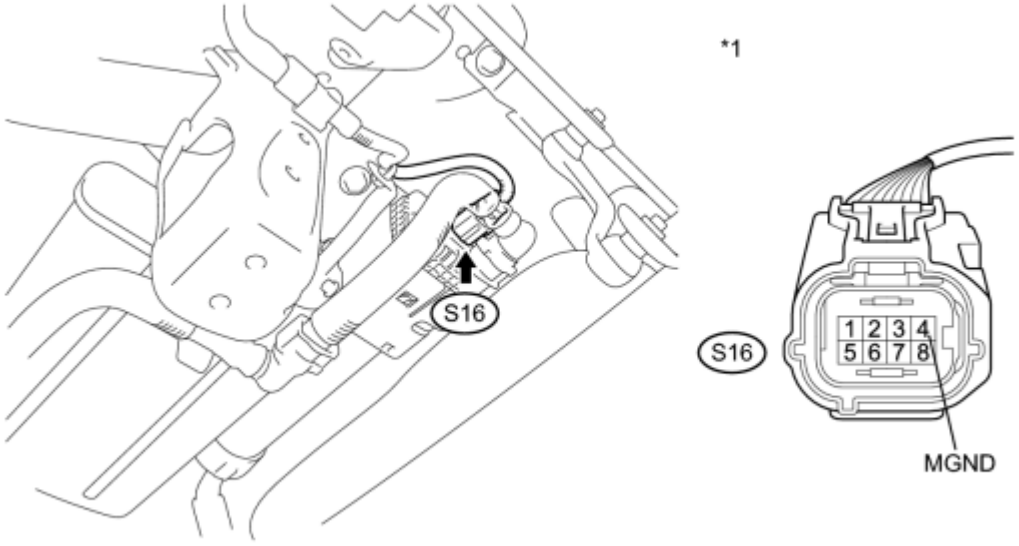
**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Canister Pump Module) | - | - |

C ▶ REPLACE ECM
B ▶ CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE)
A ▼

| | |
|---|---|
| 23. | CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - BODY GROUND) |

(a) Turn the power switch off.




c

(b) Disconnect the canister pump module connector.

(c) Measure the resistance according to the value(s) in the table below.

Result:

| Tester Connection | Condition | Specified Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|

| Tester Connection | Condition | Specified Condition | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| S16-4 (MGND) - Body ground | Always | Below 1 Ω | Leak detection pump | A |
| | | 10 kΩ or higher | Wire harness between canister pump module and body ground | B |

**Text in Illustration**

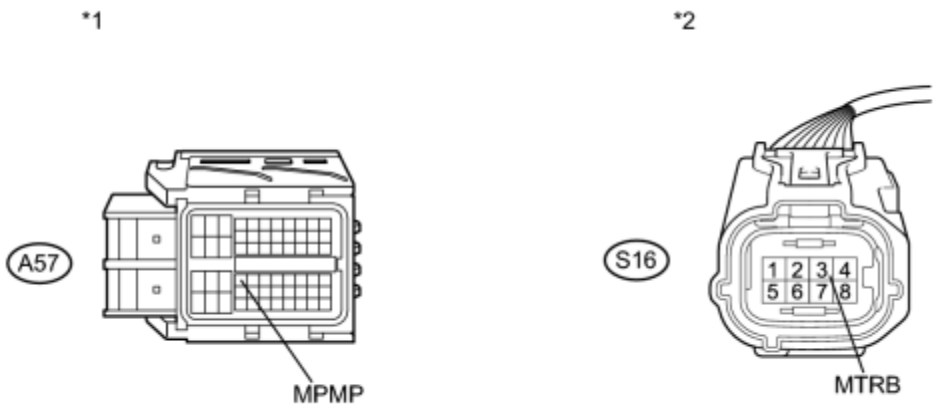
| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Canister Pump Module) | - | - |

(d) Reconnect the canister pump module connector.

B ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
A ▶ REPLACE CANISTER

| | |
|---|---|
| 24. | CHECK HARNESS AND CONNECTOR (ECM - CANISTER PUMP MODULE) |

(a) Turn the power switch off.




(b) Disconnect the canister pump module connector.

(c) Disconnect the ECM connector.

(d) Measure the resistance according to the value(s) in the table below.

Result:

| Tester Connection | Condition | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| A57-34 (MPMP) - S16-3 (MTRB) | Always | Below 1 Ω | ECM | A |
| | | 10 kΩ or | Wire harness between ECM and canister | B |

| Tester Connection | Condition | Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|---|---|
| | | higher | pump module | |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) | *2 | Front view of wire harness connector<br><br>(to Canister Pump Module) |

(e) Reconnect the canister pump module connector.

(f) Reconnect the ECM connector.

B ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
A ▶ REPLACE ECM

| | |
|---|---|
| 25. | INSPECT INTAKE MANIFOLD (EVAP PURGE PORT) |

(a) Stop the engine.

(b) Disconnect the EVAP hose from the intake manifold.

(c) Put the engine in inspection mode INFO.

(d) Start the engine.

(e) Use your finger to confirm that the port of the intake manifold has suction.

Result:

| Test Result | Suspected Trouble Area | Proceed to |
|---|---|---|
| Suction applied | EVAP hose between intake manifold and purge VSV | A |
| No suction | Intake manifold | B |

(f) Reconnect the EVAP hose.

B ▶ INSPECT INTAKE MANIFOLD (EVAP PURGE PORT)
A ▶ REPLACE EVAP HOSE (INTAKE AIR SURGE TANK ASSEMBLY - PURGE VSV)

| | |
|---|---|
| 26. | CORRECTLY REINSTALL OR REPLACE FUEL TANK CAP ASSEMBLY |

HINT:

- When reinstalling the fuel cap, tighten it until a few click sounds are heard.
- When replacing the fuel cap, use a fuel cap that meets OEM specifications, and install it until a few click sounds are heard.

NEXT ▶ PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 27. | REPLACE FUEL TANK CAP ASSEMBLY |

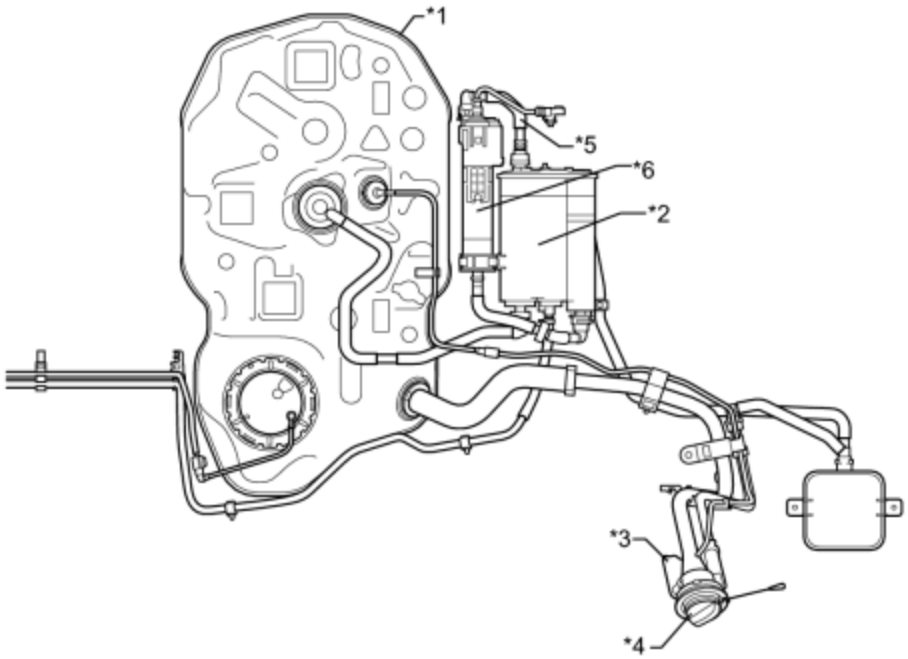
HINT:

When installing the fuel cap, tighten it until a few click sounds are heard.

NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 28. | LOCATE EVAP LEAK PART |

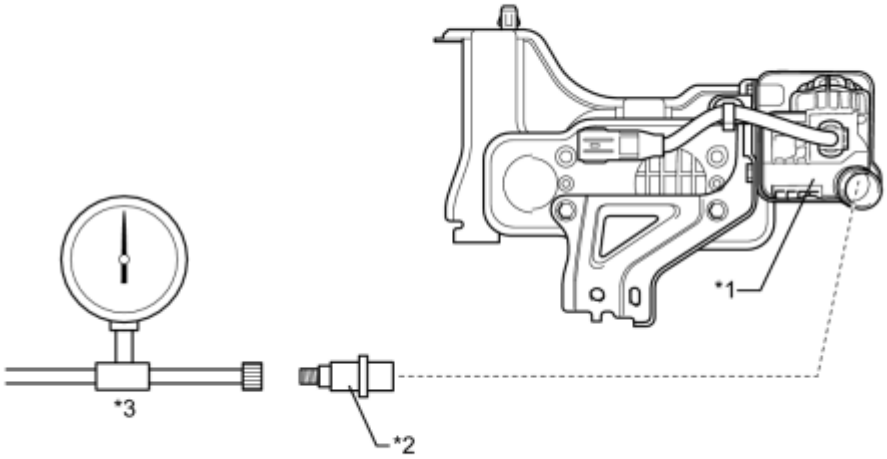
(a) Disconnect the vent hose.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Fuel Tank | *2 | Canister |
| *3 | Canister Filter | *4 | Fuel Cap |
| *5 | Disconnect the vent hose here | *6 | No. 2 Canister Filter |

(b) Connect the EVAP pressure tester tool to the canister pump module with the adapter.




c

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Canister Pump Module | *2 | Adapter |
| *3 | EVAP Pressure Tester Tool | - | - |

(c) Pressurize the EVAP system to 3.2 to 3.7 kPa (24 to 28 mmHg).

(d) Apply soapy water to the piping and connecting parts of the EVAP system.

(e) Look for areas where bubbles appear. This indicates the leak point.

(f) Repair or replace the leak point.

HINT:

Disconnect the hose between the canister and fuel tank from the canister. Block the canister side and conduct an inspection. In this way, the fuel tank can be excluded as an area suspected of causing fuel leaks.

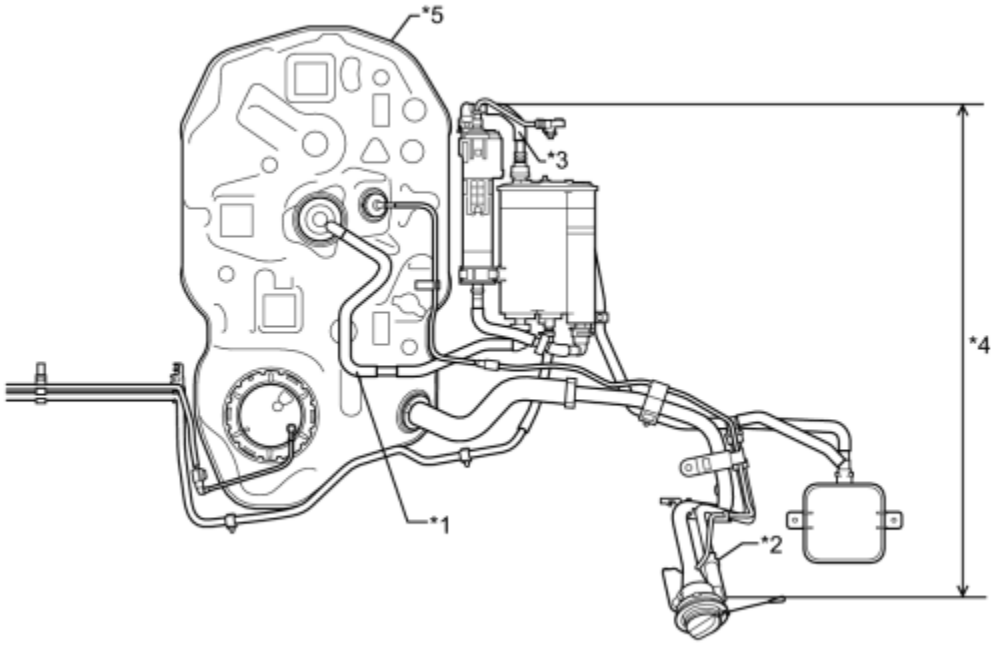
NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 29. | REPLACE CANISTER |

(a) Replace the canister INFO.

NOTICE:

When replacing the canister, check the canister pump module interior and related pipes for water, fuel and other liquids. If liquids are present, check for disconnections and/or cracks in the following: 1) the pipe from the air inlet port to the canister pump module; 2) the canister filter; and 3) the fuel tank vent hose.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Fuel Tank Vent Hose | *2 | Air Inlet Port |
| *3 | Vent Hose | *4 | Inspection Area<br><br>(check for disconnection and/or cracks) |
| *5 | Fuel Tank | - | - |

NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 30. | REPLACE PURGE VSV |

Replace the purge VSV INFO.

NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 31. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 32. | REPLACE EVAP HOSE (INTAKE AIR SURGE TANK ASSEMBLY - PURGE VSV) |

NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 33. | INSPECT INTAKE MANIFOLD (EVAP PURGE PORT) |

(a) Check that the EVAP purge port of the intake manifold is not clogged. If necessary, replace the intake manifold.

NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 34. | REPLACE ECM |

(a) Replace the ECM INFO.

NEXT PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION)

| | |
|---|---|
| 35. | REPAIR OR REPLACE PARTS AND COMPONENTS INDICATED BY OUTPUT DTCS |

(a) Repair the malfunctioning areas indicated by the DTCs that had been confirmed when the vehicle was brought in.

NEXT

| | |
|---|---|
| 36. | PERFORM EVAPORATIVE SYSTEM CHECK (AUTO OPERATION) |

NOTICE:

- The Evaporative System Check (Automatic Mode) consists of 5 steps performed automatically by the Techstream. It takes a maximum of approximately 18 minutes.
- Do not perform the Evaporative System Check when the fuel tank is more than 90% full because the cut-off valve may be closed, making the fuel tank leak check unavailable.
- Do not run the engine in this step.
- When the temperature of the fuel is 35°C (95°F) or more, a large amount of vapor forms and any check results become inaccurate. When performing an Evaporative System Check, keep the fuel temperature below 35°C (95°F).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Clear the DTCs INFO.

(e) Enter the following menus: Powertrain / Engine and ECT / Utility / Evaporative System Check / Automatic Mode.

(f) After the Evaporative System Check is completed, check for pending DTCs by entering the following menus: Powertrain / Engine and ECT / Trouble Codes / Pending.

HINT:

If no pending DTCs are found, the repair has been successfully completed.

NEXT **COMPLETED**

# CONFIRMATION DRIVING PATTERN

HINT:

After a repair, check Monitor Status by performing the Key-Off Monitor Confirmation and Purge Flow Monitor Confirmation described below.

1. KEY-OFF MONITOR CONFIRMATION

(a) Preconditions

The monitor will not run unless:

- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway).
- The fuel tank is less than 90% full.
- The altitude is less than 7875 ft. (2400 m).
- The engine coolant temperature is between 4.4°C and 35°C (40°F and 95°F).
- The intake air temperature is between 4.4°C and 35°C (40°F and 95°F).
- The vehicle remains stationary (the vehicle speed is 0 mph [0 km/h]).

(b) Monitor Conditions

1. Put the engine in inspection mode INFO.
2. Allow the engine to idle for at least 5 minutes.
3. Turn the power switch off and wait for 6 hours (8 or 10.5 hours).

   HINT:

   Do not start the engine until checking Monitor Status. If the engine is started, the steps described above must be repeated.

(c) Monitor Status

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG).
3. Turn the Techstream on.
4. Enter the following menus: Powertrain / Engine and ECT / Monitor / Evaporative System.
5. Check the Monitor Status displayed on the Techstream.

   HINT:

   If Incomplete is displayed, the monitor did not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

2. PURGE FLOW MONITOR CONFIRMATION (P0441)

HINT:

Perform this monitor confirmation after the Key-Off Monitor Confirmation shows Complete.

(a) Preconditions

The monitor will not run unless:

- The vehicle has been driven for 10 minutes or more (in a city area or on a freeway).

- The engine coolant temperature is between 4.4°C and 35°C (40°F and 95°F).
- The intake air temperature is between 4.4°C and 35°C (40°F and 95°F).

(b) Monitor Conditions

1. Release the pressure from the fuel tank by removing and reinstalling the fuel cap.
2. Put the engine in inspection mode INFO.
3. Warm the engine up until the engine coolant temperature reaches more than 75°C (167°F).
4. Increase the engine speed to 2500 rpm once.
5. Allow the engine to idle and turn the A/C switch on for 1 minute.

(c) Monitor Status

1. Turn the power switch off (if on (IG) or if the engine is running).
2. Connect the Techstream to the DLC3.
3. Turn the power switch on (IG).
4. Turn the Techstream on.
5. Enter the following menus: Powertrain / Engine and ECT / Monitor / Evaporative System.
6. Check the Monitor Status displayed on the Techstream.

   HINT:

   If Incomplete is displayed, the monitor did not complete. Make sure that the preconditions have been met, and perform the Monitor Conditions again.

# MONITOR RESULT

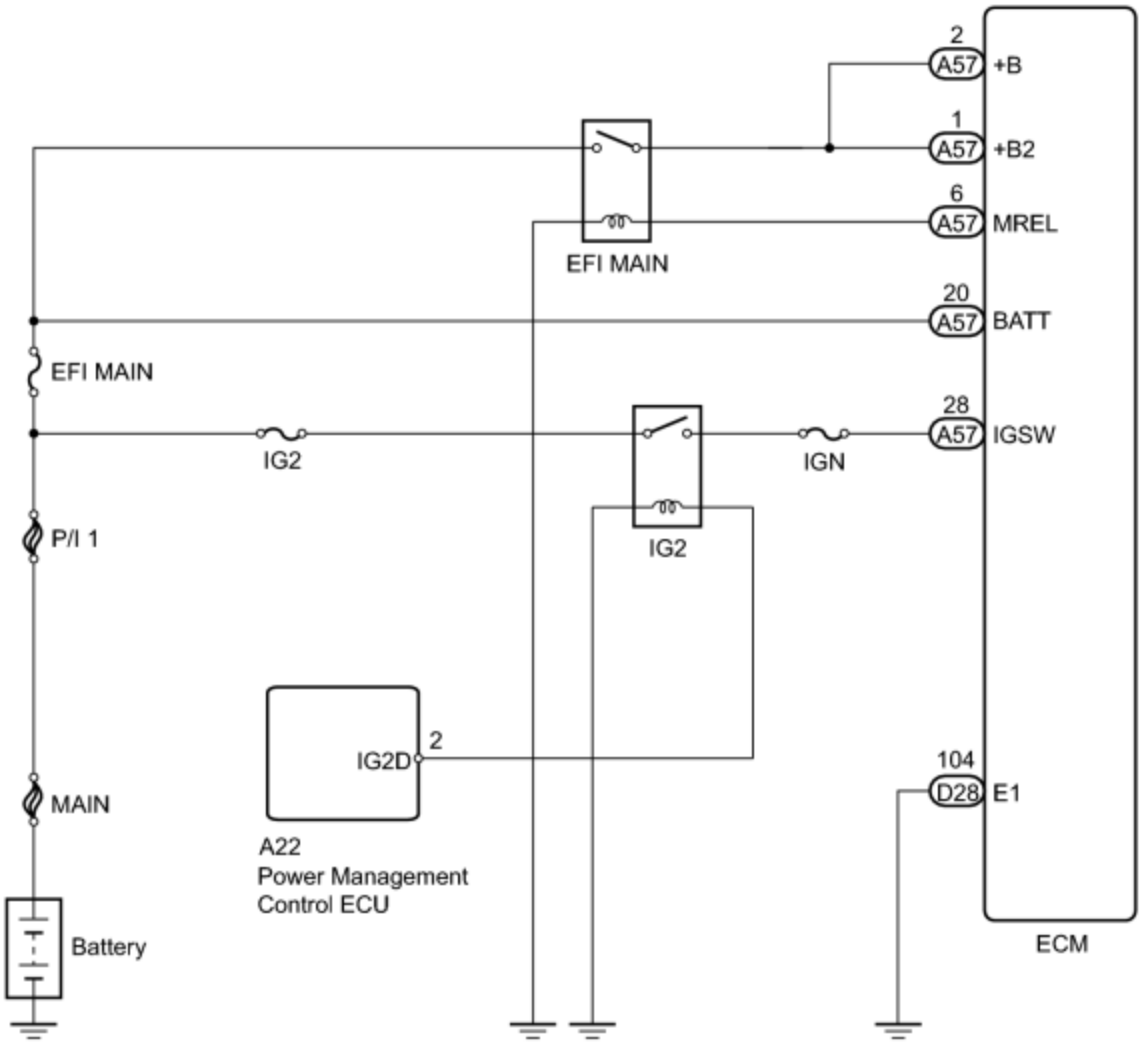
Refer to Checking Monitor Status INFO.

ECM Power Source Circuit

# DESCRIPTION

When the power switch is turned on (IG), battery voltage is applied to IGSW of the ECM. The output signal from the MREL terminal of the ECM causes a current to flow to the coil, closing the contacts of the integration relay (EFI MAIN relay) and supplying power to either terminal +B and +B2 of the ECM.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

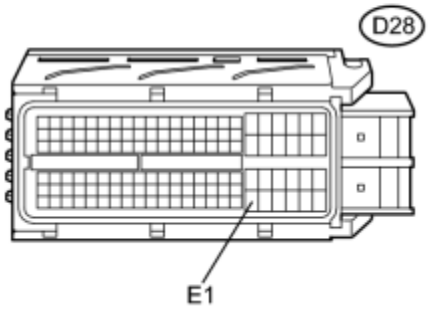
NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (ECM - BODY GROUND) |

*1




N

(a) Disconnect the ECM connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D28-104 (E1) - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(c) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ECM - BODY GROUND)

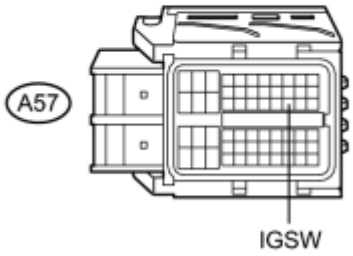
OK

▼

| | |
|---|---|
| 2. | INSPECT ECM (IGSW VOLTAGE) |

(a) Disconnect the ECM connector.

*1




N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-28 (IGSW) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

NG ▶ INSPECT INTEGRATION NO.1 RELAY (IG2 RELAY)

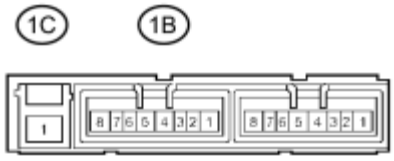
OK

▼

| | |
|---|---|
| 3. | INSPECT INTEGRATION NO.1 RELAY (EFI MAIN RELAY) |

(a) Remove the integration relay from the engine room relay block.

*1




(b) Disconnect the integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1C-1 - 1B-4 | No battery voltage applied between terminals 1B-2 and 1B-3 | 10 kΩ or higher |
| | Battery voltage applied between terminals 1B-2 and 1B-3 | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Integration Relay) |

(d) Reconnect the integration relay connector.

(e) Reinstall the integration relay.

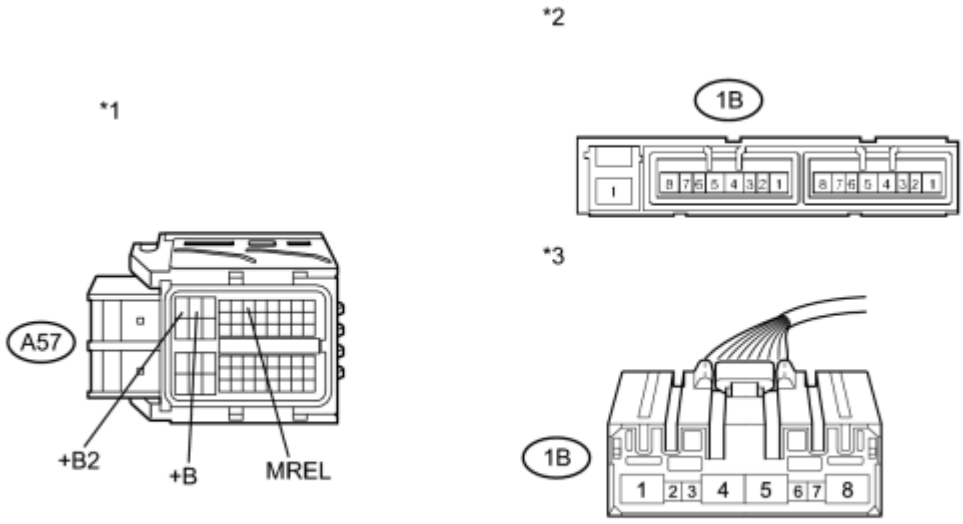
NG ▶ REPLACE INTEGRATION NO.1 RELAY

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (EFI MAIN RELAY) - ECM) |

(a) Remove the integration relay from the engine room relay block.




(b) Disconnect the integration relay connector.

(c) Disconnect the ECM connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-4 - A57-1 (+B2) | Always | Below 1 Ω |
| 1B-4 - A57-2 (+B) | Always | Below 1 Ω |
| 1B-2 - A57-6 (MREL) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-4 or A57-1 (+B2) - Body ground | Always | 10 kΩ or higher |
| 1B-4 or A57-2 (+B) - Body ground | Always | 10 kΩ or higher |
| 1B-2 or A57-6 (MREL) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) | *2 | Integration Relay |
| *3 | Front view of wire harness connector | - | - |

| | | | |
|---|---|---|---|
| | (to Integration Relay) | | |

(e) Reconnect the ECM connector.

(f) Reconnect the integration relay connector.

(g) Reinstall the integration relay.

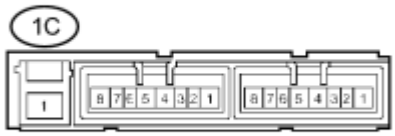
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (EFI MAIN RELAY) - ECM)

OK

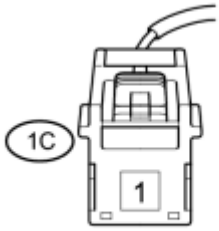
▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (EFI MAIN RELAY) - BATTERY) |

*1




*2




(a) Remove the integration relay from the engine room relay block.

(b) Disconnect the integration relay connector.

(c) Disconnect the negative battery terminal.

(d) Disconnect the positive battery terminal.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1C-1 - Battery positive terminal | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1C-1 or Battery positive terminal - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Integration Relay |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(f) Reconnect the integration relay connector.

(g) Reinstall the integration relay.

(h) Reconnect the positive battery terminal.

(i) Reconnect the negative battery terminal.

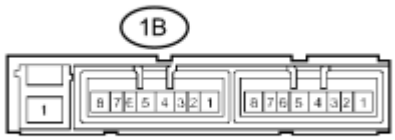
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (EFI MAIN RELAY) - BATTERY)

OK

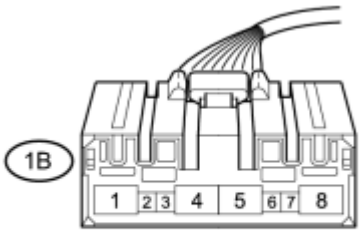
▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (EFI MAIN RELAY) - BODY GROUND) |

*1




*2




(a) Remove the integration relay from the engine room relay block.

(b) Disconnect the integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-3 - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Integration Relay |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Reconnect the integration relay connector.

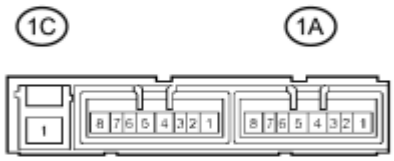
(e) Reinstall the integration relay.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (EFI MAIN RELAY) - BODY GROUND)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 7. | INSPECT INTEGRATION NO.1 RELAY (IG2 RELAY) |

*1




(a) Remove the integration relay from the engine room relay block.

(b) Disconnect the integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1C-1 - 1A-4 | No battery voltage applied to terminals 1A-2 and 1A-3 | 10 kΩ or higher |
| | Battery voltage applied to terminals 1A-2 and 1A-3 | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Integration Relay) |

(d) Reconnect the integration relay connector.

(e) Reinstall the integration relay.

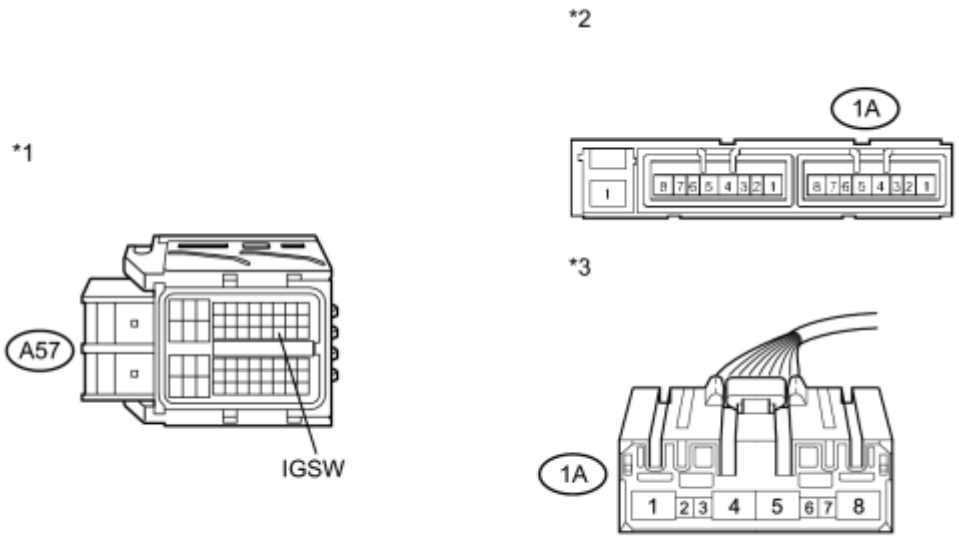
NG ▶ REPLACE INTEGRATION NO.1 RELAY (IG2 RELAY)

OK

▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - ECM) |

(a) Disconnect the ECM connector.




(b) Remove the integration relay from the engine room relay block.

(c) Disconnect the integration relay connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1A-4 - A57-28 (IGSW) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1A-4 or A57-28 (IGSW) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) | *2 | Integration Relay |
| *3 | Front view of wire harness connector<br><br>(to Integration Relay) | - | - |

(e) Reconnect the ECM connector.

(f) Reconnect the integration relay connector.

(g) Reinstall the integration relay.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - ECM)

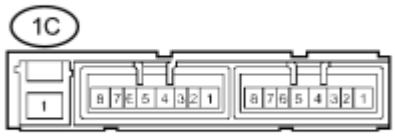
OK

▼

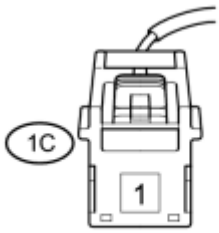
| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - BATTERY) |

(a) Remove the integration relay from the engine room relay block.

*1




*2




(b) Disconnect the integration relay connector.

(c) Disconnect the negative battery terminal.

(d) Disconnect the positive battery terminal.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1C-1 - Battery positive terminal | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1C-1 or Battery positive terminal - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

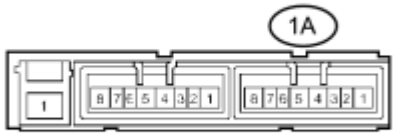
| | |
|---|---|
| *1 | Integration Relay |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - BATTERY)

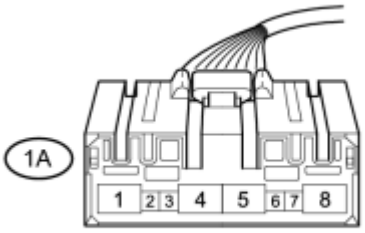
OK

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - BODY GROUND) |

*1




*2




(a) Remove the integration relay from the engine room relay block.

(b) Disconnect the integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1A-3 - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Integration Relay |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Reconnect the integration relay connector.

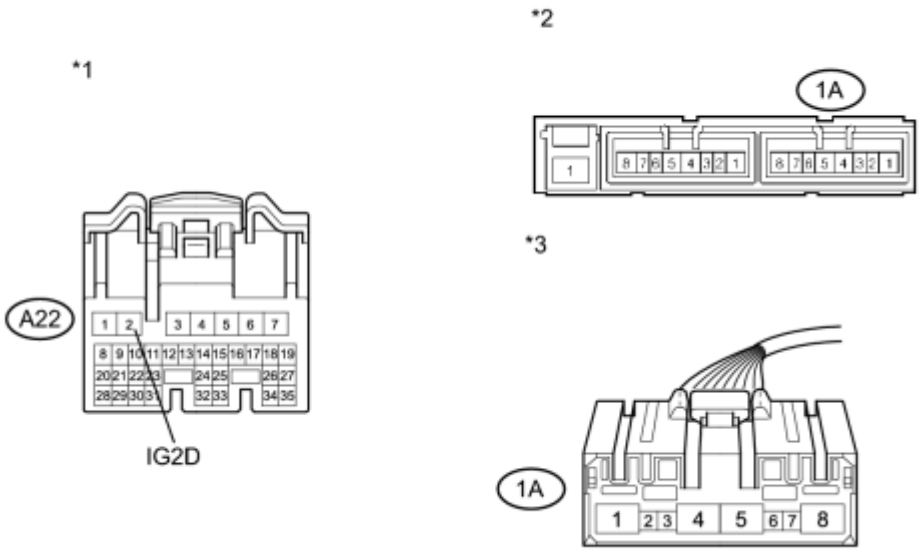
(e) Reinstall the integration relay.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - BODY GROUND)

OK

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INTEGRATION RELAY (IG2 RELAY)) |

(a) Remove the integration relay from the engine room relay block.




(b) Disconnect the integration relay connector.

(c) Disconnect the power management control ECU connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A22-2 (IG2D) - 1A-2 | Always | Below 1 Ω |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Management Control ECU) | *2 | Integration Relay |
| *3 | Front view of wire harness connector<br><br>(to Integration Relay) | - | - |

(e) Reconnect the integration relay connector.

(f) Reinstall the integration relay.

(g) Reconnect the power management control ECU connector.

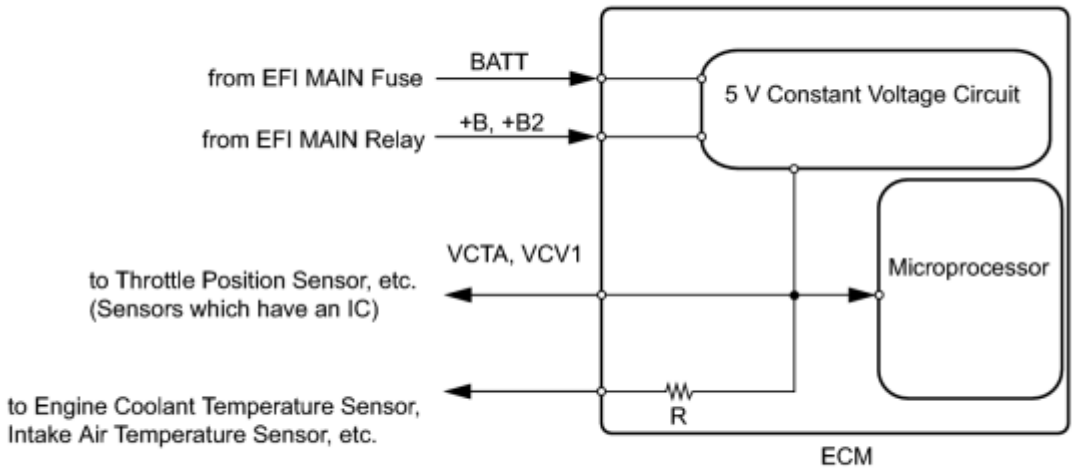
NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - INTEGRATION RELAY (IG2 RELAY))

OK → **CHECK SMART KEY SYSTEM**

VC Output Circuit

# DESCRIPTION

The ECM constantly uses 5 V from the battery voltages supplied to the +B (BATT) terminal to operate the microprocessor. The ECM also provides this power to the sensors through the VC output circuit.

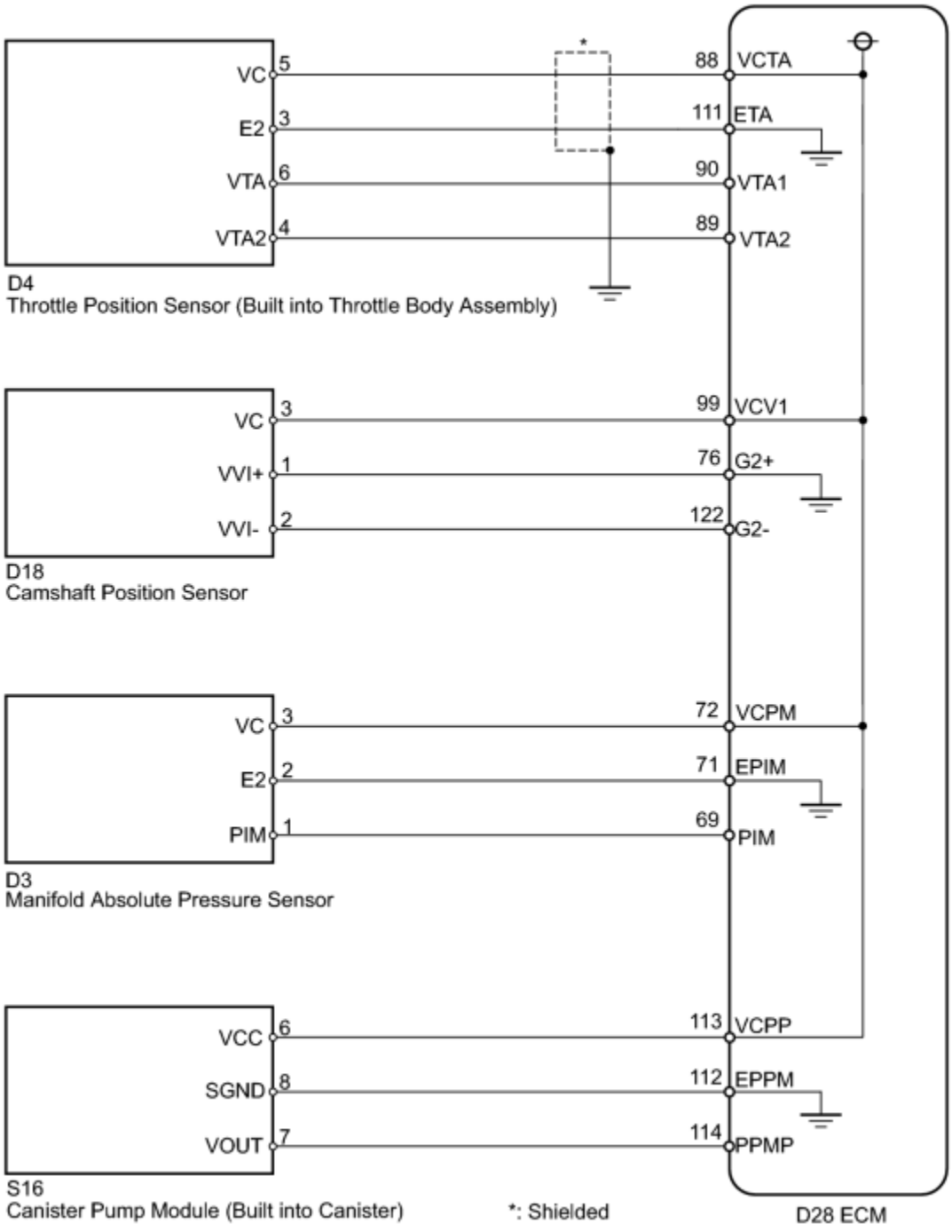



When the VC circuit is shorted, the microprocessor in the ECM and sensors that are supplied power through the VC circuit are inactivated because the power is not supplied from the VC circuit. Under this condition, the system does not start up and the MIL does not illuminate even if the system malfunctions.

HINT:

Under normal conditions, the MIL is illuminated for several seconds when the power switch is first turned on (IG). The MIL goes off when the engine is started.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK MIL |

(a) Check that the Malfunction Indicator Lamp (MIL) illuminates when turning the power switch on (IG).

OK:

MIL lights up.

NG ▶ CHECK CONNECTION BETWEEN TECHSTREAM AND ECM

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | CHECK CONNECTION BETWEEN TECHSTREAM AND ECM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Check the communication between the Techstream and ECM.

Result:

| Result | Proceed to |
|---|---|
| Communication is possible | A |
| Communication is not possible | B |

A ▶ GO TO MIL CIRCUIT

B

▼

| | |
|---|---|
| 3. | CHECK MIL (THROTTLE POSITION SENSOR) |

(a) Disconnect the throttle position sensor connector.

(b) Turn the power switch on (IG).

(c) Check the MIL.

Result:

| Result | Proceed to |
|---|---|
| MIL illuminates | A |
| MIL does not illuminate | B |

(d) Reconnect the throttle position sensor connector.

A ▶ REPLACE THROTTLE BODY ASSEMBLY

B

| | |
|---|---|
| 4. | CHECK MIL (CAMSHAFT POSITION SENSOR) |

(a) Disconnect the camshaft position sensor connector.

(b) Turn the power switch on (IG).

(c) Check the MIL.

Result:

| Result | Proceed to |
|---|---|
| MIL illuminates | A |
| MIL does not illuminate | B |

(d) Reconnect the camshaft position sensor connector.

A REPLACE CAMSHAFT POSITION SENSOR

B

| | |
|---|---|
| 5. | CHECK MIL (MANIFOLD ABSOLUTE PRESSURE SENSOR) |

(a) Disconnect the manifold absolute pressure sensor connector.

(b) Turn the power switch on (IG).

(c) Check the MIL.

Result:

| Result | Proceed to |
|---|---|
| MIL illuminates | A |
| MIL does not illuminate | B |

(d) Reconnect the manifold absolute pressure sensor connector.

A REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR

B

| | |
|---|---|
| 6. | CHECK MIL (CANISTER PUMP MODULE) |

(a) Disconnect the canister pump module connector.

(b) Turn the power switch on (IG).

(c) Check the MIL.

Result:

| Result | Proceed to |
|---|---|
| MIL illuminates | A |
| MIL does not illuminate | B |

(d) Reconnect the canister pump module connector.

A ▶ REPLACE CANISTER

B

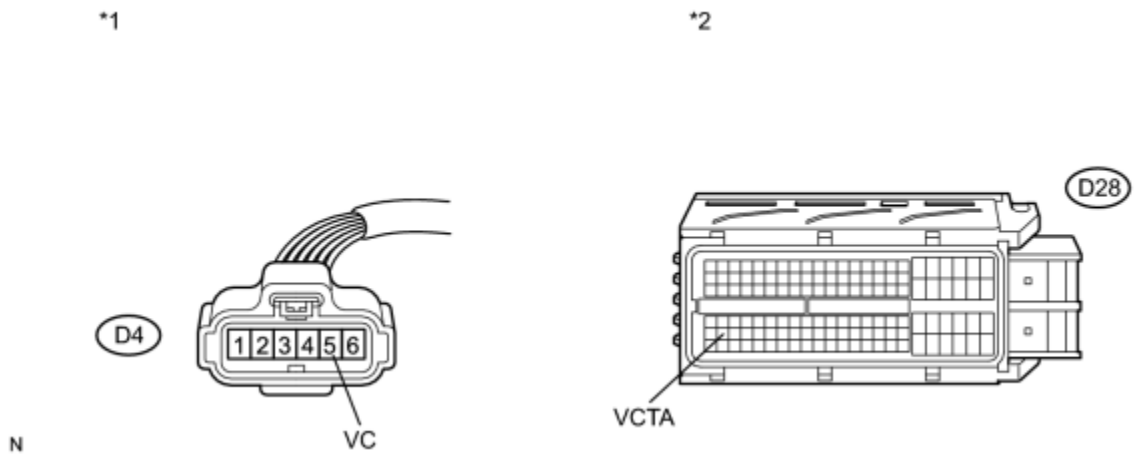
▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (THROTTLE POSITION SENSOR - ECM) |

(a) Disconnect the throttle position sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D28-88 (VCTA) or D4-5 (VC) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Throttle Position Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the throttle position sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (THROTTLE POSITION SENSOR - ECM)

OK

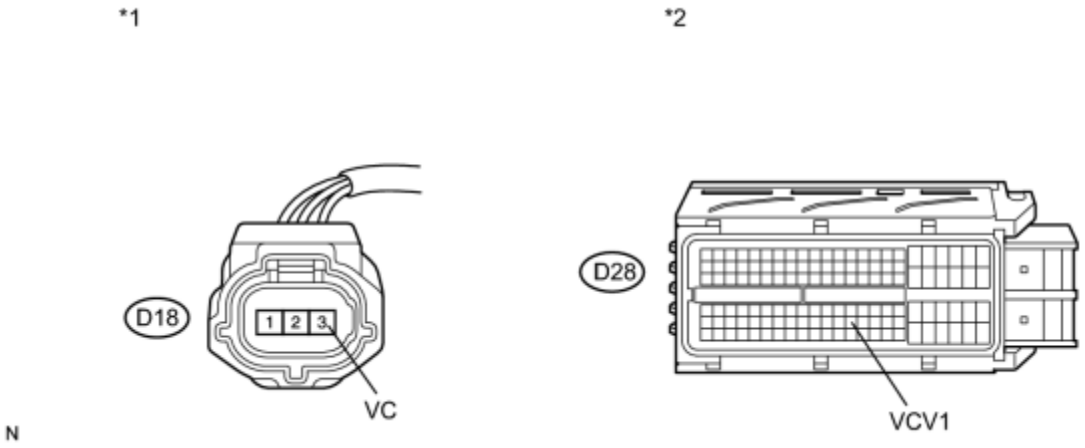
▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (CAMSHAFT POSITION SENSOR - ECM) |

(a) Disconnect the camshaft position sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D18-3 (VC) or D28-99 (VCV1) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector | *2 | Front view of wire harness connector |

| | | | |
|---|---|---|---|
| | (to Camshaft Position Sensor) | | (to ECM) |

(d) Reconnect the camshaft position sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (CAMSHAFT POSITION SENSOR - ECM)

OK

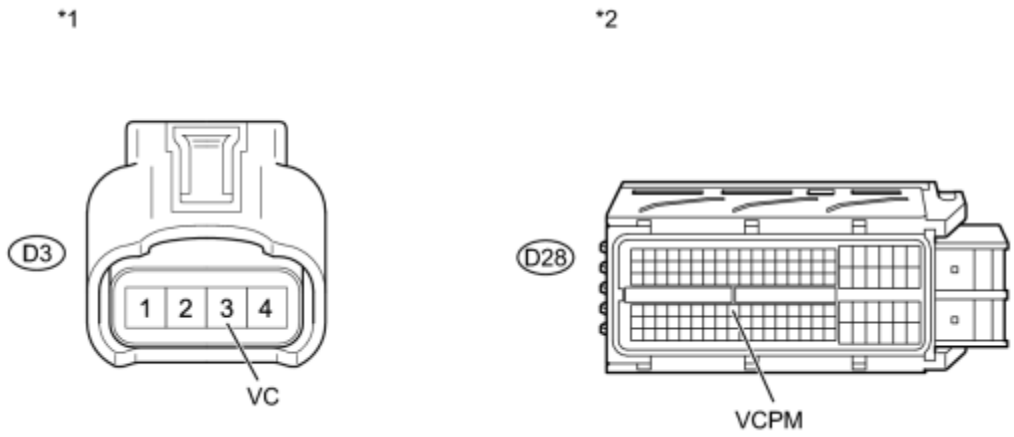
▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (MANIFOLD ABSOLUTE PRESSURE SENSOR - ECM) |

(a) Disconnect the manifold absolute pressure sensor connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D3-3 (VC) or D28-72 (VCPM) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Manifold Absolute Pressure Sensor) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the manifold absolute pressure sensor connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (MANIFOLD ABSOLUTE PRESSURE SENSOR - ECM)

OK

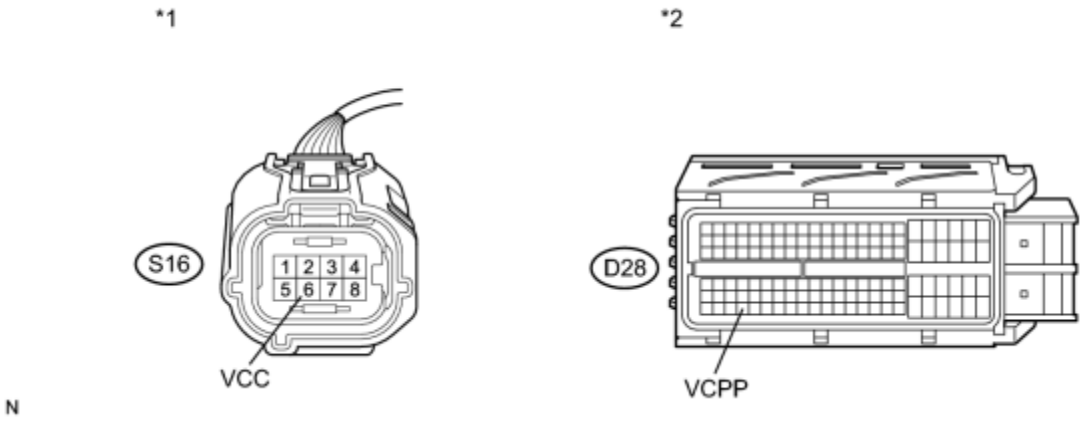
▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (CANISTER PUMP MODULE - ECM) |

(a) Disconnect the canister pump module connector.

(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S16-6 (VCC) or D28-113 (VCPP) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Canister Pump Module) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the canister pump module connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (CANISTER PUMP MODULE - ECM)

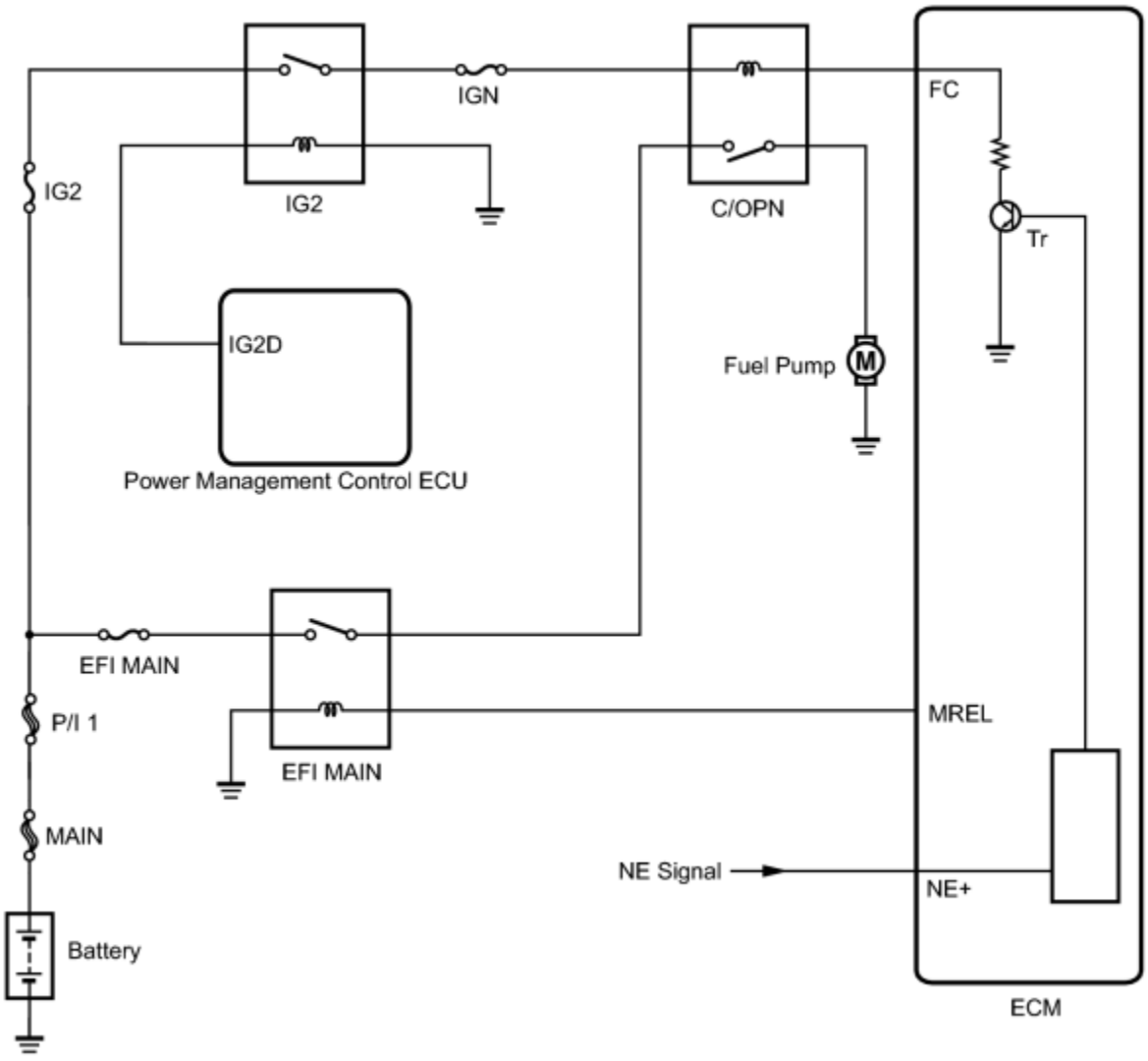
OK **REPLACE ECM**

Fuel Pump Control Circuit

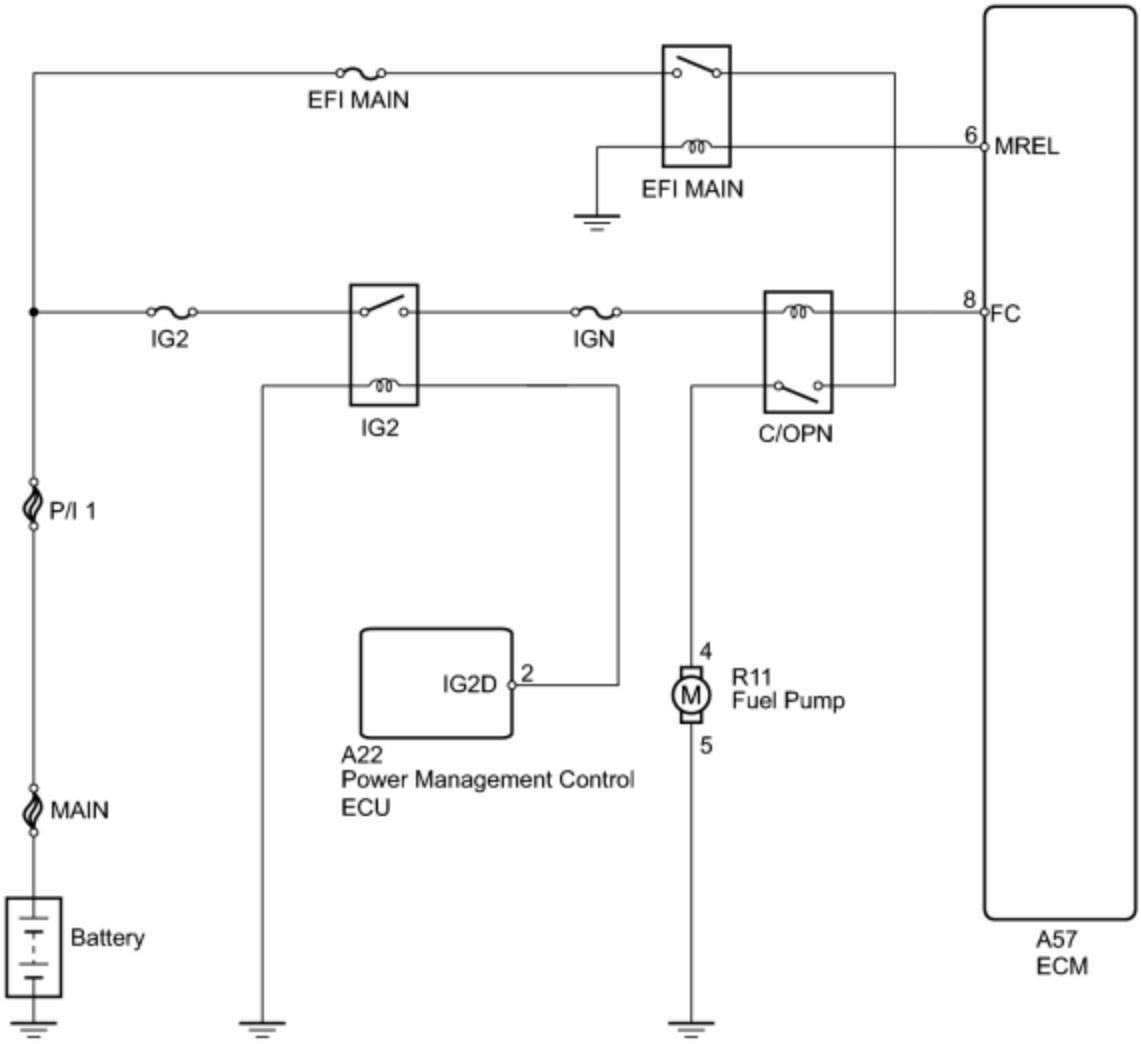
# DESCRIPTION

When the NE signal is input to the ECM, Tr is turned on, current flows to the coil of the circuit opening relay, the relay switches on, power is supplied to the fuel pump and the fuel pump operates.

While the NE signal is generated (engine running), the ECM keeps Tr on (circuit opening relay on) and the fuel pump also keeps operating.




# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (OPERATE C/OPN RELAY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump / Speed.

(e) Check whether the fuel pump operation sound occurs when performing the Active Test on the Techstream.

OK:

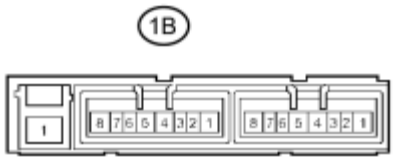
Fuel pump operating sound occurs.

NG ▶ INSPECT INTEGRATION NO.1 RELAY (C/OPN RELAY)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | INSPECT INTEGRATION NO.1 RELAY (C/OPN RELAY) |

*1




(a) Remove the integration relay from the engine room relay block.

(b) Disconnect the integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-4 - 1B-8 | No battery voltage applied to terminals 1B-6 and 1B-7 | 10 kΩ or higher |
| | Battery voltage applied to terminals 1B-6 and 1B-7 | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Integration Relay) |

(d) Reconnect the integration relay connector.

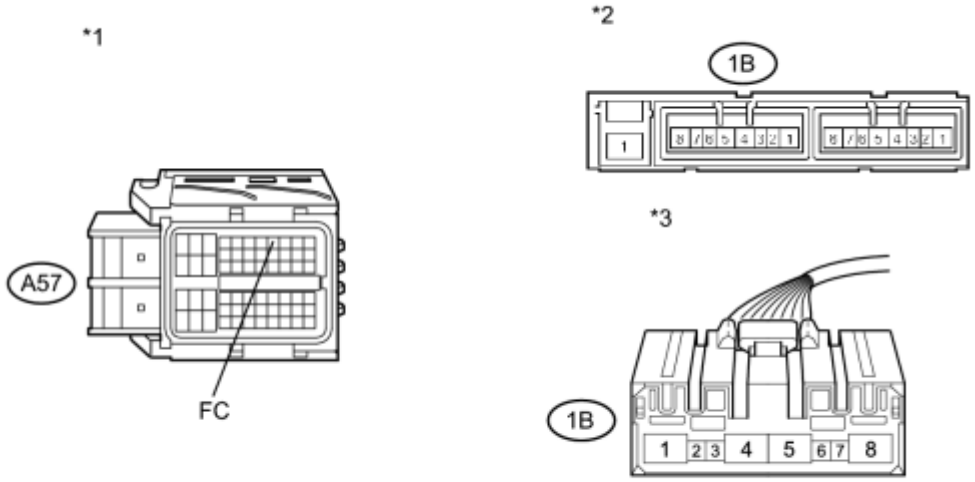
(e) Reinstall the integration relay.

NG REPLACE INTEGRATION NO.1 RELAY (C/OPN RELAY)

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (C/OPN RELAY - ECM) |

(a) Disconnect the ECM connector.




(b) Remove the integration relay from the engine room relay block.

(c) Disconnect the integration relay connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-7 - A57-8 (FC) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-7 or A57-8 (FC) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) | *2 | Integration Relay |
| *3 | Front view of wire harness connector<br><br>(to Integration Relay) | - | - |

(e) Reconnect the ECM connector.

(f) Reconnect the integration relay connector.

(g) Reinstall the integration relay.

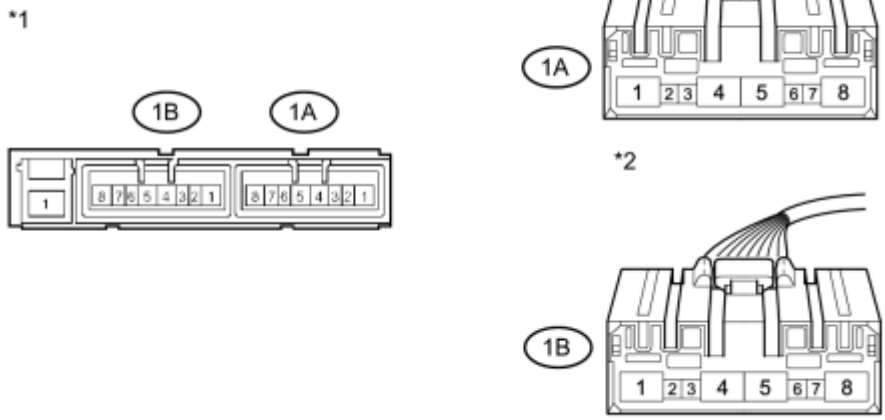
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (C/OPN RELAY - ECM)

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (C/OPN RELAY - IG2 RELAY) |

(a) Remove the integration relay from the engine room relay block.




(b) Disconnect the integration relay connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1A-4 - 1B-6 | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1A-4 or 1B-6 - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Integration Relay | *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(d) Reconnect the integration relay connector.

(e) Reinstall the integration relay.

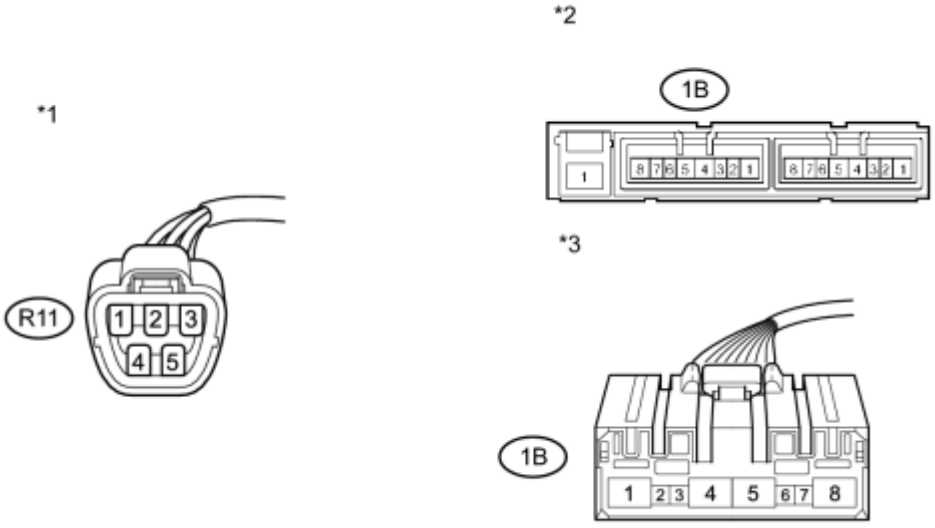
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (C/OPN RELAY - IG2 RELAY)

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (C/OPN RELAY - FUEL PUMP) |

(a) Disconnect the fuel pump connector.



(b) Remove the integration relay from the engine room relay block.

(c) Disconnect the integration relay connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-8 - R11-4 | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1B-8 or R11-4 - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Pump) | *2 | Integration Relay |
| *3 | Front view of wire harness connector<br><br>(to Integration Relay) | - | - |

(e) Reconnect the fuel pump connector.

(f) Reconnect the integration relay connector.

(g) Reinstall the integration relay.

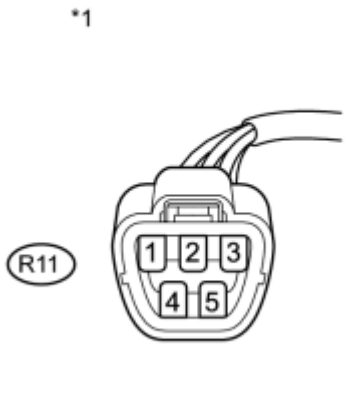
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (C/OPN RELAY - FUEL PUMP)

OK

▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (FUEL PUMP - BODY GROUND) |

(a) Disconnect the fuel pump connector.




N

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R11-5 - Body ground | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Pump) |

(c) Reconnect the fuel pump connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (FUEL PUMP - BODY GROUND)

OK

▼

| | |
|---|---|
| 7. | INSPECT FUEL PUMP |

(a) Inspect the fuel pump INFO.

NG ▶ REPLACE FUEL PUMP

OK

▼

| | |
|---|---|
| 8. | CHECK ECM POWER SOURCE CIRCUIT |

(a) Check the ECM power source circuit INFO.

NG → REPAIR OR REPLACE ECM POWER SOURCE CIRCUIT

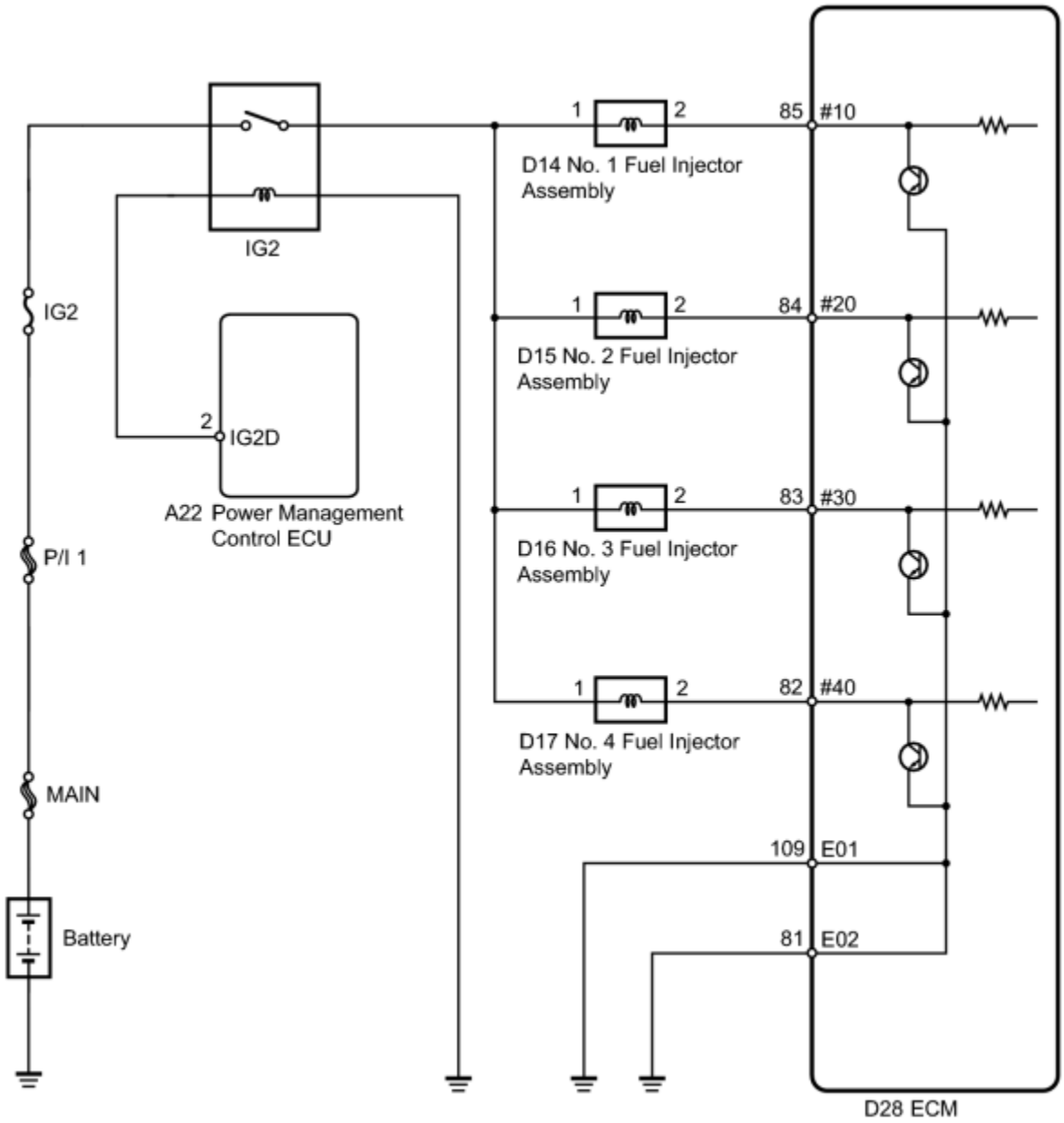
OK → **REPLACE ECM**

Fuel Injector Circuit

# DESCRIPTION

The fuel injectors are located on the intake manifold. They inject fuel into the cylinders based on the signals from the ECM.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FUEL INJECTOR ASSEMBLY (POWER SOURCE) |

*1




N

(a) Disconnect the fuel injector assembly connectors.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D14-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D15-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D16-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| D17-1 - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Injector Assembly) |

(d) Reconnect the fuel injector assembly connectors.

NG ▶ CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - FUEL INJECTOR ASSEMBLY)

OK

▼

| | |
|---|---|
| 2. | INSPECT FUEL INJECTOR ASSEMBLY |

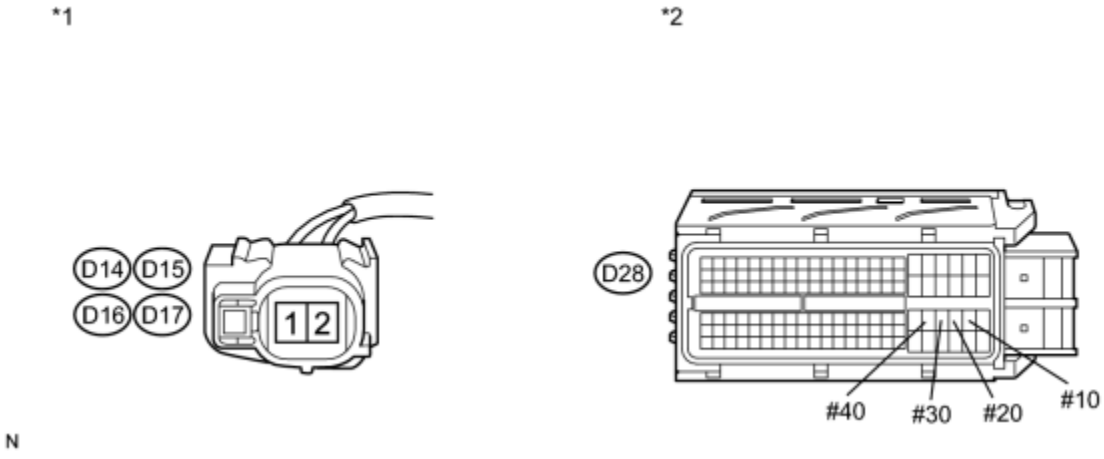
(a) Inspect the fuel injector assembly INFO.

NG REPLACE FUEL INJECTOR ASSEMBLY

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (FUEL INJECTOR ASSEMBLY - ECM) |

(a) Disconnect the fuel injector assembly connectors.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-2 - D28-85 (#10) | Always | Below 1 Ω |
| D15-2 - D28-84 (#20) | Always | Below 1 Ω |
| D16-2 - D28-83 (#30) | Always | Below 1 Ω |
| D17-2 - D28-82 (#40) | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-2 or D28-85 (#10) - Body ground | Always | 10 Ω or higher |
| D15-2 or D28-84 (#20) - Body ground | Always | 10 Ω or higher |
| D16-2 or D28-83 (#30) - Body ground | Always | 10 Ω or higher |
| D17-2 or D28-82 (#40) - Body ground | Always | 10 Ω or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Injector Assembly) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the fuel injector assembly connectors.

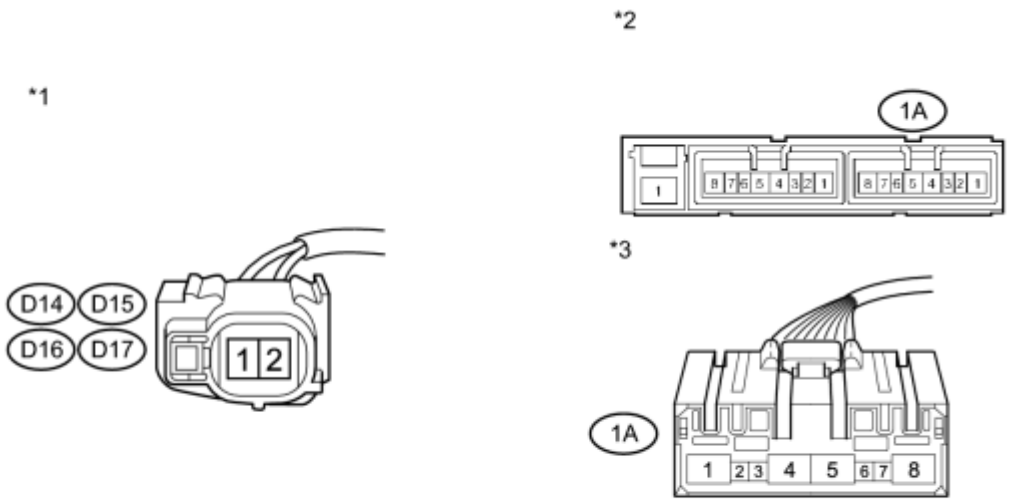
(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (FUEL INJECTOR ASSEMBLY - ECM)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - FUEL INJECTOR ASSEMBLY) |

(a) Disconnect the fuel injector assembly connectors.




(b) Remove the integration relay from the engine room relay block.

(c) Disconnect the integration relay connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-1 - 1A-4 | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D15-1 - 1A-4 | Always | Below 1 Ω |
| D16-1 - 1A-4 | Always | Below 1 Ω |
| D17-1 - 1A-4 | Always | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D14-1 or 1A-4 - Body ground | Always | 10 kΩ or higher |
| D15-1 or 1A-4 - Body ground | Always | 10 kΩ or higher |
| D16-1 or 1A-4 - Body ground | Always | 10 kΩ or higher |
| D17-1 or 1A-4 - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Injector Assembly) | *2 | Integration Relay |
| *3 | Front view of wire harness connector<br><br>(to Integration Relay) | - | - |

(e) Reconnect the fuel injector assembly connectors.

(f) Reconnect the integration relay connector.

(g) Reinstall the integration relay.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY (IG2 RELAY) - FUEL INJECTOR ASSEMBLY)

OK ▶ **CHECK ECM POWER SOURCE CIRCUIT**

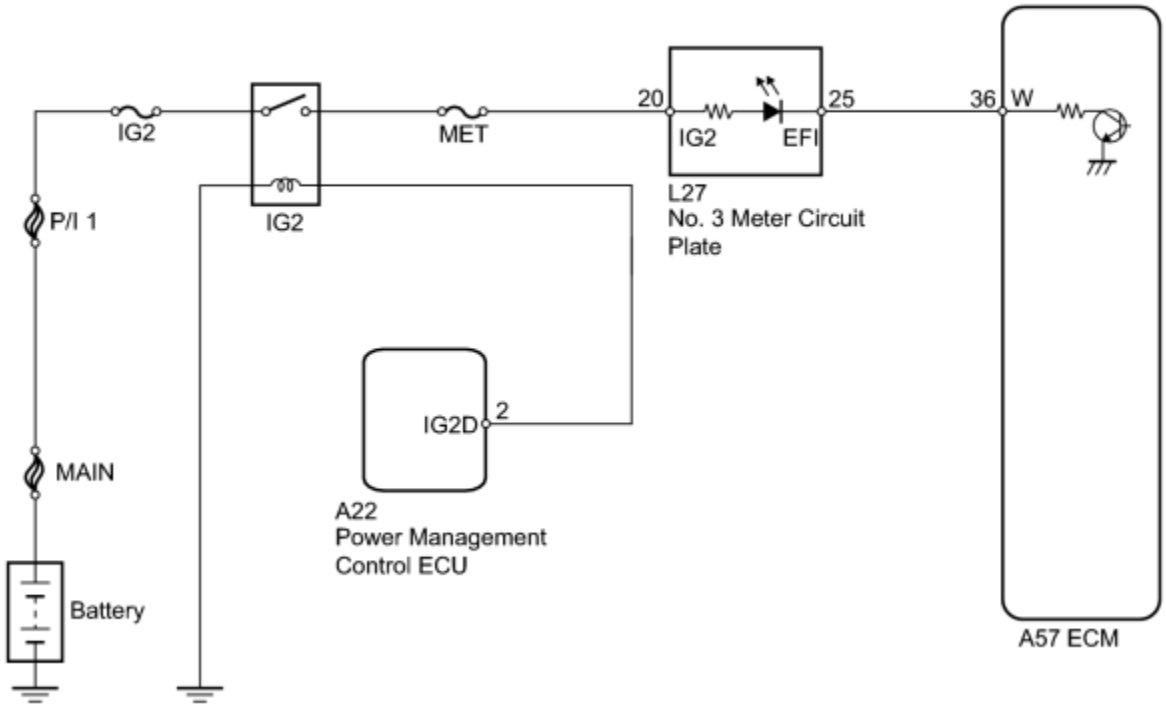
MIL Circuit

# DESCRIPTION

The MIL (Malfunction Indicator Lamp) is used to indicate vehicle malfunction detected by the ECM. When the power switch is turned on (IG), power is supplied to the MIL circuit, and the ECM provides the circuit ground which illuminates the MIL.

The MIL operation can be checked visually: When the power switch is first turned on (IG), the MIL should illuminate and should then turn off. If the MIL remains illuminated or is not illuminated, conduct the following troubleshooting procedure using the Techstream.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK THAT MIL IS ILLUMINATED |

(a) Turn the power switch on (IG).

(b) Check the illumination of the MIL.

Result:

| Condition | Proceed to |
|---|---|
| MIL remains illuminated (Even after power switch is turned on (IG) and several seconds have passed, MIL still remains illuminated) | A |
| MIL remains off (Does not illuminate at all) | B |
| MIL illuminates for several seconds, but turns off after engine is started | C |

C SYSTEM OK

B CHECK THAT ENGINE STARTS

A

| | |
|---|---|
| 2. | CHECK WHETHER MIL TURNS OFF |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Check if any DTCs have been stored. Note down the DTCs.

(f) Clear the DTCs INFO.

(g) Check if the MIL goes off.

OK:

MIL goes off.

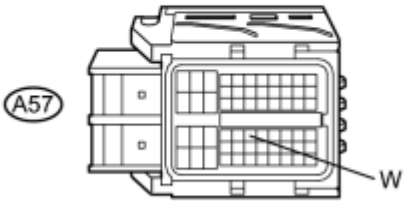
NG CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT IN WIRE HARNESS)

OK **REPAIR CIRCUITS INDICATED BY OUTPUT DTCS**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CHECK FOR SHORT IN WIRE HARNESS) |

(a) Disconnect the ECM connector.

*1




N

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(b) Turn the power switch on (IG).

(c) Check that the MIL is not illuminated.

OK:

MIL is not illuminated.

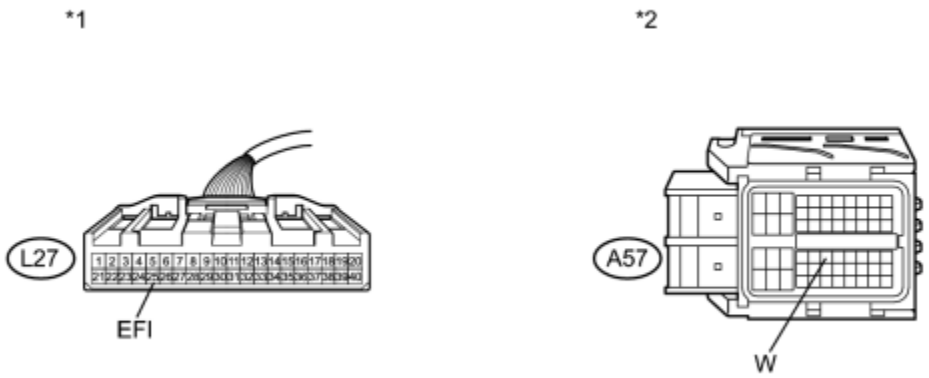
(d) Reconnect the ECM connector.

NG CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - ECM)

OK **REPLACE ECM**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - ECM) |

(a) Disconnect the No. 3 meter circuit plate connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Short):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-25 (EFI) or A57-36 (W) - Body ground | Always | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to No. 3 Meter Circuit Plate) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the No. 3 meter circuit plate connector.

(e) Reconnect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (NO. 3 METER CIRCUIT PLATE - ECM)

OK ▶ **REPLACE NO. 3 METER CIRCUIT PLATE**

| | |
|---|---|
| 5. | CHECK THAT ENGINE STARTS |

(a) Turn the power switch on (IG).

(b) Put the engine in inspection mode INFO.

(c) Start the engine.

Result:

| Result | Proceed to |
|---|---|
| Engine starts | A |
| Engine cannot be put in inspection mode*<br><br>(Engine cannot start) | B |

HINT:

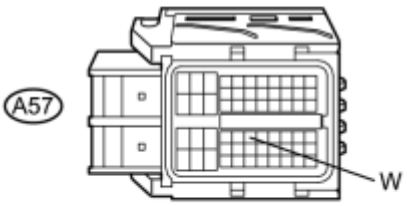
*: The Techstream cannot communicate with the ECM.

B GO TO VC OUTPUT CIRCUIT

A

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (ECM TERMINAL VOLTAGE) |

*1




(a) Disconnect the ECM connector.

N

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-36 (W) - Body ground | Power switch on (IG) | 11 to 14 V |

**Text in Illustration**

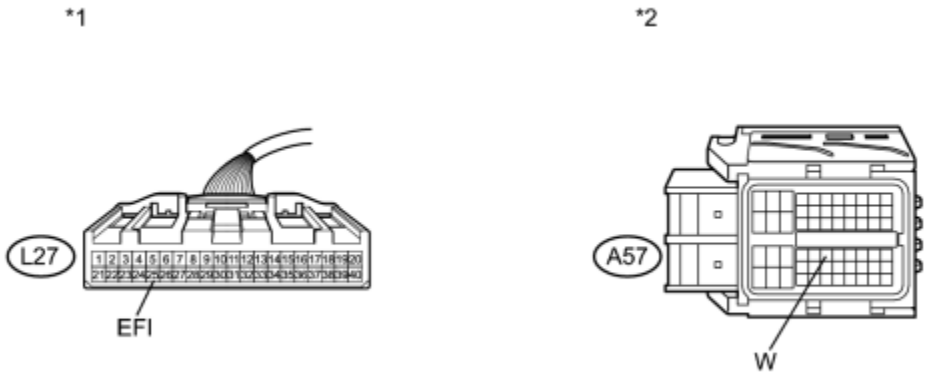
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

NG CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - ECM)

OK ▶ **REPLACE ECM**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - ECM) |

(a) Disconnect the No. 3 meter circuit plate connector.




(b) Disconnect the ECM connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-25 (EFI) - A57-36 (W) | Always | Below 1 Ω |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to No. 3 Meter Circuit Plate) | *2 | Front view of wire harness connector<br><br>(to ECM) |

(d) Reconnect the ECM connector.

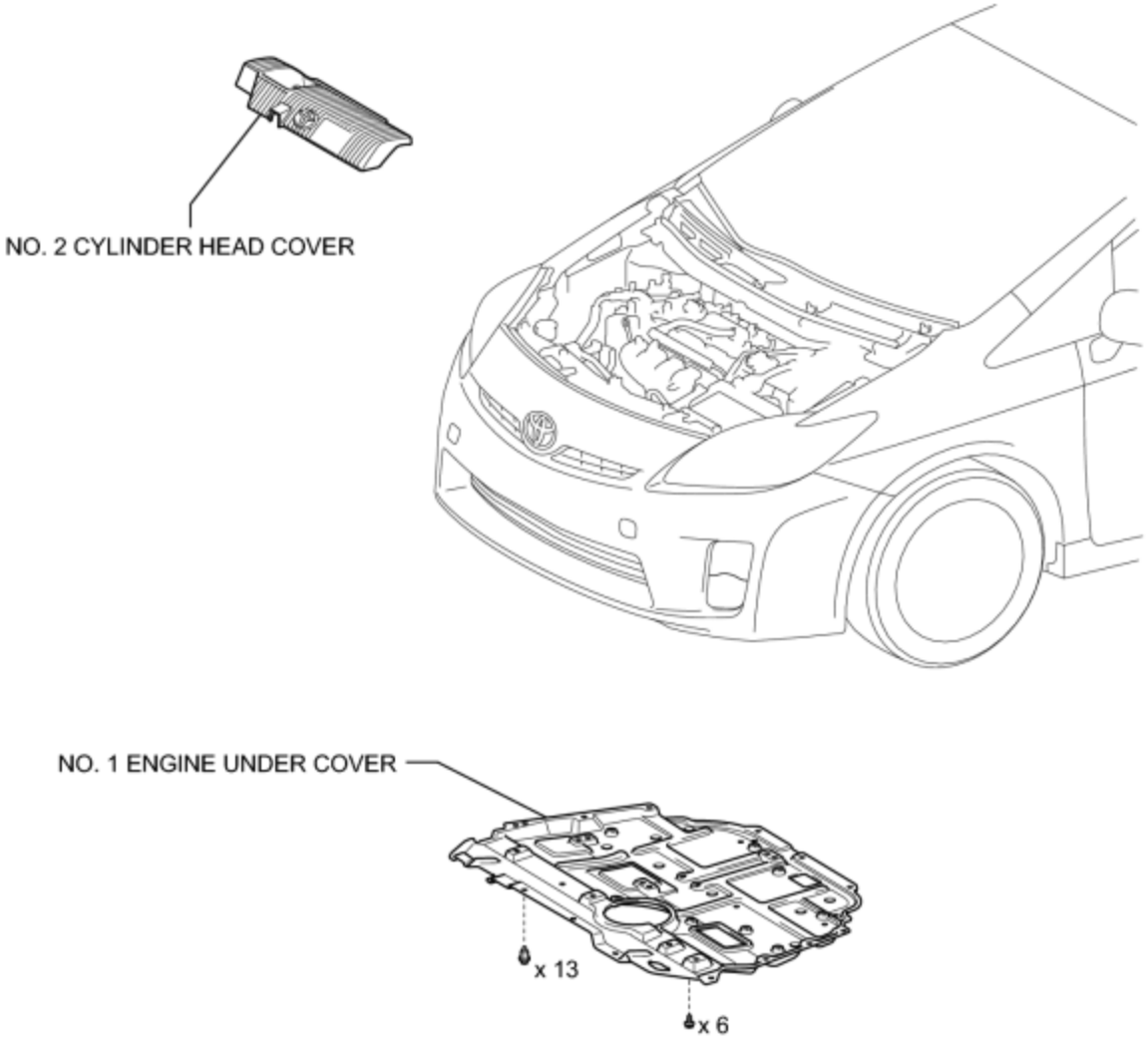
(e) Reconnect the No. 3 meter circuit plate connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (NO. 3 METER CIRCUIT PLATE - ECM)

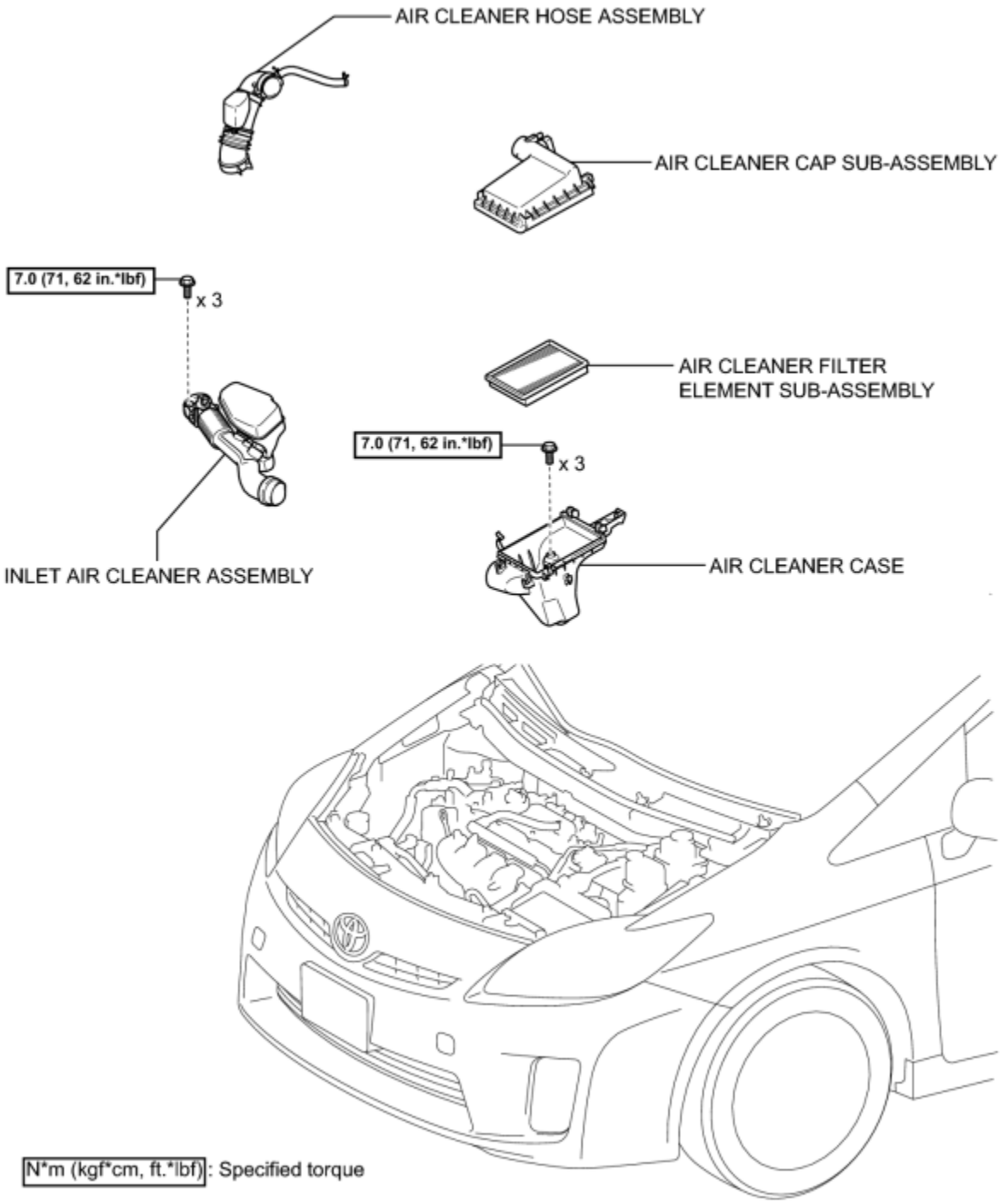
OK ▶ **REPLACE NO. 3 METER CIRCUIT PLATE**

## COMPONENTS

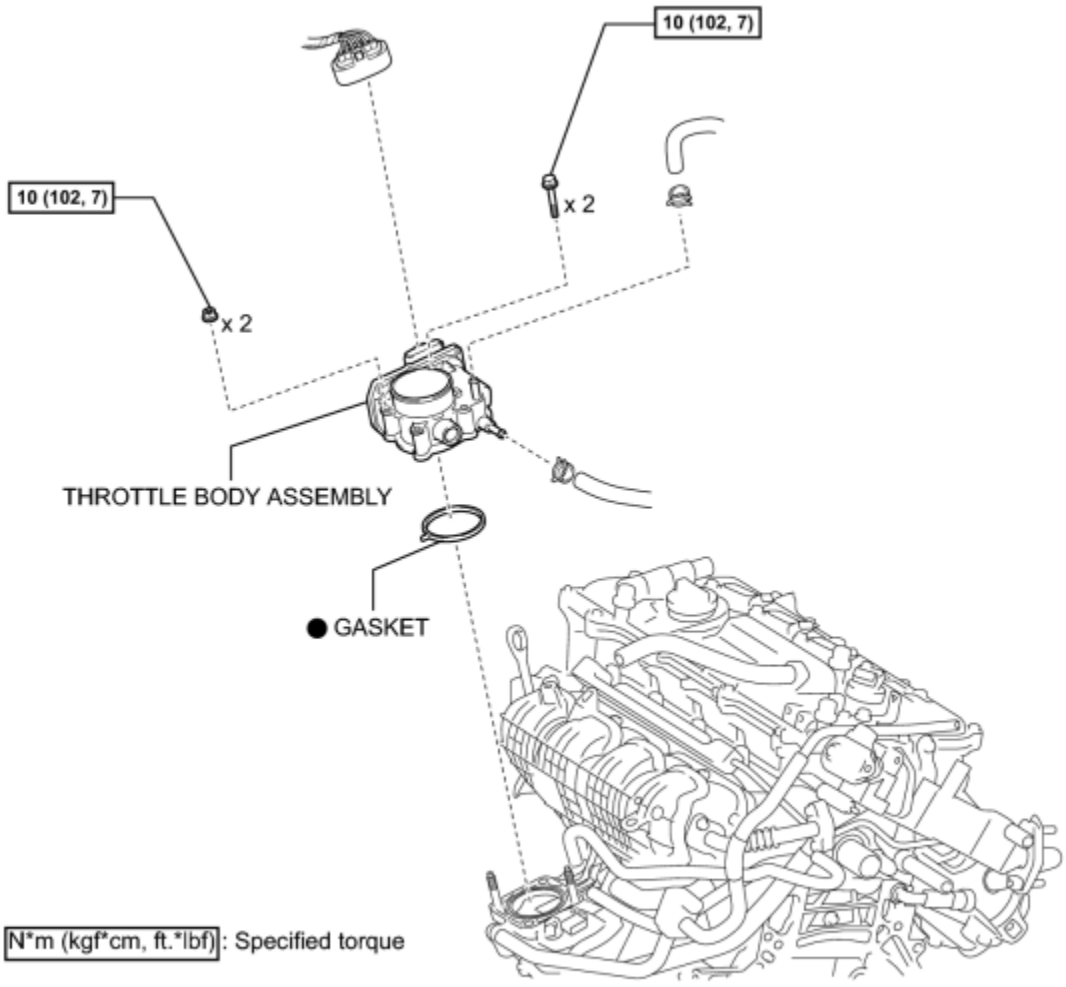
## ILLUSTRATION




## ILLUSTRATION




# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

# ON-VEHICLE INSPECTION

1. INSPECT THROTTLE BODY ASSEMBLY

(a) Check for throttle control motor operating sound.

(1) Turn the power switch on (IG).

(2) When depressing the accelerator pedal, check the operating sound of the motor. Make sure that no friction noises are emitted from the motor. If any friction noise exists, replace the throttle body assembly.

(b) Set the vehicle to the inspection mode INFO.

(c) Start the engine and check that the MIL is not illuminated. After the engine is warmed up, check that the idle speed is within the specified range when the A/C is switched off.

Standard:

| Condition | Engine Idle Speed |
|---|---|
| A/C switched off | 950 to 1050 rpm |

NOTICE:

- Be sure to perform this step with all accessories off.
- Make sure that park (P) is selected.

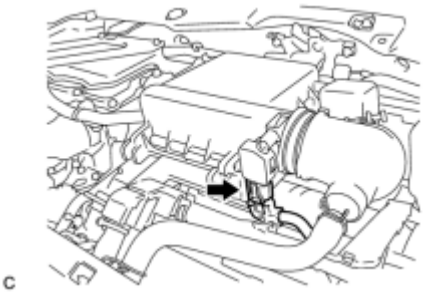
# REMOVAL

1. REMOVE NO. 1 ENGINE UNDER COVER

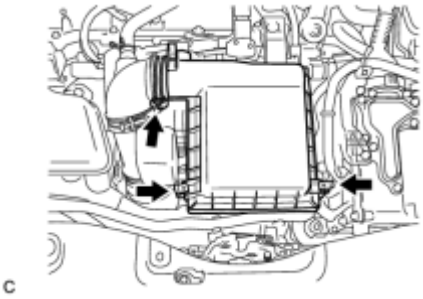
2. DRAIN ENGINE COOLANT (for Engine) INFO

3. REMOVE NO. 2 CYLINDER HEAD COVER INFO

4. REMOVE AIR CLEANER CAP SUB-ASSEMBLY




(a) Disconnect the mass air flow meter connector.

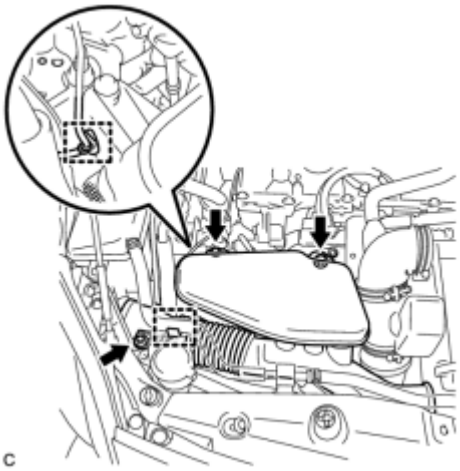



(b) Release the 2 clamps.

(c) Loosen the hose clamp and remove the air cleaner cap.

5. REMOVE INLET AIR CLEANER ASSEMBLY

(a) Separate the hose from the hose clamp.

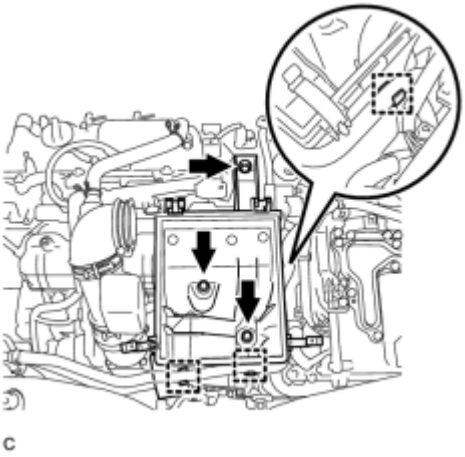



(b) Separate the wire harness clamp from the inlet air cleaner assembly.

(c) Remove the 3 bolts and inlet air cleaner assembly.

6. REMOVE AIR CLEANER CASE

(a) Remove the air cleaner filter element.




(b) Separate the hose from the 3 hose clamps.

(c) Remove the 3 bolts and air cleaner case.

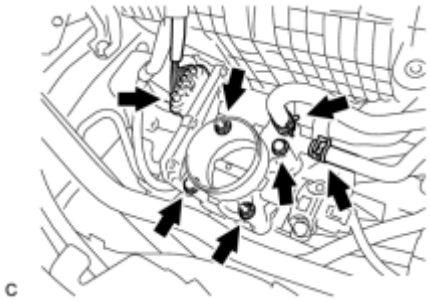
7. REMOVE AIR CLEANER HOSE ASSEMBLY

(a) Loosen the hose clamp and separate the ventilation hose.



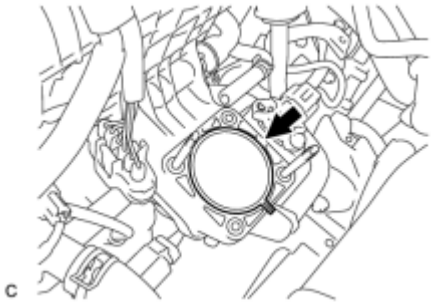

(b) Unlock the hose clamp and remove the air cleaner hose assembly.

8. REMOVE THROTTLE BODY ASSEMBLY




(a) Disconnect the throttle body connector and the 2 water by-pass hoses.

(b) Remove the 2 bolts, 2 nuts and throttle body assembly.



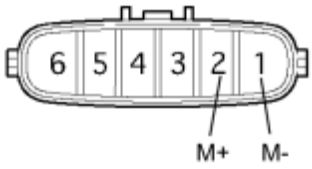

(c) Remove the gasket from the intake manifold.

# INSPECTION

1. INSPECT THROTTLE BODY ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

*1




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Throttle Body) |

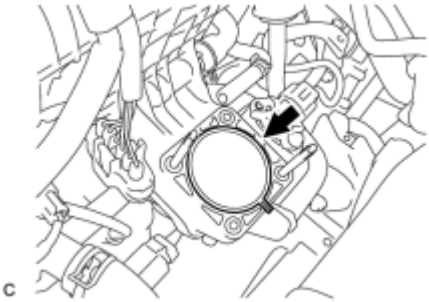
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (M-) - 2 (M+) | 20°C (68°F) | 0.3 to 100 Ω |

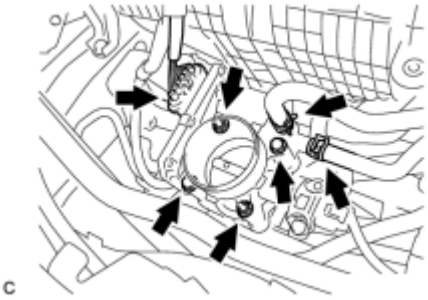
If the result is not as specified, replace the throttle body assembly.

# INSTALLATION

1. INSTALL THROTTLE BODY ASSEMBLY




(a) Install a new gasket onto the intake manifold.




(b) Install the throttle body assembly with the 2 bolts and 2 nuts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

(c) Connect the 2 water by-pass hoses and throttle body connector.

2. INSTALL AIR CLEANER HOSE ASSEMBLY



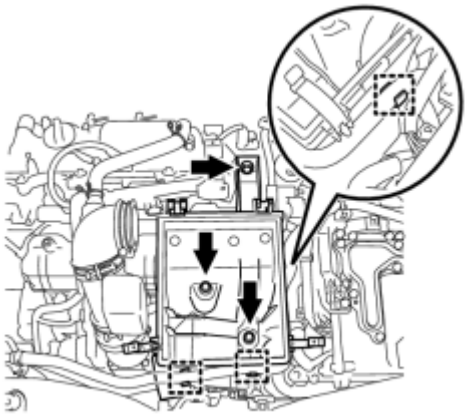

(a) Install the air cleaner hose assembly and lock the hose clamp.

(b) Connect the ventilation hose.

3. INSTALL AIR CLEANER CASE

(a) Install the air cleaner case with the 3 bolts.

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**

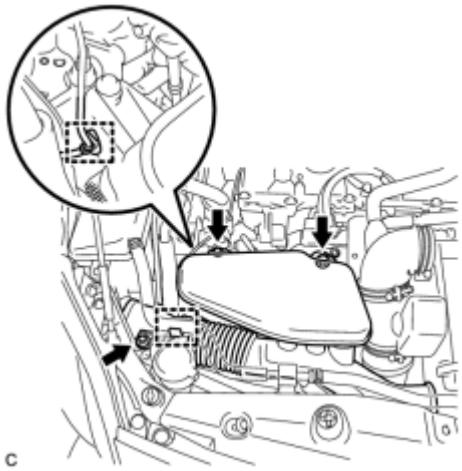


c

(b) Install the hose to the 3 hose clamps.

(c) Install the air cleaner filter element.

4. INSTALL INLET AIR CLEANER ASSEMBLY



c

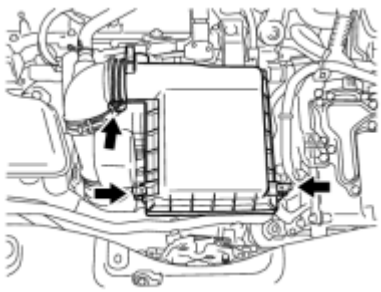
(a) Install the inlet air cleaner assembly with the 3 bolts.

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**

(b) Connect the wire harness clamp to the inlet air cleaner assembly.

(c) Install the hose to the hose clamp.

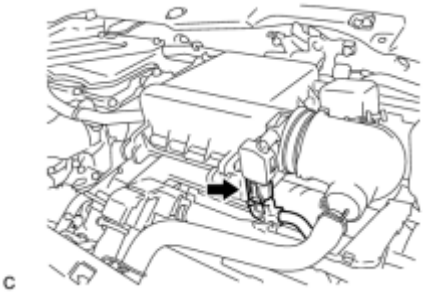
5. INSTALL AIR CLEANER CAP SUB-ASSEMBLY



c

(a) Install the air cleaner cap sub-assembly with the 2 clamps.

(b) Tighten the hose clamp.




(c) Connect the mass air flow meter connector.

6. ADD ENGINE COOLANT (for Engine) INFO

7. INSPECT FOR COOLANT LEAK (for Engine) INFO

8. INSTALL NO. 2 CYLINDER HEAD COVER INFO

9. INSTALL NO. 1 ENGINE UNDER COVER

10. PERFORM INITIALIZATION

NOTICE:

Be sure to perform this procedure after reassembling the throttle body assembly, removing and reinstalling any throttle body component or replacing the ECM.

(a) Disconnect the cable from the negative (-) battery terminal. Wait at least 60 seconds and reconnect the cable.

(b) Connect the Techstream to the DLC3 and clear the DTCs INFO.

(c) Set the vehicle to the inspection mode INFO.

(d) Start the engine without operating the accelerator pedal and check that the MIL is not illuminated and that the idle speed is within the specified range when the air conditioning is switched off after the engine is warmed up.

Standard:

| Condition | Engine Idle Speed |
|---|---|
| A/C switched off | 950 to 1050 rpm |

NOTICE:

- If the accelerator pedal is operated, perform the above steps again.
- Be sure to perform this step with all accessories off.
- Make sure that park (P) is selected.

(e) Perform a road test and confirm that there are no abnormalities.

# DTC CHECK / CLEAR

NOTICE:

When the diagnosis system is changed from normal mode to check mode or vice versa, all DTCs and freeze frame data recorded in normal mode are cleared. Before changing modes, always check and make a note of DTCs and freeze frame data.

HINT:

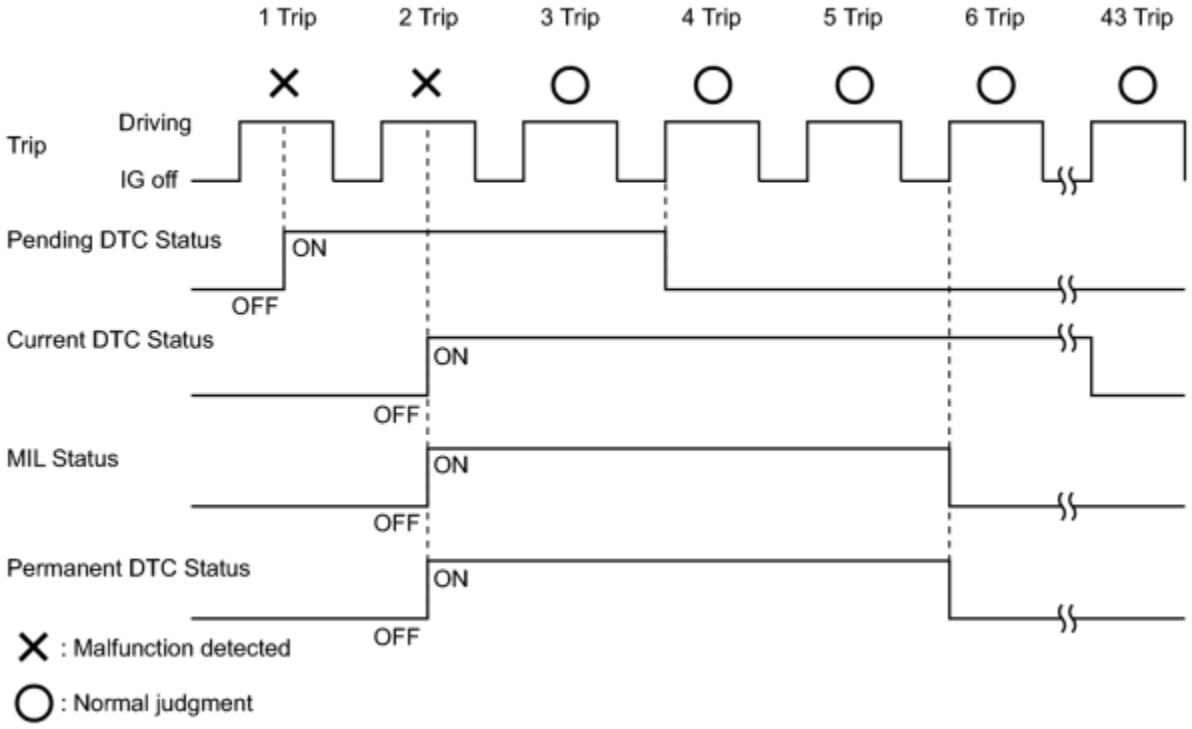
- DTCs which are stored in the ECM can be displayed on the Techstream. The Techstream can display the current, pending and permanent DTCs.
- If a malfunction is detected during the current driving cycle, current and permanent DTCs are stored.
- Some DTCs are not stored if the ECM does not detect the same malfunction again during a second consecutive driving cycle. However, such malfunctions, detected on only one occasion, are stored as pending DTCs.
- Current and pending DTCs can be cleared by using the Techstream or by disconnecting the cable from the negative battery terminal. However, permanent DTCs cannot be cleared using either of these two methods.
- After clearing current DTCs using the Techstream (or by disconnecting the cable from the negative battery terminal), permanent DTCs can be cleared when the system is determined to be normal for the relevant DTCs and then the universal trip is performed. The driving pattern to obtain a normal judgment is described under the "Confirmation Driving Pattern" for the respective DTC.

**2 Trip Detection Examples**

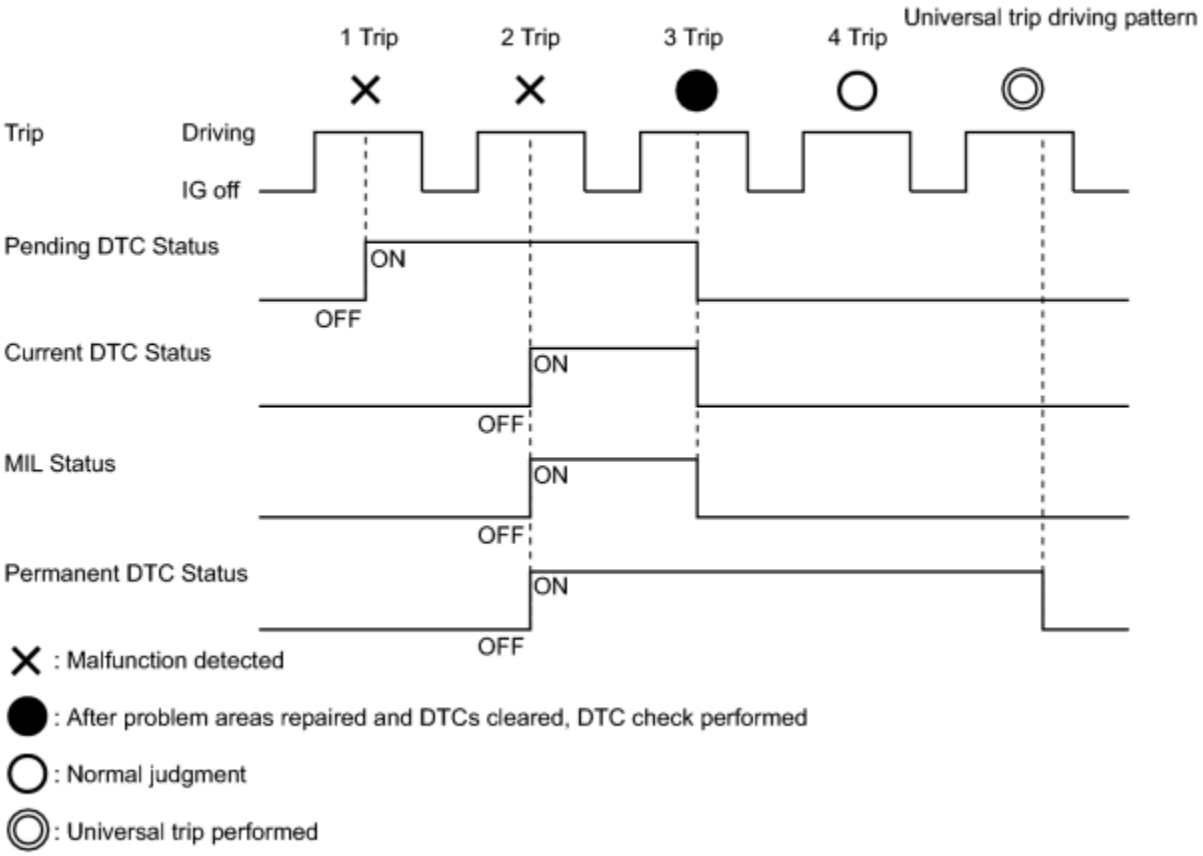
| | | |
|---|---|---|
| Pending DTC | Store condition | Malfunction detected |
| | Clear condition | System determined to be normal<br>or<br>DTCs cleared using Techstream<br>or<br>Cable disconnected from negative (-) battery terminal |
| Current DTC | Store condition | Malfunction detected (2nd trip) |
| | Clear condition | No malfunctions in 40 driving cycles<br>or<br>DTCs cleared using Techstream<br>or<br>Cable disconnected from negative (-) battery terminal |
| Permanent | Store | Malfunction detected (2nd trip) |

| | | |
|---|---|---|
| DTC | condition | |
| | Clear condition | Power switch turned to on (IG) after normal judgment obtained in 3 consecutive driving cycles<br><br>or<br><br>After DTCs cleared using Techstream or cable disconnected from negative (-) battery terminal, normal judgment obtained and universal trip performed (not for misfire and fuel system DTCs)<br><br>or<br><br>After DTCs cleared using Techstream or cable disconnected from negative (-) battery terminal, malfunction not detected when universal trip driving performed (misfire and fuel system DTCs) |
| MIL | ON | Malfunction detected (2nd trip) |
| | OFF | Power switch turned to on (IG) after normal judgment obtained in 3 consecutive driving cycles<br><br>or<br><br>DTCs cleared using Techstream<br><br>or<br><br>Cable disconnected from negative (-) battery terminal |

2 Trip Detection Examples



2 Trip Detection Examples (Instance when DTCs were cleared midway through by using the Techstream or by disconnecting the cable from the negative battery terminal)




HINT:

- Obtaining a normal judgment and performing a universal trip driving pattern can be done in the same driving cycle or in different driving cycles.
- It is unnecessary to obtain a normal judgment if the DTCs are misfire or fuel system DTCs.

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Check the DTC(s) and freeze frame data, and then write them down.

(f) Check the details of the DTC(s) INFO.

2. CLEAR DTC (Pending and Current DTC)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Clear the DTCs.

3. CLEAR DTC (Pending and Current DTC without using Techstream)

(a) Perform either of the following operations:

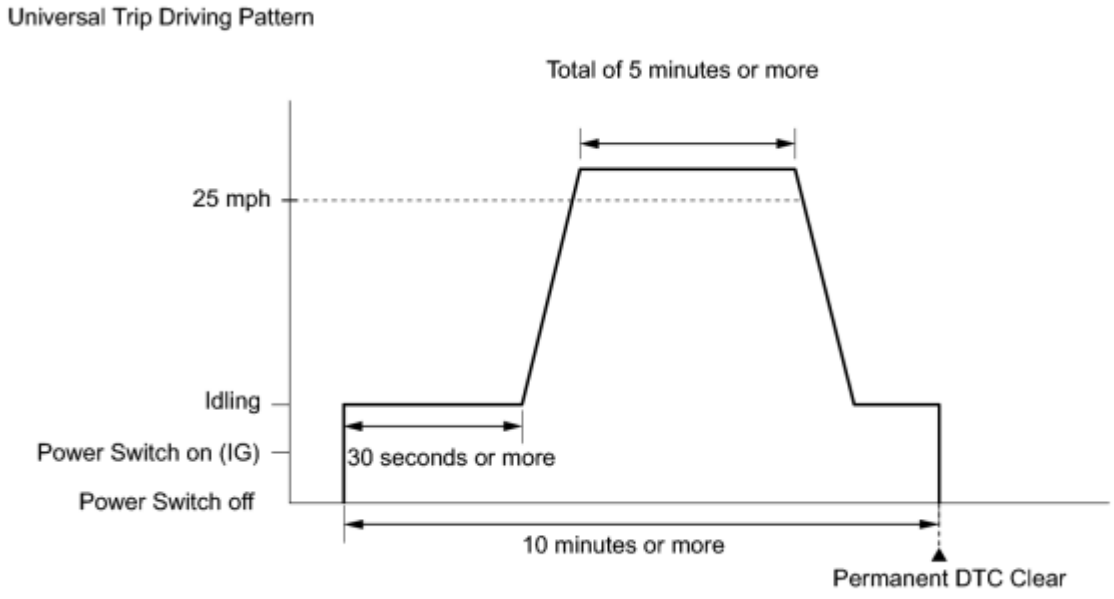
(1) Disconnect the cable from the negative (-) battery terminal for more than 1 minute.

(2) Remove the EFI MAIN and ETCS fuses from the engine room relay block located inside the engine compartment for more than 1 minute.

4. CLEAR PERMANENT DTC

HINT:

Even if the following procedure is not performed, permanent DTCs are cleared by obtaining a normal judgment during 3 consecutive driving cycles.




(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(e) Check if permanent DTCs are stored.

HINT:

If permanent DTCs are not output, it is not necessary to continue this procedure.

(f) Clear DTCs.

(g) Perform the respective confirmation driving patterns in order to obtain a normal judgment for the output DTCs.

HINT:

- Confirmation driving patterns do not need to be performed for misfire and fuel system DTCs.
- For the confirmation driving pattern, refer to the procedures for the relevant DTC INFO.

(h) Perform the universal trip.

HINT:

The driving pattern to obtain a normal judgment and the universal trip driving can be performed consecutively in the same driving cycle.

1. Put the engine in inspection mode INFO.
2. Idle the engine for 30 seconds or more.
3. Drive the vehicle at 25 mph (40 km/h) or more for a total of 5 minutes or more.

   HINT:

   It is possible to complete the drive pattern even if the vehicle decelerates to less than 25 mph (40 km/h) during the driving cycle provided that the vehicle is driven at 25 mph (40 km/h) or more for a total of 5 minutes.

4. Allow 10 minutes or more to elapse from the time the engine is started.

(i) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(j) Check that the permanent DTCs have been cleared.

HINT:

The permanent DTCs are cleared when the universal trip is completed.

# REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

(a) Remove the engine assembly with transaxle INFO.

2. INSTALL ENGINE ON ENGINE STAND INFO

3. REMOVE ENGINE HANGERS INFO

4. REMOVE THROTTLE BODY ASSEMBLY INFO

5. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE INFO

6. REMOVE EGR PIPE ASSEMBLY INFO

7. REMOVE EGR VALVE ASSEMBLY INFO

8. REMOVE EGR WITH COOLER PIPE SUB-ASSEMBLY INFO

9. REMOVE INTAKE MANIFOLD INFO

10. REMOVE FUEL VAPOR FEED PIPE INFO

11. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

12. REMOVE NO. 1 DELIVERY PIPE SPACER INFO

13. REMOVE FUEL INJECTOR ASSEMBLY INFO

14. REMOVE IGNITION COIL ASSEMBLY INFO

15. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY INFO

16. REMOVE CYLINDER HEAD COVER GASKET INFO

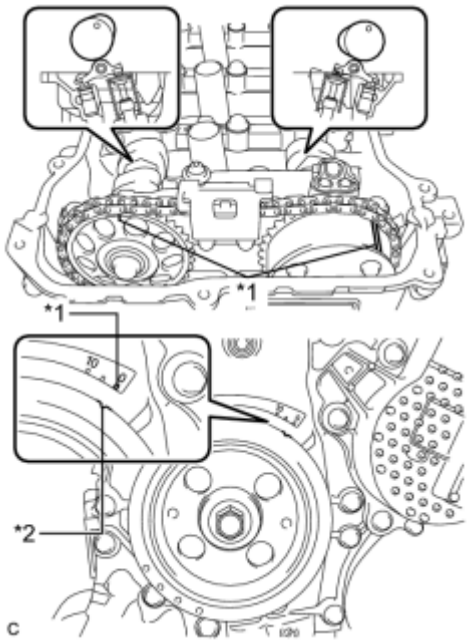
17. REMOVE SPARK PLUG TUBE GASKET INFO

18. SET NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Turn the crankshaft pulley until its notch and timing mark "0" of the timing chain cover are aligned.

## Text in Illustration

| | |
|---|---|
| *1 | Timing Mark |



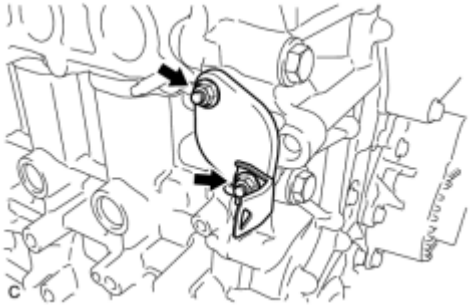

| | |
|---|---|
| *2 | Timing Notch |

(b) Check that timing marks on both the camshaft timing sprocket and camshaft timing gear are facing upward as shown in the illustration.

If not, turn the crankshaft 1 complete revolution (360°) and align the marks as above.

19. REMOVE CRANKSHAFT PULLEY INFO

20. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY




(a) Remove the 2 nuts, bracket, chain tensioner and gasket.

NOTICE:

Do not turn the crankshaft without the No. 1 chain tensioner installed.

21. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY INFO

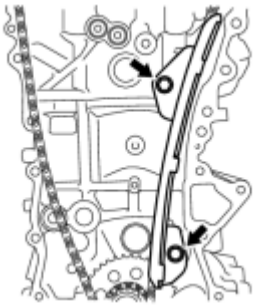
22. REMOVE TIMING CHAIN COVER OIL SEAL INFO

23. REMOVE CHAIN TENSIONER SLIPPER

(a) Remove the chain tensioner slipper from the cylinder block.

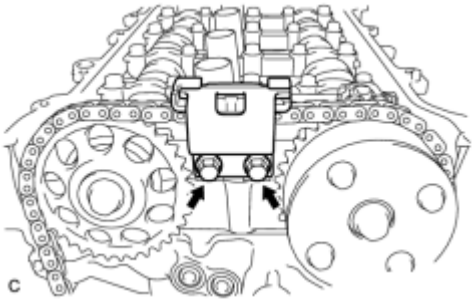


24. REMOVE NO. 1 CHAIN VIBRATION DAMPER



(a) Remove the 2 bolts and chain vibration damper.

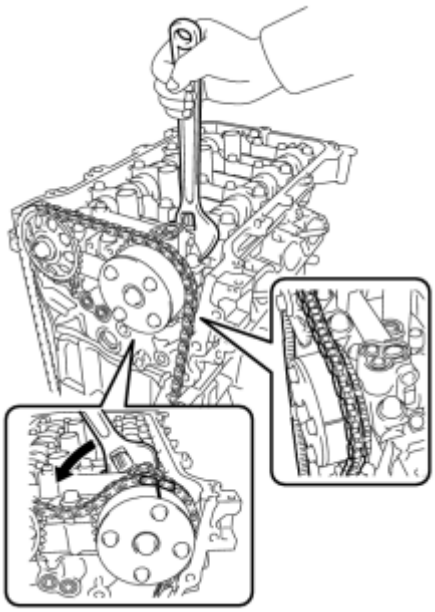
25. REMOVE NO. 2 CHAIN VIBRATION DAMPER



(a) Remove the 2 bolts and No. 2 chain vibration damper.

26. REMOVE CHAIN SUB-ASSEMBLY

(a) Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear counterclockwise to loosen the chain between the camshaft timing gears.



(b) With the chain loosened, release the chain from the camshaft timing gear and place it on the camshaft timing gear.

HINT:

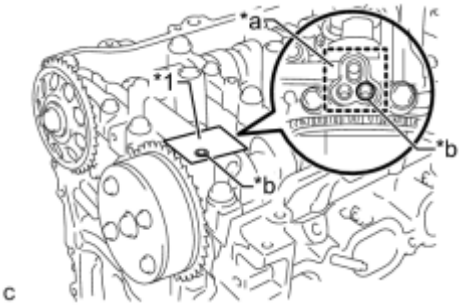
Be sure to release the chain from the sprocket completely.

(c) Turn the camshaft clockwise to return it to the original position and remove the chain.

27. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Inspect the lock of the camshaft timing gear.

(b) After cleaning and degreasing the VVT oil hole on the intake side of the No. 1 camshaft bearing cap, completely seal the oil hole with adhesive tape or equivalent as shown in the illustration to prevent air from leaking.



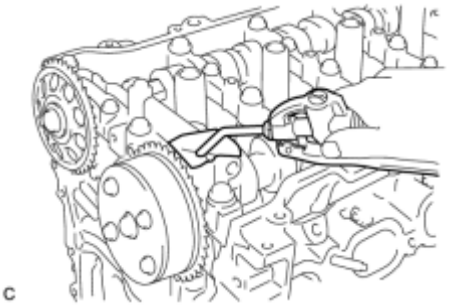

# Text in Illustration

| | |
|---|---|
| *1 | Adhesive Tape |
| *a | Adhesive Tape Sealing Area |
| *b | Prick a Hole |

NOTICE:

Be sure to cover the oil hole completely because air leaks due to insufficient sealing will prevent the lock pin from being released.

(c) Prick a hole in the tape covering the oil hole as shown in the illustration. (Procedure A)



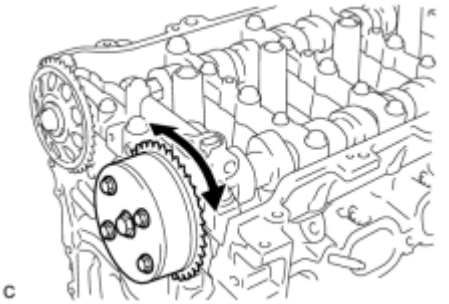
(d) Apply approximately 150 kPa (1.5 kgf/cm2, 22 psi) of air pressure to the hole pricked in procedure A to release the lock pin.

- If air leaks out, reattach the adhesive tape.
- Cover the oil hole with a piece of cloth when applying air pressure to prevent oil from spraying.

(e) Forcibly turn the camshaft timing gear in the advance direction (counterclockwise).

HINT:

Depending on the air pressure applied, the camshaft timing gear may turn in the advance direction without assistance.

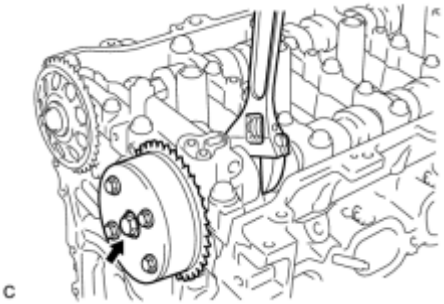


(f) Turn the camshaft timing gear within its movable range (26.5 to 28.5°) 2 or 3 times without turning it to the most retarded position. Make sure that the camshaft timing gear turns smoothly.

(g) Remove the adhesive tape from the No. 1 camshaft bearing cap.

28. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY

(a) Remove the flange bolt while holding the hexagonal portion of the camshaft with a wrench, and then remove the camshaft timing gear.

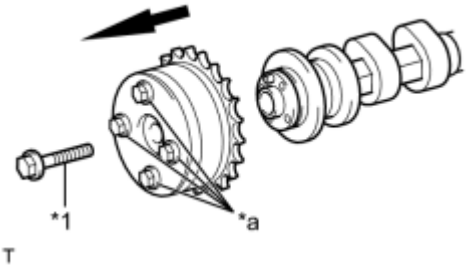


**Text in Illustration**

| | |
|---|---|
| *1 | Flange Bolt |
| *a | Do not remove |

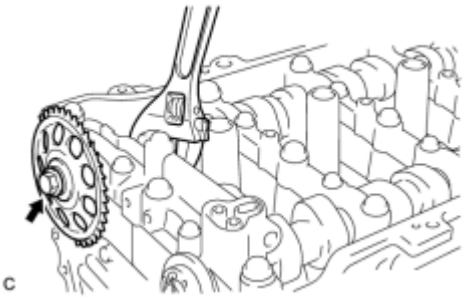
NOTICE:

- Before removing the camshaft timing gear, make sure that the lock pin has been released.
- Be sure not to remove the other 4 bolts.



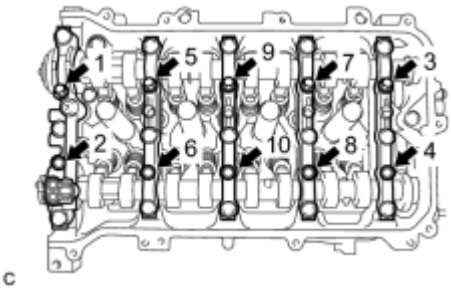

- Keep the camshaft timing gear horizontal while removing it from the camshaft.

29. REMOVE CAMSHAFT TIMING SPROCKET

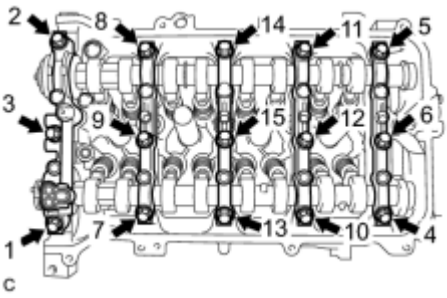



(a) Remove the flange bolt while holding the hexagonal portion of the camshaft with a wrench, and then remove the camshaft timing sprocket.

30. REMOVE CAMSHAFT BEARING CAP




(a) Uniformly loosen and remove the 10 bearing cap bolts in the sequence shown in the illustration.




(b) Uniformly loosen and remove the 15 bearing cap bolts in the sequence shown in the illustration.

NOTICE:

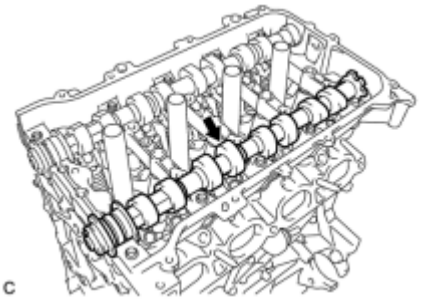
Uniformly loosen the bearing cap bolts while keeping the camshaft housing level.

(c) Remove the 5 bearing caps.

HINT:

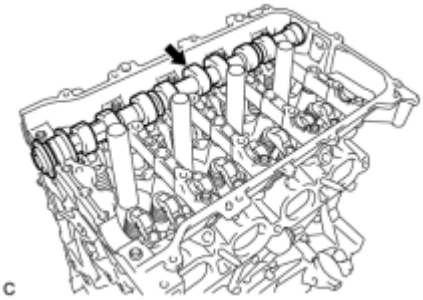
Arrange the removed parts in the correct order.

31. REMOVE CAMSHAFT



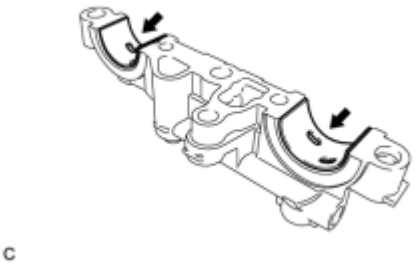

(a) Remove the camshaft.

32. REMOVE NO. 2 CAMSHAFT




(a) Remove the No. 2 camshaft.

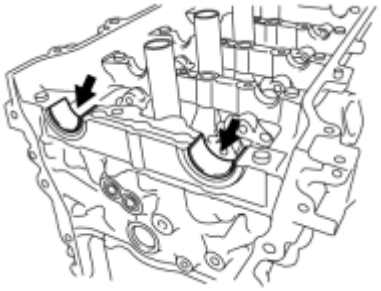
33. REMOVE NO. 1 CAMSHAFT BEARING



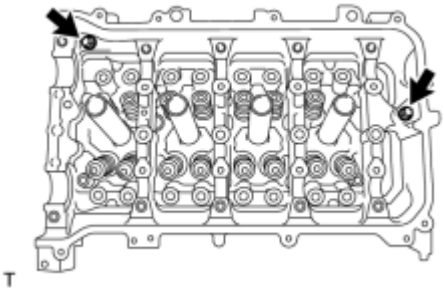

(a) Remove the 2 No. 1 camshaft bearings.

34. REMOVE NO. 2 CAMSHAFT BEARING

(a) Remove the 2 No. 2 camshaft bearings.

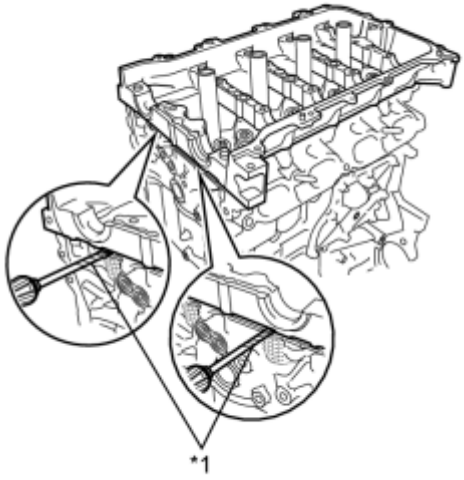


35. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY



(a) Remove the 2 bolts.

(b) Remove the camshaft housing by prying between the cylinder head and camshaft housing with a screwdriver.




# Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and camshaft housing.

HINT:

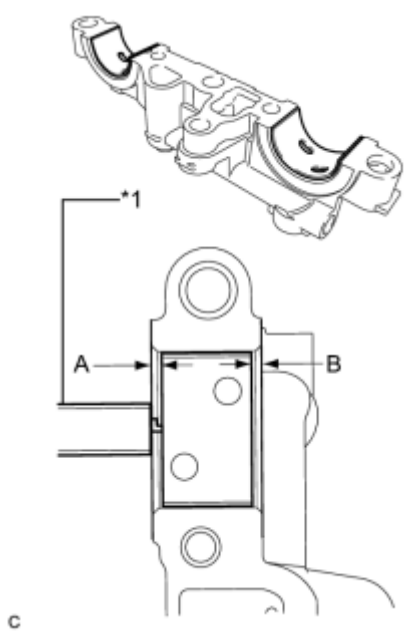
Tape the screwdriver tip before use.

# INSTALLATION

1. INSTALL NO. 1 CAMSHAFT BEARING

(a) Clean both surfaces of the bearings.

(b) Install the 2 No. 1 camshaft bearings.




(c) Using a vernier caliper, measure the distance between the bearing cap edge and the camshaft bearing edge.

## Text in Illustration

| | |
|---|---|
| *1 | Vernier Caliper |

Standard dimension (A - B):

0.7 mm (0.0276 in.) or less

NOTICE:

Position the bearings to the center of the bearing cap by measuring dimensions A and B.

2. INSTALL NO. 2 CAMSHAFT BEARING

(a) Clean both surfaces of the bearings.

(b) Install the 2 No. 2 camshaft bearings.

(c) Using a vernier caliper, measure the distance between the bearing cap edge and the camshaft bearing edge.

## Text in Illustration

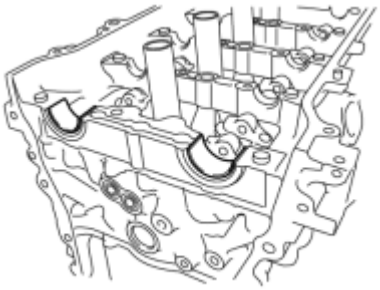
| | |
|---|---|
| *1 | Vernier Caliper |

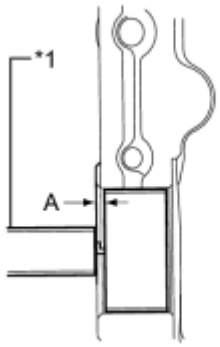
Standard dimension (A):

1.05 to 1.75 mm (0.0413 to 0.0689 in.)

NOTICE:

Position the bearings to the center of the bearing cap by measuring dimension A.

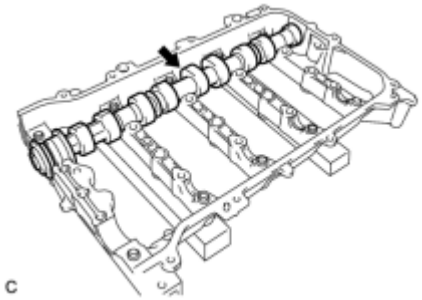





3. INSTALL NO. 2 CAMSHAFT

(a) Clean the camshaft journals.

(b) Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.

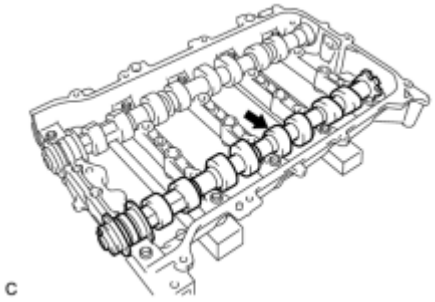



(c) Install the No. 2 camshaft to the camshaft housing.

4. INSTALL CAMSHAFT

(a) Clean the camshaft journals.

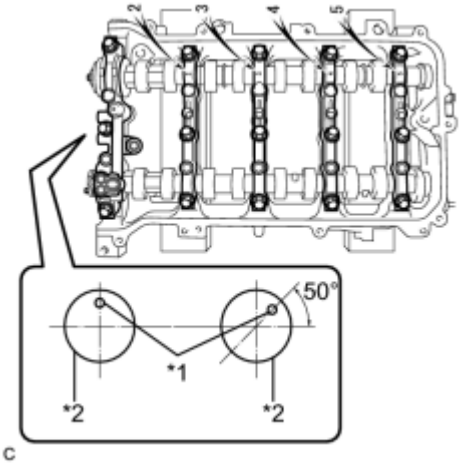
(b) Apply a light coat of engine oil to the camshaft journals, camshaft housings and bearing caps.




(c) Install the camshaft to the camshaft housing.

5. INSTALL BEARING CAP

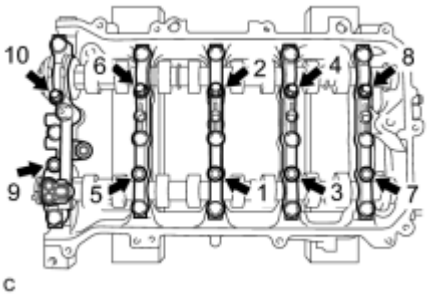
(a) Apply engine oil to the camshaft journals, camshaft housings and bearing caps.




(b) Make sure of the marks and numbers on the camshaft bearing caps and place them in each proper position and direction.

## Text in Illustration

| | |
|---|---|
| *1 | Knock Pin |
| *2 | Camshaft |

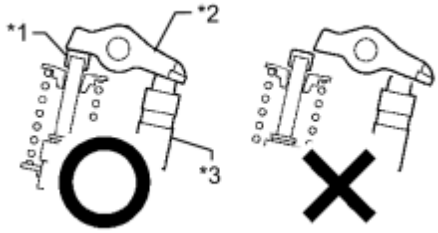



(c) Tighten the 10 bolts in the order shown in the illustration.

Torque: **16 N·m (163 kgf·cm, 12ft·lbf)**

6. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY

(a) Check that the valve rocker arms are installed as shown in the illustration.




## Text in Illustration

| | |
|---|---|
| *1 | Valve Stem Cap |
| *2 | Valve Rocker Arm |
| *3 | Valve Lash Adjuster |

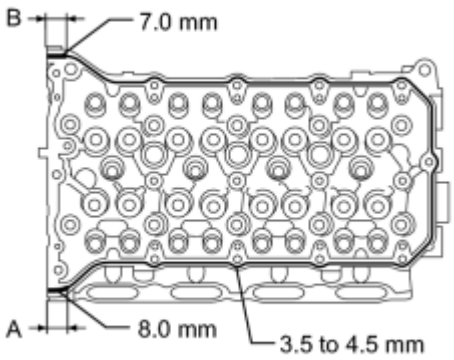
(b) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Standard Seal Diameter:

| Area | Specified Condition |
|---|---|

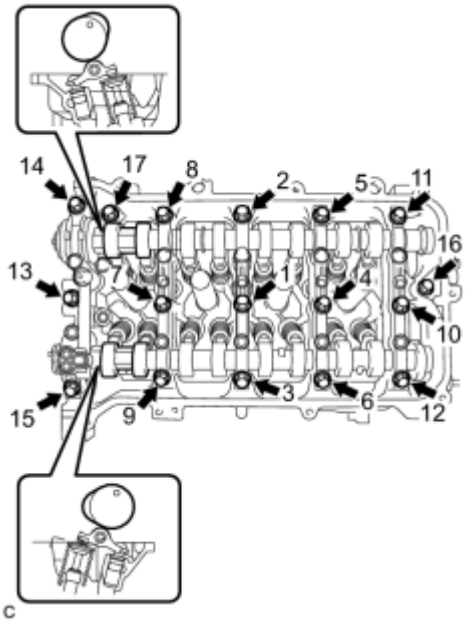



| | |
|---|---|
| Continuous line | 3.5 to 4.5 mm (0.138 to 0.177 in.) |
| A | 8.0 mm (0.315 in.) |
| B | 7.0 mm (0.276 in.) |

Application Length A and B:

15 mm (0.591 in.)

- Remove any oil from the contact surfaces.
- Install the camshaft housing within 3 minutes and tighten the bolts within 10 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after installation.




(c) Set the camshaft and No. 2 camshaft as shown in the illustration.

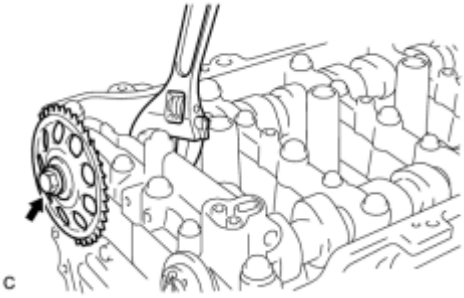
(d) Install the camshaft housing with the 17 bolts and tighten them in the order shown in the illustration.

Torque: **27 N·m (275 kgf·cm, 20ft·lbf)**

NOTICE:

- After installing the camshaft housing, make sure that the cam lobes are positioned as shown in the illustration.
- If any of the bolts is loosened during installation, remove the camshaft housing, clean the installation surfaces, and reapply seal packing.
- If the camshaft housing is removed because any of the bolts is loosened during installation, make sure that the previously applied seal packing does not enter any oil passages.
- After installing the camshaft housing, wipe off any seal packing that seeped out from between the housing and cylinder head.

7. INSTALL CAMSHAFT TIMING SPROCKET

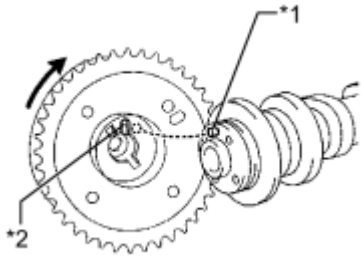


(a) Tighten the flange bolt with the camshaft timing sprocket secured in place.

Torque: **54 N·m (551 kgf·cm, 40ft·lbf)**

8. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY

(a) Put the camshaft timing gear and camshaft together with the straight pin and key groove misaligned as shown in the illustration.



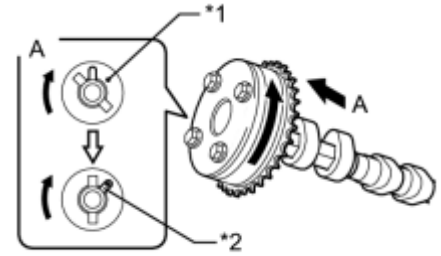

## Text in Illustration

| | |
|---|---|
| *1 | Straight Pin |
| *2 | Key Groove |

NOTICE:

Do not forcefully push in the camshaft timing gear. This may cause the camshaft straight pin tip to damage the installation surface of the camshaft timing gear.

(b) Turn the camshaft timing gear as shown in the illustration while pushing it gently against the camshaft. Push further at the position where the pin fits into the groove.




## Text in Illustration

| | |
|---|---|
| *1 | Straight Pin |
| *2 | Key Groove |

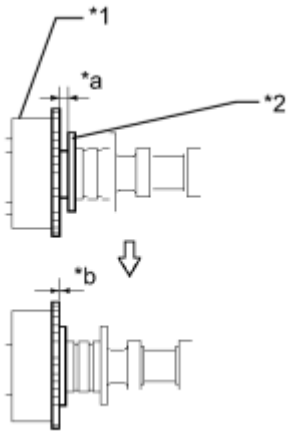
NOTICE:

Do not turn the camshaft timing gear in the retard direction (clockwise).

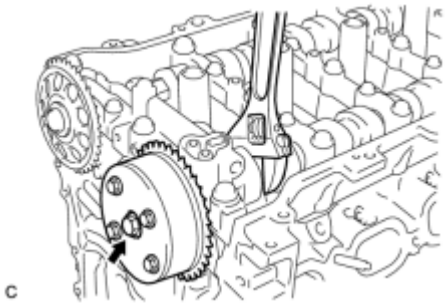
(c) Check that there is no clearance between the camshaft timing gear and camshaft flange.

## Text in Illustration

| | |
|---|---|
| *1 | Camshaft Timing Gear |
| *2 | Flange |
| *a | Clearance |

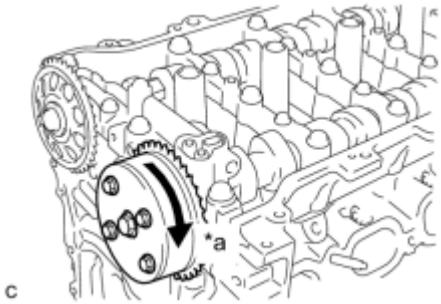



| | |
|---|---|
| *b | No Clearance |



(d) Tighten the flange bolt with the camshaft timing gear secured in place.

Torque: **54 N·m (551 kgf·cm, 40ft·lbf)**

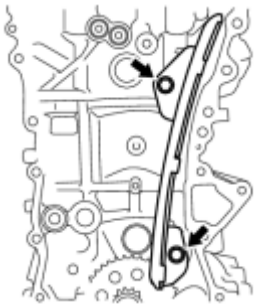



(e) Check that the camshaft timing gear can move in the retard direction (clockwise) and is locked in the most retarded position.

## Text in Illustration

| | |
|---|---|
| *a | Lock |

9. INSTALL NO. 1 CHAIN VIBRATION DAMPER

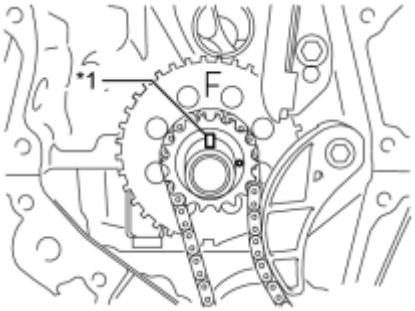


(a) Install the chain vibration damper with the 2 bolts.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

10. SET NO. 1 CYLINDER TO TDC/COMPRESSION

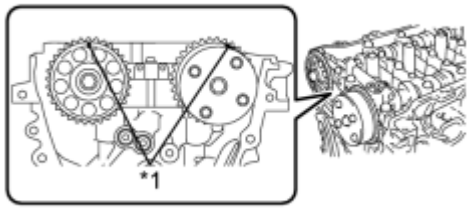
(a) Temporarily install the crankshaft pulley bolt.




## Text in Illustration

| | |
|---|---|
| *1 | Timing Gear Key |

(b) Turn the crankshaft to position the timing gear key to the top.




C

(c) Check that the timing marks on the camshaft timing gear and camshaft timing sprocket are aligned as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Timing Mark |

(d) Remove the crankshaft pulley bolt.

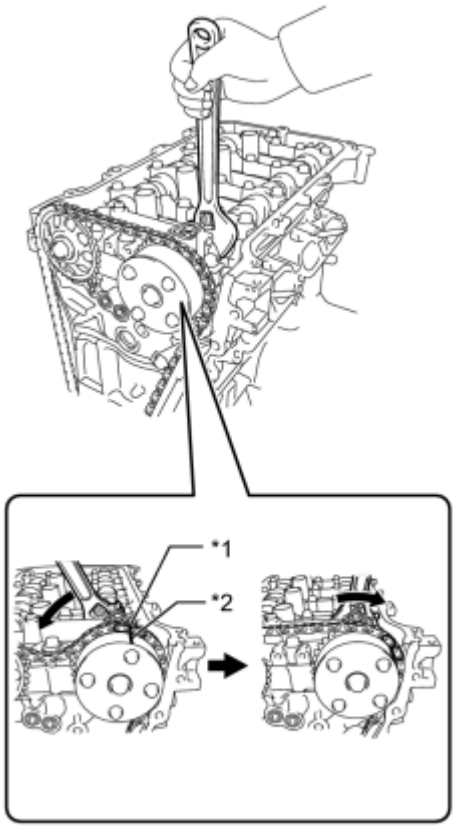
11. INSTALL CHAIN SUB-ASSEMBLY

(a) Align the mark plate (orange) with the timing mark as shown in the illustration and install the chain.

## Text in Illustration

| | |
|---|---|
| *1 | Mark Plate (Orange) |
| *2 | Timing Mark |

- Be sure to position the mark plate at the front of the engine.
- The mark plate on the camshaft side is colored orange.
- Do not pass the chain around the sprocket of the camshaft timing gear. Only place it on the sprocket.
- Pass the chain through the No. 1 vibration damper.




c

(b) Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear counterclockwise to align the mark plate (orange) and timing mark, and then install the chain.

(c) Hold the hexagonal portion of the camshaft with a wrench and turn the camshaft timing gear clockwise.

HINT:

To tension the chain, slowly turn the camshaft timing gear clockwise to prevent the chain from being misaligned.

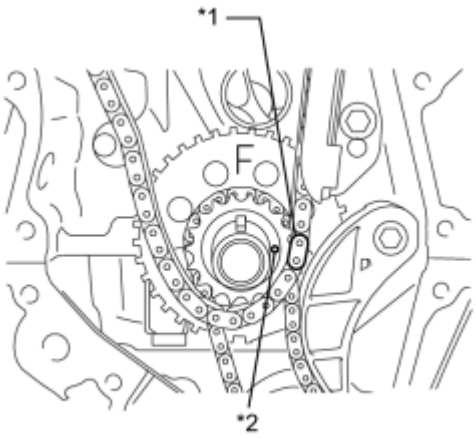
(d) Align the mark plate (yellow) and timing mark and install the chain to the crankshaft timing gear.

# Text in Illustration

| | |
|---|---|
| *1 | Mark Plate (Yellow) |
| *2 | Timing Mark |

HINT:

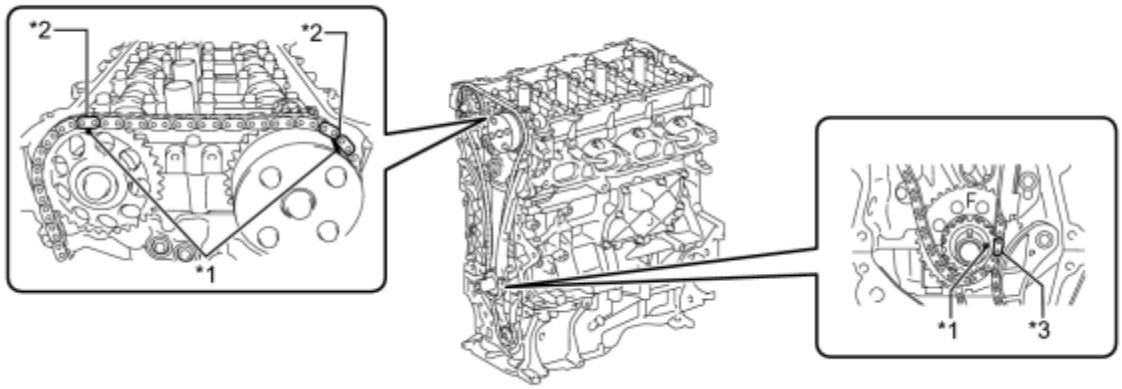
The mark plate on the crankshaft side is colored pink.




T

12. CHECK NO. 1 CYLINDER TO TDC/COMPRESSION

(a) Check each timing mark at TDC/compression.




C

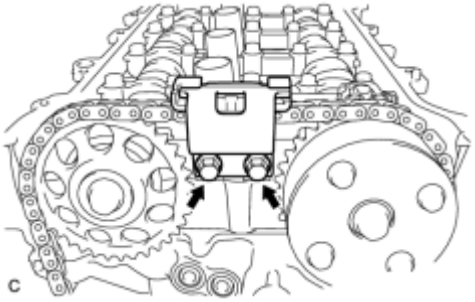
**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Timing Mark | *2 | Mark Plate (Orange) |
| *3 | Mark Plate (Yellow) | - | - |

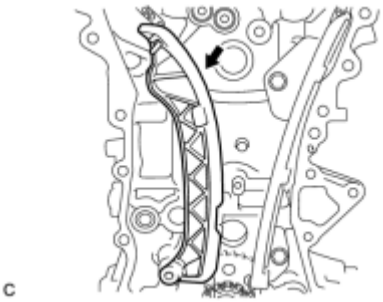
13. INSTALL NO. 2 CHAIN VIBRATION DAMPER

(a) Install the No. 2 chain vibration damper with the 2 bolts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**



14. INSTALL CHAIN TENSIONER SLIPPER



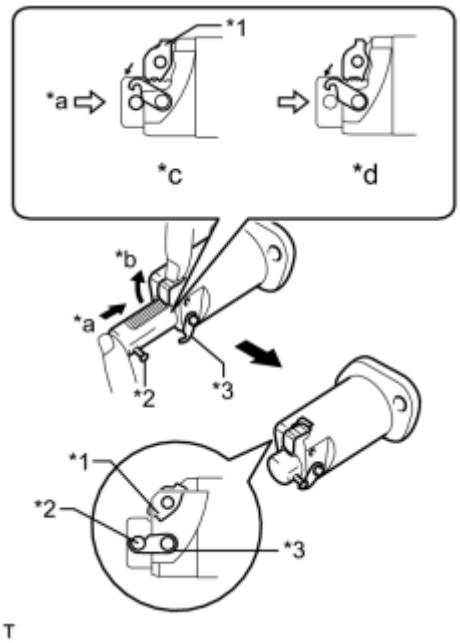
(a) Install the chain tensioner slipper to the cylinder block.

15. INSTALL TIMING CHAIN COVER OIL SEAL INFO

16. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY INFO

17. INSTALL CRANKSHAFT PULLEY INFO

18. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY




(a) Release the cam, and then fully push in the plunger and engage the hook to the pin so that the plunger is in the position shown in the illustration.

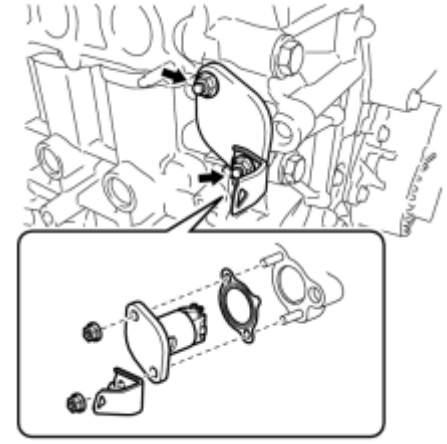
## Text in Illustration

| | |
|---|---|
| *1 | Cam |
| *2 | Pin |
| *3 | Hook |
| *a | Push |
| *b | Raise |
| *c | CORRECT |
| *d | INCORRECT |

NOTICE:

Make sure that the cam engages the first tooth of the plunger to allow the

hook to pass over the pin.



c

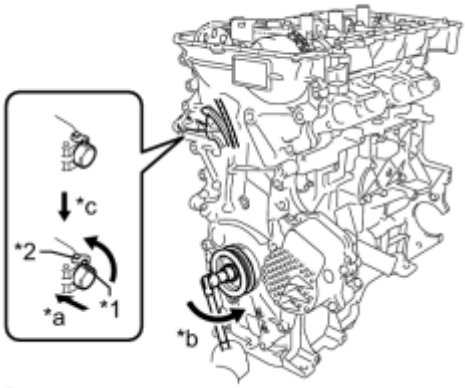
(b) Install a new gasket, the bracket and chain tensioner with the 2 nuts.

Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**

NOTICE:

If the hook releases the plunger while the chain tensioner is being installed, set the hook again.

(c) Rotate the crankshaft counterclockwise slightly and check that the hook becomes released.

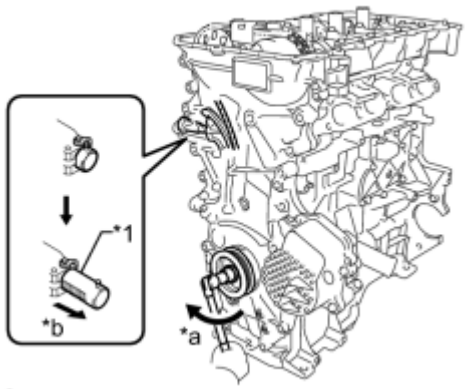



c

## Text in Illustration

| | |
|---|---|
| *1 | Pin |
| *2 | Hook |
| *a | Push |
| *b | Turn |
| *c | Disconnect |

(d) Turn the crankshaft clockwise and check that the plunger is extended.




c

## Text in Illustration

| | |
|---|---|
| *1 | Plunger |
| *a | Turn |
| *b | Plunger Extended |

19. INSTALL SPARK PLUG TUBE GASKET INFO

20. INSTALL CYLINDER HEAD COVER GASKET INFO

21. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY INFO

22. INSTALL IGNITION COIL ASSEMBLY INFO

23. INSTALL FUEL INJECTOR ASSEMBLY INFO

24. INSTALL NO. 1 DELIVERY PIPE SPACER INFO

25. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

26. INSTALL FUEL VAPOR FEED PIPE INFO

27. INSTALL INTAKE MANIFOLD INFO

28. INSTALL EGR WITH COOLER PIPE SUB-ASSEMBLY INFO

29. INSTALL EGR VALVE ASSEMBLY INFO

30. INSTALL EGR PIPE ASSEMBLY INFO

31. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE INFO

32. INSTALL THROTTLE BODY ASSEMBLY INFO

33. INSTALL ENGINE HANGERS INFO

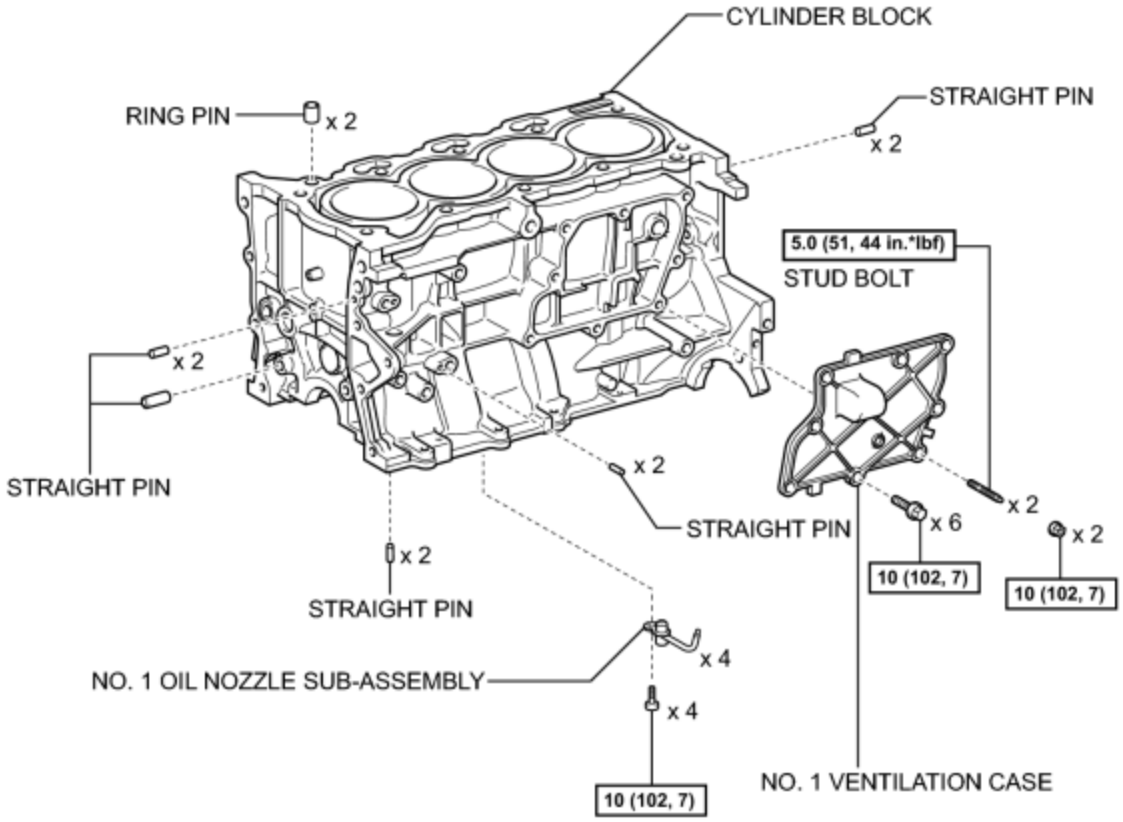
34. REMOVE ENGINE ON ENGINE STAND INFO

35. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Install the engine assembly with transaxle INFO.

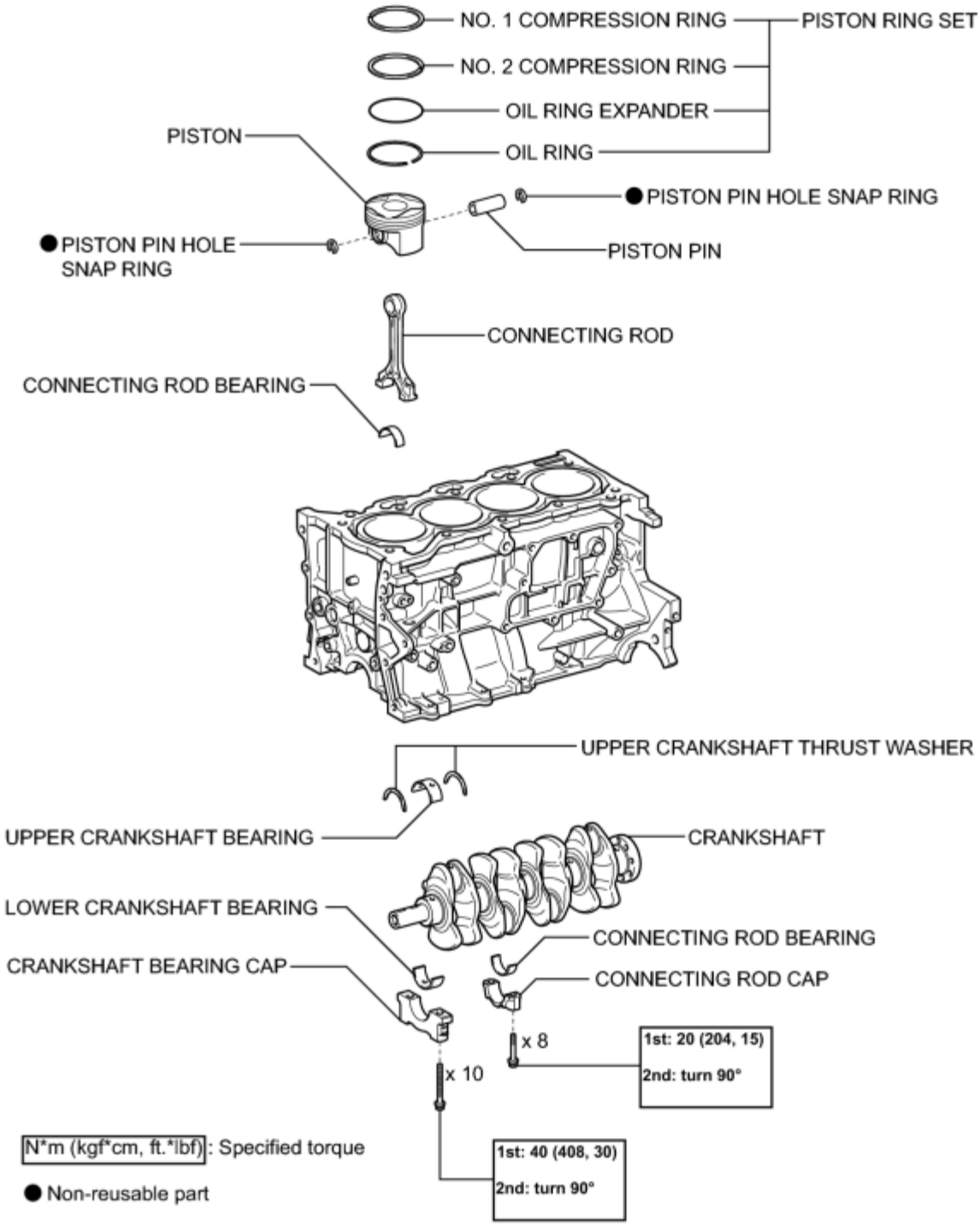
# COMPONENTS

# ILLUSTRATION



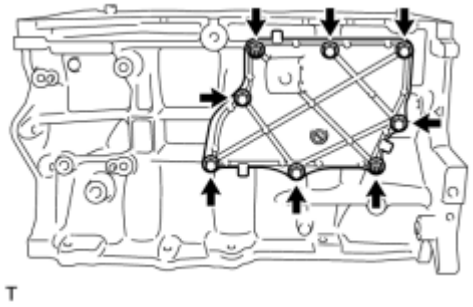

N*m (kgf*cm, ft.*lbf): Specified torque

# ILLUSTRATION


NO. 1 COMPRESSION RING
PISTON RING SET
NO. 2 COMPRESSION RING
OIL RING EXPANDER
PISTON
OIL RING
PISTON PIN HOLE SNAP RING
PISTON PIN HOLE SNAP RING
PISTON PIN
CONNECTING ROD
CONNECTING ROD BEARING
UPPER CRANKSHAFT THRUST WASHER
UPPER CRANKSHAFT BEARING
CRANKSHAFT
LOWER CRANKSHAFT BEARING
CONNECTING ROD BEARING
CRANKSHAFT BEARING CAP
CONNECTING ROD CAP
x 8
1st: 20 (204, 15)
2nd: turn 90°
x 10
N*m (kgf*cm, ft.*lbf): Specified torque
1st: 40 (408, 30)
2nd: turn 90°
Non-reusable part

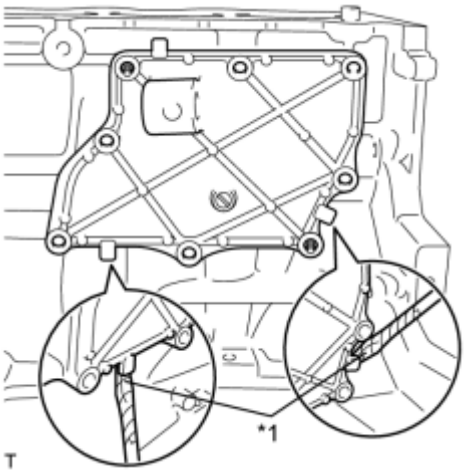
# DISASSEMBLY

1. REMOVE NO. 1 VENTILATION CASE



(a) Remove the 6 bolts and 2 nuts.

(b) Remove the ventilation case by prying between the ventilation case and cylinder block with a screwdriver as shown in the illustration.




## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

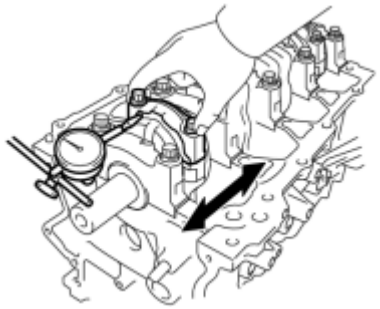
NOTICE:

Be careful not to damage the contact surfaces of the cylinder block and No. 1 ventilation case.

HINT:

Tape the screwdriver tip before use.

2. INSPECT CONNECTING ROD THRUST CLEARANCE



(a) Using a dial indicator, measure the thrust clearance while moving the connecting rod cap back and forth.

Standard thrust clearance:

0.160 to 0.342 mm (0.00630 to 0.0135 in.)

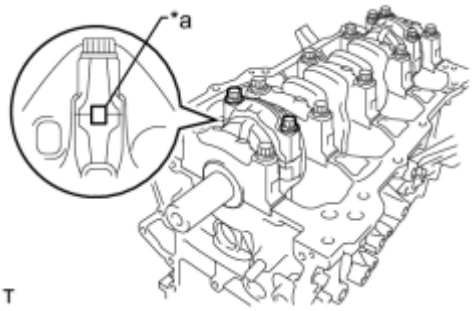
Maximum thrust clearance:

0.342 mm (0.0132 in.)

If the thrust clearance is greater than the maximum, replace the connecting rod assemblies as necessary. If necessary, replace the crankshaft.

3. INSPECT CONNECTING ROD OIL CLEARANCE

(a) Check that the matchmarks on the connecting rod and cap are aligned




T

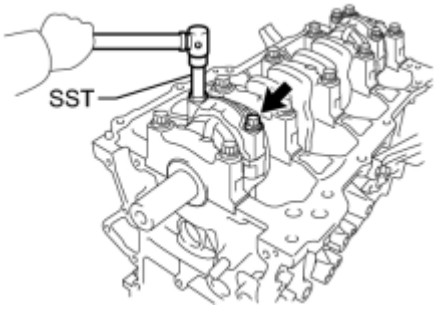
to ensure correct reassembly.

## Text in Illustration

| | |
|---|---|
| *a | Matchmark |

HINT:

The matchmarks on the connecting rods and caps are provided to ensure correct reassembly.




T

(b) Using SST, uniformly loosen the 2 bolts.

SST: 09205-16011



T

(c) Using the 2 removed connecting rod cap bolts, remove the connecting rod cap and lower bearing by wiggling the connecting rod cap right and left.

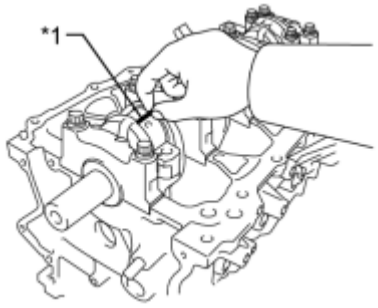
HINT:

Keep the lower bearing inserted in the connecting rod cap.

(d) Clean the crank pin and bearing.

(e) Check the crank pin and bearing for pitting and scratches.

If the crank pin or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.



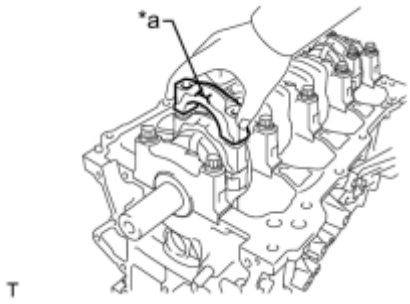

T

(f) Lay a strip of Plastigage on the crank pin.

## Text in Illustration

| | |
|---|---|
| *1 | Plastigage |

(g) Check that the front mark of the connecting rod cap is facing forward and install the connecting rod cap.




T

## Text in Illustration

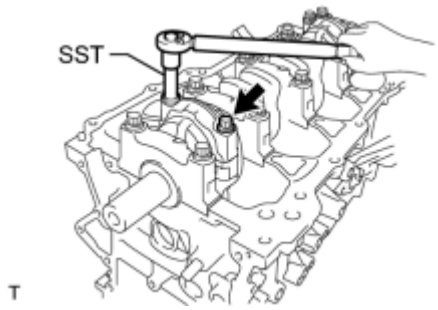
| | |
|---|---|
| *a | Front Mark |

(h) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.

(i) Install the connecting rod cap bolts.

NOTICE:

The connecting rod cap bolts should be tightened in 2 progressive steps.




T

(j) Step 1:

(1) Using SST, install and alternately tighten the bolts of the connecting rod cap in several steps.

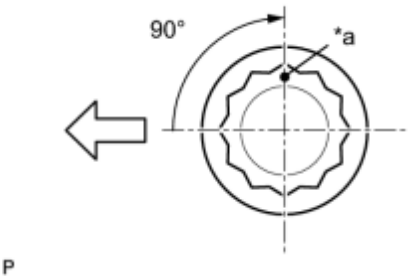
SST: 09205-16011

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

NOTICE:

Do not turn the crankshaft.

(k) Step 2:




P

**Text in Illustration**

| | |
|---|---|
| *a | Paint Mark |
| ⇨ | Engine Front |

(1) Mark the front of the connecting rod cap bolts with paint.

(2) Tighten the cap bolts 90° as shown in the illustration.

NOTICE:

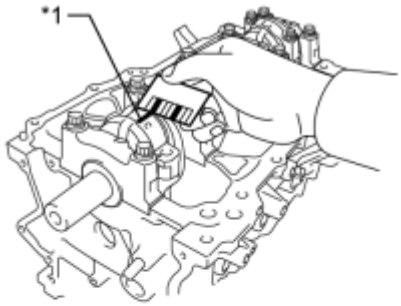
Do not turn the crankshaft.

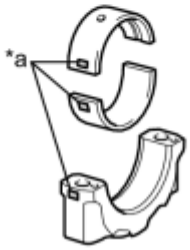
(l) Remove the 2 bolts and connecting rod cap.

HINT:

Keep the lower bearing inserted in the connecting rod cap.

(m) Measure the Plastigage at its widest point.




T

## Text in Illustration

| | |
|---|---|
| *1 | Plastigage |
| *a | Mark 1, 2 or 3 |

Standard oil clearance:

0.014 to 0.038 mm (0.000551 to 0.00150 in.)

Maximum oil clearance:

0.070 mm (0.00276 in.)

If the oil clearance is more than the maximum, replace the connecting rod bearings. If necessary, inspect the crankshaft.

NOTICE:

Remove the Plastigage completely after the measurement.

HINT:

If replacing a bearing, replace it with one that has the same number as its respective connecting rod cap. Each bearing standard thickness is indicated by a 1, 2, or 3 mark on its surface.

Standard Connecting Rod Large End Bore Diameter:

| Mark | Specified Condition |
|---|---|
| Mark 1 | 47.000 to 47.008 mm (1.85039 to 1.85070 in.) |
| Mark 2 | 47.009 to 47.016 mm (1.85074 to 1.85102 in.) |
| Mark 3 | 47.017 to 47.024 mm (1.85106 to 1.85133 in.) |

Standard Connecting Rod Bearing Thickness:

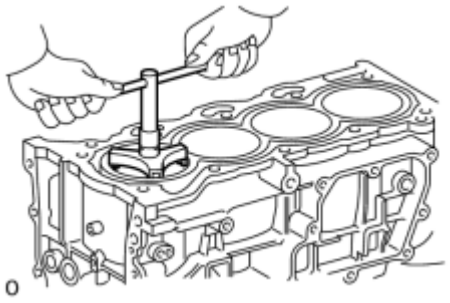
| Mark | Specified Condition |
|---|---|
| Mark 1 | 1.489 to 1.493 mm (0.05862 to 0.05878 in.) |
| Mark 2 | 1.494 to 1.497 mm (0.05882 to 0.05894 in.) |
| Mark 3 | 1.498 to 1.501 mm (0.05898 to 0.05909 in.) |

Standard crankshaft pin diameter:

43.992 to 44.000 mm (1.7320 to 1.7323 in.)

(n) Perform the inspection above for each cylinder.

4. REMOVE PISTON SUB-ASSEMBLY WITH CONNECTING ROD



(a) Using a ridge reamer, remove all the carbon from the top of the cylinder.

(b) Push the piston, connecting rod and upper bearing through the top of the cylinder block.

HINT:

- Keep the bearing, connecting rod and cap together.
- Arrange the piston and connecting rod assemblies in the correct order.
- Be sure to arrange the removed piston and connecting rod assemblies in such a way that they can be reinstalled exactly as before.

5. REMOVE CONNECTING ROD BEARING

(a) Remove the connecting rod bearings.

HINT:

Arrange the removed parts in the correct order.

6. REMOVE PISTON RING SET

(a) Using a piston ring expander, remove the 2 compression rings.



T

(b) Remove the oil ring and oil ring expander by hand.

HINT:

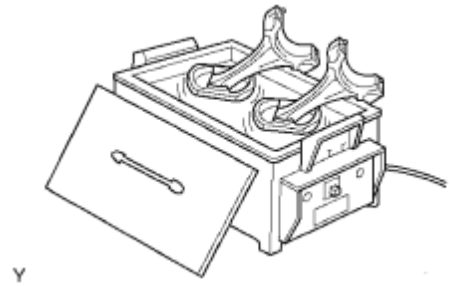
Arrange the removed parts in the correct order.

7. REMOVE PISTON



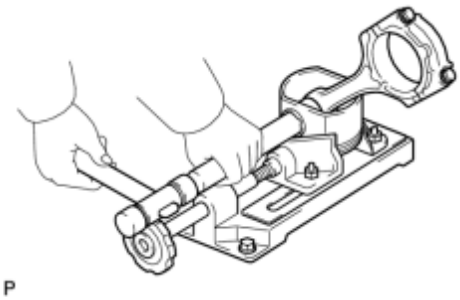
T

(a) Using a screwdriver, pry out the 2 snap rings.



Y

(b) Gradually heat each piston to approximately 80 to 90°C (176 to 194°F).



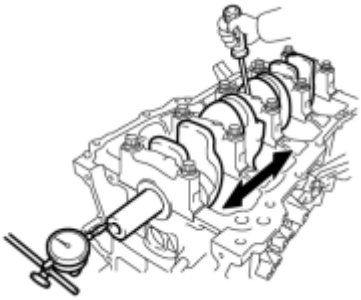
P

(c) Using a plastic-faced hammer and brass bar, lightly tap out the piston pin and remove the connecting rod.

- The piston and pin are a matched set.
- Arrange the pistons, pins, rings, connecting rods and bearings in the correct order.

8. INSPECT CRANKSHAFT THRUST CLEARANCE

(a) Using a dial indicator, measure the thrust clearance while prying the



T

crankshaft back and forth with a screwdriver.

Standard thrust clearance:

0.04 to 0.14 mm (0.00157 to 0.00551 in.)

Maximum thrust clearance:

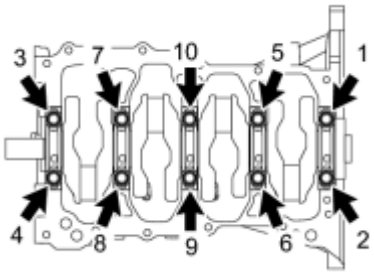
0.18 mm (0.00709 in.)

If the thrust clearance is more than the maximum, replace the thrust washers as a set. If necessary, replace the crankshaft.

HINT:

The thrust washer thickness is 2.43 to 2.48 mm (0.0957 to 0.0976 in.).

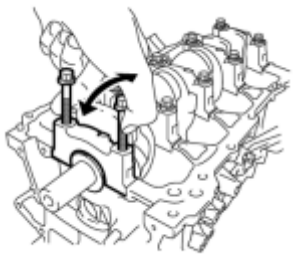
9. REMOVE CRANKSHAFT




T

(a) Uniformly loosen and remove the 10 crankshaft bearing cap bolts in the sequence shown in the illustration.

(b) Using the 2 removed crankshaft bearing cap bolts, remove the 5 crankshaft bearing caps and 5 lower bearings.



T

NOTICE:

Insert the bolts into the caps in turn. Ease the cap out by gently pulling up and applying force toward the front and back sides of the cylinder block, as shown in the illustration. Take care not to damage the contact surfaces of the cap and cylinder block.

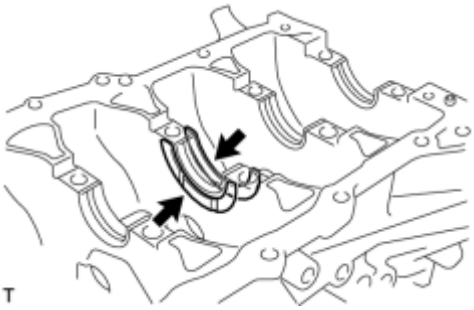
- Keep the lower bearing and crankshaft bearing cap together as a set.
- Arrange the crankshaft bearing caps in the correct order.

(c) Lift out the crankshaft.

(d) Check each crankshaft journal and bearing for pitting and scratches.

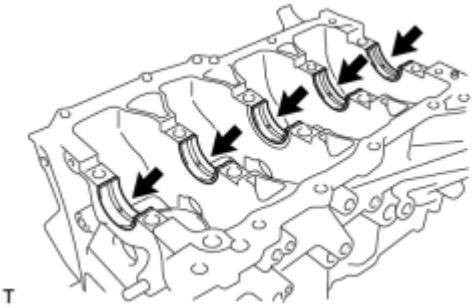
If the journal or bearing is damaged, replace the bearings. If necessary, replace the crankshaft.

10. REMOVE UPPER CRANKSHAFT THRUST WASHER



(a) Remove the 2 upper crankshaft thrust washers from the cylinder block.

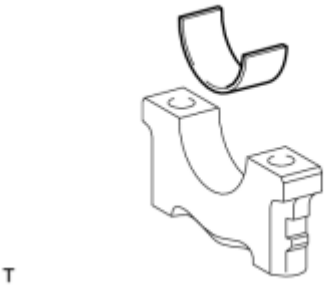
11. REMOVE CRANKSHAFT BEARING



(a) Remove the 5 upper crankshaft bearings from the cylinder block.

HINT:

Arrange the bearings in the correct order.

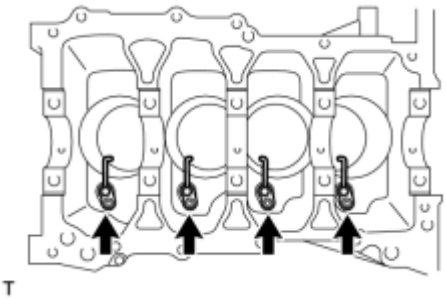


(b) Remove the 5 lower crankshaft bearings from the 5 crankshaft bearing caps.

HINT:

Arrange the bearings in the correct order.

12. REMOVE NO. 1 OIL NOZZLE SUB-ASSEMBLY



(a) Using a 5 mm socket hexagon wrench, remove the 4 bolts and 4 oil nozzles.

13. CLEAN CYLINDER BLOCK

NOTICE:

If the cylinder is washed at high temperatures, the cylinder liner will stick out beyond the cylinder block. Always wash the cylinder block at a temperature of 45°C (113°F) or less.

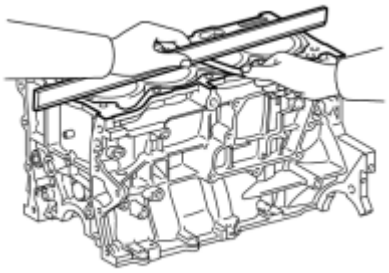
14. REMOVE STUD BOLT

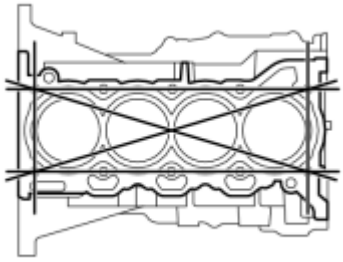
NOTICE:

If a stud bolt is deformed or its threads are damaged, replace it.

# INSPECTION

1. INSPECT CYLINDER BLOCK FOR WARPAGE





T

(a) Using a straightedge and feeler gauge, measure the warpage of the surface that contacts the cylinder head gasket.

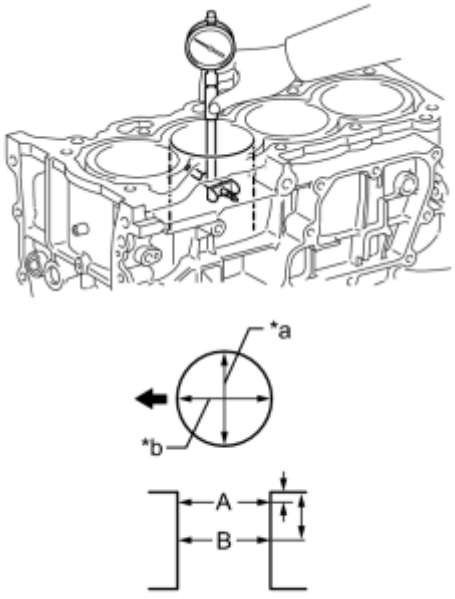
Maximum warpage:

0.05 mm (0.00197 in.)

If the warpage is more than the maximum, replace the cylinder block.

2. INSPECT CYLINDER BORE

(a) Using a cylinder gauge, measure the cylinder bore diameter at positions A and B in both the thrust and axial directions.




T

**Text in Illustration**

| | |
|---|---|
| *a | Thrust Direction |
| *b | Axial Direction |
| ➡ | Engine Front |

Standard diameter:

80.500 to 80.513 mm (3.169 to 3.170 in.)

Maximum diameter:

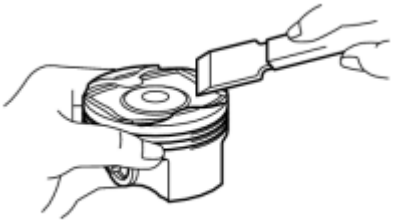
80.63 mm (3.174 in.)

Measurement Position:

| Measurement Position | Cylinder Bore Position |
|---|---|
| A | 10 mm (0.394 in.) from top edge |
| B | 50 mm (1.97 in.) from top edge |

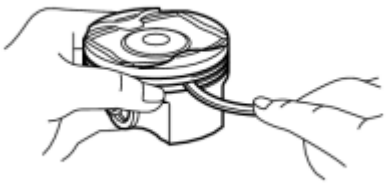
If the average diameter of the 4 positions is more than the maximum, replace the cylinder block.

3. INSPECT PISTON



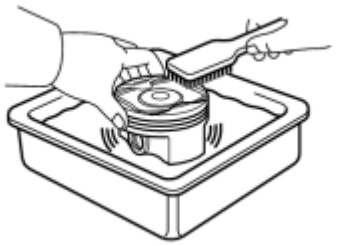
o

(a) Using a gasket scraper, remove the carbon from the piston top.



o

(b) Using a groove cleaning tool or broken ring, clean the piston ring grooves.

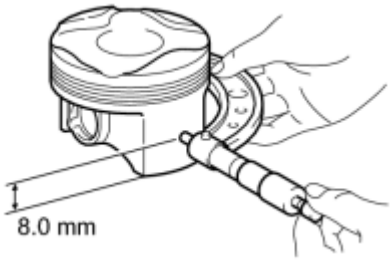


O

(c) Using a brush and solvent, thoroughly clean the piston.

NOTICE:

Do not use a wire brush.




T

(d) Using a micrometer, measure the piston diameter at a position that is 8.0 mm (0.315 in.) from the bottom of the piston (refer to the illustration).

Standard piston diameter:

80.461 to 80.471 mm (3.1677 to 3.1681 in.)

If the diameter is not as specified, replace the piston with pin.

4. INSPECT PISTON OIL CLEARANCE

(a) Subtract the piston diameter measurement from the cylinder bore diameter measurement.

Standard oil clearance:

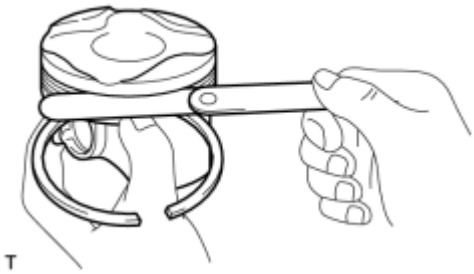
0.009 to 0.042 mm (0.000354 to 0.00165 in.)

Maximum oil clearance:

0.08 mm (0.00315 in.)

If the oil clearance is more than the maximum, replace all the pistons. If necessary, replace the cylinder block.

5. INSPECT RING GROOVE CLEARANCE



T

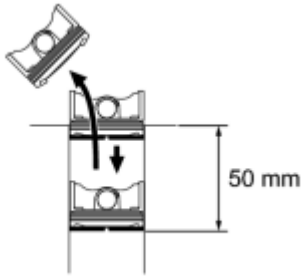
(a) Using a feeler gauge, measure the clearance between a new piston ring and the wall of the ring groove.

Standard Ring Groove Clearance:

| Item | Specified Condition |
|---|---|
| No. 1 Compression Ring | 0.02 to 0.07 mm (0.000787 to 0.00276 in.) |
| No. 2 Compression Ring | 0.02 to 0.055 mm (0.000787 to 0.00217 in.) |
| Oil Ring | 0.02 to 0.06 mm (0.000787 to 0.00236 in.) |

If the groove clearance is not as specified, replace the piston with pin.

6. INSPECT PISTON RING END GAP




T

(a) Using a piston, push the piston ring a little beyond the bottom of the ring travel, 50 mm (1.97 in.) from the top of the cylinder block.

(b) Using a feeler gauge, measure the end gap.



Standard End Gap:

| Item | Specified Condition |
|---|---|
| No. 1 Compression Ring | 0.20 to 0.30 mm (0.00787 to 0.0118 in.) |
| No. 2 Compression Ring | 0.30 to 0.45 mm (0.0118 to 0.0177 in.) |
| Oil Ring | 0.10 to 0.35 mm (0.00394 to 0.0138 in.) |

Maximum End Gap:

| Item | Specified Condition |
|---|---|
| No. 1 Compression Ring | 0.50 mm (0.0197 in.) |
| No. 2 Compression Ring | 0.70 mm (0.0276 in.) |
| Oil Ring | 0.70 mm (0.0276 in.) |

If the end gap is more than the maximum, replace the piston ring. If the end gap is more than the maximum even with a new piston ring, replace the cylinder block.

7. INSPECT PISTON PIN OIL CLEARANCE



T

(a) Using a caliper gauge, measure the piston pin bore diameter.

Standard piston pin bore diameter:

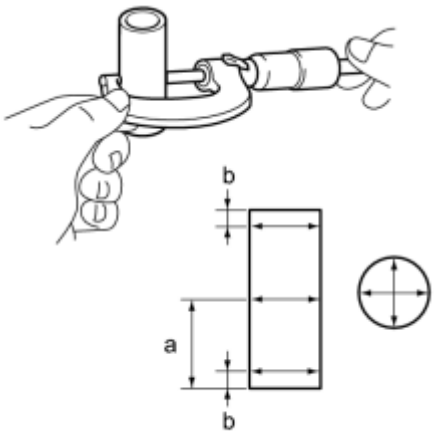
20.006 to 20.015 mm (0.78764 to 0.78799 in.)

| Item | Specified Condition |
|---|---|
| Mark A | 20.006 to 20.009 mm (0.78764 to 0.78775 in.) |
| Mark B | 20.010 to 20.012 mm (0.78779 to 0.78787 in.) |
| Mark C | 20.013 to 20.015 mm (0.78791 to 0.78799 in.) |

If the diameter is not as specified, replace the piston with pin.

(b) Using a micrometer, measure the piston pin diameter.

Standard piston pin diameter:




T

20.004 to 20.013 mm (0.78756 to 0.78791 in.)

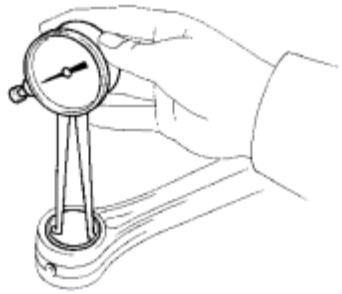
| Item | Specified Condition |
|---|---|
| Mark A | 20.004 to 20.007 mm (0.78756 to 0.78768 in.) |
| Mark B | 20.008 to 20.010 mm (0.78771 to 0.78779 in.) |
| Mark C | 20.011 to 20.013 mm (0.78783 to 0.78791 in.) |

If the diameter is not as specified, replace the piston with pin.

Measurement Position:

| Measurement Position | Piston Pin Position |
|---|---|
| a | 25 mm (0.984 in.) from side edge |
| b | 5 mm (0.197 in.) from side edge |

(c) Using a caliper gauge, measure the connecting rod small end bore diameter.



Standard connecting rod small end bore diameter:

20.012 to 20.021 mm (0.78787 to 0.78823 in.)

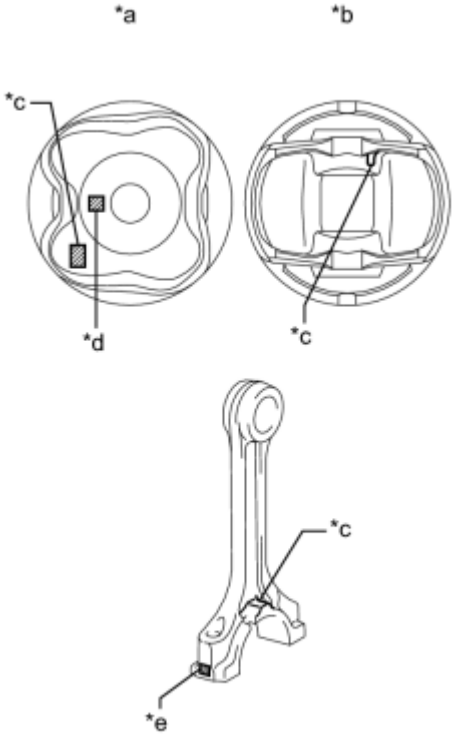
| Item | Specified Condition |
|---|---|
| Mark A | 20.012 to 20.015 mm (0.78787 to 0.78799 in.) |
| Mark B | 20.016 to 20.018 mm (0.78803 to 0.78811 in.) |
| Mark C | 20.019 to 20.021 mm (0.78815 to 0.78823 in.) |

If the diameter is not as specified, replace the connecting rod.

(d) Subtract the piston pin diameter measurement from the piston pin bore diameter measurement.

# Text in Illustration

| | |
|---|---|
| *a | Upper Side: |
| *b | Lower Side: |
| *c | Front Mark |
| *d | Piston Pin Bore Diameter Mark |
| *e | Connecting Rod Small Bore Diameter Mark |




Standard oil clearance:

-0.001 to 0.005 mm (-0.0000394 to 0.000197 in.)

Maximum oil clearance:

0.010 mm (0.000394 in.)

If the oil clearance is more than the maximum, replace the connecting rod. If necessary, replace the piston and piston with pin as a set.

(e) Subtract the piston pin diameter measurement from the connecting rod small end bore diameter measurement.

Standard oil clearance:

0.005 to 0.011 mm (0.000197 to 0.000433 in.)

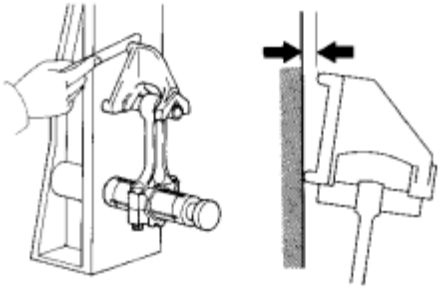
Maximum oil clearance:

0.014 mm (0.000551 in.)

If the oil clearance is more than the maximum, replace the connecting rod small end bush. If necessary, replace the piston with pin as a set.

8. INSPECT CONNECTING ROD SUB-ASSEMBLY

(a) Using a connecting rod aligner and feeler gauge, check the connecting rod alignment.

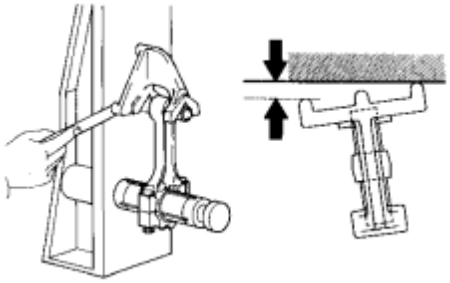


(1) Check for misalignment.

Maximum misalignment:

0.05 mm (0.00197 in.) per 100 mm (3.94 in.)

If the misalignment is more than the maximum, replace the connecting rod.



(2) Check for twist.

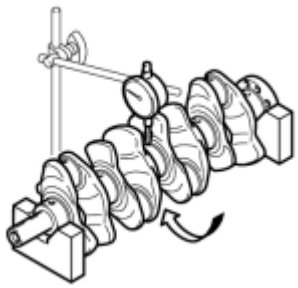
Maximum twist:

0.15 mm (0.00591 in.) per 100 mm (3.94 in.)

If the twist is more than the maximum, replace the connecting rod.

9. INSPECT CRANKSHAFT

(a) Inspect the circle runout.



T

(1) Using a dial indicator and V-blocks, measure the circle runout as shown in the illustration.

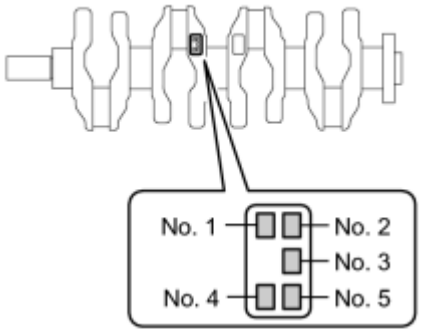
Maximum circle runout:

0.03 mm (0.00118 in.)

If the circle runout is more than the maximum, replace the crankshaft.

(b) Inspect the main journals.

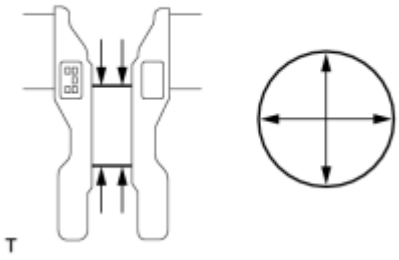
(1) Using a micrometer, measure the diameter of each main journal.




Standard diameter:

47.988 to 48.000 mm (1.8893 to 1.8898 in.)

If the diameter is not as specified, check the crankshaft oil clearance.



T

(2) Check each main journal for taper and distortion as shown in the illustration.

Maximum taper and distortion:

0.004 mm (0.000157 in.)

If the taper and distortion are more than the maximum, replace the crankshaft.

Standard Diameter (Reference):

| Mark | Specified Condition |
|---|---|
| 0 | 47.999 to 48.000 mm (1.88972 to 1.88976 in.) |
| 1 | 47.997 to 47.998 mm (1.88964 to 1.88968 in.) |
| 2 | 47.995to 47.996 mm (1.88956 to 1.88960 in.) |
| 3 | 47.993 to 47.994 mm (1.88948 to 1.88952 in.) |
| 4 | 47.991 to 47.992 mm (1.88941 to 1.88945 in.) |
| 5 | 47.988 to 47.990 mm (1.88929 to 1.88937 in.) |

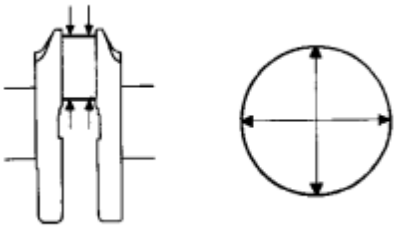
(c) Inspect the crank pin.

(1) Using a micrometer, measure the diameter of each crank pin.

Standard diameter:

43.992 to 44.000 mm (1.7320 to 1.7323 in.)

If the diameter is not as specified, check the connecting rod oil clearance.



(2) Inspect each crank pin for taper and distortion.

Maximum taper and distortion:

0.004 mm (0.000157 in.)

If the taper and distortion are more than the maximum, replace the crankshaft.

10. INSPECT CRANKSHAFT OIL CLEARANCE

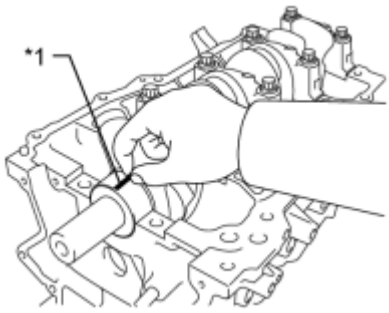
(a) Check the crankshaft journals and bearings for pitting and scratches.

(b) Install the crankshaft bearings INFO.

(c) Install the upper crankshaft thrust washers INFO.

(d) Clean each main journal and bearing.

(e) Place the crankshaft on the cylinder block.




(f) Lay a strip of Plastigage across each journal.

## Text in Illustration

| | |
|---|---|
| *1 | Plastigage |

T

(g) Examine the front marks and numbers and place the bearing caps on the cylinder block.

HINT:

A number is marked on each crankshaft bearing cap to indicate the installation position.

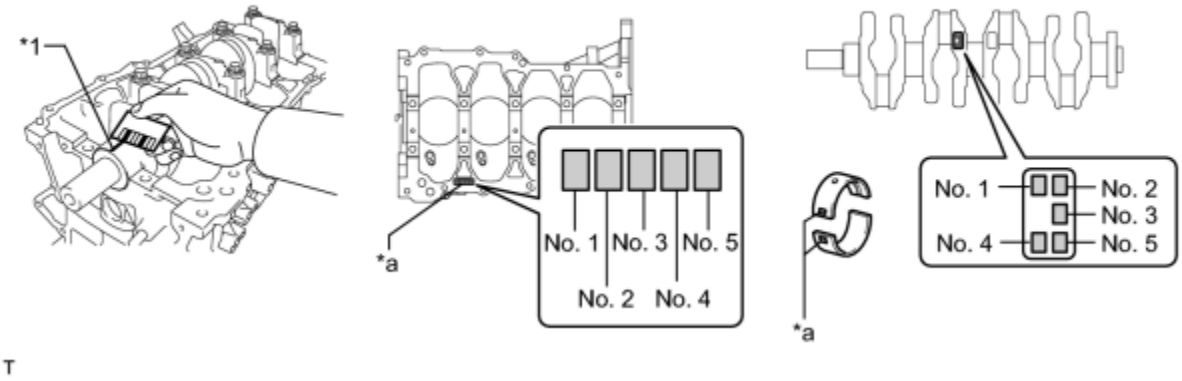
(h) Install the crankshaft bearing cap INFO.

NOTICE:

Do not turn the crankshaft.

(i) Remove the crankshaft bearing caps INFO.

(j) Measure the Plastigage at its widest point.




T

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Plastigage | *a | Number Mark |

Standard oil clearance:

0.016 to 0.039 mm (0.000630 to 0.00154 in.)

Maximum oil clearance:

0.050 mm (0.00197 in.)

If the oil clearance is more than the maximum, replace the crankshaft bearing. If necessary, replace the crankshaft.

NOTICE:

Remove the Plastigage completely after the measurement.

HINT:

If replacing a bearing, select a new one with the same number. If the number of the bearing cannot be determined, calculate the correct bearing number by adding together the numbers imprinted on the cylinder block and crankshaft. Then select a new bearing with the calculated number according to the chart below. There are 4 sizes of standard bearings, marked "1", "2", "3" and "4" accordingly.

- Example:

Cylinder block "3" + Crankshaft "5" = Total number 8 (Use bearing "3")

**Bearing Chart**

| Cylinder Block + Crankshaft | Bearing to be Used |
|---|---|
| 0 to 2 | "1" |
| 3 to 5 | "2" |
| 6 to 8 | "3" |
| 9 to 11 | "4" |

Standard Cylinder Block Journal Bore Diameter:

| Item | Specified Condition |
|---|---|
| Mark 0 | 52.000 to 52.002 mm (2.04724 to 2.04732 in.) |
| Mark 1 | 52.003 to 52.004 mm (2.04736 to 2.04740 in.) |
| Mark 2 | 52.005 to 52.006 mm (2.04744 to 2.04752 in.) |
| Mark 3 | 52.007 to 52.009 mm (2.04752 to 2.04759 in.) |
| Mark 4 | 52.010 to 52.011 mm (2.04763 to 2.04767 in.) |
| Mark 5 | 52.012 to 52.013 mm (2.04771 to 2.04775 in.) |
| Mark 6 | 52.014 to 52.016 mm (2.04779 to 2.04787 in.) |

Standard Crankshaft Journal Diameter:

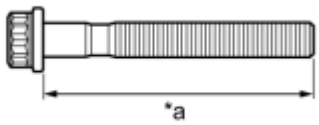
| Item | Specified Condition |
|---|---|
| Mark 0 | 47.999 to 48.000 mm (1.88972 to 1.88976 in.) |
| Mark 1 | 47.997 to 47.998 mm (1.88964 to 1.88968 in.) |
| Mark 2 | 47.995 to 47.996 mm (1.88956 to 1.88961 in.) |
| Mark 3 | 47.993 to 47.994 mm (1.88948 to 1.88952 in.) |
| Mark 4 | 47.991 to 47.992 mm (1.88941 to 1.88945 in.) |
| Mark 5 | 47.988 to 47.990 mm (1.88929 to 1.88937 in.) |

Standard Bearing Center Wall Thickness:

| Item | Specified Condition |
|---|---|
| Mark 1 | 1.994 to 1.997 mm (0.07850 to 0.07862 in.) |
| Mark 2 | 1.998 to 2.000 mm (0.07866 to 0.07874 in.) |
| Mark 3 | 2.001 to 2.003 mm (0.07878 to 0.07886 in.) |
| Mark 4 | 2.004 to 2.006 mm (0.07890 to 0.07898 in.) |

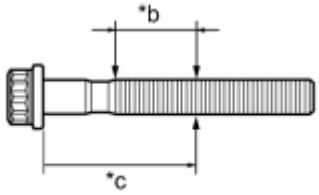
11. INSPECT CRANKSHAFT BEARING CAP SET BOLT

(a) Using a vernier caliper, measure the length of the crankshaft bearing cap set bolt from the seat to end.




## Text in Illustration

| | |
|---|---|
| *a | Measurement Length |
| *b | Measurement Area |
| *c | Distance |




Standard bolt length:

84.3 to 85.7 mm (3.32 to 3.37 in.)

Maximum bolt length:

86.7 mm (3.41 in.)

If the length is more than the maximum, replace the crankshaft bearing cap set bolt.

(b) Using a vernier caliper, measure the tension portion diameter of the bolts.

Measurement point:

55.0 mm (0.197 in.)

Standard diameter:

9.77 to 9.96 mm (0.385 to 0.392 in.)

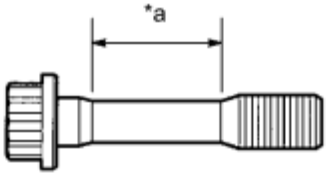
Minimum diameter:

9.1 mm (0.358 in.)

If the diameter is less than the minimum, replace the crankshaft bearing cap set bolt.

12. INSPECT CONNECTING ROD BOLT

(a) Using a vernier caliper, measure the tension portion diameter of the bolt.




## Text in Illustration

| | |
|---|---|
| *a | Measurement Area |

Standard diameter:

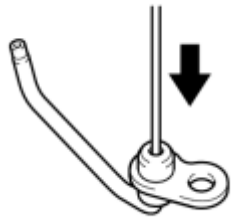
6.6 to 6.7 mm (0.260 to 0.264 in.)

Minimum diameter:

6.4 mm (0.252 in.)

If the diameter is less than the minimum, replace the connecting rod bolt.

13. INSPECT NO. 1 OIL NOZZLE SUB-ASSEMBLY



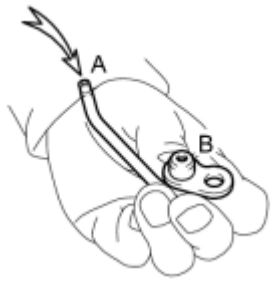
P

(a) Push the check valve with a pin to check if it is stuck.

If stuck, replace the No. 1 oil nozzle.

(b) Push the check valve with a pin to check if it moves smoothly.

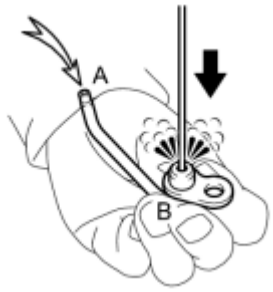
If it does not move smoothly, clean or replace the No. 1 oil nozzle.




P

(c) Apply air into A. Check that air does not leak through B.

If air leaks, clean or replace the No. 1 oil nozzle.




P

(d) Push the check valve while applying air into A. Check that air passes through B.

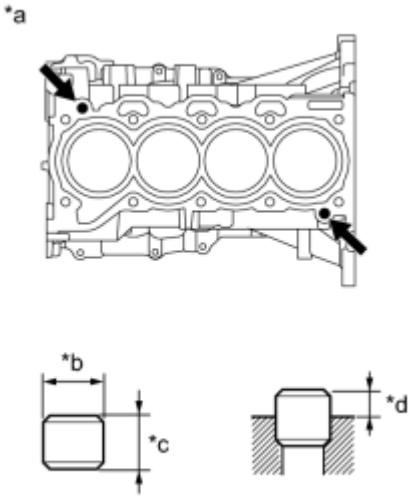
If air does not pass through B, clean or replace the No. 1 oil nozzle.

# REPLACEMENT

1. REPLACE RING PIN

NOTICE:

It is not necessary to remove a ring pin unless it is being replaced.




T

(a) Using a plastic-faced hammer, tap in the ring pins.

## Text in Illustration

| | |
|---|---|
| *a | Upper Side: |
| *b | Width |
| *c | Height |
| *d | Protrusion Height |

Standard Ring Pin:

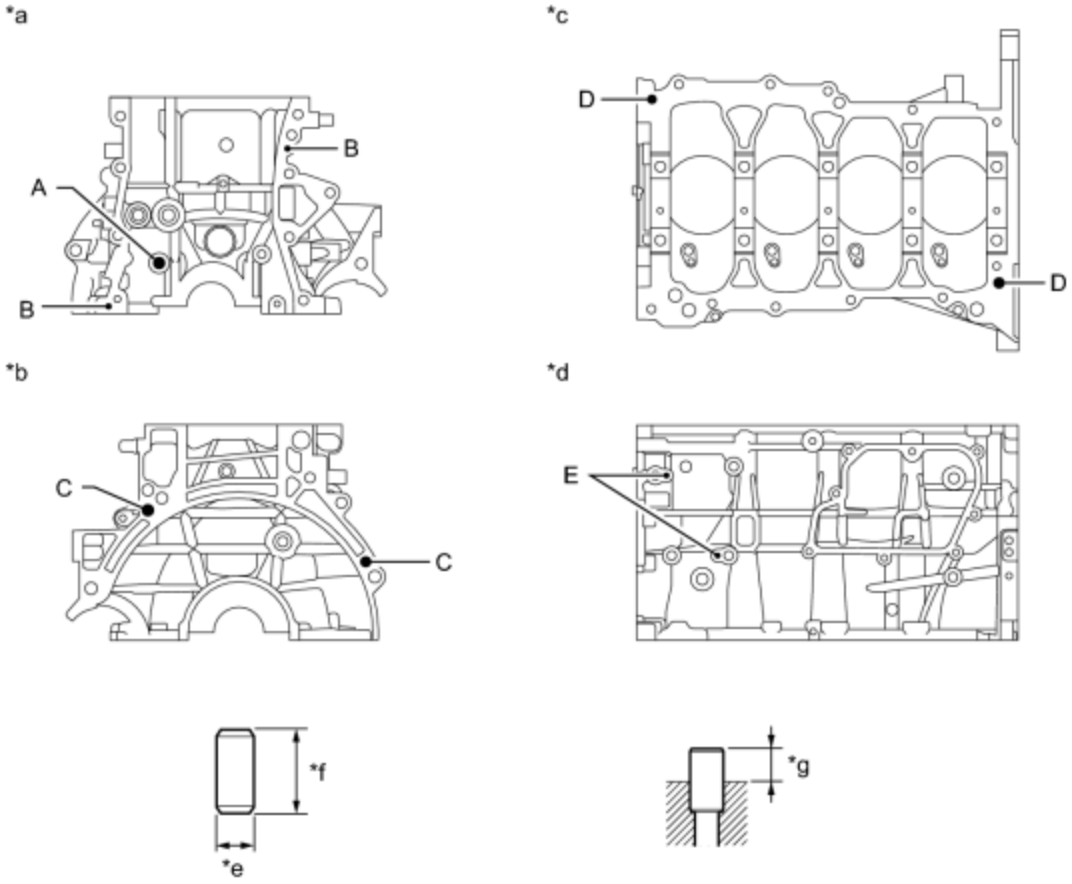
| Item | Height | Width | Protrusion |
|---|---|---|---|
| Ring Pin | 14.3 to 14.7 mm (0.563 to 0.579 in.) | 12.9 to 13.0 mm (0.508 to 0.512 in.) | 7.5 to 8.5 mm (0.295 to 0.335 in.) |

2. REPLACE STRAIGHT PIN

NOTICE:

It is not necessary to remove a straight pin unless it is being replaced.

(a) Using a plastic-faced hammer, tap in the straight pin.




T

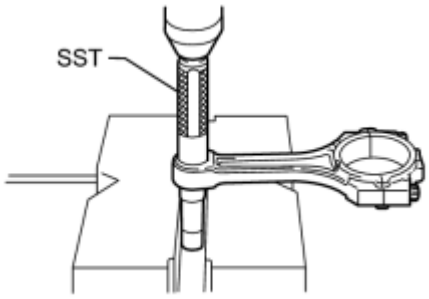
**Text in Illustration**

| | | | |
|---|---|---|---|
| *a | Front Side: | *b | Rear Side: |
| *c | Lower Side: | *d | LH Side: |
| *e | Width | *f | Height |
| *g | Protrusion Height | - | - |

Standard Straight Pin:

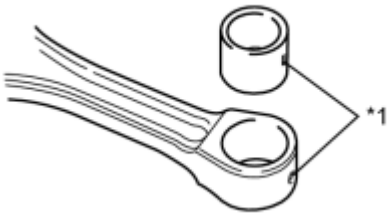
| Item | Height | Width | Protrusion |
|---|---|---|---|
| Pin A | 36 mm (1.42 in.) | 10 mm (0.394 in.) | 18.5 to 19.5 mm (0.728 to 0.768 in.) |
| Pin B | 12 mm (0.472 in.) | 4 mm (0.156 in.) | 5.0 to 7.0 mm (0.197 to 0.276 in.) |
| Pin C | 22 mm (0.866 in.) | 10 mm (0.394 in.) | 11 to 13 mm (0.433 to 0.512 in.) |
| Pin D | 15 mm (0.591 in.) | 8 mm (0.315 in.) | 5.0 to 7.0 mm (0.197 to 0.276 in.) |
| Pin E | 12 mm (0.472 in.) | 4 mm (0.156 in.) | 5.0 to 6.0 mm (0.197 to 0.236 in.) |

3. REPLACE CONNECTING ROD SMALL END BUSH




(a) Using SST and a press, press out the connecting rod small end bush.

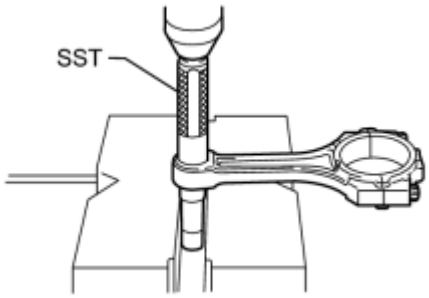
SST: 09222-30010




(b) Align the oil holes of a new connecting rod small end bush and the connecting rod.

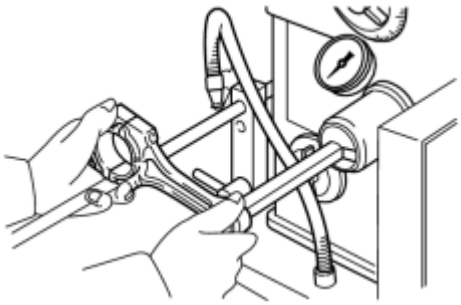
## Text in Illustration

| | |
|---|---|
| *1 | Oil Hole |




(c) Using SST and a press, press in the connecting rod small end bush.

SST: 09222-30010

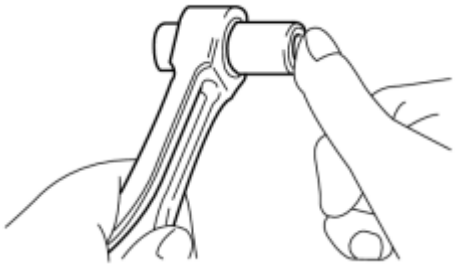


(d) Using a pin hole grinder, hone the bush to obtain the standard oil clearance between the bush and piston pin.

Standard oil clearance:

0.005 to 0.011 (0.000197 to 0.000433 in.)

(e) Coat the piston pin with engine oil. Push the piston pin into the connecting rod with your thumb to check that the piston pin fits at normal room temperature.

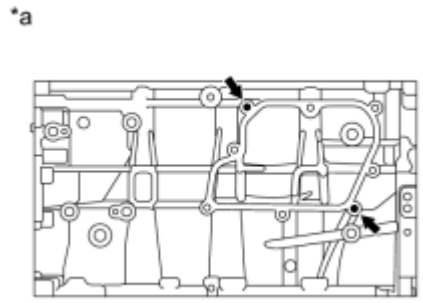


# REASSEMBLY

1. INSTALL STUD BOLT

NOTICE:

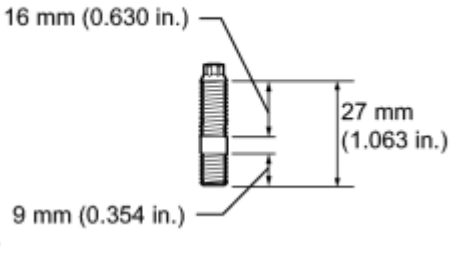
If the stud bolt is deformed or the threads are damaged, replace it.




(a) Using an E6 "TORX" socket, install the stud bolts as shown in the illustration.

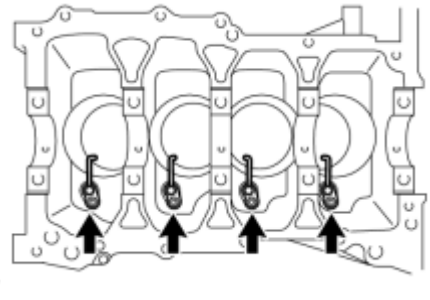
## Text in Illustration

| | |
|---|---|
| *a | LH Side: |




Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

2. INSTALL NO. 1 OIL NOZZLE SUB-ASSEMBLY




(a) Using a 5 mm socket hexagon wrench, install the 4 oil nozzles with the 4 bolts.

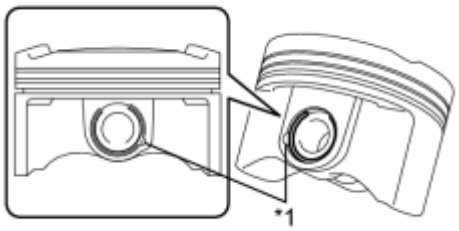
Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

3. INSTALL PISTON

(a) Using a screwdriver, install a new snap ring at one end of the piston pin hole.

## Text in Illustration

| | |
|---|---|
| *1 | Service Hole |

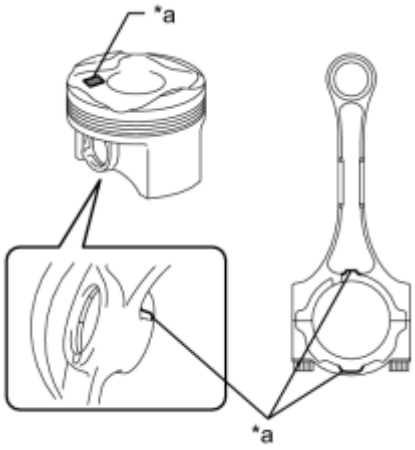



T

HINT:

Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.

(b) Gradually heat the piston to approximately 80 to 90°C (176 to 194°F).




T

(c) Align the front marks of the piston and connecting rod, insert the connecting rod into the piston, and then push in the piston pin with your thumb until the pin comes into contact with the snap ring.

## Text in Illustration

| | |
|---|---|
| *a | Front Mark |

HINT:

The piston and pin are a matched set.

(d) Using a screwdriver, install a new snap ring on the other end of the piston pin hole.

HINT:

Make sure that the end gap of the snap ring is not aligned with the pin hole cutout portion of the piston.



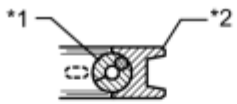
T

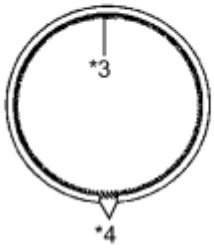
(e) Check the fitting condition between the piston and piston pin by trying to move the piston back and forth on the piston pin.

4. INSTALL PISTON RING SET

(a) Install the oil ring expander and oil ring by hand.

## Text in Illustration

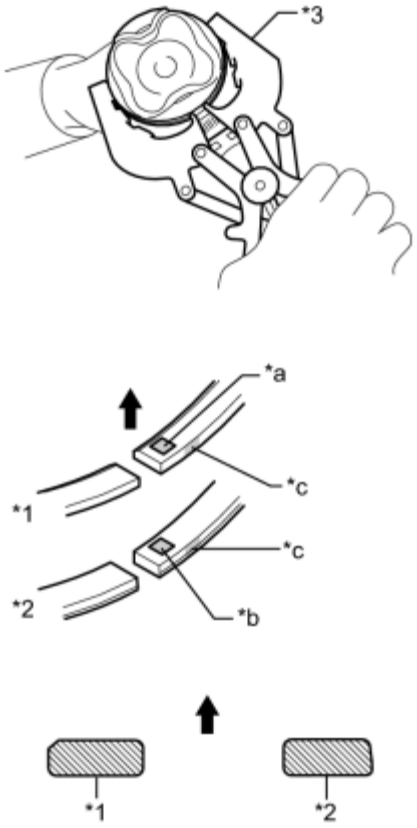



| | |
|---|---|
| *1 | Oil Ring Expander |
| *2 | Oil Ring |
| *3 | Coil Joint |
| *4 | Oil Ring End |

- Install the expander and oil ring so that their ring ends are at opposite sides.
- Securely install the expander to the inner groove of the oil ring.

(b) Using a piston ring expander, install the 2 compression rings so that the paint marks are positioned as shown in the illustration.




**Text in Illustration**

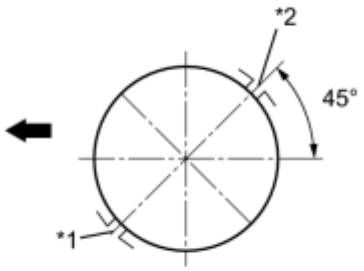
| | |
|---|---|
| *1 | No. 1 Compression Ring |

| | |
|---|---|
| *2 | No. 2 Compression Ring |
| *3 | Piston Ring Expander |
| *a | Code Mark (1R) |
| *b | Code Mark (2R) |
| *c | Paint Mark |
| ➡ | Upward |

NOTICE:

- Install the No. 1 compression ring with the code mark (1R) facing upward.
- Install the No. 2 compression ring with the code mark (2R) facing upward.
- Paint marks can only be checked on new piston rings. When reusing piston rings, check each piston ring profile in order to install them into the correct positions.

(c) Position the piston rings so that the ring ends are as shown in the illustration.



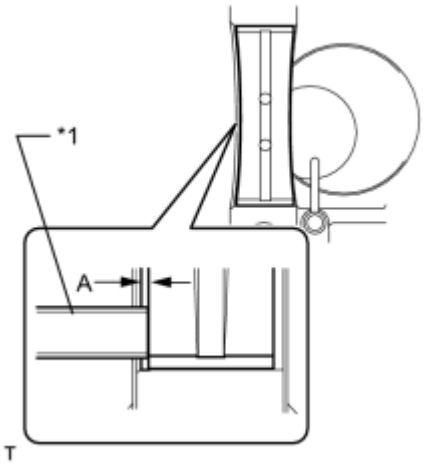

**Text in Illustration**

| | |
|---|---|
| *1 | No. 1 compression ring and Oil Ring |
| *2 | No. 2 compression ring and Oil Ring Expander |
| ➡ | Engine Front |

5. INSTALL CRANKSHAFT BEARING

(a) Install the upper bearing (except No. 3 journal).

# Text in Illustration




| | |
|---|---|
| *1 | Vernier Caliper |

(1) Install the upper bearing to the cylinder block.

HINT:

Both sides of the oil groove in the cylinder block should be visible through the oil feed holes in the bearing. The amount visible on each side of the holes should be equal.

(2) Using a vernier caliper, measure the distance between the cylinder block edge and the upper bearing edge.

Standard dimension (A):

0.5 to 1.0 mm (0.0197 to 0.0394 in.)

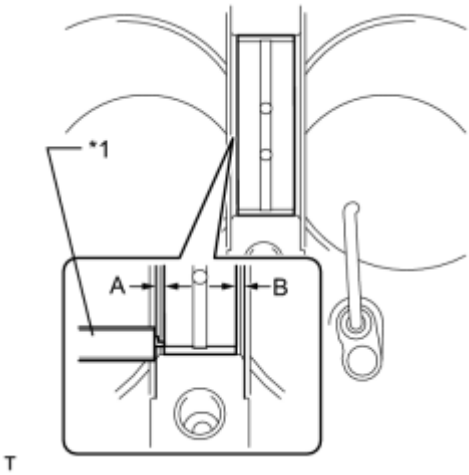
NOTICE:

Do not apply engine oil to the bearings or the contact surfaces.

(b) Install the upper bearing (for No. 3 journal).

# Text in Illustration

| | |
|---|---|
| *1 | Vernier Caliper |




(1) Install the upper bearing to the cylinder block.

HINT:

Both sides of the oil groove in the cylinder block should be visible through the oil feed holes in the bearing. The amount visible on each side of the holes should be equal.

(2) Using a vernier caliper, measure the distance between the cylinder block edge and the upper bearing edge.

Standard dimension (A - B):

0.7 mm (0.0276 in.) or less

NOTICE:

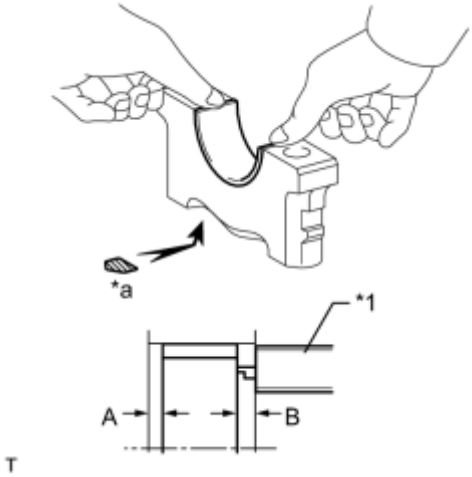
Do not apply engine oil to the bearing or the contact surfaces.

(c) Install the lower bearing.

(1) Install the upper bearing to the cylinder block.

HINT:

Both sides of the oil groove in the cylinder block should be visible through the oil feed holes in the bearing. The amount visible on each side of the holes should be equal.




T

(2) Using a vernier caliper, measure the distance between the bearing cap edge and the lower bearing edge.

## Text in Illustration

| | |
|---|---|
| *1 | Vernier Caliper |
| *a | Mark 1, 2, 3, 4 or 5 |

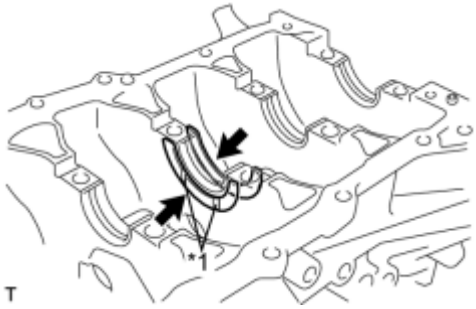
Standard dimension (A - B):

0.7 mm (0.0276 in.) or less

NOTICE:

Do not apply engine oil to the bearings or the contact surfaces.

6. INSTALL UPPER CRANKSHAFT THRUST WASHER




T

(a) Install the 2 thrust washers to the No. 3 journal position of the cylinder block with the oil grooves facing outward.

## Text in Illustration

| | |
|---|---|
| *1 | Oil Groove |

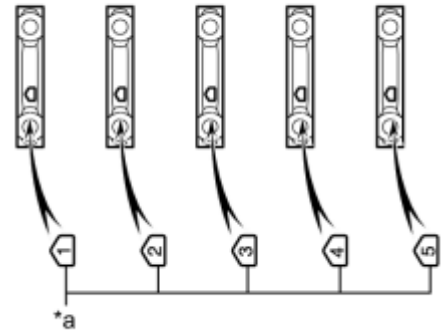
(b) Apply engine oil to the crankshaft thrust washer.

7. INSTALL CRANKSHAFT

(a) Apply engine oil to the upper bearings and install the crankshaft to the cylinder block.

(b) Apply engine oil to the lower bearings.

(c) Examine the number marks and install the bearing caps to the cylinder block.

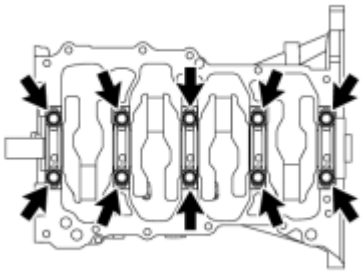



T

**Text in Illustration**

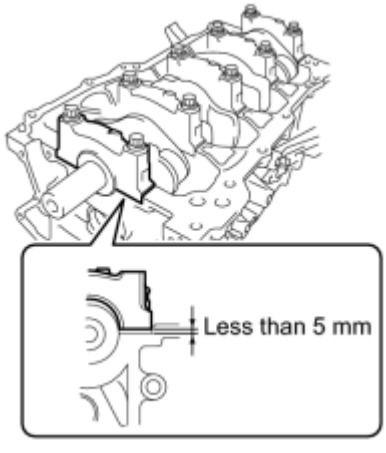
| | |
|---|---|
| *a | Number Mark |
| ➡ | Engine Front |

(d) Apply a light coat of engine oil to the threads and under the heads of the bearing cap bolts.



T

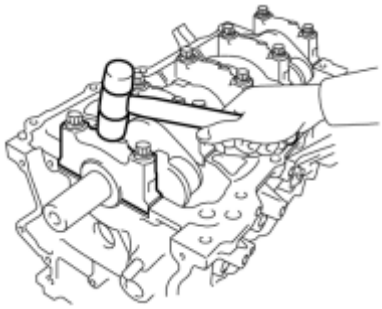
(e) Temporarily install the 10 crankshaft bearing cap bolts.




T

(f) Push on the crankshaft bearing caps with your hand until the clearance between the crankshaft bearing caps and cylinder block is less than 5 mm (0.197 in.).

(g) Using a plastic-faced hammer, lightly tap the bearing cap to ensure a proper fit.



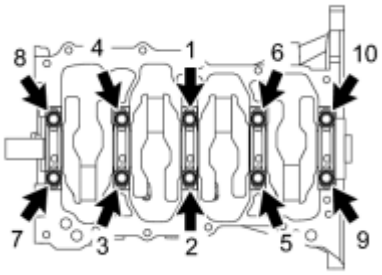
T

(h) Install the crankshaft bearing cap bolts.

NOTICE:

The crankshaft bearing cap bolts are tightened in 2 progressive steps.

(i) Step 1:



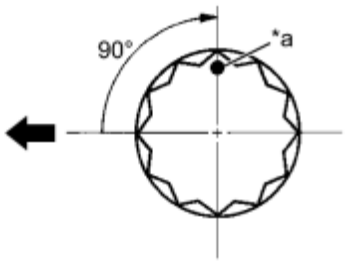

T

(1) Install and uniformly tighten the 10 crankshaft bearing cap bolts in the sequence shown in the illustration.

Torque: **40 N·m (408 kgf·cm, 30ft·lbf)**

(j) Step 2:

(1) Mark the front of the bearing cap bolts with paint.




**Text in Illustration**

| | |
|---|---|
| *a | Paint Mark |
| ➡ | Engine Front |

(2) Tighten the bearing cap bolts 90° in the sequence shown in step 1.

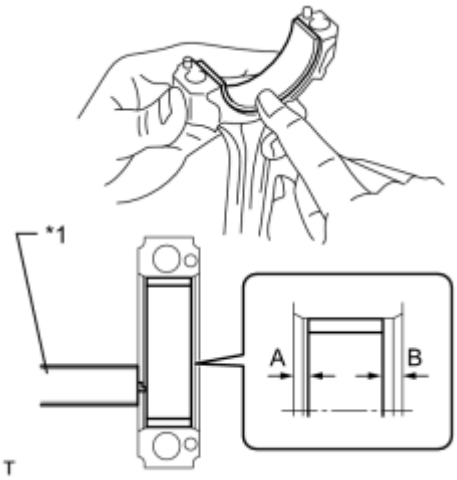
(k) Check that the paint marks are now at a 90° angle to the front.

(l) Check that the crankshaft turns smoothly.

(m) Check the crankshaft thrust clearance INFO.

8. INSTALL CONNECTING ROD BEARING

(a) Install the connecting rod bearings to the connecting rods and connecting rod caps.




(b) Using a vernier caliper, measure the distance between the edges of the connecting rods and connecting cap bearings, and the connecting rod caps and the connecting rod bearings.

## Text in Illustration

| | |
|---|---|
| *1 | Vernier caliper |

Standard dimension A - B or B - A:

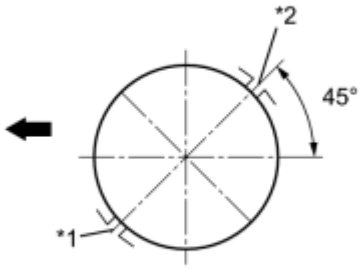
0 to 0.7 mm (0 to 0.0276 in.)

NOTICE:

Do not apply engine oil to the bearings or the contact surfaces.

9. INSTALL PISTON SUB-ASSEMBLY WITH CONNECTING ROD

(a) Apply engine oil to the cylinder walls, pistons, and the surfaces of the connecting rod bearings.




**Text in Illustration**

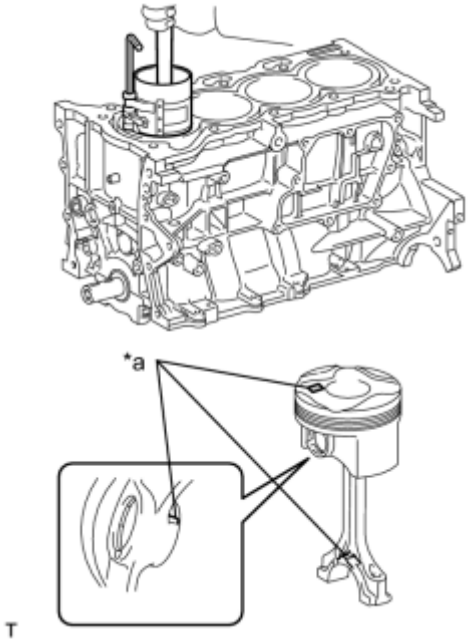
| | |
|---|---|
| *1 | No. 1 compression ring and Oil Ring |

| | |
|---|---|
| *2 | No. 2 compression ring and Oil Ring Expander |
| ➡ | Engine Front |

(b) Position the piston rings so that the ring ends are as shown in the illustration.

NOTICE:

Do not align the ring ends.

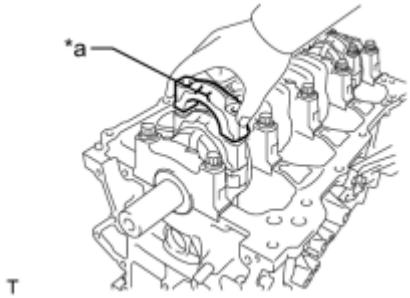



(c) Using a piston ring compressor, push the correctly numbered piston and connecting rod assembly into the cylinder with the front mark of the piston facing forward.

## Text in Illustration

| | |
|---|---|
| *a | Front Mark |

- When inserting the piston with connecting rod, do not allow it to make contact with the oil nozzle.
- Match the numbered connecting rod cap with the connecting rod.




(d) Check that the front mark of the connecting rod cap is facing in the correct direction.

## Text in Illustration

| | |
|---|---|
| *a | Front Mark |

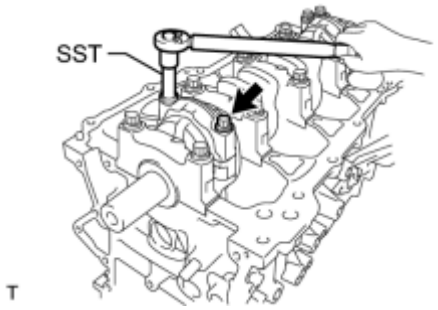
(e) Apply a light coat of engine oil to the threads and under the heads of the connecting rod cap bolts.

(f) Install the connecting rod cap bolts.

NOTICE:

The connecting rod cap bolts should be tightened in 2 progressive steps.

(g) Step 1:



T

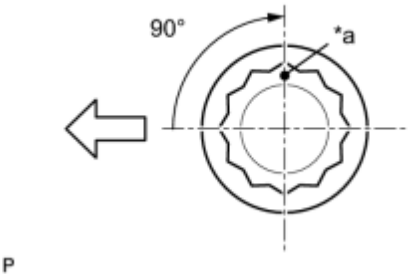
(1) Using SST, install and alternately tighten the bolts of the connecting rod cap in several steps.

SST: 09205-16011

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

(h) Step 2:

(1) Mark the front of the connecting rod cap bolts with paint.



P

**Text in Illustration**

| | |
|---|---|
| *a | Paint Mark |
| ⇨ | Engine Front |

(2) Tighten the cap bolts 90° as shown in the illustration.

(i) Check that the crankshaft turns smoothly.

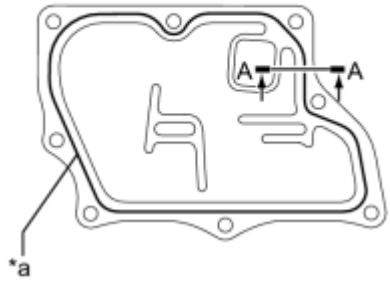
(j) Check the connecting rod thrust clearance INFO.

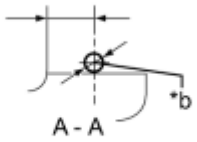
10. INSTALL NO. 1 VENTILATION CASE

(a) Apply seal packing in a continuous line as shown in the illustration.

# Text in Illustration

| | |
|---|---|
| *a | Seal Packing |
| *b | Seal Packing Diameter |




T

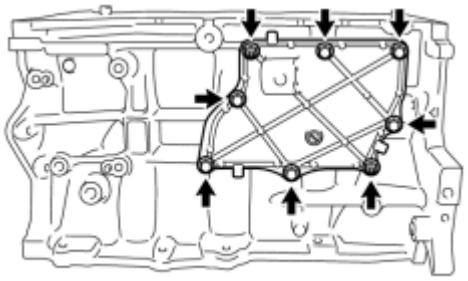
Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Application Specification:

| Seal Packing Diameter | Distance from inside edge of cover to center of seal packing |
|---|---|
| 2.0 to 3.0 mm (0.0787 to 0.118 in.) | 3.0 mm (0.118 in.) |

- Remove any oil from the contact surface.
- Install the ventilation case within 3 minutes and tighten the bolts and nuts within 15 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after installation.



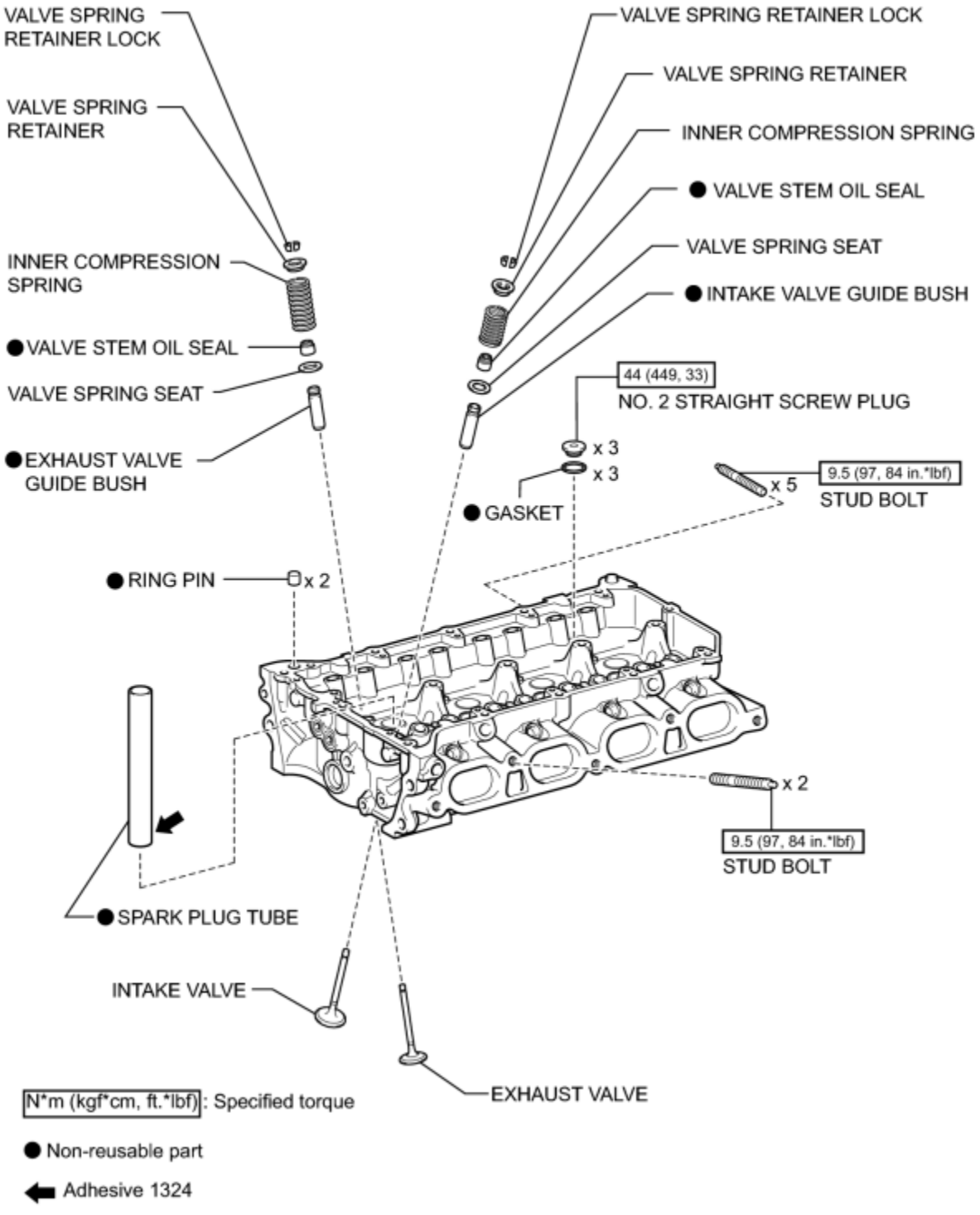
T

(b) Install the ventilation case with the 6 bolts and 2 nuts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

# COMPONENTS

# ILLUSTRATION

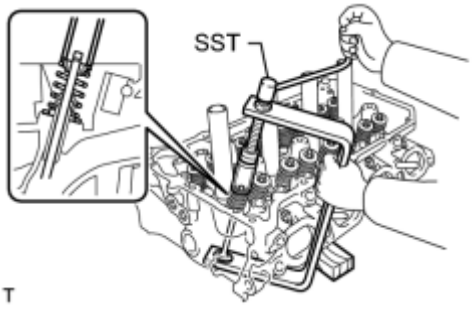



T

# DISASSEMBLY

1. REMOVE INTAKE VALVE

(a) Place the cylinder head on wooden blocks.




(b) Using SST and wooden blocks, compress and remove the valve retainer locks.

SST: 09202-70020

09202-00010

HINT:

Arrange the removed parts in the correct order.

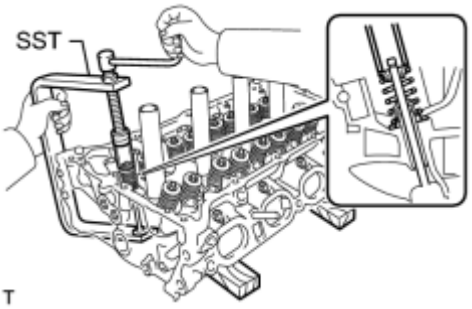
(c) Remove the retainer, valve spring and valve.

HINT:

Arrange the removed parts in the correct order.

2. REMOVE EXHAUST VALVE

(a) Place the cylinder head on wooden blocks.




(b) Using SST and wooden blocks, compress and remove the valve retainer locks.

SST: 09202-70020

09202-00010

HINT:

Arrange the removed parts in the correct order.

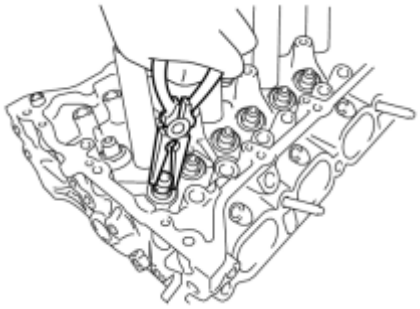
(c) Remove the retainer, valve spring and valve.

HINT:

Arrange the removed parts in the correct order.

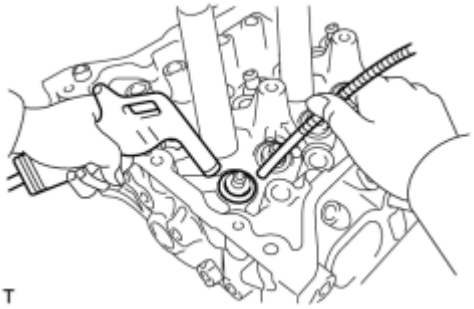
3. REMOVE VALVE STEM OIL SEAL

(a) Using needle-nose pliers, remove the oil seals.



T

4. REMOVE VALVE SPRING SEAT



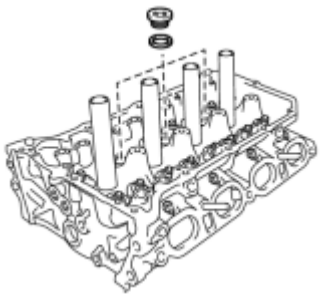
T

(a) Using compressed air and a Magnet Hand, remove the valve spring seats by blowing air onto them.

5. REMOVE NO. 2 STRAIGHT SCREW PLUG

NOTICE:

If water leaks from the straight screw plug or the plug is corroded, replace it.



T

(a) Using a 10 mm straight hexagon wrench, remove the 3 screw plugs and 3 gaskets.

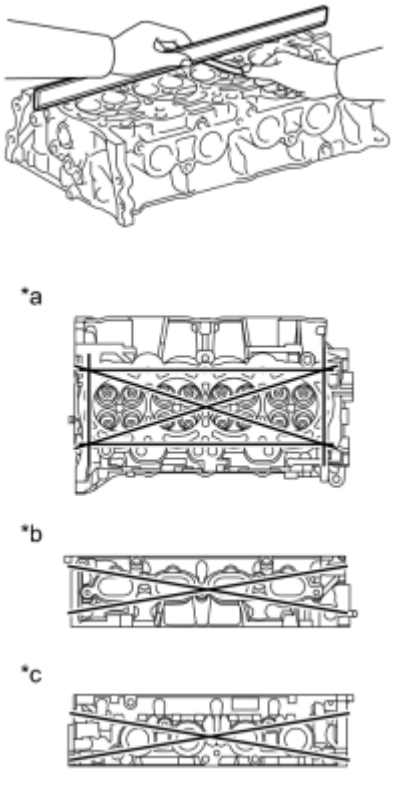
6. REMOVE STUD BOLT

NOTICE:

If a stud bolt is deformed or its threads are damaged, replace it.

# INSPECTION

1. INSPECT CYLINDER HEAD FOR FLATNESS




T

(a) Using a precision straightedge and feeler gauge, measure the warpage of the contact surfaces where the cylinder head contacts the cylinder block and manifold.

## Text in Illustration

| | |
|---|---|
| *a | Cylinder Head Lower Side: |
| *b | Intake Manifold Side: |
| *c | Exhaust Manifold Side: |

Maximum Warpage:

| Item | Specified Condition |
|---|---|
| Cylinder block side | 0.05 mm (0.00197 in.) |
| Intake manifold side | 0.10 mm (0.00394 in.) |
| Exhaust manifold side | 0.10 mm (0.00394 in.) |

If the warpage is more than the maximum, replace the cylinder head.

2. INSPECT CYLINDER HEAD FOR CRACKS



T

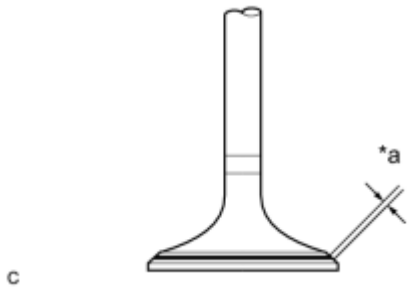
(a) Using a dye penetrant, check the intake ports, exhaust ports and cylinder surface for cracks.

If cracked, replace the cylinder head.

3. INSPECT VALVE SEATS

(a) Apply a light coat of Prussian blue to the valve face.

## Text in Illustration




| | |
|---|---|
| *a | Width |

(b) Lightly press the valve face against the valve seat.

HINT:

Do not rotate the valve while pressing the valve.

(c) Check the valve face and valve seat.

(1) Intake Side:

Check that the contact surfaces of the valve seat and valve face are in the middle area of their respective surfaces, with the width between 1.0 and 1.4 mm (0.0433 and 0.0551 in.).

If not, correct the valve seat.

(2) Exhaust Side:

Check that the contact surfaces of the valve seat and valve face are in the middle area of their respective surfaces, with the width between 1.0 and 1.4 mm (0.0433 and 0.0551 in.).

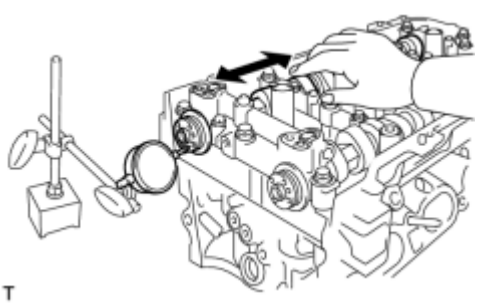
If not, correct the valve seat.

(3) Check that the contact surfaces of the valve seat and valve face are even around the entire valve seat.

If not, correct the valve seat.

4. INSPECT CAMSHAFT THRUST CLEARANCE

(a) Install the camshafts INFO.



(b) Using a dial indicator, measure the thrust clearance while moving the camshaft back and forth.

Standard thrust clearance:

0.06 to 0.155 mm (0.00236 to 0.00610 in.)

Maximum thrust clearance:

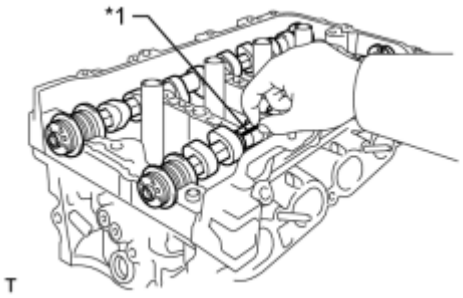
0.17 mm (0.00669 in.)

If the thrust clearance is greater than the maximum, replace the camshaft housing. If the thrust surface is damaged, replace the camshaft.

5. INSPECT CAMSHAFT OIL CLEARANCE

(a) Clean the bearing caps and camshaft journals.

(b) Place the camshafts on the camshaft housing.




T

(c) Lay a strip of Plastigage across each of the camshaft journals.

## Text in Illustration

| | |
|---|---|
| *1 | Plastigage |

(d) Install the bearing caps INFO.

NOTICE:

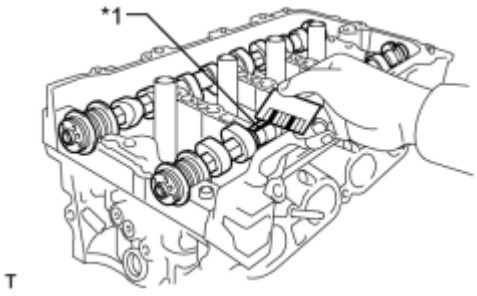
Do not turn the camshaft.

(e) Remove the bearing caps INFO.

(f) Measure the Plastigage at its widest point.

## Text in Illustration

| | |
|---|---|
| *1 | Plastigage |




T

Standard Oil Clearance:

| Item | Specified Condition |
|---|---|
| Camshaft No. 1 Journal | 0.030 to 0.063 mm (0.00118 to 0.00248 in.) |
| Camshaft Other Journals | 0.035 to 0.072 mm (0.00138 to 0.00283 in.) |

Maximum Oil Clearance:

| Item | Specified Condition |
|---|---|
| Camshaft No. 1 Journal | 0.085 mm (0.00335 in.) |

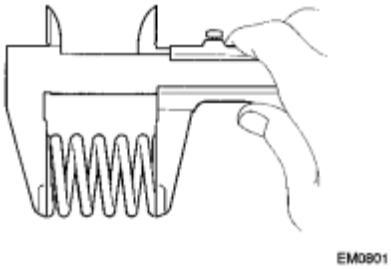
| | |
|---|---|
| Camshaft Other Journals | 0.09 mm (0.00354 in.) |

NOTICE:

Completely remove the Plastigage after the inspection.

If the oil clearance is more than the maximum, replace the camshaft. If necessary, replace the camshaft housing.

6. INSPECT COMPRESSION SPRING

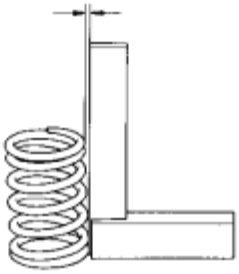



(a) Using a vernier caliper, measure the free length of the compression spring.

Standard free length:

53.36 mm (2.10 in.)

If the free length is not as specified, replace the compression spring.



(b) Using a steel square, measure the deviation of the compression spring.

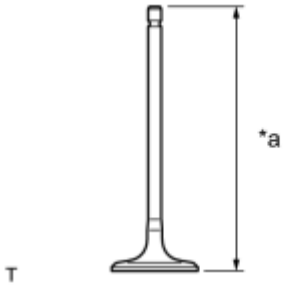
Maximum deviation:

1.0 mm (0.0394 in.)

If the deviation is more than the maximum, replace the compression spring.

7. INSPECT INTAKE VALVE

(a) Using a vernier caliper, measure the overall length of the valve.




# Text in Illustration

| | |
|---|---|
| *a | Overall Length |

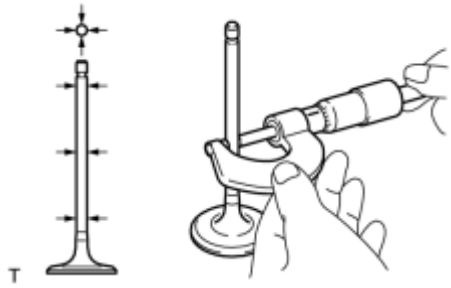
Standard overall length:

109.34 mm (4.30 in.)

Minimum overall length:

108.84 mm (4.29 in.)

If the overall length is less than the minimum, replace the valve.



(b) Using a micrometer, measure the diameter of the valve stem.

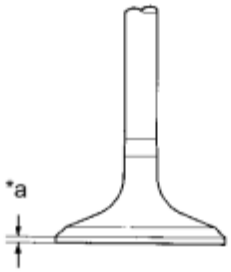
Standard valve stem diameter:

5.470 to 5.485 mm (0.215 to 0.216 in.)

If the valve stem diameter is not as specified, check the oil clearance.

(c) Using a vernier caliper, measure the valve head margin thickness.

## Text in Illustration



| | |
|---|---|
| *a | Margin Thickness |

Standard margin thickness:

1.0 mm (0.0394 in.)

Minimum margin thickness:

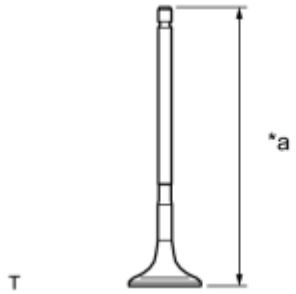
0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

8. INSPECT EXHAUST VALVE

(a) Using a vernier caliper, measure the overall length of the valve.

## Text in Illustration



| | |
|---|---|
| *a | Overall Length |

Standard overall length:

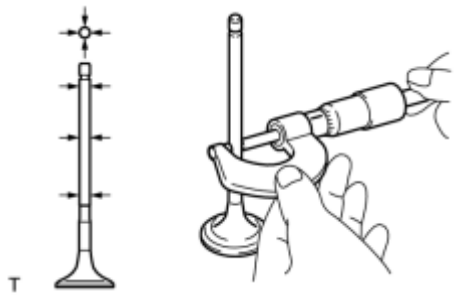
108.25 mm (4.26 in.)

Minimum overall length:

107.75 mm (4.24 in.)

If the overall length is less than the minimum, replace the valve.

(b) Using a micrometer, measure the diameter of the valve stem.

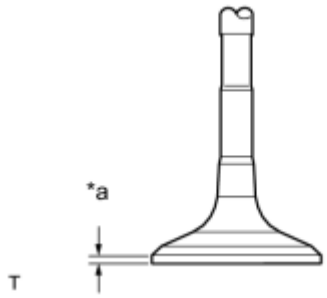


Standard valve stem diameter:

5.465 to 5.480 mm (0.215 to 0.216 in.)

If the valve stem diameter is not as specified, check the oil clearance.

(c) Using a vernier caliper, measure the valve head margin thickness.




## Text in Illustration

| | |
|---|---|
| *a | Margin Thickness |

Standard margin thickness:

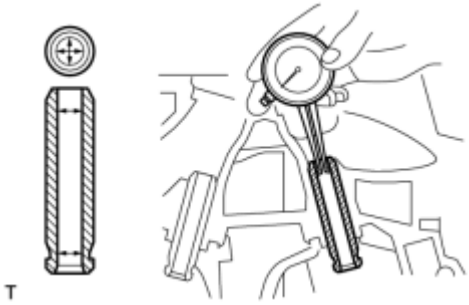
1.0 mm (0.0394 in.)

Minimum margin thickness:

0.5 mm (0.0197 in.)

If the margin thickness is less than the minimum, replace the valve.

9. INSPECT VALVE GUIDE BUSH OIL CLEARANCE



(a) Using a caliper gauge, measure the inside diameter of the guide bush.

Standard bushing inside diameter:

5.510 to 5.530 mm (0.217 to 0.218 in.)

(b) Subtract the valve stem diameter measurement from the guide bush inside diameter measurement.

Standard Oil Clearance:

| Item | Specified Condition |
|---|---|
| Intake | 0.025 to 0.060 mm (0.000984 to 0.00236 in.) |
| Exhaust | 0.030 to 0.065 mm (0.00118 to 0.00256 in.) |

Maximum Oil Clearance:

| Item | Specified Condition |
|---|---|
| Intake | 0.080 mm (0.00315 in.) |
| Exhaust | 0.085 mm (0.00335 in.) |

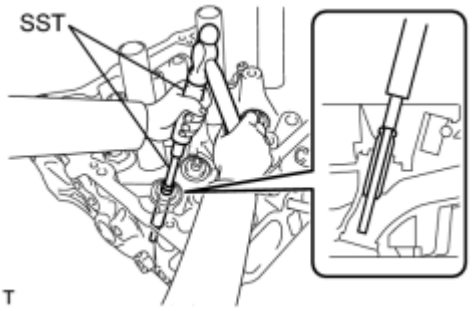
If the clearance is more than the maximum, replace the valve and guide bush.

# REPLACEMENT

1. REPLACE INTAKE VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.




(c) Using SST and a hammer, tap out the guide bush.

SST: 09201-10000

09201-01050

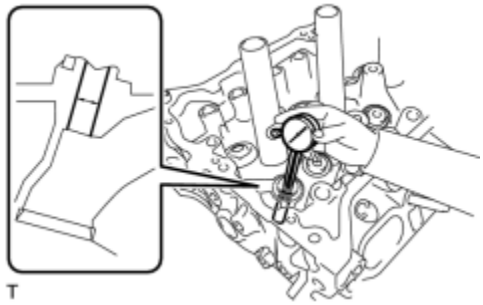
SST: 09950-70010

09951-07100

(d) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Standard cylinder bore diameter:

10.285 to 10.306 mm (0.405 to 0.406 in.)




Select New Guide Bush:

| Bush Size | Bush Diameter |
|---|---|
| STD | 10.333 to 10.344 mm (0.4068 to 0.4072 in.) |
| O/S 0.05 | 10.383 to 10.394 mm (0.4088 to 0.4092 in.) |

If the bush bore diameter of the cylinder head is more than 10.306 mm (0.406 in.), machine the bush bore to a diameter of 10.335 to 10.356 mm (0.407 to 0.408 in.) in order to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is more than 10.356 mm (0.408 in.), replace the cylinder head.

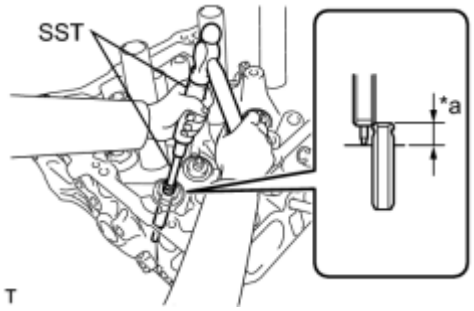
(e) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(f) Place the cylinder head on wooden blocks.

(g) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

## Text in Illustration

| | |
|---|---|
| *a | Height |




SST: 09201-10000

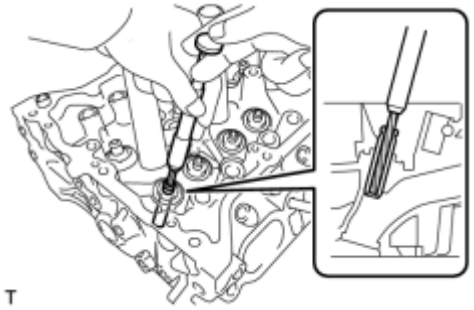
09201-01050

SST: 09950-70010

09951-07100

Standard protrusion height:

9.9 to 10.3 mm (0.390 to 0.406 in.)




(h) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard clearance between the guide bush and valve stem.

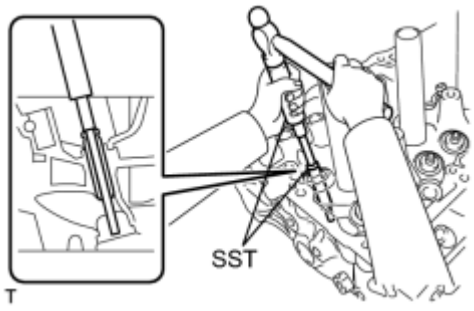
Standard oil clearance:

0.025 to 0.060 mm (0.000984 to 0.00236 in.)

2. REPLACE EXHAUST VALVE GUIDE BUSH

(a) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(b) Place the cylinder head on wooden blocks.



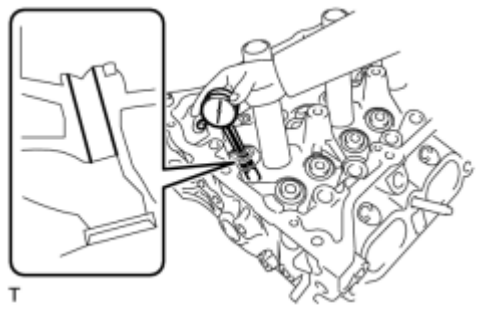

(c) Using SST and a hammer, tap out the guide bush.

SST: 09201-10000

09201-01050

SST: 09950-70010

09951-07100




(d) Using a caliper gauge, measure the bush bore diameter of the cylinder head.

Standard cylinder bore diameter:

10.285 to 10.306 mm (0.405 to 0.406 in.)

Select New Guide Bush:

| Bush Size | Bush Diameter |
|---|---|
| STD | 10.333 to 10.344 mm (0.4068 to 0.4072 in.) |
| O/S 0.05 | 10.383 to 10.394 mm (0.4088 to 0.4092 in.) |

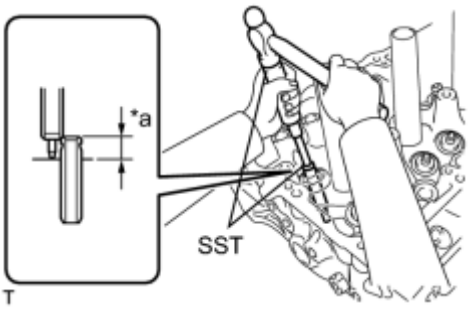
If the bush bore diameter of the cylinder head is more than 10.306 mm (0.406 in.), machine the bush bore to a diameter of 10.335 to 10.356 mm (0.407 to 0.408 in.) in order to install an O/S 0.05 valve guide bush. If the bush bore diameter of the cylinder head is more than 10.356 mm (0.408 in.), replace the cylinder head.

(e) Heat the cylinder head to 80 to 100°C (176 to 212°F).

(f) Place the cylinder head on wooden blocks.

(g) Using SST and a hammer, tap in a new guide bush to the specified protrusion height.

# Text in Illustration




| | |
|---|---|
| *a | Height |

SST: 09201-10000

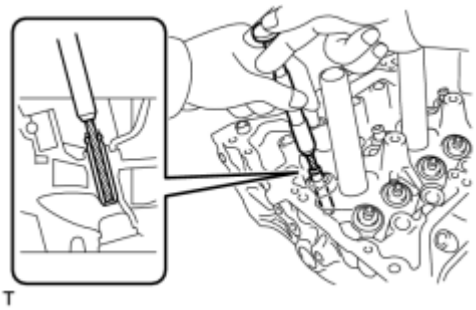
09201-01050

SST: 09950-70010

09951-07100

Standard protrusion height:

11.15 to 11.55 mm (0.439 to 0.455 in.)




(h) Using a sharp 5.5 mm reamer, ream the guide bush to obtain the standard clearance between the guide bush and valve stem.

Standard oil clearance:

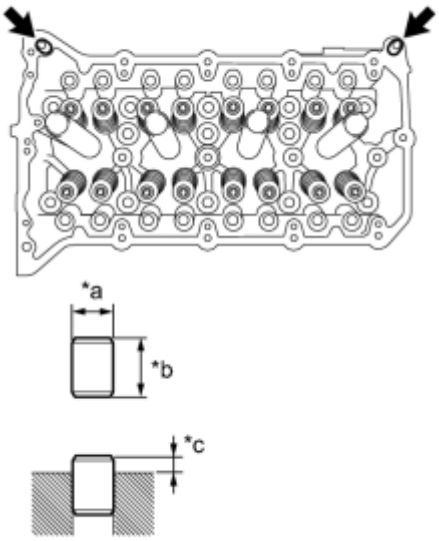
0.030 to 0.065 mm (0.00118 to 0.00256 in.)

3. REPLACE RING PIN

NOTICE:

It is not necessary to remove a ring pin unless it is being replaced.

(a) Remove the ring pins.




(b) Using a plastic-faced hammer, tap in a new ring pin to the specified protrusion height.

## Text in Illustration

| | |
|---|---|
| *a | Width |
| *b | Height |
| *c | Protrusion Height |

Standard Ring Pin:

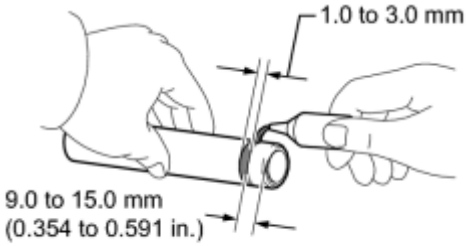
| Item | Height | Width | Protrusion |
|---|---|---|---|
| Ring pin | 11.7 to 12.3 mm (0.461 to 0.484 in.) | 12.0 mm (0.472 in.) | 6.5 to 7.5 mm (0.256 to 0.295 in.) |

# REASSEMBLY

1. INSTALL SPARK PLUG TUBE

NOTICE:

When using a new cylinder head, the spark plug tubes must be replaced.




(a) Apply adhesive onto the shaded area of a new spark plug tube.

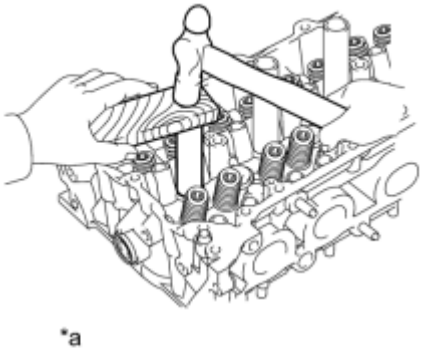
Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

Standard application width:

1.0 to 3.0 mm (0.0394 to 0.118 in.)

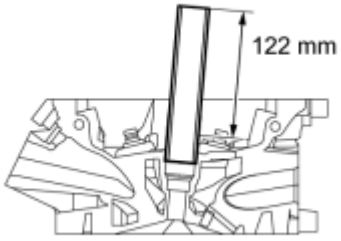
- Install the spark plug tube within 3 minutes of applying adhesive.
- Be careful not to deform the spark plug tube.
- Be careful not to expose the seal to coolant for at least 1 hour after installing the tube.




(b) Using a wooden block and hammer, tap in the spark plug tube to the specified protrusion height.

## Text in Illustration

| | |
|---|---|
| *a | Cylinder Head Casting Surface: |




T

Standard protrusion height:

122 mm (4.80 in.)

NOTICE:

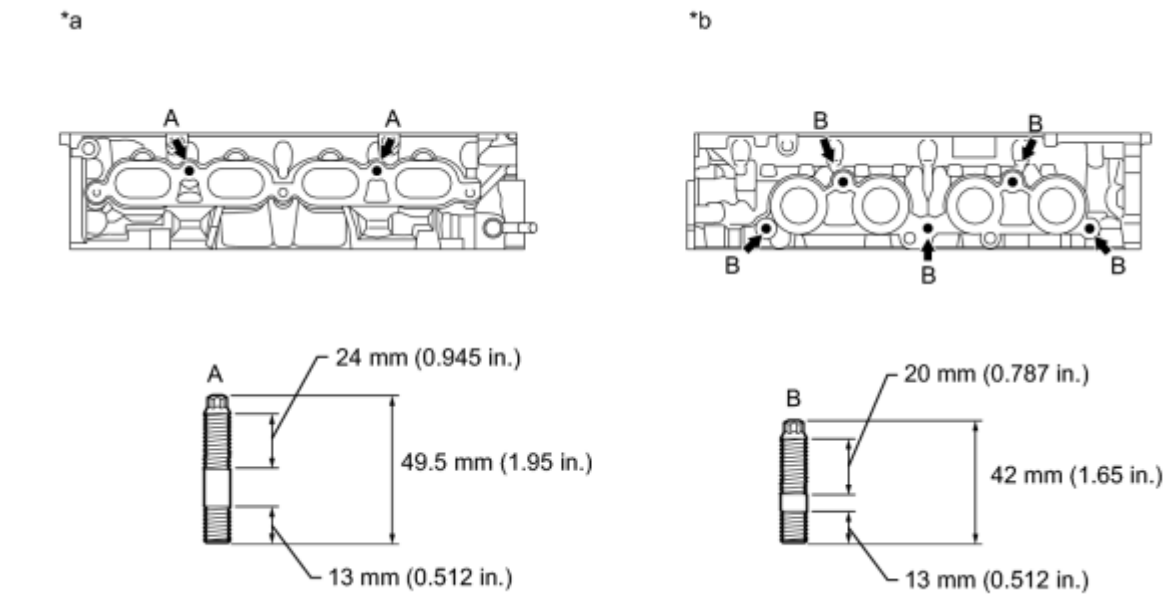
To avoid tapping in the spark plug tube too far, measure the protrusion height while tapping it.

2. INSTALL STUD BOLT

NOTICE:

If a stud bolt is deformed or its threads are damaged, replace it.

(a) Using an E8 "TORX" socket, install the stud bolts.




T

**Text in Illustration**

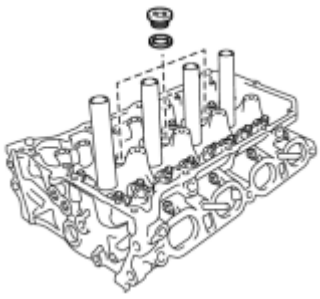
| | | | |
|---|---|---|---|
| *a | Intake Side: | *b | Exhaust Side: |

Torque: **9.5 N·m (97 kgf·cm, 84in·lbf)**

3. INSTALL NO. 2 STRAIGHT SCREW PLUG

NOTICE:

If water leaks from the straight screw plug or the plug is corroded, replace it.



T

(a) Using a 10 mm straight hexagon wrench, install 3 new gaskets and the 3 straight screw plugs.

Torque: **44 N·m (449 kgf·cm, 32ft·lbf)**

4. INSTALL VALVE SPRING SEAT

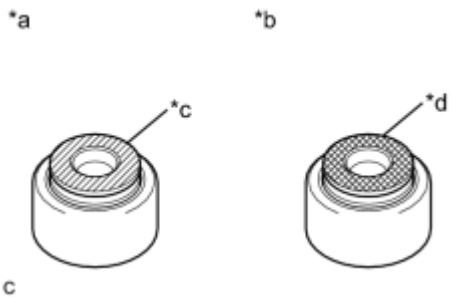
(a) Install the valve spring seats to the cylinder head.

5. INSTALL VALVE STEM OIL SEAL

(a) Apply a light coat of engine oil to a new oil seal.

## Text in Illustration

| | |
|---|---|
| *a | Intake Side: |
| *b | Exhaust Side: |
| *c | Gray |
| *d | Black |




NOTICE:

Pay close attention when installing the intake and exhaust oil seals. For example, installing the intake oil seal to the exhaust side or installing the exhaust oil seal to the intake side can cause installation problems later.

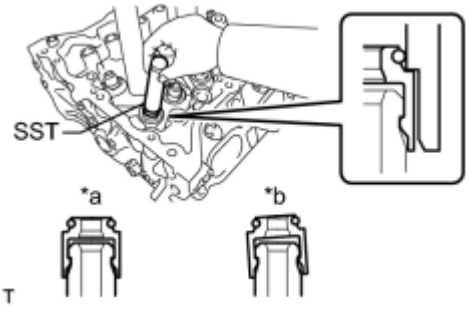
HINT:

The intake valve oil seal is gray and the exhaust valve oil seal is black.

(b) Using SST, push on the oil seal.

## Text in Illustration

| | |
|---|---|
| *a | CORRECT |
| *b | INCORRECT |



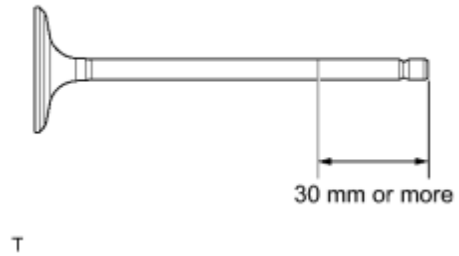

SST: 09201-41020

NOTICE:

Failure to use SST will cause the seal to be damaged or improperly seated.

6. INSTALL INTAKE VALVE

(a) Place the cylinder head on wooden blocks.

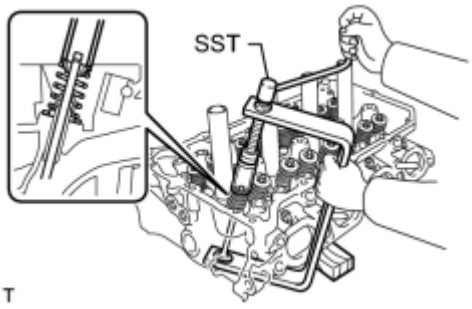



(b) Apply engine oil to each valve over an area 30 mm (1.18 in.) or more from its tip, as shown in the illustration.

(c) Install the valve, compression spring and spring retainer to the cylinder head.

NOTICE:

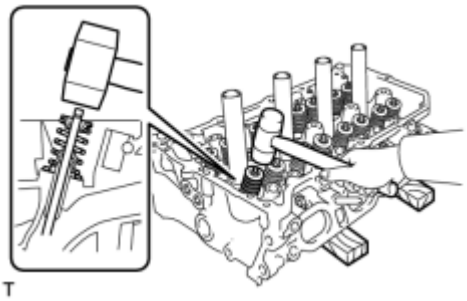
Install the same parts in the same combination to the original locations.




(d) Using SST, compression spring and install the valve retainer locks.

SST: 09202-70020

09202-00010

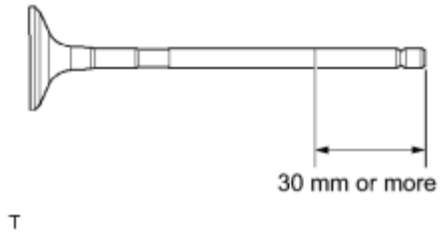



(e) Using a plastic-faced hammer, lightly tap the valve stem tip to ensure a proper fit.

- Be careful not to damage the valve stem tip.
- Be careful not to damage the retainer.

7. INSTALL EXHAUST VALVE

(a) Place the cylinder head on wooden blocks.




(b) Apply engine oil to each valve over an area 30 mm (1.18 in.) or more from its tip, as shown in the illustration.

(c) Install the valve, compression spring and spring retainer to the cylinder head.

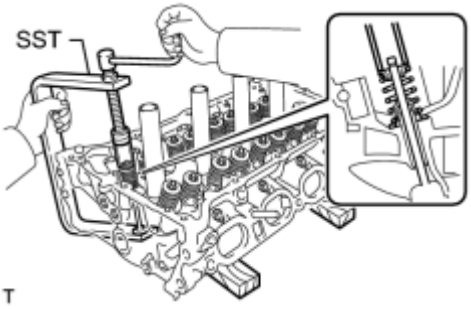
NOTICE:

Install the same parts in the same combination to the original locations.

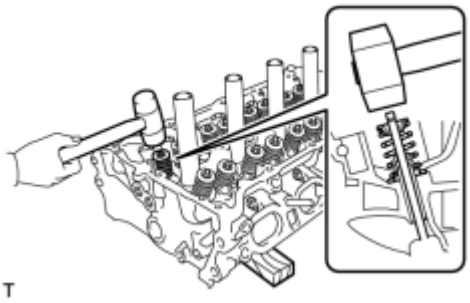
(d) Using SST, compression spring and install the valve retainer locks.

SST: 09202-70020

09202-00010




T



T

(e) Using a plastic-faced hammer, lightly tap the valve stem tip to ensure a proper fit.

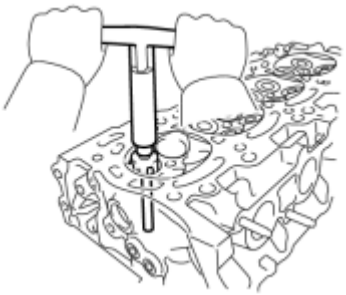
- Be careful not to damage the valve stem tip.
- Be careful not to damage the retainer.

# REPAIR

1. REPAIR VALVE SEAT

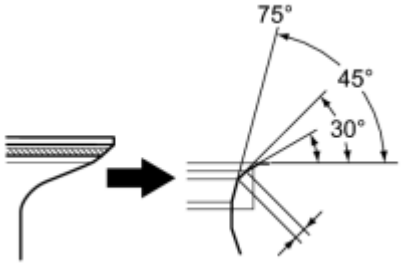
NOTICE:

- Repair the seat while checking the seating position.
- Keep the lip free from foreign matter.
- Take off the cutter gradually to make the valve seat smooth.



T

(a) Using a 45° cutter, resurface the valve seat so that the valve seat width is more than the specification.




(b) Using 30° and 75° cutters, correct the valve seat so that the valve contacts the entire circumference of the seat. The contact should be in the center of the valve seat, and the valve seat width should be maintained within the specified range around the entire circumference of the seat.

Standard valve seat width:

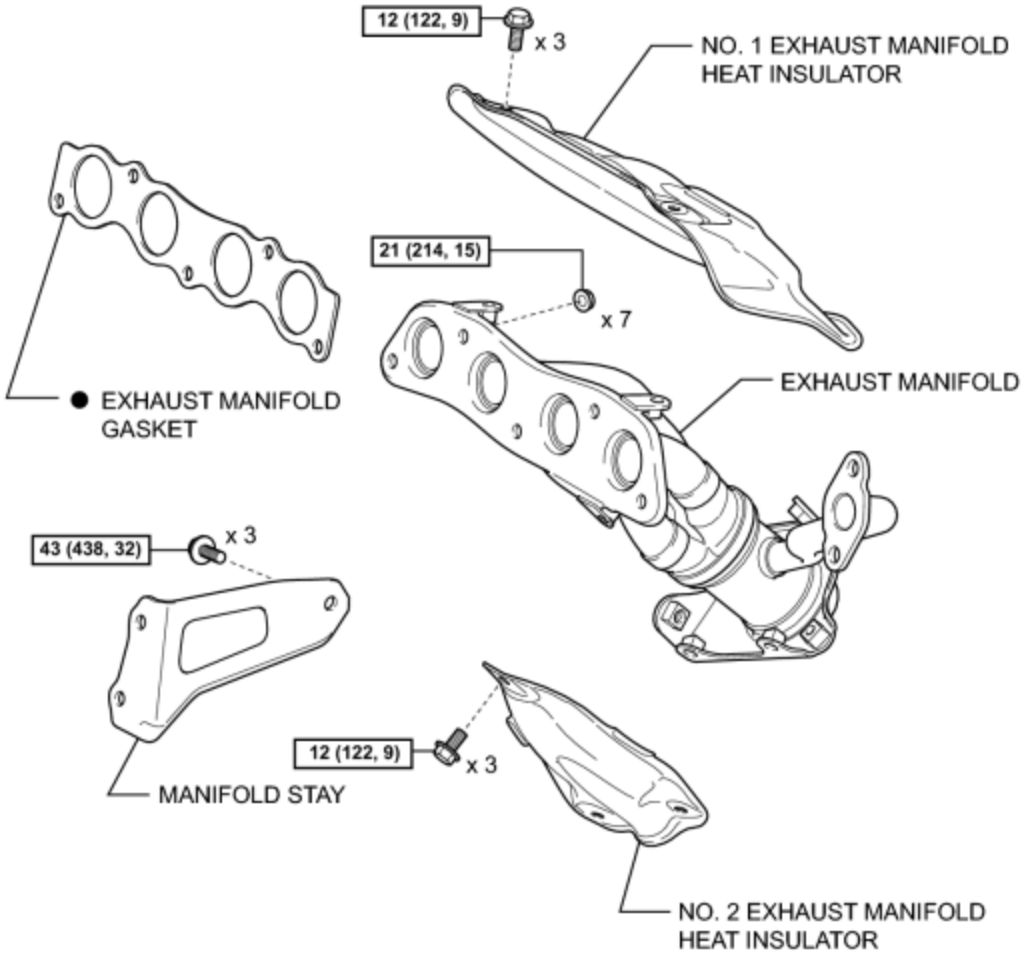
1.0 to 1.4 mm (0.0394 to 0.0551 in.)

(c) Hand-lap the valve and valve seat with an abrasive compound.

(d) Check the valve seating position.

# COMPONENTS

# ILLUSTRATION

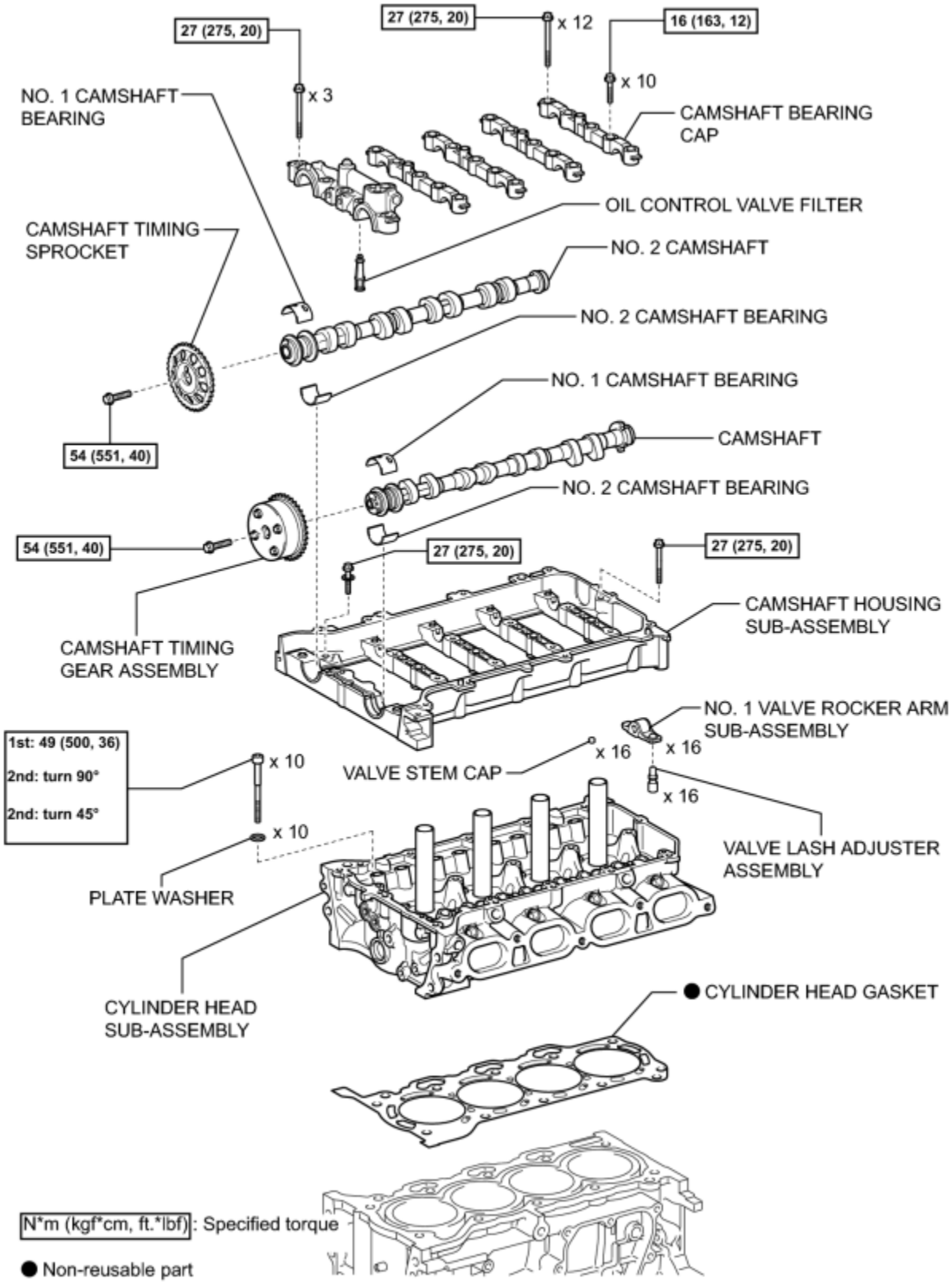



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# ILLUSTRATION


27 (275, 20)
x 3
27 (275, 20)
x 12
16 (163, 12)
x 10
NO. 1 CAMSHAFT BEARING
CAMSHAFT BEARING CAP
OIL CONTROL VALVE FILTER
CAMSHAFT TIMING SPROCKET
NO. 2 CAMSHAFT
NO. 2 CAMSHAFT BEARING
NO. 1 CAMSHAFT BEARING
CAMSHAFT
54 (551, 40)
NO. 2 CAMSHAFT BEARING
54 (551, 40)
27 (275, 20)
27 (275, 20)
CAMSHAFT HOUSING SUB-ASSEMBLY
CAMSHAFT TIMING GEAR ASSEMBLY
NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY
1st: 49 (500, 36)
2nd: turn 90°
2nd: turn 45°
x 10
x 16
x 16
VALVE STEM CAP
x 16
x 10
VALVE LASH ADJUSTER ASSEMBLY
PLATE WASHER
CYLINDER HEAD SUB-ASSEMBLY
● CYLINDER HEAD GASKET
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part

c

# REMOVAL

1. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY

(a) Remove the camshaft housing sub-assembly INFO.

2. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

3. REMOVE MANIFOLD STAY INFO

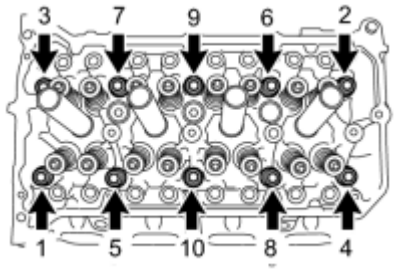
4. REMOVE EXHAUST MANIFOLD INFO

5. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

6. REMOVE VALVE LASH ADJUSTER ASSEMBLY INFO

7. REMOVE VALVE STEM CAP INFO

8. REMOVE CYLINDER HEAD SUB-ASSEMBLY




T

(a) Using a 10 mm bi-hexagon wrench, uniformly loosen and remove the 10 cylinder head bolts and 10 plate washers in several steps in the sequence shown in the illustration.

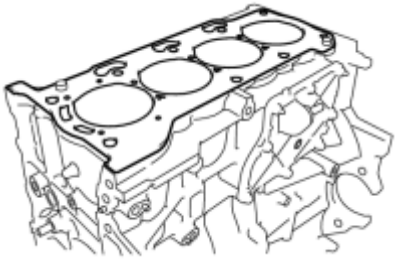
- Be careful not to drop washers into the cylinder head.
- Head warpage or cracking could result from removing the bolts in the wrong order.

(b) Using a screwdriver with its tip wrapped with tape, pry between the cylinder head and cylinder block, and remove the cylinder head.

NOTICE:

Be careful not to damage the contact surfaces of the cylinder head and cylinder block.

9. REMOVE CYLINDER HEAD GASKET



T

(a) Remove the cylinder head gasket.

# INSTALLATION

1. INSPECT NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

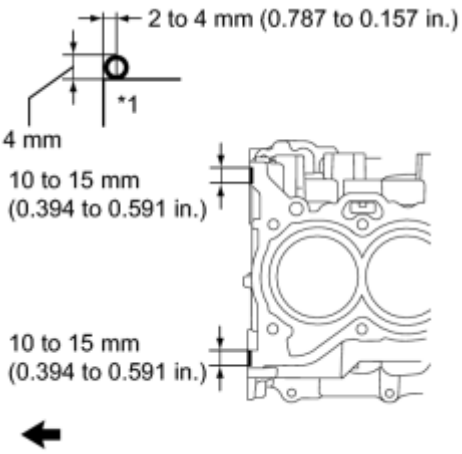
2. INSPECT VALVE LASH ADJUSTER ASSEMBLY INFO

3. INSPECT CYLINDER HEAD SET BOLT INFO

4. INSPECT CYLINDER HEAD INFO

5. INSTALL CYLINDER HEAD GASKET

(a) Apply seal packing (Diameter 4.0 mm (0.157 in.)) to the cylinder block as shown in the illustration.




**Text in Illustration**

| | |
|---|---|
| *1 | Cylinder Block |
| ➡ | Engine Front |

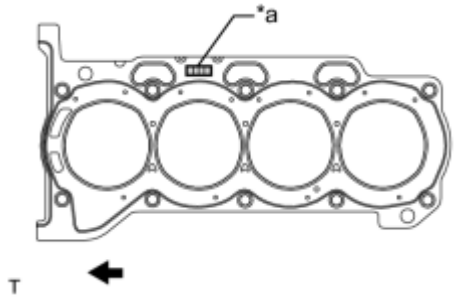
Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTICE:

Remove any oil from the cylinder block.

(b) Place a new cylinder head gasket on the cylinder block with the Lot No. stamp facing upward.



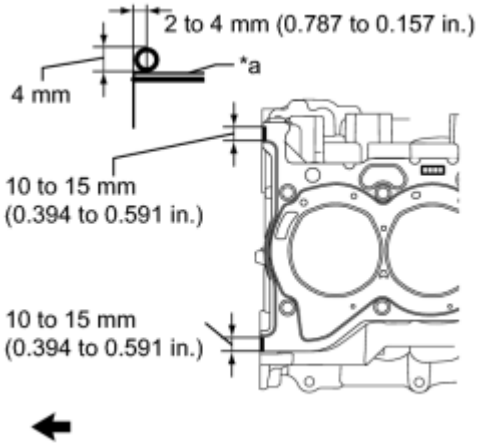

**Text in Illustration**

| | |
|---|---|
| *a | Lot No. |
| ➡ | Engine Front |

NOTICE:

Install the cylinder head gasket within 3 minutes after applying seal packing.

(c) Apply seal packing (Diameter 4.0 mm (0.157 in.)) to the new cylinder head gasket as shown in the illustration.




**Text in Illustration**

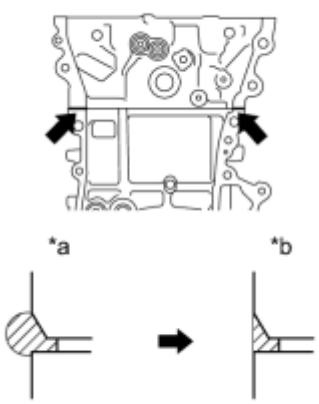
| | |
|---|---|
| *1 | Cylinder Head Gasket |
| ➡ | Engine Front |

Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

NOTICE:

- Remove any oil from the cylinder head gasket and cylinder head.
- Install the cylinder head gasket within 3 minutes and tighten the bolts within 15 minutes of applying seal packing.




(d) After tightening the cylinder head bolts, wipe off the seal packing material seeped out from the contact surfaces between the cylinder head and cylinder block.

## Text in Illustration

| | |
|---|---|
| *a | Before wiping off: |
| *b | After wiping off: |

6. INSTALL CYLINDER HEAD SUB-ASSEMBLY

HINT:

The cylinder head bolts are tightened in 3 progressive steps.

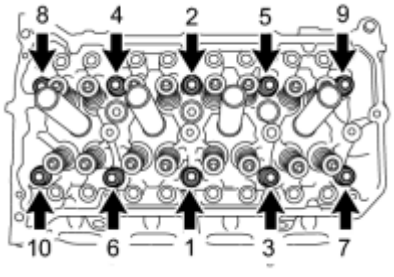
(a) Place the cylinder head on the cylinder block.

NOTICE:

- Make sure that no oil is on the mounting surface of the cylinder head.
- Place the cylinder head on the cylinder block gently in order not to damage the gasket with the bottom part of the head.

(b) Install the plate washers to the cylinder head bolts.

(c) Apply a light coat of engine oil to the threads and under the heads of the cylinder head bolts.




T

(d) Step 1:

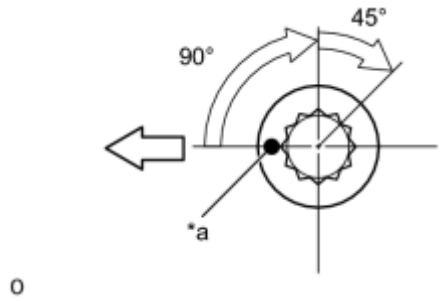
(1) Using a 10 mm bi-hexagon wrench, install and uniformly tighten the 10 cylinder head bolts in several steps, in the sequence shown in the illustration.

Torque: **49 N·m (500 kgf·cm, 36ft·lbf)**

NOTICE:

Do not drop the plate washers into the cylinder head.

(e) Step 2:




**Text in Illustration**

| | |
|---|---|
| *a | Paint Mark |
| ⇨ | Engine Front |

(1) Mark each cylinder head bolt head with paint as shown in the illustration.

(2) Tighten the cylinder head bolts 90° in the sequence shown in step 1.

(f) Step 3:

(1) Tighten the cylinder head bolts another 45° in the sequence shown in step 1.

(g) Check that the paint mark is now at a 135° angle to the front.

7. INSTALL VALVE STEM CAP INFO

8. INSTALL VALVE LASH ADJUSTER ASSEMBLY INFO

9. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY INFO

10. INSTALL EXHAUST MANIFOLD INFO

11. INSTALL MANIFOLD STAY INFO

12. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

13. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY

(a) Install the camshaft housing sub-assembly INFO.

# ON-VEHICLE INSPECTION

1. INSPECT COOLANT (for Engine)

HINT: INFO.

2. INSPECT ENGINE OIL

HINT: INFO.

3. INSPECT AUXILIARY BATTERY

HINT: INFO.

4. INSPECT AIR CLEANER FILTER ELEMENT SUB-ASSEMBLY

(a) Remove the air cleaner cap.

(b) Remove the air cleaner filter element.

(c) Visually check that the air cleaner filter element is not excessively damaged or oily.

If necessary, replace the air cleaner filter element.

(d) Install the air cleaner filter element.

(e) Install the air cleaner cap.

5. INSPECT VALVE AND ADJUSTER NOISE

(a) Put the engine in inspection mode INFO.

(b) Rev up the engine several times. Check that the engine does not emit unusual noises. If unusual noises occur, warm up the engine and idle it for over 30 minutes. Then, perform the inspection above again. If any defects or problems are found during the inspection above, perform a lash adjuster inspection INFO.

6. INSPECT IGNITION TIMING

(a) Put the engine in inspection mode INFO.

(b) Warm up and stop the engine.

(c) When using the Techstream:

Check the ignition timing.

(1) Connect the Techstream to the DLC3.

(2) Put the engine in inspection mode INFO.

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Data List / IGN Advance.

Standard ignition timing:

0 to 16 degrees BTDC

NOTICE:

- Check the ignition timing with the cooling fans off.
- Turn off all electrical systems and the A/ C.
- When checking the ignition timing, the transaxle should be in neutral or park.

HINT:

Refer to the Techstream operator's manual for further details.

(5) Check that the ignition timing advances immediately when the engine speed is increased.

(6) Enter the following menus: Powertrain / Engine and ECT / Active Test / Connect the TC and TE1 / ON.

(7) Monitor IGN Advance of the Data List.

Standard ignition timing:

8 to 12 degrees BTDC

NOTICE:

When checking the ignition timing, the transaxle should be in neutral or park.

HINT:

Refer to the Techstream operator's manual for further details.

(8) Enter the following menus: Connect the TC and TE1 / OFF.

(9) Turn the power switch off.

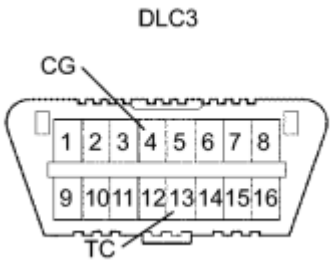
(10) Turn the Techstream off.

(11) Disconnect the Techstream from the DLC3.

(d) When not using the Techstream:

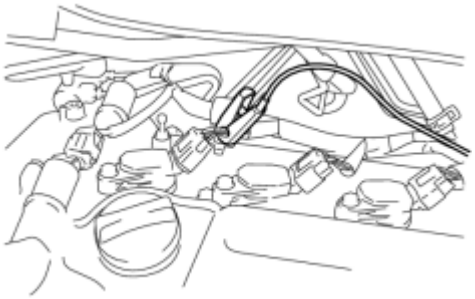
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST: 09843-18040




- Be sure to connect the terminals correctly. Failure to do this can damage the engine.
- Check the ignition timing with the cooling fans off.
- Turn off all electrical systems and the A/ C.
- When checking the ignition timing, the transaxle should be in neutral or park.

(2) Remove the No. 2 cylinder head cover INFO.



(3) Pull out the wire harness shown in the illustration.

NOTICE:

After checking, wrap the wire harness with tape.

(4) Connect the clip of the timing light to the wire harness.

NOTICE:

Use a timing light that detects the primary signal.

(5) Inspect the ignition timing at idle.

Standard ignition timing:

8 to 12 degrees BTDC

NOTICE:

When checking the ignition timing, the transaxle should be in neutral or park.

HINT:

After running the engine at 1000 to 1300 rpm for 5 seconds, check that it returns to idle speed.

(6) Disconnect terminals 13 (TC) and 4 (CG) of the DLC3.

(7) Inspect the ignition timing at idle.

Standard ignition timing:

0 to 16 degrees BTDC

(8) Confirm that the ignition timing advances when the engine rpm is increased.

(9) Remove the timing light.

(10) Install the No. 2 cylinder head cover INFO.

7. INSPECT ENGINE IDLE SPEED

(a) Put the engine in inspection mode INFO.

(b) Warm up and stop the engine.

(c) Connect the Techstream to the DLC3.

(d) Put the engine in inspection mode INFO.

(e) Turn the Techstream on.

(f) Enter the following menus: Powertrain / Engine and ECT / Data List / Engine Speed.

HINT:

Refer to the Techstream operator's manual for further details.

(g) Inspect the engine idle speed.

Standard idle speed:

950 to 1050 rpm

NOTICE:

- Turn all electrical systems and the A/C off.
- Inspect the idle speed with the cooling fans off.
- When checking the idle speed, the transaxle should be in neutral or park.

(h) Turn the power switch off.

(i) Turn the Techstream off.

(j) Disconnect the Techstream from the DLC3.

8. INSPECT COMPRESSION

(a) Put the engine in inspection mode INFO.

(b) Warm up and stop the engine.

(c) Remove the 4 spark plugs INFO.

(d) Inspect the cylinder compression pressure.

(1) Insert a compression gauge into the spark plug hole.

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Turn the Techstream on.

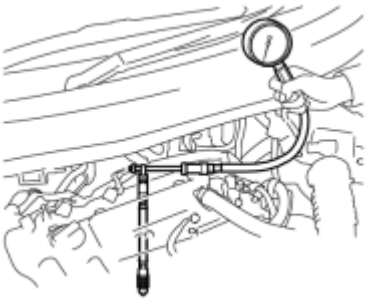
(5) Enter the following menus: Powertrain / Hybrid Control / Active Test / Compression Test / ON.

(6) Fully depress the acceleration pedal.

(7) Depress and hold the brake pedal, and turn the power switch on (READY).

NOTICE:

The measurement must be done as quickly as possible.




- Noise may emit from the transmission. However, this is not a malfunction.
- Always use a fully charged battery to obtain an engine speed of 200 rpm or more.

Standard compression pressure:

1373 kPa (14.0 kgf/cm$^2$, 199 psi) or more

Minimum pressure:

1079 kPa (11.0 kgf/cm$^2$, 157 psi)

Pressure difference between each cylinder:

98 kPa (1.0 kgf/cm$^2$, 14.2 psi) or less

- Inspect the other cylinders in the same way.
- Measure the compression as quickly as possible.

(8) If the cylinder compression is low, pour a small amount of engine oil into the cylinder through the spark plug hole, then inspect it again.

- If adding oil increases the compression, the piston rings and/or cylinder bore may be worn or damaged.
- If the pressure stays low, the valve may be stuck or seated improperly, or there may be leaks from the gasket.

(e) Install the 4 spark plugs INFO.

NOTICE:

After performing all the procedures, be sure to clear DTCs stored in memory. Then, check that the normal system code is output.

9. INSPECT CO/HC

HINT:

This check determines whether or not the idle CO / HC complies with regulations.

(a) Put the engine in inspection mode INFO.

(b) Warm up the engine.

(c) Run the engine at 2500 rpm for approximately 180 seconds.

(d) Insert a CO/HC meter testing probe at least 40 cm (1.3 ft.) into the tailpipe while idling.

(e) Check the CO/HC concentration while idling and when the engine is running at 2500 rpm.

HINT:

When doing a 2 mode (with the engine idling/ running at 2500 rpm) test, the measurement procedures are determined by applicable local regulations.

If the CO/HC concentration does not comply with the regulations, troubleshoot in the order given below.

(1) Check the DTCs INFO.

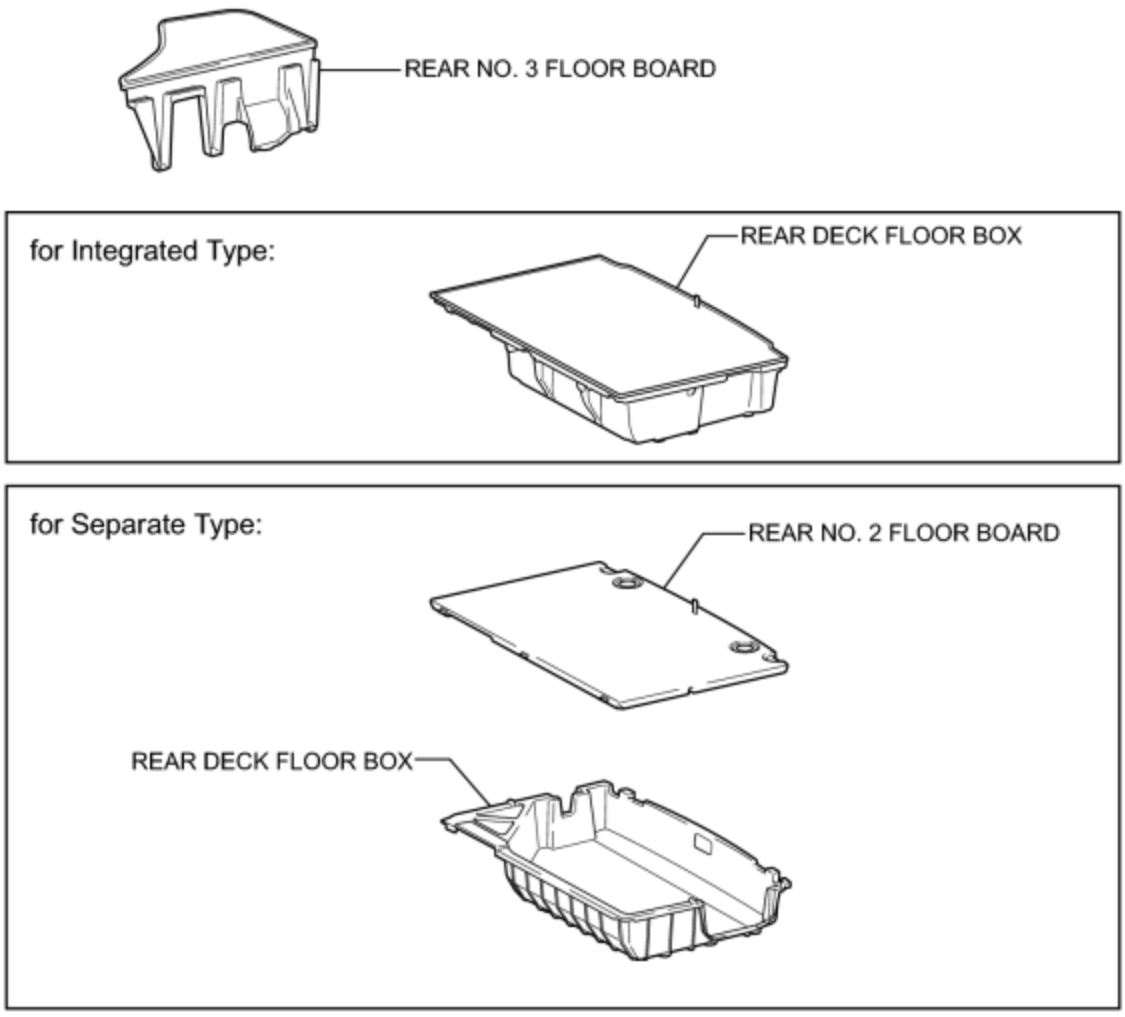
(2) See the table below for possible causes, then inspect the applicable parts and repair them if necessary.

| CO | HC | Problem | Possible Cause |
|---|---|---|---|
| Normal | High | Rough idle | 1. Faulty ignition:<br>○ Incorrect timing<br>○ Fouled, shorted or improperly gapped plugs<br>2. Incorrect valve clearance<br>3. Leaks from intake and exhaust valves<br>4. Leaks from cylinders<br>5. Faulty EGR |
| Low | High | Rough idle (Fluctuating HC reading) | 1. Vacuum leaks:<br>○ PCV hoses<br>○ Intake manifold<br>○ Throttle body<br>○ Brake booster line<br>2. Lean mixture causing misfire |

| CO | HC | Problem | Possible Cause |
|---|---|---|---|
| | | | 3. Faulty EGR |
| High | High | Rough idle (Black smoke from exhaust) | 1. Restricted air cleaner filter element<br>2. Plugged PCV valve<br>3. Faulty EFI systems:<br>o Faulty pressure regulator<br>o Faulty engine coolant temperature sensor<br>o Faulty mass air flow meter<br>o Faulty ECM<br>o Faulty injectors<br>o Throttle body<br>4. Faulty EGR |

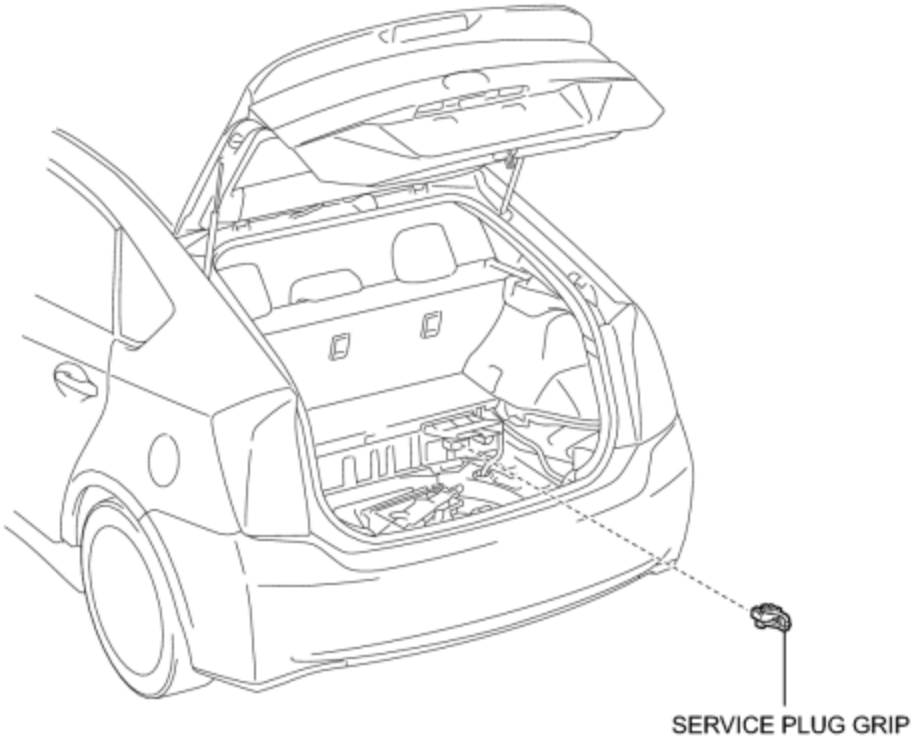
# COMPONENTS

# ILLUSTRATION



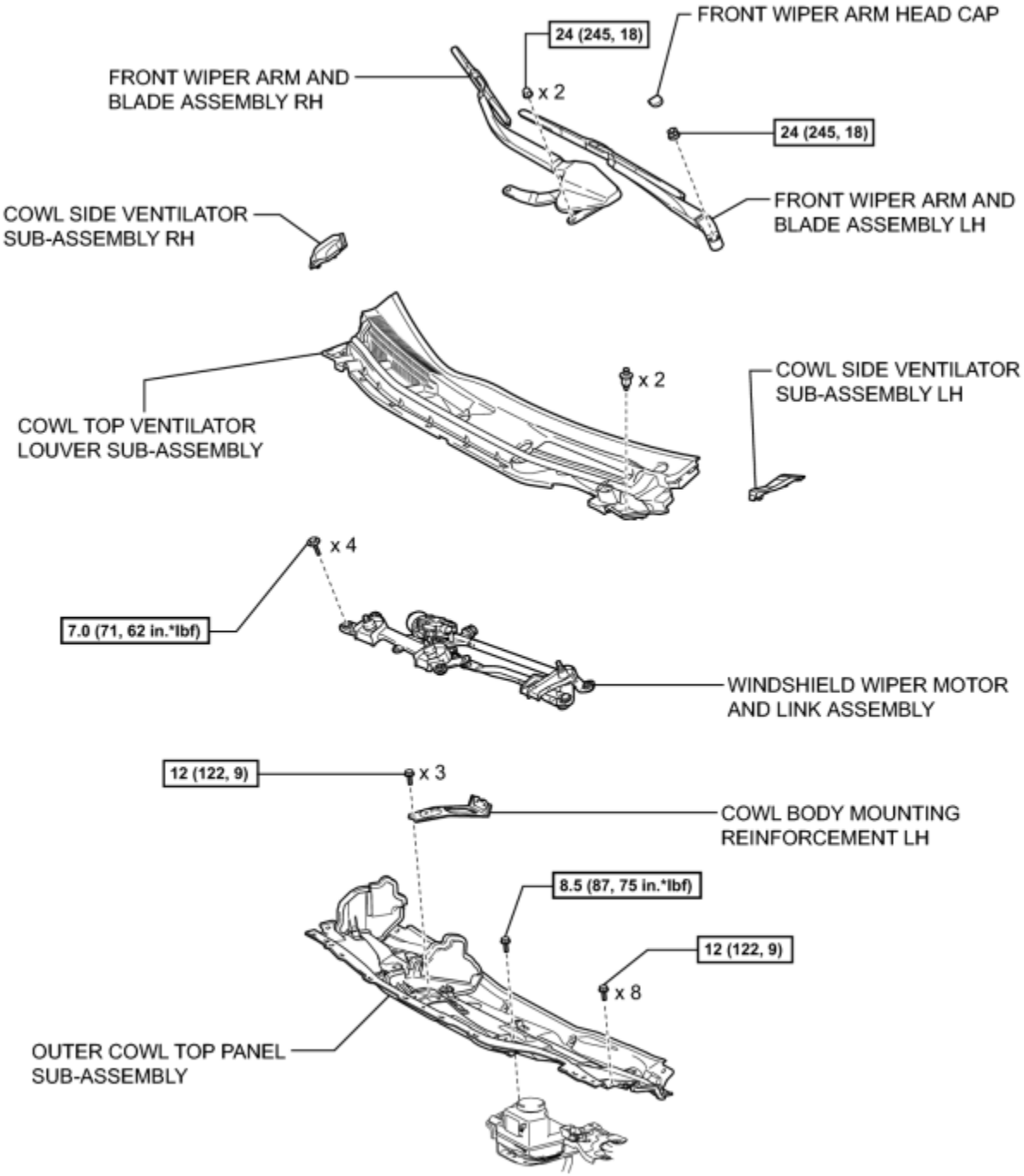

P

# ILLUSTRATION

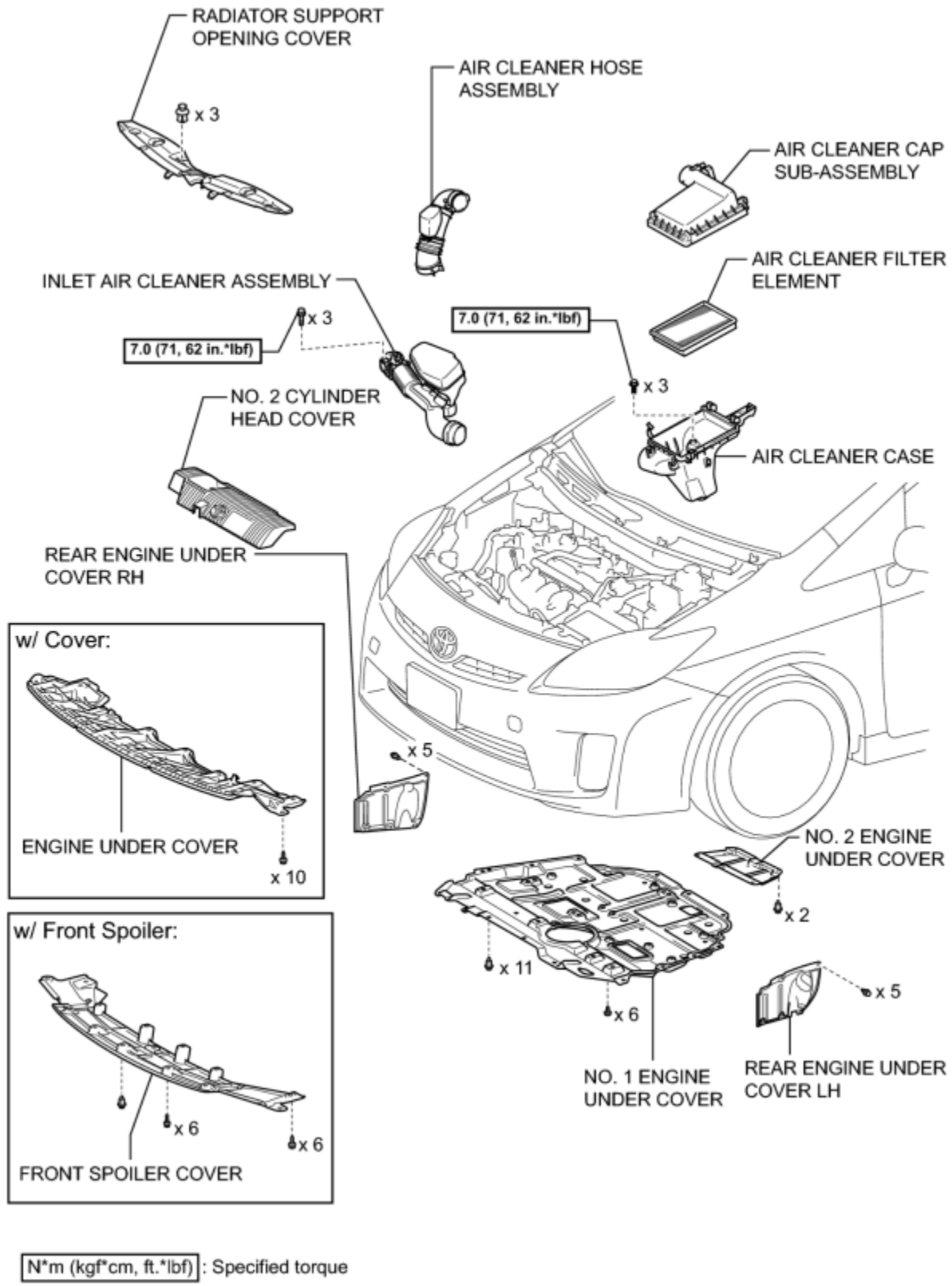



P

# ILLUSTRATION

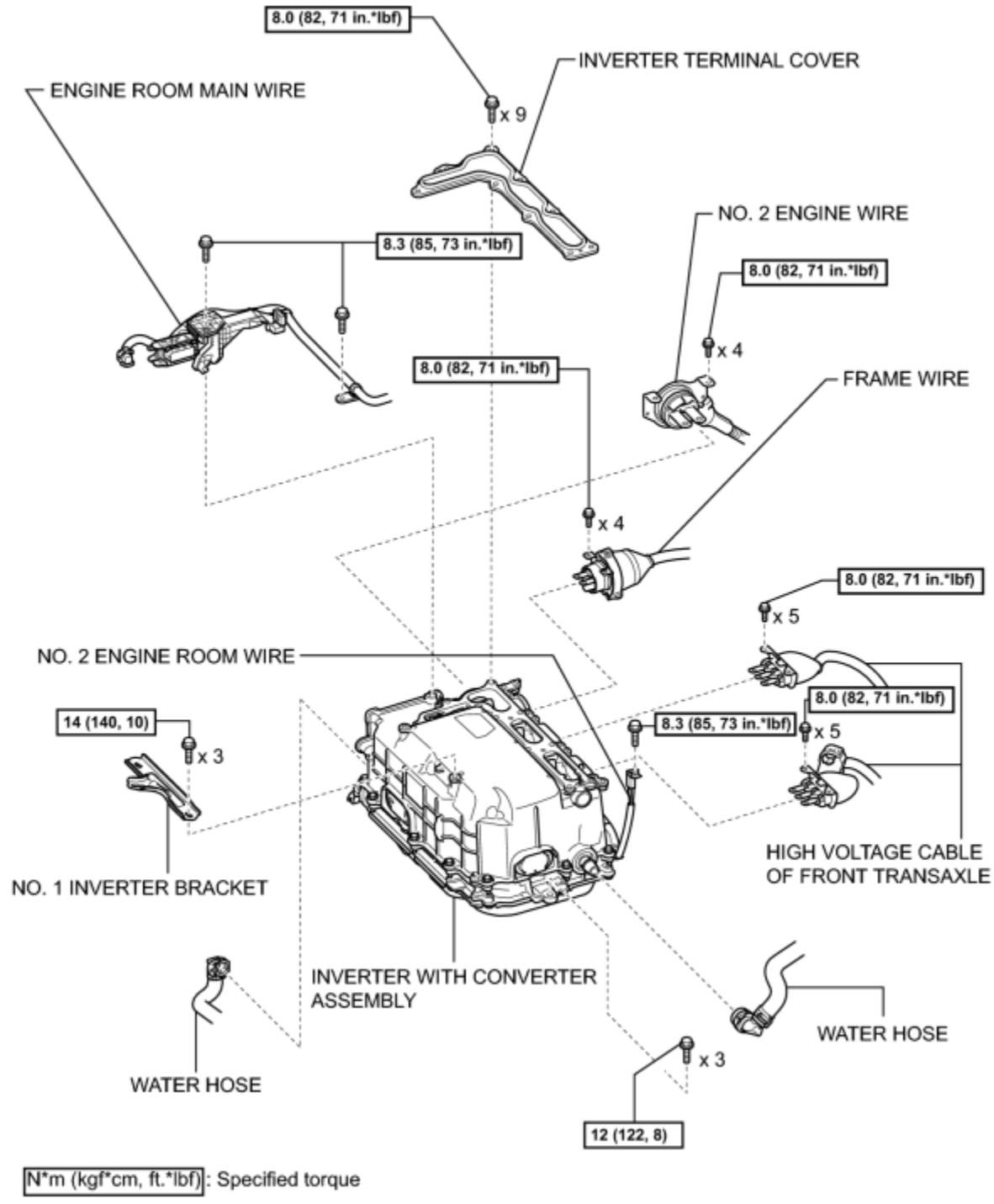



# ILLUSTRATION



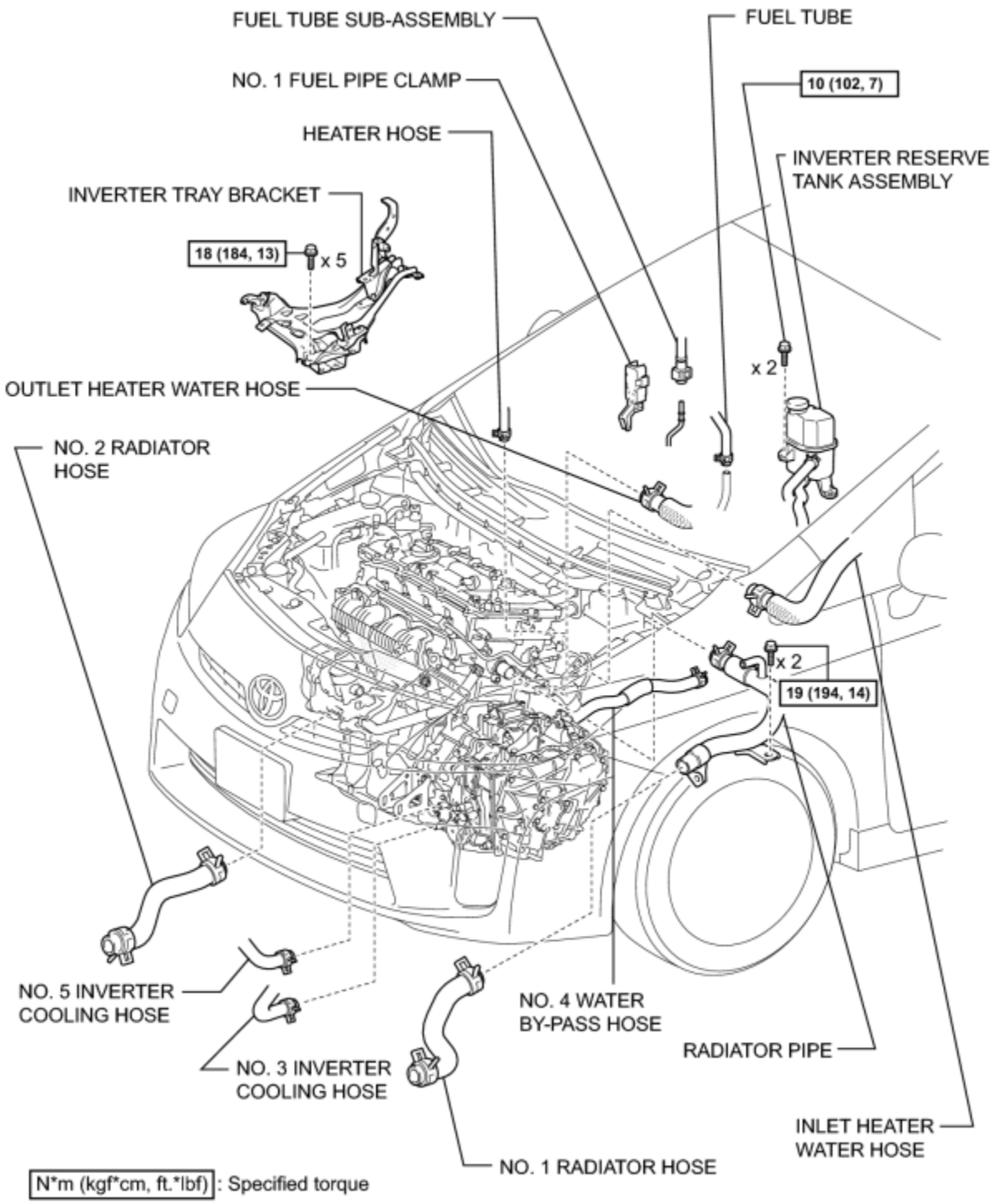

c

# ILLUSTRATION



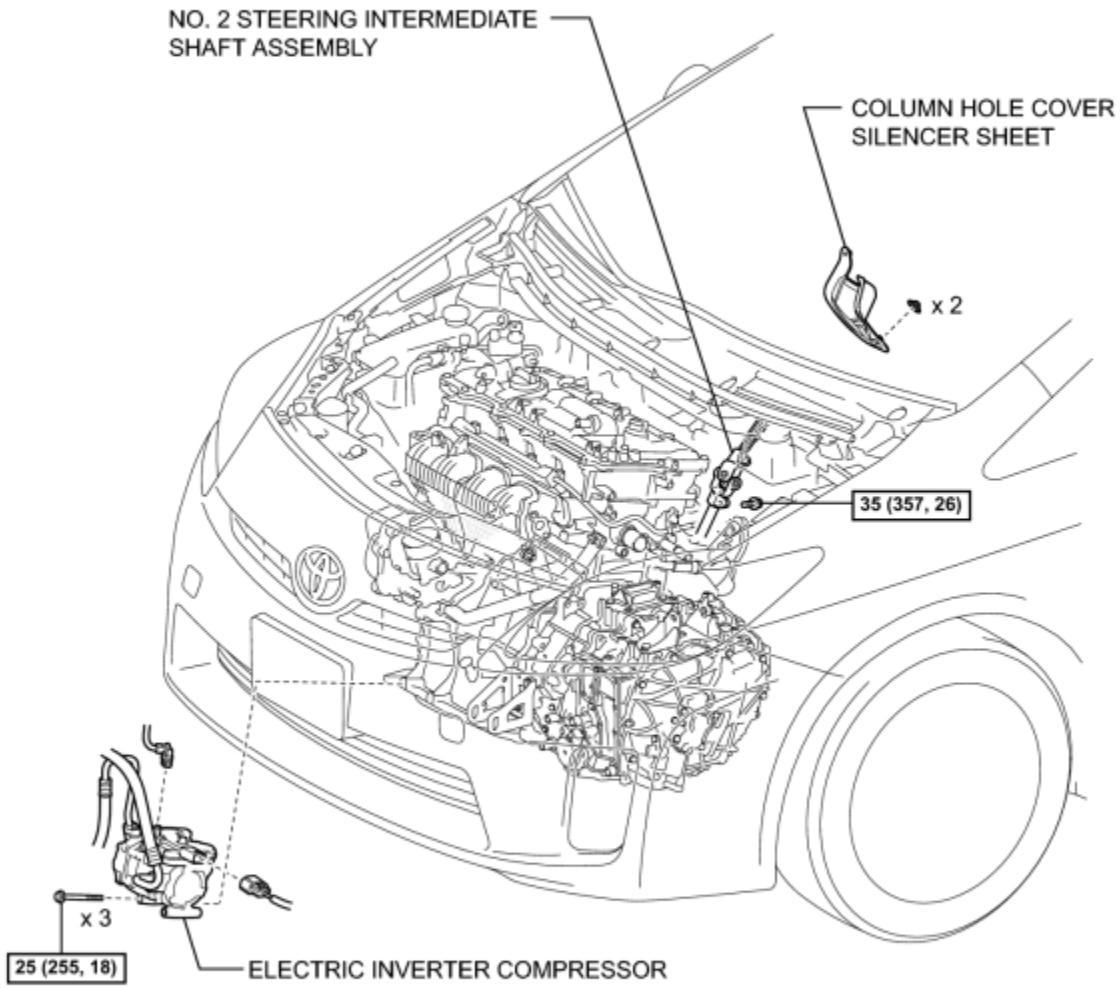

c

# ILLUSTRATION




c

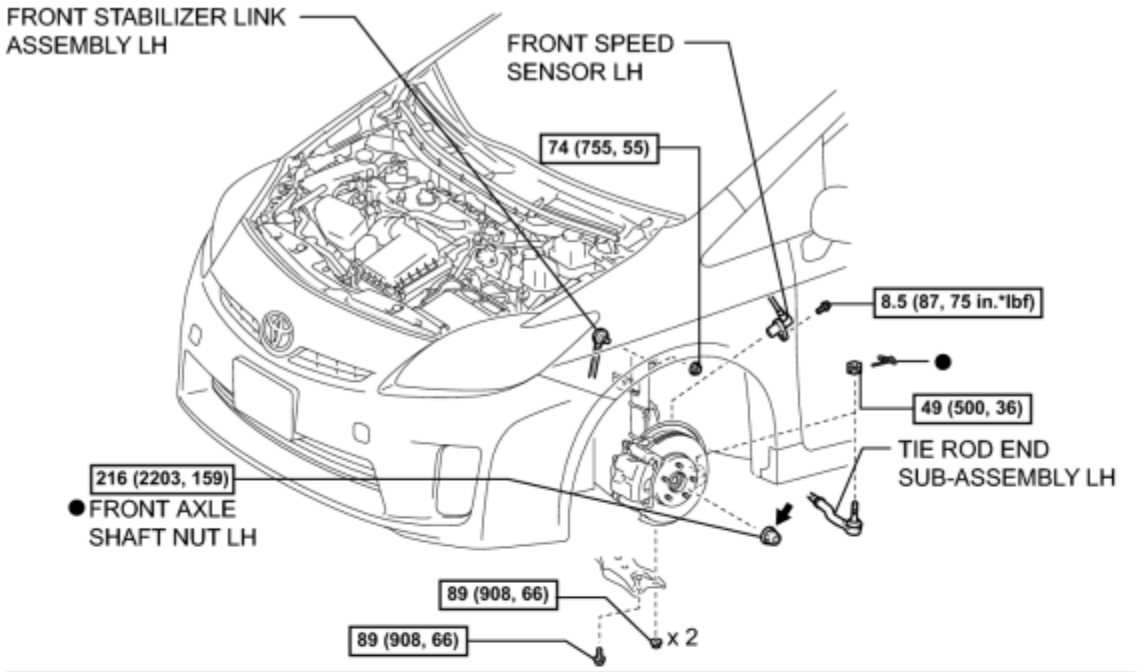
# ILLUSTRATION

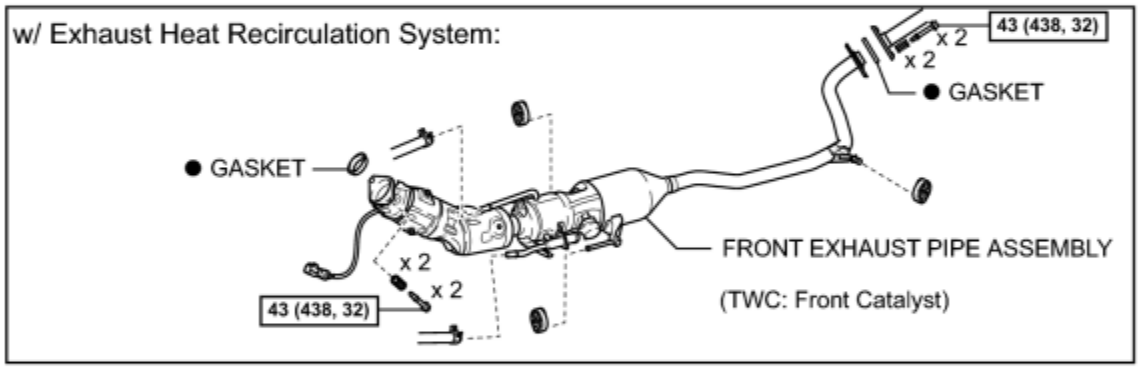


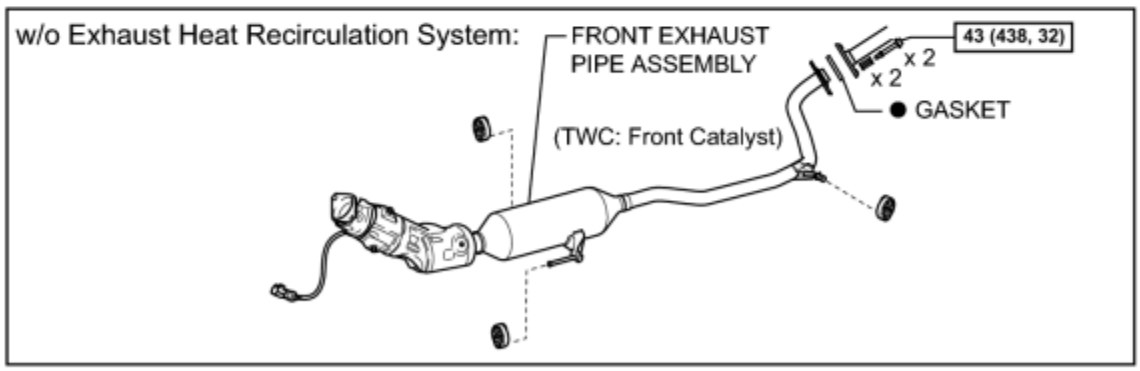

N*m (kgf*cm, ft.*lbf) : Specified torque

c

# ILLUSTRATION







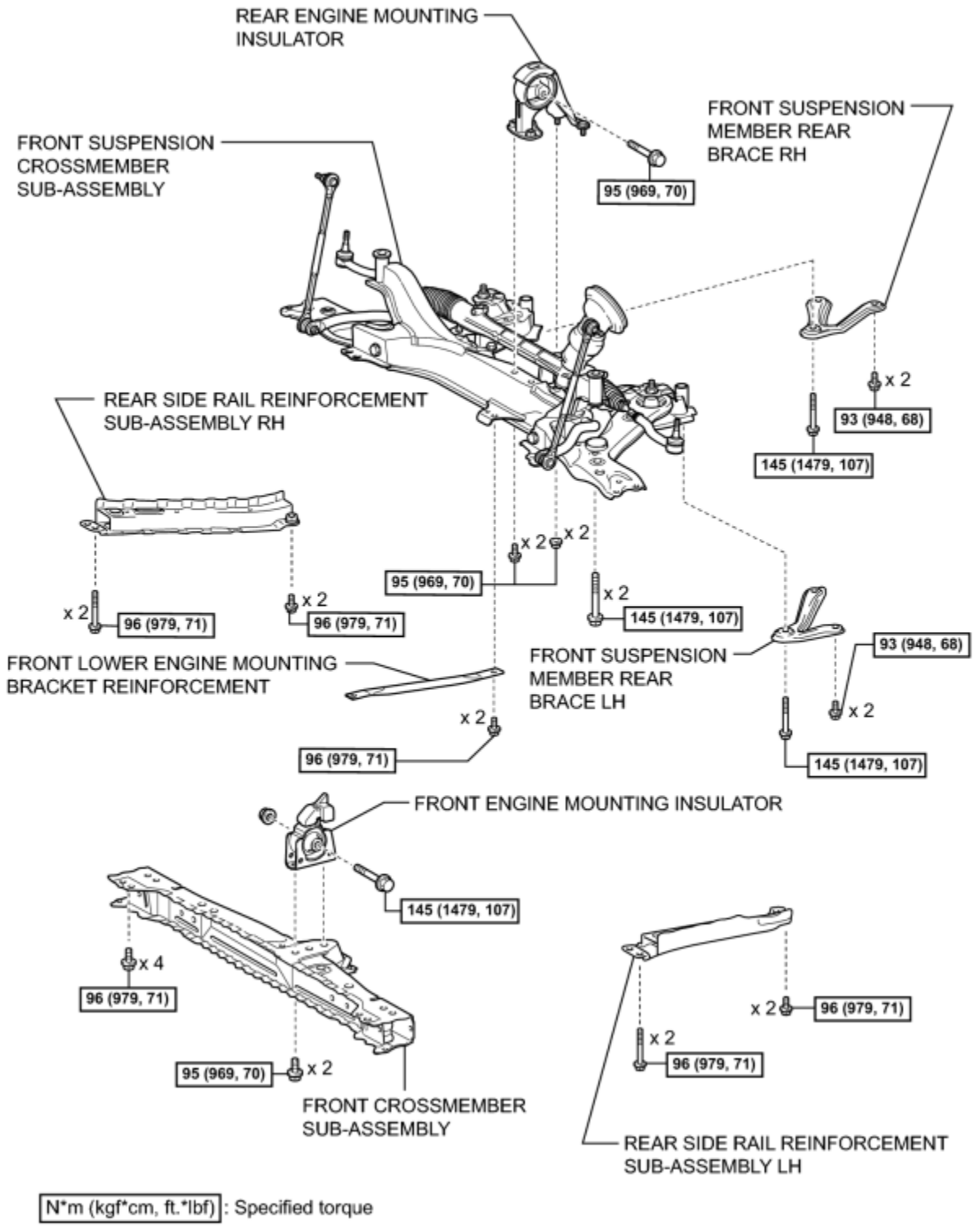
N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ Do not apply lubricants to the threaded parts

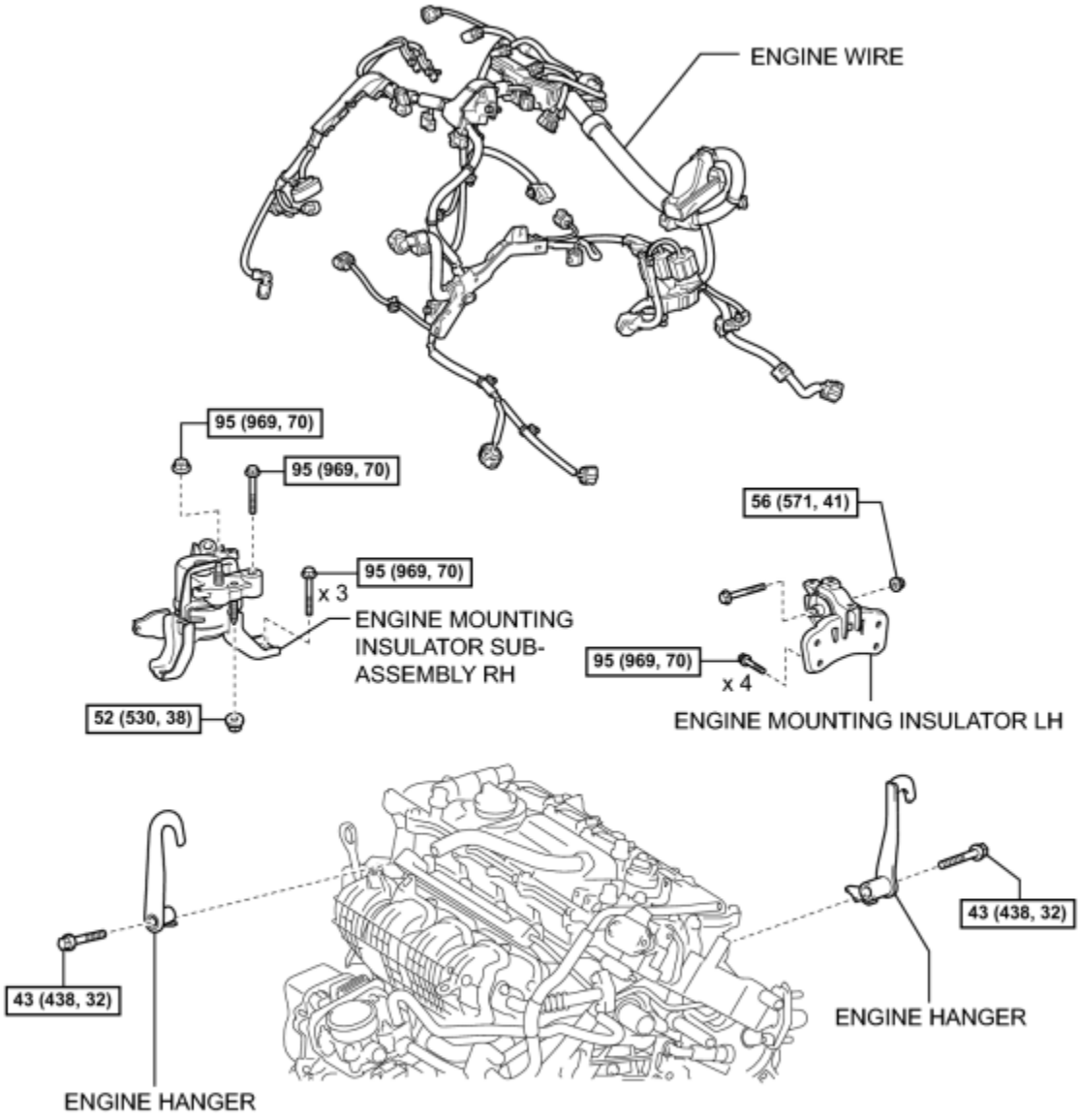
c

# ILLUSTRATION




c

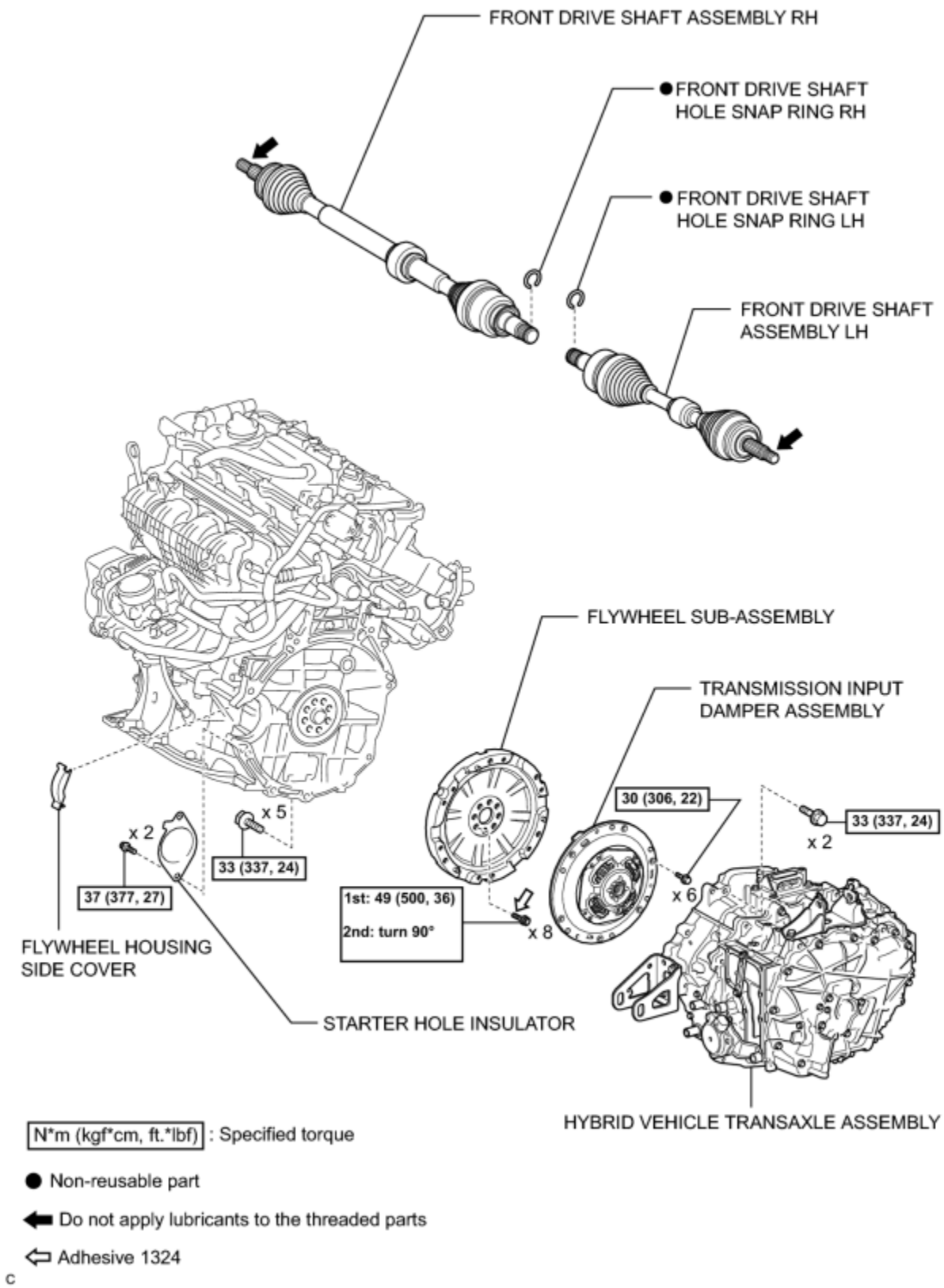
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

c

# ILLUSTRATION


FRONT DRIVE SHAFT ASSEMBLY RH
● FRONT DRIVE SHAFT HOLE SNAP RING RH
● FRONT DRIVE SHAFT HOLE SNAP RING LH
FRONT DRIVE SHAFT ASSEMBLY LH
FLYWHEEL SUB-ASSEMBLY
TRANSMISSION INPUT DAMPER ASSEMBLY
30 (306, 22)
33 (337, 24)
x 2
x 5
x 2
33 (337, 24)
37 (377, 27)
1st: 49 (500, 36)
2nd: turn 90°
x 8
x 6
FLYWHEEL HOUSING SIDE COVER
STARTER HOLE INSULATOR
HYBRID VEHICLE TRANSAXLE ASSEMBLY
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
Do not apply lubricants to the threaded parts
Adhesive 1324

c

# REMOVAL

1. PRECAUTION

HINT: INFO.

2. DISCHARGE FUEL SYSTEM PRESSURE

HINT: INFO.

3. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

4. REMOVE REAR DECK FLOOR BOX INFO

5. REMOVE REAR NO. 3 FLOOR BOARD INFO

6. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

7. REMOVE SERVICE PLUG GRIP INFO

8. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

9. REMOVE FRONT WHEEL

10. REMOVE REAR ENGINE UNDER COVER LH

11. REMOVE REAR ENGINE UNDER COVER RH

12. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

13. REMOVE ENGINE UNDER COVER (w/ Cover)

14. REMOVE NO. 1 ENGINE UNDER COVER

15. REMOVE NO. 2 ENGINE UNDER COVER

16. DRAIN ENGINE OIL INFO

17. DRAIN COOLANT (for Engine) INFO

18. DRAIN COOLANT (for Inverter) INFO

19. DRAIN HYBRID TRANSAXLE FLUID INFO

20. REMOVE FRONT WIPER ARM HEAD CAP INFO

21. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO

22. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO

23. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY LH INFO

24. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY RH INFO

25. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY INFO

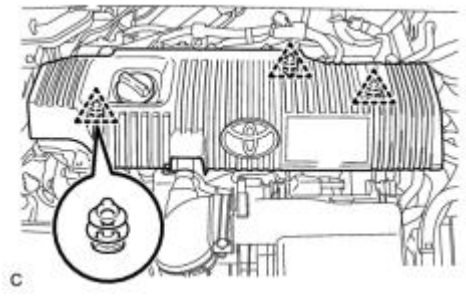
26. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY INFO

27. REMOVE COWL BODY MOUNTING REINFORCEMENT LH INFO

28. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

29. REMOVE NO. 2 CYLINDER HEAD COVER

(a) Remove the 3 clips and No. 2 cylinder head cover.

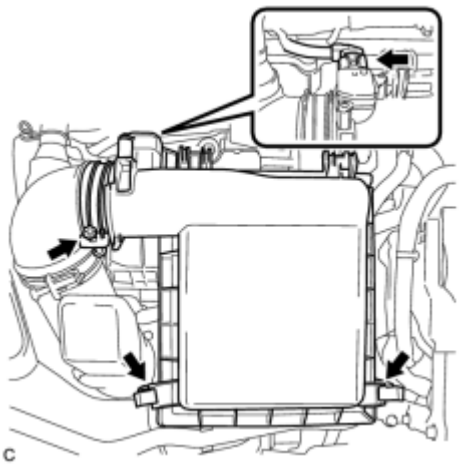



- Attempting to disengage both front and rear clips at the same time may cause the cover to break.
- Pull the cover straight up to remove. Attempting to pull the cover forward may cause it to break.

NOTICE:

Attempting to disengage both front and rear clips at the same time may cause the cover to break.

30. REMOVE AIR CLEANER CAP SUB-ASSEMBLY

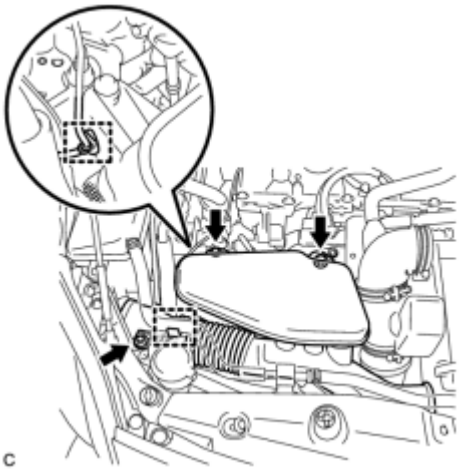



(a) Disconnect the air flow meter connector.

(b) Disconnect the 2 clamps and hose band, and remove the air cleaner cap sub-assembly.

(c) Remove the air cleaner filter element.

31. REMOVE INLET AIR CLEANER ASSEMBLY

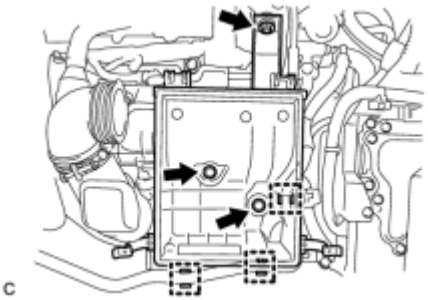



(a) Separate the water by-pass hose from the inlet air cleaner assembly.

(b) Separate the wire harness clamp from the inlet air cleaner assembly.

(c) Remove the 3 bolts and inlet air cleaner assembly.

32. REMOVE AIR CLEANER CASE




(a) Separate the No. 4 water by-pass hose from the air cleaner case.

(b) Remove the 3 bolts and air cleaner case.

33. REMOVE AIR CLEANER HOSE ASSEMBLY INFO

34. REMOVE RADIATOR SUPPORT OPENING COVER INFO

35. REMOVE NO. 1 INVERTER BRACKET INFO

36. DISCONNECT ENGINE ROOM MAIN WIRE INFO

37. REMOVE INVERTER TERMINAL COVER INFO

38. CHECK TERMINAL VOLTAGE INFO

39. DISCONNECT FRAME WIRE INFO

40. DISCONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE INFO

41. DISCONNECT NO. 2 ENGINE WIRE INFO

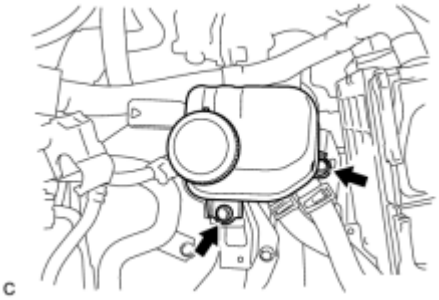
42. INSTALL INVERTER TERMINAL COVER INFO

43. DISCONNECT NO. 2 ENGINE ROOM WIRE INFO

44. DISCONNECT WATER HOSE INFO

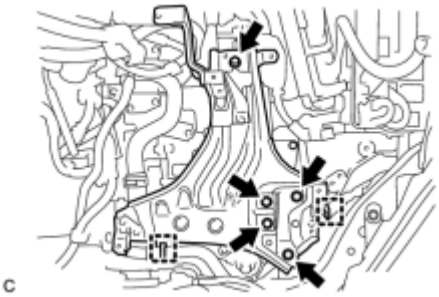
45. REMOVE INVERTER WITH CONVERTER ASSEMBLY INFO

46. REMOVE INVERTER RESERVE TANK ASSEMBLY




(a) Remove the 2 bolts and inverter reserve tank assembly.

47. REMOVE INVERTER TRAY BRACKET

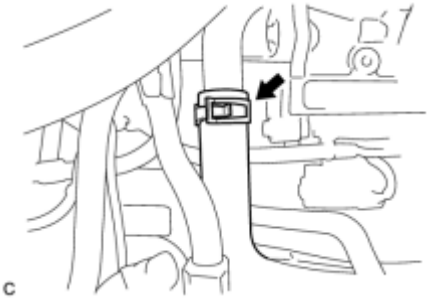



(a) Separate the 2 clamps.

(b) Remove the 5 bolts and inverter tray bracket.

48. DISCONNECT NO. 1 RADIATOR HOSE

(a) Disconnect the No. 1 radiator hose from the radiator pipe assembly.

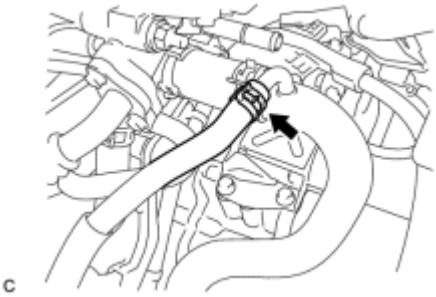



49. DISCONNECT NO. 2 RADIATOR HOSE



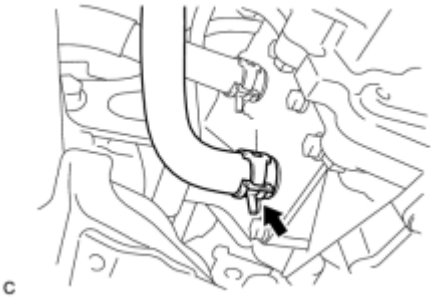

(a) Disconnect the No. 2 radiator hose from the water inlet.

50. DISCONNECT NO. 4 WATER BY-PASS HOSE




(a) Disconnect the No. 4 water by-pass hose from the radiator pipe assembly.

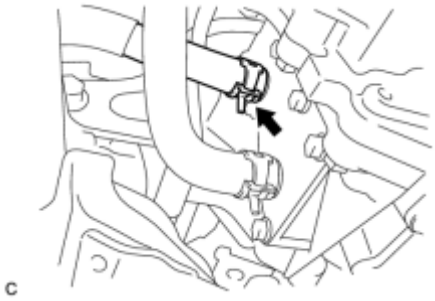
51. DISCONNECT NO. 3 INVERTER COOLING HOSE




(a) Disconnect the No. 3 inverter cooling hose from the hybrid transaxle assembly.

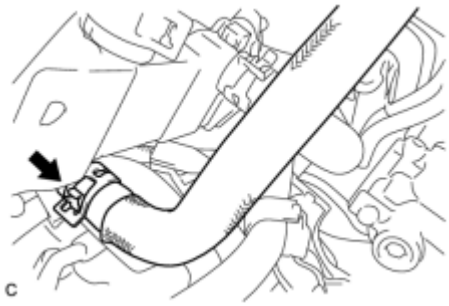
52. DISCONNECT NO. 5 INVERTER COOLING HOSE

(a) Disconnect the No. 5 inverter cooling hose from the hybrid transaxle



assembly.

53. DISCONNECT OUTLET HEATER WATER HOSE



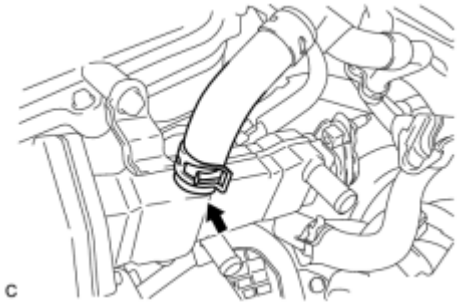
(a) Disconnect the outlet heater water hose.

54. DISCONNECT INLET HEATER WATER HOSE



(a) Disconnect the inlet heater water hose.

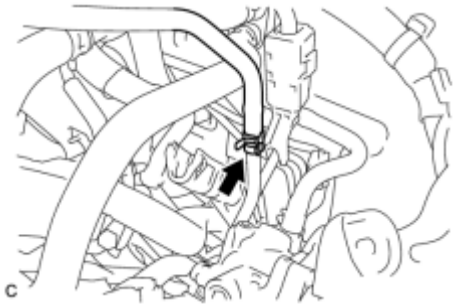
55. DISCONNECT HEATER HOSE



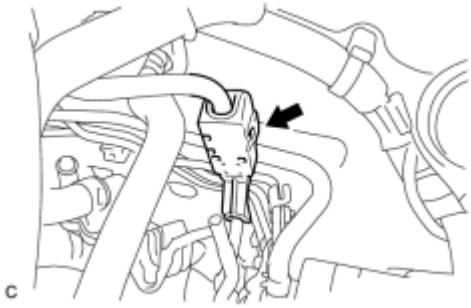
(a) Disconnect the heater hose.

56. DISCONNECT NO. 1 FUEL VAPOR FEED HOSE

(a) Disconnect the No. 1 fuel vapor feed hose.

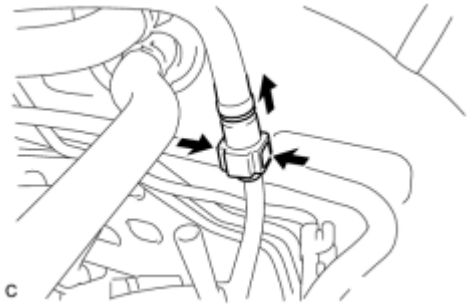


57. DISCONNECT FUEL TUBE SUB-ASSEMBLY



(a) Release the claw and remove the No. 1 fuel pipe clamp.

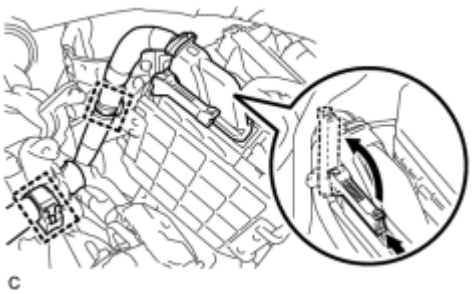
(b) Pinch the retainer as illustrated, then pull the fuel tube connector out of the pipe.



- Remove any dirt and foreign matter from the fuel tube connector before performing this work.
- Do not allow any scratches or foreign matter on the parts when disconnecting, as the fuel tube connector has the O-rings that seal the pipe.
- Perform this work by hand. Do not use any tools.
- Do not forcibly bend, kink or twist the nylon tube.
- Protect the disconnected parts by covering them with plastic bags after disconnecting the fuel tube.
- If the fuel tube connector and pipe are stuck, push and pull to release them.

58. SEPARATE ELECTRIC INVERTER COMPRESSOR INFO

59. DISCONNECT WIRE HARNESS

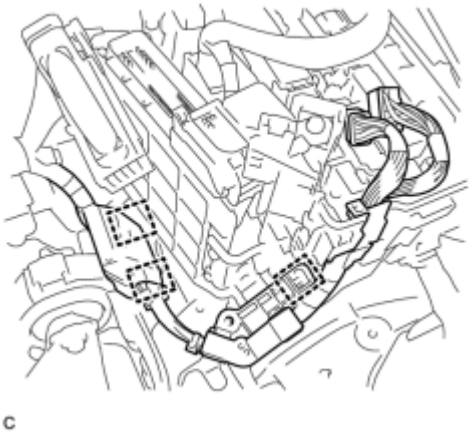


(a) Disconnect the 2 clamps.

(b) Pull up the lever and disconnect the connector of the ECM.



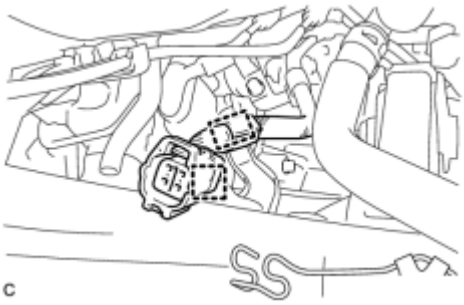

(c) Remove the 2 connectors and clamp from the engine room junction block and disconnect the wire harness.




(d) Disconnect the 3 clamps.




(e) Remove the bolt and disconnect the earth wire.




(f) Disconnect the 2 clamps and wire harness.

60. SECURE STEERING WHEEL INFO

61. REMOVE COLUMN HOLE COVER SILENCER SHEET INFO

62. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

63. SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

64. REMOVE TAIL EXHAUST PIPE ASSEMBLY INFO

65. REMOVE FRONT NO. 3 ENGINE UNDER COVER INFO

66. REMOVE FRONT CENTER FLOOR BRACE INFO

67. REMOVE FRONT EXHAUST PIPE ASSEMBLY (w/ Exhaust Heat Recirculation System) INFO

68. REMOVE FRONT EXHAUST PIPE ASSEMBLY (w/o Exhaust Heat Recirculation System) INFO

69. REMOVE FRONT AXLE SHAFT NUT LH INFO

70. REMOVE FRONT AXLE SHAFT NUT RH

HINT:

Perform the same procedure as for the LH side.

71. SEPARATE FRONT SPEED SENSOR LH INFO

72. SEPARATE FRONT SPEED SENSOR RH

HINT:

Perform the same procedure as for the LH side.

73. SEPARATE TIE ROD END SUB-ASSEMBLY LH INFO

74. SEPARATE TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

75. SEPARATE FRONT STABILIZER LINK ASSEMBLY LH INFO

76. SEPARATE FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

77. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

78. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

79. SEPARATE FRONT DRIVE SHAFT ASSEMBLY LH INFO

80. REMOVE FRONT DRIVE SHAFT ASSEMBLY LH INFO

81. SEPARATE FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

82. REMOVE FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

83. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING LH INFO

84. REMOVE FRONT DRIVE SHAFT HOLE SNAP RING RH

HINT:

Perform the same procedure as for the LH side.

85. REMOVE FRONT LOWER ENGINE MOUNTING BRACKET REINFORCEMENT INFO

86. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH INFO

87. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH INFO

88. REMOVE FRONT SUSPENSION MEMBER REAR BRACE LH INFO

89. REMOVE FRONT SUSPENSION MEMBER REAR BRACE RH

HINT:

Perform the same procedure as for the LH side.

90. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

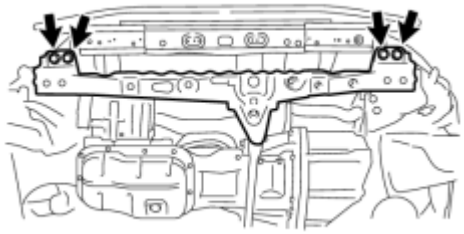
91. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine lifter.

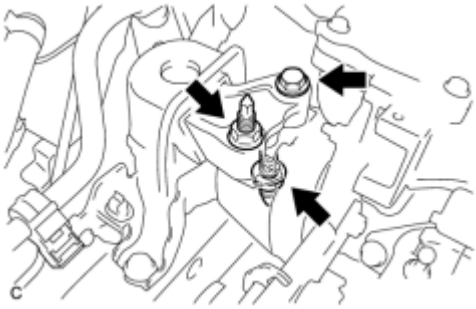


NOTICE:

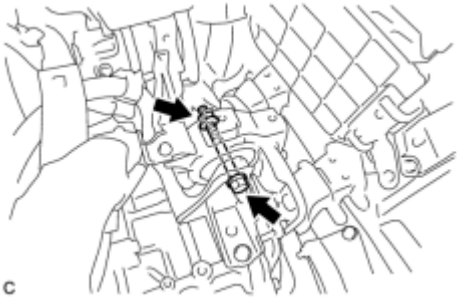
Place the engine on wooden blocks or equivalent so that the engine is level.



(b) Remove the 4 bolts and front crossmember sub-assembly.



(c) Remove the bolt and 2 nuts, and separate the engine mounting insulator RH.



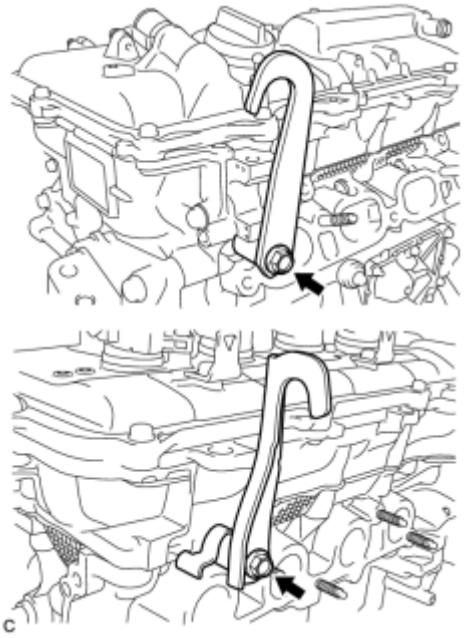
(d) Remove the bolt and nut, and separate the engine mounting insulator LH.

(e) Carefully remove the engine with transaxle from the vehicle.

(f) Install the 2 engine hangers with the 2 bolts.

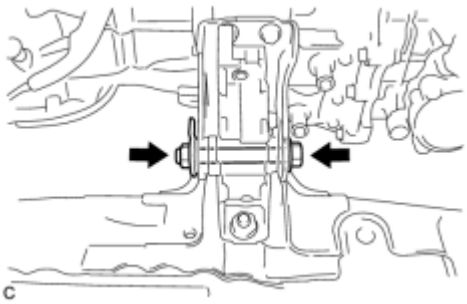
Torque: **43 N·m (438 kgf·cm, 32ft·lbf)**

| Part Name | Part No. |
|---|---|
| No. 1 engine hanger | 12281-37021 |
| No. 2 engine hanger | 12282-37011 |
| Bolt | 91552-81050 |



(g) Attach the sling device to the engine hangers and chain block.

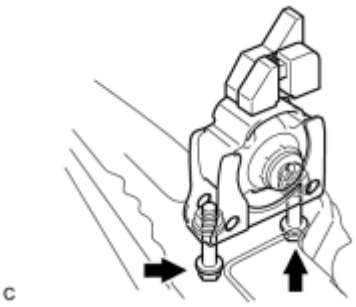
92. REMOVE FRONT CROSSMEMBER SUB-ASSEMBLY



(a) Remove the bolt and nut.

(b) Remove the front engine mounting insulator from the front engine mounting bracket.

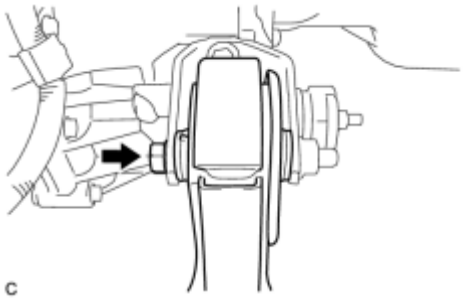
93. REMOVE FRONT ENGINE MOUNTING INSULATOR



(a) Remove the 2 bolts and front engine mounting insulator.

94. REMOVE REAR ENGINE MOUNTING INSULATOR

(a) Remove the through bolt, and separate the rear engine mounting

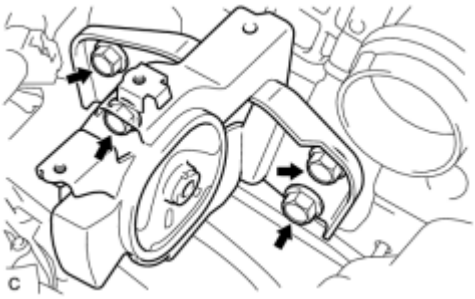


insulator.

HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

95. REMOVE ENGINE MOUNTING INSULATOR LH



(a) Remove the 4 bolts and engine mounting insulator LH.

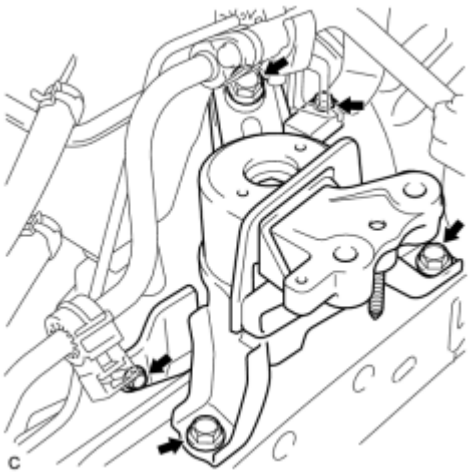
HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

96. REMOVE ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH

HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

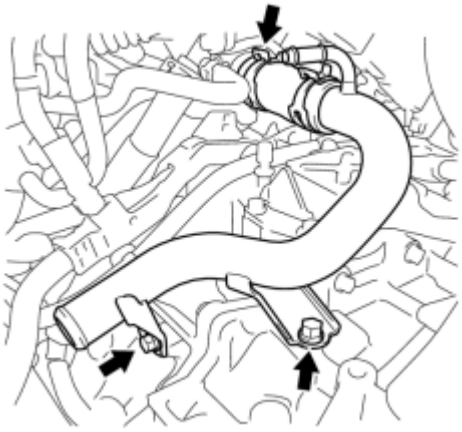


(a) Remove the 3 bolts and 2 cooler brackets.

(b) Remove the 3 bolts and engine mounting insulator sub-assembly RH.

97. REMOVE RADIATOR PIPE

(a) Separate the No. 3 radiator hose from the cylinder head.




(b) Remove the 2 bolts and radiator pipe.

98. REMOVE FLYWHEEL HOUSING SIDE COVER INFO

99. REMOVE STARTER HOLE INSULATOR INFO

100. REMOVE ENGINE WIRE

101. REMOVE HYBRID VEHICLE TRANSAXLE ASSEMBLY

(a) Remove the hybrid vehicle transaxle assembly INFO.

NOTICE:

Be careful not to apply excess force to the transmission input damper assembly when removing or installing the hybrid vehicle transaxle assembly. If excess force is applied, the transmission input damper assembly may be damaged, or its splines may become misaligned.

102. REMOVE TRANSMISSION INPUT DAMPER ASSEMBLY

(a) Gently place the engine assembly onto wood blocks or equivalent.

NOTICE:

This step should be done while hanging the engine assembly using the engine hangers and a chain block.

(b) Remove the transmission input damper assembly INFO.

103. REMOVE FLYWHEEL SUB-ASSEMBLY

(a) Gently place the engine assembly onto wood blocks or equivalent.

NOTICE:

This step should be done while hanging the engine assembly using the engine hangers and a chain block.

(b) Remove the flywheel sub-assembly INFO.

# INSTALLATION

1. INSTALL FLYWHEEL SUB-ASSEMBLY

(a) Gently place the engine assembly onto wood blocks or equivalent.

NOTICE:

This step should be done while hanging the engine assembly using the engine hangers and a chain block.

(b) Install the flywheel sub-assembly INFO.

2. INSTALL TRANSMISSION INPUT DAMPER ASSEMBLY

(a) Gently place the engine assembly onto wood blocks or equivalent.

NOTICE:

This step should be done while hanging the engine assembly using the engine hangers and a chain block.

(b) Install the transmission input damper assembly INFO.

3. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY

(a) Install the hybrid vehicle transaxle assembly INFO.

NOTICE:

Be careful not to apply excess force to the transmission input damper assembly when removing or installing the hybrid vehicle transaxle assembly. If excess force is applied, the transmission input damper assembly may be damaged, or its splines may become misaligned.

4. INSTALL ENGINE WIRE

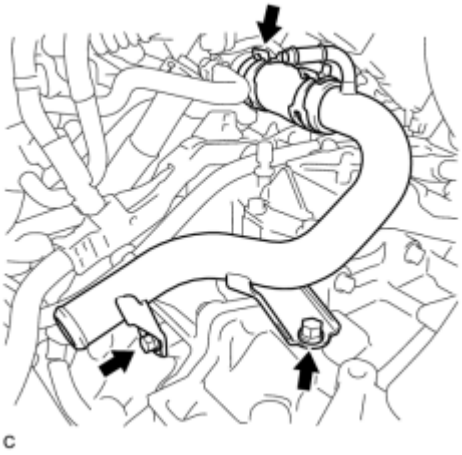
5. INSTALL STARTER HOLE INSULATOR INFO

6. INSTALL FLYWHEEL HOUSING SIDE COVER INFO

7. INSTALL RADIATOR PIPE

(a) Install the radiator pipe with the 2 bolts.

Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**

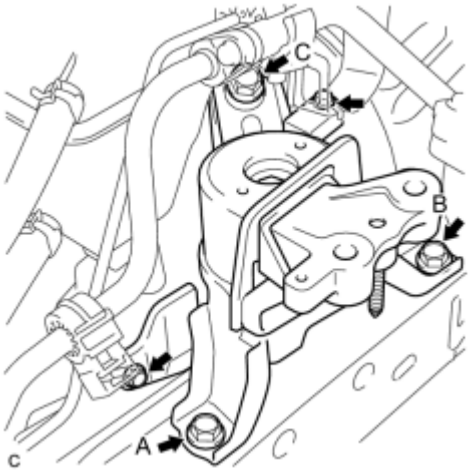



(b) Install the No. 3 radiator hose with the clamp.

8. INSTALL ENGINE MOUNTING INSULATOR SUB-ASSEMBLY RH

HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.




(a) Position the engine mounting insulator sub-assembly RH as shown in the illustration.

(b) Temporarily install bolt A to the engine mounting insulator sub-assembly RH.

(c) Tighten the 3 bolts to the engine mounting insulator sub-assembly RH in the order the bolt B, bolt C and bolt A.

Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**

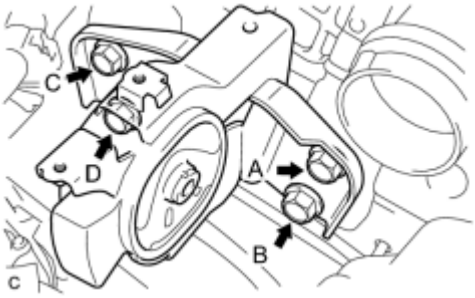
(d) Install the 2 cooler brackets with the 2 bolts.

Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**

9. INSTALL ENGINE MOUNTING INSULATOR LH

HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

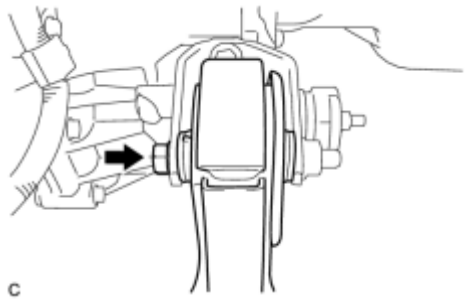



(a) Temporarily install bolt A to the engine mounting insulator LH.

(b) Tighten the 4 bolts to the engine mounting insulator LH in the order the bolt C, bolt B, bolt D and bolt A.

Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**

10. INSTALL REAR ENGINE MOUNTING INSULATOR



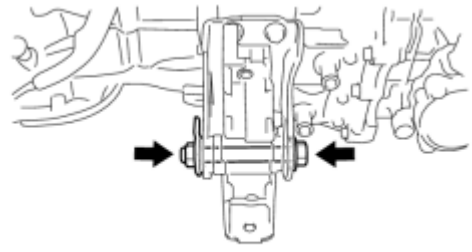
(a) Install the rear engine mounting insulator to the engine mounting bracket with the through bolt.

Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**

HINT:

Perform this procedure only when replacement of the engine mounting insulator is necessary.

11. INSTALL FRONT ENGINE MOUNTING INSULATOR



(a) Temporarily install the front engine mounting insulator with the bolt and nut.

12. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

(a) Set the engine assembly with transaxle on the engine lifter.

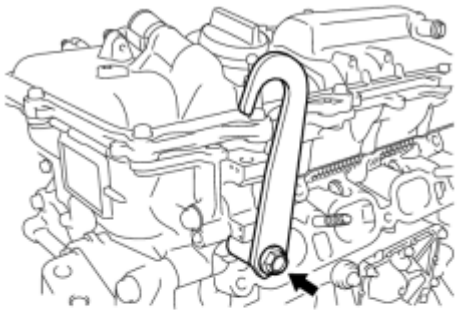
NOTICE:

- Install a height adjustment attachment and plate lift attachment onto the engine assembly with transaxle.

- Do not position a height adjustment attachment or plate lift attachment onto the front frame assembly.

HINT:

Place the engine on wooden blocks or equivalents so that the engine is level.





(b) Remove the 2 bolts and 2 engine hangers.



(c) Set the engine assembly with transaxle and front suspension crossmember on the engine lifter.

(d) Operate the engine lifter and lift the engine assembly with transaxle and front suspension crossmember to the position where the engine mounting insulators RH and LH can be installed.

CAUTION:

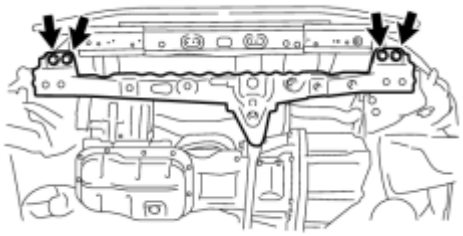
Do not raise the engine more than necessary. If the engine is raised excessively, the vehicle may also be lifted up.

NOTICE:

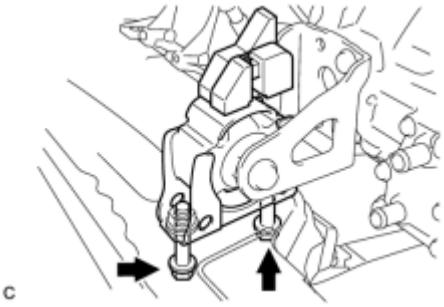
- Make sure that the engine is clear of all wiring and hoses.
- While raising the engine into the vehicle, do not allow it to contact the vehicle.

(e) Install the front crossmember with the 4 bolts.

Torque: **96 N·m (979 kgf·cm, 71ft·lbf)**



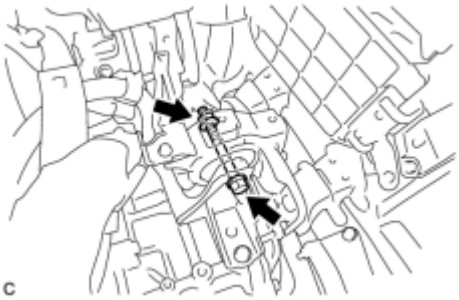
c



c

(f) Install the front engine mounting insulator to the front crossmember with the 2 bolts.

Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**



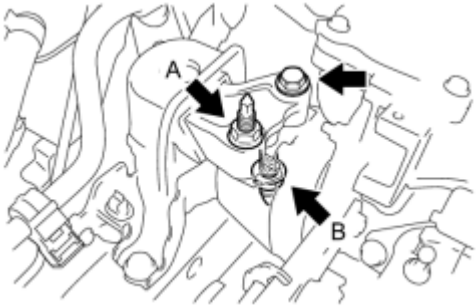
c

(g) Install the engine mounting insulator LH with the through bolt and nut.

Torque: **56 N·m (571 kgf·cm, 41ft·lbf)**

NOTICE:

When installing the engine mounting insulator, tighten the nut while holding the bolt.

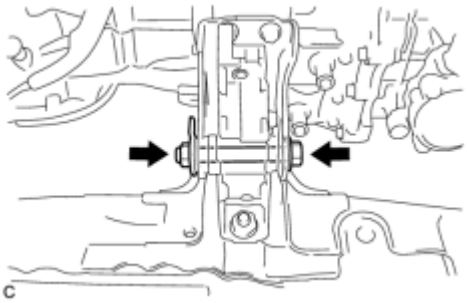



(h) Install the engine mounting insulator RH with the bolt and 2 nuts.

Nut A - Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**

Nut B - Torque: **52 N·m (530 kgf·cm, 38ft·lbf)**

Bolt - Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**



c

(i) Tighten the front engine mounting insulator with the bolt and nut.

Torque: **145 N·m (1479 kgf·cm, 107ft·lbf)**

13. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

14. INSTALL FRONT SUSPENSION MEMBER REAR BRACE LH INFO

15. INSTALL FRONT SUSPENSION MEMBER REAR BRACE RH

HINT:

Perform the same procedure as for the LH side.

16. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH INFO

17. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH INFO

18. INSTALL FRONT LOWER ENGINE MOUNTING BRACKET REINFORCEMENT INFO

19. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING LH INFO

20. INSTALL FRONT DRIVE SHAFT HOLE SNAP RING RH

HINT:

Perform the same procedure as for the LH side.

21. INSTALL FRONT DRIVE SHAFT ASSEMBLY LH INFO

22. INSTALL FRONT DRIVE SHAFT ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

23. INSTALL FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

24. INSTALL FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

25. INSTALL FRONT STABILIZER LINK ASSEMBLY LH INFO

26. INSTALL FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

27. CONNECT TIE ROD END SUB-ASSEMBLY LH INFO

28. CONNECT TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

29. INSTALL FRONT SPEED SENSOR LH INFO

30. INSTALL FRONT SPEED SENSOR RH

HINT:

Perform the same procedure as for the LH side.

31. INSTALL FRONT AXLE SHAFT NUT LH INFO

32. INSTALL FRONT AXLE SHAFT NUT RH

HINT:

Perform the same procedure as for the LH side.

33. INSTALL FRONT EXHAUST PIPE ASSEMBLY (w/ Exhaust Heat Recirculation System) INFO

34. INSTALL FRONT EXHAUST PIPE ASSEMBLY (w/o Exhaust Heat Recirculation System) INFO

35. INSTALL FRONT CENTER FLOOR BRACE INFO

36. INSTALL FRONT NO. 3 ENGINE UNDER COVER INFO

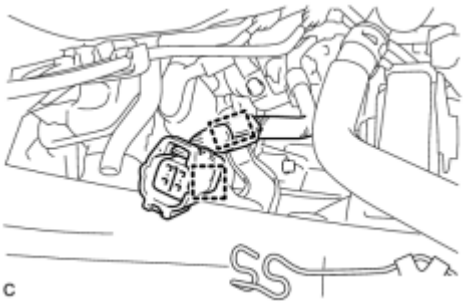
37. INSTALL TAIL EXHAUST PIPE ASSEMBLY INFO

38. INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

39. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

40. INSTALL COLUMN HOLE COVER SILENCER SHEET INFO

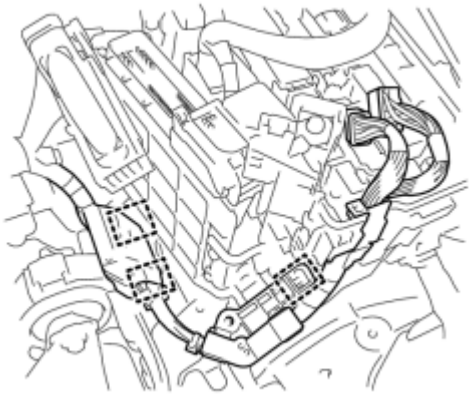
41. INSTALL WIRE HARNESS



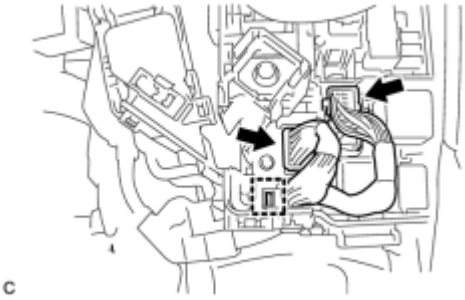

(a) Connect the wire harness with the 2 clamps.

(b) Install the wire harness with the bolt.



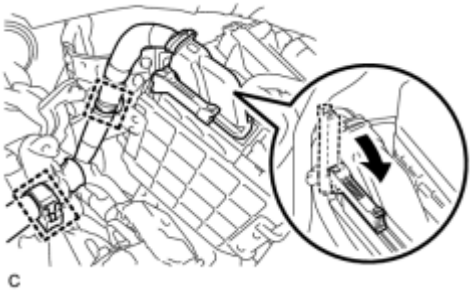


(c) Connect the wire harness with the 3 clamps.



(d) Connect the wire harness to the engine room junction block.

(e) Connect the 2 connectors to the engine room junction block.



(f) Connect the connector to the ECM with the 2 clamps and lock lever.

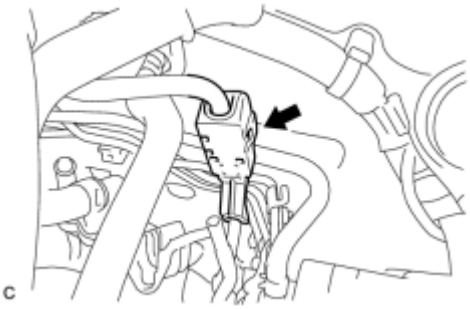
42. INSTALL ELECTRIC INVERTER COMPRESSOR INFO

43. CONNECT FUEL TUBE SUB-ASSEMBLY

(a) Connect the fuel tube connector and fuel pipe.

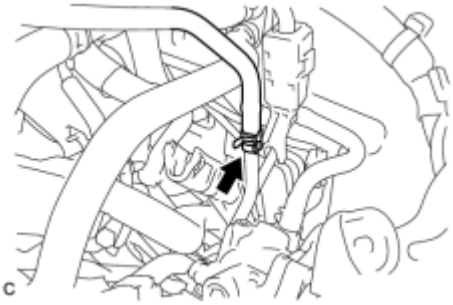
CAUTION:

Align the fuel tube connector with the pipe, then push the fuel tube connector in until the retainer makes a "click" sound. If the connection is tight, apply a small amount of engine oil to the tip of the pipe. After connecting, pull the pipe and connector to make sure that they are securely connected.



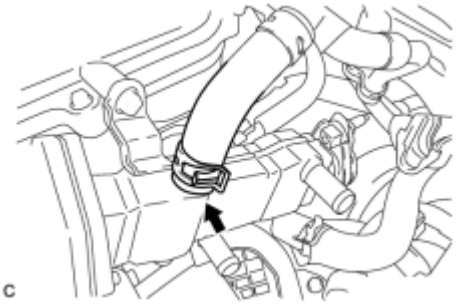

(b) Engage the claw and install the No. 1 fuel pipe clamp.

44. CONNECT NO. 1 FUEL VAPOR FEED HOSE




(a) Connect the No. 1 fuel vapor feed hose with the clamp.

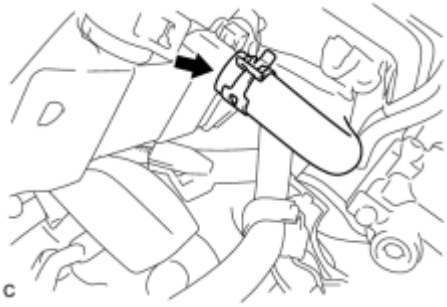
45. CONNECT HEATER HOSE




(a) Connect the heater hose with the clamp.

46. CONNECT INLET HEATER WATER HOSE

(a) Connect the inlet heater water hose with the clamp.

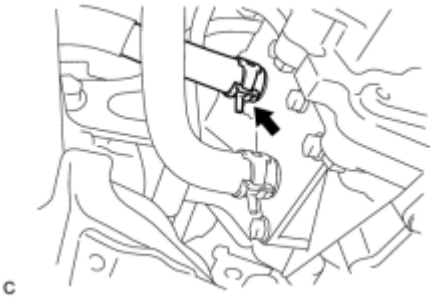


47. CONNECT OUTLET HEATER WATER HOSE



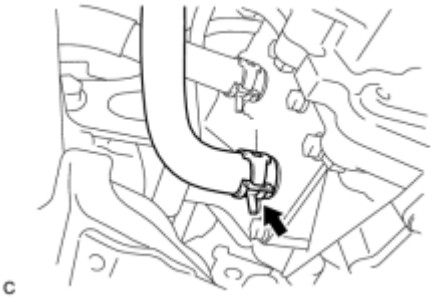
(a) Connect the outlet heater water hose with the clamp.

48. CONNECT NO. 5 INVERTER COOLING HOSE



(a) Connect the No. 5 inverter cooling hose with the clamp.

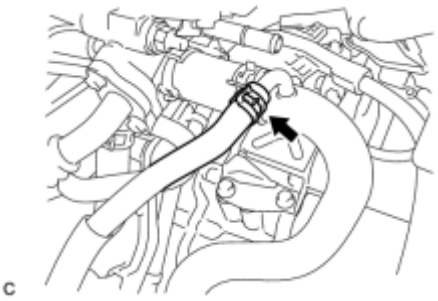
49. CONNECT NO. 3 INVERTER COOLING HOSE



(a) Connect the No. 3 inverter cooling hose with the clamp.

50. CONNECT NO. 4 WATER BY-PASS HOSE

(a) Connect the No. 4 water by-pass hose with the clamp.

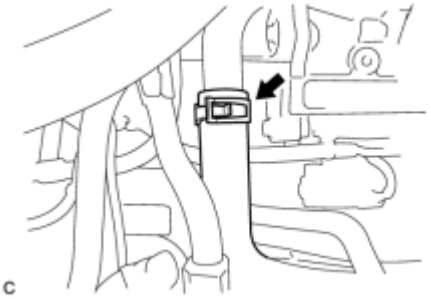


51. CONNECT NO. 2 RADIATOR HOSE



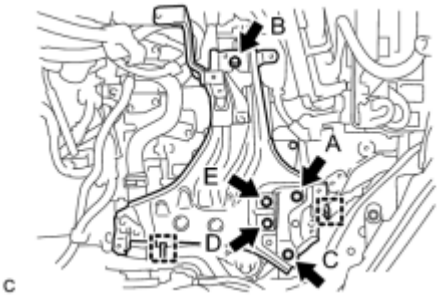
(a) Connect the No. 2 radiator hose with the clamp.

52. CONNECT NO. 1 RADIATOR HOSE



(a) Connect the No. 1 radiator hose with the clamp.

53. INSTALL INVERTER TRAY BRACKET




(a) Position the inverter tray bracket as shown in the illustration.

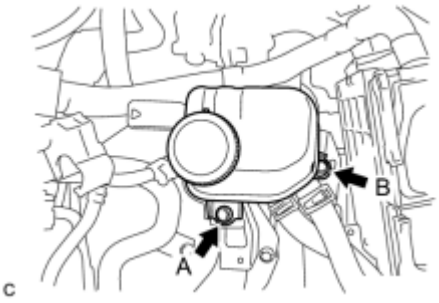
(b) Temporarily install bolt B to the inverter tray bracket.

(c) Tighten the 5 bolts to the inverter tray bracket in the order the bolt A, bolt C, bolt D, bolt E and bolt B.

Torque: **18 N·m (184 kgf·cm, 13ft·lbf)**

(d) Connect the 2 clamps to the inverter tray bracket.

54. INSTALL INVERTER RESERVE TANK ASSEMBLY




(a) Temporarily install bolt A to the inverter reserve tank assembly.

(b) Tighten the 2 bolts to the inverter reserve tank assembly in the order the bolt B and bolt A.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

55. INSTALL INVERTER WITH CONVERTER ASSEMBLY INFO

56. CONNECT WATER HOSE INFO

57. CONNECT NO. 2 ENGINE ROOM WIRE INFO

58. REMOVE INVERTER TERMINAL COVER INFO

59. CONNECT NO. 2 ENGINE WIRE INFO

60. CONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE INFO

61. CONNECT FRAME WIRE INFO

62. CHECK HIGH VOLTAGE CABLE CONNECTION INFO

63. INSTALL INVERTER TERMINAL COVER INFO

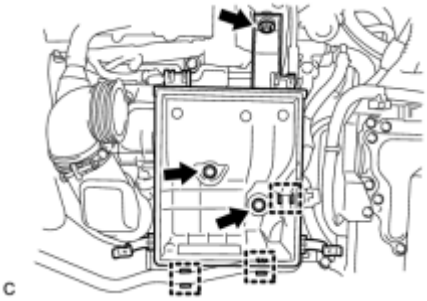
64. CONNECT ENGINE ROOM MAIN WIRE INFO

65. INSTALL NO. 1 INVERTER BRACKET INFO

66. INSTALL AIR CLEANER HOSE ASSEMBLY INFO

67. INSTALL AIR CLEANER CASE

(a) Install the air cleaner case with the 3 bolts.

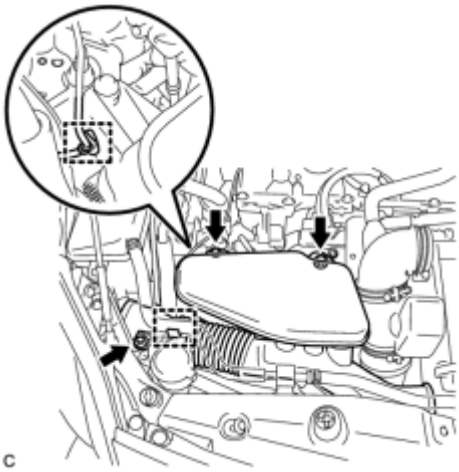


Torque: **7.0 N·m (71 kgf·cm, 62 in·lbf)**

(b) Connect the No. 4 water by-pass hose to the air cleaner case with the 3 clamps.

(c) Install the air cleaner filter element.

68. INSTALL INLET AIR CLEANER ASSEMBLY



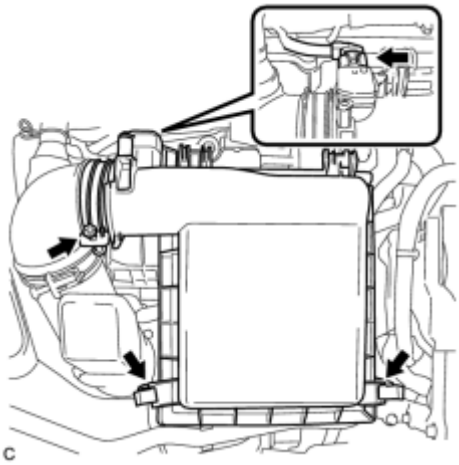
(a) Install the inlet air cleaner assembly with the 3 bolts.

Torque: **7.0 N·m (71 kgf·cm, 62 in·lbf)**

(b) Connect the wire harness clamp to the inlet air cleaner assembly.

(c) Connect the No. 4 water by-pass hose to the inlet air cleaner assembly with the clamp.

69. INSTALL AIR CLEANER CAP SUB-ASSEMBLY



(a) Install the air cleaner cap sub-assembly with the 2 clamps and hose band.

(b) Connect the air flow meter connector.

70. INSTALL SERVICE PLUG GRIP INFO

71. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

72. INSTALL REAR NO. 3 FLOOR BOARD INFO

73. INSTALL REAR DECK FLOOR BOX INFO

74. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

75. ADD HYBRID TRANSAXLE FLUID INFO

76. INSPECT HYBRID TRANSAXLE FLUID INFO

77. ADD COOLANT (for Engine) INFO

78. ADD COOLANT (for Inverter) INFO

79. ADD ENGINE OIL INFO

80. INSPECT ENGINE OIL LEVEL INFO

81. INSPECT FOR FUEL LEAK INFO

82. INSPECT FOR COOLANT LEAK (for Engine) INFO

83. INSPECT FOR COOLANT LEAK (for Inverter) INFO

84. INSPECT FOR OIL LEAK

85. INSPECT FOR EXHAUST GAS LEAK

86. INSTALL NO. 2 ENGINE UNDER COVER

87. INSTALL NO. 1 ENGINE UNDER COVER

88. INSTALL ENGINE UNDER COVER (w/ Cover)

89. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

90. INSTALL REAR ENGINE UNDER COVER LH

91. INSTALL REAR ENGINE UNDER COVER RH

92. INSTALL FRONT WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

93. INSPECT IGNITION TIMING INFO

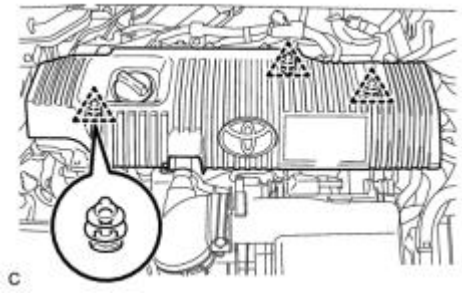
94. INSPECT ENGINE IDLE SPEED INFO

95. INSPECT CO/HC INFO

96. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT: INFO.

97. INSTALL NO. 2 CYLINDER HEAD COVER




(a) Engage the 3 clips to install the cover.

- Be sure to engage the clips securely.
- Do not apply excessive force or hit the cover to engage the clips. This may cause the cover to break.

98. INSTALL RADIATOR SUPPORT OPENING COVER INFO

99. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

100. INSTALL COWL BODY MOUNTING REINFORCEMENT LH INFO

101. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY INFO

102. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY INFO

103. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY LH INFO

104. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY RH INFO

105. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO

106. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO

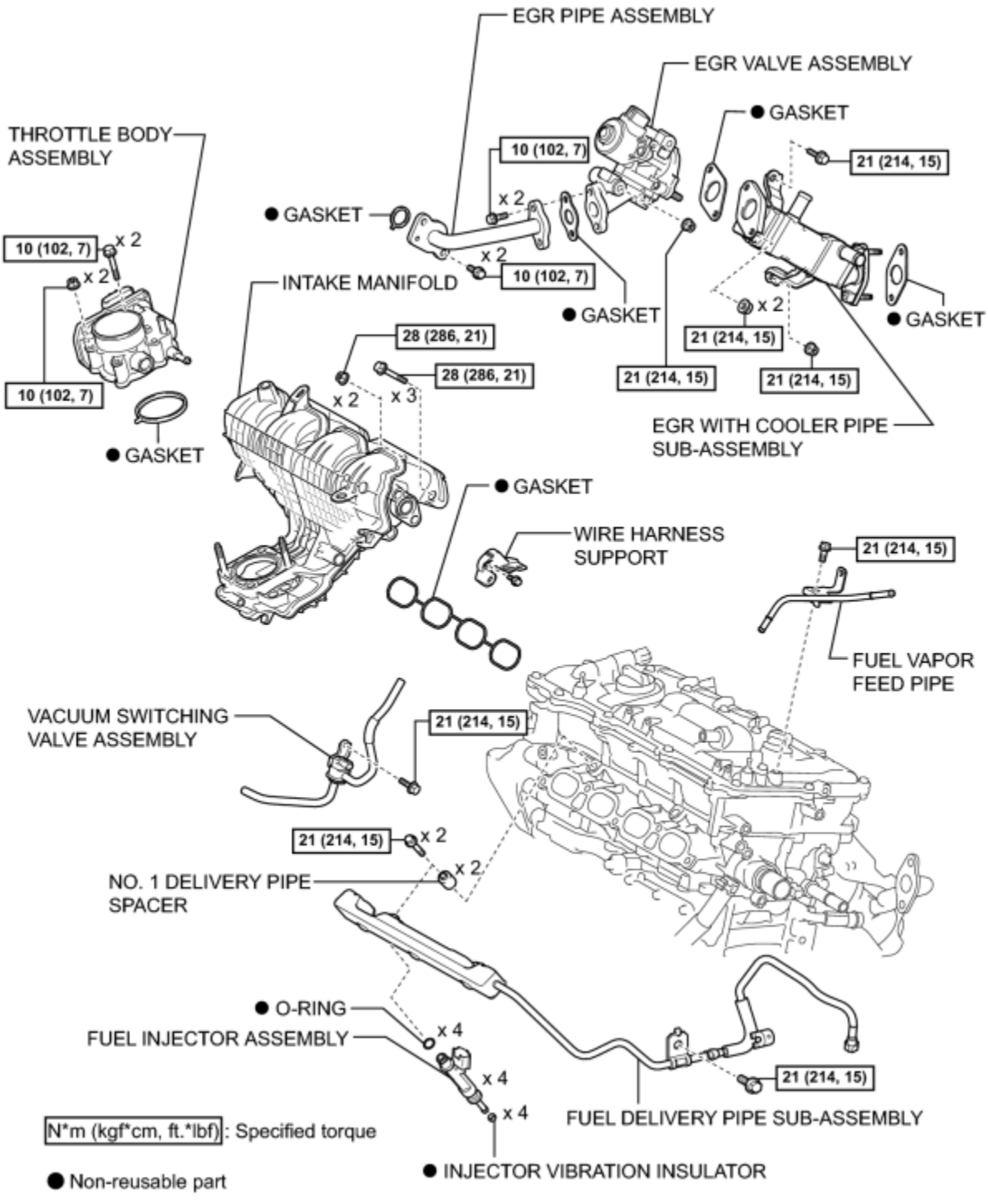
107. INSTALL FRONT WIPER ARM HEAD CAP INFO

108. CHECK ABS SPEED SENSOR SIGNAL

HINT: INFO.

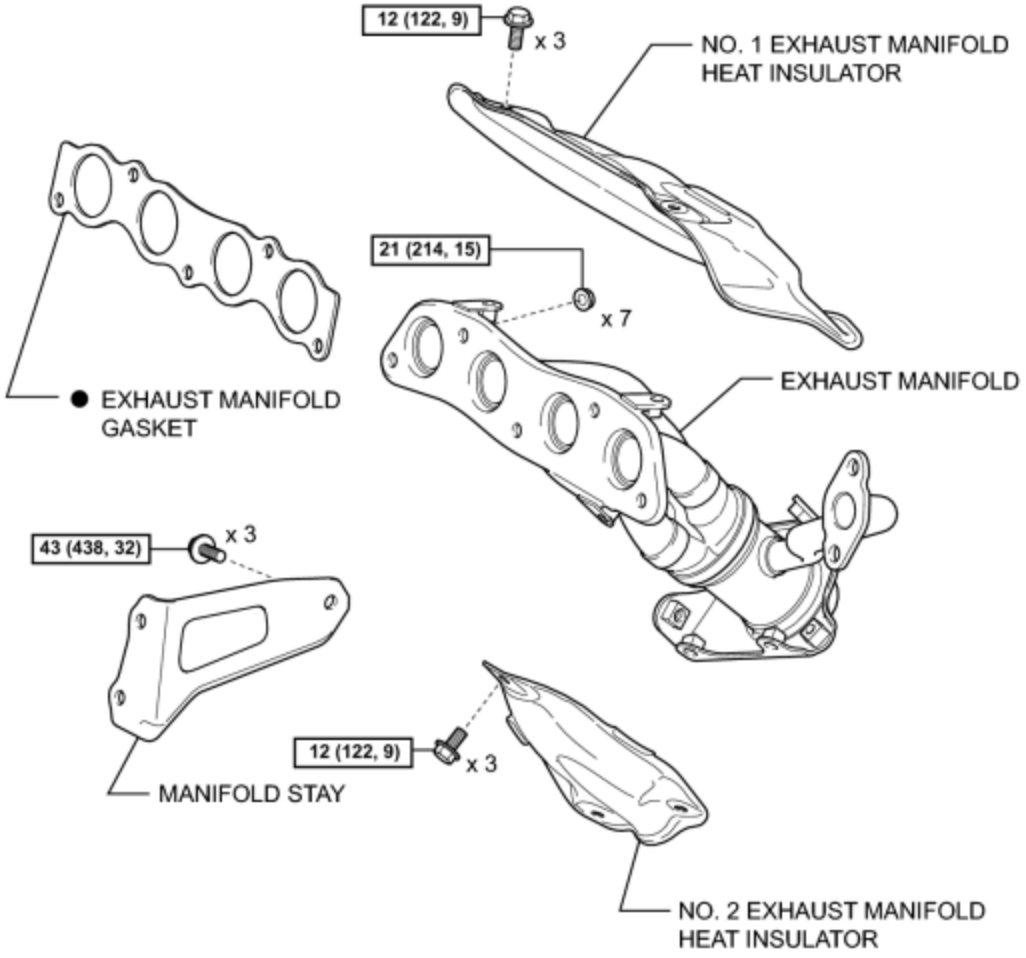
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION

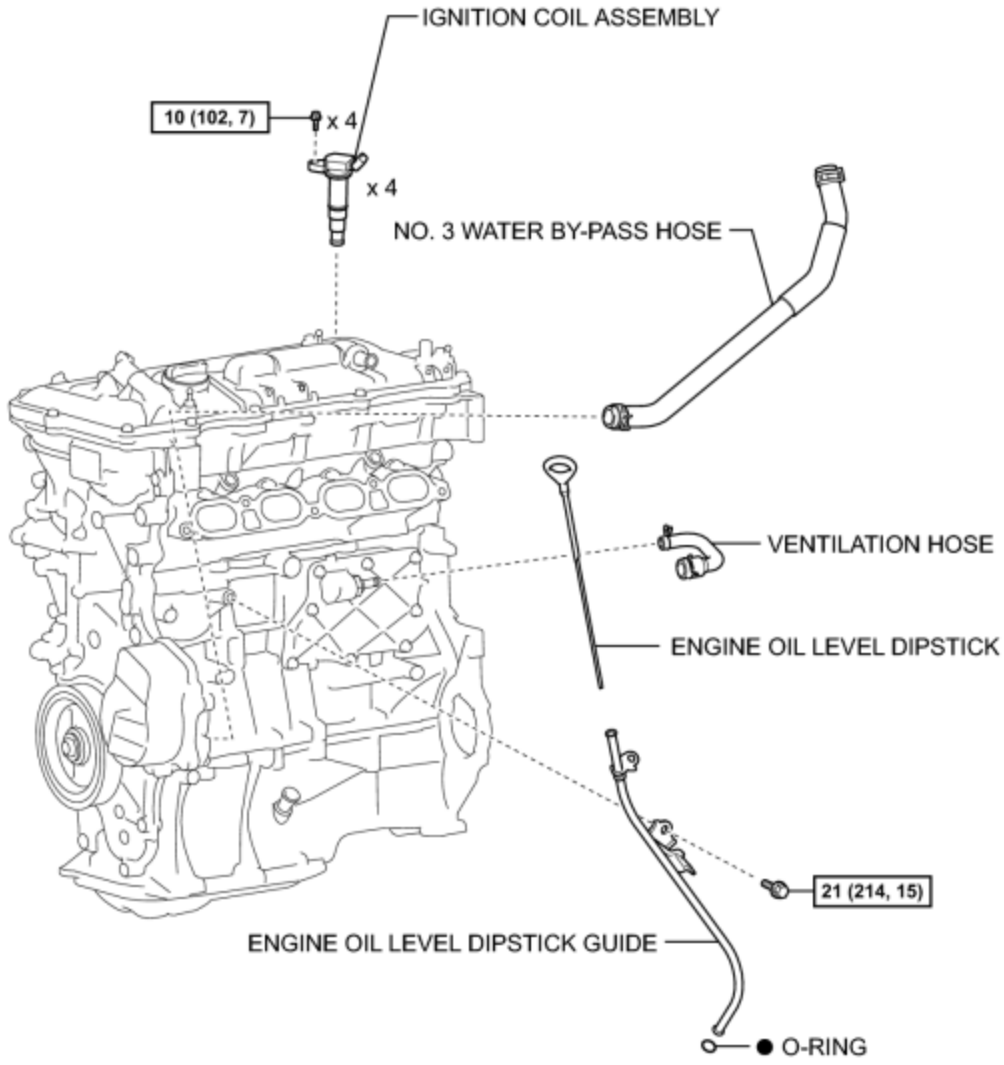



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# ILLUSTRATION

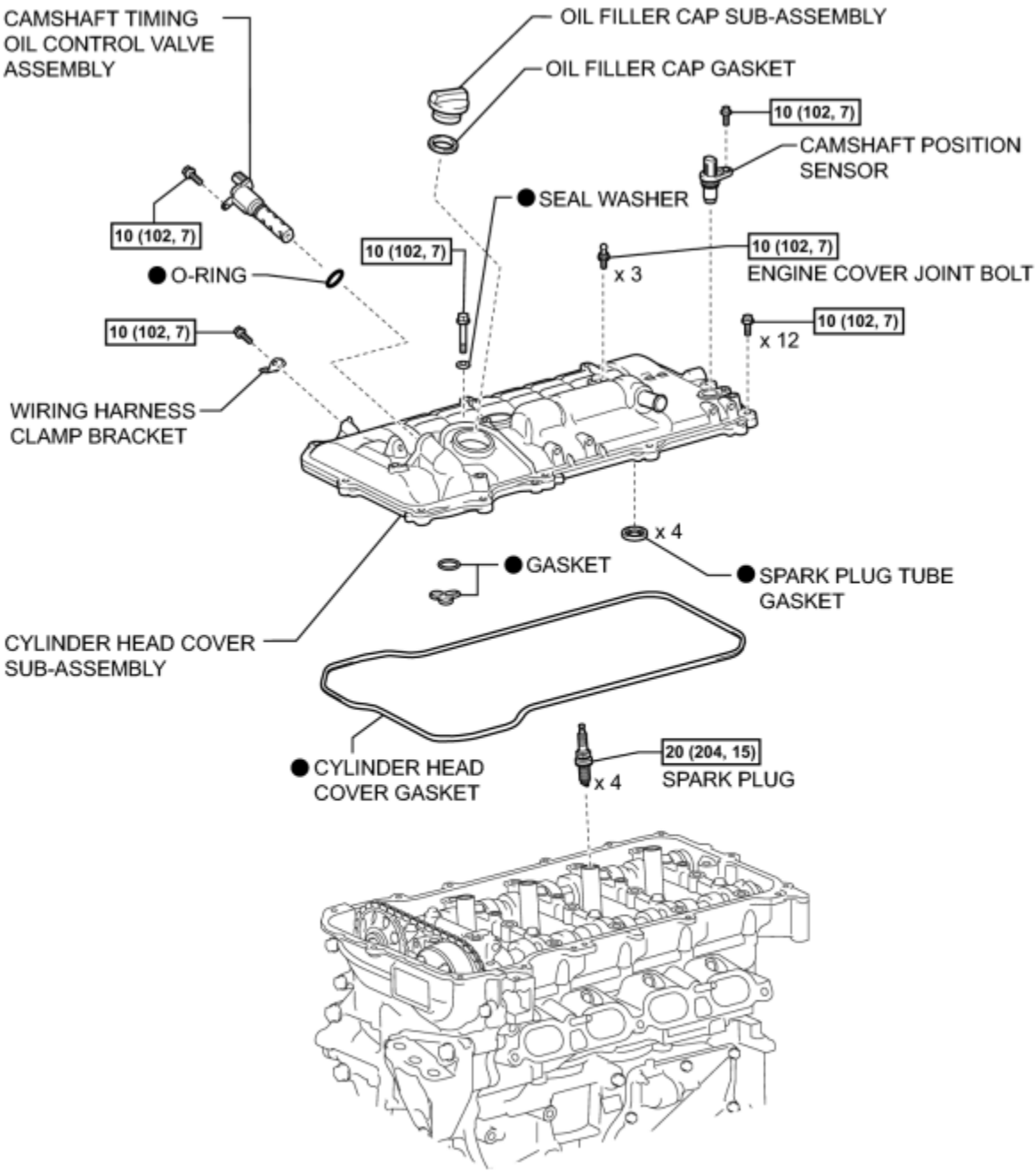



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# ILLUSTRATION

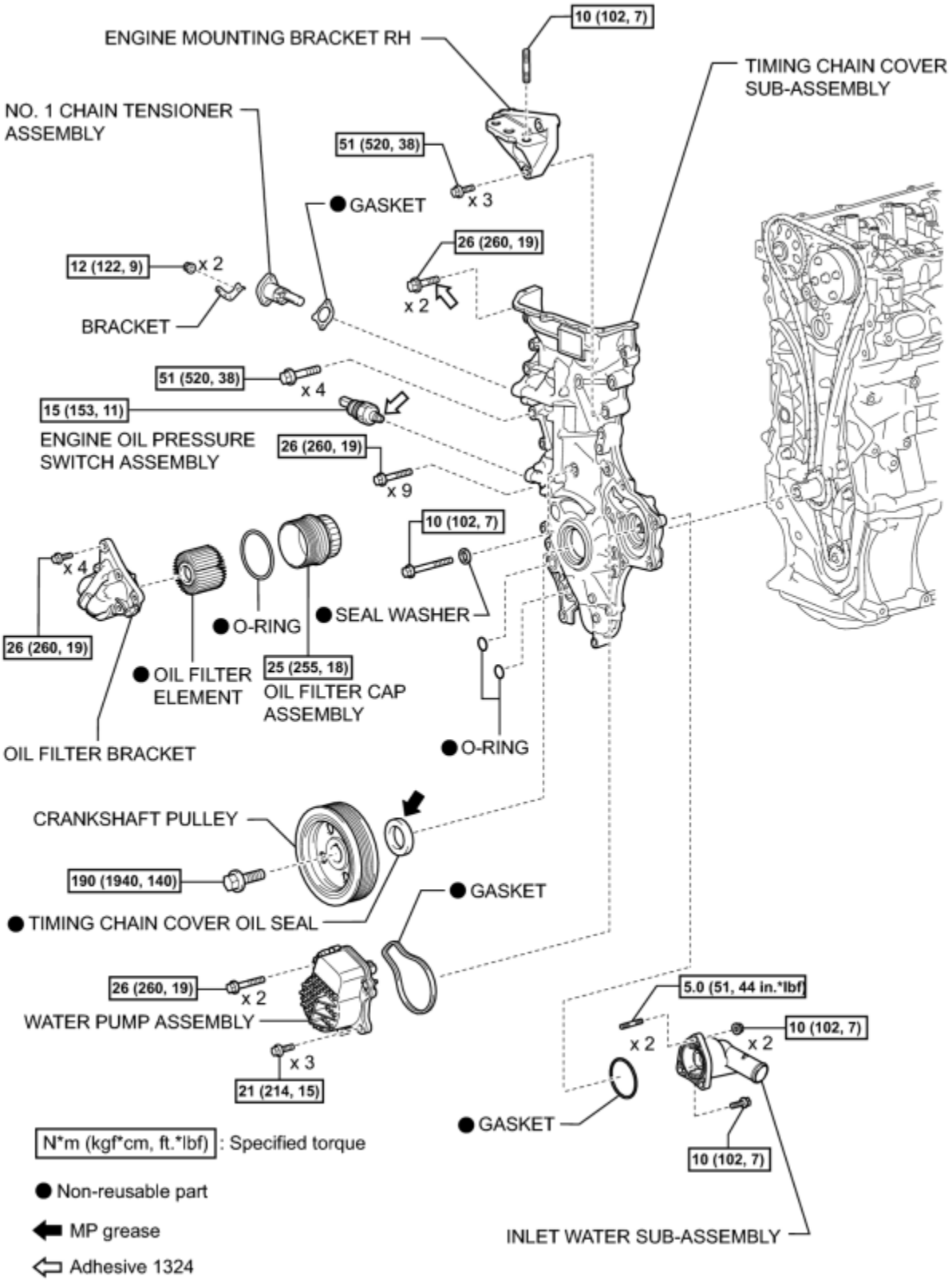



N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

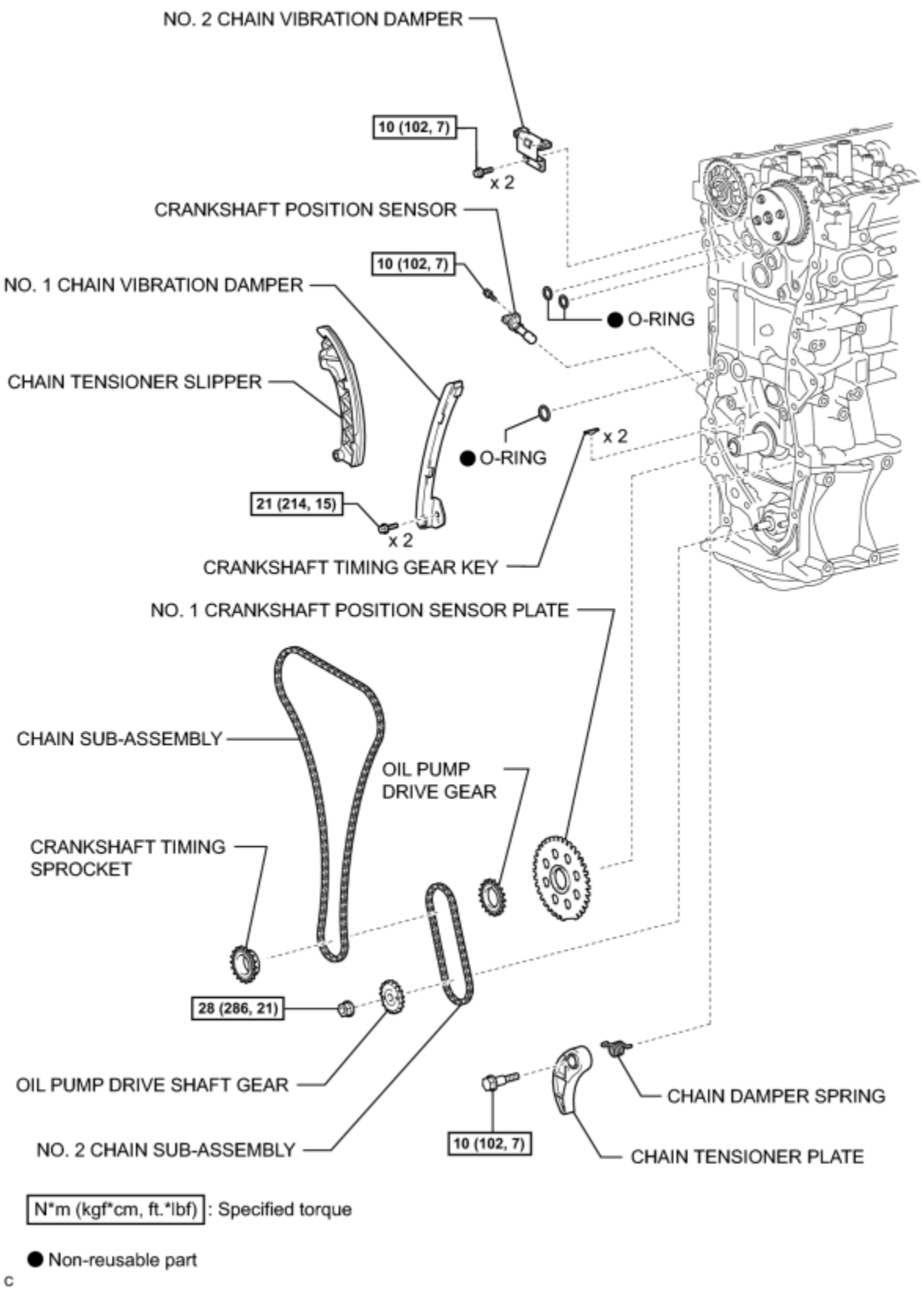
c

# ILLUSTRATION



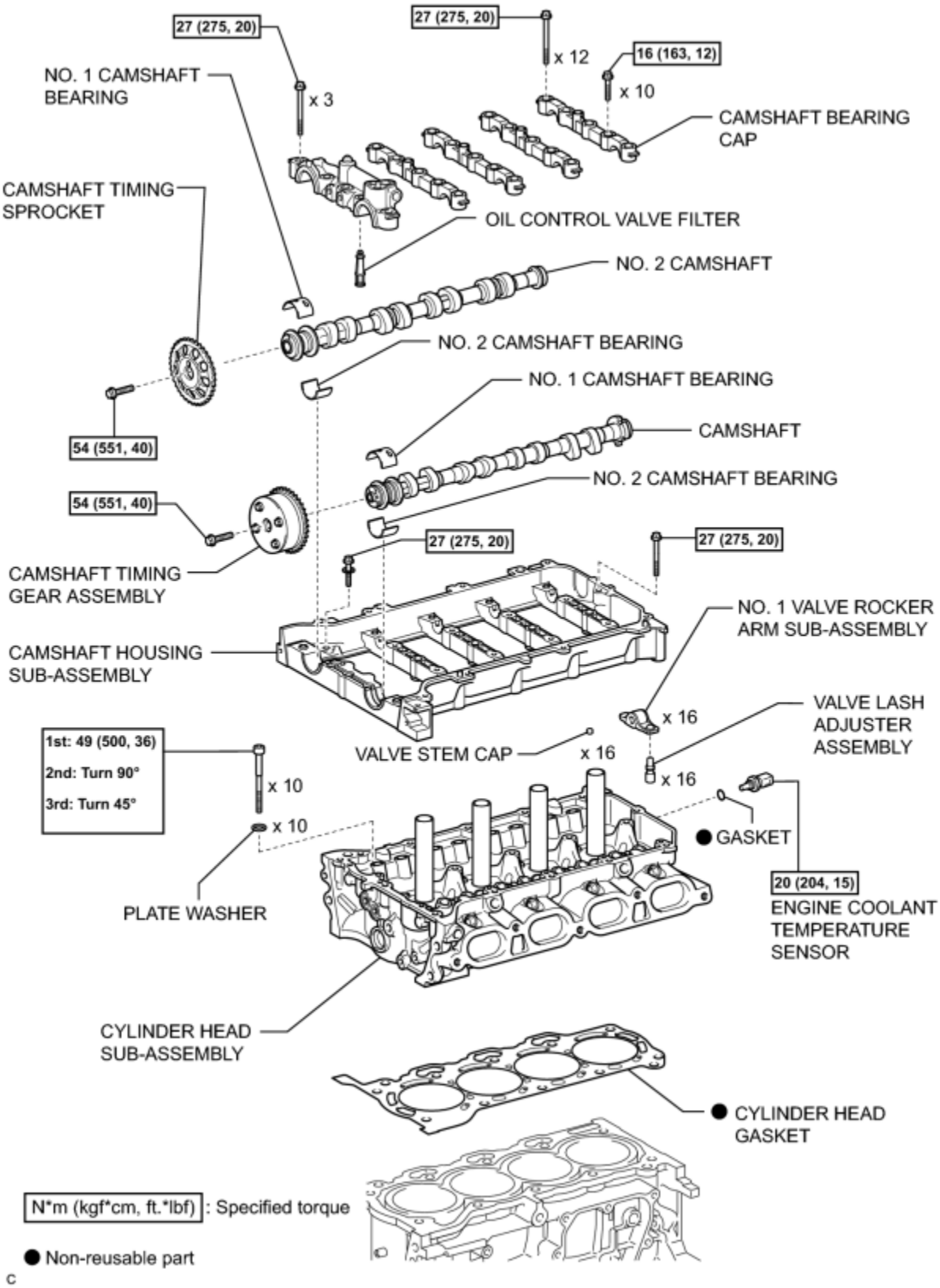

c

# ILLUSTRATION

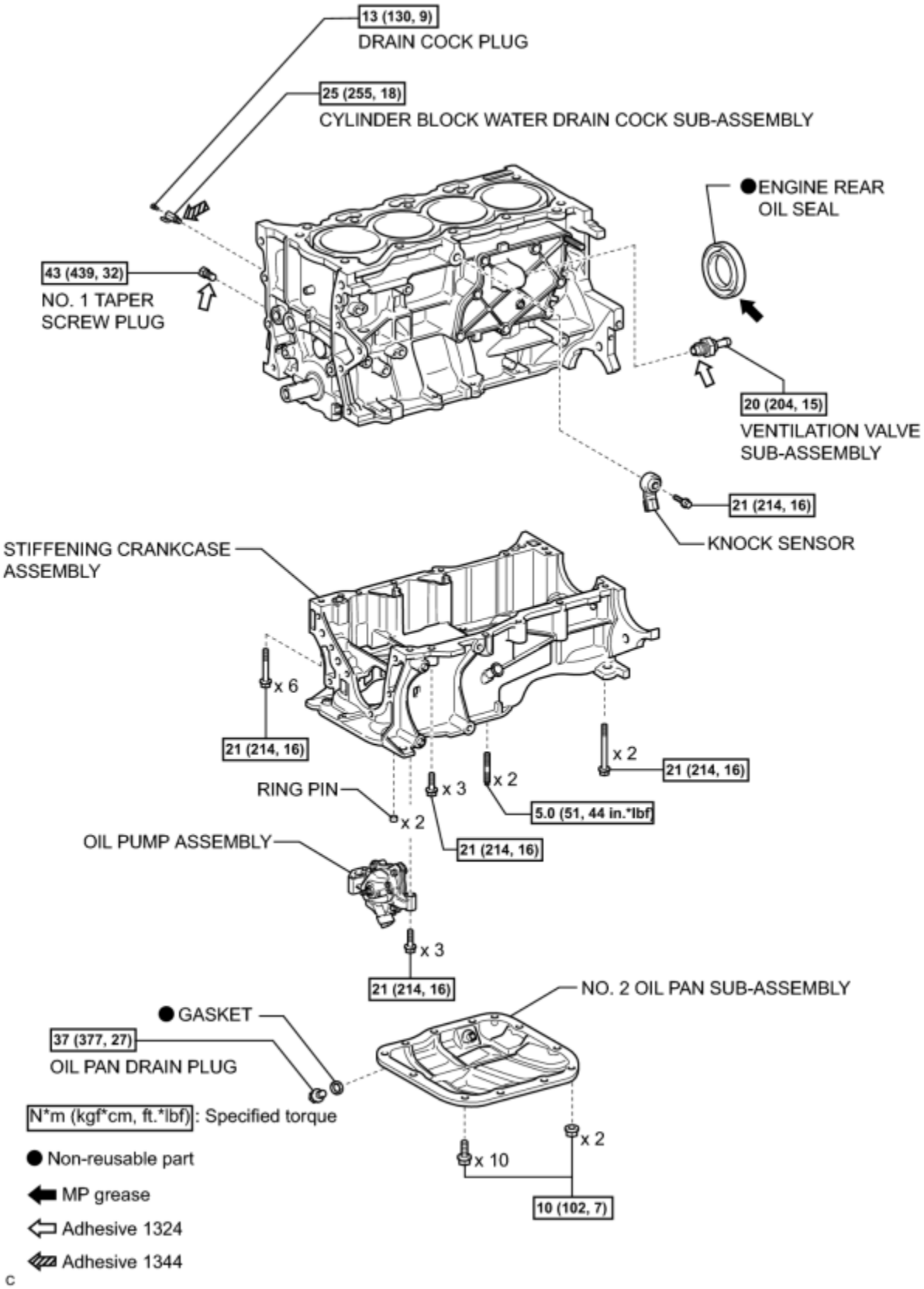



c

# ILLUSTRATION




# ILLUSTRATION


13 (130, 9)
DRAIN COCK PLUG
25 (255, 18)
CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY
ENGINE REAR OIL SEAL
43 (439, 32)
NO. 1 TAPER SCREW PLUG
20 (204, 15)
VENTILATION VALVE SUB-ASSEMBLY
21 (214, 16)
KNOCK SENSOR
STIFFENING CRANKCASE ASSEMBLY
x 6
21 (214, 16)
x 2
21 (214, 16)
x 2
5.0 (51, 44 in.*lbf)
RING PIN
x 2
x 3
21 (214, 16)
OIL PUMP ASSEMBLY
x 3
21 (214, 16)
NO. 2 OIL PAN SUB-ASSEMBLY
GASKET
37 (377, 27)
OIL PAN DRAIN PLUG
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
MP grease
Adhesive 1324
Adhesive 1344
x 2
x 10
10 (102, 7)

# REMOVAL

1. INSTALL ENGINE ON ENGINE STAND

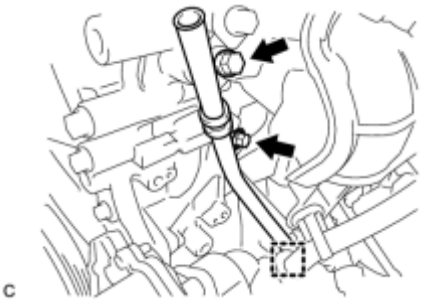
(a) Install the engine onto an engine stand with the bolts.

2. REMOVE ENGINE HANGERS

(a) Remove the 2 bolts and 2 engine hangers.

3. REMOVE THROTTLE BODY ASSEMBLY INFO

4. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE




(a) Remove the engine oil level dipstick.

(b) Remove the 2 bolts, clamp and engine oil level dipstick guide.

(c) Remove the O-ring from the engine oil level dipstick guide.

5. REMOVE EGR PIPE ASSEMBLY INFO

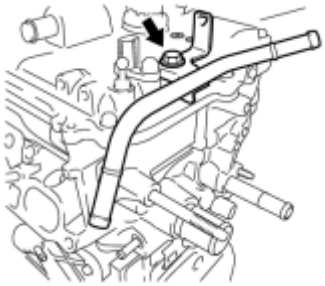
6. REMOVE EGR VALVE ASSEMBLY INFO

7. REMOVE EGR WITH COOLER PIPE SUB-ASSEMBLY INFO

8. REMOVE INTAKE MANIFOLD INFO

9. REMOVE FUEL VAPOR FEED PIPE

(a) Remove the bolt and fuel vapor feed pipe.




10. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

11. REMOVE NO. 1 DELIVERY PIPE SPACER INFO

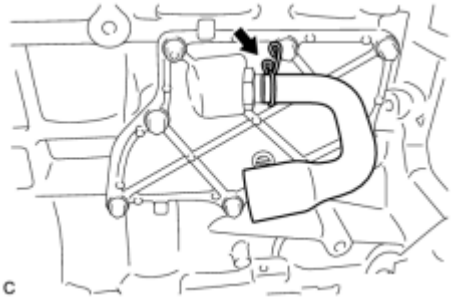
12. REMOVE FUEL INJECTOR ASSEMBLY INFO

13. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

14. REMOVE MANIFOLD STAY INFO

15. REMOVE EXHAUST MANIFOLD INFO

16. REMOVE VENTILATION HOSE

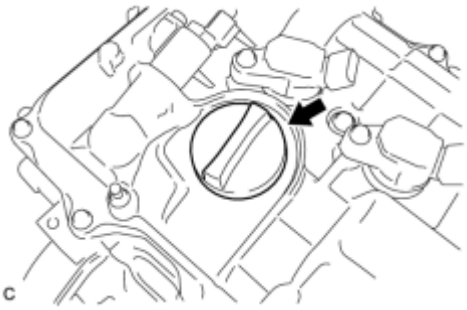



(a) Remove the ventilation hose from the ventilation valve.

17. REMOVE IGNITION COIL ASSEMBLY INFO

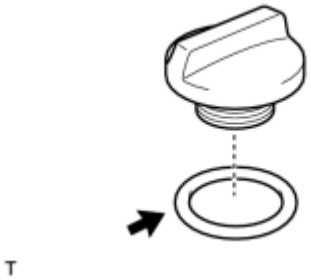
# DISASSEMBLY

1. REMOVE OIL FILLER CAP SUB-ASSEMBLY



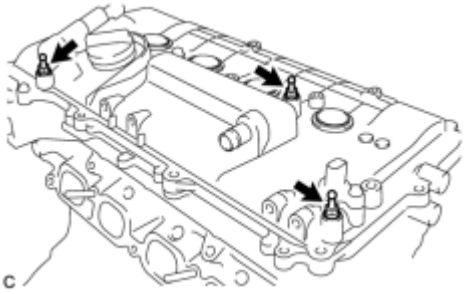

(a) Remove the oil filler cap.

2. REMOVE OIL FILLER CAP GASKET




(a) Remove the oil filler cap gasket.

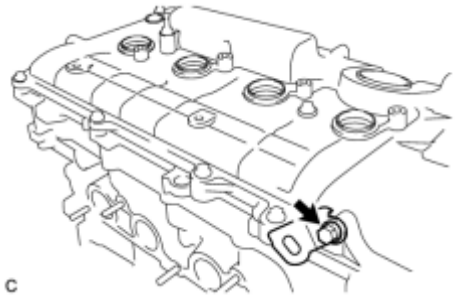
3. REMOVE ENGINE COVER JOINT BOLT




(a) Remove the 3 engine cover joint bolts.

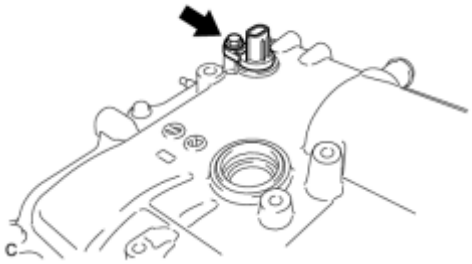
4. REMOVE WIRING HARNESS CLAMP BRACKET

(a) Remove the bolt and wiring harness clamp bracket.



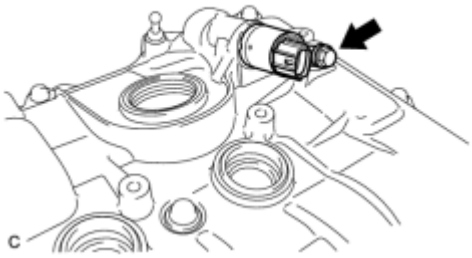
5. REMOVE SPARK PLUG INFO

6. REMOVE CAMSHAFT POSITION SENSOR



(a) Remove the bolt and camshaft position sensor.

7. REMOVE CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY

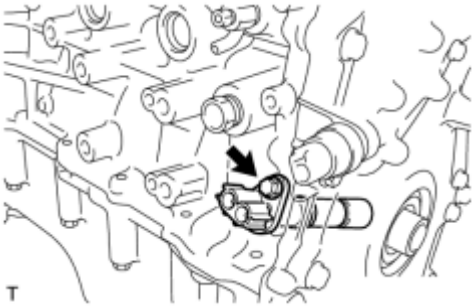


(a) Remove the bolt and camshaft timing oil control valve.

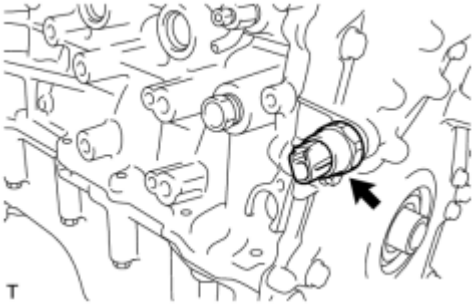
(b) Remove the O-ring from the camshaft timing oil control valve.

8. REMOVE CRANKSHAFT POSITION SENSOR

(a) Remove the bolt and crankshaft position sensor.

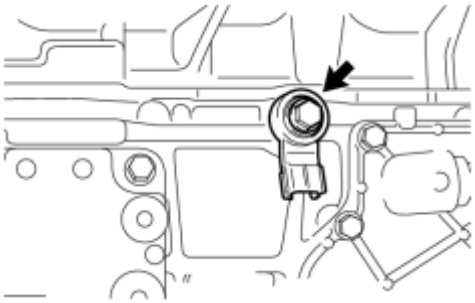


9. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY



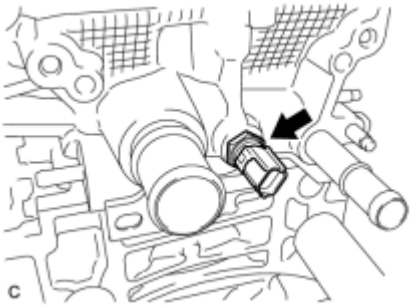
(a) Using a 24 mm deep socket wrench, remove the engine oil pressure switch assembly.

10. REMOVE KNOCK SENSOR



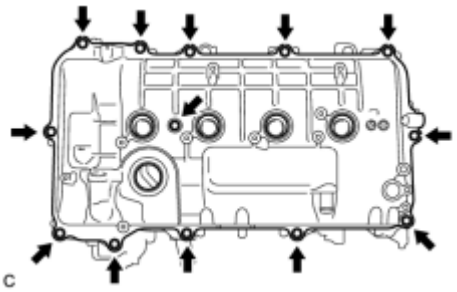
(a) Remove the bolt and knock sensor.

11. REMOVE ENGINE COOLANT TEMPERATURE SENSOR



(a) Remove the engine coolant temperature sensor and gasket.

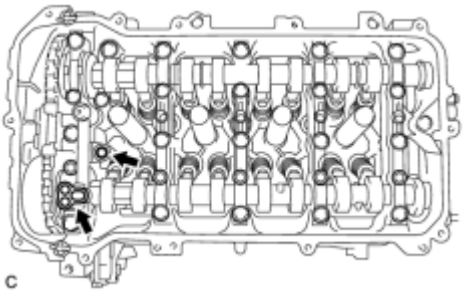
12. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY




(a) Remove the 13 bolts, seal washer and cylinder head cover.

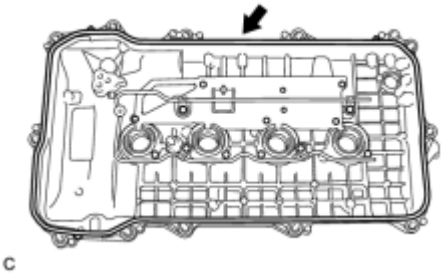
NOTICE:

As gasket may stick to the cylinder head cover, be careful not to drop any of the gaskets into the engine when removing the cylinder head cover.




(b) Remove the 2 gaskets from the camshaft bearing cap.

13. REMOVE CYLINDER HEAD COVER GASKET



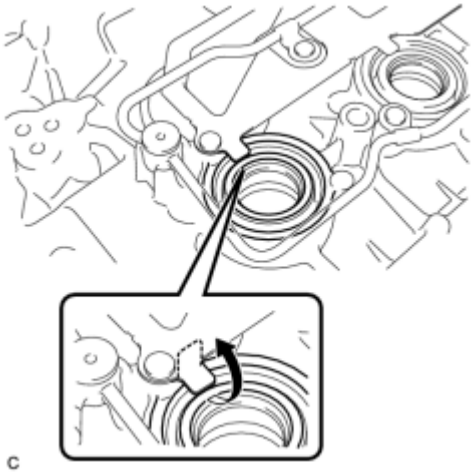

(a) Remove the cylinder head cover gasket.

14. REMOVE SPARK PLUG TUBE GASKET

(a) Pry up the 4 claws of the ventilation baffle plate.

NOTICE:

Do not deform the claws of the baffle plate more than necessary.




(b) Remove the 4 gaskets from the cylinder head cover.

HINT:

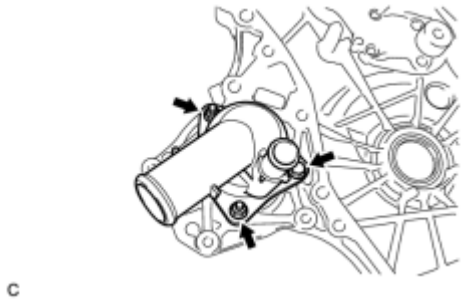
Prevent the plug tube gaskets from being deformed as much as possible. The removed gaskets will be used when installing new gaskets.

NOTICE:

Be careful not to damage the cylinder head cover.

15. REMOVE OIL FILTER CAP ASSEMBLY INFO

16. REMOVE INLET WATER SUB-ASSEMBLY




(a) Remove the bolt, 2 nuts, inlet water sub-assembly and gasket.

17. REMOVE INLET WATER SUB-ASSEMBLY STUD BOLT

NOTICE:

If a stud bolt is deformed or its threads are damaged, replace it.

18. SET NO. 1 CYLINDER TO TDC/COMPRESSION INFO

19. REMOVE CRANKSHAFT PULLEY INFO

20. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY INFO

21. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY INFO

22. REMOVE TIMING CHAIN COVER OIL SEAL INFO

23. REMOVE CHAIN TENSIONER SLIPPER INFO

24. REMOVE NO. 1 CHAIN VIBRATION DAMPER INFO

25. REMOVE NO. 2 CHAIN VIBRATION DAMPER INFO

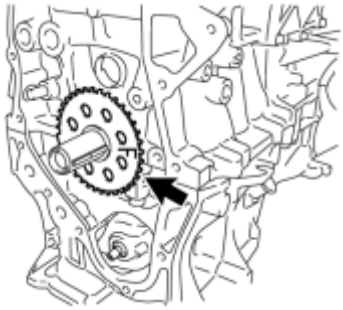
26. REMOVE CHAIN SUB-ASSEMBLY INFO

27. REMOVE CRANKSHAFT TIMING SPROCKET INFO

28. REMOVE NO. 2 CHAIN SUB-ASSEMBLY INFO

29. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE

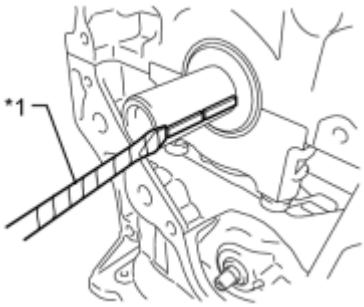
T



(a) Remove the crankshaft position sensor plate.

30. REMOVE CRANKSHAFT TIMING GEAR KEY

T




(a) Using a screwdriver, remove the 2 crankshaft timing gear keys.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

HINT:

Tape the screwdriver tip before use.

31. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY INFO

32. REMOVE CAMSHAFT TIMING GEAR ASSEMBLY INFO

33. REMOVE CAMSHAFT TIMING SPROCKET INFO

34. REMOVE CAMSHAFT BEARING CAP INFO

35. REMOVE CAMSHAFT INFO

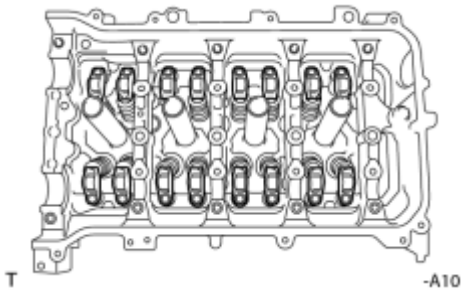
36. REMOVE NO. 2 CAMSHAFT INFO

37. REMOVE CAMSHAFT HOUSING STRAIGHT PIN

NOTICE:

It is not necessary to remove a straight pin unless it is being replaced.

38. REMOVE NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY

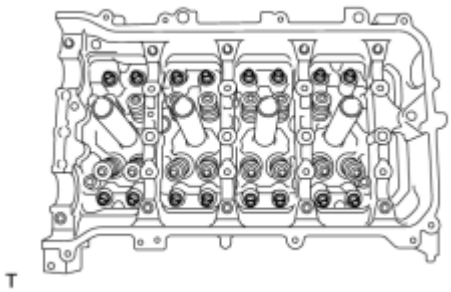



(a) Remove the 16 valve rocker arms.

HINT:

Arrange the removed parts in the correct order.

39. REMOVE VALVE LASH ADJUSTER ASSEMBLY




(a) Remove the 16 valve lash adjusters from the cylinder head.

HINT:

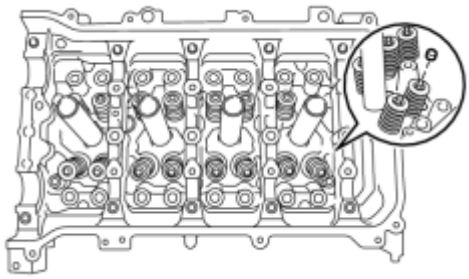
Arrange the removed parts in the correct order.

40. REMOVE VALVE STEM CAP

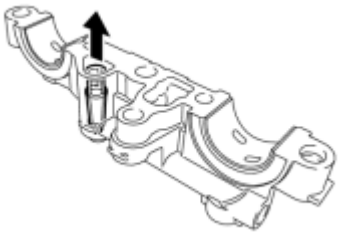
(a) Remove the 16 valve stem caps.

HINT:

Arrange the removed parts in the correct order.



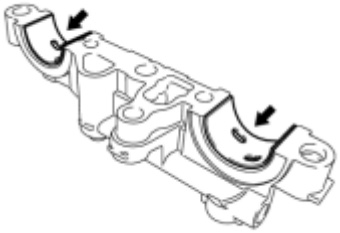
41. REMOVE OIL CONTROL VALVE FILTER



C

(a) Remove the oil control valve filter from the No. 1 camshaft bearing cap.

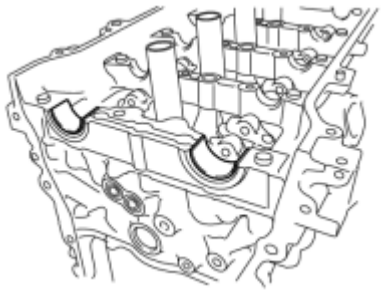
42. REMOVE NO. 1 CAMSHAFT BEARING



C

(a) Remove the 2 camshaft bearings

43. REMOVE NO. 2 CAMSHAFT BEARING



T

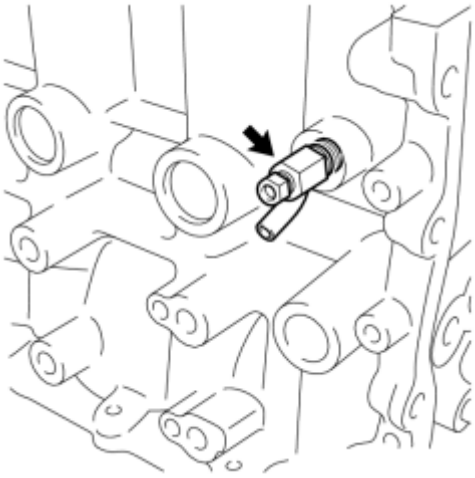
(a) Remove the 2 camshaft bearings.

44. REMOVE CAMSHAFT HOUSING SUB-ASSEMBLY INFO

45. REMOVE CYLINDER HEAD SUB-ASSEMBLY INFO

46. REMOVE CYLINDER HEAD GASKET INFO

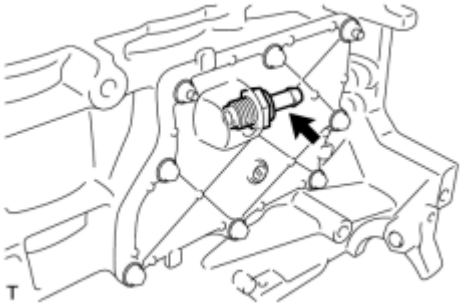
47. REMOVE CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY



(a) Remove the drain cock plug from the drain cock.

(b) Remove the drain cock from the cylinder block.

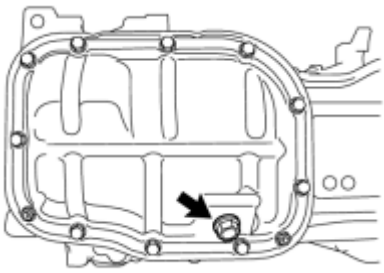
48. REMOVE VENTILATION VALVE SUB-ASSEMBLY



(a) Remove the ventilation valve sub-assembly.

49. REMOVE OIL PAN DRAIN PLUG

(a) Remove the drain plug and gasket.

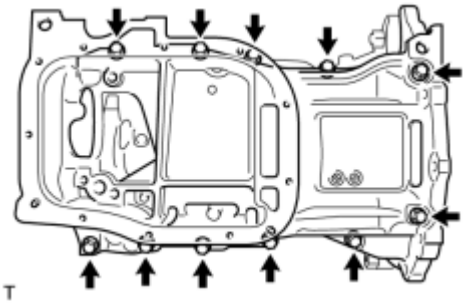


T

50. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY INFO

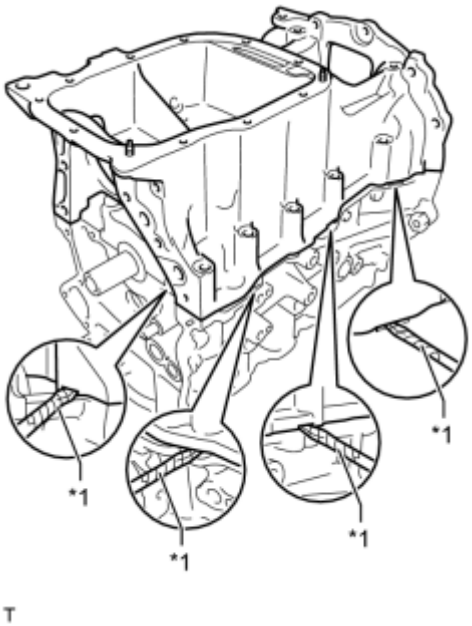
51. REMOVE OIL PUMP ASSEMBLY INFO

52. REMOVE STIFFENING CRANKCASE ASSEMBLY



T

(a) Uniformly loosen and remove the 11 bolts.




T

(b) Using a screwdriver, remove the stiffening crankcase by prying between the stiffening crankcase and cylinder block.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

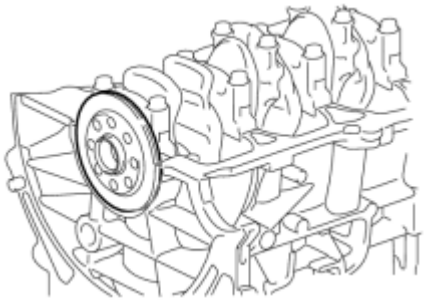
HINT:

Tape the screwdriver tip before use.

NOTICE:

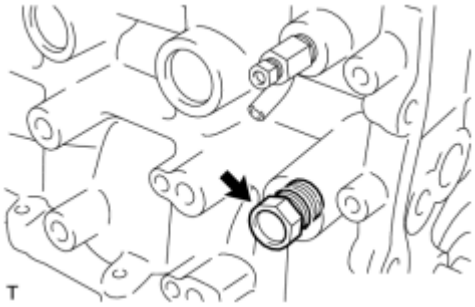
Be careful not to damage the contact surfaces of the crankcase and cylinder block.

53. REMOVE ENGINE REAR OIL SEAL



(a) Remove the engine rear oil seal from the cylinder block.

54. REMOVE NO. 1 TAPER SCREW PLUG



(a) Remove the screw plug.

55. REMOVE STIFFENING CRANKCASE STUD BOLT

NOTICE:

If a stud bolt is deformed or its threads are damaged, replace it.

56. REMOVE STIFFENING CRANKCASE RING PIN

NOTICE:

It is not necessary to remove a ring pin unless it is being replaced.

# INSPECTION

1. INSPECT NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY



(a) Turn the roller by hand to check that it turns smoothly.

If the roller does not turn smoothly, replace the No. 1 valve rocker arm sub-assembly.

T

2. INSPECT VALVE LASH ADJUSTER ASSEMBLY

NOTICE:

- Keep the valve lash adjuster free from dirt and foreign matter.
- Only use clean engine oil.

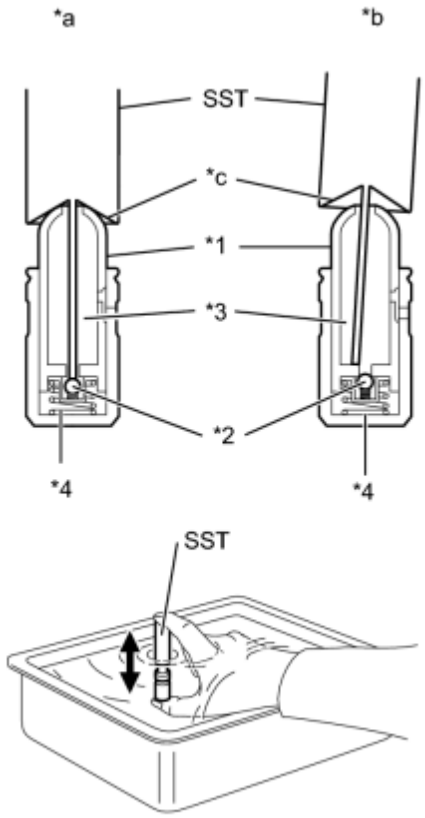
(a) Place the lash adjuster into a container full of new engine oil.

(b) Insert the tip of SST into the lash adjuster plunger and use the tip to press down on the check ball inside the plunger.

## Text in Illustration

| | |
|---|---|
| *1 | Plunger |
| *2 | Check Ball |
| *3 | Low Pressure Chamber |
| *4 | High Pressure Chamber |
| *a | CORRECT |
| *b | INCORRECT |
| *c | Taper Part |

SST: 09276-75010




T

(c) Squeeze SST and the valve lash adjuster together to move the plunger up and down 5 to 6 times.

(d) Check the movement of the plunger and bleed the air.

OK:

Plunger moves up and down.

NOTICE:

When bleeding high-pressure air from the compression chamber, make sure that the tip of SST is actually pressing the check ball as shown in the illustration. If the check ball is not pressed, air bleeding is not possible.

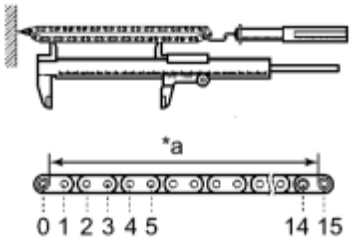
(e) After bleeding the air, remove SST. Then try to quickly and firmly press the plunger with your fingers.

OK:

Plunger can be pressed 3 times.

If the plunger can still be compressed after pressing it 3 times, replace the valve lash adjuster with a new one.

3. INSPECT CHAIN SUB-ASSEMBLY




(a) Pull the chain with a force of 147 N (15 kgf, 33.0 lbf) as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *a | Measurement Length |

(b) Using a vernier caliper, measure the length of 15 links.

Maximum chain elongation:

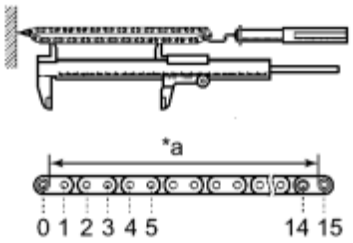
115.2 mm (4.54 in.)

NOTICE:

Perform the measurement at 3 random places. Use the average of the measurements.

If the average elongation is more than the maximum, replace the chain sub-assembly.

4. INSPECT NO. 2 CHAIN SUB-ASSEMBLY




(a) Pull the chain with a force of 147 N (15 kgf, 33.0 lbf) as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *a | Measurement Length |

(b) Using a vernier caliper, measure the length of 15 links.

Maximum chain elongation:

102.1 mm (4.02 in.)

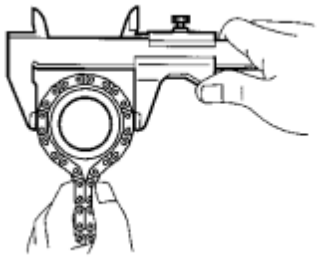
NOTICE:

Perform the measurement at 3 random places. Use the average of the measurements.

If the average elongation is more than the maximum, replace the No. 2 chain sub-assembly.

5. INSPECT OIL PUMP DRIVE GEAR

(a) Place the chain around the oil pump drive gear.



(b) Using a vernier caliper, measure the diameter of the oil pump drive gear and chain.

Minimum gear diameter (with chain):

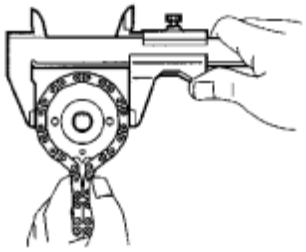
48.2 mm (1.90 in.)

NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and oil pump drive gear.

6. INSPECT OIL PUMP DRIVE SHAFT GEAR



(a) Place the chain around the oil pump drive shaft gear.

(b) Using a vernier caliper, measure the diameter of the oil pump drive shaft gear and chain.

Minimum gear diameter (with chain):

48.2 mm (1.90 in.)

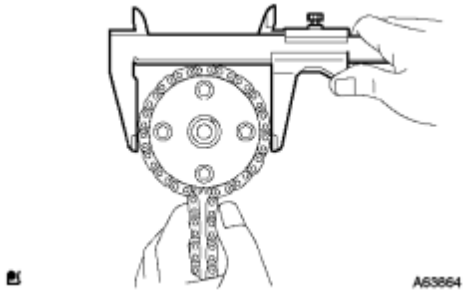
NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and oil pump drive shaft gear.

7. INSPECT CAMSHAFT TIMING GEAR ASSEMBLY

(a) Place the chain around the camshaft timing gear assembly.




(b) Using a vernier caliper, measure the diameter of the camshaft timing gear assembly and chain.

Minimum gear diameter (with chain):

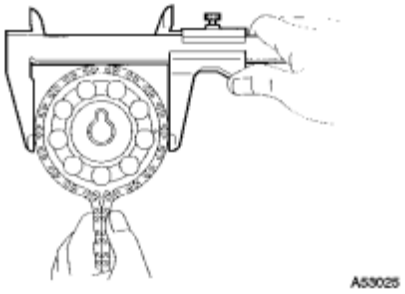
96.8 mm (3.81 in.)

NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and camshaft timing gear assembly.

8. INSPECT CAMSHAFT TIMING SPROCKET




(a) Place the chain around the camshaft timing sprocket.

(b) Using a vernier caliper, measure the diameter of the camshaft timing sprocket and chain.

Minimum gear diameter (with chain):

96.8 mm (3.81 in.)

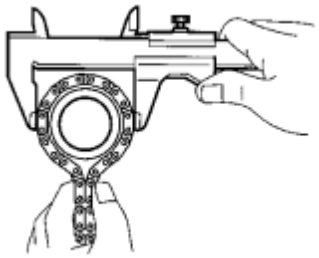
NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and camshaft timing sprocket.

9. INSPECT CRANKSHAFT TIMING GEAR

(a) Place the chain around the crankshaft timing gear.



(b) Using a vernier caliper, measure the diameter of the crankshaft timing gear and chain.

Minimum gear diameter (with chain):

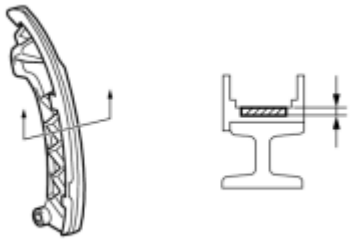
51.1 mm (2.01 in.)

NOTICE:

The vernier caliper must be in contact with the chain rollers when measuring.

If the diameter is less than the minimum, replace the chain and crankshaft timing gear.

10. INSPECT CHAIN TENSIONER SLIPPER



T

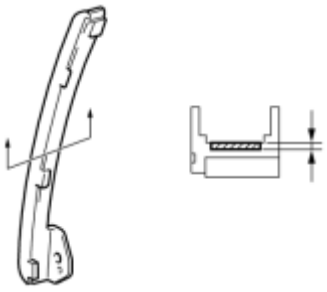
(a) Using a vernier caliper, measure the chain tensioner slipper wear.

Maximum wear:

1.0 mm (0.0394 in.)

If the wear is more than the maximum, replace the chain tensioner slipper.

11. INSPECT NO. 1 CHAIN VIBRATION DAMPER



T

(a) Using a vernier caliper, measure the No. 1 chain vibration damper wear.

Maximum wear:

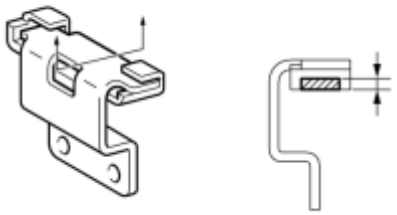
1.0 mm (0.0394 in.)

If the wear is more than the maximum, replace the No. 1 chain vibration damper.

12. INSPECT NO. 2 CHAIN VIBRATION DAMPER

(a) Using a vernier caliper, measure the No. 2 chain vibration damper

wear.



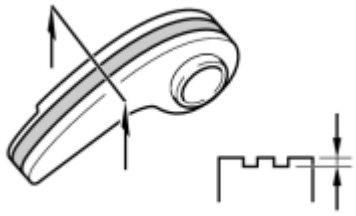
T

Maximum wear:

1.0 mm (0.0394 in.)

If the wear is more than the maximum, replace the No. 2 chain vibration damper.

13. INSPECT CHAIN TENSIONER PLATE



T

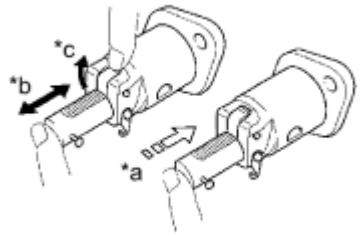
(a) Using a vernier caliper, measure the chain tensioner plate wear.

Maximum wear:

1.0 mm (0.0394 in.)

If the wear is more than the maximum, replace the chain tensioner plate.

14. INSPECT NO. 1 CHAIN TENSIONER




(a) Check that the plunger moves smoothly when the cam is raised with your finger.

## Text in Illustration

| | |
|---|---|
| *a | Lock |
| *b | Move |
| *c | Raise |

(b) Release the cam, then check that the plunger is locked in place by the cam and does not move when pushing with your finger.

If necessary, replace the No. 1 chain tensioner.

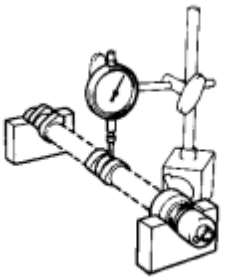
15. INSPECT CAMSHAFT

(a) Inspect the camshaft for runout.

(1) Place the camshaft on V-blocks.

(2) Using a dial indicator, measure the circle runout at the center journal.

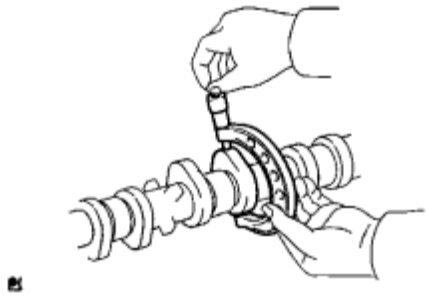
Maximum circle runout:



0.04 mm (0.00157 in.)

If the circle runout is more than the maximum, replace the camshaft.

(b) Inspect the cam lobes.



(1) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

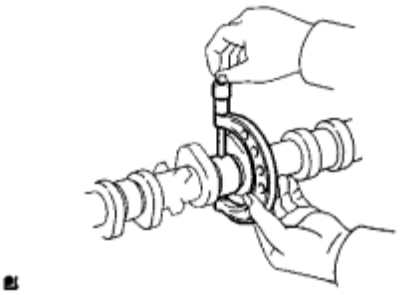
41.779 to 41.879 mm (1.6448 to 1.6488 in.)

Minimum cam lobe height:

41.629 mm (1.6389 in.)

If the cam lobe height is less than the minimum, replace the camshaft.

(c) Inspect the camshaft journals.



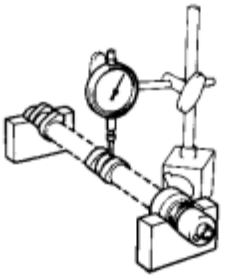
(1) Using a micrometer, measure the journal diameter.

Standard Journal Diameter:

| Journal Position | Specified Condition |
|---|---|
| No. 1 | 34.449 to 34.465 mm (1.3563 to 1.3569 in.) |
| Other | 22.949 to 22.965 mm (0.90350 to 0.90413 in.) |

If the journal diameter is not as specified, check the oil clearance INFO.

16. INSPECT NO. 2 CAMSHAFT



(a) Inspect the No. 2 camshaft for runout.

(1) Place the No. 2 camshaft on V-blocks.

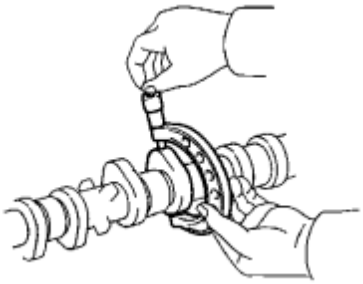
(2) Using a dial indicator, measure the circle runout at the center journal.

Maximum circle runout:

0.04 mm (0.00157 in.)

If the circle runout is more than the maximum, replace the No. 2 camshaft.

(b) Inspect the cam lobes.



(1) Using a micrometer, measure the cam lobe height.

Standard cam lobe height:

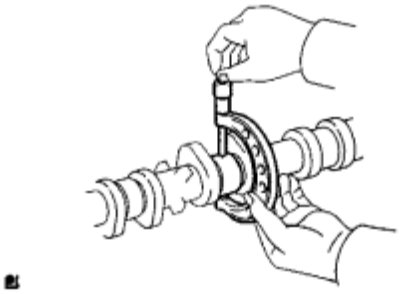
43.346 to 43.446 mm (1.7065 to 1.7105 in.)

Minimum cam lobe height:

43.196 mm (1.7006 in.)

If the cam lobe height is less than the minimum, replace the No. 2 camshaft.

(c) Inspect the camshaft journals.



(1) Using a micrometer, measure the journal diameter.

Standard Journal Diameter:

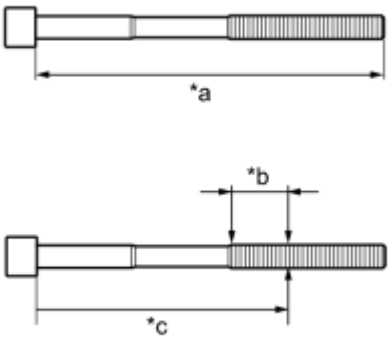
| Journal Position | Specified Condition |
|---|---|
| No. 1 | 34.449 to 34.465 mm (1.3563 to 1.3569 in.) |
| Other | 22.949 to 22.965 mm (0.90350 to 0.90413 in.) |

If the journal diameter is not as specified, check the oil clearance INFO.

17. INSPECT CYLINDER HEAD SET BOLT

(a) Using a vernier caliper, measure the length of the cylinder head set bolt from the seat to the end.

# Text in Illustration




| | |
|---|---|
| *a | Measurement Length |
| *b | Measurement Area |
| *c | Distance |

Standard length:

146.8 to 148.2 mm (5.78 to 5.83 in.)

Maximum length:

149.2 mm (5.87 in.)

If the length is more than the maximum, replace the cylinder head set bolt.

(b) Using a vernier caliper, measure the diameter of the elongated thread at the measurement point.

Measurement point:

115 mm (4.53 in.)

Standard diameter:

9.77 to 9.96 mm (0.385 to 0.392 in.)

Minimum diameter:

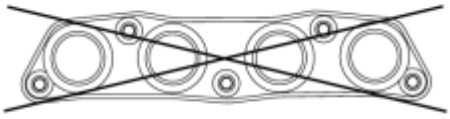
9.4 mm (0.370 in.)

If the diameter is less than the minimum, replace the cylinder head bolt.

HINT:

If a visual check reveals no excessively thin areas, check the center of the bolt (refer to illustration) and find the area that has the smallest diameter.

18. INSPECT EXHAUST MANIFOLD



(a) Using a precision straightedge and feeler gauge, measure the warpage on the surface that contacts the cylinder head.

Maximum warpage:

0.7 mm (0.0276 in.)

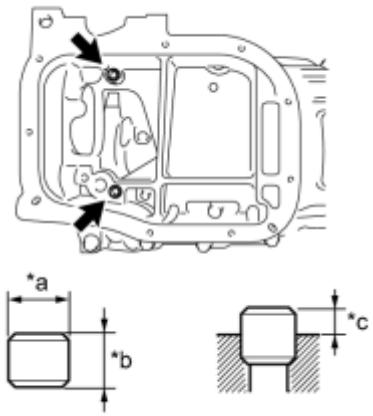
If the warpage is more than the maximum, replace the exhaust manifold.

# REASSEMBLY

1. INSTALL STIFFENING CRANKCASE RING PIN

NOTICE:

It is not necessary to remove a ring pin unless it is being replaced.



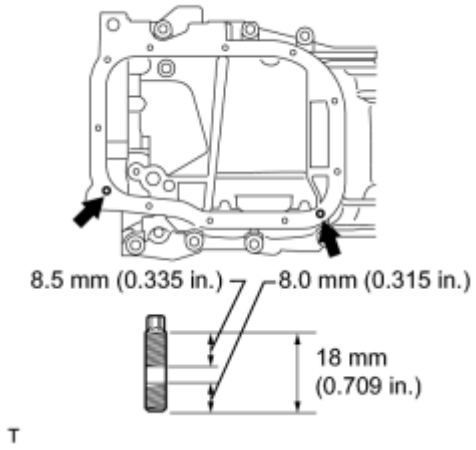

## Text in Illustration

| | |
|---|---|
| *a | Width |
| *b | Height |
| *c | Protrusion Height |

(a) Using a plastic-faced hammer, tap in 2 new ring pins until they stop.

Standard Ring Pin:

| Item | Protrusion Height | Height | Width |
|---|---|---|---|
| Ring pin | 3.0 mm (0.118 in.) | 11 mm (0.433 in.) | 8 mm (0.315 in.) |




2. INSTALL STIFFENING CRANKCASE STUD BOLT

NOTICE:

If a stud bolt is deformed or the threads are damaged, replace it.

(a) Using an E6 "TORX" socket wrench, install the stud bolts as shown in the illustration.

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

3. INSTALL STIFFENING CRANKCASE ASSEMBLY

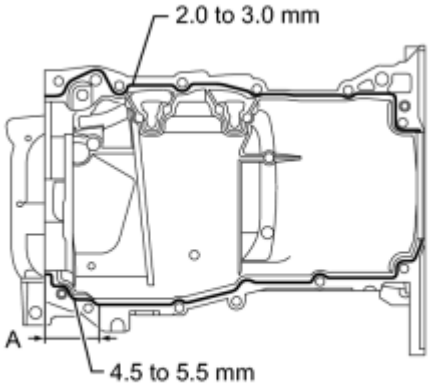
(a) Apply seal packing in a continuous line as shown in the illustration.

Seal packing:

Toyota Genuine Seal Packing Black, Three bond 1207B or equivalent

Standard Seal Diameter:

| Area | Specified Condition |
|---|---|



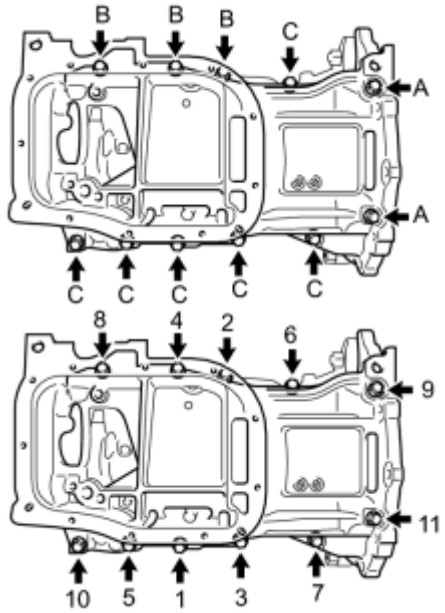

T

| | |
|---|---|
| Continuous Line | 2.0 to 3.0 mm (0.0787 to 0.118 in.) |
| A | 4.5 to 5.5 mm (0.177 to 0.217 in.) |

Application Length A:

56 mm (2.20 in.)

- Remove any oil from the contact surfaces.
- Install the crankcase within 3 minutes and tighten the bolts within 15 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after installing the stiffening crankcase assembly.




(b) Install the stiffening crankcase with the 11 bolts in the sequence shown in the illustration.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

Bolt Length:

| Item | Specified Condition |
|---|---|
| Bolt A | 138 mm (5.43 in.) |
| Bolt B | 35 mm (1.38 in.) |
| Bolt C | 70 mm (2.76 in.) |

(c) Recheck the torque for bolts 1 and 2.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

(d) Wipe off any excess seal packing with a clean piece of cloth.

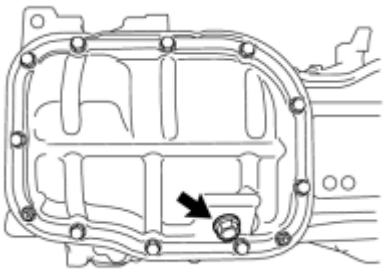
4. INSTALL OIL PUMP ASSEMBLY INFO

5. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY INFO

6. INSTALL OIL PAN DRAIN PLUG

(a) Install a new gasket and the drain plug.

Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

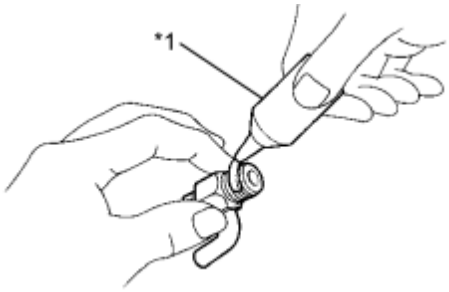


T

7. INSTALL ENGINE REAR OIL SEAL INFO

8. INSTALL CYLINDER BLOCK WATER DRAIN COCK SUB-ASSEMBLY

(a) Apply adhesive to the threads of the cylinder block water drain cock.

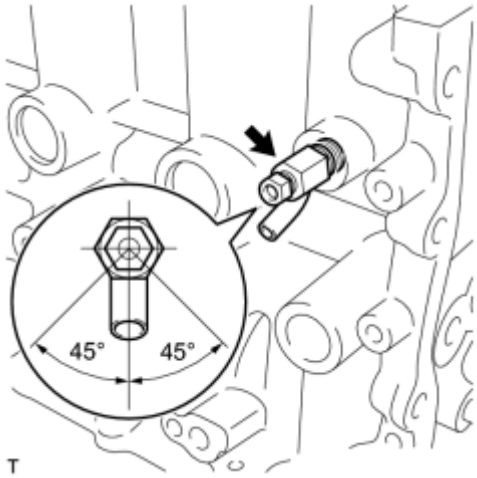



## Text in Illustration

| | |
|---|---|
| *1 | Adhesive |

Adhesive:

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent




T

(b) Install the drain cock as shown in the illustration.

Torque: **25 N·m (255 kgf·cm, 18ft·lbf)**

- Do not rotate the drain cock more than 1 revolution (360°) after tightening it to the specified torque.
- Do not loosen the drain cock to adjust it. If an adjustment is necessary, remove the drain cock and reinstall it.
- Install the drain cock within 3 minutes of applying adhesive.
- Do not start the engine for at least 1 hour after installing the drain cock.

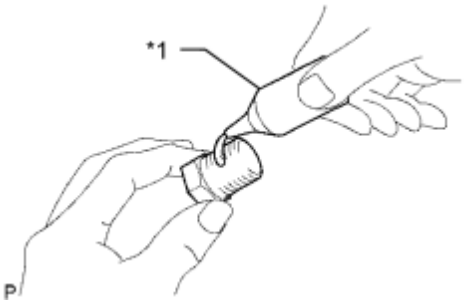
(c) Install the drain cock plug to the drain cock.

Torque: **13 N·m (130 kgf·cm, 9ft·lbf)**

9. INSTALL NO. 1 TAPER SCREW PLUG

(a) Apply adhesive to 2 or 3 threads of the taper screw plug.

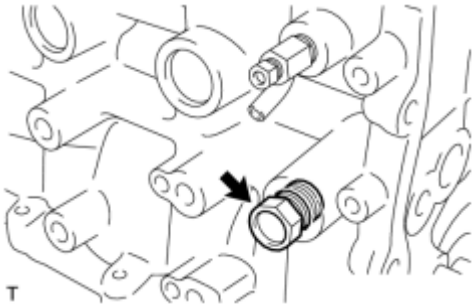
## Text in Illustration




| | |
|---|---|
| *1 | Adhesive |

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent




(b) Install the taper screw plug.

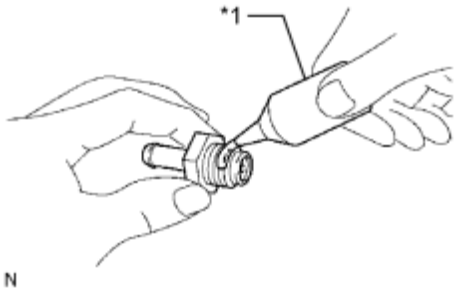
Torque: **43 N·m (438 kgf·cm, 32ft·lbf)**

- Install the plug within 3 minutes of applying adhesive.
- Do not start the engine for at least 1 hour after installation.

10. INSTALL VENTILATION VALVE SUB-ASSEMBLY

(a) Apply adhesive to the threads of the ventilation valve sub-assembly.

## Text in Illustration

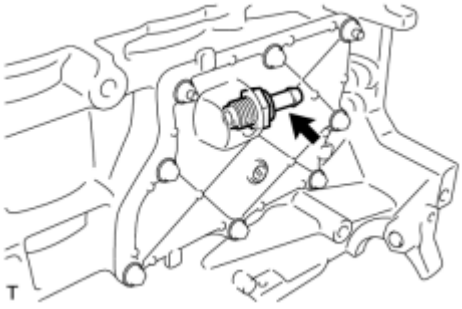



| | |
|---|---|
| *1 | Adhesive |

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

- Install the ventilation valve sub-assembly within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the ventilation valve sub-assembly.




(b) Install the ventilation valve sub-assembly.

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

11. INSTALL CYLINDER HEAD GASKET INFO

12. INSTALL CYLINDER HEAD SUB-ASSEMBLY INFO

13. INSTALL VALVE STEM CAP

(a) Apply a light coat of engine oil to the valve stem ends.

(b) Install the 16 valve stem caps to the cylinder head.

NOTICE:

Do not drop the valve stem caps into the cylinder head.

14. INSTALL VALVE LASH ADJUSTER ASSEMBLY

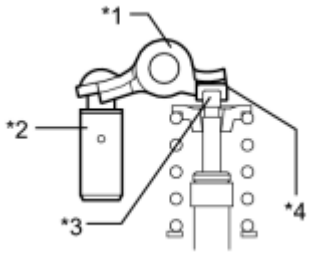
(a) Inspect each valve lash adjuster before installing it INFO.

(b) Install the 16 valve lash adjusters to the cylinder head.

NOTICE:

Install the valve lash adjuster to the same place it was removed from.

15. INSTALL NO. 1 VALVE ROCKER ARM SUB-ASSEMBLY



P

(a) Apply engine oil to the valve lash adjuster tips and valve stem cap ends.

## Text in Illustration

| | |
|---|---|
| *1 | Valve Rocker Arm |
| *2 | Valve Lash Adjuster |
| *3 | Valve Stem |
| *4 | Valve Stem Cap |

(b) Make sure that the No. 1 valve rocker arms are installed as shown in the illustration.

16. INSTALL CAMSHAFT HOUSING STRAIGHT PIN

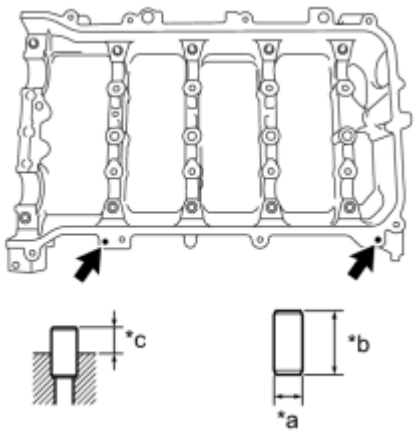
NOTICE:

It is not necessary to remove a straight pin unless it is being replaced.

(a) Using a plastic-faced hammer, tap in a new straight pin to the specified protrusion height.

## Text in Illustration

| | |
|---|---|
| *a | Width |
| *b | Height |



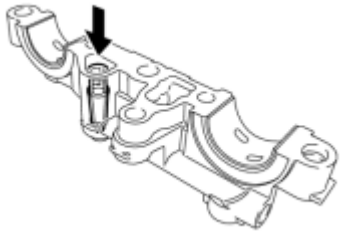

| | |
|---|---|
| *c | Protrusion Height |

Standard Straight Pin:

| Item | Protrusion Height | Height | Width |
|---|---|---|---|
| Straight pin | 6.5 to 7.5 mm (0.256 to 0.295 in.) | 14 mm (0.551 in.) | 6.0 mm (0.236 in.) |

17. INSTALL NO. 1 CAMSHAFT BEARING INFO

18. INSTALL OIL CONTROL VALVE FILTER



(a) Check that no foreign matter is on the mesh part of the oil control valve filter.

(b) Install the oil control valve filter.

NOTICE:

Do not touch the mesh when installing the oil control valve filter.

19. INSTALL NO. 2 CAMSHAFT BEARING INFO

20. INSTALL NO. 2 CAMSHAFT INFO

21. INSTALL CAMSHAFT INFO

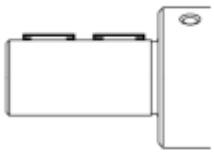
22. INSTALL CAMSHAFT BEARING CAP INFO

23. INSTALL CAMSHAFT HOUSING SUB-ASSEMBLY INFO

24. INSTALL CAMSHAFT TIMING SPROCKET INFO

25. INSTALL CAMSHAFT TIMING GEAR ASSEMBLY INFO

26. INSTALL CRANKSHAFT TIMING GEAR KEY

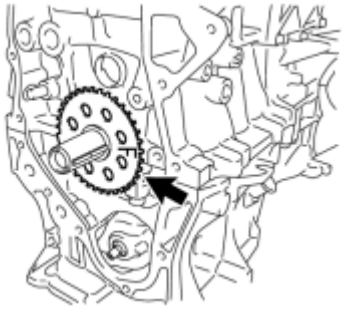


(a) Using a plastic-faced hammer, tap in the 2 crankshaft timing gear keys.

HINT:

Tap in the crankshaft timing gear keys until they contact the crankshaft as shown in the illustration.

27. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE



(a) Install the crankshaft position sensor plate with the "F" mark facing forward.

T

28. INSTALL NO. 2 CHAIN SUB-ASSEMBLY INFO

29. INSTALL CRANKSHAFT TIMING SPROCKET INFO

30. INSTALL NO. 1 CHAIN VIBRATION DAMPER INFO

31. SET NO. 1 CYLINDER TO TDC/COMPRESSION INFO

32. INSTALL CHAIN SUB-ASSEMBLY INFO

33. CHECK NO. 1 CYLINDER TO TDC/COMPRESSION INFO

34. INSTALL CHAIN TENSIONER SLIPPER INFO

35. INSTALL NO. 2 CHAIN VIBRATION DAMPER INFO

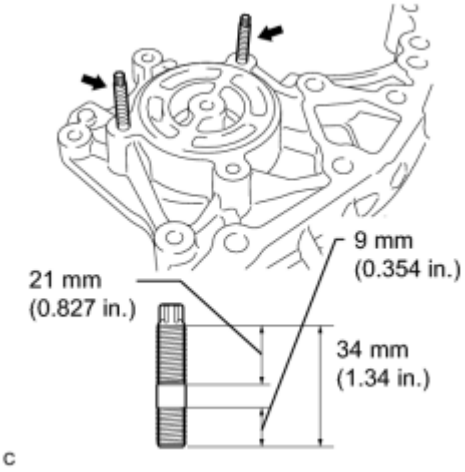
36. INSTALL INLET WATER SUB-ASSEMBLY STUD BOLT

NOTICE:

If a stud bolt is deformed or the threads are damaged, replace it.

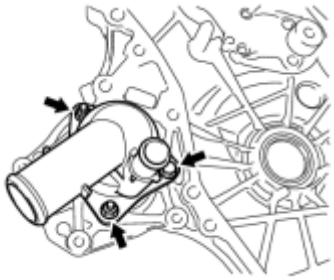
(a) Using an E5 "TORX" socket wrench, install the stud bolts as shown in the illustration.

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**




c

37. INSTALL INLET WATER SUB-ASSEMBLY



c

(a) Install a new gasket and the inlet water sub-assembly with the bolt and 2 nuts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

38. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY INFO

39. INSTALL TIMING CHAIN COVER OIL SEAL INFO

40. INSTALL CRANKSHAFT PULLEY INFO

41. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY INFO

42. INSTALL OIL FILTER CAP ASSEMBLY INFO

43. INSTALL SPARK PLUG TUBE GASKET

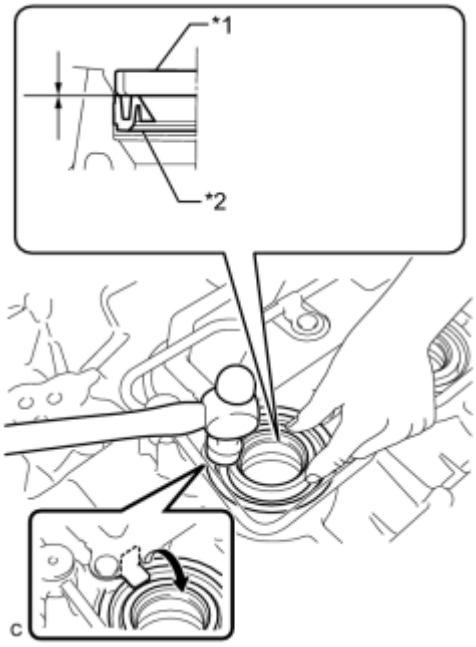
(a) Using a cutter knife, cut off the seal part of the removed gasket.





**Text in Illustration**

| | |
|---|---|
| ▨ | Part to Cut Off |




(b) Using a hammer and the plug tube gasket which has had the sealing part cut off, uniformly tap in a new plug tube gasket all the way.

# Text in Illustration

| | |
|---|---|
| *1 | Plug Tube Gasket without Sealing Part |
| *2 | New Plug Tube Gasket |

- Keep the lip free of foreign matter.
- Do not tap in the plug tube gasket.

HINT:

If a plug tube gasket that will be used to install a new gasket is deformed, and cannot be positioned on a new gasket, correct the deformation using pliers.

(c) Return the claws of the ventilation baffle plate to their original positions.

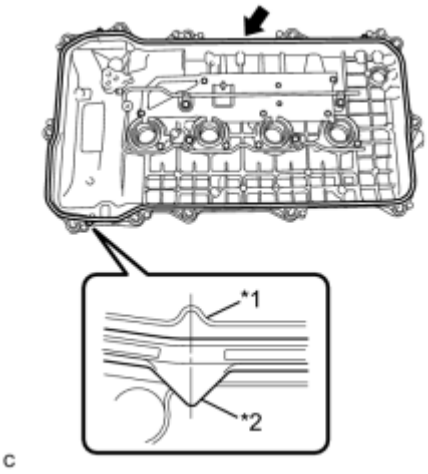
44. INSTALL CYLINDER HEAD COVER GASKET

(a) Install a new cylinder head cover gasket to the cylinder head cover.

# Text in Illustration

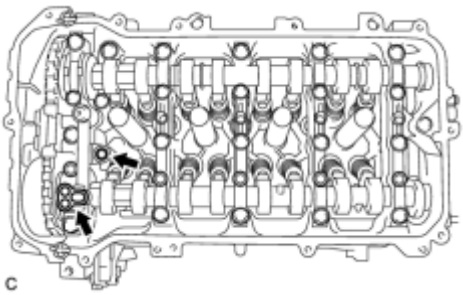
| | |
|---|---|
| *1 | Cylinder Head Cover |
| *2 | Cylinder Head Cover Gasket |

- Remove any oil from the contact surfaces.
- Misalignment between the center of the cylinder head cover rib




and the center of the cylinder head gasket tab is within 4 mm (0.157 in.).

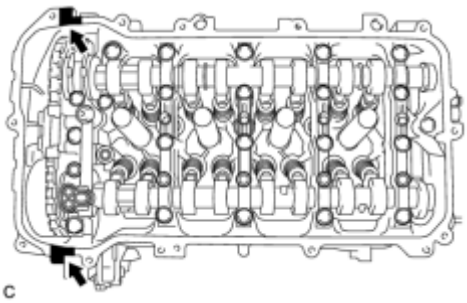
45. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY



(a) Install 2 new gaskets to the camshaft bearing cap.

(b) Apply seal packing as shown the illustration.

Seal packing:



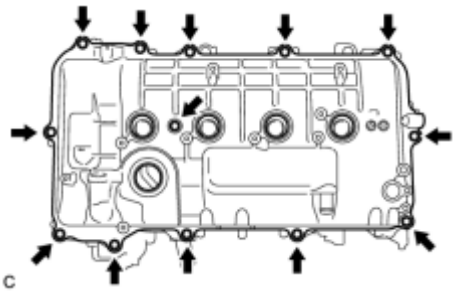
Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Standard diameter:

4.0 mm (0.157 in.)

- Remove any oil from the contact surfaces.
- Install the cylinder head cover sub-assembly within 3 minutes and tighten the bolts within 15 minutes of applying seal packing.
- Do not start the engine for at least 2 hours after the installation.

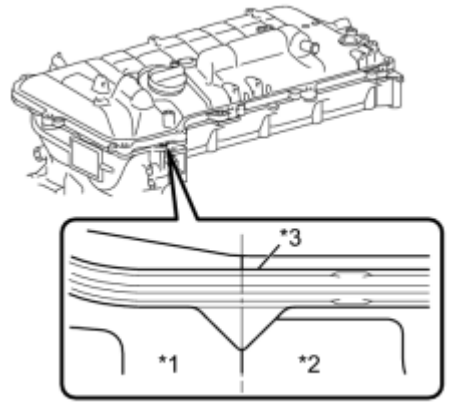
(c) Install the cylinder head cover with a new seal washer and the 13 bolts.



Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

NOTICE:

Misalignment between the contact surfaces of the timing chain cover and the camshaft housing and the center of the cylinder head gasket tab is within 4 mm (0.157 in.).




**Text in Illustration**

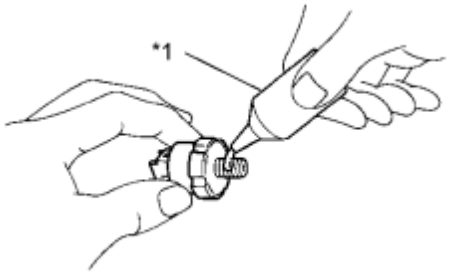
| | |
|---|---|
| *1 | Timing Chain Cover |
| *2 | Camshaft Housing |
| *3 | Cylinder Head Cover Gasket |

46. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Apply adhesive to 2 or 3 threads of the engine oil pressure switch assembly.

# Text in Illustration

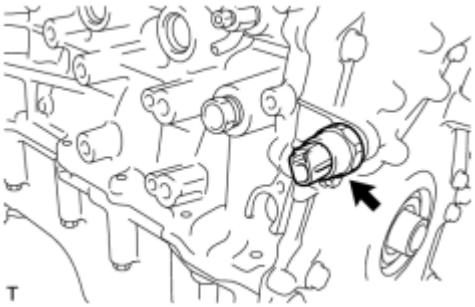
| | |
|---|---|
| *1 | Adhesive |




Adhesive:

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent

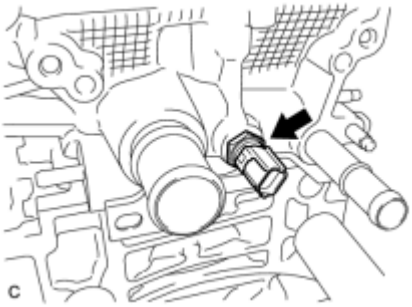
- Install the oil pressure switch within 3 minutes after applying adhesive.
- Do not start the engine within 1 hour after installation.




(b) Using a 24 mm deep socket wrench, install the engine oil pressure switch assembly.

Torque: **15 N·m (153 kgf·cm, 11ft·lbf)**

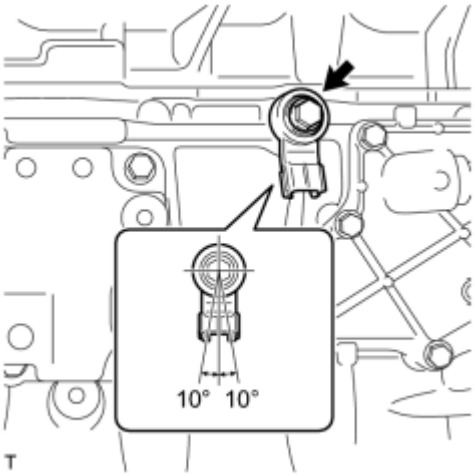
47. INSTALL ENGINE COOLANT TEMPERATURE SENSOR




(a) Install a new gasket and the engine coolant temperature sensor.

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

48. INSTALL KNOCK SENSOR



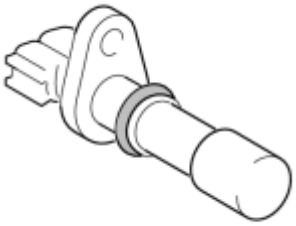

(a) Install the knock sensor with the bolt.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

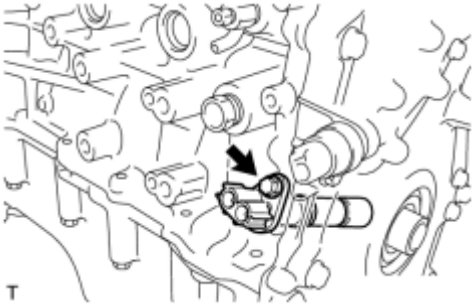
NOTICE:

Make sure that the knock sensor is in the correct position.

49. INSTALL CRANKSHAFT POSITION SENSOR



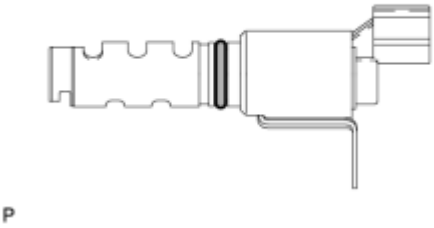
(a) Apply a light coat of engine oil to the O-ring of the sensor.




(b) Install the crankshaft position sensor with the bolt.

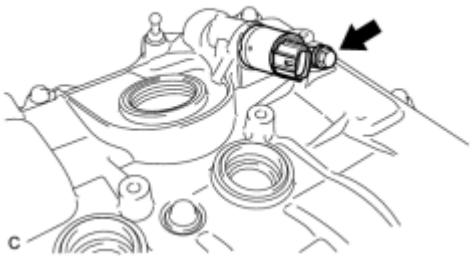
Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

50. INSTALL CAMSHAFT TIMING OIL CONTROL VALVE ASSEMBLY




(a) Apply a light coat of engine oil to a new O-ring and install it to the camshaft timing oil control valve.

(b) Install the camshaft timing oil control valve with the bolt.

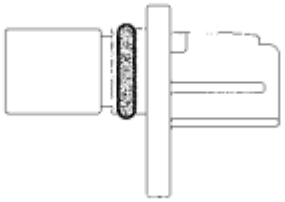



Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

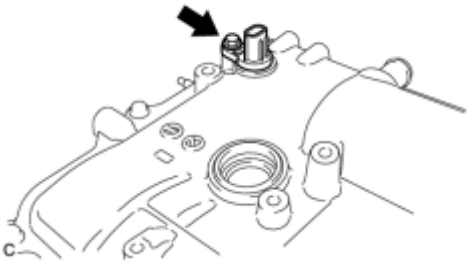
- Do not allow foreign matter to contact the oil seal face of the oil control valve (connecting surface with cylinder head cover).
- Be careful that the O-ring is not cracked or moved out of place when installing the oil control valve.

51. INSTALL CAMSHAFT POSITION SENSOR

(a) Apply a light coat of engine oil to the O-ring of the sensor.




(b) Install the camshaft position sensor with the bolt.



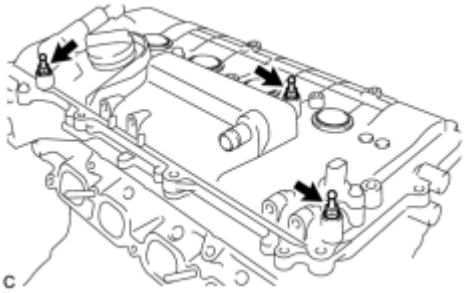

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

NOTICE:

Make sure that the O-ring is not cracked or jammed when installing the sensor.

52. INSTALL SPARK PLUG INFO

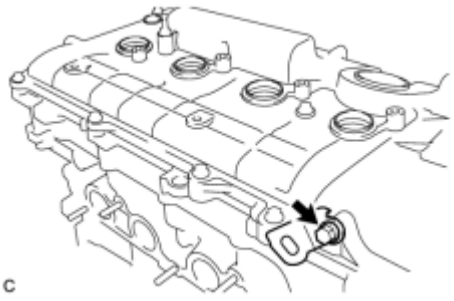
53. INSTALL ENGINE COVER JOINT BOLT




(a) Install the 3 engine cover joint bolts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

54. INSTALL WIRING HARNESS CLAMP BRACKET

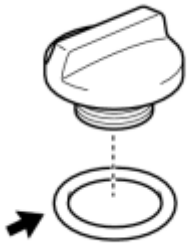



(a) Install the wiring harness clamp bracket with the bolt.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

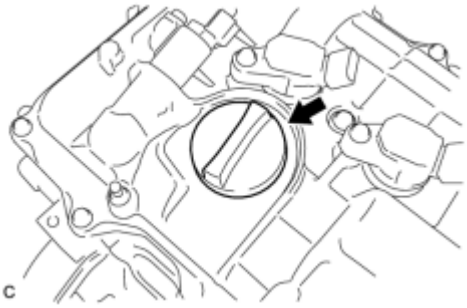
55. INSTALL OIL FILLER CAP GASKET

(a) Install the gasket to the oil filler cap.



T

56. INSTALL OIL FILLER CAP SUB-ASSEMBLY



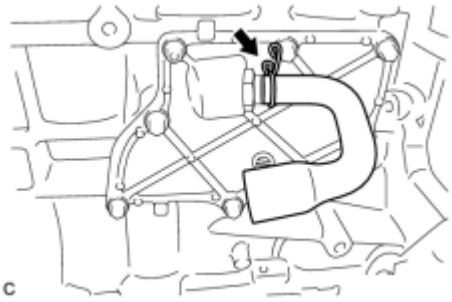
C

(a) Install the oil filler cap.

# INSTALLATION

1. INSTALL IGNITION COIL ASSEMBLY INFO

2. INSTALL VENTILATION HOSE




(a) Install the ventilation hose to the ventilation valve.

3. INSTALL EXHAUST MANIFOLD INFO

4. INSTALL MANIFOLD STAY INFO

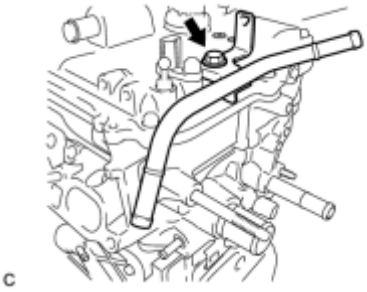
5. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR INFO

6. INSTALL FUEL INJECTOR ASSEMBLY INFO

7. INSTALL NO. 1 DELIVERY PIPE SPACER INFO

8. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

9. INSTALL FUEL VAPOR FEED PIPE




(a) Install the fuel vapor feed pipe with the bolt.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

10. INSTALL INTAKE MANIFOLD INFO

11. INSTALL EGR WITH COOLER PIPE SUB-ASSEMBLY INFO

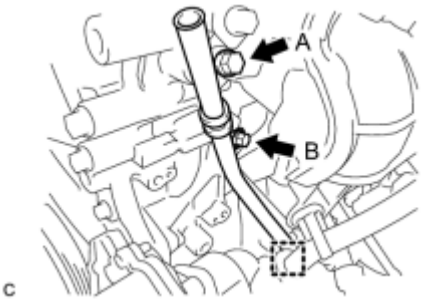
12. INSTALL EGR VALVE ASSEMBLY INFO

13. INSTALL EGR PIPE ASSEMBLY INFO

14. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE

(a) Apply a light coat of engine oil to a new O-ring.

(b) Install the O-ring to the engine oil level dipstick guide.




(c) Install the engine oil level dipstick guide with the 2 bolts.

Bolt A - Torque: **28 N·m (286 kgf·cm, 21ft·lbf)**

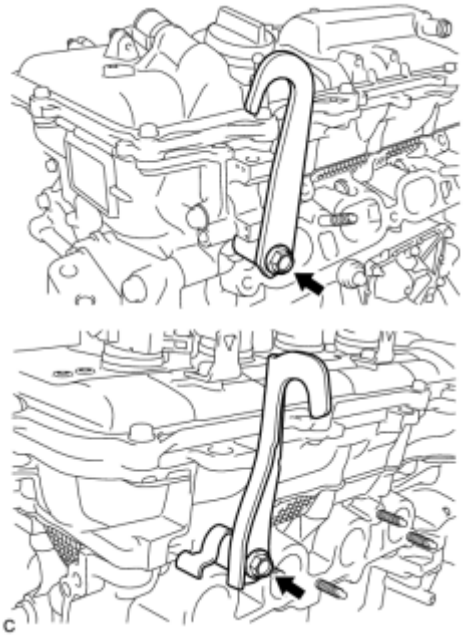
Bolt B - Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

(d) Connect the clamp to the engine oil level dipstick guide.

(e) Install the oil dipstick.

15. INSTALL THROTTLE BODY ASSEMBLY INFO

16. INSTALL ENGINE HANGERS




(a) Install the 2 engine hangers with the 2 bolts.

Torque: **43 N·m (438 kgf·cm, 32ft·lbf)**

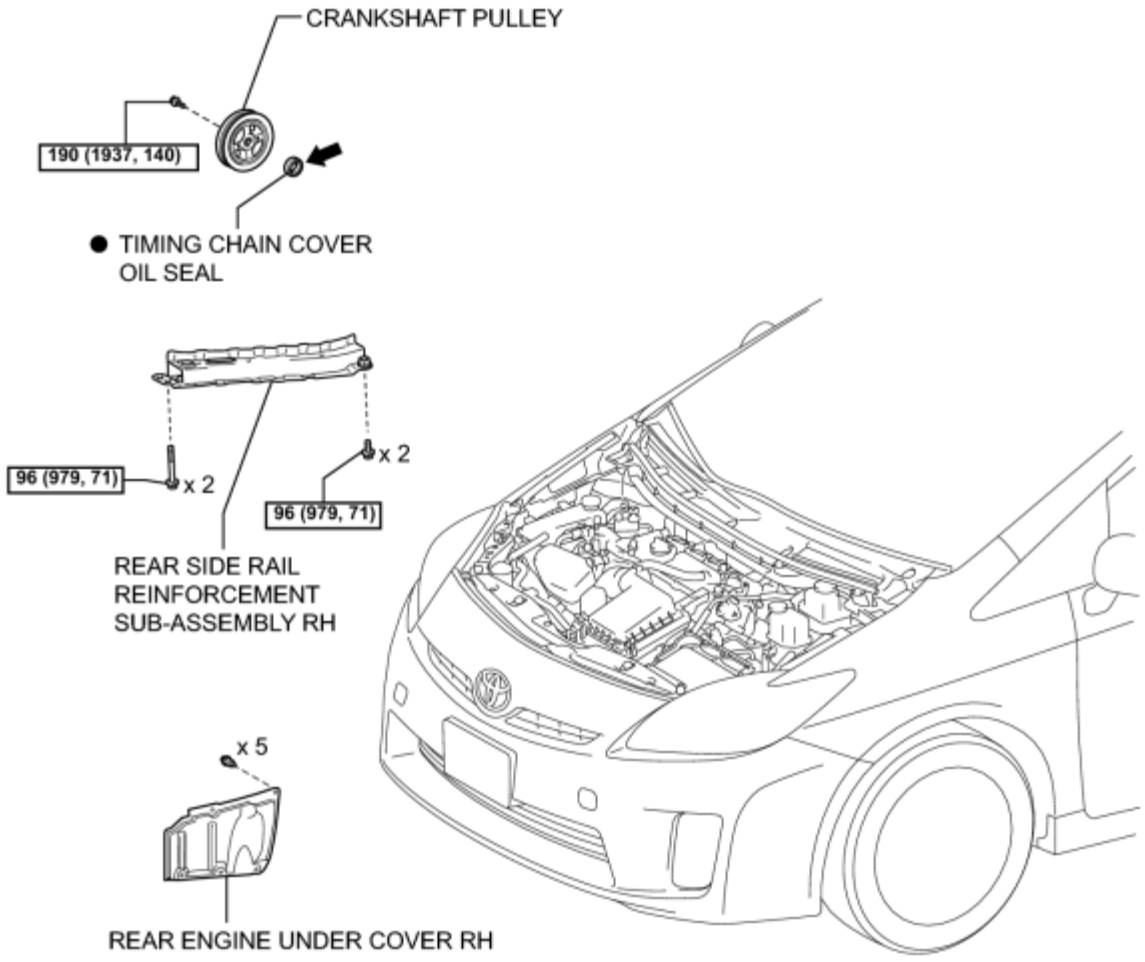
| Part Name | Part No. |
|---|---|
| No. 1 engine hanger | 12281-37021 |
| No. 2 engine hanger | 12282-37011 |
| Bolt | 91552-81050 |

17. REMOVE ENGINE ON ENGINE STAND

(a) Remove the bolts and engine on engine stand.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ MP Grease

c

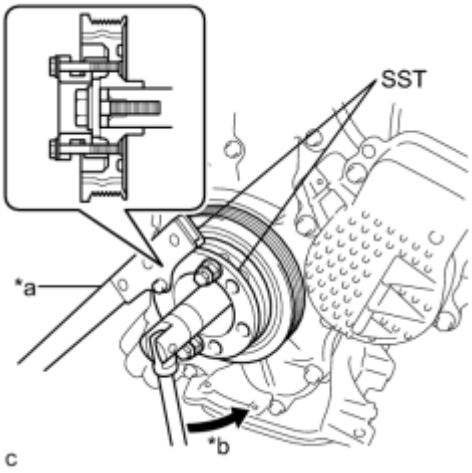
# REMOVAL

1. REMOVE FRONT WHEEL RH

2. REMOVE REAR ENGINE UNDER COVER RH

3. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH INFO

4. REMOVE CRANKSHAFT PULLEY




(a) Using SST, hold the pulley in place and loosen the pulley bolt.

## Text in Illustration

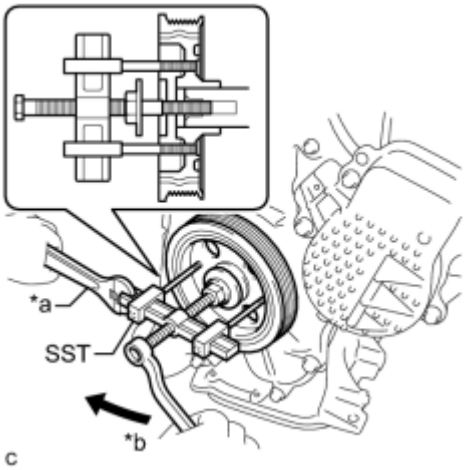
| | |
|---|---|
| *a | Hold |
| *b | Turn |

SST: 09213-58014

91551-80840

SST: 09330-00021

(b) Using SST, remove the crankshaft pulley and pulley bolt.




## Text in Illustration

| | |
|---|---|
| *a | Hold |
| *b | Turn |

SST: 09950-50013

09951-05010

09952-05010

09953-05020

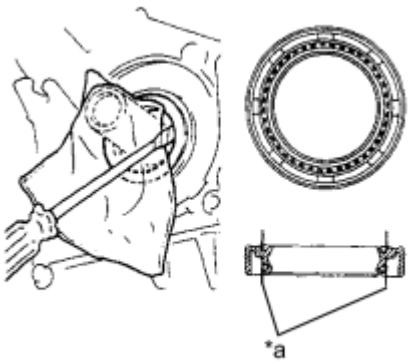
09954-05021

HINT:

If necessary, remove the pulley and pulley bolt using SST.

5. REMOVE TIMING CHAIN COVER OIL SEAL

(a) Using a knife, cut off the lip of the oil seal.




(b) Using a screwdriver with its tip wrapped with tape, pry out the oil seal.

## Text in Illustration

| | |
|---|---|
| *a | Cut Position |

NOTICE:

After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.

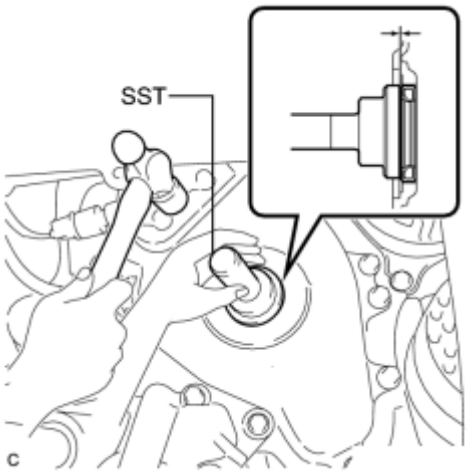
# INSTALLATION

1. INSTALL TIMING CHAIN COVER OIL SEAL

(a) Apply MP grease to the lip of a new oil seal.

NOTICE:

Keep the lip free from foreign matter.




(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the front oil seal retainer edge.

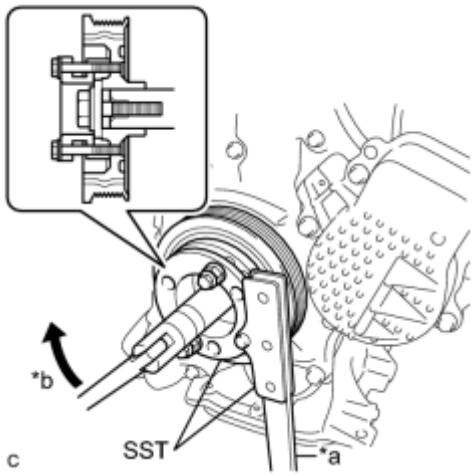
SST: 09223-22010

- Wipe off extra grease from the crankshaft.
- Do not tap the oil seal at an angle.

2. INSTALL CRANKSHAFT PULLEY

(a) Align the pulley set key with the key groove of the pulley.

(b) Using SST, hold the pulley in place and tighten the bolt.




## Text in Illustration

| | |
|---|---|
| *a | Hold |
| *b | Turn |

SST: 09213-58014

91551-80840

SST: 09330-00021

Torque: **190 N·m (1937 kgf·cm, 140ft·lbf)**

3. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH INFO

4. INSTALL FRONT WHEEL RH

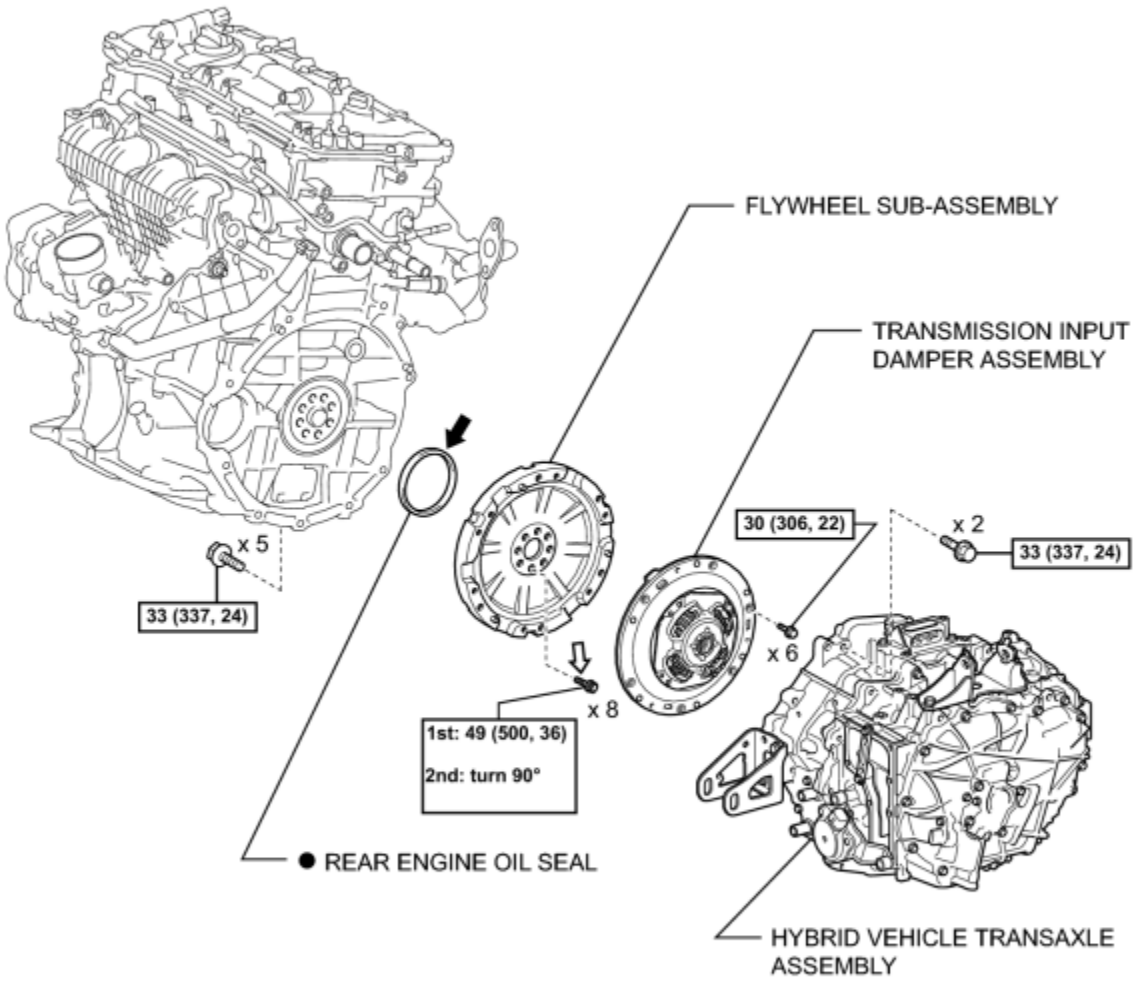
Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

5. INSPECT FOR OIL LEAK

6. INSTALL REAR ENGINE UNDER COVER RH

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

⬅ MP Grease

⇦ Adhesive 1324

c

# REMOVAL

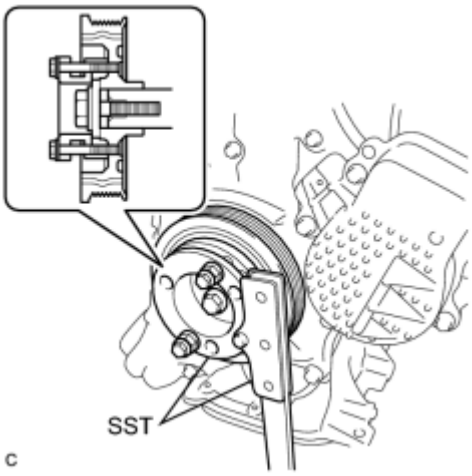
1. REMOVE HYBRID VEHICLE TRANSAXLE ASSEMBLY

(a) Remove the hybrid vehicle transaxle assembly INFO.

NOTICE:

Be careful not to apply excess force to the transmission input damper assembly when removing or installing the hybrid vehicle transaxle assembly. If excess force is applied, the transmission input damper assembly may be damaged, or its splines may become misaligned.

2. REMOVE TRANSMISSION INPUT DAMPER ASSEMBLY

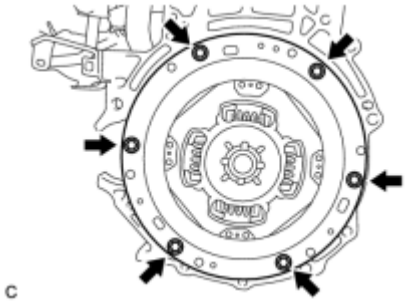



(a) Using SST, hold the crankshaft damper.

SST: 09213-58014

91551-80840

SST: 09330-00021




(b) Remove the 6 bolts and transmission input damper assembly from the flywheel sub-assembly.

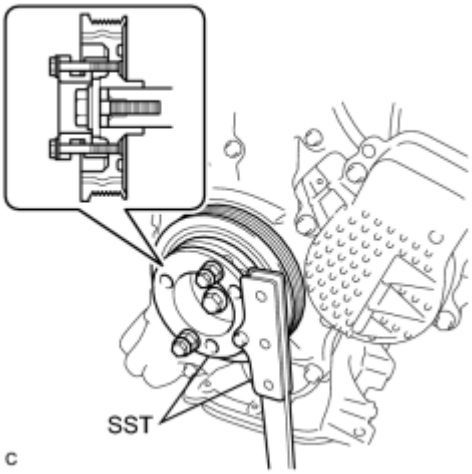
3. REMOVE FLYWHEEL SUB-ASSEMBLY

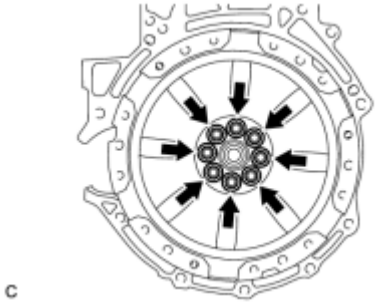
(a) Using SST, hold the crankshaft damper.

SST: 09213-58014

91551-80840

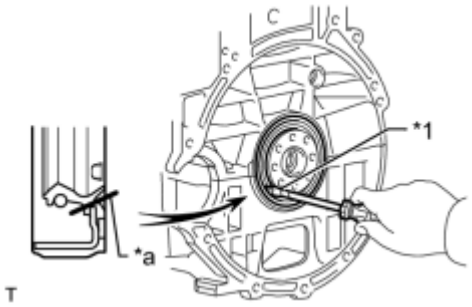
SST: 09330-00021



(b) Remove the 8 bolts and the flywheel.

4. REMOVE REAR ENGINE OIL SEAL




(a) Using a knife, cut off the lip of the oil seal.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |
| *a | Cut Position |

(b) Using a screwdriver with its tip wrapped with tape, pry out the oil seal.

NOTICE:

After removing, check the crankshaft for damage. If damaged, smooth the surface with 400-grit sandpaper.

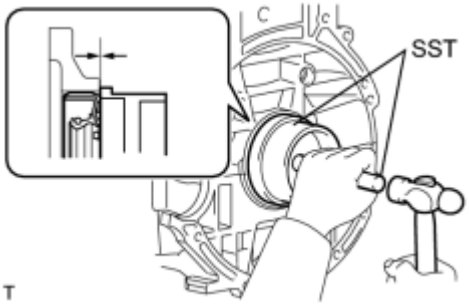
# INSTALLATION

1. INSTALL REAR ENGINE OIL SEAL

(a) Apply MP grease to the lip of a new oil seal.

NOTICE:

Keep the lip free from foreign matter.




(b) Using SST and a hammer, tap in the oil seal until its surface is flush with the rear oil seal retainer edge.

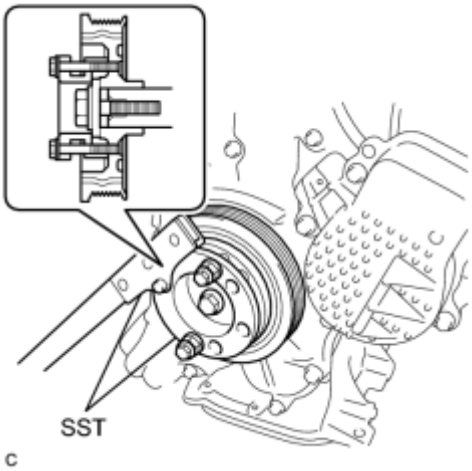
SST: 09223-15030

SST: 09950-70010

09951-07100

- Wipe any extra grease off the crankshaft.
- Do not tap the oil seal at an angle.

2. INSTALL FLYWHEEL SUB-ASSEMBLY




(a) Using SST, hold the crankshaft.

SST: 09213-58014

91551-80840

SST: 09330-00021

(b) Apply adhesive to the 2 or 3 end threads of the bolts.

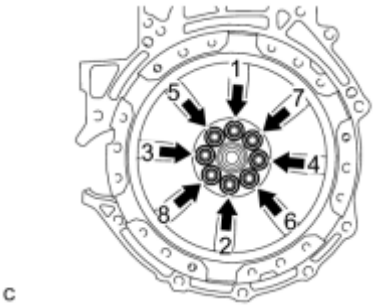



## Text in Illustration

| | |
|---|---|
| *1 | Adhesive |

Adhesive:

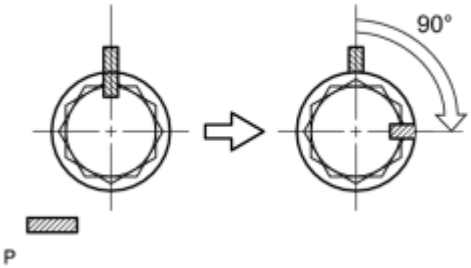
Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent




(c) Using several steps, uniformly install and tighten the 8 bolts in the sequence shown in the illustration.

Torque: **49 N·m (500 kgf·cm, 36ft·lbf)**

(d) Mark the front of the bolts with paint.




**Text in Illustration**

| | |
|---|---|
| ▨ | Paint Mark |

(e) Retighten the 8 bolts 90° in the same sequence.

(f) Check that the paint marks are now at a 90° angle to the front.

(g) Check that the crankshaft turns smoothly.

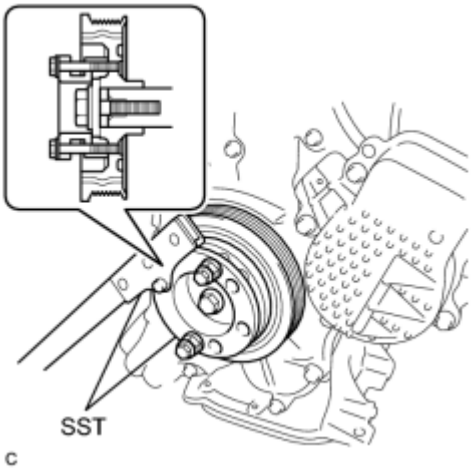
3. INSTALL TRANSMISSION INPUT DAMPER ASSEMBLY

(a) Using SST, hold the crankshaft.

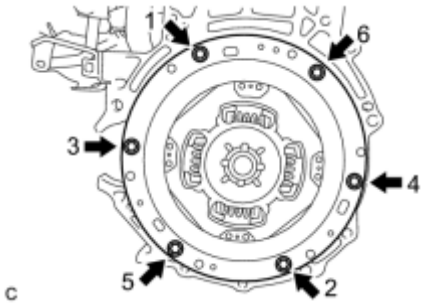
SST: 09213-58014

91551-80840

SST: 09330-00021




(b) Install the transmission input damper.




(c) In several steps, uniformly install and tighten the 6 bolts in the sequence shown in the illustration.

Torque: **30 N·m (306 kgf·cm, 22ft·lbf)**

NOTICE:

Take care not to insert the transmission input damper in a wrong direction.

4. INSTALL HYBRID VEHICLE TRANSAXLE ASSEMBLY

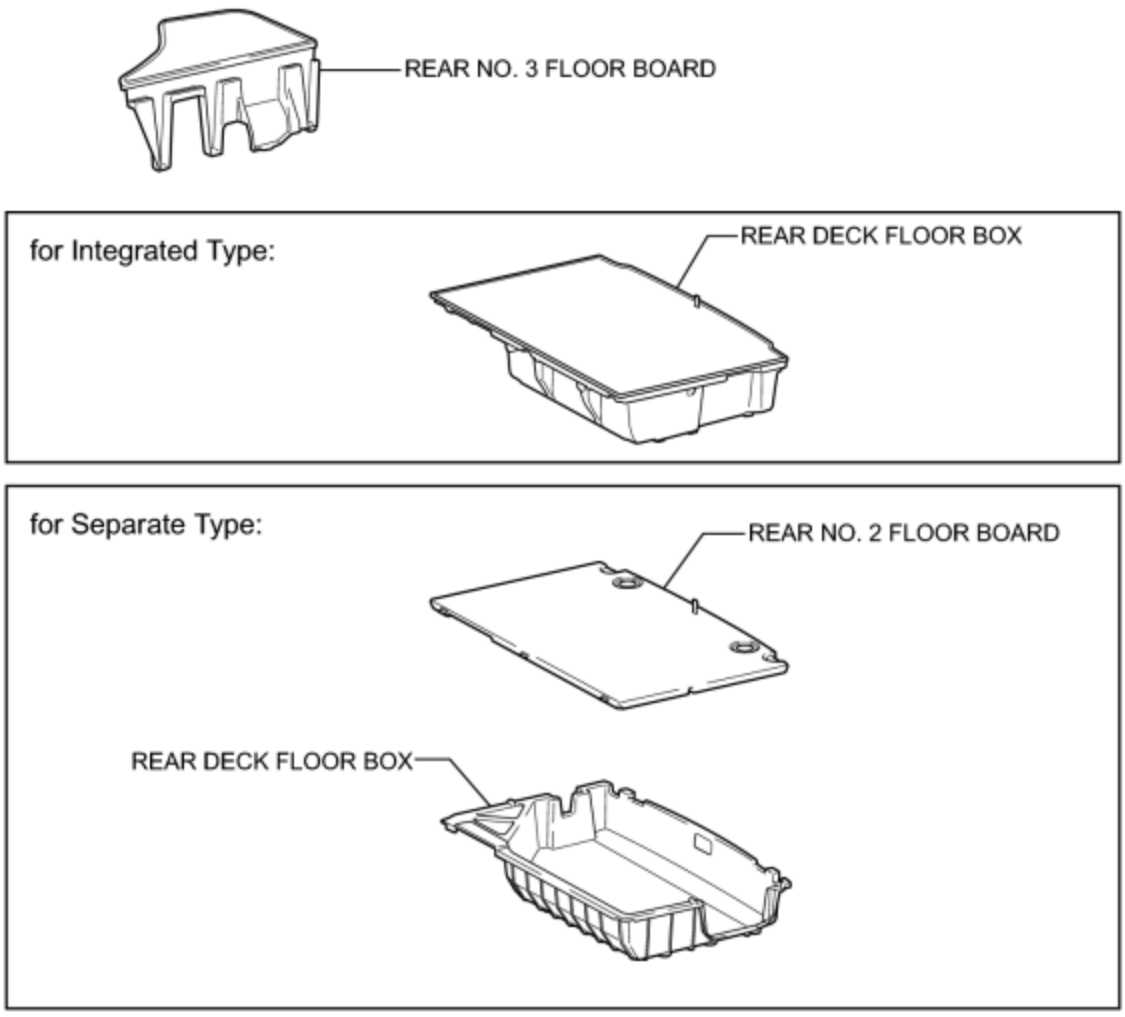
(a) Install the hybrid vehicle transaxle assembly INFO.

NOTICE:

Be careful not to apply excess force to the transmission input damper assembly when removing or installing the hybrid vehicle transaxle assembly. If excess force is applied, the transmission input damper assembly may be damaged, or its splines may become misaligned.

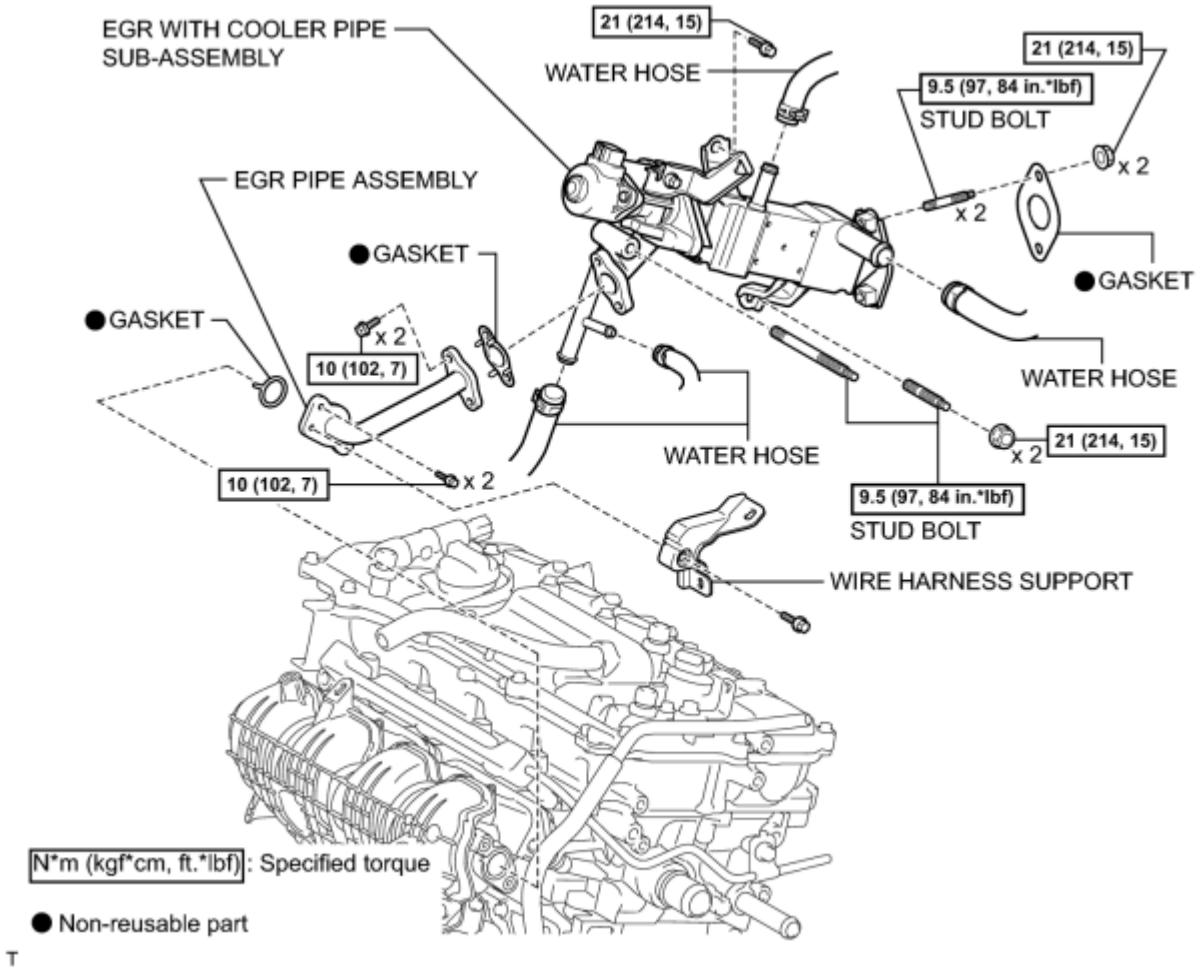
# COMPONENTS

# ILLUSTRATION



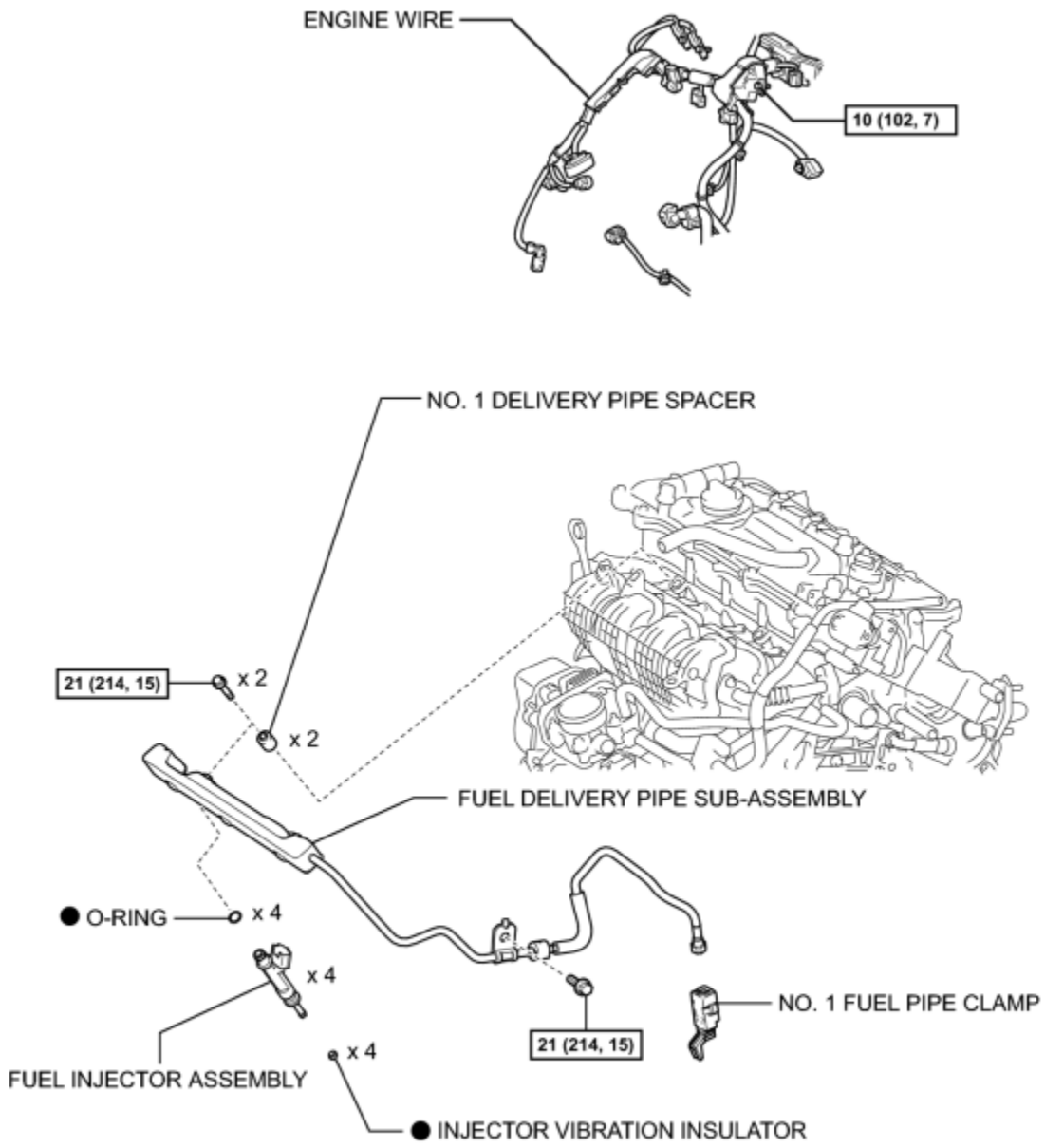

P

# ILLUSTRATION




T

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# REMOVAL

1. DISCHARGE FUEL SYSTEM PRESSURE

(a) Discharge fuel system pressure INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

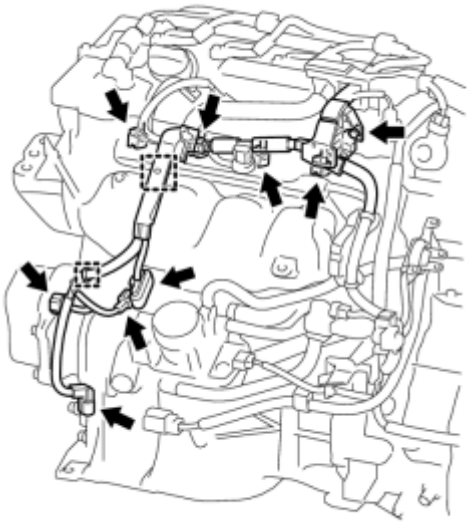
5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE EGR WITH COOLER PIPE SUB-ASSEMBLY

HINT: INFO



C

7. DISCONNECT ENGINE WIRE

(a) Disconnect the 4 fuel injector connectors.

(b) Disconnect the 4 connectors.

(c) Remove the bolt.

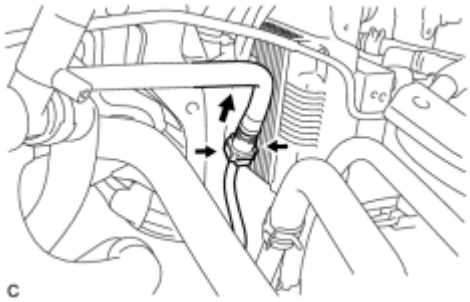
(d) Detach the 2 clamps to disconnect the wire harness.

8. DISCONNECT FUEL TUBE SUB-ASSEMBLY

(a) Release the claw and remove the No. 1 fuel pipe clamp.

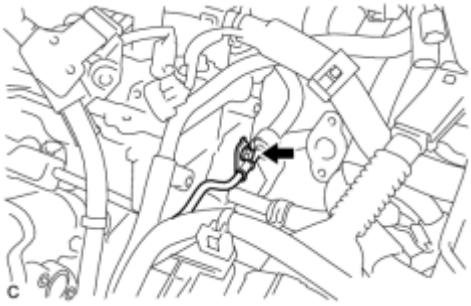


(b) Pinch the tube connector, and then pull the tube connector off of the pipe.

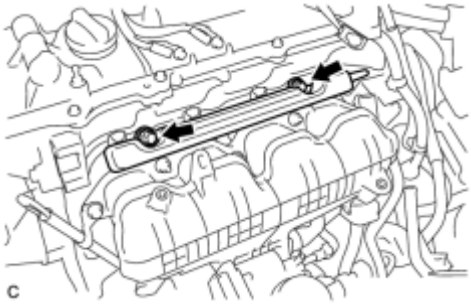


- Check for foreign matter in the fuel tube around the fuel tube connector. Clean it if necessary. Foreign matter can affect the ability of the O-ring to seal the connector and fuel pipe.
- Do not use any tools to separate the connector and pipe.
- Do not forcefully bend, kink or twist the hose.
- Keep the connector and pipe free from foreign matter.
- If the connector and pipe are stuck together, pinch the connector and turn it carefully to disconnect it.
- Put the connector in a plastic bag to prevent damage and contamination.

9. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY



(a) Remove the bolt.



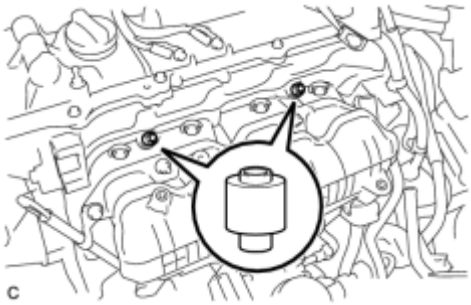
(b) Remove the 2 bolts and the fuel delivery pipe sub-assembly.

NOTICE:

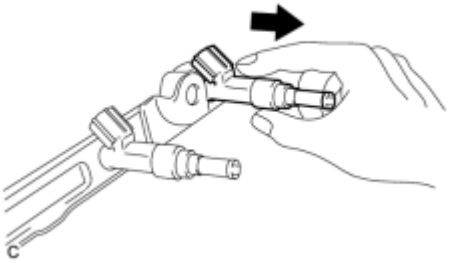
Be careful not to drop the fuel injectors when removing the fuel delivery pipe.

10. REMOVE NO. 1 DELIVERY PIPE SPACER

(a) Remove the 2 delivery pipe spacers from the cylinder head.

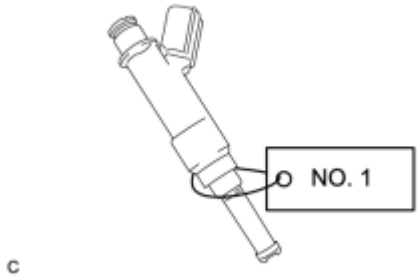


11. REMOVE FUEL INJECTOR ASSEMBLY



(a) Pull the 4 fuel injector assemblies out of the fuel delivery pipe sub-assembly.

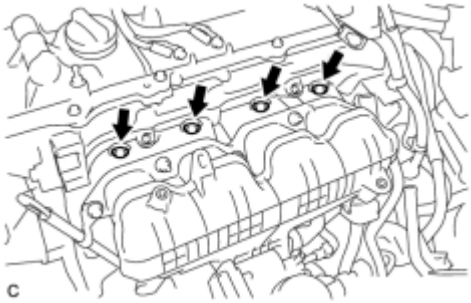
(b) Remove the O-ring from each fuel injector.




(c) For reinstallation, attach a tag or label to each injector shaft.

NOTICE:

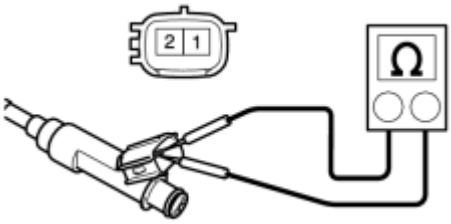
Prevent entry of foreign objects by covering the fuel injectors with plastic bags.



(d) Remove the 4 injector vibration insulators.

# INSPECTION

1. INSPECT FUEL INJECTOR ASSEMBLY




(a) Check the resistance.

(1) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 11.6 to 12.4 Ω |

If the result is not as specified, replace the injector assembly.

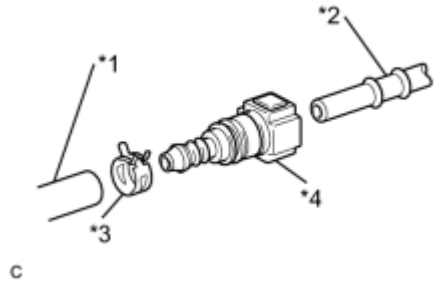
(b) Check the operation.

Inspect the injector injection volume.

CAUTION:

Perform the inspection in a well-ventilated area.

Do not perform the inspection near a naked flame.




(1) Connect SST (fuel tube connector) to SST (hose), then connect them to the fuel pipe (vehicle side).

## Text in Illustration

| | |
|---|---|
| *1 | SST (Hose) |
| *2 | Fuel Pipe (Vehicle Side) |
| *3 | SST (Clip) |
| *4 | SST (Fuel Tube Connector) |

SST: 09268-31012

90467-13001

95336-08070

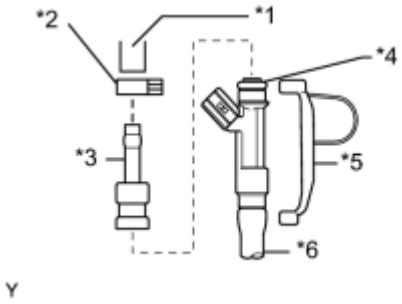
09268-41500

NOTICE:

Ensure that the SST connector O-rings are not damaged and are free of

foreign objects as they are used to seal the connections between the fuel tube connector and pipe.

(2) Install a new O-ring onto the fuel injector assembly.




## Text in Illustration

| | |
|---|---|
| *1 | SST (Hose) |
| *2 | SST (Clip) |
| *3 | SST (Adapter) |
| *4 | O-ring |
| *5 | SST (Clamp) |
| *6 | Vinyl Tube |

(3) Connect SST (adapter and hose) to the injector assembly, and hold the injector assembly and union with SST (clamp).

SST: 09268-31012

09268-41110

09268-41300

90467-13001

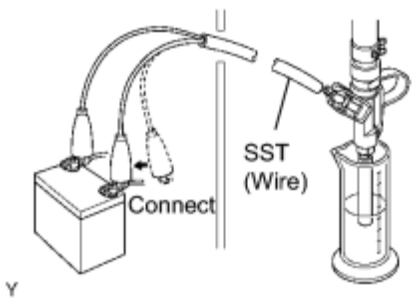
95336-08070

(4) Set the injector assembly in a graduated cylinder.

CAUTION:

Install a suitable vinyl tube onto the injector assembly to prevent gasoline from spraying.

(5) Operate the fuel pump INFO.




(6) Connect SST (wire) to the injector assembly and the battery for 15 seconds, and measure the injection volume with the graduated cylinder. Test each injector 2 or 3 times.

SST: 09842-30080

Standard Injection Volume:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Positive terminal - Ground terminal | Per 15 seconds | 60 to 73 cc (3.7 to 4.5 cu.in.) |

Difference between each injector:

13 cc (0.8 cu.in.) or less

NOTICE:

Always do the switching on the battery side.

If the injection volume is not as specified, replace the injector assembly.

(c) Inspect for leaks.



(1) In the condition above, disconnect the test probes of SST (wire) from the battery and check the fuel leaks from the injector.

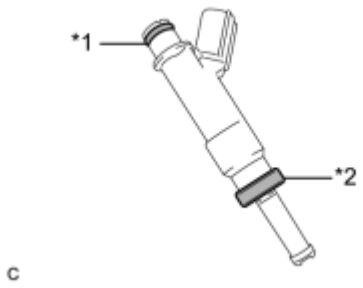
Standard fuel drop:

1 drop or less every 25 minutes

If the injection volume is not as specified, replace the injector assembly.

# INSTALLATION

1. INSTALL FUEL INJECTOR ASSEMBLY

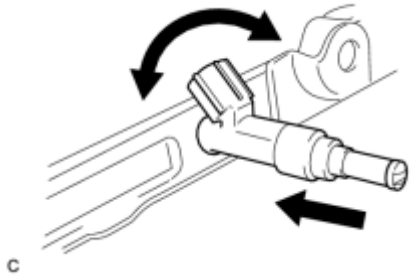



(a) Install a new insulator and O-ring to each fuel injector assembly.

## Text in Illustration

| | |
|---|---|
| *1 | O-ring |
| *2 | Insulator |

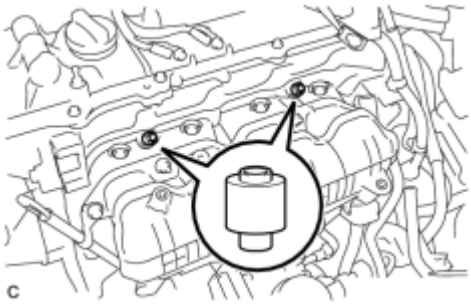
(b) Apply a light coat of gasoline or spindle oil to the contact surfaces of the new O-ring on each fuel injector assembly.




(c) While turning the fuel injector assembly left and right, install it onto the fuel delivery pipe sub-assembly.

- Do not damage the fuel injector assembly or O-ring.
- Do not twist the O-ring.
- After installing each fuel injector, check that it turns smoothly. If not, replace the O-ring with a new one.

2. INSTALL NO. 1 DELIVERY PIPE SPACER




(a) Install the 2 No. 1 delivery pipe spacers onto the cylinder head.

NOTICE:

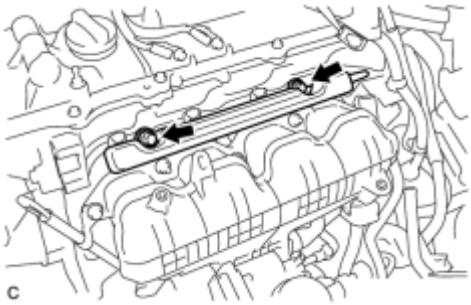
Install the No. 1 delivery pipe spacers in the correct direction.

3. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY

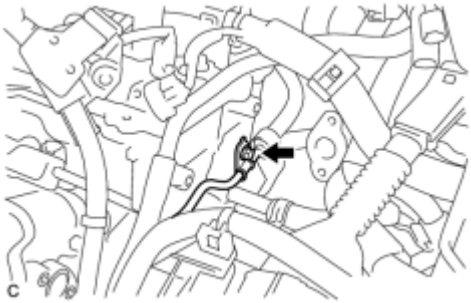
(a) Install the fuel delivery pipe sub-assembly with the 4 fuel injector assemblies and install the 2 bolts.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

- Do not drop the fuel injectors when installing the fuel delivery pipe sub-assembly.



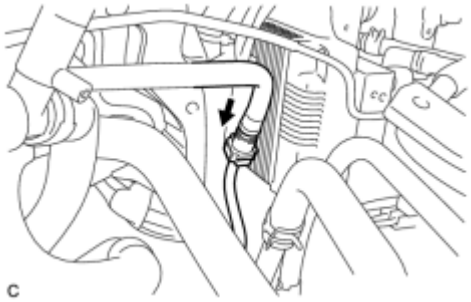
- Check that the fuel injector assemblies rotate smoothly after installing the fuel delivery pipe sub-assembly.



(b) Install the bolt to secure the fuel delivery pipe sub-assembly.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

4. CONNECT FUEL TUBE SUB-ASSEMBLY



(a) Push the tube connector to the pipe until the tube connector makes a "click" sound.

- Before connecting the connector and fuel pipe, check that there is no damage or foreign matter on the connecting part of the fuel pipe.
- After connecting the fuel tube connector and pipe, check that they are securely connected by trying to pull them apart.



(b) Engage the lock claw to install the No. 1 fuel pipe clamp.

5. CONNECT ENGINE WIRE

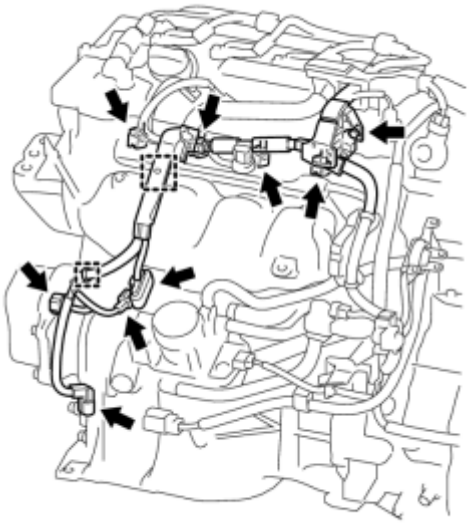
(a) Install the bolt.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

(b) Connect the 4 fuel injector connectors.

(c) Connect the 4 connectors.

(d) Attach the 2 clamps to connect the wire harness.



C

6. INSTALL EGR WITH COOLER PIPE SUB-ASSEMBLY

HINT: INFO

7. INSTALL REAR NO. 3 FLOOR BOARD INFO

8. INSTALL REAR DECK FLOOR BOX INFO

9. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

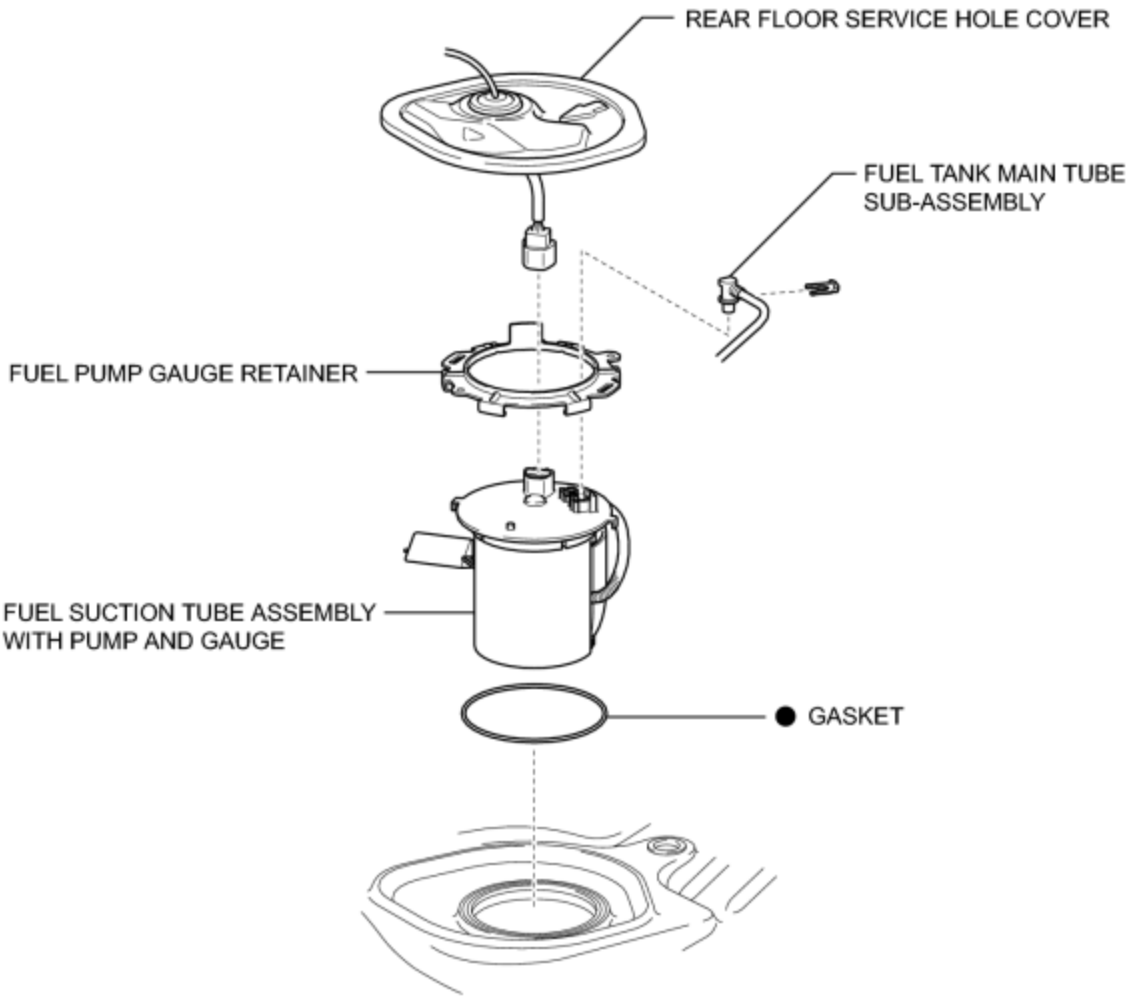
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

11. INSPECT FOR FUEL LEAK INFO

# COMPONENTS

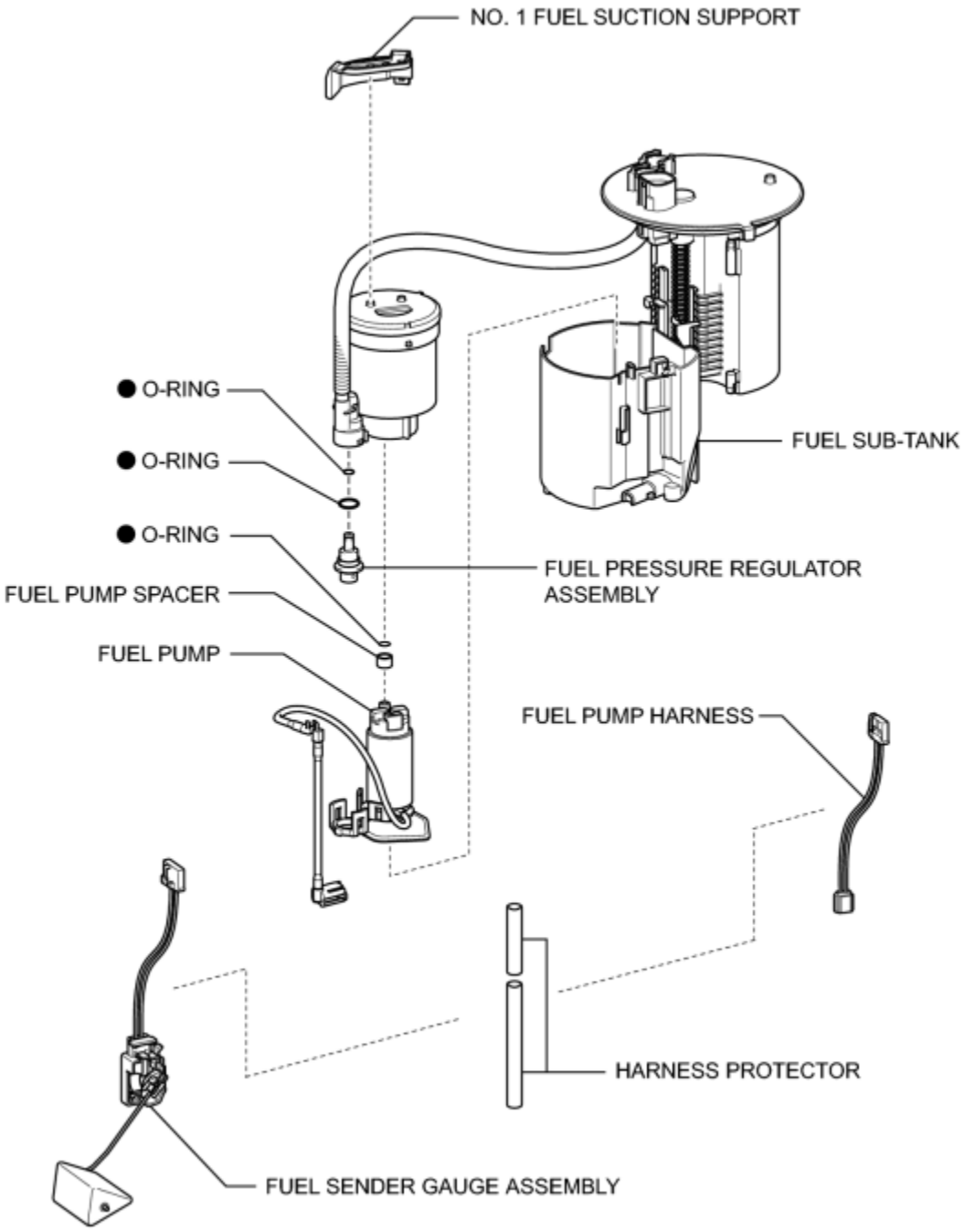
# ILLUSTRATION




● Non-reusable part

c

# ILLUSTRATION


NO. 1 FUEL SUCTION SUPPORT
FUEL SUB-TANK
● O-RING
● O-RING
● O-RING
FUEL PRESSURE REGULATOR ASSEMBLY
FUEL PUMP SPACER
FUEL PUMP
FUEL PUMP HARNESS
HARNESS PROTECTOR
FUEL SENDER GAUGE ASSEMBLY
● Non-reusable part

c

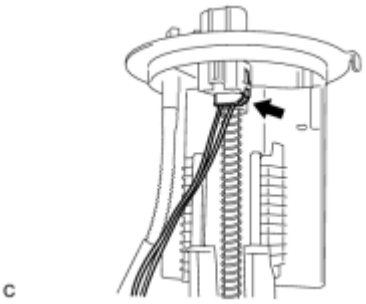
# REMOVAL

1. REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

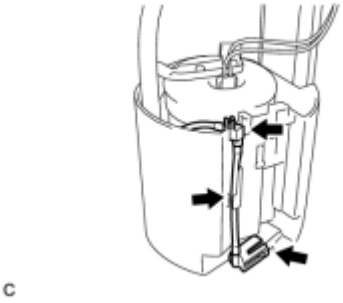
(a) Remove the fuel suction tube assembly with pump and gauge INFO.

2. REMOVE FUEL SENDER GAUGE ASSEMBLY INFO

3. REMOVE FUEL PUMP

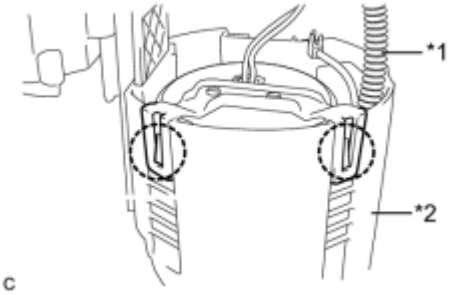


(a) Disconnect the connector of the fuel pump harness.



(b) Disconnect the fuel pump filter hose.

(c) Using a screwdriver with its tip wrapped in protective tape, disengage the 2 claws, and remove the fuel filter and fuel pump from the fuel sub-tank.



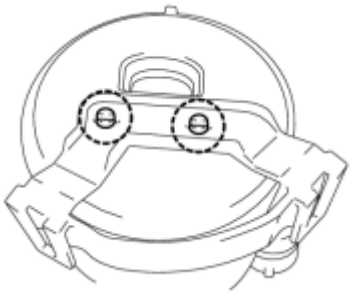

## Text in Illustration

| | |
|---|---|
| *1 | Fuel Tube |
| *2 | Fuel Sub-tank |

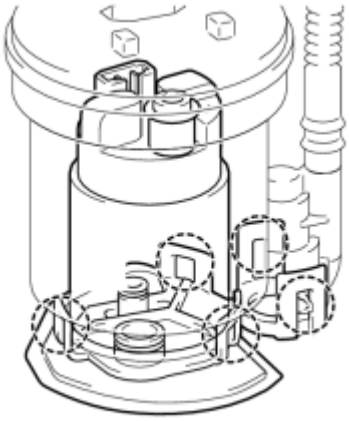
NOTICE:

Do not do anything which may separate the fuel tube from either the fuel suction plate or fuel filter assembly, such as applying excessive force to the tube INFO.

(d) Using a screwdriver with its tip wrapped in protective tape, disengage the 2 claws and remove the No. 1 fuel suction support.



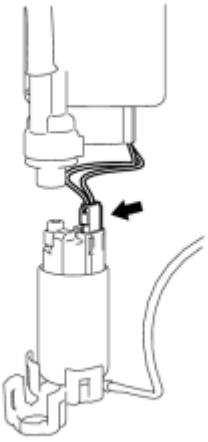
P



C

(e) Using a screwdriver with its tip wrapped in protective tape, disengage the 5 claws, and remove the fuel pump filter and fuel pump from the fuel filter.

- Do not damage the fuel pump filter.
- Do not remove the suction filter.
- Do not use either the fuel pump or the suction filter if the suction filter is removed from the fuel pump.



C

(f) Disconnect the fuel pump harness connector.

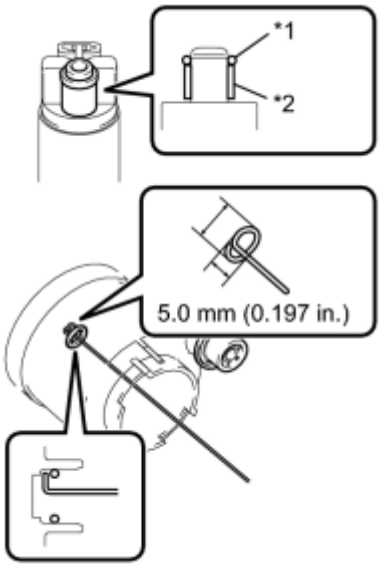
(g) Remove the O-ring and spacer from the fuel pump.

# Text in Illustration

| | |
|---|---|
| *1 | O-ring |
| *2 | Spacer |

NOTICE:

Be careful not to damage the sealing surface.

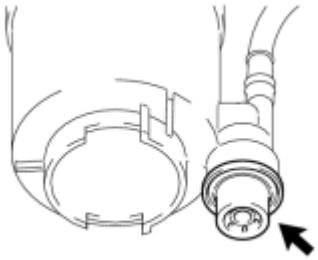



C

HINT:

If the O-ring still remains in the fuel filter, remove it using a wire tip (1 mm diameter) that is formed as shown in the illustration.

4. REMOVE FUEL PRESSURE REGULATOR ASSEMBLY

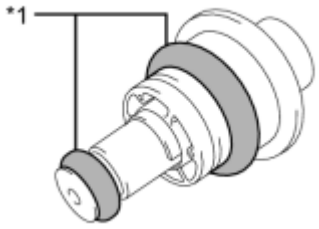


P

(a) Using a screwdriver with its tip wrapped in protective tape, remove the fuel pressure regulator assembly.

NOTICE:

Slowly pull out the fuel pressure regulator assembly because the O-ring is firmly installed between the regulator and the fuel filter.




C

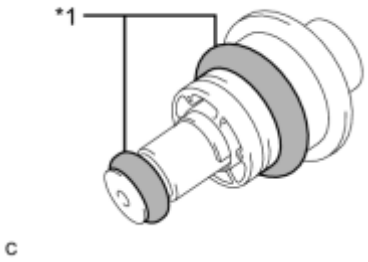
(b) Remove the 2 O-rings from the pressure regulator assembly.

# Text in Illustration

| | |
|---|---|
| *1 | O-ring |

# INSTALLATION

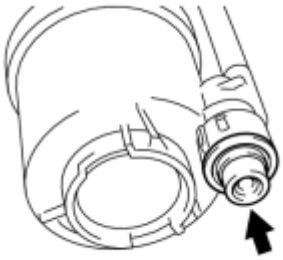
1. INSTALL FUEL PRESSURE REGULATOR ASSEMBLY




(a) Apply gasoline to 2 new O-rings and then install them to the fuel pressure regulator assembly.

## Text in Illustration

| | |
|---|---|
| *1 | O-ring |



(b) Install the fuel pressure regulator assembly.

2. INSTALL FUEL PUMP INFO

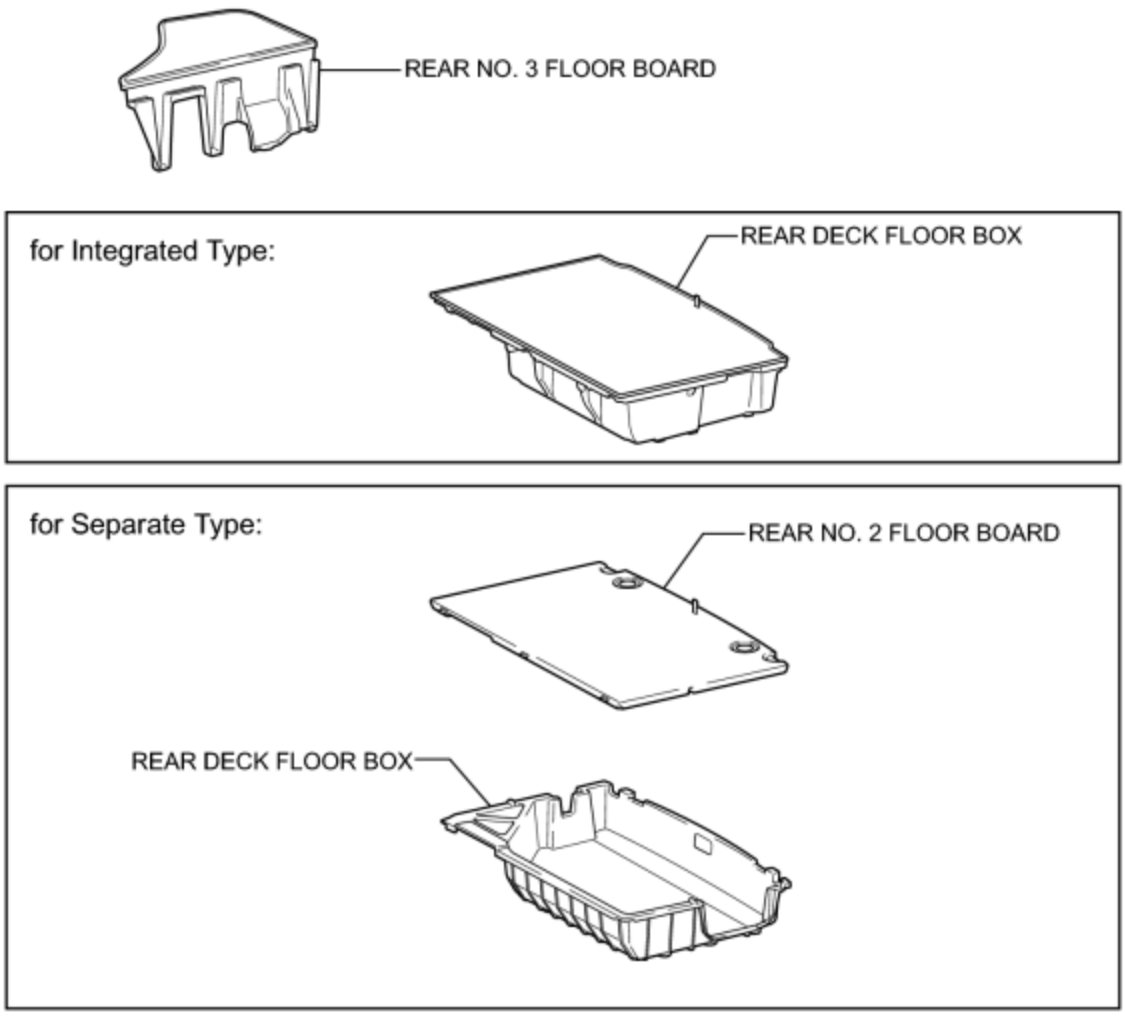
3. INSTALL FUEL SENDER GAUGE ASSEMBLY INFO

4. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Install the fuel suction tube assembly with pump and gauge INFO.

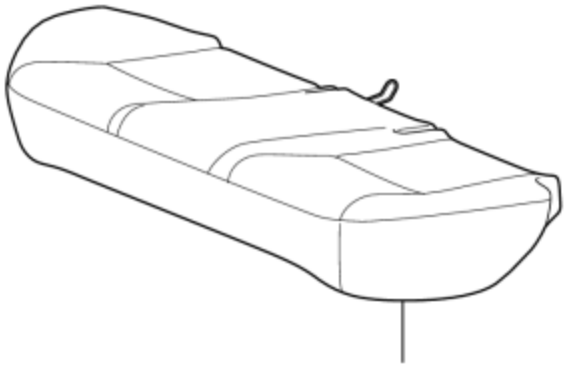
# COMPONENTS

# ILLUSTRATION

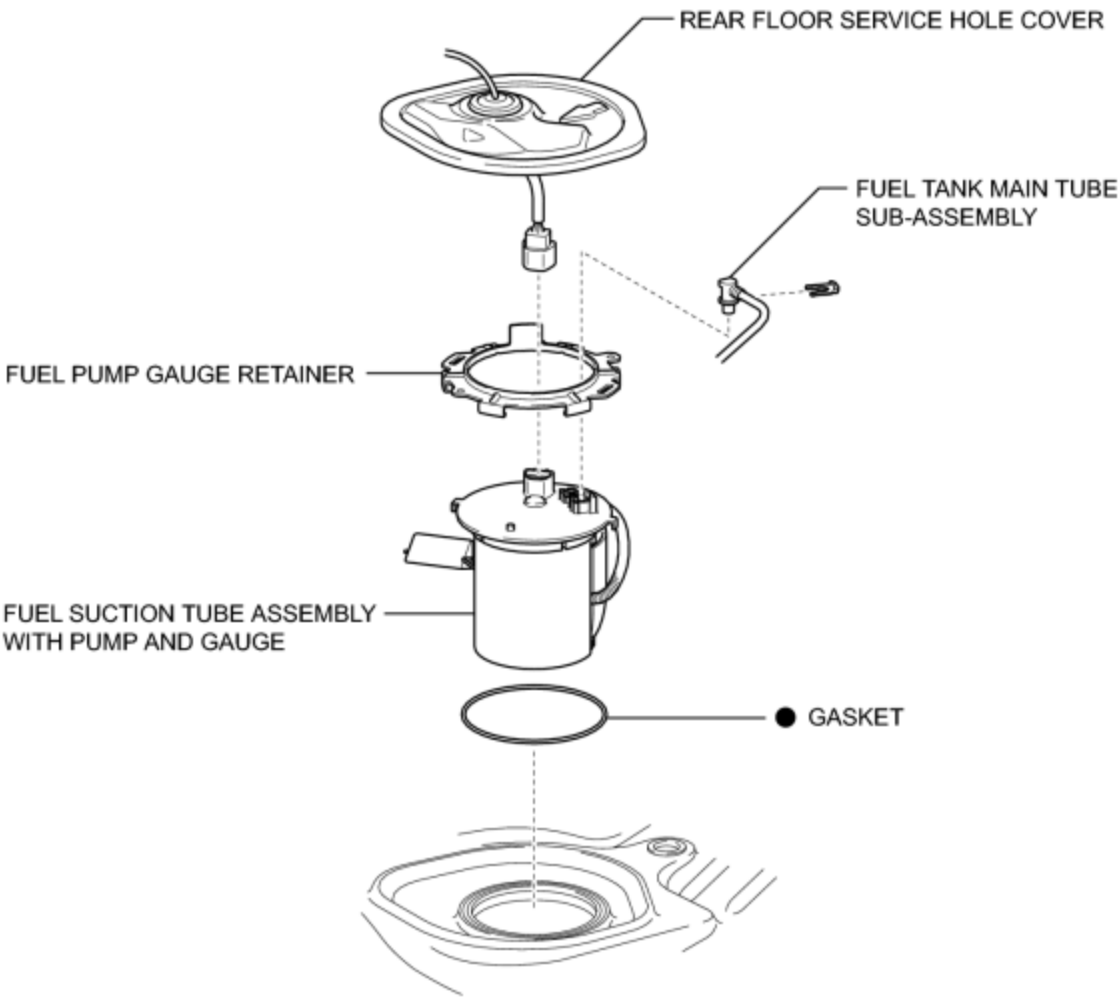



P

# ILLUSTRATION



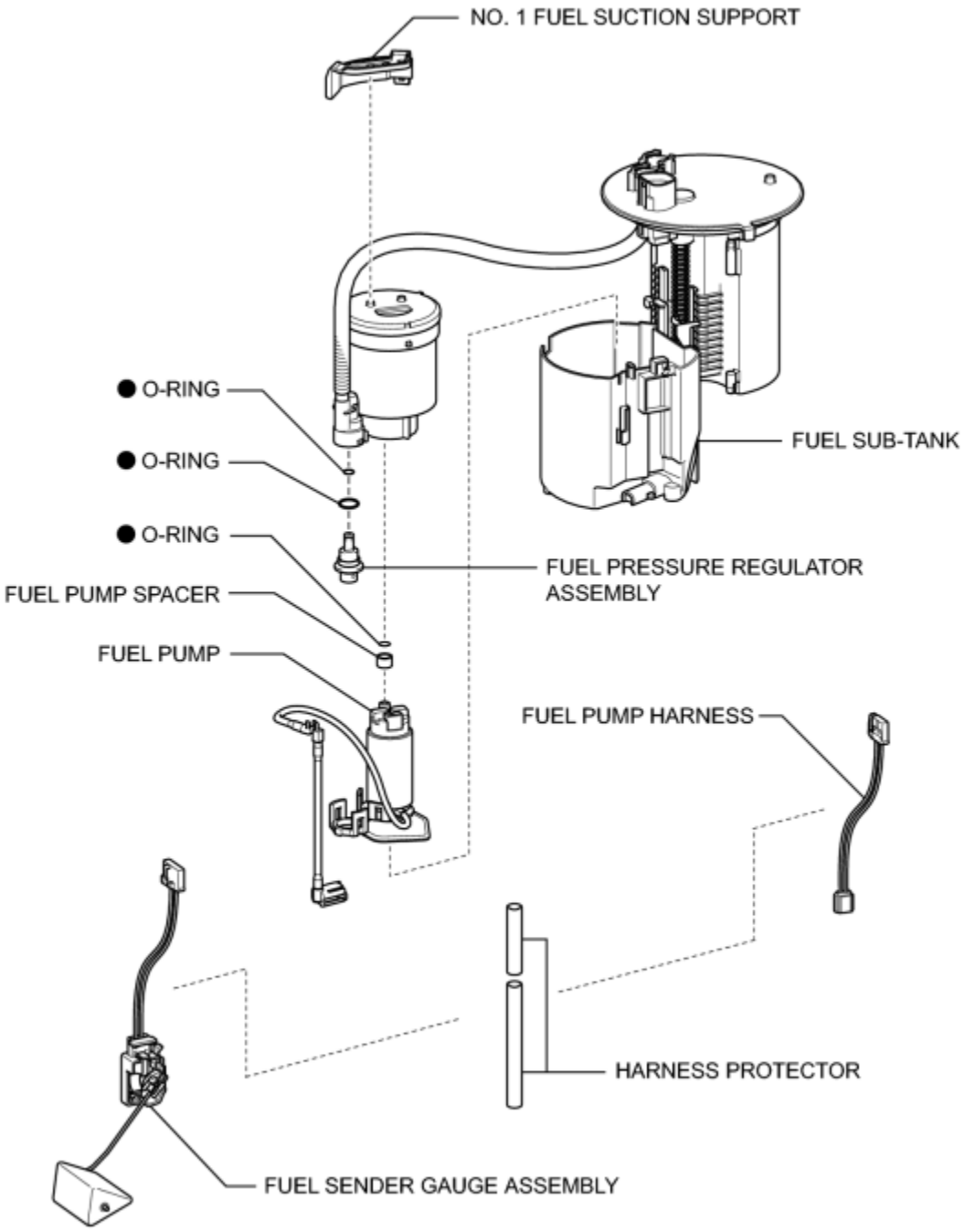

# ILLUSTRATION




● Non-reusable part

c

# ILLUSTRATION


NO. 1 FUEL SUCTION SUPPORT
FUEL SUB-TANK
● O-RING
● O-RING
● O-RING
FUEL PRESSURE REGULATOR ASSEMBLY
FUEL PUMP SPACER
FUEL PUMP
FUEL PUMP HARNESS
HARNESS PROTECTOR
FUEL SENDER GAUGE ASSEMBLY
● Non-reusable part

c

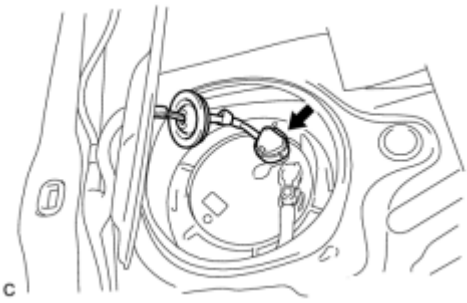
# REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

2. REMOVE REAR FLOOR SERVICE HOLE COVER




(a) Remove the rear floor service hole cover.




(b) Disconnect the fuel pump connector.

3. DISCHARGE FUEL SYSTEM PRESSURE

HINT: INFO

4. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

5. REMOVE REAR DECK FLOOR BOX INFO

6. REMOVE REAR NO. 3 FLOOR BOARD INFO

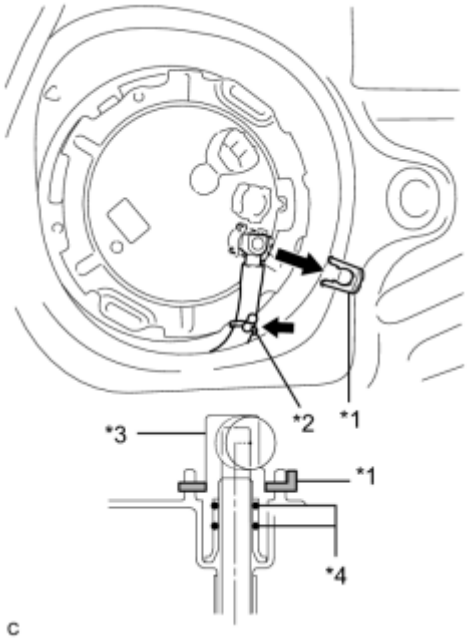
7. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

8. REMOVE FUEL TANK MAIN TUBE SUB-ASSEMBLY

(a) Remove the tube joint clip and disengage the fuel tank main tube clamp, then pull the fuel tube joint out of the plug of the fuel suction tube assembly.




## Text in Illustration

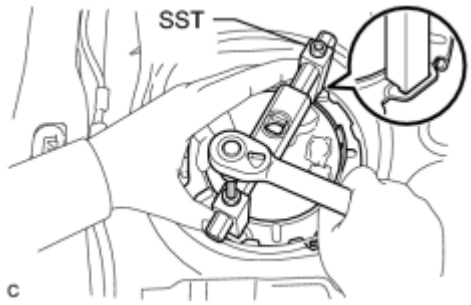
| | |
|---|---|
| *1 | Tube Joint Clip |
| *2 | Fuel Tank Main Tube Clamp |
| *3 | Fuel Tube Joint |
| *4 | O-ring |

- Check that there is no dirt or other foreign objects around the fuel tube joint before disconnecting it. Clean the joint if necessary.
- It is necessary to prevent mud or dirt from entering the joint. If mud or dirt gets in the joint, the O-rings may not seal properly.
- Only disconnect the joint by hand.
- Do not bend, kink or twist the nylon tubes.
- Protect the contact surfaces by covering it with a plastic bag.

9. REMOVE FUEL PUMP GAUGE RETAINER

(a) Using a 6 mm socket hexagon wrench, set SST to the fuel pump gauge retainer.

SST: 09808-14020




09808-01410

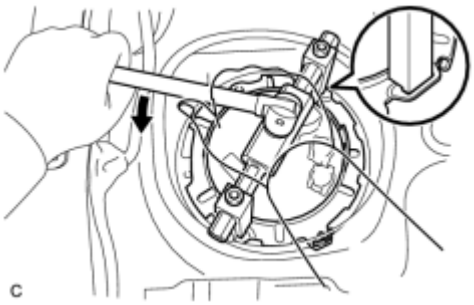
09808-01420

09808-01430

- Engage the SST claws securely with the fuel pump gauge retainer holes to secure SST.
- Install SST while pressing the SST claws toward the fuel pump gauge retainer (towards the center of SST).

(b) Using SST, loosen the fuel pump gauge retainer.

SST: 09808-14020




09808-01410

09808-01420

09808-01430

- Do not use any tools other than specified in this operation. Damage to the fuel pump gauge retainer or the fuel tank may result.

- Loosen the retainer by turning it counterclockwise while holding SST down. Do not allow the claw of the tank suction tube support to slip out of its groove on the fuel tank.

HINT:

The holes on the fuel pump gauge retainer can be fitted into the tips of SST.

(c) Remove the fuel pump gauge retainer while holding the fuel suction tube assembly by hand.

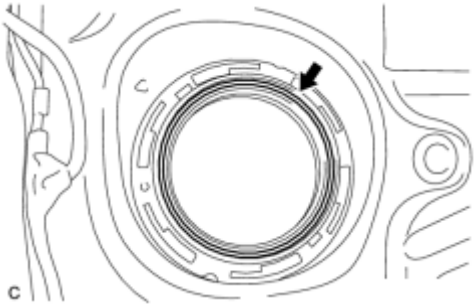
10. REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE




(a) Remove the fuel suction tube assembly with pump and gauge from the fuel tank.

NOTICE:

Make sure that the fuel sender gauge arm does not bend.

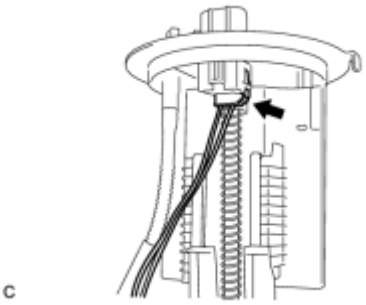



(b) Remove the gasket from the fuel tank.

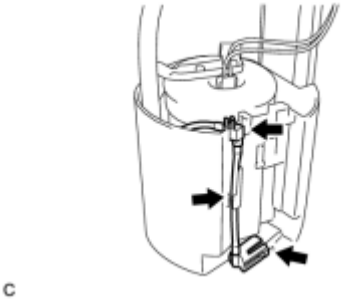
# DISASSEMBLY

1. REMOVE FUEL SENDER GAUGE ASSEMBLY INFO

2. REMOVE FUEL PUMP

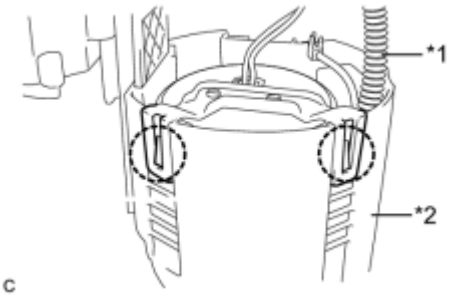



(a) Disconnect the connector of the fuel pump harness.




(b) Disconnect the fuel pump filter hose.

(c) Using a screwdriver with its tip wrapped in protective tape, disengage the 2 claws, and remove the fuel filter and fuel pump from the fuel sub-tank.

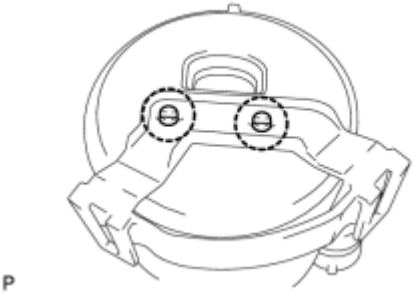



## Text in Illustration

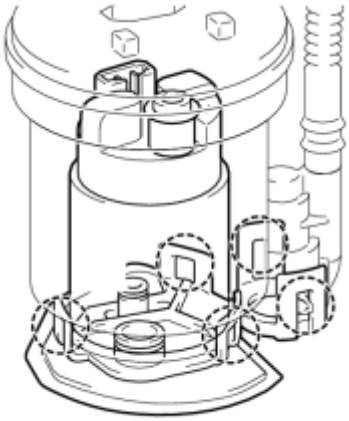
| | |
|---|---|
| *1 | Fuel Tube |
| *2 | Fuel Sub-tank |

NOTICE:

Do not do anything which may separate the fuel tube from either the fuel suction plate or fuel filter assembly, such as applying excessive force to the tube INFO.



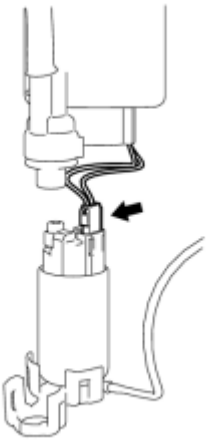

(d) Using a screwdriver with its tip wrapped in protective tape, disengage the 2 claws and remove the No. 1 fuel suction support.



(e) Using a screwdriver with its tip wrapped in protective tape, disengage the 5 claws, and remove the fuel pump filter and fuel pump from the fuel filter.

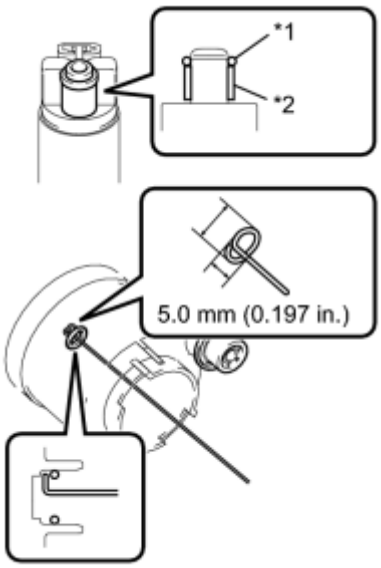
- Do not damage the fuel pump filter.
- Do not remove the suction filter.
- Do not use either the fuel pump or the suction filter if the suction filter is removed from the fuel pump.

c



(f) Disconnect the fuel pump harness connector.

c




(g) Remove the O-ring and spacer from the fuel pump.

# Text in Illustration

| | |
|---|---|
| *1 | O-ring |
| *2 | Spacer |

NOTICE:

Be careful not to damage the sealing surface.

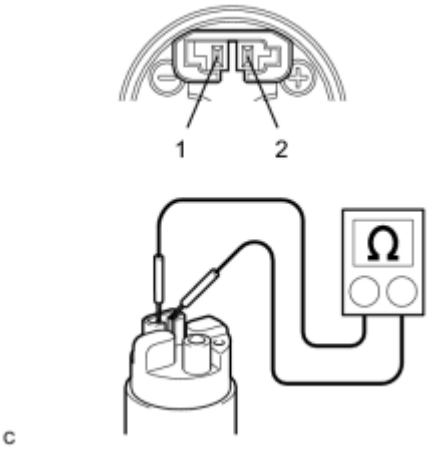
HINT:

If the O-ring still remains in the fuel filter, remove it using a wire tip (1 mm diameter) that is formed as shown in the illustration.

c

# INSPECTION

1. INSPECT FUEL PUMP




c

(a) Check the resistance.

(1) Using an ohmmeter, measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 20°C (68°F) | 0.2 to 3.0 Ω |

If the result is not as specified, replace the fuel pump.

(b) Check fuel pump operation.

(1) Apply battery voltage between terminals 1 and 2. Check that the pump operates.

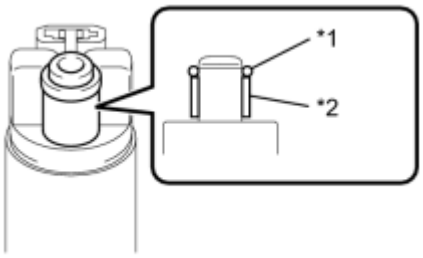
NOTICE:

- These tests must be done quickly (within 10 seconds) to prevent the coil from burning out.
- Keep the fuel pump as far away from the battery as possible.
- Always switch the voltage on and off on the battery side, not the fuel pump side. If the pump does not operate, replace the fuel pump.

If the pump does not operate, replace the fuel pump.

# REASSEMBLY

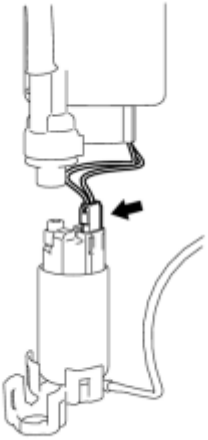
1. INSTALL FUEL PUMP




(a) Apply gasoline to a new O-ring. Then install the O-ring and spacer to the fuel pump.

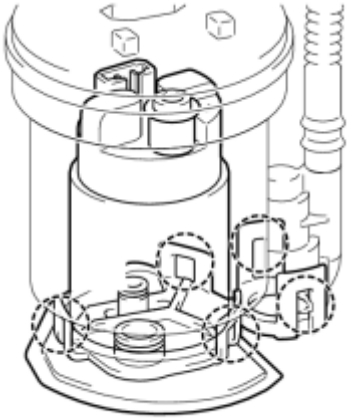
## Text in Illustration

| | |
|---|---|
| *1 | O-ring |
| *2 | Spacer |



c

(b) Connect the fuel pump harness connector.



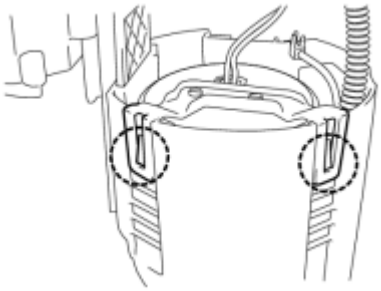
c

(c) Engage the 5 claws of the fuel pump.

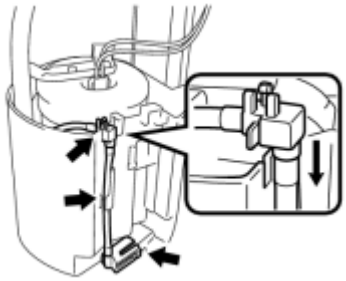
- Make sure that the O-ring is not cut or pinched during the installation.
- Engage the claws securely.
- Do not remove the fuel filter.

(d) Engage the 2 claws of the No. 1 fuel suction support.



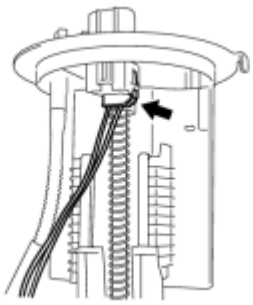

(e) Engage the 2 claws of the fuel suction support and install the fuel filter and the fuel pump onto the fuel sub-tank.




(f) Align the groove of the fuel pump filter hose with the cutout of the fuel sub-tank and install the hose.

NOTICE:

Do not apply excessive force to the fuel tube or the suction support.

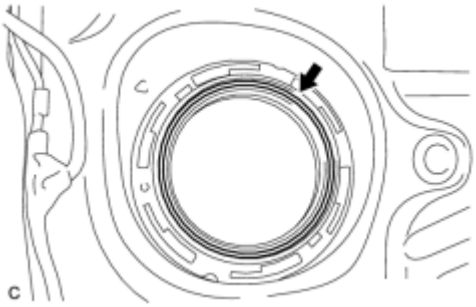



(g) Connect the connector of the fuel pump harness.

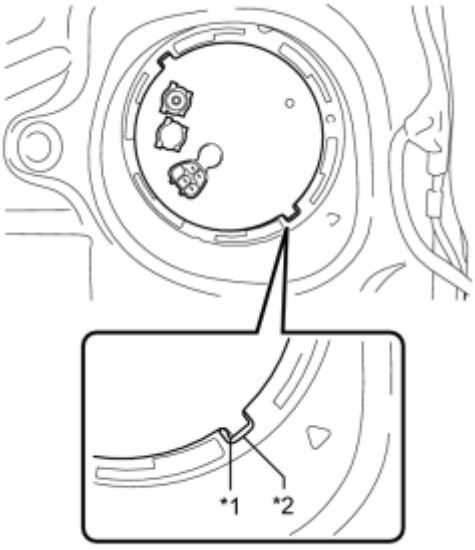
2. INSTALL FUEL SENDER GAUGE ASSEMBLY INFO

# INSTALLATION

1. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE



(a) Install a new gasket onto the fuel tank.




(b) Install the fuel suction tube assembly with pump and gauge to the fuel tank.

## Text in Illustration

| | |
|---|---|
| *1 | Protrusion |
| *2 | Notch |

NOTICE:

Make sure that the fuel sender gauge arm does not bend.

(c) Align the protrusions of the fuel suction tube assembly with pump and gauge with the notchs of the fuel tank.

NOTICE:

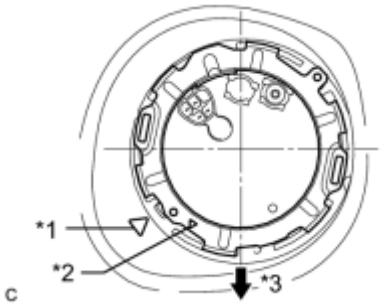
Ensure that the fuel suction tube gasket is in the correct position.

2. INSTALL FUEL PUMP GAUGE RETAINER

(a) While holding the fuel suction tube assembly with pump and gauge by hand, position the fuel pump gauge retainer and tighten it lightly by hand.

## Text in Illustration

| | |
|---|---|
| *1 | Lock Point |



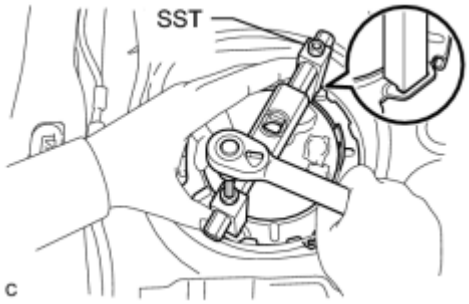

| | |
|---|---|
| *2 | Mark |
| *3 | Front of Vehicle |

NOTICE:

Check that the contact surface of the fuel tank retainer is not scratched or damaged, and prevent the entry of foreign objects.

(b) Using a 6 mm socket hexagon wrench, set SST to the fuel pump gauge retainer.

SST: 09808-14020



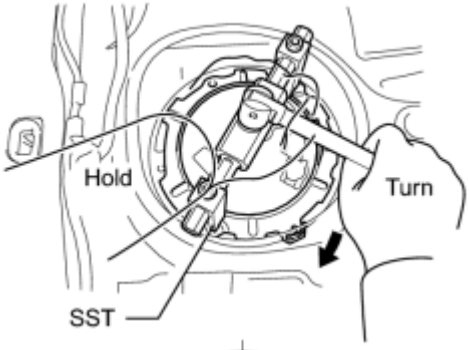

09808-01410

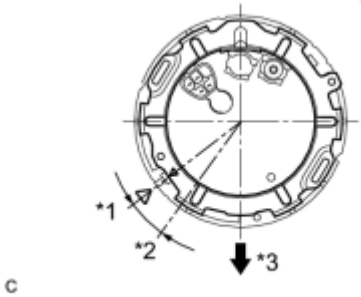
09808-01420

09808-01430

- Hold the fuel suction tube assembly upright by hand to ensure that the fuel suction tube gasket is not moved out of position.
- Engage the SST claws securely with the fuel pump gauge retainer holes to secure SST.
- Install SST while pressing the SST claws toward the fuel pump gauge retainer (toward the center of SST).

(c) Using SST, align the marks on the fuel tank and fuel pump gauge retainer.




# Text in Illustration

| | |
|---|---|
| *1 | Lock Point |
| *2 | Starting Point |
| *3 | Front of Vehicle |

SST: 09808-14020

09808-01410

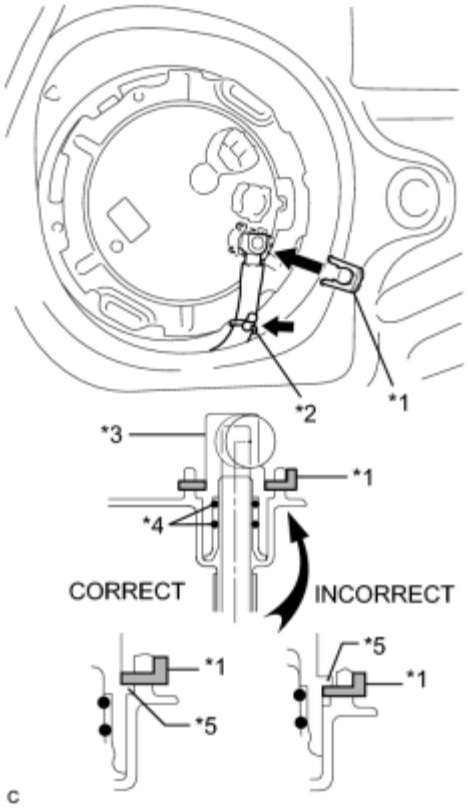
09808-01420

09808-01430

- Do not use any tools other than specified in this operation. Damage to the fuel pump gauge retainer or the fuel tank may result.
- Tighten the retainer by turning it clockwise while holding SST

down.

3. CONNECT FUEL TANK MAIN TUBE SUB-ASSEMBLY

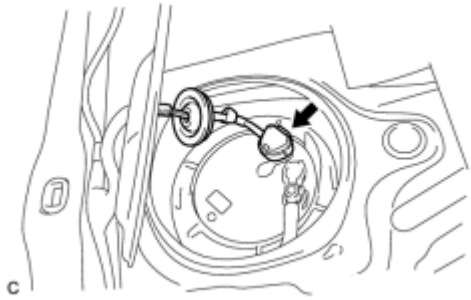



(a) Push the fuel tube joint in the plug of the fuel suction plate, then install the tube joint clip.

## Text in Illustration

| | |
|---|---|
| *1 | Tube Joint Clip |
| *2 | Fuel Tank Main Tube clamp |
| *3 | Fuel Tube Joint |
| *4 | O-ring |
| *5 | Collars |

- Check that there are no scratches or foreign objects around the connected part of the fuel tube joint and plug before performing this work.
- Check that the fuel tube joint is securely inserted to the end.
- Check that the tube joint clip is on the collar of the fuel tube joint.
- After installing the tube joint clip, check that the fuel tank main tube cannot be pushed out.




(b) Connect the fuel pump connector.

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. INSPECT FOR FUEL LEAK INFO

6. INSTALL REAR FLOOR SERVICE HOLE COVER

(a) Install the rear floor service hole cover with new butyl tape.




7. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

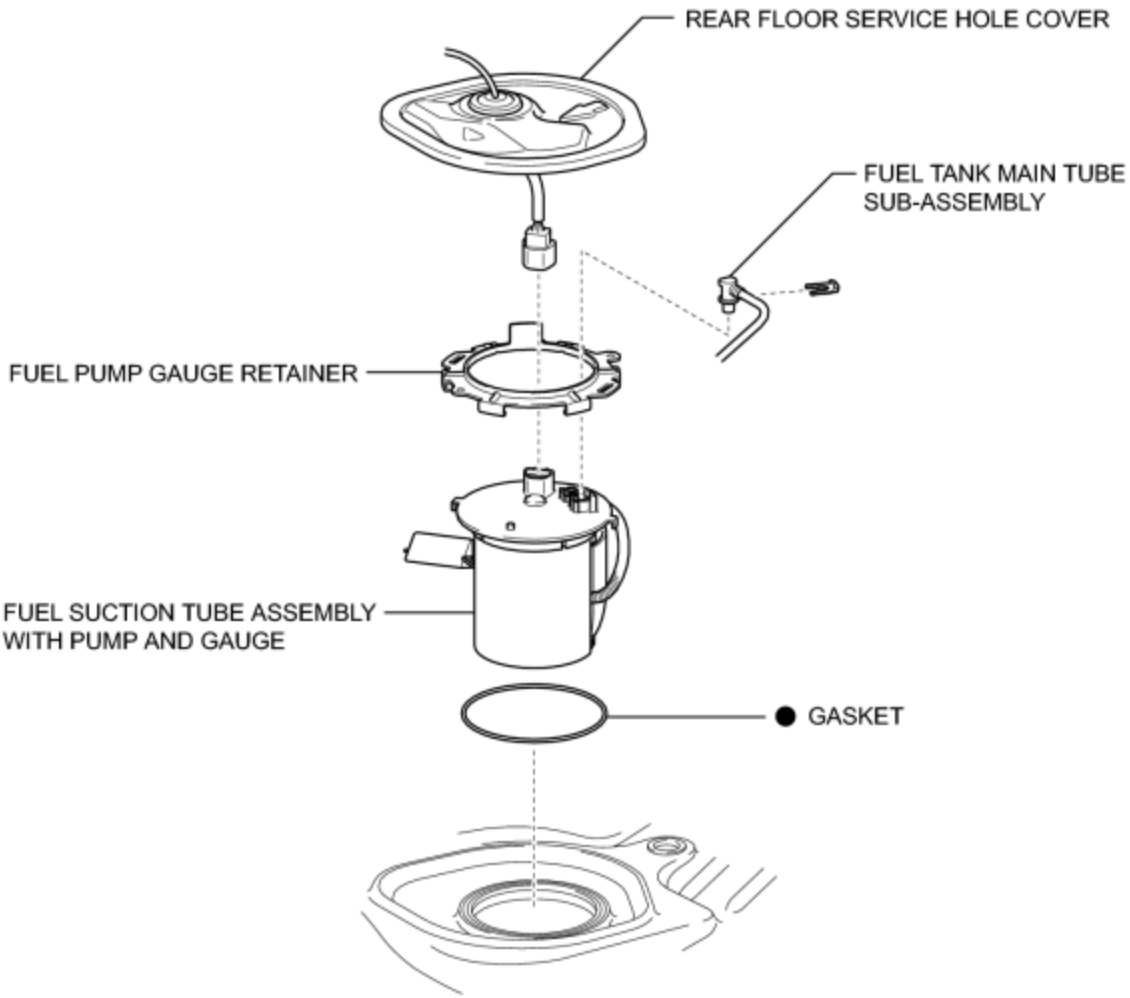
8. INSTALL REAR NO. 3 FLOOR BOARD INFO

9. INSTALL REAR DECK FLOOR BOX INFO

10. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

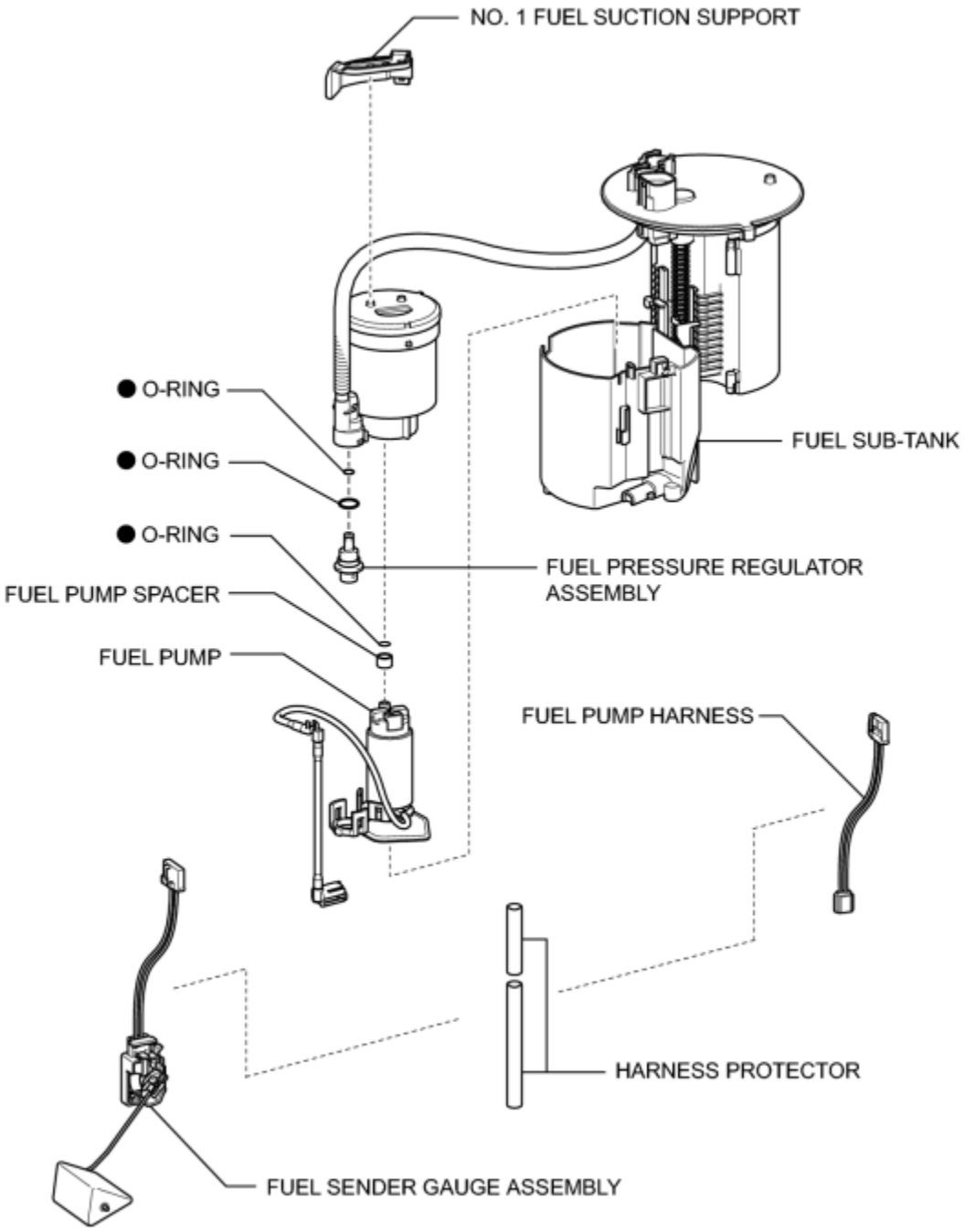
# ILLUSTRATION




● Non-reusable part

c

# ILLUSTRATION


NO. 1 FUEL SUCTION SUPPORT
FUEL SUB-TANK
● O-RING
● O-RING
● O-RING
FUEL PRESSURE REGULATOR ASSEMBLY
FUEL PUMP SPACER
FUEL PUMP
FUEL PUMP HARNESS
HARNESS PROTECTOR
FUEL SENDER GAUGE ASSEMBLY
● Non-reusable part

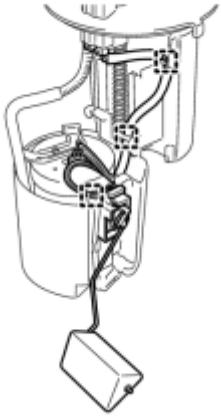
c

# REMOVAL

1. REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Remove the fuel suction tube assembly with pump and gauge INFO.

2. REMOVE FUEL SENDER GAUGE ASSEMBLY

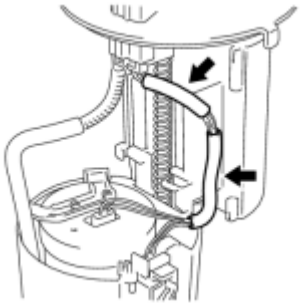


C

(a) Disconnect the 3 harness clamps.

NOTICE:

Do not damage the wire harness.



C

(b) Remove the 2 harness protectors from the wire harness.

NOTICE:

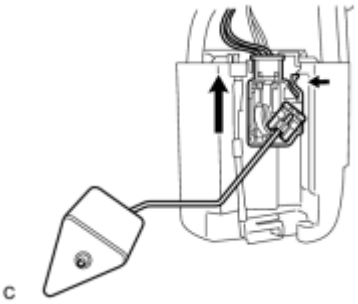
Do not damage the wire harness.



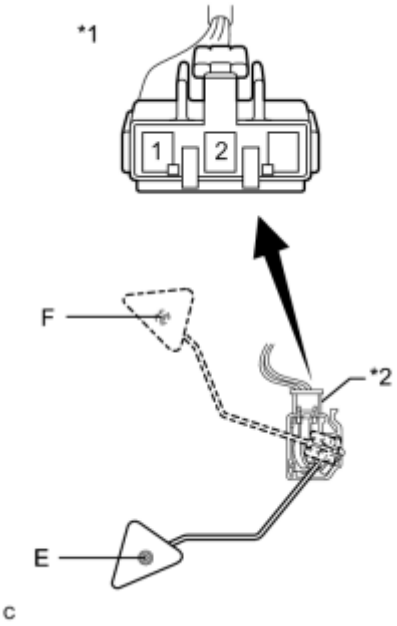
C

(c) Disconnect the connector of the fuel sender gauge assembly.

(d) Release the lock as shown in the illustration and slide the fuel sender gauge assembly to remove it.


C

# INSPECTION




1. INSPECT FUEL SENDER GAUGE ASSEMBLY

(a) Remove the fuel sender gauge assembly.

(b) Check that the float moves smoothly between F and E.

(c) Measure the resistance between terminals 1 and 2 of the connector according to the value(s) in the table below.

Standard Resistance:

| Float Level | Resistance (Ω) |
|---|---|
| F | 12.0 to 18.0 |
| Between E and F | 12.0 to 415.0 (Gradually changes) |
| E | 405.0 to 415.0 |

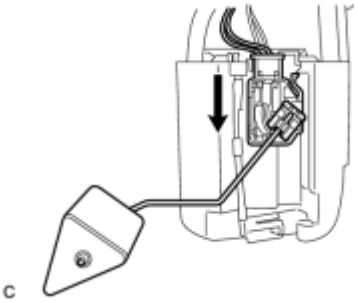
If the value is not as specified, replace the fuel sender gauge assembly.

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Fuel Sender Gauge Assembly) |
| *2 | Fuel Sender Gauge Assembly |

# INSTALLATION

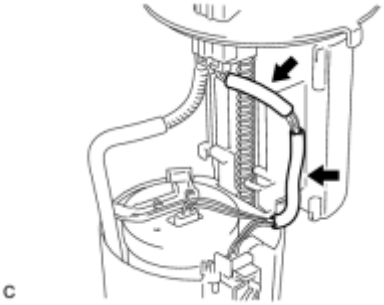
1. INSTALL FUEL SENDER GAUGE ASSEMBLY



(a) Install the fuel sender gauge assembly by sliding it downward.



(b) Connect the connector of the fuel sender gauge assembly.

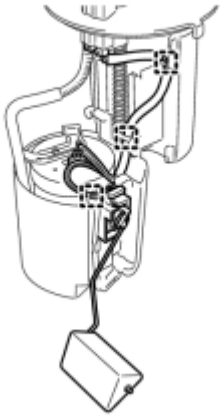


(c) Install the 2 harness protectors.

NOTICE:

Do not damage the wire harness.

(d) Connect the 3 harness clamps.



C

2. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Install the fuel suction tube assembly with pump and gauge INFO.

# PRECAUTION

1. PRECAUTIONS

(a) Before inspecting and repairing the fuel system, disconnect the cable from the negative (-) battery terminal.

(b) Do not smoke or work near fire when handling the fuel system.

(c) Keep gasoline away from rubber or leather parts.

2. DISCHARGE FUEL SYSTEM PRESSURE

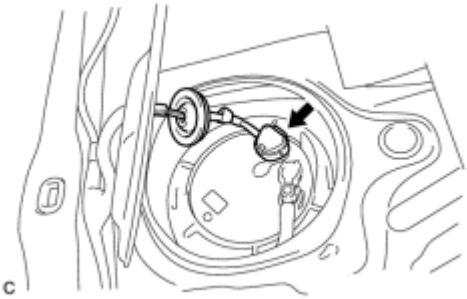
CAUTION:

- Perform the following procedure to prevent fuel from spilling out before removing any fuel system parts.
- Pressure will still remain in the fuel lines even after performing the following procedure. When disconnecting a fuel line, cover it with a piece of cloth to prevent fuel from spraying or coming out.

(a) Remove the rear seat cushion assembly INFO.




(b) Remove the rear floor service hole cover.




(c) Disconnect the fuel pump connector.

(d) Put the vehicle in the "inspection mode" INFO.

(e) Start the engine.

(f) After the engine has stopped on its own, turn the power switch off.

HINT:

DTCs P0171/25 may be detected.

(g) Crank the engine again and make sure that the engine does not start.

(h) Disconnect the cable from the negative (-) battery terminal.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

(i) Connect the fuel pump connector.

(j) Loosen the fuel tank cap, then discharge the pressure in the fuel tank completely.

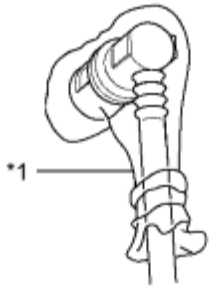
3. FUEL LINE

(a) When disconnecting a high-pressure fuel line, a large amount of gasoline will spray out. Perform the following procedure:

(1) Discharge fuel system pressure.

(2) Disconnect the fuel tube.

(3) Drain the fuel remaining inside the fuel pump tube into a container.

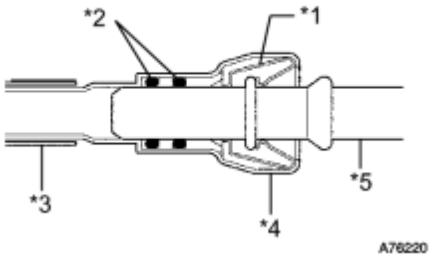



(4) Cover the disconnected pipe and connector with a plastic bag to prevent damage and contamination.

## Text in Illustration

| | |
|---|---|
| *1 | Plastic Bag |

(b) Perform the following procedure when disconnecting a fuel delivery pipe (metallic type):




**Text in Illustration**

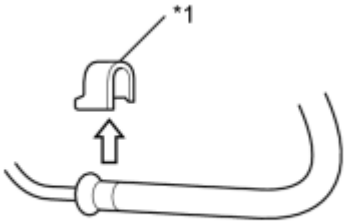
| | |
|---|---|
| *1 | Retainer |

| | |
|---|---|
| *2 | O-ring |
| *3 | Nylon Tube |
| *4 | Housing |
| *5 | Pipe |

HINT:

The structure of a fuel tube connector is as shown in the illustration.

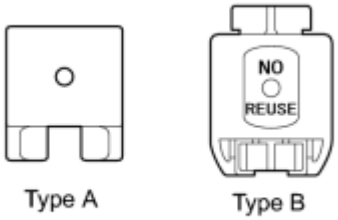
(1) Check if there is any damage or foreign objects on the pipe connections.




(2) Remove the No. 2 fuel pipe clamp.

## Text in Illustration

| | |
|---|---|
| *1 | No. 2 Fuel Pipe Clamp |

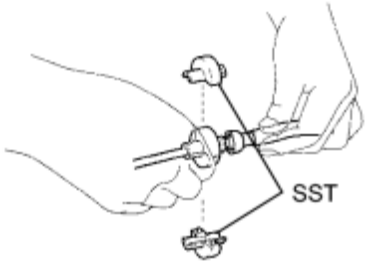



NOTICE:

Do not reuse the fuel pipe clamp.

c

(3) Find the metallic connector of the fuel tube assembly.

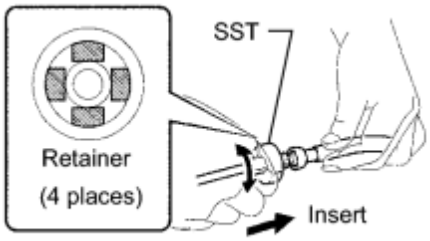



P

(4) Assemble SST to the connector as shown in the illustration.

SST: 09268-21010

(5) Turn SST, align the retainers inside the connector with the SST chamfers and insert SST into the connector.

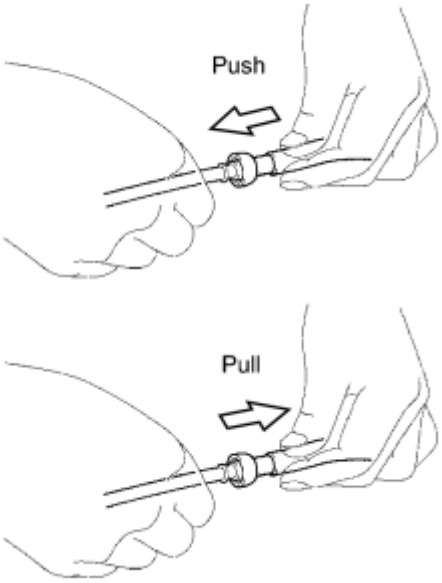



P

(6) Slide SST and the connector together towards the fuel tube assembly.

(c) Perform the following procedure when connecting a fuel tube connector (metallic type):

(1) Check if there is any damage or foreign objects on the pipe connections.



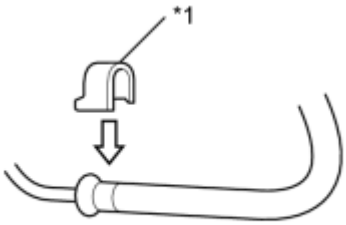

(2) Match the axis of the connector with the axis of the pipe, and push the pipe into the connector until the connector makes a "click" sound. If the pipe is difficult to push into the connector, apply a small amount of clean engine oil to the tip of the pipe.

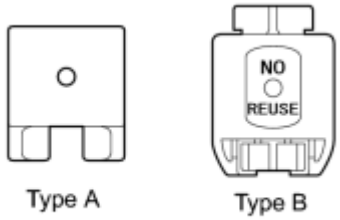
(3) After connecting, check if the pipe and the connector are securely connected by pulling on them.

(4) Install a new No. 2 fuel pipe clamp.

# Text in Illustration

| | |
|---|---|
| *1 | No. 2 Fuel Pipe Clamp |




c

(5) Check for fuel leaks.

(d) Perform the following procedure when disconnecting a fuel tube connector (quick type A):



c

(1) Release the claw and remove the No. 1 fuel pipe clamp.

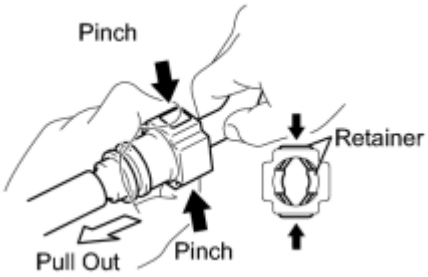
(2) Check that there is no dirt or other foreign objects on the pipe and contact surface before disconnecting them. Clean them if necessary.

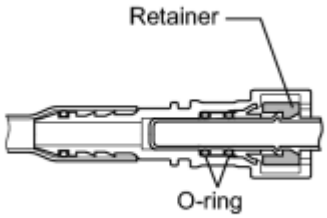
(3) Disconnect the connector from the pipe by hand.

NOTICE:

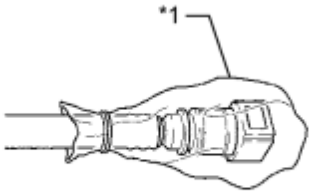
Be sure to disconnect the connector by hand.

(4) If the connector and the pipe are stuck, push in and pull on the connector to release them. Pull the connector out of the pipe carefully.




(5) Check that there is no dirt or other foreign objects on the contact surface of the disconnected pipe. Clean them away if necessary.




(6) Cover the disconnected pipe and connector with a plastic bag to prevent damage and contamination.

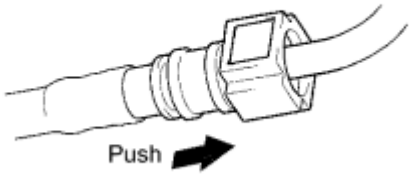
## Text in Illustration

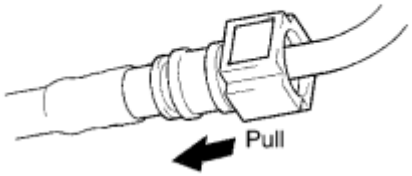
| | |
|---|---|
| *1 | Plastic Bag |

P

(e) Perform the following procedure when connecting a fuel tube connector (quick type A):

(1) Check if there is any damage or foreign objects on the pipe connections.




(2) Line up the two parts of the pipes to be connected, and push them together until the connector makes a "click" sound. If the pipe is difficult to push into the connector, apply a small amount of clean engine oil to the tip of the pipe and reinsert it.

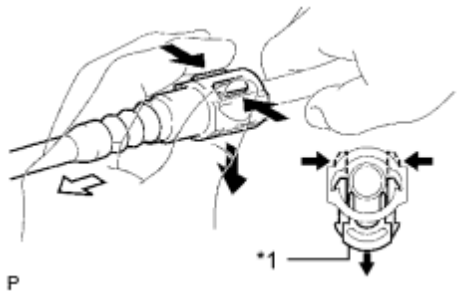
(3) After connecting the pipes, check that the pipe and connector are securely connected by pulling on them.

(4) Inspect for fuel leaks INFO.




(5) Engage the lock claw and install the No. 1 fuel pipe clamp.

(f) Perform the following procedure when disconnecting a fuel tube connector (quick type B):



**Text in Illustration**

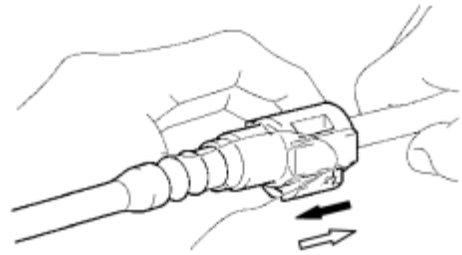
| | |
|---|---|
| *1 | Retainer |

(1) Check that there is no damage or foreign matter on the part of the pipe that contacts the connector.

(2) Detach the 2 claws of the connector retainer. Push down on the connector and disconnect it from the pipe.

HINT:

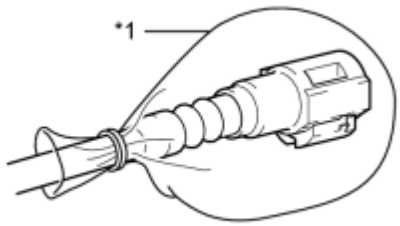
Be sure to disconnect it by hand.



P

(3) If the connector and pipe are stuck, pinch the fuel pipe by hand and push or pull the connector to disconnect it.

(4) Check for foreign matter on the seal surface of the disconnected pipe. Clean it if necessary.



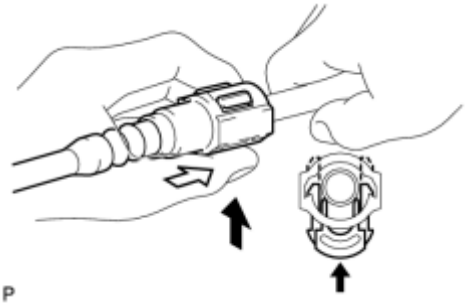

P

(5) Cover the disconnected pipe and connector with a plastic bag to prevent damage and contamination.

## Text in Illustration

| | |
|---|---|
| *1 | Plastic Bag |

(g) Perform the following procedure when connecting a fuel tube connector (quick type B):



P

(1) Line up the two parts of the pipes to be connected, and fully push the fuel tube connector and pipe together until they are fully seated. Next, push the retainer into the connector until its claws lock. If the pipe is difficult to push into the connector, apply a small amount of clean engine oil to the tip of the pipe and reinsert it.

(2) After connecting the pipes, check that the pipe and connector are securely connected by pulling on them.

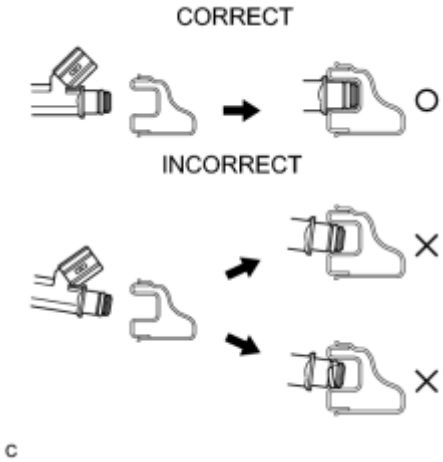
(3) Inspect for fuel leaks INFO.

(h) Observe the following precautions when handling a nylon tube:

CAUTION:

- Do not twist the connector part of the nylon tube or the quick connector when connecting them.
- Do not bend or twist the nylon tube.
- Do not remove the EPDM protector on the outside of the nylon tube.
- Do not pinch or kink the nylon tubes to prevent fuel leakage.

4. INJECTOR



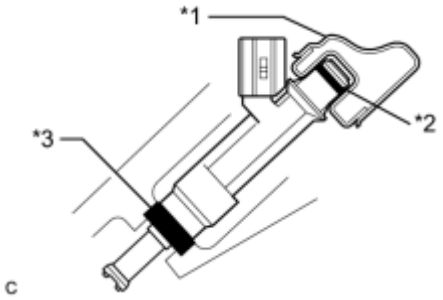

c

(a) Observe the following precautions when removing and installing a fuel injector:

(1) Do not reuse an O-ring and insulator.

(2) When placing a new O-ring onto the injector, do not damage the O-ring.

(3) Coat the new O-ring with grease or gasoline before installing it. Do not use engine oil, gear oil or brake fluid.



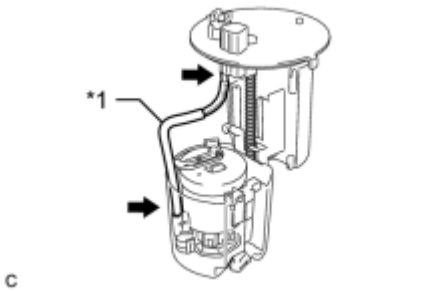

c

(b) Install the injector into the delivery pipe and cylinder head as shown in the illustration. Apply grease or gasoline to the contact surfaces of the injector before installing the injector.

## Text in Illustration

| | |
|---|---|
| *1 | Delivery Pipe |
| *2 | O-ring |
| 3 | Insulator |

5. FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE




c

(a) Do not disconnect the tube shown in the illustration when disassembling the fuel suction tube assembly with pump and gauge. Doing so will cause reassembly of the fuel suction tube assembly with pump and gauge to be impossible as the tube is welded to the plate.

## Text in Illustration

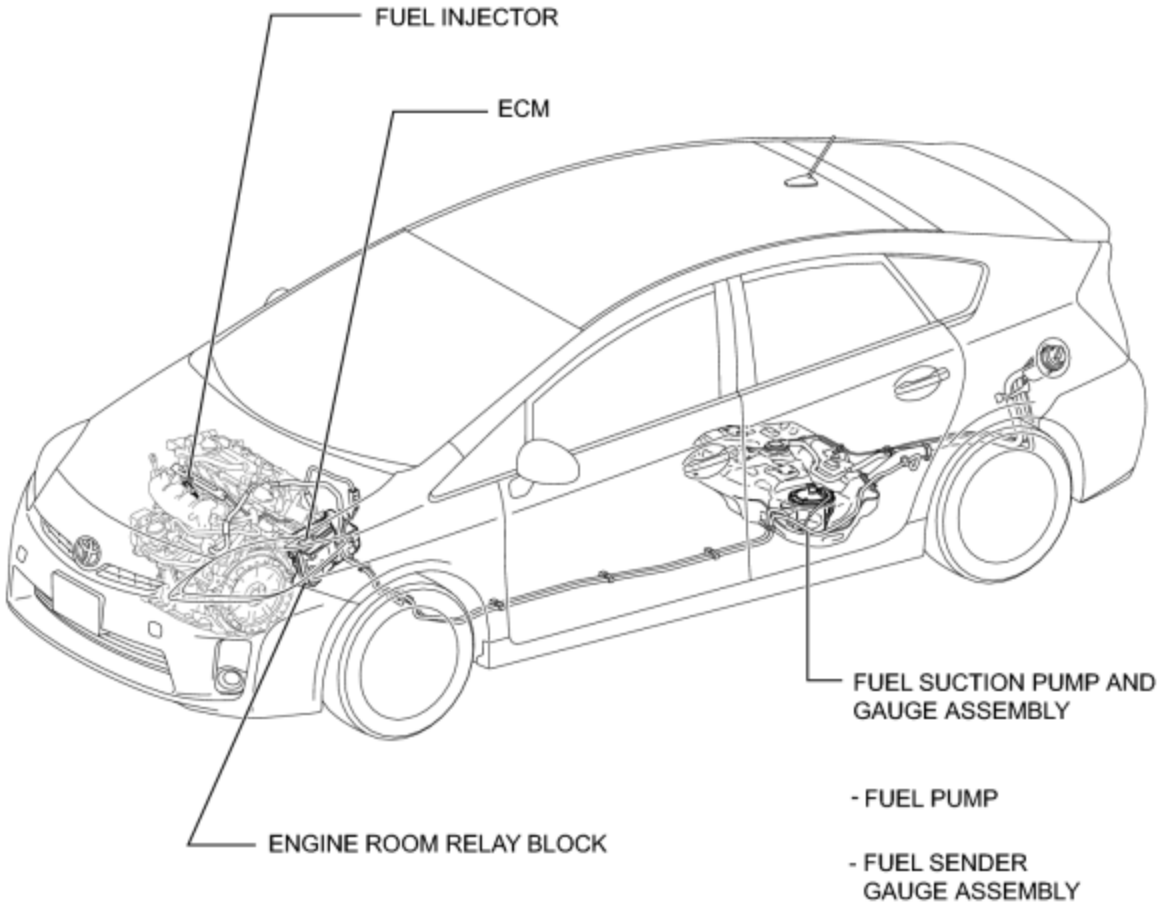
| | |
|---|---|
| *1 | Tube |

6. INSPECT FOR FUEL LEAK

(a) Check that there is no fuel leakage after performing maintenance anywhere on the fuel system INFO.

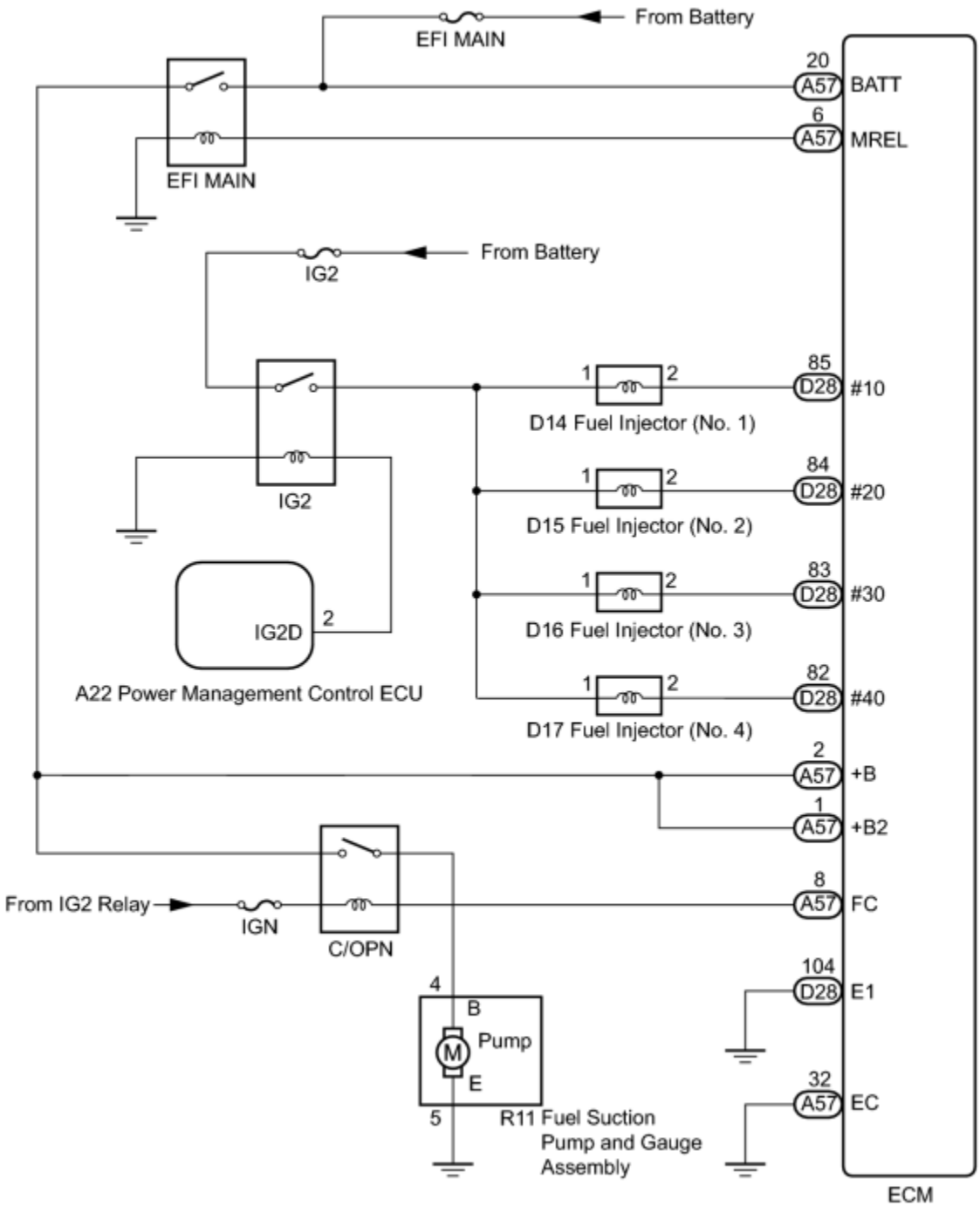
# PARTS LOCATION

# ILLUSTRATION




c

# SYSTEM DIAGRAM



# ON-VEHICLE INSPECTION

1. CHECK FUEL PUMP OPERATION AND INSPECT FOR FUEL LEAK

(a) Check fuel pump operation.

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

NOTICE:

Do not start the engine.

(3) Turn the Techstream on.

(4) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump /Speed.

(5) Check for pressure in the fuel inlet tube from the fuel line. Check that sounds of fuel flowing from the fuel tank can be heard. If no sounds can be heard, check the integration relay, fuel pump, ECM and wiring connectors.

(b) Inspect for fuel leaks.

(1) Check that there is no fuel leakage after performing maintenance anywhere on the fuel system. If there is a fuel leak, repair or replace parts as necessary.

(c) Turn the power switch off.

(d) Disconnect the Techstream from the DLC3.

2. CHECK FUEL PRESSURE

(a) Discharge fuel system pressure INFO.

(b) Using a voltmeter, measure the battery voltage according to the value(s) in the table below.

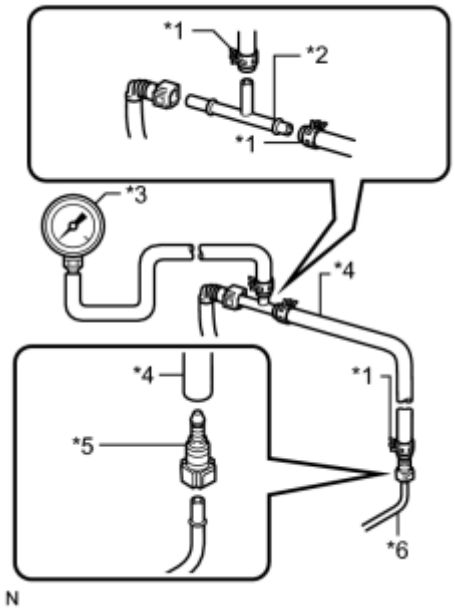
Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Positive terminal - Negative terminal | Power switch off | 11 to 14 V |

(c) Disconnect the cable from the negative (-) battery terminal.

(d) Disconnect the fuel hose from the fuel main tube INFO.

(e) Install SST (pressure gauge) using other SST as shown in the illustration.




## Text in Illustration

| | |
|---|---|
| *1 | SST (Clip) |
| *2 | SST (T-joint) |
| *3 | SST (Pressure Gauge) |
| *4 | SST (Hose) |
| *5 | SST (Tube Connector) |
| *6 | Fuel Tube |

SST: 09268-31012

09268-41500

90467-13001

95336-08070

SST: 09268-45014

09268-41200

09268-41220

09268-41250

(f) Clean up any spilled gasoline.

(g) Connect the cable to the negative (-) battery terminal.

(h) Connect the Techstream to the DLC3.

(i) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Fuel Pump /Speed.

(j) Measure the fuel pressure.

Standard fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm$^2$, 44 to 50 psi)

- If the fuel pressure is greater than the standard value, replace the fuel pressure regulator.
- If the fuel pressure is less than the standard value, check the fuel hoses and connections, fuel pump, fuel filter and fuel pressure regulator.

(k) Disconnect the Techstream from the DLC3.

(l) Put the vehicle in the "inspection mode" INFO.

(m) Start the engine.

(n) Measure the fuel pressure at idle.

Standard fuel pressure:

304 to 343 kPa (3.1 to 3.5 kgf/cm$^2$, 44 to 50 psi)

(o) Stop the engine.

(p) Check that the fuel pressure remains as specified for 5 minutes after the engine stops.

Standard fuel pressure:

147 kPa (1.5 kgf/cm$^2$, 21 psi) or more

If the fuel pressure is not as specified, check the fuel pump or fuel injector.

(q) After checking the fuel pressure, disconnect the cable from the negative (-) battery terminal and carefully remove SST to prevent gasoline from spraying.

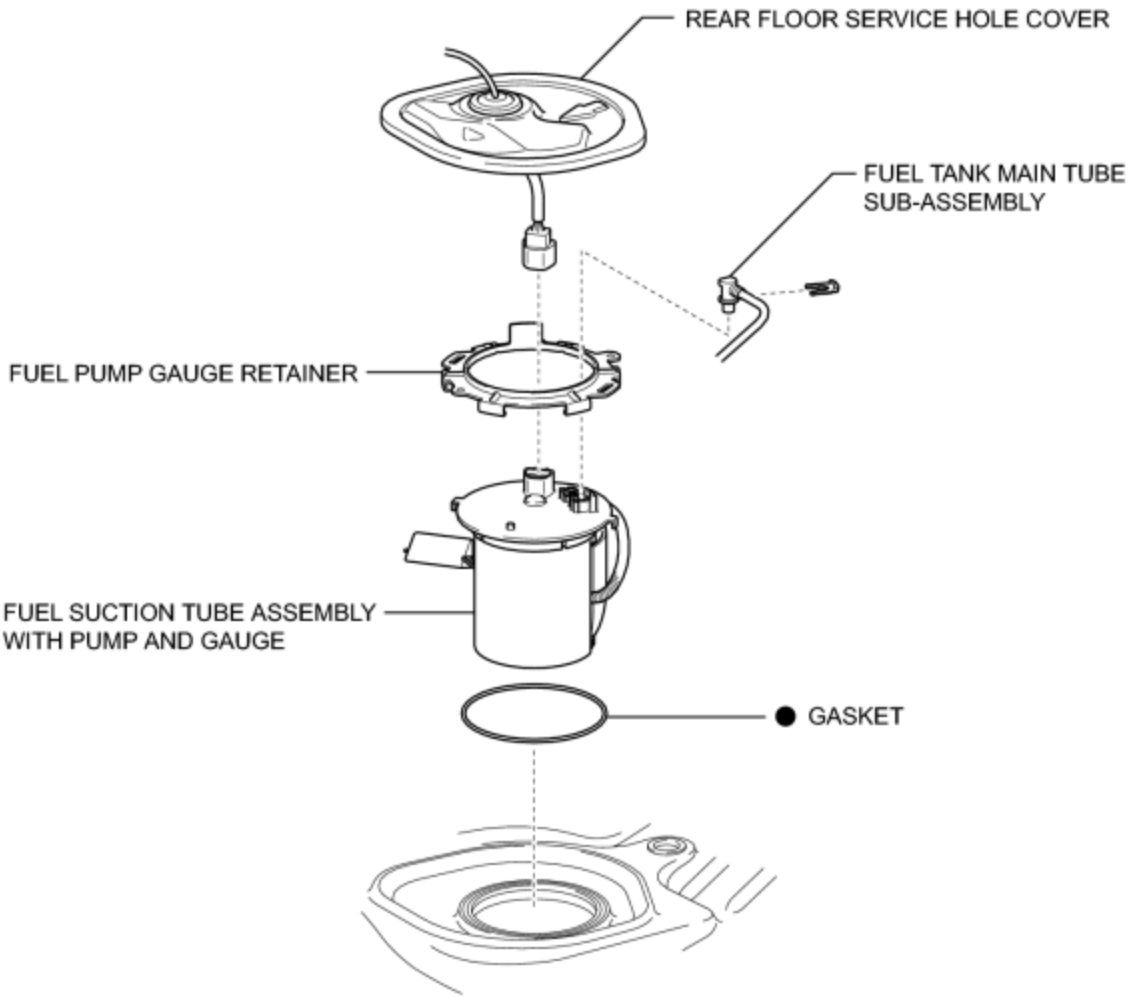
(r) Reconnect the fuel tube to the main fuel tube (fuel tube connector).

(s) Install the No. 1 fuel pipe clamp to the fuel tube connector.

(t) Inspect for fuel leaks (Step 1).

# COMPONENTS

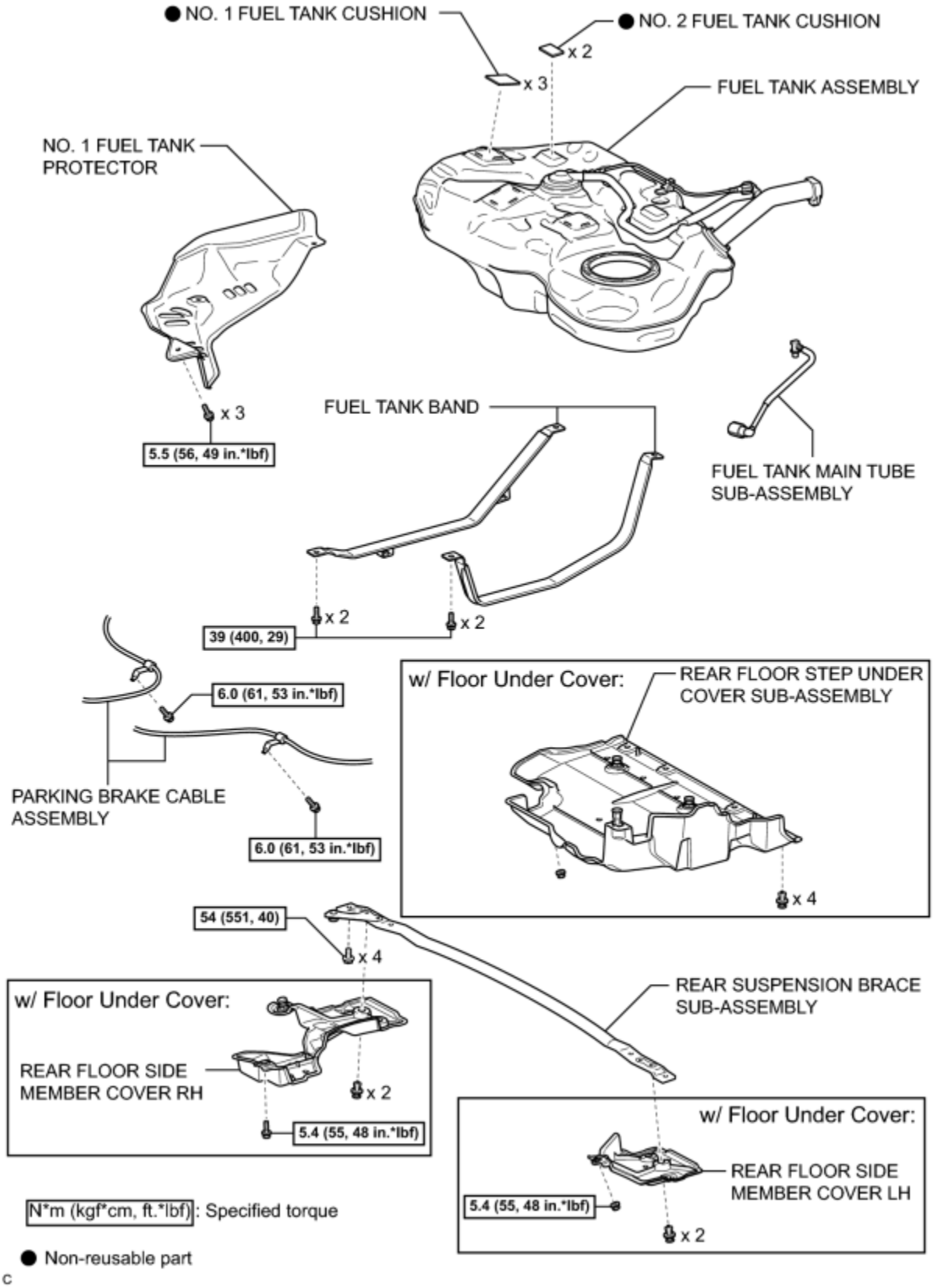
# ILLUSTRATION




● Non-reusable part

c

# ILLUSTRATION


● NO. 1 FUEL TANK CUSHION
● NO. 2 FUEL TANK CUSHION
x 2
x 3
FUEL TANK ASSEMBLY
NO. 1 FUEL TANK PROTECTOR
x 3
5.5 (56, 49 in.*lbf)
FUEL TANK BAND
FUEL TANK MAIN TUBE SUB-ASSEMBLY
x 2
x 2
39 (400, 29)
6.0 (61, 53 in.*lbf)
PARKING BRAKE CABLE ASSEMBLY
6.0 (61, 53 in.*lbf)
w/ Floor Under Cover:
REAR FLOOR STEP UNDER COVER SUB-ASSEMBLY
x 4
54 (551, 40)
x 4
REAR SUSPENSION BRACE SUB-ASSEMBLY
w/ Floor Under Cover:
REAR FLOOR SIDE MEMBER COVER RH
x 2
5.4 (55, 48 in.*lbf)
w/ Floor Under Cover:
REAR FLOOR SIDE MEMBER COVER LH
5.4 (55, 48 in.*lbf)
x 2
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part

c

# REMOVAL

1. REMOVE FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Remove the fuel suction tube assembly with pump and gauge INFO.

2. DRAIN FUEL

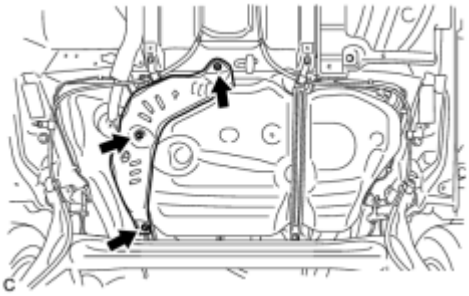
3. REMOVE REAR FLOOR SIDE MEMBER COVER LH (w/ Floor Under Cover) INFO

4. REMOVE REAR FLOOR SIDE MEMBER COVER RH (w/ Floor Under Cover) INFO

5. REMOVE REAR SUSPENSION BRACE SUB-ASSEMBLY INFO

6. REMOVE REAR FLOOR STEP UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover) INFO

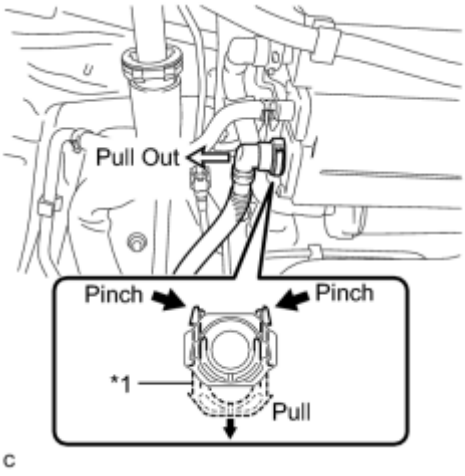
7. REMOVE NO. 1 FUEL TANK PROTECTOR



(a) Remove the 3 bolts and the No. 1 fuel tank protector.

8. DISCONNECT FUEL CUT-OFF TUBE

(a) Disconnect the fuel cut-off tube from the charcoal canister assembly.




## Text in Illustration

| | |
|---|---|
| *1 | Retainer |

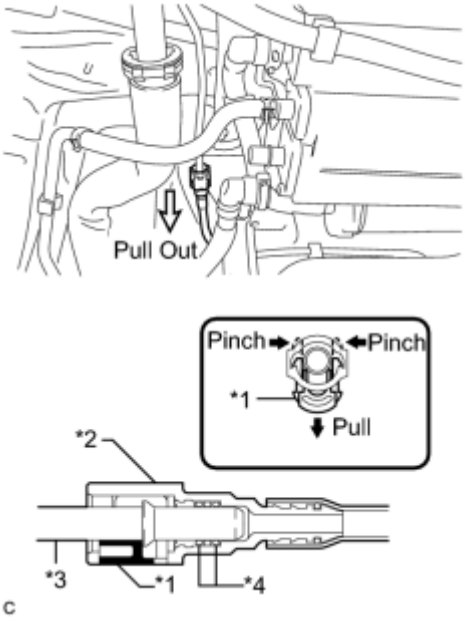
HINT:

Do not remove the retainer.

- Remove any dirt or foreign matter on the fuel cut-off tube connector before performing this work.
- Do not allow any scratches or foreign matter on the parts when disconnecting them as the fuel cut-off tube connector has an O-ring that seals the pipe.
- Perform this work by hand. Do not use any tools.
- Do not forcibly bend, twist or turn the fuel cut-off tube.

- Protect the disconnected part by covering it with a plastic bag after disconnecting the fuel cut-off tube.
- If the vent hose connector and pipe are stuck, push and pull to release them.

9. DISCONNECT FUEL TANK BREATHER TUBE




(a) Pinch the tabs of the retainer to remove the lock claws and pull it down as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Retainer |
| *2 | Quick Connector |
| *3 | Pipe |
| *4 | O-ring |

(b) Pull out the fuel tank breather tube.

NOTICE:

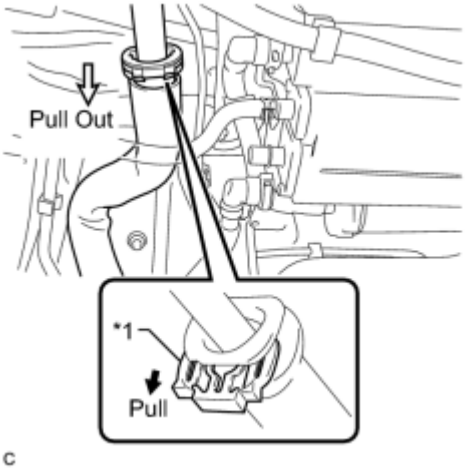
- Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector as necessary.
- It is necessary to prevent mud or dirt from entering the connector. If mud or dirt gets in the connector, the O-rings may not seal properly.
- Do not use any tools in this operation.
- Do not bend, kink or twist the nylon tube. Protect the connector by covering it with a plastic bag.
- When the pipe and connector are stuck, push and pull the connector to release and pull the connector out carefully.

10. DISCONNECT FUEL TANK TO FILLER PIPE HOSE

(a) Pull the tabs of the retainer to disengage the lock claws and pull it down as shown in the illustration

## Text in Illustration

| | |
|---|---|
| *1 | Retainer |



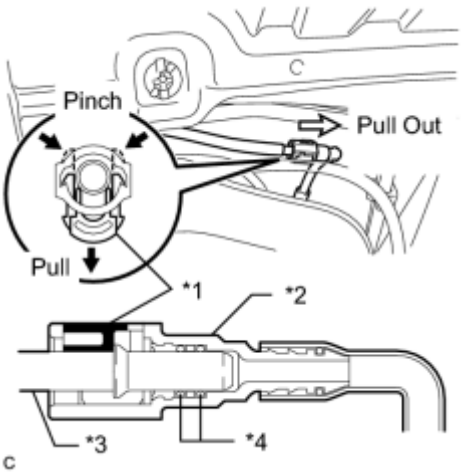

(b) Pull out the fuel tank to filler pipe hose.

NOTICE:

- Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector as necessary.
- It is necessary to prevent mud or dirt from entering the connector. If mud or dirt gets in the connector, the O-rings may not seal properly.
- Do not use any tools in this operation.
- Do not bend, kink or twist the nylon tube. Protect the connector by covering it with a plastic bag.
- When the pipe and connector are stuck, push and pull the connector to release and pull the connector out carefully.

11. REMOVE FUEL TANK MAIN TUBE SUB-ASSEMBLY

## Text in Illustration




| | |
|---|---|
| *1 | Retainer |
| *2 | Quick Connector |
| *3 | Pipe |
| *4 | O-ring |

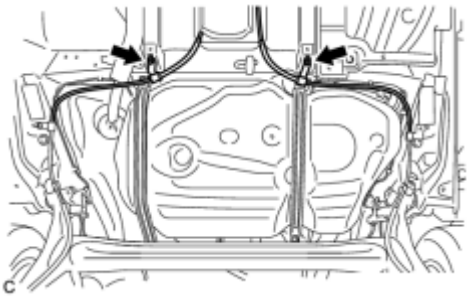
(a) Pinch the tabs of the retainer to remove the lock claws and pull it down as shown in the illustration.

(b) Pull out and remove the fuel tank main tube sub-assembly.

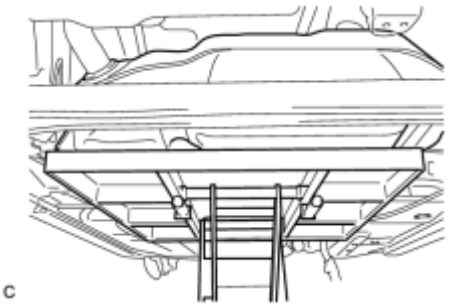
- Check that there is no dirt or other foreign objects around the connector before this operation and clean the connector as necessary.
- It is necessary to prevent mud or dirt from entering the connector. If mud or dirt gets in the connector, the O-rings may not seal properly.
- Do not use any tools in this operation.

- Do not bend, kink or twist the nylon tube. Protect the connector by covering it with a plastic bag.
- When the pipe and connector are stuck, push and pull the connector to release and pull the connector out carefully.

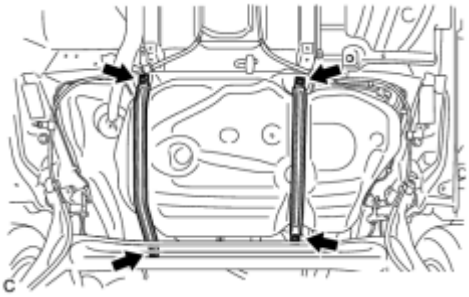
12. REMOVE FUEL TANK ASSEMBLY



(a) Remove the 2 bolts and disconnect the parking brake cable assembly.



(b) Support the fuel tank using an engine lifter.



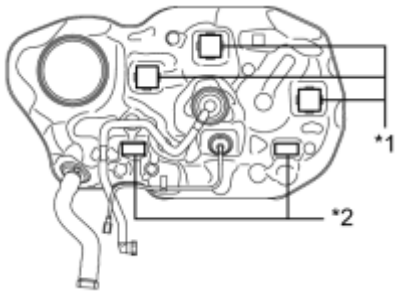
(c) Remove the 4 set bolts of the 2 fuel tank bands.

(d) Lower the engine lifter to remove the fuel tank.

NOTICE:

- Slowly operate the engine lifter to lower the fuel tank.
- Do not drop the fuel tank.
- When removing the fuel tank, tilt it slightly to prevent it from interfering with the suspension arm or other surrounding parts.

13. REMOVE FUEL TANK CUSHION




c

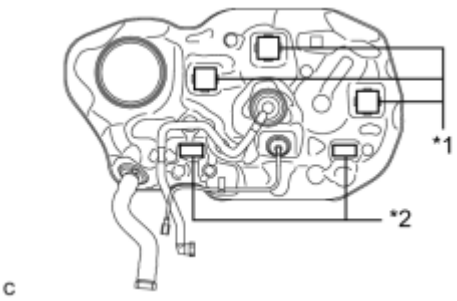
(a) Remove the 3 No. 1 fuel tank cushions and 2 No. 2 fuel tank cushions.

## Text in Illustration

| | |
|---|---|
| *1 | No. 1 Fuel Tank Cushion |
| *2 | No. 2 Fuel Tank Cushion |

# INSTALLATION

1. INSTALL FUEL TANK CUSHION



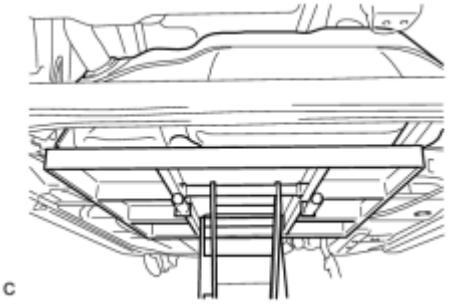

(a) Install 3 new No. 1 fuel tank cushions and 2 new No. 2 fuel tank cushions as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | No. 1 Fuel Tank Cushion |
| *2 | No. 2 Fuel Tank Cushion |

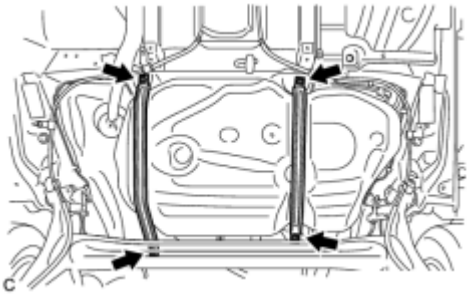
2. INSTALL FUEL TANK ASSEMBLY

(a) Support the fuel tank using an engine lifter.




(b) Raise the engine lifter, then install the fuel tank to the vehicle.

- Do not drop the fuel tank.
- When installing the fuel tank, tilt it slightly to prevent it from interfering with the suspension arm or other surrounding parts.

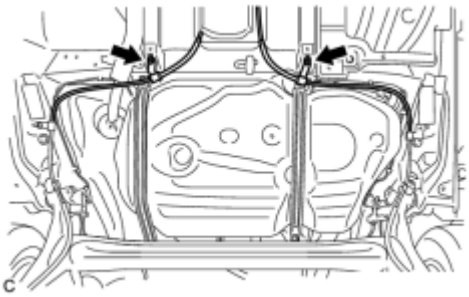



(c) Tighten the 4 set bolts of the 2 fuel tank bands.

Torque: **39 N·m (400 kgf·cm, 29ft·lbf)**

NOTICE:

First temporarily install the bolts of the tank bracket. Then temporarily install the bolts of the tank bands. Finally, tighten all of the bolts.

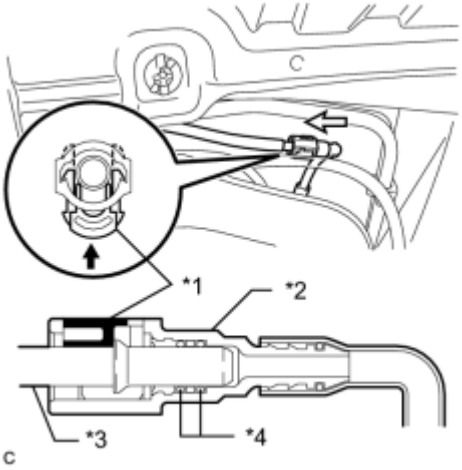



(d) Connect the parking brake cable assembly with the 2 bolts.

Torque: **6.0 N·m (61 kgf·cm, 53in·lbf)**

3. CONNECT FUEL TANK MAIN TUBE SUB-ASSEMBLY

(a) Push in the fuel tank main tube connector to the pipe and push up the retainer so that the claws engage.

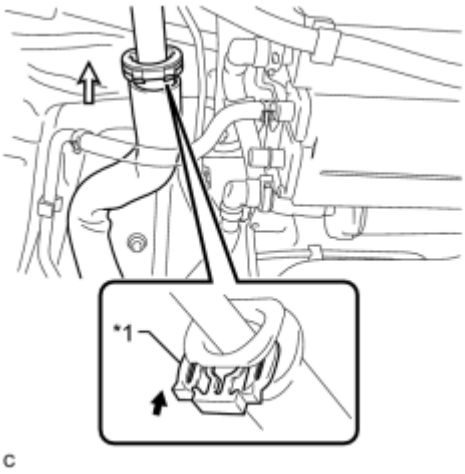



## Text in Illustration

| | |
|---|---|
| *1 | Retainer |
| *2 | Quick Connector |
| *3 | Pipe |
| *4 | O-ring |

- Check that there are no scratches or foreign objects around the connected part of the fuel tube connector and pipe before starting this step.
- After connecting the fuel tank main tube sub-assembly, check that the fuel tank main tube sub-assembly is securely connected by pulling on the fuel tube connector.

4. CONNECT FUEL TANK TO FILLER PIPE HOSE




(a) Push in the hose connector to the filler pipe and install the retainer.

## Text in Illustration

| | |
|---|---|
| *1 | Retainer |

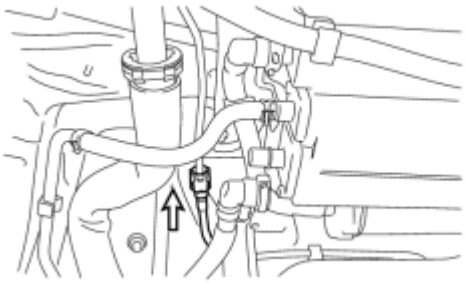
- Before connecting the tube, make sure that it is not damaged. Make sure that there is no dirt present on the connecting surfaces.
- After connecting, check if the fuel tube connector and the pipe are securely connected by pulling on them.

5. CONNECT FUEL TANK BREATHER TUBE

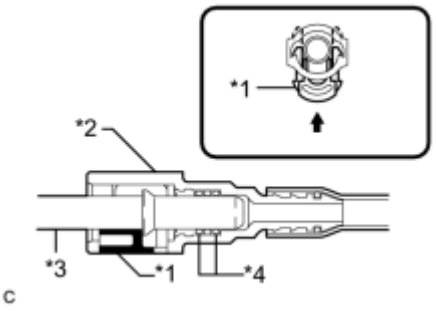
(a) Push in the fuel tank breather tube connector to the pipe and push up the retainer so that the claws engage.

## Text in Illustration

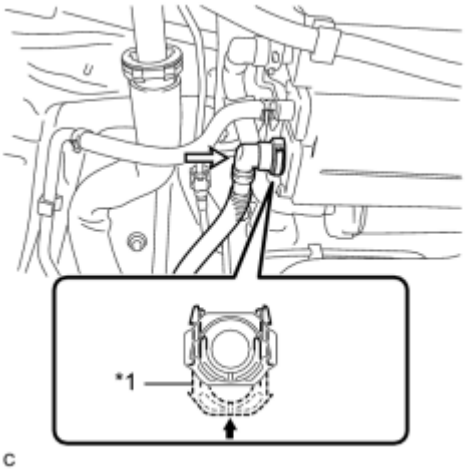
| | |
|---|---|
| *1 | Retainer |
| *2 | Quick Connector |
| *3 | Pipe |
| *4 | O-ring |



- Check that there are no scratches or foreign objects around the connected part of the fuel tube connector and pipe before starting this step.
- After connecting the fuel tank main tube sub-assembly, check that the fuel tank main tube sub-assembly is securely connected by pulling on the fuel tube connector.




6. CONNECT FUEL CUT-OFF TUBE



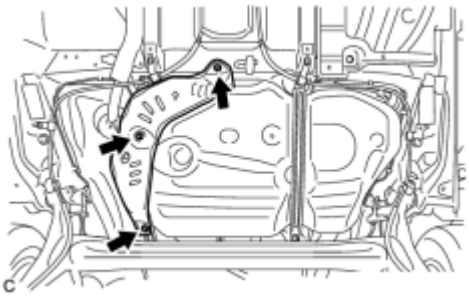

(a) Push in the fuel cut-off tube connector to the charcoal canister and push up the retainer so that the claws engage.

## Text in Illustration

| | |
|---|---|
| *1 | Retainer |

- Check that there are no scratches or foreign matter around the connected part of the fuel cut-off tube connector and pipe before performing this work.
- After connecting the fuel cut-off tube, check that the fuel cut-off tube is securely connected by pulling the fuel cut-off tube connector and the charcoal canister.

7. INSTALL NO. 1 FUEL TANK PROTECTOR




(a) Install the No. 1 fuel tank protector with the 3 bolts.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

8. INSTALL REAR FLOOR STEP UNDER COVER SUB-ASSEMBLY (w/ Floor Under Cover) INFO

9. INSTALL REAR SUSPENSION BRACE SUB-ASSEMBLY INFO

10. INSTALL REAR FLOOR SIDE MEMBER COVER LH (w/ Floor Under Cover) INFO

11. INSTALL REAR FLOOR SIDE MEMBER COVER RH (w/ Floor Under Cover) INFO

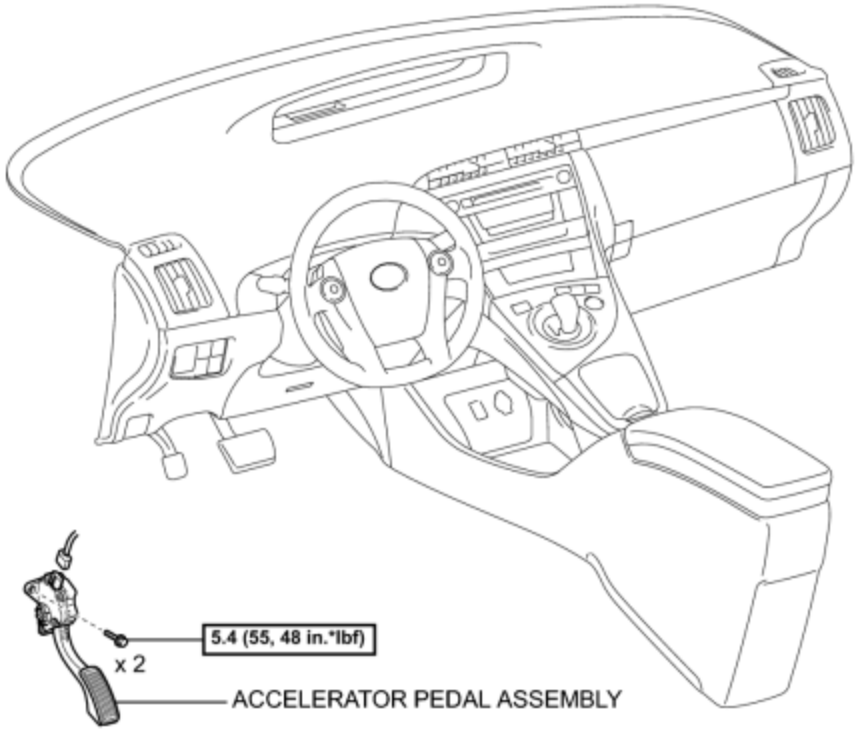
12. ADD FUEL

13. INSTALL FUEL SUCTION TUBE ASSEMBLY WITH PUMP AND GAUGE

(a) Install the fuel suction tube assembly with pump and gauge INFO.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# ON-VEHICLE INSPECTION

1. INSPECT ACCELERATOR PEDAL ASSEMBLY

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

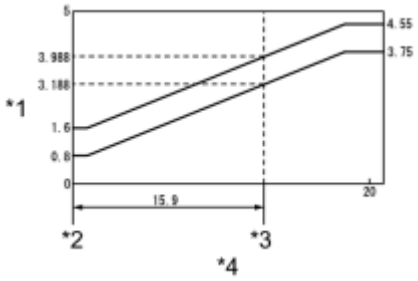
(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Accel Pedal Pos #1, Accel Pedal Pos #2.

(e) Read the Data List.

Result:

| Tester Display | Accelerator Pedal Condition | Specified Condition |
|---|---|---|
| Accel Pedal Pos #1 | Not depressed | (8 to 28%) 0.4 to 1.4 V |
| | Fully depressed | (62 to 92%) 3.1 to 4.6 V |
| | Not depressed → Fully depressed → Not depressed (Accelerator pedal should be operated slowly) | Value changes progressively as shown in the illustration |
| Accel Pedal Pos #2 | Not depressed | (20 to 44%) 1.0 to 2.2 V |
| | Fully depressed | (78 to 100%) 3.9 to 5.0 V |
| | Not depressed → Fully depressed → Not depressed (Accelerator pedal should be operated slowly) | Value changes progressively as shown in the illustration |



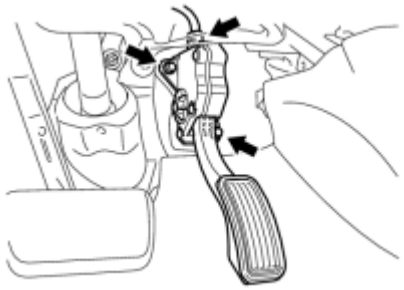

## Text in Illustration

| | |
|---|---|
| *1 | Accelerator Pedal Position Sensor Output Voltage (V) |
| *2 | Accelerator Pedal Fully Released |
| *3 | Accelerator Pedal Fully depressed |
| *4 | Accelerator Pedal Turning Angle (°) |

If the result is not as specified, check the accelerator pedal assembly, wire harness or ECM.

# REMOVAL

1. REMOVE ACCELERATOR PEDAL ASSEMBLY



(a) Disconnect the accelerator pedal assembly connector.

(b) Remove the 2 bolts and accelerator pedal assembly.

NOTICE:

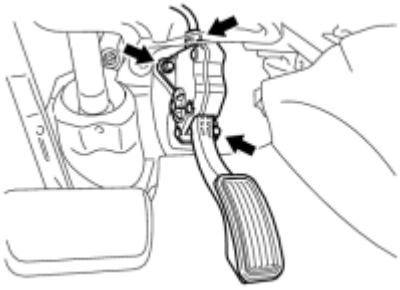
- Avoid physical shock to the accelerator pedal assembly.
- Do not disassemble the accelerator pedal assembly.

# INSTALLATION

1. INSTALL ACCELERATOR PEDAL ASSEMBLY

NOTICE:

- Avoid physical shock to the accelerator pedal assembly.
- Do not disassemble the accelerator pedal assembly.



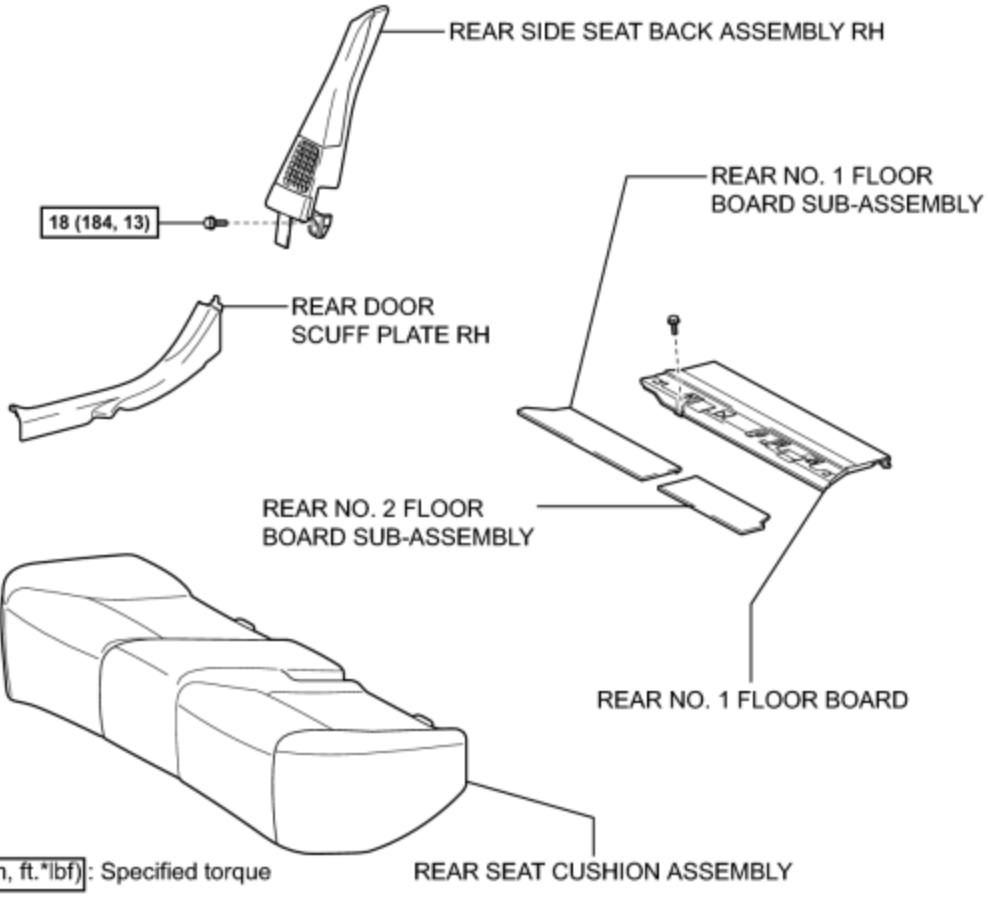
(a) Install the accelerator pedal assembly with the 2 bolts.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

(b) Connect the accelerator pedal assembly connector.

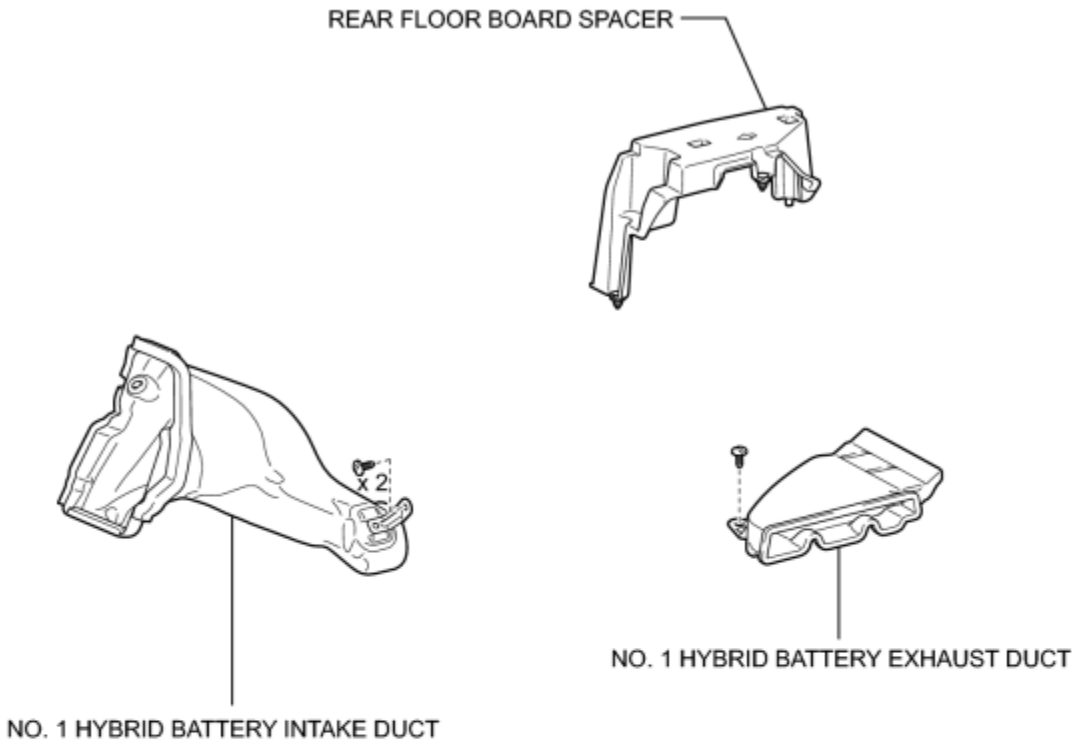
# COMPONENTS

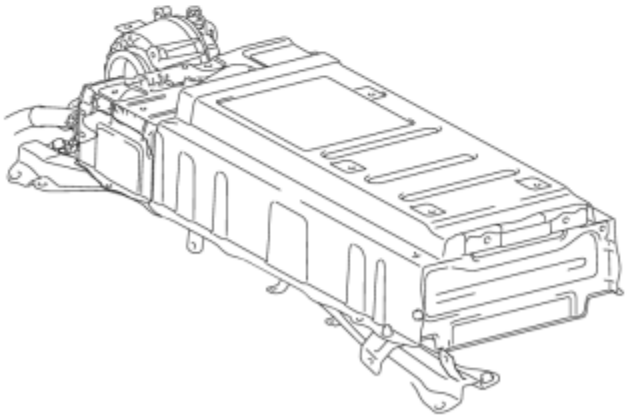
# ILLUSTRATION




P

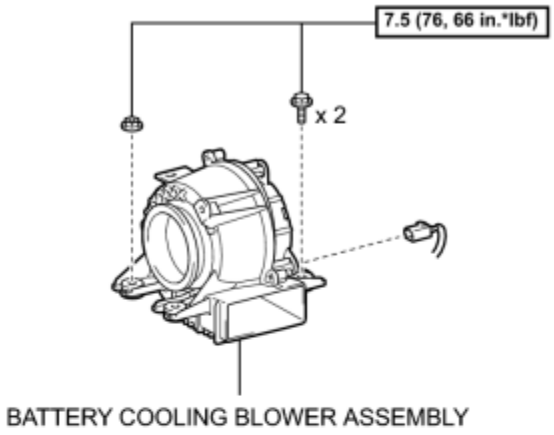
# ILLUSTRATION

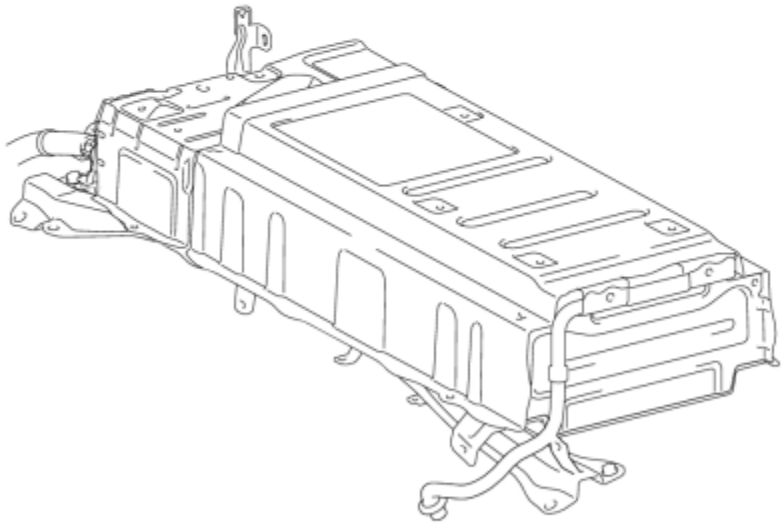


P

# ILLUSTRATION



N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

2. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

3. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

4. REMOVE REAR NO. 1 FLOOR BOARD INFO

5. REMOVE REAR FLOOR BOARD SPACER INFO

6. REMOVE NO. 1 HYBRID BATTERY EXHAUST DUCT INFO

7. REMOVE REAR DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side INFO.

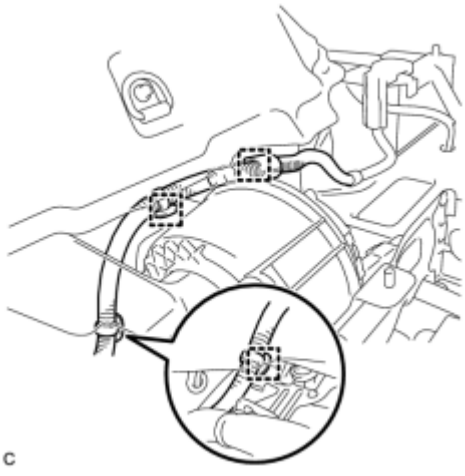
8. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH INFO

9. REMOVE NO. 1 HYBRID BATTERY INTAKE DUCT INFO

10. REMOVE BATTERY COOLING BLOWER ASSEMBLY

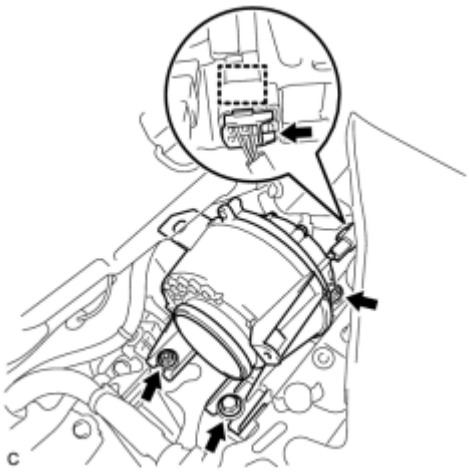
NOTICE:

- Be sure not to touch the fan part of the battery cooling blower assemblies.
- Do not lift the battery cooling blower assemblies using the wire harness.




(a) Disconnect the 3 wire harness clamps.

(b) Disconnect the battery cooling blower assembly connector and clamp.



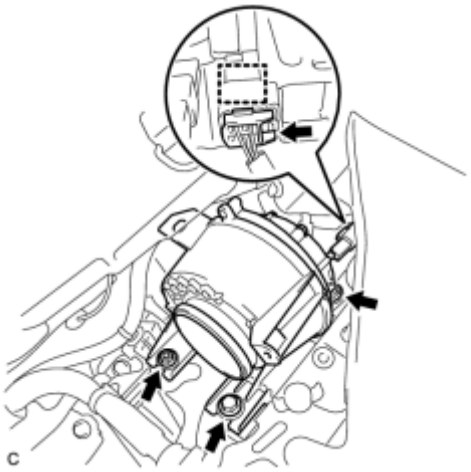

(c) Remove the 2 bolts, nut and battery cooling blower assembly.

# INSTALLATION

1. INSTALL BATTERY COOLING BLOWER ASSEMBLY

NOTICE:

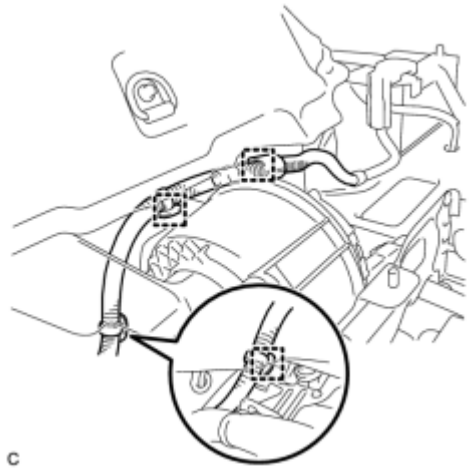
- Be sure not to touch the fan part of the battery cooling blower assemblies.
- Do not lift the battery cooling blower assemblies using the wire harness.




(a) Install the battery cooling blower assembly with the 2 bolts and nut.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(b) Connect each battery cooling blower assembly connector and clamp.




(c) Connect the 3 wire harness clamps.

2. INSTALL NO. 1 HYBRID BATTERY INTAKE DUCT INFO

3. INSTALL REAR SIDE SEAT BACK ASSEMBLY RH INFO

4. INSTALL REAR DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side INFO.

5. INSTALL NO. 1 HYBRID BATTERY EXHAUST DUCT INFO

6. INSTALL REAR FLOOR BOARD SPACER INFO

7. INSTALL REAR NO. 1 FLOOR BOARD INFO

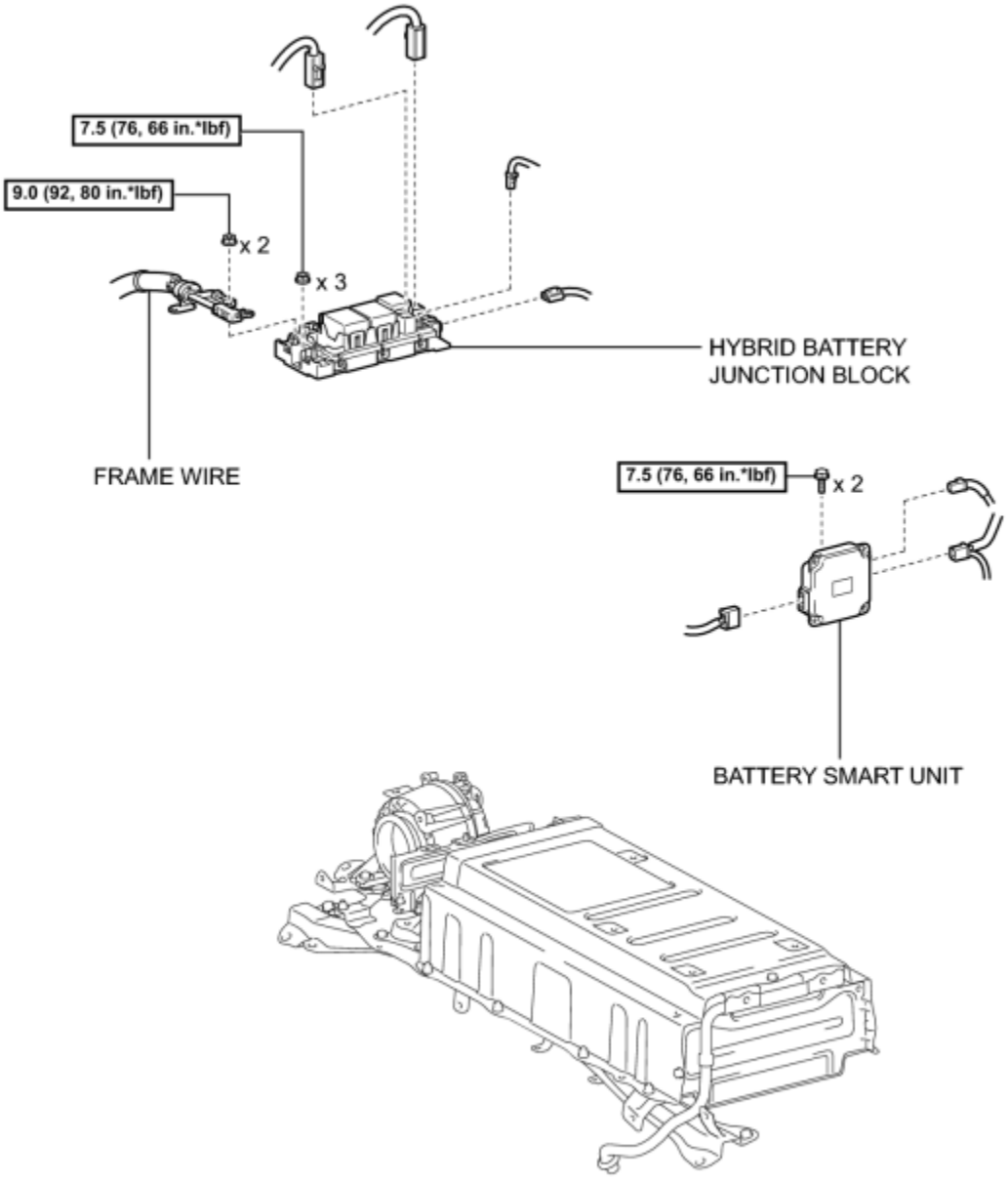
8. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

9. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

10. PERFORM REAR SEAT CUSHION ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

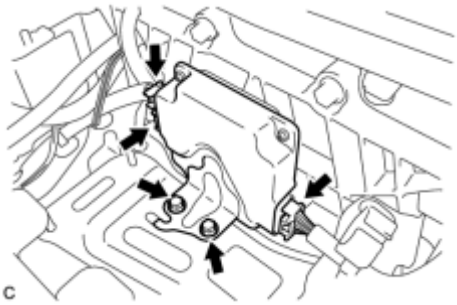
1. REMOVE HYBRID BATTERY JUNCTION BLOCK

HINT: INFO.

2. REMOVE BATTERY SMART UNIT

CAUTION:

Be sure to wear insulated gloves and protective goggles.




(a) Disconnect the 3 connectors.

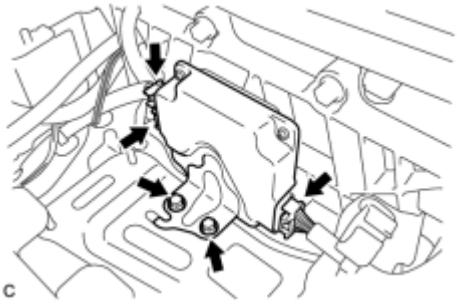
(b) Remove the 2 bolts and battery smart unit.

# INSTALLATION

1. INSTALL BATTERY SMART UNIT

CAUTION:

Be sure to wear insulated gloves and protective goggles.




(a) Install the battery smart unit with the 2 bolts.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(b) Connect the 3 connectors.

NOTICE:

The connectors should be connected securely.

2. INSTALL HYBRID BATTERY JUNCTION BLOCK

HINT: INFO.

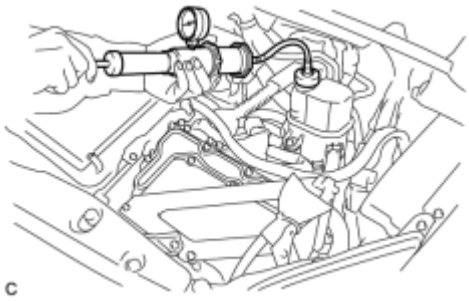
# ON-VEHICLE INSPECTION

1. INSPECT FOR COOLANT LEAK (for Inverter)

(a) Remove the reserve tank cap.

CAUTION:

To avoid the danger of being burned, do not remove the reserve tank cap while the coolant for the inverter is still hot.




(b) Install the radiator cap tester.

(c) Pump the radiator cap tester to 122 kPa (1.2 kgf/ $cm^2$, 17.7 psi), and then check that the pressure does not drop.

HINT:

If the pressure drops, check the hoses, radiator, water pump, inverter with converter, and hybrid vehicle transaxle assembly for leaks.

(d) Reinstall the reserve tank cap.

2. INSPECT COOLANT LEVEL IN RESERVE TANK (for Inverter)

(a) The coolant should be between the L and F lines when the coolant for the inverter is cold.

HINT:

If the coolant level is low, check for leaks and add TOYOTA Super Long Life Coolant (SLLC) or similar high quality ethylene glycol based non-silicate, non-amine, non-nitrite, and non-borate coolant with long-life hybrid organic acid technology up to the F line.

3. INSPECT COOLANT (for Inverter)

(a) Remove the reserve tank cap.

CAUTION:

To avoid the danger of being burned, do not remove the reserve tank cap while the coolant for the inverter is still hot.

(b) Check for excessive deposits of rust or scale on and around the reserve tank cap and its opening.

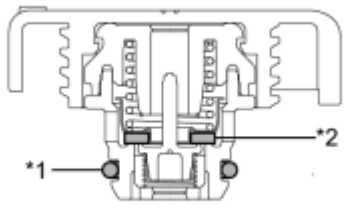
HINT:

If excessively dirty, replace the coolant for the inverter.

(c) Reinstall the reserve tank cap.

4. INSPECT RESERVE TANK CAP (for Inverter)

(a) Inspect the reserve tank cap.




C

## Text in Illustration

| | |
|---|---|
| *1 | O-ring |
| *2 | Rubber Packing |

(1) If there are water stains or foreign matter on the O-ring, clean it with water and finger scouring.

NOTICE:

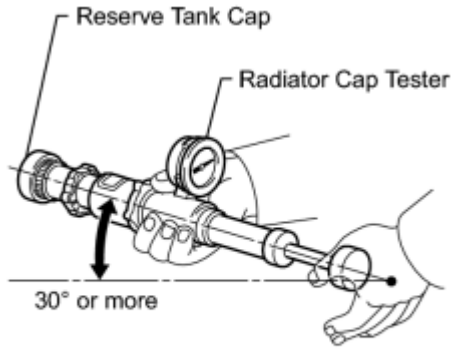
Do not use any tools.

(2) Check that the O-ring is not deformed, cracked, or damaged.

(3) Check that the O-ring is not swollen.

(b) Check the reserve tank cap operation.

(1) Apply coolant (for inverter) to the O-ring and rubber packing before using a radiator cap tester.




N

(2) Install the reserve tank cap to the radiator cap tester.

(3) Pump the cap tester several times, and check the maximum pressure.

## Judgment Criterion

| | |
|---|---|
| Standard value (for brand-new cap) | 94 to 122 kPa (1.0 to 1.2 kgf/cm$^2$, 13.6 to 17.7 psi) |
| Minimum standard value (for used cap) | 94 kPa (1.0 kgf/cm$^2$, 13.6 psi) |
| Pump speed | 1 pump per second |

NOTICE:

When using the cap tester, tilt it 30° or more.

HINT:

If the maximum pressure is less than the minimum standard value, replace the reserve tank cap.

# REPLACEMENT

1. REMOVE FRONT SPOILER COVER (for Standard)

2. REMOVE ENGINE UNDER COVER (w/ Cover)

3. DRAIN COOLANT (for Inverter)

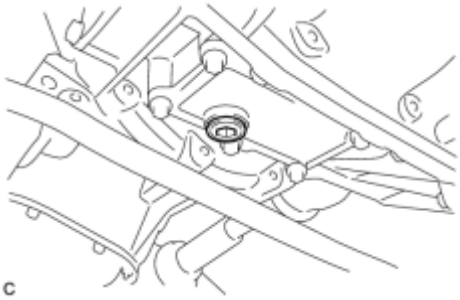
NOTICE:

- Do not reuse the drained coolant because it may contain foreign objects.
- Collect the drained coolant and measure its volume to establish a benchmark. When adding coolant, make sure to add more coolant than the measured amount.

(a) Remove the reserve tank cap.

CAUTION:

To avoid the danger of being burned, do not remove the reserve tank cap while the coolant for the inverter is still hot.




(b) Using a hexagon wrench (10 mm), remove the drain plug indicated in the illustration and drain the coolant.

CAUTION:

Use caution when handling coolant immediately after driving or in summer because it may be hot.

(c) Install the plug with a new gasket.

Torque: **39 N·m (397 kgf·cm, 29ft·lbf)**

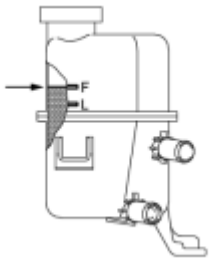
4. ADD COOLANT (for Inverter)

NOTICE:

- Do not reuse the drained coolant because it may contain foreign objects.
- If the vehicle is driven with air in the inverter cooling system, damage may occur and the following DTCs may be set.

| DTC Code | Detection Item |
|---|---|
| P0A01-726 | Motor Electronics Coolant Temperature Sensor Circuit Range / Performance |
| P0A04-725 | Motor Electronics Coolant Temperature Sensor Circuit Intermittent |
| P0A08-264 | DC / DC Converter Status Circuit |

| DTC Code | Detection Item |
|---|---|
| P0A78-284 | Drive Motor "A" Inverter Performance |
| P0A78-286 | Drive Motor "A" Inverter Performance |
| P0A7A-322 | Generator Inverter Performance |
| P0A7A-324 | Generator Inverter Performance |
| P0A93-346 | Inverter Cooling System Performance |
| P0A94-553 | DC / DC Converter Performance |
| P0A94-557 | DC / DC Converter Performance |
| P0AEE-277 | Motor Inverter Temperature Sensor "A" Circuit Range / Performance |
| P0AF1-276 | Drive Motor Inverter Temperature Sensor "A" Circuit Intermittent / Erratic |
| P0BCD-315 | Generator Inverter Temperature Sensor Circuit Range / Performance |
| P0BD0-314 | Generator Inverter Temperature Sensor Circuit Intermittent / Erratic |
| P0C39-626 | DC / DC Converter Temperature Sensor "A" Range / Performance |
| P0C3C-625 | DC / DC Converter Temperature Sensor "A" Intermittent / Erratic |
| P0C3E-628 | DC / DC Converter Temperature Sensor "B" Range / Performance |
| P0C41-627 | DC / DC Converter Temperature Sensor "B" Intermittent / Erratic |
| P0C73-776 | Motor Electronics Coolant Pump "A" Control Performance |




C

(a) Slowly pour coolant into the reserve tank until it reaches the F line.

Coolant quantity:

2.1 liters (2.2 US qts, 1.8 Imp. qts.)

(b) When using the Techstream:

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) On the Techstream, enter the following menus: Powertrain / Hybrid Control / Active Test / Activate the Water Pump.

(4) Keep the coolant at the F line in the reserve tank to compensate for the drop in coolant level when the air bleeds.

Standard:

Air bleeding from the inverter cooling system is completed when the noise made by the water pump becomes smaller and the circulation of coolant in the reserve tank improves.

HINT:

Loud noise made by the water pump and poor circulation of coolant in the reserve tank indicates that there is air in the cooling system.

(c) When not using the Techstream:

(1) Turn the power switch on (READY). [*1]

(2) Turn the power switch off and add coolant to the F line because the coolant level drops as the air bleeds. [*2]

NOTICE:

- Be sure to turn the power switch off before adding SLLC.
- Do not work on the components in the engine compartment while the vehicle is in the READY-on state because the engine is in intermittent operation.

(3) Repeat steps [*1] and [*2] until air bleeding from the cooling system is completed.

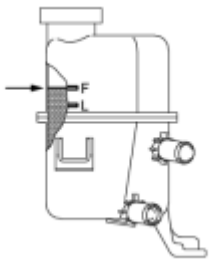
Standard:

Air bleeding from the inverter cooling system is completed when the noise made by the water pump becomes smaller and the circulation of coolant in the reserve tank improves.

HINT:

Loud noise made by the water pump and poor circulation of coolant in the reserve tank indicates that there is air in the cooling system.

(d) After the air is completely bled from the cooling system, tighten the reserve tank cap.




C

(e) Add coolant to the F line of the reserve tank.

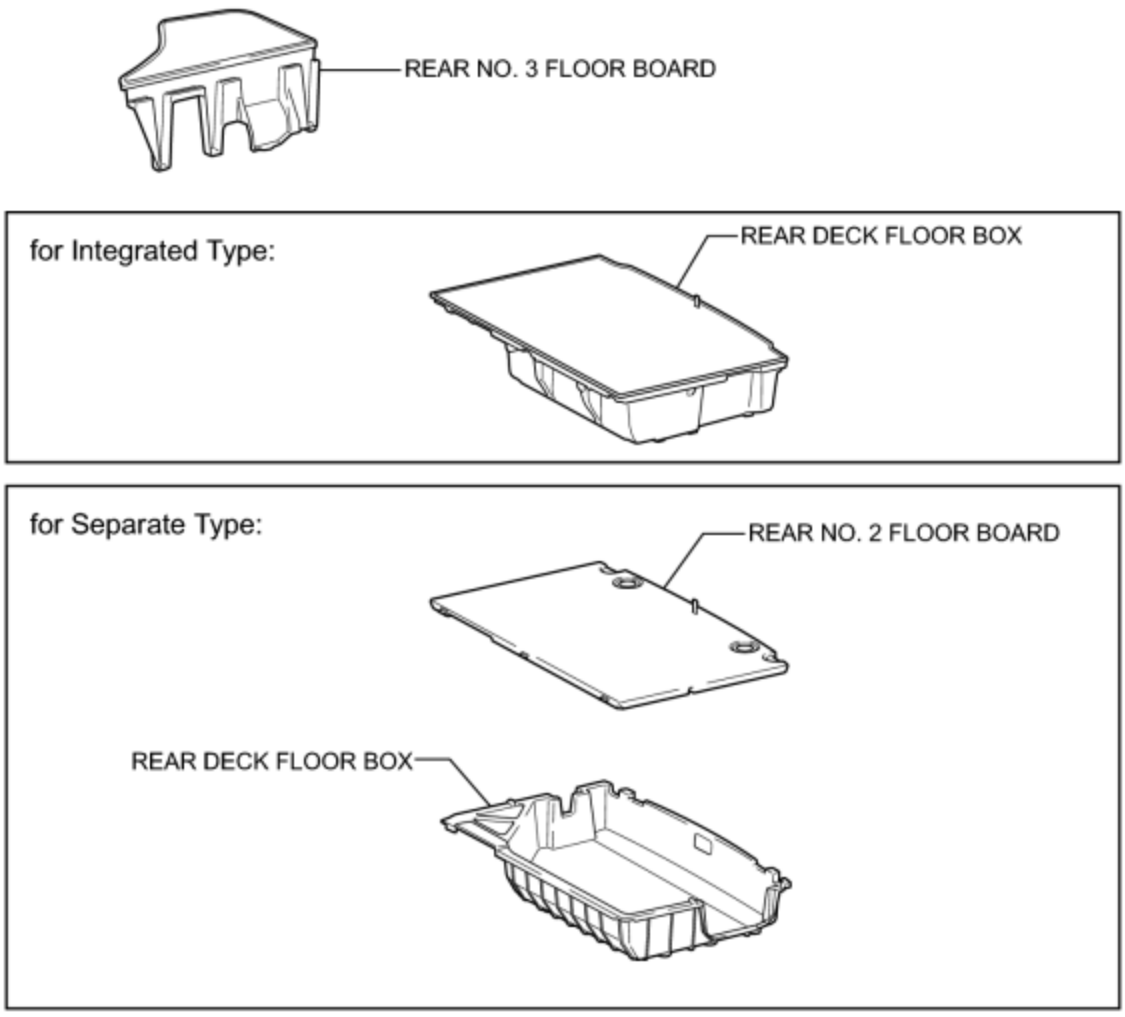
5. INSPECT FOR COOLANT LEAK (for Inverter) INFO

6. INSTALL ENGINE UNDER COVER (w/ Cover)

7. INSTALL FRONT SPOILER COVER (for Standard)

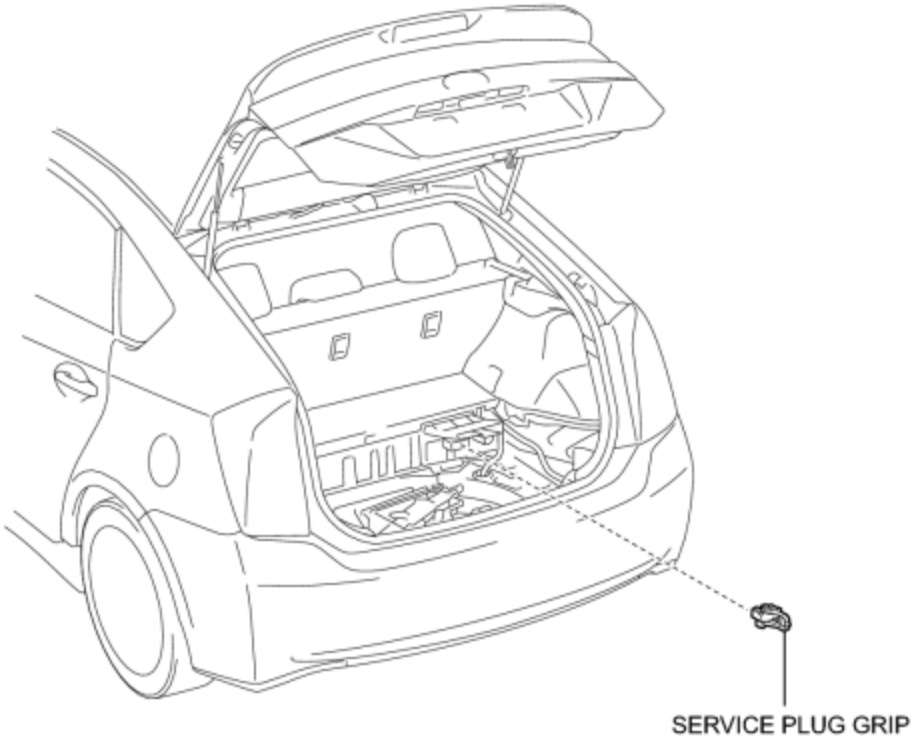
# COMPONENTS

# ILLUSTRATION



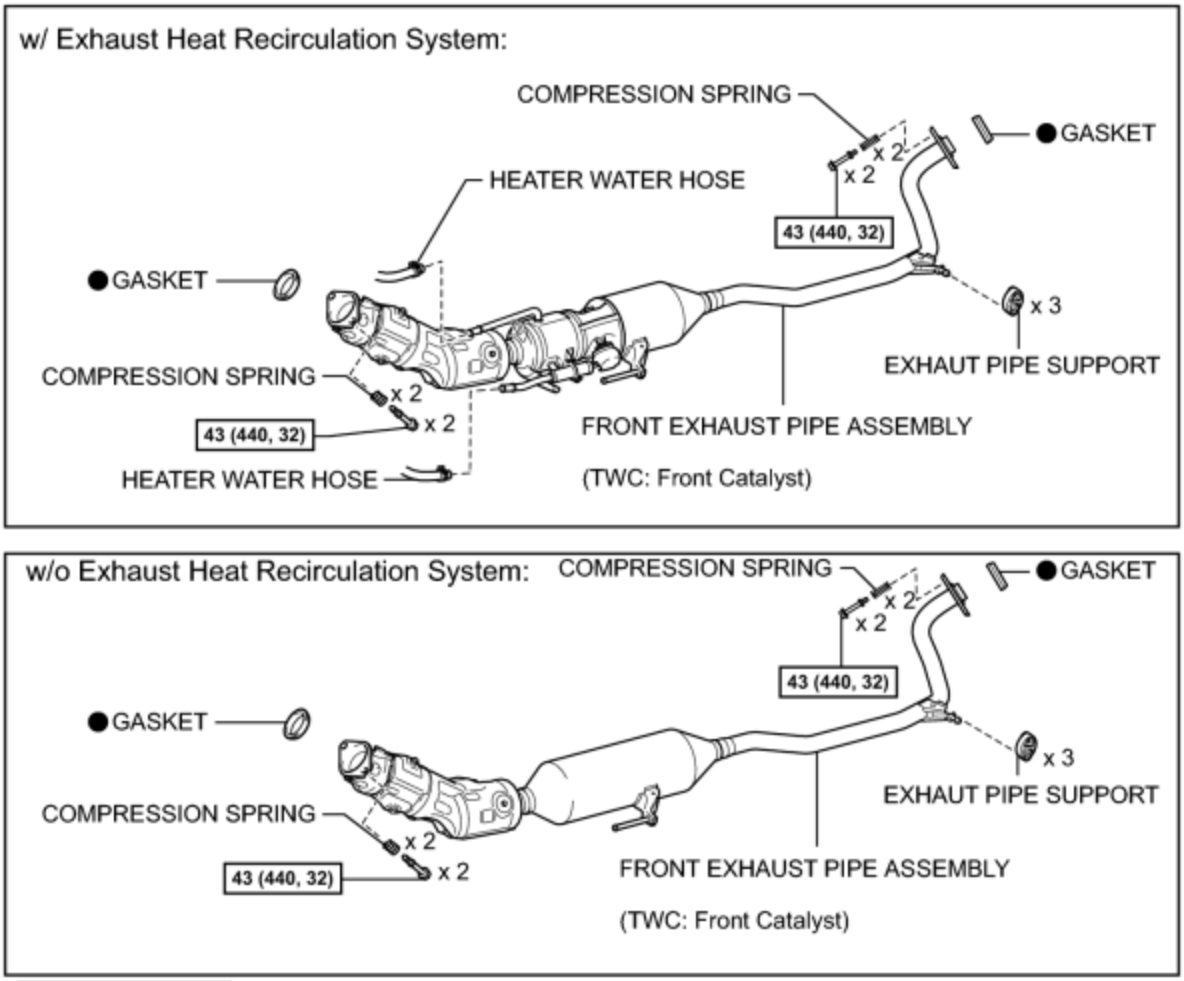

P

# ILLUSTRATION




P

# ILLUSTRATION

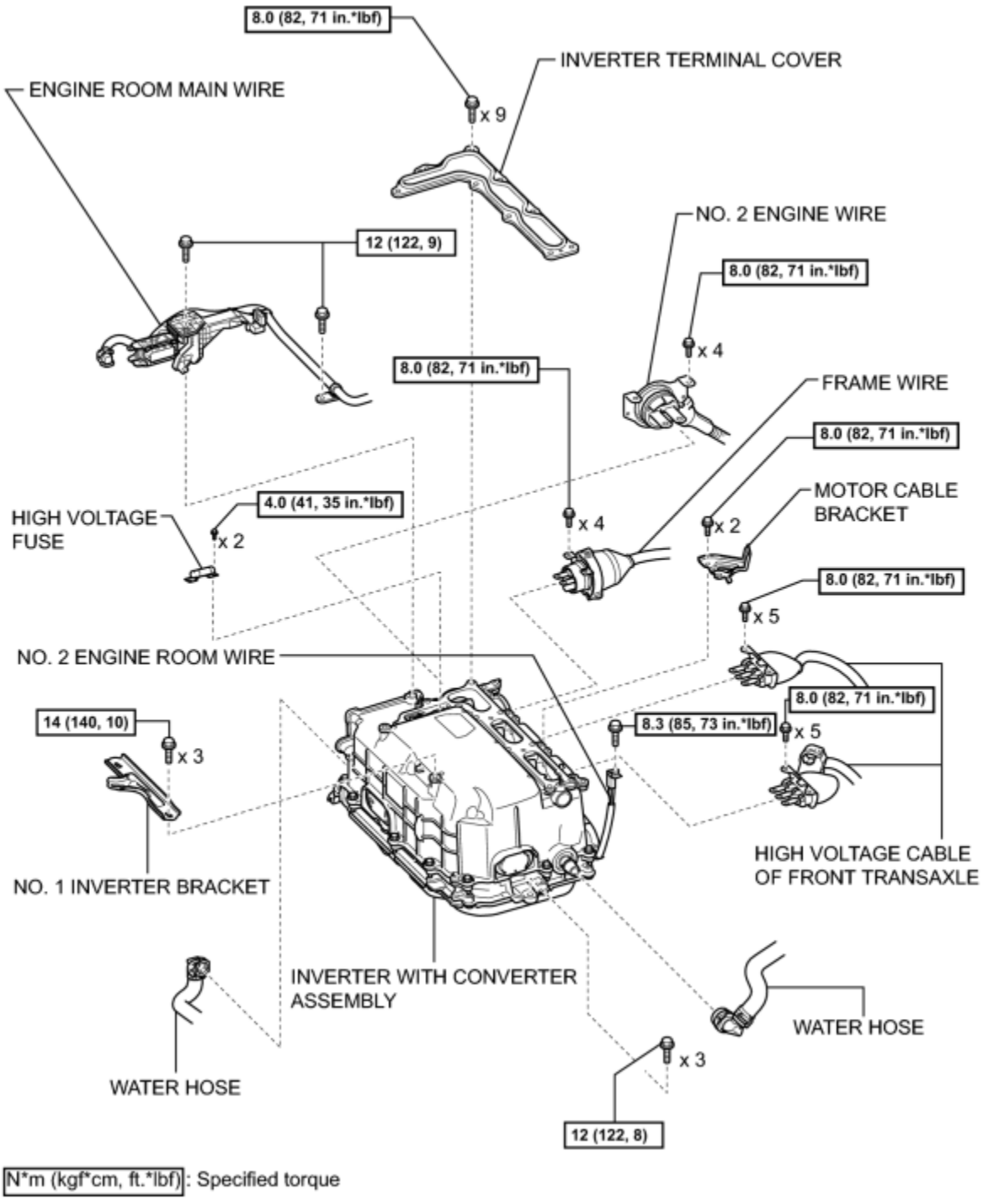



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

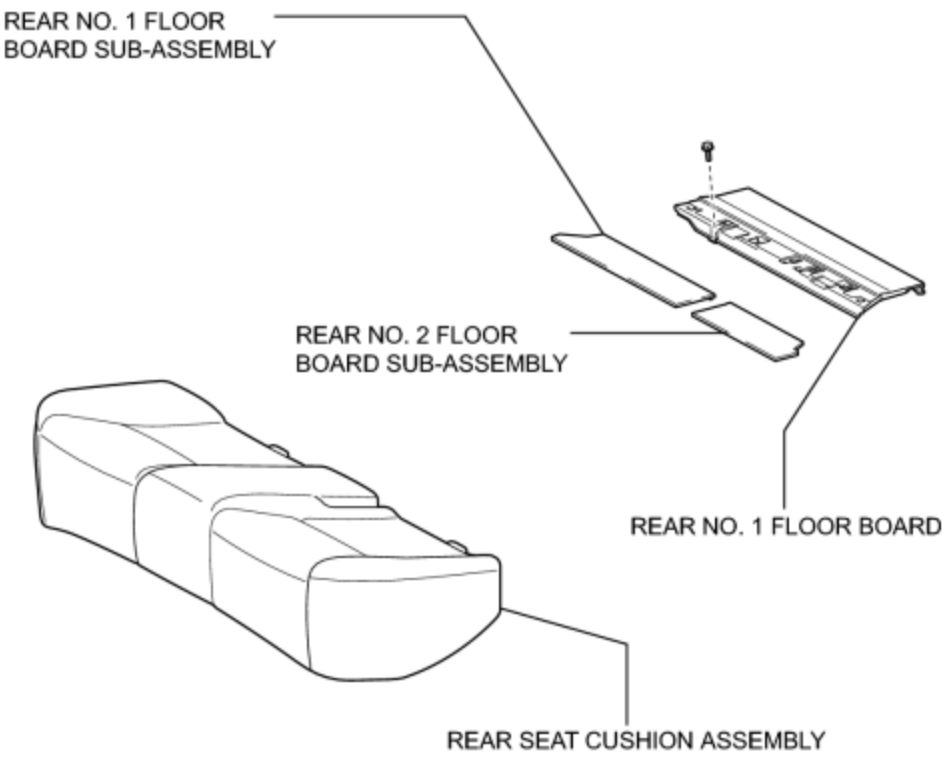
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

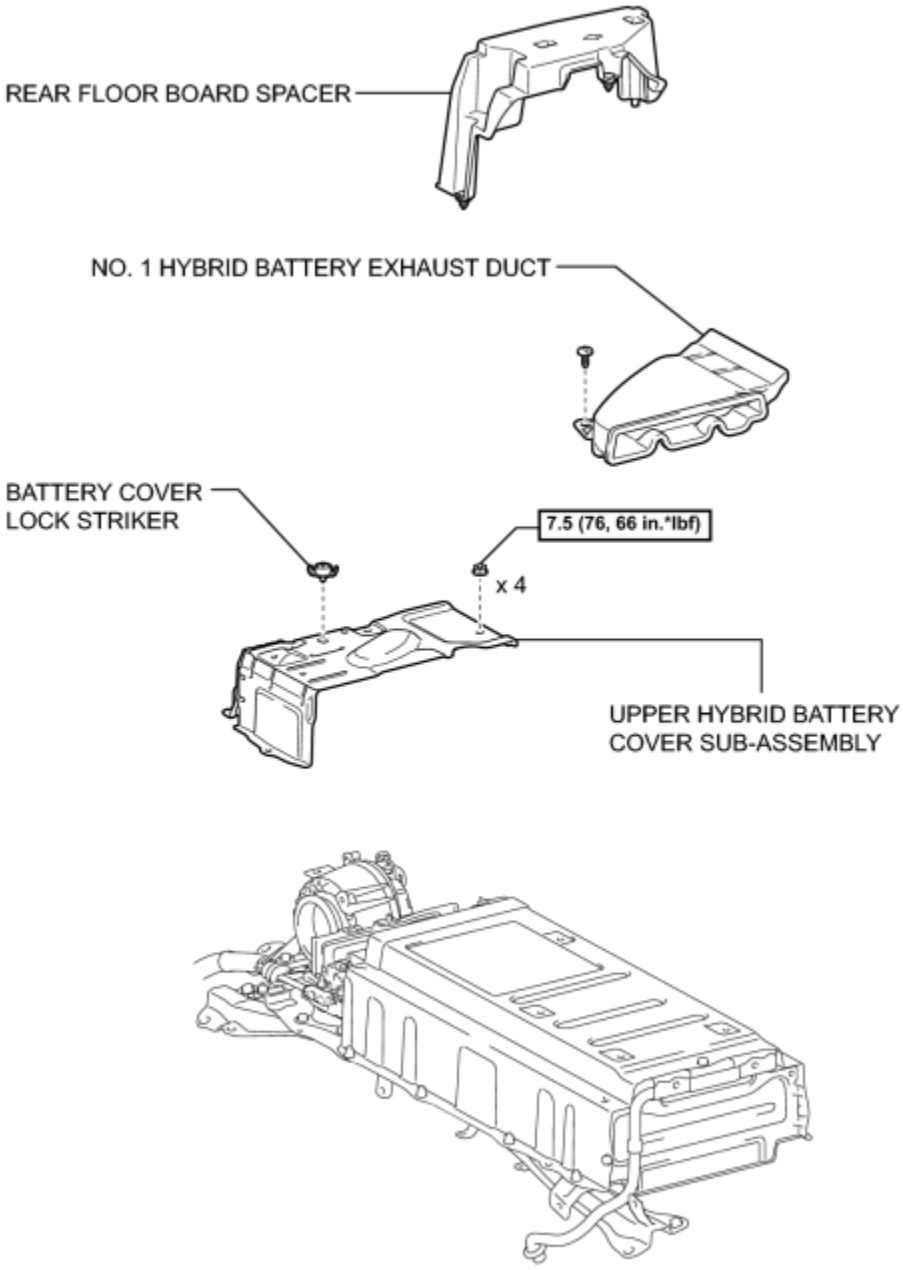
c

# ILLUSTRATION




P

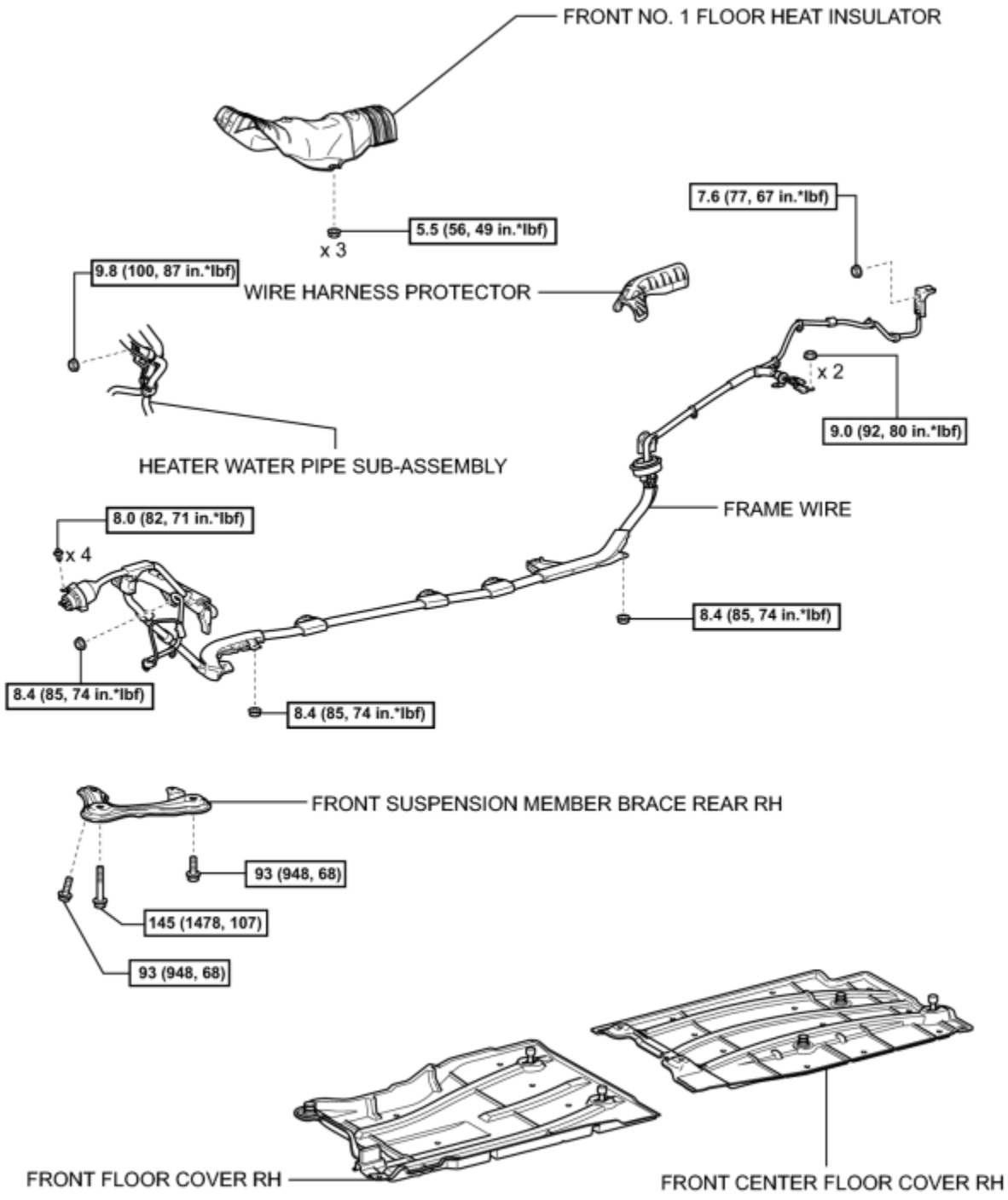
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

1. PRECAUTION

HINT: INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE SERVICE PLUG GRIP INFO

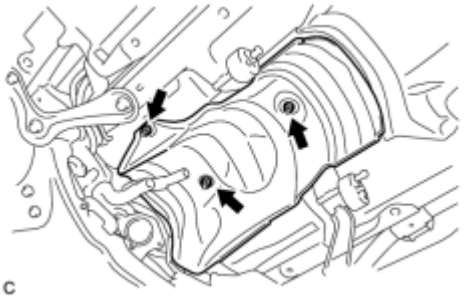
7. REMOVE INVERTER WITH CONVERTER ASSEMBLY

HINT: INFO.

8. REMOVE FRONT EXHAUST PIPE ASSEMBLY

HINT: INFO.

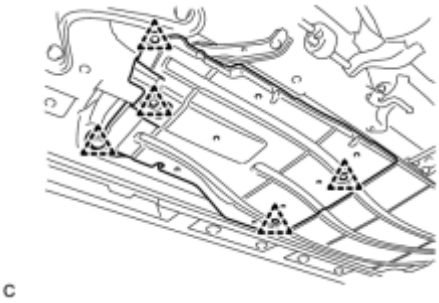
9. REMOVE FRONT NO. 1 FLOOR HEAT INSULATOR



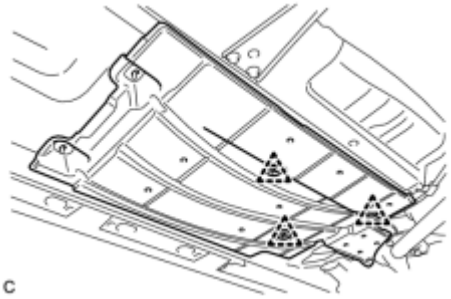

(a) Remove the 3 nuts and front No. 1 floor heat insulator.

10. REMOVE FRONT FLOOR COVER RH

(a) Remove the 5 clips and the front floor cover RH.



11. REMOVE FRONT CENTER FLOOR COVER RH



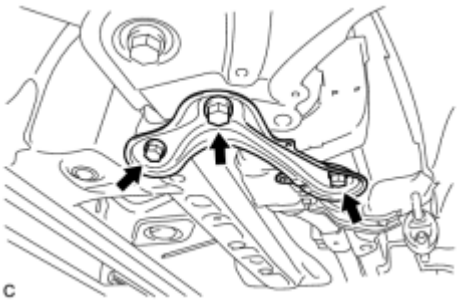
(a) Remove the 3 clips and the front floor cover center RH.

12. REMOVE FRONT SUSPENSION MEMBER BRACE REAR RH

(a) Using a transmission jack, hold the front suspension cross member.

NOTICE:

Be sure to position the transmission jack to properly support the front suspension cross member.



(b) Remove the 3 bolts and front suspension member brace rear RH.

13. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

14. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

15. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

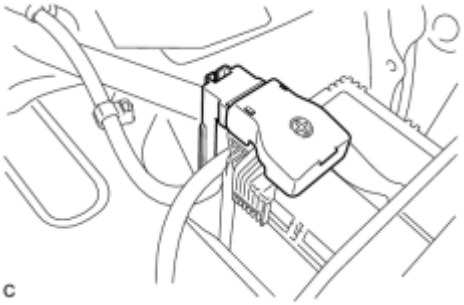
16. REMOVE REAR NO. 1 FLOOR BOARD INFO

17. REMOVE REAR FLOOR BOARD SPACER INFO

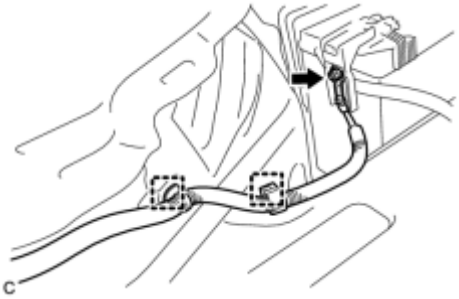
18. REMOVE NO. 1 HYBRID BATTERY EXHAUST DUCT INFO

19. REMOVE UPPER HYBRID BATTERY COVER SUB-ASSEMBLY INFO

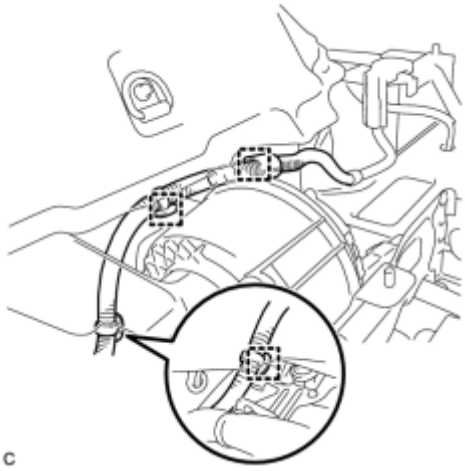
20. DISCONNECT CABLE FROM BATTERY TERMINAL




(a) Remove the connector cover.




(b) Disconnect the 2 clamps, and remove the nut.




(c) Disconnect the 3 wire harness clamps.

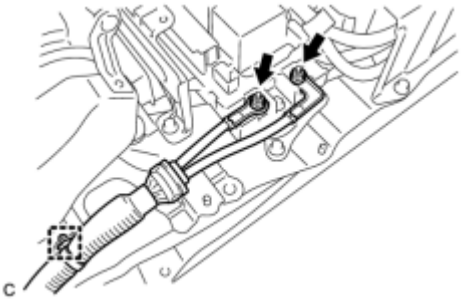
21. DISCONNECT HYBRID BATTERY JUNCTION BLOCK

CAUTION:

Wear insulating gloves.

NOTICE:

Insulate the removed terminals with insulating tape.



(a) Remove the 2 nuts, then disconnect the frame wire from the hybrid battery junction block.

(b) Disconnect the clamp and frame wire.

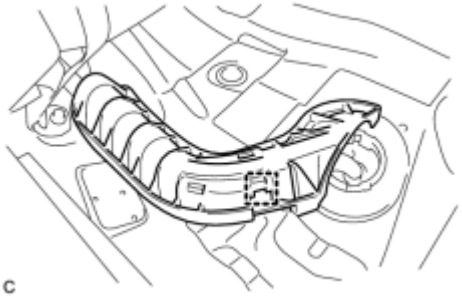
22. REMOVE FRAME WIRE

CAUTION:

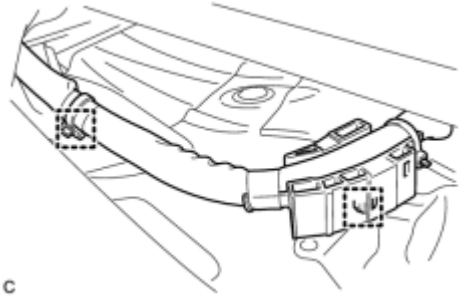
Wear insulating gloves.

NOTICE:

Insulate the removed terminals with insulating tape.

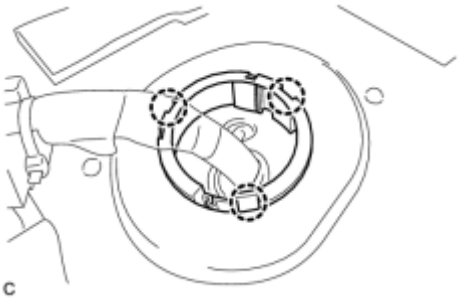


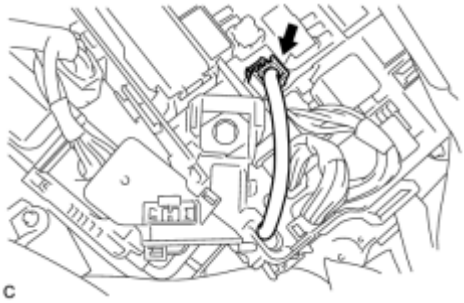
(a) Remove the wire harness protector and disconnect the clamp from the floor panel.



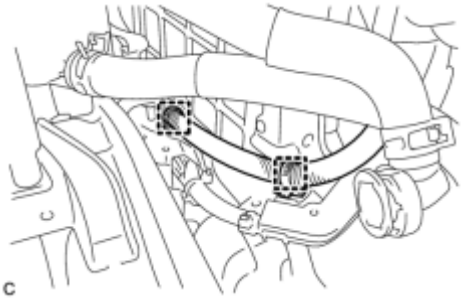
(b) Disconnect the 2 wire harness clamps from the floor panel.

(c) Disconnect the 3 claws and push the frame wire out from the floor panel.

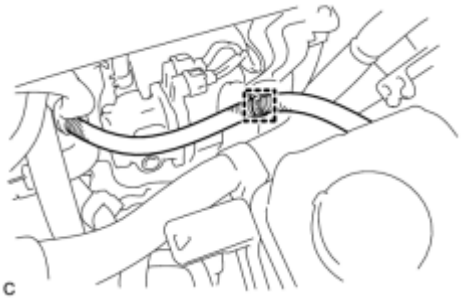




(d) Disconnect the connector from the engine room junction block assembly.

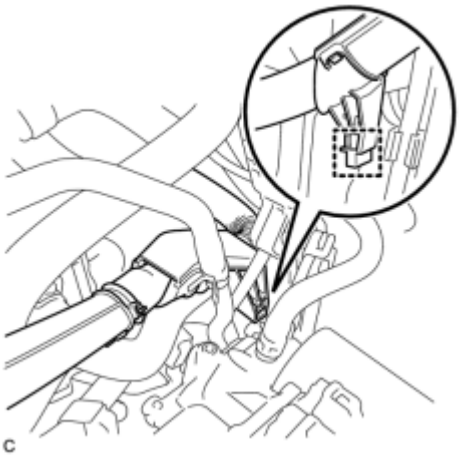


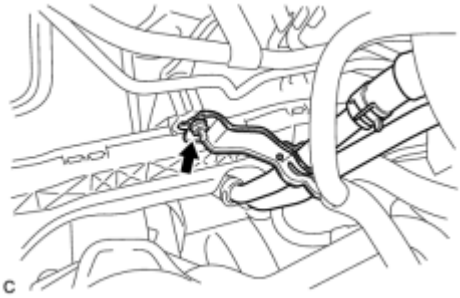
(e) Disconnect the 2 clamps shown in the illustration.



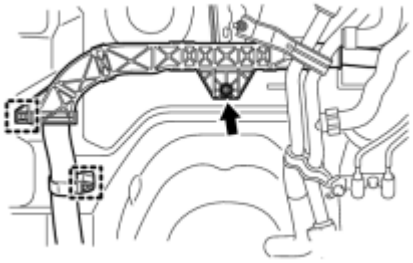
(f) Disconnect the clamp shown in the illustration.

(g) Disconnect the clamp shown in the illustration.

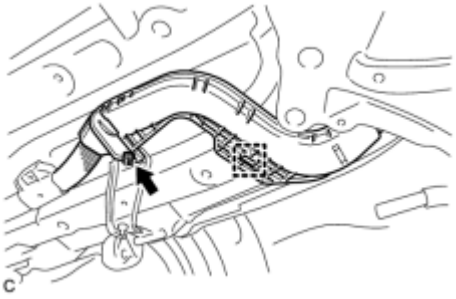




(h) Remove the nut and heater water pipe sub-assembly.

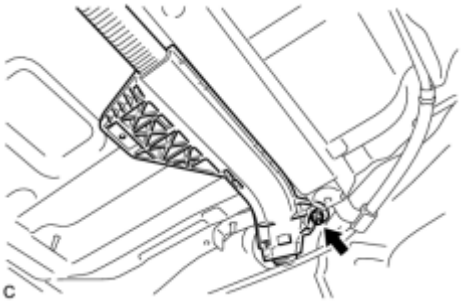


(i) Remove the nut and 2 clamps shown in the illustration.

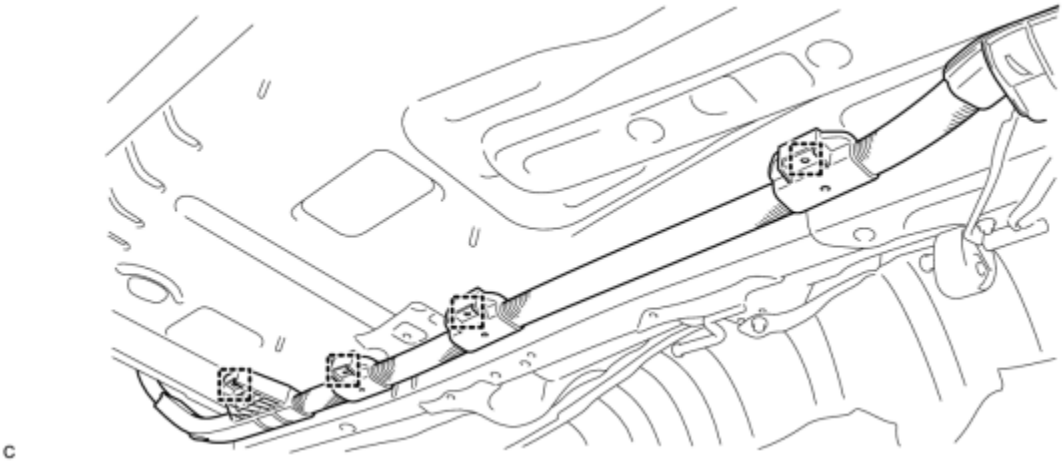


(j) Remove the nut and clamp shown in the illustration.

(k) Remove the nut shown in the illustration.




(l) Remove the frame wire and the 4 clamps.




NOTICE:

The clamps are non-reusable parts.

# INSTALLATION

1. INSTALL FRAME WIRE

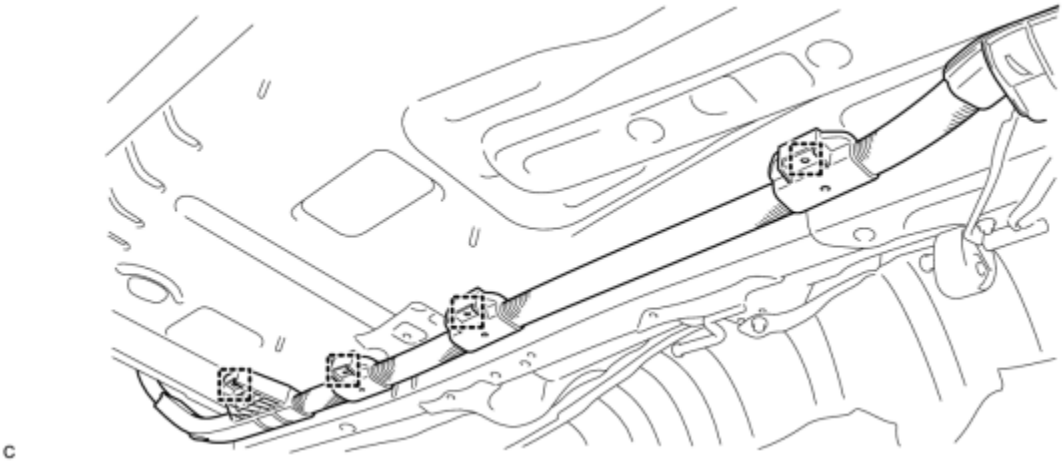
CAUTION:

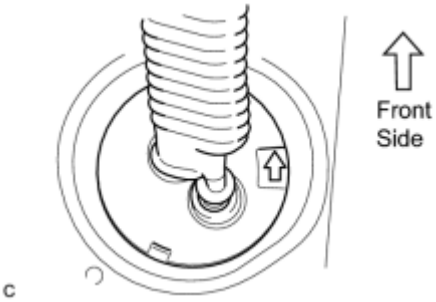
Wear insulating gloves.

NOTICE:

Insulate the removed terminals with insulating tape.

(a) Install the frame wire with the 4 clamps.

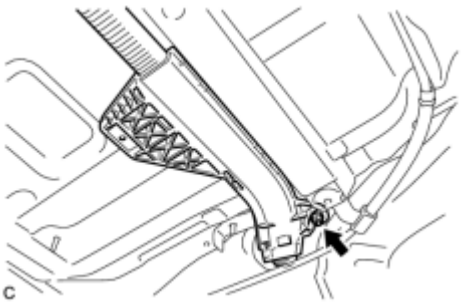





(b) Insert the frame wire into the floor panel hole.

HINT:

The arrow should be pointing toward the front of the vehicle.

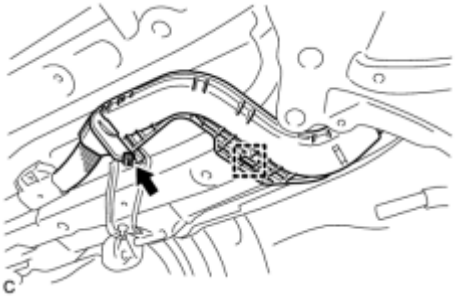


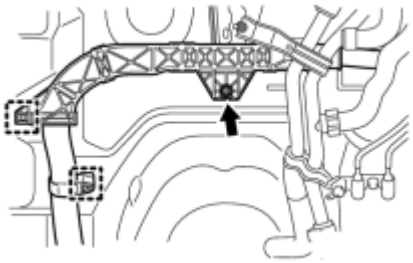
(c) Install the nut shown in the illustration.

Torque: **8.4 N·m (85 kgf·cm, 74in·lbf)**

(d) Install the nut and clamp shown in the illustration.

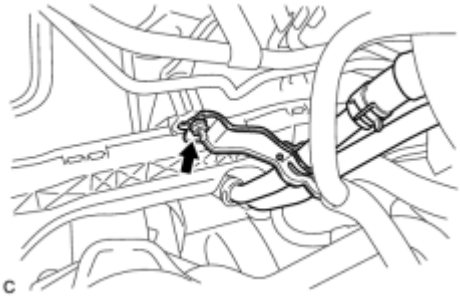
Torque: **8.4 N·m (85 kgf·cm, 74in·lbf)**





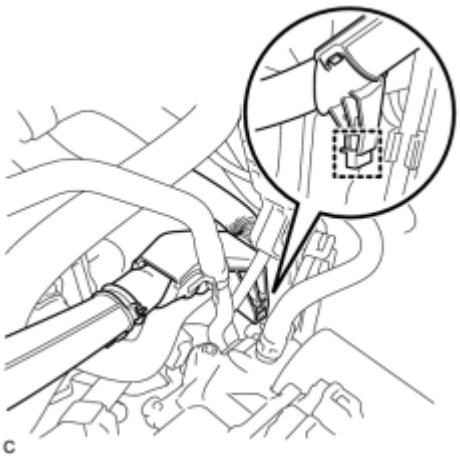
(e) Install the nut and 2 clamps shown in the illustration.

Torque: **8.4 N·m (85 kgf·cm, 74in·lbf)**



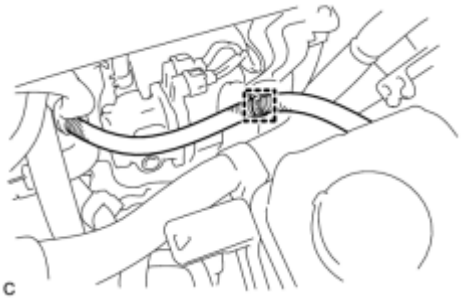
(f) Install the heater water pipe sub-assembly and nut.

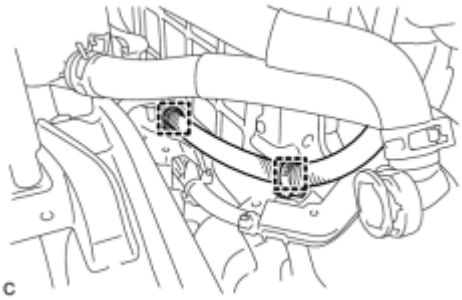
Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**



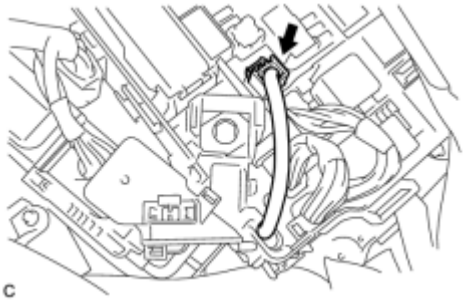
(g) Connect the clamp shown in the illustration.

(h) Connect the clamp shown in the illustration.

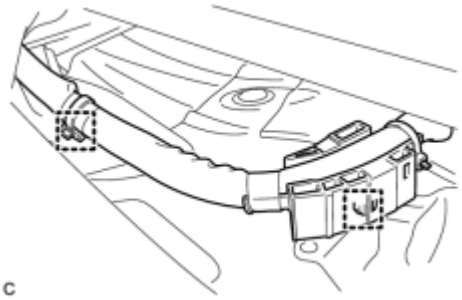




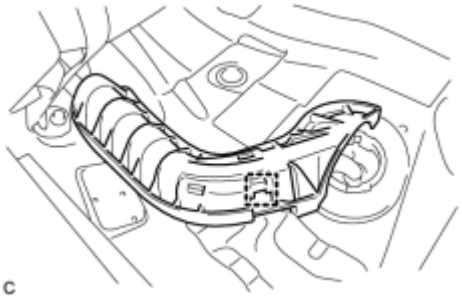
(i) Connect the 2 clamps shown in the illustration.



(j) Connect the connector to the engine room junction block assembly.



(k) Connect the 2 wire harness clamps to the floor panel.

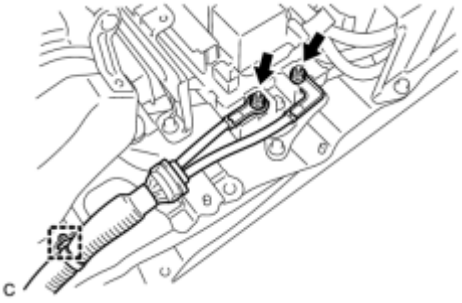


(l) Install the wire harness protector and connect the clamp to the floor panel.

2. CONNECT HYBRID BATTERY JUNCTION BLOCK

CAUTION:

Wear insulating gloves.



(a) Install the frame wire on the hybrid battery junction block with the 2 nuts.

Torque: **9.0 N·m (92 kgf·cm, 80in·lbf)**

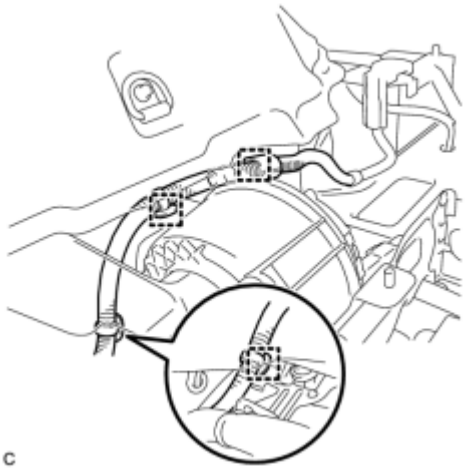
(b) Connect the clamp and frame wire.

NOTICE:

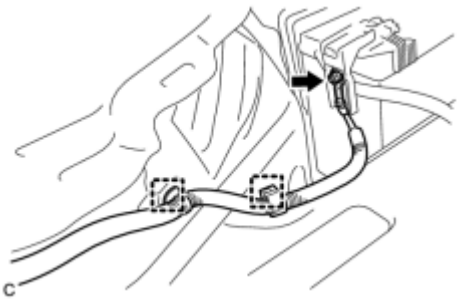
- Make sure that the ends of the frame wire are not crossed over each other.
- Be sure to connect the frame wire to each correct terminal.

3. CHECK HIGH VOLTAGE CABLE CONNECTION INFO

4. CONNECT CABLE TO BATTERY TERMINAL



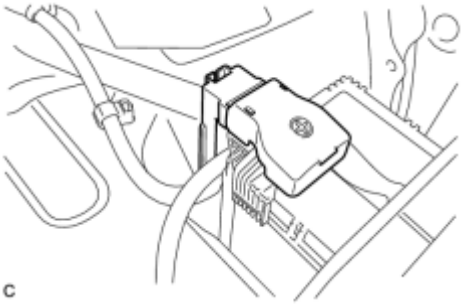
(a) Connect the 3 wire harness clamps.



(b) Install the nut, and connect the 2 clamps.

Torque: **7.6 N·m (77 kgf·cm, 67in·lbf)**

(c) Install the terminal cover.



5. INSTALL UPPER HYBRID BATTERY COVER SUB-ASSEMBLY INFO

6. INSTALL NO. 1 HYBRID BATTERY EXHAUST DUCT INFO

7. INSTALL REAR FLOOR BOARD SPACER INFO

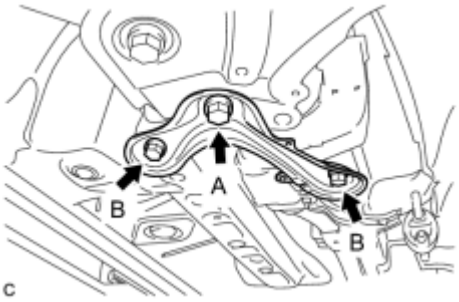
8. INSTALL REAR NO. 1 FLOOR BOARD INFO

9. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

10. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

11. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

12. INSTALL FRONT SUSPENSION MEMBER BRACE REAR RH

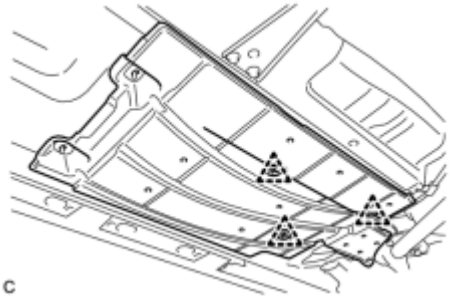



(a) Install the front suspension member brace rear RH with the 3 bolts.

Bolt A - Torque: **145 N·m (1478 kgf·cm, 107ft·lbf)**

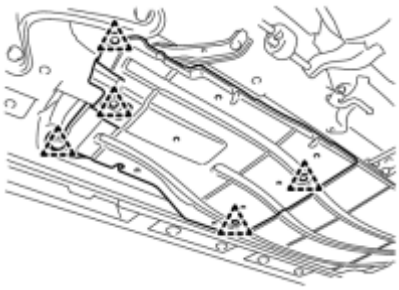
Bolt B - Torque: **93 N·m (948 kgf·cm, 68ft·lbf)**

13. INSTALL FRONT CENTER FLOOR COVER RH



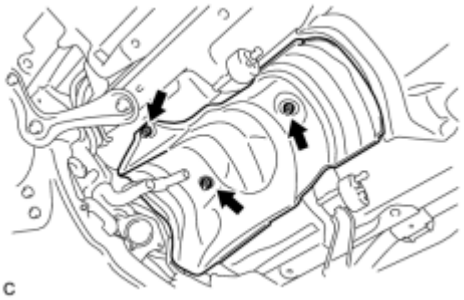
(a) Install the front center floor cover RH with the 3 clips.

14. INSTALL FRONT FLOOR COVER RH



(a) Install the front floor cover RH with the 5 clips.

15. INSTALL FRONT NO. 1 FLOOR HEAT INSULATOR



(a) Install the 3 nuts and No. 1 front floor heat insulator.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

16. INSTALL FRONT EXHAUST PIPE ASSEMBLY

HINT: INFO.

17. INSTALL INVERTER WITH CONVERTER ASSEMBLY

HINT: INFO.

18. INSTALL SERVICE PLUG GRIP INFO

19. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

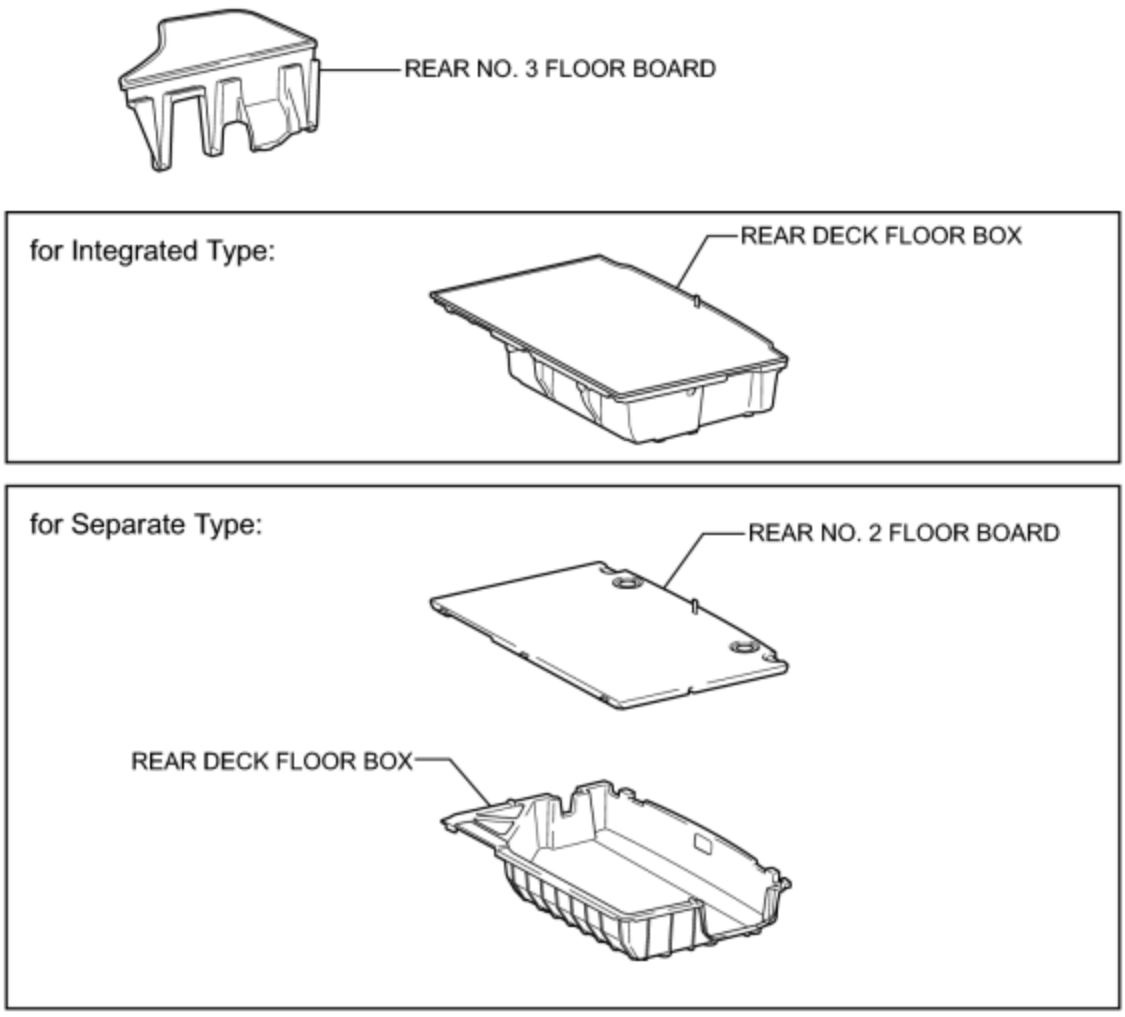
20. INSTALL REAR NO. 3 FLOOR BOARD INFO

21. INSTALL REAR DECK FLOOR BOX INFO

22. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

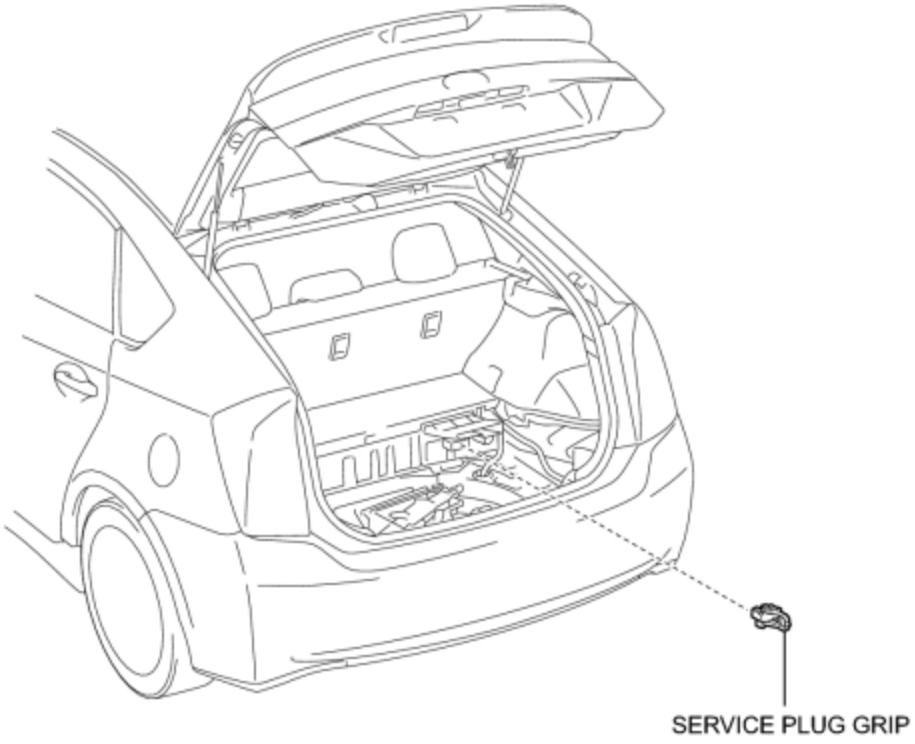
# COMPONENTS

# ILLUSTRATION



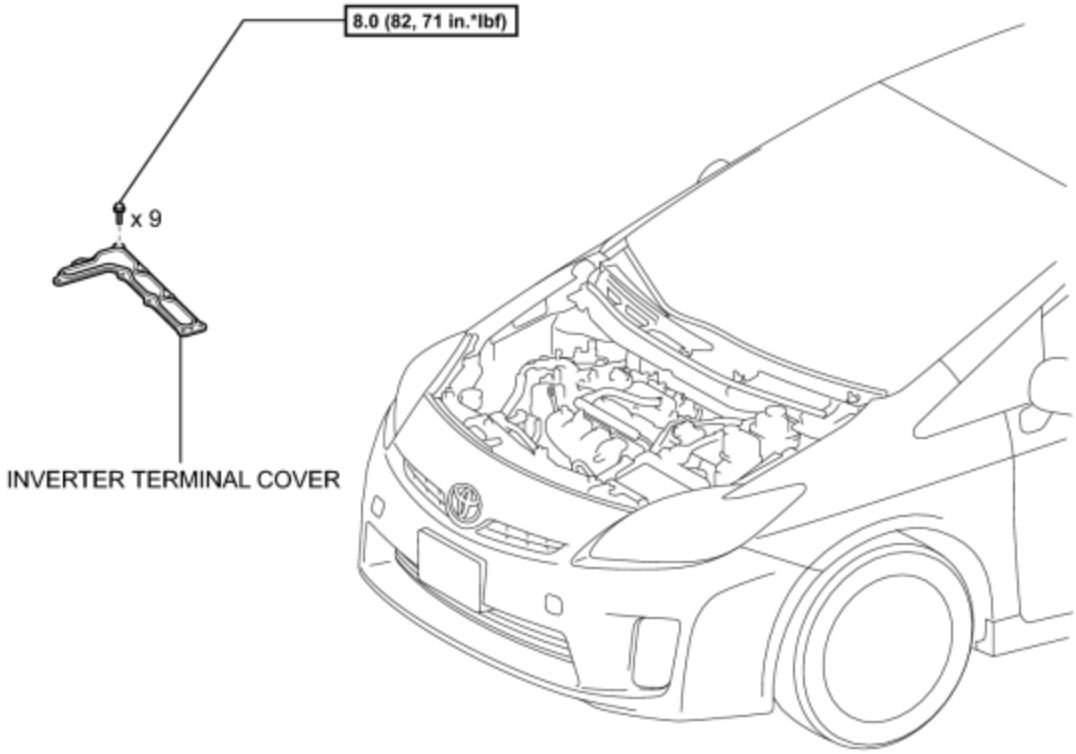

P

# ILLUSTRATION




P

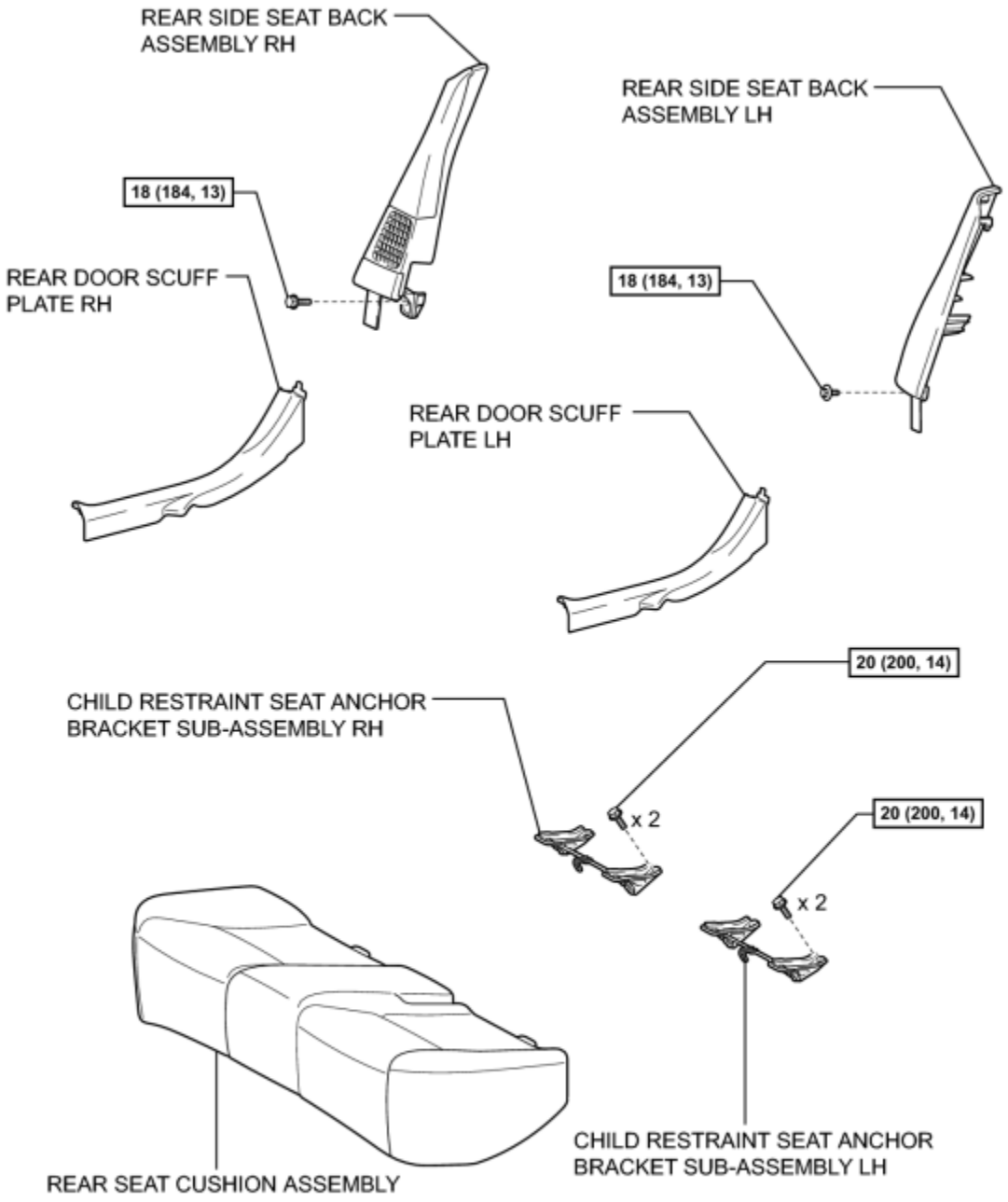
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

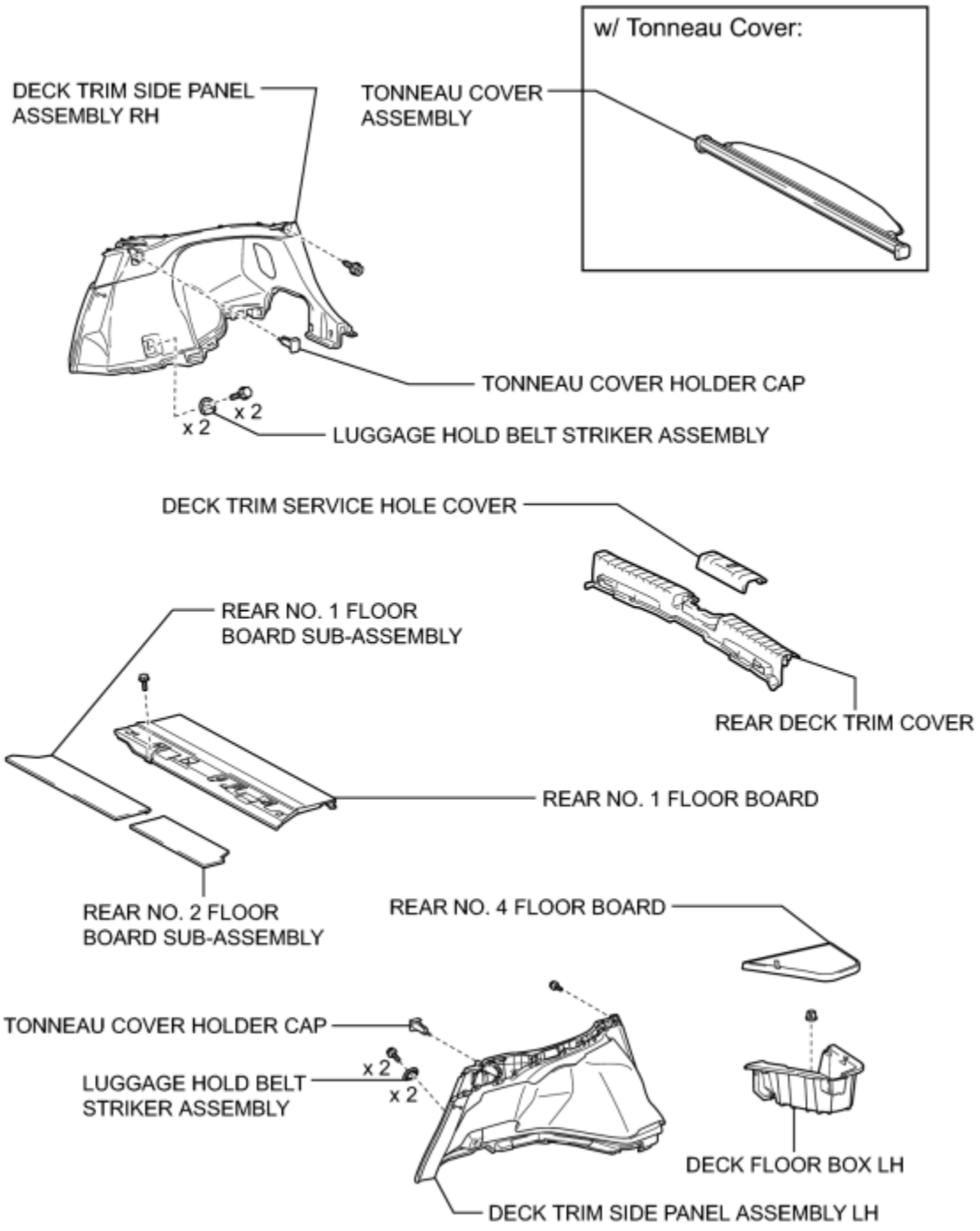
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

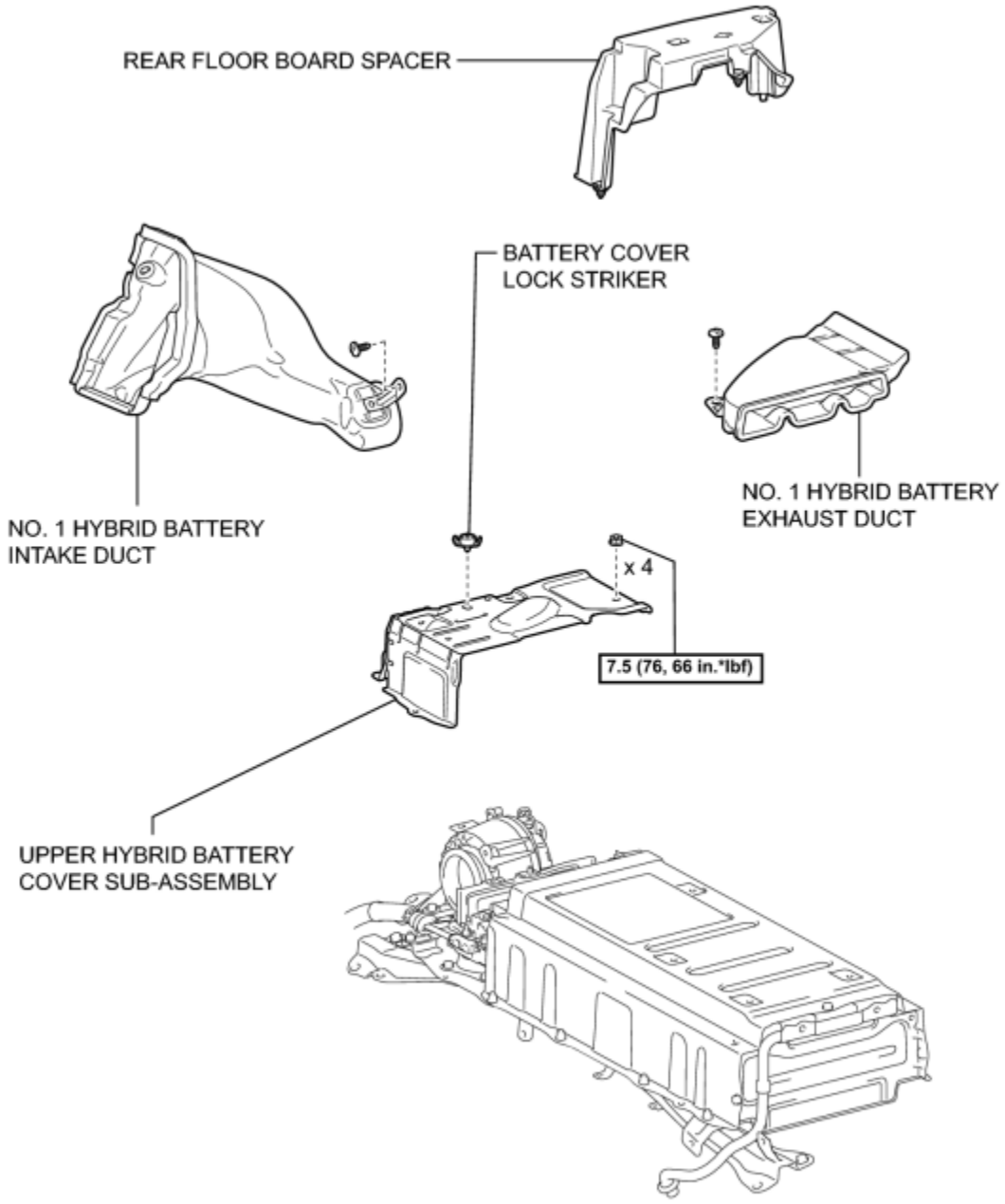
P

# ILLUSTRATION




P

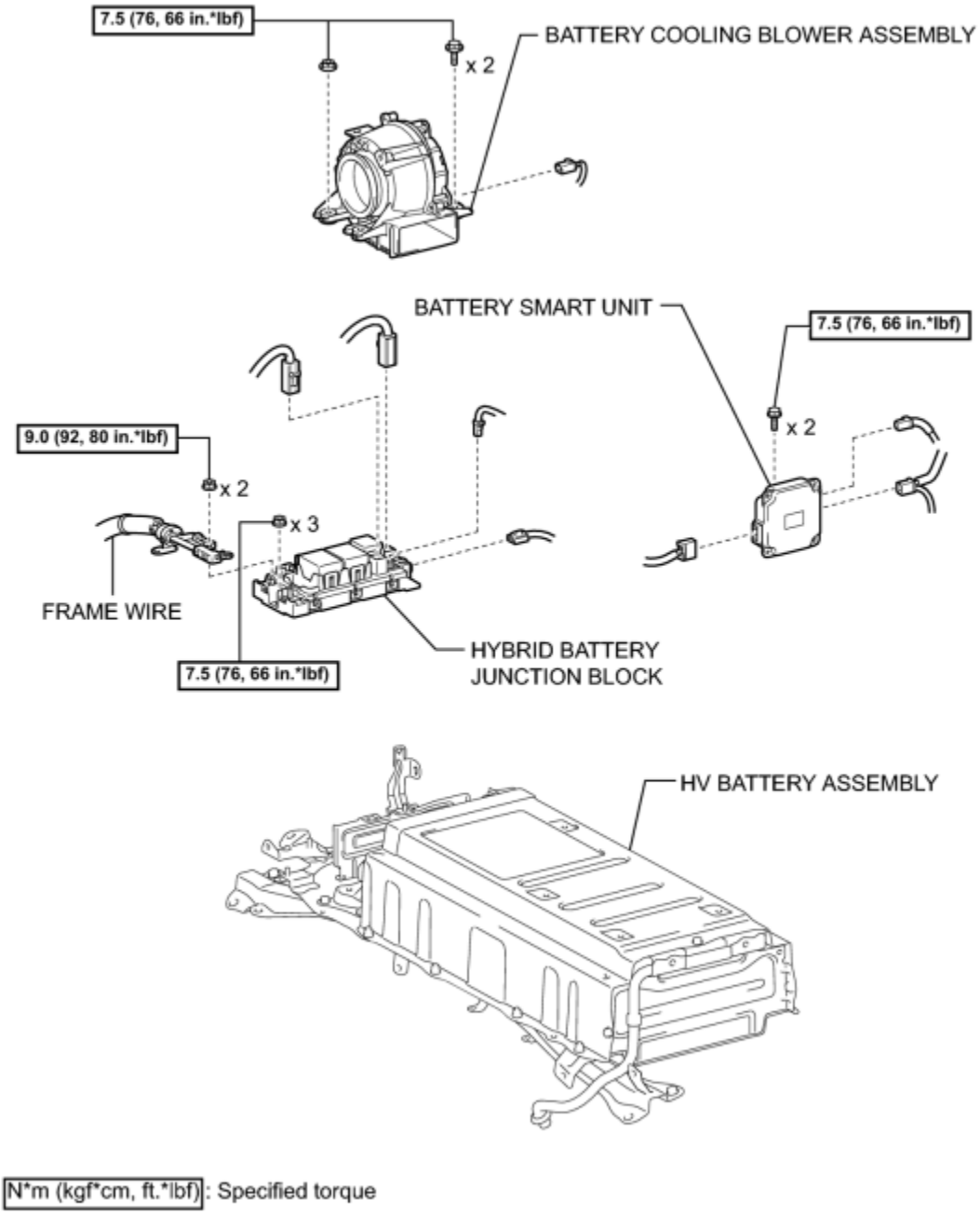
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

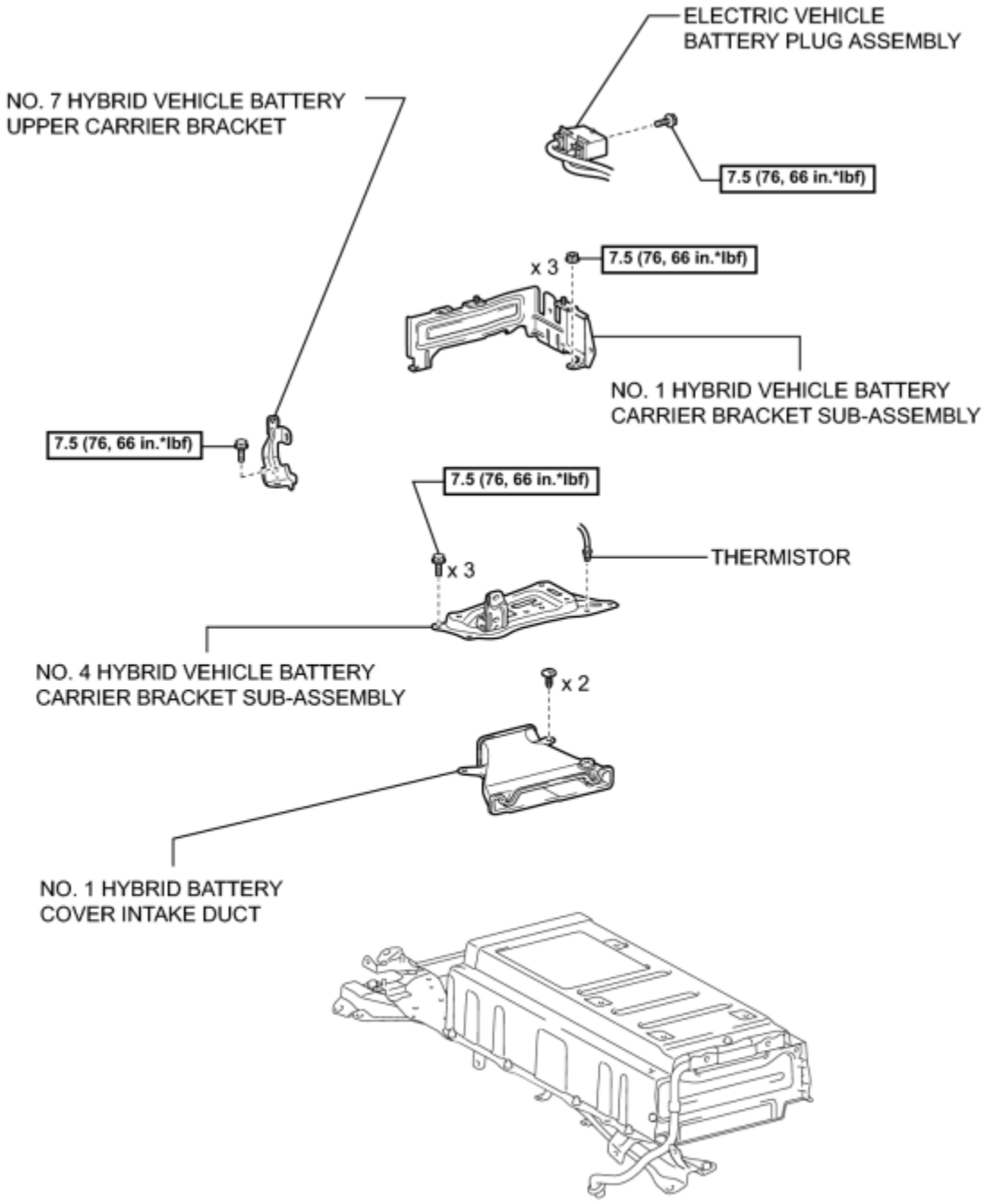
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

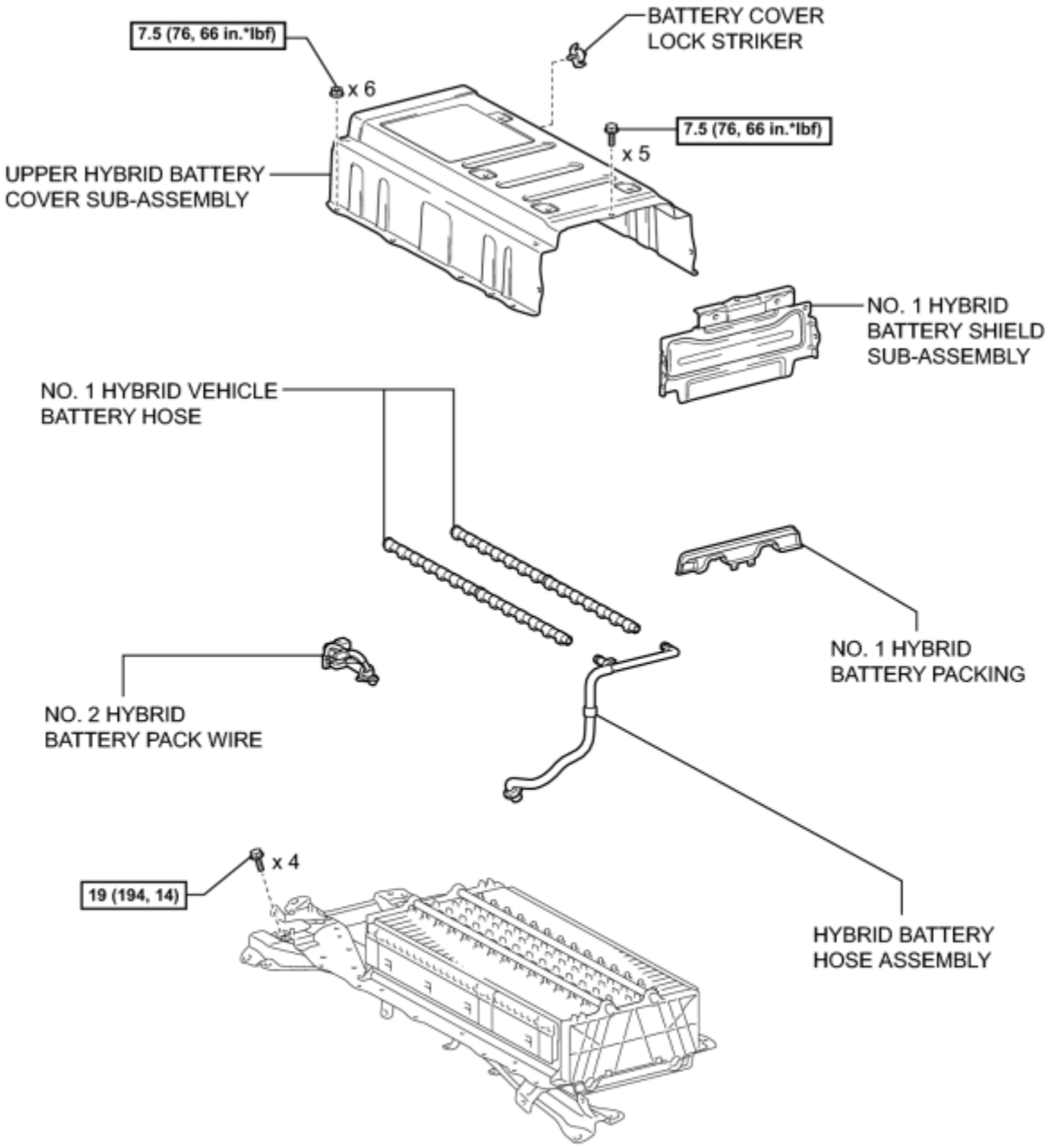
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. PRECAUTION

HINT: INFO.

2. READ OUTPUT DTC

(a) Check for DTCs INFO.

NOTICE:

Check for DTCs and confirm that P0AA6 (Hybrid Battery Voltage System Isolation Fault) is not output before doing removal or installation inside the battery. If this DTC is output, perform troubleshooting fir this DTC first.

3. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

4. REMOVE REAR DECK FLOOR BOX INFO

5. REMOVE REAR NO. 3 FLOOR BOARD INFO

6. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

7. REMOVE SERVICE PLUG GRIP INFO

8. REMOVE INVERTER TERMINAL COVER INFO

9. CHECK TERMINAL VOLTAGE INFO

10. INSTALL INVERTER TERMINAL COVER INFO

11. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

12. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

13. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

14. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

15. REMOVE REAR NO. 1 FLOOR BOARD INFO

16. REMOVE REAR DOOR SCUFF PLATE LH INFO

17. REMOVE REAR DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side.

18. REMOVE REAR SIDE SEAT BACK ASSEMBLY LH INFO

19. REMOVE REAR SIDE SEAT BACK ASSEMBLY RH INFO

20. REMOVE REAR NO. 4 FLOOR BOARD INFO

21. REMOVE DECK FLOOR BOX LH INFO

22. REMOVE DECK TRIM SERVICE HOLE COVER INFO

23. REMOVE REAR DECK TRIM COVER INFO

24. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

25. REMOVE TONNEAU COVER HOLDER CAP (for LH Side) INFO

26. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH INFO

27. REMOVE TONNEAU COVER HOLDER CAP (for RH Side)

HINT:

Use the same procedure described for the LH side.

28. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

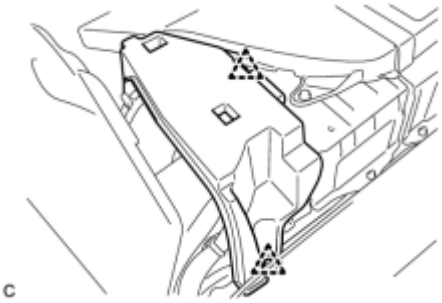
HINT:

Use the same procedure described for the LH side.

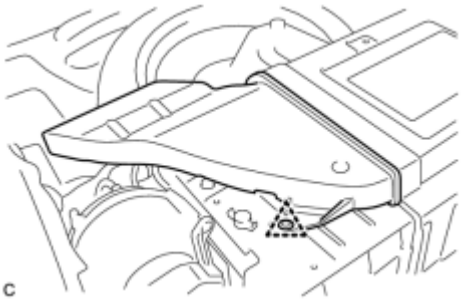
29. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH INFO

30. REMOVE REAR FLOOR BOARD SPACER

(a) Remove the 2 clips and rear floor board spacer.



31. REMOVE NO. 1 HYBRID BATTERY EXHAUST DUCT

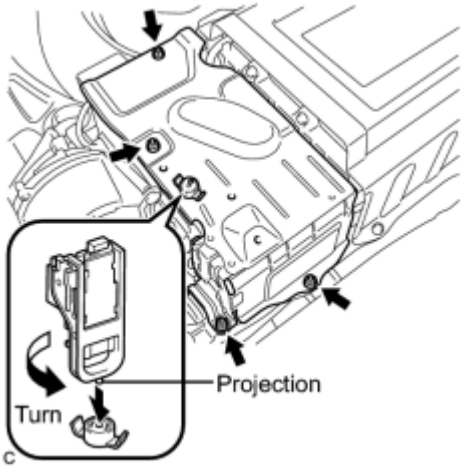


(a) Remove the clip and No. 1 hybrid battery exhaust duct.

32. REMOVE UPPER HYBRID BATTERY COVER SUB-ASSEMBLY

CAUTION:

Be sure to wear insulated gloves and protective goggles.




(a) Using the service plug grip, remove the battery cover lock striker.

HINT:

Insert the projection part of the service plug grip, and turn the button of the battery cover lock striker counterclockwise, and release the lock.

(b) Remove the 4 nuts and upper hybrid battery cover sub-assembly.

33. REMOVE NO. 1 HYBRID BATTERY INTAKE DUCT

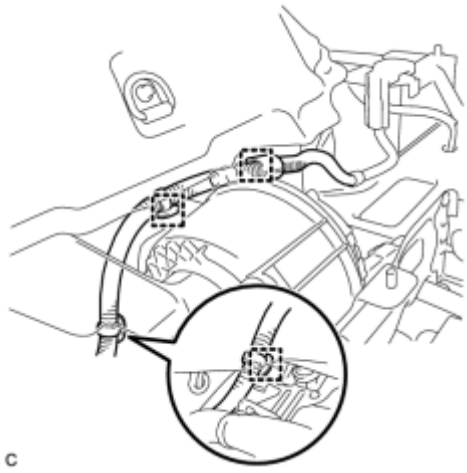
(a) Remove the 2 clips and No. 1 hybrid battery intake duct.



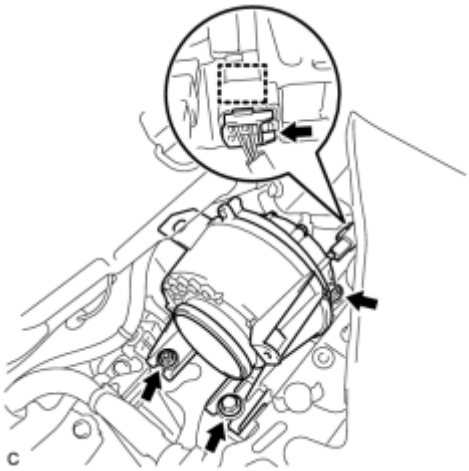
34. REMOVE BATTERY COOLING BLOWER ASSEMBLY

NOTICE:

- Be sure not to touch the fan part of the battery cooling blower assemblies.
- Do not lift the battery cooling blower assemblies using the wire harness.



(a) Disconnect the 3 wire harness clamps.

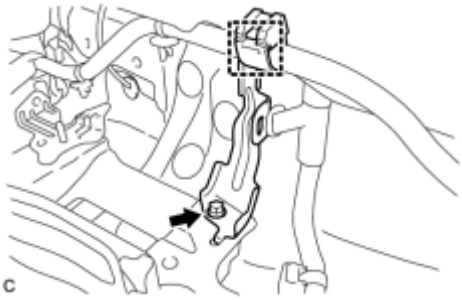


(b) Disconnect the battery cooling blower assembly connector and clamp.

(c) Remove the 2 bolts, nut and battery cooling blower assembly.

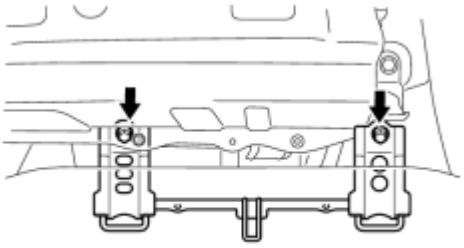
35. REMOVE NO. 7 HYBRID VEHICLE BATTERY UPPER CARRIER BRACKET

(a) Disconnect the wire harness clamp.



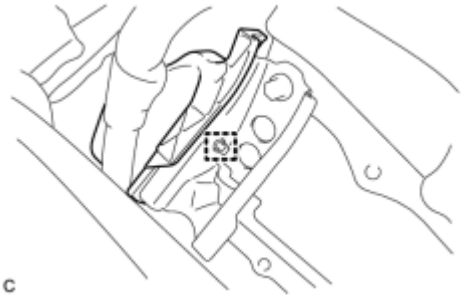
(b) Remove the bolt and No. 7 hybrid battery upper carrier bracket.

36. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH

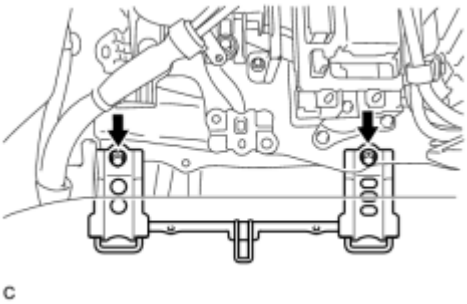


(a) Remove the 2 bolts and child restraint seat anchor bracket sub-assembly LH.

37. REMOVE CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY RH



(a) Disconnect the wire harness protector clamp.



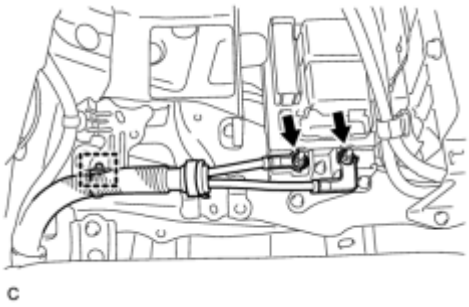
(b) Remove the 2 bolts and child restraint seat anchor bracket sub-assembly RH.

38. REMOVE FRAME WIRE

CAUTION:

- Wear insulating gloves.

- Insulate the removed terminals with insulating tape.




(a) Remove the 2 nuts, then disconnect the frame wire from the hybrid battery junction block assembly.

(b) Disconnect the clamp and frame wire.

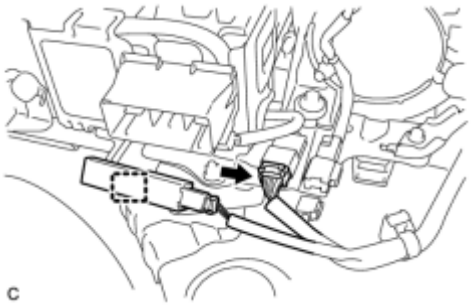
39. REMOVE HV BATTERY ASSEMBLY

CAUTION:

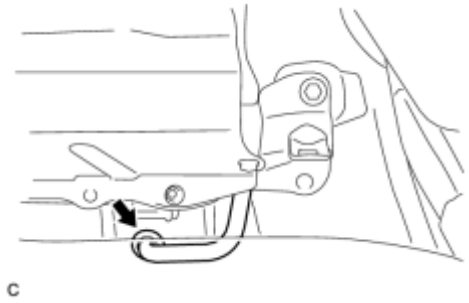
Wear insulating gloves.

NOTICE:

Since the HV battery is very heavy, 2 people are needed to remove the HV battery. When removing the HV battery, do not damage the parts around it.

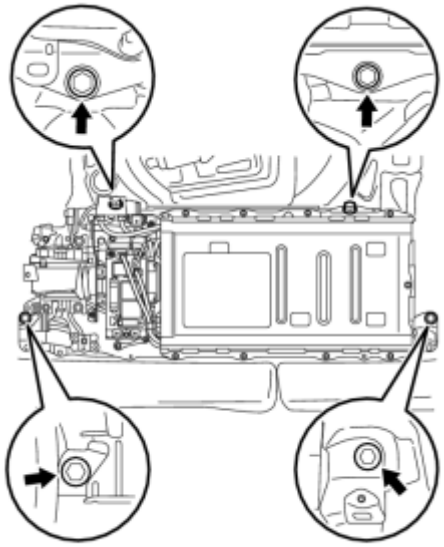



(a) Disconnect the connector and electrical key oscillator clamp.




(b) Disconnect the battery room ventilation hose from the floor panel.

(c) Remove the 4 bolts shown in the illustration.



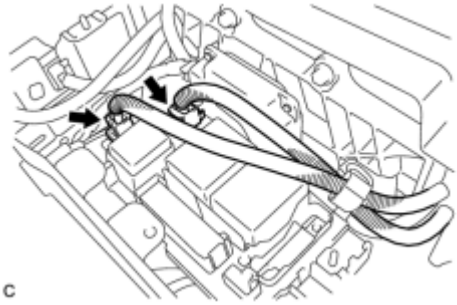
c

(d) Remove the HV battery.

40. REMOVE HYBRID BATTERY JUNCTION BLOCK

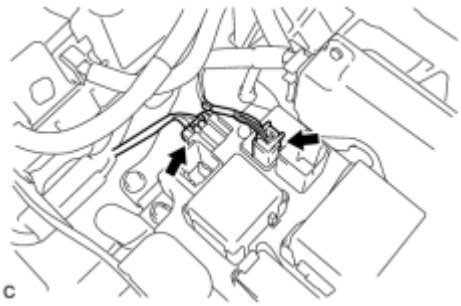
CAUTION:

Wear insulating gloves.



c

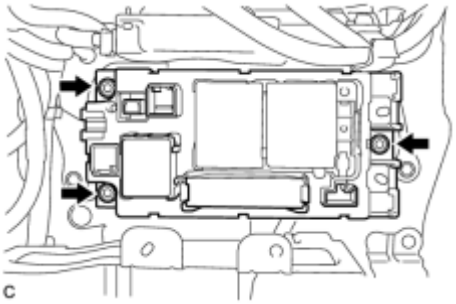
(a) Disconnect the 2 connectors from the hybrid battery junction block.



c

(b) Disconnect the 2 connectors from the hybrid battery junction block.

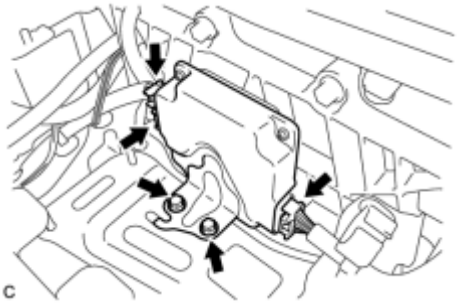
(c) Remove the 3 nuts and hybrid battery junction block.



41. REMOVE BATTERY SMART UNIT

CAUTION:

Wear insulating gloves.



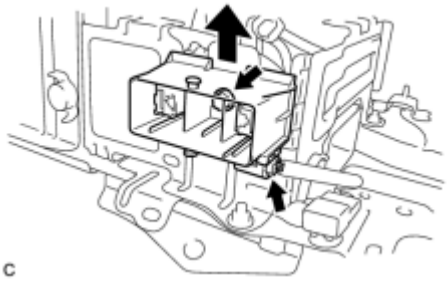
(a) Disconnect the 3 connectors.

(b) Remove the 2 nuts and battery smart unit.

42. REMOVE NO. 1 HYBRID VEHICLE BATTERY CARRIER BRACKET SUB-ASSEMBLY

CAUTION:

Wear insulating gloves.

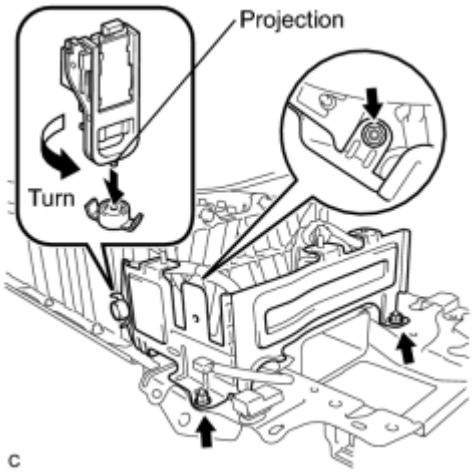


(a) Disconnect the connector.

(b) Remove the bolt and EV battery plug as shown in the illustration.

(c) Using the service plug grip, remove the battery cover lock striker.

HINT:



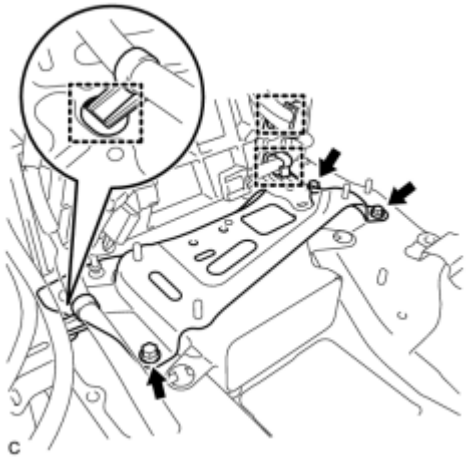

Insert the projection part of the service plug grip, and turn the button of the battery cover lock striker counterclockwise, and release the lock.

(d) Remove the 3 nuts and No. 1 hybrid vehicle battery carrier bracket sub-assembly.

43. REMOVE NO. 4 HYBRID VEHICLE BATTERY CARRIER BRACKET SUB-ASSEMBLY

CAUTION:

Wear insulating gloves.



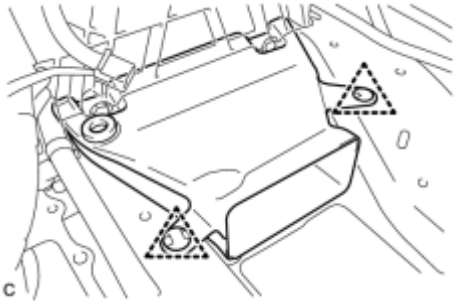

(a) Disconnect the 3 wire harness clamps.

(b) Remove the 3 bolts and No. 4 hybrid vehicle battery carrier bracket sub-assembly.




(c) Disengage the 2 claws and remove the HV battery thermistor.

44. REMOVE NO. 1 HYBRID BATTERY COVER INTAKE DUCT

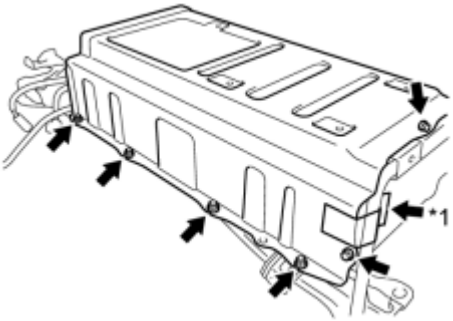


(a) Remove the 2 clips and No. 1 hybrid battery cover intake duct.

45. REMOVE UPPER HYBRID BATTERY COVER SUB-ASSEMBLY

CAUTION:

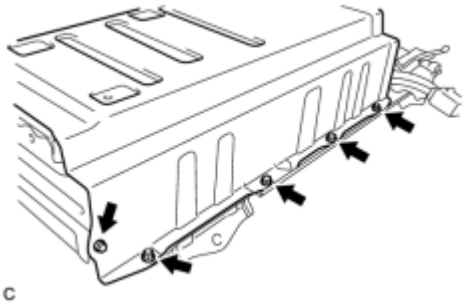
Be sure to wear insulated gloves and protective goggles.



(a) Remove the tape.

## Text in Illustration

| | |
|---|---|
| *1 | Tape |



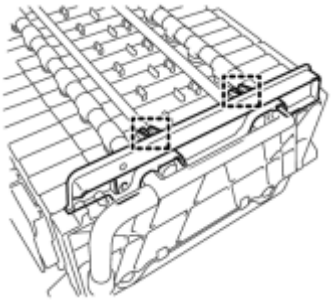
(b) Remove the 5 bolts, 6 nuts and battery cover with the No. 1 hybrid battery shield sub-assembly.

46. REMOVE NO. 1 HYBRID BATTERY PACKING

CAUTION:

Be sure to wear insulated gloves and protective goggles.

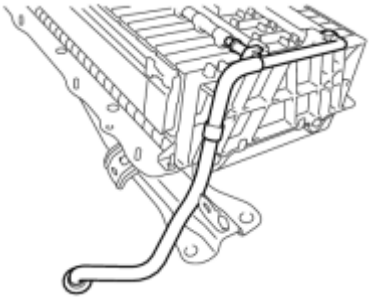
(a) Remove the 2 clamps and No. 1 hybrid battery packing.



47. REMOVE HYBRID BATTERY HOSE ASSEMBLY

CAUTION:

Be sure to wear insulated gloves and protective goggles.

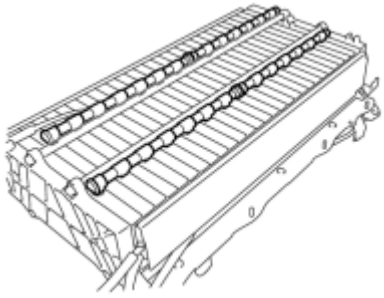


(a) Remove the hybrid battery hose assembly from the HV battery.

48. REMOVE NO. 1 HYBRID VEHICLE BATTERY HOSE

CAUTION:

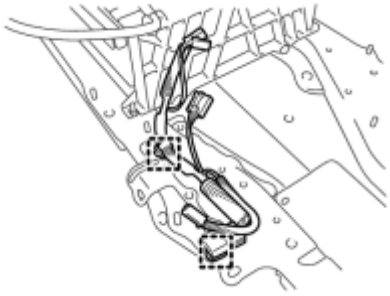
Be sure to wear insulated gloves and protective goggles.



(a) Remove the 2 No. 1 hybrid vehicle battery hoses from the HV battery.

49. REMOVE NO. 2 HYBRID BATTERY PACK WIRE

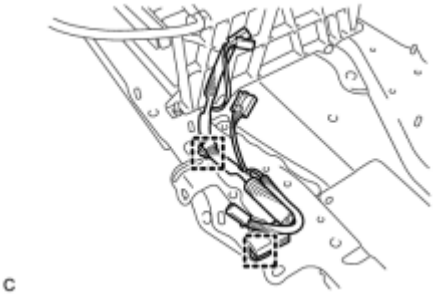
(a) Disconnect the 2 clamps, then remove the No. 2 hybrid battery pack wire.



c

# INSTALLATION

1. INSTALL NO. 2 HYBRID BATTERY PACK WIRE

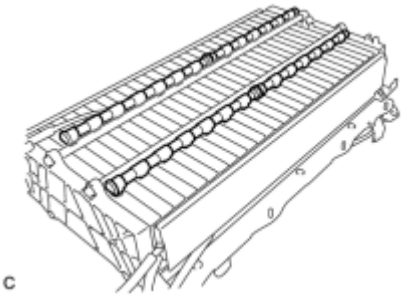



(a) Connect the 2 clamps and No. 2 hybrid battery pack wire.

2. INSTALL NO. 1 HYBRID VEHICLE BATTERY HOSE

CAUTION:

Be sure to wear insulated gloves and protective goggles.

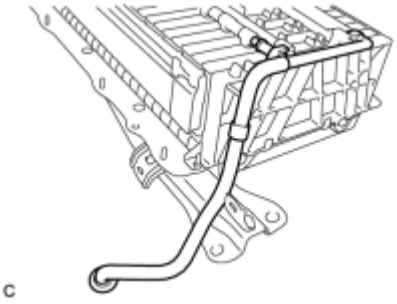



(a) Install the 2 No. 1 hybrid vehicle battery hoses to the HV battery.

3. INSTALL HYBRID BATTERY HOSE ASSEMBLY

CAUTION:

Be sure to wear insulated gloves and protective goggles.

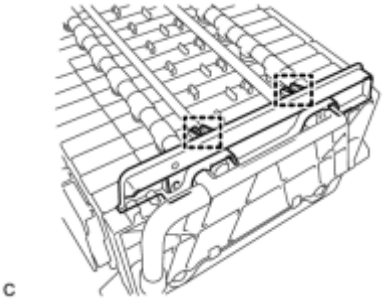



(a) Install the hybrid battery hose assembly to the HV battery.

4. INSTALL NO. 1 HYBRID BATTERY PACKING

CAUTION:

Be sure to wear insulated gloves and protective goggles.

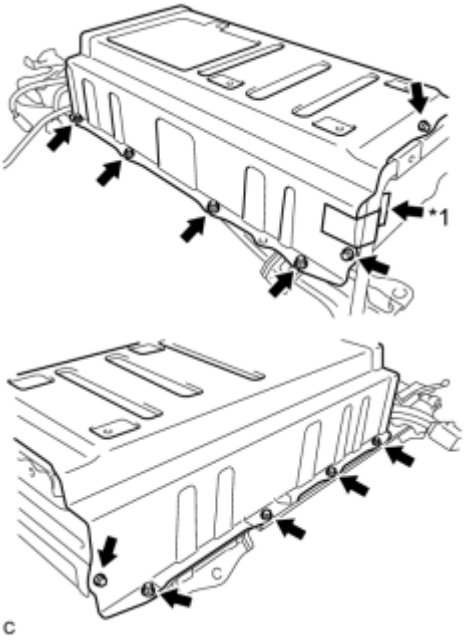



(a) Install the No. 1 hybrid battery packing with the 2 clamps.

5. INSTALL UPPER HYBRID BATTERY COVER SUB-ASSEMBLY

CAUTION:

Be sure to wear insulated gloves and protective goggles.




(a) Install the battery cover and No. 1 hybrid battery shield sub-assembly with the 5 bolts and 6 nuts.

## Text in Illustration

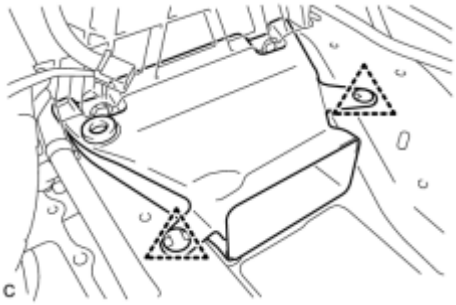
| | |
|---|---|
| *1 | Tape |

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(b) Install the tape.

6. INSTALL NO. 1 HYBRID BATTERY COVER INTAKE DUCT

(a) Install the No. 1 hybrid battery cover intake duct with the 2 clips.



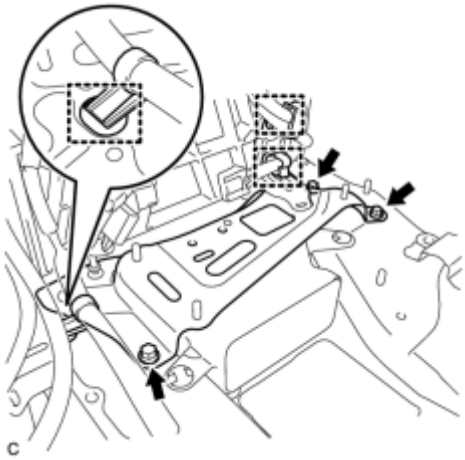
7. INSTALL NO. 4 HYBRID VEHICLE BATTERY CARRIER BRACKET SUB-ASSEMBLY

CAUTION:

Wear insulated gloves.



(a) Install the HV battery thermistor to the No. 4 hybrid vehicle battery carrier bracket sub-assembly.



(b) Install the No. 4 hybrid vehicle battery carrier bracket sub-assembly with the 3 bolts.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

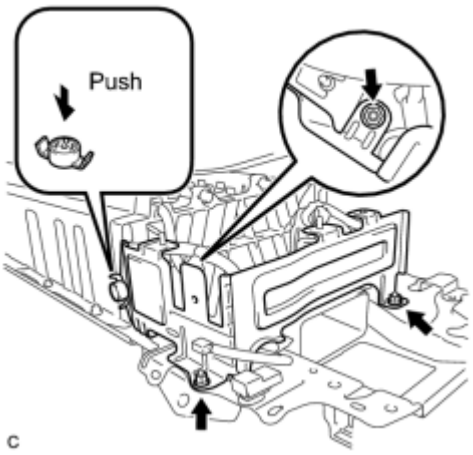
(c) Connect the 3 wire harness clamps.

8. INSTALL NO. 1 HYBRID VEHICLE BATTERY CARRIER BRACKET SUB-ASSEMBLY

CAUTION:

Wear insulated gloves.

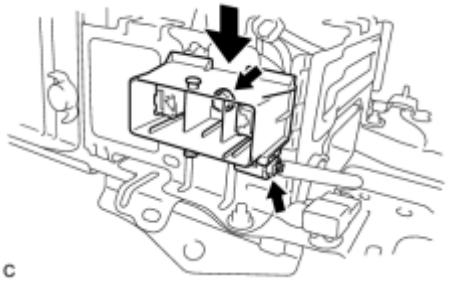
(a) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly




with the 3 nuts.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(b) Install the battery cover lock striker, then push the button to lock it.




(c) Install the electric vehicle battery plug assembly with the bolt as shown in the illustration.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(d) Connect the connector.

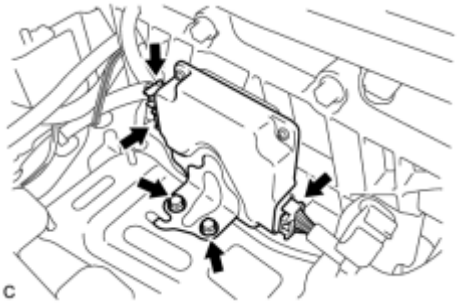
NOTICE:

The connector should be connected securely.

9. INSTALL BATTERY SMART UNIT

CAUTION:

Wear insulated gloves.




(a) Install the battery smart unit with the 2 bolts.

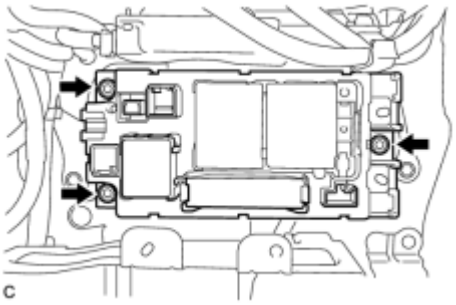
Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(b) Connect the 3 connectors.

NOTICE:

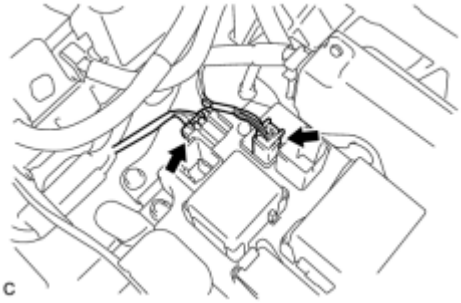
The connectors should be connected securely.

10. INSTALL HYBRID BATTERY JUNCTION BLOCK




(a) Install the hybrid battery junction block with the 3 nuts.

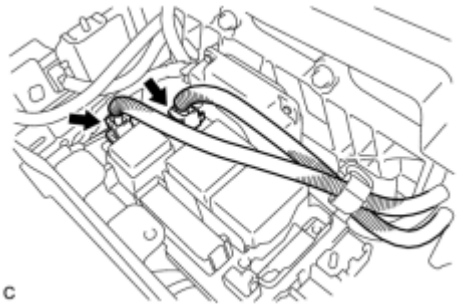
Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**




(b) Connect the 2 connectors to the hybrid battery junction block.

NOTICE:

The connectors should be connected securely.




(c) Connect the 2 connectors to the hybrid battery junction block.

NOTICE:

The connectors should be connected securely.

11. INSTALL HV BATTERY ASSEMBLY

CAUTION:

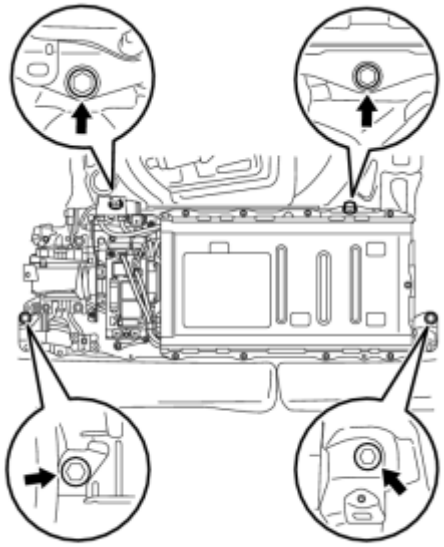
Wear insulated gloves.

NOTICE:

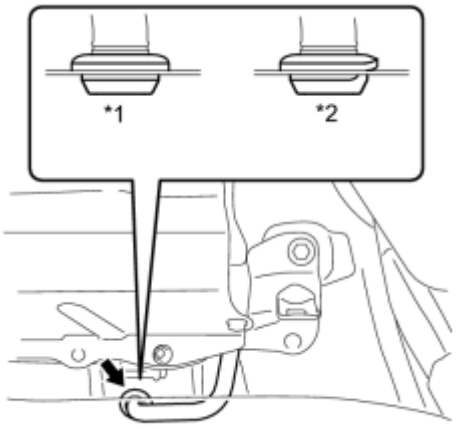
Since the HV battery is very heavy, 2 people are needed to install the HV battery. When installing the HV battery, do not damage the parts around it.

(a) Install the HV battery to the vehicle with the 4 bolts.

Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**



c




c

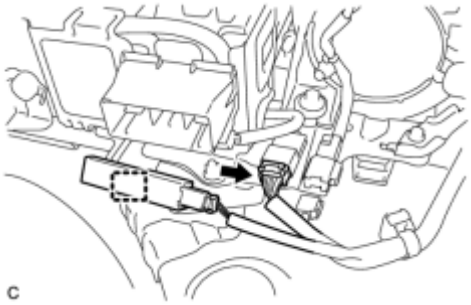
(b) Connect the battery room ventilation hose to the floor panel.

## Text in Illustration

| | |
|---|---|
| *1 | Correct |
| *2 | Incorrect |

NOTICE:

Make sure that there is no space or gap between the grommet and the body.



c

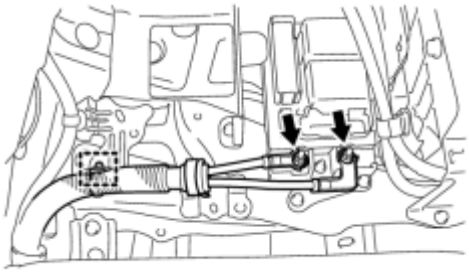
(c) Connect the connector and electrical key oscillator clamp.

12. INSTALL FRAME WIRE

CAUTION:

Wear insulating gloves.

(a) Install the frame wire on the hybrid battery junction block assembly



c

with the 2 nuts.

Torque: **9.0 N·m (92 kgf·cm, 80in·lbf)**

- Make sure that the ends of the frame wire are not crossed over each other.
- Be sure to connect the frame wires to the correct terminals.

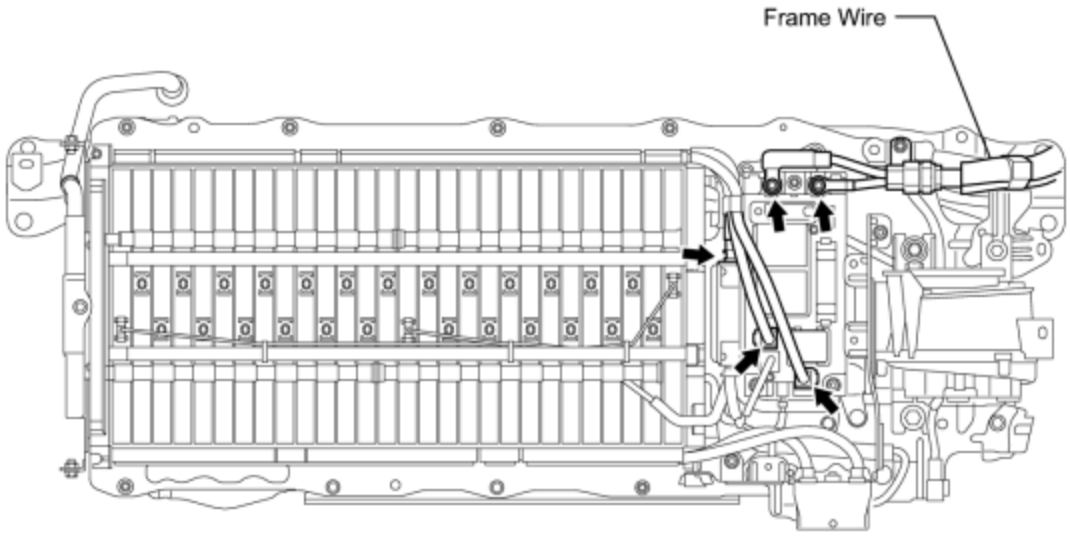
(b) Connect the clamp and frame wire.

13. CHECK HIGH VOLTAGE CABLE CONNECTION CONDITION

CAUTION:

Wear insulated gloves and protective goggles.

(a) Check that each wire harness is being installed securely.

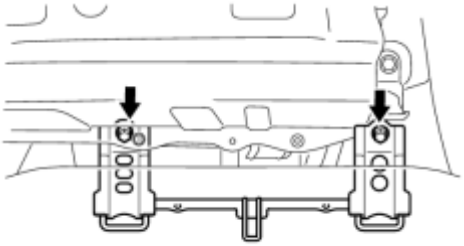



c

NOTICE:

- Make sure that the end of the frame wire are not crossover each other.
- Be sure to connect the frame wire to the correct terminals as shown in the illustration.
- The connectors should be connected securely.
- The nuts should be fastened securely.
- Make sure that the 4 plastic covers are engaged securely.

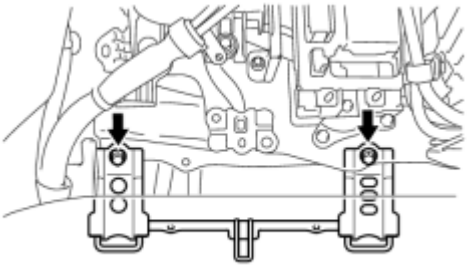
14. INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY LH



(a) Install the child restraint seat anchor bracket sub-assembly LH with the 2 bolts.

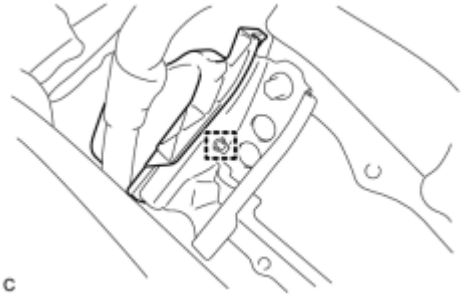
Torque: **20 N·m (200 kgf·cm, 14ft·lbf)**

15. INSTALL CHILD RESTRAINT SEAT ANCHOR BRACKET SUB-ASSEMBLY RH



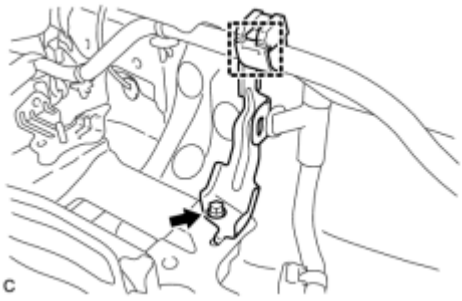
(a) Install the child restraint seat anchor bracket sub-assembly RH with the 2 bolts.

Torque: **20 N·m (200 kgf·cm, 14ft·lbf)**



(b) Connect the wire harness protector clamp.

16. INSTALL NO. 7 HYBRID VEHICLE BATTERY UPPER CARRIER BRACKET



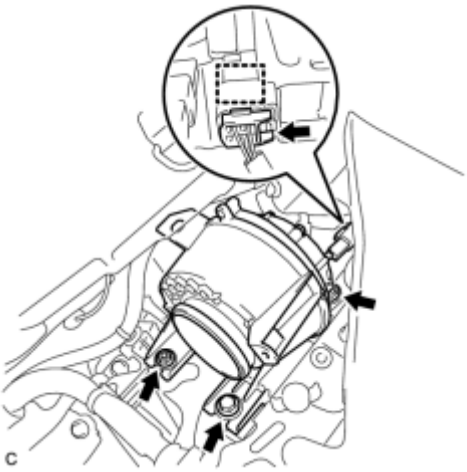
(a) Install the No. 7 hybrid battery upper carrier bracket with the bolt.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

17. INSTALL BATTERY COOLING BLOWER ASSEMBLY

NOTICE:

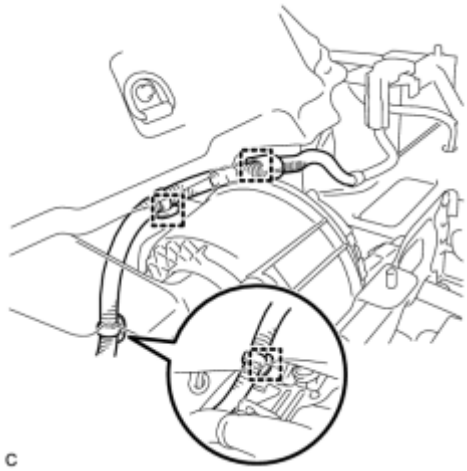
- Be sure not to touch the fan part of the battery cooling blower assemblies.
- Do not lift the battery cooling blower assemblies using the wire harness.




(a) Install the battery cooling blower assembly with the 2 bolts and nut

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(b) Connect each battery cooling blower assembly connector and clamp.




(c) Connect the 3 wire harness clamps.

18. INSTALL NO. 1 HYBRID BATTERY INTAKE DUCT

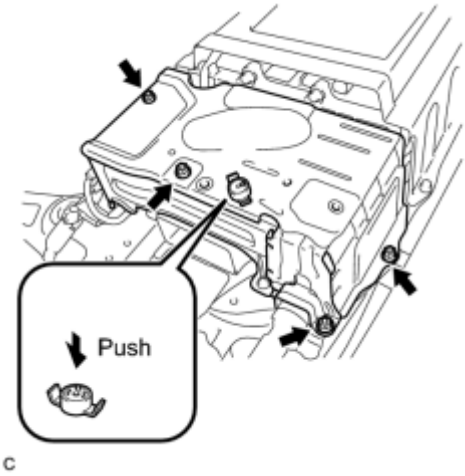
NOTICE:

Ensure that the duct is installed securely.




(a) Install the No. 1 hybrid battery intake duct with the 2 clips.

19. INSTALL UPPER HYBRID BATTERY COVER SUB-ASSEMBLY

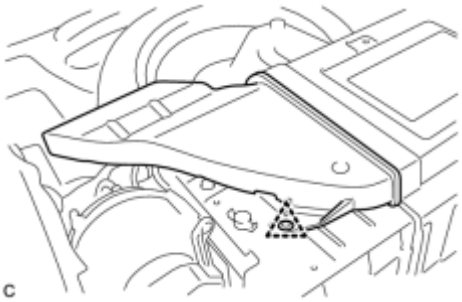



(a) Install the upper hybrid battery cover sub-assembly with the 4 nuts.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

(b) Install the battery cover lock striker, then push the button to lock.

20. INSTALL NO. 1 HYBRID BATTERY EXHAUST DUCT

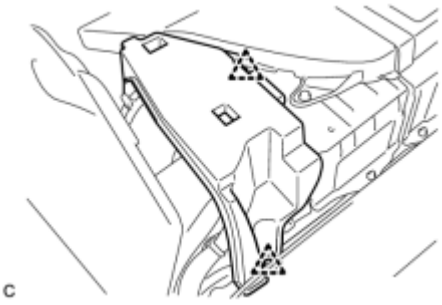



(a) Insert the No. 1 hybrid battery exhaust duct with the clip.

NOTICE:

Ensure that the duct is installed securely.

21. INSTALL REAR FLOOR BOARD SPACER




(a) Install the rear floor board spacer with the 2 clips.

22. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH INFO

23. INSTALL TONNEAU COVER HOLDER CAP (for LH Side) INFO

24. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

25. INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH INFO

26. REMOVE TONNEAU COVER HOLDER CAP (for RH Side)

HINT:

Use the same procedure described for the LH side.

27. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

HINT:

Use the same procedure described for the LH side.

28. INSTALL REAR DECK TRIM COVER INFO

29. INSTALL DECK TRIM SERVICE HOLE COVER INFO

30. INSTALL DECK FLOOR BOX LH INFO

31. INSTALL REAR NO. 4 FLOOR BOARD INFO

32. INSTALL REAR SIDE SEAT BACK ASSEMBLY LH INFO

33. INSTALL REAR SIDE SEAT BACK ASSEMBLY RH INFO

34. INSTALL REAR DOOR SCUFF PLATE LH INFO

35. INSTALL REAR DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side.

36. INSTALL REAR NO. 1 FLOOR BOARD INFO

37. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

38. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

39. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

40. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

41. INSTALL SERVICE PLUG GRIP INFO

42. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

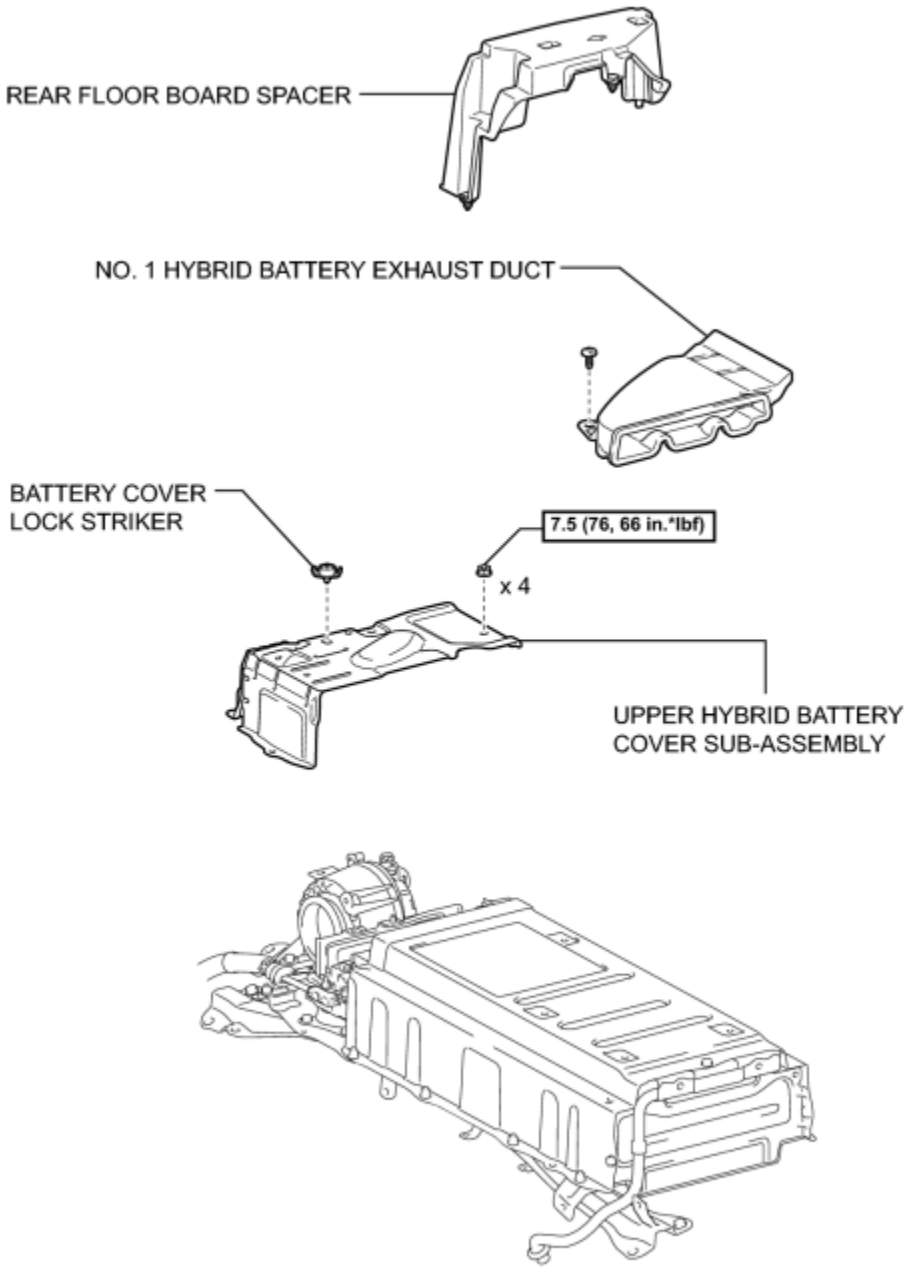
43. INSTALL REAR NO. 3 FLOOR BOARD INFO

44. INSTALL REAR DECK FLOOR BOX INFO

45. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

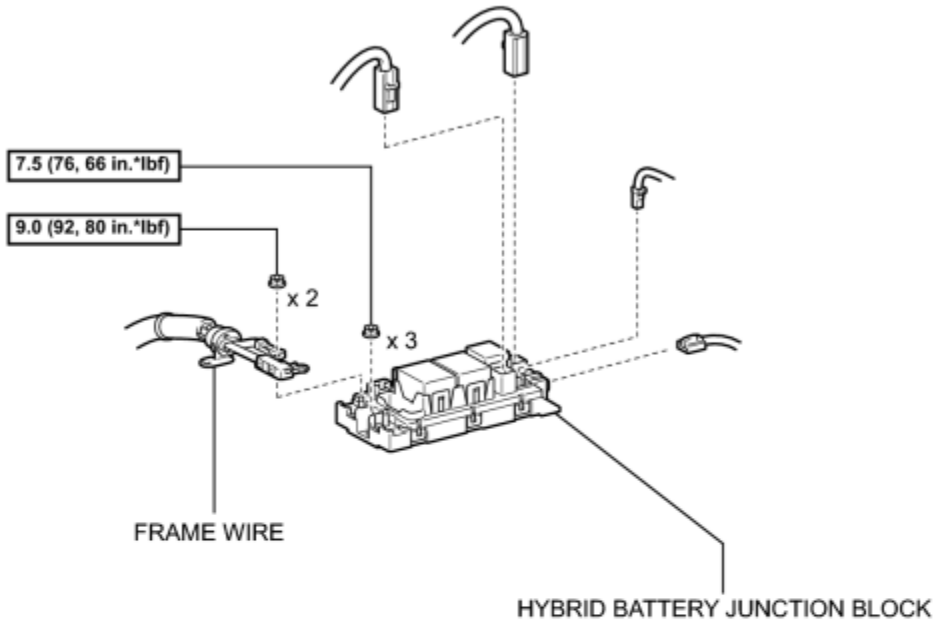
# ILLUSTRATION

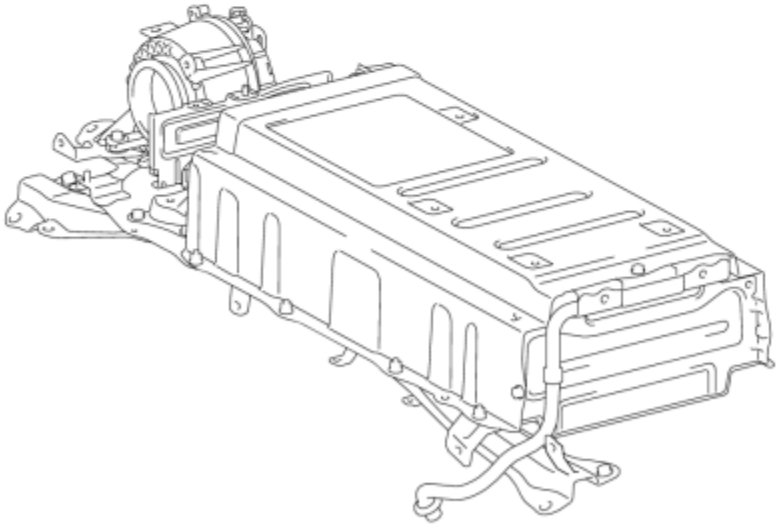



N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION



N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE UPPER HYBRID BATTERY COVER SUB-ASSEMBLY

HINT: INFO.

2. DISCONNECT FRAME WIRE INFO

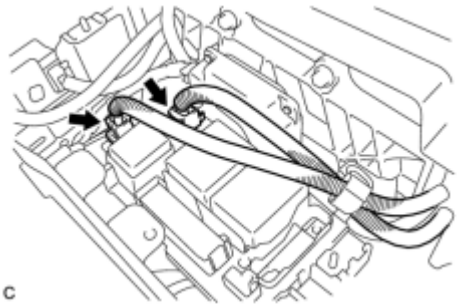
3. REMOVE HYBRID BATTERY JUNCTION BLOCK

CAUTION:

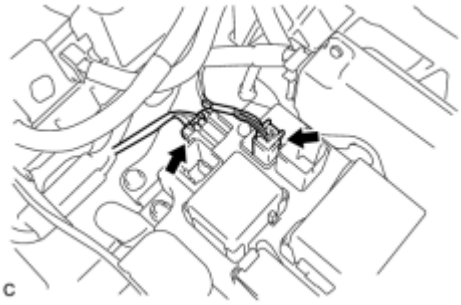
Be sure to wear insulated gloves.

NOTICE:

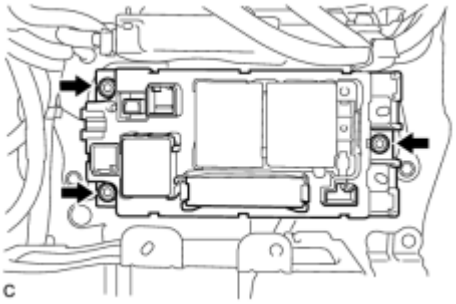
Insulate the removed terminals with insulating tape.




(a) Disconnect the 2 connectors from the hybrid battery junction block.




(b) Disconnect the 2 connectors from the hybrid battery junction block.




(c) Remove the 3 nuts and hybrid battery junction block.

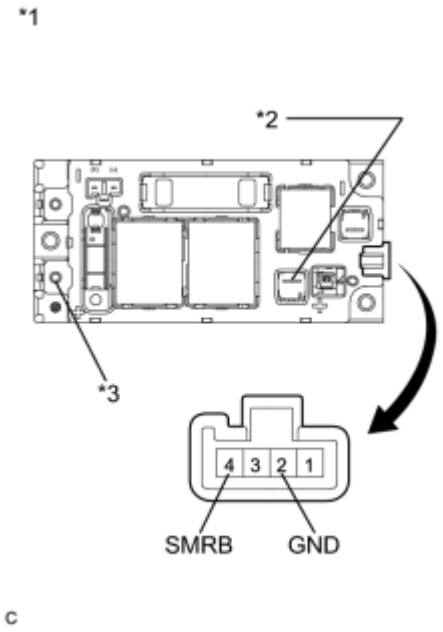
# INSPECTION

1. INSPECT HYBRID BATTERY JUNCTION BLOCK ASSEMBLY

(a) Inspect SMRB

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (+) connector - (+) terminal | Auxiliary battery voltage is not applied between terminals 4 (SMRB) and 2 (GND) | 10 kΩ or higher |
| (+) connector - (+) terminal | Auxiliary battery voltage is applied between terminals 4 (SMRB) and 2 (GND) | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Hybrid Battery Junction Block Assembly |
| *2 | (+) Connector |
| *3 | (+) Terminal |

(2) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 4 (SMRB) - 2 (GND) | -40 to 176°F (-40 to 80°C) | 19.0 to 35.5 Ω |

If the result is not as specified, replace the hybrid battery junction block assembly.

(b) Inspect SMRG

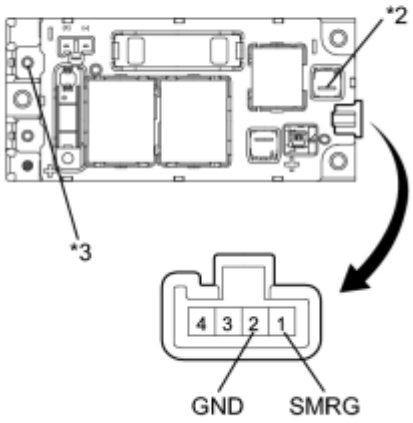
(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (-) connector - (-) terminal | Auxiliary battery voltage is not applied between terminals 1 (SMRG) and 2 (GND) | 10 kΩ or higher |

*1

| | | |
|---|---|---|
| (-) connector - (-) terminal | Auxiliary battery voltage is applied between terminals 1 (SMRG) and 2 (GND) | Below 1 Ω |




c

## Text in Illustration

| | |
|---|---|
| *1 | Hybrid Battery Junction Block Assembly |
| *2 | (-) Connector |
| *3 | (-) Terminal |

(2) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (SMRG) - 2 (GND) | -40 to 176°F (-40 to 80°C) | 19.0 to 35.5 Ω |

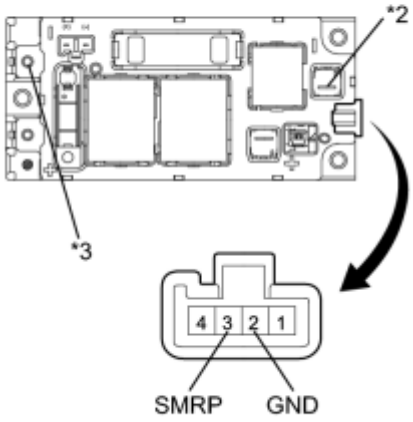
If the result is not as specified, replace the hybrid battery junction block assembly.

(c) Inspect SMRP and system main resister

*1

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (-) connector - (-) terminal | Auxiliary battery voltage is not applied between terminals 3 (SMRP) and 2 (GND) | 10 kΩ or higher |
| (-) connector - (-) terminal | Auxiliary battery voltage is applied between terminals 3 (SMRP) and 2 (GND) | 28.5 to 31.5 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Hybrid Battery Junction Block Assembly |

c

| | |
|---|---|
| *2 | (-) Connector |
| *3 | (-) Terminal |

(2) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 (SMRP) - 2 (GND) | -40 to 176°F (-40 to 80°C) | 112 to 274 Ω |

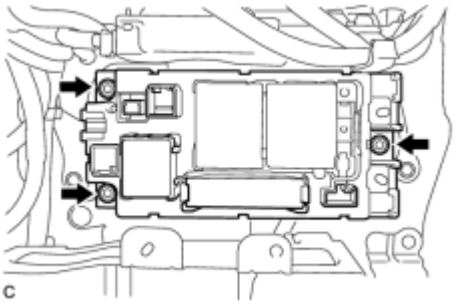
If the result is not as specified, replace the hybrid battery junction block assembly.

# INSTALLATION

1. INSTALL HYBRID BATTERY JUNCTION BLOCK

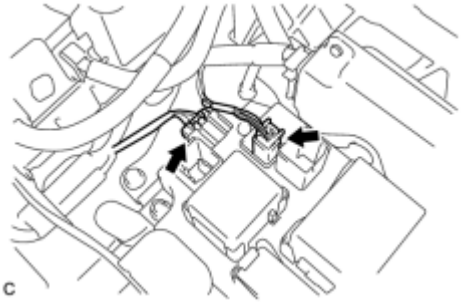
CAUTION:

Be sure to wear insulated gloves.




(a) Install the hybrid battery junction block with the 3 nuts.

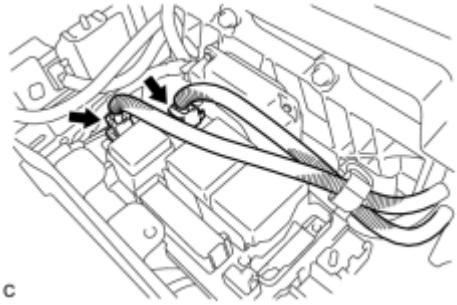
Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**




(b) Connect the 2 connectors to the hybrid battery junction block.

NOTICE:

The connectors should be connected securely.




(c) Connect the 2 connectors to the hybrid battery junction block.

2. CONNECT FRAME WIRE INFO

3. CHECK HIGH VOLTAGE CABLE CONNECTION INFO

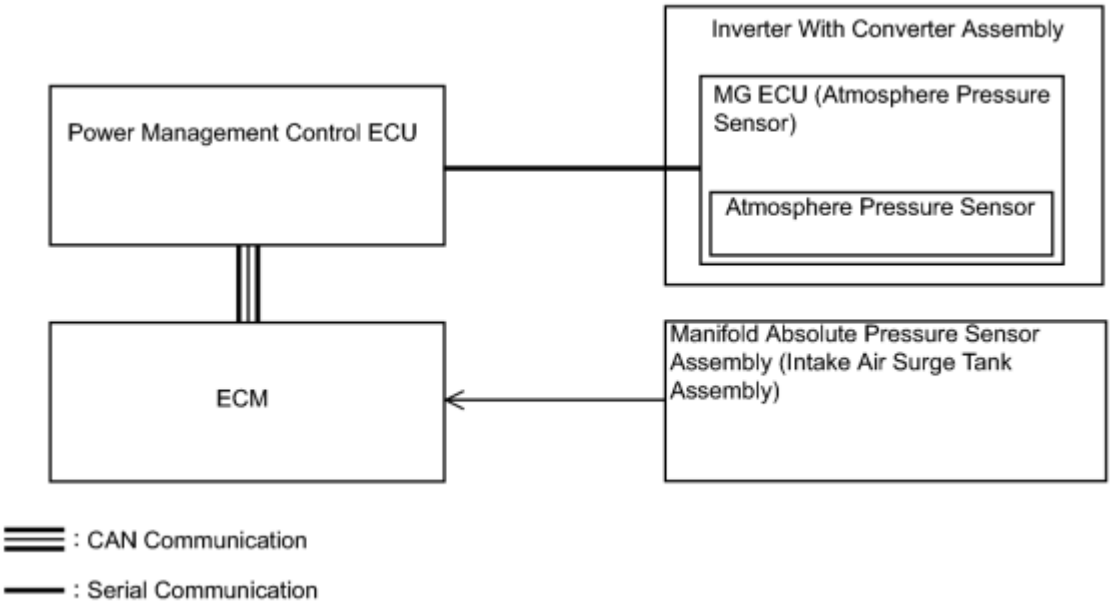
4. INSTALL UPPER HYBRID BATTERY COVER SUB-ASSEMBLY

HINT: INFO.

| DTC | P0069-273 | Manifold Absolute Pressure - Barometric Pressure Correlation |
|---|---|---|

# DESCRIPTION

The atmospheric pressure sensor mounted on the MG ECU circuit board detects the atmospheric pressure. This reading is used to perform system control that considers vehicle usage conditions.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0069 | 273 | Difference between the atmospheric pressure value of the atmospheric pressure sensor in the inverter with converter assembly and the manifold absolute pressure sensor (for EGR control) exceeds a specified value. The same condition recurs within 3 hours when driving in EV mode. | • Inverter with converter assembly<br>• Manifold absolute pressure sensor<br>• ECM<br>• Wire harness or connector |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK DTC OUTPUT (ENGINE CONTROL) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (READY).

(c) Fully depress the accelerator pedal for 5 seconds to start the engine and keep it running.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTCs other than those listed in the following table are output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0107 | Manifold Absolute Pressure/Barometric Pressure Circuit Low Input |
| P0108 | Manifold Absolute Pressure/Barometric Pressure Circuit High Input |
| P106A | Evaporative Emission System Pressure Sensor - Manifold Absolute Pressure Correlation |

HINT:

P0069-273 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a reproduction test to check that no DTCs are output.

(f) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0069-273 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A-151, 155, 156, 658, 659 | Generator Control Module |
| P0A1B-193, 512, 661, 786 | Drive Motor "A" Control Module |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1D-148 | Hybrid Powertrain Control Module |
| P2228-268 | Barometric Pressure Sensor "A" Circuit Low |
| P2229-269 | Barometric Pressure Sensor "A" Circuit High |
| P2511-149 | HV CPU Power Relay Sense Circuit Intermittent No Continuity |
| P324E-788 | MG-ECU Power Relay Intermittent Circuit |
| U0100-211, 530 | Lost Communication with ECM/PCM "A" |
| U0110 (all INF codes)*1 | Lost Communication with Drive Motor Control Module "A" |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0069-273 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a reproduction test to check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (MAP, ATMOSPHERE PRESSURE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / MAP, Atmosphere Pressure.

(d) Using the table, read the normal atmospheric pressure value for the applicable altitude.

*1

| *2 | *3 | *4 |
|---|---|---|
| 0 | -20 (-4) | 101.3 (14.7) |
| | -10 (14) | 101.3 (14.7) |
| | 0 (32) | 101.3 (14.7) |
| | 10 (50) | 101.3 (14.7) |
| | 20 (68) | 101.3 (14.7) |
| | 30 (86) | 101.3 (14.7) |
| 200 (656) | -20 (-4) | 98.6 (14.3) |
| | -10 (14) | 98.7 (14.3) |
| | 0 (32) | 98.8 (14.3) |
| | 10 (50) | 98.9 (14.3) |
| | 20 (68) | 99.0 (14.4) |
| | 30 (86) | 99.1 (14.4) |
| 400 (1312) | -20 (-4) | 96.0 (13.9) |
| | -10 (14) | 96.2 (14.0) |
| | 0 (32) | 96.4 (14.0) |
| | 10 (50) | 96.6 (14.0) |
| | 20 (68) | 96.7 (14.0) |
| | 30 (86) | 96.9 (14.1) |
| 600 (1969) | -20 (-4) | 93.5 (13.6) |
| | -10 (14) | 93.8 (13.6) |
| | 0 (32) | 94.0 (13.6) |
| | 10 (50) | 94.3 (13.7) |
| | 20 (68) | 94.5 (13.7) |
| | 30 (86) | 94.7 (13.7) |
| 800 (2625) | -20 (-4) | 91.1 (13.2) |
| | -10 (14) | 91.4 (13.3) |
| | 0 (32) | 91.8 (13.3) |
| | 10 (50) | 92.1 (13.4) |
| | 20 (68) | 92.4 (13.4) |
| | 30 (86) | 92.7 (13.4) |
| 1000 (3281) | -20 (-4) | 88.7 (12.9) |
| | -10 (14) | 89.1 (12.9) |
| | 0 (32) | 89.5 (13.0) |
| | 10 (50) | 89.9 (13.0) |
| | 20 (68) | 90.3 (13.1) |
| | 30 (86) | 90.6 (13.1) |
| 1200 (3937) | -20 (-4) | 86.4 (12.5) |
| | -10 (14) | 86.9 (12.6) |
| | 0 (32) | 87.4 (12.7) |
| | 10 (50) | 87.8 (12.7) |
| | 20 (68) | 88.3 (12.8) |
| | 30 (86) | 88.7 (12.9) |
| 1400 (4593) | -20 (-4) | 84.2 (12.2) |
| | -10 (14) | 84.7 (12.3) |
| | 0 (32) | 85.3 (12.4) |
| | 10 (50) | 85.8 (12.4) |
| | 20 (68) | 86.3 (12.5) |
| | 30 (86) | 86.7 (12.6) |
| 1600 (5250) | -20 (-4) | 82.0 (11.9) |
| | -10 (14) | 82.6 (12.0) |
| | 0 (32) | 83.3 (12.1) |
| | 10 (50) | 83.8 (12.2) |
| | 20 (68) | 84.4 (12.2) |
| | 30 (86) | 84.9 (12.3) |

| *2 | *3 | *4 |
|---|---|---|
| 1800 (5906) | -20 (-4) | 79.9 (11.6) |
| | -10 (14) | 80.6 (11.7) |
| | 0 (32) | 81.3 (11.8) |
| | 10 (50) | 81.9 (11.9) |
| | 20 (68) | 82.5 (12.0) |
| | 30 (86) | 83.0 (12.0) |
| 2000 (6592) | -20 (-4) | 77.9 (11.3) |
| | -10 (14) | 78.6 (11.4) |
| | 0 (32) | 79.4 (11.5) |
| | 10 (50) | 80.0 (11.6) |
| | 20 (68) | 80.7 (11.7) |
| | 30 (86) | 81.3 (11.8) |
| 2200 (7218) | -20 (-4) | 75.9 (11.0) |
| | -10 (14) | 76.7 (11.1) |
| | 0 (32) | 77.5 (11.2) |
| | 10 (50) | 78.2 (11.3) |
| | 20 (68) | 78.9 (11.4) |
| | 30 (86) | 79.5 (11.5) |
| 2400 (7874) | -20 (-4) | 74.0 (10.7) |
| | -10 (14) | 74.9 (10.9) |
| | 0 (32) | 75.7 (11.0) |
| | 10 (50) | 76.4 (11.1) |
| | 20 (68) | 77.2 (11.2) |
| | 30 (86) | 77.8 (11.3) |
| 2600 (8531) | -20 (-4) | 72.1 (10.5) |
| | -10 (14) | 73.0 (10.6) |
| | 0 (32) | 73.9 (10.7) |
| | 10 (50) | 74.7 (10.8) |
| | 20 (68) | 75.5 (11.0) |
| | 30 (86) | 76.2 (11.1) |
| 2800 (9187) | -20 (-4) | 70.3 (10.2) |
| | -10 (14) | 71.3 (10.3) |
| | 0 (32) | 72.2 (10.5) |
| | 10 (50) | 73.0 (10.6) |
| | 20 (68) | 73.8 (10.7) |
| | 30 (86) | 74.6 (10.8) |
| 3000 (9843) | -20 (-4) | 68.6 (9.95) |
| | -10 (14) | 69.6 (10.1) |
| | 0 (32) | 70.5 (10.2) |
| | 10 (50) | 71.4 (10.4) |
| | 20 (68) | 72.2 (10.5) |
| | 30 (86) | 73.0 (10.6) |
| 3200 (10499) | -20 (-4) | 66.9 (9.70) |
| | -10 (14) | 67.9 (9.85) |
| | 0 (32) | 68.9 (9.99) |
| | 10 (50) | 69.8 (10.1) |
| | 20 (68) | 70.7 (10.3) |
| | 30 (86) | 71.5 (10.4) |
| 3400 (11155) | -20 (-4) | 65.3 (9.47) |
| | -10 (14) | 66.3 (9.62) |
| | 0 (32) | 67.3 (9.76) |
| | 10 (50) | 68.3 (9.91) |
| | 20 (68) | 69.1 (10.0) |
| | 30 (86) | 70.0 (10.2) |

| *2 | *3 | *4 |
|---|---|---|
| 3600 (11812) | -20 (-4) | 63.7 (9.24) |
| | -10 (14) | 64.7 (9.38) |
| | 0 (32) | 65.8 (9.54) |
| | 10 (50) | 66.7 (9.67) |
| | 20 (68) | 67.7 (9.82) |
| | 30 (86) | 68.5 (9.94) |
| 3800 (12468) | -20 (-4) | 62.1 (9.01) |
| | -10 (14) | 63.2 (9.17) |
| | 0 (32) | 64.3 (9.33) |
| | 10 (50) | 65.3 (9.47) |
| | 20 (68) | 66.2 (9.60) |
| | 30 (86) | 67.1 (9.73) |
| 4000 (13124) | -20 (-4) | 60.6 (8.79) |
| | -10 (14) | 61.7 (8.95) |
| | 0 (32) | 62.8 (9.11) |
| | 10 (50) | 63.8 (9.25) |
| | 20 (68) | 64.8 (9.40) |
| | 30 (86) | 65.7 (9.53) |
| 4200 (13780) | -20 (-4) | 59.1 (8.57) |
| | -10 (14) | 60.3 (8.75) |
| | 0 (32) | 61.4 (8.91) |
| | 10 (50) | 62.5 (9.07) |
| | 20 (68) | 63.4 (9.20) |
| | 30 (86) | 64.4 (9.34) |
| 4400 (14436) | -20 (-4) | 57.7 (8.37) |
| | -10 (14) | 58.9 (8.54) |
| | 0 (32) | 60.0 (8.70) |
| | 10 (50) | 61.1 (8.86) |
| | 20 (68) | 62.1 (9.01) |
| | 30 (86) | 63.1 (9.15) |
| 4600 (15093) | -20 (-4) | 56.3 (8.17) |
| | -10 (14) | 57.5 (8.34) |
| | 0 (32) | 58.7 (8.51) |
| | 10 (50) | 59.8 (8.67) |
| | 20 (68) | 60.8 (8.82) |
| | 30 (86) | 61.8 (8.96) |
| 4800 (15749) | -20 (-4) | 55.0 (7.98) |
| | -10 (14) | 56.2 (8.15) |
| | 0 (32) | 57.4 (8.33) |
| | 10 (50) | 58.5 (8.49) |
| | 20 (68) | 59.5 (8.63) |
| | 30 (86) | 60.5 (8.78) |
| 5000 (16405) | -20 (-4) | 53.7 (7.79) |
| | -10 (14) | 54.9 (7.96) |
| | 0 (32) | 56.1 (8.14) |
| | 10 (50) | 57.2 (8.30) |
| | 20 (68) | 58.3 (8.46) |
| | 30 (86) | 59.3 (8.60) |

C

## Text in Illustration

| | | | |
|---|---|---|---|
| *1 | Altitude, Temperature and Atmospheric Pressure Correlation Table | *2 | Altitude (m (ft)) |
| *3 | Temperature (°C (°F)) | *4 | Atmospheric Pressure (kPa (psi)) |

(e) Compare the MAP and Atmosphere Pressure values in the Data List with the normal atmospheric value from the table.

Result:

| Result | Proceed to |
|---|---|
| Other than the following. | A |
| Difference between MAP in Data List and normal atmospheric pressure value is 10 kPa or more. | B |
| Difference between Atmosphere Pressure in Data List and normal atmospheric pressure value is 10 kPa or more. | C |

(f) Turn the power switch off.

C ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
B ▶ CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR)
A ▼

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (MAP) |

(a) Push the P position switch.

(b) Enter the following menus: Powertrain / Hybrid Control / Data List / MAP

(c) Read the MAP value in the Data List with the engine stopped.

(d) While depressing the brake pedal, turn the power switch on (READY).

(e) With the READY indicator light illuminated, fully depress the accelerator pedal.

(f) Read the MAP value in the Data List with the engine running.

(g) Compare the MAP value noted with the engine stopped and the MAP value noted with the engine running.

OK:

The MAP value changes (pressure decreases when the engine is started).

(h) Turn the power switch off.

NG ▶ CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR)
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 5. | CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR) INFO |

B ▶ REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR
A ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (MANIFOLD ABSOLUTE PRESSURE SENSOR - ECM) |

| | |
|---|---|
| | INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE ECM**

| | |
|---|---|
| 7. | REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR |

(a) Replace the manifold absolute pressure sensor INFO.

NEXT ▼

| | |
|---|---|
| 8. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0069-273 is not output. | A |
| DTC P0069-273 is output again. | B |

(e) Turn the power switch off.

B ▶ REPLACE ECM
A ▶ **END**

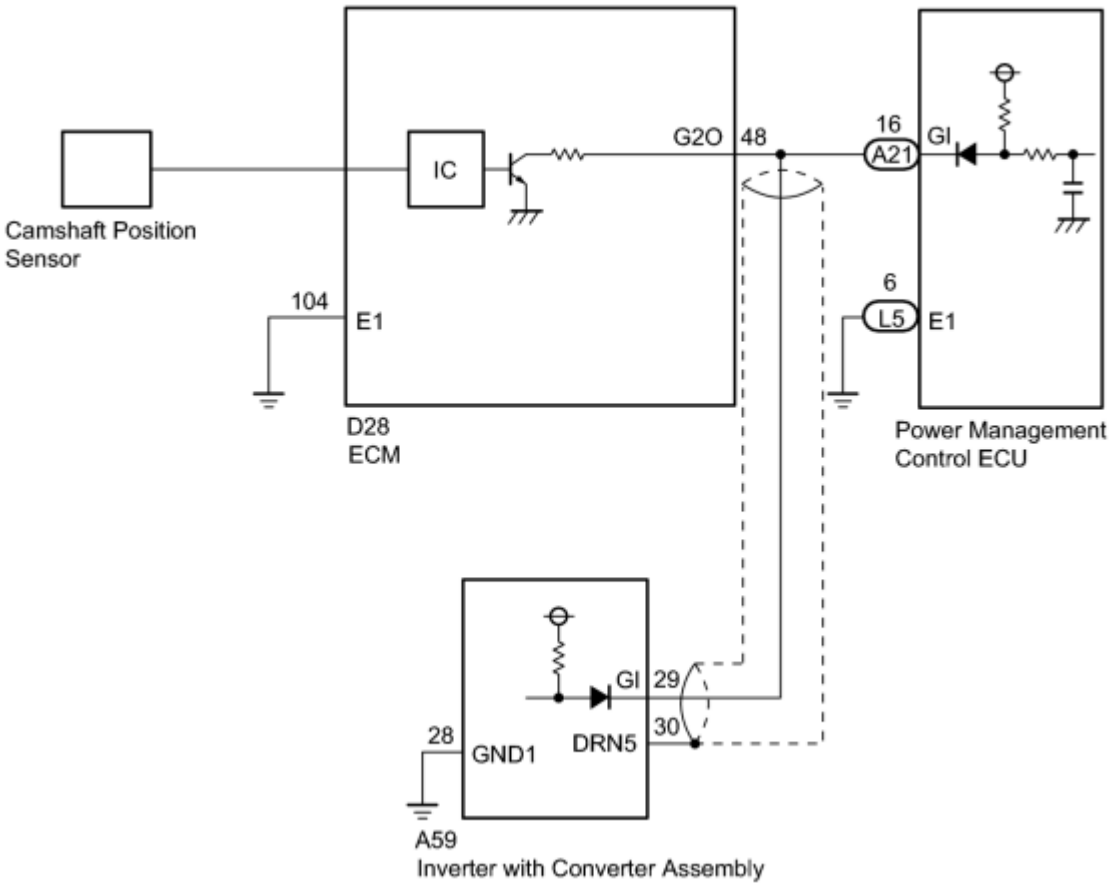
| | | |
|---|---|---|
| DTC | P0340-886 | Camshaft Position Sensor "A" Circuit |

# DESCRIPTION

The power management control ECU (HV CPU) compares the engine speed sent from the ECM via CAN communication and the engine speed that is indicated by pulses sent from the ECM. If the pulse input is not normal, the power management control ECU (HV CPU) sets this DTC.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0340 | 886 | Malfunction in the engine speed sensor (GI signal) circuit | • Wire harness or connector<br>• Camshaft position sensor<br>• Inverter with converter assembly<br>• ECM<br>• Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

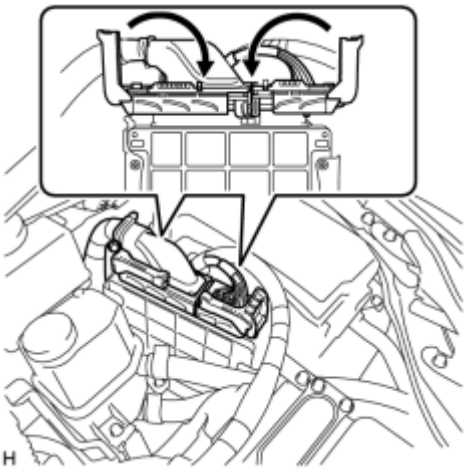
| Result | Proceed to |
|---|---|
| DTC P0340-886 only is output. | A |
| DTC P0343-747 is also output. | B |

(e) Turn the power switch off.

B ▶ CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU, INVERTER WITH CONVERTER)

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR) |




(a) Check the connections of the ECM connectors.

OK:

The connectors are connected securely and there are no contact problems.

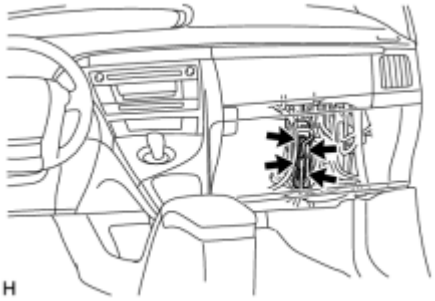
NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) |

(a) Check the connections of the power management control ECU connectors.

OK:



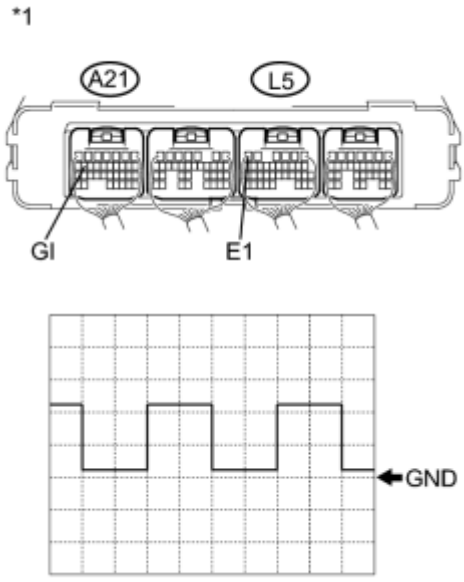

The connectors are connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 4. | CHECK POWER MANAGEMENT CONTROL ECU (CHECK WAVEFORM) |

(a) Turn the power switch on (READY).




(b) Connect an oscilloscope between the power management control ECU terminals specified in the table below, and measure the waveform.

| Item | Content |
|---|---|
| Terminal | A21-16 (GI) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 20 ms./DIV. |
| Condition | Power switch on (READY) with engine running |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

Result:

| Result | Proceed to |
|---|---|
| Normal | A |
| Waveform is flat, and is stuck on the +B side. | B |
| Waveform is flat, and is stuck on the GND side. | C |

C ▶ CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU,

INVERTER WITH CONVERTER)

B CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU)

A

| | |
|---|---|
| 5. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU) |

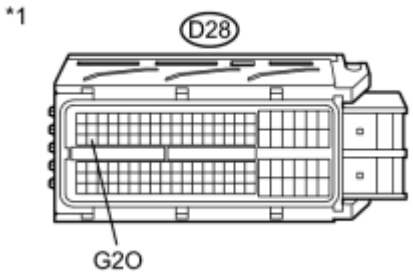
(a) Disconnect connector D28 from the ECM.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - Body ground | Power switch on (IG) | 11 to 14 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

NOTICE:

Turning the power switch on (IG) with the ECM connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Connect the ECM connector.

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK **REPLACE ECM**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU, INVERTER WITH CONVERTER) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector D28 from the ECM.

(c) Disconnect connector A21 from the power management control ECU.

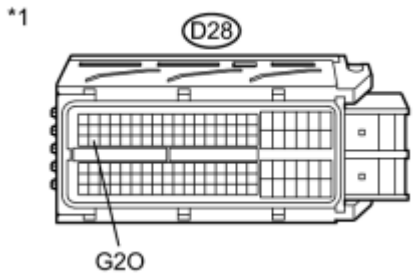
(d) Disconnect connector A59 from the inverter with converter assembly.

(e) Turn the power switch on (IG).

(f) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - Body ground | Power switch on (IG) | Below 1 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector, power management control ECU connector and ECM connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(g) Turn the power switch off.

(h) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - Body ground | Power switch off | 10 kΩ or higher |

(i) Connect the ECM connector.

(j) Connect the power management control ECU connector.

(k) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 8. | CHECK POWER MANAGEMENT CONTROL ECU |

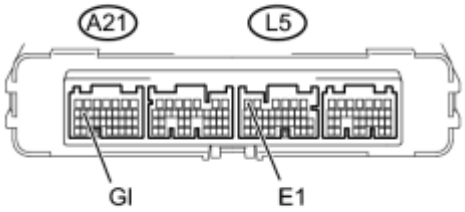
(a) Disconnect all the connectors from the power management control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-16 (GI) - L5-6 (E1) | Always | 10 kΩ or higher |

*1




P

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Management Control ECU) |

(c) Connect the power management control ECU connectors.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

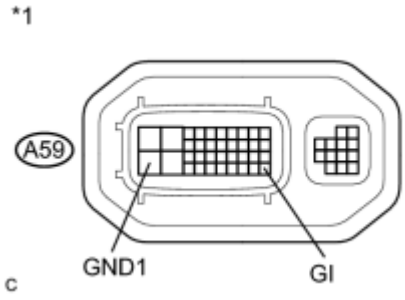
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - A59-28 (GND1) | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0343-747 | Camshaft Position Sensor "A" Circuit High Input |

# DESCRIPTION

Refer to the description for DTC P0340-886 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0343 | 747 | GI signal is not input for 2 sec. or more while the engine is running. | • SFI system<br>• Inverter with converter assembly<br>• ECM<br>• Power management control ECU<br>• Wire harness or connector |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0340-886 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Engine and ECT/ Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| Engine control system DTCs are not output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0340 | Camshaft Position Sensor Circuit Malfunction |
| P0342 | Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor) |
| P0343 | Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor) |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| None of the following DTCs are output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0343-747 may be set due to a malfunction which also causes the DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

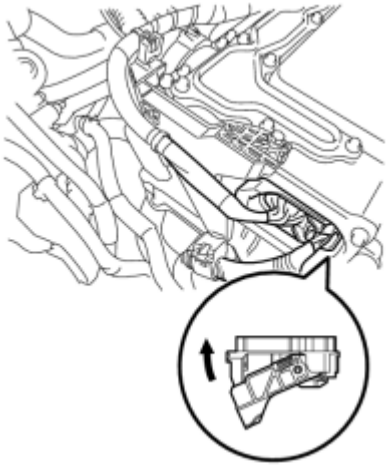
| Result | Proceed to |
|---|---|
| P0340-886 is not output. | A |
| P0340-886 is also output. | B |

(e) Turn the power switch off.

B CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR)

A

| | |
|---|---|
| 4. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) |




CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

NOTICE:

Before disconnecting the connector, confirm that it is properly connected by checking that the locking claws are engaged and that the connector does not pull out.

(b) Check the connection of the low voltage connector of the inverter with

converter assembly.

OK:

The connector is connected securely and there are no contact problems.

HINT:

When connecting the connector, insert it with the locking lever in the raised position. Rotate the lever downward and make sure that the connector is pulled into its socket. When the locking lever is in its fully closed position, a click will be heard as its locking claws engage. After the click is heard, pull up on the connector to confirm that it is properly connected.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 5. | CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - ECM) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the low voltage connector A59 from the inverter with converter assembly.

(c) Disconnect connector D28 from the ECM.

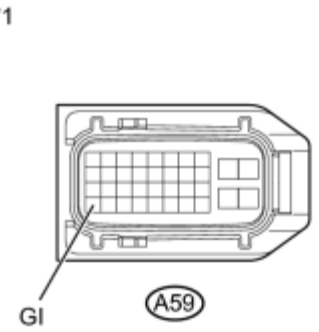
(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

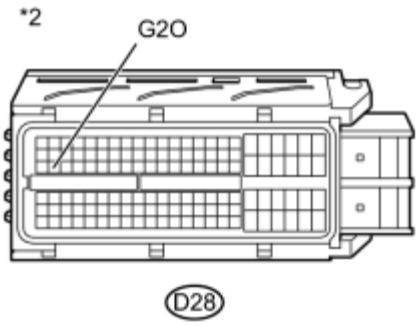
Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Front view of wire harness connector<br><br>(to ECM) |




NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector and ECM connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(f) Turn the power switch off.

(g) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - D28-48 (G2O) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) or D28-48 (G2O) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(h) Connect the ECM connector.

(i) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR) INFO |

NG ▶ CONNECT SECURELY
OK ▼

| 8. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - ECM) |
|---|---|

CAUTION:

Be sure to wear insulated gloves.

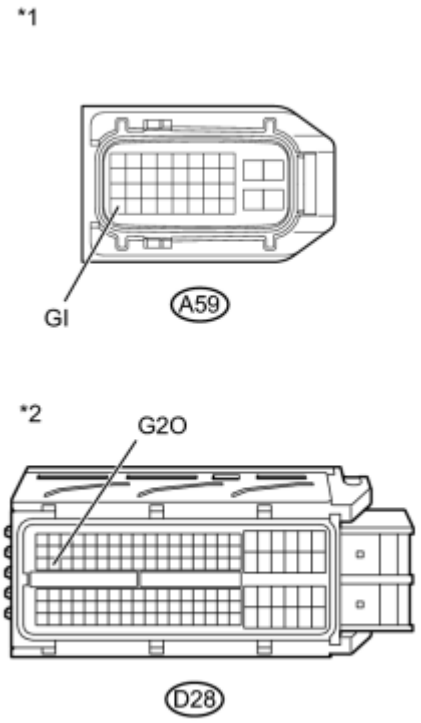
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the low voltage connector A59 from the inverter with converter assembly.

(c) Disconnect connector D28 from the ECM.




(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - D28-48 (G2O) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) or D28-48 (G2O) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Front view of wire harness connector<br><br>(to ECM) |

(e) Connect the ECM connector.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect connector D28 from the ECM.

(b) Disconnect connector A21 from the power management control ECU.

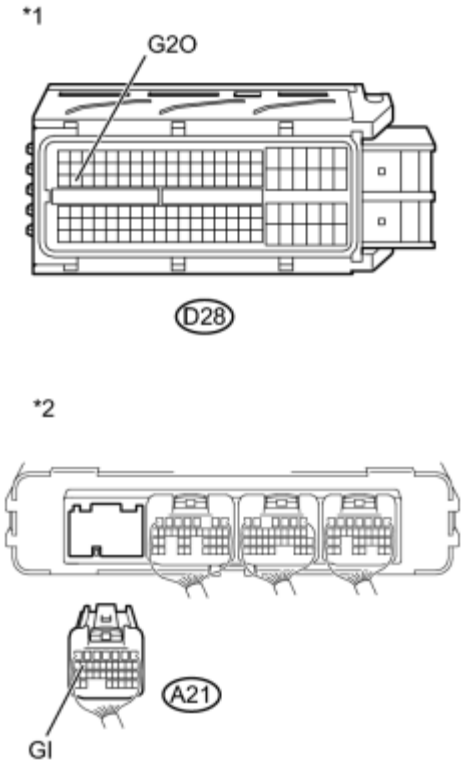
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - A21-16 (GI) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) or A21-16 (GI) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the power management control ECU connector.

(e) Connect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 10. | CHECK INVERTER WITH CONVERTER ASSEMBLY |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

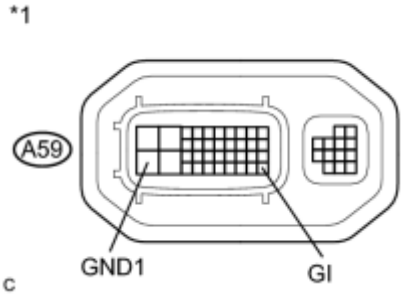
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the low voltage connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - A59-28 (GND1) | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

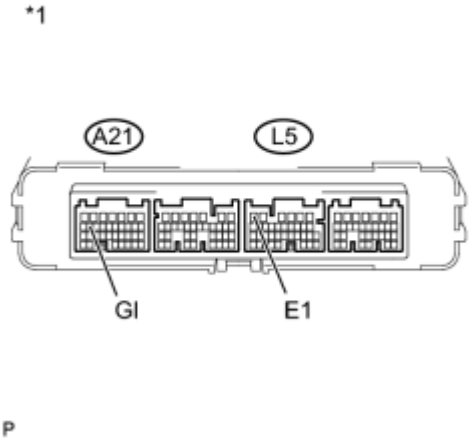
NG ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
OK
▼

| | |
|---|---|
| 11. | CHECK POWER MANAGEMENT CONTROL ECU |

(a) Disconnect connectors A21 and L5 from the power management control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-16 (GI) - L5-6 (E1) | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Management Control ECU) |

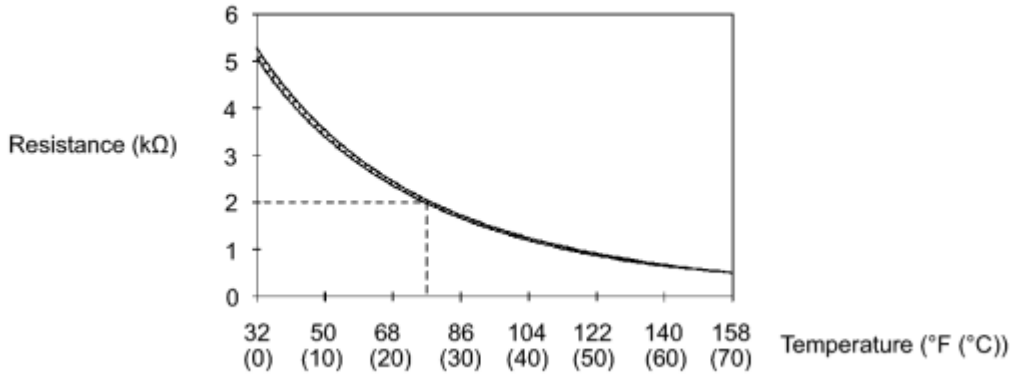
(c) Connect the power management control ECU connector.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0516-769 | Battery Temperature Sensor Circuit Low |
| DTC | P0517-770 | Battery Temperature Sensor Circuit High |

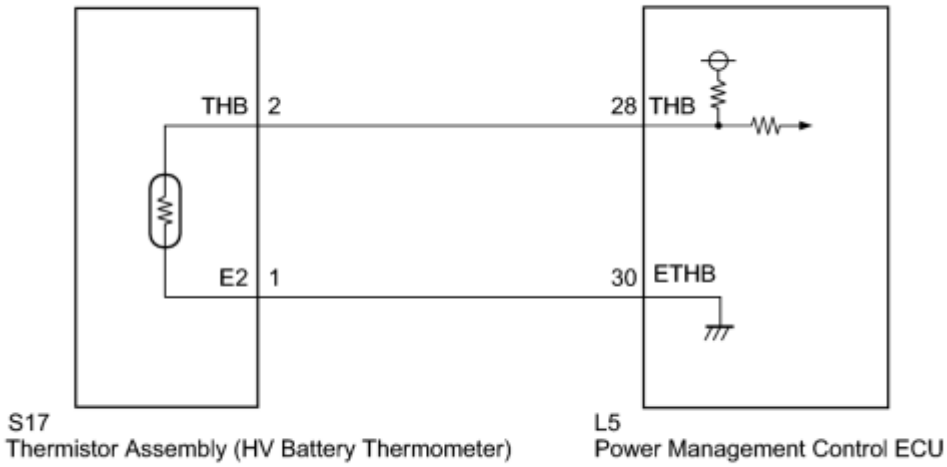
# DESCRIPTION

- The thermistor assembly (battery temperature sensor) detects the auxiliary battery temperature. The resistance of the thermistor assembly built into the thermistor changes in accordance with changes in the auxiliary battery temperature. The lower the auxiliary battery temperature, the higher the thermistor assembly resistance. Conversely, the higher the temperature, the lower the resistance. The thermistor is connected to the power management control ECU (HV CPU). A voltage of 5 V is supplied to the thermistor assembly from the THB terminal of the power management control ECU (HV CPU) through its internal resistor R. This means that resistor R and the thermistor assembly are connected in series. The voltage at the THB terminal and the resistance value change in accordance with changes in the auxiliary battery temperature. Based on this signal, the power management control ECU (HV CPU) reduces the charging current when the auxiliary battery temperature is high to protect the auxiliary battery.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0516 | 769 | Malfunction in the thermistor assembly (battery temperature sensor) circuit (short to GND) | • Thermistor assembly<br>• Wire harness or connector<br>• Power management control ECU |
| P0517 | 770 | Malfunction in the thermistor assembly (battery temperature sensor) circuit (open or short to +B)) | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- Read the freeze frame data using the Techstream. In the freeze frame data, some information is recorded about the engine conditions at the moment a malfunction occurred. This information can be helpful when troubleshooting.
- Characteristics of the thermistor resistance (reference values) are as follows.

| Terminal | THB (with Connector Disconnected) | Resistance | Ambient Temperature |
|---|---|---|---|
| THB - E2 | 4.5 to 5.5 V | 3.00 to 3.75 kΩ | Approximately 50°F (10°C) |
| | | 1.60 to 1.80 kΩ | Approximately 77°F (25°C) |
| | | 0.80 to 1.00 kΩ | Approximately 104°F (40°C) |

# PROCEDURE

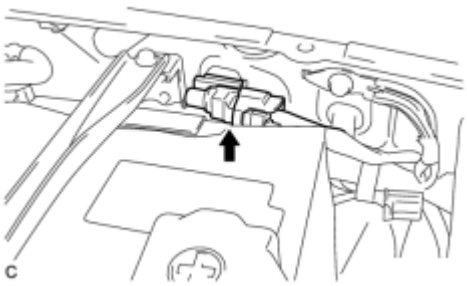
| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (THERMISTOR ASSEMBLY CONNECTOR) |

(a) Check the connection of the thermistor assembly connector.




OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

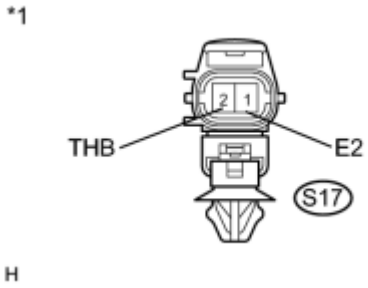
OK ▼

| | |
|---|---|
| 3. | CHECK THERMISTOR ASSEMBLY |

(a) Disconnect connector S17 from the thermistor assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S17-2 (THB) - S17-1 (E2) | 50° F (10°C) | 3.00 to 3.73 kΩ |
| | 77° F (25°C) | 1.60 to 1.80 kΩ |
| | 104° F (40°C) | 0.80 to 1.00 kΩ |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Thermistor Assembly) |

(c) Connect the thermistor assembly connector.

NG ▶ REPLACE THERMISTOR ASSEMBLY

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - THERMISTOR ASSEMBLY) |

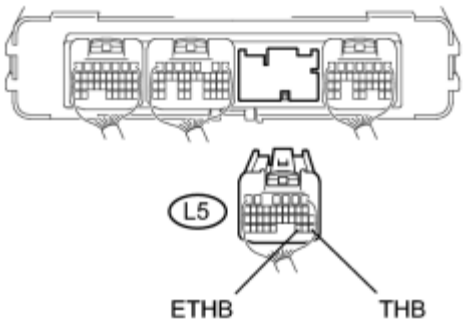
(a) Disconnect connector S17 from the thermistor assembly.

(b) Disconnect connector L5 from the power management control ECU.

*1




*2




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-28 (THB) - S17-2 (THB) | Power switch off | Below 1 Ω |
| L5-30 (ETHB) - S17-1 (E2) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-28 (THB) or S17-2 (THB) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-30 (ETHB) or S17-1 (E2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Thermistor Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-28 (THB) or S17-2 (THB) - Body ground | Power switch on (IG) | Below 1 V |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(f) Turn the power switch off.

(g) Connect the thermistor assembly connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P060B-134 | Internal Control Module A/D Processing Performance |
| DTC | P060B-135 | Internal Control Module A/D Processing Performance |
| DTC | P060B-570 | Internal Control Module A/D Processing Performance |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation and it will set this DTC when it detects an internal malfunction. If this DTC is output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P060B | 134 | ECU internal error | Power Management Control ECU |
| | 135 | ECU internal error | |
| | 570 | ECU internal error | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs diagnostic tests to verify proper operation of internal ECU systems. One of these monitors the rationality of internal analog (signal) to digital conversions. The power management control ECU (CPU) monitors the internal A/D (Analog/Digital converter) value. If there is an A/D converter malfunction, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P060B (INF 134/135/570): Internal control module A/D processing performance |
| Required sensors / components | Power management control ECU |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

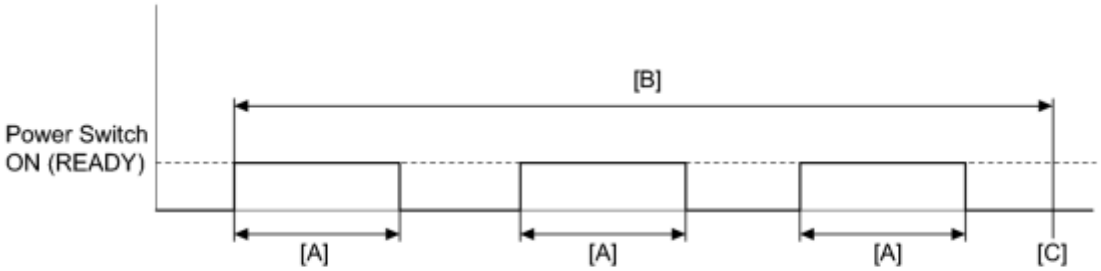
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P060B (INF 134/135/570) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

| | | |
|---|---|---|
| DTC | P062F-143 | EEPROM Malfunction |
| DTC | P062F-165 | EEPROM Malfunction |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation and it will set this DTC when it detects an internal malfunction. If this DTC is output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P062F | 143 | ECU internal error | Power Management Control ECU |
| P062F | 165 | ECU internal error | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation. If the internal operation is malfunctioning, the power management control ECU (HV CPU) illuminates the MIL and sets a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P062F (INF 143): Internal control module EEPROM<br><br>P062F (INF 165): Internal control module EEPROM for battery data |
| Required sensors / components | Power management control ECU |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

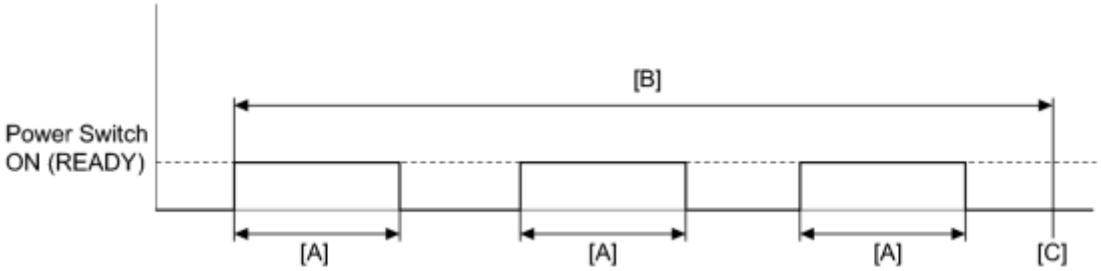
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P062F (INF 143) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0630-804 | VIN not Programmed or Mismatch-ECM / PCM |

# DESCRIPTION

DTC P0630 is set if the Vehicle Identification Number (VIN) is not stored in the power management control ECU (HV CPU) or the input VIN is not accurate. Input the VIN with the Techstream INFO.

| DTC No. | INF No. | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0630 | 804 | • VIN not stored in power management control ECU<br>• Input VIN in power management control ECU not accurate | Power management control ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

NOTICE:

If P0630 is set, the VIN must be input to the power management control ECU using the Techstream. However, all DTCs are cleared automatically by the Techstream when inputting the VIN. If DTCs other than P0630-804 are set, check them first.

NEXT

| | |
|---|---|
| 2. | INPUT VIN WITH TECHSTREAM |

(a) Input the VIN with the Techstream INFO.

NOTICE:

Be sure to check the auxiliary battery voltage before performing VIN writing because VIN writing cannot be performed if the auxiliary battery voltage is below 10 V.

NEXT

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus : Powertrain / Hybrid Control / Trouble Codes.

(d) Read output DTC.

OK:

DTC P0630-804 is not output.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P06A4-209 | Sensor Reference Voltage "D" Circuit Low |
| DTC | P06A5-210 | Sensor Reference Voltage "D" Circuit High |

# DESCRIPTION

The power management control ECU (HV CPU) monitors voltage of 5 V power supply (VC) used for the sensors. If the power management control ECU (HV CPU) detects a malfunction, it will set a DTC.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P06A4 | 209 | VC power-supply voltage is lower than 4.2 V | Power management control ECU |
| P06A5 | 210 | VC power-supply voltage is higher than 5.8 V | Power management control ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P06A4-209 to P06A5-210 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0516-769 | Battery Temperature Sensor Circuit Low |
| P0517-770 | Battery Temperature Sensor Circuit High |
| P0A2C-247 | Drive Motor "A" Temperature Sensor Circuit Low |
| P0A2D-249 | Drive Motor "A" Temperature Sensor Circuit High |
| P0A38-257 | Generator Temperature Sensor Circuit Low |
| P0A39-259 | Generator Temperature Sensor Circuit High |
| P2120-152 | Throttle/Pedal Position Sensor/Switch "D" Circuit |
| P2122-104 | Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input |

| DTC No. | Relevant Diagnosis |
|---|---|
| P2123-105 | Throttle/Pedal Position Sensor/Switch "D" Circuit High Input |
| P2125-153 | Throttle/Pedal Position Sensor/Switch "E" Circuit |
| P2127-107 | Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input |
| P2128-108 | Throttle/Pedal Position Sensor/Switch "E" Circuit High Input |

HINT:

P06A4-209 or P06A5-210 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

B GO TO DTC CHART

A **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P082B-575 | Gear Lever X Position Circuit Low |
| DTC | P082C-576 | Gear Lever X Position Circuit High |
| DTC | P082E-571 | Gear Lever Y Position Circuit Low |
| DTC | P082F-572 | Gear Lever Y Position Circuit High |
| DTC | P181A-596 | Gear Lever X Position Circuit "A" / "B" Correlation |
| DTC | P181B-595 | Gear Lever Y Position Circuit "A" / "B" Correlation |
| DTC | P182B-577 | Gear Lever X Position "B" Circuit Low |
| DTC | P182C-578 | Gear Lever X Position "B" Circuit High |
| DTC | P182E-573 | Gear Lever Y Position "B" Circuit Low |
| DTC | P182F-574 | Gear Lever Y Position "B" Circuit High |

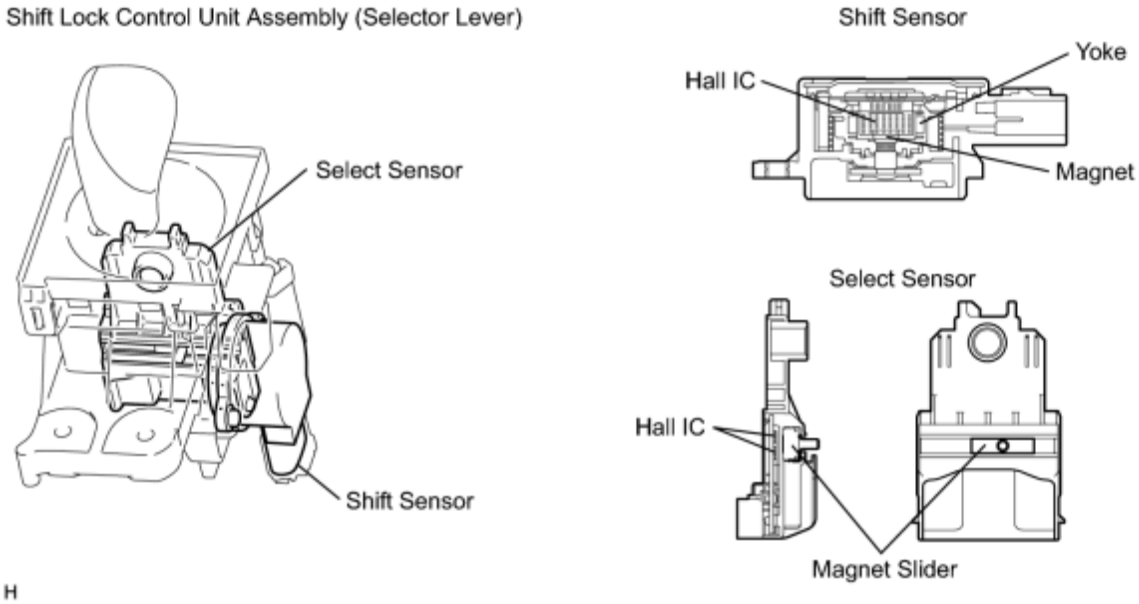
# DESCRIPTION

HINT:

- The electronic shift lever system is a linkless type that does not use a shift cable.
- The shift and select sensors are non-contact type sensors.

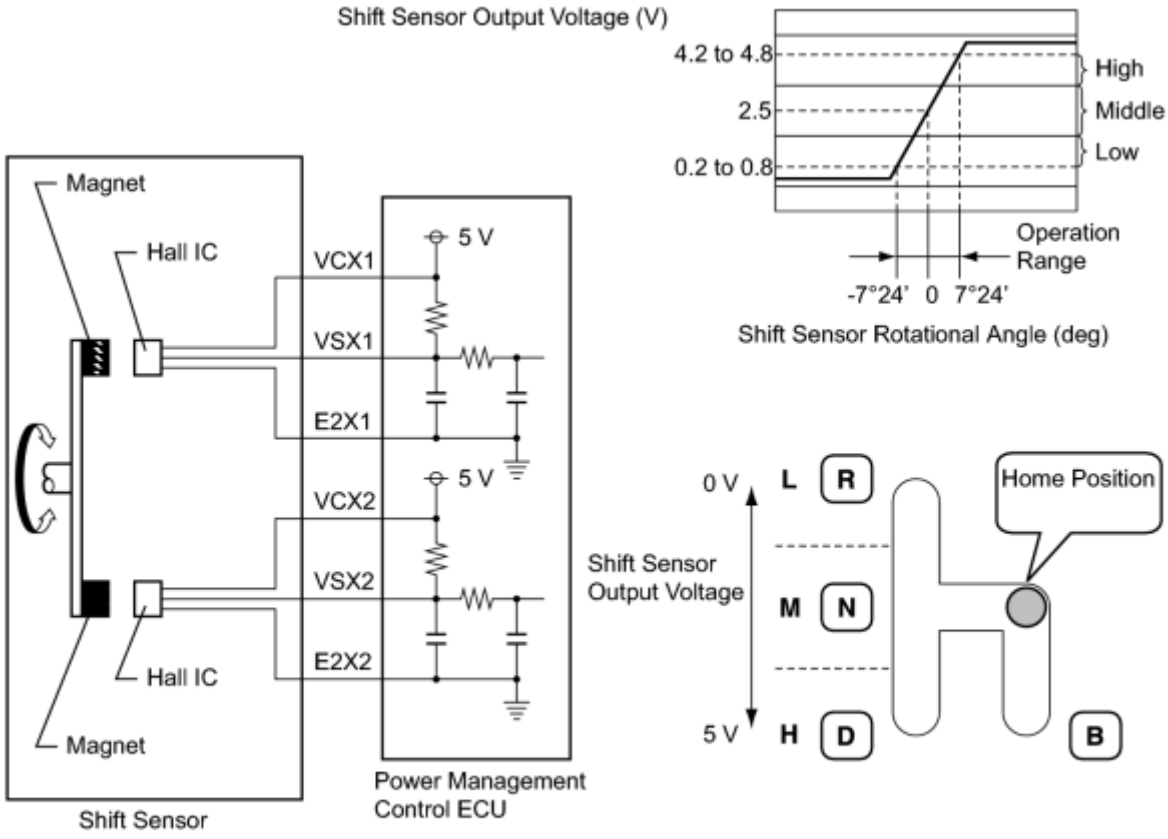
- The shift lock control unit assembly (selector lever) is a momentary type, which returns to its home position by spring reaction as the driver's hand is released from the selector lever after shifting.

The shift lock control unit assembly (selector lever) contains a shift sensor and a select sensor to detect the selector lever position (R, N, D or B). Because both sensors operate using Hall elements, they can accurately detect shift positions in a reliable manner. Both sensors contain two detection circuits, a main and a sub circuit.




H

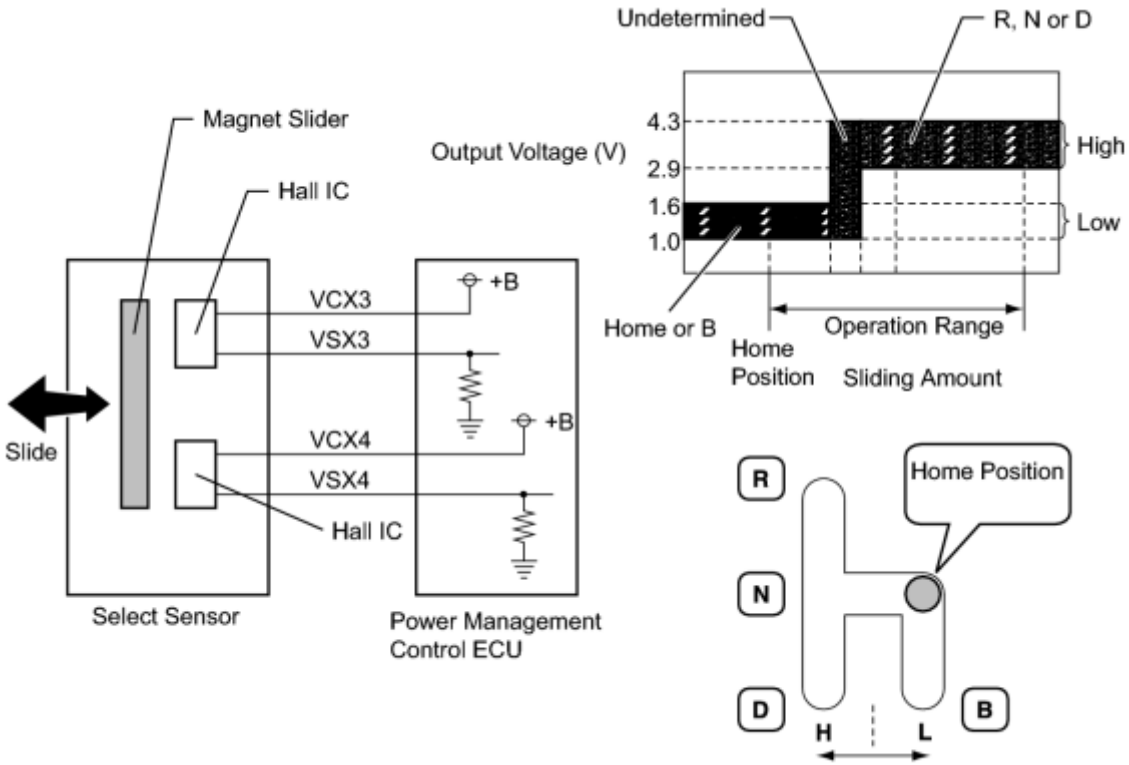
- The shift sensor outputs voltage, which varies between 0 and 5 V in accordance with the vertical movement of the selector lever, to the power management control ECU (HV CPU). The power management control ECU (HV CPU) interprets low level voltage input from the shift sensor as the D or B position, middle level voltage as the home or N position, and high level voltage as the R position.




H

- The select sensor outputs voltage, which varies between 0 and 5 V in accordance with the horizontal movement of the selector lever, to the power management control ECU (HV CPU). The power management control ECU (HV CPU) interprets low level voltage input from the select sensor as the home or B position, and high level voltage as the R, N, or D position.

The power management control ECU (HV CPU) determines the position of the selector lever in accordance with the combination of the signals from the shift sensor and select sensor.




H

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P082B | 575 | Open or GND short in select main sensor circuit | • Wire harness or connector<br>• Shift lock control unit assembly<br>• Power management control ECU |
| P082C | 576 | +B short in select main sensor circuit | |
| P082E | 571 | Open or GND short in shift main sensor circuit | |
| P082F | 572 | +B short in shift main sensor circuit | |
| P181A | 596 | Difference between select main sensor value and select sub sensor value is large | |
| P181B | 595 | Difference between shift main sensor value and shift sub sensor value is large | |
| P182B | 577 | Open or GND short in select sub sensor circuit | |
| P182C | 578 | +B short in select sub sensor circuit | |
| P182E | 573 | Open or GND short in shift sub sensor circuit | |
| P182F | 574 | +B short in shift sub sensor circuit | |

HINT:

When any of DTCs P082E-571, P082F-572, P182E-573 or P182F-574 are output, check shift sensor main and shift sensor sub voltages using the Techstream.

**Shift Sensor Main, Shift Sensor Sub**

| R position (Main) | Home or N position (Main) | D or B position (Main) | R position (Sub) | Home or N position (Sub) | D or B position (Sub) | Trouble Area |
|---|---|---|---|---|---|---|
| 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | Correct shift sensor voltage |
| 0 to 0.2 V | 0 to 0.2 V | 0 to 0.2 V | 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | Open in VCX1 circuit<br>GND short in VSX1 circuit |
| 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | 0 to 0.2 V | 0 to 0.2 V | 0 to 0.2 V | Open in VCX2 circuit<br>GND short in VSX2 circuit |
| 4.8 to 5.0 V | 4.8 to 5.0 V | 4.8 to 5.0 V | 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | Open in VSX1 circuit<br>Open in E2X1 circuit |
| 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | 4.8 to 5.0 V | 4.8 to 5.0 V | 4.8 to 5.0 V | Open in VSX2 circuit<br>Open in E2X2 circuit |

HINT:

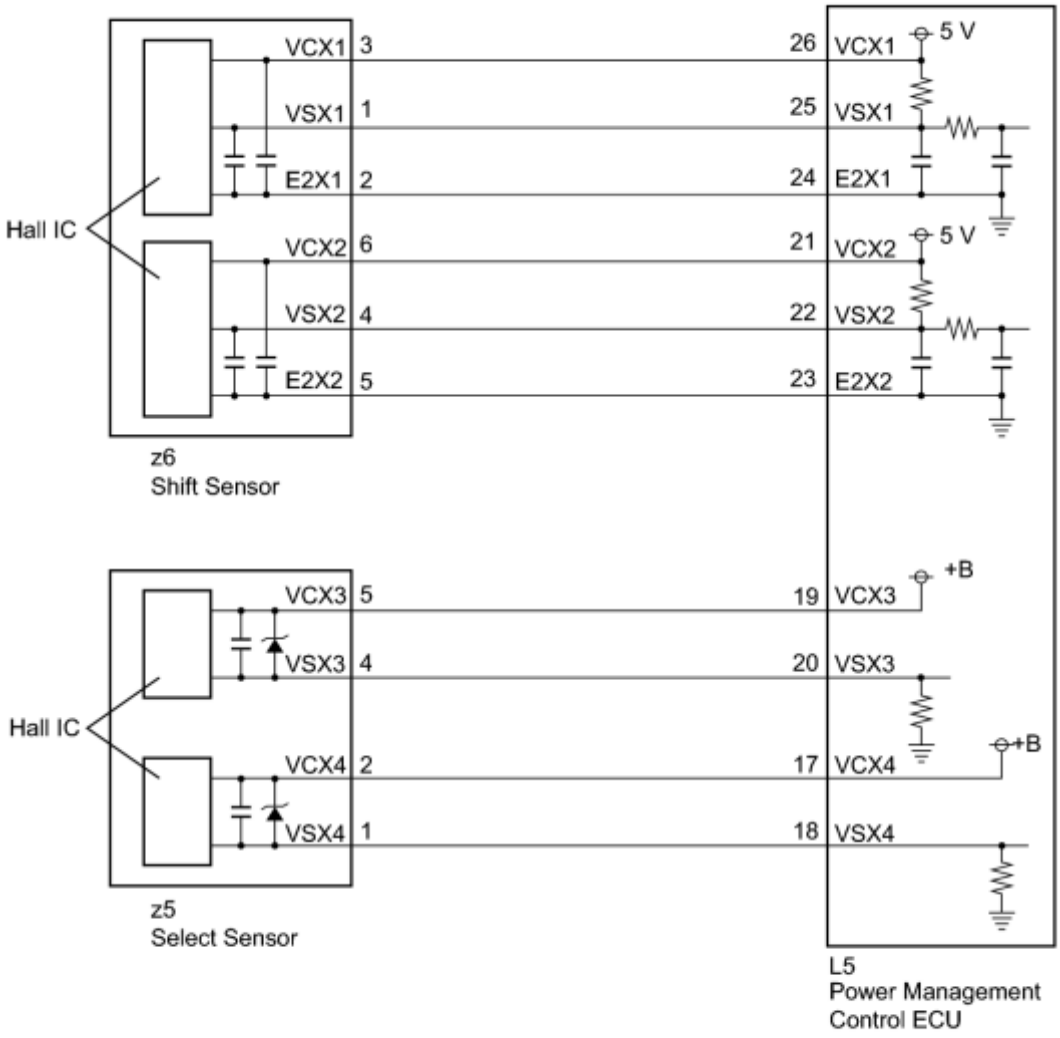
When any of DTCs P082B-575, P082C-576, P182B-577 or P182C-578 are output, check shift sensor select main and shift sensor select sub voltages using the Techstream.

**Shift Sensor Select Main, Shift Sensor Select Sub**

| R, N or D Position Select Main) | Home or B Position Select Main) | R, N or D Position Select Sub) | Home or B Position Select Sub) | Trouble Area |
|---|---|---|---|---|
| 2.9 to 4.3 V | 1.0 to 1.6 V | 2.9 to 4.3 V | 1.0 to 1.6 V | Correct select sensor voltage |
| 0 to 0.5 V | 0 to 0.5 V | 2.9 to 4.3 V | 1.0 to 1.6 V | Open in VCX3 circuit<br>Open or GND short in VSX3 circuit |
| 2.9 to 4.3 V | 1.0 to 1.6 V | 0 to 0.5 V | 0 to 0.5 V | Open in VCX4 circuit<br>Open or GND short in VSX4 |

| R, N or D Position<br><br>Select Main) | Home or B Position<br><br>Select Main) | R, N or D Position<br><br>Select Sub) | Home or B Position<br><br>Select Sub) | Trouble Area |
|---|---|---|---|---|
| | | | | circuit |
| 4.9 to 5 V | 4.9 to 5 V | 2.9 to 4.3 V | 1.0 to 1.6 V | +B short in VSX3 circuit |
| 2.9 to 4.3 V | 1.0 to 1.6 V | 4.9 to 5 V | 4.9 to 5 V | +B short in VSX4 circuit |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (SHIFT SENSOR MAIN, SHIFT SENSOR SUB) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Shift Sensor Main, Shift Sensor Sub.

(d) Read the Data List.

Result:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Shift Sensor Main | R position | 0.2 to 1.0 V |
| | Home or N position | 2.0 to 3.0 V |
| | D or B position | 4.0 to 4.8 V |
| Shift Sensor Sub | R position | 0.2 to 1.0 V |
| | Home or N position | 2.0 to 3.0 V |
| | D or B position | 4.0 to 4.8 V |

(e) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SHIFT SENSOR)

OK ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (SHIFT SENSOR SELECT MAIN, SHIFT SENSOR SELECT SUB) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Shift Sensor Select Main, Shift Sensor Select Sub.

(d) Read the Data List.

Result:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Shift Sensor Select Main | R, N or D Position | 2.9 to 4.3 V |
| | Home or B Position | 1.0 to 1.6 V |
| Shift Sensor Select Sub | R, N or D Position | 2.9 to 4.3 V |
| | Home or B Position | 1.0 to 1.6 V |

(e) Turn the power switch off.

NG → CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SELECT SENSOR)

OK ↓

| | |
|---|---|
| 3. | REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY |

(a) Replace the shift lock control unit assembly INFO.

NEXT ↓

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ↓

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output. | A |
| P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again. | B |

(f) Turn the power switch off.

B ▶REPLACE POWER MANAGEMENT CONTROL ECU
A ▶**COMPLETED**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SHIFT SENSOR) |

(a) Disconnect connector L5 from the power management control ECU.

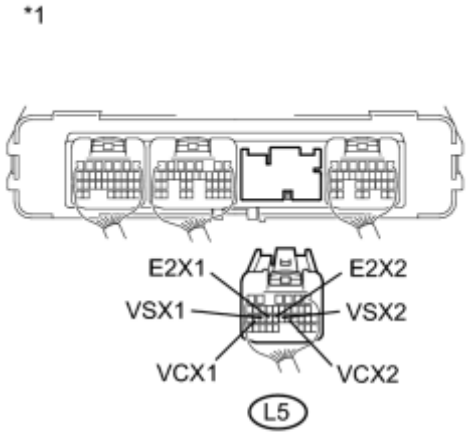
(b) Disconnect connector z6 from the shift sensor.

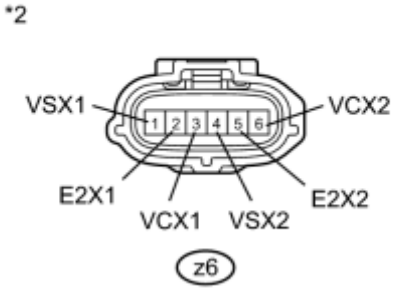
(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-26 (VCX1) - Body ground | Power switch on (IG) | Below 1 V |
| L5-25 (VSX1) - Body ground | Power switch on (IG) | Below 1 V |
| L5-24 (E2X1) - Body ground | Power switch on (IG) | Below 1 V |
| L5-21 (VCX2) - Body ground | Power switch on (IG) | Below 1 V |
| L5-22 (VSX2) - Body ground | Power switch on (IG) | Below 1 V |
| L5-23 (E2X2) - Body ground | Power switch on (IG) | Below 1 V |




# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector:<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector:<br><br>(to Shift Sensor) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-26 (VCX1) - z6-3 (VCX1) | Power switch off | Below 1 Ω |
| L5-25 (VSX1) - z6-1 (VSX1) | Power switch off | Below 1 Ω |
| L5-24 (E2X1) - z6-2 (E2X1) | Power switch off | Below 1 Ω |
| L5-21 (VCX2) - z6-6 (VCX2) | Power switch off | Below 1 Ω |
| L5-22 (VSX2) - z6-4 (VSX2) | Power switch off | Below 1 Ω |
| L5-23 (E2X2) - z6-5 (E2X2) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-26 (VCX1) or z6-3 (VCX1) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-25 (VSX1) or z6-1 (VSX1) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-24 (E2X1) or z6-2 (E2X1) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-21 (VCX2) or z6-6 (VCX2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-22 (VSX2) or z6-4 (VSX2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-23 (E2X2) or z6-5 (E2X2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the shift sensor connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU (VCX1, VCX2 VOLTAGE) |

(a) Disconnect connector z6 from the shift sensor.

(b) Turn the power switch on (IG).

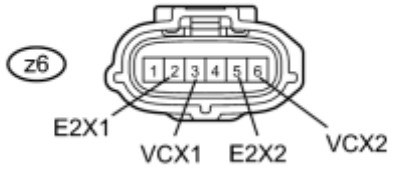
(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z6-3 (VCX1) - z6-2 (E2X1) | Power switch on (IG) | 4.5 to 5.5 V |

| | | |
|---|---|---|
| z6-6 (VCX2) - z6-5 (E2X2) | Power switch on (IG) | 4.5 to 5.5 V |

*1




H

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Shift Sensor) |

(d) Connect the shift sensor connector.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 8. | REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY |

(a) Replace the shift lock control unit assembly INFO.

NEXT ▼

| | |
|---|---|
| 9. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ▼

| | |
|---|---|
| 10. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output. | A |
| P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again. | B |

(f) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **COMPLETED**

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SELECT SENSOR) |

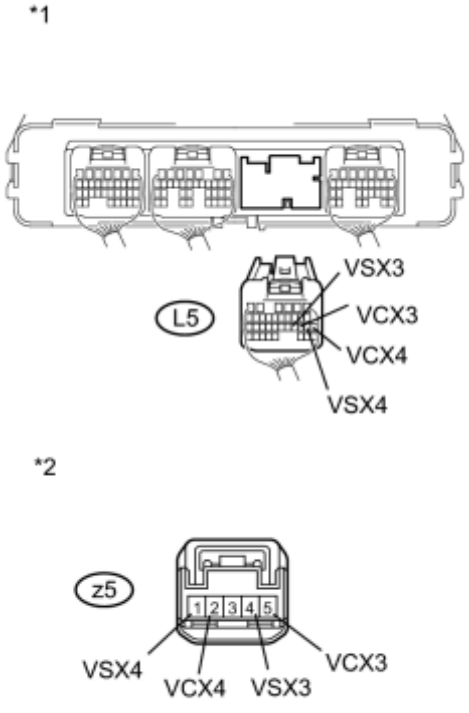
(a) Disconnect connector L5 from the power management control ECU.

(b) Disconnect connector z5 from the select sensor.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-19 (VCX3) - Body ground | Power switch on (IG) | Below 1 V |
| L5-20 (VSX3) - Body ground | Power switch on (IG) | Below 1 V |
| L5-17 (VCX4) - Body ground | Power switch on (IG) | Below 1 V |
| L5-18 (VSX4) - Body ground | Power switch on (IG) | Below 1 V |

# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector:<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector:<br><br>(to Select Sensor) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-19 (VCX3) - z5-5 (VCX3) | Power switch off | Below 1 Ω |
| L5-20 (VSX3) - z5-4 (VSX3) | Power switch off | Below 1 Ω |
| L5-17 (VCX4) - z5-2 (VCX4) | Power switch off | Below 1 Ω |
| L5-18 (VSX4) - z5-1 (VSX4) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-19 (VCX3) or z5-5 (VCX3) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-20 (VSX3) or z5-4 (VSX3) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-17 (VCX4) or z5-2 (VCX4) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-18 (VSX4) or z5-1 (VSX4) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the select sensor connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK POWER MANAGEMENT CONTROL ECU (VCX3, VCX4 VOLTAGE) |

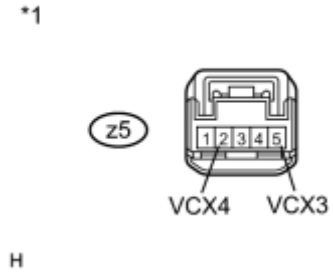
(a) Disconnect connector z5 from the select sensor.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|




| | | |
|---|---|---|
| z5-5 (VCX3) - Body ground | Power switch on (IG) | 9 to 14 V |
| z5-2 (VCX4) - Body ground | Power switch on (IG) | 9 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Select Sensor) |

(d) Connect the select sensor connector.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 13. | REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY |

(a) Replace the shift lock control unit assembly INFO.

NEXT ▼

| | |
|---|---|
| 14. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ▼

| | |
|---|---|
| 15. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output. | A |
| P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again. | B |

(f) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **COMPLETED**

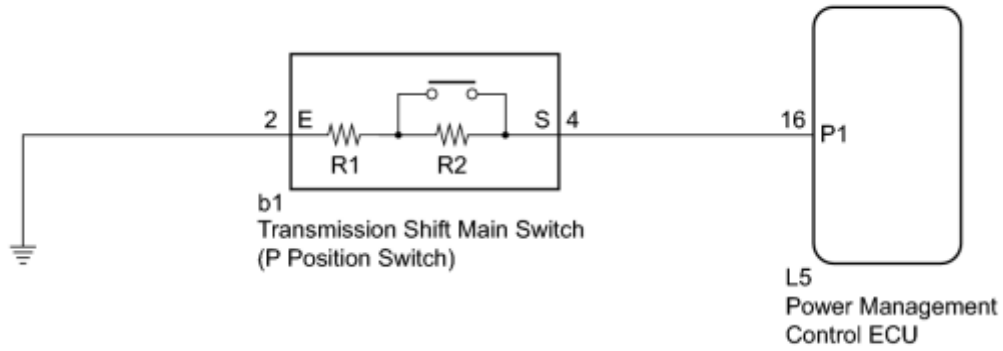
| | | |
|---|---|---|
| DTC | P0851-579 | Park / Neutral Switch Input Circuit Low |
| DTC | P0852-580 | Park / Neutral Switch Input Circuit High |

# DESCRIPTION

- Instead of having a parking position as one of the positions of the conventional selector lever, a transmission shift main switch (P position switch) is provided independently above the selector lever. The switch is a momentary type, in which the button does not lock mechanically.
- The transmission shift main switch (P position switch) contains resistors R1 and R2. When the transmission shift main switch (P position switch) is not pressed, the switch provides a combined resistance of R1 and R2; and when the transmission shift main switch (P position switch) is pressed, the switch provides only the resistance of R1. The voltage at the P1 terminal of the power management control ECU (HV CPU) varies with the changes in the resistance of the switch. The power management control ECU (HV CPU) determines the transmission shift main switch (P position switch) operation according to this resistance signal.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0851 | 579 | GND short in P position switch circuit | • Wire harness or connector<br>• Transmission shift main switch (P position switch)<br>• Power management control ECU |
| P0852 | 580 | Open or +B short in P position switch circuit | |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT TRANSMISSION SHIFT MAIN SWITCH (P POSITION SWITCH) |

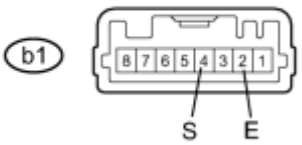
(a) Disconnect connector b1 from the transmission shift main switch (P position switch).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| b1-4 (S) - b1-2 (E) | Switch pressed | 680 Ω |
| b1-4 (S) - b1-2 (E) | Switch released | 4580 Ω |

*1




H

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Transmission Shift Main Switch (P Position Switch)) |

(c) Connect the transmission shift main switch (P position switch) connector.

NG ▶ REPLACE TRANSMISSION SHIFT MAIN SWITCH

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - P POSITION SWITCH) |

(a) Disconnect connector L5 from the power management control ECU.

(b) Disconnect connector b1 from the transmission shift main switch (P position switch).

(c) Turn the power switch on (IG).

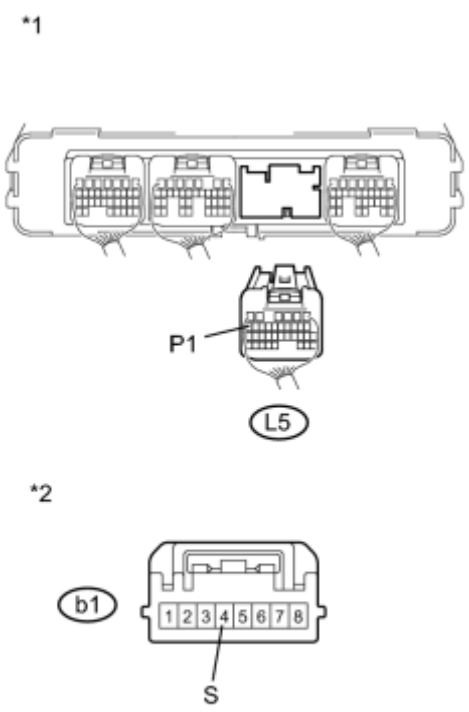
(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-16 (P1) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |




| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Transmission Shift Main Switch (P Position Switch)) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-16 (P1) - b1-4 (S) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-16 (P1) or b1-4 (S) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the transmission shift main switch (P position switch) connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

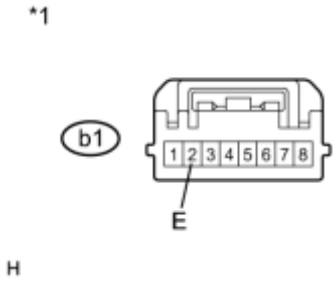
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (P POSITION SWITCH - BODY GROUND) |

(a) Disconnect connector b1 from the transmission shift main switch (P position switch).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| b1-2 (E) - Body ground | Power switch off | Below 1 Ω |




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Shift Main Switch (P Position Switch)) |

(c) Connect the transmission shift main switch (P position switch) connector.

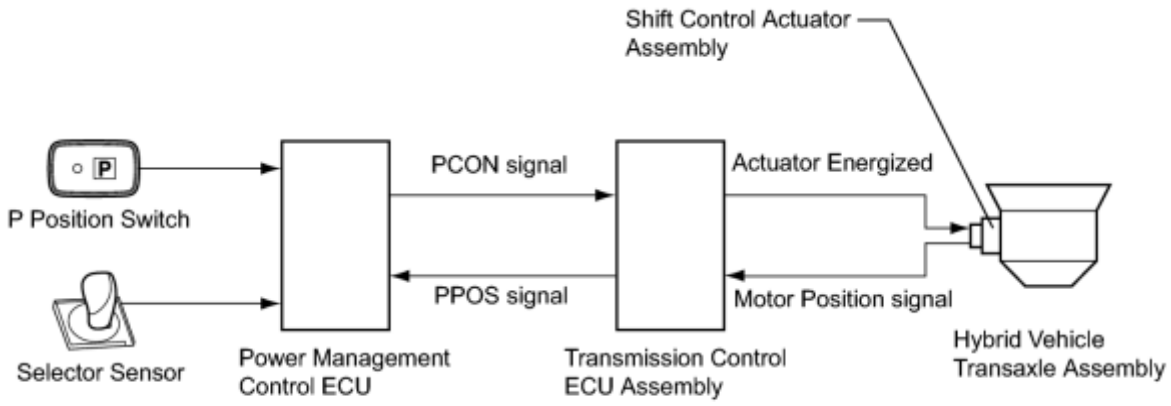
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P085D-582 | Gear Shift Control Module "A" Performance |
| DTC | P085D-599 | Gear Shift Control Module "A" Performance |
| DTC | P0861-597 | Gear Shift Control Module "A" Communication Circuit Low |
| DTC | P0862-598 | Gear Shift Control Module "A" Communication Circuit High |

# DESCRIPTION

When a signal is input from the transmission shift main switch (P position switch) or selector lever, the power management control ECU (HV CPU) transmits a P position control (PCON) signal to the transmission control ECU assembly. Based on this signal, the transmission control ECU assembly actuates the shift control actuator assembly in order to mechanically lock or unlock the counter drive gear in the hybrid vehicle transaxle assembly.

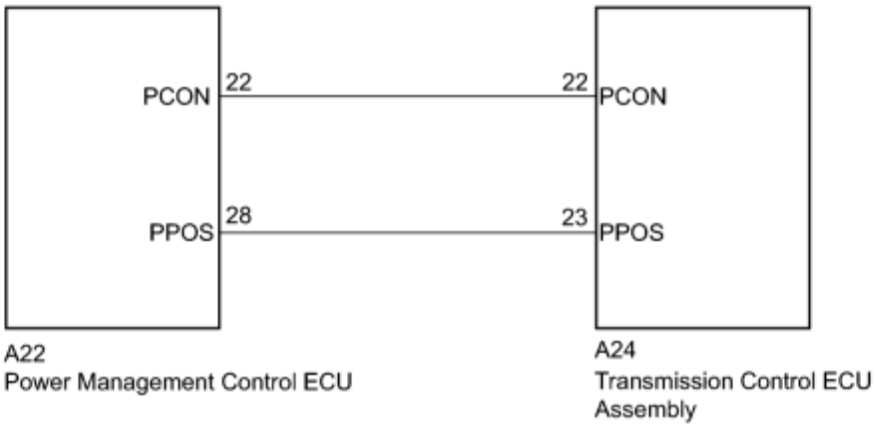
P position state (engaged or released) of the actuator assembly is sent to the power management control ECU (HV CPU) as a P position (PPOS) signal.




H

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P085D | 582 | P position (PPOS) signal is logically inconsistent | • Wire harness or connector<br>• Transmission control ECU assembly<br>• Power management control ECU |
| | 599 | P position (PPOS) signal malfunction (output pulse is abnormal) | |
| P0861 | 597 | GND short in P position (PPOS) signal circuit | |
| P0862 | 598 | +B short in P position (PPOS) signal circuit | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (TRANSMISSION CONTROL) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| Electronic shift lever system DTCs are not output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| C2309 | Open in B+ Circuit |
| C2311 | Communication Error from HV ECU |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - TRANSMISSION CONTROL ECU) |

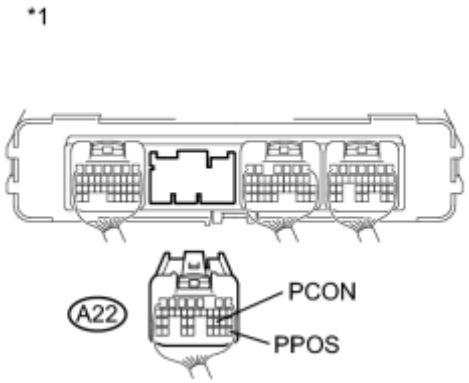
(a) Disconnect connector A22 from the power management control ECU.

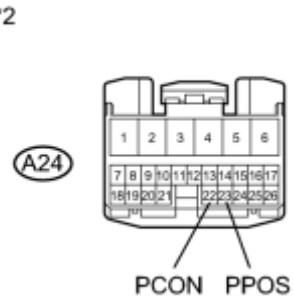
(b) Disconnect connector A24 from the transmission control ECU assembly.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A24-22 (PCON) - Body ground | Power switch on (IG) | Below 1 V |
| A24-23 (PPOS) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-22 (PCON) - A24-22 (PCON) | Power switch off | Below 1 Ω |
| A22-28 (PPOS) - A24-23 (PPOS) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-22 (PCON) or A24-22 (PCON) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-28 (PPOS) or A24-23 (PPOS) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the transmission control ECU assembly connector.

(h) Connect the power management control ECU connector.

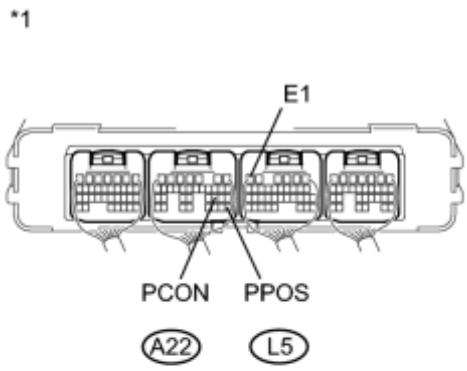
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

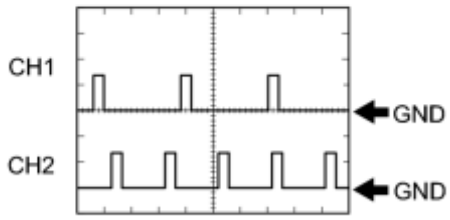
OK ▼

| | |
|---|---|
| 3. | CHECK POWER MANAGEMENT CONTROL ECU |

(a) Turn the power switch on (IG).

(b) Connect an oscilloscope between the power management control ECU terminals specified in the table below, and measure the waveform.




| Item | Content |
|---|---|
| Terminal | CH1: A22-22 (PCON) - L5-6 (E1)<br>CH2: A22-28 (PPOS) - L5-6 (E1) |
| Equipment Setting | 5V/DIV., 20ms/DIV. |
| Condition | Power switch on (IG) |

Result:

| Result | Proceed to |
|---|---|
| P position control (PCON) signal waveform appears | A |
| P position control (PCON) signal waveform does not appear | B |
| P position (PPOS) signal waveform appears | B |
| P position (PPOS) signal waveform does not appear | A |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Power Management Control ECU) |

(c) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

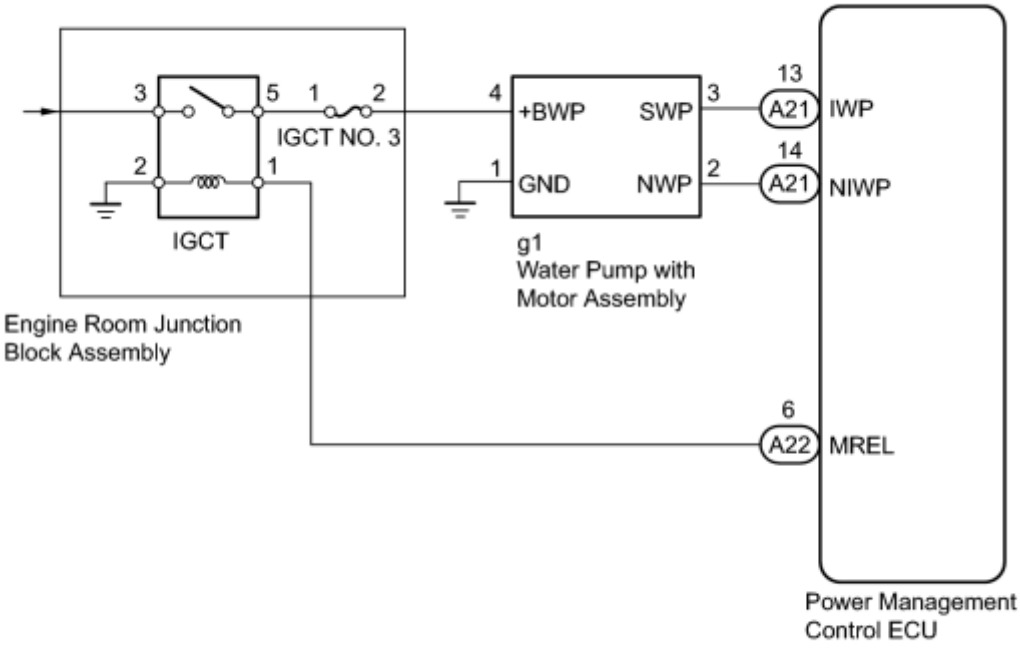
| | | |
|---|---|---|
| DTC | P0A01-726 | Motor Electronics Coolant Temperature Sensor Circuit Range / Performance |
| DTC | P0A04-725 | Motor Electronics Coolant Temperature Sensor Circuit Intermittent |

# DESCRIPTION

The power management control ECU (HV CPU) detects HV coolant temperature using the coolant temperature sensor built into the inverter with converter assembly. The power management control ECU (HV CPU) uses signals from the coolant temperature sensor to check the effectiveness of the inverter cooling system. If necessary, the power management control ECU (HV CPU) will limit inverter output to help prevent inverter overheating. The power management control ECU (HV CPU) also detects malfunctions in the sensor based on the HV coolant temperature sensor values. The inverter with converter assembly detects malfunctions in the HV coolant temperature sensor and its wiring.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A01 | 726 | Temperature calculated by power management control ECU and actual temperature are different for 10 seconds or more. | • Inverter cooling system<br>• Cooling fan system<br>• Power management control ECU<br>• Inverter with converter assembly<br>• Water pump with motor assembly<br>• Wire harness or connector<br>• IGCT No. 3 fuse |
| P0A04 | 725 | Unusual sudden change in HV coolant temperature sensor output occurs and the offset continues, or unusual sudden change in HV coolant temperature sensor output occurs repeatedly. | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the following menu items: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A01-726 or P0A04-725 is output | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A93-346 | Inverter Cooling System Performance |
| P0C73-776 | Motor Electronics Coolant Pump "A" Control Performance |
| P314A-828 | Inverter Coolant Pump Speed Signal |

HINT:

P0A01-726 or P0A04-725 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK QUANTITY OF HV COOLANT |

(a) Check the coolant level in the inverter reserve tank.

(b) Check for coolant leaks.

**Result**

| Result | Proceed to |
|---|---|
| Coolant leaks are not evident. A sufficient amount of coolant remains in the inverter reserve tank. | A |
| Coolant leaks are not evident. No coolant remains in the inverter reserve tank. | B |
| Coolant leaks are evident. | C |

HINT:

After repairing the coolant leaks and adding coolant, perform the "Activate the Water Pump" Active Test (HV Active Test item) and the "Control the Electric Cooling Fan" Active Test (Engine Active Test item) and make sure that there are no malfunctions.

C ▶ INSPECT FOR COOLANT LEAK AND ADD COOLANT
B ▶ ADD HV COOLANT
A
▼

| | |
|---|---|
| 4. | CHECK COOLANT HOSE |

(a) Check if the hoses of the cooling system are kinked or clogged.

NG ▶ CORRECT THE PROBLEM
OK
▼

| | |
|---|---|
| 5. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVATE THE WATER PUMP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Active Test / Activate the Water Pump.

(d) Select Inverter W/P Revolution in the Data List.

(e) While performing the "Activate the Water Pump" Active Test, check Inverter W/P Revolution in the Data List.

Result:

| Data List Item | Specified Condition |
|---|---|
| Inverter W/P Revolution | 2250 to 5625 rpm |

HINT:

Perform the Active Test with the inverter coolant temperature between 5 to 149°F (-15 and 65°C).

(f) Turn the power switch off.

NG ▶ CHECK FUSE (IGCT NO. 3)
OK
▼

| | |
|---|---|
| 6. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Electric Cooling Fan.

(d) Perform the "Control the Electric Cooling Fan" Active Test.

OK:

The cooling fan rotates.

(e) Turn the power switch off.

NG ▶ CHECK COOLING FAN SYSTEM
OK
▼

| | |
|---|---|
| 7. | CHECK HV COOLANT (CHECK FOR CONDITIONS THAT MAY HAVE CAUSED FREEZING) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Read the freeze frame data Ambient Temperature using the Techstream.

(d) Check if the freeze frame data Ambient Temperature is below freezing.

Result:

| Result | Proceed to |
|---|---|
| Ambient Temperature value is above freezing temperature of the HV coolant | A |
| Ambient Temperature value is below freezing temperature of the HV coolant | B |

HINT:

- HV coolant (SLLC) with a 30% concentration freezes at 5°F (-15 °C) and HV coolant (SLLC) with a 50% concentration freezes at -31°F (-35°C).
- If the HV coolant freezes in the HV radiator or HV water pump, the coolant temperature in the inverter with converter assembly rises because the HV coolant cannot circulate. As a result, a DTC may be set.
- A DTC is set when the water pump impeller cannot rotate due to freezing of the HV coolant.
- If a DTC is set due to freezing of HV coolant, the problem cannot be reproduced. Judge whether freezing of HV coolant occurred according to the freeze point of the HV coolant, HV coolant change history and ambient temperature when the DTC was set.

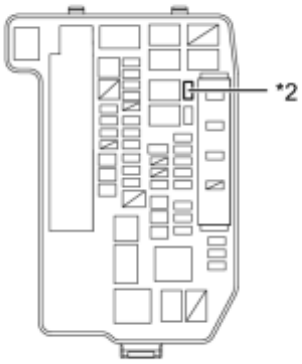
(e) Turn the power switch off.

B ▶ REPLACE HV COOLANT
A ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK FUSE (IGCT NO. 3) |

(a) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| IGCT No. 3 fuse | Always | Below 1Ω |

**Text in Illustration**

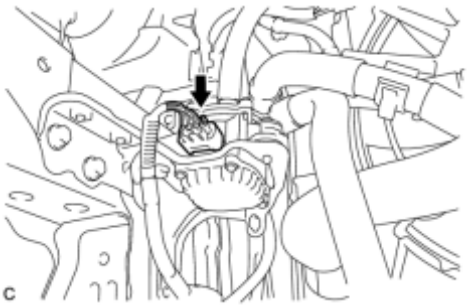
| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |

(c) Install the IGCT No. 3 fuse.

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY)

OK ▼

| | |
|---|---|
| 9. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY) |



(a) Check the connection of the water pump with motor assembly connector.

OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) |

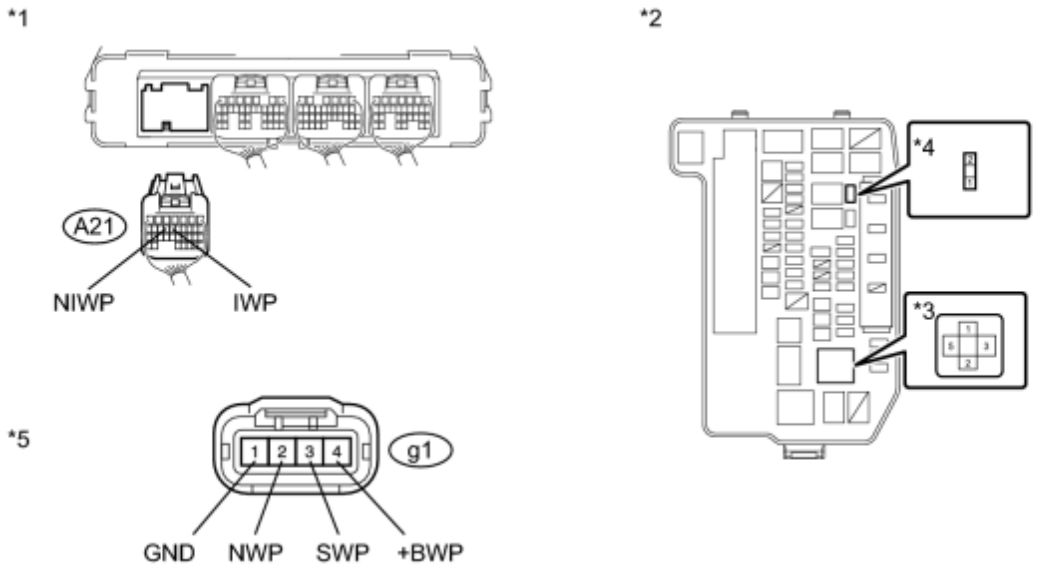
(a) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

(b) Remove the IGCT relay from the engine room junction block assembly.

(c) Disconnect connector A21 from the power management control ECU.

(d) Disconnect connector g1 from the water pump with motor assembly.

(e) Measure the resistance according to the value(s) in the table below.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) | *2 | Engine Room Junction Block Assembly |
| *3 | IGCT Relay | *4 | IGCT No. 3 Fuse |
| *5 | Front view of wire harness connector<br><br>(to Water Pump with Motor Assembly) | - | - |

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 2 (IGCT No. 3 fuse) - g1-4 (+BWP) | Power switch off | Below 1 Ω |
| 1 (IGCT No. 3 fuse) - 3 (IGCT relay) | Power switch off | Below 1 Ω |
| g1-1 (GND) - Body ground | Power switch off | Below 1 Ω |
| g1-2 (NWP) - A21-14 (NIWP) | Power switch off | Below 1 Ω |
| g1-3 (SWP) - A21-13 (IWP) | Power switch off | Below 1 Ω |
| 2 (IGCT No. 3 fuse) or g1-4 (+BWP) - Body ground and other terminals | Power switch off | 10kΩ or higher |
| 1 (IGCT No. 3 fuse) or 3 (IGCT relay) - Body ground and other terminals | Power switch off | 10kΩ or higher |
| g1-2 (NWP) or A21-14 (NIWP) - Body ground and other terminals | Power switch off | 10kΩ or higher |
| g1-3 (SWP) or A21-13 (IWP) - Body ground and other terminals | Power switch off | 10kΩ or higher |

NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(f) Install the IGCT No. 3 fuse.

(g) Install the IGCT relay.

(h) Connect the power management control ECU connector.

(i) Connect the water pump with motor assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

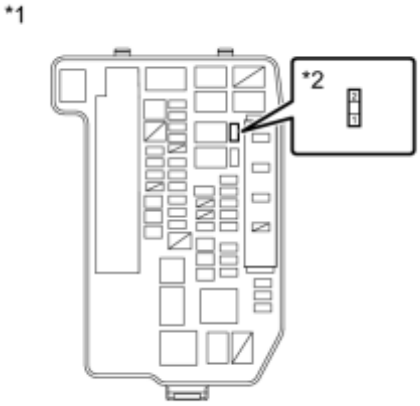
| | |
|---|---|
| 12. | CHECK WATER PUMP WITH MOTOR ASSEMBLY |

(a) Connect the Techstream to the DLC3.

(b) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

# Text in Illustration

| | |
|---|---|
| *1 | Engine Room junction Block Assembly |
| *2 | IGCT No. 3 Fuse |




(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Inverter W/P Revolution

(e) Apply 12 V to terminal 2 of the IGCT No. 3 fuse holder of the engine room junction block assembly.

(f) Read the Data List.

OK:

Inverter W/P Revolution is between 2250 and 5625 rpm.

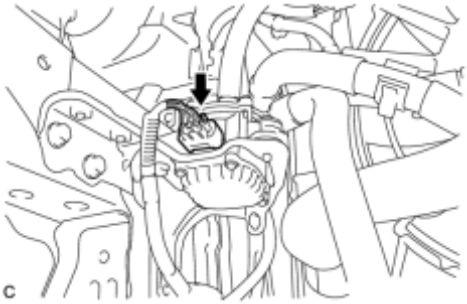
NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(g) Install the IGCT No. 3 fuse.

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 13. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY) |



(a) Check the connection of the water pump with motor assembly connector.

OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY
OK
▼

| | |
|---|---|
| 14. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) |

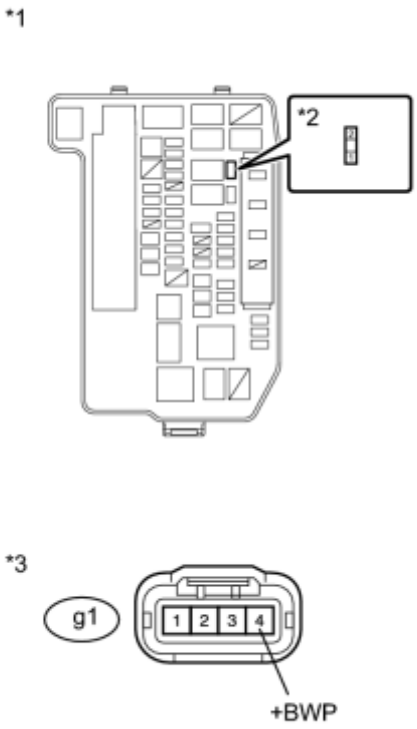
(a) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

(b) Disconnect connector g1 from the water pump with motor assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 2 (IGCT No. 3 fuse) or g1-4 (+BWP) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |
| *3 | Front view of wire harness connector<br><br>(to Water Pump with Motor Assembly) |

NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(d) Install the IGCT No. 3 fuse.

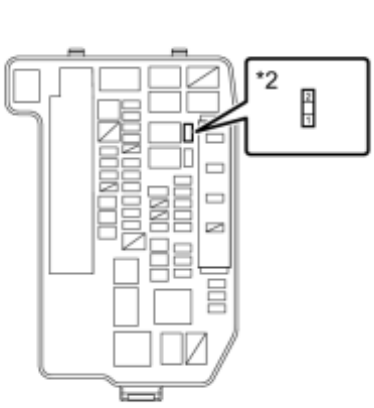
(e) Connect the water pump with motor assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 16. | CHECK WATER PUMP WITH MOTOR ASSEMBLY |

(a) Connect the Techstream to the DLC3.




(b) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Inverter W/P Revolution

(e) Apply 12 V to terminal 2 of the IGCT No. 3 fuse holder of the engine room junction block assembly.

(f) Read the Data List.

OK:

Inverter W/P Revolution is between 2250 and 5625 rpm.

NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(g) Install the IGCT No. 3 fuse.

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK ▼

| | |
|---|---|
| 17. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 18. | REPLACE HV COOLANT |

(a) Replace the HV coolant with coolant having an appropriate concentration (appropriate freeze point) for the vehicle usage conditions INFO.

NEXT ▼

| | |
|---|---|
| 19. | CHECK WATER PUMP WITH MOTOR ASSEMBLY |

(a) Perform a road test and check that DTCs are not stored.

OK:

DTCs are not stored.

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **COMPLETED**

| | |
|---|---|
| 20. | CONNECT SECURELY |

(a) Connect the power management control ECU connectors securely.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 21. | CONNECT SECURELY |

(a) Connect the inverter with converter assembly connector securely.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 22. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 23. | REPLACE WATER PUMP WITH MOTOR ASSEMBLY |

(a) Replace the water pump with motor assembly INFO

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | | |
|---|---|---|
| DTC | P0A02-719 | Motor Electronics Coolant Temperature Sensor Circuit Low |
| DTC | P0A03-720 | Motor Electronics Coolant Temperature Sensor Circuit High |

# DESCRIPTION

Refer to the description for DTC P0A01-726 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A02 | 719 | Short to GND in the HV coolant temperature sensor circuit | Inverter with converter assembly |
| P0A03 | 720 | Open or short to +B in the HV coolant temperature sensor circuit | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

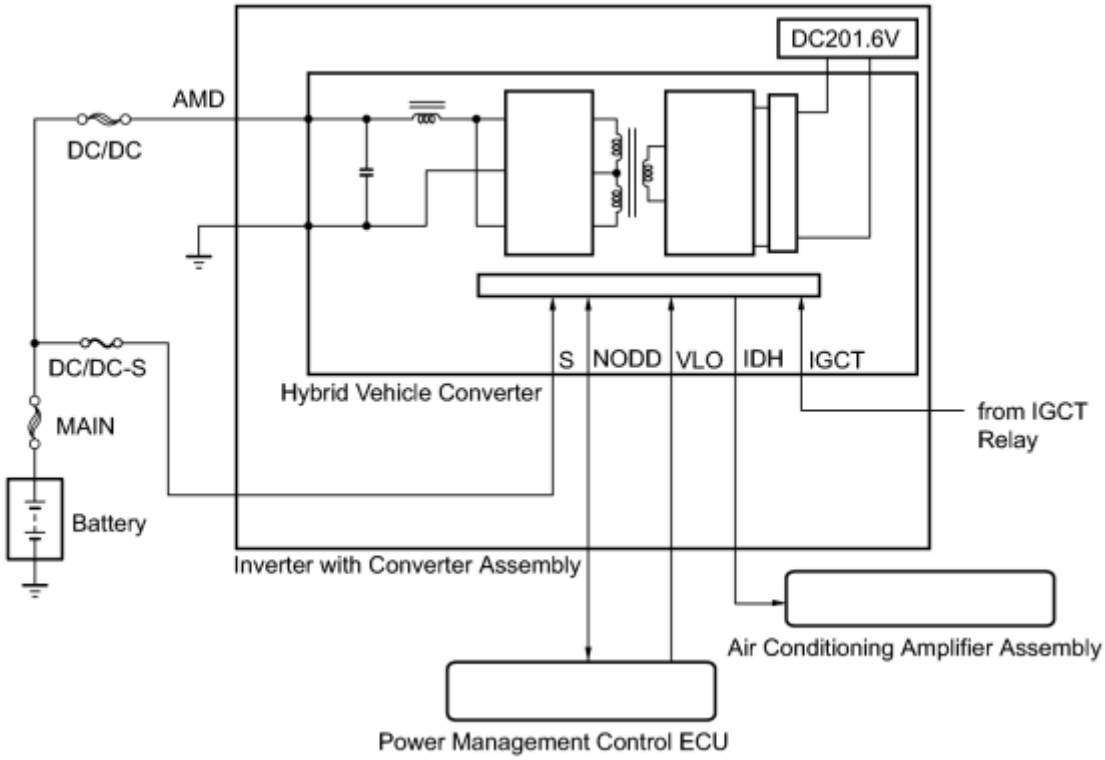
NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A08-264 | DC / DC Converter Status Circuit |

# DESCRIPTION

The hybrid vehicle converter (DC/DC converter) converts the DC 201.6 V of the HV battery into DC 12 V in order to supply power to areas such as the vehicle's lighting, audio, and ECU systems. In addition, it charges the auxiliary battery. A transistor bridge circuit initially converts DC 201.6 V into alternating current, and a transformer lowers its voltage. Then, it is rectified and smoothed (into DC) and converted into DC 12 V. The hybrid vehicle converter controls the output voltage in order to keep a constant voltage at the terminals of the auxiliary battery.

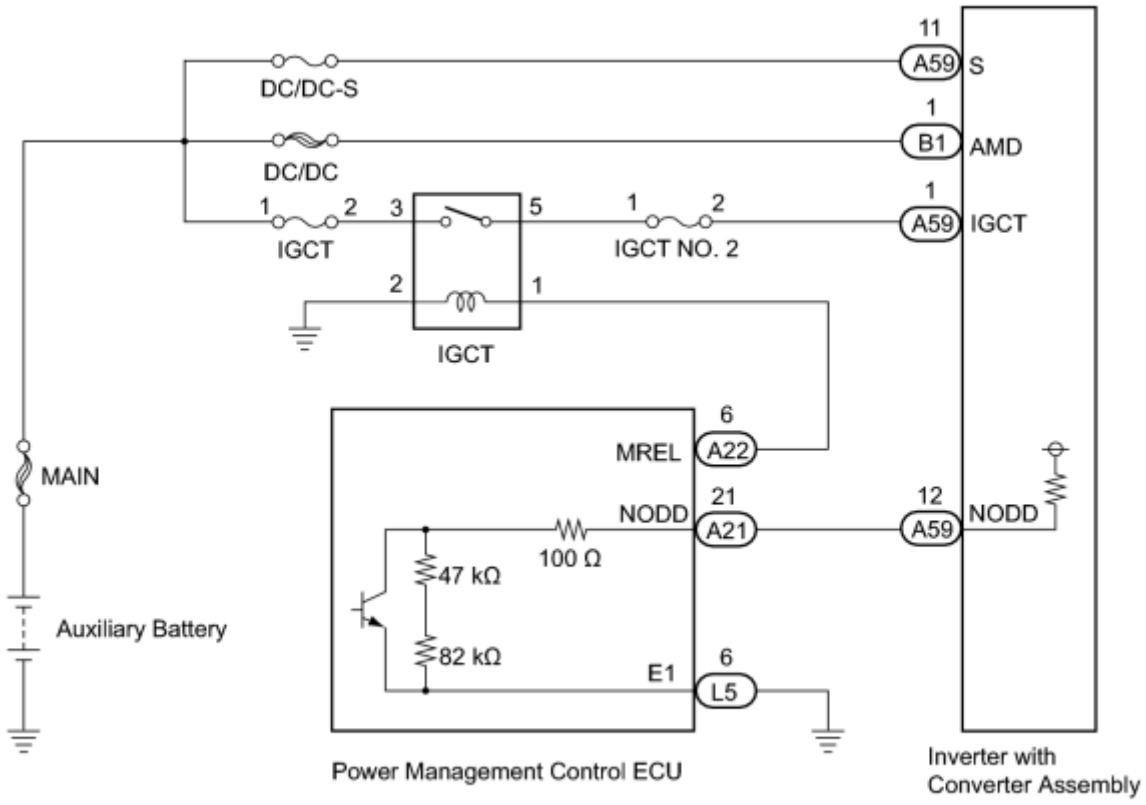
The power management control ECU (HV CPU) uses the NODD signal line to transmit a stop command to the hybrid vehicle converter and receive signals indicating the normal or abnormal condition of the 12 V charging system. If the vehicle is being driven with an inoperative hybrid vehicle converter, the voltage of the auxiliary battery will drop, which will prevent the continued operation of the vehicle. Therefore, the power management control ECU (HV CPU) monitors the operation of the hybrid vehicle converter and alerts the driver if it detects a malfunction.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A08 | 264 | DC/DC converter malfunction | • Wire harness or connector<br>• Water pump with motor assembly<br>• Inverter cooling system<br>• Hybrid vehicle transaxle assembly<br>• Generator cable |

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | • Motor cable<br>• Frame wire<br>• Inverter with converter assembly<br>• Fusible link block assembly (MAIN)<br>• Fuse (DC/DC-S, IGCT, IGCT No. 2, IGCT No. 3)<br>• Fusible link block assembly (DC/DC) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket

to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A08-264 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A93-346 | Inverter Cooling System Performance |
| P0A94-547, 548, 549 | DC / DC Converter Performance |
| P0AA6-526, 613 | Hybrid Battery Voltage System Isolation Fault |
| P0ADB-227 | Hybrid Battery Positive Contactor Control Circuit Low |
| P0ADF-229 | Hybrid Battery Negative Contactor Control Circuit Low |
| P0AE6-225 | Hybrid Battery Precharge Contactor Control Circuit Low |
| P0C73-776 | Motor Electronics Coolant Pump "A" Control Performance |
| P3004-131, 803 | Power Cable Malfunction |

(e) Turn the power switch off.

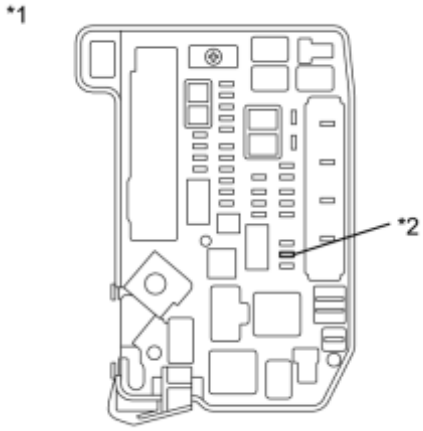
B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK FUSE (IGCT NO. 2) |

(a) Disconnect the cable from the negative auxiliary battery terminal.

(b) Remove the IGCT No. 2 fuse from the engine room junction block assembly.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| IGCT No. 2 fuse terminals | Always | Below 1 Ω |

## Text in Illustration

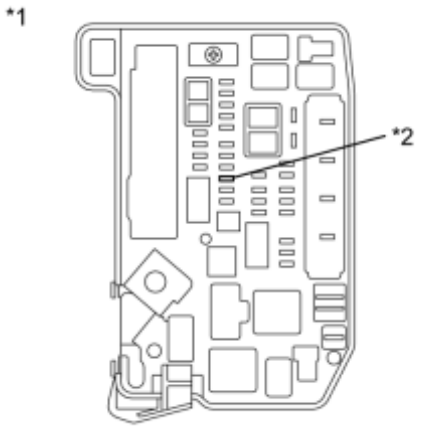
| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 2 Fuse |

(d) Install the IGCT No. 2 fuse.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - IGCT NO. 2 FUSE)

OK ▼

| | |
|---|---|
| 3. | CHECK FUSE (DC/DC-S) |




(a) Remove the DC/DC-S fuse from the engine room junction block assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| DC/DC-S fuse terminals | Always | Below 1 Ω |

**Text in Illustration**

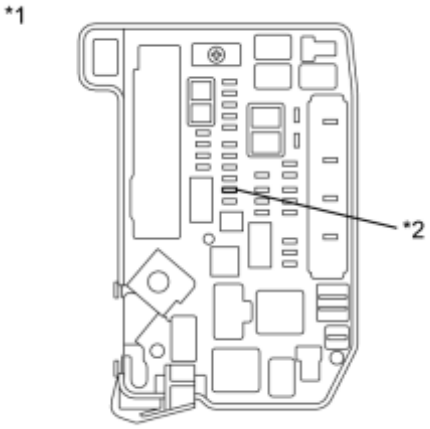
| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | DC/DC-S Fuse |

(c) Install the DC/DC-S fuse.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - DC/DC-S FUSE)

OK ▼

| | |
|---|---|
| 4. | CHECK FUSE (IGCT) |




(a) Remove the IGCT fuse from the engine room junction block assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| IGCT fuse terminals | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Fuse |

(c) Install the IGCT fuse.

NG ▶ CHECK ENGINE ROOM JUNCTION BLOCK (IGCT RELAY, IGCT FUSE, IGCT NO. 2 FUSE)

OK ▼

| | |
|---|---|
| 5. | CHECK FUSIBLE LINK (DC/DC) |

(a) Disconnect connector 1E from the engine room junction block assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1E-1 - terminal A | Always | Below 1 Ω |

(c) Check the fusible links (DC/DC) in the engine room junction block assembly for improper installation.

OK:

The fusible link is installed securely.

(d) Connect the engine room junction block assembly connector.

NG ▶ REPLACE FUSIBLE LINK (DC/DC)

OK ▼

| | |
|---|---|
| 6. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 8. | CHECK CABLE AND WIRE HARNESS |

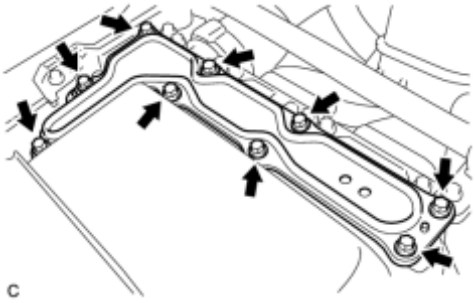
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



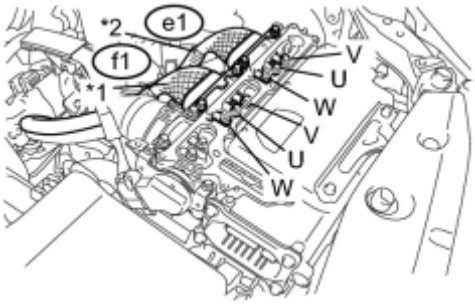

(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Using a megohmmeter set to 500 V, measure the insulation resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-3 (V) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| f1-2 (U) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| f1-1 (W) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| e1-3 (V) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| e1-2 (U) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 1 MΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cable for MG1 |
| *2 | Three-phase AC Cable for MG2 |

HINT:

Perform this inspection while the three-phase AC cable for MG1 and for

MG2 are connected.

(d) Install the inverter terminal cover to the inverter with converter assembly.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1)

OK ▼

| | |
|---|---|
| 9. | CHECK AMD TERMINAL |

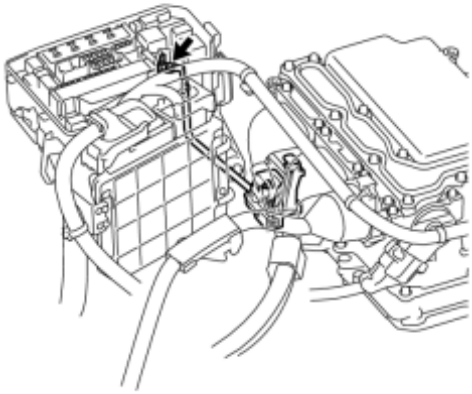
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Check that the nuts for the AMD terminal is tightened to the specified torque, the AMD terminal is connected securely, and there is no contact problem.

Torque:

T=8.3 N*m {85 kgf*cm, 73 in.*lbf }

Result:

| Result | | Proceed to |
|---|---|---|
| There are no arc marks. | The terminal is connected securely and there is no contact problem. | A |
| There are no arc marks. | The terminal is not connected securely and there is a contact problem. | B |
| There are arc marks. | - | C |

C ▶ REPLACE MALFUNCTIONING PARTS

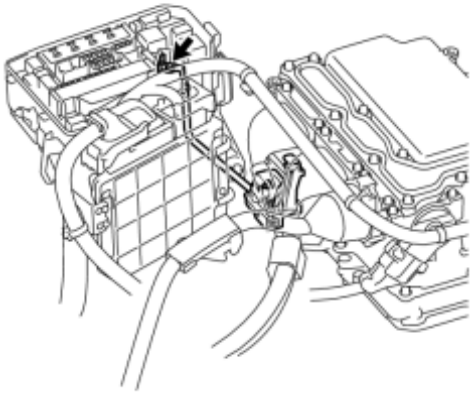
B ▶ CONNECT SECURELY

A ▼

| | |
|---|---|
| 10. | CHECK AMD TERMINAL (ENGINE ROOM JUNCTION BLOCK ASSEMBLY SIDE) |

CAUTION:

Be sure to wear insulated gloves.



(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| AMD terminal (Engine Room Junction Block Assembly side) - Body ground | Power switch off | 11 to 14 V |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

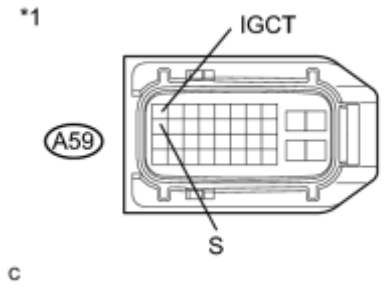
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Turn the power switch on (IG).

HINT:

Turning the power switch on (IG) with the service grip removed causes interlock switch system DTC P0A0D-350 to be output.




(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-1 (IGCT) - Body ground | Power switch on (IG) | 11 to 14 V |
| A59-11 (S) - Body ground | | |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(e) Turn the power switch off.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 12. | CHECK POWER MANAGEMENT CONTROL ECU |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

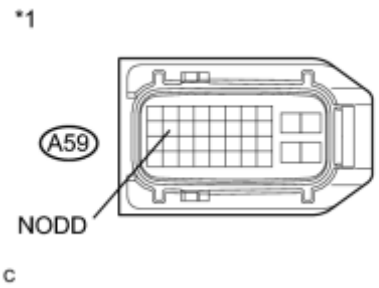
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




c

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-12 (NODD) - Body ground | Power switch off | 120 to 140 kΩ |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ INSPECT POWER MANAGEMENT CONTROL ECU

OK

▼

| | |
|---|---|
| 13. | CHECK DC/DC CONVERTER FUNCTION |

HINT:

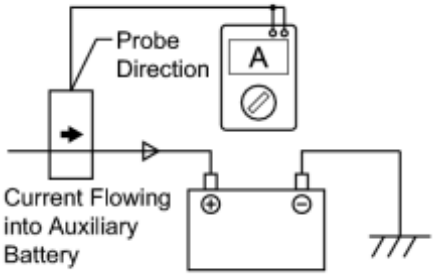
The current at the AMD terminal cannot be measured directly because of space limitations. Measure the current flowing at the auxiliary battery instead.

(a) Connect the AC/DC 400 A probe to the positive auxiliary battery line.

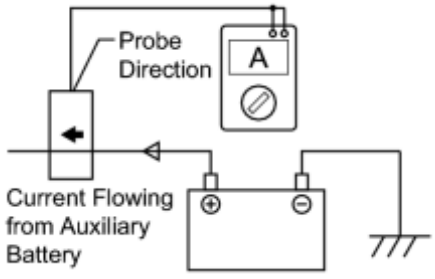
(b) Install the service plug grip.

(c) Turn the power switch on (READY) and leave the vehicle as it is until the electric current flowing into the auxiliary battery becomes 10 A or less.

(d) Measure the current flowing from the auxiliary battery with the power switch on (READY), the headlight position switch and blower motor switch in the HI position, and the rear window defogger turned on.




c




c

Standard Current:

| Item | Switch Condition | Specified Condition |
|---|---|---|
| Current flowing from auxiliary battery | Power switch on (READY)<br><br>(The headlight position switch and blower motor switch are in the HI position, and the rear window defogger is turned on.) | 0 A or less<br><br>(no current from auxiliary battery) |

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| Auxiliary battery voltage | Power switch on (READY)<br><br>(The headlight position switch and blower motor switch are in the HI position, and the rear window defogger is turned on.) | 13 to 15 V |

(f) Turn the power switch off.

NG ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY

OK ▼

| | |
|---|---|
| 14. | CHECK QUANTITY OF HV COOLANT INFO |

C ▶ INSPECT FOR COOLANT LEAK AND ADD COOLANT

B ▶ ADD HV COOLANT

A ▼

| | |
|---|---|
| 15. | CHECK COOLANT HOSE INFO |

NG ▶ CORRECT THE PROBLEM

OK ▼

| | |
|---|---|
| 16. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVE THE WATER PUMP) INFO |

NG ▶ CHECK FUSE (IGCT NO. 3)

OK ▼

| | |
|---|---|
| 17. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN) INFO |

NG ▶ CHECK COOLING FAN SYSTEM

OK ▼

| | |
|---|---|
| 18. | CHECK HV COOLANT (CHECK FOR CONDITIONS THAT MAY HAVE CAUSED FREEZING) INFO |

B ▶ REPLACE HV COOLANT

**A REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 19. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) |

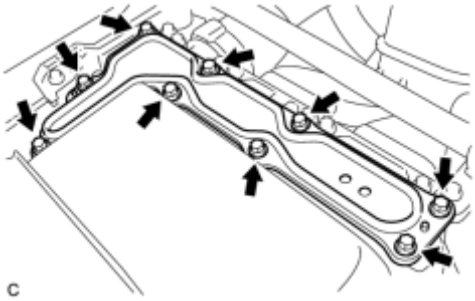
CAUTION:

Be sure to wear insulated gloves.

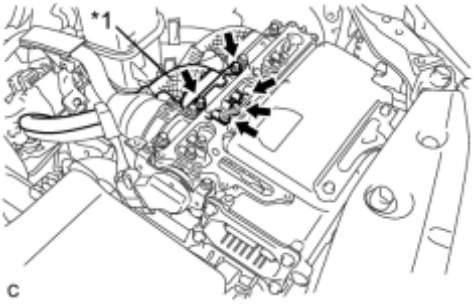
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Disconnect the three-phase AC cables for MG1 from the inverter with converter assembly.

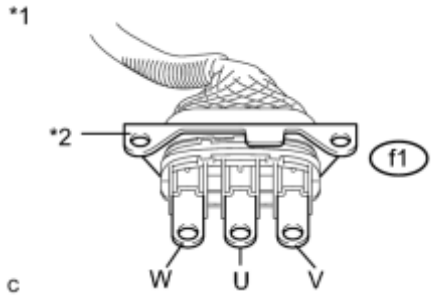
## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG1 |

(d) Using a megohmmeter set to 500 V, measure the insulation resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-2 (U) - Body ground and shield | Power switch | 100 MΩ or higher |

| | | |
|---|---|---|
| ground | off | |
| f1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG1 |
| *2 | Shield Ground |

(e) Connect the three-phase AC cables for MG1 to the inverter with converter assembly.

(f) Install the inverter terminal cover to the inverter with converter assembly.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 20. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) |

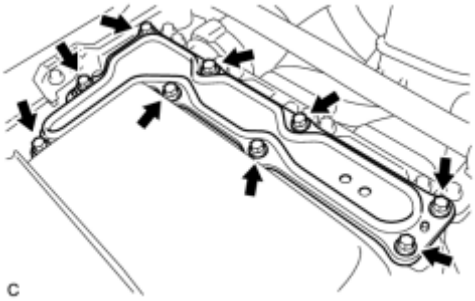
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

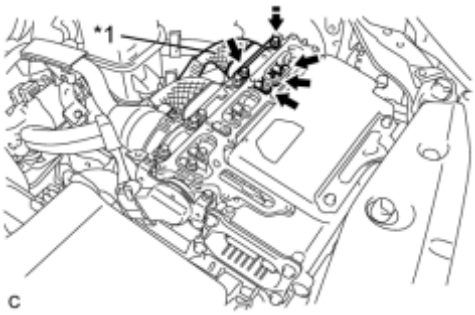



(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Disconnect the three-phase AC cables for MG2 from the inverter with converter assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG2 |

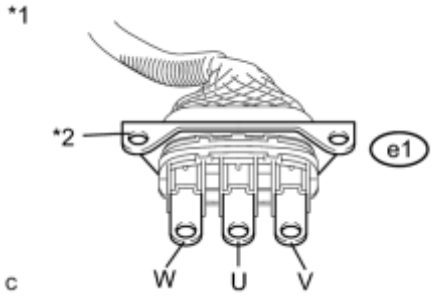



(d) Using a megohmmeter set to 500 V, measure the insulation resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG2 |
| *2 | Shield Ground |

(e) Connect the three-phase AC cables for MG2 to the inverter with converter assembly.

(f) Install the inverter terminal cover to the inverter with converter assembly.

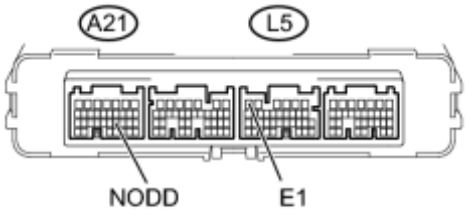
NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 21. | INSPECT POWER MANAGEMENT CONTROL ECU |

(a) Disconnect all the connectors from the power management control ECU.

*1




P

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-21 (NODD) - L5-6 (E1) | Power switch off | 120 to 140 kΩ |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Management Control ECU) |

(c) Connect the power management control ECU connectors.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 22. | CHECK FUSE (IGCT NO. 3) INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR)

OK ▼

| | |
|---|---|
| 23. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 24. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 25. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 26. | REPLACE HV COOLANT INFO |

NEXT ▼

| | |
|---|---|
| 27. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **COMPLETED**

| | |
|---|---|
| 28. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 29. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 30. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 31. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 32. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

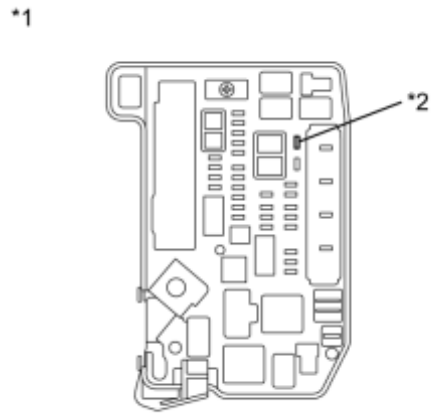
NG ▶ CONNECT SECURELY
OK ▼

| | |
|---|---|
| 33. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY POWER SOURCE CIRCUIT) |

(a) Disconnect connector A21 from the power management control ECU.

(b) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

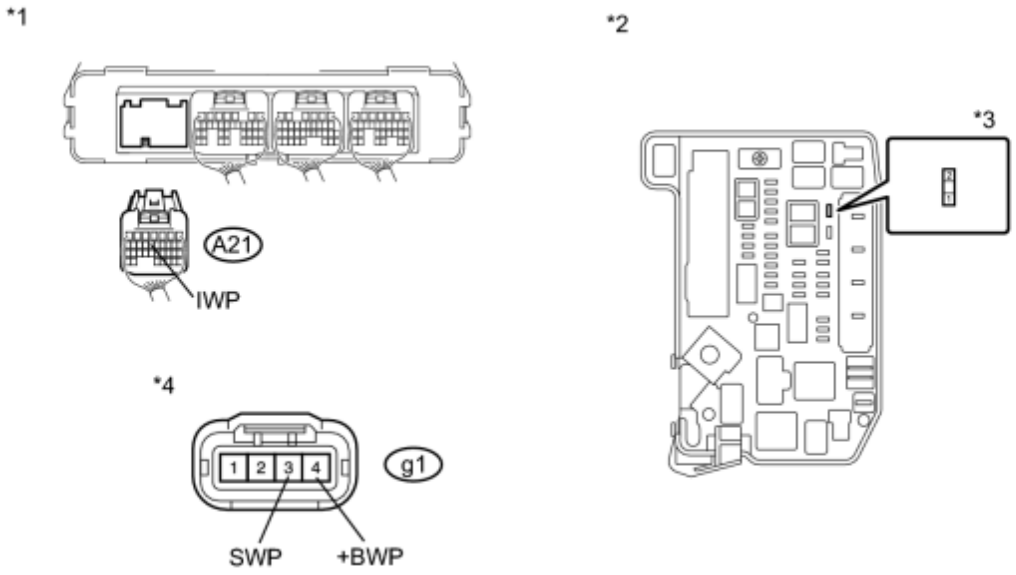
# Text in Illustration




| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |

(c) Disconnect the water pump with motor assembly connector.

(d) Measure the resistance according to the value(s) in the table below.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Rear view of wire harness connector<br>(to Power Management Control ECU) | *2 | Engine Room Junction Block Assembly |
| *3 | IGCT No. 3 Fuse | *4 | Front view of wire harness connector<br>(to Water Pump with Motor Assembly) |

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-13 (IWP) or g1-3 (SWP) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| 2 (IGCT No. 3 fuse) or g1-4 (+BWP) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(e) Connect the water pump with motor assembly connector.

(f) Connect the power management control ECU connector.

(g) Install the IGCT No. 3 fuse.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 34. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK ▼

| | |
|---|---|
| 35. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 36. | CONNECT SECURELY |

(a) Connect the water pump with motor assembly connector securely.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 37. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 38. | REPLACE WATER PUMP WITH MOTOR ASSEMBLY |

(a) Replace the water pump with motor assembly INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 39. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - IGCT NO. 2 FUSE) |

CAUTION:

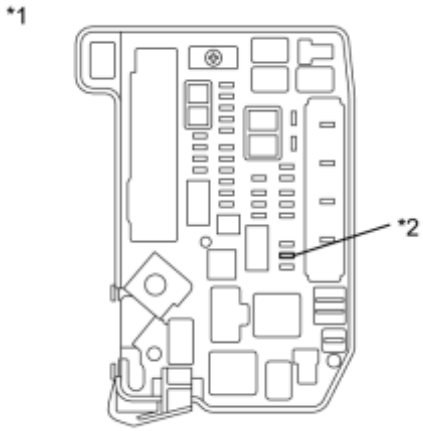
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

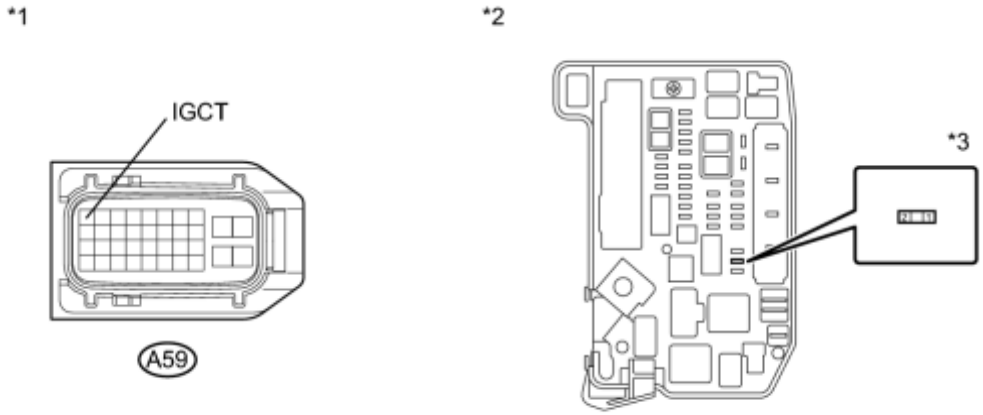



(c) Remove the IGCT No. 2 fuse from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 2 Fuse |

(d) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-1 (IGCT) or 2 (IGCT No. 2 fuse) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) | *2 | Engine Room Junction Block Assembly |
| *3 | IGCT No. 2 Fuse | - | - |

(e) Install the IGCT No. 2 fuse.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

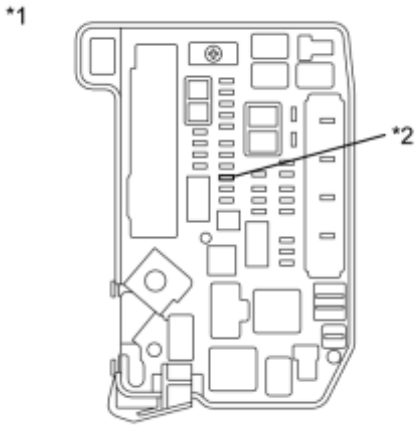
| | |
|---|---|
| 40. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 2)**

| | |
|---|---|
| 41. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - DC/DC-S FUSE) |

(a) Disconnect connector A59 from the inverter with converter assembly.

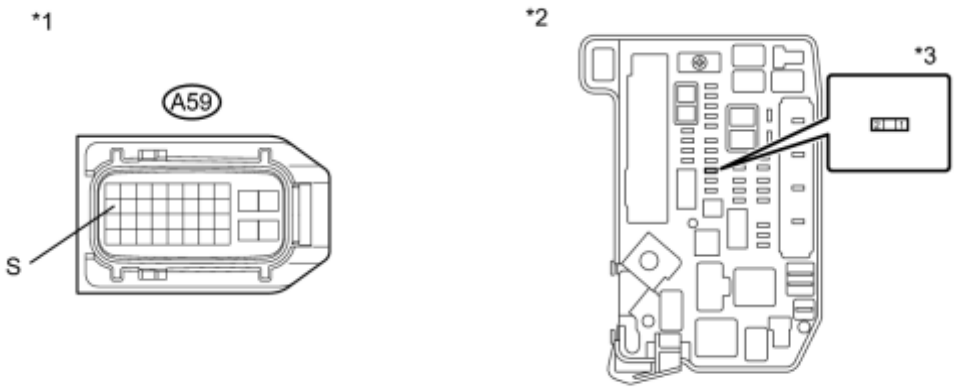



(b) Remove the DC/DC-S fuse from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | DC/DC-S Fuse |

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-11 (S) or 2 (DC/DC-S fuse) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) | *2 | Engine Room Junction Block Assembly |
| *3 | DC/DC-S Fuse | - | - |

(d) Install the DC/DC-S fuse.

(e) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 42. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

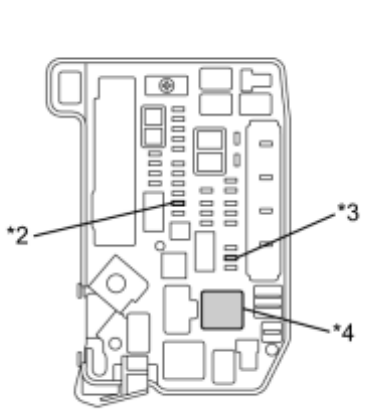
(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (DC/DC-S)**

| | |
|---|---|
| 43. | CHECK ENGINE ROOM JUNCTION BLOCK (IGCT RELAY, IGCT FUSE, IGCT NO. 2 FUSE) |

(a) Remove the IGCT relay, IGCT fuse and IGCT No. 2 fuse from the engine room junction block assembly.

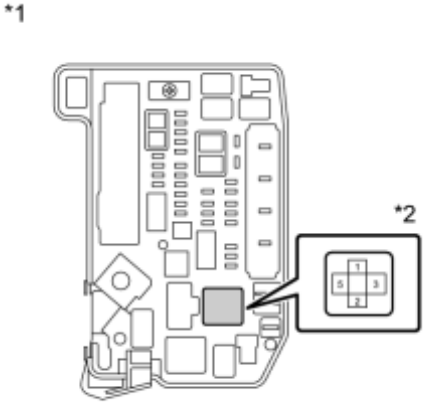
# Text in Illustration




| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Fuse |
| *3 | IGCT No. 2 Fuse |
| *4 | IGCT Relay |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 3 (IGCT relay block) - Body ground and other terminals | Always | 10 kΩ or higher |
| 5 (IGCT relay block) - Body ground and other terminals | Always | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Relay |

(c) Install the IGCT relay, IGCT fuse and IGCT No. 2 fuse.

NG ▶ REPAIR OR REPLACE ENGINE ROOM JUNCTION BLOCK
OK ▶ **REPLACE FUSE (IGCT)**

| | |
|---|---|
| 44. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

NEXT ▶ **REPLACE FUSE (IGCT NO. 2)**

| | |
|---|---|
| 45. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

NEXT ▶ **REPLACE FUSE (DC/DC-S)**

| | | |
|---|---|---|
| DTC | P0A09-265 | DC / DC Converter Status Circuit Low Input |

# DESCRIPTION

Refer to the description for DTC P0A08-264 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A09 | 265 | Open or GND short in NODD signal circuit of DC/DC converter | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A08-264 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK POWER MANAGEMENT CONTROL ECU (NODD) |

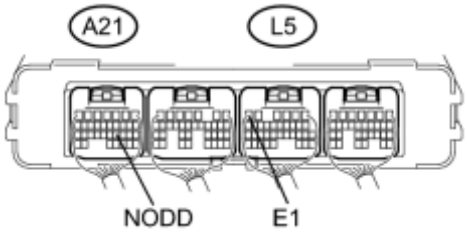
(a) Turn the power switch on (READY).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-21 (NODD) - L5-6 (E1) | Power switch on (READY) | 5 to 7 V |

*1




P

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

(c) Turn the power switch off.

NG ▶ CHECK POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Clear DTCs and freeze frame data.

NEXT ▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (HV) |

(a) Turn the power switch on (READY).

(b) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(c) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A09-265 is not output. | A |
| DTC P0A09-265 is output again. | B |

(d) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▼

| | |
|---|---|
| 6. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG ▶ REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

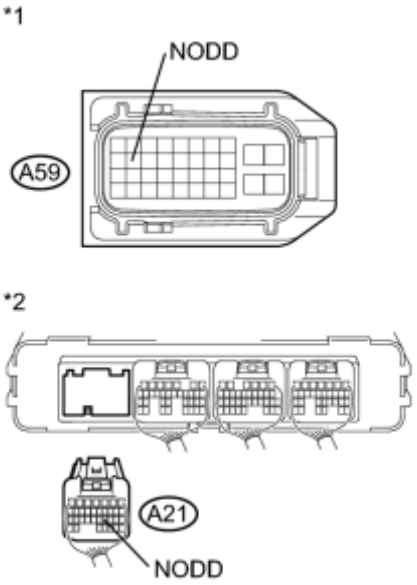
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Disconnect connector A21 from the power management control ECU.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-12 (NODD) - A21-21 (NODD) | Power switch off | Below 1 Ω |
| A59-12 (NODD) or A21-21 (NODD) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(e) Connect the inverter with converter assembly connector.

(f) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

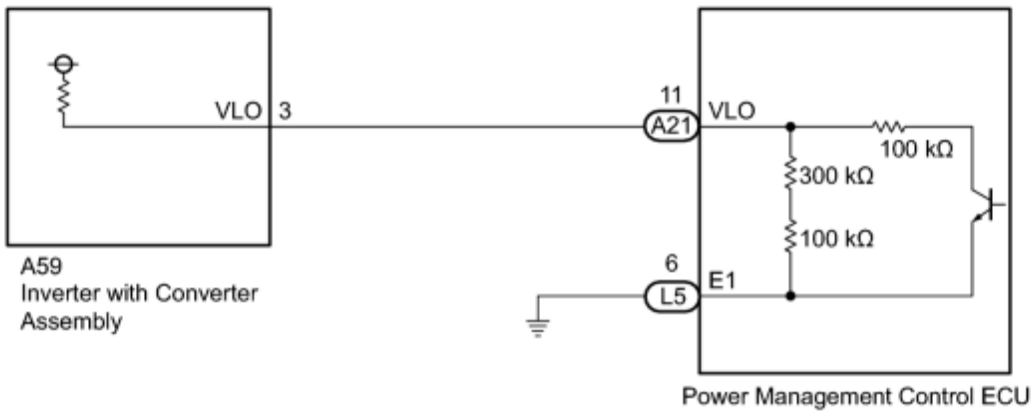
| | | |
|---|---|---|
| DTC | P0A09-591 | DC / DC Converter Status Circuit Low Input |

# DESCRIPTION

The hybrid vehicle converter (DC/DC converter) controls output voltage (12 V) based on duty ratio signals sent from the power management control ECU (HV CPU) .

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A09 | 591 | Hybrid vehicle converter voltage switching (VLO) signal circuit malfunction (Open or short to GND) | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket

to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK POWER MANAGEMENT CONTROL ECU (CHECK WAVEFORM) |

(a) Turn the power switch on (IG).

(b) Connect an oscilloscope between the power management control ECU terminals specified in the table below, and measure the waveform.

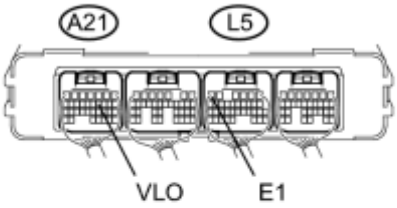
| Item | Content |
|---|---|
| Terminal | A21-11 (VLO) - L5-6 (E1) |
| Equipment Setting | 5V/DIV., 50ms/DIV. |
| Condition | Power switch on (IG) |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

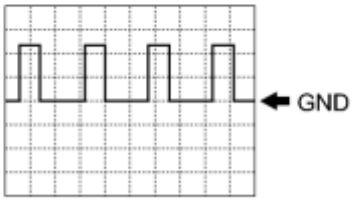
OK:

*1




The waveform appears as shown in the illustration.

Perform this inspection with the power management control ECU connector connected.




(c) Turn the power switch off.

NG ▶ CHECK POWER MANAGEMENT CONTROL ECU

OK

▼

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Clear DTCs and freeze frame data.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (HV) |

(a) Turn the power switch on (READY).

(b) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(c) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A09-591 is not output. | A |
| DTC P0A09-591 is output again. | B |

(d) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▼

| | |
|---|---|
| 6. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG ▶ REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

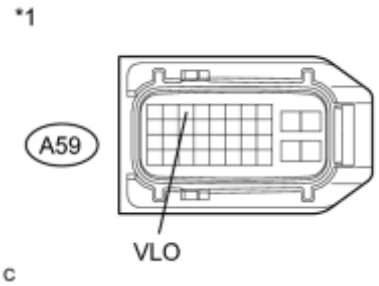
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-3 (VLO) - Body ground | Power switch off | 370 to 430 kΩ |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER

MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

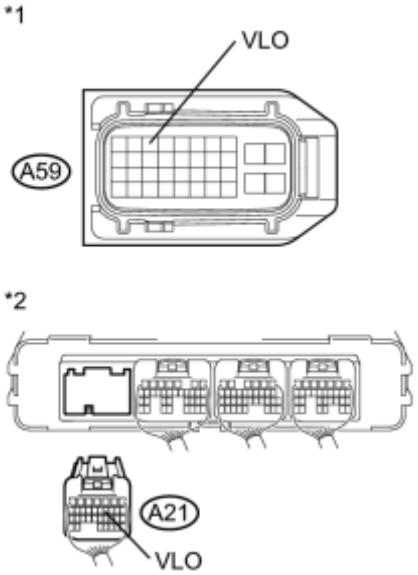
| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect connector A59 from the inverter with converter assembly.

(b) Disconnect connector A21 from the power management control ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-3 (VLO) - A21-11 (VLO) | Power switch off | Below 1 Ω |
| A59-3 (VLO) or A21-11 (VLO) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the inverter with converter assembly connector.

(e) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

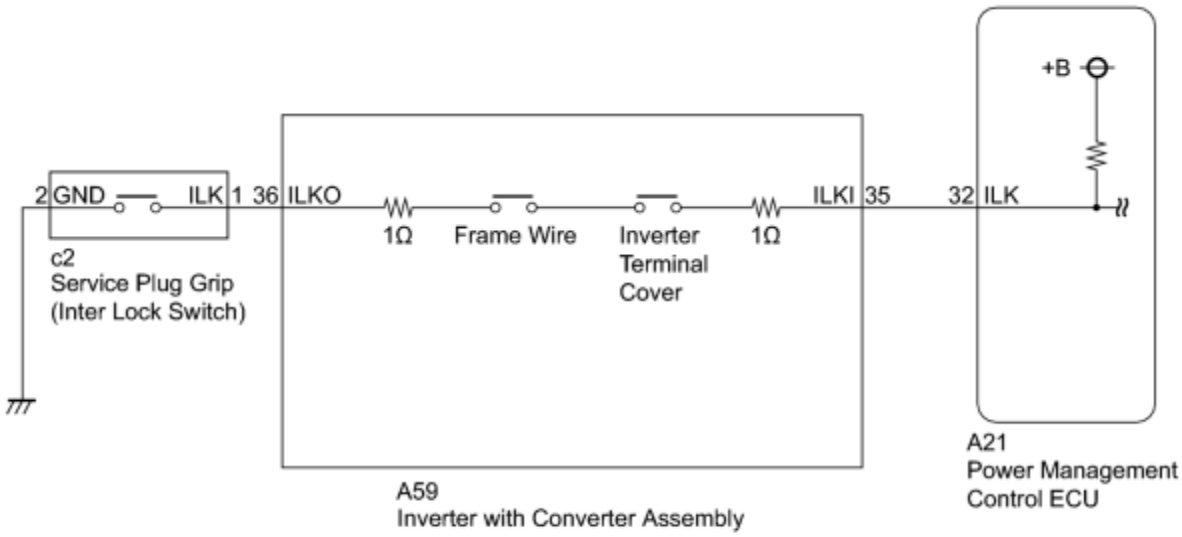
| | | |
|---|---|---|
| DTC | P0A0D-350 | High Voltage System Inter-Lock Circuit High |
| DTC | P0A0D-351 | High Voltage System Inter-Lock Circuit High |

# DESCRIPTION

- When the power management control ECU detects that a safety device is operated, it will prohibit hybrid system operation or shut off the system main relay. There are four safety devices in three different locations. The first safety device is located at the service plug grip. The second one is located at the frame wire that is connected to the inverter with converter assembly. The third one is located at the inverter terminal cover where the motor and generator cables and No. 2 engine wire (air conditioning harness) are connected to the inverter with converter assembly. If the service plug grip, inverter terminal cover, or frame wire is removed, the interlock signal line will be open. If the vehicle is being driven, this condition will be determined to be an open circuit and the system main relays will not be shut off. If the safety devices are re-installed correctly, the system will return to normal when the power switch is turned on (IG).

| DTC No. | INF Code | DTC Detection Condition | Trouble Are |
|---|---|---|---|
| P0A0D | 350 | Operating any of the safety devices with the vehicle stopped (ILK signal is ON) and turning the power switch on (IG) | • Wire harness or connector<br>• Power Management Control ECU<br>• Service plug grip<br>• Inverter with converter assembly<br>• Frame wire<br>• Inverter terminal cover |
| P0A0D | 351 | Interlock signal line opens (ILK signal is ON) while the vehicle is being driven | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A0D only is output. | A |
| P0A1D is output | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CLEAR DTC (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ▼

| | |
|---|---|
| 3. | RECONFIRM DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A0D-350 or P0A0D-351 is output again. | A |
| Neither P0A0D-350 or P0A0D-351 is output again. | B |

(e) Turn the power switch off.

B ▶ CHECK CONNECTOR CONNECTION CONDITION (INTERLOCK CIRCUIT)

A ▼

| | |
|---|---|
| 4. | CHECK SERVICE PLUG GRIP |

CAUTION:

Be sure to wear insulated gloves.

(a) Check if the service plug grip is installed correctly.

HINT:

- For the removal and installation procedures INFO.
- P0A0D-350 is also set if the power switch is turned on (IG) with the service plug grip removed. Confirm the conditions when the malfunction occurred.

NG ▶ INSTALL PARTS CORRECTLY

OK ▼

| | |
|---|---|
| 5. | CHECK INVERTER TERMINAL COVER |

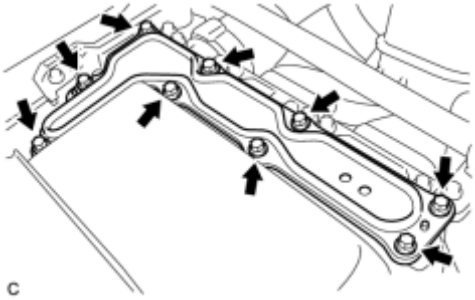
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Check if the inverter terminal cover of the inverter with converter assembly is installed correctly.

OK:

The inverter terminal cover is installed correctly.

NG ▶ INSTALL PARTS CORRECTLY

OK ▼

| | |
|---|---|
| 6. | CHECK FRAME WIRE |

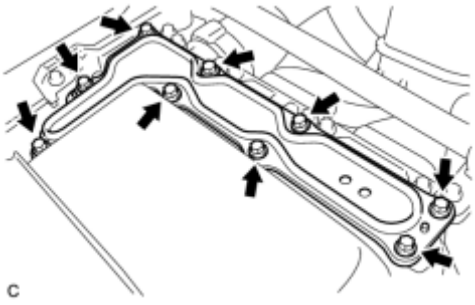
CAUTION:

Be sure to wear insulated gloves.

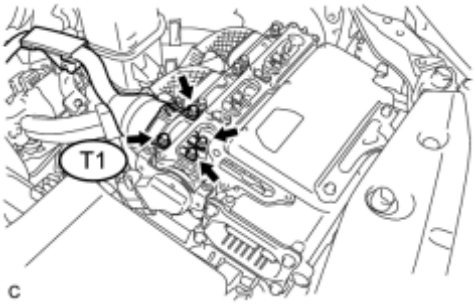
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check if the frame wire T1 is connected correctly.

OK:

The frame wire connector is connected correctly.

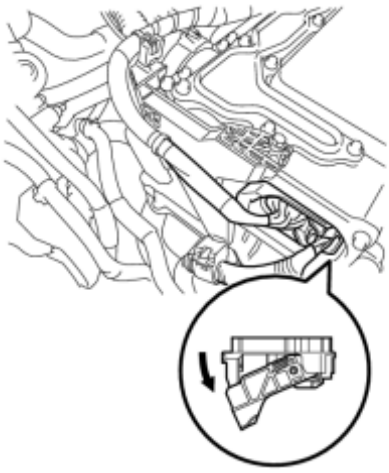
(d) Install the inverter terminal cover from the inverter with converter assembly.

NG ▶ INSTALL PARTS CORRECTLY

OK

▼

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU |



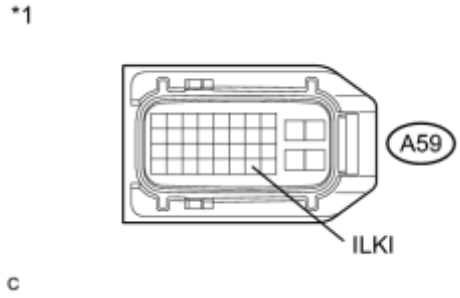
(a) Disconnect connector A59 from the inverter with converter assembly.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-35 (ILKI) - Body ground | Power switch off | 10 to 14 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Inverter with Converter Assembly) |

(d) Turn the power switch off.

(e) Connect the inverter with converter assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER)

OK ▼

| | |
|---|---|
| 8. | CHECK INVERTER WITH CONVERTER ASSEMBLY (INTERLOCK) |

CAUTION:

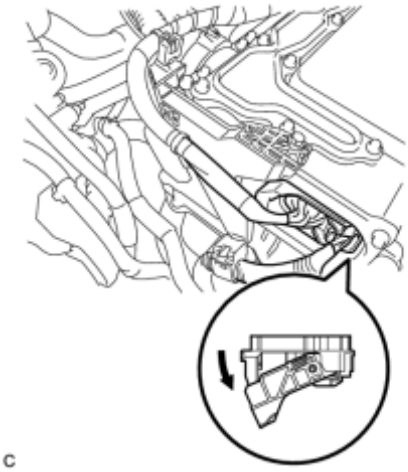
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

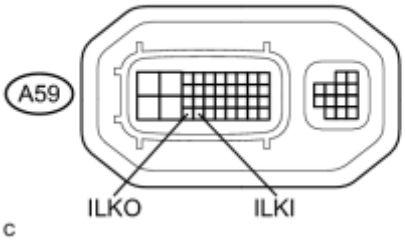
(b) Disconnect connector A59 from the inverter with converter assembly.



c

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




c

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-35 (ILKI) - A59-36 (ILKO) | Power switch off | Less than 3 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected:<br><br>(Inverter with Converter Assembly) |

NOTICE:

Do not remove the inverter terminal cover.

(d) Connect the inverter with converter assembly connector.

NG ▶ CHECK INVERTER TERMINAL COVER

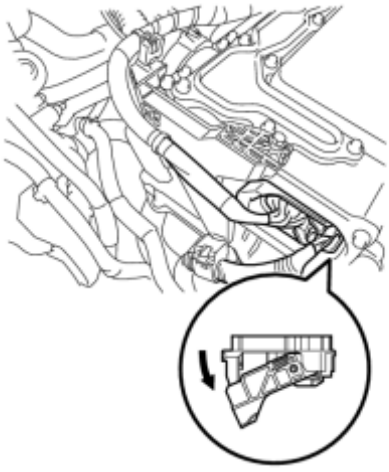
OK

▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - BODY GROUND) |

(a) Install the service plug grip INFO.

(b) Disconnect connector A59 from the inverter with converter assembly.



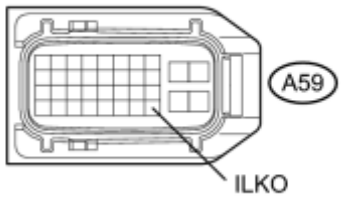
c

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-36 (ILKO) - Body ground | Power switch off | Less than 1 Ω |

*1




c

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ CHECK SERVICE PLUG GRIP

OK

▼

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (INTERLOCK CIRCUIT) |

(a) Check the connections of each connector.

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

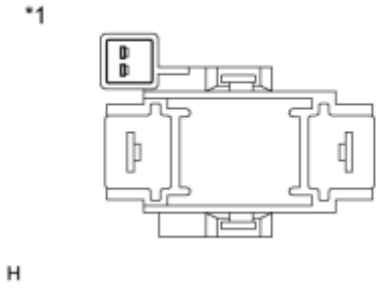
NG ▶ REPAIR OR REPLACE CONNECTOR

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 11. | CHECK SERVICE PLUG GRIP |

(a) Remove the service plug grip INFO.

(b) Check the condition of the service plug grip interlock.




## Text in Illustration

| | |
|---|---|
| *1 | Service Plug Grip |

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

(c) Install the service plug grip INFO.

NG ▶ REPLACE SERVICE PLUG GRIP

OK ▼

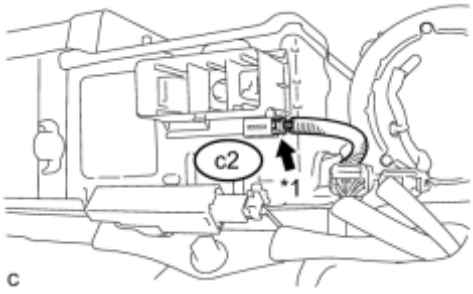
| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR |

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Check that the interlock connector at the service plug grip installation socket is connected correctly.




## Text in Illustration

| | |
|---|---|
| *1 | Inter Lock Connector |

OK:

The connector is connected correctly.

NG ▶ INSTALL PARTS CORRECTLY

OK ▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - SERVICE PLUG GRIP) |

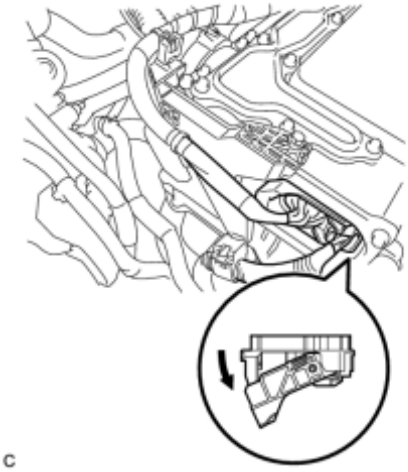
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

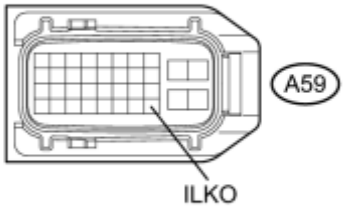


c

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Disconnect connector c2.

*1

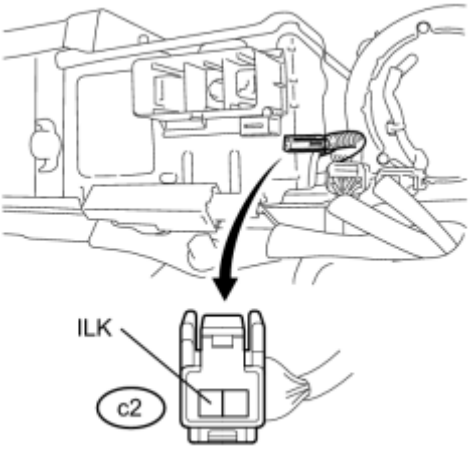



(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-36 (ILKO) - c2-1 (ILK) | Power switch off | Below 1 Ω |

*2




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Service Plug Grip) |

(e) Connect the service plug grip connector.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 14. | CHECK INVERTER TERMINAL COVER |

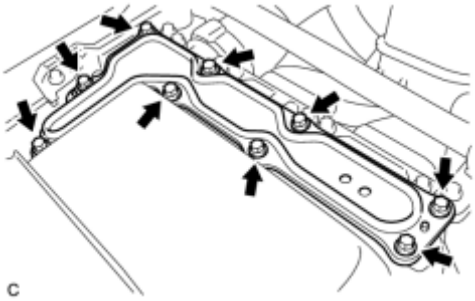
CAUTION:

Be sure to wear insulated gloves.

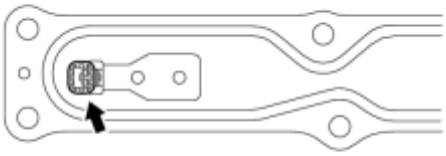
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check the condition of the inverter terminal cover interlock.

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

(d) Install the inverter terminal cover from the inverter with converter assembly.

NG ▶ REPLACE INVERTER TERMINAL COVER
OK ▼

| | |
|---|---|
| 15. | CHECK FRAME WIRE (FRAME WIRE CONNECTOR) |

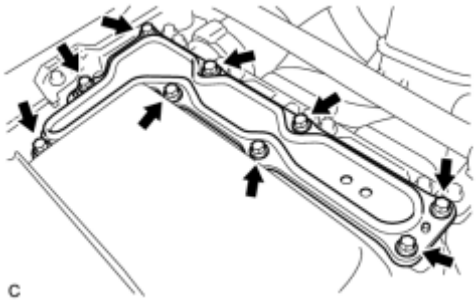
CAUTION:

Be sure to wear insulated gloves.

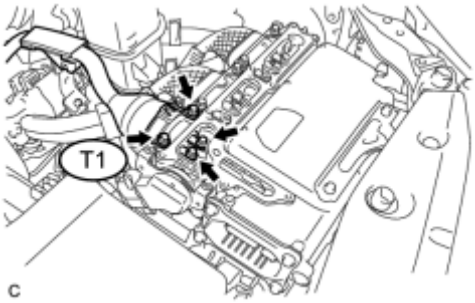
(a) Check that the service plug grip is not installed.

NOTICE:

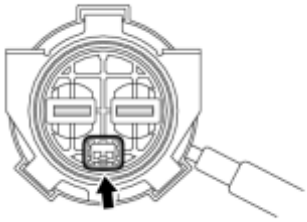
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Disconnect the frame wire T1 from the inverter with converter assembly.



(d) Check the frame wire interlock.

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

(e) Connect the frame wire to the inverter with converter assembly.

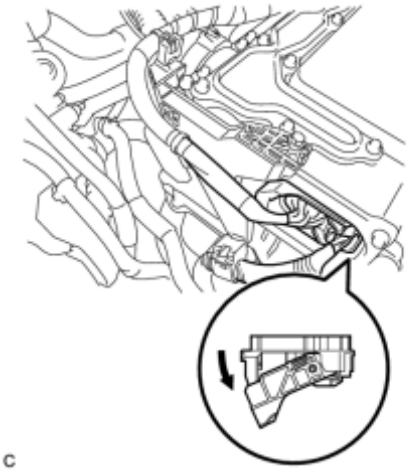
(f) Install the inverter terminal cover from the inverter with converter assembly.

NG ▶ REPLACE FRAME WIRE
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 16. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) |

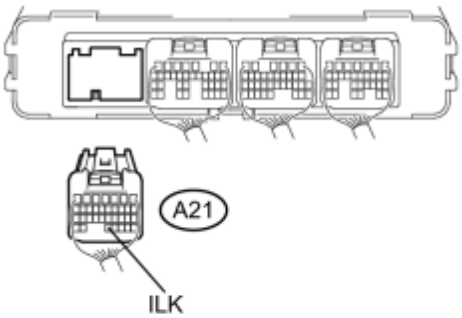
(a) Turn the power switch off.

(b) Disconnect connector A59 from the inverter with converter assembly.



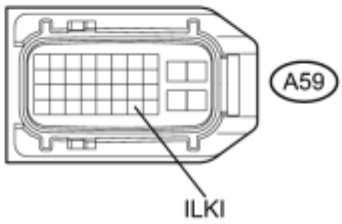
c

*1




(c) Disconnect connector A21 from the power management control ECU.

*2




(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-32 (ILK) - A59-35 (ILKI) | Power switch off | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(e) Connect the power management control ECU connector.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A0F-204 | Engine Failed to Start |
| DTC | P0A0F-205 | Engine Failed to Start |
| DTC | P0A0F-206 | Engine Failed to Start |
| DTC | P0A0F-524 | Engine Failed to Start |
| DTC | P0A0F-525 | Engine Failed to Start |

# DESCRIPTION

If an engine malfunction occurs, an engine malfunction signal is sent from the ECM to the power management control ECU (HV CPU) . When the power management control ECU (HV CPU) receives this signal, it sets a DTC and performs fail-safe control.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A0F | 204 | Signal indicating abnormality input from the ECM (abnormal engine output) | • SFI system<br>• Power management control ECU |
| | 205 | Signal indicating abnormality input from the ECM (engine is unable to start) | |
| | 206 | Signal indicating abnormality input from the ECM (engine component malfunction) | |
| | 524 | Signal indicating abnormality input from the ECM (NE signal error) | |
| | 525 | Signal indicating abnormality input from the ECM (GI signal error) | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| Engine control system DTCs are not output. | A |
| Engine control system DTCs are output. | B |

HINT:

If P0A0F-204, 205, 206, 524, or 525 is output even though the ECM has not detected a malfunction, there is a malfunction in the Power management control ECU.

(e) Turn the power switch off.

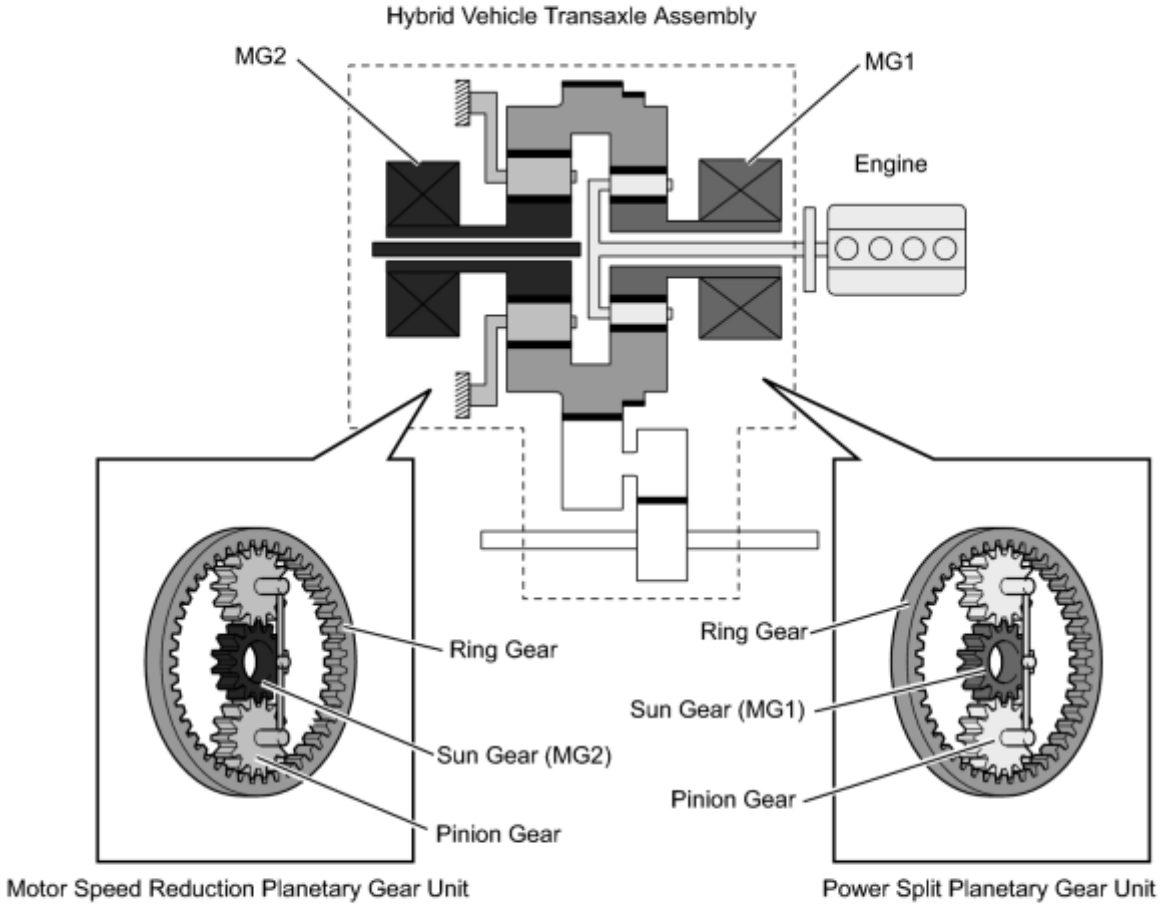
B ▶ GO TO DTC CHART
A ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A0F-238 | Engine Failed to Start |

# DESCRIPTION

If the power management control ECU (HV CPU) detects that the engine or transmission gear has seized, the power management control ECU (HV CPU) will perform fail-safe control. Also, if a substance or object is preventing the engine or transmission internal components from rotating, the power management control ECU (HV CPU) will perform fail-safe control.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A0F | 238 | Engine does not start even though it is being cranked (transaxle input malfunction [engine system]) | • Hybrid vehicle transaxle assembly<br>• Transmission input damper assembly<br>• Power management control ECU<br>• Engine |




# INSPECTION PROCEDURE

HINT:

If this DTC is output, the engine or transmission gear may be seized. Be sure to check the level of the engine oil, automatic transmission fluid (ATF), and coolant before inspection.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A0F-238 only is output. | A |
| P0A1D (hybrid vehicle control ECU circuit malfunction) is output. | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CRANKSHAFT PULLEY REVOLUTION (PARK (P) SELECTED) |

(a) Push the P position switch.

(b) Lift up the vehicle.

(c) Turn the crankshaft pulley using hand tools to check if the crankshaft can rotate smoothly.

CAUTION:

Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch off before performing this inspection, to prevent the engine from starting.

NOTICE:

Engine compression causes resistance when turning the crankshaft pulley. Check if the crankshaft rotates smoothly (or if it is locked) by manually applying sufficient torque to turn the crankshaft pulley. The torque required to turn the crankshaft pulley should be the same as for a known good vehicle of the same type.

OK:

The crankshaft rotates smoothly.

NG ▶ CHECK CRANKSHAFT PULLEY REVOLUTION (SELECTOR LEVER IN N)

OK ▼

| | |
|---|---|
| 3. | CLEAR DTC (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT

| | |
|---|---|
| 4. | CHECK ENGINE RACING |

(a) Connect the Techstream to the DLC3.

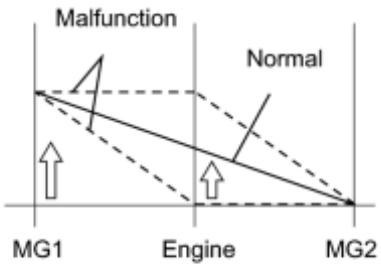
(b) Turn the power switch on (IG).

(c) Push the P position switch.

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Generator (MG1) Rev, Engine Revolution.

(e) Read the Data List.

(f) Turn the power switch on (READY).




(g) While the READY indicator is on, fully depress the accelerator pedal for 10 seconds.

OK:

Generator (MG1) Rev increases to approximately 3.6 times that of Engine Revolution.

HINT:

Refer to the graph for Data List confirmation of "Generator (MG1) Rev" and " Engine Revolution".

| Data List | ENGINE REV | MG1 REV |
|---|---|---|
| Reference Value | Approximately 1000 rpm | Approximately 3600 rpm |
| | Approximately 1500 rpm | Approximately 5400 rpm |
| | Approximately 2500 rpm | Approximately 9000 rpm |

(h) Turn the power switch off.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK

| | |
|---|---|
| 5. | CHECK CREEP MOVEMENT |

(a) Turn the power switch on (READY).

(b) Depress the brake pedal, move the selector lever to D, and release the brake pedal.

OK:

The wheels turn (the vehicle creeps forward).

(c) Turn the power switch off.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK ▼

| | |
|---|---|
| 6. | INSPECT ENGINE SPEED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor (MG2) Revolution, Generator (MG1) Rev, Engine Revolution.

(d) Read the Data List.

(e) Fully depress the accelerator pedal to accelerate the vehicle from a stop.

NOTICE:

Perform this test only in an appropriate safe location, in accordance with all local laws.

OK:

The difference between Engine Revolution and 0.28 X Generator (MG1) Rev + 0.27 X Motor (MG2) Revolution is 500 rpm or more and it is maintained for 1 second.

(f) Turn the power switch off.

NG ▶ REPLACE TRANSMISSION INPUT DAMPER ASSEMBLY

OK ▼

| | |
|---|---|
| 7. | SIMULATION TEST |

(a) Perform steps 2 through 6 again.

OK:

The problem symptom is not reproduced.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 8. | CHECK CRANKSHAFT PULLEY REVOLUTION (SELECTOR LEVER IN N) |

(a) Lift up the vehicle.

(b) Turn the power switch on (IG).

(c) Move the selector lever to N.

(d) Turn the crankshaft pulley using hand tools to check if the crankshaft can rotate smoothly.

CAUTION:

Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch on (IG) before performing this inspection, to prevent the engine from starting.

NOTICE:

Engine compression causes resistance when turning the crankshaft pulley. Check if the crankshaft rotates smoothly (or if it is locked) by manually applying sufficient torque to turn the crankshaft pulley. The torque required to turn the crankshaft pulley should be the same as for a known good vehicle of the same type.

OK:

The crankshaft rotates smoothly.

NG ▶ REPAIR OR REPLACE ENGINE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A10-263 | DC / DC Converter Status Circuit High Input |

# DESCRIPTION

Refer to the description for DTC P0A08-264 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A10 | 263 | Short to +B in the hybrid vehicle converter (DC/DC converter) NODD signal line | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A08-264 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER MANAGEMENT CONTROL ECU (NODD) INFO |

NG ▶ CHECK POWER MANAGEMENT CONTROL ECU (NODD)

OK ▼

| | |
|---|---|
| 2. | CLEAR DTC INFO |

NEXT

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Turn the power switch on (READY).

(b) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(c) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A10-263 is not output. | A |
| DTC P0A10-263 is output again. | B |

(d) Turn the power switch off.

B REPLACE POWER MANAGEMENT CONTROL ECU

A

| | |
|---|---|
| 4. | CHECH FOR INTERMITTENT PROBLEMS INFO |

NG REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 5. | CHECK POWER MANAGEMENT CONTROL ECU (NODD) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

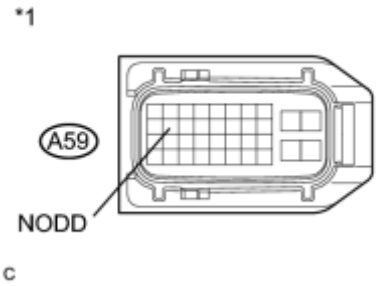
(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified |
|---|---|---|




| | | Condition |
|---|---|---|
| A59-12 (NODD) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Connect the inverter with converter assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect connector A59 from the inverter with converter assembly.

(b) Disconnect connector A21 from the power management control ECU.

(c) Turn the power switch on (IG).

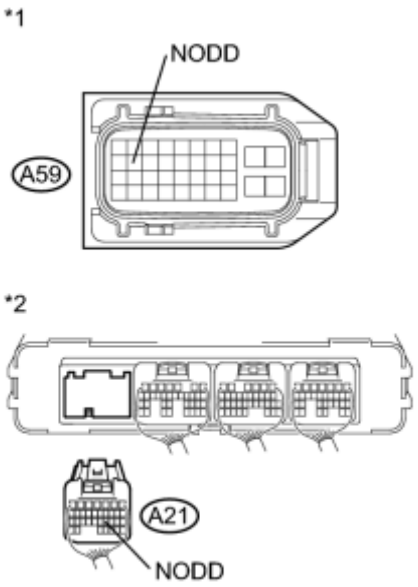
(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-12 (NODD) or A21-21 (NODD) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |




| | |
|---|---|
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector and the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Connect the inverter with converter assembly connector.

(g) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A10-592 | DC / DC Converter Status Circuit High Input |

# DESCRIPTION

Refer to the description for DTC P0A09-591 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A10 | 592 | Hybrid vehicle converter (DC/DC converter) voltage switching (VLO) signal circuit malfunction (short to +B) | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A09-591 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER MANAGEMENT CONTROL ECU (CHECK WAVEFORM) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU)

OK

| | |
|---|---|
| 2. | CLEAR DTC INFO |

NEXT

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A10-592 is not output. | A |
| DTC P0A10-592 is output again. | B |

(e) Turn the power switch off.

B REPLACE POWER MANAGEMENT CONTROL ECU

A

| | |
|---|---|
| 4. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

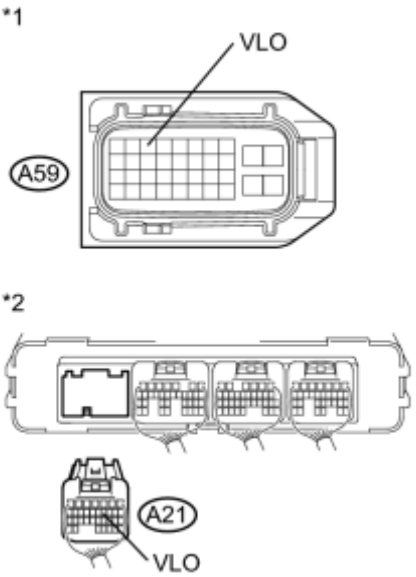
(c) Disconnect connector A21 from the power management control ECU.

(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-3 (VLO) or A21-11 (VLO) - Body ground | Power switch on (IG) | Below 1 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector and the power management control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(f) Turn the power switch off.

(g) Connect the inverter with converter assembly connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT

▼

| | |
|---|---|
| 7. | CLEAR DTC INFO |

NEXT

| | |
|---|---|
| 8. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A10-592 is not output. | A |
| DTC P0A10-592 is output again. | B |

(e) Turn the power switch off.

B ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
A ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1A-151 | Generator Control Module |
| DTC | P0A1A-155 | Generator Control Module |
| DTC | P0A1A-156 | Generator Control Module |
| DTC | P0A1A-658 | Generator Control Module |
| DTC | P0A1A-659 | Generator Control Module |
| DTC | P0A1A-791 | Generator Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1A | 151 | Run pulse signal cycle deviation or stop | Inverter with converter assembly |
| | 155 | A/D converter error | |
| | 156 | CPU ROM-RAM error | |
| | 658 | ALU error | |
| | 659 | Communication error (from MG1 to MG2) | |
| | 791 | R/D converter communication error | |

# MONITOR DESCRIPTION

The MG ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks the result of the generator CPU self-test. If the MG ECU detects a "Fail" from the generator CPU self-test, it will conclude that there is an internal malfunction in the generator CPU. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1A (INF 151): RUN pulse malfunction<br><br>P0A1A (INF 155): A/D malfunction (1 MG CPU)<br><br>P0A1A (INF 156): RAM and ROM destruction |

| | |
|---|---|
| | P0A1A (INF 658): MG CPU ALU malfunction<br><br>P0A1A (INF 659): MG CPU communication malfunction (1 MG CPU to 2 MG CPU)<br><br>P0A1A (INF 791): RD converter communication malfunction |
| Required sensors / components | Inverter with converter assembly (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

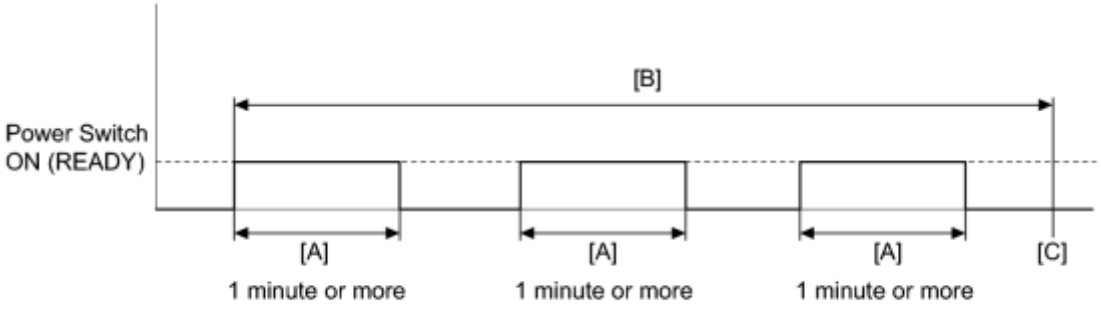
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1A (INF 151/155/156/658/659/791) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.

3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after 1 minute or more, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1A-166 | Generator Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1A | 166 | R/D converter NM stop error | Inverter with converter assembly |

# MONITOR DESCRIPTION

The MG ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In this diagnostic monitor, the MG ECU checks for an R/D (Resolver/Digital Converter) malfunction involving the generator resolver. If MG ECU detects an R/D error, it will conclude that there is an internal malfunction involving the generator resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1A (INF 166): RD converter NM signal stop abnormality |
| Required sensors / components | Inverter with converter assembly (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

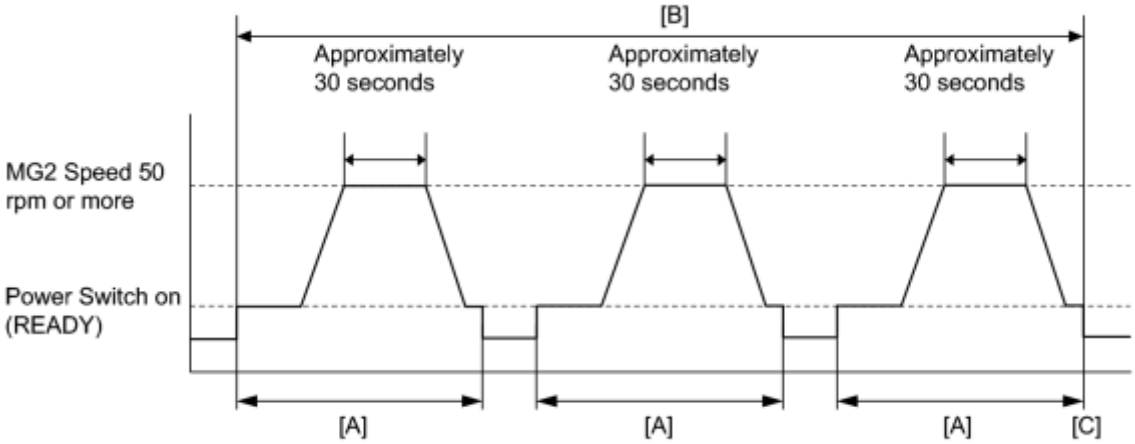
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU | DTC P0A1A (INF 166) is not detected |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1A-200 | Generator Control Module |
| DTC | P0A1A-792 | Generator Control Module |
| DTC | P0A1A-793 | Generator Control Module |

# DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects the following malfunctions.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1A | 200 | The difference between the resolver angle for control and estimated resolver angle exceeds the allowable value. | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| | 792 | Resolver REF signal cycle error | |
| | 793 | Resolver REF signal oscillation stop error | |

# MONITOR DESCRIPTION

The MG ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In this diagnostic monitor, the MG ECU checks for an R/D (Resolver/Digital Converter) malfunction involving the generator resolver. If MG ECU detects an R/D error, it will conclude that there is an internal malfunction involving the generator resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1A (INF 200): RD converter resolver angle abnormality<br><br>P0A1A (INF 792): REF malfunction (frequency abnormality)<br><br>P0A1A (INF 793): REF malfunction (REF signal stop) |
| Required sensors / components | Inverter with converter assembly (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

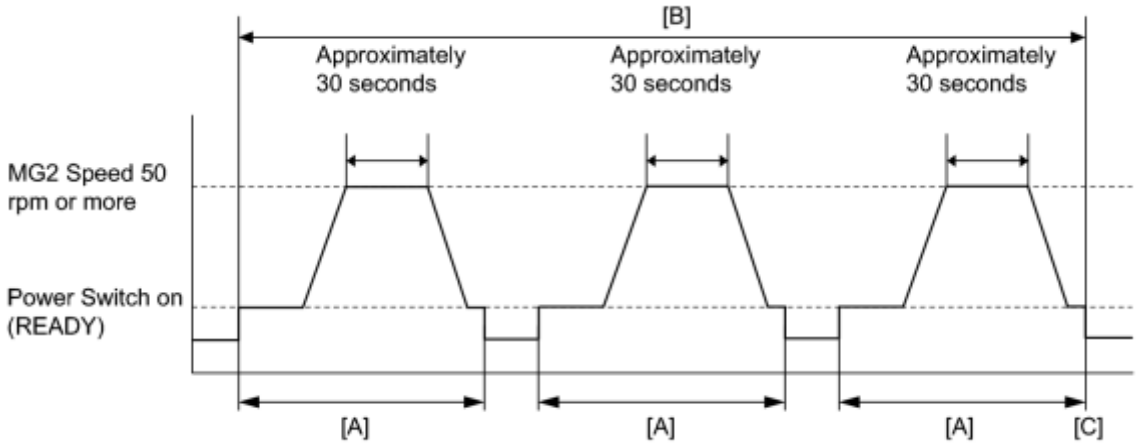
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1A (INF 200/792/793) is not detected |

# CONFIRMATION DRIVING PATTERN

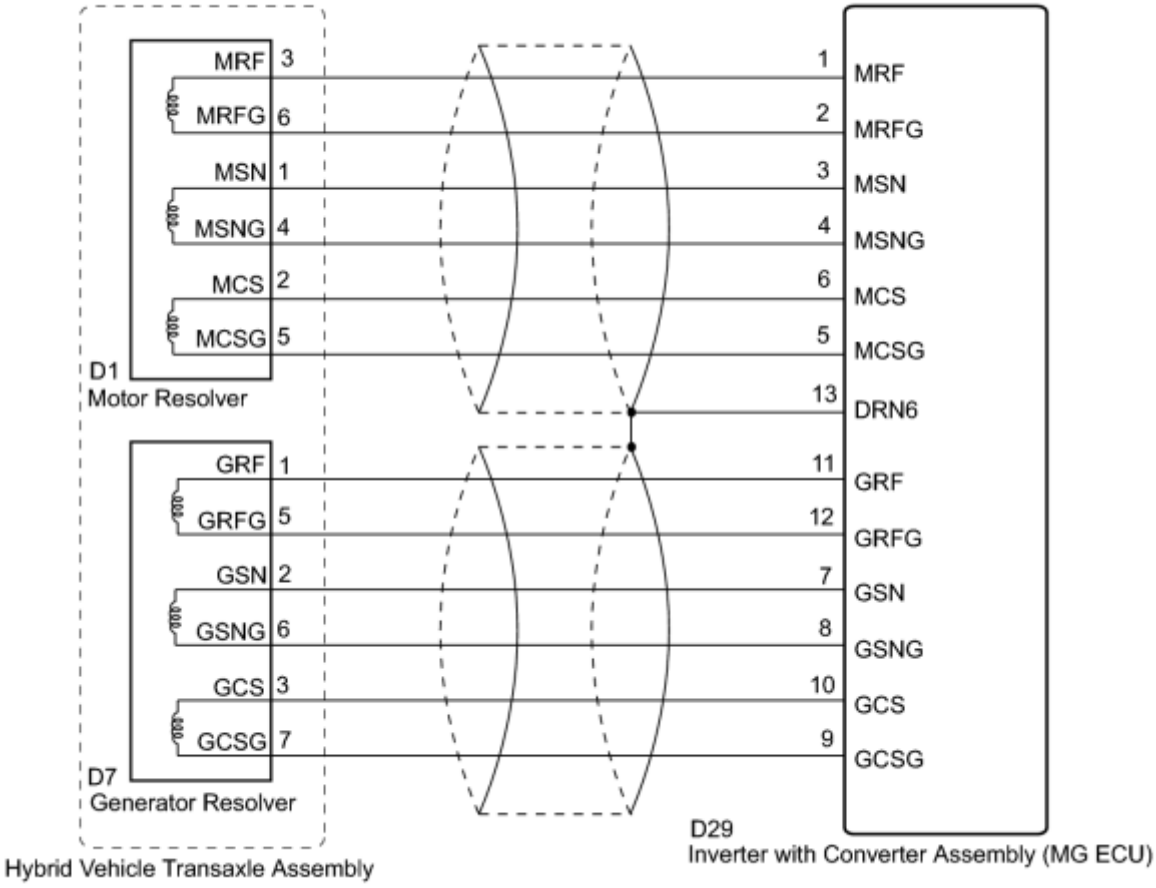



1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A1A-200, 792, or 793 only is output. | A |
| Any of the following DTCs are also output. | B |

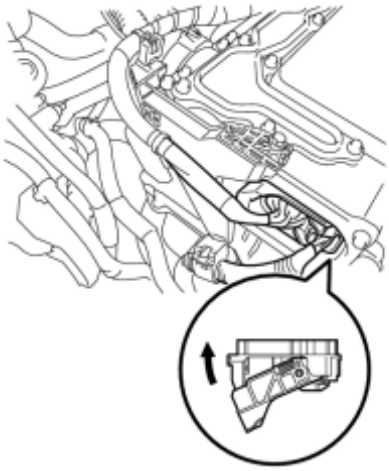
| DTC No. | Relevant Diagnosis |
|---|---|
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range / Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY) |



c

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

NOTICE:

Before disconnecting the connector, confirm that it is properly connected by checking that the locking claws are engaged and that the connector does not pull out.

(b) Check the connection of the low voltage connector of the inverter with converter assembly.

OK:

The connector is connected securely and there are no contact problems.

HINT:

When connecting the connector, insert it with the locking lever in the raised position. Rotate the lever downward and make sure that the connector is pulled into its socket. When the locking lever is in its fully closed position, a click will be heard as its locking claws engage. After the click is heard, pull up on the connector to confirm that it is properly connected.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) |

CAUTION:

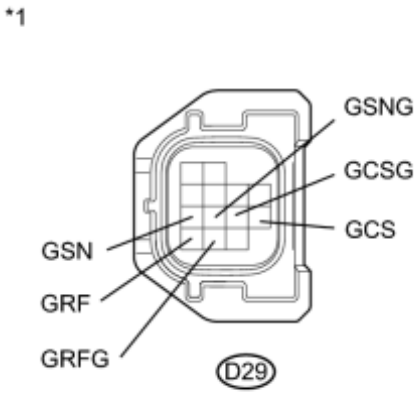
Be sure to wear insulated gloves.

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-11 (GRF) - Body ground | Power switch on (IG) | Below 1 V |
| D29-12 (GRFG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-7 (GSN) - Body ground | Power switch on (IG) | Below 1 V |
| D29-8 (GSNG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-10 (GCS) - Body ground | Power switch on (IG) | Below 1 V |
| D29-9 (GCSG) - Body | Power switch on | Below 1 V |

| | | |
|---|---|---|
| ground | (IG) | |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

NOTICE:

Turning the power switch on (IG) with the low voltage connector of the inverter with converter assembly disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Connect the low voltage connector from the inverter with converter assembly.

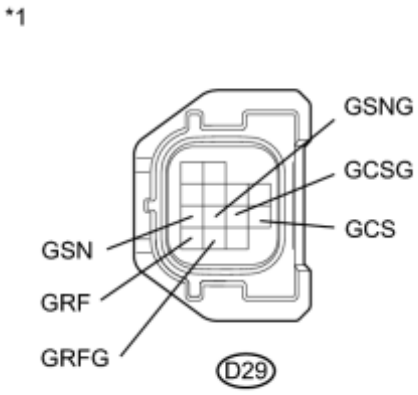
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 4. | CHECK GENERATOR RESOLVER |

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

(b) Measure the resistance according to the value(s) in the table below.




Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-11 (GRF) - D29-12 (GRFG) | Power switch off | 9.5 to 15.5 Ω |
| D29-7 (GSN) - D29-8 (GSNG) | Power switch off | 15 to 27 Ω |
| D29-10 (GCS) - D29-9 (GCSG) | Power switch off | 14 to 26 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-11 (GRF) or D29-12 (GRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-7 (GSN) or D29-8 (GSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-10 (GCS) or D29-9 (GCSG) - | Power switch | 10 kΩ or |

| | | |
|---|---|---|
| Body ground and other terminals | off | higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(c) Connect the inverter with converter assembly connector.

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) |

CAUTION:

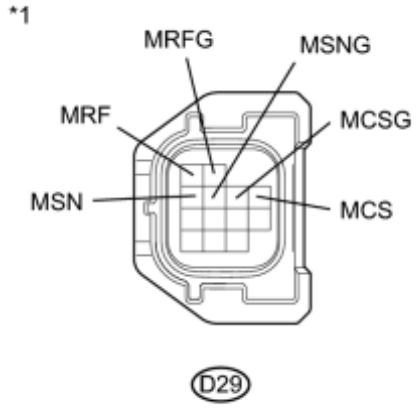
Be sure to wear insulated gloves.

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-1 (MRF) - Body ground | Power switch on (IG) | Below 1 V |
| D29-2 (MRFG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-3 (MSN) - Body ground | Power switch on (IG) | Below 1 V |
| D29-4 (MSNG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-6 (MCS) - Body ground | Power switch on (IG) | Below 1 V |
| D29-5 (MCSG) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

NOTICE:

Turning the power switch on (IG) with the low voltage connector of the inverter with converter assembly disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

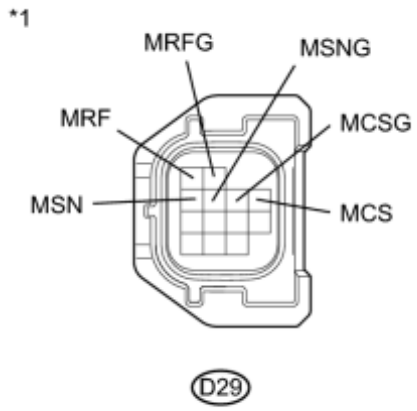
| | |
|---|---|
| 6. | CHECK MOTOR RESOLVER |

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-1 (MRF) - D29-2 (MRFG) | Power switch off | 9.5 to 15.5 Ω |
| D29-3 (MSN) - D29-4 (MSNG) | Power switch off | 15 to 27 Ω |
| D29-6 (MCS) - D29-5 (MCSG) | Power switch off | 14 to 26 Ω |




Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-1 (MRF) or D29-2 (MRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-3 (MSN) or D29-4 (MSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-6 (MCS) or D29-5 (MCSG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(c) Connect the inverter with converter assembly connector.

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) |



H

(a) Check the connection of the generator resolver connector.

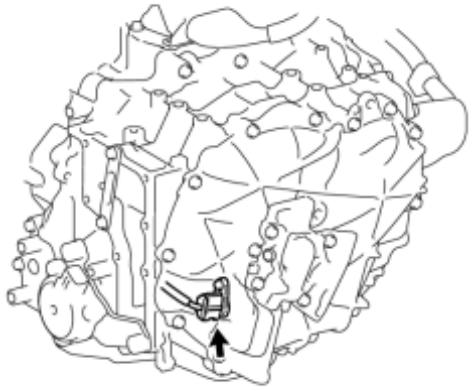
OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) |



H

(a) Check the connection of the motor resolver connector.

OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 9. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) |

(a) Check the connection of the generator resolver connector.



H

OK:

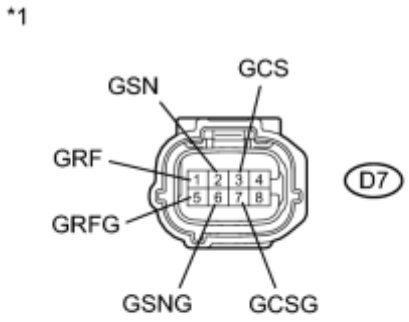
The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

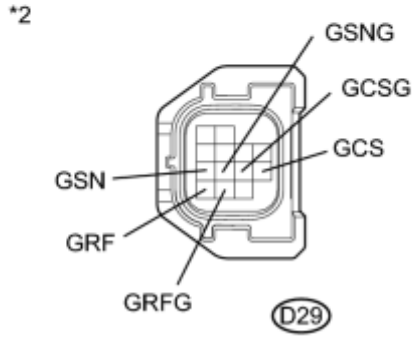
OK ▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) |

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.




(b) Disconnect the generator resolver connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-1 (GRF) - D29-11 (GRF) | Power switch off | Below 1 Ω |
| D7-5 (GRFG) - D29-12 (GRFG) | Power switch off | Below 1 Ω |
| D7-2 (GSN) - D29-7 (GSN) | Power switch off | Below 1 Ω |
| D7-6 (GSNG) - D29-8 (GSNG) | Power switch off | Below 1 Ω |
| D7-3 (GCS) - D29-10 (GCS) | Power switch off | Below 1 Ω |
| D7-7 (GCSG) - D29-9 (GCSG) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-1 (GRF) or D29-11 (GRF) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-5 (GRFG) or D29-12 (GRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-2 (GSN) or D29-7 (GSN) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-6 (GSNG) or D29-8 (GSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-3 (GCS) or D29-10 (GCS) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-7 (GCSG) or D29-9 (GCSG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Generator Resolver) |
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

HINT:

The generator resolver is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(d) Connect the generator resolver connector.

(e) Connect the inverter with converter assembly connector.

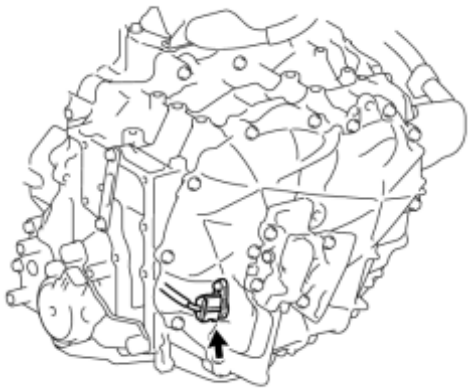
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 11. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) |

(a) Check the connection of the motor resolver connector.

OK:

The connector is connected securely and there are no contact problems.



H

NG ▶ CONNECT SECURELY

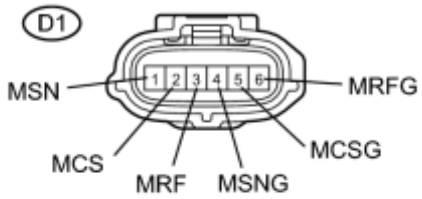
OK

▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) |

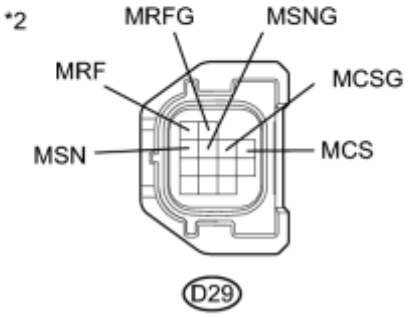
(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

*1




(b) Disconnect the motor resolver connector.

*2




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D1-3 (MRF) - D29-1 (MRF) | Power switch off | Below 1 Ω |
| D1-6 (MRFG) - D29-2 (MRFG) | Power switch off | Below 1 Ω |
| D1-1 (MSN) - D29-3 (MSN) | Power switch off | Below 1 Ω |
| D1-4 (MSNG) - D29-4 (MSNG) | Power switch off | Below 1 Ω |
| D1-2 (MCS) - D29-6 (MCS) | Power switch off | Below 1 Ω |
| D1-5 (MCSG) - D29-5 (MCSG) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D1-3 (MRF) or D29-1 (MRF) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-6 (MRFG) or D29-2 (MRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-1 (MSN) or D29-3 (MSN) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-4 (MSNG) or D29-4 (MSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-2 (MCS) or D29-6 (MCS) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-5 (MCSG) or D29-5 (MCSG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Motor Resolver) |
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

HINT:

The motor resolver is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(d) Connect the motor resolver connector.

(e) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A1B-163 | Drive Motor "A" Control Module |
| DTC | P0A1B-164 | Drive Motor "A" Control Module |
| DTC | P0A1B-192 | Drive Motor "A" Control Module |
| DTC | P0A1B-193 | Drive Motor "A" Control Module |
| DTC | P0A1B-511 | Drive Motor "A" Control Module |
| DTC | P0A1B-512 | Drive Motor "A" Control Module |
| DTC | P0A1B-661 | Drive Motor "A" Control Module |
| DTC | P0A1B-786 | Drive Motor "A" Control Module |
| DTC | P0A1B-794 | Drive Motor "A" Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1B | 163 | IPM positive power source error | Inverter with converter assembly |
| | 164 | IPM negative power source error | |
| | 192 | A/D converter error | |
| | 193 | CPU ROM-RAM error | |
| | 511 | Standard voltage for analog signal offset | |
| | 512 | Standard voltage for analog signal error | |
| | 661 | Communication error (from MG2 to MG1) | |
| | 786 | ALU error | |
| | 794 | R/D converter communication error | |

# MONITOR DESCRIPTION

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks the result of the motor CPU self-test. If the MG ECU detects a "Fail" from the motor CPU self-test, it will conclude that there is an internal

malfunction in the motor CPU. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1B (INF 163): Motor CPU power malfunction (15V)<br><br>P0A1B (INF 164): Motor CPU power malfunction (-5V)<br><br>P0A1B (INF 192): A/D malfunction (2 MG CPU)<br><br>P0A1B (INF 193): RAM and ROM destruction)<br><br>P0A1B (INF 511): Motor CPU power malfunction (2.5V)<br><br>P0A1B (INF 512): Motor CPU power malfunction (5VD)<br><br>P0A1B (INF 661): 2 MG CPU communication malfunction (2 MG CPU to 1 MG CPU)<br><br>P0A1B (INF 786): MG CPU ALU malfunction<br><br>P0A1B (INF 794): RD converter communication malfunction |
| Required sensors / components | Inverter with converter (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

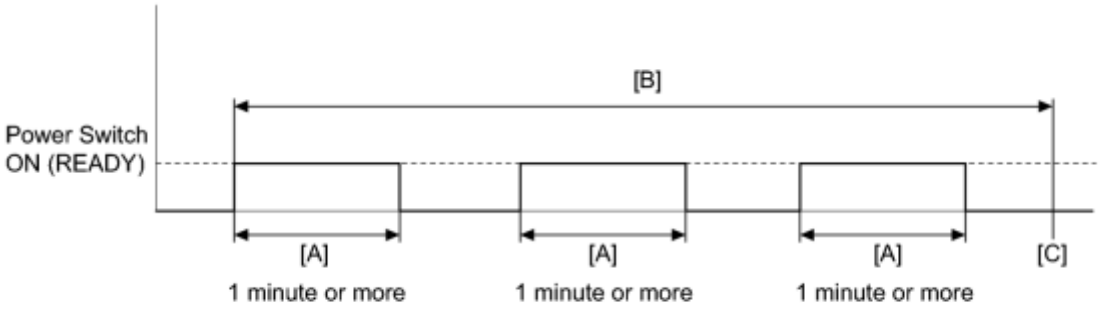
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1B (INF 163/164/192/193/511/512/661/786/794) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after 1 minute or more, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1B-168 | Drive Motor "A" Control Module |
| DTC | P0A1B-795 | Drive Motor "A" Control Module |
| DTC | P0A1B-796 | Drive Motor "A" Control Module |

# DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects malfunctions.

HINT:

The term "drive motor A" indicates MG2.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1B | 168 | The difference between the resolver angle for control and estimated resolver angle exceeds the allowable value. | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| | 795 | Resolver REF signal cycle error | |
| | 796 | Resolver REF signal oscillation stop error | |

# MONITOR DESCRIPTION

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks for an R/D (Resolver/ Digital converter) malfunction involving the motor resolver. If the MG ECU detects an R/D converter error, it will conclude that there is an internal malfunction involving the motor resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1B (INF 168): RD converter resolver angle abnormality<br>P0A1B (INF 795): REF malfunction (frequency abnormality)<br>P0A1B (INF 796): REF malfunction (REF Signal abnormality) |
| Required sensors / components | Inverter with converter (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

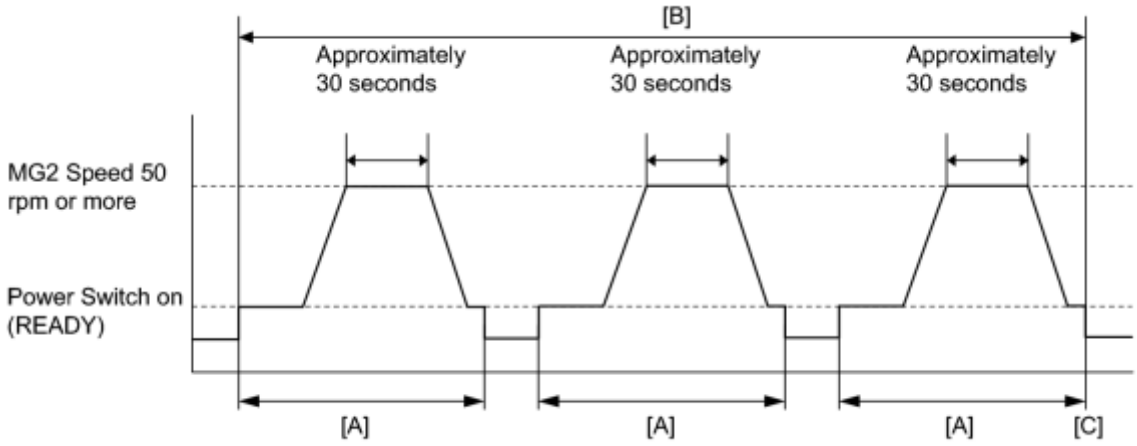
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1B (INF 168/795/796) is not detected |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A1B-168 , 795 or 796 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range / Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 4. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 6. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 9. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 11. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A1B-198 | Drive Motor "A" Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1B | 198 | R/D converter NM stop error | Inverter with converter assembly |

# MONITOR DESCRIPTION

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks for an R/D (Resolver/ Digital converter) malfunction involving the motor resolver. If the MG ECU detects an R/D converter error, it will conclude that there is an internal malfunction involving the motor resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1B (INF 198): RD converter NM signal stop abnormality |
| Required sensors / components | Inverter with converter (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

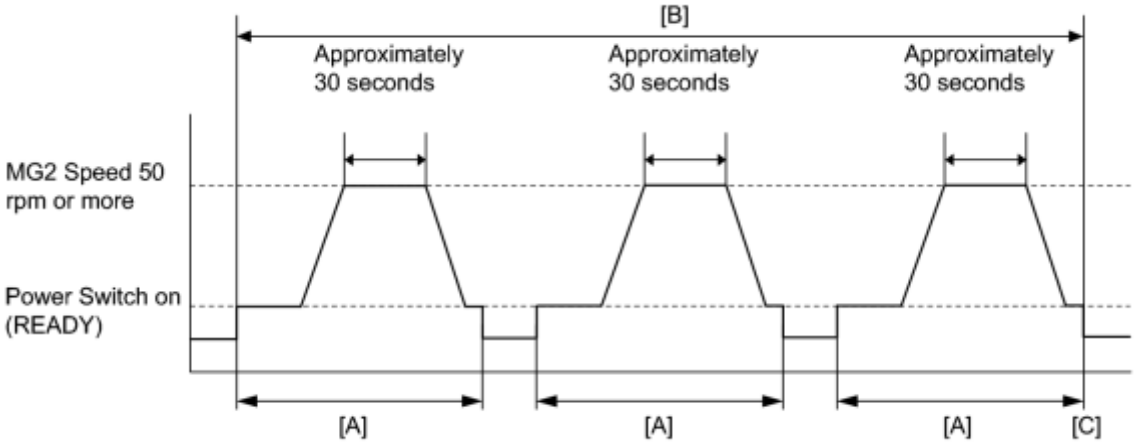
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1B (INF 198) is not detected |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-144 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 144 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) performs a self-test. If the power management control ECU (HV CPU) detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 144): Primary check malfunction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

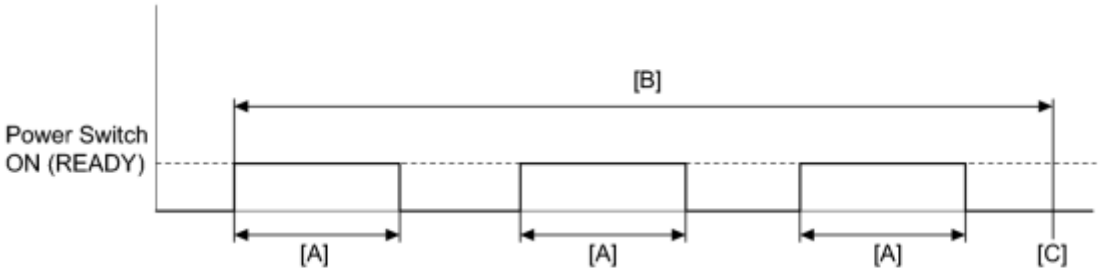
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 144) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-148 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 148 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) performs a self-test. If the power management control ECU (HV CPU) detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 148): HV CPU malfunction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

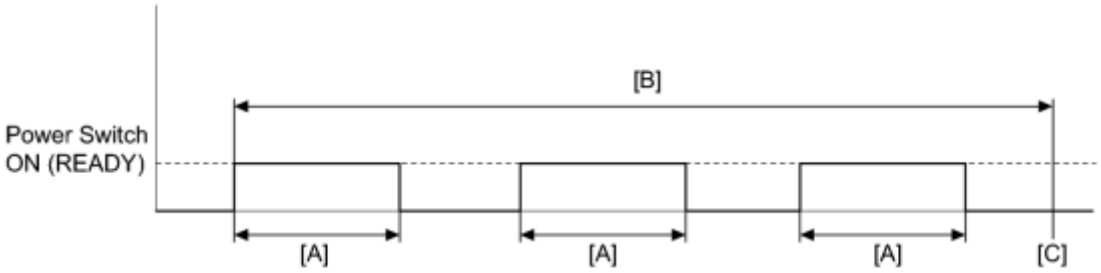
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 148) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-162 | Hybrid Powertrain Control Module |
| DTC | P0A1D-821 | Hybrid Powertrain Control Module |
| DTC | P0A1D-822 | Hybrid Powertrain Control Module |
| DTC | P0A1D-823 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 162 | ECU internal error | Power management control ECU |
| P0A1D | 821 | ECU internal error | Power management control ECU |
| P0A1D | 822 | ECU internal error | Power management control ECU |
| P0A1D | 823 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) checks the communication bus off count and the message register of the CAN (Controller Area Network) controller. If the power management control ECU (HV CPU) detects an error in the communication bus off count or message register, it will conclude that there is a malfunction in the power management control ECU (HV CPU). The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 162/821/822/823): Lost communication with ECM/PCM |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |

| | |
|---|---|
| Other conditions belong to TMC's intellectual property | - |

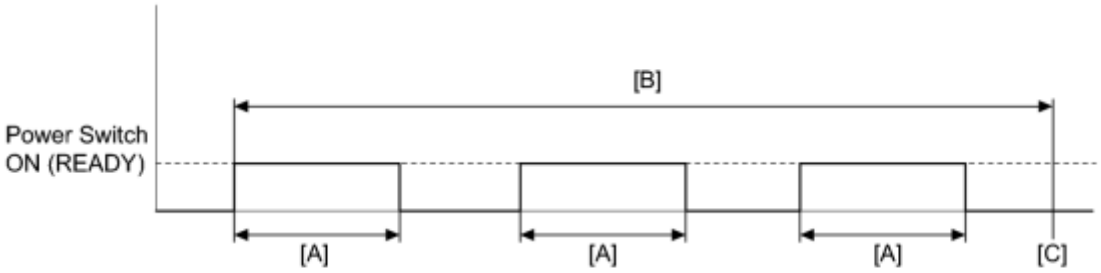
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 162/821/822/823) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-187 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 187 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs diagnostic tests to verify proper operation of internal and external ECU systems. In one of these tests, the power management control ECU (HV CPU) monitors specific RAM circuits of the power management control ECU (HV CPU). If the power management control ECU (HV CPU) detects an error in the RAM circuits, it will conclude that there is an internal malfunction in the power management control ECU (HV CPU). The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 187): Specific random access memory destruction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

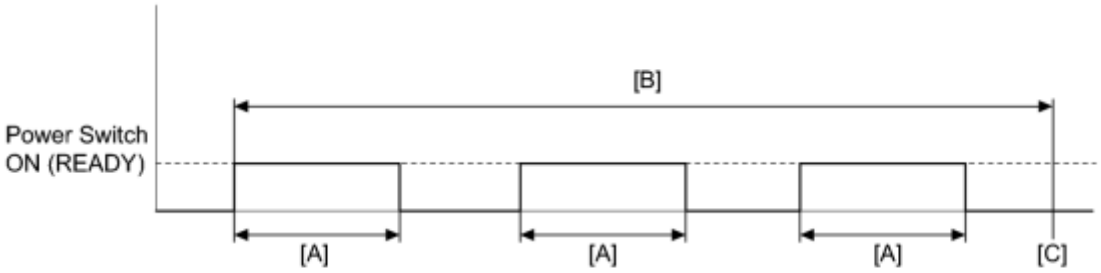
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 187) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-721 | Hybrid Powertrain Control Module |
| DTC | P0A1D-722 | Hybrid Powertrain Control Module |
| DTC | P0A1D-723 | Hybrid Powertrain Control Module |
| DTC | P0A1D-787 | Hybrid Powertrain Control Module |
| DTC | P0A1D-818 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 721 | ECU internal error | Power management control ECU |
| P0A1D | 722 | ECU internal error | Power management control ECU |
| P0A1D | 723 | ECU internal error | Power management control ECU |
| P0A1D | 787 | ECU internal error | Power management control ECU |
| P0A1D | 818 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) checks the result of the ECM self-test. If the power management control ECU (HV CPU) detects a "Fail" from the ECM self-test, it will conclude that there is an internal malfunction in the ECM. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 721/722/723/787/818): Monitor CPU malfunction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

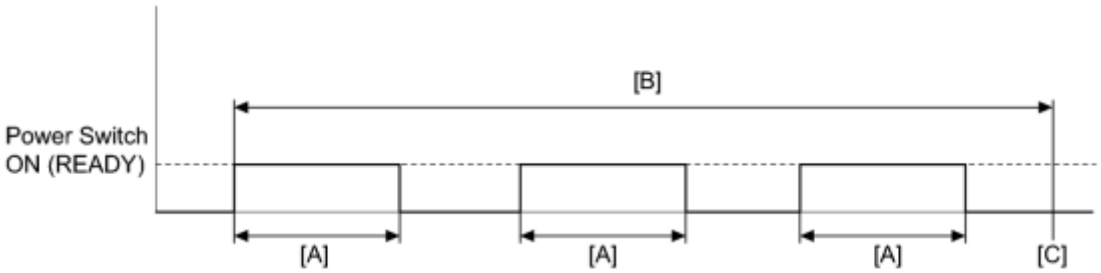
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 721/722/723/787/818) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **COMPLETED**

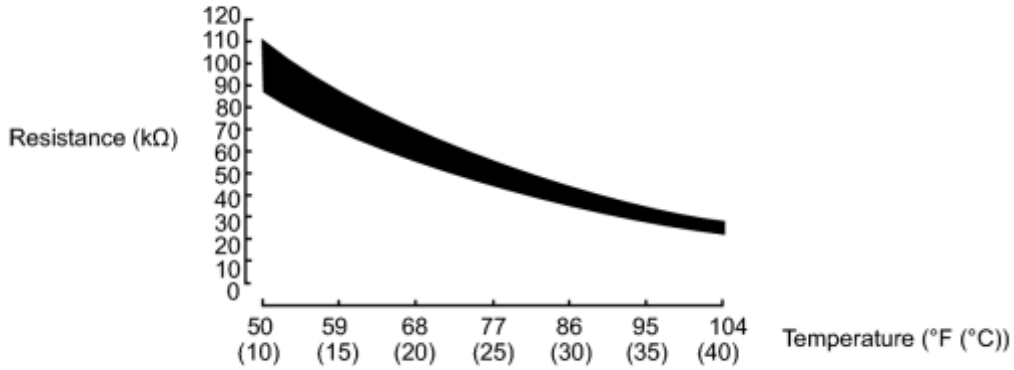
| | | |
|---|---|---|
| DTC | P0A2B-250 | Drive Motor "A" Temperature Sensor Circuit Range / Performance |
| DTC | P0A2E-248 | Drive Motor "A" Temperature Sensor Circuit Intermittent |

# DESCRIPTION

The resistance of the thermistor built into the motor temperature sensor changes in accordance with changes in MG2 temperature. The lower the MG2 temperature, the higher the thermistor resistance. Conversely, the higher the temperature, the lower the resistance.

HINT:

The term "drive motor A" indicates MG2.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A2B | 250 | Motor temperature sensor output does not increase under conditions in which the value should increase, or output does not decrease under conditions in which the value should decrease. | Hybrid vehicle transaxle assembly (Motor temperature sensor) |
| P0A2E | 248 | Unusual sudden change in motor temperature sensor output occurs and the condition continues, or unusual sudden change in motor temperature sensor output occurs repeatedly. | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

HINT:

The motor temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A2C-247 | Drive Motor "A" Temperature Sensor Circuit Low |
| DTC | P0A2D-249 | Drive Motor "A" Temperature Sensor Circuit High |

# DESCRIPTION

Refer to the description for DTC P0A2B-250 INFO.

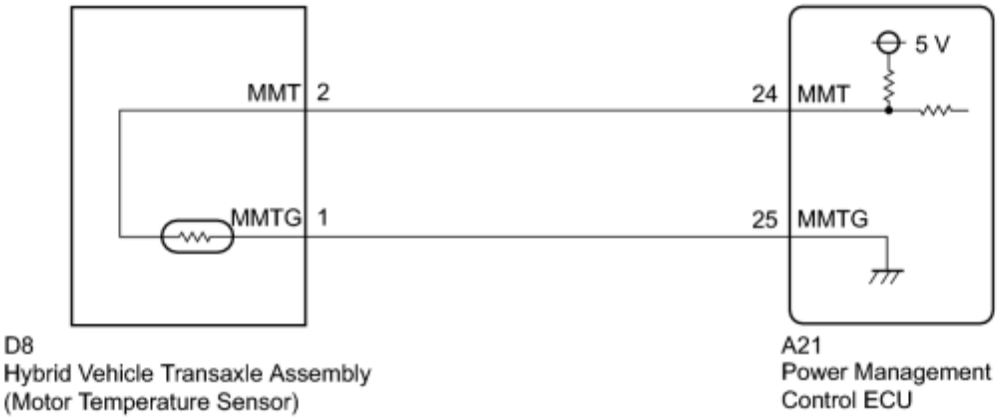
| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A2C | 247 | Short or short to GND in the motor temperature sensor circuit | • Wire harness or connector<br>• Power management control ECU<br>• Hybrid vehicle transaxle assembly (Motor temperature sensor) |
| P0A2D | 249 | Open or short to +B in the motor temperature sensor circuit | |

HINT:

After confirming that DTC P0A2C-247 or P0A2D-249 is output, use the Techstream to check "Motor Temp No1" in the power management control ECU Data List.

| Displayed Temperature | Malfunction |
|---|---|
| -58°F (-50°C) | Open circuit or short to +B |
| 401°F (205°C) | Short circuit or short to GND |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (MOTOR TEMP NO1) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(d) Read the Data List.

Result:

| Result | Proceed to |
|---|---|
| -58°F (-50°C) | A |
| 401°F (205°C) | B |
| Same as actual temperature | C |

(e) Turn the power switch off.

C CHECK FOR INTERMITTENT PROBLEMS
B READ VALUE USING TECHSTREAM (CHECK FOR SHORT)
A

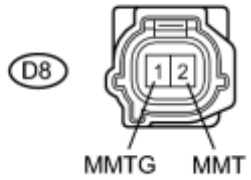
| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (CHECK FOR OPEN) |



H

(a) Disconnect the motor temperature sensor connector.

*1




H

(b) Connect terminals 2 (MMT) and 1 (MMTG) of vehicle side connector D8 of the motor temperature sensor.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(f) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No1 | Terminals MMT and MMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Motor Temperature Sensor) |

HINT:

The motor temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(g) Turn the power switch off.

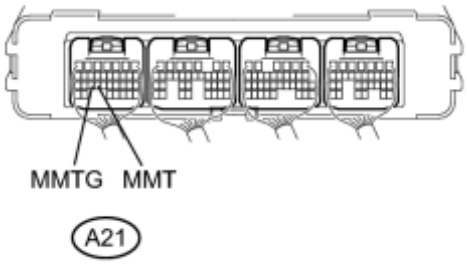
(h) Connect the motor temperature sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR TEMPERATURE SENSOR)

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR TEMPERATURE SENSOR) |

*1




P

(a) Connect terminals 24 (MMT) and 25 (MMTG) of connector A21 of the power management control ECU.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No1 | Terminals MMT and MMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

(f) Turn the power switch off.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (CHECK FOR SHORT) |




(a) Disconnect the motor temperature sensor connector.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No1 | Power switch on (IG) | -58°F (-50°C) |

HINT:

The motor temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(f) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR TEMPERATURE SENSOR)
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR |

| | |
|---|---|
| | TEMPERATURE SENSOR) |

(a) Disconnect the motor temperature sensor connector.

(b) Disconnect connector A21 from the power management control ECU.

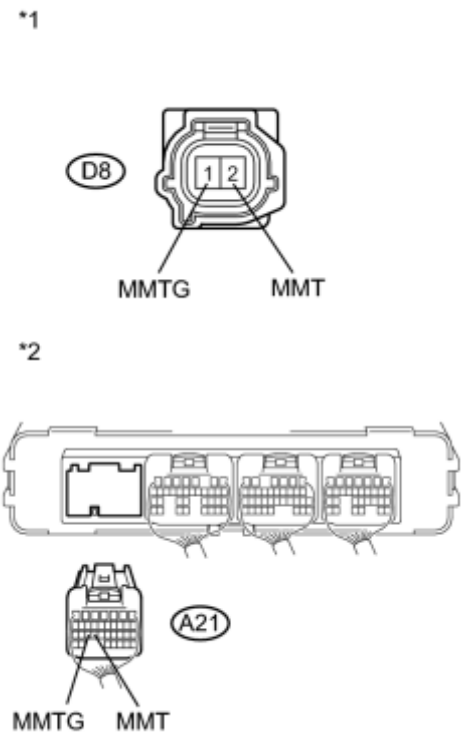
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D8-2 (MMT) - A21-24 (MMT) | Power switch off | Below 1 Ω |
| D8-1 (MMTG) - A21-25 (MMTG) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D8-2 (MMT) or A21-24 (MMT) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D8-1 (MMTG) or A21-25 (MMTG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Motor Temperature Sensor) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the power management control ECU connector.

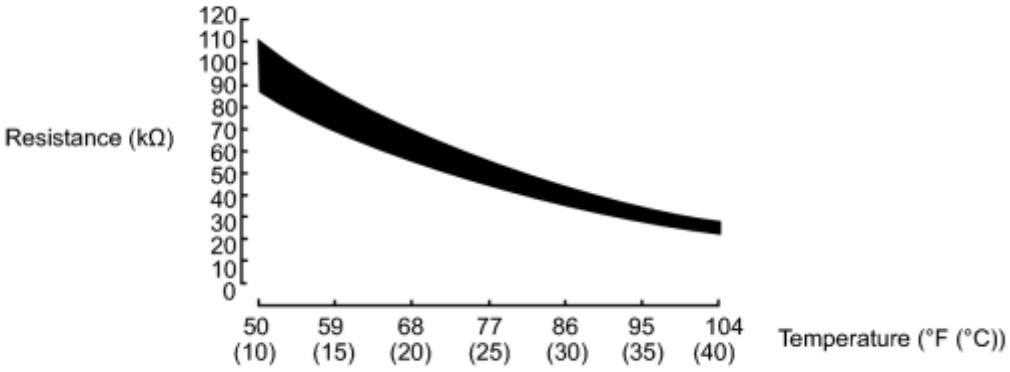
(e) Connect the motor temperature sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A37-260 | Generator Temperature Sensor Circuit Range / Performance |
| DTC | P0A3A-258 | Generator Temperature Sensor Circuit Intermittent |

# DESCRIPTION

The resistance of the thermistor built into the generator temperature sensor changes in accordance with changes in MG1 temperature. The lower the MG1 temperature, the higher the thermistor resistance. Conversely, the higher the temperature, the lower the resistance.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A37 | 260 | Generator temperature sensor output does not increase in which the value should increase, or output does not decrease under conditions in which the value should decrease. | Hybrid vehicle transaxle assembly (Generator temperature sensor) |
| P0A3A | 258 | Unusual sudden change in generator temperature sensor output occurs and the condition continues, or unusual sudden change in generator temperature sensor output occurs repeatedly. | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

HINT:

The generator temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

| | | |
|---|---|---|
| DTC | P0A38-257 | Generator Temperature Sensor Circuit Low |
| DTC | P0A39-259 | Generator Temperature Sensor Circuit High |

# DESCRIPTION

Refer to the description for DTC P0A37-260 INFO.

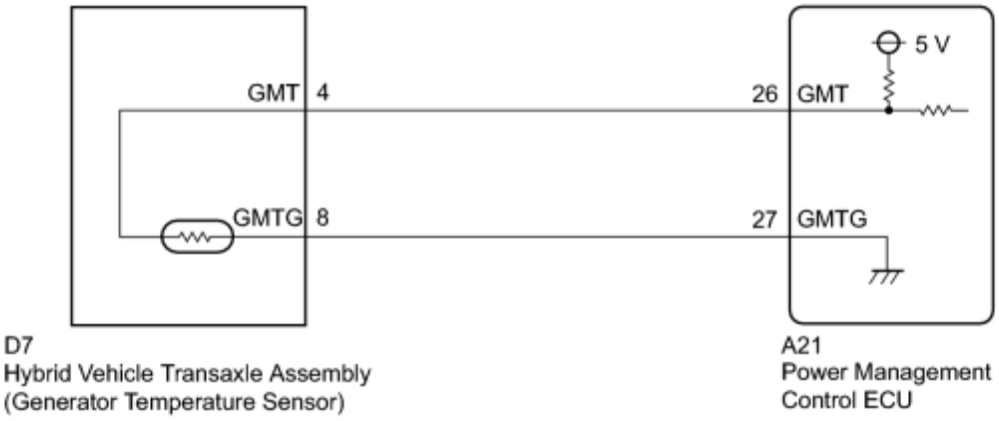
| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A38 | 257 | Short to GND in the generator temperature sensor circuit | • Wire harness or connector<br>• Power management control ECU<br>• Hybrid vehicle transaxle assembly (Generator temperature sensor) |
| P0A39 | 259 | Open or short to +B in the generator temperature sensor circuit | |

HINT:

After confirming that DTC P0A38-257 or P0A39-259 is output, use the Techstream to check "Motor Temp No2" in the power management control ECU Data List.

| Displayed Temperature | Malfunction |
|---|---|
| -58°F (-50°C) | Open circuit or short to +B |
| 401°F (205°C) | Short circuit or short to GND |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (MOTOR TEMP NO2) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(d) Read the Data List.

Result:

| Result | Proceed to |
|---|---|
| -58°F (-50°C) | A |
| 401°F (205°C) | B |
| Same as actual temperature | C |

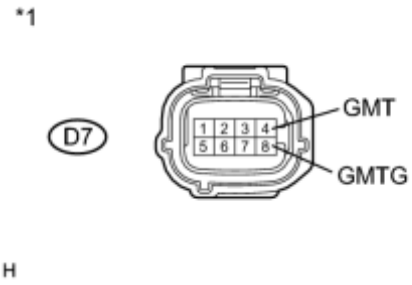
(e) Turn the power switch off.

C ▶ CHECK FOR INTERMITTENT PROBLEMS
B ▶ READ VALUE USING TECHSTREAM (CHECK FOR SHORT)
A ▼

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (CHECK FOR OPEN) |




(a) Disconnect the generator temperature sensor connector.




(b) Connect terminals 4 (GMT) and 8 (GMTG) of vehicle side connector D7 of the generator temperature sensor.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(f) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No2 | Terminals GMT and GMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Generator Temperature Sensor) |

HINT:

The generator temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(g) Turn the power switch off.

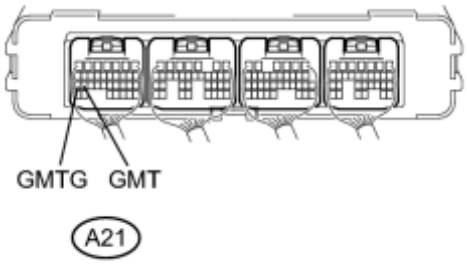
(h) Connect the generator temperature sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - GENERATOR TEMPERATURE SENSOR)

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - GENERATOR TEMPERATURE SENSOR) |

*1




P

(a) Connect terminals 26 (GMT) and 27 (GMTG) of connector A21 of the power management control ECU.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No2 | Terminals GMT and GMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

(f) Turn the power switch off.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (CHECK FOR SHORT) |




(a) Disconnect the generator temperature sensor connector.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No2 | Power switch on (IG) | -58°F (-50°C) |

HINT:

The generator temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(f) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - GENERATOR TEMPERATURE SENSOR)
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - |

| | |
|---|---|
| | GENERATOR TEMPERATURE SENSOR) |

(a) Disconnect the generator temperature sensor connector.

(b) Disconnect connector A21 from the power management control ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-4 (GMT) - A21-26 (GMT) | Power switch off | Below 1 Ω |
| D7-8 (GMTG) - A21-27 (GMTG) | Power switch off | Below 1 Ω |

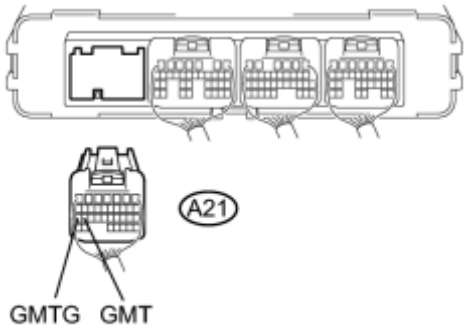
Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-4 (GMT) or A21-26 (GMT) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-8 (GMTG) or A21-27 (GMTG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

*1




*2




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Generator Temperature Sensor) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the power management control ECU connector.

(e) Connect the generator temperature sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| DTC | P0A40-500 | Drive Motor "A" Position Sensor Circuit Range / Performance |
| DTC | P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |

# DESCRIPTION

A resolver is a sensor that is used to detect the position of the magnetic poles the rotor of a motor generator. Knowing the position of the poles is indispensable for ensuring precise control of MG2 and MG1.

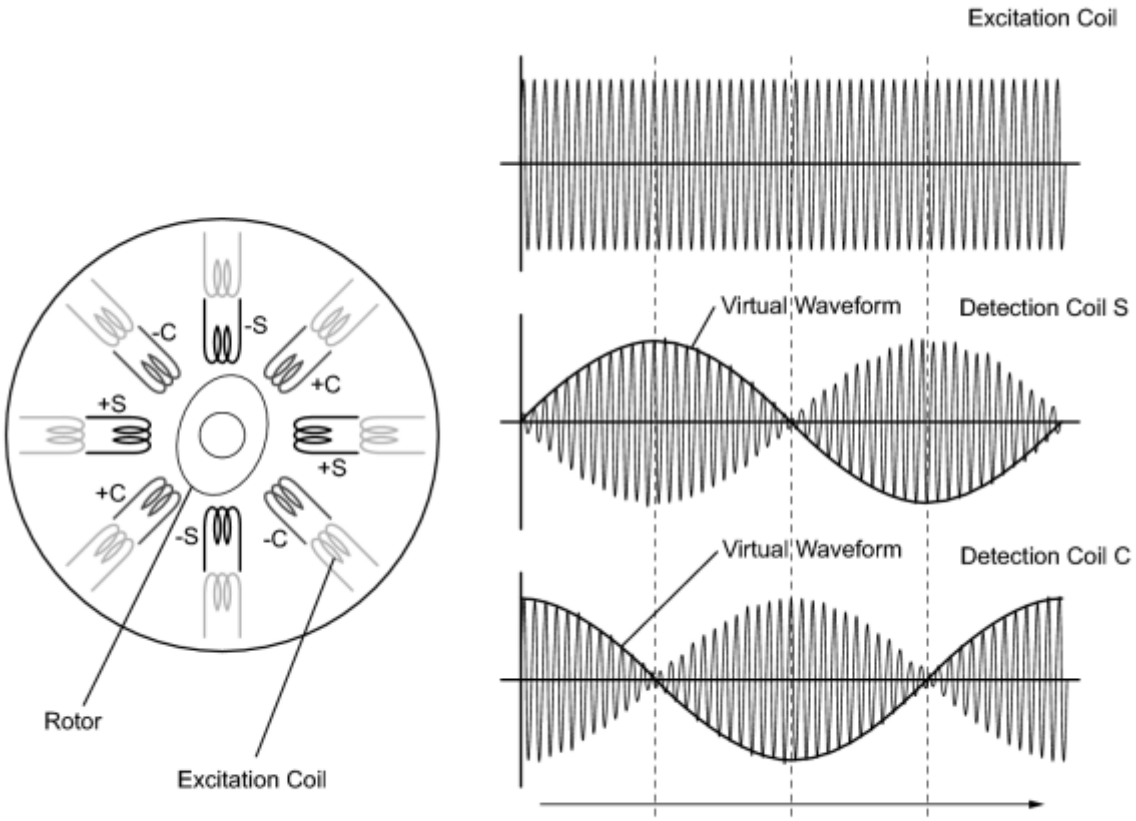
Each resolver contains a stator that has an excitation coil and 2 detection coils (S, C). The gap between the stator and rotor changes as the rotor turns because the rotor is oval shaped. An alternating current with a predetermined frequency flows through the excitation coil, and detection coils S and C output alternating currents in accordance with the sensor rotor position.

The inverter with converter assembly (MG ECU) detects the absolute position of the rotor according to the phases of detection coils S and C and the heights of their waveforms. Furthermore, the CPU calculates the amount of change in the position within a predetermined length of time, in order to use the resolver as a speed sensor.

The MG ECU monitors signals output from the motor resolver and detects malfunctions.

HINT:

The term "drive motor A" indicates MG2.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A3F | 243 | Interphase short in the motor resolver circuit | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| P0A40 | 500 | Motor resolver output is out of the normal range | |
| P0A41 | 245 | Open or short in the motor resolver circuit | |

# MONITOR DESCRIPTION

The MG ECU monitors the motor resolver output signal. If the MG ECU detects output signals that are out of the normal range or specification, it will conclude that there is a malfunction in the motor resolver. If a malfunction is detected, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A3F (INF 243): Short circuit between phases<br><br>P0A40 (INF 500): Range check<br><br>P0A41 (INF245): Circuit discontinuity / short circuit |

| | |
|---|---|
| Required sensors / components | Motor resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

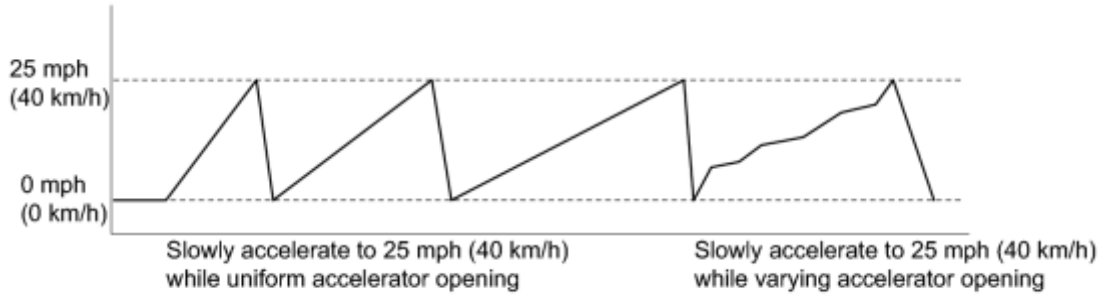
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Motor resolver | DTC P0A3F (INF 243) is not detected<br>DTC P0A40 (INF 500) is not detected<br>DTC P0A41 (INF 245) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.

6. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns.
7. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
8. Check that permanent DTCs are cleared.
9. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

- If INF code 243 is output, there may be an interphase short in the motor resolver due to an intrusion of water into the resolver. If the problem symptom cannot be reproduced, replace the hybrid vehicle transaxle assembly.
- Check for output DTCs again after the repair has been completed. If P0A78-286 or P0A7A-324 is output, replace the inverter with converter assembly.

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If the problem symptom cannot be reproduced, performing a road test on a road on which the vehicle tends to vibrate will make it easier to reproduce the symptom.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 3. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 5. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 6. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A4B-253 | Generator Position Sensor Circuit |
| DTC | P0A4C-513 | Generator Position Sensor Circuit Range / Performance |
| DTC | P0A4D-255 | Generator Position Sensor Circuit Low |

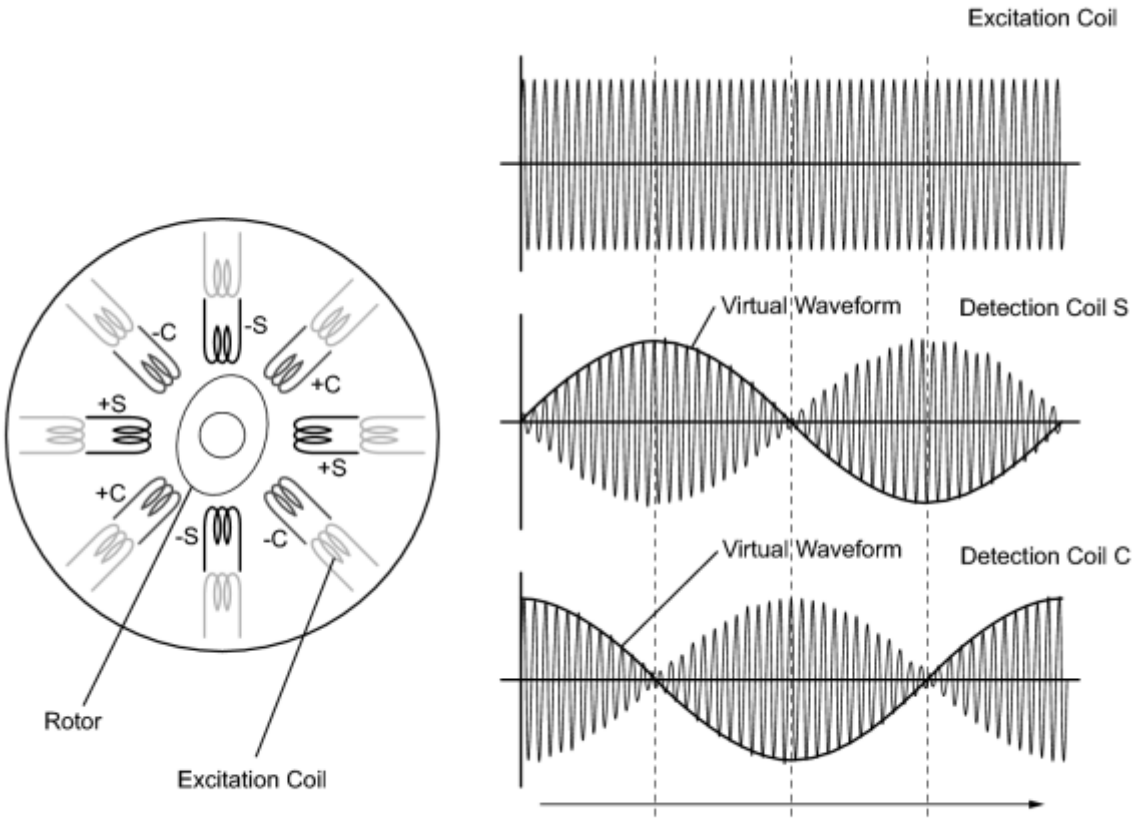
# DESCRIPTION

A resolver is a sensor that is used to detect the position of the magnetic poles the rotor of a motor generator. Knowing the position of the poles is indispensable for ensuring precise control of MG2 and MG1.

Each resolver contains a stator that has an excitation coil and 2 detection coils (S, C). The gap between the stator and rotor changes as the rotor turns because the rotor is oval shaped. An alternating current with a predetermined frequency flows through the excitation coil, and detection coils S and C output alternating currents in accordance with the sensor rotor position.

The inverter with converter assembly (MG ECU) detects the absolute position of the rotor according to the phases of detection coils S and C and the heights of their waveforms. Furthermore, the CPU calculates the amount of change in the position within a predetermined length of time, in order to use the resolver as a speed sensor.

The MG ECU monitors signals output from the motor resolver and detects malfunctions.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A4B | 253 | Interphase short in the generator resolver circuit | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| P0A4C | 513 | Generator resolver output is out of the normal range | |
| P0A4D | 255 | Open or short in the generator resolver circuit | |

# MONITOR DESCRIPTION

The MG ECU monitors the generator resolver output signal. If the MG ECU detects output signals that are out of the normal range or specification, it will conclude that there is a malfunction of the generator resolver. If a malfunction is detected, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A4B (INF 253): Short circuit between phases<br><br>P0A4C (INF 513): Range check |

| | |
|---|---|
| | P0A4D (INF 255): Circuit discontinuity / short circuit |
| Required sensors / components | Generator resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

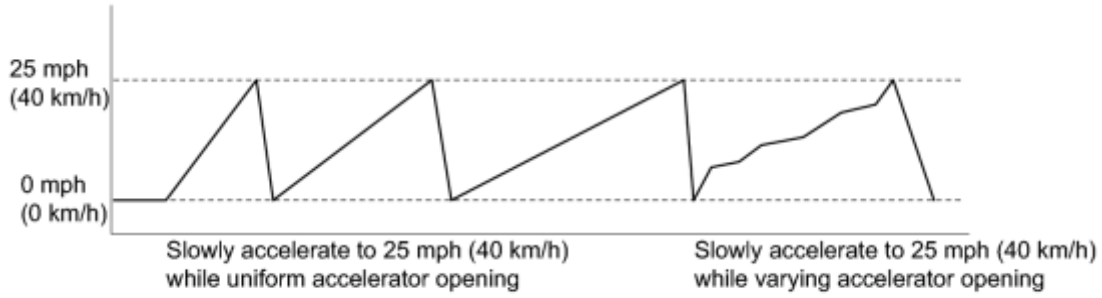
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Generator resolver | DTC P0A4B (INF 253) is not detected<br>DTC P0A4C (INF 513) is not detected<br>DTC P0A4D (INF 255) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.

5. Turn the power switch on (READY) and turn the Techstream on.
6. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns.
7. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
8. Check that permanent DTCs are cleared.
9. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

- If INF code 253 is output, there may be an interphase short in the generator resolver due to an intrusion of water into the resolver. If the problem symptom cannot be reproduced, replace the hybrid vehicle transaxle assembly.
- Check for output DTCs again after the repair has been completed. If P0A78-286 or P0A7A-324 is output, replace the inverter with converter assembly.

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If the problem symptom cannot be reproduced, performing a road test on a road on which the vehicle tends to vibrate will make it easier to reproduce the symptom.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER |

| | |
|---|---|
| | ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 3. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 5. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 6. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A51-174 | Drive Motor "A" Current Sensor Circuit |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A51 | 174 | Motor current sensor high resolution circuit signal is out of range or there is a difference between it and the motor current sensor low resolution circuit current value. | Inverter with converter assembly |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A51-174 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A78-113, 287, 505, 506 | Drive Motor "A" Inverter Performance |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A51-174 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a reproduction test to check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A60-288 | Drive Motor "A" Phase V Current |
| DTC | P0A60-290 | Drive Motor "A" Phase V Current |
| DTC | P0A60-294 | Drive Motor "A" Phase V Current |
| DTC | P0A60-501 | Drive Motor "A" Phase V Current |
| DTC | P0A63-296 | Drive Motor "A" Phase W Current |
| DTC | P0A63-298 | Drive Motor "A" Phase W Current |
| DTC | P0A63-302 | Drive Motor "A" Phase W Current |
| DTC | P0A63-502 | Drive Motor "A" Phase W Current |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors the motor inverter current sensors. P0A60 and P0A63 indicate malfunctions in current sensors, and they do not indicate malfunctions in the high-voltage system.

HINT:

The term "drive motor A" indicates MG2.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A60 | 288 | Malfunction in motor inverter current sensor (phase V sub sensor) | Inverter with converter assembly |
| P0A60 | 290 | Malfunction in motor inverter current sensor (phase V main sensor) | |
| P0A60 | 294 | Malfunction in motor inverter current sensor (performance problem or open phase V) | |
| P0A60 | 501 | Malfunction in motor inverter current sensor (phase V main and sub sensors offset) | |
| P0A63 | 296 | Malfunction in motor inverter current sensor (phase W sub sensor) | |
| P0A63 | 298 | Malfunction in motor inverter current sensor (phase W main sensor) | |
| P0A63 | 302 | Malfunction in motor inverter current sensor (performance problem or open phase W) | |

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A63 | 502 | Malfunction in motor inverter current sensor (phase W main and sub sensors offset) | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) monitors the motor inverter current sensor. If the power management control ECU (HV CPU) detects a fault, it will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A60 (INF 288/290/294/501): Phase V, sub sensor<br><br>P0A63 (INF 296/298/302/502): Phase W, sub sensor |
| Required sensors / components | Motor inverter current sensor, motor resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

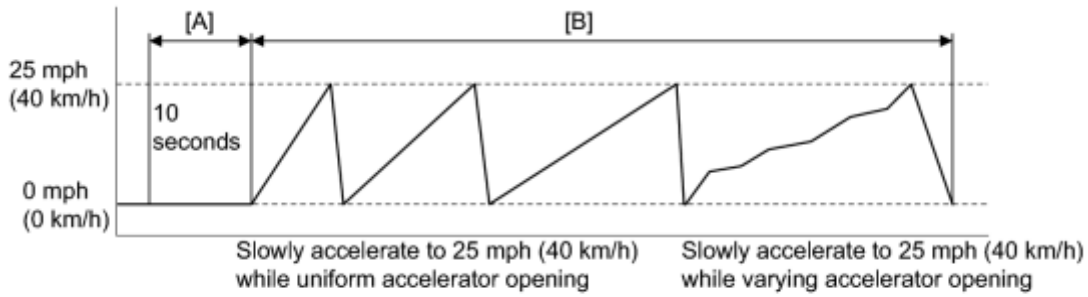
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A60 (INF 288/ 290/ 294/ 501) is not detected<br><br>DTC P0A63 (INF 296/ 298/ 302/ 502) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. With the vehicle stopped and park (P) selected, move the shift lever to N, wait for 10 seconds and then move the shift lever to D. [A]

   NOTICE:

   Do not leave the vehicle for an extended time with the shift lever in N.

7. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns. [B]
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A60 or P0A63 only is output. | A |
| P0A78-202 is output. | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A72-326 | Generator Phase V Current |
| DTC | P0A72-328 | Generator Phase V Current |
| DTC | P0A72-333 | Generator Phase V Current |
| DTC | P0A72-515 | Generator Phase V Current |
| DTC | P0A75-334 | Generator Phase W Current |
| DTC | P0A75-336 | Generator Phase W Current |
| DTC | P0A75-341 | Generator Phase W Current |
| DTC | P0A75-516 | Generator Phase W Current |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors the generator inverter current sensors. P0A72 and P0A75 indicate malfunctions in the current sensors, and they do not indicate malfunctions in the high-voltage system.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A72 | 326 | Malfunction in generator inverter current sensor (phase V sub sensor) | Inverter with converter assembly |
| P0A72 | 328 | Malfunction in generator inverter current sensor (phase V main sensor) | |
| P0A72 | 333 | Malfunction in generator inverter current sensor (performance problem or open phase V) | |
| P0A72 | 515 | Malfunction in generator inverter current sensor (phase V main and sub sensors offset) | |
| P0A75 | 334 | Malfunction in generator inverter current sensor (phase W sub sensor) | |
| P0A75 | 336 | Malfunction in generator inverter current sensor (phase W main sensor) | |
| P0A75 | 341 | Malfunction in generator inverter current sensor (performance problem or open phase W) | |
| P0A75 | 516 | Malfunction in generator inverter current sensor (phase W main and sub sensors offset) | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) monitors the generator inverter current sensor. If the power management control ECU (HV CPU) detects a fault, it will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A72 (INF 326/328/333/515): Phase V, sub sensor<br><br>P0A75 (INF 334/336/341/516): Phase W, sub sensor |
| Required sensors / components | Generator inverter current sensor, Generator resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

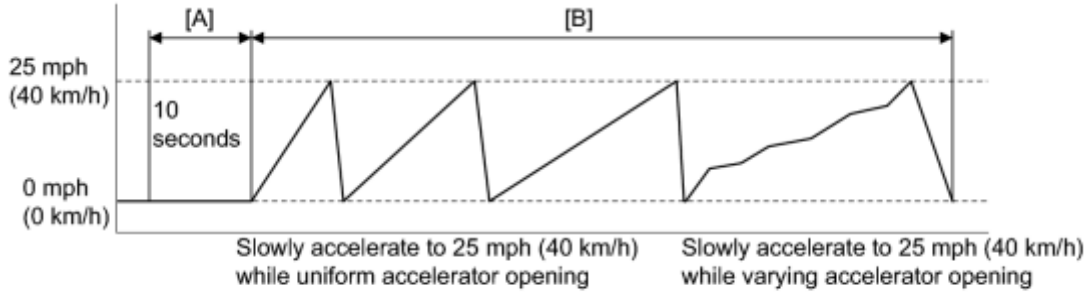
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A72 (INF 326/328/333/515) is not detected<br><br>DTC P0A75 (INF 334/336/341/516) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. With the vehicle stopped and park (p) selected, move the shift lever to N, wait for 10 seconds and then move the shift lever to D. [A]

   NOTICE:

   Do not leave the vehicle for an extended time with the shift lever in N.

7. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns. [B]
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A72 or P0A75 only is output. | A |
| P0A7A-203 is output. | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-113 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If the motor inverter overheats, has a circuit malfunction, or has an internal short, the inverter transmits this information to the MG ECU via the motor inverter fail signal line.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 113 | Motor inverter fail signal detection<br><br>(System overcurrent) | • Hybrid vehicle transaxle assembly<br>• Generator cable<br>• Motor cable<br>• Inverter with converter assembly<br>• Power management control ECU<br>• PCU fuse<br>• Wire harness or connector |

# MONITOR DESCRIPTION

If over-amperage flows through the motor inverter due to an internal short, the motor inverter transmits an inverter fail signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 113): MFIV detection (Over current malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| TMC's intellectual property | - |

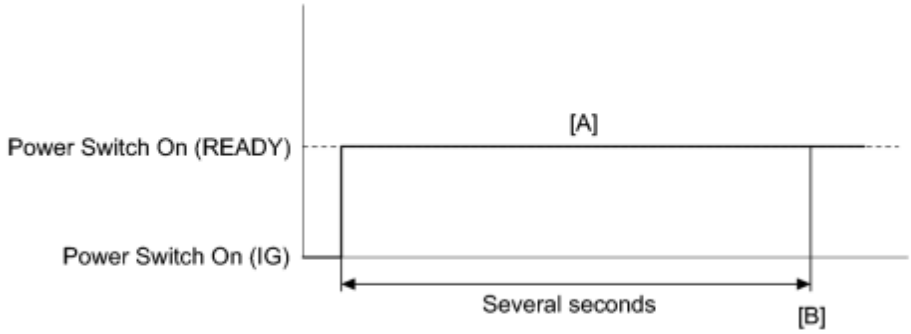
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 113) is not detected |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 113) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-113 is set before any of the DTCs in the table below are set | A |
| Any of the DTCs in the table below are set before P0A78-113 is set | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P3011-123, P3012-123, P3013-123, P0314-123, P3015-123, P3016-123, P0317-123, P3018-123, P3019-123, P3020-123, P3021-123, P3022-123, P3023-123, P3024-123 | Battery Block # Becomes Weak |
| P0AFC-123 | Hybrid Battery Pack Sensor Module |
| P308A-123 | Hybrid Battery Voltage Sensor All Circuits Low |
| P0AC0-123 | Hybrid Battery Pack Current Sensor Circuit Range/Performance |
| P0AC1-123 | Hybrid Battery Pack Current Sensor Circuit Low |
| P0AC2-123 | Hybrid Battery Pack Current Sensor |

| DTC No. | Relevant Diagnosis |
|---|---|
| | Circuit High |
| P0A9C-123 | Hybrid Battery Temperature Sensor "A" |
| P0A9D-123 | Hybrid Battery Temperature Sensor "A" Circuit Low |
| P0A9E-123 | Hybrid Battery Temperature Sensor "A" Circuit High |
| P0AC6-123 | Hybrid Battery Temperature Sensor "B" Range/Performance |
| P0AC7-123 | Hybrid Battery Temperature Sensor "B" Circuit Low |
| P0AC8-123 | Hybrid Battery Temperature Sensor "B" Circuit High |
| P0ACB-123 | Hybrid Battery Pack Cooling Fan 3 Performance or Stuck OFF |
| P0ACC-123 | Hybrid Battery Pack Cooling Fan 3 Stuck ON |
| P0ACD-123 | Hybrid Battery Pack Cooling Fan 3 Control Circuit Low |
| P3065-123 | Hybrid Battery Temperature Sensor Correlation for Stack "A" |

HINT:

P0A78-113 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-202 is not output. | A |
| P0A78-202 is also output. | B |

NOTICE:

- If P0A78-202 is output, troubleshoot it first. After completing the troubleshooting for P0A78-202, return to perform troubleshooting for this DTC.
- Parts repaired or replaced during troubleshooting for P0A78-202 do not need to be re-inspected in this diagnosis procedure.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

HINT:

- If P0A78-202 was not output in step 2 of this diagnosis procedure, check Table 1 below.
- If P0A78-202 was output in step 2 of this diagnosis procedure, repair that DTC first, then check Table 2 below.

Result:

| Result | Proceed to |
|---|---|
| P0A78-113 only is output | A |
| Any of the following DTCs are also output. | B |

**Table 1**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

**Table 2**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60-294 | Drive Motor "A" Phase V Current |
| P0A63-302 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-113 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 4. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 6. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 8. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) |

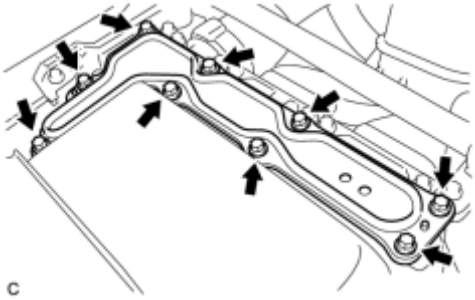
CAUTION:

Be sure to wear insulated gloves.

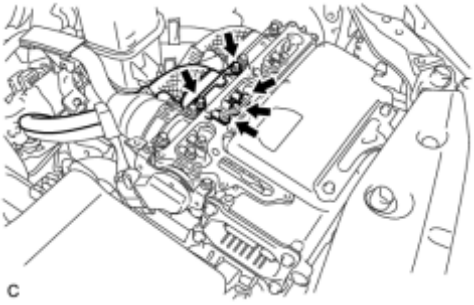
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check that the bolts for the generator cable are tightened to the specified torque, the generator cable is connected securely, and there are no contact problems.

Specified Condition:

T=8.0 N*m {82 kgf*cm, 71 in.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).

(d) Check for arc marks at the bolts for the generator cable.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter terminal cover.

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 10. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) |

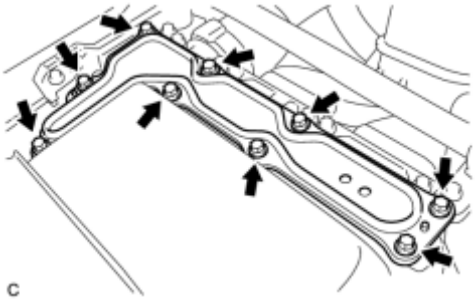
CAUTION:

Be sure to wear insulated gloves.

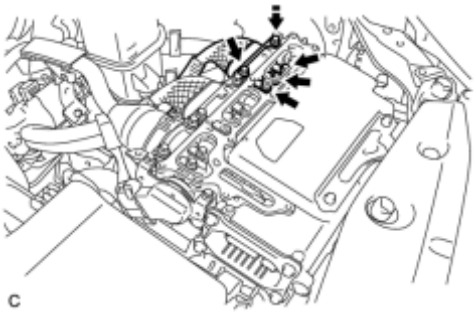
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check that the bolts for the motor cable are tightened to the specified torque, the motor cable is connected securely, and there are no contact problems.

Specified Condition:

T=8.0 N*m {82 kgf*cm, 71 in.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).

(d) Check for arc marks at the bolts for the motor cable.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter terminal cover.

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 11. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

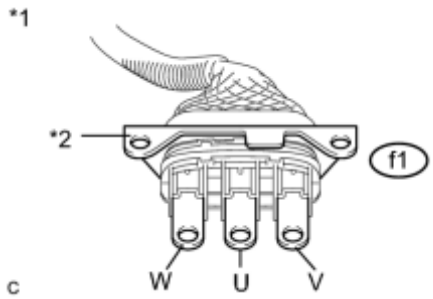
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Disconnect the generator cable and motor cable from the inverter with converter assembly.




(d) Check MG1 for an interphase short using a milliohmmeter.

(1) Using a milliohmmeter, measure the resistance according to the value(s) in the table below.

HINT:

If the MG1 temperature is high, the resistance will vary greatly from the specification. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - f1-3 (V) | Power switch off | 87.0 to 96.2 mΩ |
| f1-3 (V) - f1-1 (W) | Power switch off | 87.0 to 96.2 mΩ |

| | | |
|---|---|---|
| f1-1 (W) - f1-2 (U) | Power switch off | 87.0 to 96.2 mΩ |

## Text in Illustration

| | |
|---|---|
| *1 | Generator Cable |
| *2 | Shield Ground |

HINT:

To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 68° F (20°C).

R20 = Rt / {1 + 0.00393 X (T - 20)}

The calculation is based on the following:

R20: Resistance at 68° F (20°C) (mΩ)

Rt: Measured resistance (mΩ)

T: Temperature when the resistance is measured (° C)

(e) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

(f) Connect the generator cable and motor cable.

(g) Install the inverter terminal cover.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 12. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) |

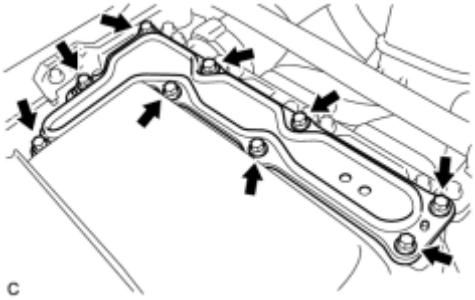
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.

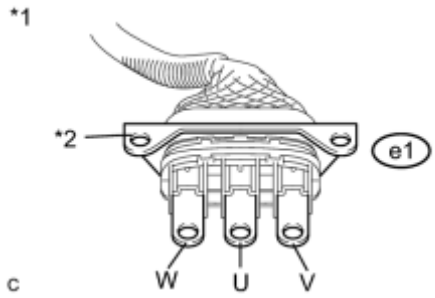
(c) Disconnect the generator cable and motor cable from the inverter with converter assembly.

(d) Check MG2 for an interphase short using a milliohmmeter.

(1) Using a milliohmmeter, measure the resistance according to the value(s) in the table below.

HINT:

If the MG2 temperature is high, the resistance will vary greatly from the specification. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - e1-3 (V) | Power switch off | 154 to 170 mΩ |
| e1-3 (V) - e1-1 (W) | Power switch off | 148 to 164 mΩ |
| e1-1 (W) - e1-2 (U) | Power switch off | 149 to 165 mΩ |

# Text in Illustration

| | |
|---|---|
| *1 | Motor Cable |
| *2 | Shield Ground |

HINT:

To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 68° F (20°C).

R20 = Rt / {1 + 0.00393 X (T - 20)}

The calculation is based on the following:

R20: Resistance at 68° F (20°C) (mΩ)

Rt: Measured resistance (mΩ)

T: Temperature when the resistance is measured (° C)

(e) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

(f) Connect the generator cable and motor cable.

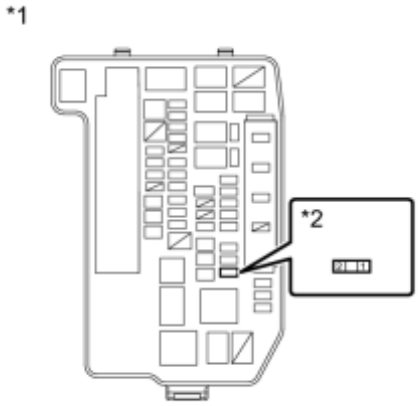
(g) Install the inverter terminal cover.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 13. | CHECK FUSE (PCU) |

(a) Remove the PCU fuse from the engine room junction block assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| PCU fuse terminal | Always | Below 1Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | PCU fuse |

(c) Install the PCU fuse.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 14. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

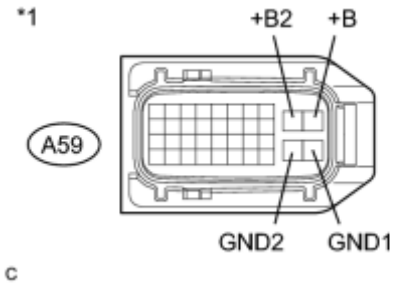
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-28 (GND1) - Body ground | Power switch off | Below 1 Ω |
| A59-27 (GND2) - Body ground | Power switch off | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-10 (+B) - Body ground | Power switch on (IG) | 11 to 14V |
| A59-9 (+B2) - Body ground | Power switch on (IG) | 11 to 14V |

(f) Turn the power switch off.

(g) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK ▼

| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

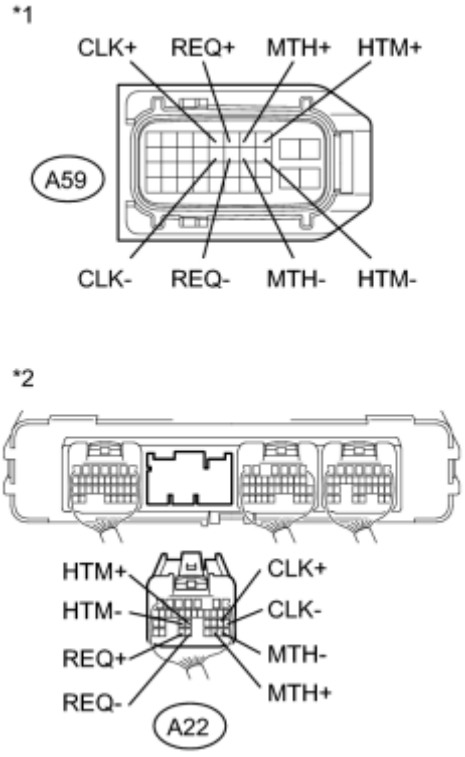
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Turn the power switch off.

(c) Disconnect connector A59 from the inverter with converter assembly.

(d) Disconnect connector A22 from the power management control ECU.

(e) Measure the resistance according to the value(s) in the table below.




Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) - A59-8 (HTM+) | Power switch off | Below 1 Ω |
| A22-25 (HTM-) - A59-18 (HTM-) | Power switch off | Below 1 Ω |
| A22-30 (MTH+) - A59-7 (MTH+) | Power switch off | Below 1 Ω |
| A22-29 (MTH-) - A59-17 (MTH-) | Power switch off | Below 1 Ω |
| A22-33 (REQ+) - A59-6 (REQ+) | Power switch off | Below 1 Ω |
| A22-32 (REQ-) - A59-16 (REQ-) | Power switch off | Below 1 Ω |
| A22-21 (CLK+) - A59-5 (CLK+) | Power switch off | Below 1 Ω |
| A22-20 (CLK-) - A59-15 (CLK-) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) or A59-8 (HTM+) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-25 (HTM-) or A59-18 (HTM-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-30 (MTH+) or A59-7 (MTH+) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-29 (MTH-) or A59-17 (MTH-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-33 (REQ+) or A59-6 (REQ+) - | Power switch | 10 kΩ or |

| | | |
|---|---|---|
| Body ground and other terminals | off | higher |
| A22-32 (REQ-) or A59-16 (REQ-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-21 (CLK+) or A59-5 (CLK+) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-20 (CLK-) or A59-15 (CLK-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(f) Turn the power switch on (IG).

(g) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) or A59-8 (HTM+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-25 (HTM-) or A59-18 (HTM-) - Body ground | Power switch on (IG) | Below 1 V |
| A22-30 (MTH+) or A59-7 (MTH+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-29 (MTH-) or A59-17 (MTH-) - Body ground | Power switch on (IG) | Below 1 V |
| A22-33 (REQ+) or A59-6 (REQ+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-32 (REQ-) or A59-16 (REQ-) - Body ground | Power switch on (IG) | Below 1 V |
| A22-21 (CLK+) or A59-5 (CLK+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-20 (CLK-) or A59-15 (CLK-) - Body ground | Power switch on (IG) | Below 1 V |

NOTICE:

Turning the power switch on (IG) with the power management control ECU and inverter with converter assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(h) Turn the power switch off.

(i) Connect the power management control ECU connector.

(j) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

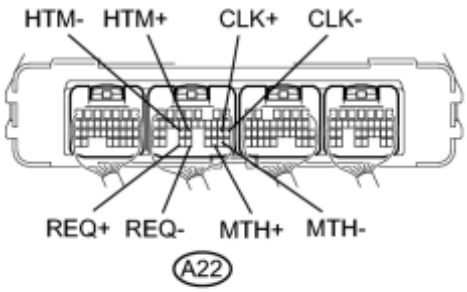
| | |
|---|---|
| 16. | CHECK POWER MANAGEMENT CONTROL ECU |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) - A22-25 (HTM-) | Power switch off | 80 to 170 Ω |
| A22-30 (MTH+) - A22-29 (MTH-) | Power switch off | 80 to 170 Ω |
| A22-33 (REQ+) - A22-32 (REQ-) | Power switch off | 80 to 170 Ω |
| A22-21 (CLK+) - A22-20 (CLK-) | Power switch off | 80 to 170 Ω |

*1




P

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 17. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 18. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 19. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 20. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 21. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 22. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 23. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

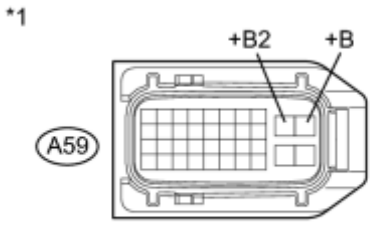
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-10 (+B) - Body ground | Power switch off | 10 kΩ or higher |
| A59-9 (+B2) - Body ground | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 24. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **REPLACE FUSE (PCU)**

| | |
|---|---|
| 25. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT **REPLACE FUSE (PCU)**

| | |
|---|---|
| 26. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) |

CAUTION:

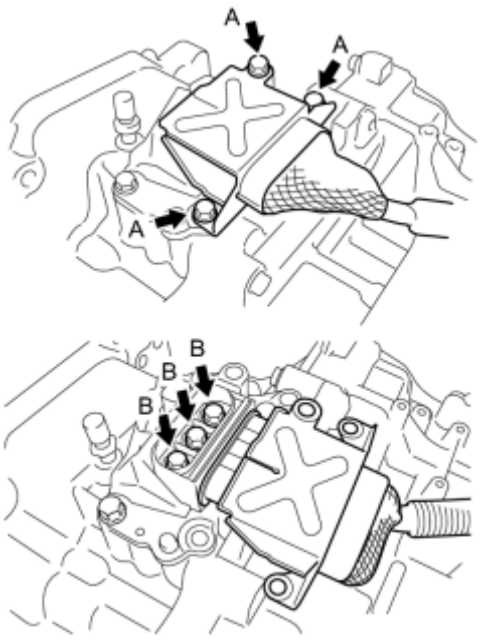
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the inverter with converter assembly.




(c) Check that the bolts for the generator cable are tightened to the specified torque, the generator cable is connected securely, and there are no contact problems.

Specified Condition:

Bolt A

T=20 N*m {204 kgf*cm, 15 ft.*lbf}

Bolt B

T=10 N*m {102 kgf*cm, 7 ft.*lbf}

- Make sure that the tightening torque of the bolt A is between 16 and 24 N*m (163 and 245 kgf*cm, 12 and 18 ft.*lbf).
- Make sure that the tightening torque of the bolt B is between 8 and 12 N*m (82 and 122 kgf*cm, 71 and 106 in.*lbf).

(d) Check for arc marks at the bolts for the generator cable.

Result:

| Result | Proceed to |
|---|---|

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter with converter assembly.

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 27. | CHECK GENERATOR CABLE |

CAUTION:

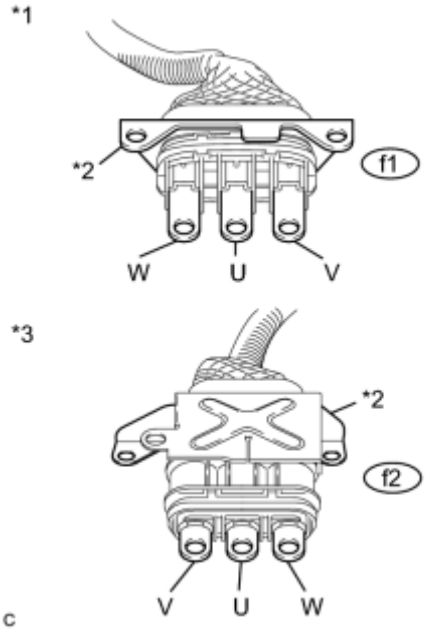
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the generator cable.




(c) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Generator Cable<br><br>(Inverter with Converter Assembly Side) |
| *2 | Shielded ground |
| *3 | Generator Cable<br><br>(Hybrid Vehicle Transaxle Assembly Side) |

NOTICE:

Wrap the terminal of the three-phase AC cable with insulating tape to prevent them from coming into contact with body ground

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - f2-2 (U) | Power switch off | Below 1 Ω |
| f1-3 (V) - f2-1 (V) | Power switch off | Below 1 Ω |
| f1-1 (W) - f2-3 (W) | Power switch off | Below 1 Ω |
| f1-2 (U) - f2-1 (V) | Power switch off | 100 MΩ or higher |
| f1-3 (V) - f2-3 (W) | Power switch off | 100 MΩ or higher |
| f1-1 (W) - f2-2 (U) | Power switch off | 100 MΩ or higher |

(e) Install the generator cable.

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 28. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) |

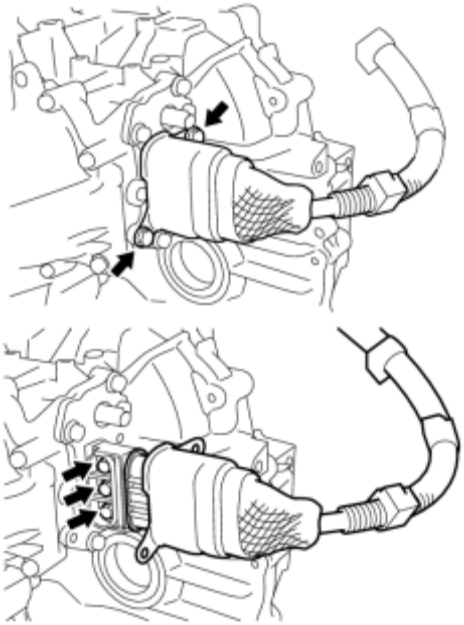
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Check that the bolts for the motor cable are tightened to the specified torque, the motor cable is connected securely, and there are no contact problems.

Specified Condition:

T=10 N*m {102 kgf*cm, 7 ft.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 8 and 12 N*m (82 and 122 kgf*cm, 71 and 106 in.*lbf).

(c) Check for arc marks at the bolts for the motor cable.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 29. | CHECK MOTOR CABLE |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

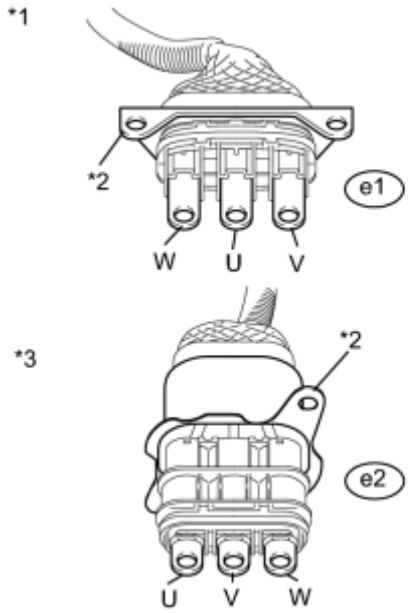
(b) Remove the motor cable.

(c) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Motor Cable<br><br>(Inverter with Converter Assembly Side) |
| *2 | Shielded ground |
| *3 | Motor Cable<br><br>(Hybrid Vehicle Transaxle Assembly Side) |

NOTICE:

Wrap the terminal of the three-phase AC cable with insulating tape to prevent them from coming into contact with body ground

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - e2-3 (U) | Power switch off | Below 1 Ω |
| e1-3 (V) - e2-2 (V) | Power switch off | Below 1 Ω |
| e1-1 (W) - e2-1 (W) | Power switch off | Below 1 Ω |
| e1-2 (U) - e2-2 (V) | Power switch off | 100 MΩ or higher |
| e1-3 (V) - e2-1 (W) | Power switch off | 100 MΩ or higher |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-1 (W) - e2-3 (U) | Power switch off | 100 MΩ or higher |

(e) Install the motor cable.

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-121 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an overvoltage occurs in the motor inverter or generator inverter, the MG ECU detects it and transmits this information to the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 121 | Motor inverter overvoltage signal detection (overvoltage due to system malfunction) | • Hybrid battery junction block<br>• Inverter with converter assembly<br>• Service plug grip (EV battery fuse)<br>• Frame wire<br>• Hybrid vehicle transaxle assembly<br>• Generator Cable<br>• Motor Cable<br>• Power management control ECU<br>• PCU fuse<br>• Wire harness or connector |

# MONITOR DESCRIPTION

If the motor inverter detects over-voltage, it transmits an over-voltage signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 121): OVH detection (Over voltage malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

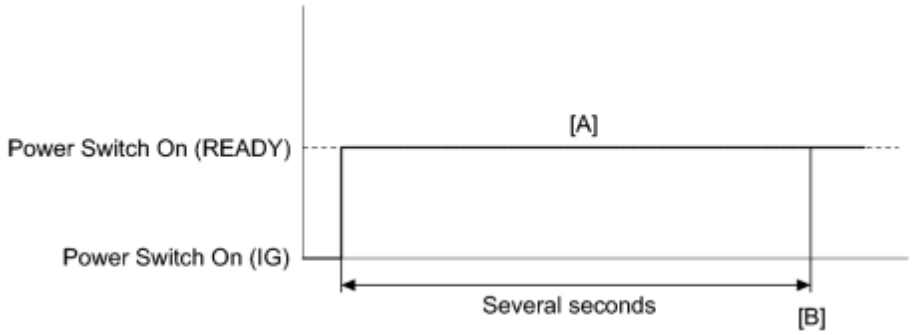
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 121) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P0AE6-225 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-121 is set before any of the DTCs in the table below are set | A |
| Any of the DTCs in the table below are set before P0A78-121 is set | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P3011-123, P3012-123, P3013-123, P0314-123, P3015-123, P3016-123, P0317-123, P3018-123, P3019-123, P3020-123, P3021-123, P3022-123, | Battery Block # Becomes Weak |

| DTC No. | Relevant Diagnosis |
|---|---|
| P3023-123, P3024-123 | |
| P0AFC-123 | Hybrid Battery Pack Sensor Module |
| P308A-123 | Hybrid Battery Voltage Sensor All Circuits Low |
| P0AC0-123 | Hybrid Battery Pack Current Sensor Circuit Range/Performance |
| P0AC1-123 | Hybrid Battery Pack Current Sensor Circuit Low |
| P0AC2-123 | Hybrid Battery Pack Current Sensor Circuit High |
| P0A9C-123 | Hybrid Battery Temperature Sensor "A" |
| P0A9D-123 | Hybrid Battery Temperature Sensor "A" Circuit Low |
| P0A9E-123 | Hybrid Battery Temperature Sensor "A" Circuit High |
| P0AC6-123 | Hybrid Battery Temperature Sensor "B" Range/Performance |
| P0AC7-123 | Hybrid Battery Temperature Sensor "B" Circuit Low |
| P0AC8-123 | Hybrid Battery Temperature Sensor "B" Circuit High |
| P0ACB-123 | Hybrid Battery Pack Cooling Fan 3 Performance or Stuck OFF |
| P0ACC-123 | Hybrid Battery Pack Cooling Fan 3 Stuck ON |
| P0ACD-123 | Hybrid Battery Pack Cooling Fan 3 Control Circuit Low |
| P3065-123 | Hybrid Battery Temperature Sensor Correlation for Stack "A" |

HINT:

- Refer to the Freeze Frame data to determine the order in which the DTCs were set.
- P0A78-121 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-121 only is output | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-113, 128, 266, 267, 279, 284, 286, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-122, 130, 322, 324, 325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-172, 442, 547, 548, 549, 553, 554, 555, 556, 557, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0ADB-227 | Hybrid Battery Positive Contactor Control Circuit Low |
| P0ADC-226 | Hybrid Battery Positive Contactor Control Circuit High |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0ADF-229 | Hybrid Battery Negative Contactor Control Circuit Low |
| P0AE0-228 | Hybrid Battery Negative Contactor Control Circuit High |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |
| P3004-803 | High Voltage Power Resource |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-121 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 5. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 7. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 8. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 10. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 11. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 12. | CHECK INVERTER WITH CONVERTER ASSEMBLY (HIGH VOLTAGE CONNECTOR CONNECTION CONDITION) |

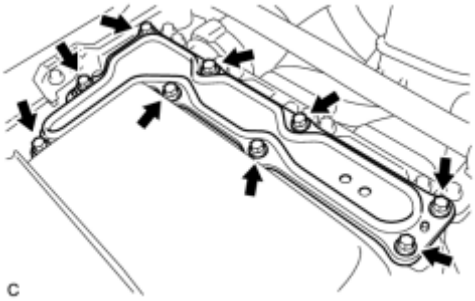
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

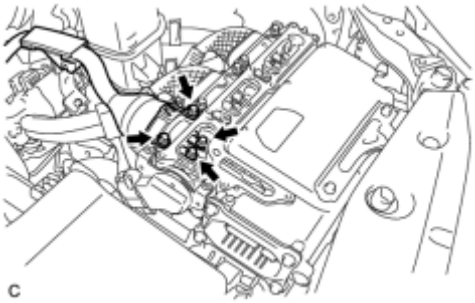
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Check that the bolts for the frame wire are tightened to the specified




torque, the frame wire is connected securely, and there are no contact problems.

Specified Condition:

T=8.0 N*m {82 kgf*cm, 71 in.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).

(d) Check for arc marks at the bolts for the frame wire.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter terminal cover.

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 13. | CHECK SERVICE PLUG GRIP (CONNECTION CONDITION) |

CAUTION:

Be sure to wear insulated gloves.

(a) Visually check the connection of the service plug grip to the HV battery. Remove the service plug grip and check for contamination.

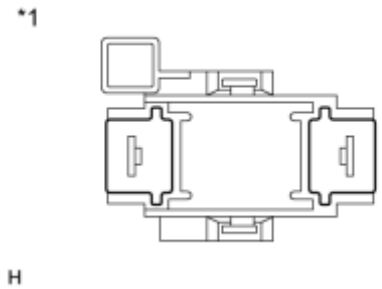
OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

NG ▶ REPLACE SERVICE PLUG GRIP
OK ▼

| | |
|---|---|
| 14. | CHECK SERVICE PLUG GRIP |

(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Service plug grip terminals | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Service plug grip |

NG ▶ REPLACE SERVICE PLUG GRIP

OK ▼

| | |
|---|---|
| 15. | CHECK FRAME WIRE |

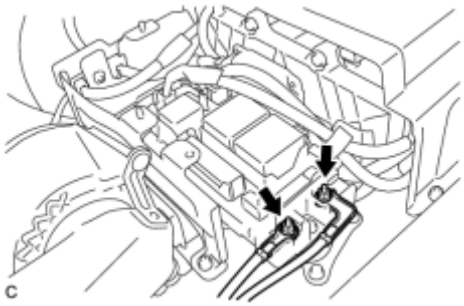
CAUTION:

Be sure to wear insulated gloves.

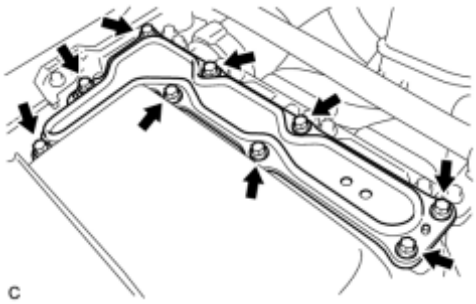
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

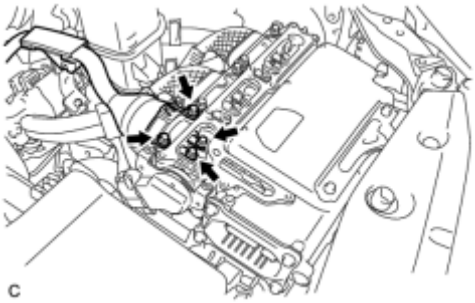



(b) Disconnect the frame wire from the hybrid battery junction block.

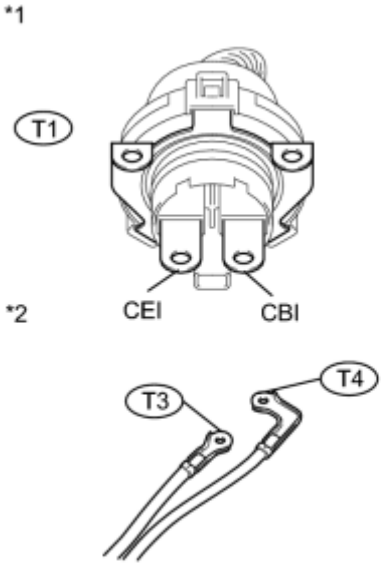



(c) Remove the inverter terminal cover from the inverter with converter assembly.

(d) Disconnect the frame wire from the inverter with converter assembly.




(e) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| T4-1 - T1-2 (CBI) (Positive terminal) | Power switch off | Below 1 Ω |
| T3-1 - T1-1 (CEI) (Negative terminal) | Power switch off | Below 1 Ω |

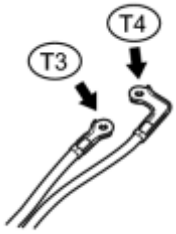
# Text in Illustration

| | |
|---|---|
| *1 | Frame Wire (Inverter with Converter Assembly Side) |
| *2 | Frame Wire (Hybrid Battery Junction Block Side) |

(f) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| T4-1 - Body ground and shielded ground | Power switch off | 10 MΩ or higher |
| T3-1 - Body ground and shielded ground | Power switch off | 10 MΩor higher |
| T3-1 - T4-1 | Power switch off | 10 MΩ or higher |

(g) Connect the frame wire to the hybrid battery junction block.

(h) Connect the frame wire to the inverter with converter assembly.

(i) Install the inverter terminal cover.

NG ▶ REPLACE FRAME WIRE

OK

▼

| | |
|---|---|
| 16. | INSPECT HYBRID BATTERY JUNCTION BLOCK (SMRB) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

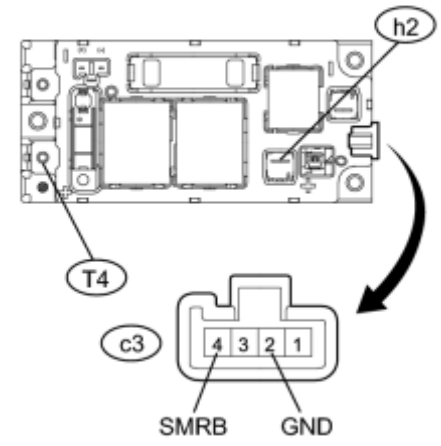
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the hybrid battery junction block.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| h2 - T4 | Auxiliary battery voltage is not applied between terminals c3-4 (SMRB) and c3-2 (GND) | 10 kΩ or higher |
| h2 - T4 | Auxiliary battery voltage is applied between terminals c3-4 (SMRB) and c3-2 (GND) | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Hybrid Battery Junction Block |

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| c3-4 (SMRB) - c3-2 (GND) | -40 to 176°F(-40 to 80°C ) | 19.0 to 35.5 Ω |

(e) Install the hybrid battery junction block.

NG ▶ REPLACE HYBRID BATTERY JUNCTION BLOCK

OK ▼

| | |
|---|---|
| 17. | INSPECT HYBRID BATTERY JUNCTION BLOCK (SMRG) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

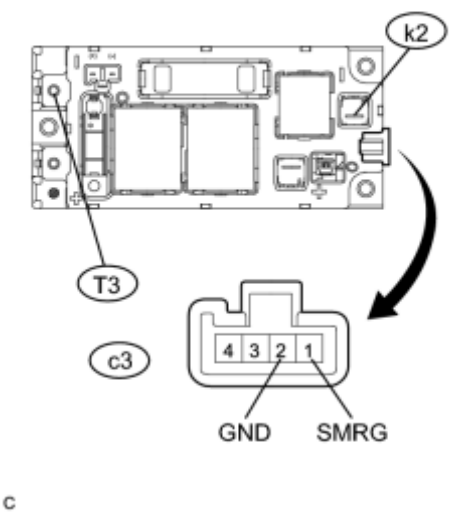
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the hybrid battery junction block.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| k2 - T3 | Auxiliary battery voltage is not applied between terminals c3-1 (SMRG) and c3-2 (GND) | 10 kΩ or higher |
| k2 - T3 | Auxiliary battery voltage is applied between terminals c3-1 (SMRG) and c3-2 (GND) | Below 1 Ω |

# Text in Illustration

| | |
|---|---|
| *1 | Hybrid Battery Junction Block |

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| c3-1 (SMRG) - c3-2 (GND) | -40 to 176°F (-40 to 80°C) | 19.0 to 35.5 Ω |

(e) Install the hybrid battery junction block.

NG ▶ REPLACE HYBRID BATTERY JUNCTION BLOCK

OK ▼

| | |
|---|---|
| 18. | CHECK FUSE (PCU) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 19. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK ▼

| | |
|---|---|
| 20. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 21. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 22. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 23. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 24. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 25. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 26. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 27. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 28. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▼

| | |
|---|---|
| 29. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 30. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 31. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 32. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 33. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 34. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-128 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an abnormal amount of current flows through the motor inverter, the MG ECU detects it and sends a signal to inform the power management control ECU (HV CPU) of the malfunction.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 128 | Abnormal motor current value detection (System malfunction) | • Hybrid vehicle transaxle assembly<br>• Generator cable<br>• Motor cable<br>• Inverter with converter assembly<br>• Power management control ECU<br>• PCU fuse<br>• Wire harness or connector |

# MONITOR DESCRIPTION

The MG ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 128): Motor inverter abnormal current |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

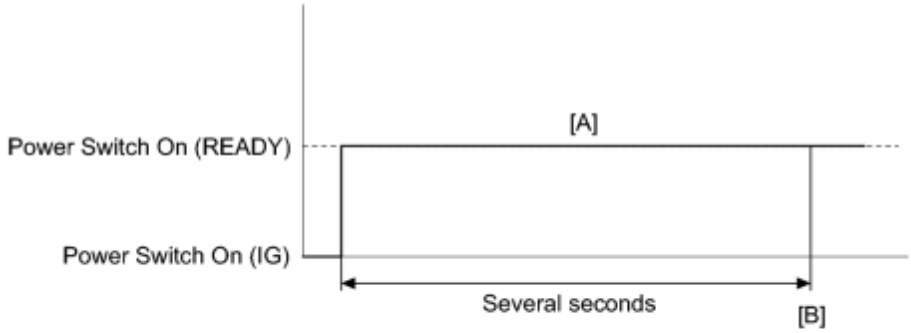
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 128) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-202 is not output | A |
| P0A78-202 is also output | B |

NOTICE:

- If P0A78-202 is output, troubleshoot it first. After completing the troubleshooting for P0A78-202, return to perform troubleshooting for this DTC.
- Parts repaired or replaced during troubleshooting for P0A78-202 do not need to be re-inspected in this diagnosis procedure.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

HINT:

- If P0A78-202 was not output in step 1 of this diagnosis procedure, check Table 1 below.
- If P0A78-202 was output in step 1 of this diagnosis procedure, repair that DTC first, then check Table 2 below.

Result:

| Result | Proceed to |
|---|---|
| P0A78-128 only is output. | A |
| Any of the following DTCs are also output. | B |

**Table 1**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

**Table 2**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60-294 | Drive Motor "A" Phase V Current |
| P0A63-302 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-128 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 5. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 7. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK

| | |
|---|---|
| 8. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A

| | |
|---|---|
| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A

| | |
|---|---|
| 10. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK

| | |
|---|---|
| 11. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 12. | CHECK FUSE (PCU) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK ▼

| | |
|---|---|
| 14. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 15. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 16. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 17. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 18. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 19. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 20. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

| | |
|---|---|
| 21. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 22. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK

| | |
|---|---|
| 23. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 24. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 25. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 26. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 27. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 28. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-202 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 202 | Malfunction (short circuit) in the motor inverter inside the inverter with converter assembly | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Motor cable |

# MONITOR DESCRIPTION

The MG ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 202): MFIV detection (Short circuit malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

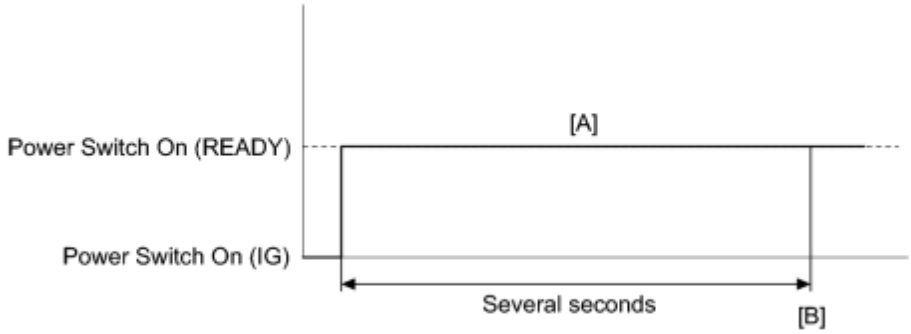
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 202) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

- DTC P0A78-202 is stored after any of DTCs P0A78-113, 128, 284, 286, 287, 505, 506, 806, 807 and 808 are stored. After troubleshooting and repairing DTC P0A78-202, be sure to troubleshoot all the other DTCs.
- Depending on the conditions in which the vehicle is being operated when a short circuit occurs in the inverter with converter assembly, the hybrid vehicle transaxle assembly may be affected. As this DTC is stored if a short circuit occurs in the inverter with converter assembly, it is necessary to perform a road test to check the hybrid vehicle transaxle assembly. If problems are found, replace the malfunctioning parts.
- After completing the repair, including the repair of previously output DTCs, drive the vehicle at a speed of approximately 25 mph (40 km/h) for 1 minute and check that DTC P0A90-251 (Drive Motor "A" Performance) is not output. If DTC P0A90-251 (Drive Motor "A" Performance) is output, replace the hybrid vehicle transaxle assembly.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY INFO |

NG ▶ CHECK MOTOR CABLE

OK ▼

| | |
|---|---|
| 2. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ CHECK DTC OUTPUT (HV)

| | |
|---|---|
| 3. | CHECK MOTOR CABLE INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2)

OK ▼

| | |
|---|---|
| 4. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

NEXT ▼

| | |
|---|---|
| 5. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ CHECK DTC OUTPUT (HV)

| | |
|---|---|
| 6. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the motor cable from the hybrid vehicle transaxle assembly.

(c) Check MG2 for an interphase short using a milliohmmeter.

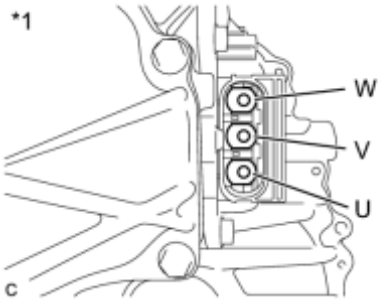
(1) Using a milliohmmeter, measure the resistance according to the value(s) in the table below.

HINT:

If the MG2 temperature is high, the resistance will vary greatly from the specification. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e2-3 (U) - e2-2 (V) | Power switch off | 154 to 170 mΩ |
| e2-2 (V) - e2-1 (W) | Power switch off | 148 to 164 mΩ |
| e2-1 (W) - e2-3 (U) | Power switch off | 149 to 165 mΩ |




# Text in Illustration

| | |
|---|---|
| *1 | Hybrid Vehicle Transaxle Assembly |

HINT:

To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 68° F (20°C).

R20 = Rt / {1 + 0.00393 X (T - 20)}

The calculation is based on the following:

R20: Resistance at 68° F (20°C) (mΩ)

Rt: Measured resistance (mΩ)

T: Temperature when the resistance is measured (° C)

(d) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e2-3 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e2-2 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e2-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

(e) Connect the motor cable.

NG ▶ REPLACE MOTOR CABLE

OK

▼

| | |
|---|---|
| 7. | REPLACE MOTOR CABLE |

(a) Replace the motor cable INFO.

NEXT

▼

| | |
|---|---|
| 8. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ CHECK DTC OUTPUT (HV)

| | |
|---|---|
| 9. | REPLACE MOTOR CABLE |

(a) Replace the motor cable INFO.

NEXT

▼

| | |
|---|---|
| 10. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

NEXT

▼

| | |
|---|---|
| 11. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT

| | |
|---|---|
| 12. | CHECK DTC OUTPUT (HV) |

(a) Check the other DTCs that were output together with DTC P0A78-202.

Result:

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A78-113, 128, 284, 286, 287, 505, 506, 806, 807, 808 | Drive Motor "A" Inverter Performance |

NOTICE:

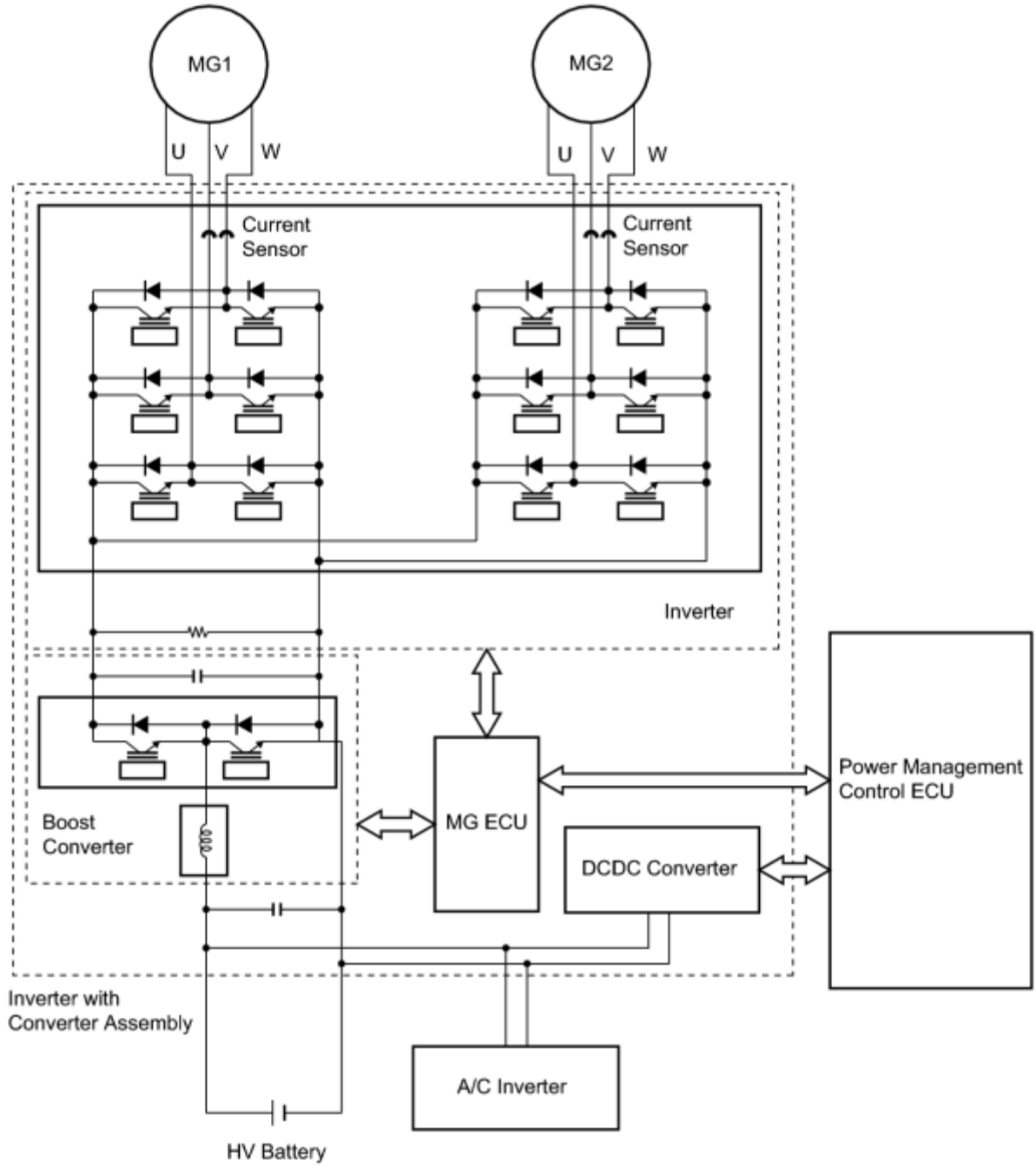
DTC P0A78-202 is stored after any of DTCs P0A78-113, 128, 284, 286, 287, 505, 506, 806, 807 and 808 are stored. After troubleshooting and repairing DTC P0A78-202, be sure to troubleshoot all the other DTCs.

NEXT **GO TO DTC CHART**

| | | |
|---|---|---|
| DTC | P0A78-266 | Drive Motor "A" Inverter Performance |
| DTC | P0A78-267 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

The inverter contains a three-phase bridge circuit, which consists of six power transistors (IGBTs) each for MG1 and MG2. The inverter converts high-voltage direct current from the HV battery into three-phase alternating current for MG1 and MG2; it also converts three-phase alternating current supplied by MG1 and MG2 into direct current for the HV battery. The MG ECU controls the actuation of the power transistors (IGBTs). The inverter transmits information necessary for control, such as amperage and voltage, to the MG ECU.




c

The MG ECU uses an inverter voltage sensor, which is built into the inverter, to detect boosted high voltage to allow control of the voltage boost.

The MG ECU monitors the inverter voltage sensor and detects the following malfunctions.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 266 | Short to GND in the inverter voltage (VH) signal line | Inverter with converter assembly |
| P0A78 | 267 | Open or short to +B in the inverter voltage (VH) signal line | |

# MONITOR DESCRIPTION

The MG ECU monitors the inverter voltage (VH) sensor circuit. If the MG ECU detects an open or short in the VH sensor circuit, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 266): VH malfunction (GND short malfunction)<br><br>P0A78 (INF 267): VH malfunction (+B short and disconnection malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

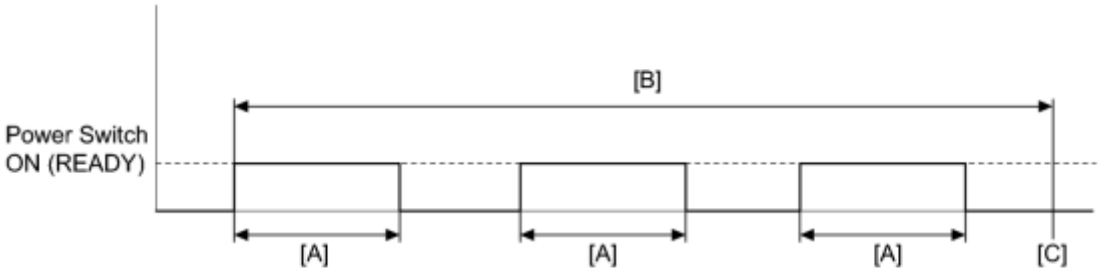
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 266/267) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

HINT:

The signal line from the inverter voltage (VH) sensor is connected to the MG ECU inside the inverter with converter assembly. If P0A78-266 or P0A78-267 is output, replace the inverter with converter assembly.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A78-279 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an overvoltage occurs in the motor inverter or generator inverter, the MG ECU detects it and transmits this information to the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 279 | Motor inverter overvoltage signal detection (overvoltage (inverter malfunction)) | Inverter with converter assembly |

# MONITOR DESCRIPTION

If the motor inverter detects overvoltage, it will transmit an overvoltage signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 279): OVH detection (Over voltage malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

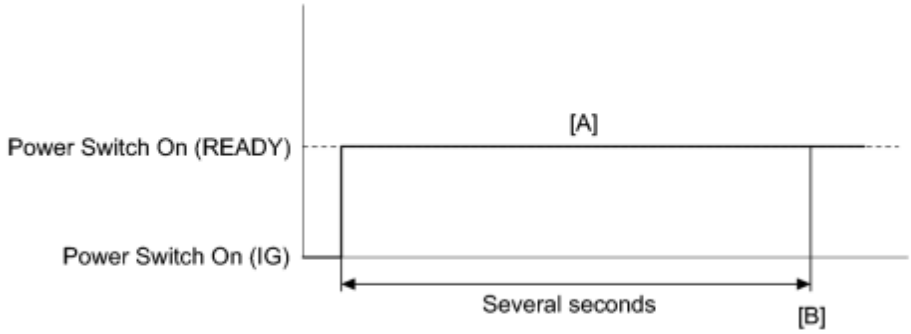
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 279) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-279 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A78-266, 267, 287, 505, 506, 565, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A94-554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0ADB-227 | Hybrid Battery Positive Contactor Control Circuit Low |
| P0ADC-226 | Hybrid Battery Positive Contactor Control Circuit High |
| P0ADF-229 | Hybrid Battery Negative Contactor Control Circuit Low |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0AE0-228 | Hybrid Battery Negative Contactor Control Circuit High |
| P3004-803 | High Voltage Power Resource |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-279 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-282 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an overvoltage occurs in the motor inverter or generator inverter, the MG ECU detects it and transmits this information to the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 282 | Motor inverter overvoltage signal detection (circuit malfunction) | Inverter with converter assembly |

# MONITOR DESCRIPTION

If the motor inverter detects a circuit malfunction, it will transmit a motor inverter overvoltage signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 282): OVH detection (Circuit malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

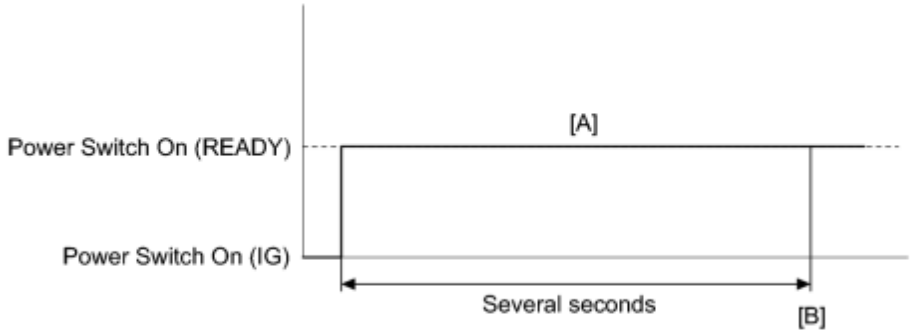
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 282) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-284 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If the motor inverter overheats, has a circuit malfunction, or has an internal short, the inverter transmits this information to the MG ECU via the motor inverter fail signal line.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 284 | Motor inverter fail signal detection (overheat) | • Inverter cooling system<br>• Cooling fan system<br>• Power management control ECU<br>• Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Generator cable<br>• Motor cable<br>• Water pump with motor assembly<br>• Wire harness or connector<br>• IGCT No. 3 fuse<br>• PCU fuse |

# MONITOR DESCRIPTION

If the motor inverter overheats, it will transmit an inverter fail signal to the MG ECU. The MG ECU will send information about the malfunction to the power management control ECU (HV CPU). Upon receiving this information, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 284): MFIV detection (Over heat malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

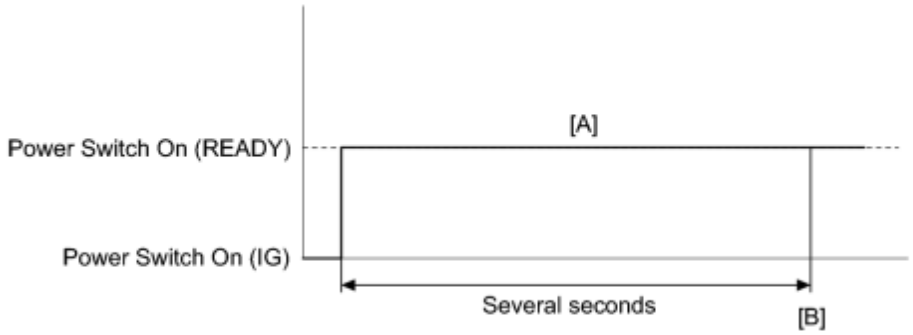
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 284) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A01-726 INFO.

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

After troubleshooting and repairing all output DTCs, be sure to replace the inverter with converter assembly.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-202 is not output | A |
| P0A78-202 is also output | B |

NOTICE:

- If P0A78-202 is output, troubleshoot it first. After completing the troubleshooting for P0A78-202, return to perform troubleshooting for this DTC.
- Parts repaired or replaced during troubleshooting for P0A78-202 do not need to be re-inspected in this diagnosis procedure.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

HINT:

- If P0A78-202 was not output in step 1 of this diagnosis procedure, check Table 1 below.
- If P0A78-202 was output in step 1 of this diagnosis procedure, repair that DTC first, then check Table 2 below.

Result:

| Result | Proceed to |
|---|---|
| P0A78-284 only is output. | A |
| Any of the following DTCs are also output. | B |

**Table 1**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

**Table 2**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60-294 | Drive Motor "A" Phase V Current |
| P0A63-302 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-284 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. After troubleshooting and repairing all output DTCs, be sure to replace the inverter with converter assembly.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 4. | CHECK QUANTITY OF HV COOLANT INFO |

C ▶ INSPECT FOR COOLANT LEAK AND ADD COOLANT

B ▶ ADD HV COOLANT

A ▼

| | |
|---|---|
| 5. | CHECK COOLANT HOSE INFO |

NG ▶ CORRECT THE PROBLEM

OK ▼

| | |
|---|---|
| 6. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVATE THE WATER PUMP) INFO |

NG ▶ CHECK FUSE (IGCT NO. 3)

OK ▼

| | |
|---|---|
| 7. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN) INFO |

NG ▶ CHECK COOLING FAN SYSTEM

OK ▼

| | |
|---|---|
| 8. | CHECK HV COOLANT (CHECK FOR CONDITIONS THAT MAY HAVE CAUSED FREEZING) INFO |

B ▶ REPLACE HV COOLANT

A ▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 10. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 12. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 13. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A ▼

| | |
|---|---|
| 14. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A ▼

| | |
|---|---|
| 15. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 16. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 17. | CHECK FUSE (PCU) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 18. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK ▼

| | |
|---|---|
| 19. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 20. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 21. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 22. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 23. | CHECK FUSE (IGCT NO. 3) INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR)

OK ▼

| | |
|---|---|
| 24. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 25. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 26. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 27. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 28. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 29. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 30. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 31. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 32. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 33. | REPLACE INVERTER WITH CONVERTER ASSEMBLY INFO |

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 34. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 35. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 36. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 37. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK

| | |
|---|---|
| 38. | REPLACE POWER MANAGEMENT CONTROL ECU INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 39. | CONNECT SECURELY INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 40. | CONNECT SECURELY INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 41. | REPAIR OR REPLACE HARNESS OR CONNECTOR INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 42. | REPLACE WATER PUMP WITH MOTOR ASSEMBLY INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 43. | REPAIR OR REPLACE HARNESS OR CONNECTOR INFO |

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 44. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 45. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 46. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 47. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 48. | REPLACE HV COOLANT INFO |

NEXT

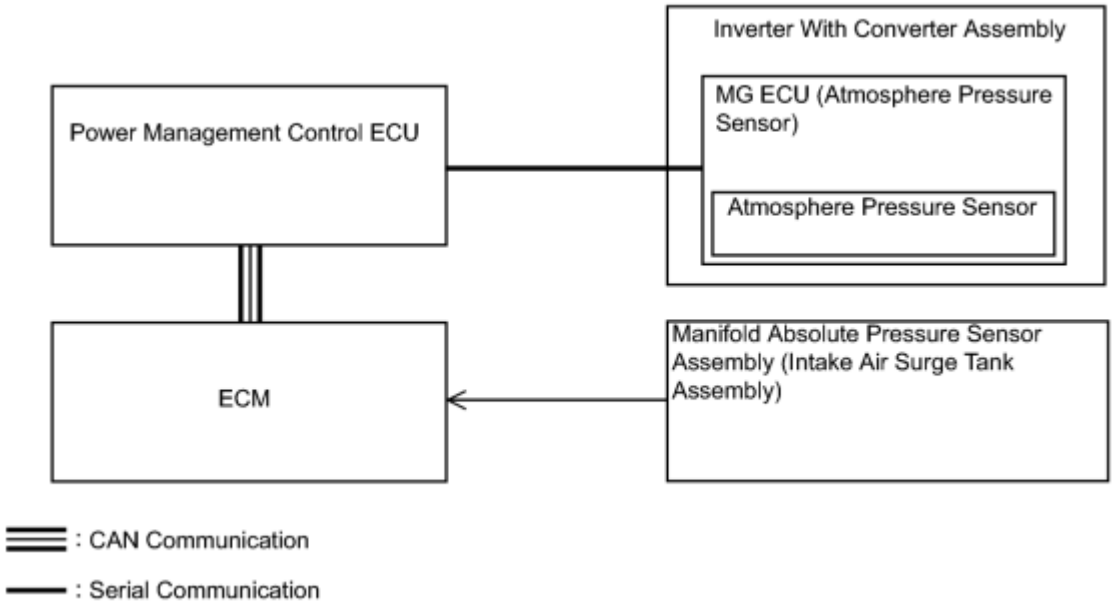
| | |
|---|---|
| 49. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0069-273 | Manifold Absolute Pressure - Barometric Pressure Correlation |

# DESCRIPTION

The atmospheric pressure sensor mounted on the MG ECU circuit board detects the atmospheric pressure. This reading is used to perform system control that considers vehicle usage conditions.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0069 | 273 | Difference between the atmospheric pressure value of the atmospheric pressure sensor in the inverter with converter assembly and the manifold absolute pressure sensor (for EGR control) exceeds a specified value. The same condition recurs within 3 hours when driving in EV mode. | • Inverter with converter assembly<br>• Manifold absolute pressure sensor<br>• ECM<br>• Wire harness or connector |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (ENGINE CONTROL) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (READY).

(c) Fully depress the accelerator pedal for 5 seconds to start the engine and keep it running.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTCs other than those listed in the following table are output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0107 | Manifold Absolute Pressure/Barometric Pressure Circuit Low Input |
| P0108 | Manifold Absolute Pressure/Barometric Pressure Circuit High Input |
| P106A | Evaporative Emission System Pressure Sensor - Manifold Absolute Pressure Correlation |

HINT:

P0069-273 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a reproduction test to check that no DTCs are output.

(f) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0069-273 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A-151, 155, 156, 658, 659 | Generator Control Module |
| P0A1B-193, 512, 661, 786 | Drive Motor "A" Control Module |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1D-148 | Hybrid Powertrain Control Module |
| P2228-268 | Barometric Pressure Sensor "A" Circuit Low |
| P2229-269 | Barometric Pressure Sensor "A" Circuit High |
| P2511-149 | HV CPU Power Relay Sense Circuit Intermittent No Continuity |
| P324E-788 | MG-ECU Power Relay Intermittent Circuit |
| U0100-211, 530 | Lost Communication with ECM/PCM "A" |
| U0110 (all INF codes)*1 | Lost Communication with Drive Motor Control Module "A" |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0069-273 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a reproduction test to check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (MAP, ATMOSPHERE PRESSURE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / MAP, Atmosphere Pressure.

(d) Using the table, read the normal atmospheric pressure value for the applicable altitude.

*1

| *2 | *3 | *4 |
|---|---|---|
| 0 | -20 (-4) | 101.3 (14.7) |
| | -10 (14) | 101.3 (14.7) |
| | 0 (32) | 101.3 (14.7) |
| | 10 (50) | 101.3 (14.7) |
| | 20 (68) | 101.3 (14.7) |
| | 30 (86) | 101.3 (14.7) |
| 200 (656) | -20 (-4) | 98.6 (14.3) |
| | -10 (14) | 98.7 (14.3) |
| | 0 (32) | 98.8 (14.3) |
| | 10 (50) | 98.9 (14.3) |
| | 20 (68) | 99.0 (14.4) |
| | 30 (86) | 99.1 (14.4) |
| 400 (1312) | -20 (-4) | 96.0 (13.9) |
| | -10 (14) | 96.2 (14.0) |
| | 0 (32) | 96.4 (14.0) |
| | 10 (50) | 96.6 (14.0) |
| | 20 (68) | 96.7 (14.0) |
| | 30 (86) | 96.9 (14.1) |
| 600 (1969) | -20 (-4) | 93.5 (13.6) |
| | -10 (14) | 93.8 (13.6) |
| | 0 (32) | 94.0 (13.6) |
| | 10 (50) | 94.3 (13.7) |
| | 20 (68) | 94.5 (13.7) |
| | 30 (86) | 94.7 (13.7) |
| 800 (2625) | -20 (-4) | 91.1 (13.2) |
| | -10 (14) | 91.4 (13.3) |
| | 0 (32) | 91.8 (13.3) |
| | 10 (50) | 92.1 (13.4) |
| | 20 (68) | 92.4 (13.4) |
| | 30 (86) | 92.7 (13.4) |
| 1000 (3281) | -20 (-4) | 88.7 (12.9) |
| | -10 (14) | 89.1 (12.9) |
| | 0 (32) | 89.5 (13.0) |
| | 10 (50) | 89.9 (13.0) |
| | 20 (68) | 90.3 (13.1) |
| | 30 (86) | 90.6 (13.1) |
| 1200 (3937) | -20 (-4) | 86.4 (12.5) |
| | -10 (14) | 86.9 (12.6) |
| | 0 (32) | 87.4 (12.7) |
| | 10 (50) | 87.8 (12.7) |
| | 20 (68) | 88.3 (12.8) |
| | 30 (86) | 88.7 (12.9) |
| 1400 (4593) | -20 (-4) | 84.2 (12.2) |
| | -10 (14) | 84.7 (12.3) |
| | 0 (32) | 85.3 (12.4) |
| | 10 (50) | 85.8 (12.4) |
| | 20 (68) | 86.3 (12.5) |
| | 30 (86) | 86.7 (12.6) |
| 1600 (5250) | -20 (-4) | 82.0 (11.9) |
| | -10 (14) | 82.6 (12.0) |
| | 0 (32) | 83.3 (12.1) |
| | 10 (50) | 83.8 (12.2) |
| | 20 (68) | 84.4 (12.2) |
| | 30 (86) | 84.9 (12.3) |

| *2 | *3 | *4 |
|---|---|---|
| 1800 (5906) | -20 (-4) | 79.9 (11.6) |
| | -10 (14) | 80.6 (11.7) |
| | 0 (32) | 81.3 (11.8) |
| | 10 (50) | 81.9 (11.9) |
| | 20 (68) | 82.5 (12.0) |
| | 30 (86) | 83.0 (12.0) |
| 2000 (6592) | -20 (-4) | 77.9 (11.3) |
| | -10 (14) | 78.6 (11.4) |
| | 0 (32) | 79.4 (11.5) |
| | 10 (50) | 80.0 (11.6) |
| | 20 (68) | 80.7 (11.7) |
| | 30 (86) | 81.3 (11.8) |
| 2200 (7218) | -20 (-4) | 75.9 (11.0) |
| | -10 (14) | 76.7 (11.1) |
| | 0 (32) | 77.5 (11.2) |
| | 10 (50) | 78.2 (11.3) |
| | 20 (68) | 78.9 (11.4) |
| | 30 (86) | 79.5 (11.5) |
| 2400 (7874) | -20 (-4) | 74.0 (10.7) |
| | -10 (14) | 74.9 (10.9) |
| | 0 (32) | 75.7 (11.0) |
| | 10 (50) | 76.4 (11.1) |
| | 20 (68) | 77.2 (11.2) |
| | 30 (86) | 77.8 (11.3) |
| 2600 (8531) | -20 (-4) | 72.1 (10.5) |
| | -10 (14) | 73.0 (10.6) |
| | 0 (32) | 73.9 (10.7) |
| | 10 (50) | 74.7 (10.8) |
| | 20 (68) | 75.5 (11.0) |
| | 30 (86) | 76.2 (11.1) |
| 2800 (9187) | -20 (-4) | 70.3 (10.2) |
| | -10 (14) | 71.3 (10.3) |
| | 0 (32) | 72.2 (10.5) |
| | 10 (50) | 73.0 (10.6) |
| | 20 (68) | 73.8 (10.7) |
| | 30 (86) | 74.6 (10.8) |
| 3000 (9843) | -20 (-4) | 68.6 (9.95) |
| | -10 (14) | 69.6 (10.1) |
| | 0 (32) | 70.5 (10.2) |
| | 10 (50) | 71.4 (10.4) |
| | 20 (68) | 72.2 (10.5) |
| | 30 (86) | 73.0 (10.6) |
| 3200 (10499) | -20 (-4) | 66.9 (9.70) |
| | -10 (14) | 67.9 (9.85) |
| | 0 (32) | 68.9 (9.99) |
| | 10 (50) | 69.8 (10.1) |
| | 20 (68) | 70.7 (10.3) |
| | 30 (86) | 71.5 (10.4) |
| 3400 (11155) | -20 (-4) | 65.3 (9.47) |
| | -10 (14) | 66.3 (9.62) |
| | 0 (32) | 67.3 (9.76) |
| | 10 (50) | 68.3 (9.91) |
| | 20 (68) | 69.1 (10.0) |
| | 30 (86) | 70.0 (10.2) |

| *2 | *3 | *4 |
|---|---|---|
| 3600 (11812) | -20 (-4) | 63.7 (9.24) |
| | -10 (14) | 64.7 (9.38) |
| | 0 (32) | 65.8 (9.54) |
| | 10 (50) | 66.7 (9.67) |
| | 20 (68) | 67.7 (9.82) |
| | 30 (86) | 68.5 (9.94) |
| 3800 (12468) | -20 (-4) | 62.1 (9.01) |
| | -10 (14) | 63.2 (9.17) |
| | 0 (32) | 64.3 (9.33) |
| | 10 (50) | 65.3 (9.47) |
| | 20 (68) | 66.2 (9.60) |
| | 30 (86) | 67.1 (9.73) |
| 4000 (13124) | -20 (-4) | 60.6 (8.79) |
| | -10 (14) | 61.7 (8.95) |
| | 0 (32) | 62.8 (9.11) |
| | 10 (50) | 63.8 (9.25) |
| | 20 (68) | 64.8 (9.40) |
| | 30 (86) | 65.7 (9.53) |
| 4200 (13780) | -20 (-4) | 59.1 (8.57) |
| | -10 (14) | 60.3 (8.75) |
| | 0 (32) | 61.4 (8.91) |
| | 10 (50) | 62.5 (9.07) |
| | 20 (68) | 63.4 (9.20) |
| | 30 (86) | 64.4 (9.34) |
| 4400 (14436) | -20 (-4) | 57.7 (8.37) |
| | -10 (14) | 58.9 (8.54) |
| | 0 (32) | 60.0 (8.70) |
| | 10 (50) | 61.1 (8.86) |
| | 20 (68) | 62.1 (9.01) |
| | 30 (86) | 63.1 (9.15) |
| 4600 (15093) | -20 (-4) | 56.3 (8.17) |
| | -10 (14) | 57.5 (8.34) |
| | 0 (32) | 58.7 (8.51) |
| | 10 (50) | 59.8 (8.67) |
| | 20 (68) | 60.8 (8.82) |
| | 30 (86) | 61.8 (8.96) |
| 4800 (15749) | -20 (-4) | 55.0 (7.98) |
| | -10 (14) | 56.2 (8.15) |
| | 0 (32) | 57.4 (8.33) |
| | 10 (50) | 58.5 (8.49) |
| | 20 (68) | 59.5 (8.63) |
| | 30 (86) | 60.5 (8.78) |
| 5000 (16405) | -20 (-4) | 53.7 (7.79) |
| | -10 (14) | 54.9 (7.96) |
| | 0 (32) | 56.1 (8.14) |
| | 10 (50) | 57.2 (8.30) |
| | 20 (68) | 58.3 (8.46) |
| | 30 (86) | 59.3 (8.60) |

c

## Text in Illustration

| | | | |
|---|---|---|---|
| *1 | Altitude, Temperature and Atmospheric Pressure Correlation Table | *2 | Altitude (m (ft)) |
| *3 | Temperature (°C (°F)) | *4 | Atmospheric Pressure (kPa (psi)) |

(e) Compare the MAP and Atmosphere Pressure values in the Data List with the normal atmospheric value from the table.

Result:

| Result | Proceed to |
|---|---|
| Other than the following. | A |
| Difference between MAP in Data List and normal atmospheric pressure value is 10 kPa or more. | B |
| Difference between Atmosphere Pressure in Data List and normal atmospheric pressure value is 10 kPa or more. | C |

(f) Turn the power switch off.

C ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
B ▶ CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR)
A ▼

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (MAP) |

(a) Push the P position switch.

(b) Enter the following menus: Powertrain / Hybrid Control / Data List / MAP

(c) Read the MAP value in the Data List with the engine stopped.

(d) While depressing the brake pedal, turn the power switch on (READY).

(e) With the READY indicator light illuminated, fully depress the accelerator pedal.

(f) Read the MAP value in the Data List with the engine running.

(g) Compare the MAP value noted with the engine stopped and the MAP value noted with the engine running.

OK:

The MAP value changes (pressure decreases when the engine is started).

(h) Turn the power switch off.

NG ▶ CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR)
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 5. | CHECK TERMINAL VOLTAGE (MANIFOLD ABSOLUTE PRESSURE SENSOR) INFO |

B ▶ REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR
A ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (MANIFOLD ABSOLUTE PRESSURE SENSOR - ECM) |

| | |
|---|---|
| | INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE ECM**

| | |
|---|---|
| 7. | REPLACE MANIFOLD ABSOLUTE PRESSURE SENSOR |

(a) Replace the manifold absolute pressure sensor INFO.

NEXT
▼

| | |
|---|---|
| 8. | CHECK WHETHER DTC OUTPUT RECURS |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0069-273 is not output. | A |
| DTC P0069-273 is output again. | B |

(e) Turn the power switch off.

B ▶ REPLACE ECM
A ▶ **END**

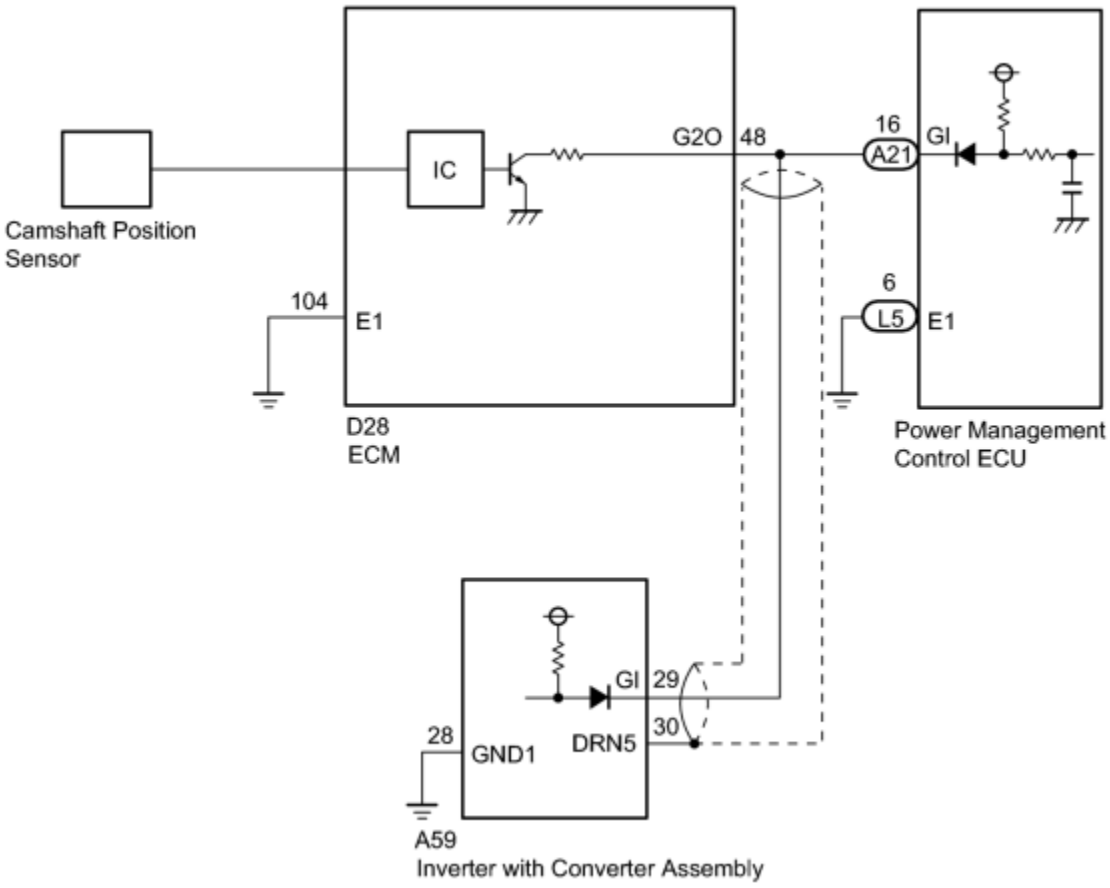
| | | |
|---|---|---|
| DTC | P0340-886 | Camshaft Position Sensor "A" Circuit |

# DESCRIPTION

The power management control ECU (HV CPU) compares the engine speed sent from the ECM via CAN communication and the engine speed that is indicated by pulses sent from the ECM. If the pulse input is not normal, the power management control ECU (HV CPU) sets this DTC.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0340 | 886 | Malfunction in the engine speed sensor (GI signal) circuit | • Wire harness or connector<br>• Camshaft position sensor<br>• Inverter with converter assembly<br>• ECM<br>• Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

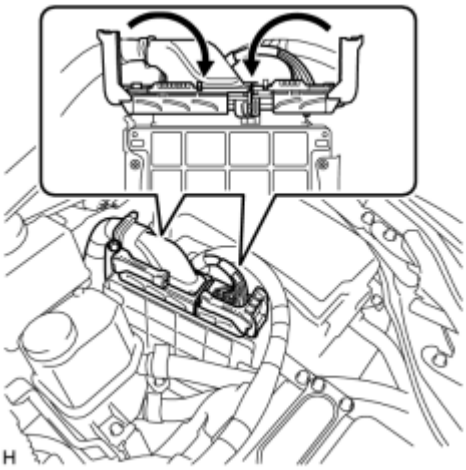
| Result | Proceed to |
|---|---|
| DTC P0340-886 only is output. | A |
| DTC P0343-747 is also output. | B |

(e) Turn the power switch off.

B ▶ CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU, INVERTER WITH CONVERTER)

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR) |




(a) Check the connections of the ECM connectors.

OK:

The connectors are connected securely and there are no contact problems.

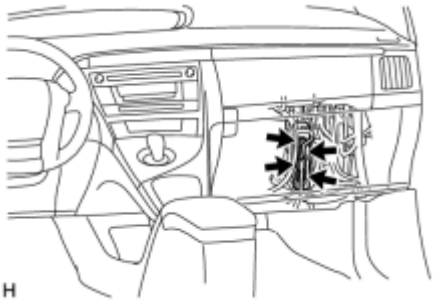
NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) |

(a) Check the connections of the power management control ECU connectors.

OK:



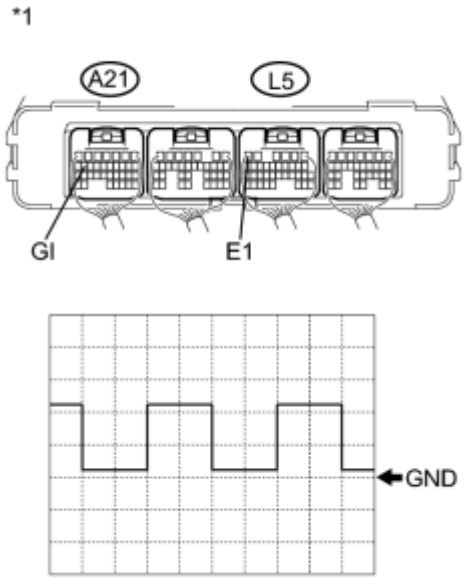

The connectors are connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 4. | CHECK POWER MANAGEMENT CONTROL ECU (CHECK WAVEFORM) |

(a) Turn the power switch on (READY).




(b) Connect an oscilloscope between the power management control ECU terminals specified in the table below, and measure the waveform.

| Item | Content |
|---|---|
| Terminal | A21-16 (GI) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 20 ms./DIV. |
| Condition | Power switch on (READY) with engine running |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

Result:

| Result | Proceed to |
|---|---|
| Normal | A |
| Waveform is flat, and is stuck on the +B side. | B |
| Waveform is flat, and is stuck on the GND side. | C |

C ▶ CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU,

INVERTER WITH CONVERTER)

B → CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU)

A ↓

| | |
|---|---|
| 5. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG → REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK → **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU) |

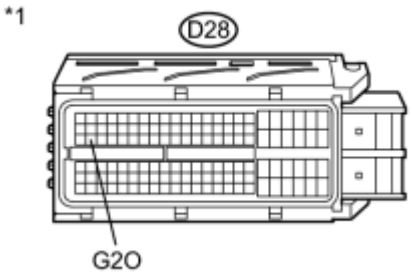
(a) Disconnect connector D28 from the ECM.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - Body ground | Power switch on (IG) | 11 to 14 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

NOTICE:

Turning the power switch on (IG) with the ECM connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Connect the ECM connector.

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → **REPLACE ECM**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU, INVERTER WITH CONVERTER) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector D28 from the ECM.

(c) Disconnect connector A21 from the power management control ECU.

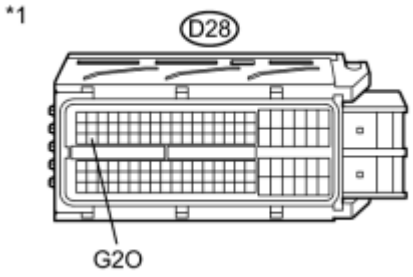
(d) Disconnect connector A59 from the inverter with converter assembly.

(e) Turn the power switch on (IG).

(f) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - Body ground | Power switch on (IG) | Below 1 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector, power management control ECU connector and ECM connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(g) Turn the power switch off.

(h) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - Body ground | Power switch off | 10 kΩ or higher |

(i) Connect the ECM connector.

(j) Connect the power management control ECU connector.

(k) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK
▼

| 8. | CHECK POWER MANAGEMENT CONTROL ECU |
|---|---|

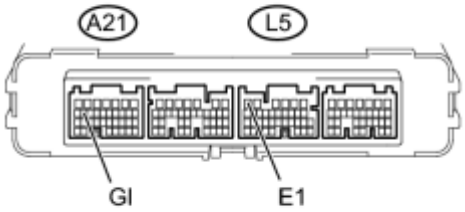
(a) Disconnect all the connectors from the power management control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-16 (GI) - L5-6 (E1) | Always | 10 kΩ or higher |

*1




P

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Management Control ECU) |

(c) Connect the power management control ECU connectors.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK
▼

| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY |
|---|---|

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

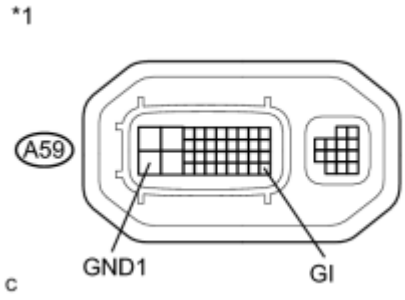
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - A59-28 (GND1) | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0343-747 | Camshaft Position Sensor "A" Circuit High Input |

# DESCRIPTION

Refer to the description for DTC P0340-886 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0343 | 747 | GI signal is not input for 2 sec. or more while the engine is running. | • SFI system<br>• Inverter with converter assembly<br>• ECM<br>• Power management control ECU<br>• Wire harness or connector |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0340-886 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Engine and ECT/ Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| Engine control system DTCs are not output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0340 | Camshaft Position Sensor Circuit Malfunction |
| P0342 | Camshaft Position Sensor "A" Circuit Low Input (Bank 1 or Single Sensor) |
| P0343 | Camshaft Position Sensor "A" Circuit High Input (Bank 1 or Single Sensor) |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| None of the following DTCs are output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0343-747 may be set due to a malfunction which also causes the DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

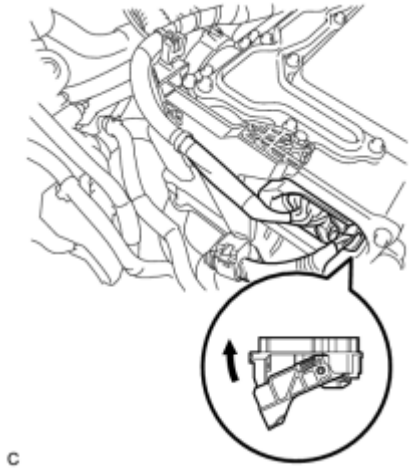
| Result | Proceed to |
|---|---|
| P0340-886 is not output. | A |
| P0340-886 is also output. | B |

(e) Turn the power switch off.

B CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR)

A

| | |
|---|---|
| 4. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) |




CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

NOTICE:

Before disconnecting the connector, confirm that it is properly connected by checking that the locking claws are engaged and that the connector does not pull out.

(b) Check the connection of the low voltage connector of the inverter with

converter assembly.

OK:

The connector is connected securely and there are no contact problems.

HINT:

When connecting the connector, insert it with the locking lever in the raised position. Rotate the lever downward and make sure that the connector is pulled into its socket. When the locking lever is in its fully closed position, a click will be heard as its locking claws engage. After the click is heard, pull up on the connector to confirm that it is properly connected.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 5. | CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - ECM) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the low voltage connector A59 from the inverter with converter assembly.

(c) Disconnect connector D28 from the ECM.

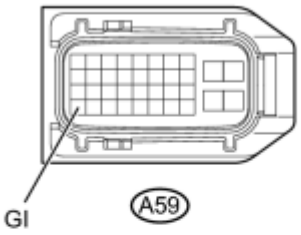
(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

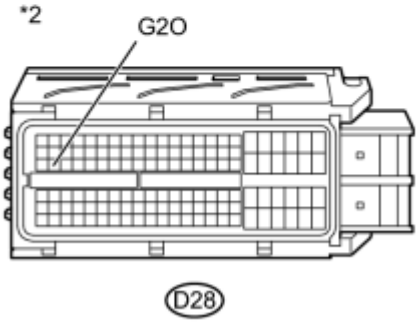
Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - Body ground | Power switch on (IG) | Below 1 V |

*1




*2




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Front view of wire harness connector<br><br>(to ECM) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector and ECM connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(f) Turn the power switch off.

(g) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - D28-48 (G2O) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) or D28-48 (G2O) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(h) Connect the ECM connector.

(i) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (ECM CONNECTOR) INFO |

NG ▶ CONNECT SECURELY
OK
▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - ECM) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the low voltage connector A59 from the inverter with converter assembly.

(c) Disconnect connector D28 from the ECM.

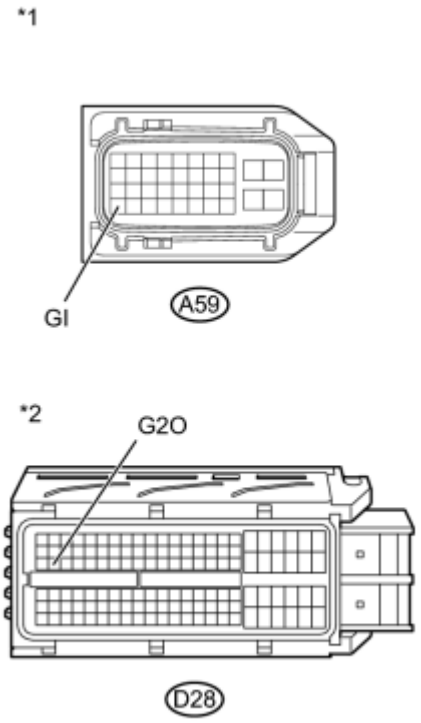
(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - D28-48 (G2O) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) or D28-48 (G2O) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Front view of wire harness connector<br><br>(to ECM) |

(e) Connect the ECM connector.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (ECM - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect connector D28 from the ECM.

(b) Disconnect connector A21 from the power management control ECU.

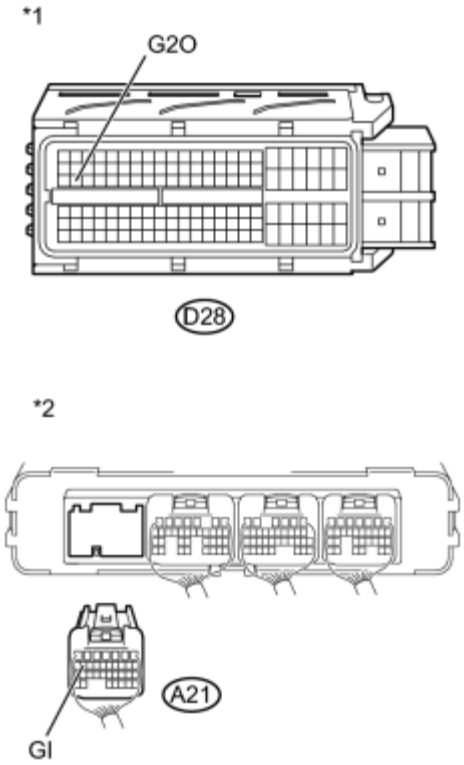
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) - A21-16 (GI) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D28-48 (G2O) or A21-16 (GI) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the power management control ECU connector.

(e) Connect the ECM connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 10. | CHECK INVERTER WITH CONVERTER ASSEMBLY |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

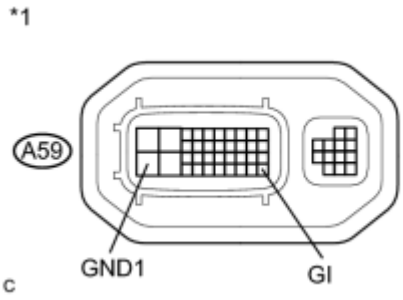
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the low voltage connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-29 (GI) - A59-28 (GND1) | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

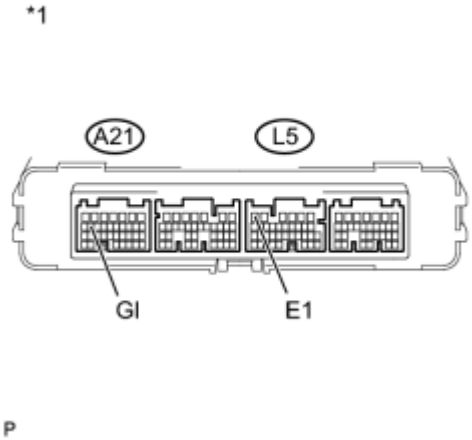
NG ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
OK
▼

| | |
|---|---|
| 11. | CHECK POWER MANAGEMENT CONTROL ECU |

(a) Disconnect connectors A21 and L5 from the power management control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-16 (GI) - L5-6 (E1) | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Management Control ECU) |

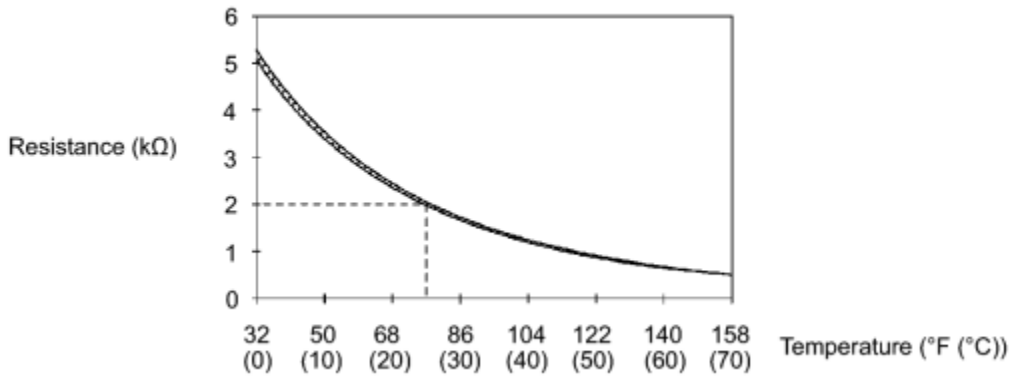
(c) Connect the power management control ECU connector.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPLACE ECM**

| | | |
|---|---|---|
| DTC | P0516-769 | Battery Temperature Sensor Circuit Low |
| DTC | P0517-770 | Battery Temperature Sensor Circuit High |

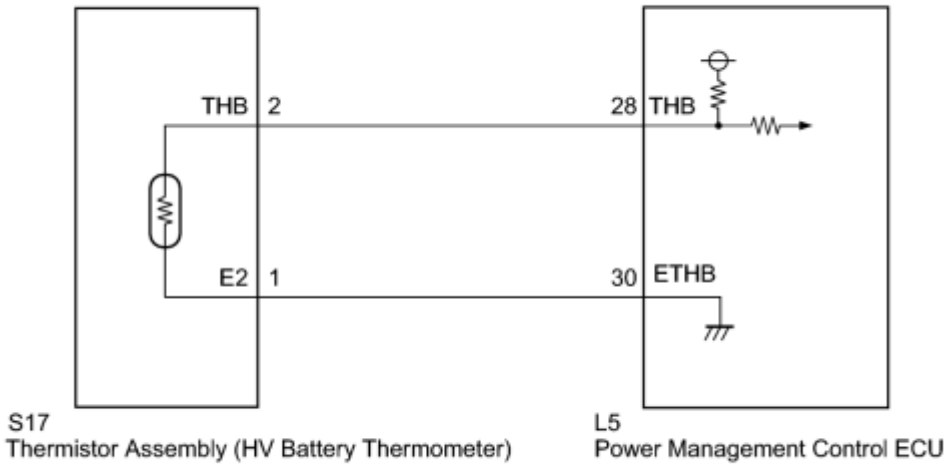
# DESCRIPTION

- The thermistor assembly (battery temperature sensor) detects the auxiliary battery temperature. The resistance of the thermistor assembly built into the thermistor changes in accordance with changes in the auxiliary battery temperature. The lower the auxiliary battery temperature, the higher the thermistor assembly resistance. Conversely, the higher the temperature, the lower the resistance. The thermistor is connected to the power management control ECU (HV CPU). A voltage of 5 V is supplied to the thermistor assembly from the THB terminal of the power management control ECU (HV CPU) through its internal resistor R. This means that resistor R and the thermistor assembly are connected in series. The voltage at the THB terminal and the resistance value change in accordance with changes in the auxiliary battery temperature. Based on this signal, the power management control ECU (HV CPU) reduces the charging current when the auxiliary battery temperature is high to protect the auxiliary battery.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0516 | 769 | Malfunction in the thermistor assembly (battery temperature sensor) circuit (short to GND) | • Thermistor assembly<br>• Wire harness or connector<br>• Power management control ECU |
| P0517 | 770 | Malfunction in the thermistor assembly (battery temperature sensor) circuit (open or short to +B)) | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- Read the freeze frame data using the Techstream. In the freeze frame data, some information is recorded about the engine conditions at the moment a malfunction occurred. This information can be helpful when troubleshooting.
- Characteristics of the thermistor resistance (reference values) are as follows.

| Terminal | THB (with Connector Disconnected) | Resistance | Ambient Temperature |
|---|---|---|---|
| THB - E2 | 4.5 to 5.5 V | 3.00 to 3.75 kΩ | Approximately 50°F (10°C) |
| | | 1.60 to 1.80 kΩ | Approximately 77°F (25°C) |
| | | 0.80 to 1.00 kΩ | Approximately 104°F (40°C) |

# PROCEDURE

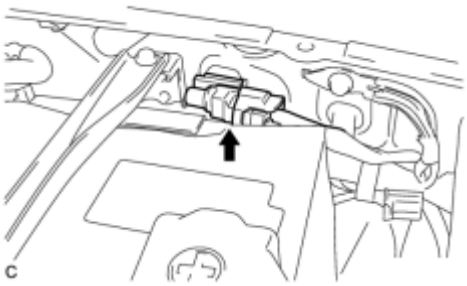
| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (THERMISTOR ASSEMBLY CONNECTOR) |

(a) Check the connection of the thermistor assembly connector.




OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

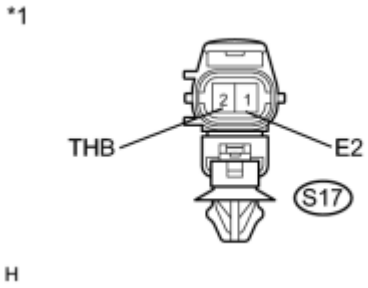
OK ▼

| | |
|---|---|
| 3. | CHECK THERMISTOR ASSEMBLY |

(a) Disconnect connector S17 from the thermistor assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S17-2 (THB) - S17-1 (E2) | 50° F (10°C) | 3.00 to 3.73 kΩ |
| | 77° F (25°C) | 1.60 to 1.80 kΩ |
| | 104° F (40°C) | 0.80 to 1.00 kΩ |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Thermistor Assembly) |

(c) Connect the thermistor assembly connector.

NG ▶ REPLACE THERMISTOR ASSEMBLY

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - THERMISTOR ASSEMBLY) |

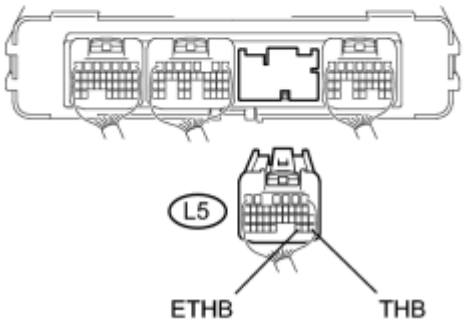
(a) Disconnect connector S17 from the thermistor assembly.

(b) Disconnect connector L5 from the power management control ECU.

*1




*2




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-28 (THB) - S17-2 (THB) | Power switch off | Below 1 Ω |
| L5-30 (ETHB) - S17-1 (E2) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-28 (THB) or S17-2 (THB) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-30 (ETHB) or S17-1 (E2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Thermistor Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-28 (THB) or S17-2 (THB) - Body ground | Power switch on (IG) | Below 1 V |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(f) Turn the power switch off.

(g) Connect the thermistor assembly connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P060B-134 | Internal Control Module A/D Processing Performance |
| DTC | P060B-135 | Internal Control Module A/D Processing Performance |
| DTC | P060B-570 | Internal Control Module A/D Processing Performance |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation and it will set this DTC when it detects an internal malfunction. If this DTC is output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P060B | 134 | ECU internal error | Power Management Control ECU |
| | 135 | ECU internal error | |
| | 570 | ECU internal error | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs diagnostic tests to verify proper operation of internal ECU systems. One of these monitors the rationality of internal analog (signal) to digital conversions. The power management control ECU (CPU) monitors the internal A/D (Analog/Digital converter) value. If there is an A/D converter malfunction, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P060B (INF 134/135/570): Internal control module A/D processing performance |
| Required sensors / components | Power management control ECU |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

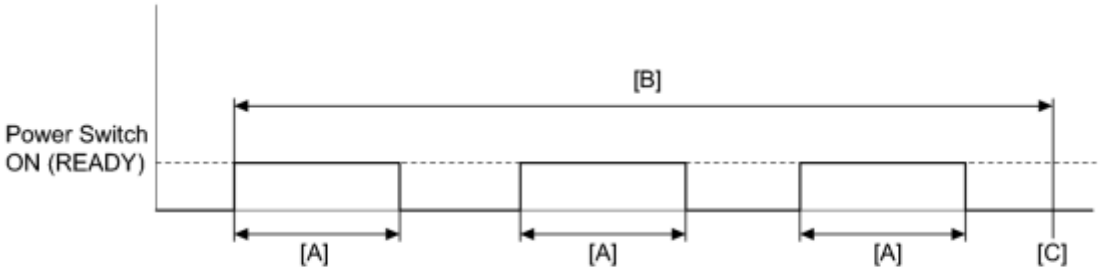
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P060B (INF 134/135/570) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

| | | |
|---|---|---|
| DTC | P062F-143 | EEPROM Malfunction |
| DTC | P062F-165 | EEPROM Malfunction |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation and it will set this DTC when it detects an internal malfunction. If this DTC is output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P062F | 143 | ECU internal error | Power Management Control ECU |
| P062F | 165 | ECU internal error | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation. If the internal operation is malfunctioning, the power management control ECU (HV CPU) illuminates the MIL and sets a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P062F (INF 143): Internal control module EEPROM<br><br>P062F (INF 165): Internal control module EEPROM for battery data |
| Required sensors / components | Power management control ECU |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

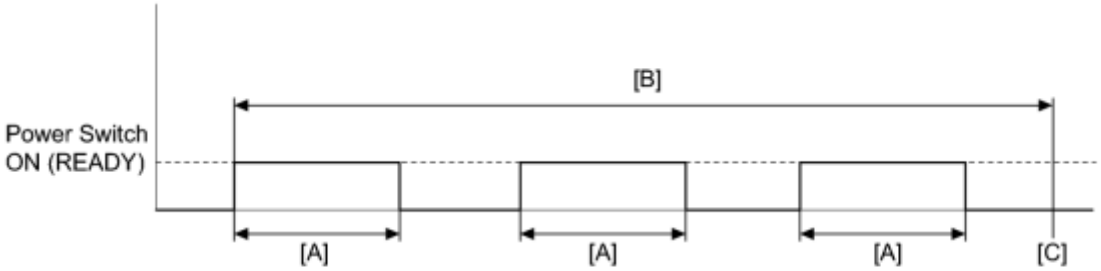
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P062F (INF 143) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0630-804 | VIN not Programmed or Mismatch-ECM / PCM |

# DESCRIPTION

DTC P0630 is set if the Vehicle Identification Number (VIN) is not stored in the power management control ECU (HV CPU) or the input VIN is not accurate. Input the VIN with the Techstream INFO.

| DTC No. | INF No. | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0630 | 804 | • VIN not stored in power management control ECU<br>• Input VIN in power management control ECU not accurate | Power management control ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

NOTICE:

If P0630 is set, the VIN must be input to the power management control ECU using the Techstream. However, all DTCs are cleared automatically by the Techstream when inputting the VIN. If DTCs other than P0630-804 are set, check them first.

NEXT

| | |
|---|---|
| 2. | INPUT VIN WITH TECHSTREAM |

(a) Input the VIN with the Techstream INFO.

NOTICE:

Be sure to check the auxiliary battery voltage before performing VIN writing because VIN writing cannot be performed if the auxiliary battery voltage is below 10 V.

NEXT

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus : Powertrain / Hybrid Control / Trouble Codes.

(d) Read output DTC.

OK:

DTC P0630-804 is not output.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P06A4-209 | Sensor Reference Voltage "D" Circuit Low |
| DTC | P06A5-210 | Sensor Reference Voltage "D" Circuit High |

# DESCRIPTION

The power management control ECU (HV CPU) monitors voltage of 5 V power supply (VC) used for the sensors. If the power management control ECU (HV CPU) detects a malfunction, it will set a DTC.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P06A4 | 209 | VC power-supply voltage is lower than 4.2 V | Power management control ECU |
| P06A5 | 210 | VC power-supply voltage is higher than 5.8 V | Power management control ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P06A4-209 to P06A5-210 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0516-769 | Battery Temperature Sensor Circuit Low |
| P0517-770 | Battery Temperature Sensor Circuit High |
| P0A2C-247 | Drive Motor "A" Temperature Sensor Circuit Low |
| P0A2D-249 | Drive Motor "A" Temperature Sensor Circuit High |
| P0A38-257 | Generator Temperature Sensor Circuit Low |
| P0A39-259 | Generator Temperature Sensor Circuit High |
| P2120-152 | Throttle/Pedal Position Sensor/Switch "D" Circuit |
| P2122-104 | Throttle/Pedal Position Sensor/Switch "D" Circuit Low Input |

| DTC No. | Relevant Diagnosis |
|---|---|
| P2123-105 | Throttle/Pedal Position Sensor/Switch "D" Circuit High Input |
| P2125-153 | Throttle/Pedal Position Sensor/Switch "E" Circuit |
| P2127-107 | Throttle/Pedal Position Sensor/Switch "E" Circuit Low Input |
| P2128-108 | Throttle/Pedal Position Sensor/Switch "E" Circuit High Input |

HINT:

P06A4-209 or P06A5-210 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

B GO TO DTC CHART

A **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P082B-575 | Gear Lever X Position Circuit Low |
| DTC | P082C-576 | Gear Lever X Position Circuit High |
| DTC | P082E-571 | Gear Lever Y Position Circuit Low |
| DTC | P082F-572 | Gear Lever Y Position Circuit High |
| DTC | P181A-596 | Gear Lever X Position Circuit "A" / "B" Correlation |
| DTC | P181B-595 | Gear Lever Y Position Circuit "A" / "B" Correlation |
| DTC | P182B-577 | Gear Lever X Position "B" Circuit Low |
| DTC | P182C-578 | Gear Lever X Position "B" Circuit High |
| DTC | P182E-573 | Gear Lever Y Position "B" Circuit Low |
| DTC | P182F-574 | Gear Lever Y Position "B" Circuit High |

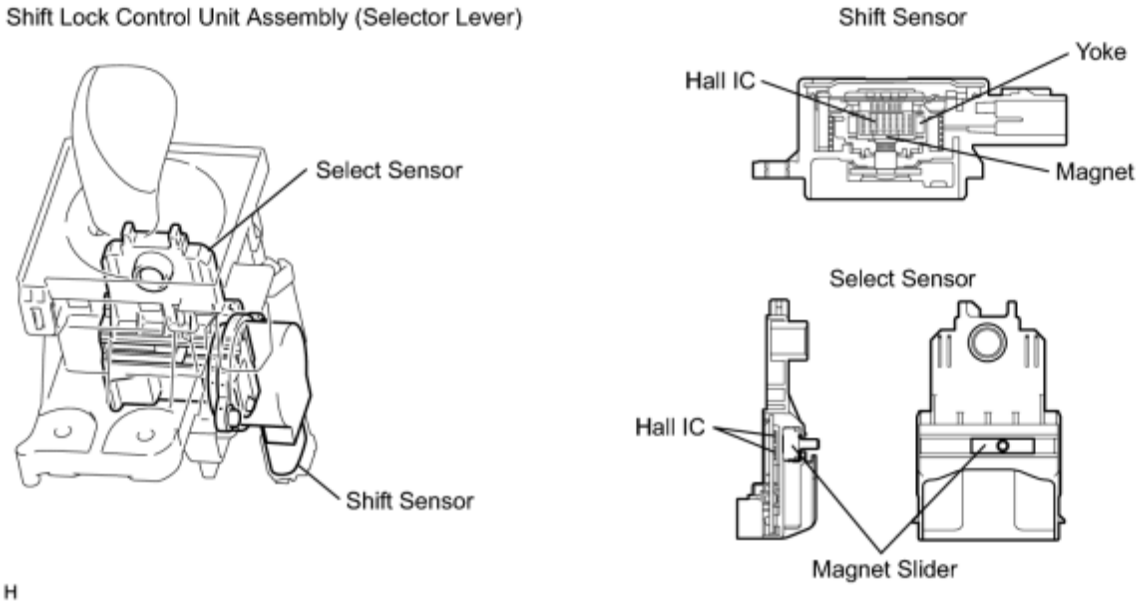
# DESCRIPTION

HINT:

- The electronic shift lever system is a linkless type that does not use a shift cable.
- The shift and select sensors are non-contact type sensors.

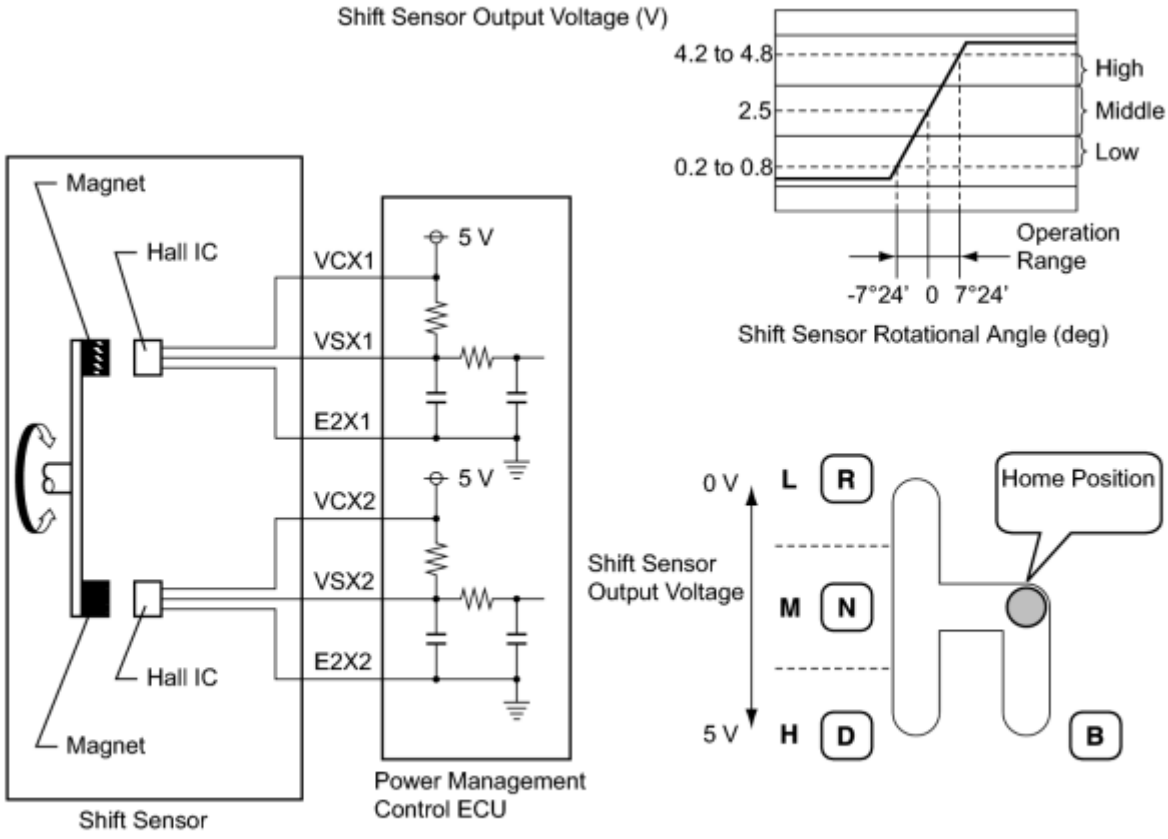
• The shift lock control unit assembly (selector lever) is a momentary type, which returns to its home position by spring reaction as the driver's hand is released from the selector lever after shifting.

The shift lock control unit assembly (selector lever) contains a shift sensor and a select sensor to detect the selector lever position (R, N, D or B). Because both sensors operate using Hall elements, they can accurately detect shift positions in a reliable manner. Both sensors contain two detection circuits, a main and a sub circuit.




H

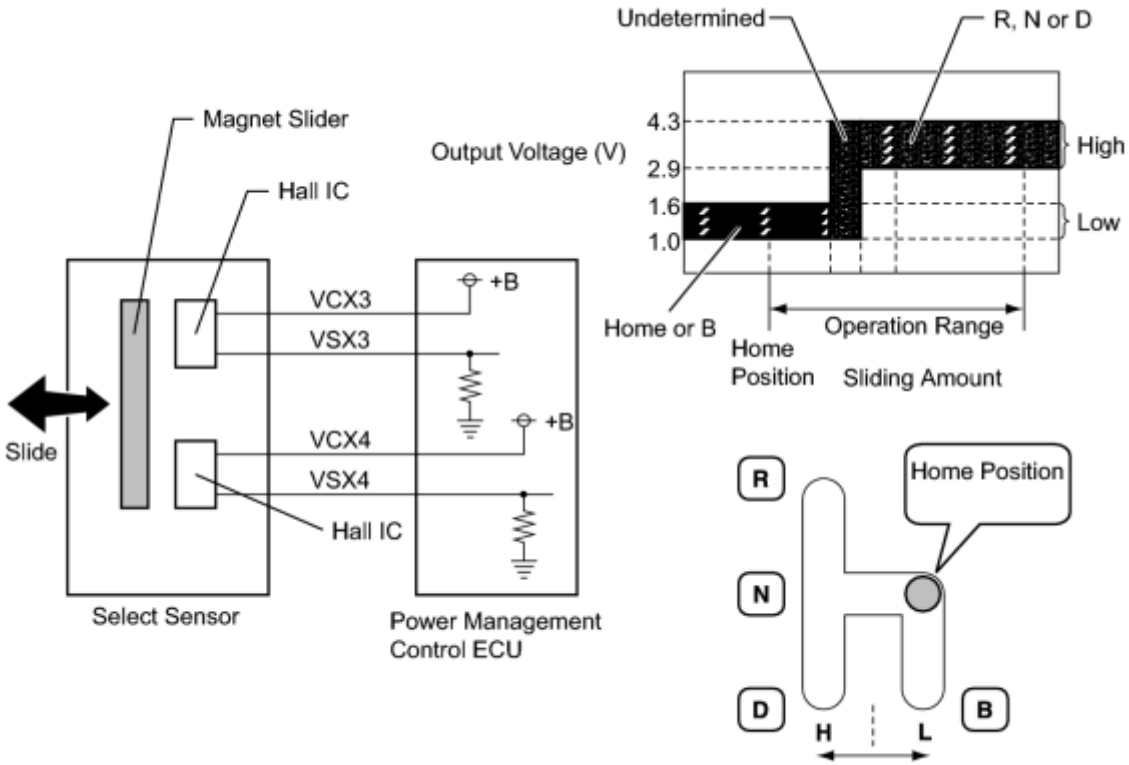
- The shift sensor outputs voltage, which varies between 0 and 5 V in accordance with the vertical movement of the selector lever, to the power management control ECU (HV CPU). The power management control ECU (HV CPU) interprets low level voltage input from the shift sensor as the D or B position, middle level voltage as the home or N position, and high level voltage as the R position.




H

- The select sensor outputs voltage, which varies between 0 and 5 V in accordance with the horizontal movement of the selector lever, to the power management control ECU (HV CPU). The power management control ECU (HV CPU) interprets low level voltage input from the select sensor as the home or B position, and high level voltage as the R, N, or D position.

The power management control ECU (HV CPU) determines the position of the selector lever in accordance with the combination of the signals from the shift sensor and select sensor.




H

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P082B | 575 | Open or GND short in select main sensor circuit | • Wire harness or connector<br>• Shift lock control unit assembly<br>• Power management control ECU |
| P082C | 576 | +B short in select main sensor circuit | |
| P082E | 571 | Open or GND short in shift main sensor circuit | |
| P082F | 572 | +B short in shift main sensor circuit | |
| P181A | 596 | Difference between select main sensor value and select sub sensor value is large | |
| P181B | 595 | Difference between shift main sensor value and shift sub sensor value is large | |
| P182B | 577 | Open or GND short in select sub sensor circuit | |
| P182C | 578 | +B short in select sub sensor circuit | |
| P182E | 573 | Open or GND short in shift sub sensor circuit | |
| P182F | 574 | +B short in shift sub sensor circuit | |

HINT:

When any of DTCs P082E-571, P082F-572, P182E-573 or P182F-574 are output, check shift sensor main and shift sensor sub voltages using the Techstream.

**Shift Sensor Main, Shift Sensor Sub**

| R position (Main) | Home or N position (Main) | D or B position (Main) | R position (Sub) | Home or N position (Sub) | D or B position (Sub) | Trouble Area |
|---|---|---|---|---|---|---|
| 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | Correct shift sensor voltage |
| 0 to 0.2 V | 0 to 0.2 V | 0 to 0.2 V | 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | Open in VCX1 circuit<br>GND short in VSX1 circuit |
| 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | 0 to 0.2 V | 0 to 0.2 V | 0 to 0.2 V | Open in VCX2 circuit<br>GND short in VSX2 circuit |
| 4.8 to 5.0 V | 4.8 to 5.0 V | 4.8 to 5.0 V | 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | Open in VSX1 circuit<br>Open in E2X1 circuit |
| 0.2 to 1.0 V | 2.0 to 3.0 V | 4.0 to 4.8 V | 4.8 to 5.0 V | 4.8 to 5.0 V | 4.8 to 5.0 V | Open in VSX2 circuit<br>Open in E2X2 circuit |

HINT:

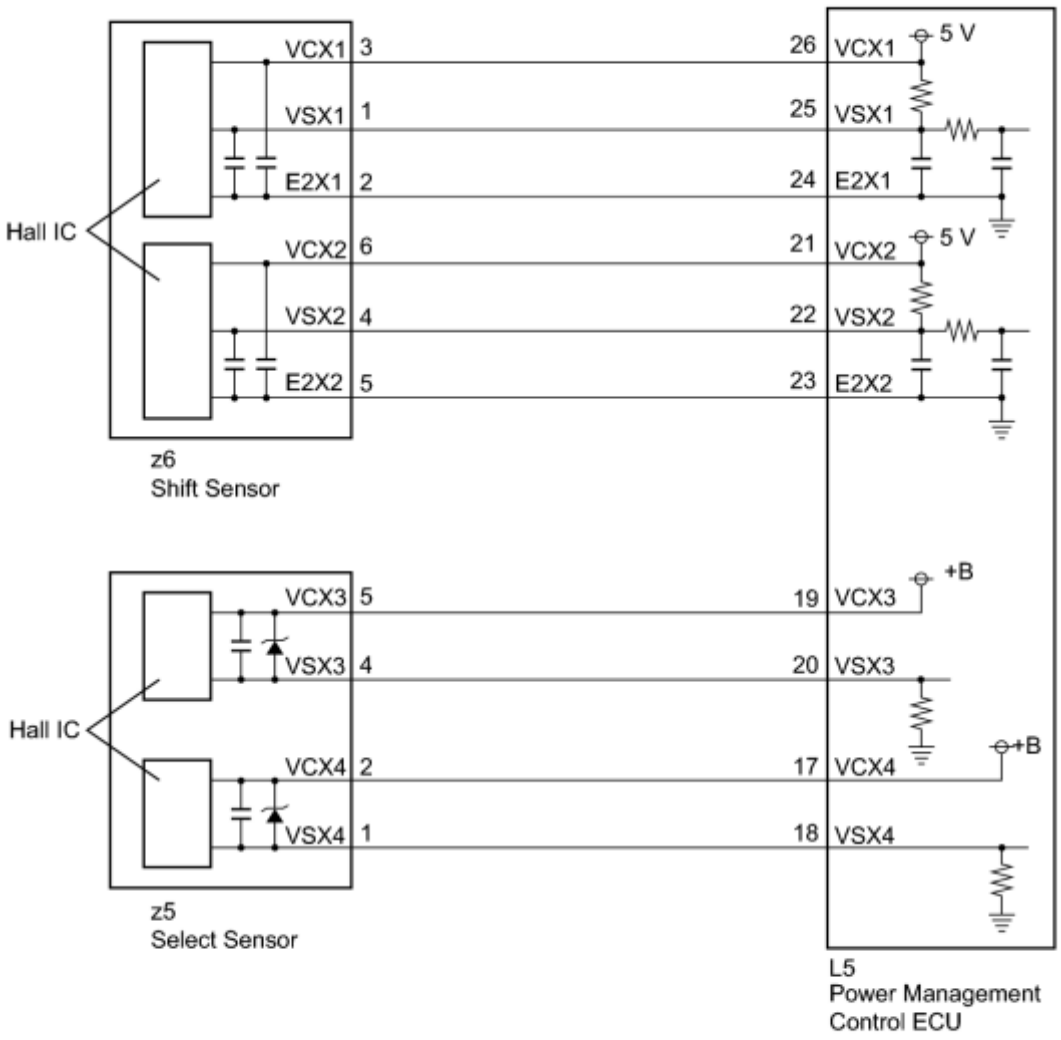
When any of DTCs P082B-575, P082C-576, P182B-577 or P182C-578 are output, check shift sensor select main and shift sensor select sub voltages using the Techstream.

**Shift Sensor Select Main, Shift Sensor Select Sub**

| R, N or D Position Select Main) | Home or B Position Select Main) | R, N or D Position Select Sub) | Home or B Position Select Sub) | Trouble Area |
|---|---|---|---|---|
| 2.9 to 4.3 V | 1.0 to 1.6 V | 2.9 to 4.3 V | 1.0 to 1.6 V | Correct select sensor voltage |
| 0 to 0.5 V | 0 to 0.5 V | 2.9 to 4.3 V | 1.0 to 1.6 V | Open in VCX3 circuit<br>Open or GND short in VSX3 circuit |
| 2.9 to 4.3 V | 1.0 to 1.6 V | 0 to 0.5 V | 0 to 0.5 V | Open in VCX4 circuit<br>Open or GND short in VSX4 |

| R, N or D Position<br><br>Select Main) | Home or B Position<br><br>Select Main) | R, N or D Position<br><br>Select Sub) | Home or B Position<br><br>Select Sub) | Trouble Area |
|---|---|---|---|---|
| | | | | circuit |
| 4.9 to 5 V | 4.9 to 5 V | 2.9 to 4.3 V | 1.0 to 1.6 V | +B short in VSX3 circuit |
| 2.9 to 4.3 V | 1.0 to 1.6 V | 4.9 to 5 V | 4.9 to 5 V | +B short in VSX4 circuit |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (SHIFT SENSOR MAIN, SHIFT SENSOR SUB) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Shift Sensor Main, Shift Sensor Sub.

(d) Read the Data List.

Result:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Shift Sensor Main | R position | 0.2 to 1.0 V |
| | Home or N position | 2.0 to 3.0 V |
| | D or B position | 4.0 to 4.8 V |
| Shift Sensor Sub | R position | 0.2 to 1.0 V |
| | Home or N position | 2.0 to 3.0 V |
| | D or B position | 4.0 to 4.8 V |

(e) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SHIFT SENSOR)

OK ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (SHIFT SENSOR SELECT MAIN, SHIFT SENSOR SELECT SUB) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Shift Sensor Select Main, Shift Sensor Select Sub.

(d) Read the Data List.

Result:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Shift Sensor Select Main | R, N or D Position | 2.9 to 4.3 V |
| | Home or B Position | 1.0 to 1.6 V |
| Shift Sensor Select Sub | R, N or D Position | 2.9 to 4.3 V |
| | Home or B Position | 1.0 to 1.6 V |

(e) Turn the power switch off.

NG → CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SELECT SENSOR)

OK ↓

| | |
|---|---|
| 3. | REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY |

(a) Replace the shift lock control unit assembly INFO.

NEXT ↓

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ↓

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output. | A |
| P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again. | B |

(f) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **COMPLETED**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SHIFT SENSOR) |

(a) Disconnect connector L5 from the power management control ECU.

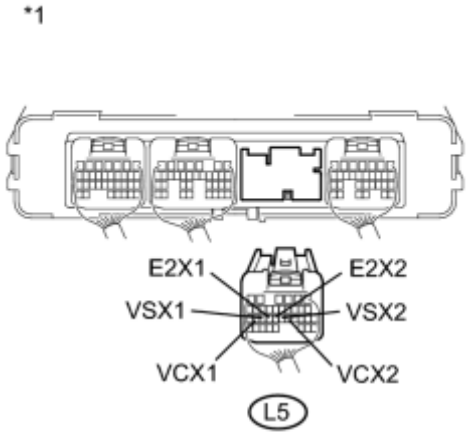
(b) Disconnect connector z6 from the shift sensor.

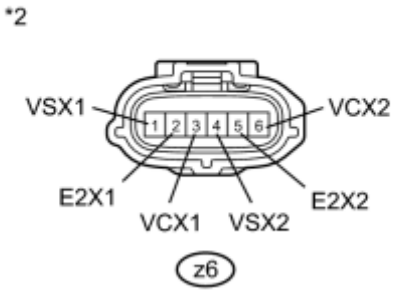
(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-26 (VCX1) - Body ground | Power switch on (IG) | Below 1 V |
| L5-25 (VSX1) - Body ground | Power switch on (IG) | Below 1 V |
| L5-24 (E2X1) - Body ground | Power switch on (IG) | Below 1 V |
| L5-21 (VCX2) - Body ground | Power switch on (IG) | Below 1 V |
| L5-22 (VSX2) - Body ground | Power switch on (IG) | Below 1 V |
| L5-23 (E2X2) - Body ground | Power switch on (IG) | Below 1 V |




# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector:<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector:<br><br>(to Shift Sensor) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-26 (VCX1) - z6-3 (VCX1) | Power switch off | Below 1 Ω |
| L5-25 (VSX1) - z6-1 (VSX1) | Power switch off | Below 1 Ω |
| L5-24 (E2X1) - z6-2 (E2X1) | Power switch off | Below 1 Ω |
| L5-21 (VCX2) - z6-6 (VCX2) | Power switch off | Below 1 Ω |
| L5-22 (VSX2) - z6-4 (VSX2) | Power switch off | Below 1 Ω |
| L5-23 (E2X2) - z6-5 (E2X2) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-26 (VCX1) or z6-3 (VCX1) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-25 (VSX1) or z6-1 (VSX1) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-24 (E2X1) or z6-2 (E2X1) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-21 (VCX2) or z6-6 (VCX2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-22 (VSX2) or z6-4 (VSX2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-23 (E2X2) or z6-5 (E2X2) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the shift sensor connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU (VCX1, VCX2 VOLTAGE) |

(a) Disconnect connector z6 from the shift sensor.

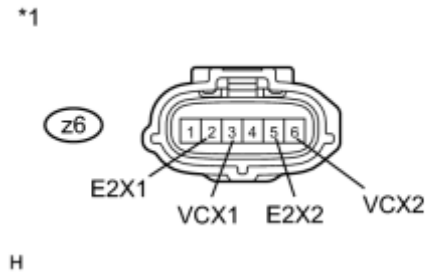
(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z6-3 (VCX1) - z6-2 (E2X1) | Power switch on (IG) | 4.5 to 5.5 V |

| | | |
|---|---|---|
| z6-6 (VCX2) - z6-5 (E2X2) | Power switch on (IG) | 4.5 to 5.5 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Shift Sensor) |

(d) Connect the shift sensor connector.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 8. | REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY |

(a) Replace the shift lock control unit assembly INFO.

NEXT ▼

| | |
|---|---|
| 9. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ▼

| | |
|---|---|
| 10. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output. | A |
| P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again. | B |

(f) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **COMPLETED**

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - SELECT SENSOR) |

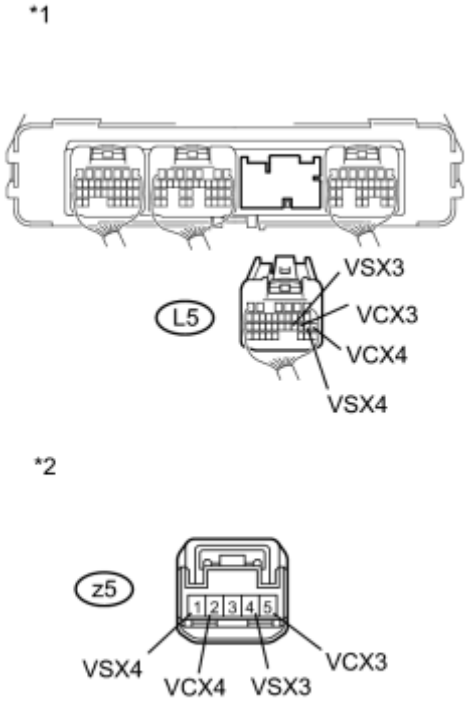
(a) Disconnect connector L5 from the power management control ECU.

(b) Disconnect connector z5 from the select sensor.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-19 (VCX3) - Body ground | Power switch on (IG) | Below 1 V |
| L5-20 (VSX3) - Body ground | Power switch on (IG) | Below 1 V |
| L5-17 (VCX4) - Body ground | Power switch on (IG) | Below 1 V |
| L5-18 (VSX4) - Body ground | Power switch on (IG) | Below 1 V |

# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector:<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector:<br><br>(to Select Sensor) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-19 (VCX3) - z5-5 (VCX3) | Power switch off | Below 1 Ω |
| L5-20 (VSX3) - z5-4 (VSX3) | Power switch off | Below 1 Ω |
| L5-17 (VCX4) - z5-2 (VCX4) | Power switch off | Below 1 Ω |
| L5-18 (VSX4) - z5-1 (VSX4) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-19 (VCX3) or z5-5 (VCX3) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-20 (VSX3) or z5-4 (VSX3) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-17 (VCX4) or z5-2 (VCX4) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| L5-18 (VSX4) or z5-1 (VSX4) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the select sensor connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK POWER MANAGEMENT CONTROL ECU (VCX3, VCX4 VOLTAGE) |

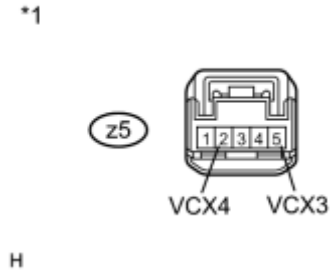
(a) Disconnect connector z5 from the select sensor.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|




| | | |
|---|---|---|
| z5-5 (VCX3) - Body ground | Power switch on (IG) | 9 to 14 V |
| z5-2 (VCX4) - Body ground | Power switch on (IG) | 9 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Select Sensor) |

(d) Connect the select sensor connector.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 13. | REPLACE SHIFT LOCK CONTROL UNIT ASSEMBLY |

(a) Replace the shift lock control unit assembly INFO.

NEXT ▼

| | |
|---|---|
| 14. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ▼

| | |
|---|---|
| 15. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Perform a road test.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output. | A |
| P082B-575, P082C-576, P082E-571, P082F-572, P181A-596, P181B-595, P182B-577, P182C-578, P182E-573 or P182F-574 is output again. | B |

(f) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU
A ▶ **COMPLETED**

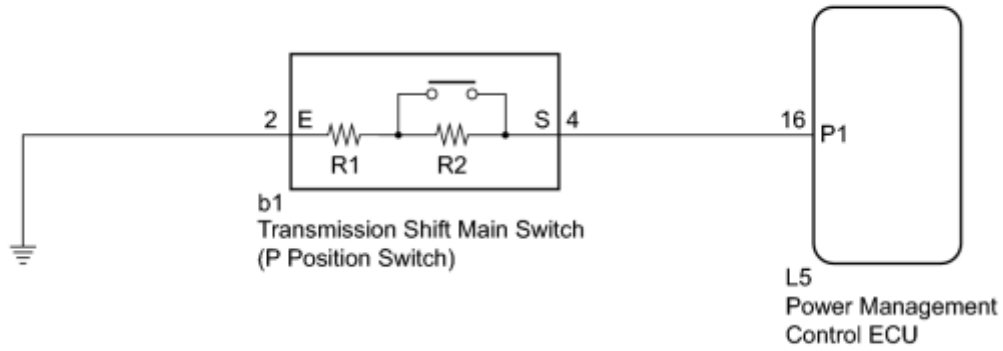
| | | |
|---|---|---|
| DTC | P0851-579 | Park / Neutral Switch Input Circuit Low |
| DTC | P0852-580 | Park / Neutral Switch Input Circuit High |

# DESCRIPTION

- Instead of having a parking position as one of the positions of the conventional selector lever, a transmission shift main switch (P position switch) is provided independently above the selector lever. The switch is a momentary type, in which the button does not lock mechanically.
- The transmission shift main switch (P position switch) contains resistors R1 and R2. When the transmission shift main switch (P position switch) is not pressed, the switch provides a combined resistance of R1 and R2; and when the transmission shift main switch (P position switch) is pressed, the switch provides only the resistance of R1. The voltage at the P1 terminal of the power management control ECU (HV CPU) varies with the changes in the resistance of the switch. The power management control ECU (HV CPU) determines the transmission shift main switch (P position switch) operation according to this resistance signal.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0851 | 579 | GND short in P position switch circuit | • Wire harness or connector<br>• Transmission shift main switch (P position switch)<br>• Power management control ECU |
| P0852 | 580 | Open or +B short in P position switch circuit | |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

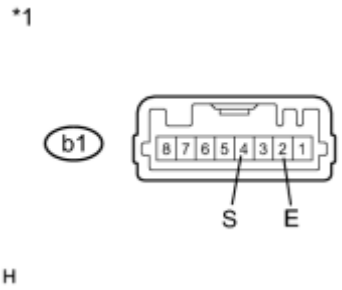
# PROCEDURE

| | |
|---|---|
| 1. | INSPECT TRANSMISSION SHIFT MAIN SWITCH (P POSITION SWITCH) |

(a) Disconnect connector b1 from the transmission shift main switch (P position switch).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| b1-4 (S) - b1-2 (E) | Switch pressed | 680 Ω |
| b1-4 (S) - b1-2 (E) | Switch released | 4580 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Transmission Shift Main Switch (P Position Switch)) |

(c) Connect the transmission shift main switch (P position switch) connector.

NG ▶ REPLACE TRANSMISSION SHIFT MAIN SWITCH

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - P POSITION SWITCH) |

(a) Disconnect connector L5 from the power management control ECU.

(b) Disconnect connector b1 from the transmission shift main switch (P position switch).

(c) Turn the power switch on (IG).

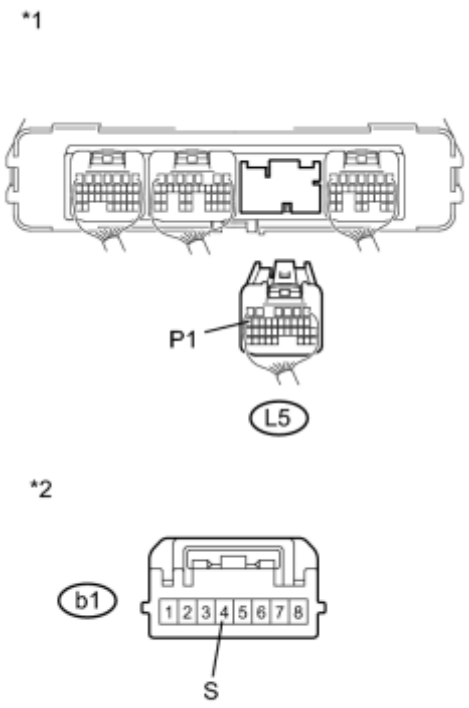
(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-16 (P1) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |




| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Transmission Shift Main Switch (P Position Switch)) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-16 (P1) - b1-4 (S) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-16 (P1) or b1-4 (S) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the transmission shift main switch (P position switch) connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

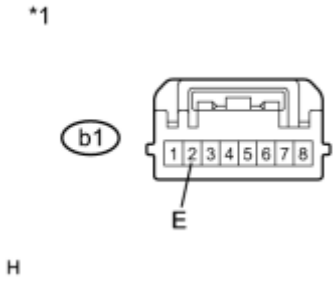
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (P POSITION SWITCH - BODY GROUND) |

(a) Disconnect connector b1 from the transmission shift main switch (P position switch).

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| b1-2 (E) - Body ground | Power switch off | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Shift Main Switch (P Position Switch)) |

(c) Connect the transmission shift main switch (P position switch) connector.

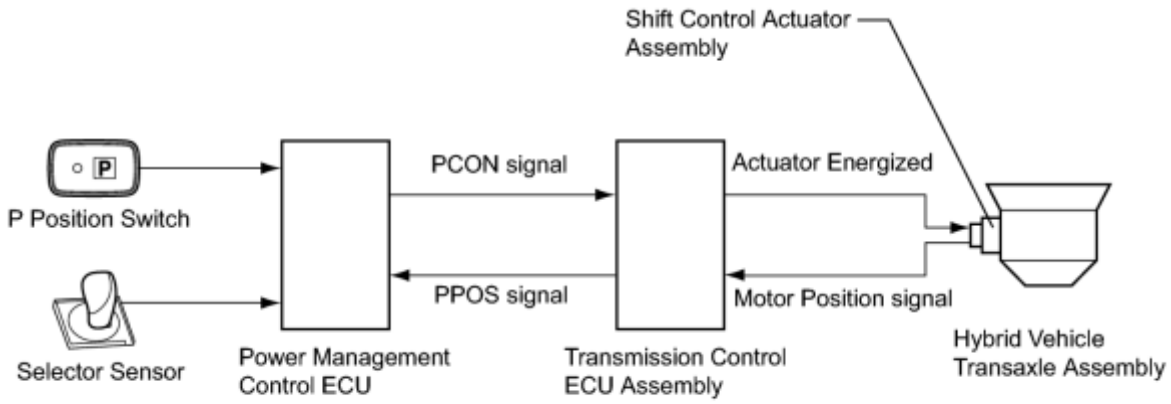
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P085D-582 | Gear Shift Control Module "A" Performance |
| DTC | P085D-599 | Gear Shift Control Module "A" Performance |
| DTC | P0861-597 | Gear Shift Control Module "A" Communication Circuit Low |
| DTC | P0862-598 | Gear Shift Control Module "A" Communication Circuit High |

# DESCRIPTION

When a signal is input from the transmission shift main switch (P position switch) or selector lever, the power management control ECU (HV CPU) transmits a P position control (PCON) signal to the transmission control ECU assembly. Based on this signal, the transmission control ECU assembly actuates the shift control actuator assembly in order to mechanically lock or unlock the counter drive gear in the hybrid vehicle transaxle assembly.

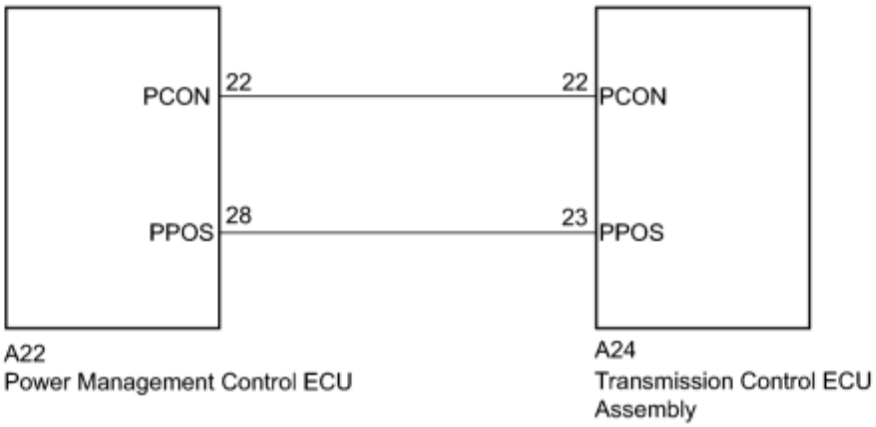
P position state (engaged or released) of the actuator assembly is sent to the power management control ECU (HV CPU) as a P position (PPOS) signal.




H

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P085D | 582 | P position (PPOS) signal is logically inconsistent | • Wire harness or connector<br>• Transmission control ECU assembly<br>• Power management control ECU |
| | 599 | P position (PPOS) signal malfunction (output pulse is abnormal) | |
| P0861 | 597 | GND short in P position (PPOS) signal circuit | |
| P0862 | 598 | +B short in P position (PPOS) signal circuit | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (TRANSMISSION CONTROL) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Chassis / Transmission Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| Electronic shift lever system DTCs are not output. | A |
| Any of the following DTCs are output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| C2309 | Open in B+ Circuit |
| C2311 | Communication Error from HV ECU |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - TRANSMISSION CONTROL ECU) |

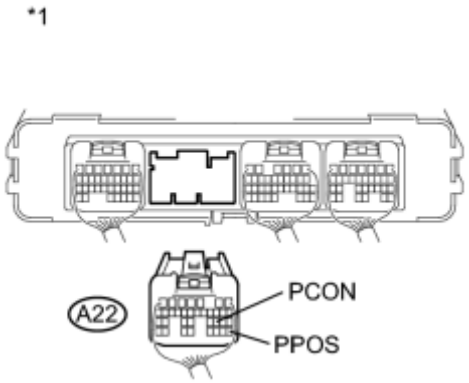
(a) Disconnect connector A22 from the power management control ECU.

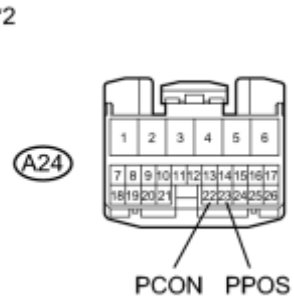
(b) Disconnect connector A24 from the transmission control ECU assembly.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A24-22 (PCON) - Body ground | Power switch on (IG) | Below 1 V |
| A24-23 (PPOS) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

NOTICE:

Turning the power switch on (IG) with the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-22 (PCON) - A24-22 (PCON) | Power switch off | Below 1 Ω |
| A22-28 (PPOS) - A24-23 (PPOS) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-22 (PCON) or A24-22 (PCON) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-28 (PPOS) or A24-23 (PPOS) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(g) Connect the transmission control ECU assembly connector.

(h) Connect the power management control ECU connector.

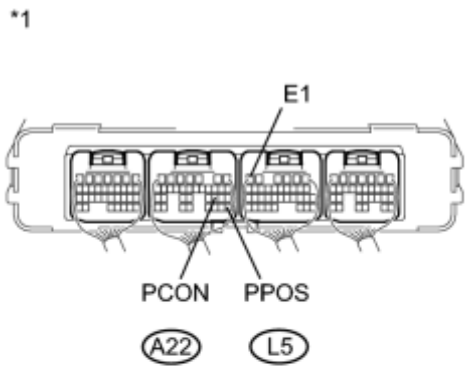
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

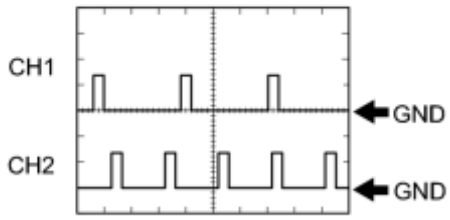
OK ▼

| | |
|---|---|
| 3. | CHECK POWER MANAGEMENT CONTROL ECU |

(a) Turn the power switch on (IG).

(b) Connect an oscilloscope between the power management control ECU terminals specified in the table below, and measure the waveform.




| Item | Content |
|---|---|
| Terminal | CH1: A22-22 (PCON) - L5-6 (E1)<br>CH2: A22-28 (PPOS) - L5-6 (E1) |
| Equipment Setting | 5V/DIV., 20ms/DIV. |
| Condition | Power switch on (IG) |

Result:

| Result | Proceed to |
|---|---|
| P position control (PCON) signal waveform appears | A |
| P position control (PCON) signal waveform does not appear | B |
| P position (PPOS) signal waveform appears | B |
| P position (PPOS) signal waveform does not appear | A |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br>(Power Management Control ECU) |

(c) Turn the power switch off.

B REPLACE POWER MANAGEMENT CONTROL ECU
A **REPLACE TRANSMISSION CONTROL ECU ASSEMBLY**

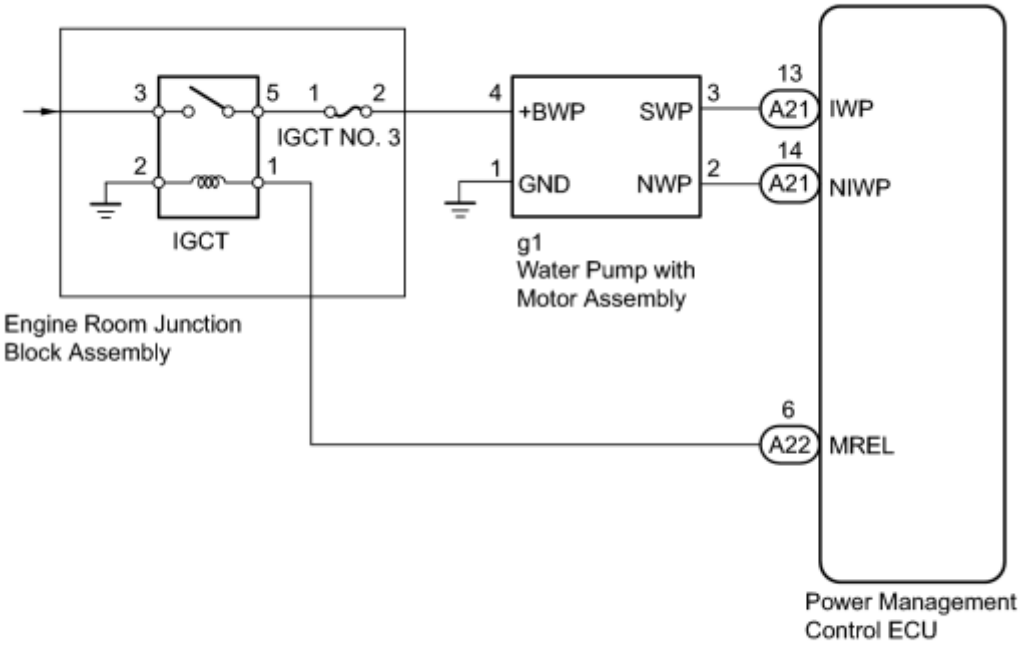
| | | |
|---|---|---|
| DTC | P0A01-726 | Motor Electronics Coolant Temperature Sensor Circuit Range / Performance |
| DTC | P0A04-725 | Motor Electronics Coolant Temperature Sensor Circuit Intermittent |

# DESCRIPTION

The power management control ECU (HV CPU) detects HV coolant temperature using the coolant temperature sensor built into the inverter with converter assembly. The power management control ECU (HV CPU) uses signals from the coolant temperature sensor to check the effectiveness of the inverter cooling system. If necessary, the power management control ECU (HV CPU) will limit inverter output to help prevent inverter overheating. The power management control ECU (HV CPU) also detects malfunctions in the sensor based on the HV coolant temperature sensor values. The inverter with converter assembly detects malfunctions in the HV coolant temperature sensor and its wiring.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A01 | 726 | Temperature calculated by power management control ECU and actual temperature are different for 10 seconds or more. | • Inverter cooling system<br>• Cooling fan system<br>• Power management control ECU<br>• Inverter with converter assembly<br>• Water pump with motor assembly<br>• Wire harness or connector<br>• IGCT No. 3 fuse |
| P0A04 | 725 | Unusual sudden change in HV coolant temperature sensor output occurs and the offset continues, or unusual sudden change in HV coolant temperature sensor output occurs repeatedly. | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Select the following menu items: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A01-726 or P0A04-725 is output | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A93-346 | Inverter Cooling System Performance |
| P0C73-776 | Motor Electronics Coolant Pump "A" Control Performance |
| P314A-828 | Inverter Coolant Pump Speed Signal |

HINT:

P0A01-726 or P0A04-725 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK QUANTITY OF HV COOLANT |

(a) Check the coolant level in the inverter reserve tank.

(b) Check for coolant leaks.

**Result**

| Result | Proceed to |
|---|---|
| Coolant leaks are not evident. A sufficient amount of coolant remains in the inverter reserve tank. | A |
| Coolant leaks are not evident. No coolant remains in the inverter reserve tank. | B |
| Coolant leaks are evident. | C |

HINT:

After repairing the coolant leaks and adding coolant, perform the "Activate the Water Pump" Active Test (HV Active Test item) and the "Control the Electric Cooling Fan" Active Test (Engine Active Test item) and make sure that there are no malfunctions.

C ▶ INSPECT FOR COOLANT LEAK AND ADD COOLANT
B ▶ ADD HV COOLANT
A
▼

| | |
|---|---|
| 4. | CHECK COOLANT HOSE |

(a) Check if the hoses of the cooling system are kinked or clogged.

NG ▶ CORRECT THE PROBLEM
OK
▼

| | |
|---|---|
| 5. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVATE THE WATER PUMP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Active Test / Activate the Water Pump.

(d) Select Inverter W/P Revolution in the Data List.

(e) While performing the "Activate the Water Pump" Active Test, check Inverter W/P Revolution in the Data List.

Result:

| Data List Item | Specified Condition |
|---|---|
| Inverter W/P Revolution | 2250 to 5625 rpm |

HINT:

Perform the Active Test with the inverter coolant temperature between 5 to 149°F (-15 and 65°C).

(f) Turn the power switch off.

NG ▶ CHECK FUSE (IGCT NO. 3)
OK
▼

| | |
|---|---|
| 6. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Engine and ECT / Active Test / Control the Electric Cooling Fan.

(d) Perform the "Control the Electric Cooling Fan" Active Test.

OK:

The cooling fan rotates.

(e) Turn the power switch off.

NG ▶ CHECK COOLING FAN SYSTEM
OK
▼

| | |
|---|---|
| 7. | CHECK HV COOLANT (CHECK FOR CONDITIONS THAT MAY HAVE CAUSED FREEZING) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Read the freeze frame data Ambient Temperature using the Techstream.

(d) Check if the freeze frame data Ambient Temperature is below freezing.

Result:

| Result | Proceed to |
|---|---|
| Ambient Temperature value is above freezing temperature of the HV coolant | A |
| Ambient Temperature value is below freezing temperature of the HV coolant | B |

HINT:

- HV coolant (SLLC) with a 30% concentration freezes at 5°F (-15 °C) and HV coolant (SLLC) with a 50% concentration freezes at -31°F (-35°C).
- If the HV coolant freezes in the HV radiator or HV water pump, the coolant temperature in the inverter with converter assembly rises because the HV coolant cannot circulate. As a result, a DTC may be set.
- A DTC is set when the water pump impeller cannot rotate due to freezing of the HV coolant.
- If a DTC is set due to freezing of HV coolant, the problem cannot be reproduced. Judge whether freezing of HV coolant occurred according to the freeze point of the HV coolant, HV coolant change history and ambient temperature when the DTC was set.

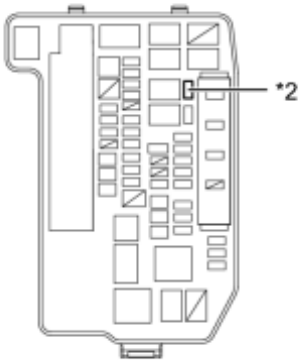
(e) Turn the power switch off.

B ▶ REPLACE HV COOLANT
A ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK FUSE (IGCT NO. 3) |

(a) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| IGCT No. 3 fuse | Always | Below 1Ω |

**Text in Illustration**

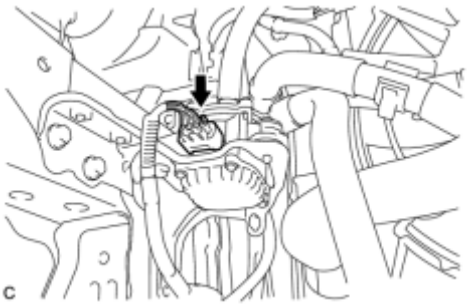
| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |

(c) Install the IGCT No. 3 fuse.

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY)

OK ▼

| | |
|---|---|
| 9. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY) |



(a) Check the connection of the water pump with motor assembly connector.

OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) |

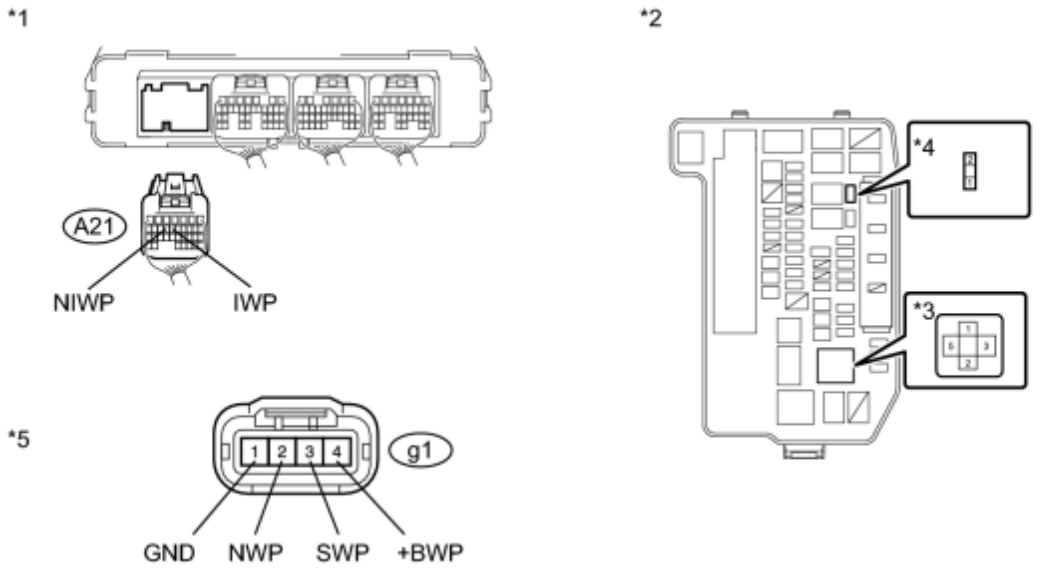
(a) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

(b) Remove the IGCT relay from the engine room junction block assembly.

(c) Disconnect connector A21 from the power management control ECU.

(d) Disconnect connector g1 from the water pump with motor assembly.

(e) Measure the resistance according to the value(s) in the table below.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) | *2 | Engine Room Junction Block Assembly |
| *3 | IGCT Relay | *4 | IGCT No. 3 Fuse |
| *5 | Front view of wire harness connector<br><br>(to Water Pump with Motor Assembly) | - | - |

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 2 (IGCT No. 3 fuse) - g1-4 (+BWP) | Power switch off | Below 1 Ω |
| 1 (IGCT No. 3 fuse) - 3 (IGCT relay) | Power switch off | Below 1 Ω |
| g1-1 (GND) - Body ground | Power switch off | Below 1 Ω |
| g1-2 (NWP) - A21-14 (NIWP) | Power switch off | Below 1 Ω |
| g1-3 (SWP) - A21-13 (IWP) | Power switch off | Below 1 Ω |
| 2 (IGCT No. 3 fuse) or g1-4 (+BWP) - Body ground and other terminals | Power switch off | 10kΩ or higher |
| 1 (IGCT No. 3 fuse) or 3 (IGCT relay) - Body ground and other terminals | Power switch off | 10kΩ or higher |
| g1-2 (NWP) or A21-14 (NIWP) - Body ground and other terminals | Power switch off | 10kΩ or higher |
| g1-3 (SWP) or A21-13 (IWP) - Body ground and other terminals | Power switch off | 10kΩ or higher |

NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(f) Install the IGCT No. 3 fuse.

(g) Install the IGCT relay.

(h) Connect the power management control ECU connector.

(i) Connect the water pump with motor assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

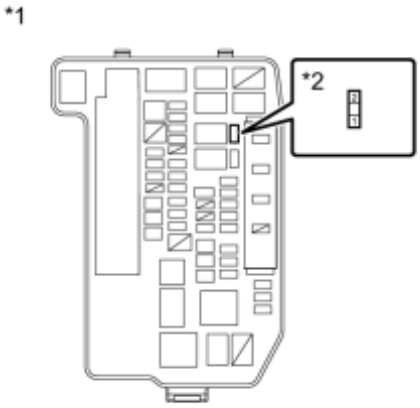
| | |
|---|---|
| 12. | CHECK WATER PUMP WITH MOTOR ASSEMBLY |

(a) Connect the Techstream to the DLC3.

(b) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

# Text in Illustration

| | |
|---|---|
| *1 | Engine Room junction Block Assembly |
| *2 | IGCT No. 3 Fuse |




(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Inverter W/P Revolution

(e) Apply 12 V to terminal 2 of the IGCT No. 3 fuse holder of the engine room junction block assembly.

(f) Read the Data List.

OK:

Inverter W/P Revolution is between 2250 and 5625 rpm.

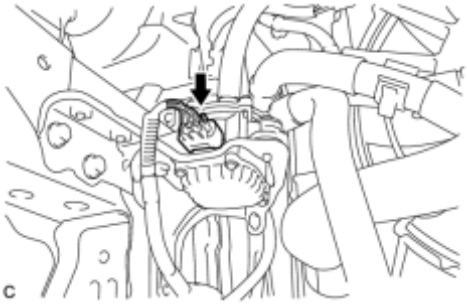
NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(g) Install the IGCT No. 3 fuse.

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 13. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY) |



(a) Check the connection of the water pump with motor assembly connector.

OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY
OK
▼

| | |
|---|---|
| 14. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) |

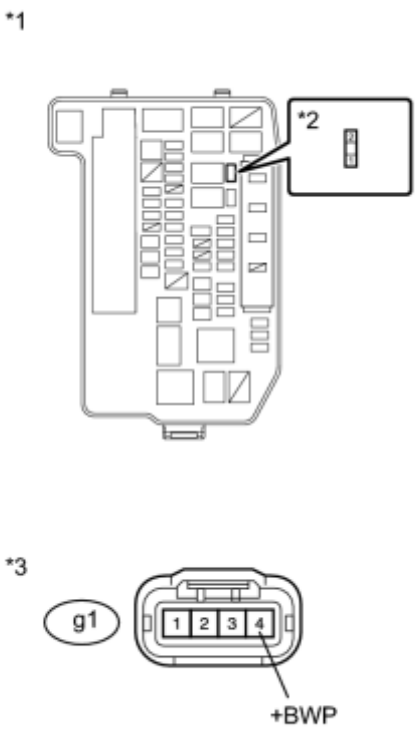
(a) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

(b) Disconnect connector g1 from the water pump with motor assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 2 (IGCT No. 3 fuse) or g1-4 (+BWP) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |
| *3 | Front view of wire harness connector<br><br>(to Water Pump with Motor Assembly) |

NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(d) Install the IGCT No. 3 fuse.

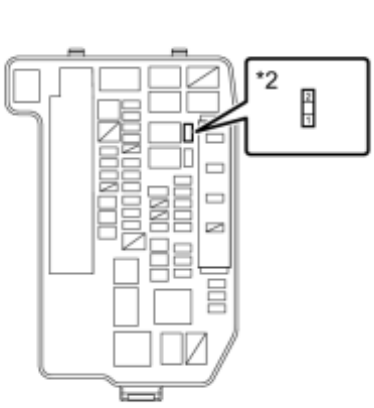
(e) Connect the water pump with motor assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 16. | CHECK WATER PUMP WITH MOTOR ASSEMBLY |

(a) Connect the Techstream to the DLC3.




(b) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Inverter W/P Revolution

(e) Apply 12 V to terminal 2 of the IGCT No. 3 fuse holder of the engine room junction block assembly.

(f) Read the Data List.

OK:

Inverter W/P Revolution is between 2250 and 5625 rpm.

NOTICE:

Do not apply excessive force when using the probes of the tester to perform the inspection. If excessive force is used, the terminals will be damaged.

(g) Install the IGCT No. 3 fuse.

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK ▼

| | |
|---|---|
| 17. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 18. | REPLACE HV COOLANT |

(a) Replace the HV coolant with coolant having an appropriate concentration (appropriate freeze point) for the vehicle usage conditions INFO.

NEXT ▼

| | |
|---|---|
| 19. | CHECK WATER PUMP WITH MOTOR ASSEMBLY |

(a) Perform a road test and check that DTCs are not stored.

OK:

DTCs are not stored.

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **COMPLETED**

| | |
|---|---|
| 20. | CONNECT SECURELY |

(a) Connect the power management control ECU connectors securely.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 21. | CONNECT SECURELY |

(a) Connect the inverter with converter assembly connector securely.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 22. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 23. | REPLACE WATER PUMP WITH MOTOR ASSEMBLY |

(a) Replace the water pump with motor assembly INFO

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | | |
|---|---|---|
| DTC | P0A02-719 | Motor Electronics Coolant Temperature Sensor Circuit Low |
| DTC | P0A03-720 | Motor Electronics Coolant Temperature Sensor Circuit High |

# DESCRIPTION

Refer to the description for DTC P0A01-726 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A02 | 719 | Short to GND in the HV coolant temperature sensor circuit | Inverter with converter assembly |
| P0A03 | 720 | Open or short to +B in the HV coolant temperature sensor circuit | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

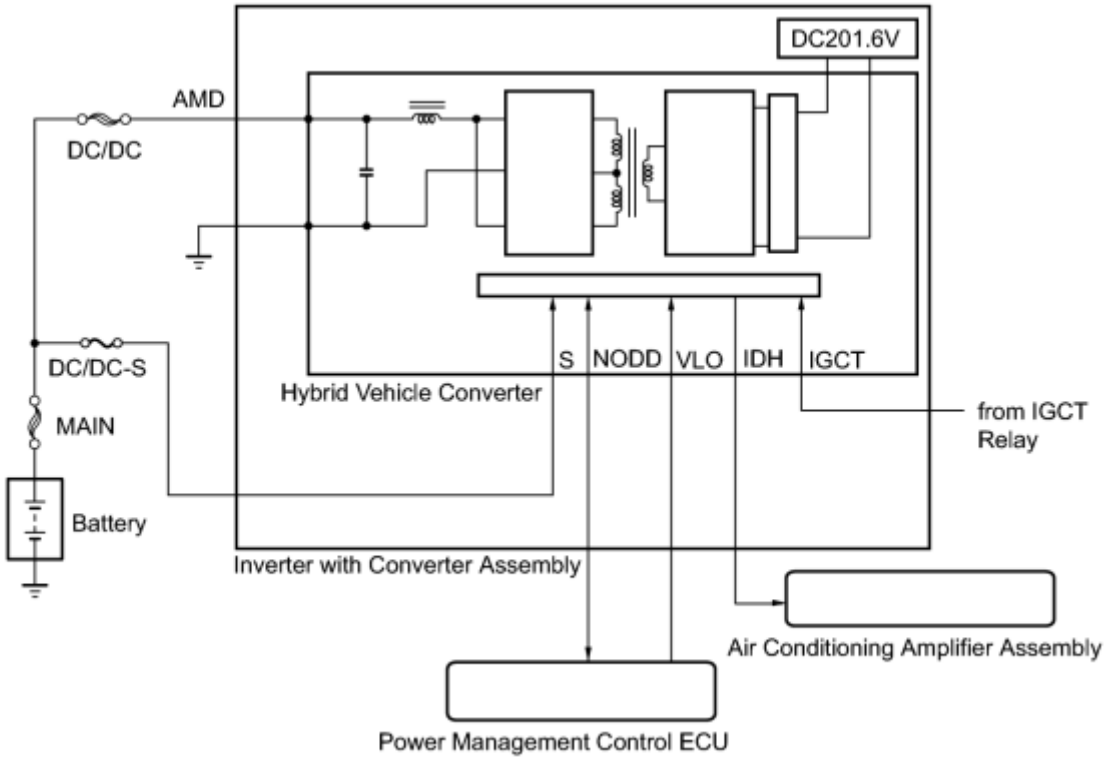
NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A08-264 | DC / DC Converter Status Circuit |

# DESCRIPTION

The hybrid vehicle converter (DC/DC converter) converts the DC 201.6 V of the HV battery into DC 12 V in order to supply power to areas such as the vehicle's lighting, audio, and ECU systems. In addition, it charges the auxiliary battery. A transistor bridge circuit initially converts DC 201.6 V into alternating current, and a transformer lowers its voltage. Then, it is rectified and smoothed (into DC) and converted into DC 12 V. The hybrid vehicle converter controls the output voltage in order to keep a constant voltage at the terminals of the auxiliary battery.

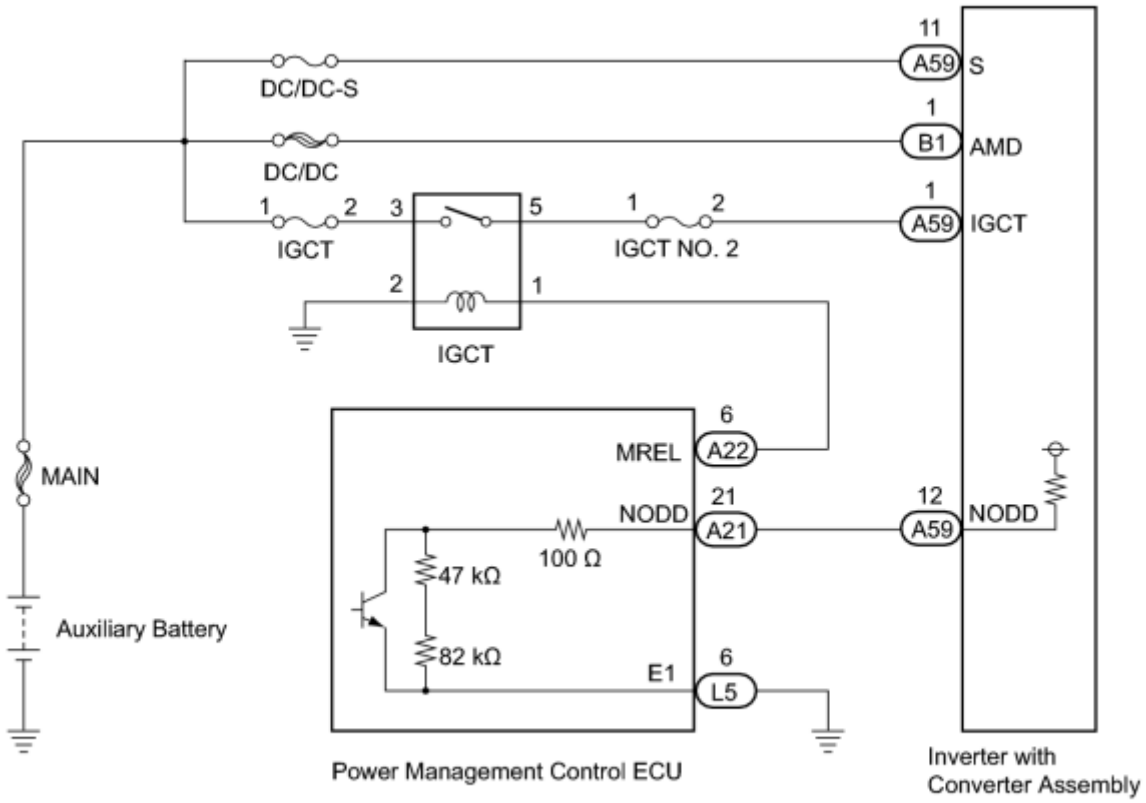
The power management control ECU (HV CPU) uses the NODD signal line to transmit a stop command to the hybrid vehicle converter and receive signals indicating the normal or abnormal condition of the 12 V charging system. If the vehicle is being driven with an inoperative hybrid vehicle converter, the voltage of the auxiliary battery will drop, which will prevent the continued operation of the vehicle. Therefore, the power management control ECU (HV CPU) monitors the operation of the hybrid vehicle converter and alerts the driver if it detects a malfunction.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A08 | 264 | DC/DC converter malfunction | • Wire harness or connector<br>• Water pump with motor assembly<br>• Inverter cooling system<br>• Hybrid vehicle transaxle assembly<br>• Generator cable |

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| | | | • Motor cable<br>• Frame wire<br>• Inverter with converter assembly<br>• Fusible link block assembly (MAIN)<br>• Fuse (DC/DC-S, IGCT, IGCT No. 2, IGCT No. 3)<br>• Fusible link block assembly (DC/DC) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket

to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A08-264 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A93-346 | Inverter Cooling System Performance |
| P0A94-547, 548, 549 | DC / DC Converter Performance |
| P0AA6-526, 613 | Hybrid Battery Voltage System Isolation Fault |
| P0ADB-227 | Hybrid Battery Positive Contactor Control Circuit Low |
| P0ADF-229 | Hybrid Battery Negative Contactor Control Circuit Low |
| P0AE6-225 | Hybrid Battery Precharge Contactor Control Circuit Low |
| P0C73-776 | Motor Electronics Coolant Pump "A" Control Performance |
| P3004-131, 803 | Power Cable Malfunction |

(e) Turn the power switch off.

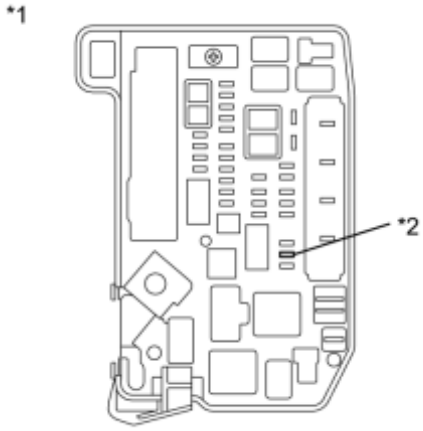
B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK FUSE (IGCT NO. 2) |

(a) Disconnect the cable from the negative auxiliary battery terminal.

(b) Remove the IGCT No. 2 fuse from the engine room junction block assembly.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| IGCT No. 2 fuse terminals | Always | Below 1 Ω |

## Text in Illustration

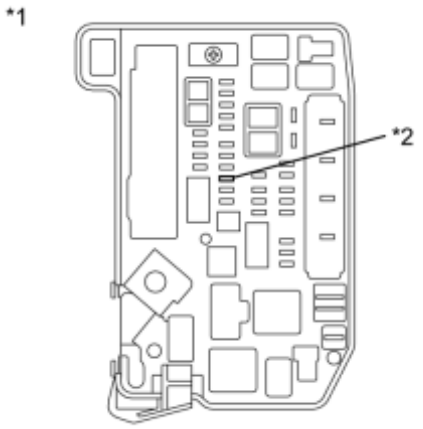
| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 2 Fuse |

(d) Install the IGCT No. 2 fuse.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - IGCT NO. 2 FUSE)

OK ▼

| | |
|---|---|
| 3. | CHECK FUSE (DC/DC-S) |




(a) Remove the DC/DC-S fuse from the engine room junction block assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| DC/DC-S fuse terminals | Always | Below 1 Ω |

**Text in Illustration**

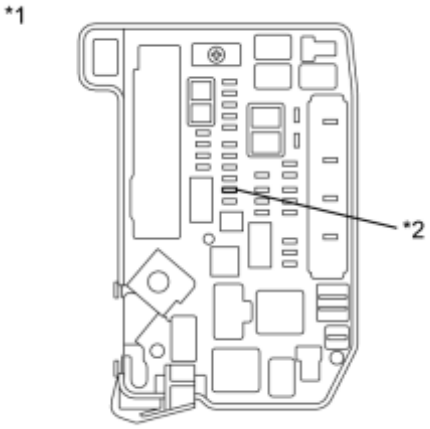
| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | DC/DC-S Fuse |

(c) Install the DC/DC-S fuse.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - DC/DC-S FUSE)

OK ▼

| | |
|---|---|
| 4. | CHECK FUSE (IGCT) |




(a) Remove the IGCT fuse from the engine room junction block assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| IGCT fuse terminals | Always | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Fuse |

(c) Install the IGCT fuse.

NG ▶ CHECK ENGINE ROOM JUNCTION BLOCK (IGCT RELAY, IGCT FUSE, IGCT NO. 2 FUSE)

OK ▼

| | |
|---|---|
| 5. | CHECK FUSIBLE LINK (DC/DC) |

(a) Disconnect connector 1E from the engine room junction block assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1E-1 - terminal A | Always | Below 1 Ω |

(c) Check the fusible links (DC/DC) in the engine room junction block assembly for improper installation.

OK:

The fusible link is installed securely.

(d) Connect the engine room junction block assembly connector.

NG ▶ REPLACE FUSIBLE LINK (DC/DC)
OK
▼

| | |
|---|---|
| 6. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY
OK
▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY
OK
▼

| | |
|---|---|
| 8. | CHECK CABLE AND WIRE HARNESS |

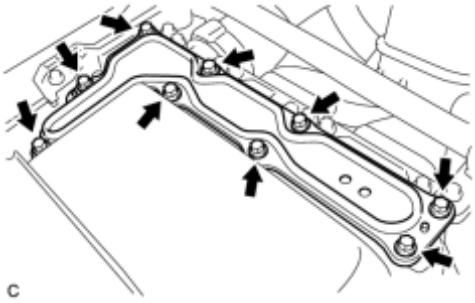
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



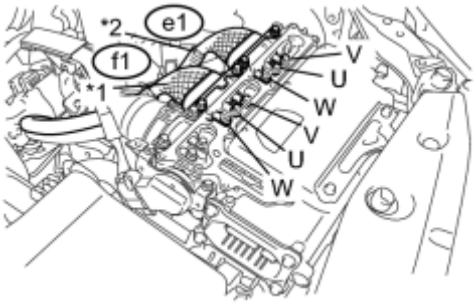

(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Using a megohmmeter set to 500 V, measure the insulation resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-3 (V) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| f1-2 (U) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| f1-1 (W) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| e1-3 (V) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| e1-2 (U) - Body ground and shield ground | Power switch off | 1 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 1 MΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cable for MG1 |
| *2 | Three-phase AC Cable for MG2 |

HINT:

Perform this inspection while the three-phase AC cable for MG1 and for

MG2 are connected.

(d) Install the inverter terminal cover to the inverter with converter assembly.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1)

OK ▼

| 9. | CHECK AMD TERMINAL |
|---|---|

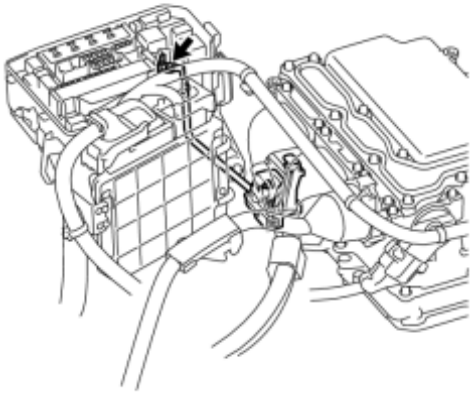
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Check that the nuts for the AMD terminal is tightened to the specified torque, the AMD terminal is connected securely, and there is no contact problem.

Torque:

T=8.3 N*m {85 kgf*cm, 73 in.*lbf }

Result:

| Result | | Proceed to |
|---|---|---|
| There are no arc marks. | The terminal is connected securely and there is no contact problem. | A |
| There are no arc marks. | The terminal is not connected securely and there is a contact problem. | B |
| There are arc marks. | - | C |

C ▶ REPLACE MALFUNCTIONING PARTS

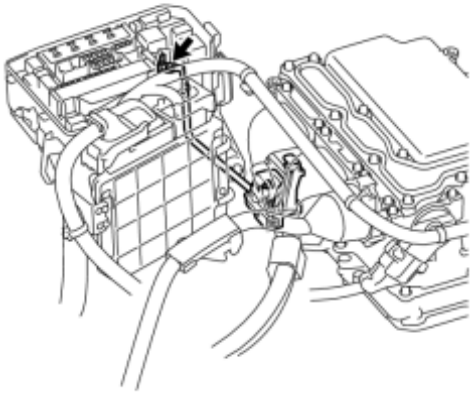
B ▶ CONNECT SECURELY

A ▼

| 10. | CHECK AMD TERMINAL (ENGINE ROOM JUNCTION BLOCK ASSEMBLY SIDE) |
|---|---|

CAUTION:

Be sure to wear insulated gloves.



(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| AMD terminal (Engine Room Junction Block Assembly side) - Body ground | Power switch off | 11 to 14 V |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

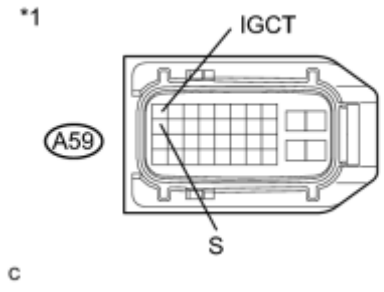
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Turn the power switch on (IG).

HINT:

Turning the power switch on (IG) with the service grip removed causes interlock switch system DTC P0A0D-350 to be output.




(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-1 (IGCT) - Body ground | Power switch on (IG) | 11 to 14 V |
| A59-11 (S) - Body ground | | |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(e) Turn the power switch off.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK POWER MANAGEMENT CONTROL ECU |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

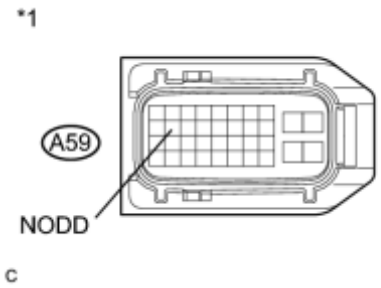
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-12 (NODD) - Body ground | Power switch off | 120 to 140 kΩ |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG INSPECT POWER MANAGEMENT CONTROL ECU

OK

| | |
|---|---|
| 13. | CHECK DC/DC CONVERTER FUNCTION |

HINT:

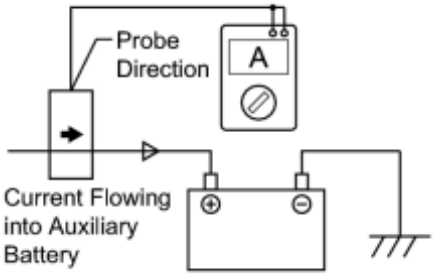
The current at the AMD terminal cannot be measured directly because of space limitations. Measure the current flowing at the auxiliary battery instead.

(a) Connect the AC/DC 400 A probe to the positive auxiliary battery line.

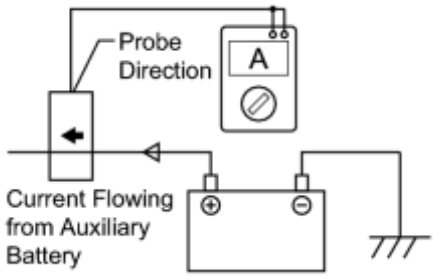
(b) Install the service plug grip.

(c) Turn the power switch on (READY) and leave the vehicle as it is until the electric current flowing into the auxiliary battery becomes 10 A or less.

(d) Measure the current flowing from the auxiliary battery with the power switch on (READY), the headlight position switch and blower motor switch in the HI position, and the rear window defogger turned on.




c




c

Standard Current:

| Item | Switch Condition | Specified Condition |
|---|---|---|
| Current flowing from auxiliary battery | Power switch on (READY)<br><br>(The headlight position switch and blower motor switch are in the HI position, and the rear window defogger is turned on.) | 0 A or less<br><br>(no current from auxiliary battery) |

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| Auxiliary battery voltage | Power switch on (READY)<br><br>(The headlight position switch and blower motor switch are in the HI position, and the rear window defogger is turned on.) | 13 to 15 V |

(f) Turn the power switch off.

NG ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY

OK ▼

| | |
|---|---|
| 14. | CHECK QUANTITY OF HV COOLANT INFO |

C ▶ INSPECT FOR COOLANT LEAK AND ADD COOLANT

B ▶ ADD HV COOLANT

A ▼

| | |
|---|---|
| 15. | CHECK COOLANT HOSE INFO |

NG ▶ CORRECT THE PROBLEM

OK ▼

| | |
|---|---|
| 16. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVE THE WATER PUMP) INFO |

NG ▶ CHECK FUSE (IGCT NO. 3)

OK ▼

| | |
|---|---|
| 17. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN) INFO |

NG ▶ CHECK COOLING FAN SYSTEM

OK ▼

| | |
|---|---|
| 18. | CHECK HV COOLANT (CHECK FOR CONDITIONS THAT MAY HAVE CAUSED FREEZING) INFO |

B ▶ REPLACE HV COOLANT

A **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 19. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) |

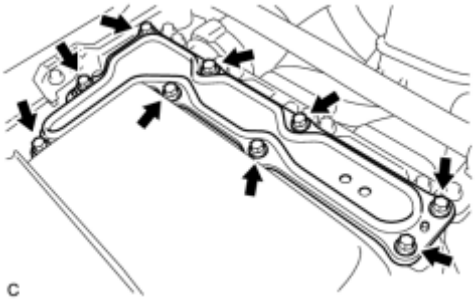
CAUTION:

Be sure to wear insulated gloves.

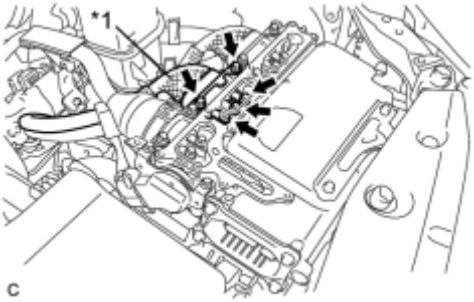
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Disconnect the three-phase AC cables for MG1 from the inverter with converter assembly.

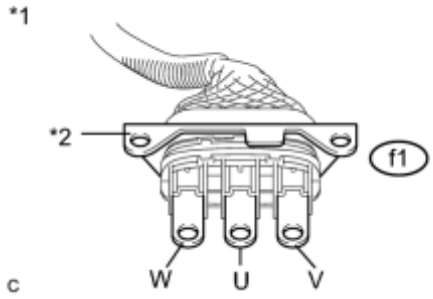
## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG1 |

(d) Using a megohmmeter set to 500 V, measure the insulation resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-2 (U) - Body ground and shield | Power switch | 100 MΩ or higher |

| | | |
|---|---|---|
| ground | off | |
| f1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG1 |
| *2 | Shield Ground |

(e) Connect the three-phase AC cables for MG1 to the inverter with converter assembly.

(f) Install the inverter terminal cover to the inverter with converter assembly.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 20. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) |

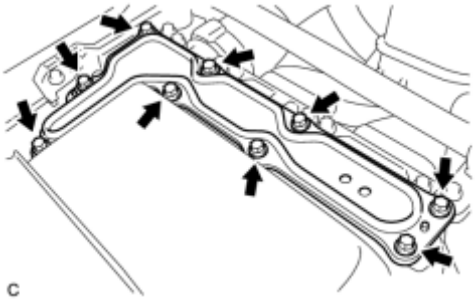
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

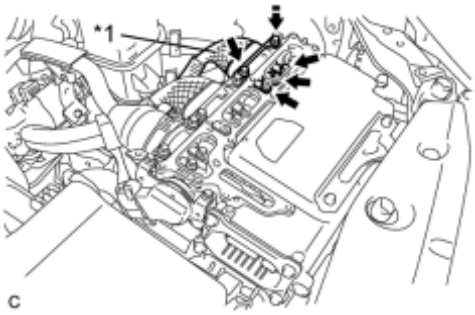



(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Disconnect the three-phase AC cables for MG2 from the inverter with converter assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG2 |

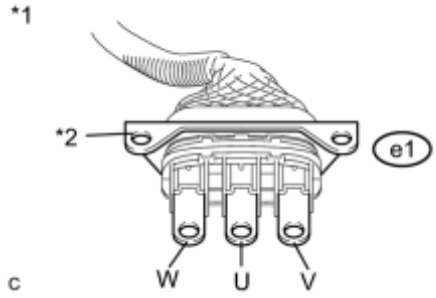



(d) Using a megohmmeter set to 500 V, measure the insulation resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Three-phase AC Cables for MG2 |
| *2 | Shield Ground |

(e) Connect the three-phase AC cables for MG2 to the inverter with converter assembly.

(f) Install the inverter terminal cover to the inverter with converter assembly.

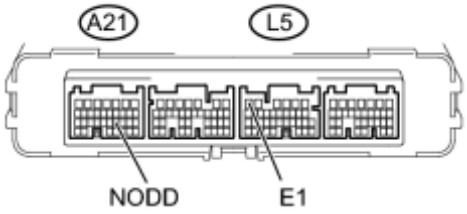
NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 21. | INSPECT POWER MANAGEMENT CONTROL ECU |

(a) Disconnect all the connectors from the power management control ECU.

*1




P

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-21 (NODD) - L5-6 (E1) | Power switch off | 120 to 140 kΩ |

**Text in Illustration**

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Management Control ECU) |

(c) Connect the power management control ECU connectors.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 22. | CHECK FUSE (IGCT NO. 3) INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR)

OK ▼

| | |
|---|---|
| 23. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY
OK ▼

| | |
|---|---|
| 24. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▼

| | |
|---|---|
| 25. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 26. | REPLACE HV COOLANT INFO |

NEXT
▼

| | |
|---|---|
| 27. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **COMPLETED**

| | |
|---|---|
| 28. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A
▼

| | |
|---|---|
| 29. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 30. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A
▼

| | |
|---|---|
| 31. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 32. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

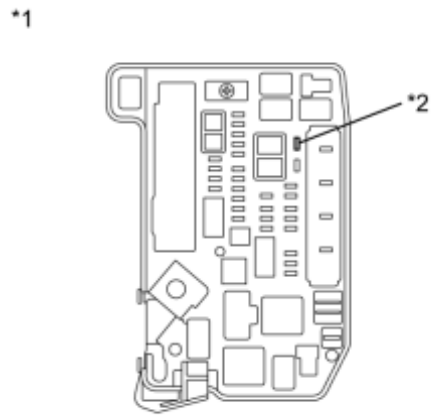
NG ▶ CONNECT SECURELY
OK
▼

| | |
|---|---|
| 33. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY POWER SOURCE CIRCUIT) |

(a) Disconnect connector A21 from the power management control ECU.

(b) Remove the IGCT No. 3 fuse from the engine room junction block assembly.

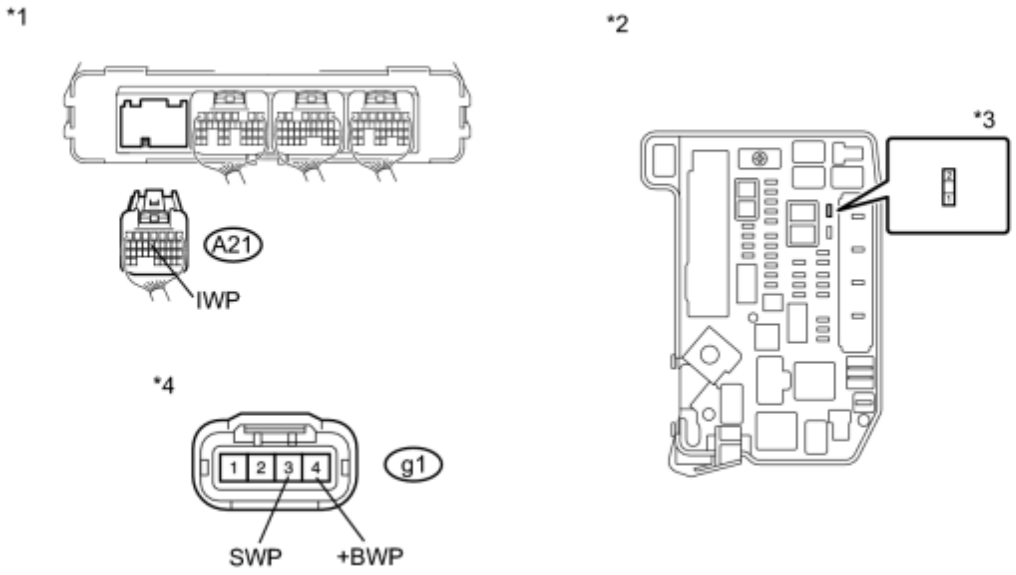
## Text in Illustration




| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 3 Fuse |

(c) Disconnect the water pump with motor assembly connector.

(d) Measure the resistance according to the value(s) in the table below.




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Rear view of wire harness connector<br>(to Power Management Control ECU) | *2 | Engine Room Junction Block Assembly |
| *3 | IGCT No. 3 Fuse | *4 | Front view of wire harness connector<br>(to Water Pump with Motor Assembly) |

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-13 (IWP) or g1-3 (SWP) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| 2 (IGCT No. 3 fuse) or g1-4 (+BWP) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

(e) Connect the water pump with motor assembly connector.

(f) Connect the power management control ECU connector.

(g) Install the IGCT No. 3 fuse.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 34. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK ▼

| | |
|---|---|
| 35. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 36. | CONNECT SECURELY |

(a) Connect the water pump with motor assembly connector securely.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 37. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 38. | REPLACE WATER PUMP WITH MOTOR ASSEMBLY |

(a) Replace the water pump with motor assembly INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 39. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - IGCT NO. 2 FUSE) |

CAUTION:

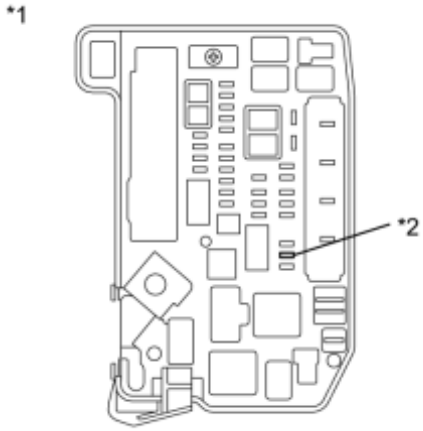
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

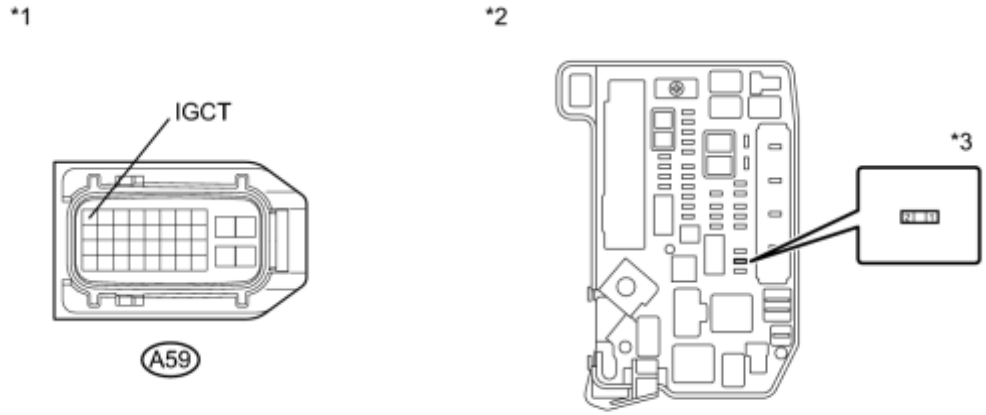



(c) Remove the IGCT No. 2 fuse from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT No. 2 Fuse |

(d) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-1 (IGCT) or 2 (IGCT No. 2 fuse) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) | *2 | Engine Room Junction Block Assembly |
| *3 | IGCT No. 2 Fuse | - | - |

(e) Install the IGCT No. 2 fuse.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

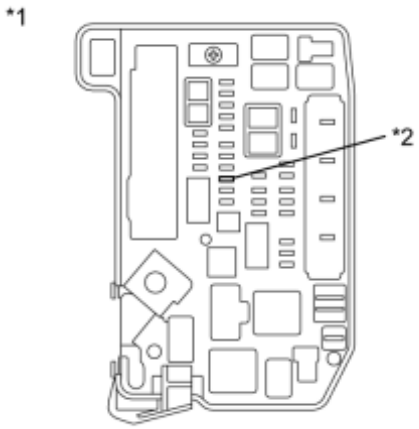
| | |
|---|---|
| 40. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (IGCT NO. 2)**

| | |
|---|---|
| 41. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - DC/DC-S FUSE) |

(a) Disconnect connector A59 from the inverter with converter assembly.

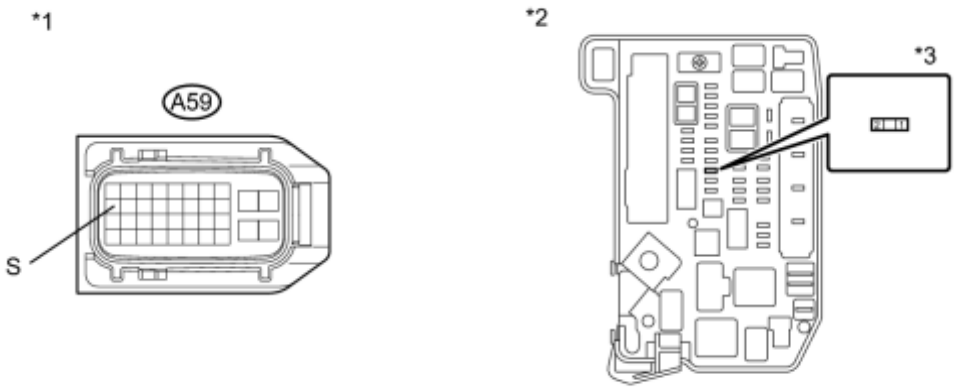



(b) Remove the DC/DC-S fuse from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | DC/DC-S Fuse |

(c) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-11 (S) or 2 (DC/DC-S fuse) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) | *2 | Engine Room Junction Block Assembly |
| *3 | DC/DC-S Fuse | - | - |

(d) Install the DC/DC-S fuse.

(e) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 42. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

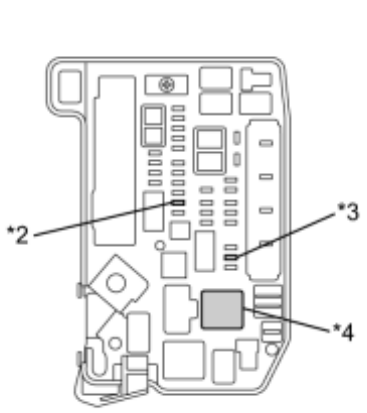
(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (DC/DC-S)**

| | |
|---|---|
| 43. | CHECK ENGINE ROOM JUNCTION BLOCK (IGCT RELAY, IGCT FUSE, IGCT NO. 2 FUSE) |

(a) Remove the IGCT relay, IGCT fuse and IGCT No. 2 fuse from the engine room junction block assembly.

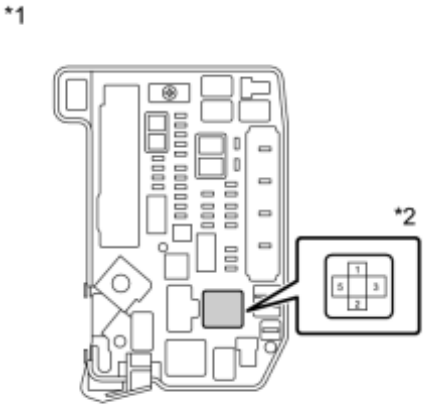
# Text in Illustration




| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Fuse |
| *3 | IGCT No. 2 Fuse |
| *4 | IGCT Relay |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 3 (IGCT relay block) - Body ground and other terminals | Always | 10 kΩ or higher |
| 5 (IGCT relay block) - Body ground and other terminals | Always | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Relay |

(c) Install the IGCT relay, IGCT fuse and IGCT No. 2 fuse.

NG ▶ REPAIR OR REPLACE ENGINE ROOM JUNCTION BLOCK

OK ▶ **REPLACE FUSE (IGCT)**

| | |
|---|---|
| 44. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

NEXT ▶ **REPLACE FUSE (IGCT NO. 2)**

| | |
|---|---|
| 45. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

NEXT ▶ **REPLACE FUSE (DC/DC-S)**

| | | |
|---|---|---|
| DTC | P0A09-265 | DC / DC Converter Status Circuit Low Input |

# DESCRIPTION

Refer to the description for DTC P0A08-264 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A09 | 265 | Open or GND short in NODD signal circuit of DC/DC converter | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A08-264 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK POWER MANAGEMENT CONTROL ECU (NODD) |

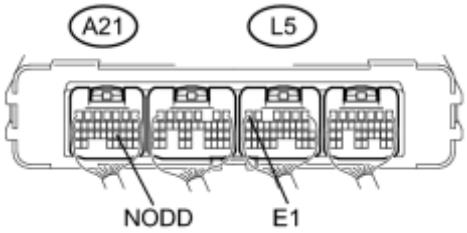
(a) Turn the power switch on (READY).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-21 (NODD) - L5-6 (E1) | Power switch on (READY) | 5 to 7 V |

*1




P

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

(c) Turn the power switch off.

NG ▶ CHECK POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Clear DTCs and freeze frame data.

NEXT ▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (HV) |

(a) Turn the power switch on (READY).

(b) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(c) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A09-265 is not output. | A |
| DTC P0A09-265 is output again. | B |

(d) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▼

| | |
|---|---|
| 6. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG ▶ REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

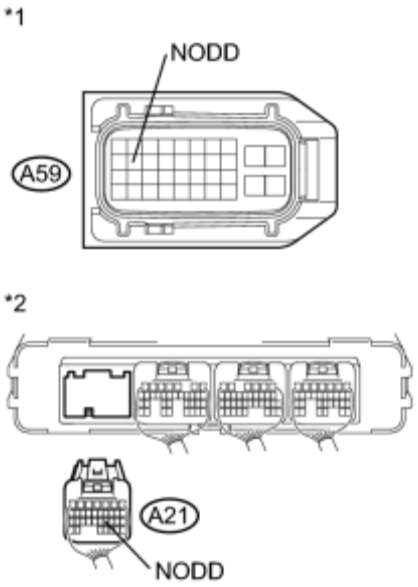
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Disconnect connector A21 from the power management control ECU.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-12 (NODD) - A21-21 (NODD) | Power switch off | Below 1 Ω |
| A59-12 (NODD) or A21-21 (NODD) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(e) Connect the inverter with converter assembly connector.

(f) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

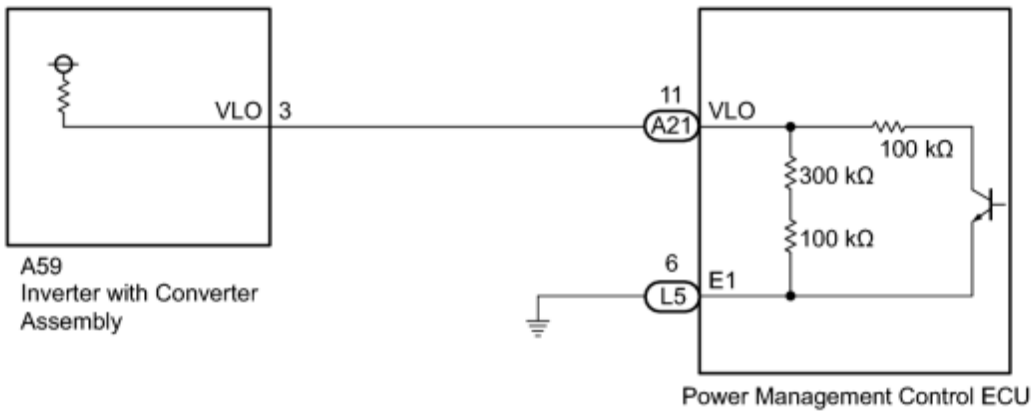
| | | |
|---|---|---|
| DTC | P0A09-591 | DC / DC Converter Status Circuit Low Input |

# DESCRIPTION

The hybrid vehicle converter (DC/DC converter) controls output voltage (12 V) based on duty ratio signals sent from the power management control ECU (HV CPU) .

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A09 | 591 | Hybrid vehicle converter voltage switching (VLO) signal circuit malfunction (Open or short to GND) | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket

to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK POWER MANAGEMENT CONTROL ECU (CHECK WAVEFORM) |

(a) Turn the power switch on (IG).

(b) Connect an oscilloscope between the power management control ECU terminals specified in the table below, and measure the waveform.

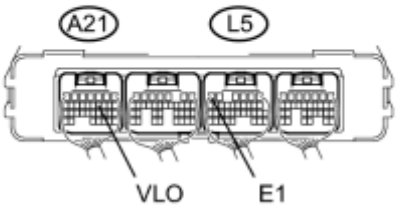
| Item | Content |
|---|---|
| Terminal | A21-11 (VLO) - L5-6 (E1) |
| Equipment Setting | 5V/DIV., 50ms/DIV. |
| Condition | Power switch on (IG) |

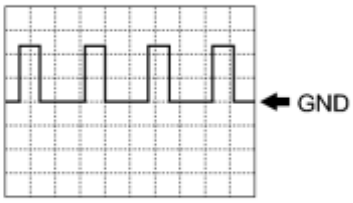
## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

OK:

*1




The waveform appears as shown in the illustration.

Perform this inspection with the power management control ECU connector connected.

(c) Turn the power switch off.

NG ▶ CHECK POWER MANAGEMENT CONTROL ECU

OK

▼

| | |
|---|---|
| 4. | CLEAR DTC |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Clear DTCs and freeze frame data.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (HV) |

(a) Turn the power switch on (READY).

(b) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(c) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A09-591 is not output. | A |
| DTC P0A09-591 is output again. | B |

(d) Turn the power switch off.

B ▶ REPLACE POWER MANAGEMENT CONTROL ECU

A ▼

| | |
|---|---|
| 6. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG ▶ REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

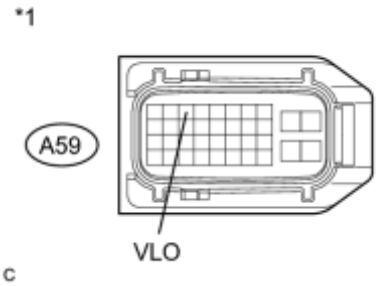
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-3 (VLO) - Body ground | Power switch off | 370 to 430 kΩ |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER

MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

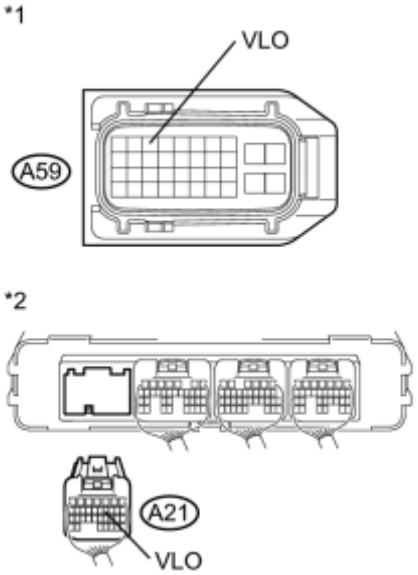
| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect connector A59 from the inverter with converter assembly.

(b) Disconnect connector A21 from the power management control ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-3 (VLO) - A21-11 (VLO) | Power switch off | Below 1 Ω |
| A59-3 (VLO) or A21-11 (VLO) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the inverter with converter assembly connector.

(e) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

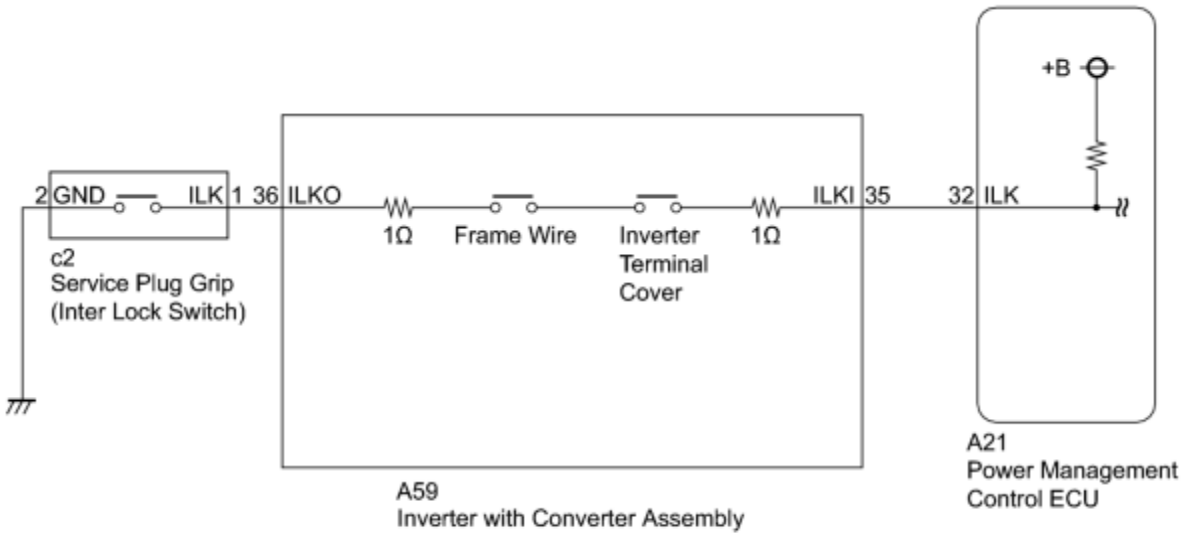
| | | |
|---|---|---|
| DTC | P0A0D-350 | High Voltage System Inter-Lock Circuit High |
| DTC | P0A0D-351 | High Voltage System Inter-Lock Circuit High |

# DESCRIPTION

- When the power management control ECU detects that a safety device is operated, it will prohibit hybrid system operation or shut off the system main relay. There are four safety devices in three different locations. The first safety device is located at the service plug grip. The second one is located at the frame wire that is connected to the inverter with converter assembly. The third one is located at the inverter terminal cover where the motor and generator cables and No. 2 engine wire (air conditioning harness) are connected to the inverter with converter assembly. If the service plug grip, inverter terminal cover, or frame wire is removed, the interlock signal line will be open. If the vehicle is being driven, this condition will be determined to be an open circuit and the system main relays will not be shut off. If the safety devices are re-installed correctly, the system will return to normal when the power switch is turned on (IG).

| DTC No. | INF Code | DTC Detection Condition | Trouble Are |
|---|---|---|---|
| P0A0D | 350 | Operating any of the safety devices with the vehicle stopped (ILK signal is ON) and turning the power switch on (IG) | • Wire harness or connector<br>• Power Management Control ECU<br>• Service plug grip<br>• Inverter with converter assembly<br>• Frame wire<br>• Inverter terminal cover |
| P0A0D | 351 | Interlock signal line opens (ILK signal is ON) while the vehicle is being driven | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A0D only is output. | A |
| P0A1D is output | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CLEAR DTC (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT ▼

| | |
|---|---|
| 3. | RECONFIRM DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A0D-350 or P0A0D-351 is output again. | A |
| Neither P0A0D-350 or P0A0D-351 is output again. | B |

(e) Turn the power switch off.

B CHECK CONNECTOR CONNECTION CONDITION (INTERLOCK CIRCUIT)

A

| | |
|---|---|
| 4. | CHECK SERVICE PLUG GRIP |

CAUTION:

Be sure to wear insulated gloves.

(a) Check if the service plug grip is installed correctly.

HINT:

- For the removal and installation procedures INFO.
- P0A0D-350 is also set if the power switch is turned on (IG) with the service plug grip removed. Confirm the conditions when the malfunction occurred.

NG INSTALL PARTS CORRECTLY

OK

| | |
|---|---|
| 5. | CHECK INVERTER TERMINAL COVER |

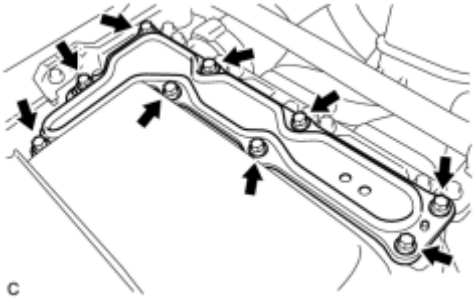
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Check if the inverter terminal cover of the inverter with converter assembly is installed correctly.

OK:

The inverter terminal cover is installed correctly.

NG INSTALL PARTS CORRECTLY

OK

| | |
|---|---|
| 6. | CHECK FRAME WIRE |

CAUTION:

Be sure to wear insulated gloves.

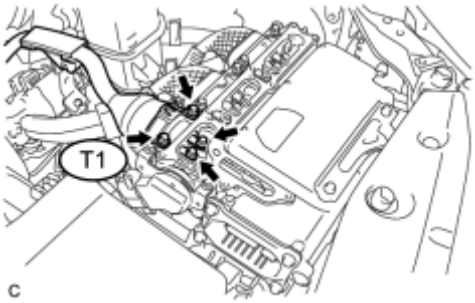
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check if the frame wire T1 is connected correctly.

OK:

The frame wire connector is connected correctly.

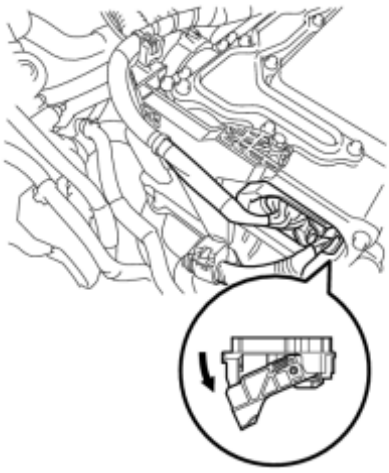
(d) Install the inverter terminal cover from the inverter with converter assembly.

NG ▶ INSTALL PARTS CORRECTLY

OK

▼

| | |
|---|---|
| 7. | CHECK POWER MANAGEMENT CONTROL ECU |



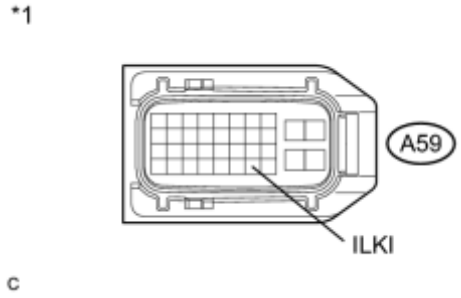
(a) Disconnect connector A59 from the inverter with converter assembly.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-35 (ILKI) - Body ground | Power switch off | 10 to 14 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Inverter with Converter Assembly) |

(d) Turn the power switch off.

(e) Connect the inverter with converter assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER)

OK ▼

| | |
|---|---|
| 8. | CHECK INVERTER WITH CONVERTER ASSEMBLY (INTERLOCK) |

CAUTION:

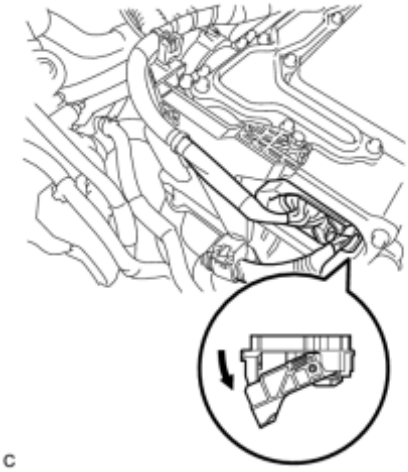
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

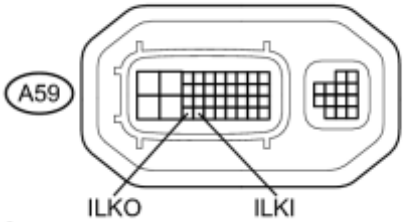
(b) Disconnect connector A59 from the inverter with converter assembly.



c

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




c

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-35 (ILKI) - A59-36 (ILKO) | Power switch off | Less than 3 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected:<br><br>(Inverter with Converter Assembly) |

NOTICE:

Do not remove the inverter terminal cover.

(d) Connect the inverter with converter assembly connector.

NG ▶ CHECK INVERTER TERMINAL COVER

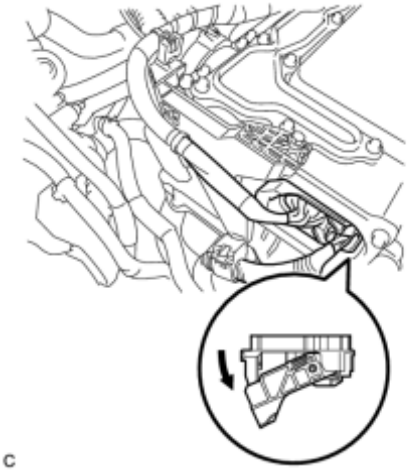
OK

▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - BODY GROUND) |

(a) Install the service plug grip INFO.

(b) Disconnect connector A59 from the inverter with converter assembly.

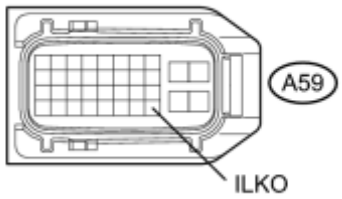


c

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




c

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-36 (ILKO) - Body ground | Power switch off | Less than 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector:<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ CHECK SERVICE PLUG GRIP

OK

▼

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (INTERLOCK CIRCUIT) |

(a) Check the connections of each connector.

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

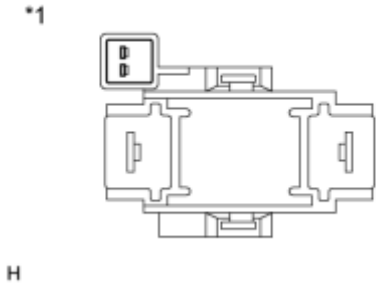
NG ▶ REPAIR OR REPLACE CONNECTOR

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 11. | CHECK SERVICE PLUG GRIP |

(a) Remove the service plug grip INFO.

(b) Check the condition of the service plug grip interlock.




## Text in Illustration

| | |
|---|---|
| *1 | Service Plug Grip |

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

(c) Install the service plug grip INFO.

NG ▶ REPLACE SERVICE PLUG GRIP

OK ▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR |

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Check that the interlock connector at the service plug grip installation socket is connected correctly.




## Text in Illustration

| | |
|---|---|
| *1 | Inter Lock Connector |

OK:

The connector is connected correctly.

NG ▶ INSTALL PARTS CORRECTLY

OK ▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - SERVICE PLUG GRIP) |

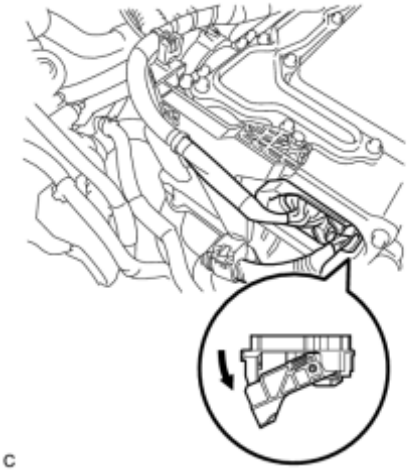
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

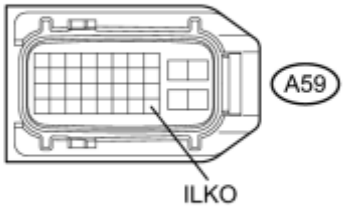


c

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Disconnect connector c2.

*1

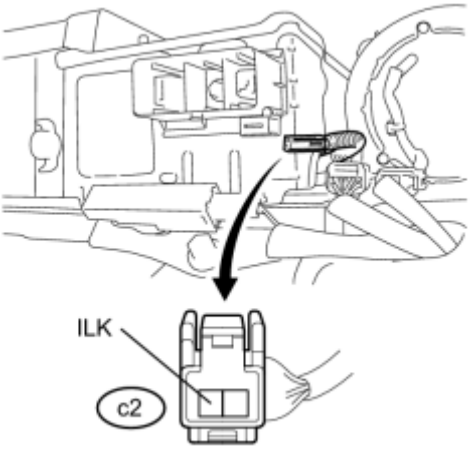



(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-36 (ILKO) - c2-1 (ILK) | Power switch off | Below 1 Ω |

*2




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Service Plug Grip) |

(e) Connect the service plug grip connector.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 14. | CHECK INVERTER TERMINAL COVER |

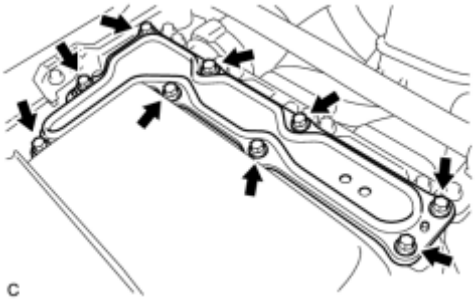
CAUTION:

Be sure to wear insulated gloves.

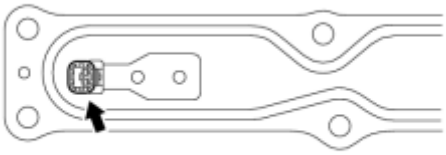
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check the condition of the inverter terminal cover interlock.

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

(d) Install the inverter terminal cover from the inverter with converter assembly.

NG ▶ REPLACE INVERTER TERMINAL COVER
OK
▼

| | |
|---|---|
| 15. | CHECK FRAME WIRE (FRAME WIRE CONNECTOR) |

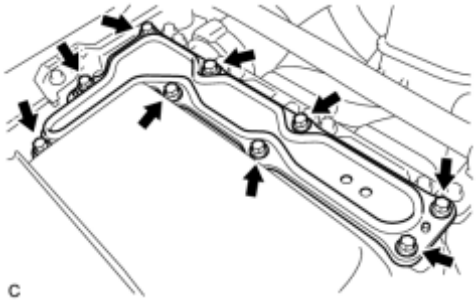
CAUTION:

Be sure to wear insulated gloves.

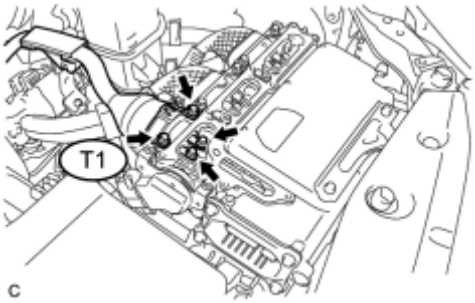
(a) Check that the service plug grip is not installed.

NOTICE:

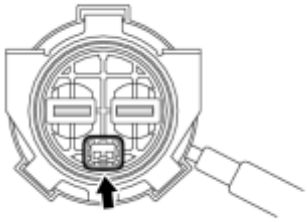
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Disconnect the frame wire T1 from the inverter with converter assembly.



(d) Check the frame wire interlock.

OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

(e) Connect the frame wire to the inverter with converter assembly.

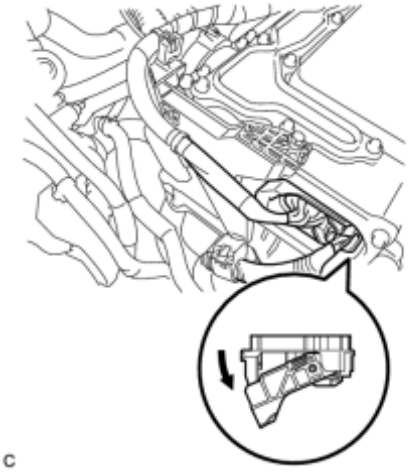
(f) Install the inverter terminal cover from the inverter with converter assembly.

NG ▶ REPLACE FRAME WIRE
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 16. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) |

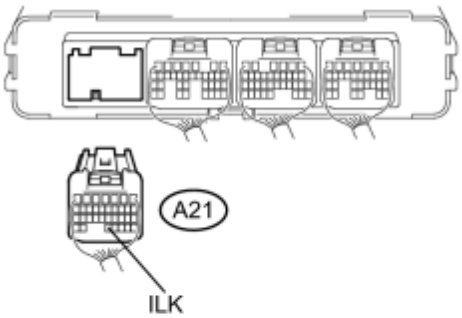
(a) Turn the power switch off.

(b) Disconnect connector A59 from the inverter with converter assembly.



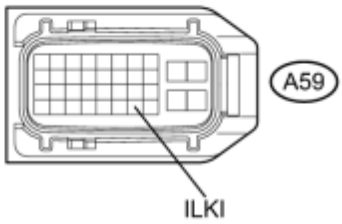
c

*1




(c) Disconnect connector A21 from the power management control ECU.

*2




(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-32 (ILK) - A59-35 (ILKI) | Power switch off | Below 1 Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(e) Connect the power management control ECU connector.

(f) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A0F-204 | Engine Failed to Start |
| DTC | P0A0F-205 | Engine Failed to Start |
| DTC | P0A0F-206 | Engine Failed to Start |
| DTC | P0A0F-524 | Engine Failed to Start |
| DTC | P0A0F-525 | Engine Failed to Start |

# DESCRIPTION

If an engine malfunction occurs, an engine malfunction signal is sent from the ECM to the power management control ECU (HV CPU) . When the power management control ECU (HV CPU) receives this signal, it sets a DTC and performs fail-safe control.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A0F | 204 | Signal indicating abnormality input from the ECM (abnormal engine output) | • SFI system<br>• Power management control ECU |
| | 205 | Signal indicating abnormality input from the ECM (engine is unable to start) | |
| | 206 | Signal indicating abnormality input from the ECM (engine component malfunction) | |
| | 524 | Signal indicating abnormality input from the ECM (NE signal error) | |
| | 525 | Signal indicating abnormality input from the ECM (GI signal error) | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (ENGINE CONTROL SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Engine and ECT / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| Engine control system DTCs are not output. | A |
| Engine control system DTCs are output. | B |

HINT:

If P0A0F-204, 205, 206, 524, or 525 is output even though the ECM has not detected a malfunction, there is a malfunction in the Power management control ECU.

(e) Turn the power switch off.

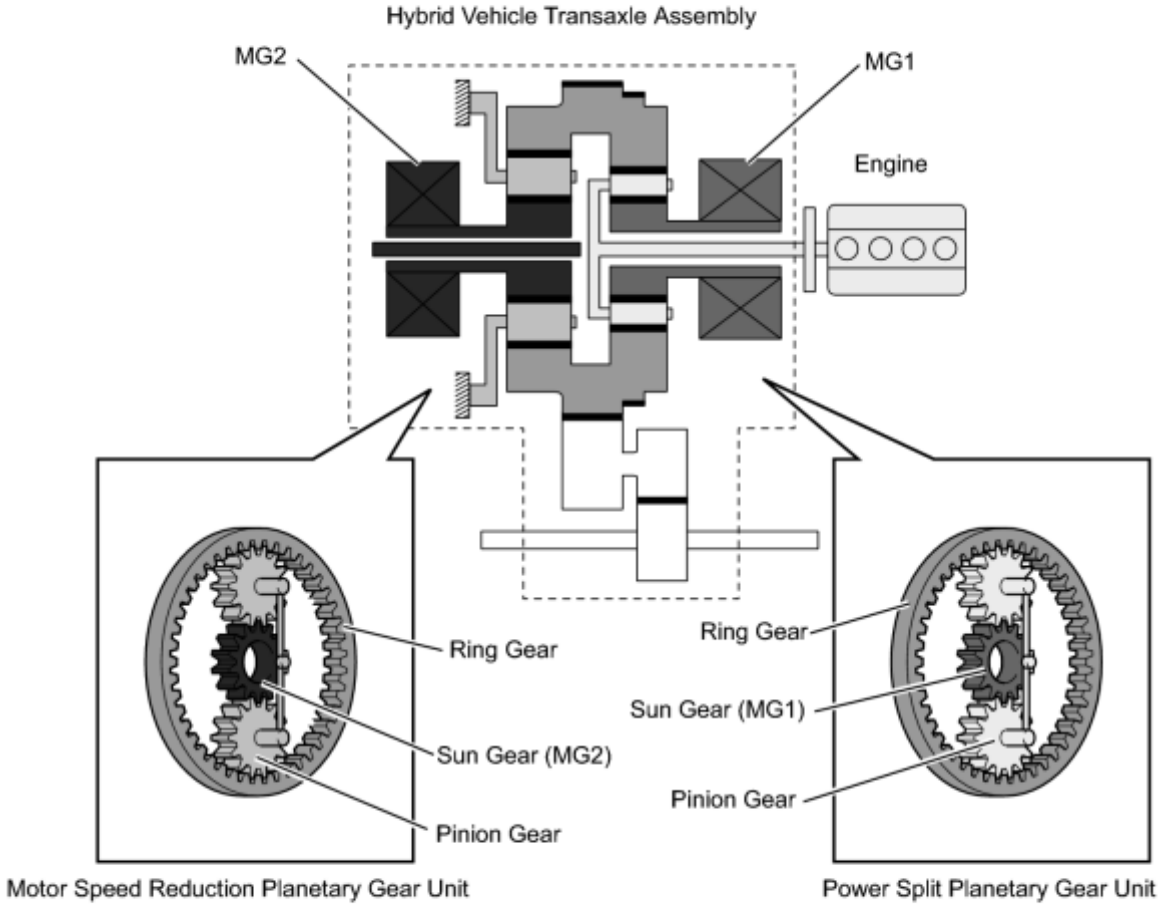
B ▶ GO TO DTC CHART
A ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A0F-238 | Engine Failed to Start |

# DESCRIPTION

If the power management control ECU (HV CPU) detects that the engine or transmission gear has seized, the power management control ECU (HV CPU) will perform fail-safe control. Also, if a substance or object is preventing the engine or transmission internal components from rotating, the power management control ECU (HV CPU) will perform fail-safe control.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A0F | 238 | Engine does not start even though it is being cranked (transaxle input malfunction [engine system]) | • Hybrid vehicle transaxle assembly<br>• Transmission input damper assembly<br>• Power management control ECU<br>• Engine |




# INSPECTION PROCEDURE

HINT:

If this DTC is output, the engine or transmission gear may be seized. Be sure to check the level of the engine oil, automatic transmission fluid (ATF), and coolant before inspection.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A0F-238 only is output. | A |
| P0A1D (hybrid vehicle control ECU circuit malfunction) is output. | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CRANKSHAFT PULLEY REVOLUTION (PARK (P) SELECTED) |

(a) Push the P position switch.

(b) Lift up the vehicle.

(c) Turn the crankshaft pulley using hand tools to check if the crankshaft can rotate smoothly.

CAUTION:

Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch off before performing this inspection, to prevent the engine from starting.

NOTICE:

Engine compression causes resistance when turning the crankshaft pulley. Check if the crankshaft rotates smoothly (or if it is locked) by manually applying sufficient torque to turn the crankshaft pulley. The torque required to turn the crankshaft pulley should be the same as for a known good vehicle of the same type.

OK:

The crankshaft rotates smoothly.

NG ▶ CHECK CRANKSHAFT PULLEY REVOLUTION (SELECTOR LEVER IN N)

OK ▼

| | |
|---|---|
| 3. | CLEAR DTC (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read and record the DTCs and freeze frame data.

(e) Clear DTCs and freeze frame data.

(f) Turn the power switch off.

NEXT

| | |
|---|---|
| 4. | CHECK ENGINE RACING |

(a) Connect the Techstream to the DLC3.

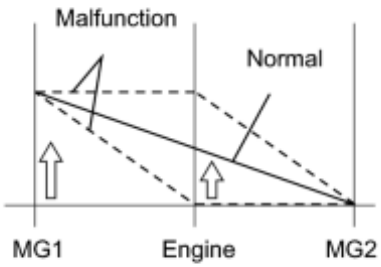
(b) Turn the power switch on (IG).

(c) Push the P position switch.

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Generator (MG1) Rev, Engine Revolution.

(e) Read the Data List.

(f) Turn the power switch on (READY).




(g) While the READY indicator is on, fully depress the accelerator pedal for 10 seconds.

OK:

Generator (MG1) Rev increases to approximately 3.6 times that of Engine Revolution.

HINT:

Refer to the graph for Data List confirmation of "Generator (MG1) Rev" and " Engine Revolution".

| Data List | ENGINE REV | MG1 REV |
|---|---|---|
| Reference Value | Approximately 1000 rpm | Approximately 3600 rpm |
| | Approximately 1500 rpm | Approximately 5400 rpm |
| | Approximately 2500 rpm | Approximately 9000 rpm |

(h) Turn the power switch off.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK

| | |
|---|---|
| 5. | CHECK CREEP MOVEMENT |

(a) Turn the power switch on (READY).

(b) Depress the brake pedal, move the selector lever to D, and release the brake pedal.

OK:

The wheels turn (the vehicle creeps forward).

(c) Turn the power switch off.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK

▼

| | |
|---|---|
| 6. | INSPECT ENGINE SPEED |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor (MG2) Revolution, Generator (MG1) Rev, Engine Revolution.

(d) Read the Data List.

(e) Fully depress the accelerator pedal to accelerate the vehicle from a stop.

NOTICE:

Perform this test only in an appropriate safe location, in accordance with all local laws.

OK:

The difference between Engine Revolution and 0.28 X Generator (MG1) Rev + 0.27 X Motor (MG2) Revolution is 500 rpm or more and it is maintained for 1 second.

(f) Turn the power switch off.

NG ▶ REPLACE TRANSMISSION INPUT DAMPER ASSEMBLY

OK

▼

| | |
|---|---|
| 7. | SIMULATION TEST |

(a) Perform steps 2 through 6 again.

OK:

The problem symptom is not reproduced.

NG ▶ REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 8. | CHECK CRANKSHAFT PULLEY REVOLUTION (SELECTOR LEVER IN N) |

(a) Lift up the vehicle.

(b) Turn the power switch on (IG).

(c) Move the selector lever to N.

(d) Turn the crankshaft pulley using hand tools to check if the crankshaft can rotate smoothly.

CAUTION:

Do not turn the power switch on (READY) while performing this inspection. Be sure to turn the power switch on (IG) before performing this inspection, to prevent the engine from starting.

NOTICE:

Engine compression causes resistance when turning the crankshaft pulley. Check if the crankshaft rotates smoothly (or if it is locked) by manually applying sufficient torque to turn the crankshaft pulley. The torque required to turn the crankshaft pulley should be the same as for a known good vehicle of the same type.

OK:

The crankshaft rotates smoothly.

NG ▶ REPAIR OR REPLACE ENGINE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A10-263 | DC / DC Converter Status Circuit High Input |

# DESCRIPTION

Refer to the description for DTC P0A08-264 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A10 | 263 | Short to +B in the hybrid vehicle converter (DC/DC converter) NODD signal line | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A08-264 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER MANAGEMENT CONTROL ECU (NODD) INFO |

NG ▶ CHECK POWER MANAGEMENT CONTROL ECU (NODD)

OK ▼

| | |
|---|---|
| 2. | CLEAR DTC INFO |

NEXT

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Turn the power switch on (READY).

(b) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(c) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A10-263 is not output. | A |
| DTC P0A10-263 is output again. | B |

(d) Turn the power switch off.

B REPLACE POWER MANAGEMENT CONTROL ECU

A

| | |
|---|---|
| 4. | CHECH FOR INTERMITTENT PROBLEMS INFO |

NG REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 5. | CHECK POWER MANAGEMENT CONTROL ECU (NODD) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

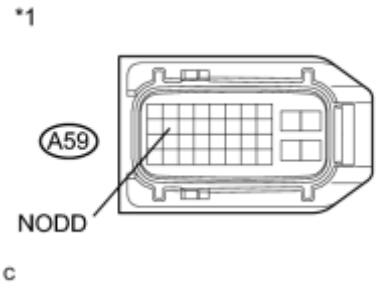
(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified |
|---|---|---|




| | | Condition |
|---|---|---|
| A59-12 (NODD) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Connect the inverter with converter assembly connector.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect connector A59 from the inverter with converter assembly.

(b) Disconnect connector A21 from the power management control ECU.

(c) Turn the power switch on (IG).

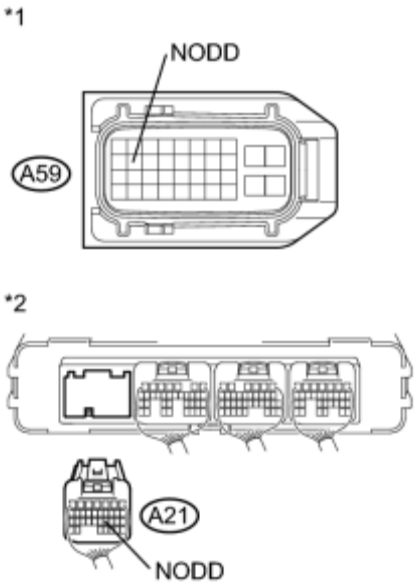
(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-12 (NODD) or A21-21 (NODD) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |




| | |
|---|---|
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector and the power management control ECU connectors disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(e) Turn the power switch off.

(f) Connect the inverter with converter assembly connector.

(g) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A10-592 | DC / DC Converter Status Circuit High Input |

# DESCRIPTION

Refer to the description for DTC P0A09-591 INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A10 | 592 | Hybrid vehicle converter (DC/DC converter) voltage switching (VLO) signal circuit malfunction (short to +B) | • Wire harness or connector<br>• Inverter with converter assembly<br>• Power management control ECU |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A09-591 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER MANAGEMENT CONTROL ECU (CHECK WAVEFORM) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU)

OK

| | |
|---|---|
| 2. | CLEAR DTC INFO |

NEXT

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A10-592 is not output. | A |
| DTC P0A10-592 is output again. | B |

(e) Turn the power switch off.

B REPLACE POWER MANAGEMENT CONTROL ECU

A

| | |
|---|---|
| 4. | CHECK FOR INTERMITTENT PROBLEMS |

(a) Check for intermittent problems INFO.

NG REPAIR OR REPLACE MALFUNCTIONING PARTS, COMPONENT AND AREA

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER - POWER MANAGEMENT CONTROL ECU) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

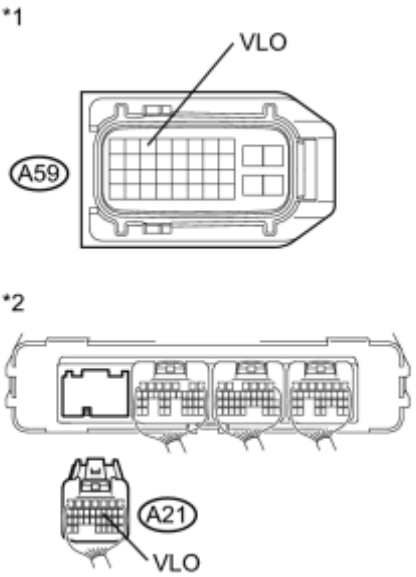
(c) Disconnect connector A21 from the power management control ECU.

(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-3 (VLO) or A21-11 (VLO) - Body ground | Power switch on (IG) | Below 1 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

Turning the power switch on (IG) with the inverter with converter assembly connector and the power management control ECU connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(f) Turn the power switch off.

(g) Connect the inverter with converter assembly connector.

(h) Connect the power management control ECU connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT

▼

| | |
|---|---|
| 7. | CLEAR DTC INFO |

NEXT

| | |
|---|---|
| 8. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| DTC P0A10-592 is not output. | A |
| DTC P0A10-592 is output again. | B |

(e) Turn the power switch off.

B ▶ REPLACE INVERTER WITH CONVERTER ASSEMBLY
A ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1A-151 | Generator Control Module |
| DTC | P0A1A-155 | Generator Control Module |
| DTC | P0A1A-156 | Generator Control Module |
| DTC | P0A1A-658 | Generator Control Module |
| DTC | P0A1A-659 | Generator Control Module |
| DTC | P0A1A-791 | Generator Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1A | 151 | Run pulse signal cycle deviation or stop | Inverter with converter assembly |
| | 155 | A/D converter error | |
| | 156 | CPU ROM-RAM error | |
| | 658 | ALU error | |
| | 659 | Communication error (from MG1 to MG2) | |
| | 791 | R/D converter communication error | |

# MONITOR DESCRIPTION

The MG ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks the result of the generator CPU self-test. If the MG ECU detects a "Fail" from the generator CPU self-test, it will conclude that there is an internal malfunction in the generator CPU. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1A (INF 151): RUN pulse malfunction<br><br>P0A1A (INF 155): A/D malfunction (1 MG CPU)<br><br>P0A1A (INF 156): RAM and ROM destruction |

| | |
|---|---|
| | P0A1A (INF 658): MG CPU ALU malfunction<br><br>P0A1A (INF 659): MG CPU communication malfunction (1 MG CPU to 2 MG CPU)<br><br>P0A1A (INF 791): RD converter communication malfunction |
| Required sensors / components | Inverter with converter assembly (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

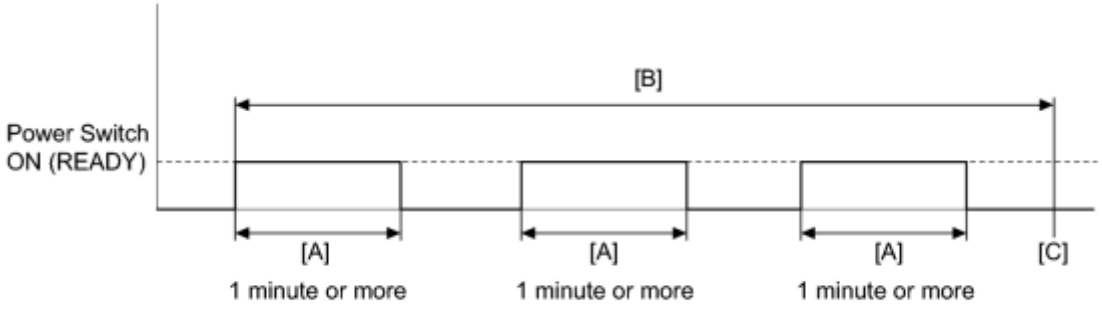
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1A (INF 151/155/156/658/659/791) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.

3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after 1 minute or more, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1A-166 | Generator Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1A | 166 | R/D converter NM stop error | Inverter with converter assembly |

# MONITOR DESCRIPTION

The MG ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In this diagnostic monitor, the MG ECU checks for an R/D (Resolver/Digital Converter) malfunction involving the generator resolver. If MG ECU detects an R/D error, it will conclude that there is an internal malfunction involving the generator resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1A (INF 166): RD converter NM signal stop abnormality |
| Required sensors / components | Inverter with converter assembly (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

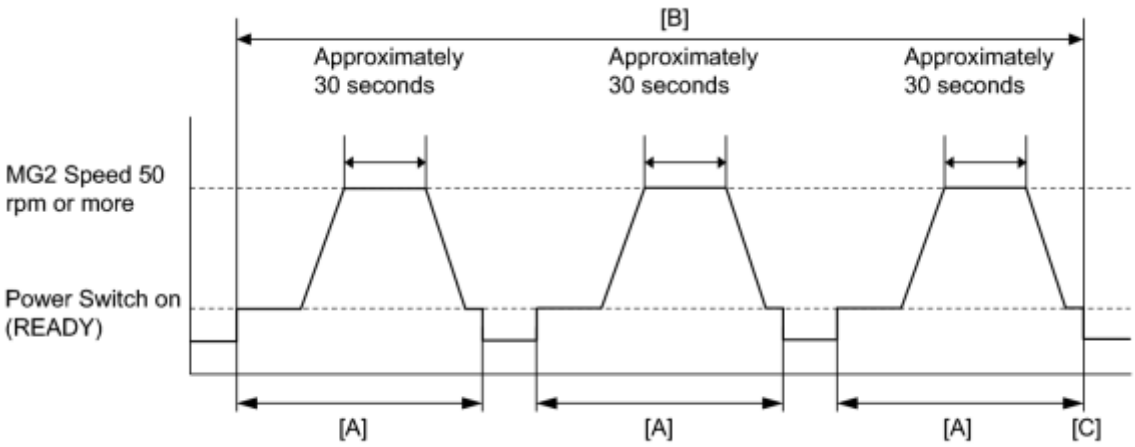
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU | DTC P0A1A (INF 166) is not detected |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1A-200 | Generator Control Module |
| DTC | P0A1A-792 | Generator Control Module |
| DTC | P0A1A-793 | Generator Control Module |

# DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects the following malfunctions.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1A | 200 | The difference between the resolver angle for control and estimated resolver angle exceeds the allowable value. | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| | 792 | Resolver REF signal cycle error | |
| | 793 | Resolver REF signal oscillation stop error | |

# MONITOR DESCRIPTION

The MG ECU performs many diagnostic tests to verify proper operation of internal ECU systems. In this diagnostic monitor, the MG ECU checks for an R/D (Resolver/Digital Converter) malfunction involving the generator resolver. If MG ECU detects an R/D error, it will conclude that there is an internal malfunction involving the generator resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1A (INF 200): RD converter resolver angle abnormality<br><br>P0A1A (INF 792): REF malfunction (frequency abnormality)<br><br>P0A1A (INF 793): REF malfunction (REF signal stop) |
| Required sensors / components | Inverter with converter assembly (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

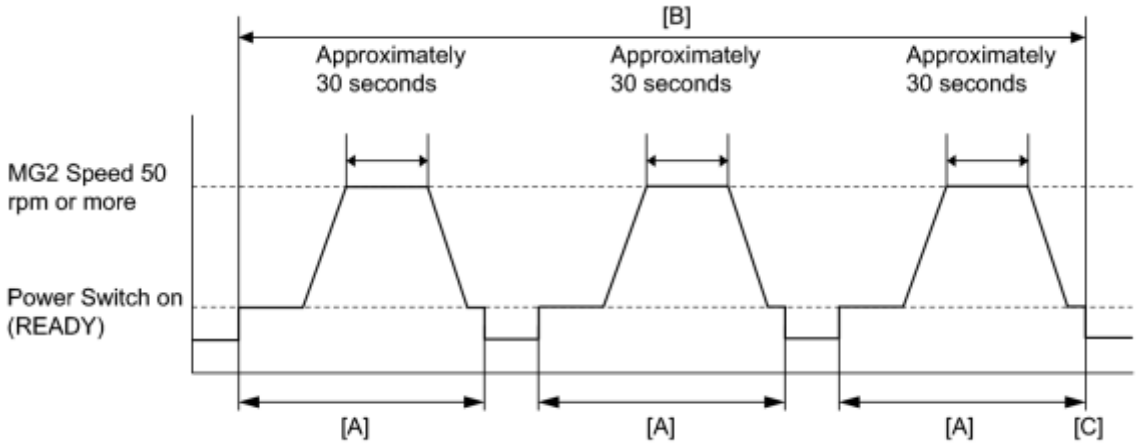
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1A (INF 200/792/793) is not detected |

# CONFIRMATION DRIVING PATTERN

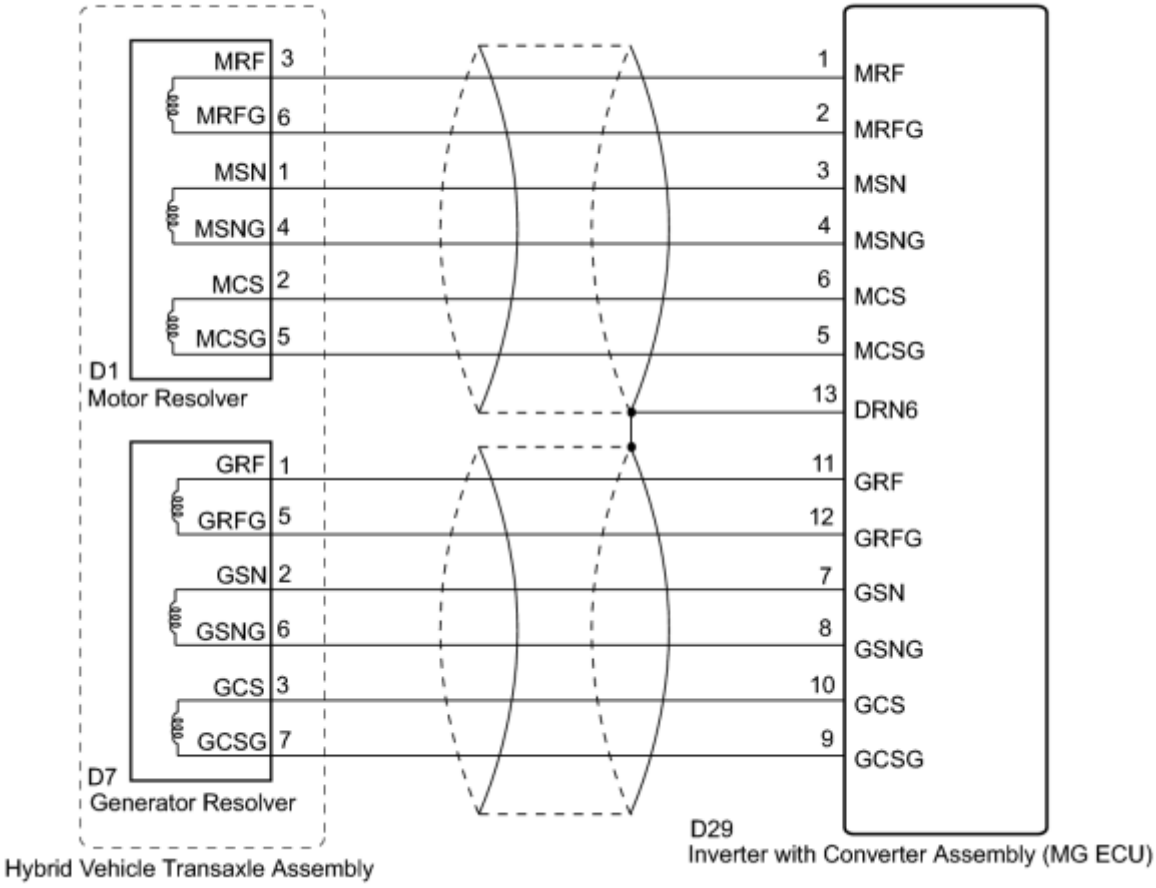



1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A1A-200, 792, or 793 only is output. | A |
| Any of the following DTCs are also output. | B |

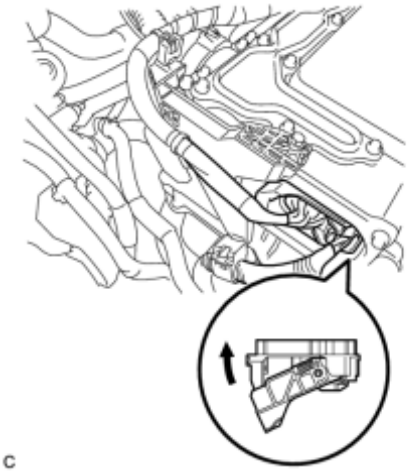
| DTC No. | Relevant Diagnosis |
|---|---|
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range / Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY) |



C

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

NOTICE:

Before disconnecting the connector, confirm that it is properly connected by checking that the locking claws are engaged and that the connector does not pull out.

(b) Check the connection of the low voltage connector of the inverter with converter assembly.

OK:

The connector is connected securely and there are no contact problems.

HINT:

When connecting the connector, insert it with the locking lever in the raised position. Rotate the lever downward and make sure that the connector is pulled into its socket. When the locking lever is in its fully closed position, a click will be heard as its locking claws engage. After the click is heard, pull up on the connector to confirm that it is properly connected.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) |

CAUTION:

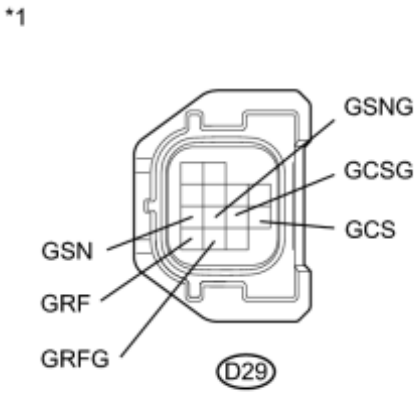
Be sure to wear insulated gloves.

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-11 (GRF) - Body ground | Power switch on (IG) | Below 1 V |
| D29-12 (GRFG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-7 (GSN) - Body ground | Power switch on (IG) | Below 1 V |
| D29-8 (GSNG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-10 (GCS) - Body ground | Power switch on (IG) | Below 1 V |
| D29-9 (GCSG) - Body | Power switch on | Below 1 V |

| | | |
|---|---|---|
| ground | (IG) | |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

NOTICE:

Turning the power switch on (IG) with the low voltage connector of the inverter with converter assembly disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

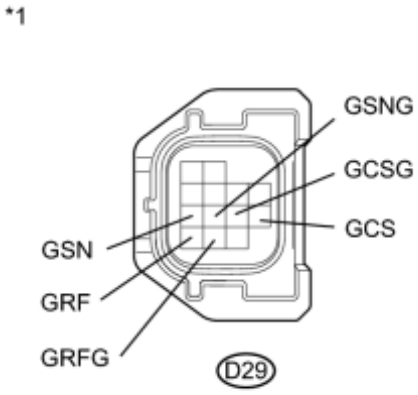
(e) Connect the low voltage connector from the inverter with converter assembly.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 4. | CHECK GENERATOR RESOLVER |

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-11 (GRF) - D29-12 (GRFG) | Power switch off | 9.5 to 15.5 Ω |
| D29-7 (GSN) - D29-8 (GSNG) | Power switch off | 15 to 27 Ω |
| D29-10 (GCS) - D29-9 (GCSG) | Power switch off | 14 to 26 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-11 (GRF) or D29-12 (GRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-7 (GSN) or D29-8 (GSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-10 (GCS) or D29-9 (GCSG) - | Power switch | 10 kΩ or |

| | | |
|---|---|---|
| Body ground and other terminals | off | higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(c) Connect the inverter with converter assembly connector.

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) |

CAUTION:

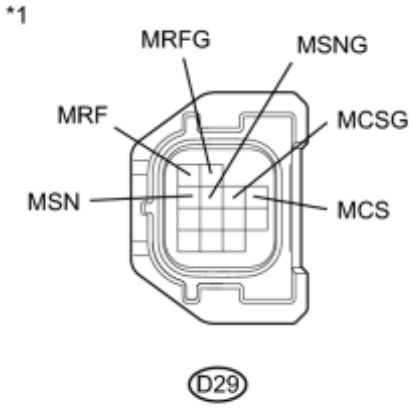
Be sure to wear insulated gloves.

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-1 (MRF) - Body ground | Power switch on (IG) | Below 1 V |
| D29-2 (MRFG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-3 (MSN) - Body ground | Power switch on (IG) | Below 1 V |
| D29-4 (MSNG) - Body ground | Power switch on (IG) | Below 1 V |
| D29-6 (MCS) - Body ground | Power switch on (IG) | Below 1 V |
| D29-5 (MCSG) - Body ground | Power switch on (IG) | Below 1 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

NOTICE:

Turning the power switch on (IG) with the low voltage connector of the inverter with converter assembly disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(d) Turn the power switch off.

(e) Connect the inverter with converter assembly connector.

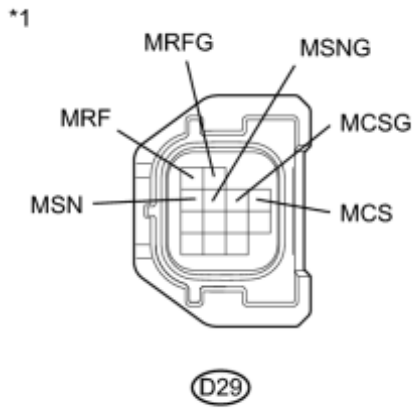
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 6. | CHECK MOTOR RESOLVER |

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

(b) Measure the resistance according to the value(s) in the table below.




Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-1 (MRF) - D29-2 (MRFG) | Power switch off | 9.5 to 15.5 Ω |
| D29-3 (MSN) - D29-4 (MSNG) | Power switch off | 15 to 27 Ω |
| D29-6 (MCS) - D29-5 (MCSG) | Power switch off | 14 to 26 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D29-1 (MRF) or D29-2 (MRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-3 (MSN) or D29-4 (MSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D29-6 (MCS) or D29-5 (MCSG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(c) Connect the inverter with converter assembly connector.

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) |



H

(a) Check the connection of the generator resolver connector.

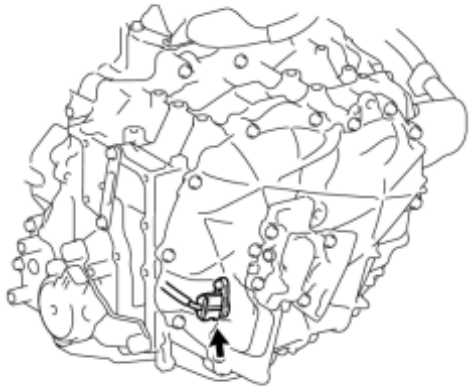
OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) |



H

(a) Check the connection of the motor resolver connector.

OK:

The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 9. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) |

(a) Check the connection of the generator resolver connector.



H

OK:

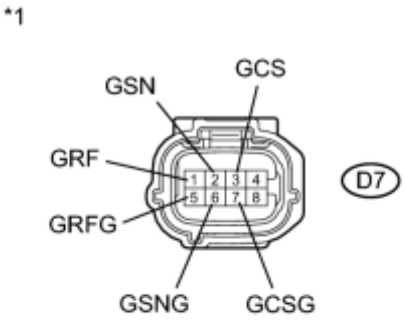
The connector is connected securely and there are no contact problems.

NG ▶ CONNECT SECURELY

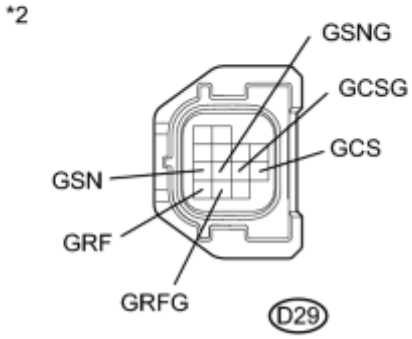
OK ▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) |

(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.




(b) Disconnect the generator resolver connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-1 (GRF) - D29-11 (GRF) | Power switch off | Below 1 Ω |
| D7-5 (GRFG) - D29-12 (GRFG) | Power switch off | Below 1 Ω |
| D7-2 (GSN) - D29-7 (GSN) | Power switch off | Below 1 Ω |
| D7-6 (GSNG) - D29-8 (GSNG) | Power switch off | Below 1 Ω |
| D7-3 (GCS) - D29-10 (GCS) | Power switch off | Below 1 Ω |
| D7-7 (GCSG) - D29-9 (GCSG) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-1 (GRF) or D29-11 (GRF) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-5 (GRFG) or D29-12 (GRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-2 (GSN) or D29-7 (GSN) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-6 (GSNG) or D29-8 (GSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-3 (GCS) or D29-10 (GCS) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-7 (GCSG) or D29-9 (GCSG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Generator Resolver) |
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

HINT:

The generator resolver is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(d) Connect the generator resolver connector.

(e) Connect the inverter with converter assembly connector.

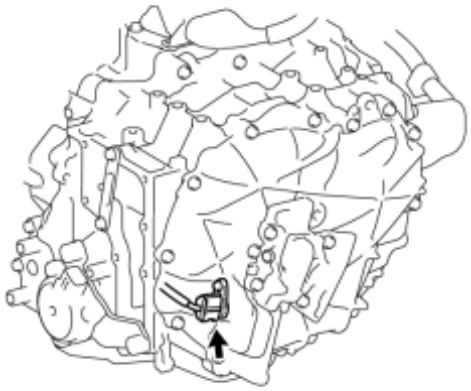
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 11. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) |

(a) Check the connection of the motor resolver connector.

OK:

The connector is connected securely and there are no contact problems.



H

NG ▶ CONNECT SECURELY

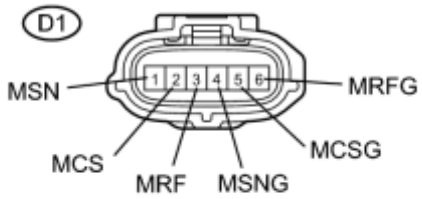
OK

▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) |

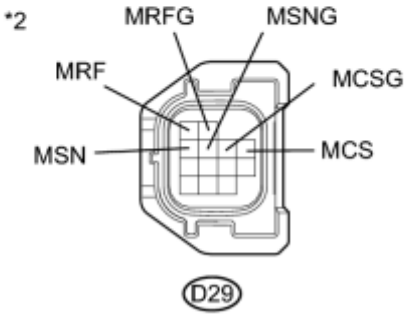
(a) Disconnect the low voltage connector D29 from the inverter with converter assembly.

*1




(b) Disconnect the motor resolver connector.

*2




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D1-3 (MRF) - D29-1 (MRF) | Power switch off | Below 1 Ω |
| D1-6 (MRFG) - D29-2 (MRFG) | Power switch off | Below 1 Ω |
| D1-1 (MSN) - D29-3 (MSN) | Power switch off | Below 1 Ω |
| D1-4 (MSNG) - D29-4 (MSNG) | Power switch off | Below 1 Ω |
| D1-2 (MCS) - D29-6 (MCS) | Power switch off | Below 1 Ω |
| D1-5 (MCSG) - D29-5 (MCSG) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D1-3 (MRF) or D29-1 (MRF) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-6 (MRFG) or D29-2 (MRFG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-1 (MSN) or D29-3 (MSN) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-4 (MSNG) or D29-4 (MSNG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-2 (MCS) or D29-6 (MCS) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D1-5 (MCSG) or D29-5 (MCSG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Motor Resolver) |
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

HINT:

The motor resolver is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(d) Connect the motor resolver connector.

(e) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A1B-163 | Drive Motor "A" Control Module |
| DTC | P0A1B-164 | Drive Motor "A" Control Module |
| DTC | P0A1B-192 | Drive Motor "A" Control Module |
| DTC | P0A1B-193 | Drive Motor "A" Control Module |
| DTC | P0A1B-511 | Drive Motor "A" Control Module |
| DTC | P0A1B-512 | Drive Motor "A" Control Module |
| DTC | P0A1B-661 | Drive Motor "A" Control Module |
| DTC | P0A1B-786 | Drive Motor "A" Control Module |
| DTC | P0A1B-794 | Drive Motor "A" Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1B | 163 | IPM positive power source error | Inverter with converter assembly |
| | 164 | IPM negative power source error | |
| | 192 | A/D converter error | |
| | 193 | CPU ROM-RAM error | |
| | 511 | Standard voltage for analog signal offset | |
| | 512 | Standard voltage for analog signal error | |
| | 661 | Communication error (from MG2 to MG1) | |
| | 786 | ALU error | |
| | 794 | R/D converter communication error | |

# MONITOR DESCRIPTION

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks the result of the motor CPU self-test. If the MG ECU detects a "Fail" from the motor CPU self-test, it will conclude that there is an internal

malfunction in the motor CPU. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1B (INF 163): Motor CPU power malfunction (15V)<br><br>P0A1B (INF 164): Motor CPU power malfunction (-5V)<br><br>P0A1B (INF 192): A/D malfunction (2 MG CPU)<br><br>P0A1B (INF 193): RAM and ROM destruction)<br><br>P0A1B (INF 511): Motor CPU power malfunction (2.5V)<br><br>P0A1B (INF 512): Motor CPU power malfunction (5VD)<br><br>P0A1B (INF 661): 2 MG CPU communication malfunction (2 MG CPU to 1 MG CPU)<br><br>P0A1B (INF 786): MG CPU ALU malfunction<br><br>P0A1B (INF 794): RD converter communication malfunction |
| Required sensors / components | Inverter with converter (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

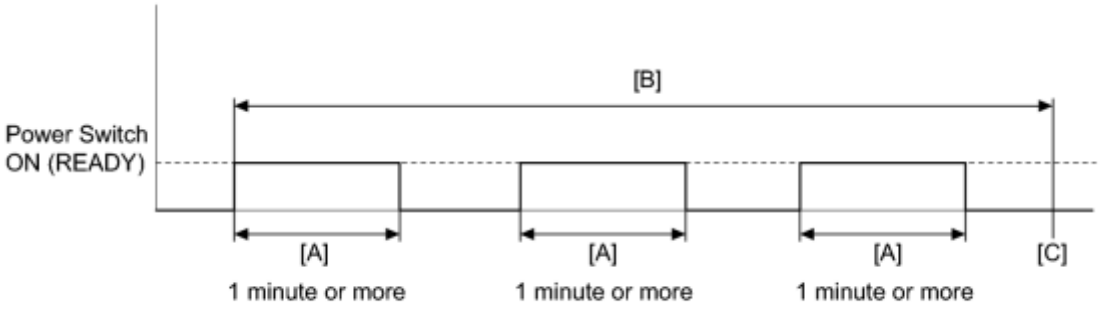
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1B (INF 163/164/192/193/511/512/661/786/794) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after 1 minute or more, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1B-168 | Drive Motor "A" Control Module |
| DTC | P0A1B-795 | Drive Motor "A" Control Module |
| DTC | P0A1B-796 | Drive Motor "A" Control Module |

# DESCRIPTION

The inverter with converter assembly (MG ECU) monitors its internal operation and detects malfunctions.

HINT:

The term "drive motor A" indicates MG2.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1B | 168 | The difference between the resolver angle for control and estimated resolver angle exceeds the allowable value. | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| | 795 | Resolver REF signal cycle error | |
| | 796 | Resolver REF signal oscillation stop error | |

# MONITOR DESCRIPTION

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks for an R/D (Resolver/ Digital converter) malfunction involving the motor resolver. If the MG ECU detects an R/D converter error, it will conclude that there is an internal malfunction involving the motor resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1B (INF 168): RD converter resolver angle abnormality<br>P0A1B (INF 795): REF malfunction (frequency abnormality)<br>P0A1B (INF 796): REF malfunction (REF Signal abnormality) |
| Required sensors / components | Inverter with converter (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

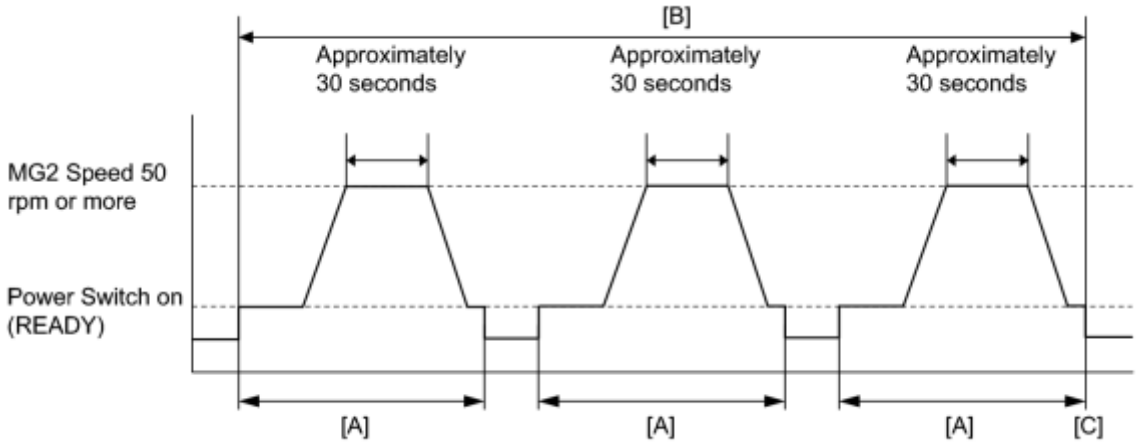
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1B (INF 168/795/796) is not detected |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A1B-168 , 795 or 796 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range / Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 4. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 6. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 9. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 11. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A1B-198 | Drive Motor "A" Control Module |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions. If any of the following DTCs are output, replace the inverter with converter assembly.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1B | 198 | R/D converter NM stop error | Inverter with converter assembly |

# MONITOR DESCRIPTION

The MG ECU (in the inverter with converter assembly) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of those tests, the MG ECU checks for an R/D (Resolver/ Digital converter) malfunction involving the motor resolver. If the MG ECU detects an R/D converter error, it will conclude that there is an internal malfunction involving the motor resolver. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1B (INF 198): RD converter NM signal stop abnormality |
| Required sensors / components | Inverter with converter (MG ECU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

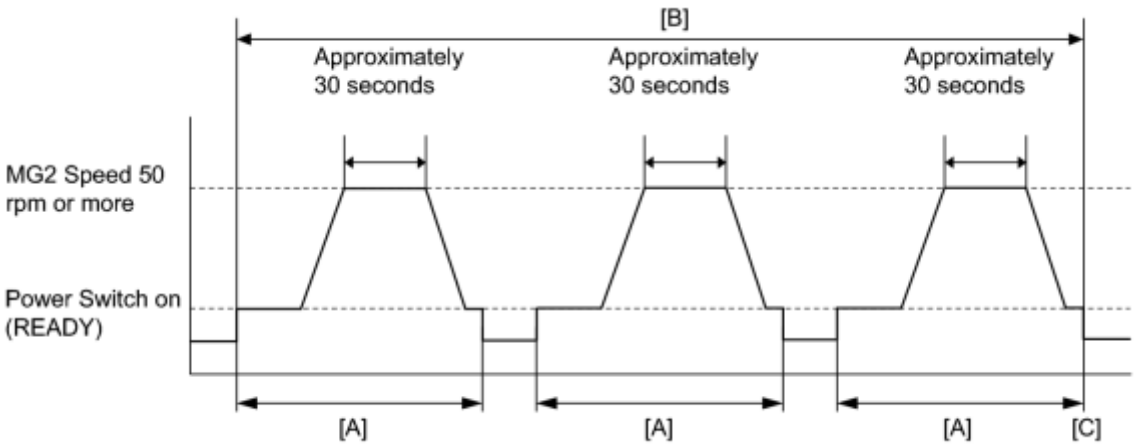
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1B (INF 198) is not detected |

# CONFIRMATION DRIVING PATTERN




1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and allow MG2 to rotate at 50 rpm or more for 30 seconds, then turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-144 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 144 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) performs a self-test. If the power management control ECU (HV CPU) detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 144): Primary check malfunction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

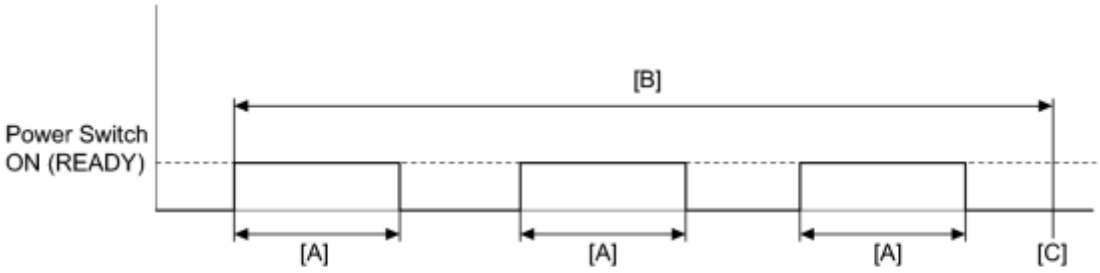
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 144) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-148 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 148 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) performs a self-test. If the power management control ECU (HV CPU) detects an internal problem during this self-test, it will conclude that there is an internal malfunction. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 148): HV CPU malfunction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

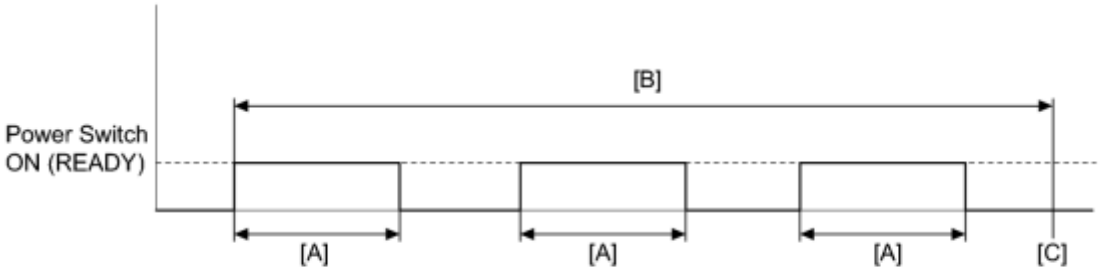
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 148) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-162 | Hybrid Powertrain Control Module |
| DTC | P0A1D-821 | Hybrid Powertrain Control Module |
| DTC | P0A1D-822 | Hybrid Powertrain Control Module |
| DTC | P0A1D-823 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 162 | ECU internal error | Power management control ECU |
| P0A1D | 821 | ECU internal error | Power management control ECU |
| P0A1D | 822 | ECU internal error | Power management control ECU |
| P0A1D | 823 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) checks the communication bus off count and the message register of the CAN (Controller Area Network) controller. If the power management control ECU (HV CPU) detects an error in the communication bus off count or message register, it will conclude that there is a malfunction in the power management control ECU (HV CPU). The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 162/821/822/823): Lost communication with ECM/PCM |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |

| | |
|---|---|
| Other conditions belong to TMC's intellectual property | - |

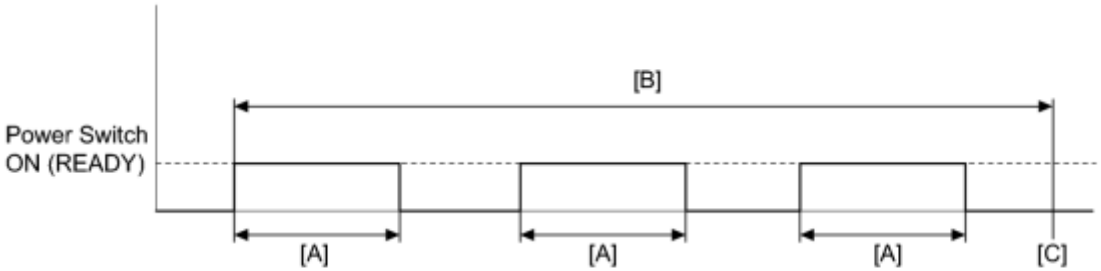
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 162/821/822/823) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-187 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 187 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs diagnostic tests to verify proper operation of internal and external ECU systems. In one of these tests, the power management control ECU (HV CPU) monitors specific RAM circuits of the power management control ECU (HV CPU). If the power management control ECU (HV CPU) detects an error in the RAM circuits, it will conclude that there is an internal malfunction in the power management control ECU (HV CPU). The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 187): Specific random access memory destruction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

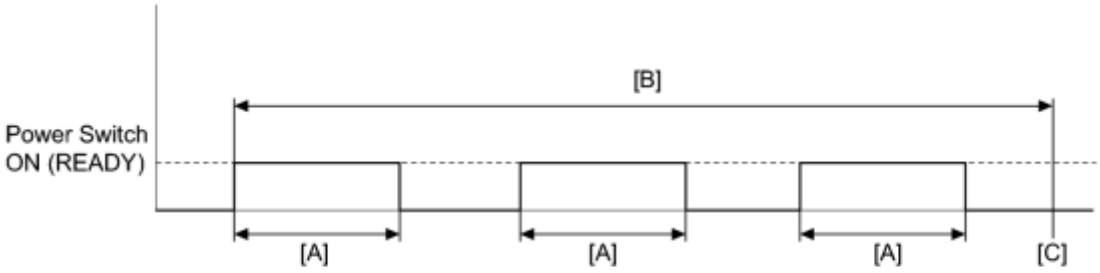
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 187) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A1D-721 | Hybrid Powertrain Control Module |
| DTC | P0A1D-722 | Hybrid Powertrain Control Module |
| DTC | P0A1D-723 | Hybrid Powertrain Control Module |
| DTC | P0A1D-787 | Hybrid Powertrain Control Module |
| DTC | P0A1D-818 | Hybrid Powertrain Control Module |

# DESCRIPTION

The power management control ECU (HV CPU) monitors its internal operation, it will set DTCs and perform fail-safe control when it detects the following malfunctions. If any of the following DTCs are output, replace the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A1D | 721 | ECU internal error | Power management control ECU |
| P0A1D | 722 | ECU internal error | Power management control ECU |
| P0A1D | 723 | ECU internal error | Power management control ECU |
| P0A1D | 787 | ECU internal error | Power management control ECU |
| P0A1D | 818 | ECU internal error | Power management control ECU |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) performs many diagnostic tests to verify proper operation of internal ECU systems. In one of these tests, the power management control ECU (HV CPU) checks the result of the ECM self-test. If the power management control ECU (HV CPU) detects a "Fail" from the ECM self-test, it will conclude that there is an internal malfunction in the ECM. The power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A1D (INF 721/722/723/787/818): Monitor CPU malfunction |
| Required sensors / components | Power management control ECU (HV CPU) |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

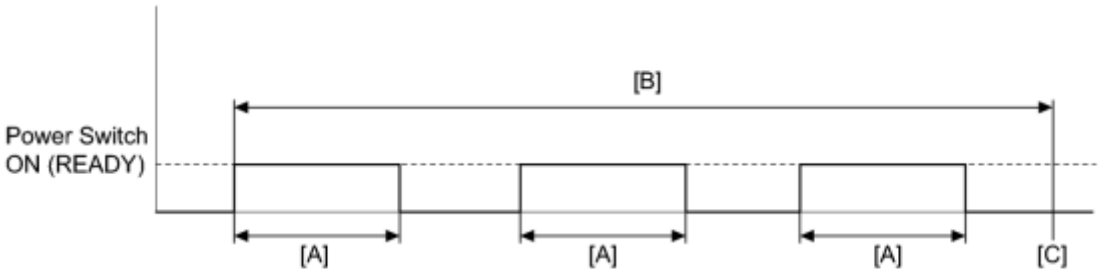
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A1D (INF 721/722/723/787/818) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT ▶ **COMPLETED**

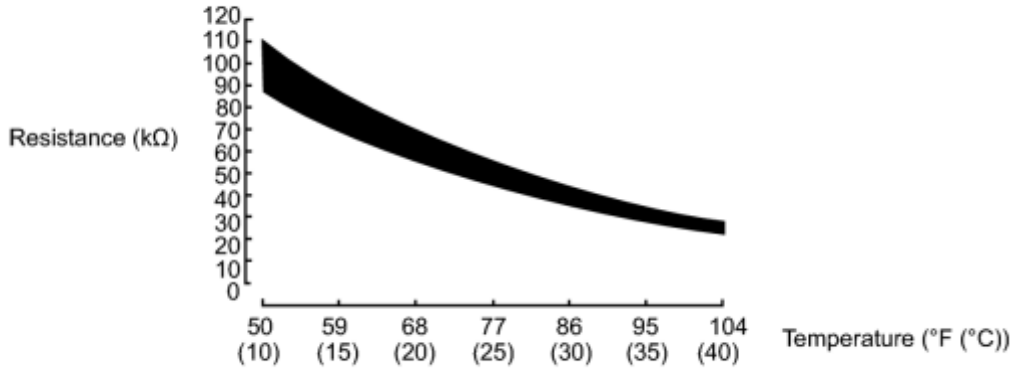
| | | |
|---|---|---|
| DTC | P0A2B-250 | Drive Motor "A" Temperature Sensor Circuit Range / Performance |
| DTC | P0A2E-248 | Drive Motor "A" Temperature Sensor Circuit Intermittent |

# DESCRIPTION

The resistance of the thermistor built into the motor temperature sensor changes in accordance with changes in MG2 temperature. The lower the MG2 temperature, the higher the thermistor resistance. Conversely, the higher the temperature, the lower the resistance.

HINT:

The term "drive motor A" indicates MG2.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A2B | 250 | Motor temperature sensor output does not increase under conditions in which the value should increase, or output does not decrease under conditions in which the value should decrease. | Hybrid vehicle transaxle assembly (Motor temperature sensor) |
| P0A2E | 248 | Unusual sudden change in motor temperature sensor output occurs and the condition continues, or unusual sudden change in motor temperature sensor output occurs repeatedly. | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

HINT:

The motor temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A2C-247 | Drive Motor "A" Temperature Sensor Circuit Low |
| DTC | P0A2D-249 | Drive Motor "A" Temperature Sensor Circuit High |

# DESCRIPTION

Refer to the description for DTC P0A2B-250 INFO.

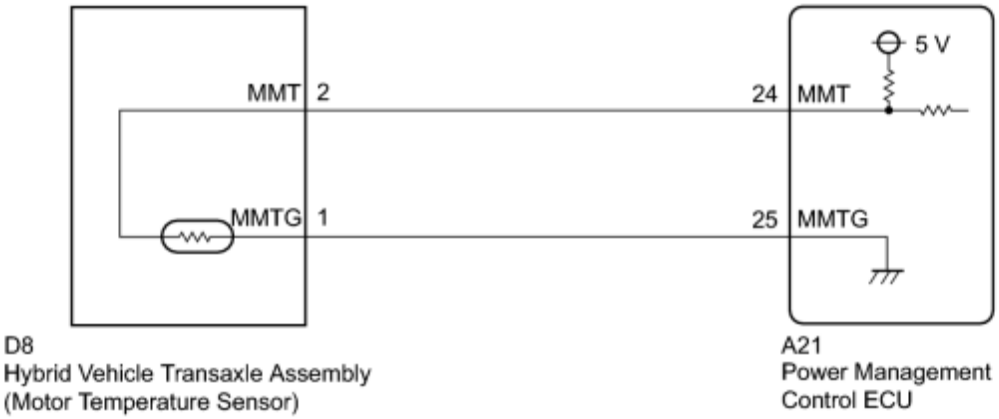
| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A2C | 247 | Short or short to GND in the motor temperature sensor circuit | • Wire harness or connector<br>• Power management control ECU<br>• Hybrid vehicle transaxle assembly (Motor temperature sensor) |
| P0A2D | 249 | Open or short to +B in the motor temperature sensor circuit | |

HINT:

After confirming that DTC P0A2C-247 or P0A2D-249 is output, use the Techstream to check "Motor Temp No1" in the power management control ECU Data List.

| Displayed Temperature | Malfunction |
|---|---|
| -58°F (-50°C) | Open circuit or short to +B |
| 401°F (205°C) | Short circuit or short to GND |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (MOTOR TEMP NO1) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(d) Read the Data List.

Result:

| Result | Proceed to |
|---|---|
| -58°F (-50°C) | A |
| 401°F (205°C) | B |
| Same as actual temperature | C |

(e) Turn the power switch off.

C CHECK FOR INTERMITTENT PROBLEMS
B READ VALUE USING TECHSTREAM (CHECK FOR SHORT)
A

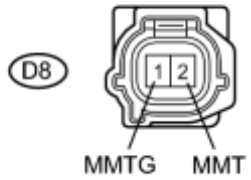
| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (CHECK FOR OPEN) |



H

(a) Disconnect the motor temperature sensor connector.

*1




H

(b) Connect terminals 2 (MMT) and 1 (MMTG) of vehicle side connector D8 of the motor temperature sensor.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(f) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No1 | Terminals MMT and MMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Motor Temperature Sensor) |

HINT:

The motor temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(g) Turn the power switch off.

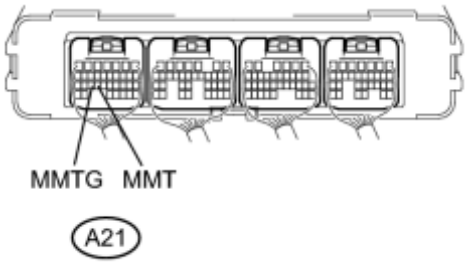
(h) Connect the motor temperature sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR TEMPERATURE SENSOR)

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR TEMPERATURE SENSOR) |

*1




P

(a) Connect terminals 24 (MMT) and 25 (MMTG) of connector A21 of the power management control ECU.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No1 | Terminals MMT and MMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

(f) Turn the power switch off.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (CHECK FOR SHORT) |




(a) Disconnect the motor temperature sensor connector.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No1.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No1 | Power switch on (IG) | -58°F (-50°C) |

HINT:

The motor temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(f) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR TEMPERATURE SENSOR)
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - MOTOR |

| | |
|---|---|
| | TEMPERATURE SENSOR) |

(a) Disconnect the motor temperature sensor connector.

(b) Disconnect connector A21 from the power management control ECU.

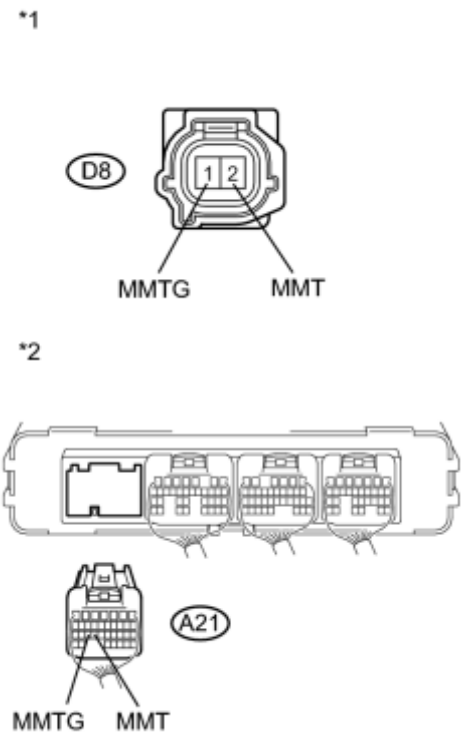
(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D8-2 (MMT) - A21-24 (MMT) | Power switch off | Below 1 Ω |
| D8-1 (MMTG) - A21-25 (MMTG) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D8-2 (MMT) or A21-24 (MMT) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D8-1 (MMTG) or A21-25 (MMTG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Motor Temperature Sensor) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the power management control ECU connector.

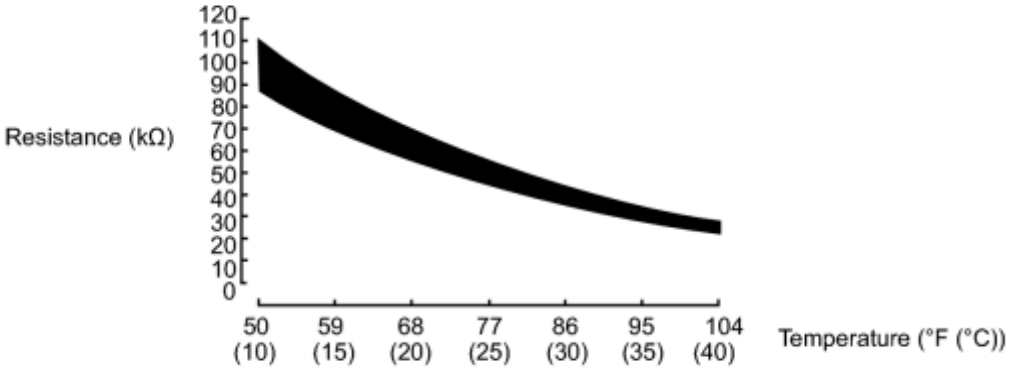
(e) Connect the motor temperature sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A37-260 | Generator Temperature Sensor Circuit Range / Performance |
| DTC | P0A3A-258 | Generator Temperature Sensor Circuit Intermittent |

# DESCRIPTION

The resistance of the thermistor built into the generator temperature sensor changes in accordance with changes in MG1 temperature. The lower the MG1 temperature, the higher the thermistor resistance. Conversely, the higher the temperature, the lower the resistance.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A37 | 260 | Generator temperature sensor output does not increase in which the value should increase, or output does not decrease under conditions in which the value should decrease. | Hybrid vehicle transaxle assembly (Generator temperature sensor) |
| P0A3A | 258 | Unusual sudden change in generator temperature sensor output occurs and the condition continues, or unusual sudden change in generator temperature sensor output occurs repeatedly. | |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

HINT:

The generator temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A38-257 | Generator Temperature Sensor Circuit Low |
| DTC | P0A39-259 | Generator Temperature Sensor Circuit High |

# DESCRIPTION

Refer to the description for DTC P0A37-260 INFO.

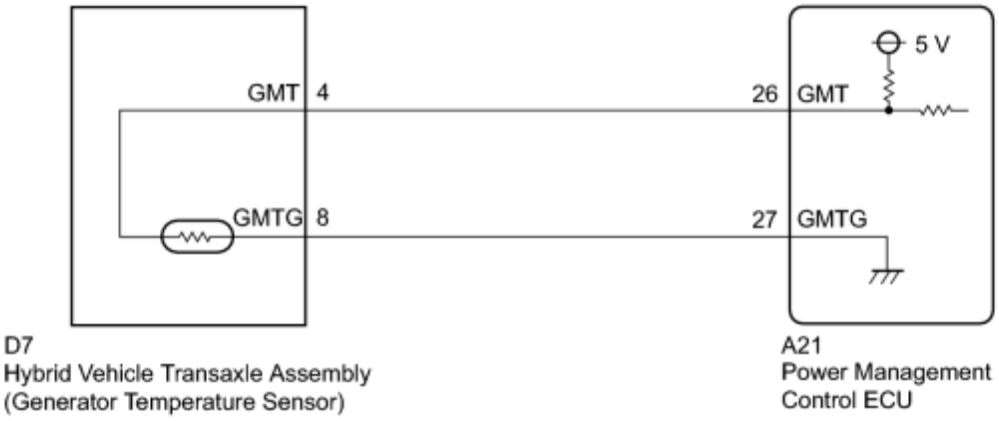
| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A38 | 257 | Short to GND in the generator temperature sensor circuit | • Wire harness or connector<br>• Power management control ECU<br>• Hybrid vehicle transaxle assembly (Generator temperature sensor) |
| P0A39 | 259 | Open or short to +B in the generator temperature sensor circuit | |

HINT:

After confirming that DTC P0A38-257 or P0A39-259 is output, use the Techstream to check "Motor Temp No2" in the power management control ECU Data List.

| Displayed Temperature | Malfunction |
|---|---|
| -58°F (-50°C) | Open circuit or short to +B |
| 401°F (205°C) | Short circuit or short to GND |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (MOTOR TEMP NO2) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(d) Read the Data List.

Result:

| Result | Proceed to |
|---|---|
| -58°F (-50°C) | A |
| 401°F (205°C) | B |
| Same as actual temperature | C |

(e) Turn the power switch off.

C CHECK FOR INTERMITTENT PROBLEMS
B READ VALUE USING TECHSTREAM (CHECK FOR SHORT)
A

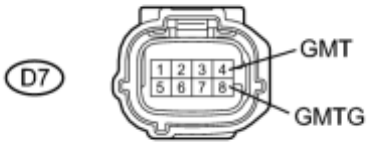
| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (CHECK FOR OPEN) |



H

(a) Disconnect the generator temperature sensor connector.

*1




H

(b) Connect terminals 4 (GMT) and 8 (GMTG) of vehicle side connector D7 of the generator temperature sensor.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(f) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No2 | Terminals GMT and GMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Generator Temperature Sensor) |

HINT:

The generator temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(g) Turn the power switch off.

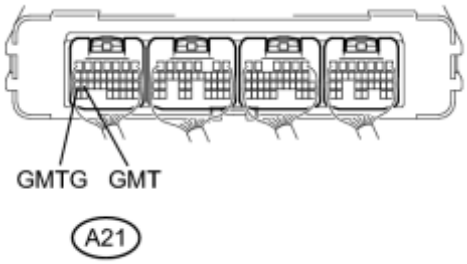
(h) Connect the generator temperature sensor connector.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - GENERATOR TEMPERATURE SENSOR)

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - GENERATOR TEMPERATURE SENSOR) |

*1




P

(a) Connect terminals 26 (GMT) and 27 (GMTG) of connector A21 of the power management control ECU.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No2 | Terminals GMT and GMTG connected.<br><br>Power switch on (IG) | 401°F (205°C) |

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

(f) Turn the power switch off.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR**

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (CHECK FOR SHORT) |




(a) Disconnect the generator temperature sensor connector.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / Motor Temp No2.

(e) Read the Data List.

OK:

| Tester Display | Condition | Specified Condition |
|---|---|---|
| Motor Temp No2 | Power switch on (IG) | -58°F (-50°C) |

HINT:

The generator temperature sensor is not available separately. If it requires replacement, replace the hybrid vehicle transaxle assembly.

(f) Turn the power switch off.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - GENERATOR TEMPERATURE SENSOR)
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - |

| | |
|---|---|
| | GENERATOR TEMPERATURE SENSOR) |

(a) Disconnect the generator temperature sensor connector.

(b) Disconnect connector A21 from the power management control ECU.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-4 (GMT) - A21-26 (GMT) | Power switch off | Below 1 Ω |
| D7-8 (GMTG) - A21-27 (GMTG) | Power switch off | Below 1 Ω |

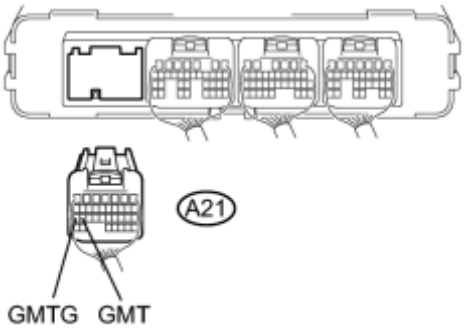
Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| D7-4 (GMT) or A21-26 (GMT) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| D7-8 (GMTG) or A21-27 (GMTG) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

*1




*2




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Generator Temperature Sensor) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(d) Connect the power management control ECU connector.

(e) Connect the generator temperature sensor connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | | |
|---|---|---|
| DTC | P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| DTC | P0A40-500 | Drive Motor "A" Position Sensor Circuit Range / Performance |
| DTC | P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |

# DESCRIPTION

A resolver is a sensor that is used to detect the position of the magnetic poles the rotor of a motor generator. Knowing the position of the poles is indispensable for ensuring precise control of MG2 and MG1.

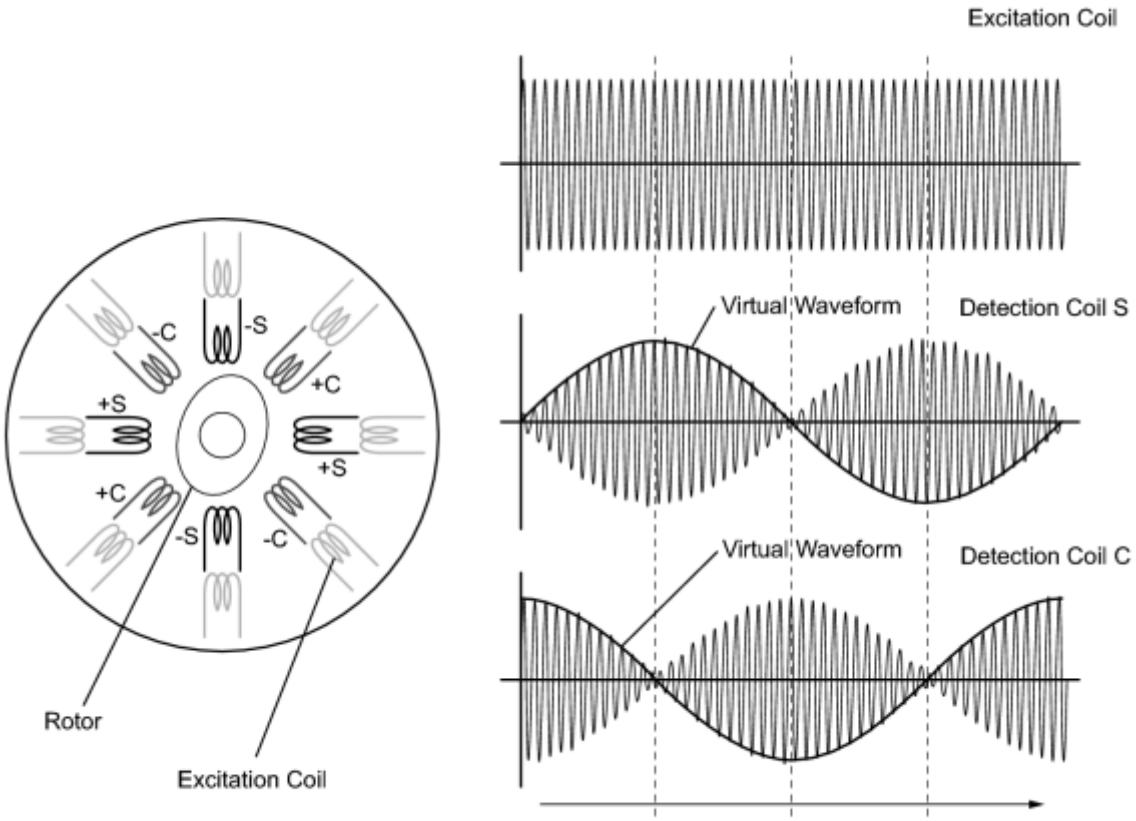
Each resolver contains a stator that has an excitation coil and 2 detection coils (S, C). The gap between the stator and rotor changes as the rotor turns because the rotor is oval shaped. An alternating current with a predetermined frequency flows through the excitation coil, and detection coils S and C output alternating currents in accordance with the sensor rotor position.

The inverter with converter assembly (MG ECU) detects the absolute position of the rotor according to the phases of detection coils S and C and the heights of their waveforms. Furthermore, the CPU calculates the amount of change in the position within a predetermined length of time, in order to use the resolver as a speed sensor.

The MG ECU monitors signals output from the motor resolver and detects malfunctions.

HINT:

The term "drive motor A" indicates MG2.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A3F | 243 | Interphase short in the motor resolver circuit | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| P0A40 | 500 | Motor resolver output is out of the normal range | |
| P0A41 | 245 | Open or short in the motor resolver circuit | |

# MONITOR DESCRIPTION

The MG ECU monitors the motor resolver output signal. If the MG ECU detects output signals that are out of the normal range or specification, it will conclude that there is a malfunction in the motor resolver. If a malfunction is detected, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A3F (INF 243): Short circuit between phases<br><br>P0A40 (INF 500): Range check<br><br>P0A41 (INF245): Circuit discontinuity / short circuit |

| | |
|---|---|
| Required sensors / components | Motor resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

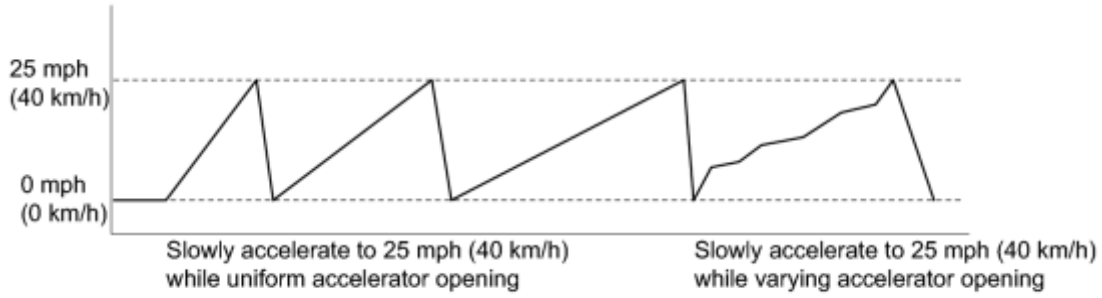
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Motor resolver | DTC P0A3F (INF 243) is not detected<br>DTC P0A40 (INF 500) is not detected<br>DTC P0A41 (INF 245) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.

6. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns.
7. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
8. Check that permanent DTCs are cleared.
9. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

- If INF code 243 is output, there may be an interphase short in the motor resolver due to an intrusion of water into the resolver. If the problem symptom cannot be reproduced, replace the hybrid vehicle transaxle assembly.
- Check for output DTCs again after the repair has been completed. If P0A78-286 or P0A7A-324 is output, replace the inverter with converter assembly.

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If the problem symptom cannot be reproduced, performing a road test on a road on which the vehicle tends to vibrate will make it easier to reproduce the symptom.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 3. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 5. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 6. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A4B-253 | Generator Position Sensor Circuit |
| DTC | P0A4C-513 | Generator Position Sensor Circuit Range / Performance |
| DTC | P0A4D-255 | Generator Position Sensor Circuit Low |

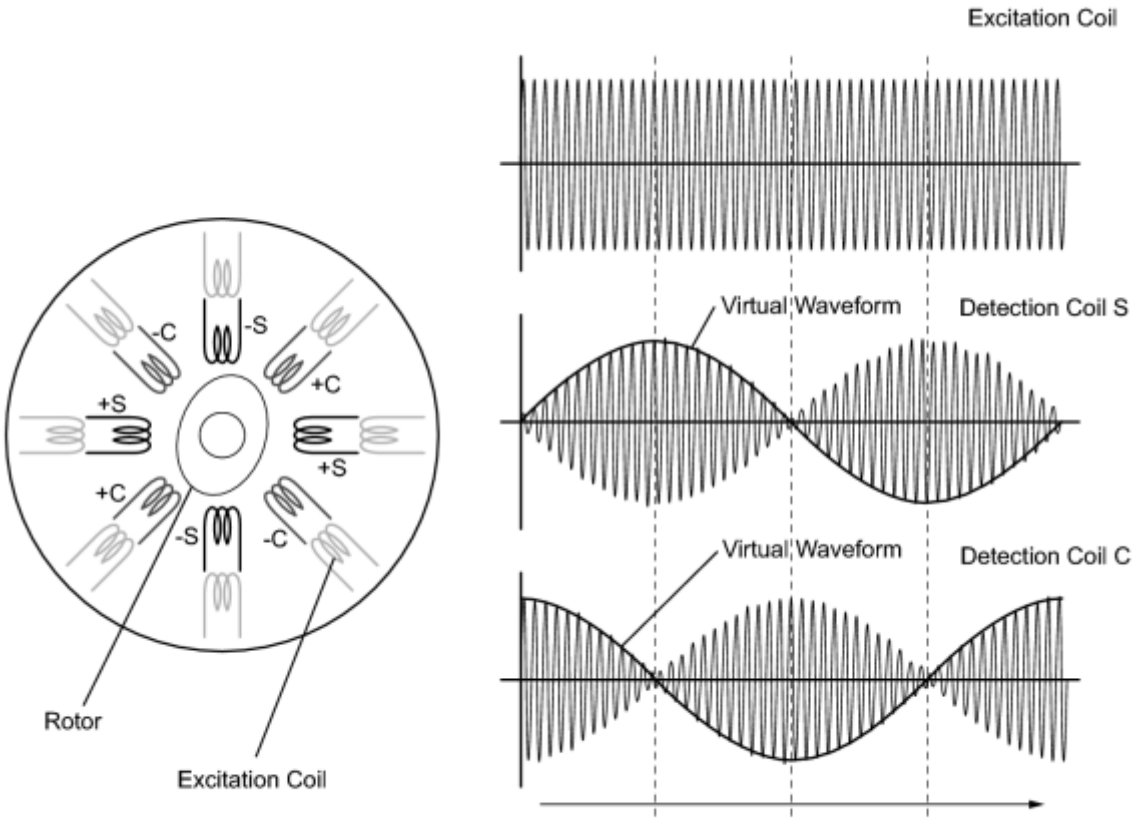
# DESCRIPTION

A resolver is a sensor that is used to detect the position of the magnetic poles the rotor of a motor generator. Knowing the position of the poles is indispensable for ensuring precise control of MG2 and MG1.

Each resolver contains a stator that has an excitation coil and 2 detection coils (S, C). The gap between the stator and rotor changes as the rotor turns because the rotor is oval shaped. An alternating current with a predetermined frequency flows through the excitation coil, and detection coils S and C output alternating currents in accordance with the sensor rotor position.

The inverter with converter assembly (MG ECU) detects the absolute position of the rotor according to the phases of detection coils S and C and the heights of their waveforms. Furthermore, the CPU calculates the amount of change in the position within a predetermined length of time, in order to use the resolver as a speed sensor.

The MG ECU monitors signals output from the motor resolver and detects malfunctions.




| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A4B | 253 | Interphase short in the generator resolver circuit | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Wire harness or connector |
| P0A4C | 513 | Generator resolver output is out of the normal range | |
| P0A4D | 255 | Open or short in the generator resolver circuit | |

# MONITOR DESCRIPTION

The MG ECU monitors the generator resolver output signal. If the MG ECU detects output signals that are out of the normal range or specification, it will conclude that there is a malfunction of the generator resolver. If a malfunction is detected, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A4B (INF 253): Short circuit between phases<br><br>P0A4C (INF 513): Range check |

| | |
|---|---|
| | P0A4D (INF 255): Circuit discontinuity / short circuit |
| Required sensors / components | Generator resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

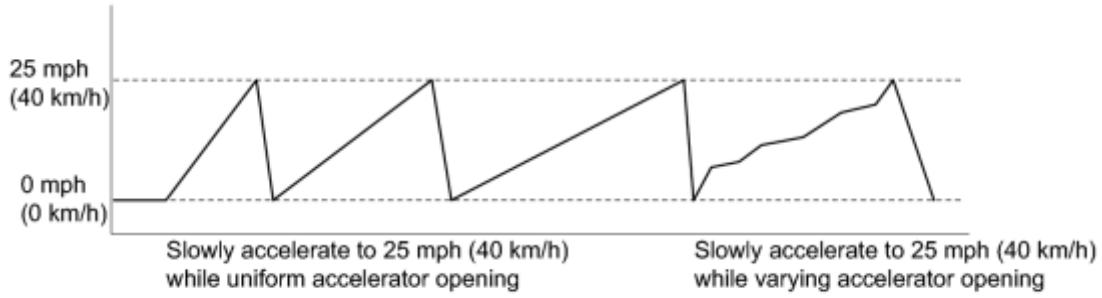
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Generator resolver | DTC P0A4B (INF 253) is not detected<br><br>DTC P0A4C (INF 513) is not detected<br><br>DTC P0A4D (INF 255) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.

5. Turn the power switch on (READY) and turn the Techstream on.
6. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns.
7. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
8. Check that permanent DTCs are cleared.
9. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

- If INF code 253 is output, there may be an interphase short in the generator resolver due to an intrusion of water into the resolver. If the problem symptom cannot be reproduced, replace the hybrid vehicle transaxle assembly.
- Check for output DTCs again after the repair has been completed. If P0A78-286 or P0A7A-324 is output, replace the inverter with converter assembly.

HINT:

- Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.
- If the problem symptom cannot be reproduced, performing a road test on a road on which the vehicle tends to vibrate will make it easier to reproduce the symptom.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER |

| | |
|---|---|
| | ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 3. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 5. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 6. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 7. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 8. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 10. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A51-174 | Drive Motor "A" Current Sensor Circuit |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors its internal operation and it will set DTCs when it detects malfunctions.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A51 | 174 | Motor current sensor high resolution circuit signal is out of range or there is a difference between it and the motor current sensor low resolution circuit current value. | Inverter with converter assembly |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A51-174 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A78-113, 287, 505, 506 | Drive Motor "A" Inverter Performance |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A51-174 may be output due to a malfunction which causes the DTCs in the table above to be output. In this case, first troubleshoot the output DTCs in the table above. Then, perform a reproduction test to check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A60-288 | Drive Motor "A" Phase V Current |
| DTC | P0A60-290 | Drive Motor "A" Phase V Current |
| DTC | P0A60-294 | Drive Motor "A" Phase V Current |
| DTC | P0A60-501 | Drive Motor "A" Phase V Current |
| DTC | P0A63-296 | Drive Motor "A" Phase W Current |
| DTC | P0A63-298 | Drive Motor "A" Phase W Current |
| DTC | P0A63-302 | Drive Motor "A" Phase W Current |
| DTC | P0A63-502 | Drive Motor "A" Phase W Current |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors the motor inverter current sensors. P0A60 and P0A63 indicate malfunctions in current sensors, and they do not indicate malfunctions in the high-voltage system.

HINT:

The term "drive motor A" indicates MG2.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A60 | 288 | Malfunction in motor inverter current sensor (phase V sub sensor) | Inverter with converter assembly |
| P0A60 | 290 | Malfunction in motor inverter current sensor (phase V main sensor) | |
| P0A60 | 294 | Malfunction in motor inverter current sensor (performance problem or open phase V) | |
| P0A60 | 501 | Malfunction in motor inverter current sensor (phase V main and sub sensors offset) | |
| P0A63 | 296 | Malfunction in motor inverter current sensor (phase W sub sensor) | |
| P0A63 | 298 | Malfunction in motor inverter current sensor (phase W main sensor) | |
| P0A63 | 302 | Malfunction in motor inverter current sensor (performance problem or open phase W) | |

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A63 | 502 | Malfunction in motor inverter current sensor (phase W main and sub sensors offset) | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) monitors the motor inverter current sensor. If the power management control ECU (HV CPU) detects a fault, it will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A60 (INF 288/290/294/501): Phase V, sub sensor<br><br>P0A63 (INF 296/298/302/502): Phase W, sub sensor |
| Required sensors / components | Motor inverter current sensor, motor resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

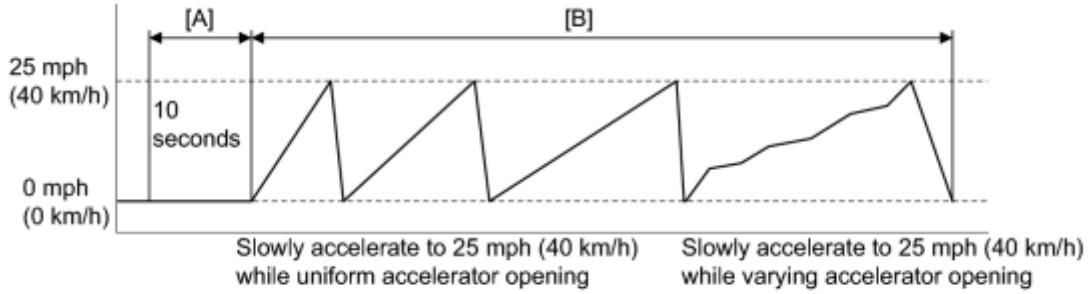
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A60 (INF 288/ 290/ 294/ 501) is not detected<br><br>DTC P0A63 (INF 296/ 298/ 302/ 502) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. With the vehicle stopped and park (P) selected, move the shift lever to N, wait for 10 seconds and then move the shift lever to D. [A]

   NOTICE:

   Do not leave the vehicle for an extended time with the shift lever in N.

7. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns. [B]
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A60 or P0A63 only is output. | A |
| P0A78-202 is output. | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A72-326 | Generator Phase V Current |
| DTC | P0A72-328 | Generator Phase V Current |
| DTC | P0A72-333 | Generator Phase V Current |
| DTC | P0A72-515 | Generator Phase V Current |
| DTC | P0A75-334 | Generator Phase W Current |
| DTC | P0A75-336 | Generator Phase W Current |
| DTC | P0A75-341 | Generator Phase W Current |
| DTC | P0A75-516 | Generator Phase W Current |

# DESCRIPTION

The MG ECU located in the inverter with converter assembly monitors the generator inverter current sensors. P0A72 and P0A75 indicate malfunctions in the current sensors, and they do not indicate malfunctions in the high-voltage system.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A72 | 326 | Malfunction in generator inverter current sensor (phase V sub sensor) | Inverter with converter assembly |
| P0A72 | 328 | Malfunction in generator inverter current sensor (phase V main sensor) | |
| P0A72 | 333 | Malfunction in generator inverter current sensor (performance problem or open phase V) | |
| P0A72 | 515 | Malfunction in generator inverter current sensor (phase V main and sub sensors offset) | |
| P0A75 | 334 | Malfunction in generator inverter current sensor (phase W sub sensor) | |
| P0A75 | 336 | Malfunction in generator inverter current sensor (phase W main sensor) | |
| P0A75 | 341 | Malfunction in generator inverter current sensor (performance problem or open phase W) | |
| P0A75 | 516 | Malfunction in generator inverter current sensor (phase W main and sub sensors offset) | |

# MONITOR DESCRIPTION

The power management control ECU (HV CPU) monitors the generator inverter current sensor. If the power management control ECU (HV CPU) detects a fault, it will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A72 (INF 326/328/333/515): Phase V, sub sensor<br><br>P0A75 (INF 334/336/341/516): Phase W, sub sensor |
| Required sensors / components | Generator inverter current sensor, Generator resolver |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

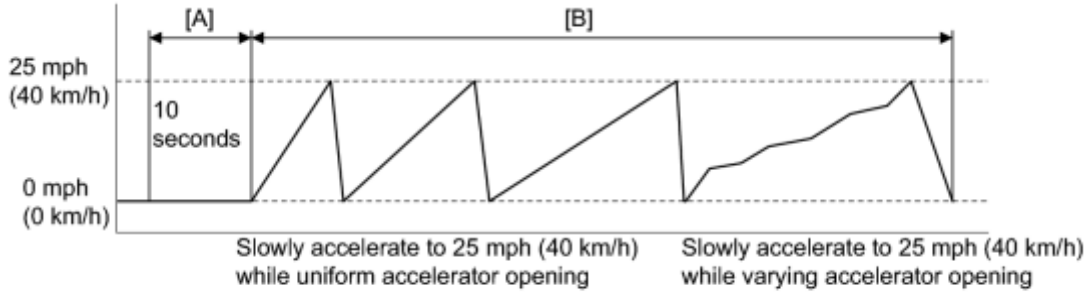
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A72 (INF 326/328/333/515) is not detected<br><br>DTC P0A75 (INF 334/336/341/516) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. With the vehicle stopped and park (p) selected, move the shift lever to N, wait for 10 seconds and then move the shift lever to D. [A]

   NOTICE:

   Do not leave the vehicle for an extended time with the shift lever in N.

7. Slowly accelerate from a stop (0 mph (0 km/h)) to 25 mph (40 km/h) several times while using different acceleration patterns. [B]
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A72 or P0A75 only is output. | A |
| P0A7A-203 is output. | B |

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-113 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If the motor inverter overheats, has a circuit malfunction, or has an internal short, the inverter transmits this information to the MG ECU via the motor inverter fail signal line.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 113 | Motor inverter fail signal detection<br><br>(System overcurrent) | • Hybrid vehicle transaxle assembly<br>• Generator cable<br>• Motor cable<br>• Inverter with converter assembly<br>• Power management control ECU<br>• PCU fuse<br>• Wire harness or connector |

# MONITOR DESCRIPTION

If over-amperage flows through the motor inverter due to an internal short, the motor inverter transmits an inverter fail signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 113): MFIV detection (Over current malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| TMC's intellectual property | - |

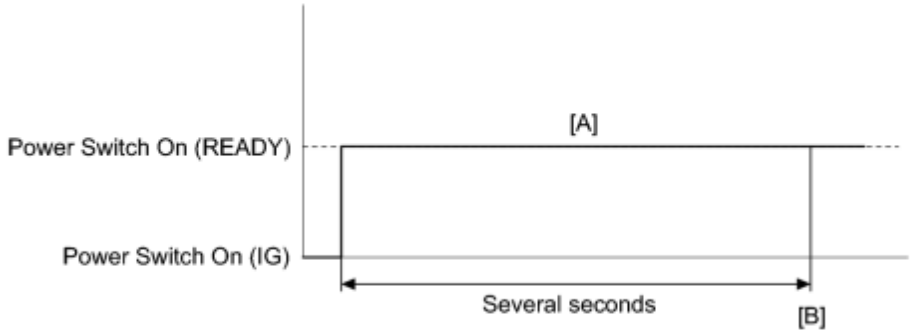
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 113) is not detected |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 113) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-113 is set before any of the DTCs in the table below are set | A |
| Any of the DTCs in the table below are set before P0A78-113 is set | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P3011-123, P3012-123, P3013-123, P0314-123, P3015-123, P3016-123, P0317-123, P3018-123, P3019-123, P3020-123, P3021-123, P3022-123, P3023-123, P3024-123 | Battery Block # Becomes Weak |
| P0AFC-123 | Hybrid Battery Pack Sensor Module |
| P308A-123 | Hybrid Battery Voltage Sensor All Circuits Low |
| P0AC0-123 | Hybrid Battery Pack Current Sensor Circuit Range/Performance |
| P0AC1-123 | Hybrid Battery Pack Current Sensor Circuit Low |
| P0AC2-123 | Hybrid Battery Pack Current Sensor |

| DTC No. | Relevant Diagnosis |
|---|---|
| | Circuit High |
| P0A9C-123 | Hybrid Battery Temperature Sensor "A" |
| P0A9D-123 | Hybrid Battery Temperature Sensor "A" Circuit Low |
| P0A9E-123 | Hybrid Battery Temperature Sensor "A" Circuit High |
| P0AC6-123 | Hybrid Battery Temperature Sensor "B" Range/Performance |
| P0AC7-123 | Hybrid Battery Temperature Sensor "B" Circuit Low |
| P0AC8-123 | Hybrid Battery Temperature Sensor "B" Circuit High |
| P0ACB-123 | Hybrid Battery Pack Cooling Fan 3 Performance or Stuck OFF |
| P0ACC-123 | Hybrid Battery Pack Cooling Fan 3 Stuck ON |
| P0ACD-123 | Hybrid Battery Pack Cooling Fan 3 Control Circuit Low |
| P3065-123 | Hybrid Battery Temperature Sensor Correlation for Stack "A" |

HINT:

P0A78-113 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-202 is not output. | A |
| P0A78-202 is also output. | B |

NOTICE:

- If P0A78-202 is output, troubleshoot it first. After completing the troubleshooting for P0A78-202, return to perform troubleshooting for this DTC.
- Parts repaired or replaced during troubleshooting for P0A78-202 do not need to be re-inspected in this diagnosis procedure.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

HINT:

- If P0A78-202 was not output in step 2 of this diagnosis procedure, check Table 1 below.
- If P0A78-202 was output in step 2 of this diagnosis procedure, repair that DTC first, then check Table 2 below.

Result:

| Result | Proceed to |
|---|---|
| P0A78-113 only is output | A |
| Any of the following DTCs are also output. | B |

**Table 1**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

**Table 2**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60-294 | Drive Motor "A" Phase V Current |
| P0A63-302 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-113 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 4. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 6. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 8. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) |

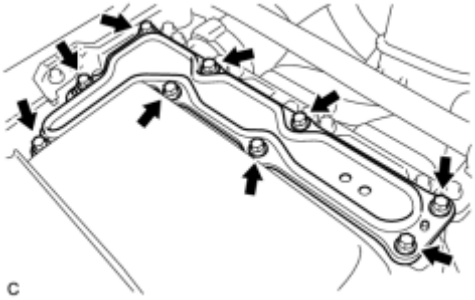
CAUTION:

Be sure to wear insulated gloves.

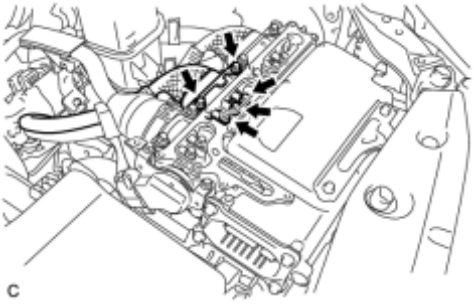
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check that the bolts for the generator cable are tightened to the specified torque, the generator cable is connected securely, and there are no contact problems.

Specified Condition:

T=8.0 N*m {82 kgf*cm, 71 in.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).

(d) Check for arc marks at the bolts for the generator cable.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter terminal cover.

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 10. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) |

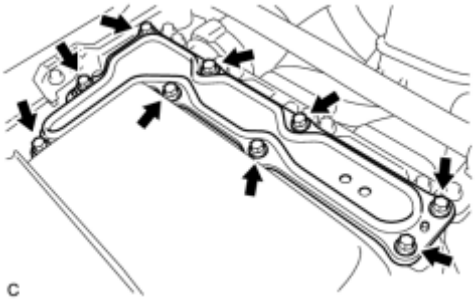
CAUTION:

Be sure to wear insulated gloves.

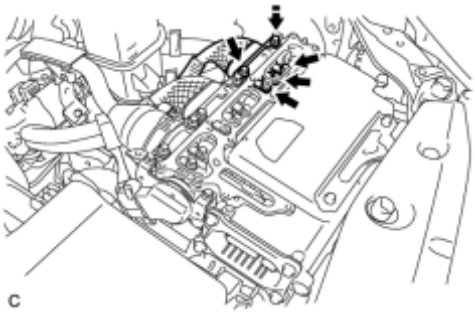
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.




(c) Check that the bolts for the motor cable are tightened to the specified torque, the motor cable is connected securely, and there are no contact problems.

Specified Condition:

T=8.0 N*m {82 kgf*cm, 71 in.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).

(d) Check for arc marks at the bolts for the motor cable.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter terminal cover.

C CONNECT SECURELY
B REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 11. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

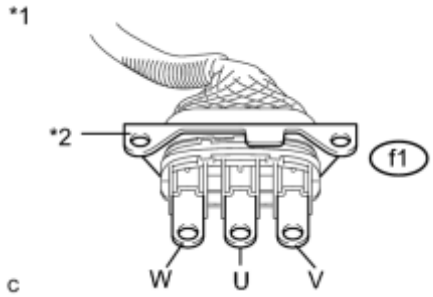
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Disconnect the generator cable and motor cable from the inverter with converter assembly.




(d) Check MG1 for an interphase short using a milliohmmeter.

(1) Using a milliohmmeter, measure the resistance according to the value(s) in the table below.

HINT:

If the MG1 temperature is high, the resistance will vary greatly from the specification. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - f1-3 (V) | Power switch off | 87.0 to 96.2 mΩ |
| f1-3 (V) - f1-1 (W) | Power switch off | 87.0 to 96.2 mΩ |

| | | |
|---|---|---|
| f1-1 (W) - f1-2 (U) | Power switch off | 87.0 to 96.2 mΩ |

## Text in Illustration

| | |
|---|---|
| *1 | Generator Cable |
| *2 | Shield Ground |

HINT:

To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 68° F (20°C).

R20 = Rt / {1 + 0.00393 X (T - 20)}

The calculation is based on the following:

R20: Resistance at 68° F (20°C) (mΩ)

Rt: Measured resistance (mΩ)

T: Temperature when the resistance is measured (° C)

(e) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

(f) Connect the generator cable and motor cable.

(g) Install the inverter terminal cover.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 12. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) |

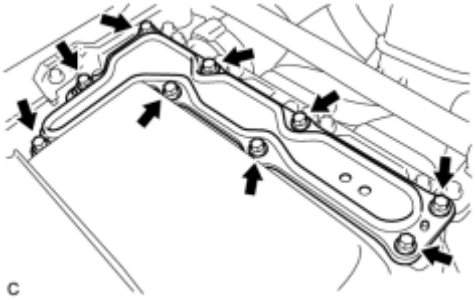
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.

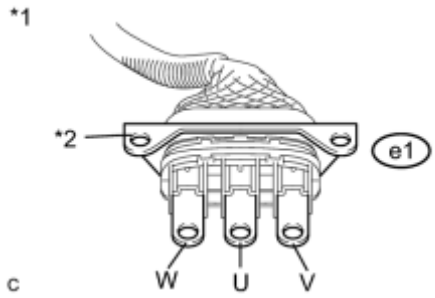
(c) Disconnect the generator cable and motor cable from the inverter with converter assembly.

(d) Check MG2 for an interphase short using a milliohmmeter.

(1) Using a milliohmmeter, measure the resistance according to the value(s) in the table below.

HINT:

If the MG2 temperature is high, the resistance will vary greatly from the specification. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - e1-3 (V) | Power switch off | 154 to 170 mΩ |
| e1-3 (V) - e1-1 (W) | Power switch off | 148 to 164 mΩ |
| e1-1 (W) - e1-2 (U) | Power switch off | 149 to 165 mΩ |

# Text in Illustration

| | |
|---|---|
| *1 | Motor Cable |
| *2 | Shield Ground |

HINT:

To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 68° F (20°C).

R20 = Rt / {1 + 0.00393 X (T - 20)}

The calculation is based on the following:

R20: Resistance at 68° F (20°C) (mΩ)

Rt: Measured resistance (mΩ)

T: Temperature when the resistance is measured (° C)

(e) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

(f) Connect the generator cable and motor cable.

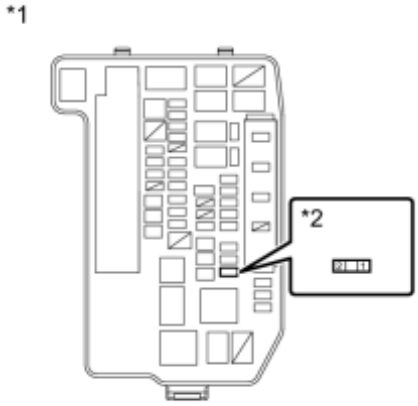
(g) Install the inverter terminal cover.

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 13. | CHECK FUSE (PCU) |

(a) Remove the PCU fuse from the engine room junction block assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| PCU fuse terminal | Always | Below 1Ω |

**Text in Illustration**

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | PCU fuse |

(c) Install the PCU fuse.

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 14. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

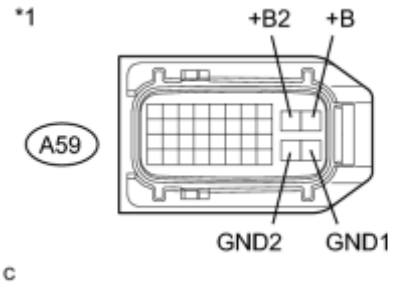
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-28 (GND1) - Body ground | Power switch off | Below 1 Ω |
| A59-27 (GND2) - Body ground | Power switch off | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-10 (+B) - Body ground | Power switch on (IG) | 11 to 14V |
| A59-9 (+B2) - Body ground | Power switch on (IG) | 11 to 14V |

(f) Turn the power switch off.

(g) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK

▼

| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

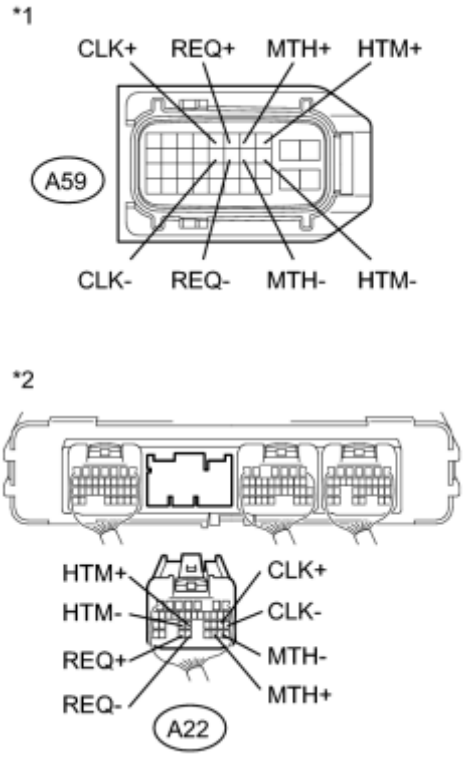
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Turn the power switch off.

(c) Disconnect connector A59 from the inverter with converter assembly.

(d) Disconnect connector A22 from the power management control ECU.

(e) Measure the resistance according to the value(s) in the table below.




Standard Resistance (Check for open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) - A59-8 (HTM+) | Power switch off | Below 1 Ω |
| A22-25 (HTM-) - A59-18 (HTM-) | Power switch off | Below 1 Ω |
| A22-30 (MTH+) - A59-7 (MTH+) | Power switch off | Below 1 Ω |
| A22-29 (MTH-) - A59-17 (MTH-) | Power switch off | Below 1 Ω |
| A22-33 (REQ+) - A59-6 (REQ+) | Power switch off | Below 1 Ω |
| A22-32 (REQ-) - A59-16 (REQ-) | Power switch off | Below 1 Ω |
| A22-21 (CLK+) - A59-5 (CLK+) | Power switch off | Below 1 Ω |
| A22-20 (CLK-) - A59-15 (CLK-) | Power switch off | Below 1 Ω |

Standard Resistance (Check for short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) or A59-8 (HTM+) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-25 (HTM-) or A59-18 (HTM-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-30 (MTH+) or A59-7 (MTH+) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-29 (MTH-) or A59-17 (MTH-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-33 (REQ+) or A59-6 (REQ+) - | Power switch | 10 kΩ or |

| | | |
|---|---|---|
| Body ground and other terminals | off | higher |
| A22-32 (REQ-) or A59-16 (REQ-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-21 (CLK+) or A59-5 (CLK+) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| A22-20 (CLK-) or A59-15 (CLK-) - Body ground and other terminals | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(f) Turn the power switch on (IG).

(g) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) or A59-8 (HTM+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-25 (HTM-) or A59-18 (HTM-) - Body ground | Power switch on (IG) | Below 1 V |
| A22-30 (MTH+) or A59-7 (MTH+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-29 (MTH-) or A59-17 (MTH-) - Body ground | Power switch on (IG) | Below 1 V |
| A22-33 (REQ+) or A59-6 (REQ+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-32 (REQ-) or A59-16 (REQ-) - Body ground | Power switch on (IG) | Below 1 V |
| A22-21 (CLK+) or A59-5 (CLK+) - Body ground | Power switch on (IG) | Below 1 V |
| A22-20 (CLK-) or A59-15 (CLK-) - Body ground | Power switch on (IG) | Below 1 V |

NOTICE:

Turning the power switch on (IG) with the power management control ECU and inverter with converter assembly connector disconnected causes other DTCs to be stored. Clear the DTCs after performing this inspection.

(h) Turn the power switch off.

(i) Connect the power management control ECU connector.

(j) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

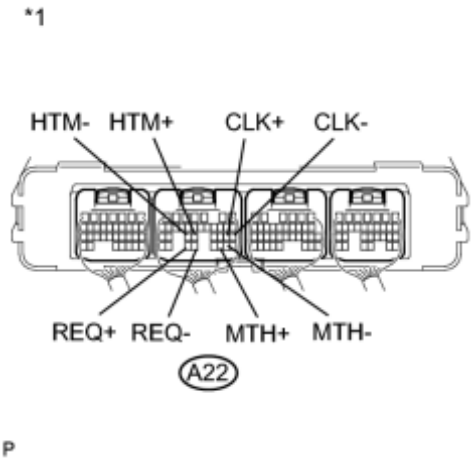
OK ▼

| | |
|---|---|
| 16. | CHECK POWER MANAGEMENT CONTROL ECU |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A22-24 (HTM+) - A22-25 (HTM-) | Power switch off | 80 to 170 Ω |
| A22-30 (MTH+) - A22-29 (MTH-) | Power switch off | 80 to 170 Ω |
| A22-33 (REQ+) - A22-32 (REQ-) | Power switch off | 80 to 170 Ω |
| A22-21 (CLK+) - A22-20 (CLK-) | Power switch off | 80 to 170 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 17. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 18. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 19. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 20. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 21. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 22. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 23. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

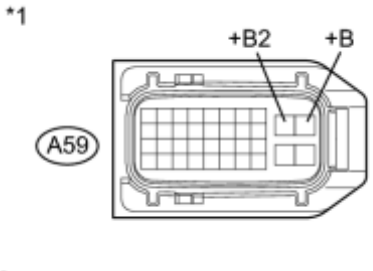
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect connector A59 from the inverter with converter assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A59-10 (+B) - Body ground | Power switch off | 10 kΩ or higher |
| A59-9 (+B2) - Body ground | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

(d) Connect the inverter with converter assembly connector.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 24. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT **REPLACE FUSE (PCU)**

| | |
|---|---|
| 25. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT **REPLACE FUSE (PCU)**

| | |
|---|---|
| 26. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) |

CAUTION:

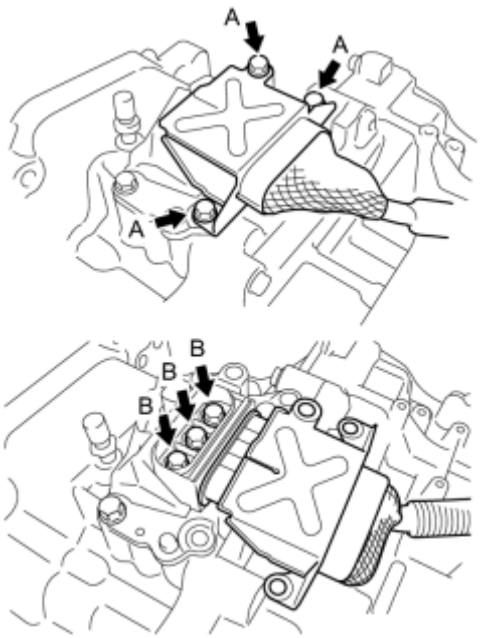
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the inverter with converter assembly.




(c) Check that the bolts for the generator cable are tightened to the specified torque, the generator cable is connected securely, and there are no contact problems.

Specified Condition:

Bolt A

T=20 N*m {204 kgf*cm, 15 ft.*lbf}

Bolt B

T=10 N*m {102 kgf*cm, 7 ft.*lbf}

- Make sure that the tightening torque of the bolt A is between 16 and 24 N*m (163 and 245 kgf*cm, 12 and 18 ft.*lbf).
- Make sure that the tightening torque of the bolt B is between 8 and 12 N*m (82 and 122 kgf*cm, 71 and 106 in.*lbf).

(d) Check for arc marks at the bolts for the generator cable.

Result:

| Result | Proceed to |
|---|---|

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter with converter assembly.

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 27. | CHECK GENERATOR CABLE |

CAUTION:

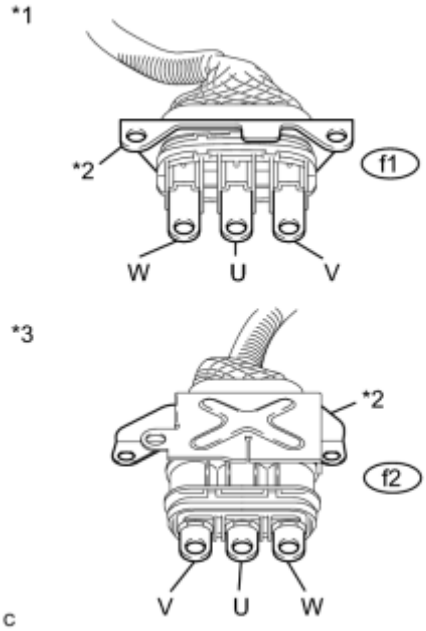
Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the generator cable.




(c) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| f1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Generator Cable<br><br>(Inverter with Converter Assembly Side) |
| *2 | Shielded ground |
| *3 | Generator Cable<br><br>(Hybrid Vehicle Transaxle Assembly Side) |

NOTICE:

Wrap the terminal of the three-phase AC cable with insulating tape to prevent them from coming into contact with body ground

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| f1-2 (U) - f2-2 (U) | Power switch off | Below 1 Ω |
| f1-3 (V) - f2-1 (V) | Power switch off | Below 1 Ω |
| f1-1 (W) - f2-3 (W) | Power switch off | Below 1 Ω |
| f1-2 (U) - f2-1 (V) | Power switch off | 100 MΩ or higher |
| f1-3 (V) - f2-3 (W) | Power switch off | 100 MΩ or higher |
| f1-1 (W) - f2-2 (U) | Power switch off | 100 MΩ or higher |

(e) Install the generator cable.

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 28. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) |

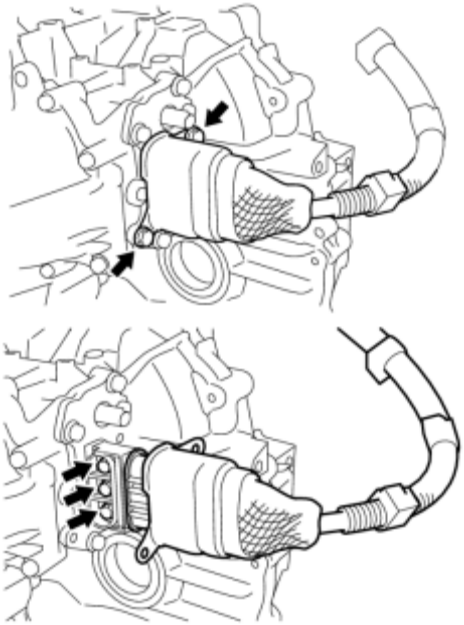
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(b) Check that the bolts for the motor cable are tightened to the specified torque, the motor cable is connected securely, and there are no contact problems.

Specified Condition:

T=10 N*m {102 kgf*cm, 7 ft.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 8 and 12 N*m (82 and 122 kgf*cm, 71 and 106 in.*lbf).

(c) Check for arc marks at the bolts for the motor cable.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A ▼

| | |
|---|---|
| 29. | CHECK MOTOR CABLE |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

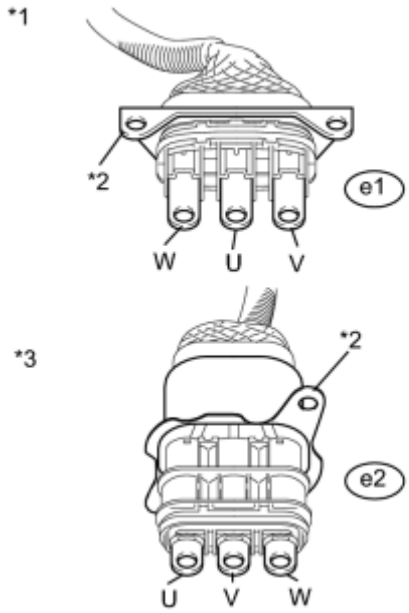
(b) Remove the motor cable.

(c) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-3 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e1-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Motor Cable<br><br>(Inverter with Converter Assembly Side) |
| *2 | Shielded ground |
| *3 | Motor Cable<br><br>(Hybrid Vehicle Transaxle Assembly Side) |

NOTICE:

Wrap the terminal of the three-phase AC cable with insulating tape to prevent them from coming into contact with body ground

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-2 (U) - e2-3 (U) | Power switch off | Below 1 Ω |
| e1-3 (V) - e2-2 (V) | Power switch off | Below 1 Ω |
| e1-1 (W) - e2-1 (W) | Power switch off | Below 1 Ω |
| e1-2 (U) - e2-2 (V) | Power switch off | 100 MΩ or higher |
| e1-3 (V) - e2-1 (W) | Power switch off | 100 MΩ or higher |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e1-1 (W) - e2-3 (U) | Power switch off | 100 MΩ or higher |

(e) Install the motor cable.

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-121 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an overvoltage occurs in the motor inverter or generator inverter, the MG ECU detects it and transmits this information to the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 121 | Motor inverter overvoltage signal detection (overvoltage due to system malfunction) | • Hybrid battery junction block<br>• Inverter with converter assembly<br>• Service plug grip (EV battery fuse)<br>• Frame wire<br>• Hybrid vehicle transaxle assembly<br>• Generator Cable<br>• Motor Cable<br>• Power management control ECU<br>• PCU fuse<br>• Wire harness or connector |

# MONITOR DESCRIPTION

If the motor inverter detects over-voltage, it transmits an over-voltage signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 121): OVH detection (Over voltage malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

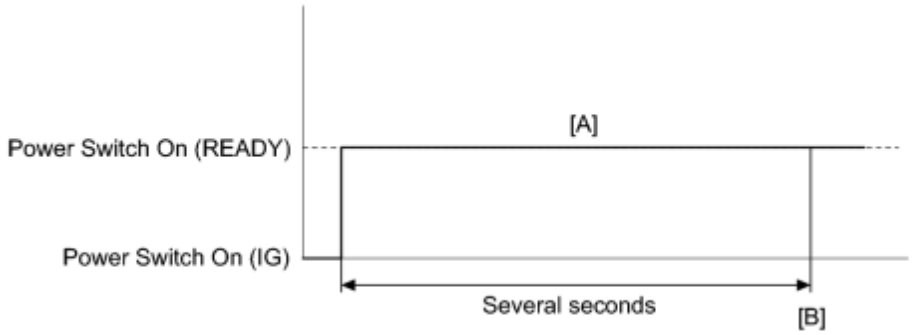
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 121) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P0AE6-225 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-121 is set before any of the DTCs in the table below are set | A |
| Any of the DTCs in the table below are set before P0A78-121 is set | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P3011-123, P3012-123, P3013-123, P0314-123, P3015-123, P3016-123, P0317-123, P3018-123, P3019-123, P3020-123, P3021-123, P3022-123, | Battery Block # Becomes Weak |

| DTC No. | Relevant Diagnosis |
|---|---|
| P3023-123, P3024-123 | |
| P0AFC-123 | Hybrid Battery Pack Sensor Module |
| P308A-123 | Hybrid Battery Voltage Sensor All Circuits Low |
| P0AC0-123 | Hybrid Battery Pack Current Sensor Circuit Range/Performance |
| P0AC1-123 | Hybrid Battery Pack Current Sensor Circuit Low |
| P0AC2-123 | Hybrid Battery Pack Current Sensor Circuit High |
| P0A9C-123 | Hybrid Battery Temperature Sensor "A" |
| P0A9D-123 | Hybrid Battery Temperature Sensor "A" Circuit Low |
| P0A9E-123 | Hybrid Battery Temperature Sensor "A" Circuit High |
| P0AC6-123 | Hybrid Battery Temperature Sensor "B" Range/Performance |
| P0AC7-123 | Hybrid Battery Temperature Sensor "B" Circuit Low |
| P0AC8-123 | Hybrid Battery Temperature Sensor "B" Circuit High |
| P0ACB-123 | Hybrid Battery Pack Cooling Fan 3 Performance or Stuck OFF |
| P0ACC-123 | Hybrid Battery Pack Cooling Fan 3 Stuck ON |
| P0ACD-123 | Hybrid Battery Pack Cooling Fan 3 Control Circuit Low |
| P3065-123 | Hybrid Battery Temperature Sensor Correlation for Stack "A" |

HINT:

- Refer to the Freeze Frame data to determine the order in which the DTCs were set.
- P0A78-121 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-121 only is output | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-113, 128, 266, 267, 279, 284, 286, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-122, 130, 322, 324, 325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-172, 442, 547, 548, 549, 553, 554, 555, 556, 557, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0ADB-227 | Hybrid Battery Positive Contactor Control Circuit Low |
| P0ADC-226 | Hybrid Battery Positive Contactor Control Circuit High |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0ADF-229 | Hybrid Battery Negative Contactor Control Circuit Low |
| P0AE0-228 | Hybrid Battery Negative Contactor Control Circuit High |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |
| P3004-803 | High Voltage Power Resource |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-121 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 5. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 7. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 8. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 10. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 11. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 12. | CHECK INVERTER WITH CONVERTER ASSEMBLY (HIGH VOLTAGE CONNECTOR CONNECTION CONDITION) |

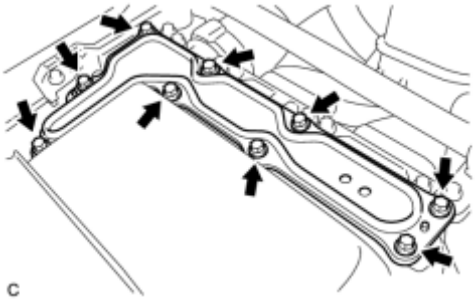
CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

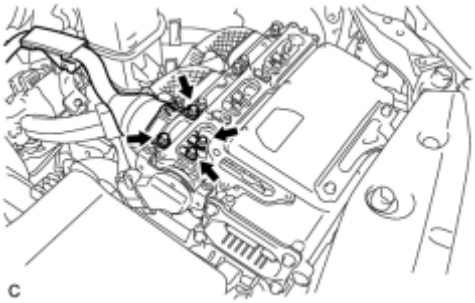
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.




(b) Remove the inverter terminal cover from the inverter with converter assembly.

(c) Check that the bolts for the frame wire are tightened to the specified




torque, the frame wire is connected securely, and there are no contact problems.

Specified Condition:

T=8.0 N*m {82 kgf*cm, 71 in.*lbf}

NOTICE:

Make sure that the tightening torque of the bolts is between 6.4 and 9.6 N*m (65 and 98 kgf*cm, 57 and 85 in.*lbf).

(d) Check for arc marks at the bolts for the frame wire.

Result:

| Result | | Proceed to |
|---|---|---|
| The terminals are connected securely and there are no contact problems. | There are no arc marks. | A |
| The terminals are not connected securely and there is a contact problem. | There are arc marks. | B |
| The terminals are not connected securely and there is a contact problem. | There are no arc marks. | C |
| The terminals are connected securely and there are no contact problems. | There are arc marks. | B |

(e) Install the inverter terminal cover.

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A
▼

| | |
|---|---|
| 13. | CHECK SERVICE PLUG GRIP (CONNECTION CONDITION) |

CAUTION:

Be sure to wear insulated gloves.

(a) Visually check the connection of the service plug grip to the HV battery. Remove the service plug grip and check for contamination.

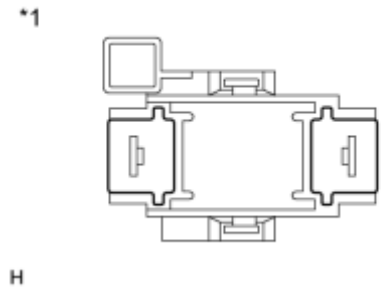
OK:

Dirt or foreign objects have not entered the connection, and there is no evidence of contamination.

NG ▶ REPLACE SERVICE PLUG GRIP
OK
▼

| | |
|---|---|
| 14. | CHECK SERVICE PLUG GRIP |

(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Service plug grip terminals | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Service plug grip |

NG ▶ REPLACE SERVICE PLUG GRIP

OK ▼

| | |
|---|---|
| 15. | CHECK FRAME WIRE |

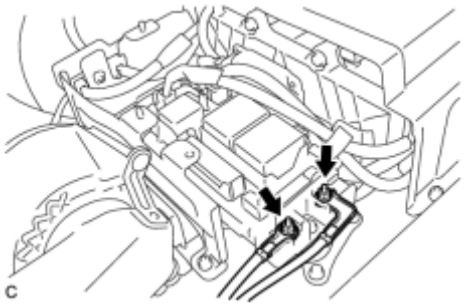
CAUTION:

Be sure to wear insulated gloves.

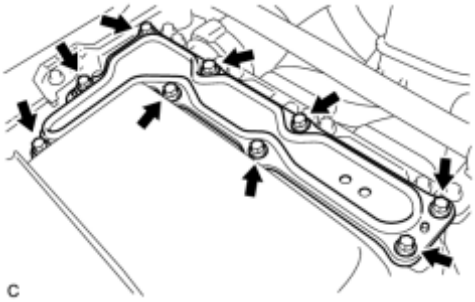
(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

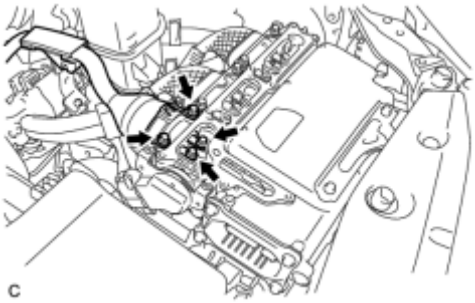



(b) Disconnect the frame wire from the hybrid battery junction block.

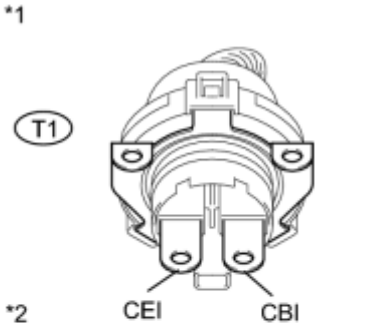



(c) Remove the inverter terminal cover from the inverter with converter assembly.

(d) Disconnect the frame wire from the inverter with converter assembly.

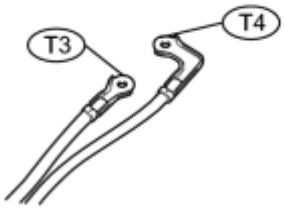



(e) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| T4-1 - T1-2 (CBI) (Positive terminal) | Power switch off | Below 1 Ω |
| T3-1 - T1-1 (CEI) (Negative terminal) | Power switch off | Below 1 Ω |



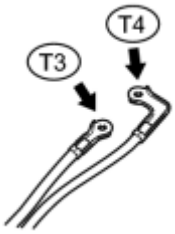

# Text in Illustration

| | |
|---|---|
| *1 | Frame Wire (Inverter with Converter Assembly Side) |
| *2 | Frame Wire (Hybrid Battery Junction Block Side) |

(f) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| T4-1 - Body ground and shielded ground | Power switch off | 10 MΩ or higher |
| T3-1 - Body ground and shielded ground | Power switch off | 10 MΩor higher |
| T3-1 - T4-1 | Power switch off | 10 MΩ or higher |

(g) Connect the frame wire to the hybrid battery junction block.

(h) Connect the frame wire to the inverter with converter assembly.

(i) Install the inverter terminal cover.

NG ▶ REPLACE FRAME WIRE

OK

▼

| | |
|---|---|
| 16. | INSPECT HYBRID BATTERY JUNCTION BLOCK (SMRB) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

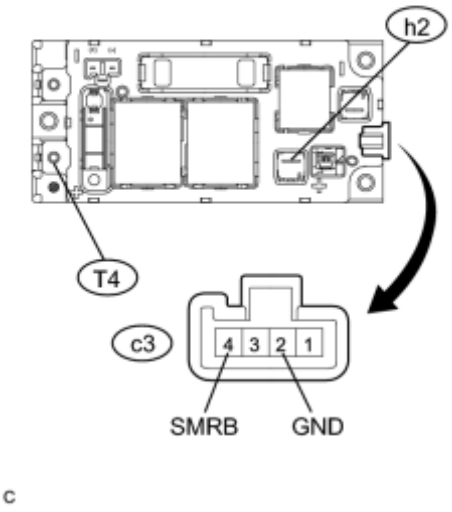
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the hybrid battery junction block.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| h2 - T4 | Auxiliary battery voltage is not applied between terminals c3-4 (SMRB) and c3-2 (GND) | 10 kΩ or higher |
| h2 - T4 | Auxiliary battery voltage is applied between terminals c3-4 (SMRB) and c3-2 (GND) | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Hybrid Battery Junction Block |

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| c3-4 (SMRB) - c3-2 (GND) | -40 to 176°F(-40 to 80°C ) | 19.0 to 35.5 Ω |

(e) Install the hybrid battery junction block.

NG ▶ REPLACE HYBRID BATTERY JUNCTION BLOCK

OK ▼

| | |
|---|---|
| 17. | INSPECT HYBRID BATTERY JUNCTION BLOCK (SMRG) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

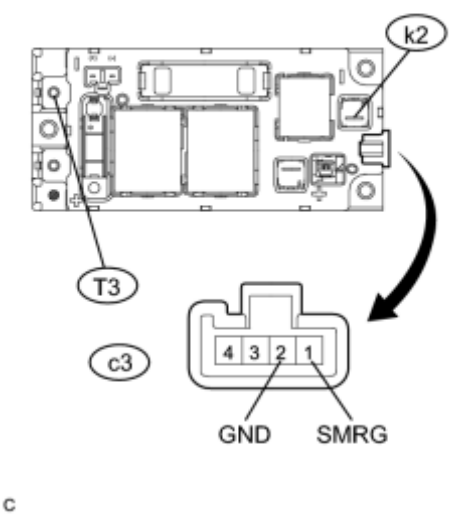
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Remove the hybrid battery junction block.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| k2 - T3 | Auxiliary battery voltage is not applied between terminals c3-1 (SMRG) and c3-2 (GND) | 10 kΩ or higher |
| k2 - T3 | Auxiliary battery voltage is applied between terminals c3-1 (SMRG) and c3-2 (GND) | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Hybrid Battery Junction Block |

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| c3-1 (SMRG) - c3-2 (GND) | -40 to 176°F (-40 to 80°C) | 19.0 to 35.5 Ω |

(e) Install the hybrid battery junction block.

NG ▶ REPLACE HYBRID BATTERY JUNCTION BLOCK

OK ▼

| | |
|---|---|
| 18. | CHECK FUSE (PCU) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 19. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK ▼

| | |
|---|---|
| 20. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 21. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 22. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 23. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 24. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 25. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 26. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 27. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 28. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▼

| | |
|---|---|
| 29. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 30. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 31. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 32. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 33. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 34. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-128 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an abnormal amount of current flows through the motor inverter, the MG ECU detects it and sends a signal to inform the power management control ECU (HV CPU) of the malfunction.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 128 | Abnormal motor current value detection (System malfunction) | • Hybrid vehicle transaxle assembly<br>• Generator cable<br>• Motor cable<br>• Inverter with converter assembly<br>• Power management control ECU<br>• PCU fuse<br>• Wire harness or connector |

# MONITOR DESCRIPTION

The MG ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 128): Motor inverter abnormal current |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

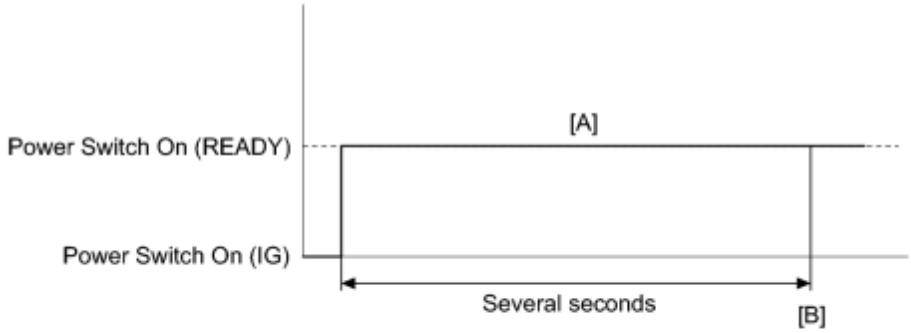
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 128) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-202 is not output | A |
| P0A78-202 is also output | B |

NOTICE:

- If P0A78-202 is output, troubleshoot it first. After completing the troubleshooting for P0A78-202, return to perform troubleshooting for this DTC.
- Parts repaired or replaced during troubleshooting for P0A78-202 do not need to be re-inspected in this diagnosis procedure.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

HINT:

- If P0A78-202 was not output in step 1 of this diagnosis procedure, check Table 1 below.
- If P0A78-202 was output in step 1 of this diagnosis procedure, repair that DTC first, then check Table 2 below.

Result:

| Result | Proceed to |
|---|---|
| P0A78-128 only is output. | A |
| Any of the following DTCs are also output. | B |

**Table 1**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

**Table 2**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60-294 | Drive Motor "A" Phase V Current |
| P0A63-302 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-128 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B▶GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 5. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 7. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK

| | |
|---|---|
| 8. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A

| | |
|---|---|
| 9. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A

| | |
|---|---|
| 10. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK

| | |
|---|---|
| 11. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 12. | CHECK FUSE (PCU) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK ▼

| | |
|---|---|
| 14. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 15. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 16. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 17. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 18. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 19. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 20. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK

| | |
|---|---|
| 21. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 22. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK

| | |
|---|---|
| 23. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 24. | REPAIR OR REPLACE HARNESS OR CONNECTOR |

(a) Repair or replace the wire harness or connector.

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 25. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 26. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 27. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A

| | |
|---|---|
| 28. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-202 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 202 | Malfunction (short circuit) in the motor inverter inside the inverter with converter assembly | • Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Motor cable |

# MONITOR DESCRIPTION

The MG ECU monitors the motor inverter electric current. If the current exceeds the threshold for a specified period of time, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 202): MFIV detection (Short circuit malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

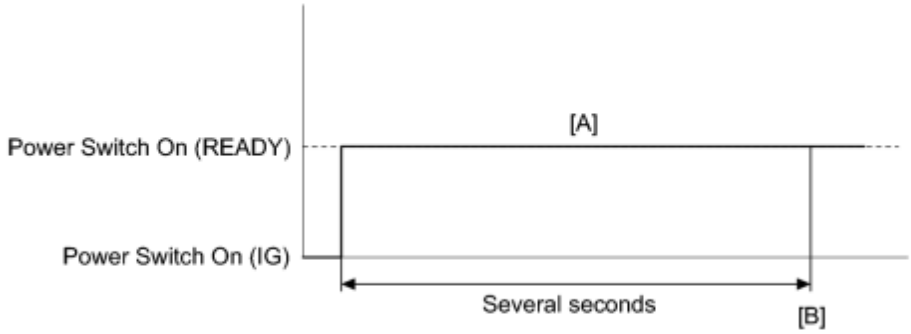
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 202) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

- DTC P0A78-202 is stored after any of DTCs P0A78-113, 128, 284, 286, 287, 505, 506, 806, 807 and 808 are stored. After troubleshooting and repairing DTC P0A78-202, be sure to troubleshoot all the other DTCs.
- Depending on the conditions in which the vehicle is being operated when a short circuit occurs in the inverter with converter assembly, the hybrid vehicle transaxle assembly may be affected. As this DTC is stored if a short circuit occurs in the inverter with converter assembly, it is necessary to perform a road test to check the hybrid vehicle transaxle assembly. If problems are found, replace the malfunctioning parts.
- After completing the repair, including the repair of previously output DTCs, drive the vehicle at a speed of approximately 25 mph (40 km/h) for 1 minute and check that DTC P0A90-251 (Drive Motor "A" Performance) is not output. If DTC P0A90-251 (Drive Motor "A" Performance) is output, replace the hybrid vehicle transaxle assembly.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY INFO |

NG ▶ CHECK MOTOR CABLE

OK ▼

| | |
|---|---|
| 2. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ CHECK DTC OUTPUT (HV)

| | |
|---|---|
| 3. | CHECK MOTOR CABLE INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2)

OK ▼

| | |
|---|---|
| 4. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

NEXT ▼

| | |
|---|---|
| 5. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ CHECK DTC OUTPUT (HV)

| | |
|---|---|
| 6. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) |

CAUTION:

Be sure to wear insulated gloves.

(a) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(b) Disconnect the motor cable from the hybrid vehicle transaxle assembly.

(c) Check MG2 for an interphase short using a milliohmmeter.

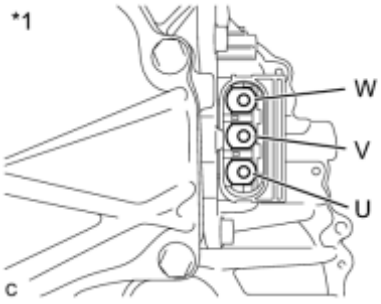
(1) Using a milliohmmeter, measure the resistance according to the value(s) in the table below.

HINT:

If the MG2 temperature is high, the resistance will vary greatly from the specification. Therefore, measure the resistance at least 8 hours after the vehicle is stopped.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e2-3 (U) - e2-2 (V) | Power switch off | 154 to 170 mΩ |
| e2-2 (V) - e2-1 (W) | Power switch off | 148 to 164 mΩ |
| e2-1 (W) - e2-3 (U) | Power switch off | 149 to 165 mΩ |




# Text in Illustration

| | |
|---|---|
| *1 | Hybrid Vehicle Transaxle Assembly |

HINT:

To correct the variation of the measured resistance due to temperature, use the following formula to calculate the resistance at 68° F (20°C).

R20 = Rt / {1 + 0.00393 X (T - 20)}

The calculation is based on the following:

R20: Resistance at 68° F (20°C) (mΩ)

Rt: Measured resistance (mΩ)

T: Temperature when the resistance is measured (° C)

(d) Using a megohmmeter set to 500 V, measure the resistance according to the value(s) in the table below.

NOTICE:

Be sure to set the megohmmeter to 500 V when performing this test. Using a setting higher than 500 V can result in damage to the component being inspected.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| e2-3 (U) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e2-2 (V) - Body ground and shield ground | Power switch off | 100 MΩ or higher |
| e2-1 (W) - Body ground and shield ground | Power switch off | 100 MΩ or higher |

(e) Connect the motor cable.

NG ▶ REPLACE MOTOR CABLE

OK

▼

| | |
|---|---|
| 7. | REPLACE MOTOR CABLE |

(a) Replace the motor cable INFO.

NEXT

▼

| | |
|---|---|
| 8. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT ▶ CHECK DTC OUTPUT (HV)

| | |
|---|---|
| 9. | REPLACE MOTOR CABLE |

(a) Replace the motor cable INFO.

NEXT

▼

| | |
|---|---|
| 10. | REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY |

(a) Replace the hybrid vehicle transaxle assembly INFO.

NEXT

▼

| | |
|---|---|
| 11. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

NEXT

| | |
|---|---|
| 12. | CHECK DTC OUTPUT (HV) |

(a) Check the other DTCs that were output together with DTC P0A78-202.

Result:

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A78-113, 128, 284, 286, 287, 505, 506, 806, 807, 808 | Drive Motor "A" Inverter Performance |

NOTICE:

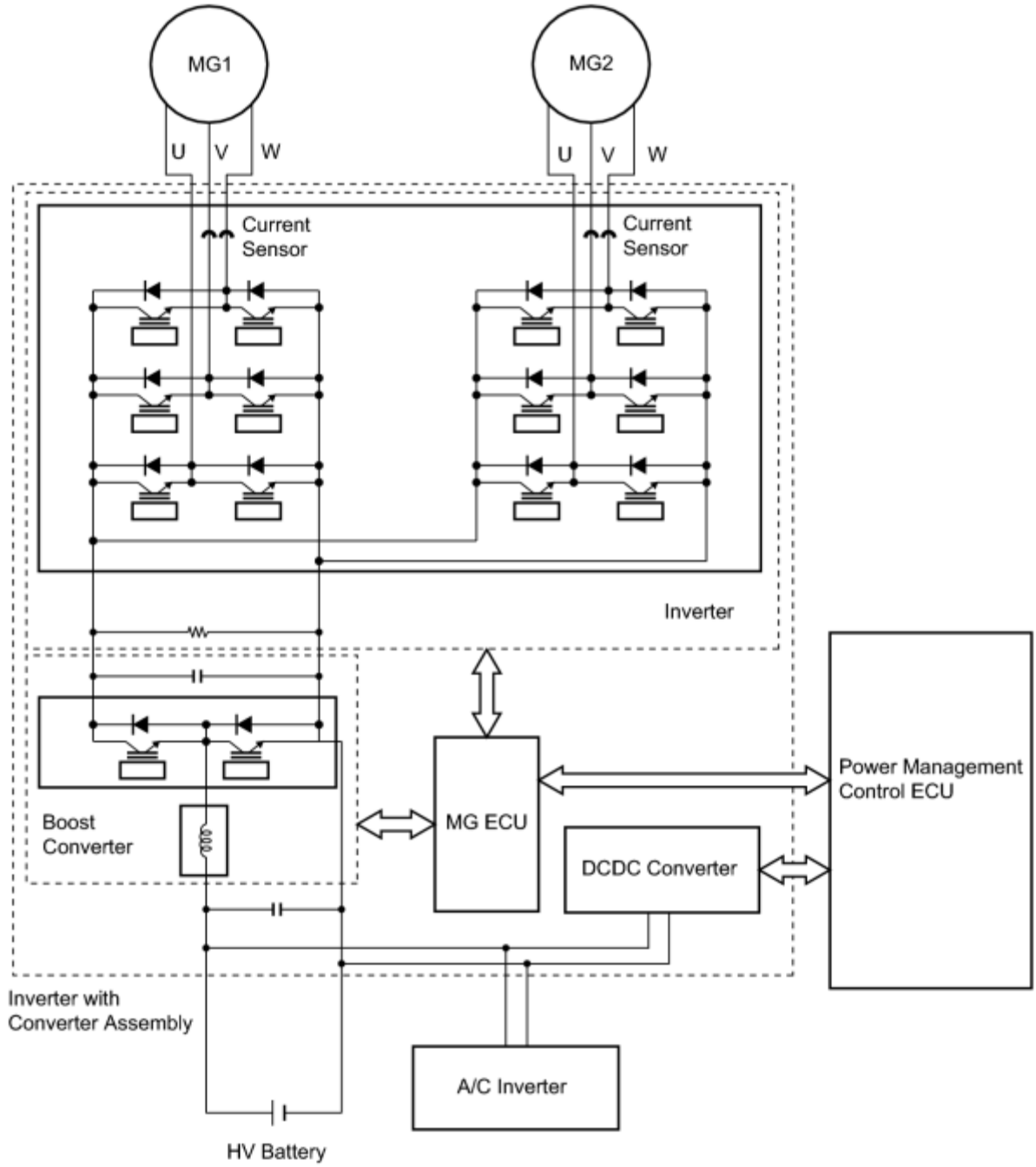
DTC P0A78-202 is stored after any of DTCs P0A78-113, 128, 284, 286, 287, 505, 506, 806, 807 and 808 are stored. After troubleshooting and repairing DTC P0A78-202, be sure to troubleshoot all the other DTCs.

NEXT **GO TO DTC CHART**

| | | |
|---|---|---|
| DTC | P0A78-266 | Drive Motor "A" Inverter Performance |
| DTC | P0A78-267 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

The inverter contains a three-phase bridge circuit, which consists of six power transistors (IGBTs) each for MG1 and MG2. The inverter converts high-voltage direct current from the HV battery into three-phase alternating current for MG1 and MG2; it also converts three-phase alternating current supplied by MG1 and MG2 into direct current for the HV battery. The MG ECU controls the actuation of the power transistors (IGBTs). The inverter transmits information necessary for control, such as amperage and voltage, to the MG ECU.




c

The MG ECU uses an inverter voltage sensor, which is built into the inverter, to detect boosted high voltage to allow control of the voltage boost.

The MG ECU monitors the inverter voltage sensor and detects the following malfunctions.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 266 | Short to GND in the inverter voltage (VH) signal line | Inverter with converter assembly |
| P0A78 | 267 | Open or short to +B in the inverter voltage (VH) signal line | |

# MONITOR DESCRIPTION

The MG ECU monitors the inverter voltage (VH) sensor circuit. If the MG ECU detects an open or short in the VH sensor circuit, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 266): VH malfunction (GND short malfunction)<br><br>P0A78 (INF 267): VH malfunction (+B short and disconnection malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

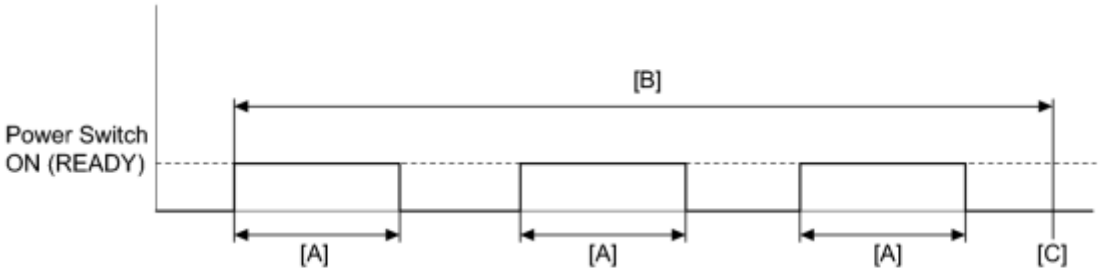
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 266/267) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE INVERTER WITH CONVERTER ASSEMBLY |

(a) Replace the inverter with converter assembly INFO.

HINT:

The signal line from the inverter voltage (VH) sensor is connected to the MG ECU inside the inverter with converter assembly. If P0A78-266 or P0A78-267 is output, replace the inverter with converter assembly.

NEXT **COMPLETED**

| | | |
|---|---|---|
| DTC | P0A78-279 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an overvoltage occurs in the motor inverter or generator inverter, the MG ECU detects it and transmits this information to the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 279 | Motor inverter overvoltage signal detection (overvoltage (inverter malfunction)) | Inverter with converter assembly |

# MONITOR DESCRIPTION

If the motor inverter detects overvoltage, it will transmit an overvoltage signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 279): OVH detection (Over voltage malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

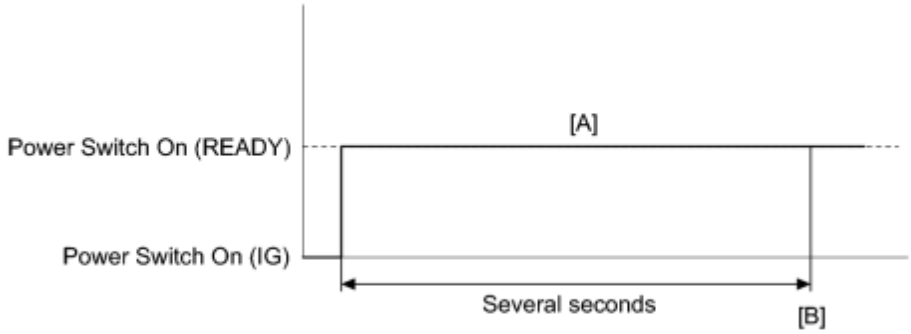
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 279) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-279 only is output. | A |
| Any of the following DTCs are also output. | B |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A78-266, 267, 287, 505, 506, 565, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A94-554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0ADB-227 | Hybrid Battery Positive Contactor Control Circuit Low |
| P0ADC-226 | Hybrid Battery Positive Contactor Control Circuit High |
| P0ADF-229 | Hybrid Battery Negative Contactor Control Circuit Low |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0AE0-228 | Hybrid Battery Negative Contactor Control Circuit High |
| P3004-803 | High Voltage Power Resource |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-279 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. Then, perform a test to attempt to reproduce the problems, and check that no DTCs are output.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-282 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If an overvoltage occurs in the motor inverter or generator inverter, the MG ECU detects it and transmits this information to the power management control ECU (HV CPU).

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 282 | Motor inverter overvoltage signal detection (circuit malfunction) | Inverter with converter assembly |

# MONITOR DESCRIPTION

If the motor inverter detects a circuit malfunction, it will transmit a motor inverter overvoltage signal to the MG ECU. Upon receiving this signal, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 282): OVH detection (Circuit malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

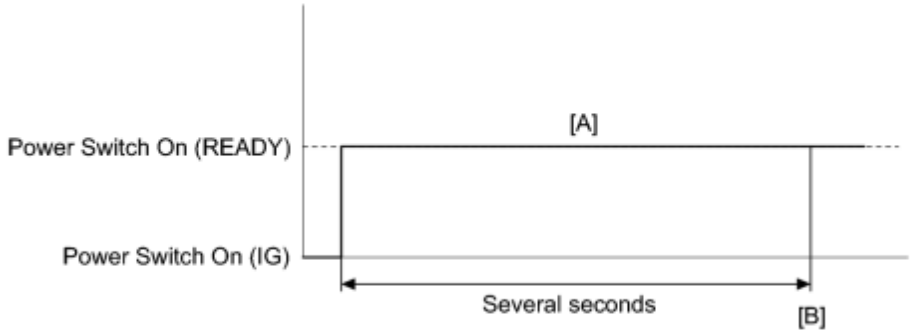
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 282) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY
OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A78-284 | Drive Motor "A" Inverter Performance |

# DESCRIPTION

For a description of the inverter, INFO.

If the motor inverter overheats, has a circuit malfunction, or has an internal short, the inverter transmits this information to the MG ECU via the motor inverter fail signal line.

| DTC No. | INF Code | DTC Detection Condition | Trouble Area |
|---|---|---|---|
| P0A78 | 284 | Motor inverter fail signal detection (overheat) | • Inverter cooling system<br>• Cooling fan system<br>• Power management control ECU<br>• Inverter with converter assembly<br>• Hybrid vehicle transaxle assembly<br>• Generator cable<br>• Motor cable<br>• Water pump with motor assembly<br>• Wire harness or connector<br>• IGCT No. 3 fuse<br>• PCU fuse |

# MONITOR DESCRIPTION

If the motor inverter overheats, it will transmit an inverter fail signal to the MG ECU. The MG ECU will send information about the malfunction to the power management control ECU (HV CPU). Upon receiving this information, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A78 (INF 284): MFIV detection (Over heat malfunction) |
| Required sensors / components | Motor inverter |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | 1 driving cycle |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

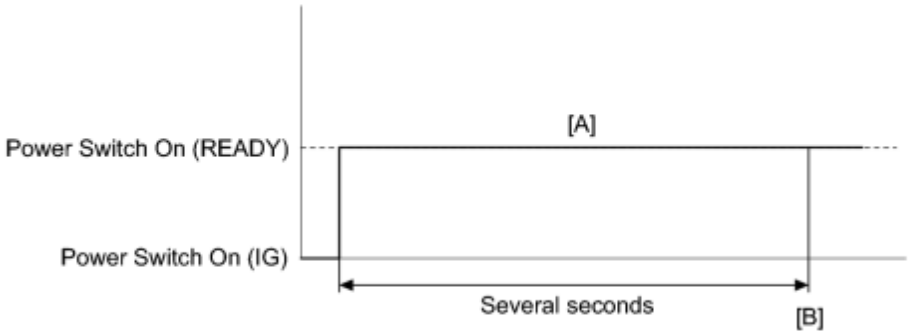
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Power management control ECU (HV CPU) | DTC P0A78 (INF 284) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG) and check that there are no abnormalities (abnormal sounds, coolant leaks, DTC output, etc).
6. Turn the power switch on (READY) and turn the Techstream on. [A]
7. With park (P) selected, wait for several seconds.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [B]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform a universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A01-726 INFO.

Refer to the wiring diagram for DTC P0A1A-200 INFO.

Refer to the wiring diagram for DTC P324E-788 INFO.

Refer to the wiring diagram for DTC U0110-159 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals. After waiting for 10 minutes, check the voltage at the terminals in the inspection point in the inverter with converter assembly. The voltage should be 0 V before beginning work.

NOTICE:

After troubleshooting and repairing all output DTCs, be sure to replace the inverter with converter assembly.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

Result:

| Result | Proceed to |
|---|---|
| P0A78-202 is not output | A |
| P0A78-202 is also output | B |

NOTICE:

- If P0A78-202 is output, troubleshoot it first. After completing the troubleshooting for P0A78-202, return to perform troubleshooting for this DTC.
- Parts repaired or replaced during troubleshooting for P0A78-202 do not need to be re-inspected in this diagnosis procedure.

(e) Turn the power switch off.

B GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Check if DTCs are output.

HINT:

- If P0A78-202 was not output in step 1 of this diagnosis procedure, check Table 1 below.
- If P0A78-202 was output in step 1 of this diagnosis procedure, repair that DTC first, then check Table 2 below.

Result:

| Result | Proceed to |
|---|---|
| P0A78-284 only is output. | A |
| Any of the following DTCs are also output. | B |

**Table 1**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60 (all INF codes)*1 | Drive Motor "A" Phase V Current |
| P0A63 (all INF codes)*1 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 306, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A90-509 | Drive Motor "A" Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

**Table 2**

| DTC No. | Relevant Diagnosis |
|---|---|
| P0A1A (all INF codes)*1 | Generator Control Module |
| P0A1B (all INF codes)*1 | Drive Motor "A" Control Module |
| P0A1D (all INF codes)*1 | Hybrid Powertrain Control Module |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range/Performance |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low |
| P0A4B-253 | Generator Position Sensor Circuit |
| P0A4C-513 | Generator Position Sensor Circuit Range/Performance |
| P0A4D-255 | Generator Position Sensor Circuit Low |
| P0A60-294 | Drive Motor "A" Phase V Current |
| P0A63-302 | Drive Motor "A" Phase W Current |
| P0A72 (all INF codes)*1 | Generator Phase V Current |
| P0A75 (all INF codes)*1 | Generator Phase W Current |
| P0A78-266, 267, 279, 287, 503, 504, 505, 506, 586, 806, 807, 808 | Drive Motor "A" Inverter Performance |
| P0A7A-325, 344, 517, 518, 809, 810, 811 | Generator Inverter Performance |
| P0A92-521 | Hybrid Generator Performance |
| P0A94-442, 547, 548, 549, 554, 555, 556, 585, 587, 589, 590 | DC/DC Converter Performance |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long |

HINT:

- *1: If any INF codes are output for this DTC, refer to the corresponding diagnostic procedure.
- P0A78-284 may be set due to a malfunction which also causes DTCs in the preceding table to be set. In this case, first troubleshoot the output DTCs in the preceding table. After troubleshooting and repairing all output DTCs, be sure to replace the inverter with converter assembly.

(e) Turn the power switch off.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION (INVERTER WITH CONVERTER ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 4. | CHECK QUANTITY OF HV COOLANT INFO |

C ▶ INSPECT FOR COOLANT LEAK AND ADD COOLANT

B ▶ ADD HV COOLANT

A ▼

| | |
|---|---|
| 5. | CHECK COOLANT HOSE INFO |

NG ▶ CORRECT THE PROBLEM

OK ▼

| | |
|---|---|
| 6. | PERFORM ACTIVE TEST USING TECHSTREAM (ACTIVATE THE WATER PUMP) INFO |

NG ▶ CHECK FUSE (IGCT NO. 3)

OK ▼

| | |
|---|---|
| 7. | PERFORM ACTIVE TEST USING TECHSTREAM (CONTROL THE ELECTRIC COOLING FAN) INFO |

NG ▶ CHECK COOLING FAN SYSTEM

OK ▼

| | |
|---|---|
| 8. | CHECK HV COOLANT (CHECK FOR CONDITIONS THAT MAY HAVE CAUSED FREEZING) INFO |

B ▶ REPLACE HV COOLANT

A ▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 10. | CHECK GENERATOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 12. | CHECK MOTOR RESOLVER INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR)

OK ▼

| | |
|---|---|
| 13. | CHECK INVERTER WITH CONVERTER ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A ▼

| | |
|---|---|
| 14. | CHECK INVERTER WITH CONVERTER ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY

B ▶ REPLACE MALFUNCTIONING PARTS

A ▼

| | |
|---|---|
| 15. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG1) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 16. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MG2) INFO |

NG ▶ CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION)

OK ▼

| | |
|---|---|
| 17. | CHECK FUSE (PCU) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE)

OK ▼

| | |
|---|---|
| 18. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY POWER SOURCE CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE POWER SOURCE CIRCUIT

OK ▼

| | |
|---|---|
| 19. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INVERTER WITH CONVERTER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 20. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 21. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 22. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▶ **REPLACE INVERTER WITH CONVERTER ASSEMBLY**

| | |
|---|---|
| 23. | CHECK FUSE (IGCT NO. 3) INFO |

NG ▶ CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR)

OK ▼

| | |
|---|---|
| 24. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 25. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 26. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 27. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 28. | CHECK CONNECTOR CONNECTION CONDITION (GENERATOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 29. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - GENERATOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 30. | CHECK CONNECTOR CONNECTION CONDITION (MOTOR RESOLVER CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 31. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - MOTOR RESOLVER) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 32. | CHECK HARNESS AND CONNECTOR (INVERTER WITH CONVERTER ASSEMBLY - PCU FUSE) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 33. | REPLACE INVERTER WITH CONVERTER ASSEMBLY INFO |

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 34. | CHECK CONNECTOR CONNECTION CONDITION (WATER PUMP WITH MOTOR ASSEMBLY CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 35. | CHECK CONNECTOR CONNECTION CONDITION (POWER MANAGEMENT CONTROL ECU CONNECTOR) INFO |

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 36. | CHECK HARNESS AND CONNECTOR (WATER PUMP WITH MOTOR ASSEMBLY CIRCUIT) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 37. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY

OK

| | |
|---|---|
| 38. | REPLACE POWER MANAGEMENT CONTROL ECU INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 39. | CONNECT SECURELY INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 40. | CONNECT SECURELY INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 41. | REPAIR OR REPLACE HARNESS OR CONNECTOR INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 42. | REPLACE WATER PUMP WITH MOTOR ASSEMBLY INFO |

NEXT ▶ **REPLACE FUSE (IGCT NO. 3)**

| | |
|---|---|
| 43. | REPAIR OR REPLACE HARNESS OR CONNECTOR INFO |

NEXT ▶ **REPLACE FUSE (PCU)**

| | |
|---|---|
| 44. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (GENERATOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 45. | CHECK GENERATOR CABLE INFO |

NG ▶ REPLACE GENERATOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 46. | CHECK HYBRID VEHICLE TRANSAXLE ASSEMBLY (MOTOR CABLE CONNECTION CONDITION) INFO |

C ▶ CONNECT SECURELY
B ▶ REPLACE MALFUNCTIONING PARTS
A ▼

| | |
|---|---|
| 47. | CHECK MOTOR CABLE INFO |

NG ▶ REPLACE MOTOR CABLE
OK ▶ **REPLACE HYBRID VEHICLE TRANSAXLE ASSEMBLY**

| | |
|---|---|
| 48. | REPLACE HV COOLANT INFO |

NEXT ▼

| | |
|---|---|
| 49. | CHECK WATER PUMP WITH MOTOR ASSEMBLY INFO |

NG ▶ REPLACE WATER PUMP WITH MOTOR ASSEMBLY
OK ▶ **COMPLETED**

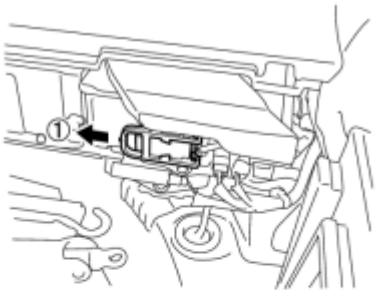
# PRECAUTION

1. PRECAUTIONS FOR INSPECTING HYBRID CONTROL SYSTEM

(a) Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

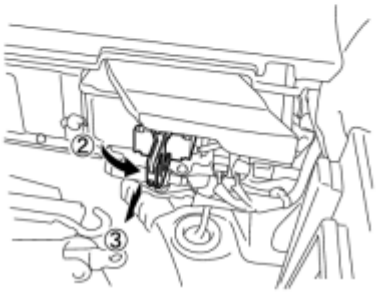
NOTICE:

After removing the service plug grip, turning the power switch on (READY) may cause a malfunction. Do not turn the power switch on (READY) unless instructed by the repair manual.




(b) After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

HINT:



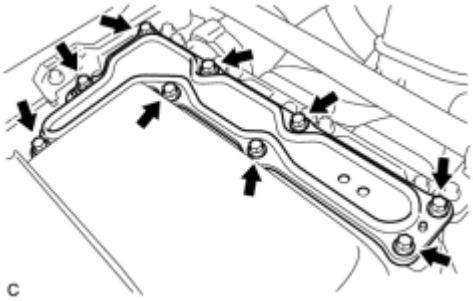

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

C

(c) Check the voltage at the terminals in the inspection point in the inverter with converter assembly.

CAUTION:

Be sure to wear insulated gloves.

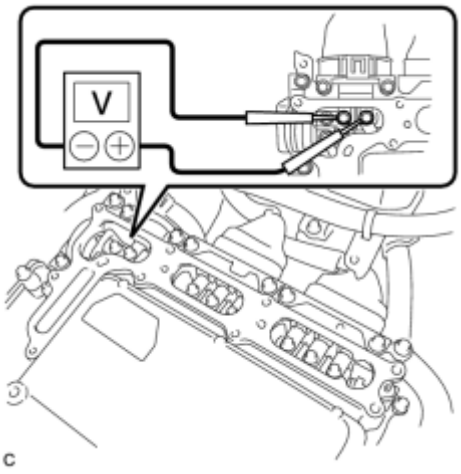


(1) Remove the 9 bolts and inverter terminal cover. INFO

NOTICE:

Cover the opening with non-residue tape to prevent entry of foreign matter or liquid after removing the connector cover.

C




(2) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Inspection point | 10 minutes passed after removing the service plug | 0 V |

HINT:

Set the tester to DC750 V or more to measure the voltage.

(d) When turning the power switch on (IG) during inspections, do not press the power switch with the brake pedal depressed.

CAUTION:

Pressing the power switch with the brake pedal depressed causes the system to enter the READY-on state. This is very dangerous because high voltage may be applied to the inspection area.

(e) Turn the power switch off, wear insulated gloves, and disconnect the cable from the negative (-) terminal of the auxiliary battery before touching any of the orange-colored wires of the high-voltage system.

(f) Turn the power switch off before performing any resistance checks.

(g) Turn the power switch off before disconnecting or reconnecting any connectors.

(h) When high-voltage connectors are removed, wrap the connectors with insulation tape to prevent them from contacting foreign objects.

2. NOTICE FOR HYBRID CONTROL SYSTEM ACTIVATION

(a) When the warning light is illuminated, or the auxiliary battery has been disconnected and reconnected, attempting to turn the power switch on (READY) may not start the system (the system may not enter the READY-on state) on the first attempt. If so, turn the power switch off and reattempt to start the hybrid system.

3. PRECAUTIONS FOR DISCONNECTING AMD TERMINAL

HINT:

The AMD terminal is connected to the positive terminal of the auxiliary battery. To prevent damage when the AMD terminal is being disconnected, use the following procedure.

(a) Be sure to disconnect the cable from the negative (-) terminal of the auxiliary battery before disconnecting the AMD terminal from the engine room junction block assembly.

(b) After disconnecting the AMD terminal, wrap the terminal with insulation tape.

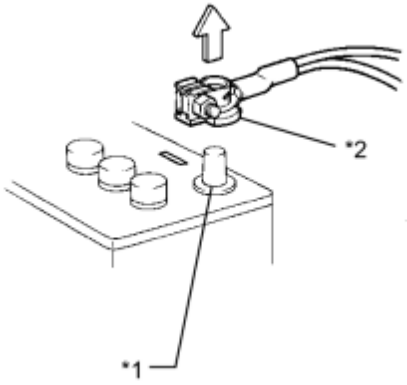
(c) Be sure to reconnect the AMD terminal to the engine room junction block assembly before reconnecting the cable of the negative (-) terminal of the auxiliary battery.

NOTICE:

A short circuit to ground may occur if the AMD terminal is disconnected before the cable is disconnected from the negative (-) terminal of the auxiliary battery. If a short circuit to ground occurs, it can result in an open circuit in a fusible link or fuse.

4. DISCONNECTING AND RECONNECTING NEGATIVE BATTERY CABLE

(a) Before performing work on electronic components, disconnect the cable from the negative (-) battery terminal to prevent damage to the electrical system or electrical components.




## Text in Illustration

| | |
|---|---|
| *1 | Negative (-) Battery Terminal |
| *2 | Cable |

(b) Before disconnecting and reconnecting the battery cable, turn the power switch off and the headlight switch off. Then loosen the terminal nut completely. Do not damage the cable or terminal.

(c) When the battery cable is disconnected, the clock and radio settings and stored DTCs are cleared. Therefore, before disconnecting the battery cable, make a note of them.

- When the cable is disconnected from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.

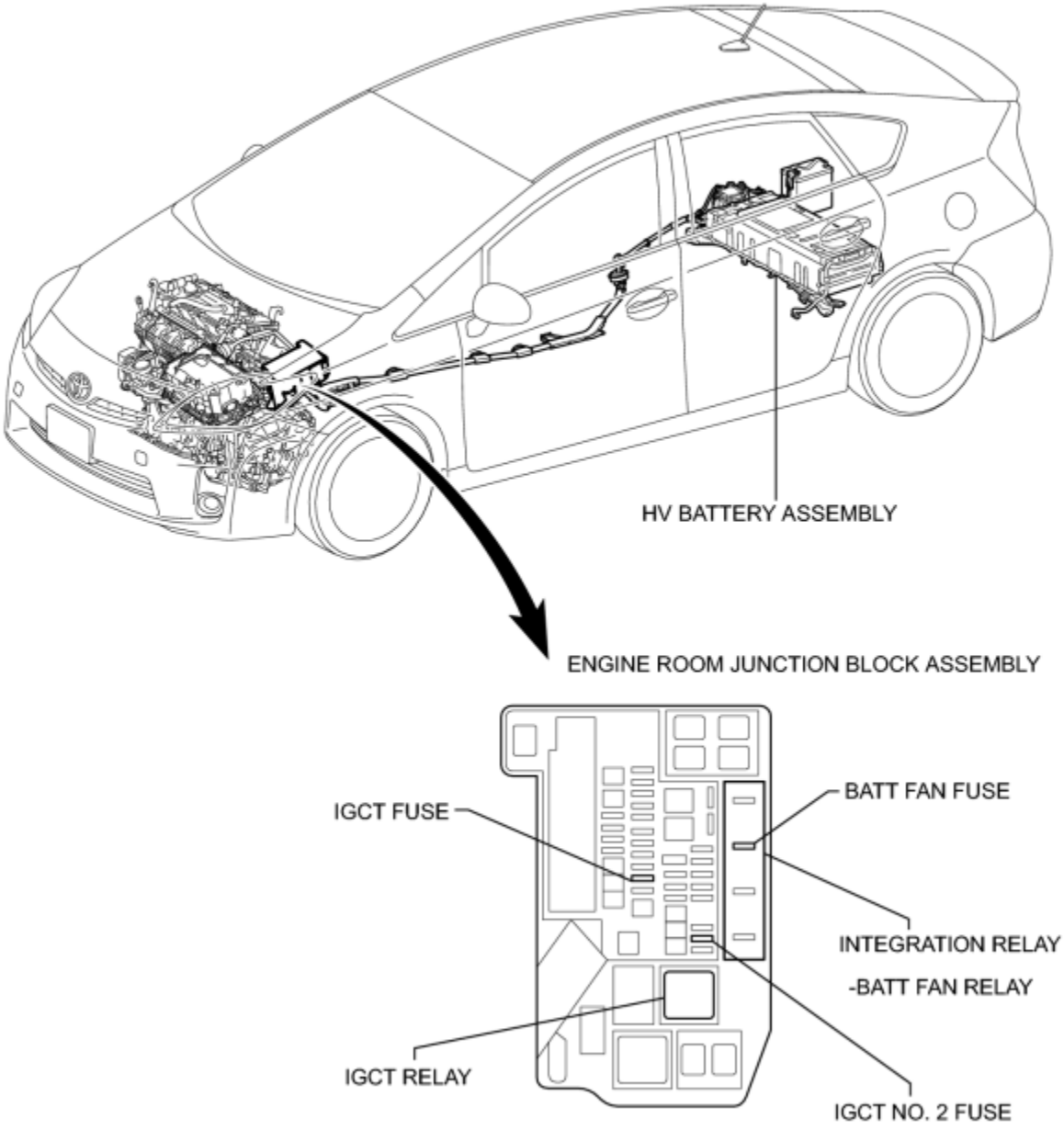
| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

# DEFINITION OF TERMS

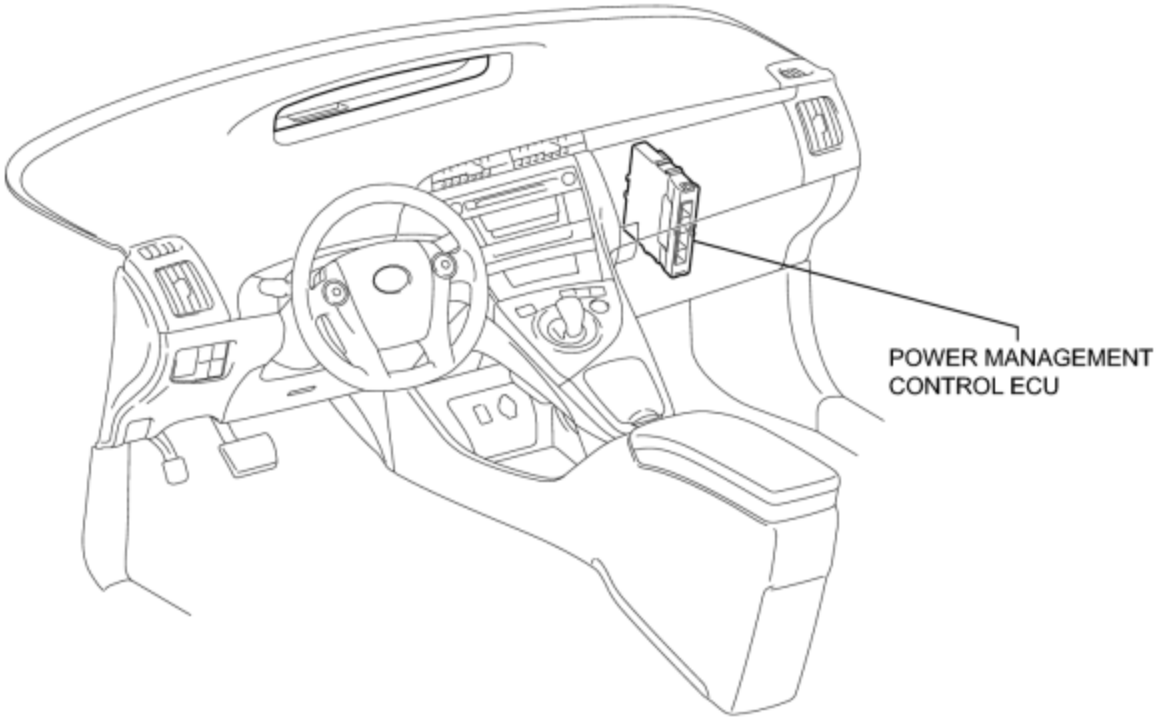
| Terms | Definition |
|---|---|
| Monitor Description | Description of what the power management control ECU (HV CPU) monitors and how to detects malfunctions (monitoring purpose and its details). |
| Related DTCs | A group of diagnostic trouble codes that are output by the power management control ECU (HV CPU) based on the same malfunction detection logic. |
| Typical Enabling Condition | Preconditions that allow the power management control ECU (HV CPU) to detect malfunctions.<br><br>With all preconditions satisfied, the power management control ECU (HV CPU) sets DTCs when the monitored value(s) exceeds malfunction threshold(s). |
| Sequence of Operation | Order of monitor priority, applied if multiple sensors and components are involved in a single malfunction detection process.<br><br>Each sensor and component are monitored in turn and subsequent items are not monitored until the previous detection operation completes. |
| Required Sensor/Components | Sensors and components used by the power management control ECU (HV CPU) to detect each malfunction. |
| Frequency of Operation | Number of times the power management control ECU (HV CPU) checks for each malfunction during each driving cycle.<br><br>"Once per driving cycle" means that the power management control ECU (HV CPU) only checks for malfunctions once during a single driving cycle.<br><br>"Continuous" means that the power management control ECU (HV CPU) checks for malfunctions whenever enabling conditions are met. |
| Duration | Minimum time for which the power management control ECU (HV CPU) must detect continuous deviation in monitored value(s) in order to set a DTC. Timing begins when typical enabling conditions are met. |
| Malfunction Thresholds | Value beyond which the power management control ECU (HV CPU) determines malfunctions exist and sets DTCs. |
| MIL Operation | Timing of MIL illumination after a malfunction is detected.<br><br>"Immediate" means that the power management control ECU (HV CPU) illuminates the MIL as soon as a malfunction is detected.<br><br>"2 driving cycles" means that the power management control ECU (HV CPU) illuminates the MIL if the same malfunction is detected again during the next driving cycle. |

# PARTS LOCATION

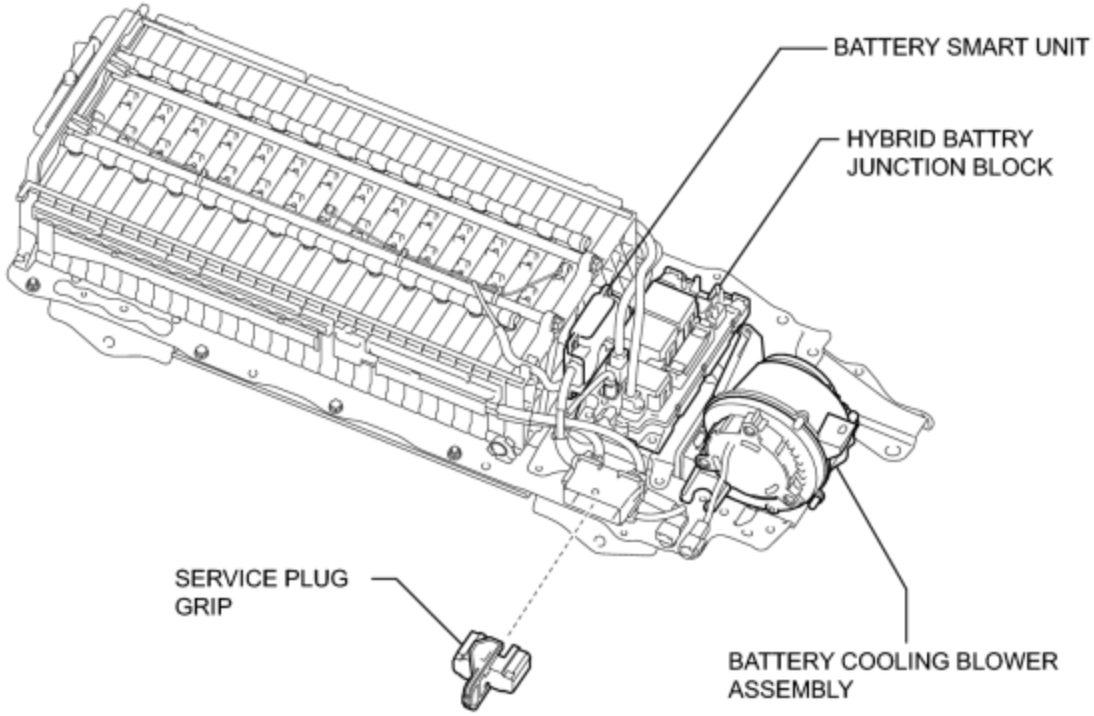
# ILLUSTRATION



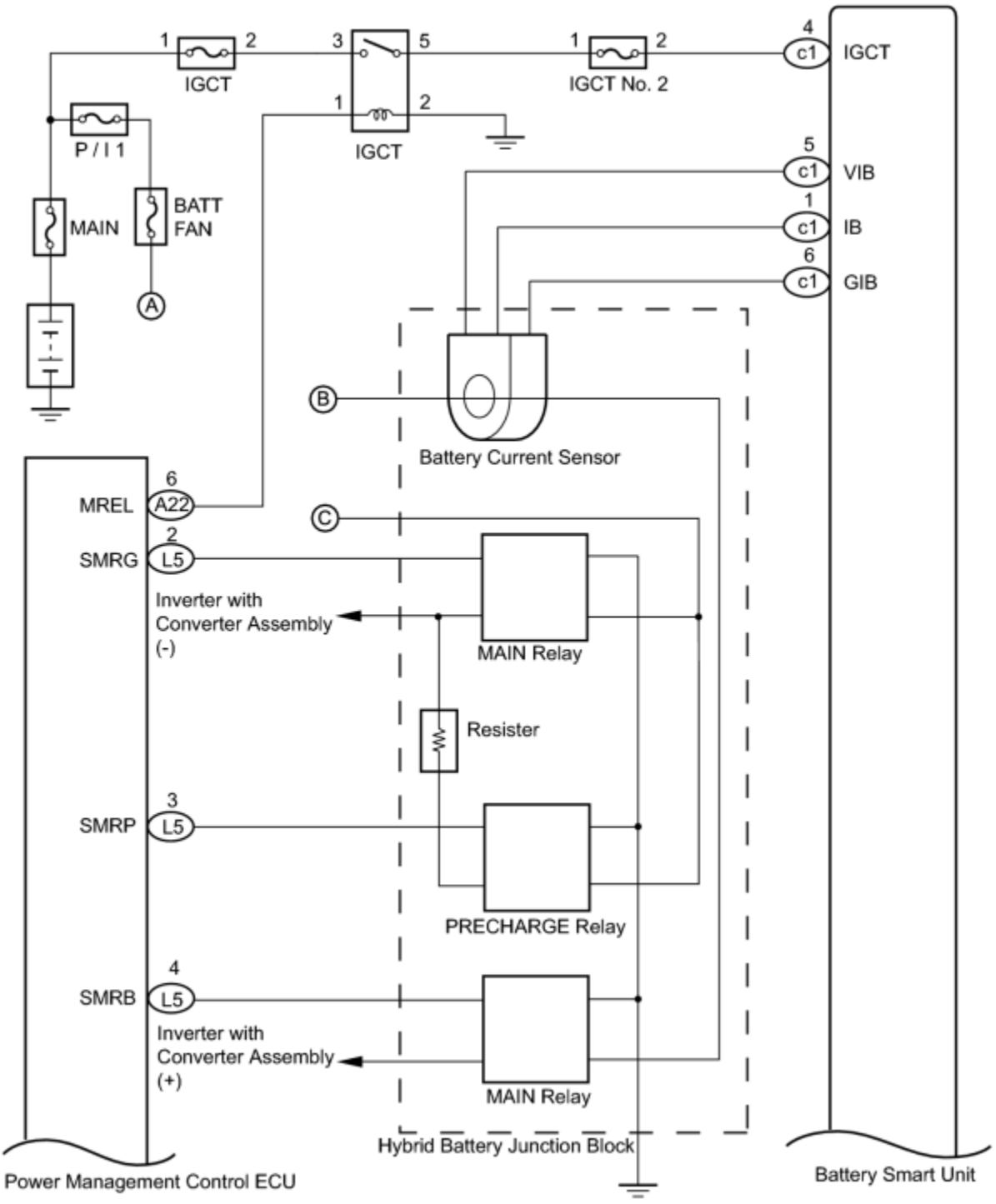

# ILLUSTRATION

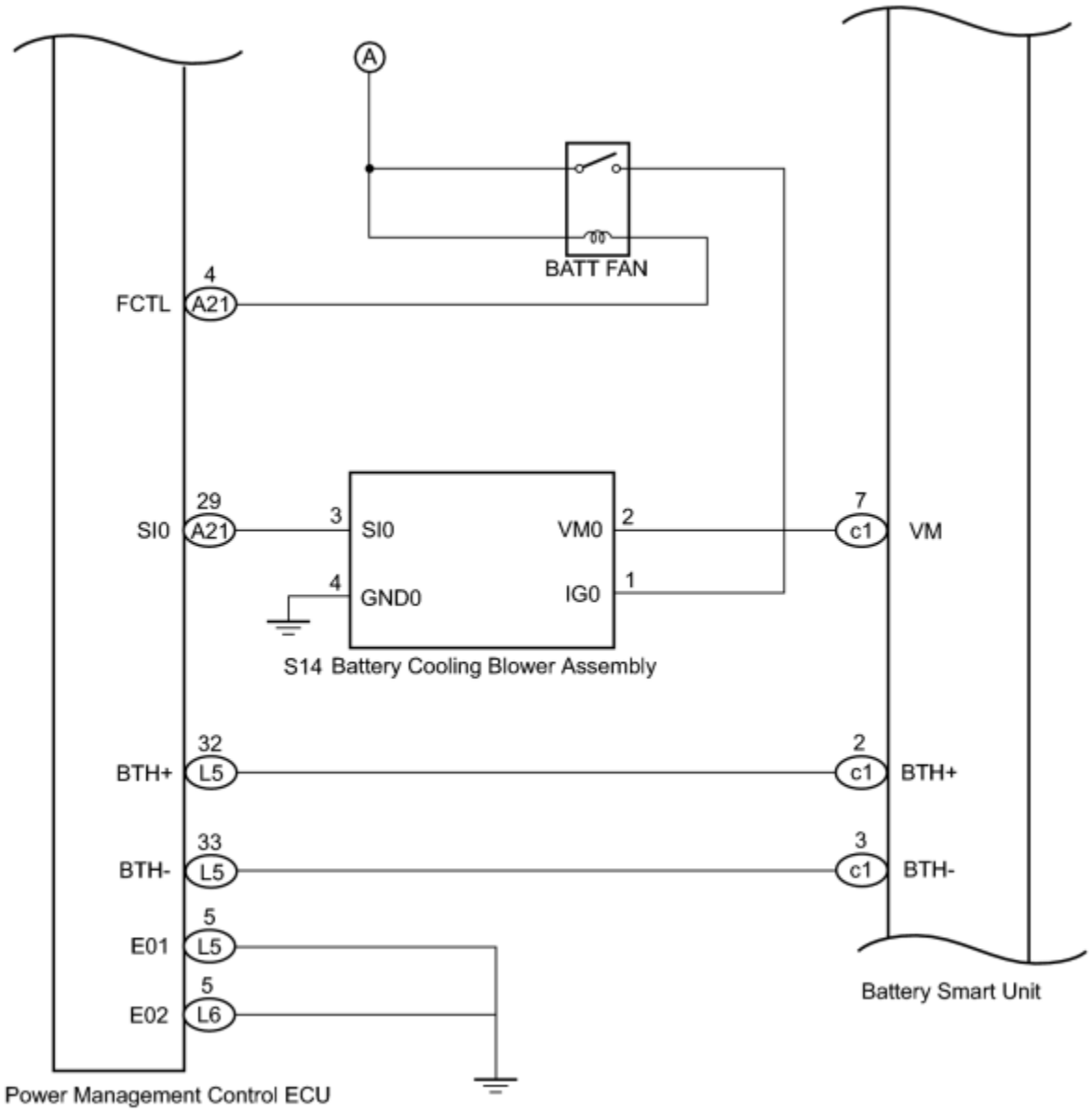


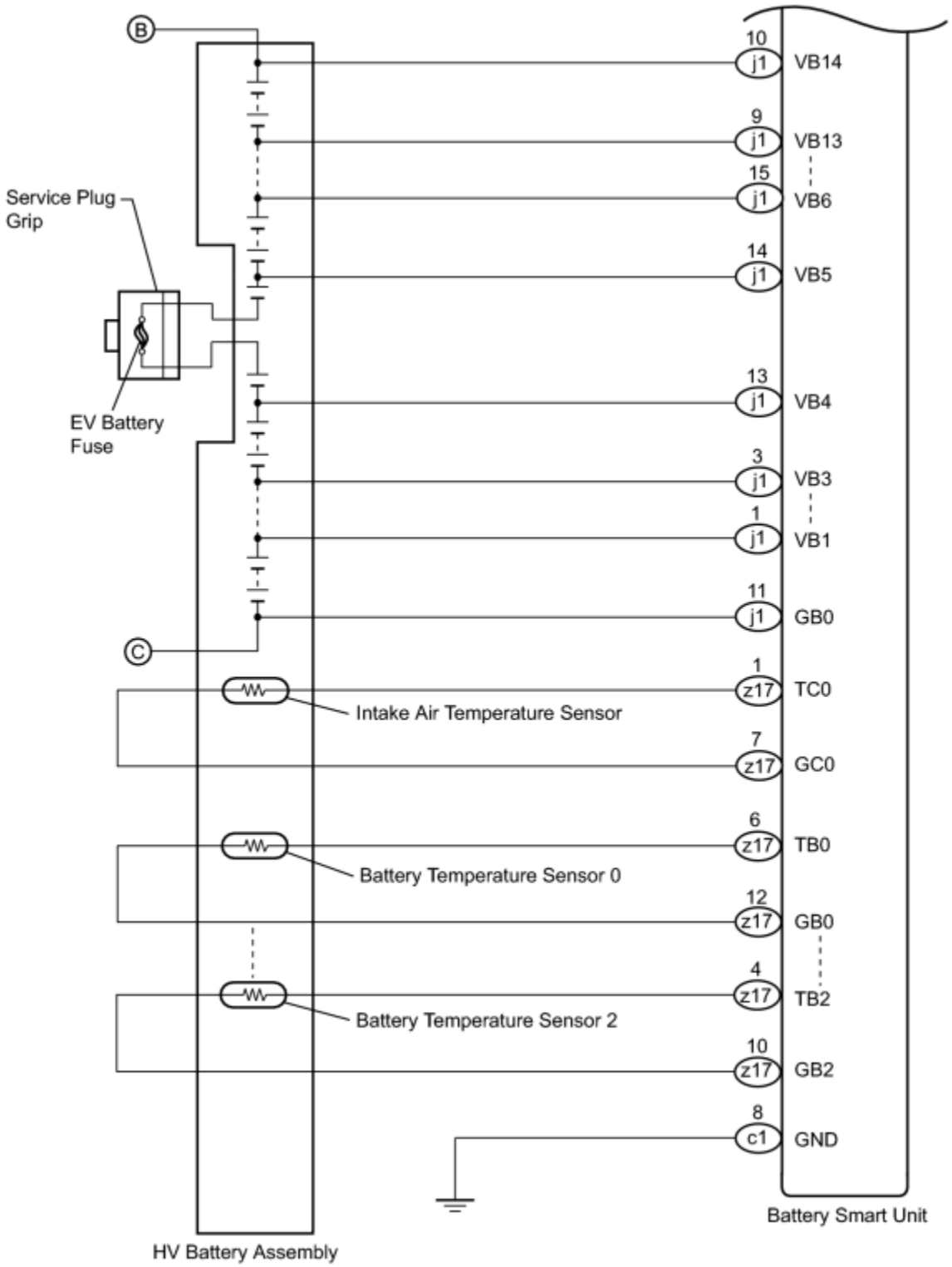

# ILLUSTRATION



# SYSTEM DIAGRAM



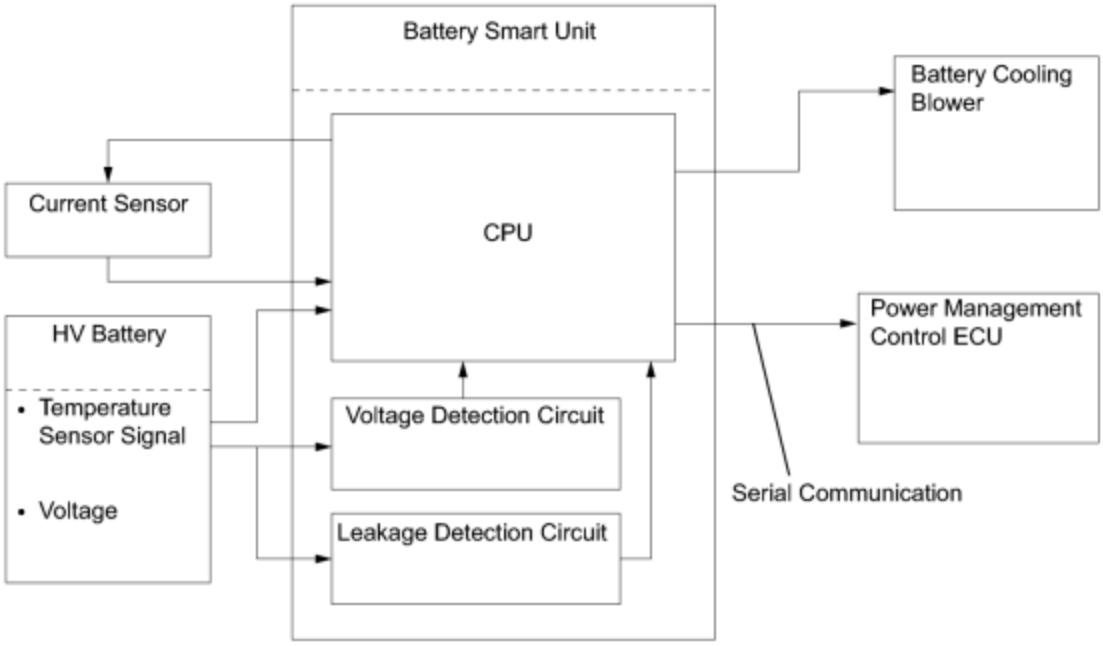

A
BATT FAN
4
FCTL
A21
29
SI0
A21
3
SI0
VM0
2
4
GND0
IG0
1
S14 Battery Cooling Blower Assembly
7
c1
VM
32
BTH+
L5
2
c1
BTH+
33
BTH-
L5
3
c1
BTH-
5
E01
L5
5
E02
L6
Power Management Control ECU
Battery Smart Unit


B
C
Service Plug Grip
EV Battery Fuse
HV Battery Assembly
Intake Air Temperature Sensor
Battery Temperature Sensor 0
Battery Temperature Sensor 2
10 j1 VB14
9 j1 VB13
15 j1 VB6
14 j1 VB5
13 j1 VB4
3 j1 VB3
1 j1 VB1
11 j1 GB0
1 z17 TC0
7 z17 GC0
6 z17 TB0
12 z17 GB0
4 z17 TB2
10 z17 GB2
8 c1 GND
Battery Smart Unit

# SYSTEM DESCRIPTION

1. BATTERY SMART UNIT CONTROL

- The battery smart unit converts the HV battery condition signals (voltage, current, and temperature), which are needed to determine the charging or discharging values that are calculated by the power management control ECU into digital signals, and transmits them to the power management control ECU via serial communication.
- A leakage detection circuit is provided in the battery smart unit in order to detect any leakage from the HV battery. Furthermore, the battery smart unit detects the voltage of the cooling fan, which is needed by the power management control ECU to effect cooling fan control. The battery smart unit also converts these signals into digital signals and transmits them to the power management control ECU via serial communication.




c

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- *: Use the Techstream
- Use the following procedure to troubleshoot the hybrid battery system.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

NEXT

| | |
|---|---|
| 3. | CONNECT TECHSTREAM TO THE DLC3* |

HINT:

If the display on the tester indicates a communication fault, inspect the DLC3.

NEXT

| | |
|---|---|
| 4. | CHECK DTC AND SAVE FREEZE FRAME DATA* INFO |

HINT:

- Make sure to save freeze frame data because the data is necessary for a simulation test.
- For the hybrid vehicle control system, there are many DTCs, many of which can be stored due to a single malfunction. As a result, in some of the diagnosis procedures an instruction is provided to check for other DTCs and their corresponding INF codes. By following the diagnosis path based on the combination of output DTCs and INF codes, it is possible to narrow down the problem early and avoid unnecessary diagnosis.

NEXT

| | |
|---|---|
| 5. | CLEAR DTC AND FREEZE FRAME DATA* INFO |

NEXT

| | |
|---|---|
| 6. | CONDUCT VISUAL INSPECTION |

NEXT

| | |
|---|---|
| 7. | CONFIRM PROBLEM SYMPTOMS |

HINT:

If the engine does not start, perform steps 9 and 11 first.

Result:

| Result | Proceed to |
|---|---|
| Malfunction does not occur | A |
| Malfunction occurs | B |

B ▶ GO TO STEP 10

A ▼

| | |
|---|---|
| 8. | DUPLICATE CONDITIONS THAT PRODUCE SYMPTOMS |

NEXT ▼

| | |
|---|---|
| 9. | CHECK FOR DTCS* INFO |

Result:

| Result | Proceed to |
|---|---|
| DTC is output | A |
| DTC is not output | B |

B ▶ GO TO STEP 11

A ▼

| | |
|---|---|
| 10. | REFER TO DTC CHART INFO |

NEXT ▶ **GO TO STEP 13**

| | |
|---|---|
| 11. | CONDUCT BASIC INSPECTION |

Result:

| Result | Proceed to |
|---|---|
| Malfunctioning parts not confirmed | A |
| Malfunctioning parts confirmed | B |

B ▶ GO TO STEP 15

A ▼

| | |
|---|---|
| 12. | CHECK ECU POWER SOURCE CIRCUIT |

NEXT ▼

| | |
|---|---|
| 13. | CONDUCT CIRCUIT INSPECTION |

Result:

| Result | Proceed to |
|---|---|
| Malfunction not confirmed | A |

| Result | Proceed to |
| --- | --- |
| Malfunction confirmed | B |

B ▶ GO TO STEP 16

A ▼

| | |
| --- | --- |
| 14. | CHECK FOR INTERMITTENT PROBLEMS INFO |

NEXT ▶ **GO TO STEP 16**

| | |
| --- | --- |
| 15. | CONDUCT PARTS INSPECTION |

NEXT ▼

| | |
| --- | --- |
| 16. | IDENTIFY PROBLEM |

NEXT ▼

| | |
| --- | --- |
| 17. | ADJUST AND/OR REPAIR |

NEXT ▼

| | |
| --- | --- |
| 18. | CONDUCT CONFIRMATION TEST |

NEXT ▶ **END**

# CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

(a) Perform a simulation test INFO.

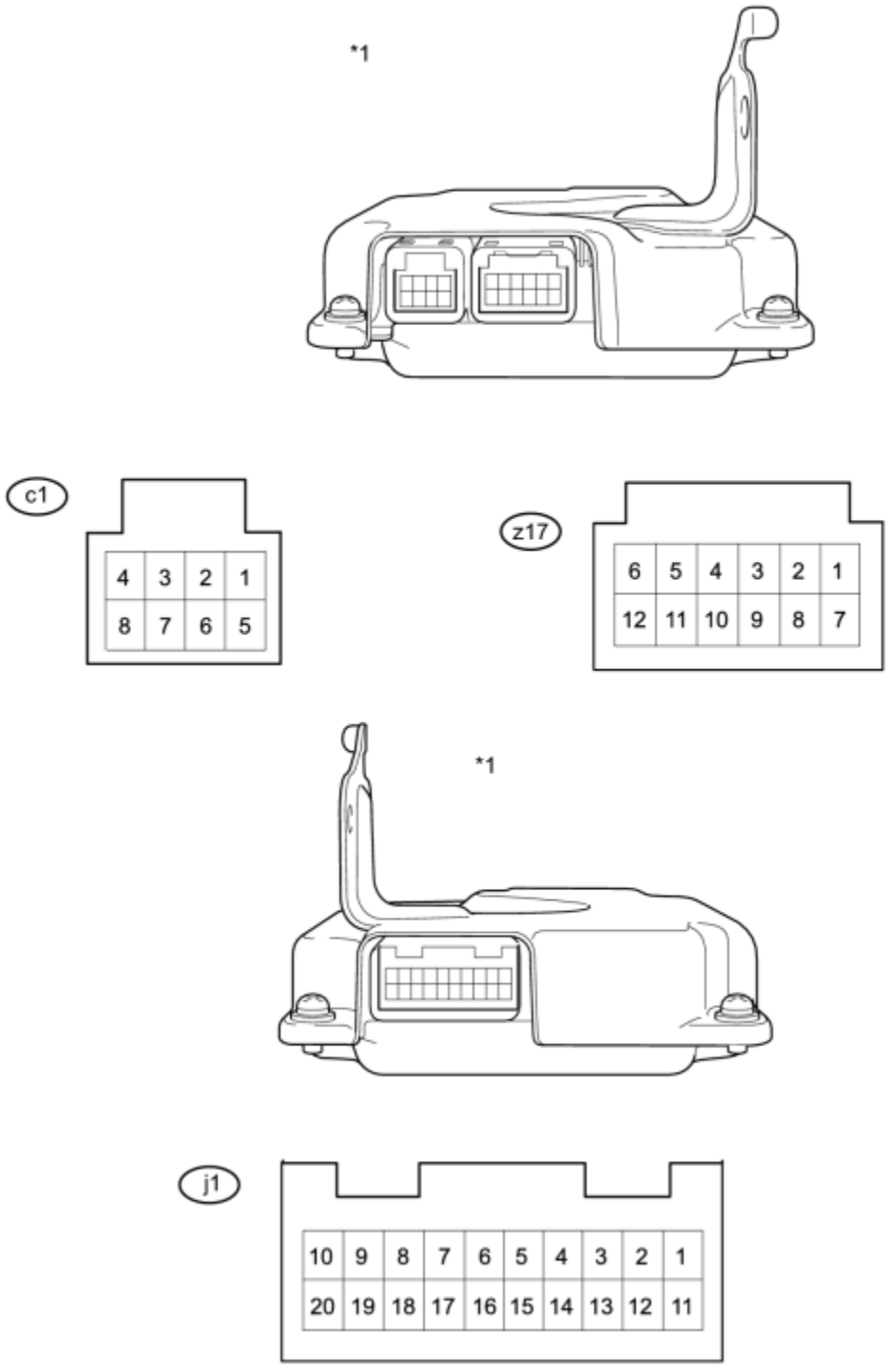
(1) For the simulation test, reproduce the driving conditions that were present when the trouble occurred. These conditions should be based on the customer's comments and freeze frame data that is recorded with DTCs, such as the opening angle of the accelerator pedal, SOC (state of charge), engine coolant temperature, engine rpm, and MG1/MG2 rpm and torque.

(b) Check the connector(s) and terminal(s) INFO.

(c) Wiggle the harness and connector(s) INFO.

(d) Heat or cool suspected parts INFO.

# TERMINALS OF ECU




**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Battery Smart Unit | - | - |

**ECU TERMINAL CHART**

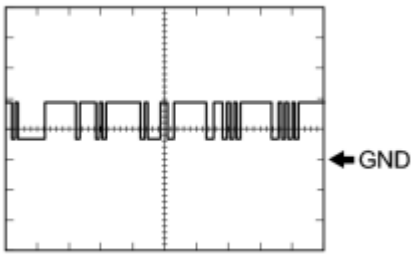
| Terminal No. (Symbols) | Wiring Color | Terminal Description | Condition | Standard (V) |
|---|---|---|---|---|
| z17-4 (TB2) - z17-10 (GB2) | L - L | Battery temperature sensor 2 | HV battery temperature: -40 to 194°F (-40 to 90°C) | 4.8 (-40°F(-40°C)) to 1.0 (194°F(90°C)) |
| z17-5 (TB1) - z17-11 (GB1) | B - B | Battery temperature sensor 1 | HV battery temperature: -40 to 194°F (-40 to 90°C) | 4.8 (-40°F(-40°C)) to 1.0 (194°F(90°C)) |
| z17-6 (TB0) - z17-12 (GB0) | W - W | Battery temperature sensor 0 | HV battery temperature: -40 to 194°F (-40 to 90°C) | 4.8 (-40°F(-40°C)) to 1.0 (194°F(90°C)) |
| c1-1 (IB) - c1-6 (GIB) | P - B | Current sensor | Power switch on (READY) | 0.5 to 4.5 |
| c1-5 (VIB) - c1-6 (GIB) | G - B | Power source for battery current sensor | Power switch on (IG) | 4.5 to 5.5 |
| c1-4 (IGCT) - c1-8 (GND) | L - W-B | Control signal | Power switch on (READY) | 11 to 14 |
| c1-2 (BTH+) - c1-8 (GND) | R - W-B | Serial communication | Power switch on (IG) | Pulse generation (waveform 1) |
| c1-3 (BTH-) - c1-8 (GND) | G - W-B | Serial communication | Power switch on (IG) | Pulse generation (waveform 2) |
| c1-7 (VM) - c1-8 (GND) | V - W-B | Battery cooling blower No. 0 monitor signal | Cooling blower activated | 0 to 5 |
| c1-8 (GND) - Body ground | W-B | Ground | Always (continuity check) | Below 1 Ω |

1. Oscilloscope waveforms

HINT:

Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.

(a) Waveform 1



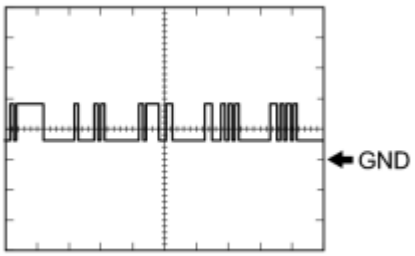

| Item | Content |
|---|---|
| Terminal | c1-2 (BTH+) - c1-8 (GND) |
| Equipment Setting | 2 V/DIV, 500 μs/DIV |
| Condition | Power switch on (IG) |

HINT:

The waveform will vary depending on the content of the digital

communication (digital signal).

(b) Waveform 2




| Item | Content |
|---|---|
| Terminal | c1-3 (BTH-) - c1-8 (GND) |
| Equipment Setting | 2 V/DIV, 500 μs/DIV |
| Condition | Power switch on (IG) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The power management control ECU (HV CPU) has a self-diagnosis system. If the computer, power management control ECU (HV CPU), or a component is not working properly, the ECU records the conditions that relate to the fault. The ECU also illuminates the master warning light in the combination meter and provides other appropriate messages on the multi-information display, such as an HV system warning message, HV battery warning message or discharge warning message.




HINT:

The master warning light will illuminate when the hybrid control system malfunctions and the light will blink when in inspection mode.

- When troubleshooting OBD II (On-Board Diagnostics) vehicles, the Techstream (complying with SAE J1987) must be connected to the DLC3 (Data Link Connector 3) of the vehicle. Various data in the vehicle ECM (Engine Control Module) can then be read.
- OBD II regulations require that the vehicle's on-board computer illuminate the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction in:




a. The emission control system components.
b. The powertrain control components (which affect vehicle emissions).
c. The computer itself.

In addition, the applicable DTCs prescribed by SAE J2012 are recorded in the power management control ECU (HV CPU) memory. If the malfunction does not recur in 3 consecutive

trips, the MIL turns off automatically but the DTCs remain recorded in the power management control ECU (HV CPU) memory.

- To check for DTCs, connect the Techstream to the DLC3. The Techstream displays DTCs, freeze frame data, and a variety of hybrid control system data. The DTCs and freeze frame data can be cleared with the Techstream. In order to enhance the OBD function on vehicles and develop the Off-Board diagnosis system, Controller Area Network (CAN) communication is used in this system. CAN is a network which uses a pair of data transmission lines spanning multiple computers and sensors. It allows for high speed communications between the systems and simplification of the wire harness connections.

2. 2 TRIP DETECTION LOGIC

- When a malfunction is first detected, the malfunction is temporarily stored in the power management control ECU (HV CPU) memory (1st trip). If the same malfunction is detected during the next drive cycle, the MIL is illuminated (2nd trip).

3. FREEZE FRAME DATA

- The power management control ECU (HV CPU) records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, as well as other data recorded at the time of a malfunction.

4. AUXILIARY BATTERY VOLTAGE

Standard Voltage:

| Switch Condition | Specified Condition |
|---|---|
| Power switch on (IG) | 11 to 14 V |

- If voltage is below 11 V, replace or recharge the battery.

5. MIL (Malfunction Indicator Lamp)

(a) The MIL is illuminated when the power switch is first turned on (IG), before the READY indicator comes on.

(b) When the READY indicator turns on, the MIL should turn off. If the MIL remains illuminated, the diagnosis system has detected a malfunction or abnormality in the system.

HINT:

If the MIL is not illuminated when the power switch is first turned on (IG), check the MIL circuit INFO.

# DTC CHECK / CLEAR

1. CHECK FOR DTCS

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check the DTCs and freeze frame data, and then write them down.

(f) Check the details of the DTCs 

.

2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) If a DTC is present, select it in order to display its freeze frame data.

(b) Read the freeze frame data recorded when the DTC was set.

NOTICE:

A 3-digit information code (INF code) will be displayed as the value for one of the Information 1 to Information 5 lines.

(c) Read the information for the information code.

(1) Select the item from among Information 1 to Information 5 that has an information code and click the engine icon to view the additional information.

3. CHECK FOR DTCS (SYSTEMS OTHER THAN POWER MANAGEMENT CONTROL ECU (HV CPU))

HINT:

The power management control ECU (HV CPU) maintains communication with other computers, including the ECM, skid control ECU and power steering ECU. Therefore, if the power management control ECU (HV CPU) outputs a warning, it is necessary to check and record the DTCs of all systems.

(a) If DTCs are present, check the relevant systems.

HINT:

If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair any malfunctions in the CAN communication system.

4. CLEAR DTCS

NOTICE:

Clearing the DTCs will also clear the freeze frame data, information INFO, and operation history data INFO.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Check that park (P) is selected.

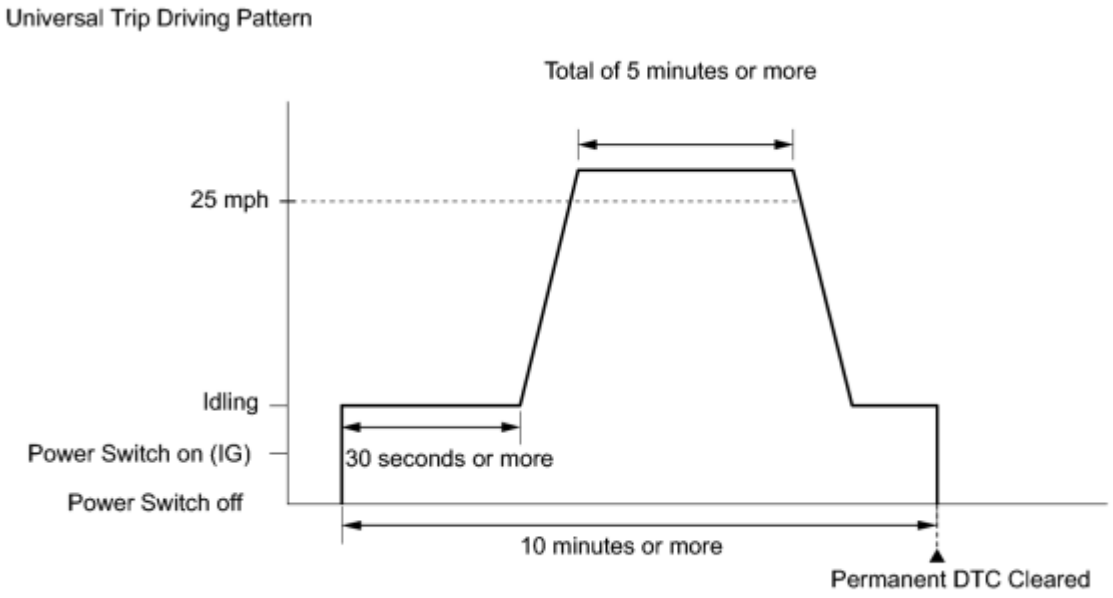
(e) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(f) Clear DTCs and freeze frame data.

5. CLEAR PERMANENT DTC

HINT:

Even if the following procedure is not performed, permanent DTCs are cleared by obtaining a normal judgment during 3 consecutive driving cycles.




(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if permanent DTCs are stored.

HINT:

If permanent DTCs are not output, it is not necessary to continue this procedure.

(f) Clear the DTCs.

(g) Perform the respective confirmation driving patterns in order to obtain a normal judgment for the output DTCs.

HINT:

- Confirmation driving patterns do not need to be performed for misfire and fuel system DTCs.
- For the confirmation driving pattern, refer to the procedures for the relevant DTC INFO.

(h) Perform the universal trip.

HINT:

The driving pattern to obtain a normal judgment and the universal trip driving can be performed consecutively in the same driving cycle.

1. Put the engine in inspection mode INFO.
2. Idle the engine for 30 seconds or more.
3. Drive the vehicle at 25 mph (40 km/h) or more for a total of 5 minutes or more.

   HINT:

   It is possible to complete the drive pattern even if the vehicle decelerates to less than 25 mph (40 km/h) during the driving cycle provided that the vehicle is driven at 25 mph (40 km/h) or more for a total of 5 minutes.

4. Allow 10 minutes or more to elapse from the time the engine is started.

(i) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(j) Check that the permanent DTCs have been cleared.

HINT:

The permanent DTCs are cleared when the universal trip is completed.

# FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

The power management control ECU (HV CPU) records vehicle and driving condition information as freeze frame data the moment a DTC is stored. It can be used for estimating or duplicating the vehicle conditions that were present when the malfunction occurred. To confirm the details of the hybrid control system, check the detailed information for the DTC information code in the Data List (INF code).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Select a DTC in order to display its freeze frame data.

(f) Check the freeze frame information recorded with the DTC.

HINT:

For the freeze frame data chart, 

.

# DATA LIST / ACTIVE TEST

1. Data List

NOTICE:

- Some Data List values may vary significantly if there are slight differences in the environment in which the vehicle is operating when measurements are obtained. Variations may also occur due to aging of the vehicle. Due to these considerations, it is not always possible to provide definite values to be used for judgment of malfunctions. It is possible that a malfunction may be present even if measured values are within the reference range.
- In the event of a problem with intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions in order to reach an overall judgment by comparing all the items in the Data List.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List.

(d) Check the results by referring to the following table.

HINT:

For the data list, 

.

2. Active Test

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data list information can be displayed while performing Active Tests.

NOTICE:

It is necessary to use caution, because if the tester DLC connector becomes disconnected or if a communication error occurs during an Active Test, the vehicle could become inoperative (the READY indicator may go off).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on. Enter the following menus: Powertrain / Hybrid Control / Active Test.

(d) According to the display on the Techstream perform the appropriate active test.

HINT:

For the active test chart, 

.

# DIAGNOSTIC TROUBLE CODE CHART

**Hybrid Battery System**

| DTC Code | Detection Item | Trouble Area | MIL | See page |
|---|---|---|---|---|
| P0A7F-123 | Hybrid Battery Pack Deterioration | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P0A80-123 | Replace Hybrid Battery Pack | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P0A82-123 | Hybrid Battery Pack Cooling Fan 1 | 1. Battery cooling blower assembly<br>2. Battery smart unit<br>3. Power management control ECU<br>4. HV battery intake duct<br>5. Wire harness or connector | - | INFO |
| P0A84-123 | Hybrid Battery Pack Cooling Fan 1 | 1. Wire harness or connector<br>2. Integration relay<br>3. Battery cooling blower assembly<br>4. Battery smart unit<br>5. Power management control ECU | - | INFO |
| P0A85-123 | Hybrid Battery Pack Cooling Fan 1 | 1. Wire harness or connector<br>2. Battery cooling blower assembly<br>3. Battery smart unit<br>4. HV battery assembly | - | INFO |
| P0A95-123 | High Voltage Fuse | 1. Service plug grip<br>2. HV battery assembly | - | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | See page |
|---|---|---|---|---|
| P0A9C-123 | Hybrid Battery Temperature Sensor "A" Range / Performance | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector | Comes on | INFO |
| P0A9D-123 | Hybrid Battery Temperature Sensor "A" Circuit Low | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector<br>4. Hybrid battery junction block | Comes on | INFO |
| P0A9E-123 | Hybrid Battery Temperature Sensor "A" Circuit High | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector<br>4. Hybrid battery junction block | Comes on | INFO |
| P0AAE-123 | Hybrid Battery Pack Air Temperature Sensor "A" Circuit Low | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector<br>4. Hybrid battery junction block | - | INFO |
| P0AAF-123 | Hybrid Battery Pack Air Temperature Sensor "A" Circuit High | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector<br>4. Hybrid battery junction block | - | INFO |
| P0ABF-123 | Hybrid Battery Pack Current Sensor Circuit | 1. Hybrid battery junction block | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | See page |
|---|---|---|---|---|
| | | 2. Battery smart unit<br><br>3. Wire harness or connector | | |
| P0AC0-123 | Hybrid Battery Pack Current Sensor Circuit Range / Performance | 1. Hybrid battery junction block<br><br>2. Battery smart unit | Comes on | INFO |
| P0AC1-123 | Hybrid Battery Pack Current Sensor Circuit Low | 1. Hybrid battery junction block<br><br>2. Battery smart unit<br><br>3. Wire harness or connector | Comes on | INFO |
| P0AC2-123 | Hybrid Battery Pack Current Sensor Circuit High | 1. Hybrid battery junction block<br><br>2. Battery smart unit<br><br>3. Wire harness or connector | Comes on | INFO |
| P0AC6-123 | Hybrid Battery Temperature Sensor "B" Range / Performance | 1. HV battery assembly<br><br>2. Battery smart unit<br><br>3. Wire harness or connector | Comes on | INFO |
| P0AC7-123 | Hybrid Battery Temperature Sensor "B" Circuit Low | 1. HV battery assembly<br><br>2. Battery smart unit<br><br>3. Wire harness or connector<br><br>4. Hybrid battery junction block | Comes on | INFO |
| P0AC8-123 | Hybrid Battery Temperature Sensor "B" Circuit High | 1. HV battery assembly<br><br>2. Battery smart unit<br><br>3. Wire harness or connector<br><br>4. Hybrid battery junction block | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | See page |
|---|---|---|---|---|
| P0ACB-123 | Hybrid Battery Temperature Sensor "C" Range / Performance | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector | Comes on | INFO |
| P0ACC-123 | Hybrid Battery Temperature Sensor "C" Circuit Low | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector<br>4. Hybrid battery junction block | Comes on | INFO |
| P0ACD-123 | Hybrid Battery Temperature Sensor "C" Circuit High | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector<br>4. Hybrid battery junction block | Comes on | INFO |
| P0AFC-123 | Hybrid Battery Pack Sensor Module | 1. Battery smart unit<br>2. Wire harness or connector<br>3. IGCT fuse<br>4. IGCT No. 2 fuse<br>5. IGCT relay | Comes on | INFO |
| P0B3D-123 | Hybrid Battery Voltage Sensor "A" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B42-123 | Hybrid Battery Voltage Sensor "B" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B47-123 | Hybrid Battery Voltage Sensor "C" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B4C-123 | Hybrid Battery Voltage Sensor "D" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | See page |
|---|---|---|---|---|
| P0B51-123 | Hybrid Battery Voltage Sensor "E" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B56-123 | Hybrid Battery Voltage Sensor "F" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B5B-123 | Hybrid Battery Voltage Sensor "G" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B60-123 | Hybrid Battery Voltage Sensor "H" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B65-123 | Hybrid Battery Voltage Sensor "I" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B6A-123 | Hybrid Battery Voltage Sensor "J" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B6F-123 | Hybrid Battery Voltage Sensor "K" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B74-123 | Hybrid Battery Voltage Sensor "L" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B79-123 | Hybrid Battery Voltage Sensor "M" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B7E-123 | Hybrid Battery Voltage Sensor "N" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P0B83-123 | Hybrid Battery Voltage Sensor "O" Circuit Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| P3011-123 | Battery Block 1 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3012-123 | Battery Block 2 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3013-123 | Battery Block 3 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |

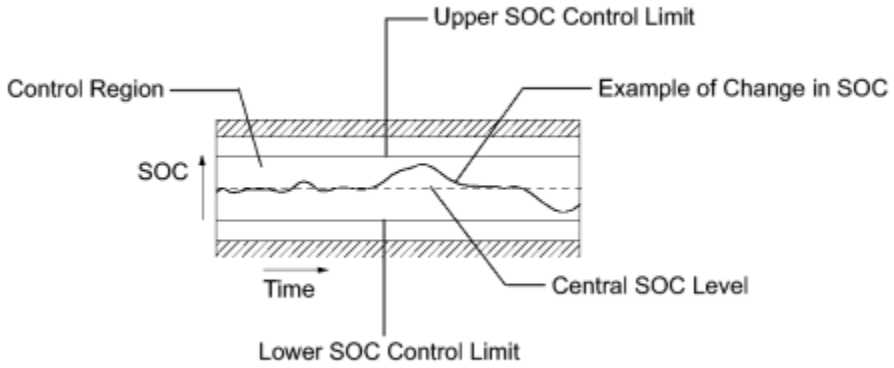
| DTC Code | Detection Item | Trouble Area | MIL | See page |
|---|---|---|---|---|
| P3014-123 | Battery Block 4 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3015-123 | Battery Block 5 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3016-123 | Battery Block 6 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3017-123 | Battery Block 7 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3018-123 | Battery Block 8 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3019-123 | Battery Block 9 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3020-123 | Battery Block 10 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3021-123 | Battery Block 11 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3022-123 | Battery Block 12 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3023-123 | Battery Block 13 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3024-123 | Battery Block 14 Becomes Weak | 1. HV battery assembly<br>2. Battery smart unit | Comes on | INFO |
| P3065-123 | Hybrid Battery Temperature Sensor Range / Perfoemance Stack A | 1. HV battery assembly<br>2. Battery smart unit<br>3. Wire harness or connector | Comes on | INFO |
| P308A-123 | Hybrid Battery Voltage Sensor All Circuits Low | 1. Battery smart unit<br>2. HV battery assembly | Comes on | INFO |
| U029A-123 | Lost Communication with Hybrid Battery Pack Sensor Module | 1. Wire harness or | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | MIL | See page |
|---|---|---|---|---|
| | | connector<br><br>2. Power management control ECU<br><br>3. Battery smart unit<br><br>4. IGCT fuse<br><br>5. IGCT NO. 2 fuse<br><br>6. IGCT relay | | |

| | | |
|---|---|---|
| DTC | P0A7F-123 | Hybrid Battery Pack Deterioration |

# DESCRIPTION

• The battery smart unit and the power management control ECU calculate the SOC (state of charge) of the HV battery through the accumulated amperage in the HV battery. The battery smart unit sends the condition of the HV battery to the power management control ECU. Then the power management control ECU calculates the SOC based on the information and controls HV battery charge and discharge according to the driving condition.




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A7F-123 | • Internal resistance of the HV battery is higher than the standard (1 trip detection)<br>• Difference in the capacity between battery blocks is larger than the standard (2 trip detection) | • HV battery assembly<br>• Battery smart unit |

HINT:

P0A7F-123 will not be set unless the vehicle is driven for approximately 10 minutes after clearing the DTC.

# MONITOR DESCRIPTION

• The battery smart unit calculates the resistance of the HV battery through amperage and voltage, and uses this resistance to determine the extent of deterioration of the HV battery. If the battery smart unit detects that the resistance of the HV battery has exceeded the standard, it determines that a malfunction has occurred. In addition, the battery smart unit monitors the SOC, and if the difference between the maximum and minimum SOC values exceeds the standard, it determines that a malfunction has occurred. When either of the malfunction detection conditions is met, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A7F (INF 123): Battery cell malfunction |
| Required sensors / components | Main: Battery voltage sensor inside battery smart unit, battery current sensor |

| | |
|---|---|
| | Sub: Battery temperature sensor |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

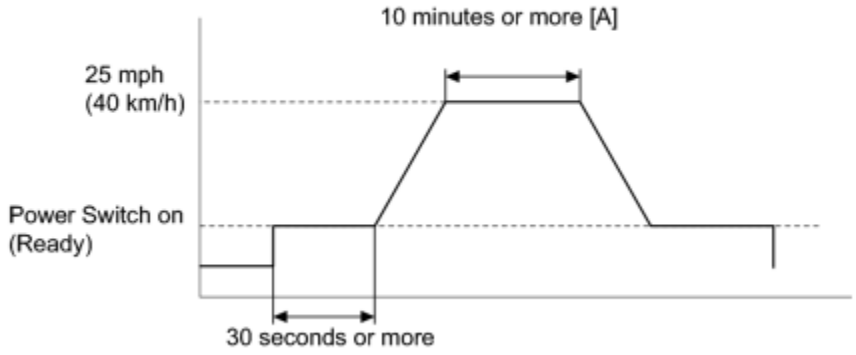
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P0A7F (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Turn the power switch on (READY) and wait for 30 seconds or more.
7. Drive the vehicle on urban roads at a speed of 25 mph (40 km/h) or more for a total of at least 10 minutes. [A]

NOTICE:

Avoid abrupt acceleration or braking.

8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read output DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| P0AFC-123 is not output. | A |
| P0AFC-123 is also output. | B |

(e) Disconnect the Techstream from the DLC3.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK BATTERY SMART UNIT |

(a) Ensure the safety of the areas in front and at the back of the vehicle.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Enter the following menus: Powertrain / Hybrid Control / Data List / VB0 to 14 Batt block.

(e) Fully warm up the engine and turn the air conditioning off.

(f) Firmly depress the brake pedal with your left foot.

(g) Move the select lever to D.

(h) Record each battery block voltage from the data list (V1 to 14 Batt block) while fully depressing the accelerator pedal.

(i) Compare the battery block voltages (VB0 to 13 Batt block) between the even and odd number groups in each combination shown in the table below.

| Even Number Group | Odd number group | Battery block voltages to be compared |
|---|---|---|
| V0 BATT BLOCK | V1 BATT BLOCK | VB0 - VB1 |
| V2 BATT BLOCK | V3 BATT BLOCK | VB2 - VB3 |
| V4 BATT BLOCK | V5 BATT BLOCK | VB4 - VB5 |
| V6 BATT BLOCK | V7 BATT BLOCK | VB6 - VB7 |
| V8 BATT BLOCK | V9 BATT BLOCK | VB8 - VB9 |
| V10 BATT BLOCK | V11 BATT BLOCK | VB10 - VB11 |
| V12 BATT BLOCK | V13 BATT BLOCK | VB12 - VB13 |

(j) Check the difference in voltage of each combination.

**Result**

| Result | Proceed to |
|---|---|
| Difference in voltage of each combination is less than 0.3 V. | A |
| Difference in voltage of each combination is 0.3 V or more. | B |

HINT:

If the difference in voltage of each combination is 0.3 V or more, it is due to a battery smart unit internal error.

(k) Turn the power switch off.

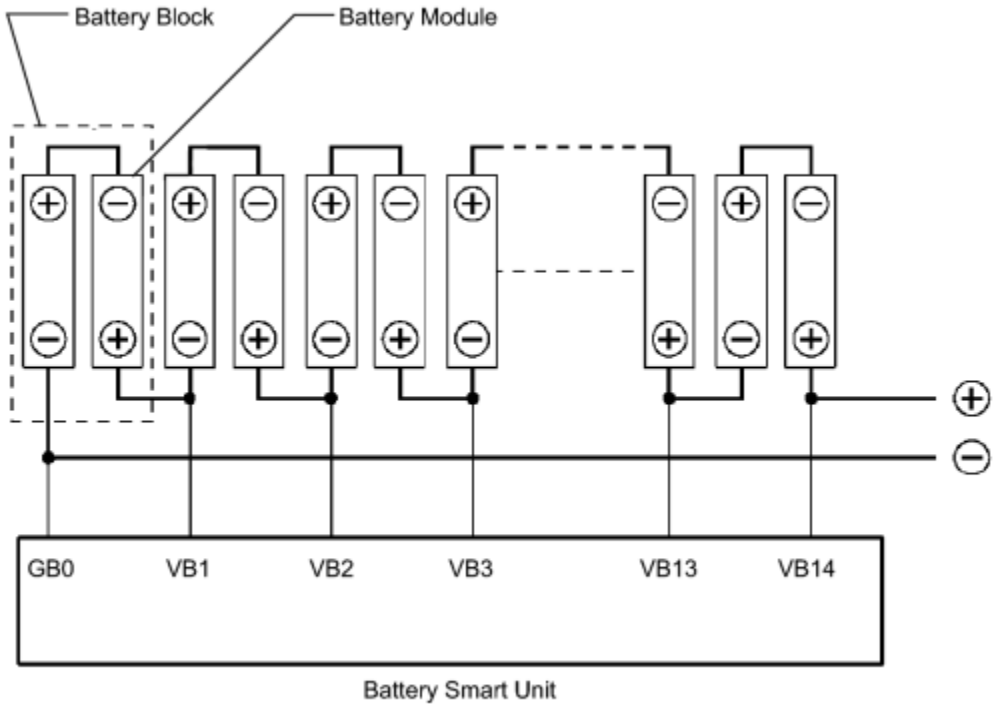
(l) Disconnect the Techstream from the DLC3.

B ▶ REPLACE BATTERY SMART UNIT
A ▶ **REPLACE HV BATTERY ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A80-123 | Replace Hybrid Battery Pack |

# DESCRIPTION

- The HV battery uses nickel metal-hydride batteries and does not require external charging. The power management control ECU controls the SOC (state of charge) of the HV battery at a constant level during driving. The HV battery is composed of 28 modules, and each module consists of eight 1.2 V cells in series. The battery smart unit monitors battery block voltage at 14 locations. Each battery block is composed of 2 modules in a set.




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A80-123 | Difference in voltage between battery blocks is larger than the standard (2 trip detection) | • HV battery assembly<br>• Battery smart unit |

HINT:

- P0A80-123 will not be set unless the vehicle is driven for approximately 10 minutes after clearing the DTC.

# MONITOR DESCRIPTION

The battery smart unit, which monitors the voltage of the battery blocks, determines that malfunction has occurred if a voltage difference between the battery blocks exceeds the standard. When the malfunction detection condition is satisfied, the power management control ECU (HV CPU) will illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A80 (INF 123): Rationality |
| Required sensors / components | Main: Battery voltage sensor inside battery smart unit<br><br>Sub: Battery current sensor, battery temperature sensor |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P0A80 (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Perform a universal trip.
7. With the select lever in N, leave the vehicle until SOC drops to 30%.

   HINT:

   Although DTC P3000 (INF 388) may be stored if the SOC drops to 20% or lower, this is not a malfunction.

8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.

   HINT:

- If the permanent DTC is not cleared, repeat steps 6 and 7.
- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK BATTERY SMART UNIT INFO |

B ▶ REPLACE BATTERY SMART UNIT

A ▶ **REPLACE HV BATTERY ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A82-123 | Hybrid Battery Pack Cooling Fan 1 |

# DESCRIPTION

- Refer to the circuit description for DTC P0A84-123 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A82-123 | The speed of the battery cooling blower assembly is not within the specified range (1 trip detection) | • Battery cooling blower assembly<br>• Battery smart unit<br>• Power management control ECU<br>• HV battery intake duct<br>• Wire harness or connector |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A84-123 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

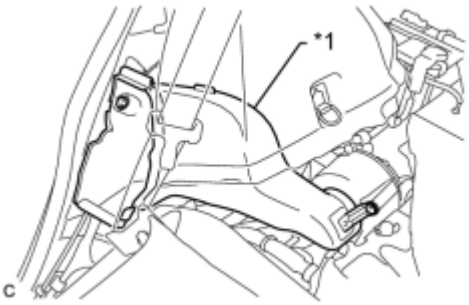
| | |
|---|---|
| 1. | CHECK FOR DTCS (DTC P0A1F-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK DUCT AND BLOWER |

(a) Remove the upper hybrid battery cover sub-assembly INFO.




(b) Check that the No. 1 hybrid battery intake duct and battery cooling blower are not disconnected, damaged, or clogged with foreign objects, and that the acoustical materials have not peeled.

OK:

The duct and blower are not disconnected, damaged, or clogged with foreign objects and the acoustical materials have not peeled.

## Text in Illustration

| | |
|---|---|
| *1 | No. 1 Hybrid Battery Intake Duct |

(c) Install the upper hybrid battery cover sub-assembly INFO.

NG ▶ CORRECT THE PROBLEM

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

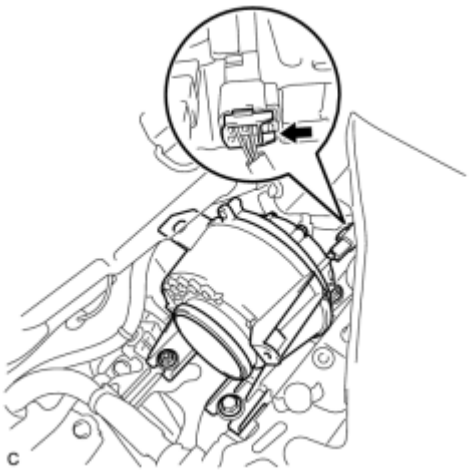
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Disconnect the battery cooling blower assembly connector.

(d) Disconnect the A21 connector from the power management control ECU INFO.

(e) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

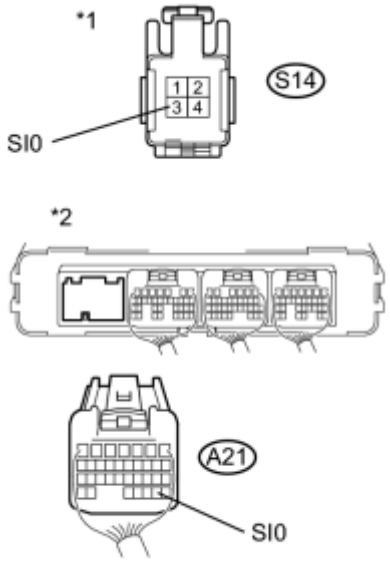
(f) Disconnect the S14 connector from the battery cooling blower assembly.




(g) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Specified Condition |
|---|---|
| S14-3 (SI0) or A21-29 (SI0) - Body ground | 10 kΩ or higher |
| S14-3 (SI0) - A21-29 (SI0) | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Battery Cooling Blower Assembly) |
| *2 | Rear view of wire harness connector<br><br>(Power Management Control ECU) |

(h) Connect the S14 connector to the battery cooling blower assembly.

(i) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(j) Connect the A21 connector to the power management control ECU INFO.

(k) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

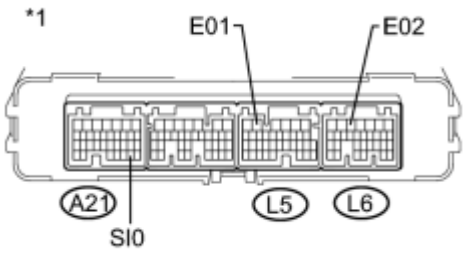
OK ▼

| | |
|---|---|
| 4. | CHECK POWER MANAGEMENT CONTROL ECU (GROUND SHORT CHECK) |

(a) Remove the power management control ECU INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Specified Condition |
|---|---|
| A21-29 (SI0) - L5-5 (E01) | 10 kΩ or higher |
| A21-29 (SI0) - L6-5 (E02) | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Power Management Control ECU) |

(c) Install the power management control ECU INFO.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▼

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM |

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Connect the cable to the negative (-) battery terminal.

(e) Connect the Techstream to the DLC3.

(f) Turn the power switch on (IG).

NOTICE:

- After removing the service plug grip, do not turn the power switch on (READY) unless instructed by the repair manual because this may cause a malfunction.
- If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be stored. If this DTC is output, clear the DTC using the Techstream INFO.

(g) Enter the following menus: Powertrain / Hybrid Control / Active Test / Driving the Battery Cooling Fan.

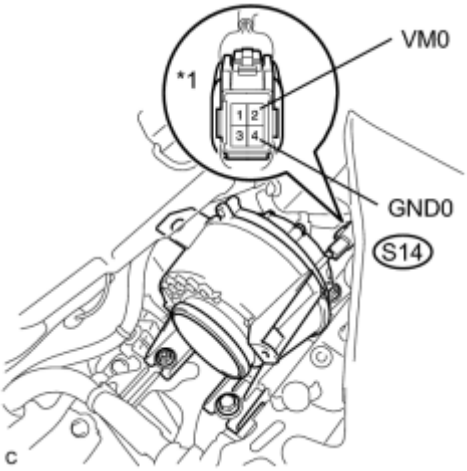
HINT:

Check "Cooling Fan Mode 1" in the data list using the Techstream. If the "Cooling Fan Mode 1" is 1 to 6, it is not necessary to perform the Active Test.

(h) Enter the following menus: All Data / VMF Fan Motor Voltage 1.

(i) Select each air volume mode (1 to 6) in the "Driving the Battery Cooling Fan" active test to operate the battery cooling blower assembly.

(j) While the cooling fan is operating, compare the value in the data list (VMF Fan Motor Voltage 1) with the voltage value that was actually measured at the battery cooling blower assembly connector.




Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S14-2 (VM0) - S14-4 (GND0) | Battery cooling blower is operating | Difference between the value in the Data List (VMF Fan Motor Voltage 1) and the actual measurement value is 1 V or less. |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Cooling Blower assembly) |

HINT:

Compare the values in each air volume mode (1 to 6).

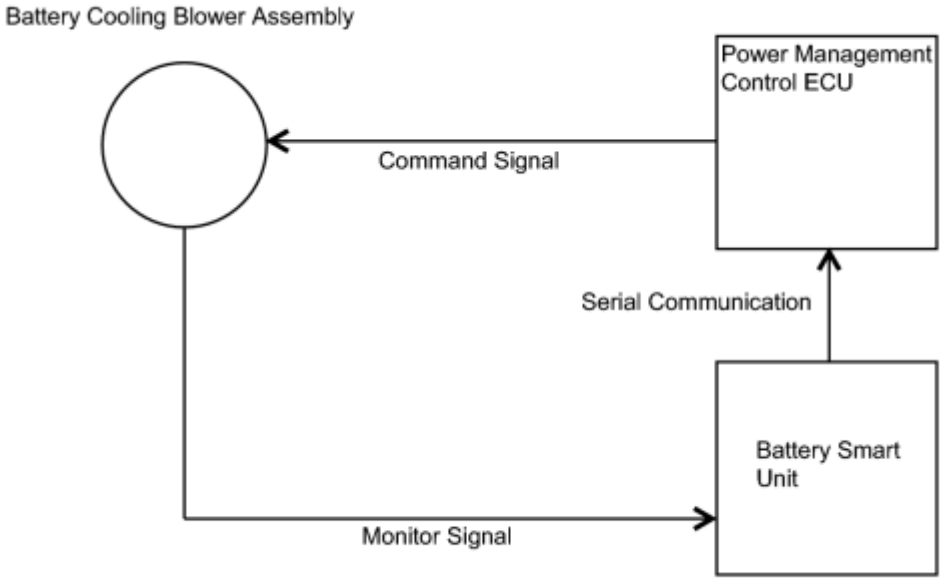
(k) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ REPLACE BATTERY SMART UNIT
OK ▶ **REPLACE BATTERY COOLING BLOWER ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A84-123 | Hybrid Battery Pack Cooling Fan 1 |

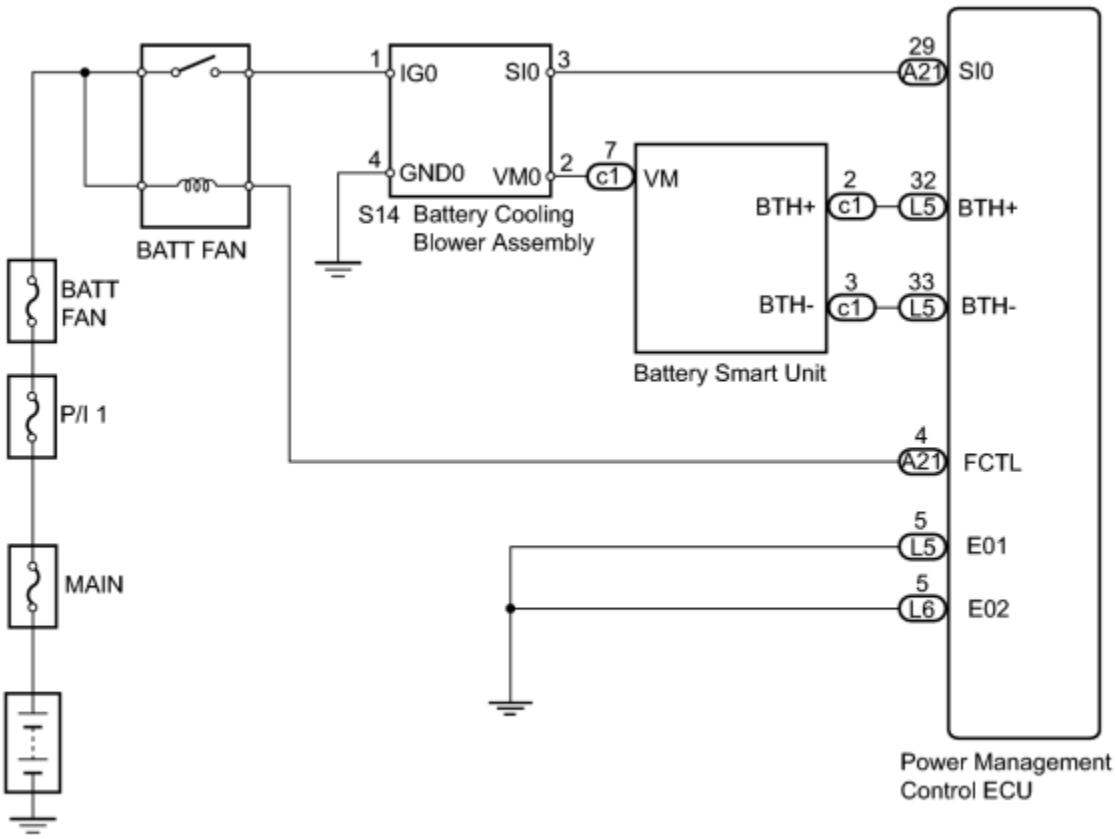
# DESCRIPTION

- The speed of the battery cooling blower assembly is controlled by the power management control ECU. Battery cooling blower assembly power is supplied when the FCTL terminal of the power management control ECU turns on the battery blower relay. The power management control ECU sends command signals (SI) to the battery cooling blower assembly to get the fan speed corresponding to the HV battery temperature. Information about the voltage applied to the battery cooling blower assembly (VM) is sent to the power management control ECU as a monitor signal using serial communication via the battery smart unit.




| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A84-123 | When the output voltage of the battery cooling blower assembly (VM) is too low compared to the target control voltage range (1 trip detection) | • Wire harness or connector<br>• Integration relay<br>• Battery cooling blower assembly<br>• Battery smart unit<br>• Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTCS (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Remove the rear side seatback assembly RH INFO.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Enter the following menus: Powertrain / Hybrid Control / Active Test / Driving the Battery Cooling Fan.

HINT:

Check Cooling Fan Mode1 in the Data List. If the mode is 6, it is not necessary to perform the Active Test.

(e) Select air volume mode 6 in the "Driving the Battery Cooling Fan" active test to operate the battery cooling blower assembly.

(f) Check that the fan operates and air is sucked into the inlet duct.

HINT:

The cooling fan may not stop even when turning the cooling fan off in the "Driving the Battery Cooling Fan" active test. This is due to HV system control and not a malfunction.

OK:

The fan operates.

(g) Install the rear side seatback assembly RH INFO.

NG ▶ CHECK INTEGRATION NO.1 RELAY (BATT FAN)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BATTERY SMART UNIT) |

CAUTION:

Be sure to wear insulated gloves.

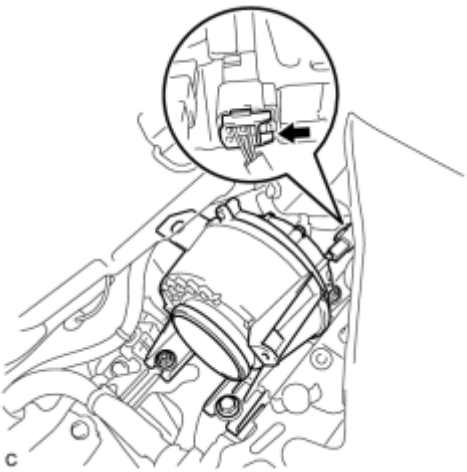
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

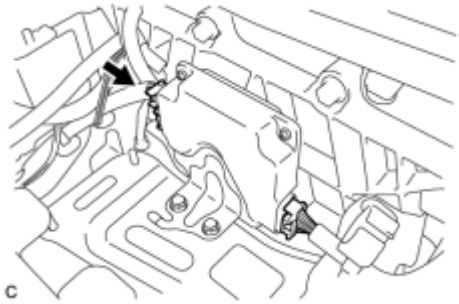
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(d) Disconnect the S14 connector of the battery cooling blower assembly.




(e) Disconnect the c1 connector of the battery smart unit.

(f) Measure the resistance according to the value(s) in the table below.

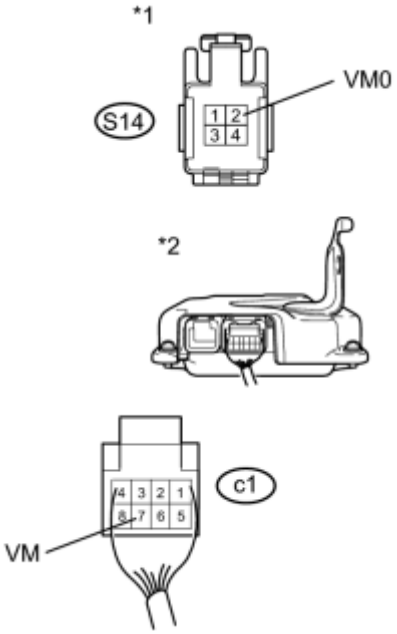
Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-2 (VM0) - c1-7 (VM) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-2 (VM0) or c1-7 (VM) - Body ground | Power switch off | 10 kΩ or higher |

# Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Battery Cooling Blower Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |

(g) Connect the S14 connector of the battery cooling blower assembly.

(h) Connect the c1 connector of the battery smart unit.

(i) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 4. | CHECK BATTERY COOLING BLOWER ASSEMBLY (VOLTAGE) INFO |

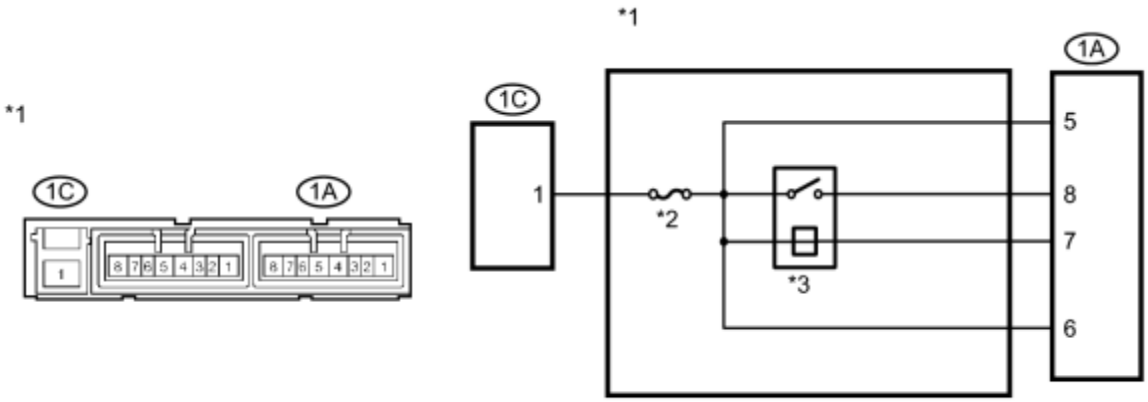
NG ▶ REPLACE BATTERY SMART UNIT

OK ▶ **REPLACE BATTERY COOLING BLOWER ASSEMBLY**

| | |
|---|---|
| 5. | CHECK INTEGRATION NO.1 RELAY (BATT FAN) |

(a) Remove the integration relay from the engine room junction block assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1C-1 - 1A-8 | Battery voltage is applied across terminals 1A-6 and 1A-7 | Below 1 Ω |
| | No battery voltage is applied across terminals 1A-6 and 1A-7 | 10 kΩ or higher |

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Integration Relay | *2 | BATT FAN Fuse |
| *3 | BATT FAN Fuse | - | - |

(c) Install the integration relay INFO.

NG ▶ REPLACE INTEGRATION NO.1 RELAY

OK ▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (VOLTAGE) |

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Connect the cable to the negative (-) battery terminal.

(e) Connect the Techstream to the DLC3.

(f) Turn the power switch on (IG).

NOTICE:

- After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
- If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be stored. If this DTC is output, clear the DTC using the Techstream INFO.

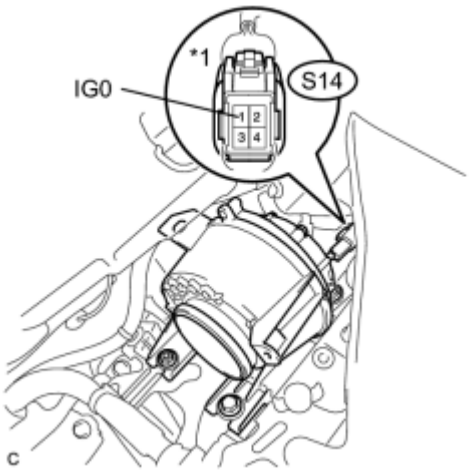
(g) Enter the following menus: Powertrain / Hybrid Control / Active Test / Driving the Battery Cooling Fan.

HINT:

Check "Cooling Fan Mode 1" in the data list using the Techstream. If the "Cooling Fan Mode 1" is 1 to 6, it is not necessary to perform the Active Test.

(h) Enter the following menus: All Data / VMF Fan Motor Voltage 1.

(i) Select each air volume mode (1 to 6) in the "Driving the Battery Cooling Fan" active test to operate the battery cooling blower assembly.




(j) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S14-1 (IG0) - Body ground | Battery cooling blower is operating | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Cooling Blower) |

HINT:

Measure the voltage on the wire side of the connector that is part of the battery cooling blower.

(k) Turn the power switch off.

(l) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - POWER MANAGEMENT CONTROL ECU)

OK

| | |
|---|---|
| 7. | CHECK BATTERY COOLING BLOWER ASSEMBLY |

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Connect the cable to the negative (-) battery terminal.

(e) Connect the Techstream to the DLC3.

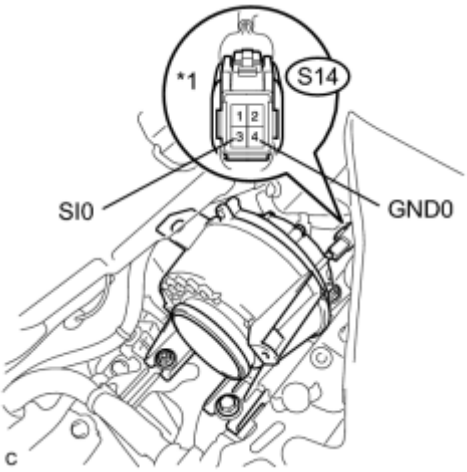
(f) Turn the power switch on (IG).

NOTICE:

- After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
- If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be stored. If this DTC is output, clear the DTC using the Techstream INFO.

(g) Enter the following menus: Powertrain / Hybrid Control / Active Test / Driving the Battery Cooling Fan.

(h) Select air volume mode 0 in the "Driving the Battery Cooling Fan" active test to operate the battery cooling blower assembly.




(i) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S14-3 (SI0) - S14-4 (GND) | Battery cooling blower is operating | 4.5 to 5.5 V |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Cooling Blower) |

HINT:

Measure the voltage on the wire side of the connector that is part of the battery cooling blower.

(j) Turn the power switch off.

(k) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ REPLACE BATTERY COOLING BLOWER ASSEMBLY

OK ▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - POWER MANAGEMENT CONTROL ECU) |

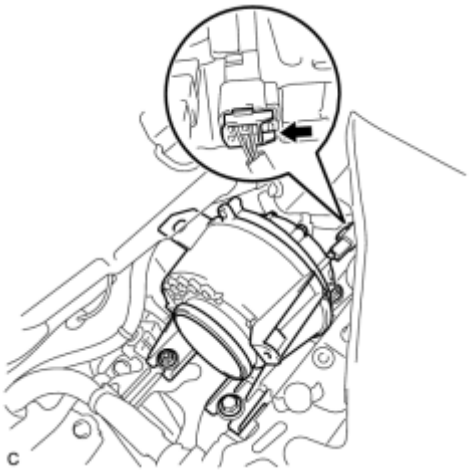
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.



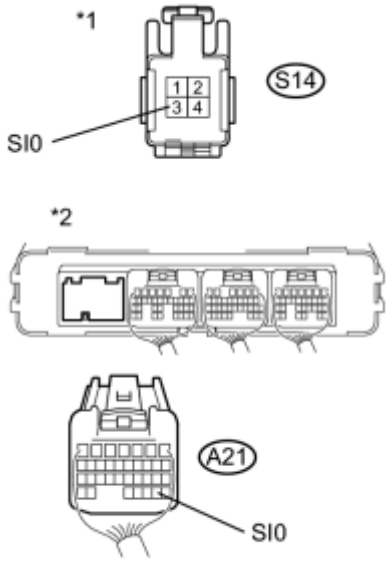
(d) Remove the S14 connector of the battery cooling blower assembly.

(e) Disconnect the A21 connector of the power management control ECU INFO.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-3 (SI0) - A21-29 (SI0) | Power switch off | Below 1 Ω |




Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-3 (SI0) or A21-29 (SI0) - Body ground | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Battery Cooling Blower Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(g) Connect the cable to the negative (-) battery terminal.

(h) Turn the power switch on (IG).

NOTICE:

- After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
- If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be stored. If this DTC is output, clear the DTC using the Techstream INFO.

(i) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-3 (SI0) - Body ground | Power switch on (IG) | Below 1 V |

(j) Turn the power switch off.

(k) Connect the S14 connector of the battery cooling blower assembly.

(l) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(m) Connect the A21 connector of the power management control ECU INFO.

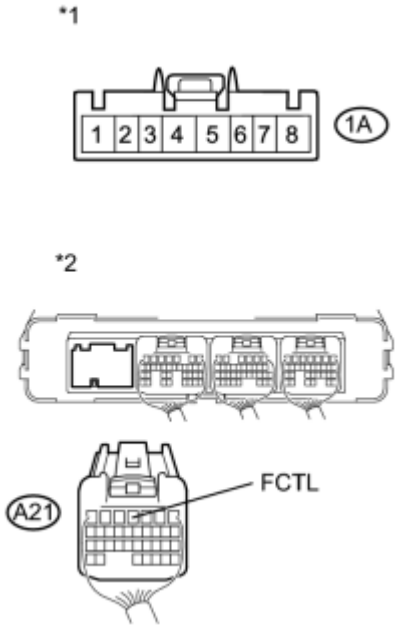
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Disconnect the A21 connector of the power management control ECU INFO.

(c) Remove the integration relay INFO.




(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1A-7 - A21-4 (FCTL) | Power switch off | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |
| *2 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(e) Connect the cable to the negative (-) battery terminal.

(f) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A21-4 (FCTL) - Body ground | Power switch off | Below 1 V |
| | Power switch on (IG) | Below 1 V |

NOTICE:

If the power switch is turned on (IG) with the connector removed, DTC will be stored. If the DTC is output, clear the DTC using the Techstream INFO.

(g) Connect the A21 connector of the power management control ECU INFO.

(h) Install the integration relay INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) |

(a) Disconnect the cable from the negative (-) battery terminal.

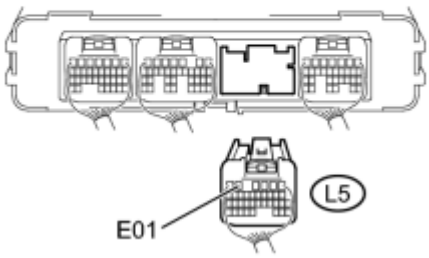
(b) Disconnect the L5 connector of the power management control ECU INFO.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-5 (E01) - Body ground | Power switch off | Below 1 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Connect the L5 connector of the power management control ECU INFO.

(e) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) |

(a) Disconnect the cable from the negative (-) battery terminal.

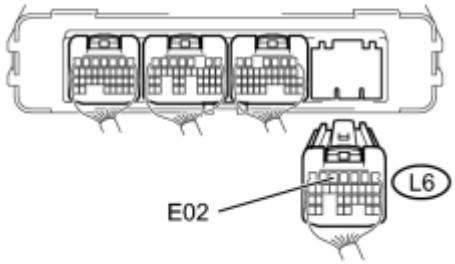
(b) Disconnect the L6 connector of the power management control ECU INFO.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L6-5 (E02) - Body ground | Power switch off | Below 1 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NOTICE:

When taking a measurement with a tester, do not apply excessive force to the tester probe to avoid damaging the holder.

(d) Connect the L6 connector of the power management control ECU INFO.

(e) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

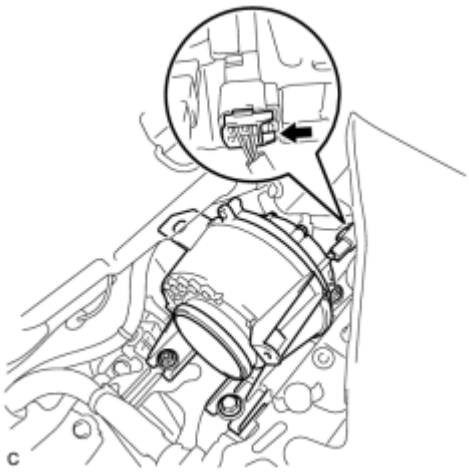
| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BATTERY COOLING BLOWER ASSEMBLY) |

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Remove the integration relay INFO.

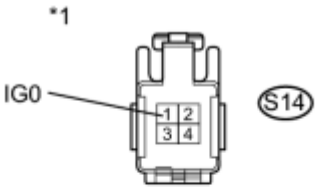
(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Disconnect the S14 connector of the battery cooling blower assembly.

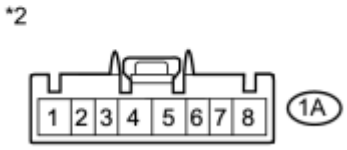



(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1A-8 - S14-1 (IG0) | Power switch off | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Battery Cooling Blower Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(f) Install the integration relay INFO.

(g) Connect the S14 connector of the battery cooling blower assembly.

(h) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(i) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 13. | REPLACE INTEGRATION NO.1 RELAY |

(a) Replace the integration relay INFO.

NEXT ▼

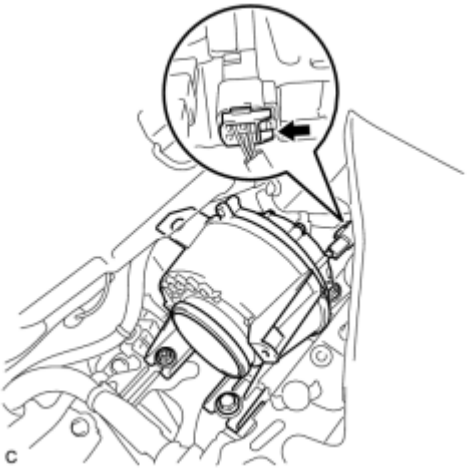
| | |
|---|---|
| 14. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BATTERY COOLING |

| | |
|---|---|
| | BLOWER ASSEMBLY) |

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Remove the integration relay INFO.

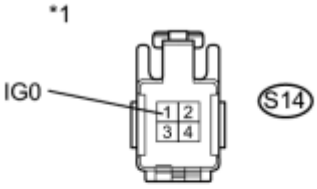
(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.



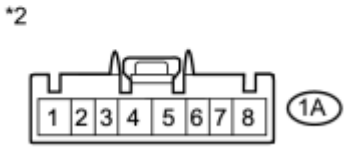

(d) Disconnect the S14 connector of the battery cooling blower assembly.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-1 (IG0) - Terminals other than 1A-8 and body ground | Power switch off | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Battery Cooling Blower Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

(f) Install the integration relay INFO.

(g) Connect the S14 connector of the battery cooling blower assembly.

(h) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(i) Connect the cable to the negative (-) battery terminal.

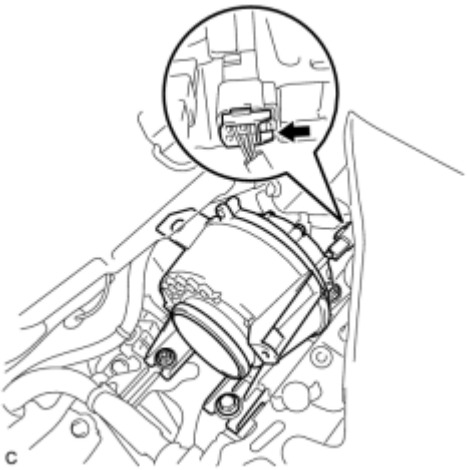
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 15. | CHECK BATTERY COOLING BLOWER ASSEMBLY |

(a) Disconnect the cable from the negative (-) battery terminal.

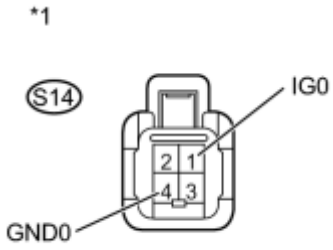
(b) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(c) Disconnect the S14 connector of the battery cooling blower assembly.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-1 (IG0) - S14-4 (GND0) and body ground | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Battery Cooling Blower Assembly) |

(e) Connect the S14 connector of the battery cooling blower assembly.

(f) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(g) Connect the cable to the negative (-) battery terminal.

NG ▶ REPLACE BATTERY COOLING BLOWER ASSEMBLY

OK ▶ **RECOVERY TO NORMAL**

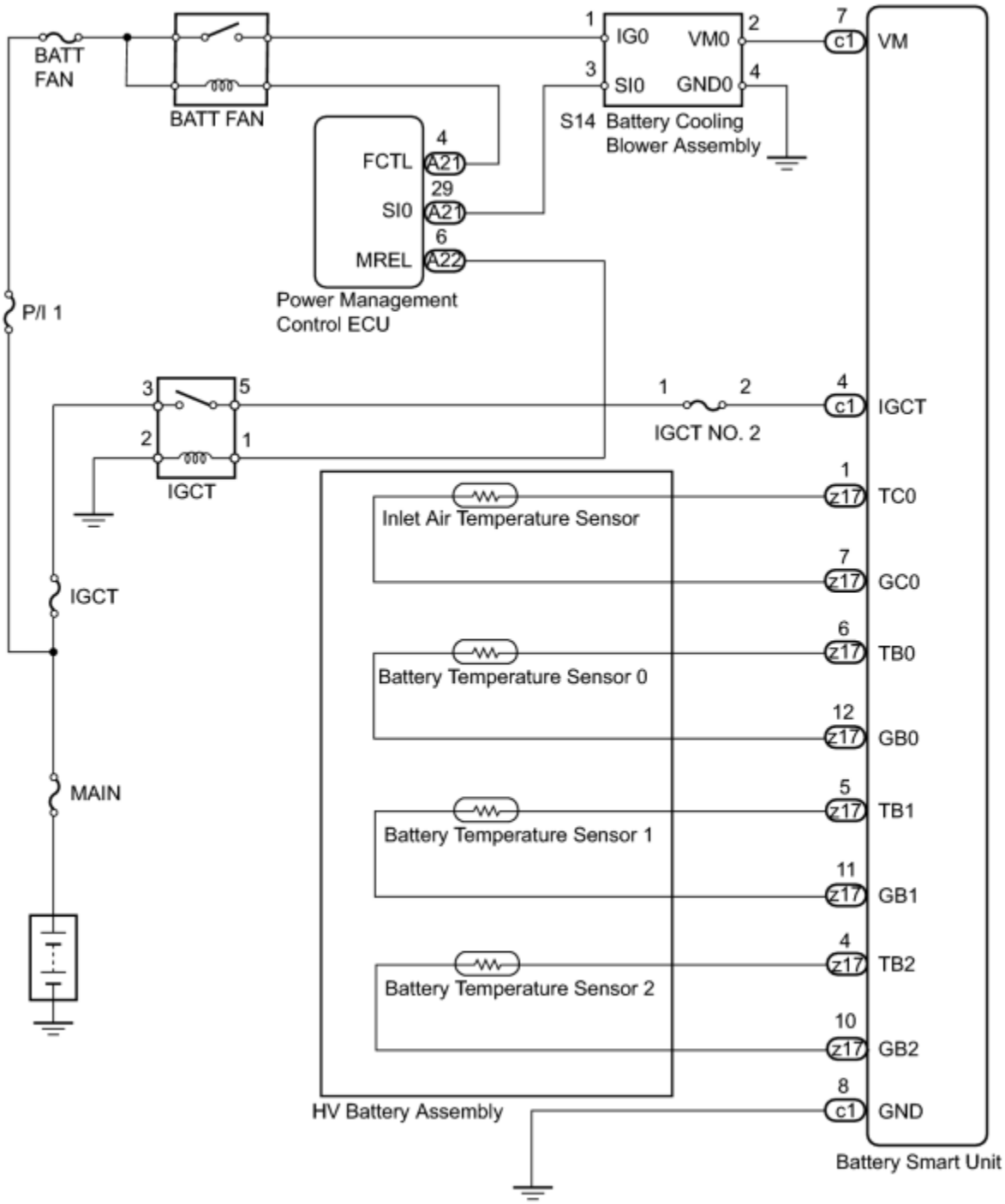
| | | |
|---|---|---|
| DTC | P0A85-123 | Hybrid Battery Pack Cooling Fan 1 |

# DESCRIPTION

Refer to the circuit description for DTC P0A84-123 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A85-123 | When the output voltage of the battery cooling blower assembly (VM) is too high compared to the target control voltage range (1 trip detection) | • Wire harness or connector<br>• Battery cooling blower assembly<br>• Battery smart unit<br>• HV battery assembly |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it

in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTCS (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (VOLTAGE) |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Connect the cable to the negative (-) battery terminal.

(e) Connect the Techstream to the DLC3.

(f) Turn the power switch on (IG).

NOTICE:

- After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

- If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be stored. If this DTC is output, clear the DTC using the Techstream INFO.

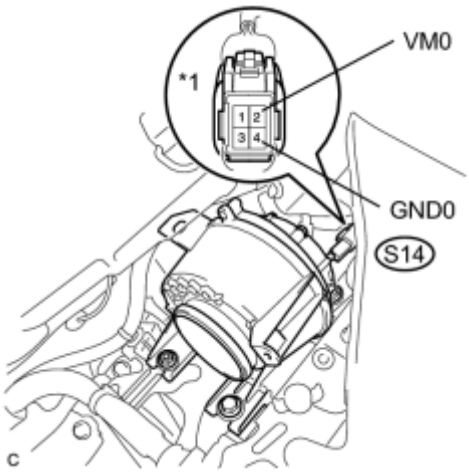
(g) Enter the following menus: Powertrain / Hybrid Control / Active Test / Driving the Battery Cooling Fan.

HINT:

Check "Cooling Fan Mode 1" in the data list using the Techstream. If the "Cooling Fan Mode 1" is 6, it is not necessary to perform the Active Test.

(h) Select each air volume mode (1 to 6) in the "Driving the Battery Cooling Fan" active test to operate the battery cooling blower assembly.

(i) Measure the voltage according to the value(s) in the table below.




Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S14-2 (VM0) - S14-4 (GND0) | Battery cooling blower is operating | Below 5 V |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Cooling Blower Assembly) |

HINT:

Measure the voltage on the wire side of the connector that is part of the battery cooling blower.

(j) Turn the power switch off.

(k) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ CHECK HARNESS AND CONNECTOR (VOLTAGE)

OK ▼

| | |
|---|---|
| 3. | CHECK HV BATTERY ASSEMBLY (BATTERY TEMPERATURE SENSOR AND INLET AIR TEMPERATURE SENSOR) |

CAUTION:

Be sure to wear insulated gloves.

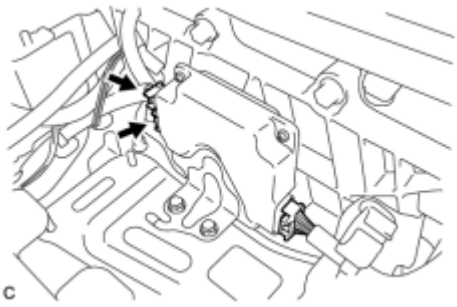
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

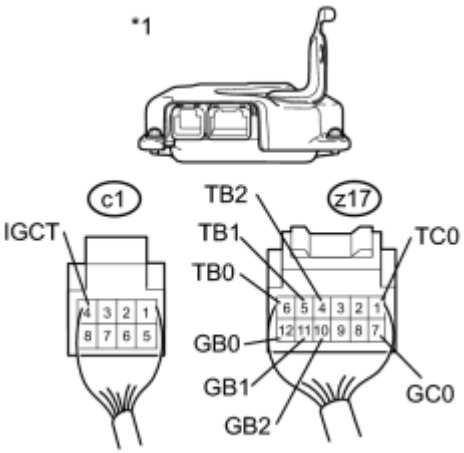
(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(d) Disconnect the c1 and z17 connectors from the battery smart unit.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z17-6 (TB0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-12 (GB0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-5 (TB1) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-11 (GB1) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-4 (TB2) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-10 (GB2) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-1 (TC0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-7 (GC0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |

(f) Connect the c1 and z17 connectors to the battery smart unit.

(g) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(h) Connect the cable to the negative (-) battery terminal.

NG ▶ CHECK HARNESS AND CONNECTOR (INLET AIR TEMPERATURE SENSOR AND BATTERY

TEMPERATURE SENSOR)

OK ▶ **REPLACE BATTERY SMART UNIT**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INLET AIR TEMPERATURE SENSOR AND BATTERY TEMPERATURE SENSOR) |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the upper hybrid battery cover sub-assembly INFO.

(d) Check the wire harness and connectors of the battery temperature sensor and inlet air temperature sensor for abnormalities by sight and touch.

Specified Condition:

There are no open or short circuits in the wire harness and connectors. There are no short circuits to other wire harnesses.

(e) Install the upper hybrid battery cover sub-assembly INFO.

(f) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR HARNESS OR CONNECTOR

OK ▶ **REPLACE HV BATTERY ASSEMBLY**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (VOLTAGE) |

CAUTION:

Be sure to wear insulated gloves.

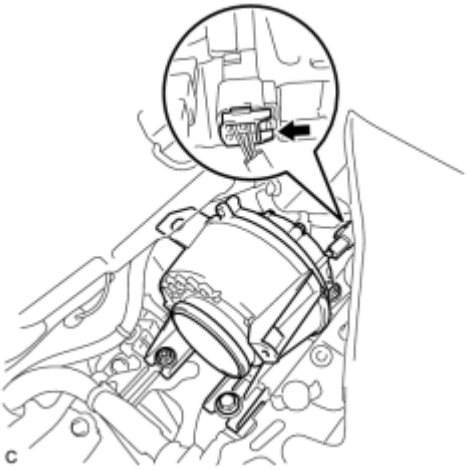
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(d) Disconnect the S14 connector of the battery cooling blower assembly.

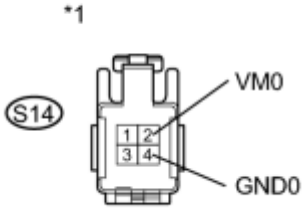
(e) Connect the cable to the negative (-) battery terminal.

(f) Turn the power switch on (IG).

(g) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| S14-2 (VM0) - S14-4 (GND0) | Power switch on (IG) | Below 5 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Battery Cooling Blower Assembly) |

NOTICE:

If the power switch is turned on (IG) with the battery cooling blower assembly connector removed, DTC P0A84-123 will be stored. If this DTC is output, clear the DTC using the Techstream INFO.

(h) Connect the S14 connector of the battery cooling blower assembly.

(i) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BATTERY SMART UNIT)

OK ▶ **REPLACE BATTERY COOLING BLOWER ASSEMBLY**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (BATTERY COOLING BLOWER - BATTERY SMART UNIT) |

CAUTION:

Be sure to wear insulated gloves.

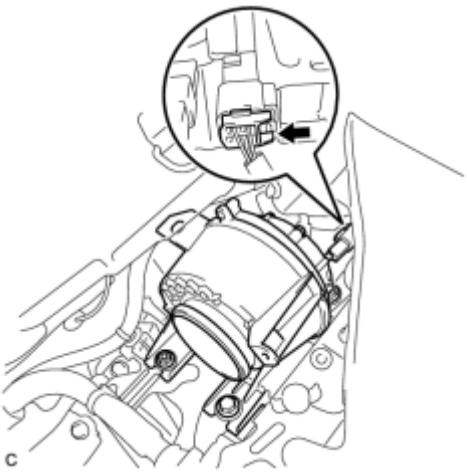
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

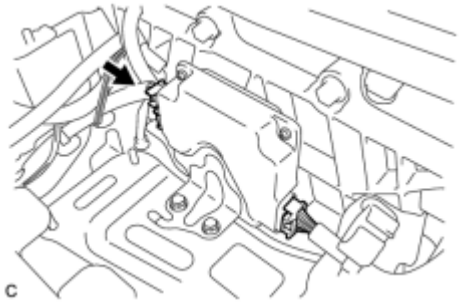
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(d) Disconnect the S14 connector of the battery cooling blower assembly.

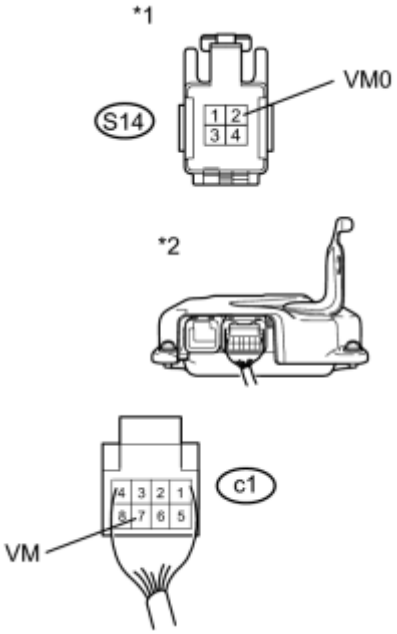



(e) Disconnect the c1 connector of the battery smart unit.

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|




| | | |
|---|---|---|
| S14-2 (VM0) and c1-7 (VM) - Other terminal | Power switch off | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Battery Cooling Blower Assembly) |
| *2 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |

(g) Connect the c1 connector of the battery smart unit.

(h) Connect the S14 connector of the battery cooling blower assembly.

(i) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(j) Connect the cable to the negative (-) battery terminal.

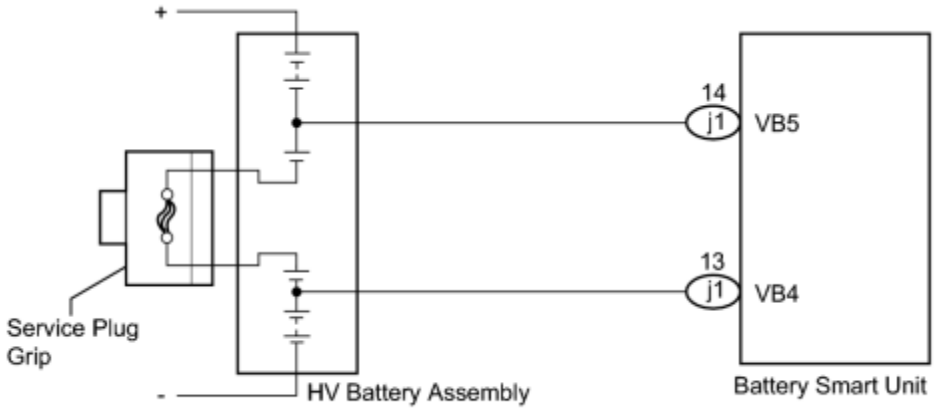
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE BATTERY SMART UNIT**

| | | |
|---|---|---|
| DTC | P0A95-123 | High Voltage Fuse |

# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A95-123 | Voltage between VBB4 and VBB5 terminals is below the standard despite the interlock switch being engaged (1 trip detection) | • Service plug grip<br>• HV battery assembly |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B GO TO DTC CHART

A

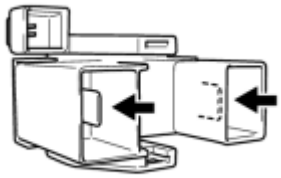
| | |
|---|---|
| 2. | CHECK SERVICE PLUG GRIP |

(a) Turn the power switch off.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.



(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Standard Resistance |
|---|---|
| Service plug grip | Below 1 Ω |

C

NG REPLACE SERVICE PLUG GRIP

OK **REPLACE HV BATTERY ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A9C-123 | Hybrid Battery Temperature Sensor "A" Range / Performance |
| DTC | P0AC6-123 | Hybrid Battery Temperature Sensor "B" Range / Performance |
| DTC | P0ACB-123 | Hybrid Battery Temperature Sensor "C" Range / Performance |
| DTC | P3065-123 | Hybrid Battery Temperature Sensor Range / Perfoemance Stack A |

# DESCRIPTION

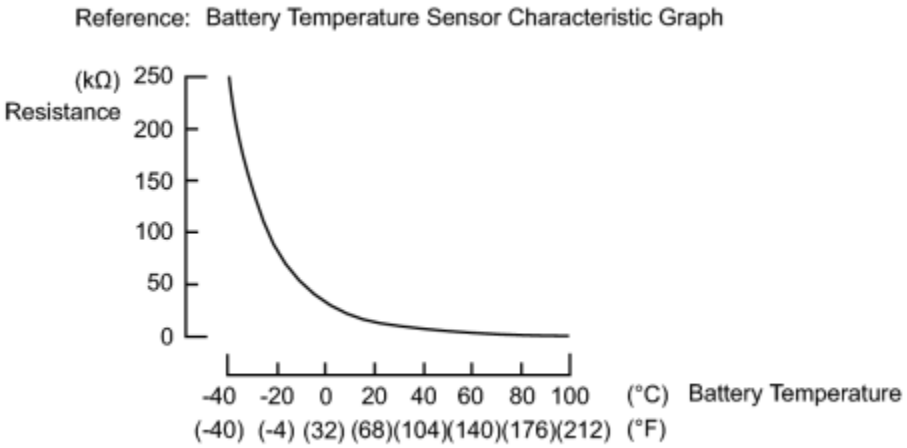
- The battery temperature sensors are provided at 3 locations of the HV battery. The resistance of the thermistor, which is built into each battery temperature sensor, varies in accordance with changes in the HV battery temperature. The lower the battery temperature, the higher the thermistor resistance. Conversely, the higher the temperature, the lower the resistance. The battery smart unit uses the battery temperature sensors to detect the HV battery temperature, and sends the detected value to the power management control ECU. Based on the results of this detection, the power management control ECU controls the blower fan. (The blower fan starts when HV battery temperature rises above a predetermined level.)

Temperature Sensor Identification Cross Reference Table:

| DTC Title Sensor | Battery Temperature Sensor | Techstream Display |
|---|---|---|
| A | 0 | 1 |
| B | 1 | 2 |
| C | 2 | 3 |

HINT:

For example, sensor A in the DTC title is battery temperature sensor (No. 0). This sensor is displayed as Temp of Batt TB1 in the Data List.



| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A9C-123<br><br>P0AC6-123<br><br>P0ACB-123<br><br>P3065-123 | When the battery temperature sensor performance is abnormal (1 trip detection/2 trip detection) | • HV battery assembly<br>• Battery smart unit<br>• Wire harness or connector |

# MONITOR DESCRIPTION

If the temperature indicated by the battery temperature sensor is lower than the standard level (open), or is higher than the standard level (short), the battery smart unit interprets this as a sensor malfunction. If the battery smart unit detects that HV battery temperature is out of the normal range or its value is abnormal, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A9C (INF 123): Battery temperature sensor malfunction (stuck)<br><br>P0AC6 (INF 123): Battery temperature sensor malfunction (stuck)<br><br>P0ACB (INF 123): Battery temperature sensor malfunction (stuck)<br><br>P3065 (INF 123): Battery temperature sensor malfunction (stuck) |
| Required sensors / components | Battery temperature sensor |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

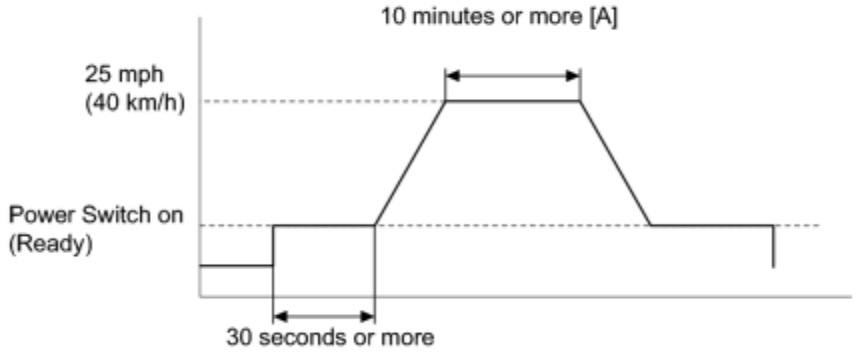
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P0A9C (INF 123) is not detected<br><br>DTC P0AC6 (INF 123) is not detected<br><br>DTC P0ACB (INF 123) is not detected<br><br>DTC P3065 (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Check that the temperature of each temperature sensor is 14°F (-10°C) or more.

   HINT:

   If any of temperature sensor values are less than 14°F (-10°C), raise the temperature to 14°F (-10°C) or more and then perform the next step.

7. Turn the power switch on (READY) and wait for 30 seconds or more.
8. Drive the vehicle on urban roads at a speed of 25 mph (40 km/h) or more for a total of at least 10 minutes. [A]

   NOTICE:

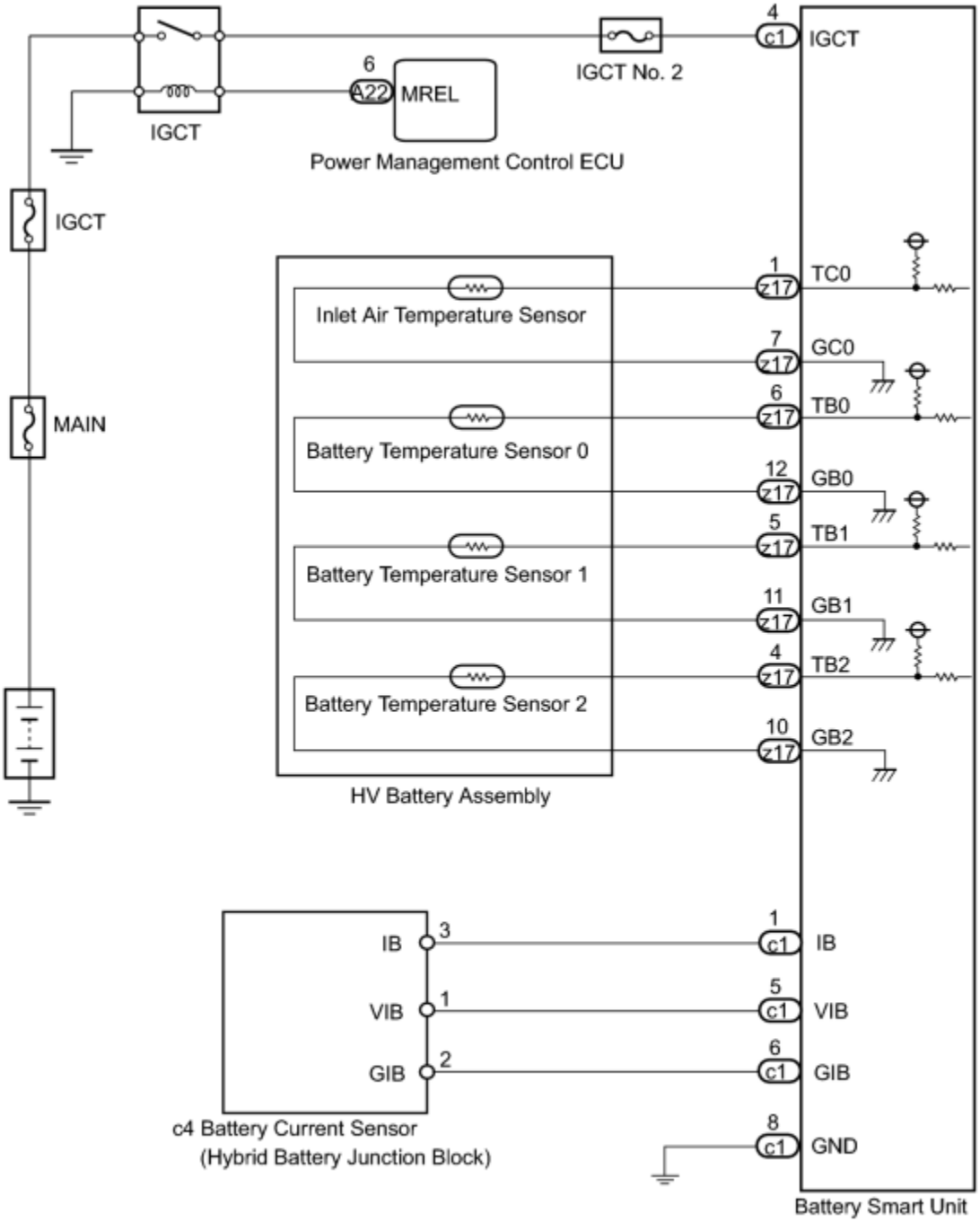
   Avoid abrupt acceleration or braking.

9. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
10. Check that permanent DTCs are cleared.
11. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

HINT:

- If a permanent DTC is output, the system is malfunctioning.
- If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM



# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0A1D-390 IS OUTPUT) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read output DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| P0A1D-390 is not output. | A |
| P0A1D-390 is also output. | B |

(e) Disconnect the Techstream from the DLC3.

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A

| | |
|---|---|
| 3. | CHECK INSTALLATION OF BATTERY TEMPERATURE SENSOR |

CAUTION:

Be sure to wear insulated gloves and protective goggles.

(a) Disconnect the cable from the negative (-) battery terminal.

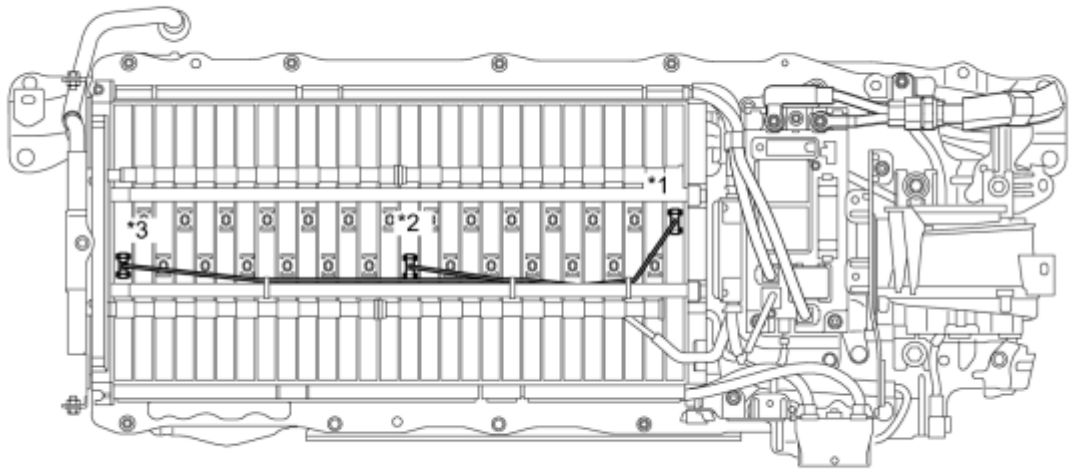
(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the upper hybrid battery cover sub-assembly INFO.

(d) Visually check the installation condition of the relevant battery temperature sensor.




Standard Condition:

Each battery temperature sensor is installed in the correct location with the correct orientation and its claws are engaged securely.

Result:

| Result | Proceed to |
|---|---|
| Each battery temperature sensor is installed in the correct location with the correct orientation and its claws are engaged securely | A |
| Claws are damaged. | B |
| Any of battery temperature sensors are not installed correctly, but claws are not damaged. | C |

NOTICE:

Do not use a stick or similar object to push on the sensors when inspecting them. Doing so may result in damage to the sensors.

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Battery Temperature Sensor 0 | *2 | Battery Temperature Sensor 1 |
| *3 | Battery Temperature Sensor 2 | - | - |

(e) Install the upper hybrid battery cover sub-assembly INFO.

(f) Connect the cable to the negative (-) battery terminal.

C INSTALL PARTS CORRECTLY
B REPLACE HV BATTERY ASSEMBLY
A

| | |
|---|---|
| 4. | CHECK HV BATTERY ASSEMBLY (BATTERY TEMPERATURE SENSOR) |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

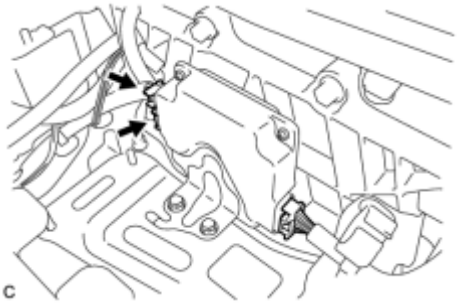
(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

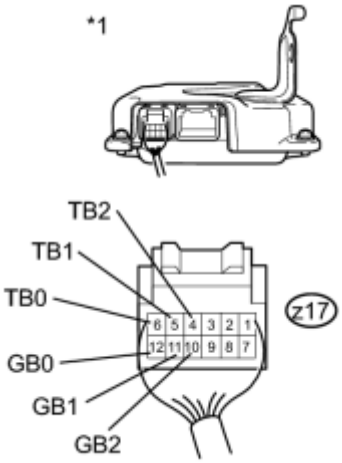
(d) Disconnect the z17 and c1 connectors of the battery smart unit.




(e) Measure the resistance of the circuit for the malfunctioning sensor (battery temperature sensor 0 to 2).

## Tester Connection

| Tester Connection | Battery Temperature Sensor No. |
|---|---|
| z17-6 (TB0) - z17-12 (GB0) | 0 |
| z17-5 (TB1) - z17-11 (GB1) | 1 |
| z17-4 (TB2) - z17-10 (GB2) | 2 |



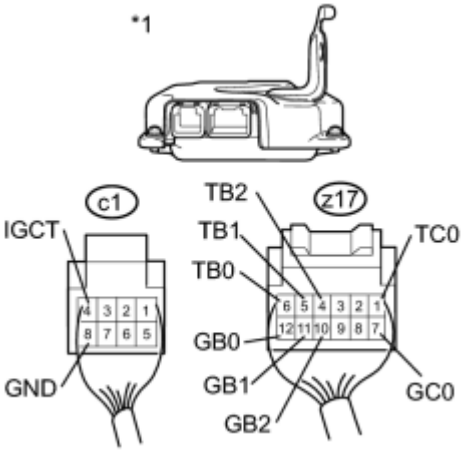

## Standard Resistance

| Thermistor Temperature | Switch Condition | Specified Condition |
|---|---|---|
| 32°F (0°C) | Power switch off | 26.7 to 27.8 kΩ |
| 77°F (25°C) | Power switch off | 9.9 to 10.1 kΩ |
| 104°F (40°C ) | Power switch off | 5.73 to 5.92 kΩ |

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |

(f) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Standard Resistance |
|---|---|---|
| z17-6 (TB0) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |
| z17-6 (TB0) - c1-8 (GND) | Power switch off | 10 kΩ or more |
| z17-12 (GB0) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |
| z17-12 (GB0) - c1-8 (GND) | Power switch off | 10 kΩ or more |
| z17-5 (TB1) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |
| z17-5 (TB1) - c1-8 (GND) | Power switch off | 10 kΩ or more |
| z17-11 (GB1) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |

| | | |
|---|---|---|
| z17-11 (GB1) - c1-8 (GND) | Power switch off | 10 kΩ or more |
| z17-4 (TB2) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |
| z17-4 (TB2) - c1-8 (GND) | Power switch off | 10 kΩ or more |
| z17-10 (GB2) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |
| z17-10 (GB2) - c1-8 (GND) | Power switch off | 10 kΩ or more |
| z17-1 (TC0) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |
| z17-1 (TC0) - c1-8 (GND) | Power switch off | 10 kΩ or more |
| z17-7 (GC0) - c1-4 (IGCT) | Power switch off | 10 kΩ or more |
| z17-7 (GC0) - c1-8 (GND) | Power switch off | 10 kΩ or more |

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |

(g) Connect the z17 and c1 connectors of the battery smart unit.

(h) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(i) Connect the cable to the negative (-) battery terminal.

NG ▶ CHECK HARNESS AND CONNECTOR (BATTERY TEMPERATURE SENSOR)
OK ▶ **REPLACE BATTERY SMART UNIT**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (BATTERY TEMPERATURE SENSOR) |

CAUTION:

Be sure to wear insulated gloves and protective goggles.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the upper hybrid battery cover sub-assembly INFO.

(d) Check the wire harness and connectors of the battery temperature sensor for abnormalities by sight and touch.

Specified Condition:

There are no open or short circuits in the wire harness and connectors. There are no short circuits to other wire harnesses.

(e) Install the upper hybrid battery cover sub-assembly INFO.

(f) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR HARNESS OR CONNECTOR
OK ▶ **REPLACE HV BATTERY ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0A9D-123 | Hybrid Battery Temperature Sensor "A" Circuit Low |
| DTC | P0A9E-123 | Hybrid Battery Temperature Sensor "A" Circuit High |
| DTC | P0AC7-123 | Hybrid Battery Temperature Sensor "B" Circuit Low |
| DTC | P0AC8-123 | Hybrid Battery Temperature Sensor "B" Circuit High |
| DTC | P0ACC-123 | Hybrid Battery Temperature Sensor "C" Circuit Low |
| DTC | P0ACD-123 | Hybrid Battery Temperature Sensor "C" Circuit High |

# DESCRIPTION

- Refer to the description for DTC P0A9C-123 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0A9D-123<br>P0A9E-123<br>P0AC7-123<br>P0AC8-123<br>P0ACC-123<br>P0ACD-123 | When the temperature of the battery temperature sensor is less than the standard value (open) or higher than the standard value (shorted) (1 trip detection). | • HV battery assembly<br>• Battery smart unit<br>• Wire harness or connector<br>• Hybrid battery junction block |

HINT:

After confirming that a DTC is output, use the Techstream to check "Temp of BATT TB 1 to 3" in the hybrid vehicle control system ECU data list.

| Temperature Displayed | Malfunction |
|---|---|
| Below -49°F (-45°C) | Open or +B short circuit |
| 203°F (95°C) or more | GND short circuit |

# MONITOR DESCRIPTION

If the temperature indicated by the battery temperature sensor is lower than the standard level (open), or is higher than the standard level (short), the battery smart unit interprets this as a sensor malfunction. If the battery smart unit detects that HV battery temperature is out of the normal range or its value is abnormal, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0A9D (INF 123): Battery temperature sensor circuit malfunction (GND short)<br>P0A9E (INF 123): Battery temperature sensor circuit malfunction (open)<br>P0AC7 (INF 123): Battery temperature sensor circuit malfunction (GND short)<br>P0AC8 (INF 123): Battery temperature sensor circuit malfunction (open)<br>P0ACC (INF 123): Battery temperature sensor circuit malfunction (GND short)<br>P0ACD (INF 123): Battery temperature sensor circuit malfunction (open) |
| Required sensors / components | Battery temperature sensor |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P0A9D (INF 123) is not detected<br>DTC P0A9E (INF 123) is not detected<br>DTC P0AC7 (INF 123) is not detected |

| | |
|---|---|
| | DTC P0AC8 (INF 123) is not detected<br><br>DTC P0ACC (INF 123) is not detected<br><br>DTC P0ACD (INF 123) is not detected |

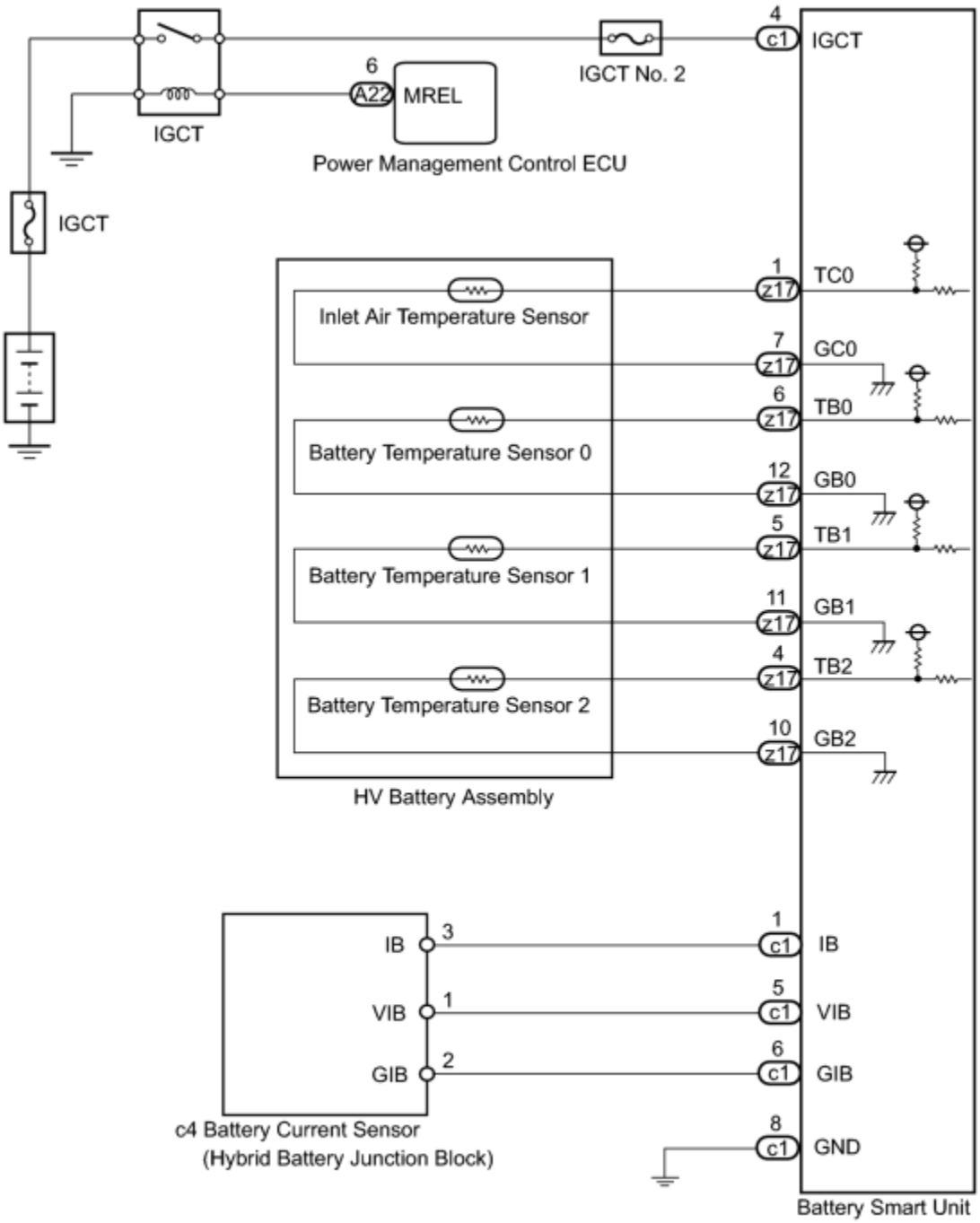
# CONFIRMATION DRIVING PATTERN

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Perform the universal trip.
7. Enter the following menus: Powertrain / HV / Trouble Codes.
8. Check that permanent DTCs are cleared.

   HINT:

   - If a permanent DTC is output, the system is malfunctioning.
   - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it

in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List / Temp of Batt TB 1 to 3.

HINT:

Compare the temperature of the 3 battery temperature sensors to determine the sensor with the malfunction (Temp of Batt TB1 to TB3).

NEXT ▼

| | |
|---|---|
| 3. | CHECK CONNECTOR CONNECTION CONDITION |

CAUTION:

Be sure to wear insulated gloves.

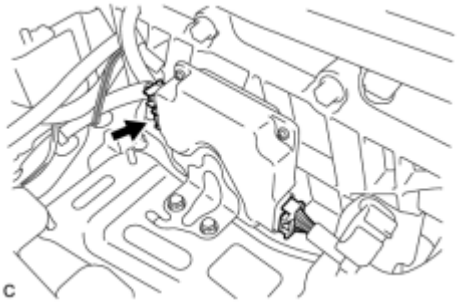
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(d) Check the connections of the z17 connector of the battery smart unit.

OK:

The connectors are connected securely and there are no contact problems.

(e) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(f) Connect the cable to the negative (-) battery terminal.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 4. | CHECK HV BATTERY ASSEMBLY (BATTERY TEMPERATURE SENSOR) INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (BATTERY TEMPERATURE SENSOR)

OK ▼

| | |
|---|---|
| 5. | CHECK BATTERY SMART UNIT (VIB VOLTAGE) |

NOTICE:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

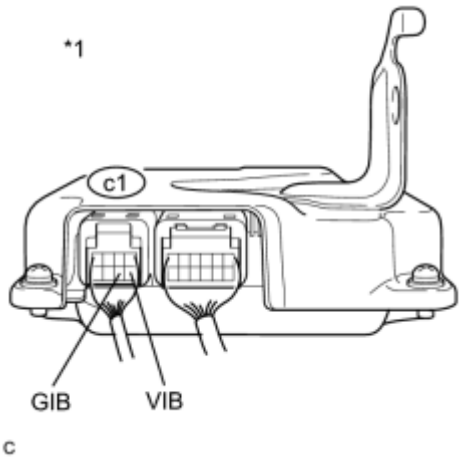
(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Connect the cable to the negative (-) battery terminal.

(e) Turn the power switch on (IG).

NOTICE:

Turning the power switch on (IG) with the service plug grip removed causes an interlock switch system DTC (P0A0D-350) to be set. Use the Techstream to clear the DTCs INFO.




(f) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| c1-5 (VIB) - c1-6 (GIB) | Power switch on (IG) | 4.6 to 5.4 V |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Smart Unit) |

(g) Turn the power switch off.

(h) Disconnect the cable from the negative (-) battery terminal.

(i) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(j) Connect the cable to the negative (-) battery terminal.

NG ▶ CHECK HYBRID BATTERY JUNCTION BLOCK
OK ▶ **REPLACE BATTERY SMART UNIT**

| | |
|---|---|
| 6. | CHECK HYBRID BATTERY JUNCTION BLOCK |

NOTICE:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Disconnect the c4 battery current sensor connector from the hybrid battery junction block.

(e) Connect the cable to the negative (-) battery terminal.

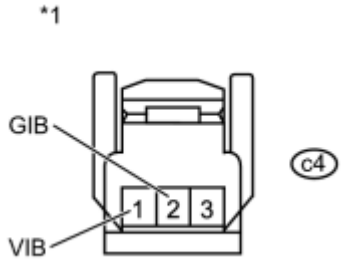
(f) Turn the power switch on (IG).

NOTICE:

Turning the power switch on (IG) with the HV relay assembly (battery current sensor) connector disconnected causes DTC P0AC2-123 to be set. Use the Techstream to clear the DTCs INFO.

(g) Measure the voltage according to the value(s) in the table below.

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| c4-1 (VIB) - c4-2 (GIB) | Power switch on (IG) | 4.6 to 5.4 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Hybrid Battery Junction Block) |

(h) Turn the power switch off.

(i) Connect the c4 battery current sensor connector to the hybrid battery junction block.

(j) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - HYBRID BATTERY JUNCTION BLOCK)

OK ▶ **REPLACE HYBRID BATTERY JUNCTION BLOCK**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - HYBRID BATTERY JUNCTION BLOCK) |

NOTICE:

Be sure to wear insulated gloves.

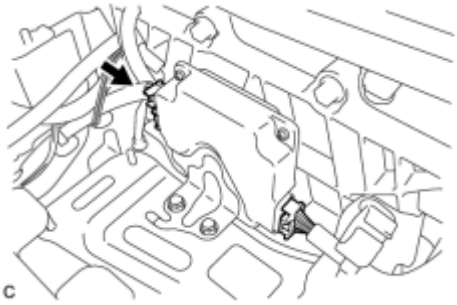
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(d) Disconnect only the c1 connector of the battery smart unit.

(e) Disconnect the c4 battery current sensor connector from the hybrid battery junction block.

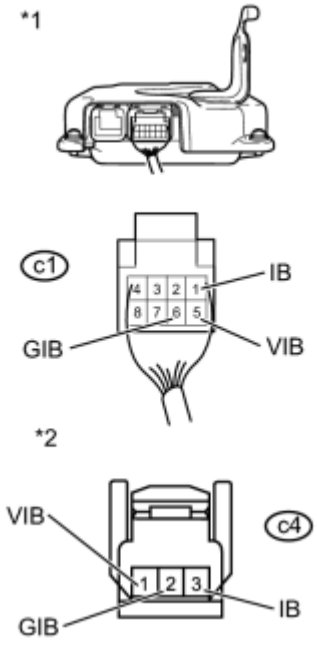
(f) Measure the resistance according to the value(s) in the tables below.

Standard Resistance (Check for Open):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| c1-1 (IB) - c4-3 (IB) | Power switch off | Below 1 Ω |
| c1-6 (GIB) - c4-2 (GIB) | Power switch off | Below 1 Ω |
| c1-5 (VIB) - c4-1 (VIB) | Power switch off | Below 1 Ω |

Standard Resistance (Check for Short):

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| c1-1 (IB) or c4-3 (IB) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| c1-6 (GIB) or c4-2 (GIB) - Body ground and other terminals | Power switch off | 10 kΩ or higher |
| c1-5 (VIB) or c4-1 (VIB) - Body ground and other terminals | Power switch off | 10 kΩ or higher |




# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |
| *2 | Front view of wire harness connector<br><br>(to Hybrid Battery Junction Block) |

(g) Connect the c1 connector to the battery smart unit.

(h) Connect the c4 battery current sensor connector to the hybrid battery junction block.

(i) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(j) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE BATTERY SMART UNIT**

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (BATTERY TEMPERATURE SENSOR) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE HV BATTERY ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0AAE-123 | Hybrid Battery Pack Air Temperature Sensor "A" Circuit Low |
| DTC | P0AAF-123 | Hybrid Battery Pack Air Temperature Sensor "A" Circuit High |

# DESCRIPTION

- The inlet air temperature sensor (battery) is mounted on the HV battery. The resistance of the sensor varies in accordance with changes in the intake air temperature. The characteristics of the inlet air temperature sensor are the same as those of the battery temperature sensor INFO. The battery smart unit uses signals from the inlet air temperature sensor to control the air volume of the battery cooling blower assembly.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0AAE-123<br><br>P0AAF-123 | When the temperature indicated by the inlet air temperature sensor is lower than a predetermined limit (open circuit) or is higher than a predetermined limit (short circuit) | • HV battery assembly<br>• Battery smart unit<br>• Wire harness or connector<br>• Hybrid battery junction block |

HINT:

After confirming that DTC P0AAE-123 or P0AAF-123 is output, use the Techstream to check "Inhaling Air Temp" in the HV ECU data list.

| Displayed Temperature | Malfunction |
|---|---|
| -49°F (-45°C) or less | Open or +B short circuit |
| 203°F (95°C) or more | GND short |

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0A9D-123 INFO.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTCS (DTC P0AFC-123 IS OUTPUT) INFO |

B GO TO DTC CHART

A

| | |
|---|---|
| 2. | CHECK INSTALLATION OF INLET AIR TEMPERATURE SENSOR |

CAUTION:

Be sure to wear insulated gloves and protective goggles.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

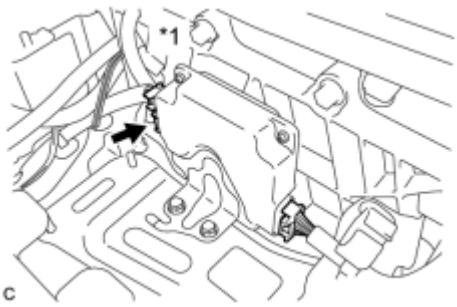
(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Check installation of inlet air temperature sensor

(1) Check the connections of the z17 connector of the battery smart unit.

OK:

The connectors are connected securely and there are no contact problems.




Result:

| Result | Proceed to |
|---|---|
| NG | B |
| OK | Go to next step |

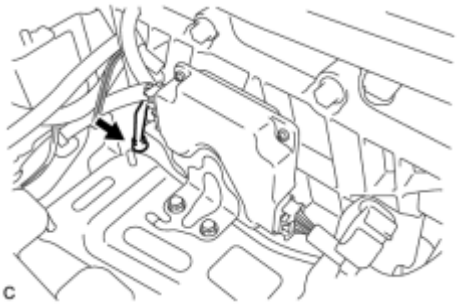
## Text in Illustration

| | |
|---|---|
| *1 | Battery Smart Unit |

(2) Visually check the installation condition of the inlet air temperature sensor.

OK:

The inlet air temperature sensor is installed in the correct location and its claws are engaged securely.




Result:

| Result | Proceed to |
|---|---|
| The inlet air temperature sensor is installed in the correct location and its claws are engaged securely | A |
| Claws are damaged. | C |
| Inlet air temperature sensor is not installed correctly, but claws are not damaged. | D |

(e) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(f) Connect the cable to the negative (-) battery terminal.

D ▶ INSTALL PARTS CORRECTLY
C ▶ REPLACE HV BATTERY ASSEMBLY
B ▶ CONNECT SECURELY
A ▼

| | |
|---|---|
| 3. | CHECK HV BATTERY ASSEMBLY (INLET AIR TEMPERATURE SENSOR AND BATTERY TEMPERATURE SENSOR) |

CAUTION:

Be sure to wear insulated gloves.

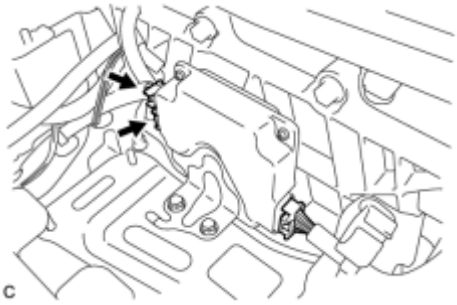
(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

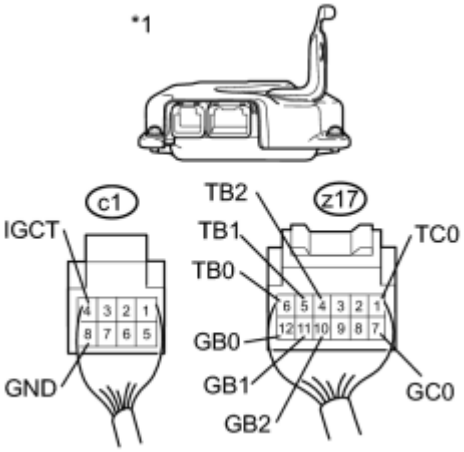



(d) Disconnect the c1 and z17 connectors from the battery smart unit.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z17-1 (TC0) - z17-7 (GC0) | 32°F (0°C) | 26.7 to 27.8 kΩ |
| | 77°F (25°C) | 9.9 to 10.1 kΩ |
| | 104°F (40°C) | 5.73 to 5.92 kΩ |




# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |

(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z17-1 (TC0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-1 (TC0) - c1-8 (GND) | Power switch off | 10 kΩ or higher |
| z17-7 (GC0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-7 (GC0) - c1-8 (GND) | Power switch off | 10 kΩ or higher |

(g) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z17-6 (TB0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-6 (TB0) - c1-8 (GND) | Power switch off | 10 kΩ or higher |
| z17-12 (GB0) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-12 (GB0) - c1-8 (GND) | Power switch off | 10 kΩ or higher |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z17-5 (TB1) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-5 (TB1) - c1-8 (GND) | Power switch off | 10 kΩ or higher |
| z17-11 (GB1) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-11 (GB1) - c1-8 (GND) | Power switch off | 10 kΩ or higher |
| z17-4 (TB2) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-4 (TB2) - c1-8 (GND) | Power switch off | 10 kΩ or higher |
| z17-10 (GB2) - c1-4 (IGCT) | Power switch off | 10 kΩ or higher |
| z17-10 (GB2) - c1-8 (GND) | Power switch off | 10 kΩ or higher |

(h) Connect the c1 and z17 connectors to the battery smart unit.

(i) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(j) Connect the cable to the negative (-) battery terminal.

NG ▶ CHECK HARNESS AND CONNECTOR (INLET AIR TEMPERATURE SENSOR AND BATTERY TEMPERATURE SENSOR)

OK ▼

| | |
|---|---|
| 4. | CHECK BATTERY SMART UNIT (VIB VOLTAGE) INFO |

NG ▶ CHECK HYBRID BATTERY JUNCTION BLOCK

OK ▶ **REPLACE BATTERY SMART UNIT**

| | |
|---|---|
| 5. | CHECK HYBRID BATTERY JUNCTION BLOCK INFO |

NG ▶ CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - HYBRID BATTERY JUNCTION BLOCK)

OK ▶ **REPLACE HYBRID BATTERY JUNCTION BLOCK**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (BATTERY SMART UNIT - HYBRID BATTERY JUNCTION BLOCK) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE BATTERY SMART UNIT**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (INLET AIR TEMPERATURE SENSOR AND BATTERY TEMPERATURE SENSOR) INFO |

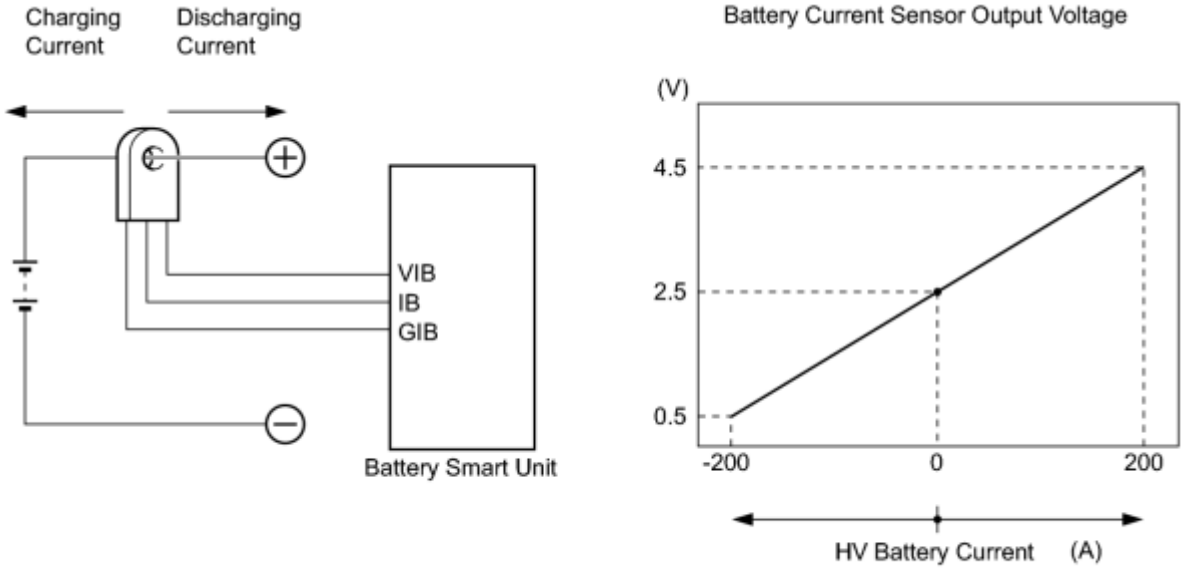
NG ▶ REPAIR HARNESS OR CONNECTOR

OK ▶ **REPLACE HV BATTERY ASSEMBLY**

| | | |
|---|---|---|
| DTC | P0ABF-123 | Hybrid Battery Pack Current Sensor Circuit |
| DTC | P0AC1-123 | Hybrid Battery Pack Current Sensor Circuit Low |
| DTC | P0AC2-123 | Hybrid Battery Pack Current Sensor Circuit High |

# DESCRIPTION

- The battery current sensor, which is mounted on the positive cable side of the HV battery assembly, detects the amperage that flows into the HV battery. The battery smart unit inputs a voltage, which varies between 0 and 5 V in proportion to the amperage, into the IB terminal from the battery current sensor. An output voltage of the battery current sensor below 2.5 V indicates that the HV battery is being charged, and above 2.5 V indicates that the HV battery is being discharged. The power management control ECU determines the charging and discharging amperage of the HV battery based on the signals that are input to its IB terminal from the battery smart unit, and calculates the SOC (state of charge) of the HV battery through the accumulated amperage.




G

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0ABF-123<br>P0AC1-123<br>P0AC2-123 | When the battery current sensor is abnormal (1 trip detection) | • Hybrid battery junction block<br>• Battery smart unit<br>• Wire harness or connector |

# MONITOR DESCRIPTION

If the battery smart unit detects a malfunction in the battery current sensor, the power management control ECU (HV CPU) illuminates the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0ABF (INF 123): Power-supply circuit for current sensor malfunction (GND short/ +B short)<br><br>P0AC1 (INF 123): Current sensor circuit malfunction (GND short)<br><br>P0AC2 (INF 123): Current sensor circuit malfunction (open) |
| Required sensors / components | Battery current sensor |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P0ABF (INF 123) is not detected<br><br>DTC P0AC1 (INF 123) is not detected<br><br>DTC P0AC2 (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN

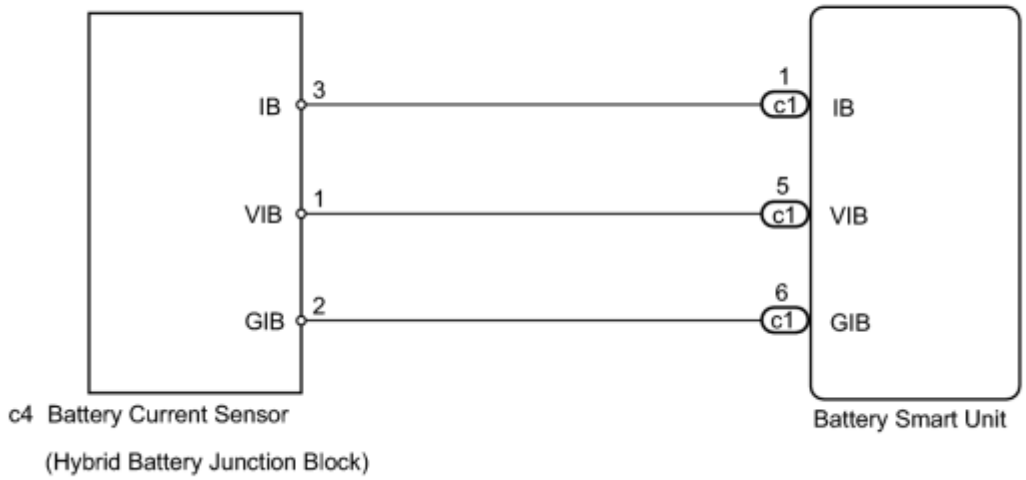
1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Perform the universal trip.
7. Enter the following menus: Powertrain / HV / Trouble Codes.

8. Check that permanent DTCs are cleared.

   HINT:

   - If a permanent DTC is output, the system is malfunctioning.
   - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (HYBRID BATTERY JUNCTION BLOCK - BATTERY SMART UNIT) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 3. | CHECK BATTERY SMART UNIT (VIB VOLTAGE) INFO |

NG ▶ REPLACE BATTERY SMART UNIT

OK ▼

| | |
|---|---|
| 4. | CHECK BATTERY SMART UNIT |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

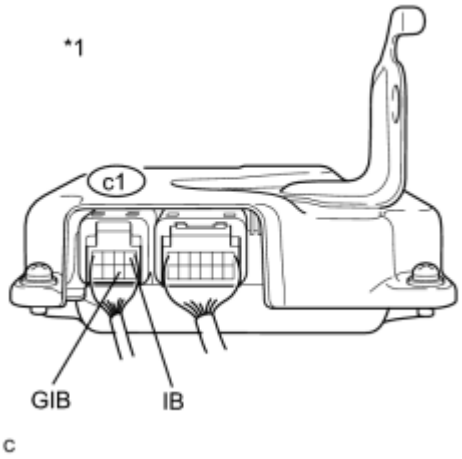
(d) Connect the cable to the negative (-) battery terminal.

(e) Turn the power switch on (IG).

NOTICE:

Turning the power switch on (IG) with the service plug grip removed causes an interlock switch system DTC (P0A0D-350) to be set. Use the Techstream to clear the DTCs INFO.

(f) Measure the voltage according to the value(s) in the table below.




Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| c1-1 (IB) - c1-6 (GIB) | Power switch on (IG) | 2.46 to 2.54 V |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Smart Unit) |

(g) Turn the power switch off.

(h) Disconnect the cable from the negative (-) battery terminal.

(i) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(j) Connect the cable to the negative (-) battery terminal.

NG ▶ REPLACE HYBRID BATTERY JUNCTION BLOCK
OK ▶ **REPLACE BATTERY SMART UNIT**

| | | |
|---|---|---|
| DTC | P0AC0-123 | Hybrid Battery Pack Current Sensor Circuit Range / Performance |

# DESCRIPTION

Refer to the Description for DTC P0ABF-123 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0AC0-123 | When the battery current sensor is abnormal (1 or 2 trip detection) | • Hybrid battery junction block<br>• Battery smart unit |

# MONITOR DESCRIPTION

If the battery smart unit detects a malfunction in the battery current sensor, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0AC0 (INF 123): Current sensor malfunction |
| Required sensors / components | Battery current sensor |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | P0AC0 (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN

1. Connect the Techstream to the DLC3.

2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (IG), wait for 10 seconds or more and then turn the power switch off.
6. Turn the power switch on (READY) and turn the Techstream on.
7. Perform a universal trip.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
9. Check that permanent DTCs are cleared.

   HINT:

   - If a permanent DTC is output, the system is malfunctioning.
   - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | REPLACE HYBRID BATTERY JUNCTION BLOCK |

(a) Replace the hybrid battery junction block INFO.

NEXT ▼

| | |
|---|---|
| 3. | CLEAR DTC (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Clear the DTCs and freeze frame data INFO.

(e) Perform a road test to charge and discharge the HV battery assembly.

HINT:

2 trip detection logic is used. After the first road test, turn the power switch off and perform a road test again.

(f) Disconnect the Techstream from the DLC3.

NEXT

| | |
|---|---|
| 4. | RECONFIRM DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read output DTCs INFO.

**Result**

| Result | Proceed to |
|---|---|
| DTCs P0AC0-123 is not output. | A |
| DTCs P0AC0-123 is output. | B |

(e) Disconnect the Techstream from the DLC3.

B REPLACE BATTERY SMART UNIT
A **RECOVERY TO NORMAL**

| | | |
|---|---|---|
| DTC | P0AFC-123 | Hybrid Battery Pack Sensor Module |

# DESCRIPTION

• If the battery smart unit detects an internal malfunction, it sends an error signal to the power management control ECU. When the power management control ECU receives the error signal from the battery smart unit, the ECU warns the driver and performs fail-safe control.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0AFC-123 | The power management control ECU receives an error signal from the battery smart unit. | • Battery smart unit<br>• Wire harness or connector<br>• IGCT fuse<br>• IGCT No. 2 fuse<br>• IGCT relay |

# MONITOR DESCRIPTION

If the battery smart unit detects an internal malfunction in the unit itself, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0AFC (INF 123): Hybrid Battery Pack Sensor Module |
| Required sensors / components | Battery smart unit |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P0AFC (INF 123) is not detected |

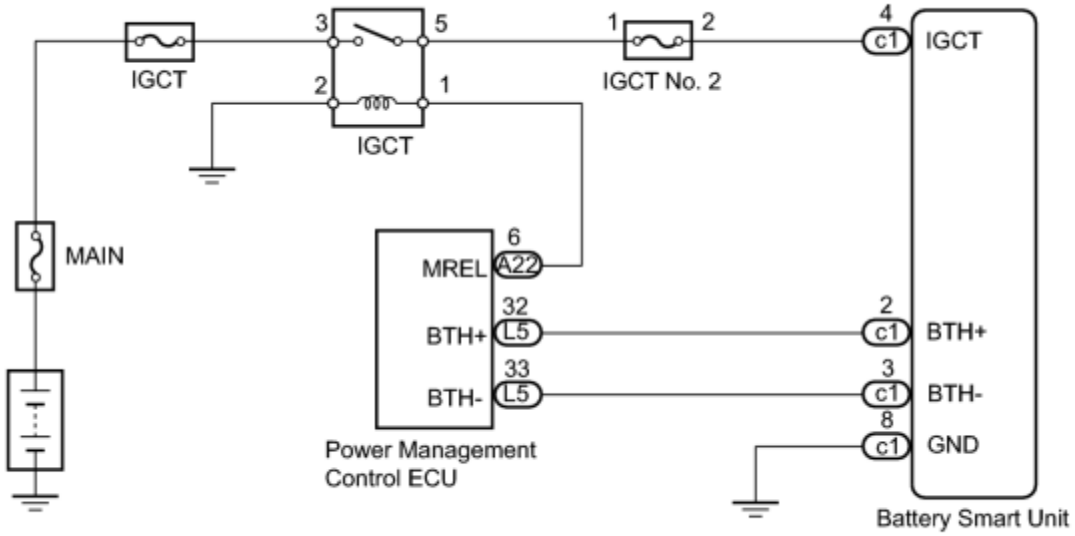
# CONFIRMATION DRIVING PATTERN

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Perform the universal trip.
7. Enter the following menus: Powertrain / HV / Trouble Codes.
8. Check that permanent DTCs are cleared.

   HINT:

   - If a permanent DTC is output, the system is malfunctioning.
   - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

HINT:

After repairing, restart the system (turn the power switch on (READY)) and recheck for DTCs INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (IGCT VOLTAGE) |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

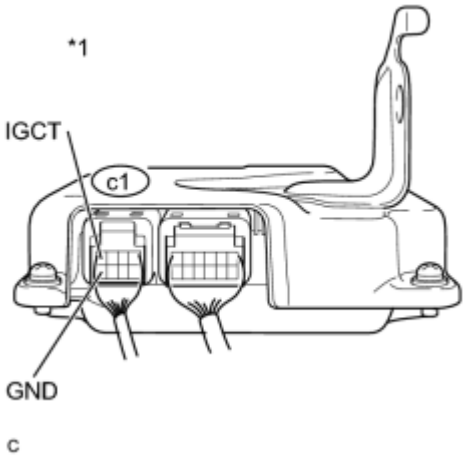
(d) Connect the cable to the negative (-) battery terminal.

(e) Turn the power switch on (IG).

(f) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| c1-4 (IGCT) - c1-8 (GND) | Power switch on (IG) | 11 to 14 V |




- After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
- Turning the power switch on (IG) with the service plug grip removed causes an interlock switch system DTC (P0A0D-350) to be set. Use the Techstream to clear the DTCs INFO.

## Text in Illustration

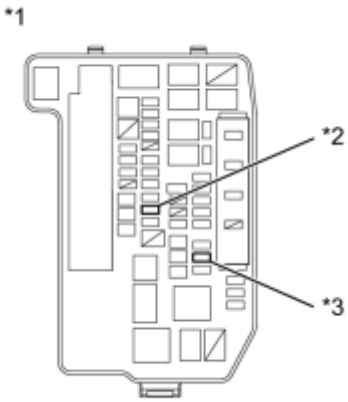
| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Smart Unit) |

(g) Turn the power switch off.

(h) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

NG ▶ CHECK FUSE (IGCT, IGCT NO. 2)
OK ▶ **REPLACE BATTERY SMART UNIT**

| | |
|---|---|
| 2. | CHECK FUSE (IGCT, IGCT NO. 2) |




(a) Remove the IGCT and IGCT No. 2 fuses from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Fuse |
| *3 | IGCT No. 2 Fuse |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

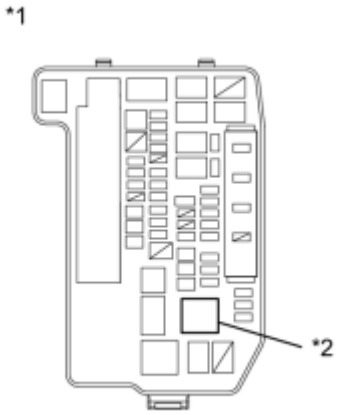
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| IGCT fuse | Always | Below 1 Ω |
| IGCT No. 2 fuse | Always | Below 1 Ω |

(c) Install the IGCT and IGCT No. 2 fuses to the engine room junction block assembly.

NG ▶ REPLACE FUSE (IGCT, IGCT NO. 2)

OK

| | |
|---|---|
| 3. | CHECK RELAY (IGCT) |



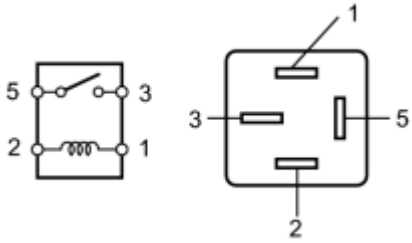

(a) Remove the IGCT relay from the engine room junction block assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Relay |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Auxiliary battery voltage is applied between terminals 1 and 2 | 10 kΩ or more |
| | Auxiliary battery voltage is not applied between terminals 1 and 2 | below 1 Ω |

(c) Install the IGCT relay to the engine room junction block assembly.

NG ▶ REPLACE RELAY (IGCT)

OK

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (IGCT RELAY - BATTERY SMART UNIT) |

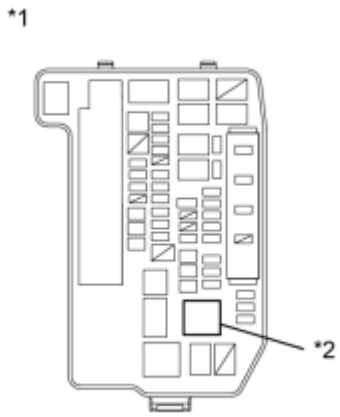
CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Remove the IGCT relay from the engine room junction block assembly.

## Text in Illustration



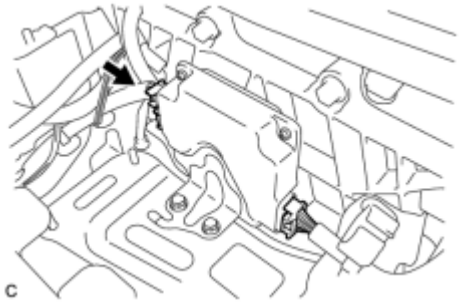

| | |
|---|---|
| *1 | Engine Room Junction Block Assembly |
| *2 | IGCT Relay |

(c) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(d) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.




(e) Disconnect only the c1 connector of the battery smart unit.

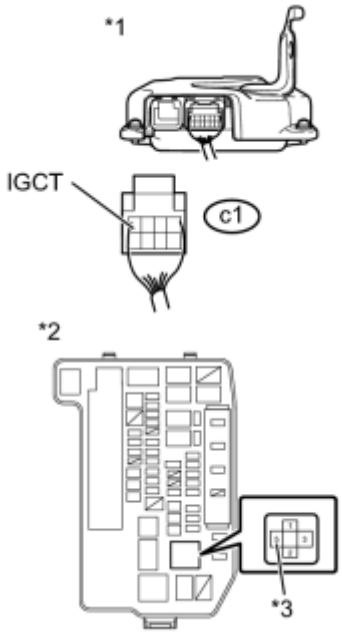
(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| IGCT relay terminal 5 - c1-4 (IGCT) | Power switch off | Below 1 Ω |

# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |
| *2 | Engine Room Junction Block Assembly |




| | |
|---|---|
| *3 | IGCT relay terminal 5 |

(g) Connect the c1 connector of the battery smart unit.

(h) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(i) Install the IGCT relay to the engine room junction block assembly.

(j) Connect the cable to the negative (-) battery terminal.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **CHECK AND REPAIR POWER SOURCE CIRCUIT**

| | | |
|---|---|---|
| DTC | P0B3D-123 | Hybrid Battery Voltage Sensor "A" Circuit Low |
| DTC | P0B42-123 | Hybrid Battery Voltage Sensor "B" Circuit Low |
| DTC | P0B47-123 | Hybrid Battery Voltage Sensor "C" Circuit Low |
| DTC | P0B4C-123 | Hybrid Battery Voltage Sensor "D" Circuit Low |
| DTC | P0B51-123 | Hybrid Battery Voltage Sensor "E" Circuit Low |
| DTC | P0B56-123 | Hybrid Battery Voltage Sensor "F" Circuit Low |
| DTC | P0B5B-123 | Hybrid Battery Voltage Sensor "G" Circuit Low |
| DTC | P0B60-123 | Hybrid Battery Voltage Sensor "H" Circuit Low |
| DTC | P0B65-123 | Hybrid Battery Voltage Sensor "I" Circuit Low |
| DTC | P0B6A-123 | Hybrid Battery Voltage Sensor "J" Circuit Low |
| DTC | P0B6F-123 | Hybrid Battery Voltage Sensor "K" Circuit Low |
| DTC | P0B74-123 | Hybrid Battery Voltage Sensor "L" Circuit Low |
| DTC | P0B79-123 | Hybrid Battery Voltage Sensor "M" Circuit Low |
| DTC | P0B7E-123 | Hybrid Battery Voltage Sensor "N" Circuit Low |
| DTC | P0B83-123 | Hybrid Battery Voltage Sensor "O" Circuit Low |
| DTC | P308A-123 | Hybrid Battery Voltage Sensor All Circuits Low |

# DESCRIPTION

- Refer to the description for DTC P0A80-123 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0B3D-123 | Each battery block voltage becomes less than 2.5 V (open) (1 trip detection) | • Battery smart unit<br>• HV battery assembly |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0B42-123<br>P0B47-123<br>P0B4C-123<br>P0B51-123<br>P0B56-123<br>P0B5B-123<br>P0B60-123<br>P0B65-123<br>P0B6A-123<br>P0B6F-123<br>P0B74-123<br>P0B79-123<br>P0B7E-123<br>P0B83-123<br>P308A-123 | | |

HINT:

- Values smaller than 2.0 V may not be shown in the Data List because a fail-safe value is substituted.
- Hybrid battery voltage sensor in the DTC titles refers to the battery smart unit.

# MONITOR DESCRIPTION

If the battery smart unit detects voltage drop in a battery module, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P0B3D (INF 123) / P0B42 (INF 123) / P0B47 (INF 123) / P0B4C (INF 123) / P0B51 (INF 123) / P0B56 (INF 123) / P0B5B (INF 123) / P0B60 (INF 123) / P0B65 (INF 123) / P0B6A (INF 123) / P0B6F (INF 123) / P0B74 (INF 123) / P0B79 (INF 123) / P0B7E (INF 123) / P0B83 (INF 123) / P308A (INF 123): Battery voltage sensor circuit malfunction (open) |
| Required sensors / components | Battery smart unit |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P0B3D (INF 123) / P0B42 (INF 123) / P0B47 (INF 123) / P0B4C (INF 123) / P0B51 (INF 123) / P0B56 (INF 123) / P0B5B (INF 123) / P0B60 (INF 123) / P0B65 (INF 123) / P0B6A (INF 123) / P0B6F (INF 123) / P0B74 (INF 123) / P0B79 (INF 123) / P0B7E (INF 123) / P0B83 (INF 123) / P308A (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Perform the universal trip.
7. Enter the following menus: Powertrain / HV / Trouble Codes.
8. Check that permanent DTCs are cleared.

   HINT:

   - If a permanent DTC is output, the system is malfunctioning.
   - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

CAUTION:

- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTOR CONNECTION CONDITION |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

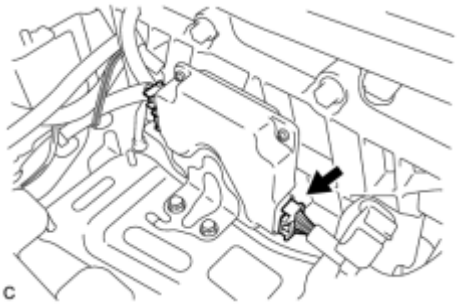
(b) Check that the service plug grip is not installed.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(d) Check the connections of the j1 connector of the battery smart unit.




OK:

The connectors are connected securely and there are no contact problems.

(e) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(f) Connect the cable to the negative (-) battery terminal.

NG ▶ CONNECT SECURELY

OK ▼

| | |
|---|---|
| 3. | REPLACE BATTERY SMART UNIT |

(a) Replace the battery smart unit INFO.

NEXT ▼

| | |
|---|---|
| 4. | CLEAR DTC (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Clear the DTCs and freeze frame data INFO.

(e) Perform a road test to charge and discharge the HV battery assembly.

(f) Disconnect the Techstream from the DLC3.

NEXT ▼

| | |
|---|---|
| 5. | RECONFIRM DTC OUTPUT (HV) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(d) Read output DTCs INFO.

**Result**

| Result | Proceed to |
|---|---|
| Battery temperature sensor DTCs for this diagnostic procedure are not output | A |
| Battery temperature sensor DTCs for this diagnostic procedure are output | B |

HINT:

Turning the power switch on (IG) with the service plug grip removed causes an interlock switch system DTC (P0A0D-350) to be set. Use the Techstream to clear the DTCs INFO.

(e) Disconnect the Techstream from the DLC3.

B ▶REPLACE HV BATTERY ASSEMBLY
A ▶**RETURN TO NORMAL OPERATION**

| | | |
|---|---|---|
| DTC | P3011-123 | Battery Block 1 Becomes Weak |
| DTC | P3012-123 | Battery Block 2 Becomes Weak |
| DTC | P3013-123 | Battery Block 3 Becomes Weak |
| DTC | P3014-123 | Battery Block 4 Becomes Weak |
| DTC | P3015-123 | Battery Block 5 Becomes Weak |
| DTC | P3016-123 | Battery Block 6 Becomes Weak |
| DTC | P3017-123 | Battery Block 7 Becomes Weak |
| DTC | P3018-123 | Battery Block 8 Becomes Weak |
| DTC | P3019-123 | Battery Block 9 Becomes Weak |
| DTC | P3020-123 | Battery Block 10 Becomes Weak |
| DTC | P3021-123 | Battery Block 11 Becomes Weak |
| DTC | P3022-123 | Battery Block 12 Becomes Weak |
| DTC | P3023-123 | Battery Block 13 Becomes Weak |
| DTC | P3024-123 | Battery Block 14 Becomes Weak |

# DESCRIPTION

- Refer to the Description for DTC P0A9C-123 INFO.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P3011-123<br><br>P3012-123<br><br>P3013-123 | Presence of a malfunctioning block is determined based on each battery block voltage (1 trip detection). | • HV battery assembly<br>• Battery smart unit |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P3014-123<br><br>P3015-123<br><br>P3016-123<br><br>P3017-123<br><br>P3018-123<br><br>P3019-123<br><br>P3020-123<br><br>P3021-123<br><br>P3022-123<br><br>P3023-123<br><br>P3024-123 | | |

HINT:

P3011-123 and P3024-123 will not be set unless the vehicle is driven for approximately 10 minutes after clearing the DTCs.

# MONITOR DESCRIPTION

If there is an abnormal internal resistance or electromotive voltage in the battery blocks, the battery smart unit determines that a malfunction has occurred. When the malfunction detection condition is satisfied, the power management control ECU (HV CPU) will illuminate the MIL and set a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | P3011 to P3024 (INF 123): Rationality |

| | |
|---|---|
| Required sensors / components | HV battery |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | TMC's intellectual property |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| Battery smart unit | DTC P3011 (INF 123) to P3024 (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and turn the Techstream on.
6. Perform a universal trip.
7. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.
8. Check that permanent DTCs are cleared.

   HINT:

   - If a permanent DTC is output, the system is malfunctioning.
   - If no permanent DTC is output, the system is normal.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (DTC P0AFC-123 IS OUTPUT) INFO |

B ▶ GO TO DTC CHART

A ▼

| | |
|---|---|
| 2. | CHECK BATTERY SMART UNIT INFO |

B ▶ REPLACE BATTERY SMART UNIT

A ▶ **REPLACE HV BATTERY ASSEMBLY**

| | | |
|---|---|---|
| DTC | U029A-123 | Lost Communication with Hybrid Battery Pack Sensor Module |

# DESCRIPTION

The battery smart unit detects the HV battery conditions (voltage, current, and temperature) and the battery cooling fan voltage, and sends the detected signals to the power management control ECU via the serial communication system.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U029A-123 | Problem in serial communication between the battery smart unit and power management control ECU (1 trip detection) | • Wire harness or connector<br>• Power management control ECU<br>• Battery smart unit<br>• IGCT fuse<br>• IGCT NO. 2 fuse<br>• IGCT relay |

# MONITOR DESCRIPTION

If a malfunction in communication line between the battery smart unit and power management control ECU (HV CPU) is detected, the power management control ECU (HV CPU) illuminates the MIL and sets a DTC.

# MONITOR STRATEGY

| | |
|---|---|
| Related DTCs | U029A (INF 123): Battery Smart Unit communication malfunction |
| Required sensors / components | Main: Battery smart unit<br><br>Sub: Communication line |
| Frequency of operation | Continuous |
| Duration | TMC's intellectual property |
| MIL operation | Immediately |
| Sequence of operation | None |

# TYPICAL ENABLING CONDITIONS

| | |
|---|---|
| The monitor will run whenever the following DTCs are not present | TMC's intellectual property |
| Other conditions belong to TMC's intellectual property | - |

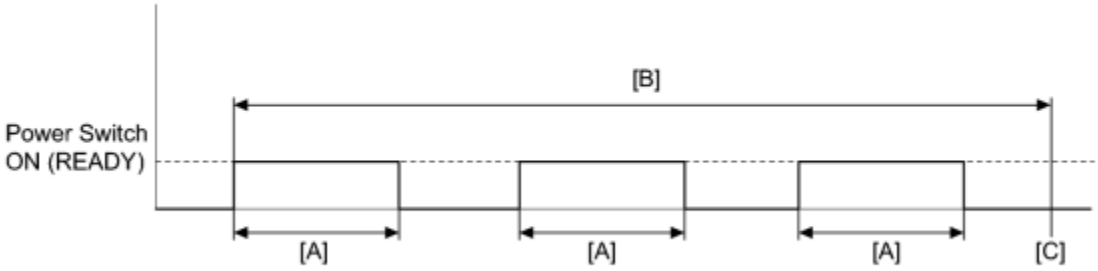
# TYPICAL MALFUNCTION THRESHOLDS

| | |
|---|---|
| TMC's intellectual property | - |

# COMPONENT OPERATING RANGE

| | |
|---|---|
| TMC's intellectual property | DTC U029A (INF 123) is not detected |

# CONFIRMATION DRIVING PATTERN




c

1. Connect the Techstream to the DLC3.
2. Turn the power switch on (IG) and turn the Techstream on.
3. Clear the DTCs (even if no DTCs are stored, perform the clear DTC procedure).
4. Turn the power switch off.
5. Turn the power switch on (READY) and after a few seconds, turn the power switch off. [A]
6. Repeat [A] 3 times. [B]
7. Turn the power switch on (IG) and turn the Techstream on.
8. Enter the following menus: Powertrain / Hybrid Control / Trouble Codes. [C]
9. Check that permanent DTCs are cleared.
10. If the permanent DTCs are not cleared, perform the universal trip, and then check for permanent DTCs again.

    HINT:

    - If a permanent DTC is output, the system is malfunctioning.
    - If no permanent DTC is output, the system is normal.

# WIRING DIAGRAM

Refer to the wiring diagram for DTC P0AFC-123 INFO.

# INSPECTION PROCEDURE

CAUTION:

- If the battery cover is removed, install it before turning the power switch on (IG) or (READY). If the power switch is turned on (IG) or (READY) with the battery cover removed, U029A-123 may be set.
- Before inspecting the high-voltage system, take safety precautions to prevent electrical shocks, such as wearing insulated gloves and removing the service plug grip. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.
- After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

  HINT:

  At least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

NOTICE:

After the power switch is turned off, the display and navigation module display (HDD navigation system) records various types of memory and settings. As a result, after turning the power switch off, make sure to wait at least 60 seconds before disconnecting the cable from the negative (-) battery terminal.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (IGCT VOLTAGE) INFO |

NG ▶ CHECK FUSE (IGCT, IGCT NO. 2)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BATTERY SMART UNIT) |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

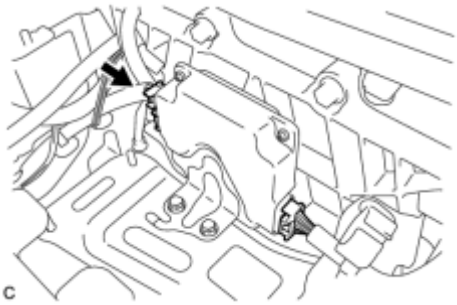
NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Disconnect the L5 connector from the power management control ECU INFO.

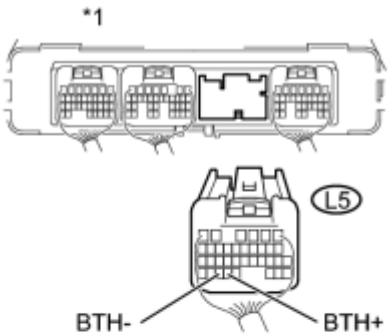
(d) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

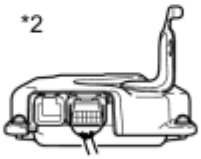
(e) Disconnect only the c1 connector of the battery smart unit.

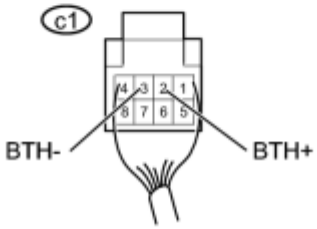



(f) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-32 (BTH+) - c1-2 (BTH+) | Power switch off | Below 1 Ω |
| L5-33 (BTH-) - c1-3 (BTH-) | Power switch off | Below 1 Ω |
| L5-32 (BTH+) - Body ground and other terminals | Power switch off | 10 kΩ or more |
| L5-33 (BTH-) - Body ground and other terminals | Power switch off | 10 kΩ or more |

# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |
| *2 | Rear view of wire harness connector<br><br>(to Battery Smart Unit) |

(g) Connect the cable to the negative (-) battery terminal.

(h) Turn the power switch on (IG).

(i) Measure the voltage according to the value(s) in the table below.

NOTICE:

After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-32 (BTH+) - Body ground | Power switch on (IG) | Below 1 V |
| L5-33 (BTH-) - Body ground | Power switch on (IG) | Below 1 V |

NOTICE:

- If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be stored. If this DTC is stored, clear the DTC using the Techstream INFO.
- If the power switch is turned on (IG) with the connector removed from the sensor, DTCs will be stored. If DTC are stored, clear the DTCs using the Techstream INFO.

(j) Connect the c1 connector of the battery smart unit.

(k) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(l) Connect the L5 connector to the power management control ECU INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▼

| | |
|---|---|
| 3. | CHECK WAVEFORM |

CAUTION:

Be sure to wear insulated gloves.

(a) Disconnect the cable from the negative (-) battery terminal.

(b) Check that the service plug grip is not installed.

NOTICE:

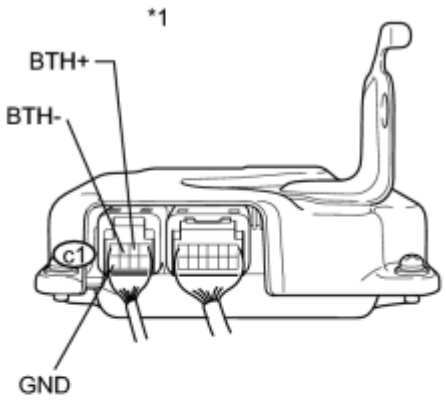
After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.

(c) Remove the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

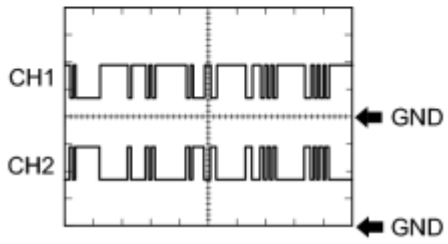
(d) Connect the cable to the negative (-) battery terminal.

(e) Connect an oscilloscope between the battery smart unit terminals specified in the table below, and measure the waveform.

| Item | Content |
|---|---|
| Tester Connection | CH1: c1-2 (BTH+) - c1-8 (GND)<br><br>CH2: c1-3 (BTH-) - c1-8 (GND) |




| | |
|---|---|
| Equipment Setting | 2 V/DIV., 500 µs/DIV. |
| Condition | Power switch on (IG) |




NOTICE:

- After removing the service plug grip, do not turn the power switch on (READY), unless instructed by the repair manual because this may cause a malfunction.
- If the power switch is turned on (IG) with the service plug grip removed, DTC P0A0D-350 for the interlock switch system will be stored. If this DTC is output, clear the DTC using the Techstream INFO.

**Text in Illustration**

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Battery Smart Unit) |

(f) Turn the power switch off.

(g) Disconnect the cable from the negative (-) battery terminal.

(h) Install the No. 1 hybrid vehicle battery carrier bracket sub-assembly INFO.

(i) Connect the cable to the negative (-) battery terminal.

NG ▶ REPLACE BATTERY SMART UNIT
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 4. | CHECK FUSE (IGCT, IGCT NO. 2) INFO |

NG ▶ REPLACE FUSE (IGCT, IGCT NO. 2)

OK

| | |
|---|---|
| 5. | CHECK RELAY (IGCT) INFO |

NG → REPLACE RELAY (IGCT)

OK

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (IGCT RELAY - BATTERY SMART UNIT) INFO |

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK → **CHECK AND REPAIR POWER SOURCE CIRCUIT**

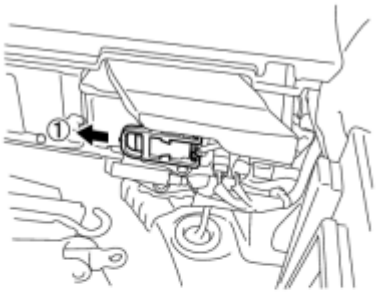
# PRECAUTION

1. PRECAUTIONS FOR INSPECTING HYBRID CONTROL SYSTEM

(a) Before inspecting the high-voltage system or disconnecting the low voltage connector of the inverter with converter assembly, take safety precautions such as wearing insulated gloves and removing the service plug grip to prevent electrical shocks. After removing the service plug grip, put it in your pocket to prevent other technicians from accidentally reconnecting it while you are working on the high-voltage system.

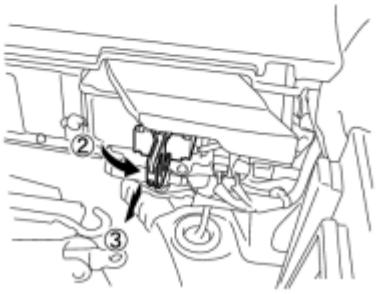
NOTICE:

After removing the service plug grip, turning the power switch on (READY) may cause a malfunction. Do not turn the power switch on (READY) unless instructed by the repair manual.




(b) After disconnecting the service plug grip, wait for at least 10 minutes before touching any of the high-voltage connectors or terminals.

HINT:



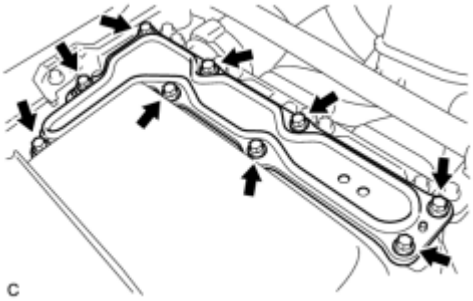

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

C

(c) Check the voltage at the terminals in the inspection point in the inverter with converter assembly.

CAUTION:

Be sure to wear insulated gloves.

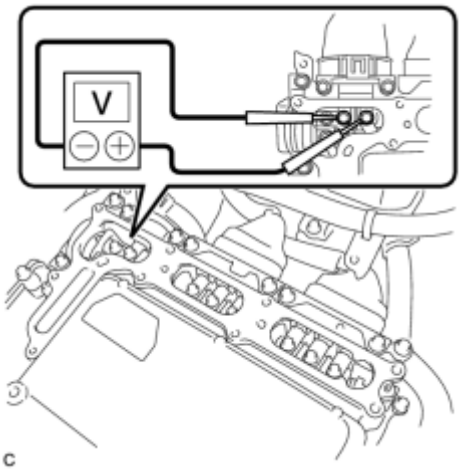


(1) Remove the 9 bolts and inverter terminal cover. INFO

NOTICE:

Cover the opening with non-residue tape to prevent entry of foreign matter or liquid after removing the connector cover.

C




(2) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Inspection point | 10 minutes passed after removing the service plug | 0 V |

HINT:

Set the tester to DC750 V or more to measure the voltage.

(d) When turning the power switch on (IG) during inspections, do not press the power switch with the brake pedal depressed.

CAUTION:

Pressing the power switch with the brake pedal depressed causes the system to enter the READY-on state. This is very dangerous because high voltage may be applied to the inspection area.

(e) Turn the power switch off, wear insulated gloves, and disconnect the cable from the negative (-) terminal of the auxiliary battery before touching any of the orange-colored wires of the high-voltage system.

(f) Turn the power switch off before performing any resistance checks.

(g) Turn the power switch off before disconnecting or reconnecting any connectors.

(h) When high-voltage connectors are removed, wrap the connectors with insulation tape to prevent them from contacting foreign objects.

2. NOTICE FOR HYBRID CONTROL SYSTEM ACTIVATION

(a) When the warning light is illuminated, or the auxiliary battery has been disconnected and reconnected, attempting to turn the power switch on (READY) may not start the system (the system may not enter the READY-on state) on the first attempt. If so, turn the power switch off and reattempt to start the hybrid system.

3. PRECAUTIONS FOR DISCONNECTING AMD TERMINAL

HINT:

The AMD terminal is connected to the positive terminal of the auxiliary battery. To prevent damage when the AMD terminal is being disconnected, use the following procedure.

(a) Be sure to disconnect the cable from the negative (-) terminal of the auxiliary battery before disconnecting the AMD terminal from the engine room junction block assembly.

(b) After disconnecting the AMD terminal, wrap the terminal with insulation tape.

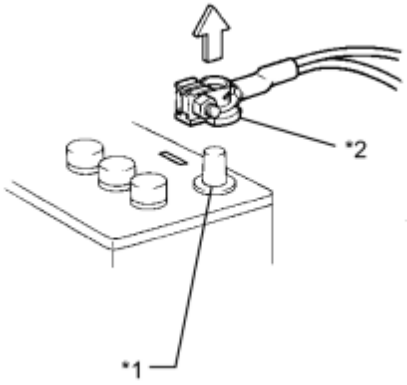
(c) Be sure to reconnect the AMD terminal to the engine room junction block assembly before reconnecting the cable of the negative (-) terminal of the auxiliary battery.

NOTICE:

A short circuit to ground may occur if the AMD terminal is disconnected before the cable is disconnected from the negative (-) terminal of the auxiliary battery. If a short circuit to ground occurs, it can result in an open circuit in a fusible link or fuse.

4. DISCONNECTING AND RECONNECTING NEGATIVE BATTERY CABLE

(a) Before performing work on electronic components, disconnect the cable from the negative (-) battery terminal to prevent damage to the electrical system or electrical components.




## Text in Illustration

| | |
|---|---|
| *1 | Negative (-) Battery Terminal |
| *2 | Cable |

(b) Before disconnecting and reconnecting the battery cable, turn the power switch off and the headlight switch off. Then loosen the terminal nut completely. Do not damage the cable or terminal.

(c) When the battery cable is disconnected, the clock and radio settings and stored DTCs are cleared. Therefore, before disconnecting the battery cable, make a note of them.

- When the cable is disconnected from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.

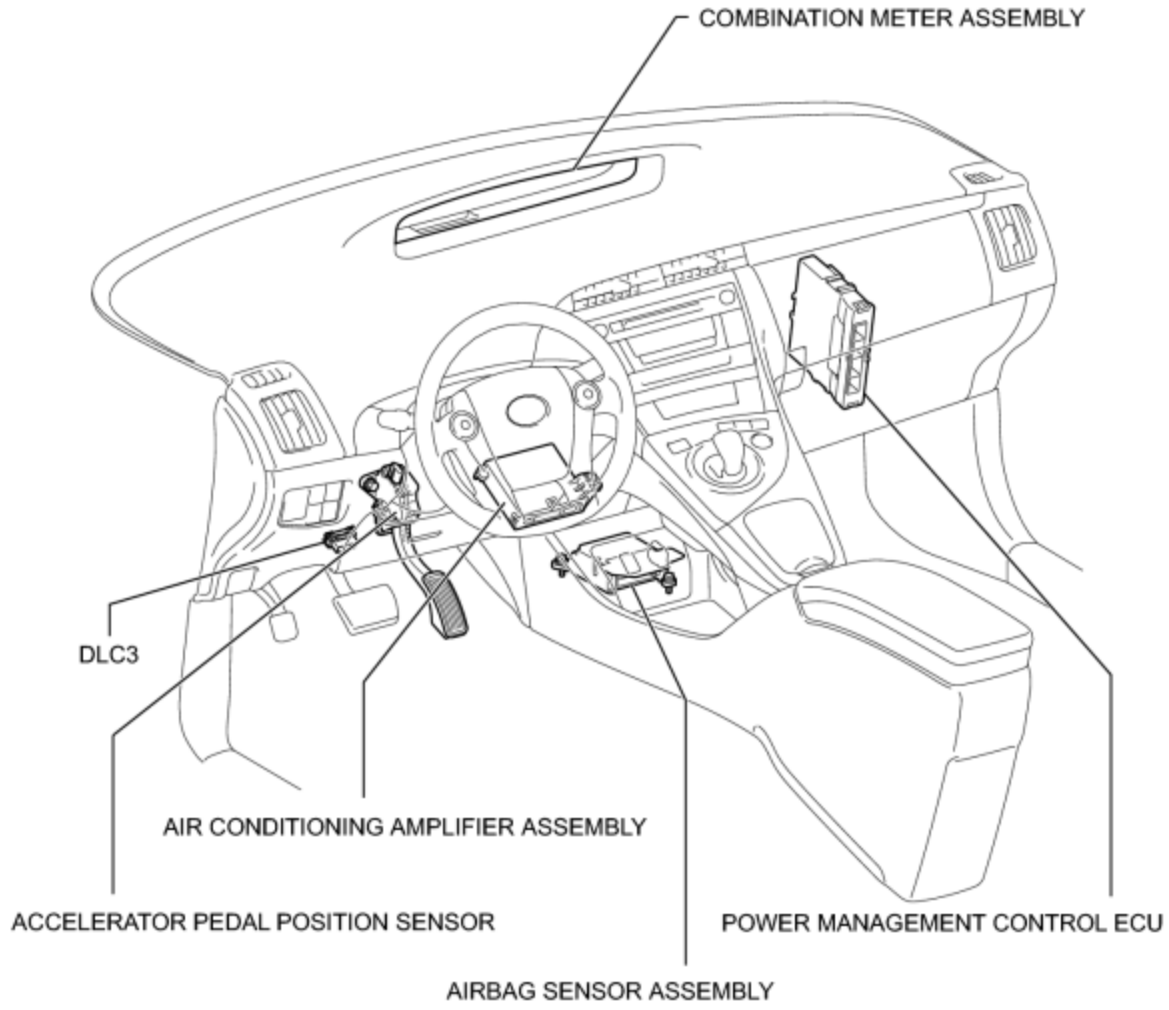
| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

# DEFINITION OF TERMS

| Terms | Definition |
|---|---|
| Monitor Description | Description of what the power management control ECU (HV CPU) monitors and how to detects malfunctions (monitoring purpose and its details). |
| Related DTCs | A group of diagnostic trouble codes that are output by the power management control ECU (HV CPU) based on the same malfunction detection logic. |
| Typical Enabling Condition | Preconditions that allow the power management control ECU (HV CPU) to detect malfunctions.<br><br>With all preconditions satisfied, the power management control ECU (HV CPU) sets DTCs when the monitored value(s) exceeds malfunction threshold(s). |
| Sequence of Operation | Order of monitor priority, applied if multiple sensors and components are involved in a single malfunction detection process.<br><br>Each sensor and component are monitored in turn and subsequent items are not monitored until the previous detection operation completes. |
| Required Sensor/Components | Sensors and components used by the power management control ECU (HV CPU) to detect each malfunction. |
| Frequency of Operation | Number of times the power management control ECU (HV CPU) checks for each malfunction during each driving cycle.<br><br>"Once per driving cycle" means that the power management control ECU (HV CPU) only checks for malfunctions once during a single driving cycle.<br><br>"Continuous" means that the power management control ECU (HV CPU) checks for malfunctions whenever enabling conditions are met. |
| Duration | Minimum time for which the power management control ECU (HV CPU) must detect continuous deviation in monitored value(s) in order to set a DTC. Timing begins when typical enabling conditions are met. |
| Malfunction Thresholds | Value beyond which the power management control ECU (HV CPU) determines malfunctions exist and sets DTCs. |
| MIL Operation | Timing of MIL illumination after a malfunction is detected.<br><br>"Immediate" means that the power management control ECU (HV CPU) illuminates the MIL as soon as a malfunction is detected.<br><br>"2 driving cycles" means that the power management control ECU (HV CPU) illuminates the MIL if the same malfunction is detected again during the next driving cycle. |

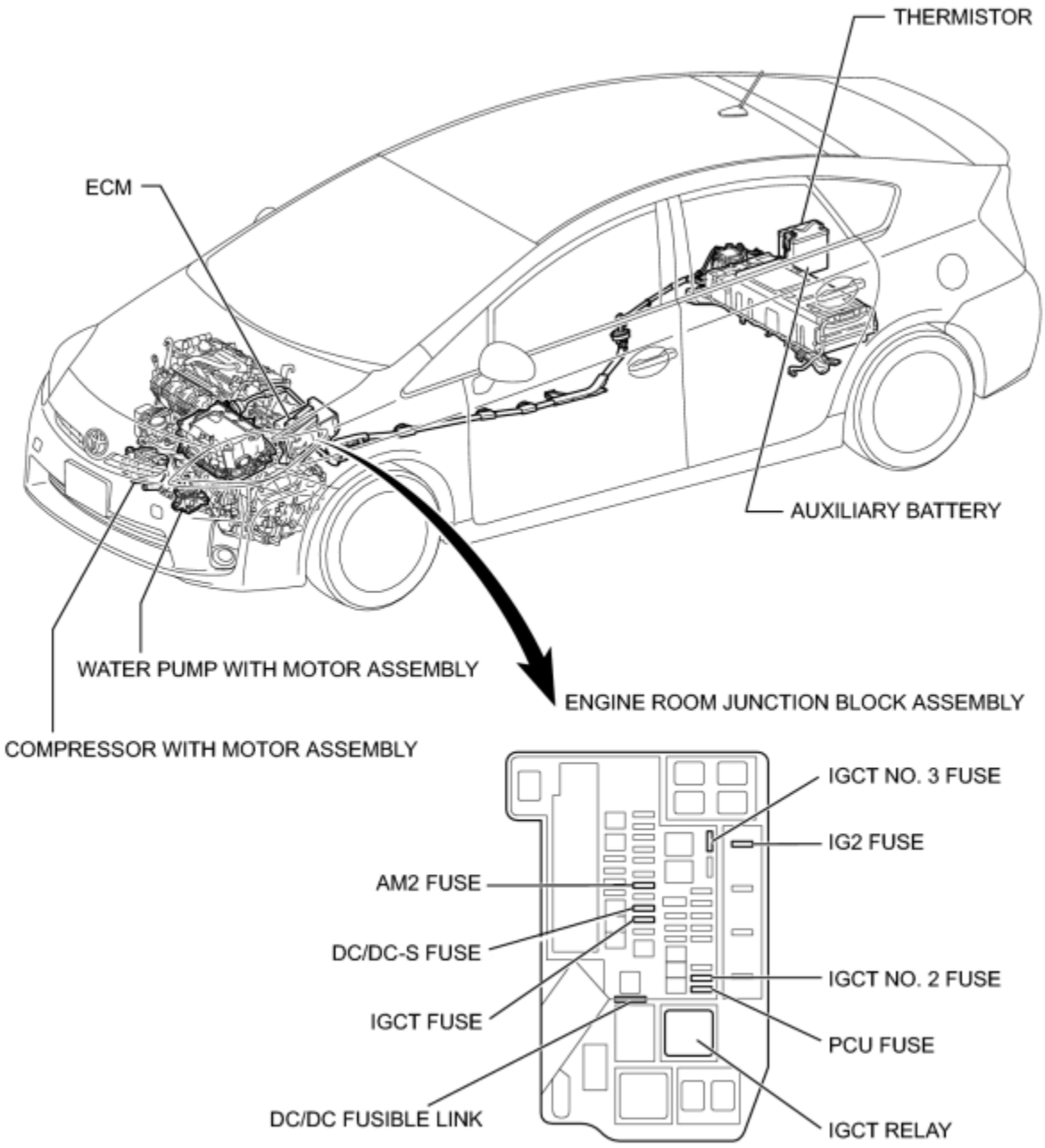
# PARTS LOCATION

# ILLUSTRATION



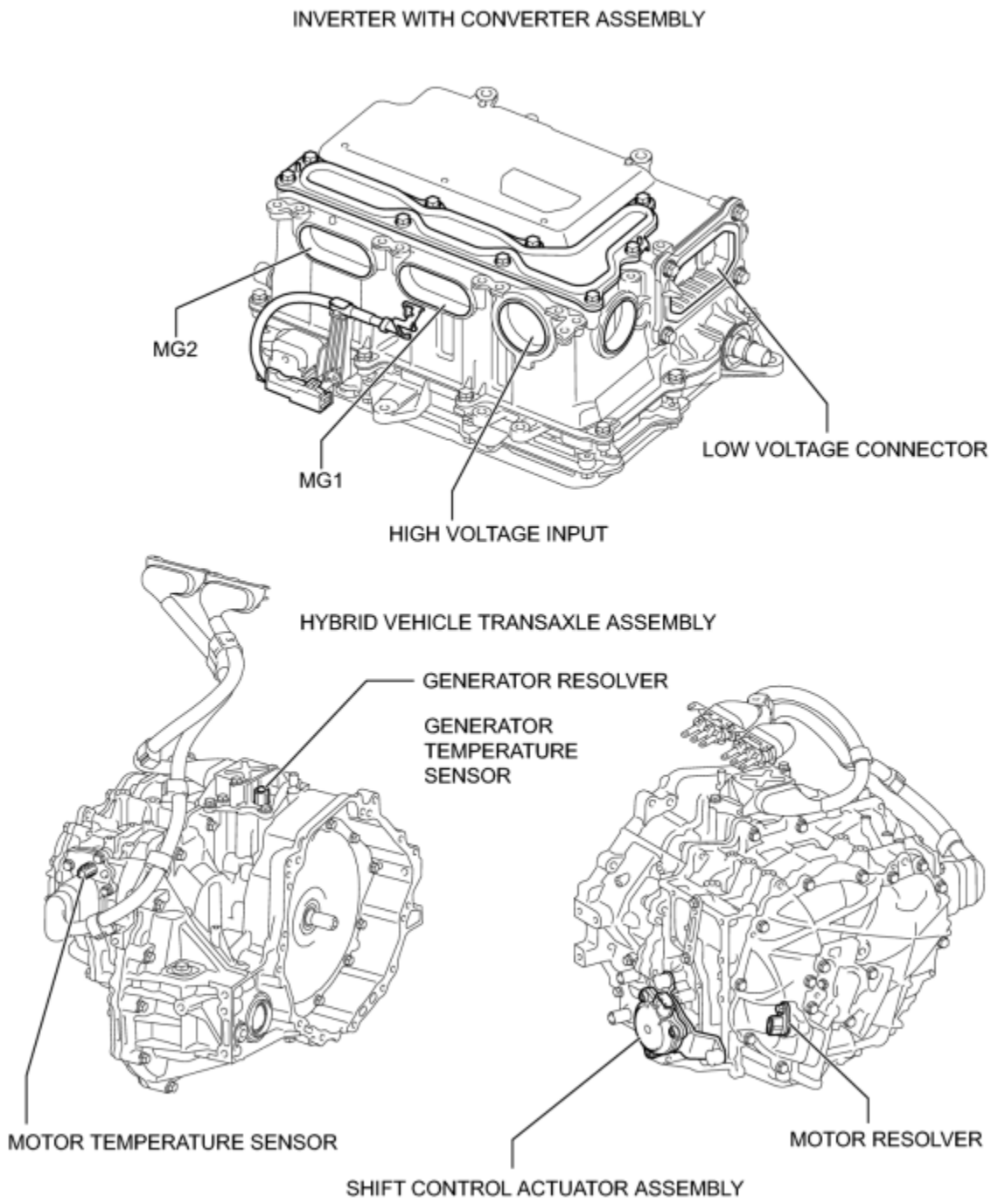

c

# ILLUSTRATION



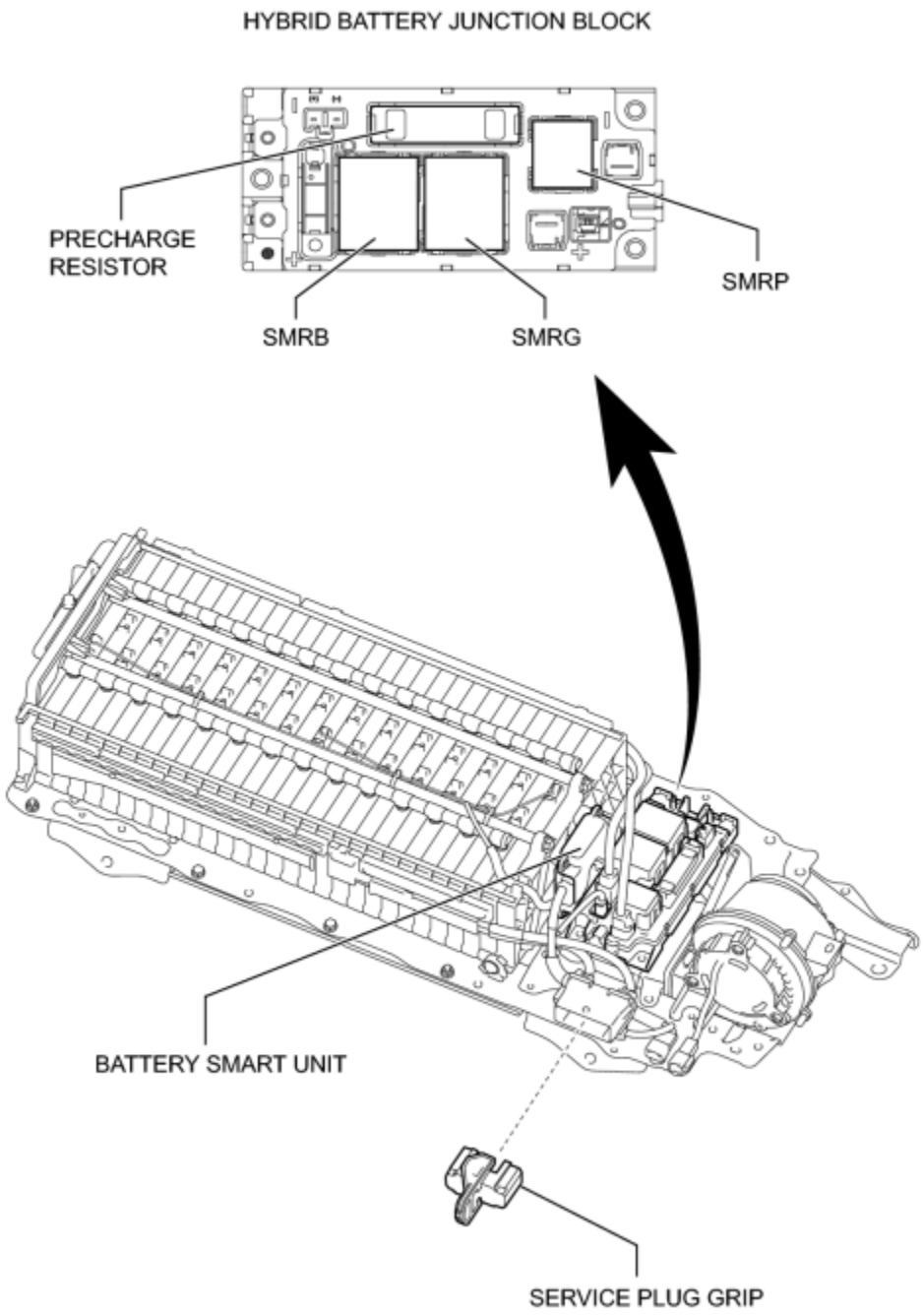

c

# ILLUSTRATION



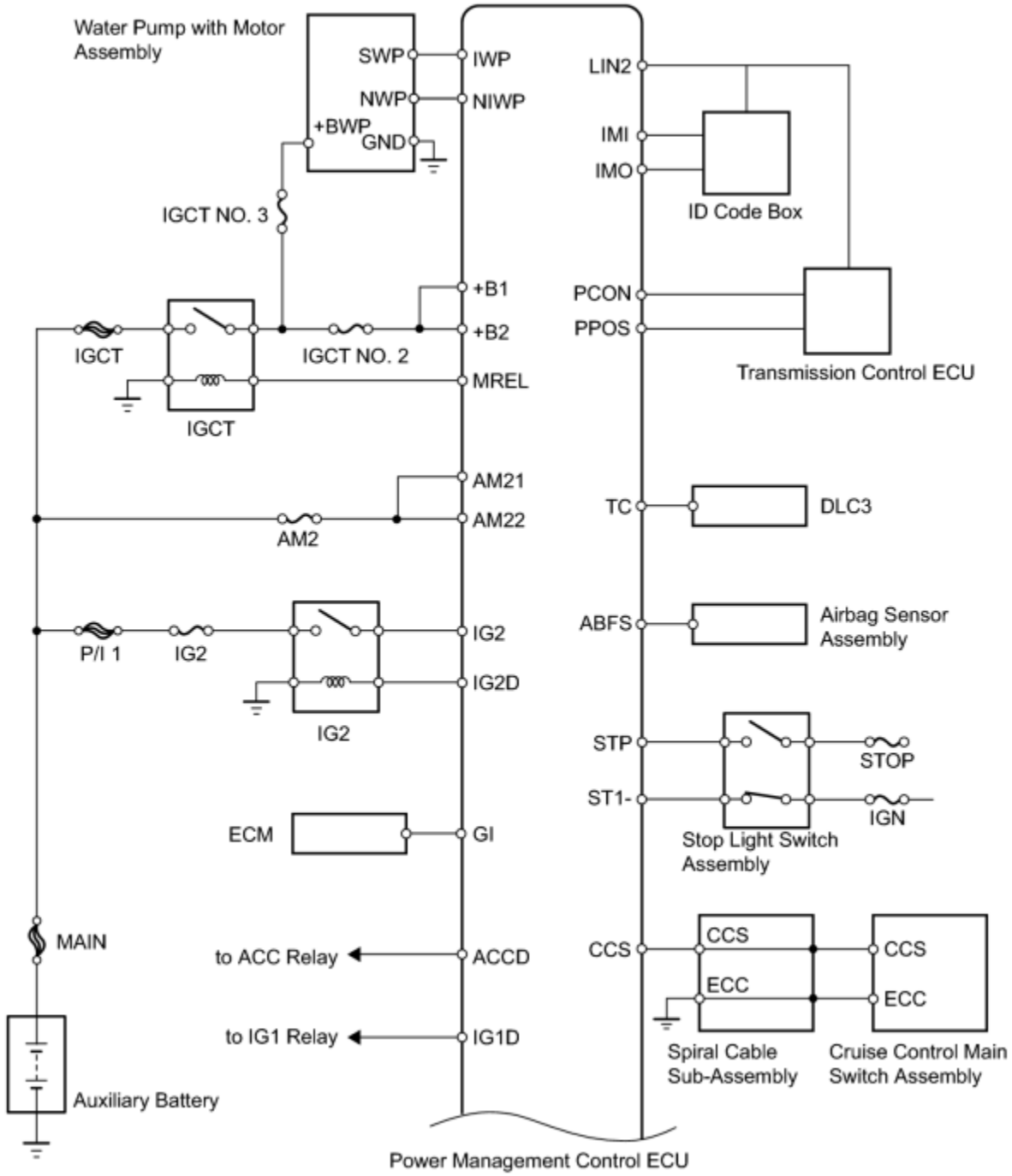

c

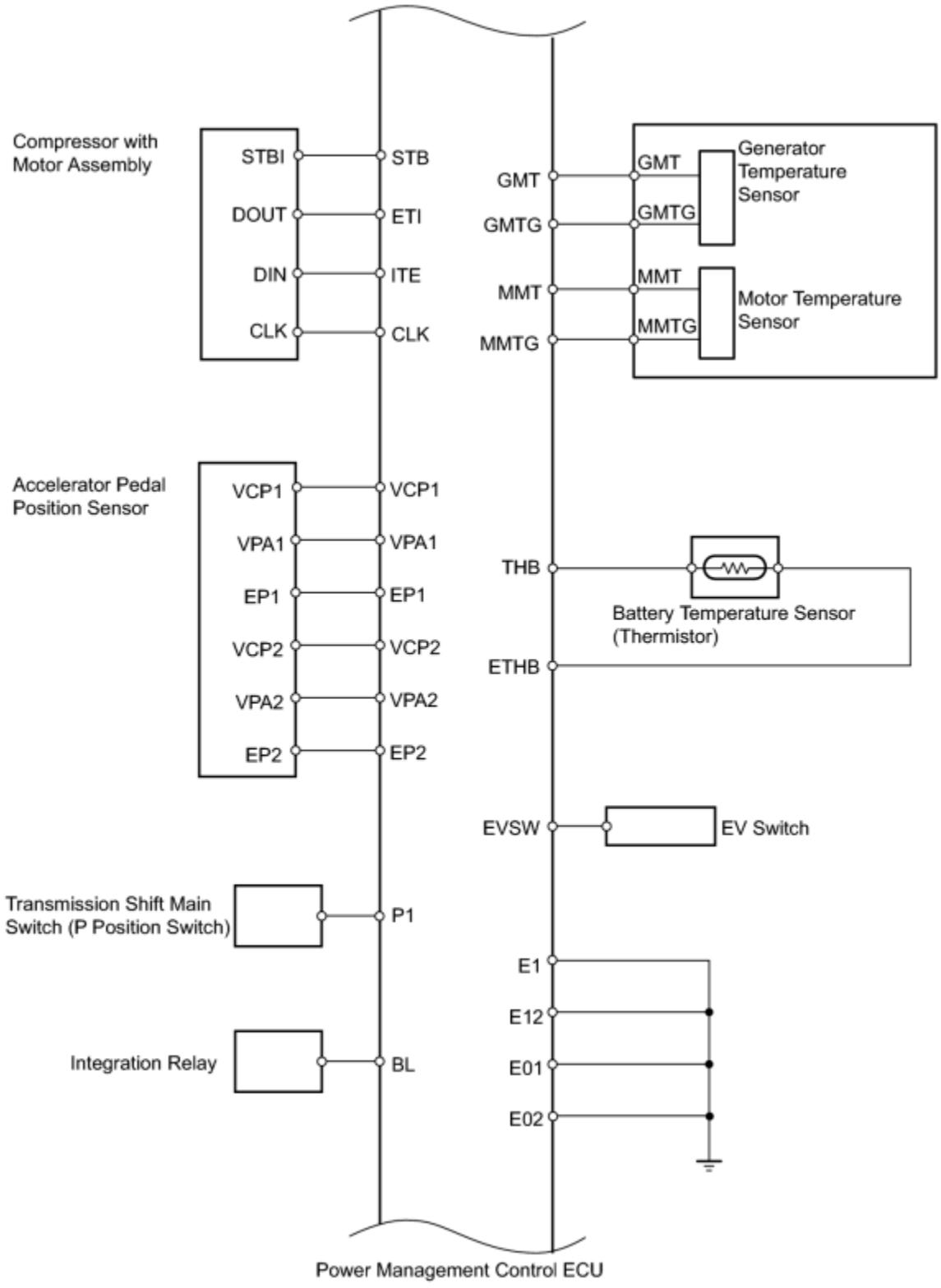
# ILLUSTRATION

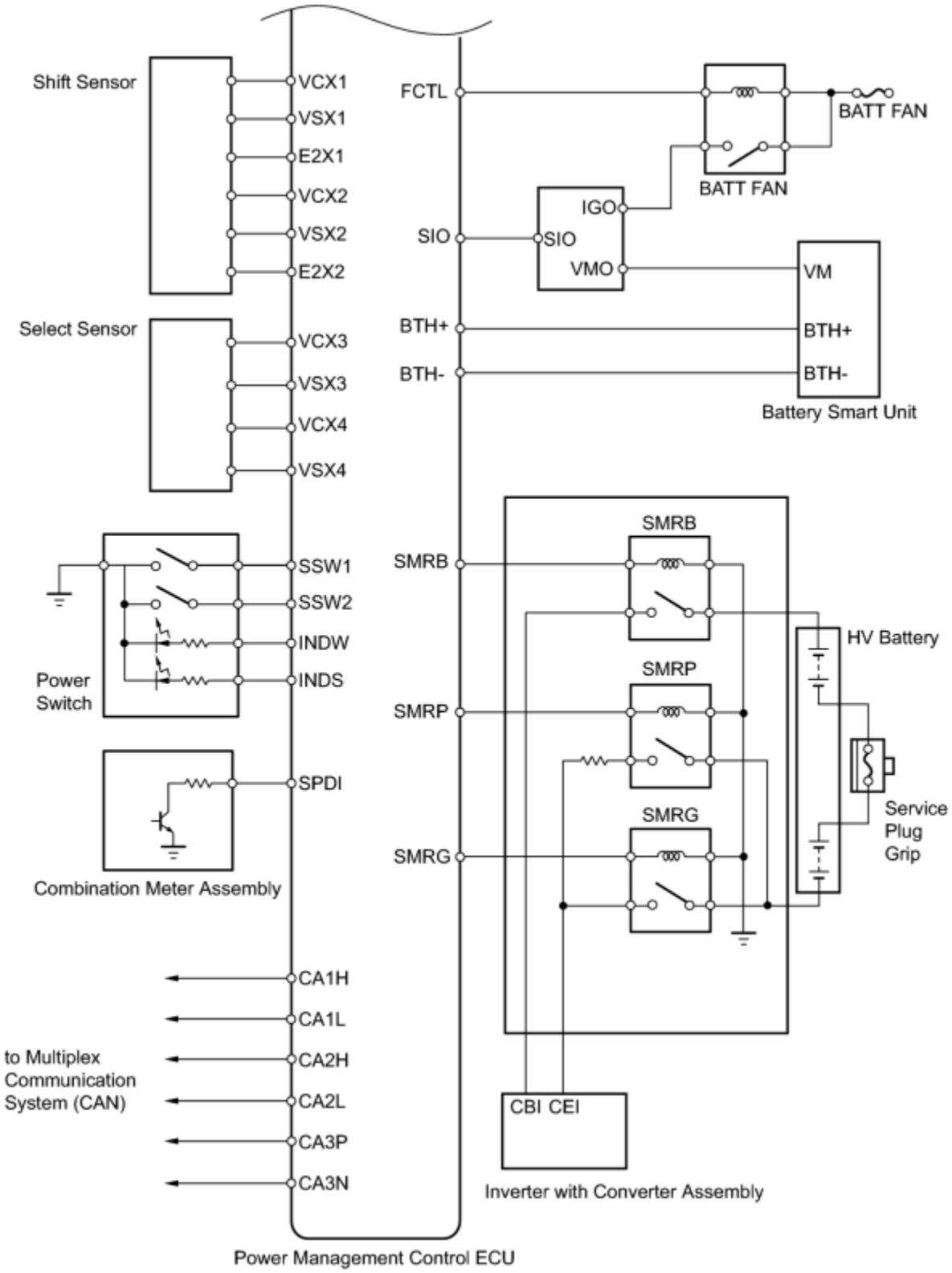

HYBRID BATTERY JUNCTION BLOCK
PRECHARGE RESISTOR
SMRB
SMRG
SMRP
BATTERY SMART UNIT
SERVICE PLUG GRIP

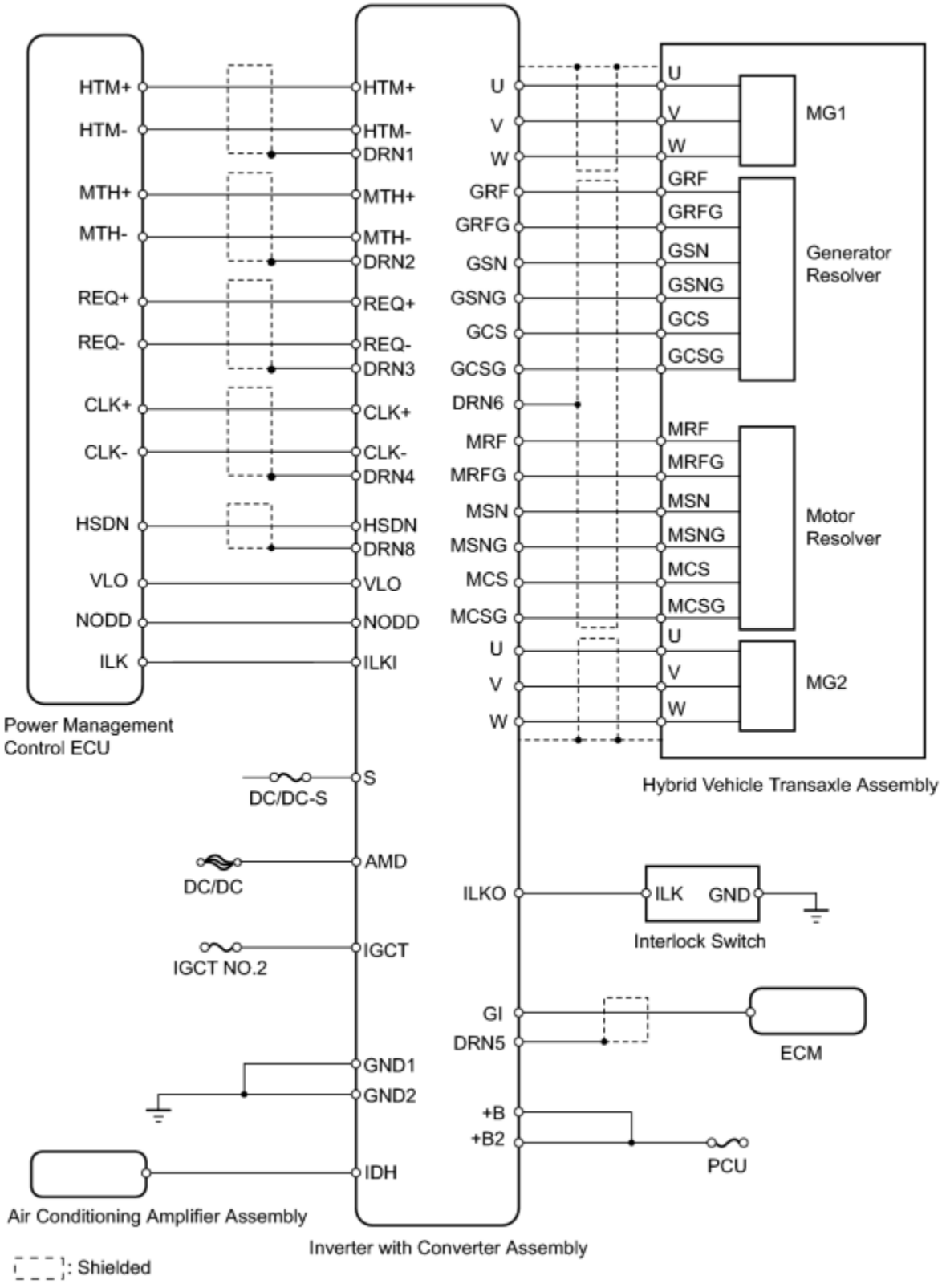
c

# SYSTEM DIAGRAM




Compressor with Motor Assembly
STBI
DOUT
DIN
CLK
STB
ETI
ITE
CLK
GMT
GMTG
MMT
MMTG
GMT
GMTG
MMT
MMTG
Generator Temperature Sensor
Motor Temperature Sensor
Accelerator Pedal Position Sensor
VCP1
VPA1
EP1
VCP2
VPA2
EP2
VCP1
VPA1
EP1
VCP2
VPA2
EP2
THB
ETHB
Battery Temperature Sensor (Thermistor)
EVSW
EV Switch
Transmission Shift Main Switch (P Position Switch)
P1
Integration Relay
BL
E1
E12
E01
E02
Power Management Control ECU


Shift Sensor
VCX1
VSX1
E2X1
VCX2
VSX2
E2X2
Select Sensor
VCX3
VSX3
VCX4
VSX4
SSW1
SSW2
INDW
INDS
Power Switch
SPDI
Combination Meter Assembly
CA1H
CA1L
CA2H
CA2L
CA3P
CA3N
to Multiplex Communication System (CAN)
Power Management Control ECU
FCTL
SIO
BTH+
BTH-
SMRB
SMRP
SMRG
BATT FAN
BATT FAN
IGO
SIO
VMO
VM
BTH+
BTH-
Battery Smart Unit
SMRB
SMRP
SMRG
HV Battery
Service Plug Grip
CBI CEI
Inverter with Converter Assembly

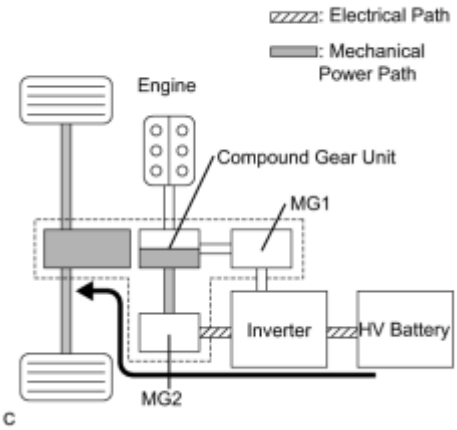

HTM+
HTM-
MTH+
MTH-
REQ+
REQ-
CLK+
CLK-
HSDN
VLO
NODD
ILK
Power Management Control ECU
HTM+
HTM-
DRN1
MTH+
MTH-
DRN2
REQ+
REQ-
DRN3
CLK+
CLK-
DRN4
HSDN
DRN8
VLO
NODD
ILKI
S
DC/DC-S
AMD
DC/DC
IGCT
IGCT NO.2
GND1
GND2
IDH
Air Conditioning Amplifier Assembly
: Shielded
U
V
W
GRF
GRFG
GSN
GSNG
GCS
GCSG
DRN6
MRF
MRFG
MSN
MSNG
MCS
MCSG
U
V
W
ILKO
GI
DRN5
+B
+B2
Inverter with Converter Assembly
U
V
W
MG1
GRF
GRFG
GSN
GSNG
GCS
GCSG
Generator Resolver
MRF
MRFG
MSN
MSNG
MCS
MCSG
Motor Resolver
U
V
W
MG2
Hybrid Vehicle Transaxle Assembly
ILK
GND
Interlock Switch
ECM
PCU

# SYSTEM DESCRIPTION

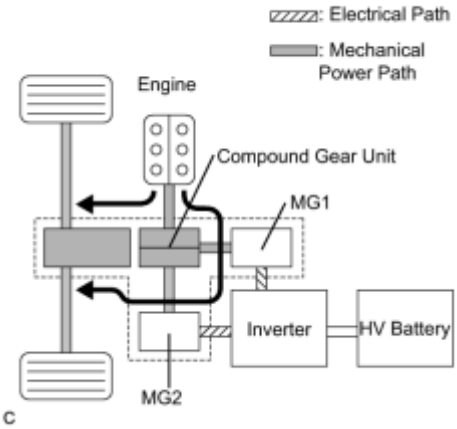
1. BASIC OPERATION

(a) This system generates a motive force in combination with the engine, MG1 and MG2 in accordance with the driving conditions. Representative examples of the various combinations are described below.

(b) Operation:

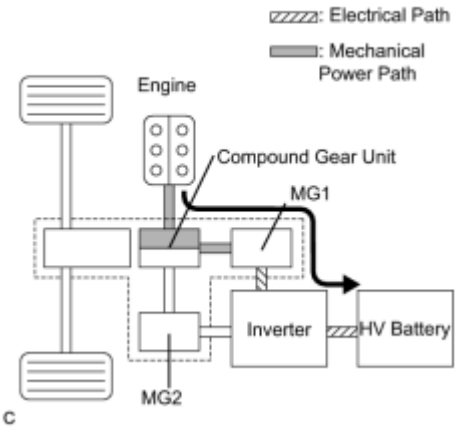


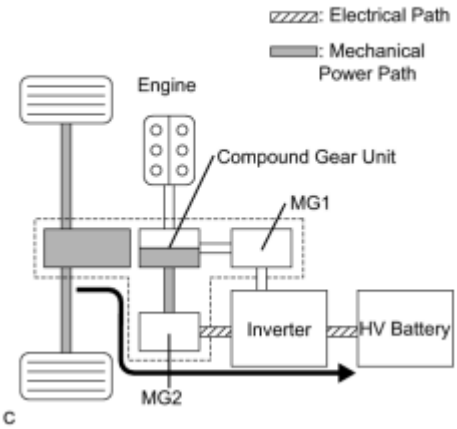

(1) Supply of electrical power from the HV battery to MG2 provides force to drive the front wheels.




(2) While the front wheels are being driven by the engine via the planetary gears, MG1 is driven by the engine via the planetary gears, in order to supply the generated electricity to MG2.

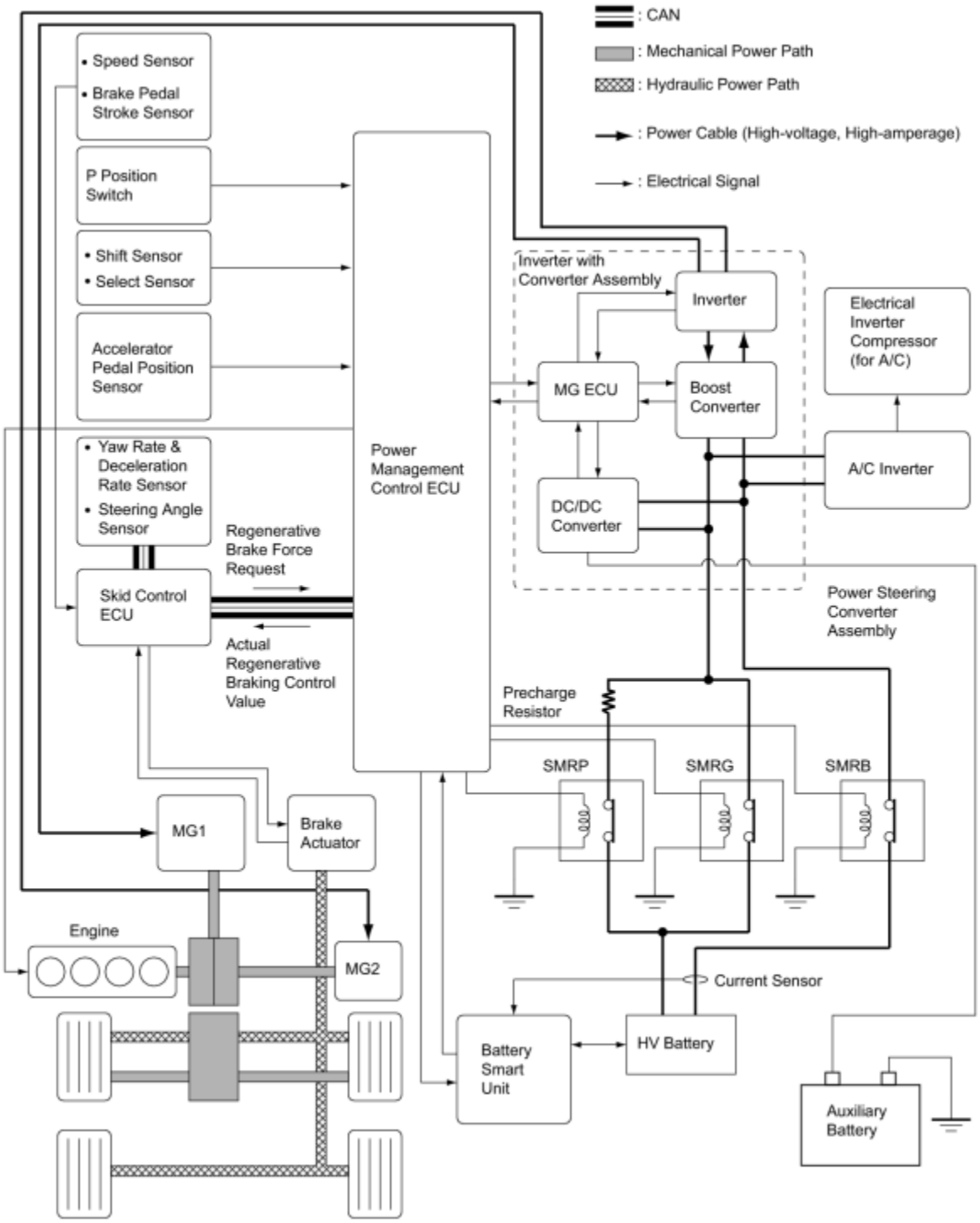
(3) MG1 is rotated by the engine via the planetary gears, in order to charge the HV battery.




(4) When the vehicle is decelerating, kinetic energy from the front wheels is recovered and converted into electrical energy and used to recharge the HV battery by means of MG2.

2. SYSTEM DIAGRAM




3. FUNCTION OF MAIN COMPONENTS

| Component | Function |
|---|---|
| Power Management Control ECU (HV CPU) | • Performs comprehensive control of the hybrid system.<br>• Information from various sensors as well as from ECUs |

| Component | | | Function |
|---|---|---|---|
| | | | (ECM, MG ECU, battery smart unit and skid control ECU) is received, and based on this the required torque and output power is calculated. The power management control ECU (HV CPU) transmits the calculated result to the ECM, MG ECU and skid control ECU.<br>• Monitors the SOC of the HV battery.<br>• Controls the DC-DC converter.<br>• Controls the HV water pump with motor.<br>• Controls the HV battery cooling blower. |
| Hybrid Vehicle Transaxle Assembly | Motor Generator 1 (MG1) | | MG1, which is driven by the engine, generates high-voltage electricity in order to operate MG2 and charge the HV battery. Also, it functions as a starter to start the engine. |
| | Motor Generator 2 (MG2) | | • MG2, which is driven by electrical power from MG1 and the HV battery, generates motive force for the drive wheels.<br>• During braking, or when the accelerator pedal is not depressed, it generates high-voltage electricity to recharge the HV battery. |
| | Resolver (for MG1/for MG2) | | Detects the rotor position, rotational speed and direction of MG1 and MG2. |
| | Temperature Sensor (for MG1/for MG2) | | Detects the temperature of MG1 and MG2. |
| | Compound Gear Unit | Power Split Planetary Gear Unit | Distributes the engine motive force as appropriate to directly drive the vehicle as well as MG1. |
| | | Motor Speed Reduction Planetary Gear Unit | Reduces the rotational speed of MG2 in accordance with the characteristics of the planetary gear, in order to increase torque. |
| Inverter with Converter Assembly | Inverter | | Converts the direct current from the boost converter into the alternating current for MG1 and MG 2, and vice versa (from AC to DC). |
| | Boost Converter | | Boosts the HV battery nominal voltage of DC 201.6 V up to a maximum voltage of DC 650 V and vice versa (drops DC 650 V to DC 201.6 V). |
| | DC-DC Converter | | Drops the HV battery nominal voltage of DC 201.6 V to approximately DC 14 V in order to supply electricity to the electrical components, as well as to recharge the auxiliary battery. |
| | MG ECU | | Controls the inverter and boost converter in accordance with the signals received from the power management control ECU (HV CPU), thus operating MG1 and MG2 as either a generator or motor. |
| | Atmospheric Pressure Sensor | | Detects the atmospheric pressure. |

| Component | | Function |
|---|---|---|
| | Temperature Sensor (for Inverter with Converter Assembly) | Detects temperatures in the parts of the inverter with converter assembly as well as the HV coolant temperature. |
| | Inverter Current Sensor | Detects the current of MG1 and MG2. |
| HV Battery Assembly | HV Battery (Battery Modules) | • Supplies electrical power to MG1 and MG2 in accordance with the driving conditions of the vehicle.<br>• Recharged by MG1 and MG2 in accordance with the SOC and the driving conditions of the vehicle. |
| | HV Battery Temperature Sensor | Detects temperatures in the parts of the HV battery and the Intake air temperature from the HV battery cooling blower. |
| HV Junction Block Assembly | System Main Relays | Connects and disconnects the high-voltage circuit between the HV battery and the inverter with converter assembly, through the use of the signals from the power management control ECU (HV CPU). |
| | HV Battery Current Sensor | Detects the input and output current of the HV battery. |
| Battery Smart Unit | | • Monitors the conditions of the HV battery such as voltage, current and temperature, and transmits this information to the power management control ECU (HV CPU).<br>• Monitors the high-voltage system for breakdown of the electrical insulation. |
| Service Plug Grip | | Shuts off the high-voltage circuit of the HV battery when the service plug grip is removed for vehicle inspection or maintenance. |
| Interlock Switch (for Service Plug Grip/for Inverter Terminal Cover/for Power Cable Connector) | | Verifies that the service plug grip, inverter terminal cover and inverter power cable connector are installed. |
| Power Cable | | Connects the HV battery, inverter with converter assembly, hybrid vehicle transaxle assembly and cooler compressor with motor assembly. |
| Water Pump with Motor Assembly | | Operates by the signal from the power management control ECU (HV CPU) in order to cool the inverter with converter assembly and MG1. |
| HV Battery Cooling Blower | | Operates by the signal from the power management control ECU (HV CPU) in order to cool the HV battery. |
| Auxiliary Battery Temperature Sensor | | Detects the temperature of the auxiliary battery. |
| Accelerator Pedal Position Sensor | | Converts the accelerator pedal position into an electrical signal and outputs it to the power management control ECU (HV CPU). |
| Selector Lever Position Sensor | | Converts the selector lever operation into an electrical signal and outputs it to the power management control ECU (HV CPU). |
| P Position Switch | | Outputs the P position switch signal to the power management control ECU (HV CPU) when operated by the driver. |
| EV Drive Mode Switch | | Outputs the EV drive mode switch signal to the power management control ECU (HV CPU) when operated by the driver. |
| PWR MODE Switch | | Outputs the PWR MODE switch signal to the power management |

| Component | Function |
| --- | --- |
| | control ECU (HV CPU) via the ECM when operated by the driver. |
| ECO MODE Switch | Outputs the ECO MODE switch signal to the power management control ECU (HV CPU) via the air conditioning amplifier when operated by the driver. |
| Air Conditioning Amplifier | Transmits various A/C state signals to the power management control ECU (HV CPU). |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- *: Use the Techstream
- Use the following procedure to troubleshoot the hybrid control system.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

NEXT

| | |
|---|---|
| 3. | CONNECT TECHSTREAM TO THE DLC3* |

HINT:

If the display on the tester indicates a communication fault, inspect the DLC3.

NEXT

| | |
|---|---|
| 4. | CHECK DTC AND SAVE FREEZE FRAME DATA* INFO |

HINT:

- Make sure to save freeze frame data because the data is necessary for a simulation test.
- For the hybrid vehicle control system, there are many DTCs, many of which can be stored due to a single malfunction. As a result, in some of the diagnosis procedures an instruction is provided to check for other DTCs and their corresponding INF codes. By following the diagnosis path based on the combination of output DTCs and INF codes, it is possible to narrow down the problem early and avoid unnecessary diagnosis.

NEXT

| | |
|---|---|
| 5. | CLEAR DTC AND FREEZE FRAME DATA* INFO |

NEXT

| | |
|---|---|
| 6. | CONDUCT VISUAL INSPECTION |

NEXT

| | |
|---|---|
| 7. | CONFIRM PROBLEM SYMPTOMS |

HINT:

If the engine does not start, perform steps 9 and 11 first.

Result:

| Result | Proceed to |
|---|---|
| Malfunction does not occur | A |
| Malfunction occurs | B |

B ▶ GO TO STEP 10

A ▼

| | |
|---|---|
| 8. | DUPLICATE CONDITIONS THAT PRODUCE SYMPTOMS |

NEXT ▼

| | |
|---|---|
| 9. | CHECK FOR DTCS* INFO |

Result:

| Result | Proceed to |
|---|---|
| DTC is output | A |
| DTC is not output | B |

B ▶ GO TO STEP 11

A ▼

| | |
|---|---|
| 10. | REFER TO DTC CHART INFO |

NEXT ▶ **GO TO STEP 13**

| | |
|---|---|
| 11. | CONDUCT BASIC INSPECTION |

Result:

| Result | Proceed to |
|---|---|
| Malfunctioning parts not confirmed | A |
| Malfunctioning parts confirmed | B |

B ▶ GO TO STEP 15

A ▼

| | |
|---|---|
| 12. | CHECK ECU POWER SOURCE CIRCUIT |

NEXT ▼

| | |
|---|---|
| 13. | CONDUCT CIRCUIT INSPECTION |

Result:

| Result | Proceed to |
|---|---|
| Malfunction not confirmed | A |

| Result | Proceed to |
| --- | --- |
| Malfunction confirmed | B |

B ▶ GO TO STEP 16

A ▼

| | |
| --- | --- |
| 14. | CHECK FOR INTERMITTENT PROBLEMS INFO |

NEXT ▶ **GO TO STEP 16**

| | |
| --- | --- |
| 15. | CONDUCT PARTS INSPECTION |

NEXT ▼

| | |
| --- | --- |
| 16. | IDENTIFY PROBLEM |

NEXT ▼

| | |
| --- | --- |
| 17. | ADJUST AND/OR REPAIR |

NEXT ▼

| | |
| --- | --- |
| 18. | CONDUCT CONFIRMATION TEST |

NEXT ▶ **END**

# CHECK FOR INTERMITTENT PROBLEMS

1. CHECK FOR INTERMITTENT PROBLEMS

(a) Perform a simulation test INFO.

(1) For the simulation test, reproduce the driving conditions that were present when the trouble occurred. These conditions should be based on the customer's comments and freeze frame data that is recorded with DTCs, such as the opening angle of the accelerator pedal, SOC (state of charge), engine coolant temperature, engine rpm, and MG1/MG2 rpm and torque.

(b) Check the connector(s) and terminal(s) INFO.

(c) Wiggle the harness and connector(s) INFO.

(d) Heat or cool suspected parts INFO.

# REGISTRATION

NOTICE:

The Vehicle Identification Number (VIN) must be input into the replacement power management control ECU.

HINT:

The VIN is in a 17-digit alphanumeric vehicle identification number. The Techstream is required to register the VIN.

1. DESCRIPTION

(a) Read VIN: This process allows the VIN stored in the power management control ECU to be read, in order to confirm that the two VINs, provided with the vehicle and stored in the power management control ECU, are the same.

(b) Write VIN: This process allows the VIN to be input into the power management control ECU. If the power management control ECU is changed, or the power management control ECU VIN and the vehicle VIN do not match, the VIN can be registered, or overwritten in the power management control ECU by following this procedure.

2. READ VIN

(a) Confirm the vehicle VIN.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Powertrain / Hybrid Control / Utility / VIN / VIN Read.

3. WRITE VIN

(a) Confirm the vehicle VIN.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Powertrain / Hybrid Control / Utility / VIN / VIN Write.

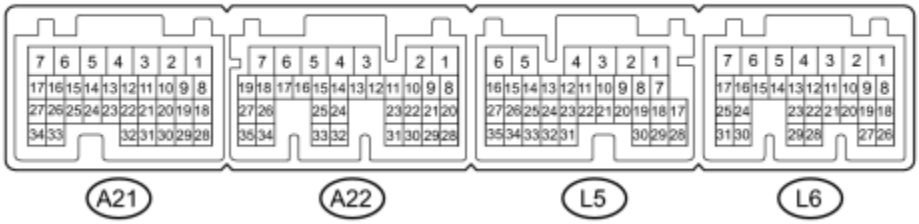
# PROBLEM SYMPTOMS TABLE

### Hybrid Vehicle Control System

| Symptom | Suspected Area | See page |
|---|---|---|
| Cannot enter EV mode | CAN communication system | INFO |
| | Combination meter | INFO |
| | Pattern select switch (EV switch) | - |
| | EV drive mode switch circuit | INFO |
| EV mode indicator light does not illuminate | Combination meter | INFO |
| | Pattern select switch (EV switch) | - |
| EV mode indicator light does not turn off | Combination meter | INFO |
| | Pattern select switch (EV switch) | - |
| Cannot enter POWER mode | CAN communication system | INFO |
| | Combination meter | - |
| | Pattern select switch (POWER switch) | - |
| | Pattern select switch POWER mode circuit | INFO |
| POWER mode indicator light does not illuminate | Combination meter | INFO |
| | Pattern select switch (POWER switch) | - |
| POWER mode indicator light does not turn off | Combination meter | INFO |
| | Pattern select switch (POWER switch) | - |
| Cannot enter ECO mode | CAN communication system | INFO |
| | Combination meter | INFO |
| | Pattern select switch (ECO switch) | - |
| | Pattern select switch ECO mode circuit | INFO |
| ECO mode indicator light does not illuminate | Combination meter | INFO |
| | Pattern select switch (ECO switch) | - |
| ECO mode indicator light does not turn off | Combination meter | INFO |
| | Pattern select switch (ECO switch) | - |
| Loud rattle from hybrid vehicle transaxle | Loud Rattle from Hybrid Vehicle Transmission | INFO |
| | Transmission input damper | INFO |
| | Hybrid vehicle transaxle assembly | INFO |

# TERMINALS OF ECU

Power Management Control ECU




Y

**Power management control ECU**

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A21-2 (+B2) - L5-6 (E1) | L - BR | Power Source | Power switch on (IG) | 11 to 14 V |
| A21-4 (FCTL) - L5-5 (E01) | BR - W-B | Cooling fan relay signal | Power switch on (IG) | Below 2 V |
| A21-11 (VLO) - L5-6 (E1) | R - BR | DC/DC operation monitor / voltage change signal | Power switch on (IG) | Pulse generation (Waveform 1) |
| A21-13 (IWP) - L5-6 (E1) | G - BR | Water pump with motor assembly signal | Power switch on (READY) | Pulse generation (Waveform 2) |
| A21-14 (NIWP) - L5-6 (E1) | P - BR | Water pump with motor assembly signal | Power switch on (READY) | Pulse generation (Waveform 2) |
| A21-15 (BL) - L5-6 (E1) | R - BR | Back up light | Power switch on (IG), selector lever in R | 11 to 14 V |
| A21-16 (GI) - L5-6 (E1) | Y - BR | Camshaft position sensor signal | Power switch on (READY), with engine running | Pulse generation (Waveform 3) |
| A21-19 (CLK) - L5-6 (E1) | G - BR | A/C communication signal | Power switch on (READY), air conditioning system stopped | Pulse generation |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | | (Waveform 4) |
| A21-20 (STB) - L5-6 (E1) | W - BR | A/C communication signal | Power switch on (READY), air conditioning system stopped | Pulse generation (Waveform 4) |
| A21-21 (NODD) - L5-6 (E1) | W - BR | DC/DC operation | Converter operating normally | 5 to 7 V |
| A21-21 (NODD) - L5-6 (E1) | W - BR | DC/DC operation | Converter not operating normally | 2 to 4 V |
| A21-21 (NODD) - L5-6 (E1) | W - BR | DC/DC operation | Converter operating prohibited | 0.1 to 0.5 V |
| A21-24 (MMT) - A21-25 (MMTG) | L - BR | Motor temperature sensor | Power switch on (IG), temperature 77°F (25°C) | 3.6 to 4.6 V |
| A21-24 (MMT) - A21-25 (MMTG) | L - BR | Motor temperature sensor | Power switch on (IG), temperature 140°F (60°C) | 2.2 to 3.2 V |
| A21-26 (GMT) - A21-27 (GMTG) | B - R | Generator temperature sensor | Power switch on (IG), temperature 77°F (25°C) | 3.6 to 4.6 V |
| A21-26 (GMT) - A21-27 (GMTG) | B - R | Generator temperature sensor | Power switch on (IG), temperature 140°F (60°C) | 2.2 to 3.2 V |
| A21-29 (SI0) - L5-6 (E1) | Y - BR | HV battery blower fan | Power switch on (IG), during Active Test | Pulse generation (Waveform 5) |
| A21-30 (ETI) - L5-6 (E1) | R - BR | A/C communication signal | Power switch on (READY), air conditioning system stopped | Pulse generation (Waveform 4) |
| A21-31 (ITE) - L5-6 (E1) | Y - BR | A/C communication signal | Power switch on (READY), air conditioning system stopped | Pulse generation (Waveform 4) |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A21-32 (ILK) - L5-6 (E1) | V - BR | Interlock switch | Power switch on (IG), inverter terminal cover, high-voltage input cables and service plug grip installed correctly | 0 to 1.5 V |
| A21-32 (ILK) - L5-6 (E1) | V - BR | Interlock switch | Power switch on (IG), inverter terminal cover, high-voltage input cables or service plug grip not installed | 11 to 14 V |
| A22-1 (IG2) - L5-6 (E1) | R - BR | Power source | Power switch on (IG) | 11 to 14 V |
| A22-2 (IG2D) - L5-6 (E1) | V - BR | IG2 relay | Power switch on (IG) | 11 to 14 V |
| A22-5 (+B1) - L5-6 (E1) | L - BR | Power source | Power switch on (IG) | 11 to 14 V |
| A22-6 (MREL) - L5-6 (E1) | BE - BR | Main relay | Power switch on (IG) | 11 to 14 V |
| A22-7 (ST1-) - L5-6 (E1) | R - BR | Brake cancel switch | Power switch on (IG), brake pedal depressed | 0 to 1.5 V |
| A22-7 (ST1-) - L5-6 (E1) | R - BR | Brake cancel switch | Power switch on (IG), brake pedal released | 11 to 14 V |
| A22-18 (VCP1) - A22-34 (EP1) | Y - B | Accelerator pedal position sensor power source (for VPA1) | Power switch on (IG) | 4.5 to 5.5 V |
| A22-19 (VCP2) - A22-35 (EP2) | G - R | Accelerator pedal position sensor power source (for VPA2) | Power switch on (IG) | 4.5 to 5.5 V |
| A22-20 (CLK-) - L5-6 (E1) | W - BR | MG communication clock signal | Power switch on (IG) | Pulse generation (Waveform 6) |
| A22-21 (CLK+) - L5-6 (E1) | B - BR | MG communication clock signal | Power switch on (IG) | Pulse generation (Waveform 6) |
| A22-22 (PCON) - L5-6 (E1) | LG - BR | P position switch signal | Power switch on (IG), park (P) selected | Pulse generation (Waveform 7) |
| A22-23 (STP) - L5-6 (E1) | L - BR | Stop light switch | Brake pedal depressed | 11 to 14 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A22-23 (STP) - L5-6 (E1) | L - BR | Stop light switch | Brake pedal released | 0 to 1.5 V |
| A22-24 (HTM+) - L5-6 (E1) | B - BR | Communication signal from power management control ECU (HV CPU) to MG ECU | Power switch on (IG) | Pulse generation (Waveform 8) |
| A22-25 (HTM-) - L5-6 (E1) | W - BR | Communication signal from power management control ECU (HV CPU) to MG ECU | Power switch on (IG) | Pulse generation (Waveform 8) |
| A22-26 (VPA1) - A22-34 (EP1) | L - B | Accelerator pedal position sensor (for accelerator pedal position detection) | Power switch on (IG), accelerator pedal released | 0.4 to 1.4 V |
| A22-26 (VPA1) - A22-34 (EP1) | L - B | Accelerator pedal position sensor (for accelerator pedal position detection) | Power switch on (IG) engine stopped, park (P) selected, accelerator pedal fully depressed | 2.6 to 4.5 V |
| A22-27 (VPA2) - A22-35 (EP2) | W - R | Accelerator pedal position sensor (for accelerator pedal position detection) | Power switch on (IG), accelerator pedal released | 1.0 to 2.2 V |
| A22-27 (VPA2) - A22-35 (EP2) | W - R | Accelerator pedal position sensor (for accelerator pedal position detection) | Power switch on (IG) engine stopped, park (P) selected, accelerator pedal fully depressed | 3.4 to 5.3 V |
| A22-28 (PPOS) - L5-6 (E1) | W - BR | P position switch signal | Power switch on (IG), park (P) selected | Pulse generation (Waveform 7) |
| A22-29 (MTH-) - L5-6 (E1) | W - BR | Communication signal from MG ECU to power management control ECU (HV CPU) | Power switch on (IG) | Pulse generation (Waveform 9) |
| A22-30 (MTH+) - L5-6 (E1) | B - BR | Communication signal from MG ECU to power management control ECU (HV CPU) | Power switch on (IG) | Pulse generation (Waveform 9) |
| A22-31 (HSDN) - L5-6 (E1) | B - BR | MG ECU shutdown signal | Power switch on (READY) | 0 to 1.5 V |
| A22-32 (REQ-) - L5-6 (E1) | W - BR | MG ECU communication request signal | Power switch on (IG) | Pulse |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | | generation (Waveform 10) |
| A22-33 (REQ+) - L5-6 (E1) | B - BR | MG ECU communication request signal | Power switch on (IG) | Pulse generation (Waveform 10) |
| L5-1 (AM22) - L5-6 (E1) | W - BR | Constant power source | Power switch on (IG) | 11 to 14 V |
| L5-1 (AM22) - L5-6 (E1) | W - BR | Constant power source | Power switch on (READY) | 11 to 15.5 V |
| L5-2 (SMRG) - L5-5 (E01) | Y - W-B | System main relay | Power switch on (IG)→Power switch on (READY) | Pulse generation (Waveform 11) |
| L5-3 (SMRP) - L5-5 (E01) | W - W-B | System main relay | Power switch on (IG)→Power switch on (READY) | Pulse generation (Waveform 11) |
| L5-4 (SMRB) - L5-5 (E01) | SB - W-B | System main relay | Power switch on (IG)→Power switch on (READY) | Pulse generation (Waveform 11) |
| L5-7 (SSW1) - L5-6 (E1) | B - BR | Power switch | Power switch pressed and held | 0 to 1.5 V |
| L5-11 (TC) - L5-6 (E1) | P - BR | Diagnosis terminal | Power switch on (IG) | 11 to 14 V |
| L5-13 (EVSW) - L5-6 (E1) | B - BR | EV switch signal | Power switch on (IG), EV switch off | 11 to 14 V |
| L5-13 (EVSW) - L5-6 (E1) | B - BR | EV switch signal | Power switch on (IG), EV switch off | 0 to 1.5 V |
| L5-14 (SPDI) - L5-6 (E1) | V - BR | Vehicle speed signal | Approximately 12 mph (20 km/h) | Pulse generation (Waveform 12) |
| L5-16 (P1) - L5-6 (E1) | Y - BR | P position switch signal | Power switch on (IG), P position switch off | 7 to 12 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-16 (P1) - L5-6 (E1) | Y - BR | P position switch signal | Power switch on (IG), P position switch on | 3 to 5 V |
| L5-17 (VCX4) - L5-6 (E1) | P - BR | Select position sensor power source (VCX4) | Power switch on (IG) | 11 to 14 V |
| L5-18 (VSX4) - L5-6 (E1) | LG - BR | Select position sensor (Sub) | Power switch on (IG), selector lever in home position | 0.5 to 0.2 V |
| L5-18 (VSX4) - L5-6 (E1) | LG - BR | Select position sensor (Sub) | Power switch on (IG), selector lever in R, N or D | 3.0 to 4.85 V |
| L5-19 (VCX3) - L5-6 (E1) | W - BR | Select position sensor power source (VSX3) | Power switch on (IG) | 11 to 14 V |
| L5-20 (VSX3) - L5-6 (E1) | BR - BR | Select position sensor (Main) | Power switch on (IG), selector lever in home position | 0.5 to 0.2 V |
| L5-20 (VSX3) - L5-6 (E1) | BR - BR | Select position sensor (Main) | Power switch on (IG), selector lever in R, N or D | 3.0 to 4.85 V |
| L5-21 (VCX2) - L5-23 (E2X2) | G - Y | Shift position sensor power source (VSX2) | Power switch on (IG) | 4.5 to 5.5 V |
| L5-22 (VSX2) - L5-23 (E2X2) | L - Y | Shift position sensor (Sub) | Power switch on (IG), shift lever in home position | 2.0 to 3.0 V |
| L5-22 (VSX2) - L5-23 (E2X2) | L - Y | Shift position sensor (Sub) | Power switch on (IG), selector lever in R | 0.2 to 1.0 V |
| L5-22 (VSX2) - L5-23 (E2X2) | L - Y | Shift position sensor (Sub) | Power switch on (IG), selector lever in B or D | 4.0 to 4.8 V |
| L5-25 (VSX1) - L5-24 (E2X1) | B - R | Shift position sensor (Main) | Power switch on (IG), selector lever in home position | 2.0 to 3.0 V |
| L5-25 (VSX1) - L5-24 (E2X1) | B - R | Shift position sensor (Main) | Power switch on (IG), selector lever in R | 0.2 to 1.0 V |
| L5-25 (VSX1) - L5-24 (E2X1) | B - R | Shift position sensor (Main) | Power switch on (IG), selector lever in B or D | 4.0 to 4.8 V |
| L5-26 (VCX1) - L5-24 (E2X1) | W - R | Shift position sensor power source (VSX1) | Power switch on (IG) | 4.5 to 5.5 V |
| L5-28 (THB) - L5-30 (ETHB) | L - V | Auxiliary battery temperature | Power switch on (IG), auxiliary battery temperature 77°F (25°C) | 1.7 to 2.3 V |
| L5-28 (THB) - L5-30 (ETHB) | L - V | Auxiliary battery temperature | Power switch on (IG), auxiliary battery temperature 140°F (60°C) | 0.6 to 0.9 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-29 (ABFS) - L5-6 (E1) | B - BR | Airbag activation signal | Power switch on (READY)<br><br>(2 seconds after power switch on (ACC)) | Pulse generation<br><br>(Waveform 13) |
| L5-32 (BTH+) - L5-6 (E1) | R - BR | Communication signal from battery smart unit to power management control ECU (HV CPU) | Power switch on (IG) | Pulse generation<br><br>(Waveform 14) |
| L5-33 (BTH-) - L5-6 (E1) | G - BR | Communication signal from battery smart unit to power management control ECU (HV CPU) | Power switch on (IG) | Pulse generation<br><br>(Waveform 14) |
| L5-34 (CA2H) - L5-6 (E1) | P - BR | CAN communication system | Power switch on (IG) | Pulse generation<br><br>(Waveform 15) |
| L5-35 (CA2L) - L5-6 (E1) | V - BR | CAN communication system | Power switch on (IG) | Pulse generation<br><br>(Waveform 15) |
| L6-1 (ACCD) - L5-6 (E1) | G - BR | ACC relay | Power switch on (ACC) | 11 to 14 V |
| L6-2 (IG1D) - L5-6 (E1) | B - BR | IG1 relay | Power switch on (IG) | 11 to 14 V |
| L6-7 (AM21) - L5-6 (E1) | W - BR | Constant power source | Power switch on (IG) | 11 to 14 V |
| L6-7 (AM21) - L5-6 (E1) | W - BR | Constant power source | Power switch on (READY) | 11 to 15.5 V |
| L6-11 (LIN2) - L5-6 (E1) | L - BR | LIN communication system | Power switch on (IG), brake pedal depressed | Pulse generation |
| L6-17 (SSW2) - L5-6 (E1) | Y - BR | Power switch | Power switch pressed and held | 0 to 1.5 V |
| L6-20 (IMO) - L5-6 (E1) | L - BR | Immobiliser communication | Immobiliser communicating | Pulse generation<br><br>(Waveform 16) |
| L6-21 (IMI) - | R - BR | Immobiliser communication | Immobiliser communicating | Pulse |

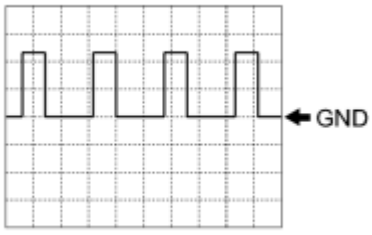
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-6 (E1) | | | | generation (Waveform 16) |
| L6-24 (CA1L) - L5-6 (E1) | W - BR | CAN communication system | Power switch on (IG) | Pulse generation (Waveform 17) |
| L6-25 (CA1H) - L5-6 (E1) | B - BR | CAN communication system | Power switch on (IG) | Pulse generation (Waveform 17) |
| L6-30 (CA3N) - L5-6 (E1) | L - BR | CAN communication system | Power switch on (IG) | Pulse generation (Waveform 18) |
| L6-31 (CA3P) - L5-6 (E1) | LG - BR | CAN communication system | Power switch on (IG) | Pulse generation (Waveform 18) |

1. Oscilloscope waveforms

HINT:

Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.

(a) Waveform 1 (DC/DC operation monitor / voltage change signal)

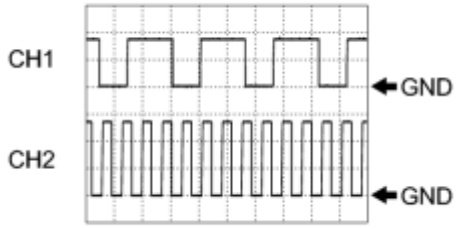



| Item | Content |
|---|---|
| Terminal | A21-11 (VLO) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 50 ms./DIV. |
| Condition | Power switch on (IG) |

HINT:

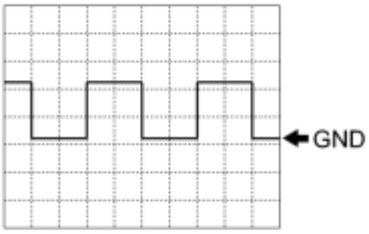
The cycle will vary depending on the specified voltage of the hybrid vehicle converter.

(b) Waveform 2 (HV water pump signal)




| Item | Content |
|---|---|
| Terminal | CH1: A21-13 (IWP) - L5-6 (E1)<br><br>CH2: A21-14 (NIWP) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 50 ms./DIV. |
| Condition | Power switch on (READY) |

(c) Waveform 3 (GI signal)

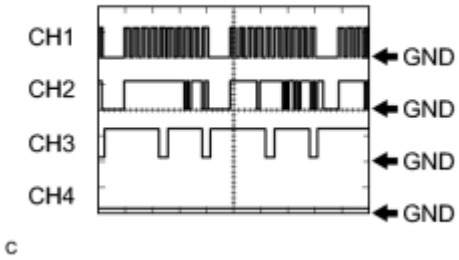



| Item | Content |
|---|---|
| Terminal | A21-16 (GI) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 20 ms./DIV. |
| Condition | Power switch on (READY) with engine running |

HINT:

The pulse cycle becomes shorter as the engine speed increases.

(d) Waveform 4 (A/C communication signal)



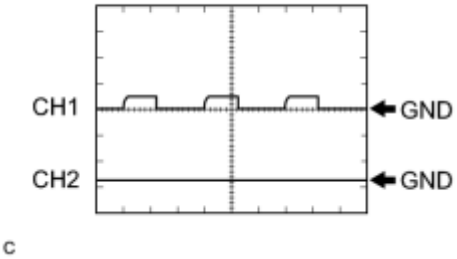

| Item | Content |
|---|---|
| Terminal | CH1: A21-19 (CLK) - L5-6 (E1)<br><br>CH2: A21-31 (ITE) - L5-6 (E1)<br><br>CH3: A21-30 (ETI) - L5-6 (E1)<br><br>CH4: A21-20 (STB) - L5-6 (E1) |
| Equipment Setting | 10 V/DIV., 100 ms./DIV. |
| Condition | Power switch on (READY) with air conditioning system stopped |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

(e) Waveform 5 (HV battery blower fan operation signal)

| Item | Content |
|---|---|
| Terminal | CH1: A21-29 (SI0) - L5-6 (E1)<br><br>CH2: A21-4 (FCTL) - L5-5 (E01) |



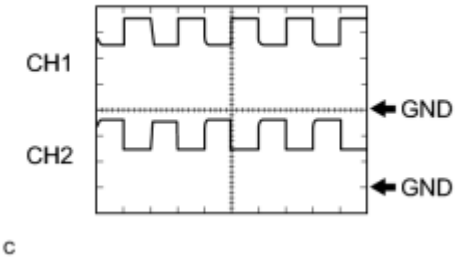

c

| | |
|---|---|
| Equipment Setting | 10 V/DIV., 1 ms./DIV. |
| Condition | Power switch on (READY), with air conditioning system stopped |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

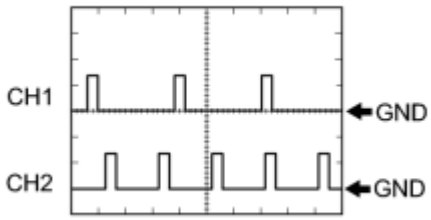
(f) Waveform 6 (MG communication clock signal)




c

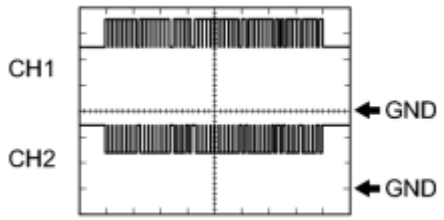
| Item | Content |
|---|---|
| Terminal | CH1: A22-21 (CLK+) - L5-6 (E1)<br><br>CH2: A22-20 (CLK-) - L5-6 (E1) |
| Equipment Setting | 1 V/DIV., 1 μs./DIV. |
| Condition | Power switch on (READY) |

(g) Waveform 7 (P position signal)




| Item | Content |
|---|---|
| Terminal | CH1: A22-22 (PCON) - L5-6 (E1)<br><br>CH2: A22-28 (PPOS) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 20 ms./DIV. |
| Condition | Power switch on (IG) |

(h) Waveform 8 (communication signal from power management control ECU (HV CPU) to MG ECU)

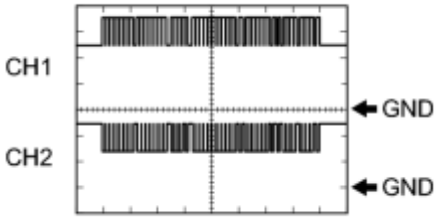



| Item | Content |
|---|---|
| Terminal | CH1: A22-24 (HTM+) - L5-6 (E1)<br><br>CH2: A22-25 (HTM-) - L5-6 (E1) |
| Equipment Setting | 1 V/DIV., 200 μs./DIV. |
| Condition | Power switch on (READY) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

(i) Waveform 9 (communication signal from MG ECU to power management control ECU (HV CPU))

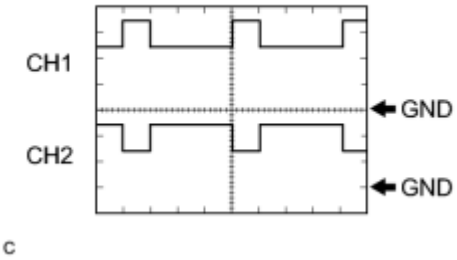



| Item | Content |
|---|---|
| Terminal | CH1: A22-30 (MTH+) - L5-6 (E1)<br>CH2: A22-29 (MTH-) - L5-6 (E1) |
| Equipment Setting | 1 V/DIV., 200 μs./DIV. |
| Condition | Power switch on (READY) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

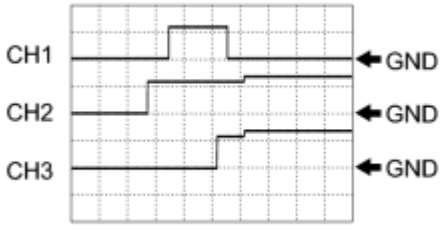
(j) Waveform 10 (MG ECU communication request signal)




c

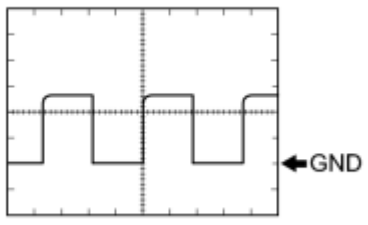
| Item | Content |
|---|---|
| Terminal | CH1: A22-33 (REQ+) - L5-6 (E1)<br>CH2: A22-32 (REQ-) - L5-6 (E1) |
| Equipment Setting | 1 V/DIV., 1 ms./DIV. |
| Condition | Power switch on (READY) |

(k) Waveform 11 (system main relay operation signal)




| Item | Content |
|---|---|
| Terminal | CH1: L5-3 (SMRP) - L5-5 (E01)<br>CH2: L5-4 (SMRB) - L5-5 (E01)<br>CH3: L5-2 (SMRG) - L5-5 (E01) |
| Equipment Setting | 10 V/DIV., 200 ms./DIV. |
| Condition | Power switch on (IG) → Power switch on (READY) |

(l) Waveform 12 (vehicle speed signal)



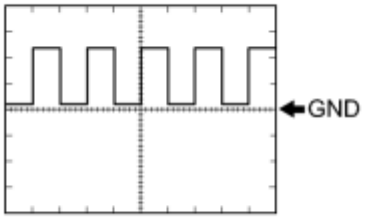

c

| Item | Content |
|---|---|
| Terminal | L5-14 (SPDI) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 20 ms./DIV. |
| Condition | Driving at approximately 12 mph (20 km/h) with power switch on (READY) |

HINT:

The higher the vehicle speed, the shorter the cycle.

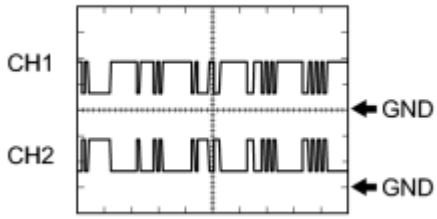
(m) Waveform 13 (airbag deployment signal)




c

| Item | Content |
|---|---|
| Terminal | L5-29 (ABFS) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 500 ms./DIV. |
| Condition | Power switch on (READY) |

(n) Waveform 14 (communication signal from battery smart unit to power management control ECU (HV CPU))



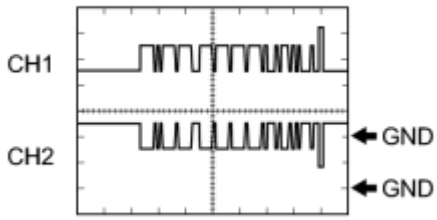

c

| Item | Content |
|---|---|
| Terminal | CH1: L5-32 (BTH+) - L5-6 (E1)<br>CH2: L5-33 (BTH-) - L5-6 (E1) |
| Equipment Setting | 2 V/DIV., 500 µs./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

(o) Waveform 15 (CAN communication signal)



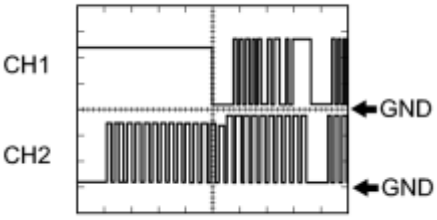

c

| Item | Content |
|---|---|
| Terminal | CH1: L5-34 (CA2H) - L5-6 (E1)<br>CH2: L5-35 (CA2L) - L5-6 (E1) |
| Equipment Setting | 1 V/DIV., 50 µs./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

(p) Waveform 16 (immobilizer communication signal)

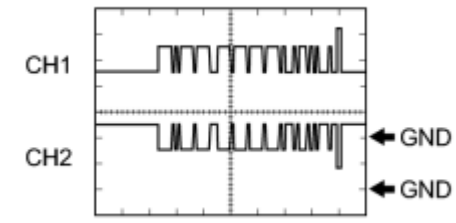



c

| Item | Content |
|---|---|
| Terminal | CH1: L6-20 (IMO) - L5-6 (E1)<br>CH2: L6-21 (IMI) - L5-6 (E1) |
| Equipment Setting | 5 V/DIV., 200 ms./DIV. |
| Condition | Power switch off → Power switch on (IG) → Power |

| | |
|---|---|
| | switch on (READY) |

(q) Waveform 17 (CAN communication signal)



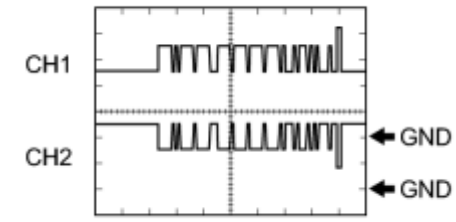

c

| Item | Content |
|---|---|
| Terminal | CH1: L6-25 (CA1H) - L5-6 (E1)<br><br>CH2: L6-24 (CA1L) - L5-6 (E1) |
| Equipment Setting | 1 V/DIV., 50 µs./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

(r) Waveform 18 (CAN communication signal)



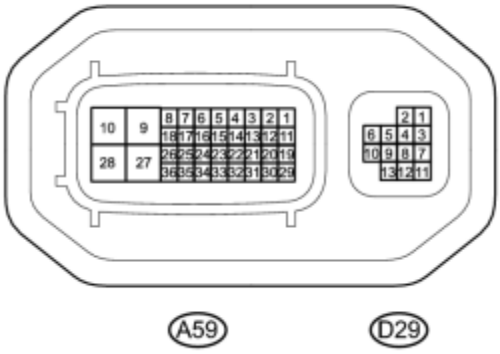

c

| Item | Content |
|---|---|
| Terminal | CH1: L6-31 (CA3P) - L5-6 (E1)<br><br>CH2: L6-30 (CA3N) - L5-6 (E1) |
| Equipment Setting | 1 V/DIV., 50 µs./DIV. |
| Condition | Power switch on (IG) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

Inverter with Converter Assembly




c

HINT:

Since the inverter with converter assembly uses waterproof connectors, the voltage and waveform cannot be inspected directly. Standard voltage readings and waveforms are indicated for reference only.

**Inverter with converter assembly**

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Standard Condition |
|---|---|---|---|---|
| A59-1 (IGCT) - A59-28 (GND1) | B - W-B | MG ECU power source | Power switch on (IG) | 11 to 14 V |
| A59-2 (IDH) - A59-28 (GND1) | L - W-B | PTC heater prohibit signal | Power switch on (IG) | 4 to 6 V |
| A59-3 (VLO) - A59-28 (GND1) | R - W-B | DC/DC operation monitor / voltage change signal | Power switch on (IG) | Pulse generation (Waveform 1) |
| A59-5 (CLK+) - A59-28 (GND1) | B - W-B | Communication clock signal | Power switch on (READY) | Pulse generation (Waveform 2) |
| A59-6 (REQ+) - A59-28 (GND1) | B - W-B | Communication request signal | Power switch on (READY) | Pulse generation (Waveform 3) |
| A59-7 (MTH+) - A59-28 (GND1) | B - W-B | Communication signal from MG ECU to power management control ECU (HV CPU) | Power switch on (READY) | Pulse generation (Waveform 4) |
| A59-8 (HTM+) - A59-28 (GND1) | B - W-B | Communication signal from power management control ECU (HV CPU) to MG ECU | Power switch on (READY) | Pulse generation (Waveform 5) |
| A59-11 (S) - A59-28 (GND1) | W - W-B | Auxiliary battery voltage monitor | Power switch on (IG) | 11 to 14 V |
| A59-12 (NODD) - A59-28 (GND1) | W - W-B | DC/DC operation | Converter operating normally | 5 to 7 V |
| A59-12 (NODD) - A59- | W - W-B | DC/DC operation | Converter not operating normally | 2 to 4 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Standard Condition |
|---|---|---|---|---|
| 28 (GND1) | | | | |
| A59-12 (NODD) - A59-28 (GND1) | W - W-B | DC/DC operation | Converter operation prohibited | 0.1 to 0.5 V |
| A59-15 (CLK-) - A59-28 (GND1) | W - W-B | Communication clock signal | Power switch on (READY) | Pulse generation (Waveform 2) |
| A59-16 (REQ-) - A59-28 (GND1) | W - W-B | Communication request signal | Power switch on (READY) | Pulse generation (Waveform 3) |
| A59-17 (MTH-) - A59-28 (GND1) | W - W-B | Communication signal from MG ECU to power management control ECU (HV CPU) | Power switch on (READY) | Pulse generation (Waveform 4) |
| A59-18 (HTM-) - A59-28 (GND1) | W - W-B | Communication signal from power management control ECU (HV CPU) to MG ECU | Power switch on (READY) | Pulse generation (Waveform 5) |
| A59-29 (GI) - A59-28 (GND1) | B - W-B | GI signal | Power switch on (READY), with engine running | Pulse generation (Waveform 6) |
| A59-31 (HSDN) - A59-28 (GND1) | B - W-B | MG shutdown signal | Power switch on (READY) | 0 to 1 V |
| A59-35 (ILKI) - A59-28 (GND1) | V - W-B | Interlock switch signal | Power switch on (IG), inverter terminal cover, high-voltage input cables and service plug grip installed correctly | Below 1 V |
| A59-35 (ILKI) - A59-28 (GND1) | V - W-B | Interlock switch signal | Power switch on (IG), inverter terminal cover, high-voltage input cables or service plug grip not installed | 11 to 14 |
| A59-36 (ILKO) - A59-28 (GND1) | LG - W-B | Interlock switch signal | Power switch on (IG), inverter terminal cover, high-voltage input cables and service plug grip installed correctly | Below 1 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Standard Condition |
|---|---|---|---|---|
| A59-36 (ILKO) - A59-28 (GND1) | LG - W-B | Interlock switch signal | Power switch on (IG), inverter terminal cover, high-voltage input cables or service plug grip not installed | 11 to 14 |
| A59-9 (+B2) - A59-28 (GND1) | G - W-B | MG ECU power source | Power switch on (IG) | 11 to 14 V |
| A59-10 (+B) - A59-28 (GND1) | G - W-B | MG ECU power source | Power switch on (IG) | 11 to 14 V |
| D29-1 (MRF) - D29-2 (MRFG) | Y - L | Motor resolver signal | Motor resolver stopped or running | Pulse generation (Waveform 7) |
| D29-3 (MSN) - D29-4 (MSNG) | G - W | Motor resolver signal | Motor resolver stopped or running | Pulse generation (Waveform 7) |
| D29-6 (MCS) - D29-5 (MCSG) | R - BR | Motor resolver signal | Motor resolver stopped or running | Pulse generation (Waveform 7) |
| D29-7 (GSN) - D29-8 (GSNG) | G - W | Generator resolver signal | Generator resolver stopped or running | Pulse generation (Waveform 8) |
| D29-10 (GCS) - D29-9 (GCSG) | R - B | Generator resolver signal | Generator resolver stopped or running | Pulse generation (Waveform 8) |
| D29-11 (GRF) - D29-12 (GRFG) | Y - L | Generator resolver signal | Generator resolver stopped or running | Pulse generation (Waveform 8) |

NOTICE:

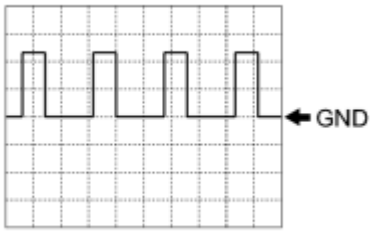
Do not measure the voltage or waveform directly at the sealed side of the inverter with converter assembly connector. Doing so may damage the connector because the connector is waterproof.

2. Oscilloscope waveforms

HINT:

Oscilloscope waveform samples are provided here for informational purposes. Noise and fluttering waveforms have been omitted.

(a) Waveform 1 (DC/DC operation monitor / voltage change signal)

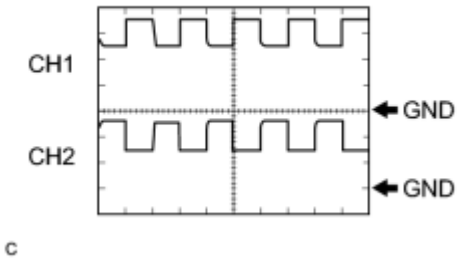



| Item | Content |
|---|---|
| Terminal | A59-3 (VLO) - A59-28 (GND1) |
| Equipment Setting | 5 V/DIV., 50 ms./DIV. |
| Condition | Power switch on (IG) |

HINT:

The cycle will vary depending on the specified voltage of the hybrid vehicle converter.

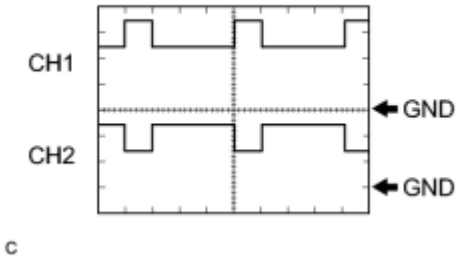
(b) Waveform 2 (MG ECU communication clock signal)




c

| Item | Content |
|---|---|
| Terminal | CH1: A59-5 (CLK+) - A59-28 (GND1)<br>CH2: A59-15 (CLK-) - A59-28 (GND1) |
| Equipment Setting | 1 V/DIV., 1 μs./DIV. |
| Condition | Power switch on (READY) |

(c) Waveform 3 (MG ECU communication request signal)

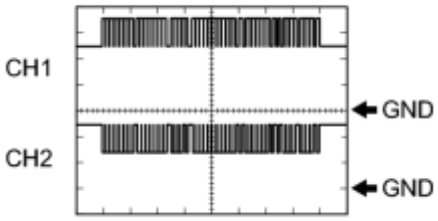



c

| Item | Content |
|---|---|
| Terminal | CH1: A59-6 (REQ+) - A59-28 (GND1)<br>CH2: A59-16 (REQ-) - A59-28 (GND1) |
| Equipment Setting | 1 V/DIV., 1 ms./DIV. |
| Condition | Power switch on (READY) |

(d) Waveform 4 (communication signal from MG ECU to power management control ECU (HV CPU))

| Item | Content |
|---|---|
| Terminal | CH1: A59-7 (MTH+) - A59-28 (GND1) |

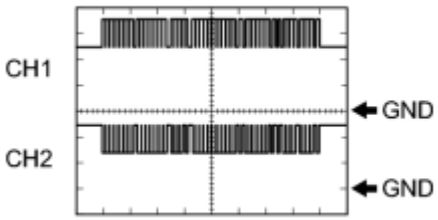



| | |
|---|---|
| | CH2: A59-17 (MTH-) - A59-28 (GND1) |
| Equipment Setting | 1 V/DIV., 200 μs./DIV. |
| Condition | Power switch on (READY) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

(e) Waveform 5 (communication signal from power management control ECU (HV CPU) to MG ECU)

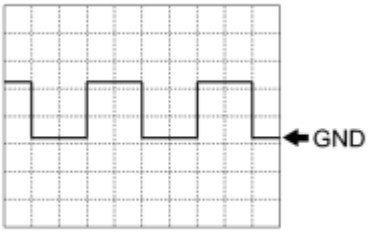



| Item | Content |
|---|---|
| Terminal | CH1: A59-8 (HTM+) - A59-28 (GND1)<br>CH2: A59-18 (HTM-) - A59-28 (GND1) |
| Equipment Setting | 1 V/DIV., 200 μs./DIV. |
| Condition | Power switch on (READY) |

HINT:

The waveform will vary depending on the content of the digital communication (digital signal).

(f) Waveform 6 (GI signal)

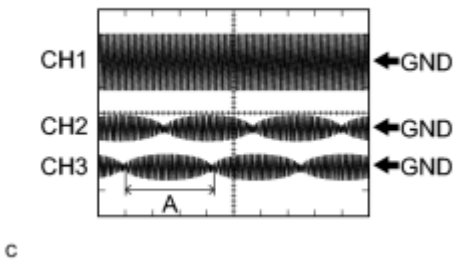



| Item | Content |
|---|---|
| Terminal | A59-29 (GI) - A59-28 (GND1) |
| Equipment Setting | 5 V/DIV., 20 ms./DIV. |
| Condition | Power switch on (READY) with engine running |

HINT:

The pulse cycle becomes shorter as the engine speed increases.

(g) Waveform 7 (motor resolver signal)



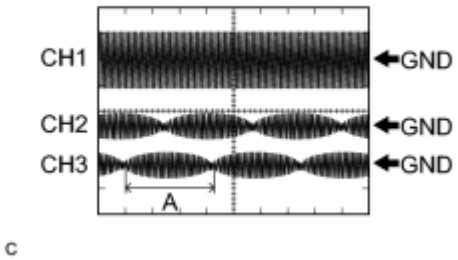

c

| Item | Content |
|---|---|
| Terminal | CH1: D29-1 (MRF) - D29-2 (MRFG)<br>CH2: D29-3 (MSN) - D29-4 (MSNG)<br>CH3: D29-6 (MCS) - D29-5 (MCSG) |
| Equipment Setting | CH1: 10 V/DIV., 1 ms./DIV.<br>CH2, 3: 5 V/DIV., 1 ms./DIV. |
| Condition | Resolver running |

HINT:

Pulse cycle A becomes shorter as the rotor speed increases.

(h) Waveform 8 (generator resolver signal)




c

| Item | Content |
|---|---|
| Terminal | CH1: D29-11 (GRF) - D29-12 (GRFG)<br>CH2: D29-7 (GSN) - D29-8 (GSNG)<br>CH3: D29-10 (GCS) - D29-9 (GCSG) |
| Equipment Setting | CH1: 10 V/DIV., 1 ms./DIV.<br>CH2, 3: 5 V/DIV., 1 ms./DIV. |
| Condition | Resolver running |

HINT:

Pulse cycle A becomes shorter as the rotor speed increases.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The power management control ECU (HV CPU) has a self-diagnosis system. If the computer, power management control ECU (HV CPU), or a component is not working properly, the ECU records the conditions that relate to the fault. The ECU also illuminates the master warning light in the combination meter and provides other appropriate messages on the multi-information display, such as the HV system warning message, the HV battery warning message, on the discharge warning message.




HINT:

The master warning light will illuminate when the hybrid control system malfunctions and the light will blink when in inspection mode.

- When troubleshooting OBD II (On-Board Diagnostics) vehicles, the Techstream (complying with SAE J1987) must be connected to the DLC3 (Data Link Connector 3) of the vehicle. Various data in the vehicle ECM (Engine Control Module) can then be read.
- OBD II regulations require that the vehicle's on-board computer illuminate the MIL (Malfunction Indicator Lamp) on the instrument panel when the computer detects a malfunction in:




a. The emission control system components.
b. The powertrain control components (which affect vehicle emissions).
c. The computer itself.

In addition, the applicable DTCs prescribed by SAE J2012 are recorded in the power management control ECU (HV CPU) memory. If the malfunction does not recur in 3 consecutive

trips, the MIL turns off automatically but the DTCs remain recorded in the power management control ECU (HV CPU) memory.

- To check for DTCs, connect the Techstream to the DLC3. The Techstream displays DTCs, freeze frame data, and a variety of hybrid control system data. The DTCs and freeze frame data can be cleared with the Techstream. In order to enhance the OBD function on vehicles and develop the Off-Board diagnosis system, Controller Area Network (CAN) communication is used in this system. CAN is a network which uses a pair of data transmission lines spanning multiple computers and sensors. It allows for high speed communications between the systems and simplification of the wire harness connections.

2. 2 TRIP DETECTION LOGIC

- When a malfunction is first detected, the malfunction is temporarily stored in the power management control ECU (HV CPU) memory (1st trip). If the same malfunction is detected during the next drive cycle, the MIL is illuminated (2nd trip).

3. FREEZE FRAME DATA

- The power management control ECU (HV CPU) records vehicle and driving condition information as freeze frame data the moment a DTC is stored. When troubleshooting, freeze frame data can be helpful in determining whether the vehicle was running or stopped, whether the engine was warmed up or not, as well as other data recorded at the time of a malfunction.

4. AUXILIARY BATTERY VOLTAGE

Standard Voltage:

| Switch Condition | Specified Condition |
|---|---|
| Power switch on (IG) | 11 to 14 V |

- If voltage is below 11 V, replace or recharge the battery.

5. MIL (Malfunction Indicator Lamp)

(a) The MIL is illuminated when the power switch is first turned on (IG), before the READY indicator comes on.

(b) When the READY indicator turns on, the MIL should turn off. If the MIL remains illuminated, the diagnosis system has detected a malfunction or abnormality in the system.

HINT:

If the MIL is not illuminated when the power switch is first turned on (IG), check the MIL circuit INFO.

# DTC CHECK / CLEAR

1. CHECK FOR DTCS

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check the DTCs and freeze frame data, and then write them down.

(f) Check the details of the DTCs INFO.

2. CHECK FREEZE FRAME DATA AND INFORMATION

(a) If a DTC is present, select it in order to display its freeze frame data.

(b) Read the freeze frame data recorded when the DTC was set.

NOTICE:

A 3-digit information code (INF code) will be displayed as the value for one of the Information 1 to Information 5 lines.

(c) Read the information for the information code.

(1) Select the item from among Information 1 to Information 5 that has an information code and click the engine icon to view the additional information.

3. CHECK FOR DTCS (SYSTEMS OTHER THAN POWER MANAGEMENT CONTROL ECU (HV CPU))

HINT:

The power management control ECU (HV CPU) maintains communication with other computers, including the ECM, skid control ECU and power steering ECU. Therefore, if the power management control ECU (HV CPU) outputs a warning, it is necessary to check and record the DTCs of all systems.

(a) If DTCs are present, check the relevant systems.

HINT:

If DTCs for the CAN communication system are present in addition to other DTCs, first troubleshoot and repair any malfunctions in the CAN communication system.

4. CLEAR DTCS

NOTICE:

Clearing the DTCs will also clear the freeze frame data, information INFO, and operation history data INFO.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Check that park (P) is selected.

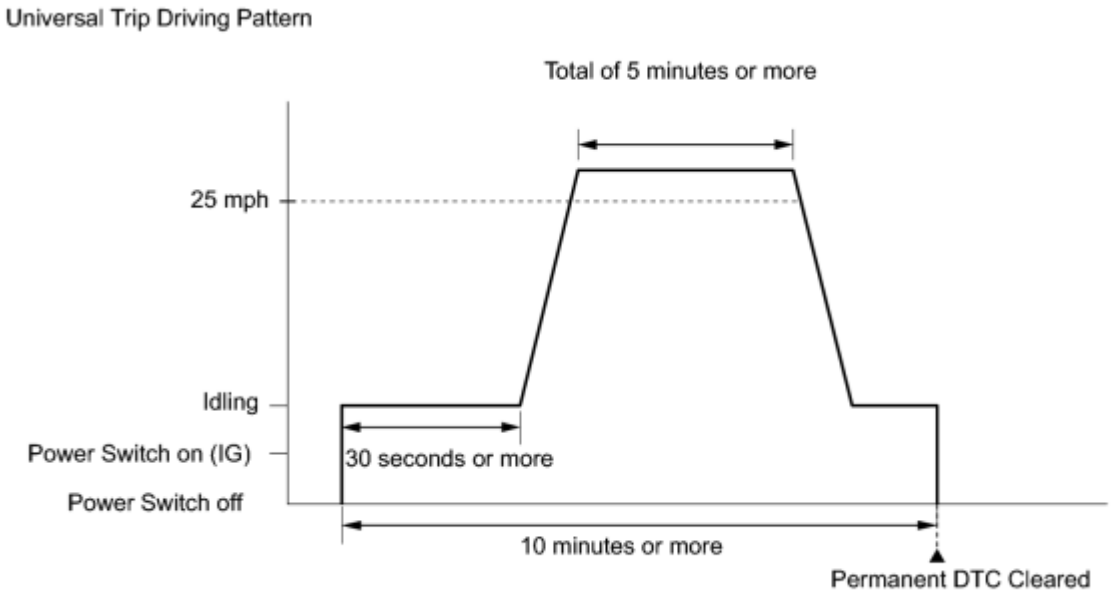
(e) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(f) Clear DTCs and freeze frame data.

5. CLEAR PERMANENT DTC

HINT:

Even if the following procedure is not performed, permanent DTCs are cleared by obtaining a normal judgment during 3 consecutive driving cycles.




(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Check if permanent DTCs are stored.

HINT:

If permanent DTCs are not output, it is not necessary to continue this procedure.

(f) Clear the DTCs.

(g) Perform the respective confirmation driving patterns in order to obtain a normal judgment for the output DTCs.

HINT:

- Confirmation driving patterns do not need to be performed for misfire and fuel system DTCs.
- For the confirmation driving pattern, refer to the procedures for the relevant DTC INFO.

(h) Perform the universal trip.

HINT:

The driving pattern to obtain a normal judgment and the universal trip driving can be performed consecutively in the same driving cycle.

1. Put the engine in inspection mode INFO.
2. Idle the engine for 30 seconds or more.
3. Drive the vehicle at 25 mph (40 km/h) or more for a total of 5 minutes or more.

   HINT:

   It is possible to complete the drive pattern even if the vehicle decelerates to less than 25 mph (40 km/h) during the driving cycle provided that the vehicle is driven at 25 mph (40 km/h) or more for a total of 5 minutes.

4. Allow 10 minutes or more to elapse from the time the engine is started.

(i) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(j) Check that the permanent DTCs have been cleared.

HINT:

The permanent DTCs are cleared when the universal trip is completed.

# DATA LIST / ACTIVE TEST

1. DATA LIST

NOTICE:

- Some Data List values may vary significantly if there are slight differences in the environment in which the vehicle is operating when measurements are obtained. Variations may also occur due to aging of the vehicle. Due to these considerations, it is not always possible to provide definite values to be used for judgment of malfunctions. It is possible that a malfunction may be present even if measured values are within the reference range.
- In the event of a problem with intricate symptoms, collect sample data from another vehicle of the same model operating under identical conditions in order to reach an overall judgment by comparing all the items in the Data List.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Enter the following menus: Powertrain / Hybrid Control / Data List.

(d) Check the results by referring to the following table.

HINT:

- When reviewing Data List information, try to select only the specific Data List items related to the inspection being performed. If all items are selected when checking the Data List, the interval between updates for each item will be longer, resulting in delayed or incorrect data.
- Using a custom list makes it possible to easily select smaller groups of related Data List items.
- The following custom lists are available:
  - Electric Leakage
  - Boost/Lower Converter
  - High Voltage Charge
  - HV Transmission
  - Thermo Sensor
  - Auxiliary Battery
  - Drive Performance
  - Elec Shift Lever System

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Engine Coolant Temp | Engine coolant temperature/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | Cold start→Fully warmed up<br><br>Gradually rises:<br><br>After warming up: 176 to 212°F (80 to 100°C): | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Engine Revolution | Engine speed/<br><br>Min.: 0 r/min, Max.: 16383.75 r/min | While idling after the engine is warmed up and inspection mode:<br><br>Approximately 900 rpm<br><br>While driving at a constant speed:<br><br>No significant fluctuation | - |
| Vehicle Spd | Vehicle speed/<br><br>Min.: 0 mph (0 km/h), Max.: 158 mph (255 km/h) | Vehicle stopped: 0 mph (0 km/h)<br><br>While driving at a constant speed:<br><br>No significant fluctuation | - |
| Engine Run Time | Elapsed time after starting engine/<br><br>Min.: 0 s, Max.: 65535 s | - | - |
| +B | Auxiliary battery voltage/<br><br>Min.: 0 V, Max.: 65.535 V | Constant: Auxiliary battery voltage +/-3 V | Auxiliary battery |
| Accel Pedal Pos #1 | Accelerator pedal position sensor No.1/<br><br>Min.: 0%, Max.: 100% | Accelerator pedal depressed:<br><br>Changes with accelerator pedal pressure | Accelerator pedal position sensor |
| Accel Pedal Pos #2 | Accelerator pedal position sensor No.2/<br><br>Min.: 0%, Max.: 100% | Accelerator pedal depressed:<br><br>Changes with accelerator pedal pressure | Accelerator pedal position sensor |
| Ambient Temperature | Ambient air temperature/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | Power switch on (IG): Same as ambient air | Ambient temperature sensor |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | temperature | |
| Intake Air Temperature | Intake air temperature/<br><br>Min.: -40°F (-40°C), Max.: 284°F (140°C) | Constant: Same as ambient air temperature | - |
| DTC Clear Warm Up | The number of times the engine is warmed up after clearing DTCs/<br><br>Min.: 0, Max.: 255 | MIL OFF, engine coolant temperature increases from below 71.6°F (22°C) before starting the engine to above 158°F (70°C) after starting the engine: Increases once | - |
| DTC Clear Run Distance | Drive distance after clearing DTCs/<br><br>Min.: 0 mile (0 km), Max.: 40723 mile (65535 km) | - | - |
| DTC Clear Min | Elapsed time after clearing DTCs/<br><br>Min.: 0, Min, Max.: 65535 Min | - | - |
| MIL on Engine Run Time | Driving time after a malfunction occurs/<br><br>Min.: 0 Min, Max.: 65535 Min | - | - |
| MIL Status | MIL status/<br><br>ON or OFF | MIL ON: ON | Constant ON: Repair in accordance with detected DTCs |
| MIL on Run Distance | Travel distance after a malfunction occurs/<br><br>Min.: 0 mile (0 km), Max.: 40723 mile (65535 km) | - | - |
| Model Code | Model code | ZVW3# | - |
| Engine Code | Engine code | P410 | - |
| ECU Code | ECU code | - | - |
| Destination | Destination | A | - |
| OBD Requirements | OBD requirements | OBD | - |
| MAP | Intake manifold vacuum/<br><br>Min.: 0 kPa, Max.: 255 kPa | Power switch on (IG) or engine stopped:<br><br>Atmosphere pressure | Valued less than atmospheric pressure are indicated while the engine is running |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Atmosphere Pressure | Atmosphere pressure/<br><br>Min.: 0 kPa, Max.: 255 kPa | Constant:<br><br>Atmosphere pressure | - |
| Number of Emission DTC | The number of emission DTCs | - | - |
| Motor(MG2) Revolution | MG2 revolution/<br><br>Min.: -32768 r/min, Max.: 32767 r/min | While driving: Varies depending on vehicle operating conditions | • Hybrid vehicle transaxle assembly<br>• Inverter with converter assembly |
| Motor(MG2) Torq | MG2 torque/<br><br>Min.: -4096 Nm, Max.: 4095.875 Nm | While driving: Varies depending on vehicle operating conditions | • Power management control ECU<br>• Hybrid vehicle transaxle assembly<br>• Inverter with converter assembly |
| M(MG2) Trq Exec Val | MG2 torque execution value/<br><br>Min.: -4096 Nm, Max.: 4095.875 Nm | After full-load acceleration with power switch on (READY) and engine stopped: Less than +/- 20% of MG2 torque | • Power management control ECU<br>• Hybrid vehicle transaxle assembly<br>• Inverter with converter assembly |
| Generator(MG 1) Rev | MG1 revolution/<br><br>Min.: -32768 r/min, Max.: 32767 r/min | During charge or discharge: Varies depending on vehicle operating conditions | • Hybrid vehicle transaxle assembly<br>• Inverter with converter assembly |
| Generator(MG 1) Torq | MG1 torque/ | During charge or discharge: | • Power management |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: -4096 Nm, Max.: 4095.875 Nm | Varies depending on vehicle operating conditions | control ECU<br>• Hybrid vehicle transaxle assembly<br>• Inverter with converter assembly |
| G(MG1) Trq Exec Val | MG1 torque execution value/<br><br>Min.: -4096 Nm, Max.: 4095.875 Nm | One second after engine automatically starts with park (P) selected (Condition before engine start: Power switch on (READY), engine stopped, A/C fan speed high and headlights on)<br><br>Less than +/- 20% of MG1 torque | • Power management control ECU<br>• Hybrid vehicle transaxle assembly<br>• Inverter with converter assembly |
| Regenerative Brake Torq | MG1 regenerative braking execution torque/<br><br>Min.: -4096 Nm, Max.: 4095 Nm | While braking:<br><br>Varies depending on vehicle operation conditions | • Power management control ECU<br>• Hybrid vehicle transaxle assembly<br>• Inverter with converter assembly |
| Rqst Regen Brake Torq | Requested MG2 regenerative braking torque/<br><br>Min.: -4096 Nm, Max.: 4095 Nm | While braking:<br><br>Varies depending on vehicle operation conditions | • Power management control ECU<br>• Hybrid vehicle transaxle assembly<br>• Inverter with converter |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | | assembly |
| Inverter Temp-(MG1) | Generator inverter temperature/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | • Vehicle left for 1 day at an ambient temperature of 77°F (25°C): 59°F (15°C) to 95°F (35°C)<br>• While driving at an ambient temperature of 77°F (25°C): 59°F (15°C) to 230°F (110°C) | Inverter with converter assembly |
| Inverter Temp-(MG2) | Motor inverter temperature/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | • Vehicle left for 1 day at an ambient temperature of 77°F (25°C): 59°F (15°C) to 95°F (35°C)<br>• While driving at an ambient temperature of 77°F (25°C): 59°F | Inverter with converter assembly |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | (15°C) to 230°F (110°C) | |
| Motor Temp No2 | MG1 temperature/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | • Vehicle left for 1 day at an ambient temperature of 77°F (25°C): 77°F (25°C)<br>• While driving at an ambient temperature of 77°F (25°C): 77°F (25°C) to 212°F (100°C) | GMT terminal |
| Motor Temp No1 | MG2 temperature/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | • Vehicle left for 1 day at an ambient temperature of 77°F (25°C): 77°F (25°C)<br>• While driving at an ambient temperature of 77°F (25°C): 77°F (25°C) to 194°F | MMT terminal |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | (90°C) | |
| Accelerator Degree | Accelerator pedal depressed angle/<br><br>Min.: 0%, Max.: 127.5% | Accelerator pedal depressed:<br><br>Changes with accelerator pedal pressure | Accelerator pedal position sensor |
| Request Power | Request engine power/<br><br>Min.: 0 W, Max.: 655350 W | While driving with the engine running:<br><br>Varies depending on vehicle operating conditions | • Power management control ECU<br>• ECM<br>• Engine |
| Target Engine Rev | Target engine speed/<br><br>Min.: 0 r/min, Max.: 65535 r/min | While driving with the engine running:<br><br>Varies depending on vehicle operating conditions | • Power management control ECU<br>• ECM<br>• Engine |
| Engine Rev (Sensor) | Engine speed/<br><br>Min.: 0 r/min, Max.: 16383.75 r/min | While idling after the engine is warmed up:<br><br>Approximately 1000 rpm<br><br>While driving at a constant speed:<br><br>No significant fluctuation | - |
| State of Charge (All Bat) | Battery state of charge/<br><br>Min.: 0%, Max.: 100% | Constant:<br><br>0 to 100% | • HV battery<br>• Battery smart unit<br>• Power management control ECU |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Master Cylinder Ctrl Trq | Master cylinder control torque/<br><br>Min.: -4096 Nm, Max.: 4095 Nm | Brake pedal depressed:<br><br>Changes with the brake pedal pressure | Master cylinder pressure sensor |
| Power Resource VB | HV battery voltage/<br><br>Min.: 0 V, Max.: 6553.5 V | Power switch on (READY):<br><br>150 to 300: | • HV battery<br>• Battery smart unit<br>• Power management control ECU |
| Power Resource IB | HV battery current/<br><br>Min.: -327.68 A, Max.: 327.67 A | Power switch on (READY):<br><br>-200 to 200 A | • HV battery<br>• Power cable<br>• Inverter with converter assembly<br>• Battery current sensor<br>• Air conditioning system |
| VL-Voltage before Boosting | High voltage before it is boosted/<br><br>Min.: 0 V, Max.: 450 V | Power switch on (READY):<br><br>Practically the same as the HV battery voltage | • HV battery<br>• Inverter with converter assembly |
| VH-Voltage after Boosting | High voltage after it is boosted/<br><br>Min.: 0 V, Max.: 765 V | Engine revving up with park (P) selected: After boosted voltage to below 650 V | Inverter with converter assembly |
| Boost Ratio | Boost ratio/<br><br>Min.: 0%, Max.: 127.5% | The pre-boost and the post boost voltages are equal:<br><br>0 to 10% | Inverter with converter assembly |
| Drive Condition ID | Drive condition ID | • Engine stopped: 0<br>• Engine about to be stopped: 1<br>• Engine about | • Power management control ECU<br>• ECM<br>• Hybrid |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | to be started: 2<br>• Engine operated or operating: 3<br>• While generating or driving under load: 4<br>• Engine racing with park (P) selected: 6 | vehicle transaxle assembly |
| Shift Sensor Main | Shift position sensor (Main) voltage/<br><br>Min.: 0 V, Max.: 4.98 V | Selector lever in home position or N:<br><br>2.0 to 3.0 V<br><br>Selector lever in R:<br><br>0.2 to 1.0 V<br><br>Selector lever in D or B:<br><br>4.0 to 4.8 V | - |
| Shift Sensor Sub | Shift position sensor (Sub) voltage/<br><br>Min.: 0 V, Max.: 4.98 V | Selector lever in home position or N:<br><br>2.0 to 3.0 V<br><br>Selector lever in R:<br><br>0.2 to 1.0 V<br><br>Selector lever in D or B:<br><br>4.0 to 4.8 V | - |
| Shift Sensor Select Main | Select position sensor (Main) voltage/<br><br>Min.: 0 V, Max.: 4.98 V | Selector lever in home position or B:<br><br>10. to 1.6 V | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | Selector lever in R, N or D:<br><br>2.9 to 4.3 V | |
| Shift Sensor Select Sub | Select position sensor (Sub) voltage/<br><br>Min.: 0 V, Max.: 4.98 V | Selector lever in home position or B:<br><br>10. to 1.6 V<br><br>Selector lever in R, N or D:<br><br>2.9 to 4.3 V | - |
| Shift Sensor Shift Pos | Selector lever position/<br><br>P/D/N/R/B | Selector lever remains in one position:<br><br>P, R, N, D or B | Selector lever position sensor |
| Crank Position | Crankshaft position/<br><br>Min.: -128 °CA, Max.: 127 °CA | - | - |
| A/C Consumption Pwr | A/C consumption power/<br><br>Min.: 0 W, Max.: 12750 W | While the Air conditioning system is operating: 0.001 kW to 5000 W | • Air conditioning system<br>• Battery smart unit |
| Short Wave Highest Val | Waveform voltage in leak detection circuit in battery ECU/<br><br>Min.: 0 V, Max.: 4.98 V | Left for 2 minutes in power switch on (READY), and pre-boost and post boost voltages are equal: 4 V or more | High voltage circuit |
| MG1 Control Mode | MG1 control mode/<br><br>Min.: 0, Max.: 2 | PWM: 0<br><br>Variable PWM: 1<br><br>Rectangular wave: 2 | - |
| MG1 Carrier Frequency | MG1 carrier frequency/ | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | 0.75kHz/1.25kHz/2.5kHz/ 3.75kHz/5kHz/10kHz | | |
| MG2 Control Mode | MG2 control mode/<br><br>Min.: 0, Max.: 2 | PWM: 0<br><br>Variable PWM: 1<br><br>Rectangular wave: 2 | - |
| MG2 Carrier Frequency | MG2 carrier frequency/<br><br>0.75kHz/1.25kHz/2.5kHz/ 3.75kHz/5kHz/10kHz | - | - |
| Num of Current Code | The number of current DTCs/<br><br>Min.: 0, Max.: 255 | - | - |
| Num of History Code | The number of history DTCs/<br><br>Min.: 0, Max.: 255 | - | - |
| Check Mode | Check Mode/<br><br>ON or OFF | - | - |
| Calculate Load | Calculated load/<br><br>Min.: 0%, Max.: 100% | • Engine idling with warm engine, air conditioner off, park (P) and inspection mode selected: 20 to 40%<br>• Engine speed of 2500 rpm, air conditioner off, park (P) and inspection mode selected: | • Air cleaner condition<br>• Throttle valve status |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | 15 to 35% | |
| Throttle Position | Throttle position sensor/<br><br>Min.: 0%, Max.: 100% | Throttle valve fully closed:<br><br>10 to 24% | Throttle valve status |
| DCDC Cnv Tar Pulse Duty | Target auxiliary battery voltage/<br><br>Min.: 0%, Max.: 399.9% | - | - |
| Inverter Coolant Water Temperature | Inverter coolant temperature/<br><br>Min.: -58°F (-50°C), Max.: 230°F (110°C) | Cold start→Fully warmed up:<br><br>Gradually rises<br><br>System operating normally:<br><br>Controlled at 149°F (65°C) or less | • Inverter with converter assembly<br>• Water pump with motor assembly<br>• Cooling fan system<br>• Inverter cooling system<br>• IGCT No.3 fuse |
| Cooling Fan 0 | Battery cooling fan operating mode/<br><br>Min.: 0%, Max.: 127.5% | - | - |
| Cooling Fan Relay | BATT FAN relay on or off/<br><br>ON or OFF | While the battery cooling fan is operating:<br><br>ON | - |
| Inverter W/P Revolution | Water pump with motor assembly speed/<br><br>Min.: 0 rpm, Max.: 15000 rpm | Power switch on (READY):<br><br>1375 to 5500 rpm | • Power management control ECU<br>• Water pump with motor assembly |
| Prohibit DC/DC conv sig | Hybrid vehicle converter prohibition signal/<br><br>ON or OFF | • Power switch on (IG): ON (Prohibited)<br>• Power | • Power management control ECU<br>• Hybrid vehicle converter |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | switch on (READY): OFF (Permitted) | |
| EV Request | EV mode transition availability/<br><br>ON or OFF | In EV mode:<br><br>ON | - |
| TRC OFF Switch | VSC condition/<br><br>OFF / TRC / TRC/VSC | - | - |
| Starter Switch | ST ON signal/<br><br>ON or OFF | - | - |
| Inv-T (MG1) aftr IG-ON | Generator inverter temperature soon after power switch on (IG)/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | - | - |
| Inv-T (MG2) aftr IG-ON | Motor temperature soon after power switch on (IG)/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | - | - |
| Mtr-T (MG2) aftr IG-ON | MG2 temperature soon after power switch on (IG)/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | - | - |
| Conv-Tmp after IG-ON | Boost converter temperature soon after power switch on (IG)/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | - | - |
| SOC after IG-ON | SOC soon after power switch on (IG)/<br><br>Min.: 0%, Max.: 127.5% | - | - |
| Inv-Temp (MG1) Max | Generator inverter maximum temperature/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | - | - |
| Inv-Temp (MG2) Max | Motor inverter maximum temperature/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | - | - |
| Mtr-Temp (MG2) Max | MG2 maximum temperature/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | - | - |
| Converter Temp Max | Boost converter maximum temperature/ | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: 59°F (15°C), Max.: 302°F (150°C) | | |
| Status of Charge Max | Maximum status of charge/<br><br>Min.: 0%, Max.: 127.5% | - | - |
| Status of Charge Min | Minimum status of charge/<br><br>Min.: 0%, Max.: 127.5% | - | - |
| Stop Light Switch | Stop light switch condition/<br><br>ON or OFF | Brake pedal depressed:<br><br>ON | - |
| Auxiliary Batt Temperature | Auxiliary battery temperature/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | Auxiliary battery temperature is 68°F (20°C):<br><br>68°F (20°C) | - |
| Collision Signal (Airbag) | Airbag sensor assembly collision detection/<br><br>ON or OFF | Collision detection by the airbag sensor assembly:<br><br>ON | - |
| TC Terminal | TC terminal state/<br><br>ON or OFF | TC terminal connected:<br><br>ON | - |
| Inter Lock Switch | Interlock switch condition/<br><br>ON or OFF | Power switch on (IG), inverter terminal cover, high voltage input cables and service plug grip installed detached<br><br>ON | - |
| EV SW2 | EV switch condition/<br><br>ON or OFF | EV switch on:<br><br>ON | - |
| Back Up Lamp Relay | Back up light switch condition/<br><br>ON or OFF | Selector lever in R<br><br>ON | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ECO Mode | ECO mode signal/<br><br>ON or OFF | ECO mode being selected OFF→ON:<br><br>OFF→ON | • Combination meter assembly<br>• Power management control ECU |
| Generate Torque | Currently generated drive torque/<br><br>Min.: -4096 Nm, Max.: 4095.875 Nm | While driving: Varies depending on vehicle operating conditions | - |
| Prohibit Charge for P Pos | HV battery charge in park (P) selected prohibition state/<br><br>ON or OFF | HV battery charge in park (P) selected prohibition:<br><br>ON | - |
| Vehicle Parking (T/M Ctrl) | Indicates whether vehicle being driven or stopped./<br><br>ON or OFF | - | - |
| Shift Pos Status (T/M Ctrl) | Indicates whether park (P) is selected/<br><br>Not P / Run / P | - | - |
| Shift P Permission Signal | Indicates whether selection of park (P) is permitted./<br><br>ON or OFF | - | - |
| DC/DC Cnv Tmp (Upper) | Boost converter temperature (upper)/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | • Vehicle left for 1 day at an ambient temperature of 77°F (25°C): 59°F (15°C) to 95°F (35°C)<br>• While driving at an ambient temperature of | Inverter with converter assembly |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | 77°F (25°C): 59°F (15°C) to 230°F (110°C) | |
| Safing Signal (Airbag) | Safing state of the airbag sensor assembly/<br><br>ON or OFF | When safing state of the airbag sensor assembly:<br><br>ON | - |
| DC/DC Cnv Temp (Lower) | Boost converter temperature (lower)/<br><br>Min.: 59°F (15°C), Max.: 302°F (150°C) | • Vehicle left for 1 day at an ambient temperature of 77°F (25°C): 59°F (15°C) to 95°F (35°C)<br>• While driving at an ambient temperature of 77°F (25°C): 59°F (15°C) to 250°F (121°C) | Inverter with converter assembly |
| Normal Signal for A/B ECU | Control state of airbag sensor assembly/<br><br>ON or OFF | When the airbag sensor assembly is operating normally:<br><br>ON | - |
| Mtr-T (MG1) aftr IG-ON | MG1 temperature soon after power switch on (IG)/<br><br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Mtr-Temp (MG1) Max | MG1 maximum temperature/<br>Min.: -40°F (-40°C), Max.: 419°F (215°C) | - | - |
| Overvoltage Input to Conv | Boost converter overvoltage detection/<br>ON or OFF | Overvoltage is received by the boost converter:<br>ON | - |
| Overvoltage Input to Inv | Inverter overvoltage detection/<br>ON or OFF | Overvoltage is received by the inverter:<br>ON | - |
| Emergency Shutdown | Inverter emergency shutdown/<br>ON or OFF | Inverter emergency shutdown:<br>ON | - |
| MG1 Inverter Shutdown | Generator inverter shutdown/<br>ON or OFF | Generator inverter shutdown:<br>ON | - |
| MG1 Inverter Fail | Generator inverter failure/<br>ON or OFF | Generator inverter faulty:<br>ON | - |
| MG2 Inverter Shutdown | Motor inverter shutdown/<br>ON or OFF | Motor inverter shutdown:<br>ON | - |
| MG2 Inverter Fail | Motor inverter failure/<br>ON or OFF | Motor inverter faulty:<br>ON | - |
| Conv Shutdown | Boost converter shutdown/<br>ON or OFF | Boost converter shutdown:<br>ON | - |
| Converter Fail | Boost converter failure/<br>ON or OFF | Boost converter faulty:<br>ON | - |
| P Pos SW Terminal Vol | Indicates voltage at the P position switch terminals/ | P position | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: 0 V, Max.: 79.9987793 V | switch ON:<br><br>0 to 1.5 V | |
| Internal Shift Position | ECU internal shift condition/<br><br>P/R/N/D/B | Matches currently selected condition:<br><br>P, R, N, D or B | - |
| P Rq Malfunction (T/M Ctrl) | Indicates whether park (P) selection request is normal/<br><br>Normal or Abnormal | - | - |
| P Request (T/M Ctrl) | Indicates whether selection of park (P) is requested./<br><br>ON or OFF | - | - |
| T/M Control ECU Status | Indicates the control condition of the transmission control ECU/<br><br>Normal or Abnormal | - | - |
| T/M ECU Pulse Consec Err | Indicates consecutive communication errors with the transmission control ECU/<br><br>Normal or Abnormal | - | - |
| T/M ECU Pulse Single Err | Indicates a single communication error with the transmission control ECU/<br><br>Normal or Abnormal | - | - |
| HV Start Condition | Indicates the hybrid start condition/<br><br>Norml /Pr A/C / Remote | - | - |
| W/P Run Control Duty | Water pump motor driver request duty/<br><br>Min.: 0%, Max.: 100% | Power switch on (READY):<br><br>62.5 to 81.25% | Power management control ECU |
| Engine Stop Request | Engine stop request/<br><br>ON or OFF | Requesting engine stop:<br><br>ON | • ECM<br>• Power management control ECU |
| Engine Idling Request | Engine idling request/<br><br>ON or OFF | Requesting idle:<br><br>ON | • ECM<br>• Power management control ECU |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Main Batt Charging Rqst | HV battery charging request/<br><br>ON or OFF | Requesting HV battery charging:<br><br>ON | • Battery smart unit<br>• HV battery |
| Aircon Request | Engine starting request from A/C amplifier/<br><br>ON or OFF | While an engine start is requested from the A/C amplifier:<br><br>ON | Air conditioning amplifier |
| Engine Warming Up Rqst | Engine warm-up request/<br><br>ON or OFF | While an engine warm-up is requested:<br><br>ON<br><br>After the engine is warmed up:<br><br>OFF | • Power management control ECU<br>• ECM |
| SMRP Status | Operating state of SMRP/<br><br>ON or OFF | Immediately after the power switch on (ST-ON) state occurred:<br><br>ON<br><br>After the above timing:<br><br>OFF | • Hybrid battery junction block<br>• Wire harness |
| SMRB Status | Operating state of SMRB/<br><br>ON or OFF | Power switch on (READY):<br><br>ON | • Hybrid battery junction block<br>• Wire harness |
| SMRG Status | Operating state of SMRG/<br><br>ON or OFF | Power switch on (READY):<br><br>ON | • Hybrid battery junction block<br>• Wire harness |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| MG1 Gate Status | MG1 gate status/<br><br>ON or OFF | Shutting down generator inverter:<br><br>ON | • Power management control ECU<br>• Inverter with converter assembly |
| MG2 Gate Status | MG2 gate status/<br><br>ON or OFF | Shutting down motor inverter:<br><br>ON | • Power management control ECU<br>• Inverter with converter assembly |
| Converter Gate Status | Boost converter gate status/<br><br>ON or OFF | Shutting down boost converter:<br><br>ON | • Power management control ECU<br>• Inverter with converter assembly |
| Aircon Gate Status | While A/C inverter is being shut off/<br><br>ON or OFF | While A/C inverter is being shut off:<br><br>ON | • Air conditioning amplifier<br>• Power management control ECU |
| Converter Carrier Freq | Converter signal carrier frequency/<br><br>9.55kHz/9.13kHz/8.71kHz/8.29kHz/7.87kHz/7.45kHz/4.8kHz | - | - |
| Delta SOC | Difference between maximum and minimum values of SOC/<br><br>Min.: 0%, Max.: 127.5% | READY indicator on, engine stopped and no electrical load:<br><br>0 to 60% | - |
| Batt Pack Current Val | HV battery current/<br><br>Min.: -327.68 A, Max.: 327.67 A | Immediately after a full-load acceleration with the engine stopped:<br><br>Maximum 190 | HV battery current sensor circuit |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | A<br><br>Immediately after engine start with park (P) selected:<br><br>100 A or more | |
| Inhaling Air Temp | HV battery intake air temperature/<br><br>Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | - | - |
| VMF Fan Motor Voltage1 | Battery blower motor monitoring voltage/<br><br>Min.: 0 V, Max.: 25.5 V | Fan mode 1 with READY indicator ON and park (P) selected:<br><br>1.0 to 1.4 V | Battery cooling fan circuit |
| Auxiliary Battery Vol | Auxiliary battery voltage/<br><br>Min.: -40 V, Max.: 39.9 V | Same as auxiliary battery voltage | • Auxiliary battery<br>• Hybrid vehicle converter |
| Charge Control Value | Charge control wattage sent from battery smart unit to power management control ECU/<br><br>Min.: -64 kW, Max.: 63.5 kW | -33 kW or more | - |
| Discharge Control Value | Discharge control wattage sent from battery smart unit to power management control ECU/<br><br>Min.: -64 kW, Max.: 63.5 kW | 30 kW or less | - |
| Cooling Fan Mode1 | Battery cooling fan operation mode/<br><br>Min.: 0, Max.: 255 | Power switch on (IG) or on (READY), and cooling fan stopped:<br><br>0<br><br>Power switch on (IG) or on (READY), and cooling fan low speed to high | Battery cooling fan circuit |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | speed:<br><br>1→6 | |
| ECU Control Mode | Battery control mode/<br><br>Min.: 1, Max.: 5 | Driving control mode:<br><br>1<br><br>Current sensor offset mode:<br><br>2<br><br>External charge control mode:<br><br>3<br><br>Power supply end mode:<br><br>4 | - |
| Standby Blower Request | Battery blower motor stop control request (standby blower)/<br><br>ON or OFF | Constant:<br><br>ON or OFF | Air conditioning system |
| Temp of Batt TB1 | Temperature of HV battery/<br><br>Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | Undisturbed for 1 day:<br><br>Same as ambient air temperature | • Battery temperature sensor<br>• Battery smart unit |
| Temp of Batt TB2 | Temperature of HV battery/<br><br>Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | Undisturbed for 1 day:<br><br>Same as ambient air temperature | • Battery temperature sensor<br>• Battery smart unit |
| Temp of Batt TB3 | Temperature of HV battery/<br><br>Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | Undisturbed for 1 day:<br><br>Same as ambient air temperature | • Battery temperature sensor<br>• Battery smart unit |
| Temp of Batt TB4 | Temperature of HV battery/ | Undisturbed for | • Battery temperature |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | 1 day:<br><br>Same as ambient air temperature | sensor<br>• Battery smart unit |
| Battery Block Num | The number of battery blocks | Always: 14 | HV battery |
| Batt Block Minimum Vol | Battery block minimum voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 55 to 60%: 12 V or more | - |
| Minimum Batt Block No | Battery block number with minimum voltage/<br><br>Min.: 0, Max.: 14 | Any of block number 0 to 14 | - |
| Batt Block Max Vol | Battery block maximum voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 55 to 60%: 23 V or less | - |
| Max Battery Block No | Battery block number with maximum voltage/<br><br>Min.: 0, Max.: 14 | Any of block number 0 to 14 | - |
| Battery Block Vol -V01 | Battery block voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V02 | Battery block voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V03 | Battery block voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V04 | Battery block voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V05 | Battery block voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V06 | Battery block voltage/<br><br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V07 | Battery block voltage/ | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: 0 V, Max.: 79.99 V | | unit |
| Battery Block Vol -V08 | Battery block voltage/<br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V09 | Battery block voltage/<br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V10 | Battery block voltage/<br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V11 | Battery block voltage/<br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V12 | Battery block voltage/<br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V13 | Battery block voltage/<br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Battery Block Vol -V14 | Battery block voltage/<br>Min.: 0 V, Max.: 79.99 V | SOC 60% : 12 to 20 V | • HV battery<br>• Battery smart unit |
| Internal Resistance R01 | Internal resistance of each battery block/<br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R02 | Internal resistance of each battery block/<br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R03 | Internal resistance of each battery block/<br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R04 | Internal resistance of each battery block/<br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance | Internal resistance of each battery block/ | Always: | HV battery |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| R05 | Min.: 0 Ω, Max.: 0.255 Ω | 0.01 to 0.1 Ω | |
| Internal Resistance R06 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R07 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R08 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R09 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R10 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R11 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R12 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R13 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Internal Resistance R14 | Internal resistance of each battery block/<br><br>Min.: 0 Ω, Max.: 0.255 Ω | Always:<br><br>0.01 to 0.1 Ω | HV battery |
| Battery Low Time | Cumulative total of extremely low battery charge level (engine not startable)/<br><br>Min.: 0, Max.: 65535 | - | - |
| DC Inhibit Time | Cumulative total of extremely low battery charge level (engine startable)/<br><br>Min.: 0, Max.: 65535 | - | - |
| Battery too High Time | Cumulative total of charging during charge prohibition state/<br><br>Min.: 0, Max.: 65535 | - | - |
| Hot Temperature Time | Cumulative total of rapid battery temperature increase/<br><br>Min.: 0, Max.: 65535 | - | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Pattern Switch (PWR/M) | POWER mode switch signal/<br><br>ON or OFF | POWER mode switch on:<br><br>ON | - |

2. ACTIVE TEST

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data list information can be displayed while performing Active Tests.

NOTICE:

It is necessary to use caution, because if the tester DLC connector becomes disconnected or if a communication error occurs during an Active Test, the vehicle could become inoperative (the READY indicator may go off).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

Enter the following menus: Powertrain / Hybrid Control / Active Test.

(d) According to the display on the Techstream perform the appropriate Active Test.

| Tester Display | Test Part | Control Range | Test Details | Test Condition |
|---|---|---|---|---|
| Inspection Mode - 2WD Inspection*1 | - | - | - | - |
| Inspection Mode - 2WD Chassis-Dynamo*1 | - | - | - | - |
| Compression Test*2 | To crank the engine continuously in order to measure the compression | ON / OFF | Allows the engine to continue cranking by activating MG1 continuously | Power switch on (IG), HV system normal, not in cranking mode, and other Active Tests not being done |
| Activate the Water Pump | To activate the water pump with motor assembly continuously | ON / OFF | Activates the water pump with motor assembly continuously | Power switch on (IG), HV system normal, not in inspection mode, and other Active Tests not being done |
| Driving the Battery Cooling Fan | To check operation of the cooling fan check if there is sufficient air | 1 to 6 | Stops the cooling fan or changes air volume mode | - |

| Tester Display | Test Part | Control Range | Test Details | Test Condition |
|---|---|---|---|---|
| | flow | | | |
| Connect the TC and TE1 | Batch display of warnings on combination meter | ON / OFF | TC terminal can be switched ON/OFF | Power switch on (IG), system is normal |

NOTICE:

- *1: Enter inspection mode INFO.
- *2: The Techstream will display a communication error and the vehicle's READY indicator will turn off when the Active Test is completed. If the Techstream will be used on the vehicle again, turn the power switch off and then on (READY) again to restart the Techstream.

# DIAGNOSTIC TROUBLE CODE CHART

### Hybrid Vehicle Control System

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0069-273 | Manifold Absolute Pressure - Barometric Pressure Correlation | - Inverter with converter assembly<br>- Manifold absolute pressure sensor<br>- ECM<br>- Wire harness or connector | Comes on | - | INFO |
| P0340-886 | Camshaft Position Sensor "A" Circuit | - Wire harness or connector<br>- Camshaft position sensor<br>- Inverter with converter assembly<br>- ECM<br>- Power management control ECU | Comes on | - | INFO |
| P0343-747 | Camshaft Position Sensor "A" Circuit High Input | - SFI system<br>- Inverter with converter assembly<br>- ECM<br>- Power management control ECU<br>- Wire harness or connector | Comes on | - | INFO |
| P0516-769 | Battery Temperature Sensor Circuit Low | - Thermistor assembly<br>- Wire harness or connector<br>- Power management control ECU | - | - | INFO |
| P0517-770 | Battery Temperature Sensor Circuit High | - Thermistor assembly<br>- Wire harness or connector<br>- Power management control | - | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | ECU | | | |
| P060B-134 | Internal Control Module A/D Processing Performance | Power management control ECU | Comes on | Comes on | INFO |
| P060B-135 | Internal Control Module A/D Processing Performance | Power management control ECU | Comes on | Comes on | INFO |
| P060B-570 | Internal Control Module A/D Processing Performance | Power management control ECU | Comes on | Comes on | INFO |
| P062F-143 | EEPROM Malfunction | Power management control ECU | Comes on | Comes on | INFO |
| P062F-165 | EEPROM Malfunction | Power management control ECU | Comes on | Comes on | INFO |
| P0630-804 | VIN not Programmed or Mismatch-ECM / PCM | Power management control ECU | Comes on | - | INFO |
| P06A4-209 | Sensor Reference Voltage "D" Circuit Low | Power management control ECU | Comes on | - | INFO |
| P06A5-210 | Sensor Reference Voltage "D" Circuit High | Power management control ECU | Comes on | - | INFO |
| P082B-575 | Gear Lever X Position Circuit Low | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control ECU | Comes on | - | INFO |
| P082C-576 | Gear Lever X Position Circuit High | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control ECU | Comes on | - | INFO |
| P082E-571 | Gear Lever Y Position Circuit Low | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control ECU | Comes on | - | INFO |
| P082F-572 | Gear Lever Y Position Circuit High | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | ECU | | | |
| P0851-579 | Park / Neutral Switch Input Circuit Low | - Wire harness or connector<br>- Transmission shift main switch (P position switch)<br>- Power management control ECU | Comes on | - | INFO |
| P0852-580 | Park / Neutral Switch Input Circuit High | - Wire harness or connector<br>- Transmission shift main switch (P position switch)<br>- Power management control ECU | Comes on | - | INFO |
| P085D-582 | Gear Shift Control Module "A" Performance | - Wire harness or connector<br>- Transmission control ECU assembly<br>- Power management control ECU | Comes on | - | INFO |
| P085D-599 | Gear Shift Control Module "A" Performance | - Wire harness or connector<br>- Transmission control ECU assembly<br>- Power management control ECU | Comes on | - | INFO |
| P0861-597 | Gear Shift Control Module "A" Communication Circuit Low | - Wire harness or connector<br>- Transmission control ECU assembly<br>- Power management control ECU | Comes on | - | INFO |
| P0862-598 | Gear Shift Control Module "A" Communication Circuit High | - Wire harness or connector<br>- Transmission control ECU assembly<br>- Power management control ECU | Comes on | - | INFO |
| P0A01-726 | Motor Electronics Coolant Temperature Sensor Circuit Range / Performance | - Inverter cooling system | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | | | |
| P0A02-719 | Motor Electronics Coolant Temperature Sensor Circuit Low | Inverter with converter assembly | Comes on | - | INFO |
| P0A03-720 | Motor Electronics Coolant Temperature Sensor Circuit High | Inverter with converter assembly | Comes on | - | INFO |
| P0A04-725 | Motor Electronics Coolant Temperature Sensor Circuit Intermittent | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | Comes on | - | INFO |
| P0A08-264 | DC / DC Converter Status Circuit | - Wire harness or connector<br><br>- Water pump with motor assembly<br><br>- Inverter cooling system<br><br>- Hybrid vehicle transaxle assembly<br><br>- Generator cable | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Motor cable<br><br>- Frame wire<br><br>- Inverter with converter assembly<br><br>- Fusible link block assembly (MAIN)<br><br>- Fuse (DC/DC-S, IGCT, IGCT No. 2, IGCT No. 3)<br><br>- Fusible link block assembly (DC/DC) | | | |
| P0A09-265 | DC / DC Converter Status Circuit Low Input | - Wire harness or connector<br><br>- Inverter with converter assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P0A09-591 | DC / DC Converter Status Circuit Low Input | - Wire harness or connector<br><br>- Inverter with converter assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P0A0D-350 | High Voltage System Inter-Lock Circuit High | - Wire harness or connector<br><br>- Service plug grip<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Frame wire<br><br>- Inverter terminal cover | Comes on | - | INFO |
| P0A0D-351 | High Voltage System Inter-Lock Circuit High | - Wire harness or connector<br><br>- Service plug grip<br><br>- Power management control | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | ECU<br><br>- Inverter with converter assembly<br><br>- Frame wire<br><br>- Inverter terminal cover | | | |
| P0A0F-204 | Engine Failed to Start | - SFI system<br><br>- Power management control ECU | Comes on | - | INFO |
| P0A0F-205 | Engine Failed to Start | - SFI system<br><br>- Power management control ECU | Comes on | - | INFO |
| P0A0F-206 | Engine Failed to Start | - SFI system<br><br>- Power management control ECU | Comes on | - | INFO |
| P0A0F-238 | Engine Failed to Start | - Hybrid vehicle transaxle assembly<br><br>- Transmission input damper assembly<br><br>- Power management control ECU<br><br>- Engine | Comes on | - | INFO |
| P0A0F-524 | Engine Failed to Start | - SFI system<br><br>- Power management control ECU | Comes on | - | INFO |
| P0A0F-525 | Engine Failed to Start | - SFI system<br><br>- Power management control ECU | Comes on | - | INFO |
| P0A10-263 | DC / DC Converter Status Circuit High Input | - Wire harness or connector<br><br>- Inverter with converter assembly<br><br>- Power management control ECU | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0A10-592 | DC / DC Converter Status Circuit High Input | - Wire harness or connector<br>- Inverter with converter assembly<br>- Power management control ECU | Comes on | - | INFO |
| P0A1A-151 | Generator Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1A-155 | Generator Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1A-156 | Generator Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1A-166 | Generator Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1A-200 | Generator Control Module | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A1A-658 | Generator Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1A-659 | Generator Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1A-791 | Generator Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1A-792 | Generator Control Module | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A1A-793 | Generator Control Module | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A1B-163 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0A1B-164 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-168 | Drive Motor "A" Control Module | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A1B-192 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-193 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-198 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-511 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-512 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-661 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-786 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-794 | Drive Motor "A" Control Module | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A1B-795 | Drive Motor "A" Control Module | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A1B-796 | Drive Motor "A" Control Module | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A1D-144 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-148 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D- | Hybrid Powertrain Control | Power management control | Comes on | Comes | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| 162 | Module | ECU | | on | |
| P0A1D-187 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-721 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-722 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-723 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-787 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-818 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-821 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-822 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A1D-823 | Hybrid Powertrain Control Module | Power management control ECU | Comes on | Comes on | INFO |
| P0A2B-250 | Drive Motor "A" Temperature Sensor Circuit Range / Performance | Hybrid vehicle transaxle assembly (Motor temperature sensor) | Comes on | - | INFO |
| P0A2C-247 | Drive Motor "A" Temperature Sensor Circuit Low | - Wire harness or connector<br>- Power management control ECU<br>- Hybrid vehicle transaxle assembly (Motor temperature sensor) | Comes on | - | INFO |
| P0A2D-249 | Drive Motor "A" Temperature Sensor Circuit High | - Wire harness or connector<br>- Power management control ECU<br>- Hybrid vehicle transaxle assembly (Motor temperature sensor) | Comes on | - | INFO |
| P0A2E-248 | Drive Motor "A" Temperature Sensor Circuit Intermittent | Hybrid vehicle transaxle assembly (Motor temperature sensor) | Comes on | - | INFO |
| P0A37-260 | Generator Temperature Sensor Circuit Range / Performance | Hybrid vehicle transaxle assembly (Generator temperature sensor) | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0A38-257 | Generator Temperature Sensor Circuit Low | - Wire harness or connector<br>- Power management control ECU<br>- Hybrid vehicle transaxle assembly (Generator temperature sensor) | Comes on | - | INFO |
| P0A39-259 | Generator Temperature Sensor Circuit High | - Wire harness or connector<br>- Power management control ECU<br>- Hybrid vehicle transaxle assembly (Generator temperature sensor) | Comes on | - | INFO |
| P0A3A-258 | Generator Temperature Sensor Circuit Intermittent | Hybrid vehicle transaxle assembly (Generator temperature sensor) | Comes on | - | INFO |
| P0A3F-243 | Drive Motor "A" Position Sensor Circuit | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A40-500 | Drive Motor "A" Position Sensor Circuit Range / Performance | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A41-245 | Drive Motor "A" Position Sensor Circuit Low | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A4B-253 | Generator Position Sensor Circuit | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Wire harness or connector | | | |
| P0A4C-513 | Generator Position Sensor Circuit Range / Performance | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A4D-255 | Generator Position Sensor Circuit Low | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A51-174 | Drive Motor "A" Current Sensor Circuit | Inverter with converter assembly | Comes on | - | INFO |
| P0A60-288 | Drive Motor "A" Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A60-290 | Drive Motor "A" Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A60-294 | Drive Motor "A" Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A60-501 | Drive Motor "A" Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A63-296 | Drive Motor "A" Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A63-298 | Drive Motor "A" Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A63-302 | Drive Motor "A" Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A63-502 | Drive Motor "A" Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A72-326 | Generator Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A72-328 | Generator Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A72-333 | Generator Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A72-515 | Generator Phase V Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A75-334 | Generator Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0A75-336 | Generator Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A75-341 | Generator Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A75-516 | Generator Phase W Current | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-113 | Drive Motor "A" Inverter Performance | - Hybrid vehicle transaxle assembly<br>- Generator cable<br>- Motor cable<br>- Inverter with converter assembly<br>- Power management control ECU<br>- PCU fuse<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A78-121 | Drive Motor "A" Inverter Performance | - Hybrid battery junction block<br>- Inverter with converter assembly<br>- Service plug grip (EV battery fuse)<br>- Frame wire<br>- Hybrid vehicle transaxle assembly<br>- Generator cable<br>- Motor cable<br>- Power management control ECU<br>- PCU fuse<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A78- | Drive Motor "A" Inverter | - Hybrid vehicle transaxle | Comes on | Comes | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| 128 | Performance | assembly<br><br>- Generator cable<br><br>- Motor cable<br><br>- Inverter with converter assembly<br><br>- Power management control ECU<br><br>- PCU fuse<br><br>- Wire harness or connector | | on | |
| P0A78-202 | Drive Motor "A" Inverter Performance | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Motor cable | Comes on | Comes on | INFO |
| P0A78-266 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-267 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-279 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-282 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-284 | Drive Motor "A" Inverter Performance | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Generator cable | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Motor cable<br>- Water pump with motor assembly<br>- Wire harness or connector<br>- IGCT No. 3 fuse<br>- PCU fuse | | | |
| P0A78-286 | Drive Motor "A" Inverter Performance | - Inverter cooling system<br>- Cooling fan system<br>- Power management control ECU<br>- Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Generator cable<br>- Motor cable<br>- Water pump with motor assembly<br>- Wire harness or connector<br>- IGCT No. 3 fuse<br>- PCU fuse | Comes on | Comes on | INFO |
| P0A78-287 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-306 | Drive Motor "A" Inverter Performance | - Hybrid vehicle transaxle assembly<br>- Motor cable<br>- Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-503 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0A78-504 | Drive Motor "A" Inverter Performance | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A78-505 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-506 | Drive Motor "A" Inverter Performance | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A78-510 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on until DTC is cleared | Comes on | INFO |
| P0A78-565 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-586 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-806 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-807 | Drive Motor "A" Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A78-808 | Drive Motor "A" Inverter Performance | - Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A7A-122 | Generator Inverter Performance | - Power management control ECU<br>- Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly<br>- Generator cable | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Motor cable<br><br>- Wire harness or connector<br><br>- PCU fuse | | | |
| P0A7A-130 | Generator Inverter Performance | - Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Generator cable<br><br>- Motor cable<br><br>- Wire harness or connector<br><br>- PCU fuse | Comes on | Comes on | INFO |
| P0A7A-203 | Generator Inverter Performance | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Generator cable | Comes on | Comes on | INFO |
| P0A7A-322 | Generator Inverter Performance | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Generator cable<br><br>- Motor cable<br><br>- Water pump with motor | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse<br><br>- PCU fuse | | | |
| P0A7A-324 | Generator Inverter Performance | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Generator cable<br><br>- Motor cable<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse<br><br>- PCU fuse | Comes on | Comes on | INFO |
| P0A7A-325 | Generator Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A7A-344 | Generator Inverter Performance | - Hybrid vehicle transaxle assembly<br><br>- Generator cable<br><br>- Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A7A-517 | Generator Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A7A-518 | Generator Inverter Performance | - Inverter with converter assembly | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector | | | |
| P0A7A-522 | Generator Inverter Performance | Inverter with converter assembly | Comes on until DTC is cleared | Comes on | INFO |
| P0A7A-809 | Generator Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A7A-810 | Generator Inverter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A7A-811 | Generator Inverter Performance | - Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector | Comes on | Comes on | INFO |
| P0A90-251 | Drive Motor "A" Performance | - Hybrid vehicle transaxle assembly<br><br>- Motor cable<br><br>- Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A90-509 | Drive Motor "A" Performance | - Hybrid vehicle transaxle assembly<br><br>- Motor cable<br><br>- Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A92-261 | Hybrid Generator Performance | - Hybrid vehicle transaxle assembly<br><br>- Generator cable<br><br>- Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A92-521 | Hybrid Generator Performance | - Hybrid vehicle transaxle assembly<br><br>- Generator cable<br><br>- Inverter with converter assembly | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0A93-346 | Inverter Cooling System Performance | - Wire harness or connector<br>- Inverter cooling system<br>- Water pump with motor assembly<br>- Power management control ECU<br>- Inverter with converter assembly<br>- Cooling fan system<br>- IGCT No. 3 fuse | Comes on | Comes on | INFO |
| P0A94-127 | DC / DC Converter Performance | - Hybrid battery junction block<br>- Inverter with converter assembly<br>- Service plug grip<br>- Frame wire<br>- Hybrid vehicle transaxle assembly<br>- Generator cable<br>- Motor cable<br>- Wire harness or connector<br>- PCU fuse<br>- Power management control ECU | Comes on | Comes on | INFO |
| P0A94-172 | DC / DC Converter Performance | - Wire harness or connector<br>- Hybrid vehicle transaxle assembly<br>- Generator cable<br>- Motor cable | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Inverter with converter assembly<br><br>- PCU fuse<br><br>- Power management control ECU | | | |
| P0A94-442 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-547 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-548 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-549 | DC / DC Converter Performance | - Wire harness or connector<br><br>- Inverter with converter assembly<br><br>- Hybrid vehicle transaxle assembly | Comes on | Comes on | INFO |
| P0A94-550 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-553 | DC / DC Converter Performance | - Wire harness or connector<br><br>- Inverter cooling system<br><br>- Water pump with motor assembly<br><br>- Hybrid vehicle transaxle assembly<br><br>- Generator cable<br><br>- Motor cable<br><br>- Inverter with converter assembly<br><br>- Cooling fan circuit<br><br>- PCU fuse<br><br>- IGCT No. 3 fuse<br><br>- Power management control | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | ECU | | | |
| P0A94-554 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-555 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-556 | DC / DC Converter Performance | - Wire harness or connector<br>- Inverter with converter assembly<br>- Hybrid vehicle transaxle assembly | Comes on | Comes on | INFO |
| P0A94-557 | DC / DC Converter Performance | - Wire harness or connector<br>- Inverter cooling system<br>- Water pump with motor assembly<br>- Hybrid vehicle transaxle assembly<br>- Generator cable<br>- Motor cable<br>- Inverter with converter assembly<br>- Cooling fan circuit<br>- PCU fuse<br>- IGCT No. 3 fuse<br>- Power management control ECU | Comes on | Comes on | INFO |
| P0A94-564 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-585 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-587 | DC / DC Converter Performance | - Inverter with converter assembly<br>- Battery smart unit | Comes on | Comes on | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0A94-589 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0A94-590 | DC / DC Converter Performance | Inverter with converter assembly | Comes on | Comes on | INFO |
| P0AA1-231 | Hybrid Battery Positive Contactor Circuit Stuck Closed | - Hybrid battery junction block assembly<br>- Inverter with converter assembly | Comes on until DTC is cleared | - | INFO |
| P0AA1-233 | Hybrid Battery Positive Contactor Circuit Stuck Closed | Hybrid battery junction block assembly | Comes on until DTC is cleared | - | INFO |
| P0AA4-232 | Hybrid Battery Negative Contactor Circuit Stuck Closed | - Hybrid battery junction block assembly<br>- Inverter with converter assembly | Comes on until DTC is cleared | - | INFO |
| P0AA6-526 | Hybrid Battery Voltage System Isolation Fault | - Hybrid vehicle transaxle assembly<br>- Generator cable<br>- Motor cable<br>- Inverter with converter assembly<br>- Frame wire<br>- No. 2 engine wire<br>- Hybrid battery junction block assembly<br>- Compressor with motor assembly<br>- HV battery<br>- Battery smart unit | Comes on until DTC is cleared | - | INFO |
| P0AA6-611 | Hybrid Battery Voltage System Isolation Fault | Compressor with motor assembly | Comes on until DTC is cleared | - | INFO |
| P0AA6-612 | Hybrid Battery Voltage System Isolation Fault | - Hybrid battery junction block assembly<br>- Battery smart unit | Comes on until DTC is cleared | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - HV battery | | | |
| P0AA6-613 | Hybrid Battery Voltage System Isolation Fault | - Hybrid vehicle transaxle assembly<br>- Motor cable<br>- Generator cable<br>- Inverter with converter assembly | Comes on until DTC is cleared | - | INFO |
| P0AA6-614 | Hybrid Battery Voltage System Isolation Fault | - Inverter with converter assembly<br>- Frame wire<br>- Compressor with motor assembly<br>- No. 2 engine wire<br>- Hybrid battery junction block assembly<br>- Hybrid vehicle transaxle assembly<br>- Motor cable<br>- Generator cable | Comes on until DTC is cleared | - | INFO |
| P0AA7-727 | Hybrid Battery Voltage Isolation Sensor Circuit | Battery smart unit | Comes on | - | INFO |
| P0AC0-817 | Hybrid Battery Pack Current Sensor Circuit Range / Performance | - Hybrid battery junction block assembly<br>- Battery smart unit | Comes on | Comes on | INFO |
| P0ADB-227 | Hybrid Battery Positive Contactor Control Circuit Low | - Wire harness or connector<br>- Hybrid battery junction block assembly<br>- Power management control ECU | Comes on | - | INFO |
| P0ADC-226 | Hybrid Battery Positive Contactor Control Circuit High | - Wire harness or connector<br>- Hybrid battery junction block | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | assembly<br><br>- Power management control ECU | | | |
| P0ADF-229 | Hybrid Battery Negative Contactor Control Circuit Low | - Wire harness or connector<br><br>- Hybrid battery junction block assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P0AE0-228 | Hybrid Battery Negative Contactor Control Circuit High | - Wire harness or connector<br><br>- Hybrid battery junction block assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P0AE2-773 | Hybrid Battery Precharge Contactor Circuit Stuck Closed | - Hybrid battery junction block assembly<br><br>- Inverter with converter assembly | Comes on | - | INFO |
| P0AE6-225 | Hybrid Battery Precharge Contactor Control Circuit Low | - Wire harness or connector<br><br>- Hybrid battery junction block assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P0AE7-224 | Hybrid Battery Precharge Contactor Control Circuit High | - Wire harness or connector<br><br>- Hybrid battery junction block assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P0AEE-277 | Motor Inverter Temperature Sensor "A" Circuit Range / Performance | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | | | |
| P0AEF-275 | Drive Motor Inverter Temperature Sensor "A" Circuit Low | Inverter with converter assembly | Comes on | - | INFO |
| P0AF0-274 | Drive Motor Inverter Temperature Sensor "A" Circuit High | Inverter with converter assembly | Comes on | - | INFO |
| P0AF1-276 | Drive Motor Inverter Temperature Sensor "A" Circuit Intermittent / Erratic | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | Comes on | - | INFO |
| P0AFC-129 | Hybrid Battery Pack Sensor Module | Battery smart unit | Comes on | Comes on | INFO |
| P0AFC-150 | Hybrid Battery Pack Sensor Module | - Battery smart unit<br><br>- Wire harness or connector<br><br>- Fuse<br><br>- Relay | Comes on | Comes on | INFO |
| P0BCD-315 | Generator Inverter Temperature Sensor Circuit Range / Performance | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | | | |
| P0BCE-313 | Generator Inverter Temperature Sensor Circuit Low | Inverter with converter assembly | Comes on | - | INFO |
| P0BCF-312 | Generator Inverter Temperature Sensor Circuit High | Inverter with converter assembly | Comes on | - | INFO |
| P0BD0-314 | Generator Inverter Temperature Sensor Circuit Intermittent / Erratic | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | Comes on | - | INFO |
| P0C30-390 | Hybrid Battery Pack State of Charge High | Power management control ECU | Comes on | - | INFO |
| P0C39-626 | DC / DC Converter Temperature Sensor "A" Range / Performance | - Inverter cooling system<br><br>- Cooling fan system<br><br>- Power management control ECU<br><br>- Inverter with converter assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| P0C3A-621 | DC / DC Converter Temperature Sensor "A" Low | Inverter with converter assembly | Comes on | - | INFO |
| P0C3B-622 | DC / DC Converter Temperature Sensor "A" High | Inverter with converter assembly | Comes on | - | INFO |
| P0C3C-625 | DC / DC Converter Temperature Sensor "A" Intermittent / Erratic | - Inverter cooling system<br>- Cooling fan system<br>- Power management control ECU<br>- Inverter with converter assembly<br>- Water pump with motor assembly<br>- Wire harness or connector<br>- IGCT No. 3 fuse | Comes on | - | INFO |
| P0C3E-628 | DC / DC Converter Temperature Sensor "B" Range / Performance | - Inverter cooling system<br>- Cooling fan system<br>- Power management control ECU<br>- Inverter with converter assembly<br>- Water pump with motor assembly<br>- Wire harness or connector<br>- IGCT No. 3 fuse | Comes on | - | INFO |
| P0C3F-623 | DC / DC Converter Temperature Sensor "B" Low | Inverter with converter assembly | Comes on | - | INFO |
| P0C40-624 | DC / DC Converter Temperature Sensor "B" High | Inverter with converter assembly | Comes on | - | INFO |
| P0C41-627 | DC / DC Converter Temperature Sensor "B" Intermittent / Erratic | - Inverter cooling system<br>- Cooling fan system<br>- Power management control | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | ECU<br><br>- Inverter with converter assembly<br><br>- Water pump with motor assembly<br><br>- Wire harness or connector<br><br>- IGCT No. 3 fuse | | | |
| P0C73-776 | Motor Electronics Coolant Pump "A" Control Performance | - Inverter cooling system<br><br>- Wire harness or connector<br><br>- Water pump with motor assembly<br><br>- Power management control ECU | Comes on | Comes on | INFO |
| P0C76-523 | Hybrid Battery System Discharge Time Too Long | Inverter with converter assembly | Comes on | - | INFO |
| P1606-308 | Collision Detection | - Airbag sensor assembly<br><br>- Power management control ECU<br><br>- Supplemental restraint systems | Comes on until DTC is cleared | - | INFO |
| P1606-317 | Collision Detection | - Power management control ECU<br><br>- Supplemental restraint systems | Comes on until DTC is cleared | - | INFO |
| P181A-596 | Gear Lever X Position Circuit "A" / "B" Correlation | - Wire harness or connector<br><br>- Shift lock control unit assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P181B-595 | Gear Lever Y Position Circuit "A" / "B" Correlation | - Wire harness or connector<br><br>- Shift lock control unit assembly | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Power management control ECU | | | |
| P182B-577 | Gear Lever X Position "B" Circuit Low | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control ECU | Comes on | - | INFO |
| P182C-578 | Gear Lever X Position "B" Circuit High | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control ECU | Comes on | - | INFO |
| P182E-573 | Gear Lever Y Position "B" Circuit Low | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control ECU | Comes on | - | INFO |
| P182F-574 | Gear Lever Y Position "B" Circuit High | - Wire harness or connector<br>- Shift lock control unit assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2120-152 | Throttle / Pedal Position Sensor / Switch "D" Circuit | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2121-106 | Throttle / Pedal Position Sensor / Switch "D" Circuit Range / Performance | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2122-104 | Throttle / Pedal Position Sensor / Switch "D" Circuit Low Input | - Wire harness or connector<br>- Accelerator pedal assembly | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Power management control ECU | | | |
| P2123-105 | Throttle / Pedal Position Sensor / Switch "D" Circuit High Input | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2125-153 | Throttle / Pedal Position Sensor / Switch "E" Circuit | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2126-109 | Throttle / Pedal Position Sensor / Switch "E" Circuit Range / Performance | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2127-107 | Throttle / Pedal Position Sensor / Switch "E" Circuit Low Input | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2128-108 | Throttle / Pedal Position Sensor / Switch "E" Circuit High Input | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2138-110 | Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2138-154 | Throttle / Pedal Position Sensor / Switch "D" / "E" Voltage Correlation | - Wire harness or connector<br>- Accelerator pedal assembly<br>- Power management control ECU | Comes on | - | INFO |
| P2228- | Barometric Pressure Sensor "A" | Inverter with converter | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| 268 | Circuit Low | assembly | | | |
| P2229-269 | Barometric Pressure Sensor "A" Circuit High | Inverter with converter assembly | Comes on | - | INFO |
| P2511-149 | ECM/PCM Power Relay Sense Circuit Intermittent | - Wire harness or connector<br>- Power management control ECU | Comes on | - | INFO |
| P2532-772 | Ignition Switch Run Position Circuit High | - Wire harness or connector<br>- Integration relay (IG2 relay)<br>- Power management control ECU | Comes on | - | INFO |
| P3000-388 | HV Battery Malfunction | - Fuel level<br>- HV battery | - | - | INFO |
| P3000-389 | HV Battery Malfunction | - Engine<br>- Hybrid vehicle transaxle assembly<br>- HV battery | Comes on | - | INFO |
| P3000-603 | HV Battery Malfunction | - Power management control ECU<br>- HV battery | Comes on | - | INFO |
| P3004-131 | Power Cable Malfunction | - Hybrid battery junction block<br>- Frame wire<br>- Inverter with converter assembly<br>- HV battery<br>- Wire harness or connector | Comes on | - | INFO |
| P3004-132 | Power Cable Malfunction | - Hybrid battery junction block assembly<br>- Frame wire<br>- Inverter with converter assembly<br>- Power management control | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | ECU<br><br>- HV battery<br><br>- Wire harness or connector | | | |
| P3004-133 | Power Cable Malfunction | Power management control ECU | Comes on | - | INFO |
| P3004-800 | Power Cable Malfunction | - Wire harness or connector<br><br>- No. 2 engine wire<br><br>- Compressor with motor assembly<br><br>- Inverter with converter assembly<br><br>- Hybrid battery junction block<br><br>- Frame wire<br><br>- Power management control ECU | Comes on | - | INFO |
| P3004-801 | Power Cable Malfunction | - Wire harness or connector<br><br>- No. 2 engine wire<br><br>- Compressor with motor assembly<br><br>- Inverter with converter assembly<br><br>- Hybrid battery junction block<br><br>- Frame wire<br><br>- Power management control ECU | Comes on | - | INFO |
| P3004-803 | Power Cable Malfunction | - Hybrid battery junction block assembly<br><br>- Wire harness or connector | Comes on | - | INFO |
| P3107-213 | Airbag ECU Communication Circuit Malfunction | - Wire harness or connector | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | - Airbag sensor assembly<br><br>- Power management control ECU | | | |
| P3107-214 | Airbag ECU Communication Circuit Malfunction | - Wire harness or connector<br><br>- Airbag sensor assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P3107-215 | Airbag ECU Communication Circuit Malfunction | - Wire harness or connector<br><br>- Airbag sensor assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| P3108-536 | A/C Amplifier Communication Circuit Malfunction | - Wire harness or connector<br><br>- Compressor with motor assembly<br><br>- Power management control ECU | - | - | INFO |
| P3110-223 | IGCT Relay Malfunction | - Wire harness or connector<br><br>- IGCT relay<br><br>- Power management control ECU | Comes on | - | INFO |
| P3147-239 | Transmission Malfunction | - Engine<br><br>- Hybrid vehicle transaxle assembly<br><br>- Wire harness or connector<br><br>- Power management control ECU<br><br>- Transmission input damper | Comes on | - | INFO |
| P3147-240 | Transmission Malfunction | Hybrid vehicle transaxle assembly | Comes on | - | INFO |
| P3147-241 | Transmission Malfunction | - Engine<br><br>- Hybrid vehicle transaxle | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| | | assembly<br><br>- Wire harness or connector<br><br>- Power management control ECU<br><br>- Transmission input damper | | | |
| P3147-242 | Transmission Malfunction | Hybrid vehicle transaxle assembly | Comes on | - | INFO |
| P314A-828 | Inverter Coolant Pump Speed Signal | - Wire harness or connector<br><br>- Power management control ECU<br><br>- Water pump with motor assembly<br><br>- IGCT No. 3 fuse | Comes on | Comes on | INFO |
| P3232-749 | Open or Short to B+ in Blocking of HV Gate Connection | - Wire harness or connector<br><br>- Power management control ECU<br><br>- Inverter with converter assembly | Comes on | - | INFO |
| P3233-750 | Short to B+ in Blocking of HV Gate Connection | - Wire harness or connector<br><br>- Power management control ECU<br><br>- Inverter with converter assembly | Comes on | - | INFO |
| P324E-788 | MG-ECU Power Relay Intermittent Circuit | - Wire harness or connector<br><br>- Inverter with converter assembly<br><br>- Engine room junction block assembly<br><br>- Power management control ECU | Comes on | - | INFO |
| U0100-211 | Lost Communication with ECM / PCM "A" | CAN communication system | Comes on | Comes on | INFO |
| U0100- | Lost Communication with ECM / | CAN communication system | Comes on | Comes | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| 212 | PCM "A" | | | on | |
| U0100-530 | Lost Communication with ECM / PCM "A" | CAN communication system | Comes on | Comes on | INFO |
| U0110-159 | Lost Communication with Driver Motor Control Module | - Wire harness or connector<br>- Inverter with converter assembly<br>- Power management control ECU<br>- PCU fuse | Comes on | - | INFO |
| U0110-160 | Lost Communication with Driver Motor Control Module | - Wire harness or connector<br>- Inverter with converter assembly<br>- Generator cable<br>- Motor cable<br>- Hybrid vehicle transaxle assembly<br>- Power management control ECU | Comes on | - | INFO |
| U0110-656 | Lost Communication with Driver Motor Control Module | - Wire harness or connector<br>- Inverter with converter assembly<br>- Power management control ECU<br>- PCU fuse | Comes on | - | INFO |
| U0110-657 | Lost Communication with Driver Motor Control Module | - Wire harness or connector<br>- Inverter with converter assembly<br>- Power management control ECU<br>- PCU fuse | Comes on | - | INFO |
| U0129-220 | Lost Communication with Brake System Control Module | CAN communication system | Comes on | - | INFO |

| DTC Code | Detection Item | Trouble Area | Master Warning Light | MIL | See page |
|---|---|---|---|---|---|
| U0129-222 | Lost Communication with Brake System Control Module | CAN communication system | Comes on | - | INFO |
| U0129-527 | Lost Communication with Brake System Control Module | CAN communication system | Comes on | - | INFO |
| U0129-528 | Lost Communication with Brake System Control Module | CAN communication system | Comes on | - | INFO |
| U0140-146 | Lost Communication with Body Control Module | CAN communication system | Comes on | - | INFO |
| U0151-763 | Lost Communication with Airbag ECU | CAN communication system | Comes on | - | INFO |
| U0164-594 | Lost Communication with A/C ECU | CAN communication system | - | - | INFO |
| U0164-827 | Lost Communication with A/C ECU | CAN communication system | - | - | INFO |
| U0424-537 | Invalid Data Received from HVAC Control Module | Air conditioning amplifier assembly | - | - | INFO |
| U1107-436 | Lost Communication with Power Management Module | CAN communication system | Comes on | - | INFO |

# INFORMATION / FREEZE FRAME DATA

1. FREEZE FRAME DATA

HINT:

The power management control ECU (HV CPU) records vehicle and driving condition information as freeze frame data the moment a DTC is stored. It can be used for estimating or duplicating the vehicle conditions that were present when the malfunction occurred. To confirm the details of the hybrid control system, check the detailed information for the DTC information code in the Data List (INF code).

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Trouble Codes.

(e) Select a DTC in order to display its freeze frame data.

(f) Check the freeze frame information recorded with the DTC.

**FREEZE FRAME DATA**

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Engine Coolant Temp | • Engine coolant temperature/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | Cold or warmed-up engine |
| Engine Revolution | • Engine speed/<br>• Min.: 0 r/min, Max.: 16383.75 r/min | Engine speed |
| Vehicle Spd | • Vehicle speed/<br>• Min.: 0 mph (0 km/h), Max.: 158 mph (255 km/h) | Stopped, or driving (at low, medium, or high speeds) |
| Engine Run Time | • Elapsed time after engine start/<br>• Min.: 0 s, Max.: 65535 s | Elapsed time after engine start |
| +B | • Auxiliary battery voltage/<br>• Min.: 0 V, Max.: 65.535 V | Auxiliary battery condition |
| Accel Pedal Pos #1 | • Accelerator pedal position sensor No. 1/<br>• Min.: 0%, Max.: 100% | Idling, accelerating, or decelerating |
| Accel Pedal Pos #2 | • Accelerator pedal position sensor No. 2/ | For comparison to accelerator pedal |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | • Min.: 0%, Max.: 100% | position sensor No. 1 |
| Ambient Temperature | • Ambient air temperature/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | Hot or cold weather |
| Intake Air Temperature | • Intake air temperature/<br>• Min.: -40°F (-40°C), Max.: 284°F (140°C) | Hot or cold weather |
| DTC Clear Warm Up | • The number of times the engine is warmed up after clearing DTCs/<br>• Min.: 0, Max.: 255 | Frequency of malfunction recurrence after clearing DTCs |
| DTC Clear Run Distance | • Drive distance after clearing DTCs/<br>• Min.: 0 mile (0 km), Max.: 40723 mile (65535 km) | Frequency of malfunction recurrence after clearing DTCs |
| DTC Clear Min | • Elapsed time after clearing DTCs/<br>• Min.: 0 Min, Max.: 65535 Min | Elapsed time after clearing DTCs |
| MAP | • Intake manifold pressure/<br>• Min.: 0 kPa, Max.: 255 kPa | - |
| Atmosphere Pressure | • Atmospheric pressure/<br>• Min.: 0 kPa, Max.: 255 kPa | Vehicle driving elevation |
| Motor(MG2) Revolution | • MG2 revolution/<br>• Min.: -32768 r/min, Max.: 32767 r/min | - |
| Motor(MG2) Torq | • MG2 torque/<br>• Min.: -4096 Nm, Max.: 4095.875 Nm | - |
| M(MG2) Trq Exec Val | • MG2 torque execution value/<br>• Min.: -4096 Nm, Max.: 4095.875 Nm | - |
| Generator(MG1) Rev | • MG1 revolution/<br>• Min.: -32768 r/min, Max.: 32767 r/min | - |
| Generator(MG1) Torq | • MG1 torque/<br>• Min.: -4096 Nm, Max.: 4095.875 Nm | - |
| G(MG1) Trq Exec Val | • MG1 torque execution value/<br>• Min.: -4096 Nm, Max.: 4095.875 Nm | - |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Regenerative Brake Torq | • MG1 regenerative braking execution torque/<br>• Min.: -4096 Nm, Max.: 4095 Nm | - |
| Rqst Regen Brake Torq | • Requested MG1 regenerative braking torque/<br>• Min.: -4096 Nm, Max.: 4095 Nm | - |
| Inverter Temp-(MG1) | • Generator inverter temperature/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Inverter Temp-(MG2) | • Motor inverter temperature/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Motor Temp No2 | • MG1 temperature/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | - |
| Motor Temp No1 | • MG2 temperature/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | |
| Accelerator Degree | • Accelerator pedal depressed angle/<br>• Min.: 0%, Max.: 127.5% | Idling, accelerating, or decelerating |
| Request Power | • Request engine power/<br>• Min.: 0 W, Max.: 655350 W | - |
| Target Engine Rev | • Target engine speed/<br>• Min.: 0 r/min, Max.: 65535 r/min | - |
| Engine Rev (Sensor) | • Engine speed/<br>• Min.: 0 rpm, Max.: 16383.75 rpm | - |
| State of Charge (All Bat) | • HV battery state of charge/<br>• Min.: 0%, Max.: 100% | State of charge of HV battery |
| Master Cylinder Ctrl Trq | • Master cylinder control torque/<br>• Min.: -4096 Nm, Max.: 4095 Nm | Brake force requested by driver |
| Power Resource VB | • HV battery voltage/<br>• Min.: 0 V, Max.: 6553.5 V | HV battery condition |
| Power Resource IB | • HV battery charge/discharge status/<br>• Min.: -327.68 A, Max.:327.67 A | HV battery condition |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| VL-Voltage before Boosting | • High voltage before it is boosted/<br>• Min.: 0 V, Max.: 450 V | - |
| VH-Voltage after Boosting | • High voltage before it is boosted/<br>• Min.: 0 V, Max.: 765 V | - |
| Boost Ratio | • Boost ratio/<br>• Min.: 0%, Max.: 127.5% | - |
| Drive Condition ID | Drive condition ID/<br><br>• Engine stopped: 0<br>• Engine about to be stopped: 1<br>• Engine about to be started: 2<br>• Engine operated or operating: 3<br>• While generating or driving under load: 4<br>• Engine racing with park (P) selected: 6 | Engine operating condition |
| Shift Sensor Main | • Shift position sensor (Main) voltage/<br>• Min.: 0 V, Max.: 4.98 V | - |
| Shift Sensor Sub | • Shift position sensor (Sub) voltage/<br>• Min.: 0 V, Max.: 4.98 V | - |
| Shift Sensor Select Main | • Select position sensor (Main) voltage/<br>• Min.: 0 V, Max.: 4.98 V | - |
| Shift Sensor Select Sub | • Select position sensor (Sub) voltage/<br>• Min.: 0 V, Max.: 4.98 V | - |
| Shift Sensor Shift Pos | • Shift lever position/<br>• R/N/D/B | Selector lever position |
| Crank Position | • Crankshaft position/<br>• Min.: -128 °CA, Max.: 127 °CA | - |
| A/C Consumption Pwr | • A/C consumption power/<br>• Min.: 0 W, Max.: 12750 W | - |
| Short Wave Highest Val | • Waveform voltage in leak detection circuit in battery smart unit/<br>• Min.: 0 V, Max.: 4.98 V | Electrical leakage presence |
| MG1 Control | • MG1 control mode/ | Operating state of |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Mode | • PWM: 0/Variable PWM: 1/Rectangular wave: 2 | inverter with converter assembly |
| MG1 Carrier Frequency | • MG1 carrier frequency/<br>• 0.75kHz/1.25kHz/2.5kHz/3.75kHz/5kHz/10kHz | Operating state of inverter with converter assembly |
| MG2 Control Mode | • MG2 control mode/<br>• PWM: 0/Variable PWM: 1/Rectangular wave: 2 | Operating state of inverter with converter assembly |
| MG2 Carrier Frequency | • MG2 carrier frequency/<br>• 0.75kHz/1.25kHz/2.5kHz/3.75kHz/5kHz/10kHz | Operating state of inverter with converter assembly |
| Num of Current Code | • The number of current DTCs/<br>• Min.: 0, Max.: 255 | - |
| Num of History Code | • The number of history DTCs/<br>• Min.: 0, Max.: 255 | - |
| Calculate Load | • Calculate load/<br>• Min.: 0%, Max.: 100% | - |
| Throttle Position | • Throttle position sensor/<br>• Min.: 0%, Max.: 100% | Idling, accelerating, or decelerating |
| DCDC Cnv Tar Pulse Duty | • Target auxiliary battery voltage/<br>• Min.: 0%, Max.: 399.9% | Auxiliary battery condition |
| Inverter Coolant Water Temperature | • Inverter coolant temperature/<br>• Min.: -58°F (-50°C), Max.: 230°F (110°C) | Hot or cold weather |
| Cooling Fan 0 | • Cooling fan operating condition/<br>• Min.: 0%, Max.: 127.5% | Cooling fan operating condition |
| Cooling Fan Relay | • BATT FAN relay/<br>• ON or OFF | Cooling fan operating condition |
| Inverter W/P Revolution | • Inverter water pump speed/<br>• Min.: 0 rpm, Max.: 15000 rpm | Operating state of water pump with motor assembly |
| Prohibit DC/DC conv sig | • Hybrid vehicle converter prohibition signal/<br>• ON or OFF | Operating state of inverter with converter assembly |
| EV Request | • EV mode transition availability/ | EV mode on or off |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | • ON or OFF | |
| TRC OFF Switch | • TRC OFF switch condition/<br>• OFF/TRC/TRC,VSC | VSC OFF switch on or off |
| Starter Switch | • Stater ON/OFF signal/<br>• OFF or ON | - |
| Inv-T (MG1) aftr IG-ON | • Generator inverter temperature after power switch on (IG)/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Inv-T (MG2) aftr IG-ON | • Motor inverter temperature after power switch on (IG)/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Mtr-T (MG2) aftr IG-ON | • MG2 temperature after power switch on (IG)/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | - |
| Conv-Tmp after IG-ON | • Converter temperature after power switch on (IG)/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| SOC after IG-ON | • Battery state of charge after power switch on (IG)/<br>• Min.: 0%, Max.: 127.5% | HV battery condition |
| Inv-Temp (MG1) Max | • Generator inverter maximum temperature/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Inv-Temp (MG2) Max | • Motor inverter maximum temperature/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Mtr-Temp (MG2) Max | • MG2 maximum temperature/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | - |
| Converter Temp Max | • Converter maximum temperature/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Status of Charge Max | • Maximum status of charge/<br>• Min.: 0%, Max.: 127.5% | HV battery condition |
| Status of Charge Min | • Minimum status of charge/<br>• Min.: 0%, Max.: 127.5% | HV battery condition |
| Stop Light | • Stop light switch condition/ | Brake pedal depressed |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Switch | • ON or OFF | |
| Auxiliary Batt Temperature | • Auxiliary battery temperature/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | - |
| Collision Signal (Airbag) | • Detection of collision by airbag sensor assembly/<br>• ON or OFF | Operating state of airbag sensor assembly |
| TC Terminal | • TC terminal state/<br>• ON or OFF | - |
| Inter Lock Switch | • Interlock switch condition/<br>• ON or OFF | Power switch on (IG), inverter terminal cover, high-voltage input cables or service plug grip not installed: ON |
| Back Up Lamp Relay | • Back up light switch condition/<br>• ON or OFF | Selector lever in R: ON |
| ECO Mode | • ECO drive mode signal/<br>• ON or OFF | ECO mode on or off |
| Generate Torque | • Generated drive torque/<br>• Min.: -4096 Nm, Max.: 4095.875 Nm | - |
| Prohibit Charge for P Pos | • HV battery charge in park (P) prohibition state/<br>• ON or OFF | - |
| Vehicle Parking (T/M Ctrl) | • Indicates whether vehicle being driven or stopped./<br>• ON or OFF | - |
| Shift Pos Status (T/M Ctrl) | • Indicates whether park (P) is selected/<br>• Not P/Run/P | - |
| Shift P Permission Signal | • Indicates whether selection of park (P) is permitted/<br>• ON or OFF | - |
| DC/DC Cnv Temp (Upper) | • Boost converter temperature (upper)/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Safing Signal (Airbag) | • Safing state of the airbag sensor assembly/<br>• ON or OFF | Operating state of airbag sensor assembly |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| DC/DC Cnv Temp (Lower) | • Boost converter temperature (lower)/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | - |
| Normal Signal for A/B ECU | • Control state of airbag sensor assembly/<br>• Normal or Abnormal | Operating state of airbag sensor assembly |
| Mtr-T (MG1) aftr IG-ON | • MG1 temperature after power switch on (IG)/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | - |
| Mtr-Temp (MG1) Max | • MG1 maximum temperature/<br>• Min.: -40°F (-40°C), Max.: 419°F (215°C) | - |
| Overvoltage Input to Conv | • Boost converter overvoltage detection/<br>• ON or OFF | - |
| Overvoltage Input to Inv | • Inverter overvoltage detection/<br>• ON or OFF | - |
| Emergency Shutdown | • Inverter emergency shutdown/<br>• ON or OFF | Operating state of inverter with converter assembly |
| MG1 Inverter Shutdown | • Generator inverter shutdown/<br>• ON or OFF | Operating state of inverter with converter assembly |
| MG1 Inverter Fail | • Generator inverter failure/<br>• ON or OFF | Operating state of inverter with converter assembly |
| MG2 Inverter Shutdown | • Motor inverter shutdown/<br>• ON or OFF | Operating state of inverter with converter assembly |
| MG2 Inverter Fail | • Motor inverter failure/<br>• ON or OFF | Operating state of inverter with converter assembly |
| Conv Shutdown | • Converter shutdown/<br>• ON or OFF | Operating state of inverter with converter assembly |
| Converter Fail | • Converter failure/<br>• ON or OFF | Operating state of inverter with converter assembly |
| P Pos SW Terminal Vol | • Indicates voltage at the P position switch terminal/<br>• Min.: 0 V, Max.: 4.98 V | - |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Internal Shift Position | • Selector lever remain in one position/<br>• R/N/D/B | Selector lever position |
| P Rq Malfunction (T/M Ctrl) | • Indicates whether park (P) selection request is normal/<br>• Normal or Abnormal | - |
| P Request (T/M Ctrl) | • Indicates whether selection of park (P) is requested/<br>• ON or OFF | - |
| T/M Control ECU Status | • Indicates the control condition of the transmission control ECU/<br>• Normal or Abnormal | - |
| T/M ECU Pulse Consec Err | • Indicates consecutive communication errors with the transmission control ECU/<br>• Normal or Abnormal | - |
| T/M ECU Pulse Single Err | • Indicates a single communication error with the transmission control ECU/<br>• Normal or Abnormal | - |
| HV Start Condition | • Indicates the hybrid start condition/<br>• Norml / Pr A/C / Remote | - |
| W/P Run Control Duty | • Water pump motor drive request duty/<br>• Min.: 0%, Max.: 100% | Operating state of water pump with motor assembly |
| Engine Stop Request | • Engine stop request/<br>• ON or OFF | Engine operating conditions |
| Engine Idling Request | • Engine idling request/<br>• ON or OFF | Engine operating conditions |
| Main Batt Charging Rqst | • HV battery charging request/<br>• ON or OFF | HV battery condition |
| Aircon Request | • A/C operation request/<br>• ON or OFF | - |
| Engine Warming Up Rqst | • Engine warming up request/<br>• NO or YES | Engine operating conditions |
| SMRP Status | • Operating state of SMRP/ | - |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | • ON or OFF | |
| SMRB Status | • Operating state of SMRB/<br>• ON or OFF | - |
| SMRG Status | • Operating state of SMRG/<br>• ON or OFF | - |
| MG1 Gate Status | • MG1 Gate Status/<br>• ON or OFF | Operating state of inverter with converter assembly |
| MG2 Gate Status | • MG2 Gate Status/<br>• ON or OFF | Operating state of inverter with converter assembly |
| Converter Gate Status | • Boost converter gate status/<br>• ON or OFF | Operating state of inverter with converter assembly |
| Aircon Gate Status | • A/C inverter gate status/<br>• ON or OFF | Operating state of inverter with converter assembly |
| Converter Carrier Freq | • Converter signal carrier frequency/<br>• 9.55kHz/9.13kHz/8.71kHz/8.29kHz/7.87kHz/7.45kHz/ 4.8kHz | Operating state of inverter with converter assembly |
| Delta SOC | • Difference between maximum and minimum values of SOC/<br>• Min.: 0%, Max.: 127.5% | SOC variance |
| Batt Pack Current Val | • Battery pack current value/<br>• Min.: -327.68 A, Max.: 327.67 A | HV battery charge/discharge status<br>• Amount of current during discharge is displayed with positive values<br>• Amount of current during charge is displayed with negative values |
| Inhaling Air Temp | • HV battery intake air temperature/ | - |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | • Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | |
| VMF Fan Motor Voltage1 | • Cooling fan monitor voltage/<br>• Min.: 0 V, Max.: 25.5 V | Operating state of cooling fan |
| Auxiliary Battery Vol | • Auxiliary battery voltage/<br>• Min.: -40 V, Max.: 39.99 V | Auxiliary battery condition |
| Charge Control Value | • Charge control power value/<br>• Min.: -64 kW, Max.: 63.5 kW | Charge amount of HV battery |
| Discharge Control Value | • Discharge control power value/<br>• Min.: -64 kW, Max.: 63.5 kW | Discharge amount of HV battery |
| Cooling Fan Mode1 | • Battery cooling fan activation mode/<br>• Min.: 0, Max.: 6 | HV battery cooling fan activation condition<br>• Cooling fan stopped: 0<br>• Low speed drive - high speed drive: 1-6 |
| ECU Control Mode | • Battery control mode/<br>• Min.: 1, Max.: 5 | HV battery control status |
| Standby Blower Request | • Battery cooling fan Lo speed requested/<br>• ON or OFF | Operating state of cooling fan |
| Temp of Batt TB1 | • Battery module temperature/<br>• Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | HV battery temperature |
| Temp of Batt TB2 | • Battery module temperature/<br>• Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | HV battery temperature |
| Temp of Batt TB3 | • Battery module temperature/<br>• Min.: -58°F (-50°C), Max.: 402.6°F (205.9°C) | HV battery temperature |
| Battery Block Vol -V01 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V02 | • Battery block voltage/ | Each HV battery block voltage variance |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | • Min.: 0 V, Max.: 79.99 V | |
| Battery Block Vol -V03 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V04 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V05 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V06 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V07 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V08 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V09 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V10 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V11 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V12 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V13 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Battery Block Vol -V14 | • Battery block voltage/<br>• Min.: 0 V, Max.: 79.99 V | Each HV battery block voltage variance |
| Pattern Switch (PWR/M) | • POWER mode switch signal/<br>• ON or OFF | - |
| Detail Code 1 | • Number of detailed information stored by information code/ | - |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | • Min.: 0, Max.: 32767 | |
| Detail Code 2 | • Number of detailed information stored by information code/<br>• Min.: 0, Max.: 32767 | - |
| Detail Code 3 | • Number of detailed information stored by information code/<br>• Min.: 0, Max.: 32767 | - |
| Detail Code 4 | • Number of detailed information stored by information code/<br>• Min.: 0, Max.: 32767 | - |
| Detail Code 5 | • Number of detailed information stored by information code/<br>• Min.: 0, Max.: 32767 | - |

2. INFORMATION

HINT:

Similar to freeze frame data, the power management control ECU (HV CPU) also records vehicle and driving condition information as INFORMATION (INF code) at the moment a DTC is stored.

(a) Select the information item which has an INF code from among INFORMATION 1 to 5.

(b) Check the information for the DTC.

**INFORMATION**

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Information 1 | INF code | Identification of malfunctioning system |
| Generator(MG1) Rev | • MG1 revolution/<br>• Min.: -16384 r/min, Max.: 16256 r/min | MG1 speed<br>• Forward rotation appears as "+"<br>• Backward rotation appears as "- |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | | " |
| Motor(MG2) Revolution | • MG2 revolution/<br>• Min.: -16384 r/min, Max.: 16256 r/min | MG2 speed<br>• Forward rotation appears as "+"<br>• Backward rotation appears as "-" |
| Generator(MG1) Torq | • MG1 torque/<br>• Min.: -512 Nm, Max.: 508 Nm | When MG1 rotates in "+" direction:<br>• Torque appears as "+" while MG1 discharges<br>• Torque appears as "-" while MG1 charges<br>When MG1 rotates in "-" direction:<br>• Torque appears as "-" while MG1 discharges<br>• Torque appears as "+" while MG1 charges |
| Motor(MG2) Torq | • MG2 torque/<br>• Min.: -512 Nm, Max.: 508 Nm | When MG2 rotates in "+" direction:<br>• Torque appears as "+" while MG2 |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | | • discharges<br>• Torque appears as "-" while MG2 charges<br><br>When MG2 rotates in "-" direction:<br><br>• Torque appears as "-" while MG2 discharges<br>• Torque appears as "+" while MG2 charges |
| Request Power | • Request engine power/<br>• Min.: 0 kW, Max.: 255 kW | Engine power output requested to ECM |
| Engine Spd | • Engine speed/<br>• Min.: 0 r/min, Max.: 16320 r/min | Engine speed |
| Master Cylinder Ctrl Trq | • Master cylinder control torque/<br>• Min.: -512 Nm, Max.: 508 Nm | Brake force requested by driver |
| State of Charge | • Battery state of charge/<br>• Min.: 0%, Max.: 100% | Charge of amount HV battery |
| WOUT Control Power | • Power value discharge control/<br>• Min.: 0 W, Max.: 81600 W | Discharge amount of HV battery |
| WIN Control Power | • Power value charge control/<br>• Min.: -40800 W, Max.: 0 W | Charge amount of HV battery |
| Drive Condition ID | Drive condition ID/<br><br>• Engine stopped: 0<br>• Engine about to be stopped: 1<br>• Engine about to be started: 2<br>• Engine operated or operating: 3<br>• While generating or driving under load: 4 | Engine operating condition |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| | • Engine racing with park (P) selected: 6 | |
| Power Resource VB | • HV battery voltage/<br>• Min.: 0 V, Max.: 510 V | HV battery voltage |
| Power Resource IB | • HV battery charge/discharge status/<br>• Min.: -256 A, Max.: 254 A | HV battery charge and discharge current<br>• Amount of current during discharge is indicated with positive values<br>• Amount of current during charge is indicated with negative values |
| Shift Sensor Shift Pos | • Selector lever position/<br>• R/N/D/B | Selector lever position sensor |
| Auxiliary Batt Voltage | • Auxiliary battery voltage/<br>• Min.: 0 V, Max.: 20 V | Auxiliary battery condition |
| VL-Voltage before Boosting | • High voltage before it is boosted/<br>• Min.: 0 V, Max.: 450 V | High voltage level before it is boosted |
| VH-Voltage after Boosting | • High voltage before it is boosted/<br>• Min.: 0 V, Max.: 765 V | High voltage level after it is boosted |
| The Time of Ignition ON | • Elapsed time after power switch on (IG)/<br>• Min.: 0 min, Max.: 255 min | Time elapsed with power switch on (IG) |
| Vehicle Speed(Max) | • Maximum vehicle speed/<br>• Min.: -159 mph (-256 km/h), Max.: 157 mph (254 km/h) | Maximum vehicle speed |
| Engine Stop | • Engine stop request/ | Engine stop request |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Request | • ON or OFF | |
| Engine Idling Request | • Engine idling request/<br>• ON or OFF | Idle stop request |
| Engine Fuel Cut | • Engine fuel cut/<br>• ON or OFF | Fuel cut |
| Main Batt Charging Rqst | • HV battery charging request/<br>• ON or OFF | HV battery charging request |
| Engine Warming Up Rqst | • Engine warming up request/<br>• ON or OFF | Engine warm-up request |
| Stop Switch | • Stop light switch ON condition/<br>• ON or OFF | Brake pedal depressed or released |
| Exclusive Information 1 | • Indicates exclusive information/<br>• Min.: -127, Max.: 127 | Exclusive information linked to Information |
| Exclusive Information 2 | • Indicates exclusive information/<br>• Min.: -127, Max.: 127 | Exclusive information linked to Information |
| Exclusive Information 3 | • Indicates exclusive information/<br>• Min.: -127, Max.: 127 | Exclusive information linked to Information |
| Exclusive Information 4 | • Indicates exclusive information/<br>• Min.: -127, Max.: 127 | Exclusive information linked to Information |
| Exclusive Information 5 | • Indicates exclusive information/<br>• Min.: -127, Max.: 127 | Exclusive information linked to Information |
| Exclusive Information 6 | • Indicates exclusive information/<br>• Min.: -127, Max.: 127 | Exclusive information linked to Information |
| Exclusive Information 7 | • Indicates exclusive information/<br>• Min.: -127, Max.: 127 | Exclusive information linked to Information |
| Occurrence Order | Occurrence sequence of information | Occurrence sequence of information |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| Cnv Tmp (Upper) | • Boost converter temperature (upper)/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | Boost converter temperature |
| Cnv Temp (Lower) | • Boost converter temperature (lower)/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | Boost converter temperature |
| Generator Temp | • MG1 temperature/<br>• Min.: -58°F (-50°C), Max.: 401°F (205°C) | MG1 temperature |
| MG1 Carrier Frequency | • MG1 Carrier Frequency/<br>• 0.75kHz/1.25kHz/2.5kHz/3.75kHz/5kHz/10kHz | MG1 inverter carrier frequency |
| MG2 Carrier Frequency | • MG2 carrier frequency/<br>• 0.75kHz/1.25kHz/2.5kHz/3.75kHz/5kHz/10kHz | MG2 inverter carrier frequency |
| Motor Temp | • MG2 temperature/<br>• Min.: -58°F (-50°C), Max.: 401°F (205°C) | MG2 carrier temperature |
| Converter Carrier Freq | • Converter carrier frequency/<br>• 9.55kHz/9.13kHz/8.71kHz/8.29kHz/7.87kHz/7.45kHz/4.8kHz | Converter carrier frequency |
| Inverter Temp (MG1) | • Generator inverter temperature/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | Generator inverter temperature |
| MG1 Control Mode | • MG1 control mode/<br>• PWM: 0/Variable PWM: 1/Rectangular wave: 2 | MG1 control mode |
| Inverter Temp (MG2) | • Motor inverter temperature/<br>• Min.: 59°F (15°C), Max.: 302°F (150°C) | Motor inverter temperature |
| MG2 Control Mode | • MG2 control mode/<br>• PWM: 0/Variable PWM: 1/Rectangular wave: 2 | MG2 control mode |
| Boost Ratio | • Boost ratio/<br>• Min.: 0%, Max.: 100% | Boost condition |
| MG1 Inverter Shutdown | • Generator inverter shutdown/<br>• ON or OFF | Generator inverter shutdown: ON |
| HV Coolant Temperature | • HV coolant temperature/<br>• Min.: 59°F (15°C), Max.: 230°F (110°C) | HV coolant temperature |

| Tester Display | Measurement Item/Range | Suspected Vehicle Status When Malfunction Occurs |
|---|---|---|
| MG2 Inverter Shutdown | • Motor inverter shutdown/<br>• ON or OFF | Motor inverter shutdown: ON |
| Accel Sensor Main | • Accelerator pedal depressed angle/<br>• Min.: 0%, Max.: 100% | Idling, accelerating, or decelerating |
| Conv Shutdown | • Hybrid vehicle converter shutdown/<br>• ON or OFF | Hybrid vehicle converter shutdown: ON |

# OPERATION HISTORY DATA

1. OPERATION HISTORY DATA

HINT:

The power management control ECU (HV CPU) records inappropriate operations performed by the driver and the number of abnormal conditions that have been input to the ECU as operation history data.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / Hybrid Control / Data List.

(e) Enter the menu to view the number of inappropriate operations or controls that have been performed.

HINT:

- Latest Operation: Among the past occurrences, the number of inappropriate operations or controls that have been performed during the most recent 1 trip detection.
- Latest Trip: The number of trips after the occurrence of Latest Operation.
- Operation before Latest: The number of occurrences during the trip previous to the Latest Operation.
- Trip before Latest: The number of trips after the occurrence of Operation before Latest.

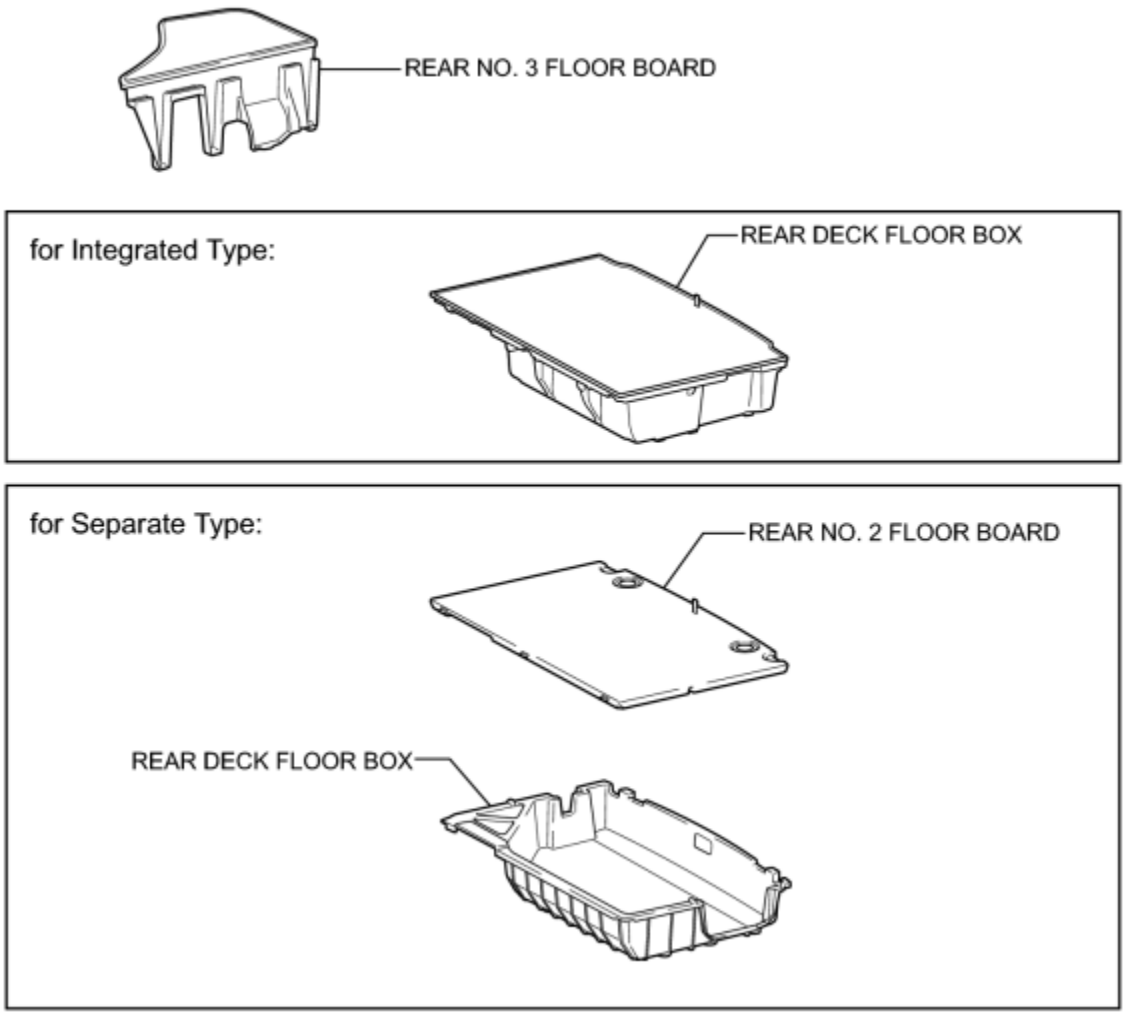
**Inappropriate operation and history data**

| Tester Display | Count Condition |
|---|---|
| Shift Gear before READY | Selector lever moved with READY indicator blinking |
| N Range Control by Busy Shift | N position control performed due to frequent shifting operation |
| Step Accelerator in N Range | Accelerator pedal depressed in N position |
| Auxiliary Battery Low | Auxiliary battery voltage below 9.5 V |
| HV ECU Intermittent Problems | Instantaneous open circuit at +B terminal of power management control ECU |
| MG2 Temp High | MG2 temperature exceeded 323.6°F (162°C) |
| MG1 Temp High | MG1 temperature exceeded 334.4°F (168°C) |
| MG2 (Motor) Inv Temp High | Motor inverter temperature rose and HV system overheat was indicated |
| MG1 (Generator) Inv Temp High | Generator inverter temperature rose and HV system overheat was indicated |
| Main Battery Low Voltage | Battery state of charge dropped below 30% |
| Resister Over Heat | System main resistor overheated |
| Coolant Heating | HV coolant temperature exceeded 149°F (65°C) |
| Converter Heating | Boost converter temperature rose and HV system overheat was indicated |
| Shift Backward Direction | Shifted to R while moving forward or to D or B while moving in reverse |
| Prevention Control of staying | Engine speed stays in resonance frequency band |

| Tester Display | Count Condition |
| --- | --- |
| Accelerator and Brake Depress | Both accelerator and brake pedals depressed |
| Shift P in Running | P position switch pushed while driving |

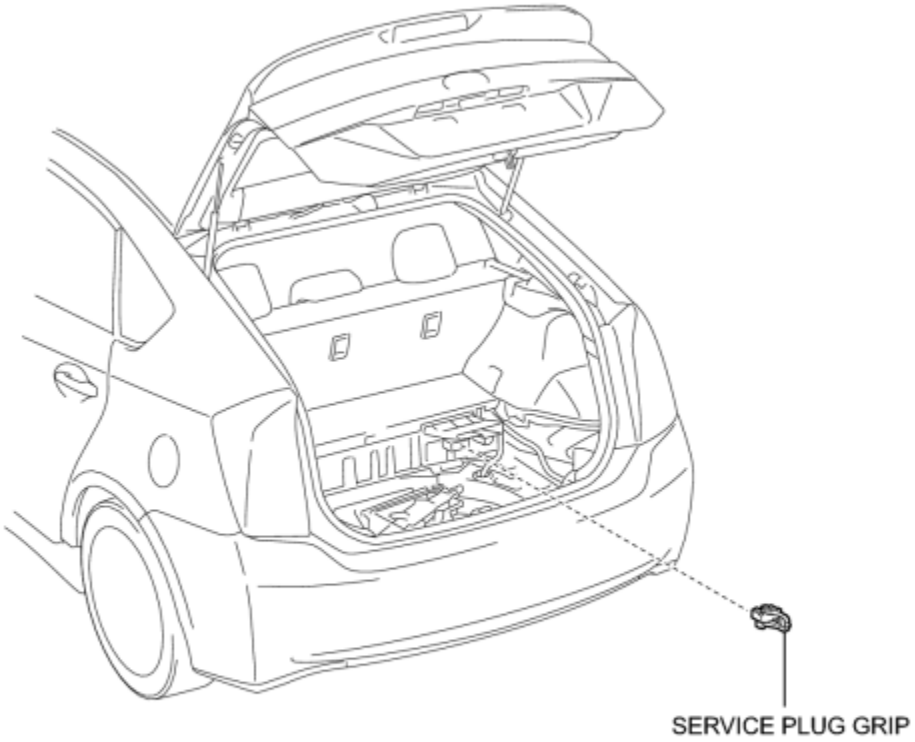
# COMPONENTS

# ILLUSTRATION



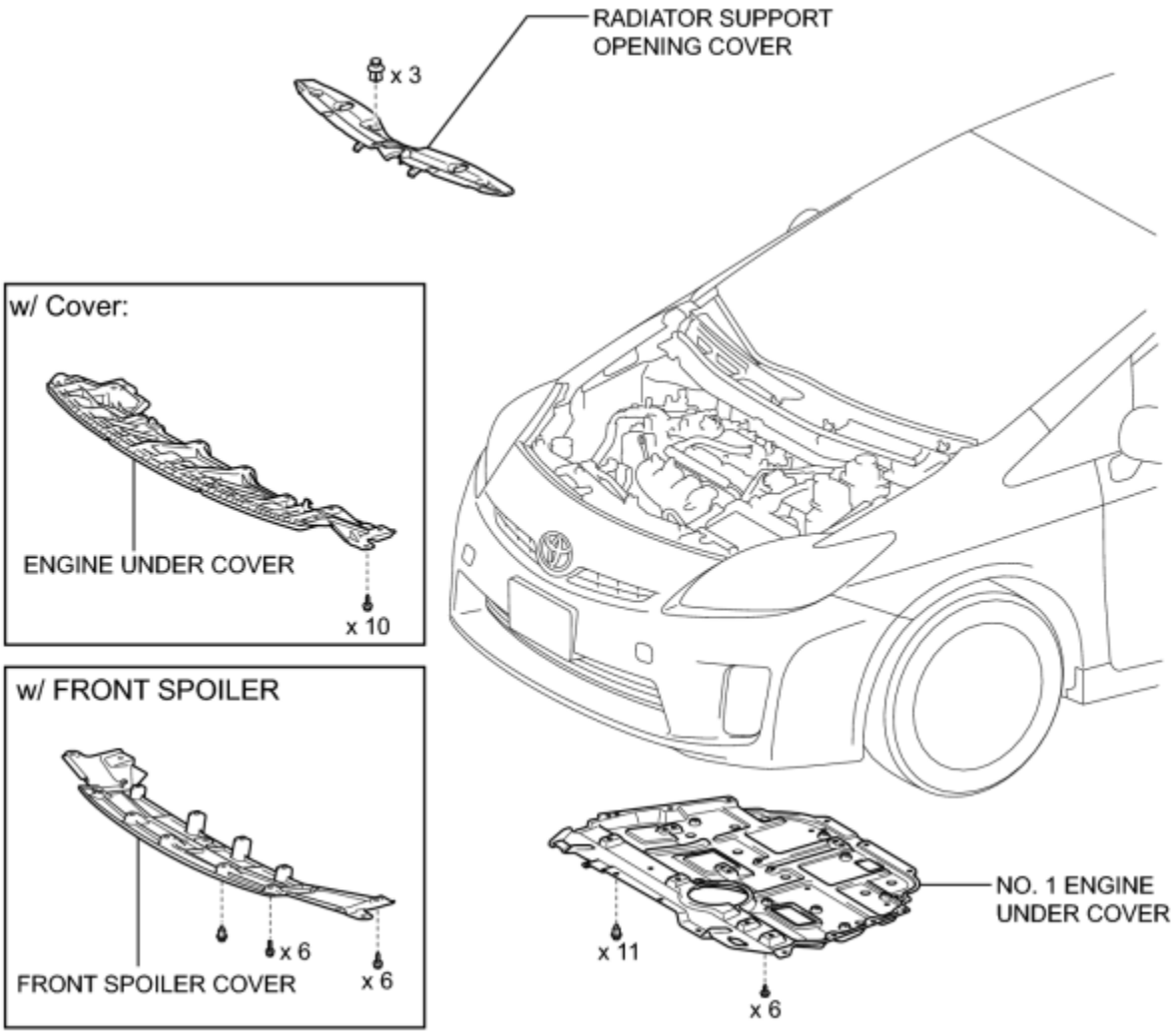

P

# ILLUSTRATION



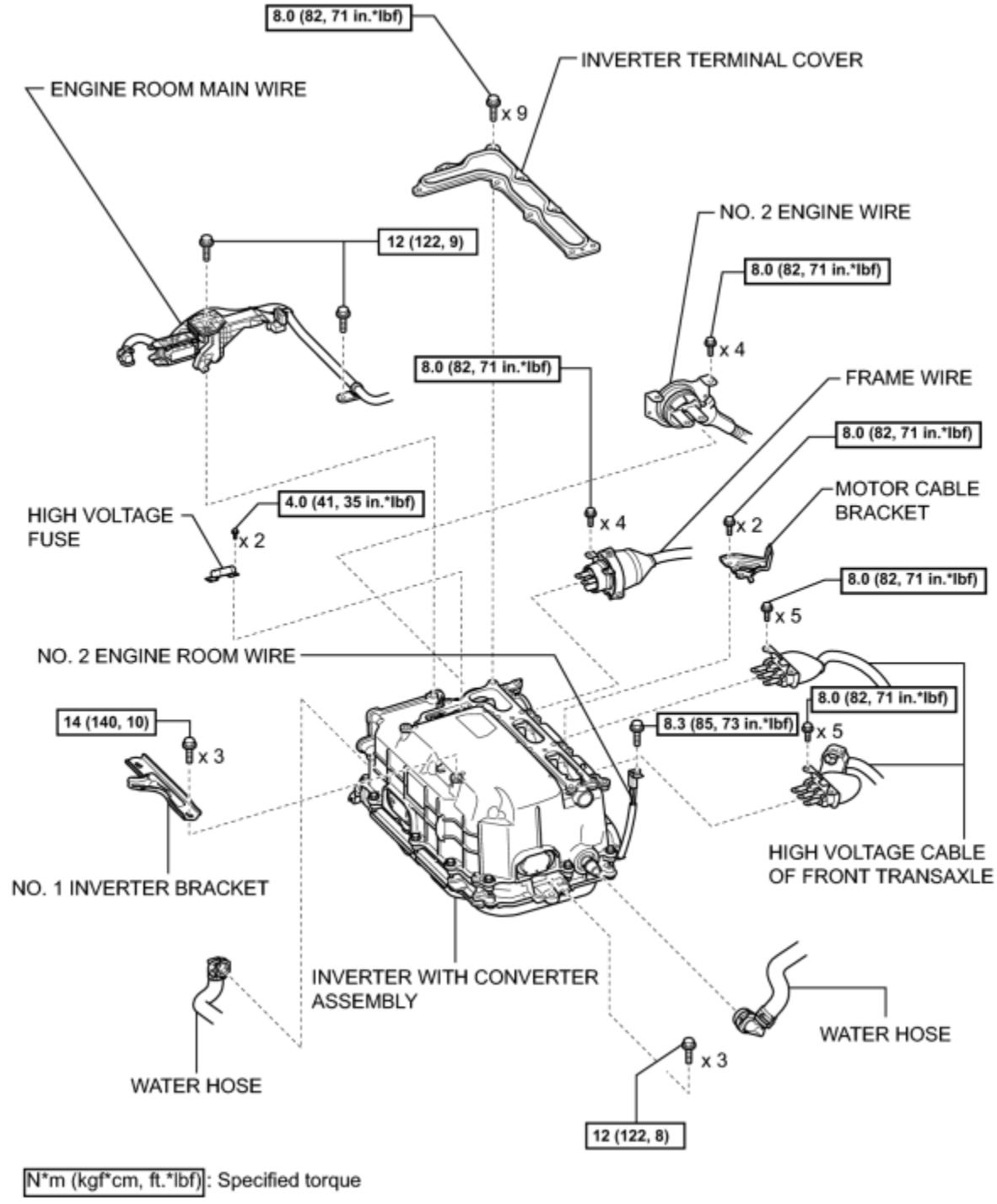

P

# ILLUSTRATION




c

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

1. PRECAUTION

HINT: INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE SERVICE PLUG GRIP INFO

7. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

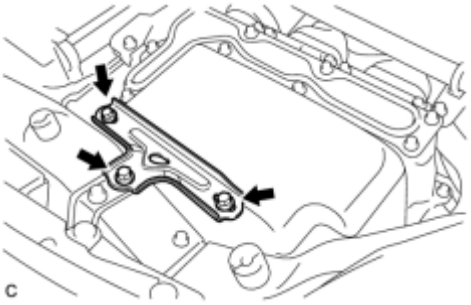
8. REMOVE ENGINE UNDER COVER (w/ Cover)

9. REMOVE NO. 1 ENGINE UNDER COVER

10. DRAIN COOLANT (for Inverter) INFO

11. REMOVE RADIATOR SUPPORT OPENING COVER INFO

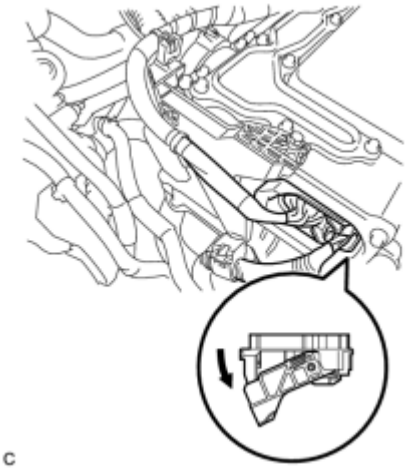
12. REMOVE NO. 1 INVERTER BRACKET



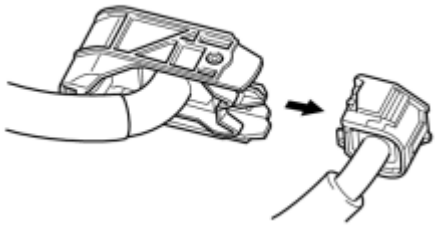
(a) Remove the 3 bolts and No. 1 inverter bracket.

13. DISCONNECT ENGINE ROOM MAIN WIRE

(a) Raise the lock lever and disconnect the inverter with converter connector.

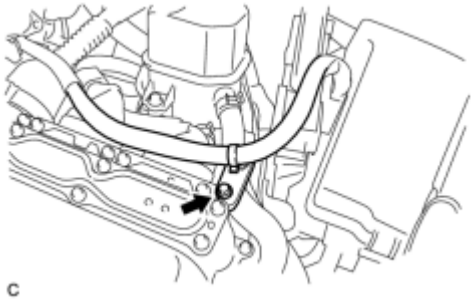


C



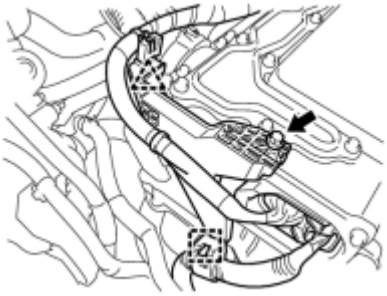
C

(b) Disconnect the engine wire from the engine room main wire.



C

(c) Remove the bolt.



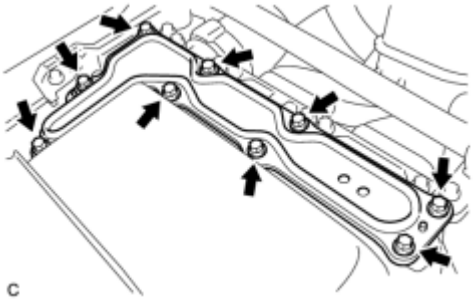
C

(d) Remove the bolt, clamp and clip, and disconnect the engine room main ware.

14. REMOVE INVERTER TERMINAL COVER

CAUTION:

Wear insulating gloves.



(a) Remove the 9 bolts and inverter terminal cover.

NOTICE:

Make sure to pull the inverter terminal cover straight up, as a connector is connected to the bottom of the cover.

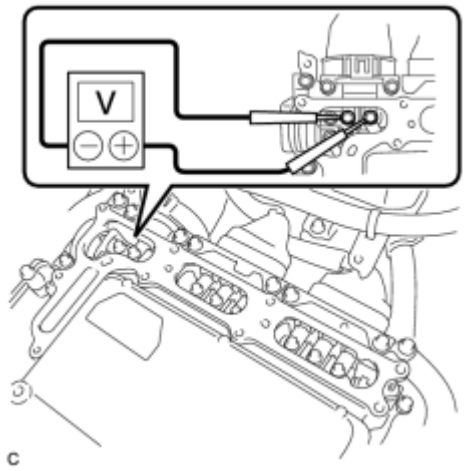
15. CHECK TERMINAL VOLTAGE

CAUTION:

Wear insulating gloves.

NOTICE:

Do not allow any foreign objects or water to enter the inverter with converter assembly.




(a) Using a voltmeter, measure the voltage between the terminals of the 2 phase connectors.

Standard voltage:

0 V

HINT:

Use measuring range of DC 750 V or more on the voltmeter.

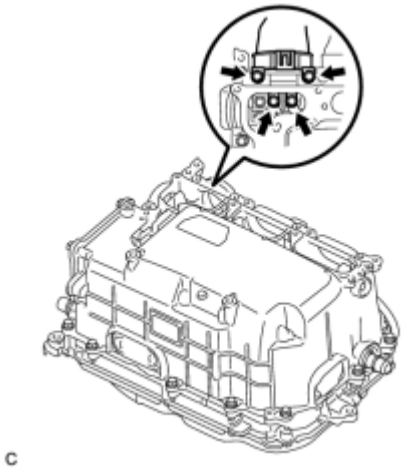
16. DISCONNECT FRAME WIRE

CAUTION:

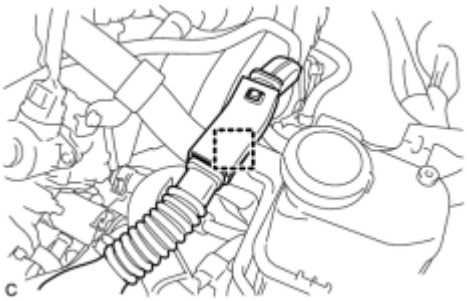
Wear insulating gloves.

NOTICE:

- Insulate the removed terminals with insulating tape.
- Cover the hole where the cable was connected with tape or equivalent (non-residue type) to prevent entry of foreign matter.




(a) Remove the 4 bolts, and disconnect the frame wire (high voltage cables of the hybrid battery) from the inverter with converter assembly.




(b) Disconnect the harness clamp.

17. DISCONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE

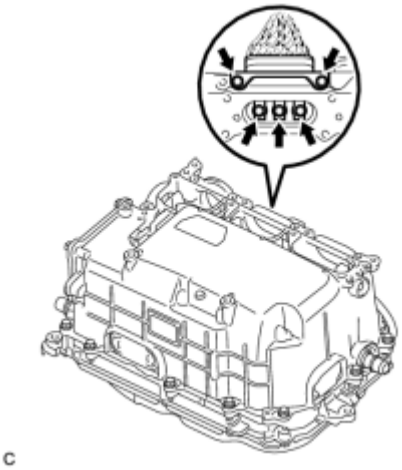
CAUTION:

Wear insulating gloves.

NOTICE:

- Insulate the removed terminals with insulating tape.
- Cover the hole where the cable was connected with tape or equivalent (non-residue type) to prevent entry of foreign matter.

(a) Remove the 5 bolts, and disconnect the high voltage cables of the generator (MG1) from the inverter with converter assembly.

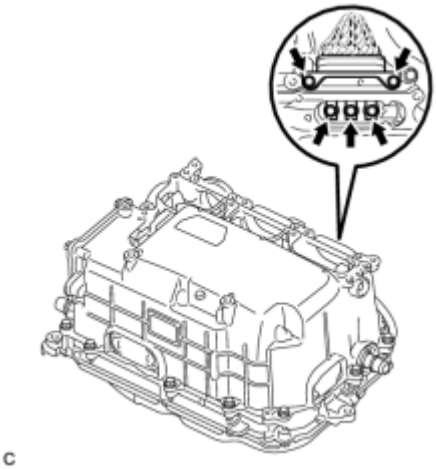


C



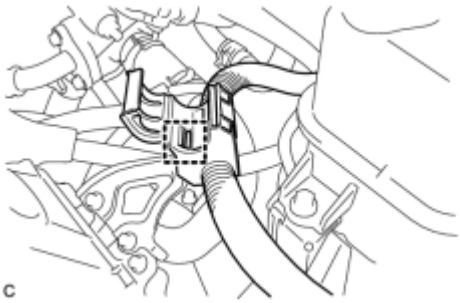
C

(b) Turn back the wire harness cover and release the cable.



C

(c) Remove the 5 bolts, and disconnect the high voltage cables of the motor (MG2) from the inverter with converter assembly.



C

(d) Disconnect the harness clamp.

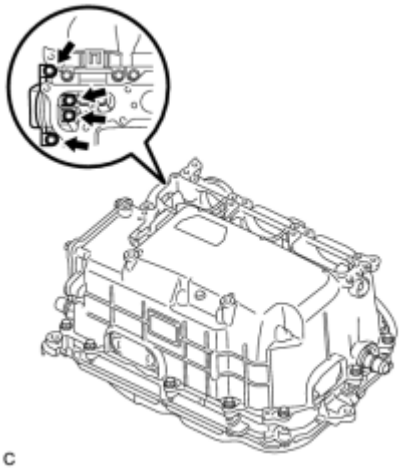
18. DISCONNECT NO. 2 ENGINE WIRE

CAUTION:

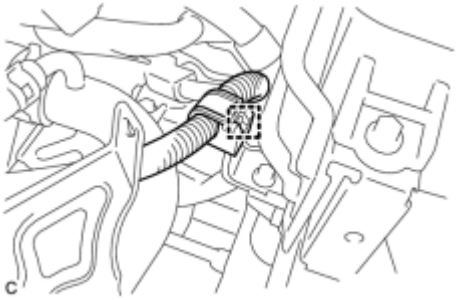
Wear insulating gloves.

NOTICE:

- Insulate the removed terminals with insulating tape.
- Cover the hole where the cable was connected with tape or equivalent (non-residue type) to prevent entry of foreign matter.

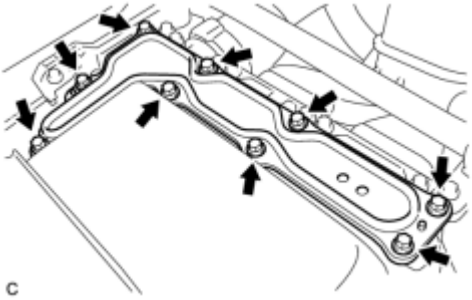


(a) Remove the 4 bolts, and disconnect the No. 2 engine wire (high voltage cables for the air conditioning compressor) from the inverter with converter assembly.



(b) Disconnect the harness clamp.

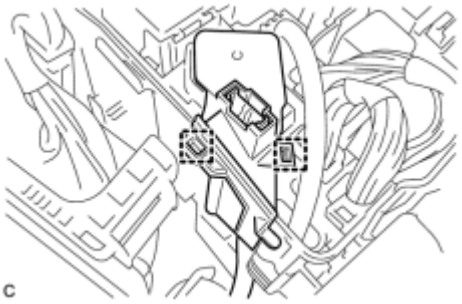
19. INSTALL INVERTER TERMINAL COVER



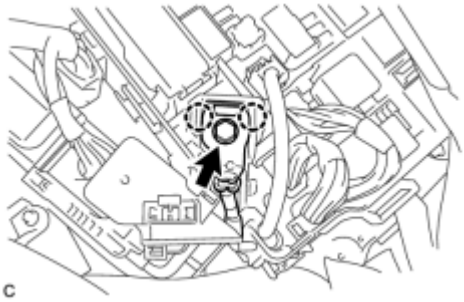
(a) Temporarily install the inverter terminal cover with the 9 bolts to prevent any foreign objects or water from entering the inverter with converter assembly.

20. DISCONNECT NO. 2 ENGINE ROOM WIRE

(a) Remove the relay block cover.

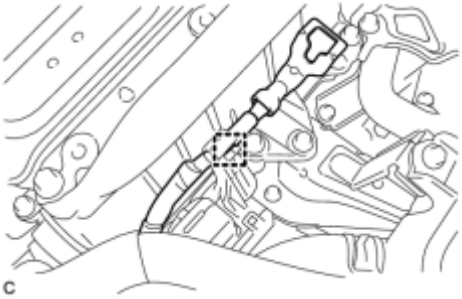



(b) Release the 2 clamps, and remove the No. 1 relay block cover.




(c) Remove the bolt from the No. 2 engine room wire.

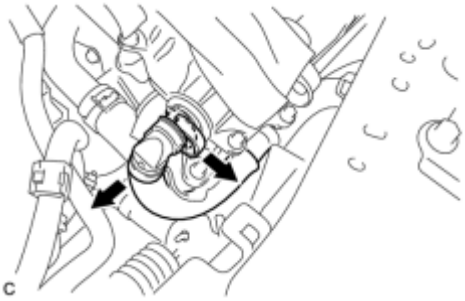
(d) Release the 2 claws, and disconnect the No. 2 engine room wire.

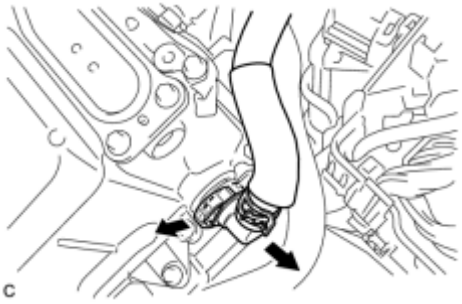



(e) Connect the No. 2 engine room wire to the protector.

21. DISCONNECT WATER HOSE

(a) Release the retainer and disconnect the water hose from the inverter with converter assembly.





(b) Release the retainer and disconnect the water hose from the inverter with converter assembly.



(c) Disconnect the coolant hose from the inverter with converter assembly. Put a piece of cloth in the pipe and in the disconnected hose or cover the pipe and hose with plastic bags as shown in the illustration, so that foreign matter doesn't stick to the union or the inside of the connector and to prevent coolant from spilling near the inverter with converter assembly.

22. REMOVE INVERTER WITH CONVERTER ASSEMBLY

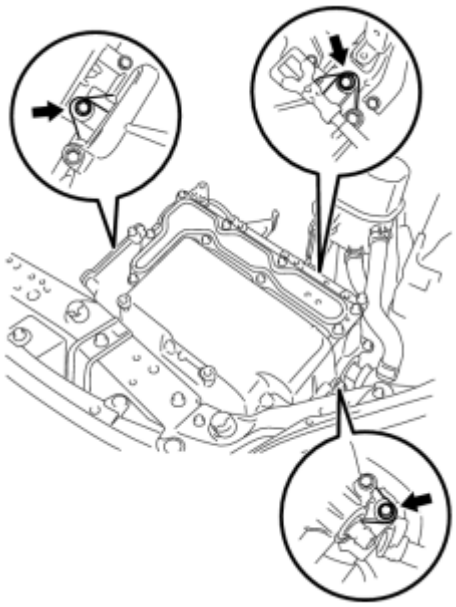
CAUTION:

Wear insulating gloves.

(a) Remove the 3 bolts and inverter with converter assembly.

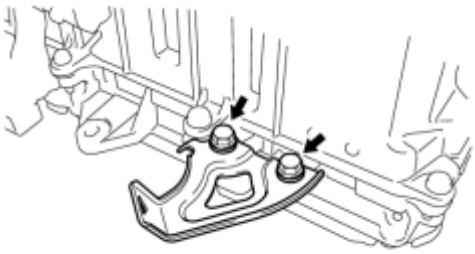
- Since the inverter with converter assembly is very heavy, 2 people are needed to remove the inverter with converter assembly. When removing the inverter with converter assembly, do not damage the parts around it.
- To prevent damage, do not hold the inverter with converter assembly by the connectors.
- To prevent damage due to static electricity, do not touch the terminals

of the disconnected connectors.



c

23. REMOVE MOTOR CABLE BRACKET



c

(a) Remove the 2 bolts and motor cable bracket.

24. REMOVE HIGH VOLTAGE FUSE

CAUTION:

Wear insulating gloves.

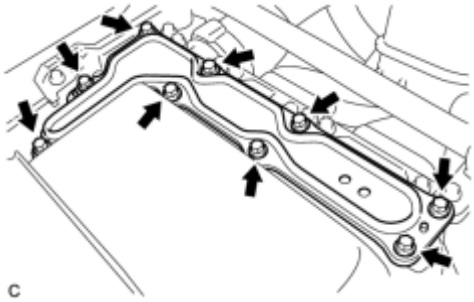
HINT:

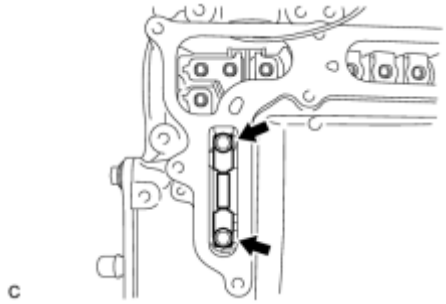
Perform this procedure only when replacement of the high voltage fuse is necessary.

(a) Remove the 9 bolts and inverter terminal cover.

NOTICE:

Make sure to pull the inverter terminal cover straight up, as a connector is connected to the bottom of the cover.

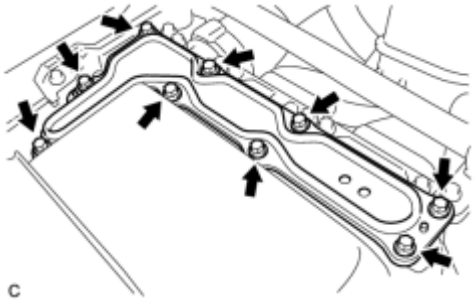



(b) Remove the 2 bolts and high voltage fuse from the inverter with converter assembly.

NOTICE:

Do not allow any foreign objects or water to enter the inverter with converter assembly.




(c) Temporarily install the inverter terminal cover with the 9 bolts to prevent any foreign objects or water from entering the inverter with converter assembly.

# INSTALLATION

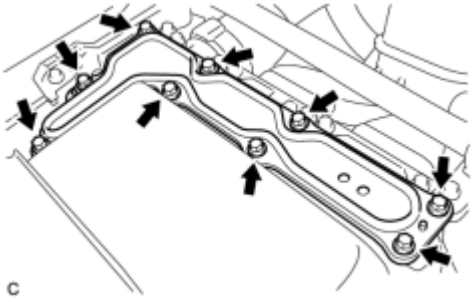
1. INSTALL HIGH VOLTAGE FUSE

CAUTION:

Wear insulating gloves.

HINT:

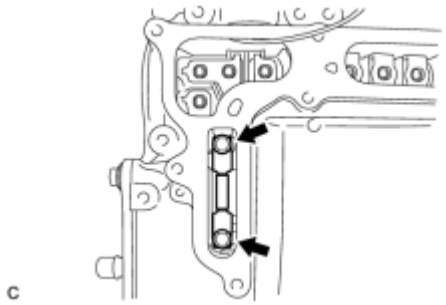
Perform this procedure only when replacement of the high voltage fuse is necessary.



(a) Remove the 9 bolts and inverter terminal cover.

NOTICE:

Make sure to pull the inverter terminal cover straight up, as a connector is connected to the bottom of the cover.

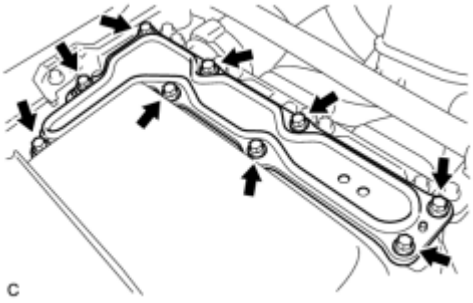


(b) Install the high voltage fuse with the 2 bolts.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

NOTICE:

Be sure to use a torque wrench to tighten the bolts.



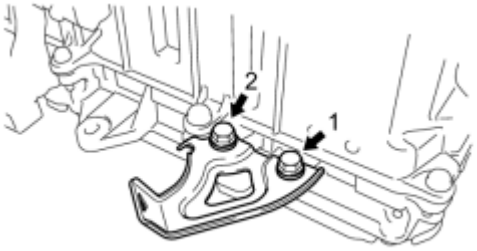
(c) Temporarily install the inverter terminal cover with the 9 bolts to prevent any foreign objects or water from entering the inverter with converter assembly.

2. INSTALL MOTOR CABLE BRACKET

(a) Temporarily install the motor cable bracket with the 2 bolts.

(b) Tighten the 2 bolts in the order shown in the illustration.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

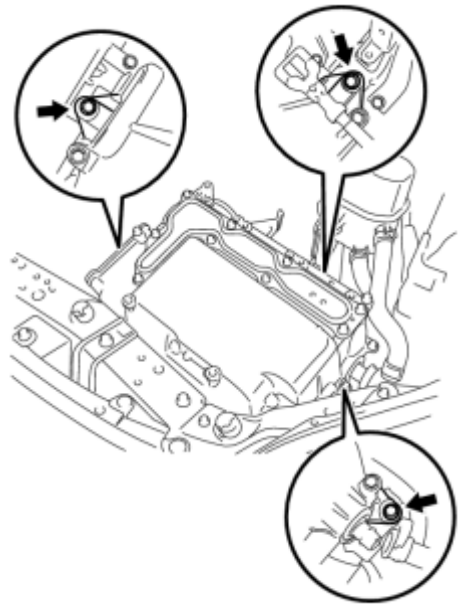



C

3. INSTALL INVERTER WITH CONVERTER ASSEMBLY

CAUTION:

Wear insulating gloves.



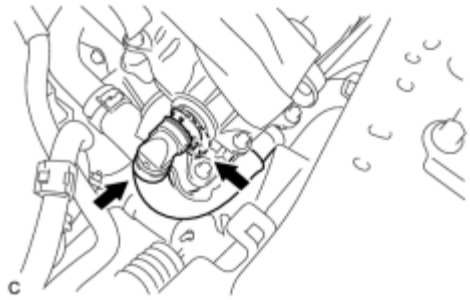
C

(a) Install the inverter with converter assembly with the 3 bolts.

Torque: **12 N·m (122 kgf·cm, 8ft·lbf)**

- Since the inverter with converter assembly is very heavy, 2 people are needed to install the inverter with converter assembly. When installing the inverter with converter assembly, do not damage the parts around it.
- To prevent damage, do not hold the inverter with converter assembly by the connectors.
- To prevent damage due to static electricity, do not touch the terminals of the disconnected connectors.

4. CONNECT WATER HOSE



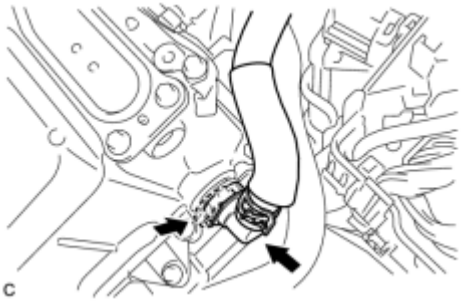
C

(a) Connect the water hose to the inverter with converter assembly and lock the hose with the retainer.

- Insert the retainer until a click sound is heard.
- Pull on the hose to confirm that the hose is securely connected.
- If there is foreign matter on the union or the O-ring, clean it with water and finger scouring.

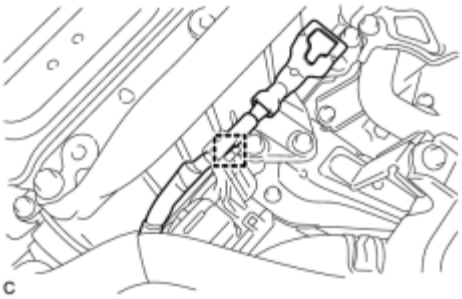
(b) Connect the water hose to the inverter with converter assembly and lock the hose with the retainer.

- Insert the retainer until a click sound is heard.

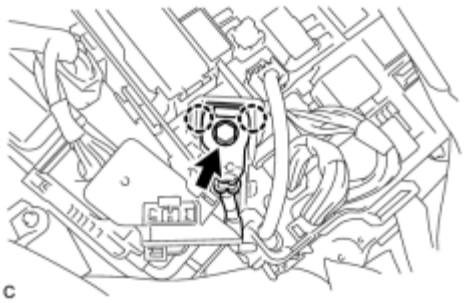


- Pull on the hose to confirm that the hose is securely connected.
- If there is foreign matter on the union or the O-ring, clean it with water and finger scouring.

5. CONNECT NO. 2 ENGINE ROOM WIRE



(a) Disconnect the No. 2 engine room wire from the protector.

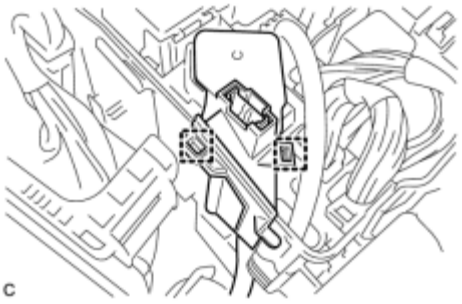


(b) Connect the No. 2 engine room wire with the bolt and 2 claws.

Torque: **8.3 N·m (85 kgf·cm, 73in·lbf)**

NOTICE:

Pass the No. 2 engine room wire under the two cooling hoses that pass beside the inverter.



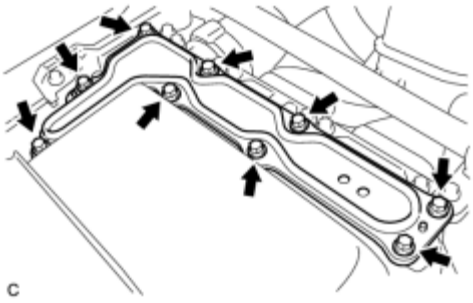
(c) Install the No. 1 relay block cover and 2 clamps.

(d) Install the relay block cover.

6. REMOVE INVERTER TERMINAL COVER

CAUTION:

Wear insulating gloves.



(a) Remove the 9 bolts and inverter terminal cover.

NOTICE:

Make sure to pull the inverter terminal cover straight up, as a connector is connected to the bottom of the cover.

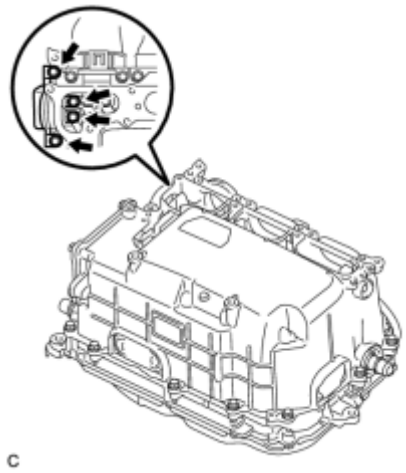
7. CONNECT NO. 2 ENGINE WIRE

CAUTION:

Wear insulating gloves.

NOTICE:

Do not allow any foreign objects or water to enter the inverter with converter assembly.



(a) Temporarily install the No. 2 engine wire (high voltage cables of the air conditioning) and 4 bolts to the inverter assembly by hand.

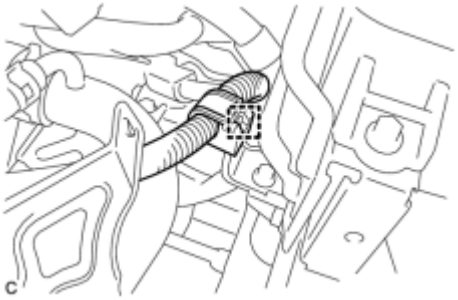
(b) Fully tighten the 4 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

NOTICE:

Be sure to use a torque wrench to tighten the bolts.

(c) Connect the harness clamp.



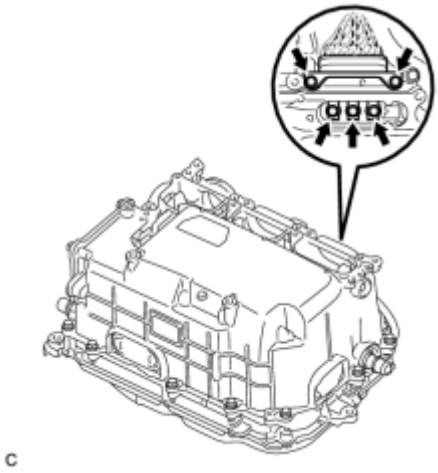
8. CONNECT HIGH VOLTAGE CABLE OF FRONT TRANSAXLE

CAUTION:

Wear insulating gloves.

NOTICE:

Do not allow any foreign objects or water to enter the inverter with converter assembly.



(a) Temporarily install the high voltage cable of the motor (MG2) and 5 bolts to the inverter assembly by hand.

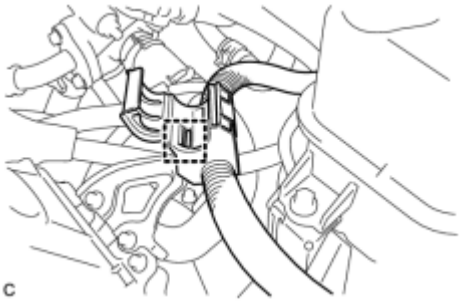
(b) Fully tighten the 5 bolts.

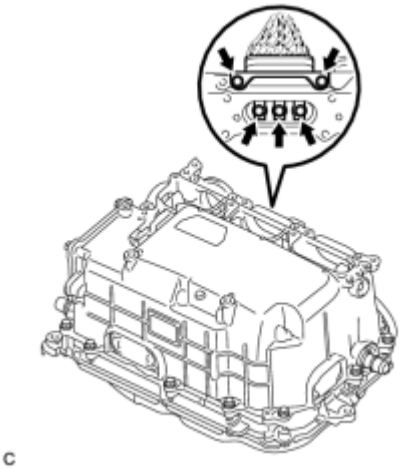
Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

NOTICE:

Be sure to use a torque wrench to tighten the bolts.

(c) Connect the harness clamp.





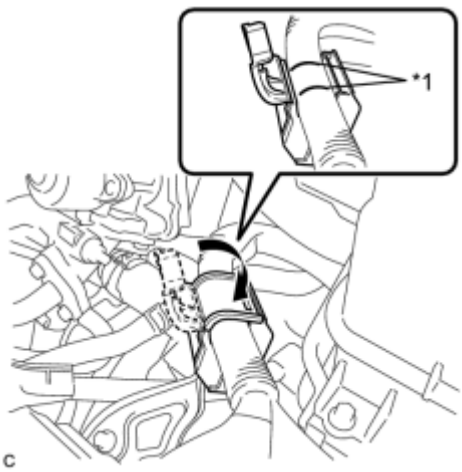
(d) Temporarily install the high voltage cable of the generator (MG1) and 5 bolts to the inverter assembly by hand.

(e) Fully tighten the 5 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

NOTICE:

Be sure to use a torque wrench to tighten the bolts.




(f) Install the cable and cover.

## Text in Illustration

| | |
|---|---|
| *1 | Align Mark |

NOTICE:

Close the cover so that the matchmarks are not visible.

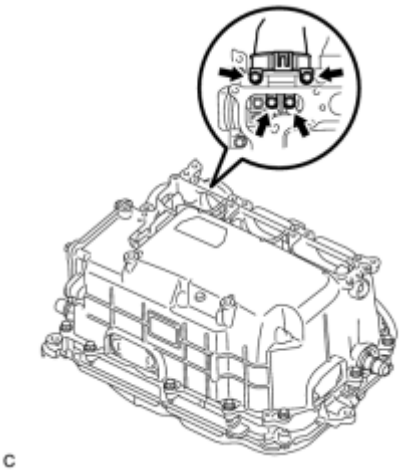
9. CONNECT FRAME WIRE

CAUTION:

Wear insulating gloves.

NOTICE:

- Make sure that the interlock is fully engaged.
- Do not allow any foreign objects or water to enter the inverter with converter assembly.



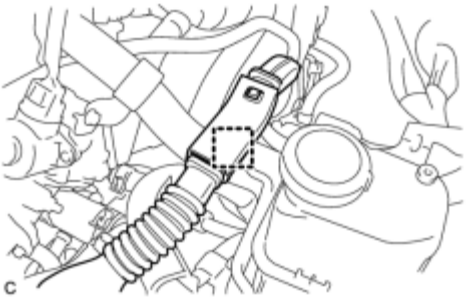

(a) Temporarily install the frame wire (high voltage cables of the hybrid battery) and 4 bolts to the inverter assembly by hand.

(b) Fully tighten the 4 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

NOTICE:

Be sure to use a torque wrench to tighten the bolts.




(c) Connect the harness clamp.

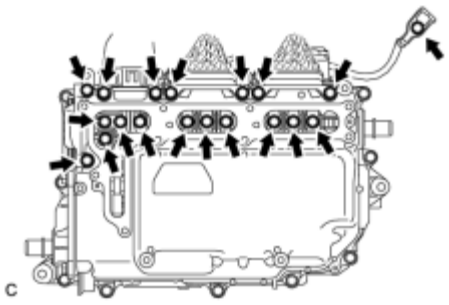
10. CHECK HIGH VOLTAGE CABLE CONNECTION

CAUTION:

Wear insulating gloves.

NOTICE:

Do not allow any foreign objects or water to enter the inverter with converter assembly.



(a) Check that each connector and terminal is firmly installed.

NOTICE:

Make sure that the bolts are fully tightened.

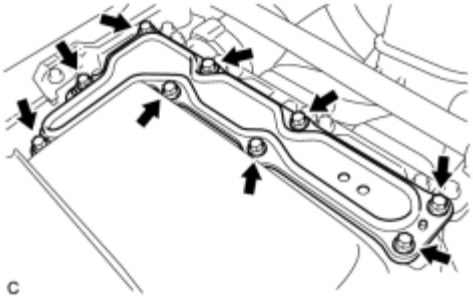
11. INSTALL INVERTER TERMINAL COVER

CAUTION:

Wear insulating gloves.

NOTICE:

- Make sure that the interlock is fully engaged.
- Do not allow any foreign objects or water to enter the inverter with converter assembly.



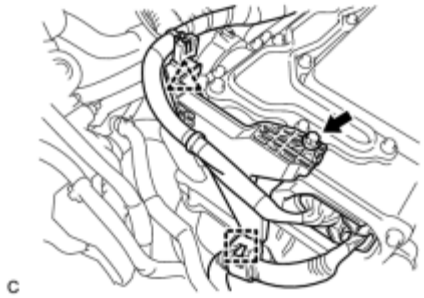
(a) Install the inverter terminal cover with the 9 bolts to the inverter with converter assembly.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

12. INSTALL ENGINE ROOM MAIN WIRE

NOTICE:

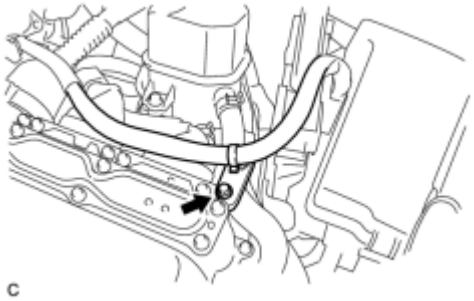
- Make sure that the connectors are fully engaged.
- Do not allow any foreign objects or water to enter the inverter with converter assembly.



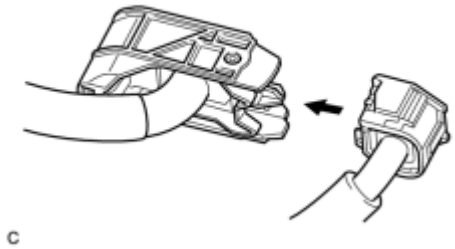
(a) Install the bolt, clamp and clip, and connect the engine room main ware.

Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**

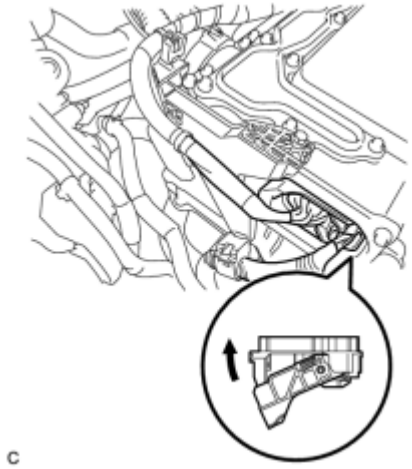
(b) Install the bolt.



Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**

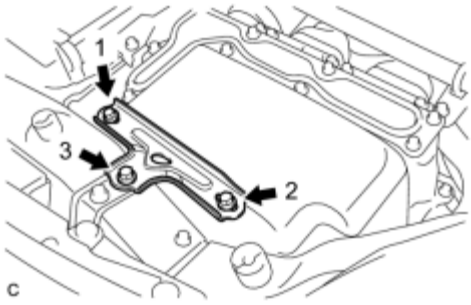


(c) Connect the engine wire to the engine room main wire.



(d) Connect the connector to the inverter with converter assembly and lock the connector with the lock lever.

13. INSTALL NO. 1 INVERTER BRACKET




(a) Temporarily install the No. 1 inverter bracket with the 3 bolts.

(b) Tighten the 3 bolts in the order shown in the illustration.

Torque: **14 N·m (140 kgf·cm, 10ft·lbf)**

14. INSTALL SERVICE PLUG GRIP INFO

15. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

16. INSTALL REAR NO. 3 FLOOR BOARD INFO

17. INSTALL REAR DECK FLOOR BOX INFO

18. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

19. ADD COOLANT (for Inverter) INFO

20. INSPECT FOR COOLANT LEAK (for Inverter) INFO

21. INSTALL NO. 1 ENGINE UNDER COVER

22. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

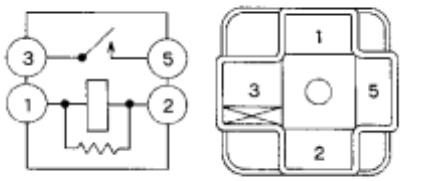
23. INSTALL ENGINE UNDER COVER (w/ Cover)

24. INSTALL RADIATOR SUPPORT OPENING COVER INFO

# ON-VEHICLE INSPECTION

1. INSPECT RELAY

(a) Inspect IGCT MAIN relay



A32779

(1) Measure the resistance according to the value(s) in the table below.

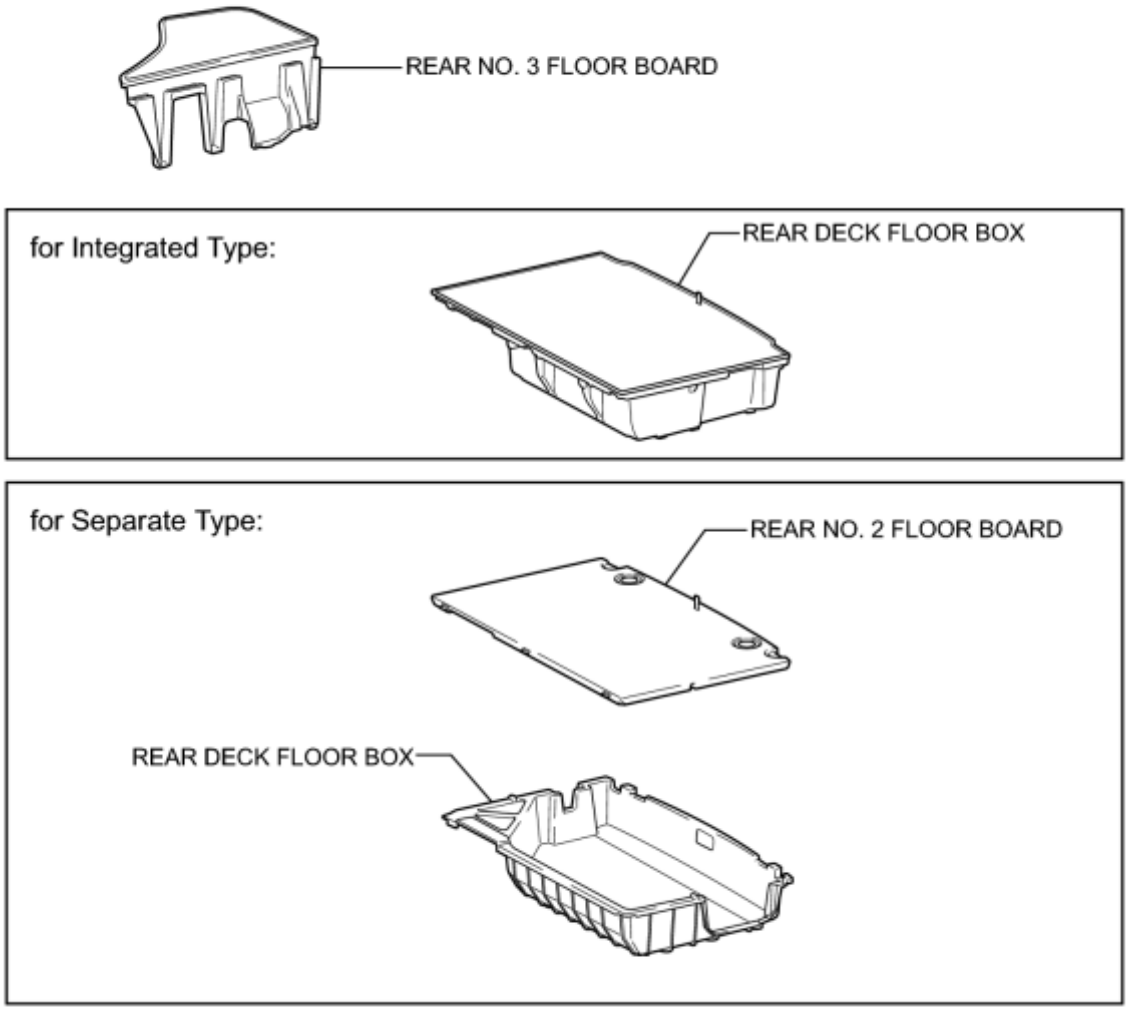
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | No battery voltage is applied across terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Battery voltage is applied across terminals 1 and 2 | Below 1 Ω |

If the result is not as specified, replace the relay.

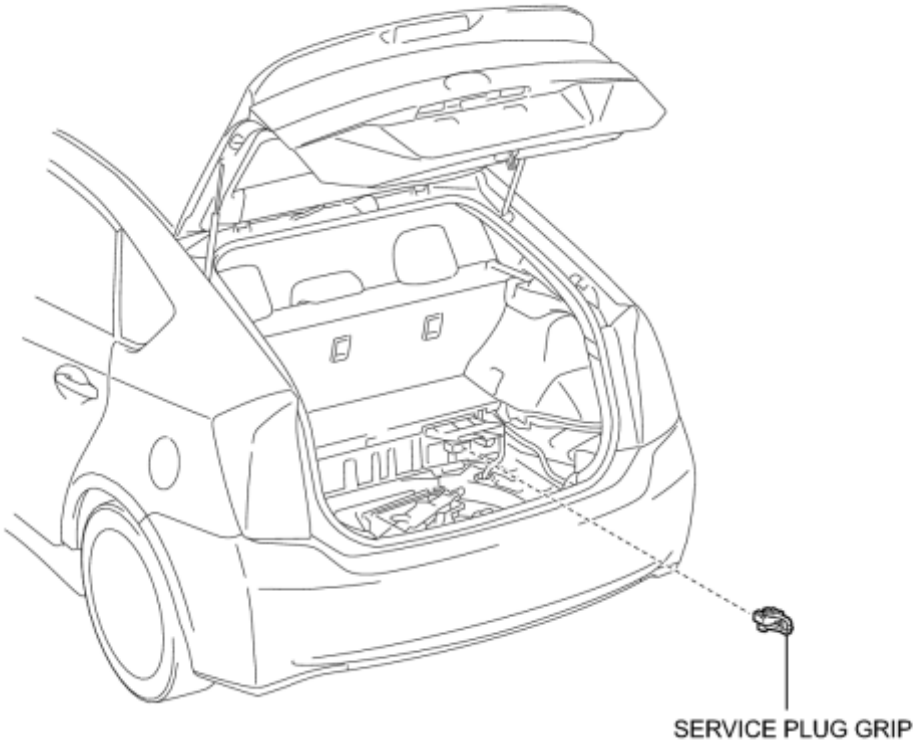
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION




P

# REMOVAL

1. PRECAUTION

HINT: INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

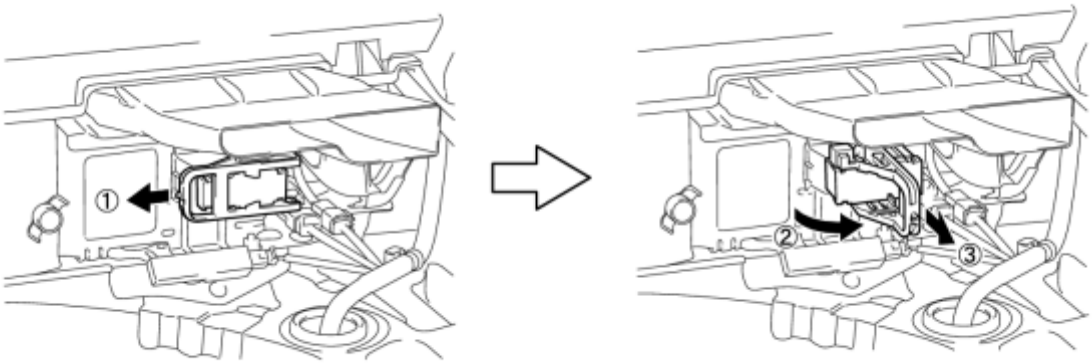
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE SERVICE PLUG GRIP

CAUTION:

- Wear insulating gloves.
- Remove the service plug grip to interrupt the high voltage circuit at the time of inspection or repair.
- Keep the removed service plug grip in your pocket to prevent other technicians from accidentally reconnecting it while you are servicing the vehicle.
- All the high voltage wiring connectors are colored in orange.

(a) Wear insulating gloves and remove the service plug grip after sliding up the lever of the service plug grip as shown in the illustration.




c

CAUTION:

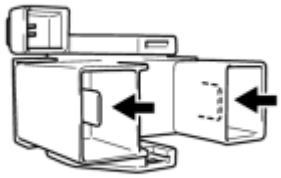
- Keep the removed service plug grip in your pocket to prevent other technicians from accidentally reconnecting it while you are servicing the vehicle.
- After removing the service plug grip, do not touch the high voltage connectors or terminals for 10 minutes.

HINT:

Waiting for at least 10 minutes is required to discharge the high-voltage capacitor inside the inverter with converter assembly.

# INSPECTION

1. INSPECT SERVICE PLUG GRIP



c

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Service plug grip | Always | Below 1 Ω |

If the result is not as specified, replace the service plug grip.

# INSTALLATION

1. INSTALL SERVICE PLUG GRIP

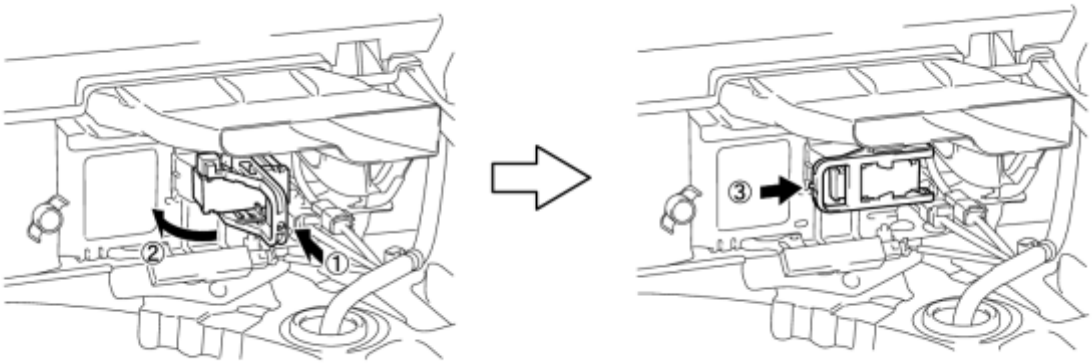
CAUTION:

Wear insulating gloves.

NOTICE:

Before connecting the service plug, check that no parts and tools remain and that the high voltage terminals and connectors are connected securely.

(a) Wear insulated gloves and install the service plug grip in the order shown in the illustration.




c

(b) Rotate the handle of the service plug grip 90° toward the battery and slide it in the direction shown by the arrow until a click sound is heard.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

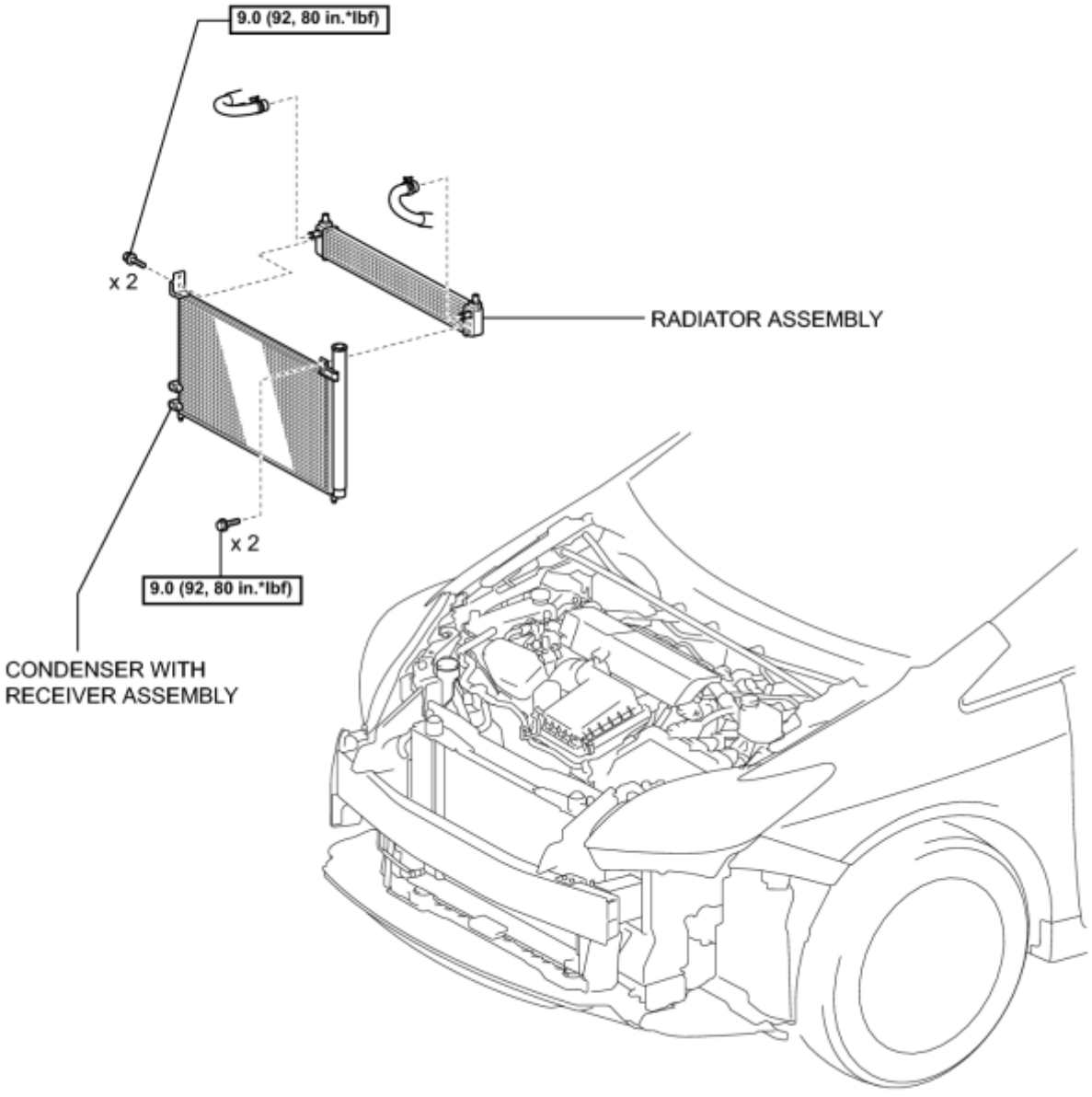
3. INSTALL REAR NO. 3 FLOOR BOARD INFO

4. INSTALL REAR DECK FLOOR BOX INFO

5. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

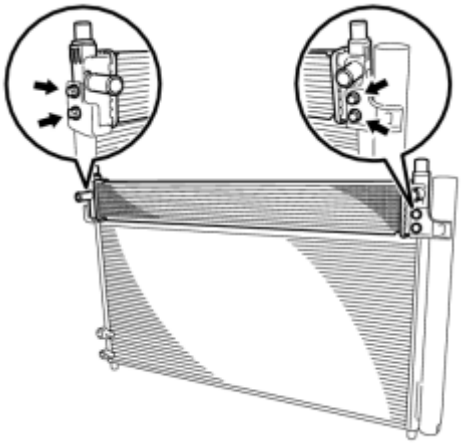
c

# REMOVAL

1. REMOVE CONDENSER WITH RECEIVER ASSEMBLY

HINT: INFO.

2. REMOVE RADIATOR ASSEMBLY

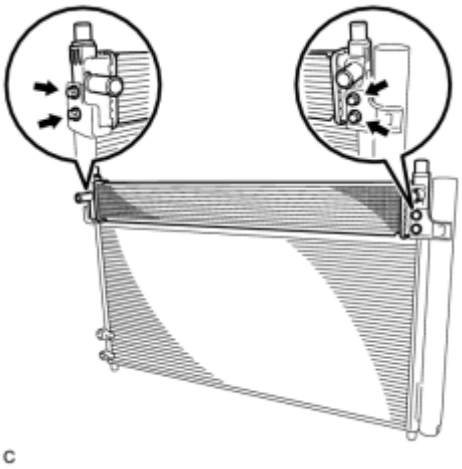


C

(a) Remove the 4 bolts and radiator assembly from the condenser assembly.

# INSTALLATION

1. INSTALL RADIATOR ASSEMBLY




(a) Install the radiator assembly to the condenser assembly with the 4 bolts.

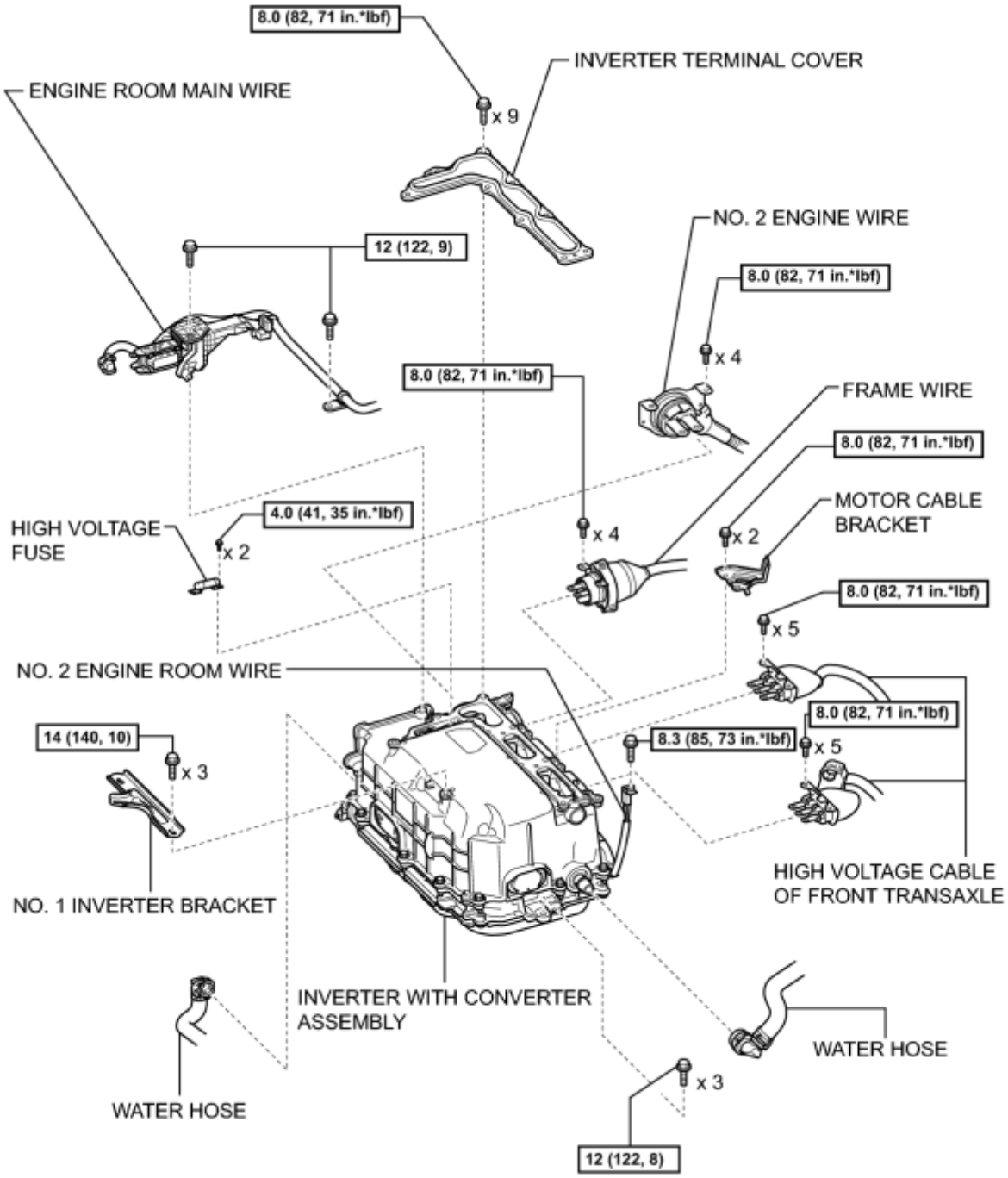
Torque: **9.0 N·m (92 kgf·cm, 80in·lbf)**

2. INSTALL CONDENSER WITH RECEIVER ASSEMBLY

HINT: INFO.

# COMPONENTS

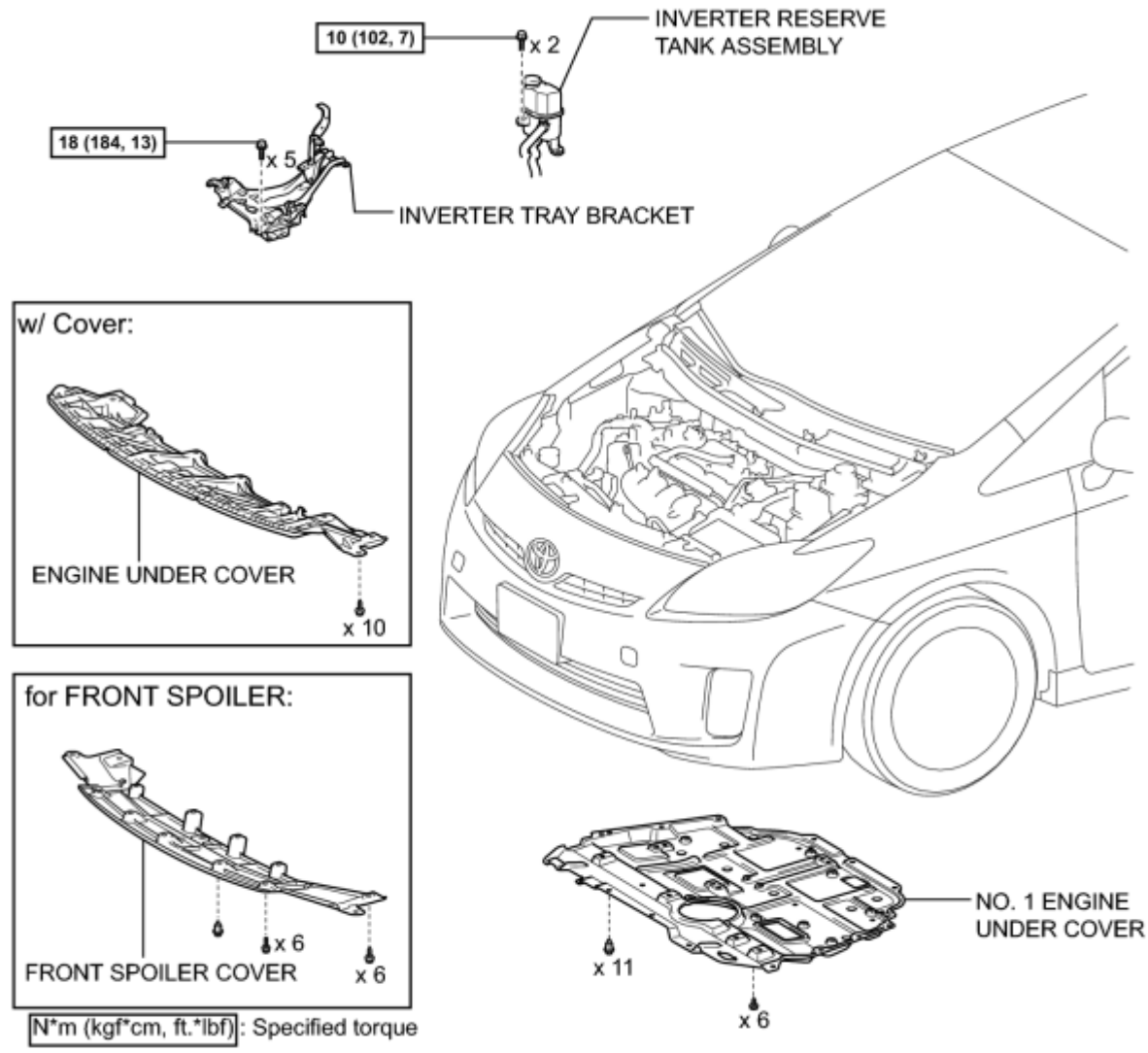
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

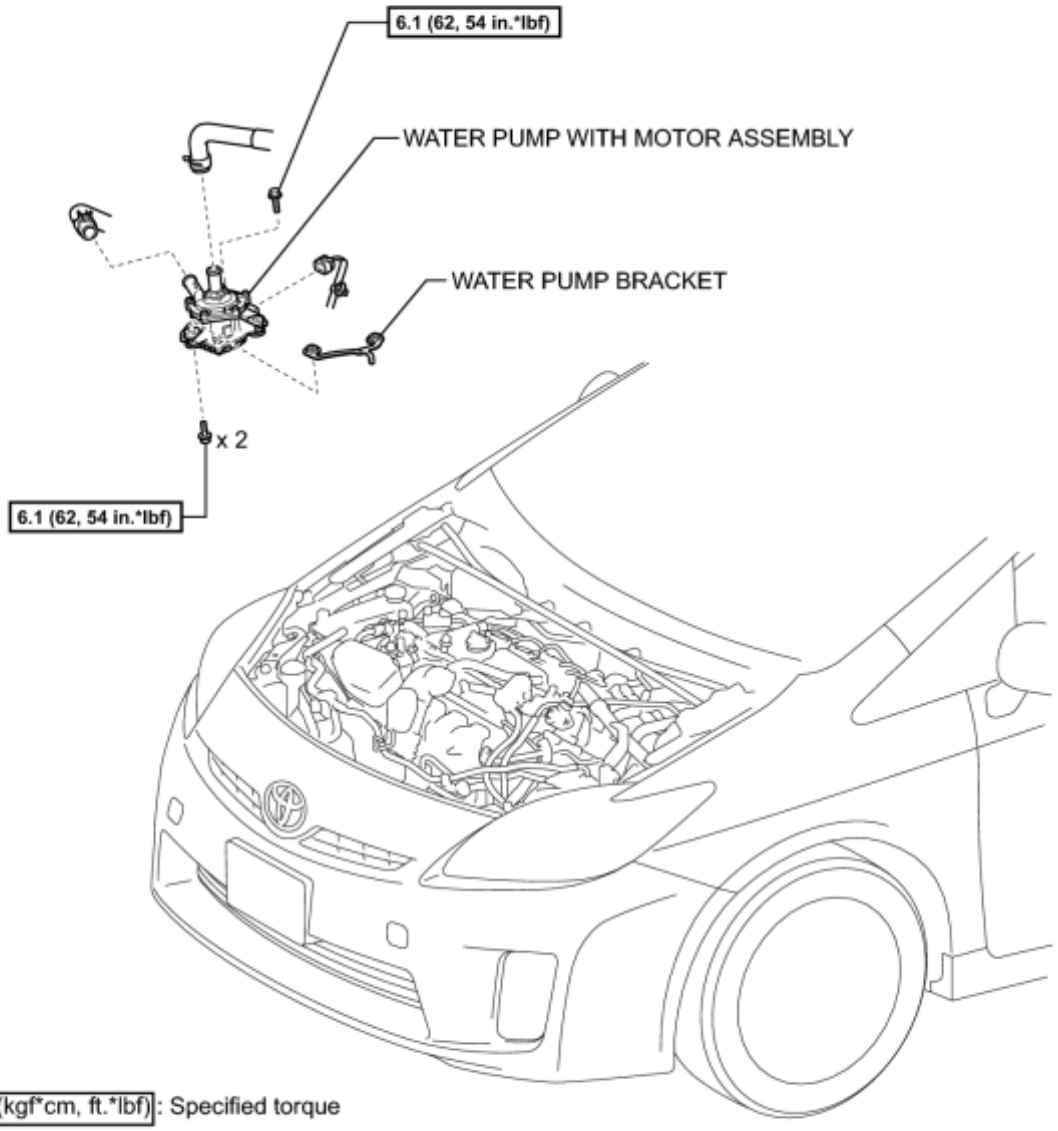
c

# ILLUSTRATION




c

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

1. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

2. REMOVE ENGINE UNDER COVER (w/ Cover)

3. REMOVE NO. 1 ENGINE UNDER COVER

4. DRAIN COOLANT (for Inverter) INFO

5. REMOVE INVERTER WITH CONVERTER ASSEMBLY

HINT: INFO.

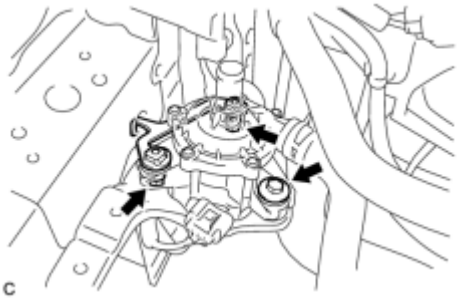
6. REMOVE INVERTER RESERVE TANK ASSEMBLY INFO

7. REMOVE INVERTER TRAY BRACKET INFO

8. REMOVE WATER PUMP WITH MOTOR ASSEMBLY



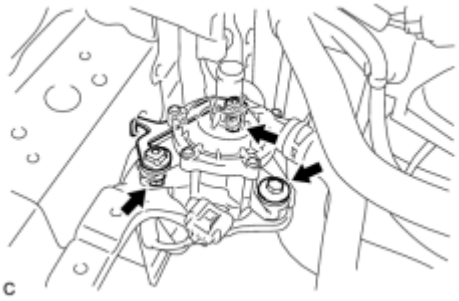
(a) Disconnect the water hose and connector.



(b) Remove the 3 bolts and the water pump with motor assembly with the water pump bracket.

# INSTALLATION

1. INSTALL WATER PUMP WITH MOTOR ASSEMBLY



(a) Install the water pump with motor assembly and water pump bracket with the 3 bolts.

Torque: **6.1 N·m (62 kgf·cm, 54in·lbf)**



(b) Connect the water hose and connector.

2. INSTALL INVERTER TRAY BRACKET INFO

3. INSTALL INVERTER RESERVE TANK ASSEMBLY INFO

4. INSTALL INVERTER WITH CONVERTER ASSEMBLY

HINT: INFO.

5. ADD COOLANT (for Inverter) INFO

6. INSPECT FOR COOLANT LEAK (for Inverter) INFO

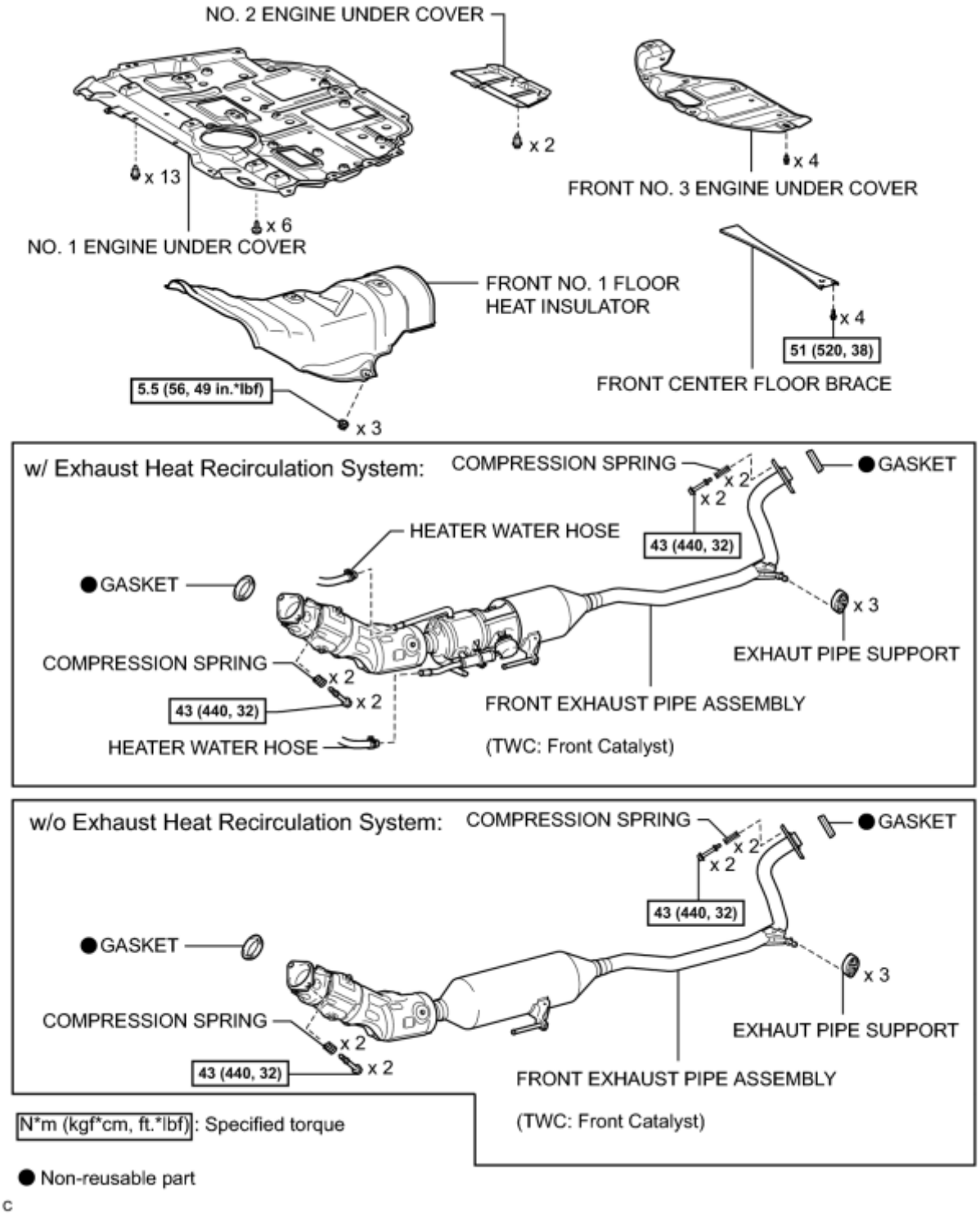
7. INSTALL NO. 1 ENGINE UNDER COVER

8. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

9. INSTALL ENGINE UNDER COVER (w/ Cover)

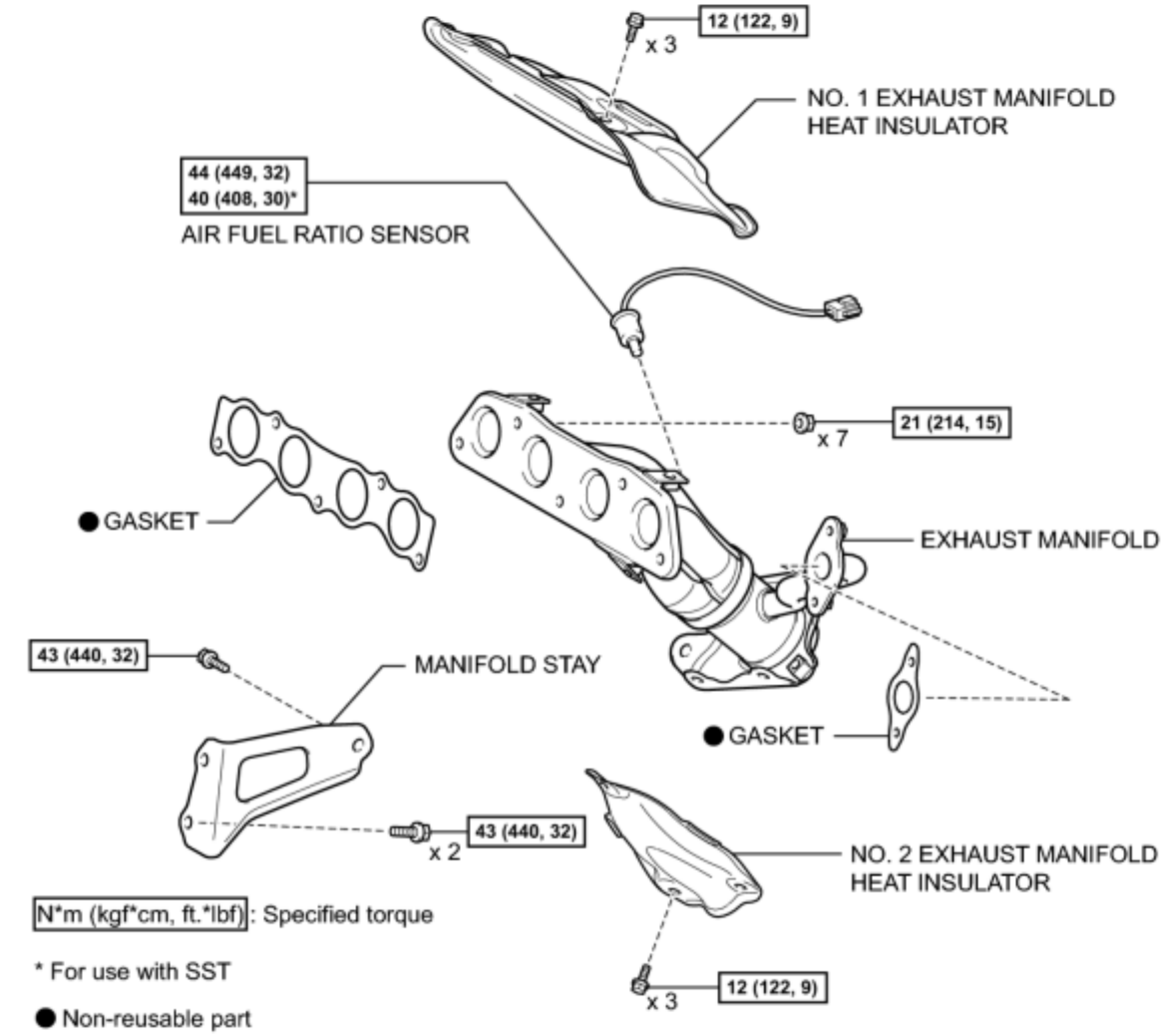
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION


12 (122, 9)
x 3
NO. 1 EXHAUST MANIFOLD HEAT INSULATOR
44 (449, 32)
40 (408, 30)*
AIR FUEL RATIO SENSOR
21 (214, 15)
x 7
GASKET
EXHAUST MANIFOLD
43 (440, 32)
MANIFOLD STAY
GASKET
43 (440, 32)
x 2
NO. 2 EXHAUST MANIFOLD HEAT INSULATOR
12 (122, 9)
x 3
N*m (kgf*cm, ft.*lbf): Specified torque
* For use with SST
Non-reusable part

T

# REMOVAL

1. REMOVE NO. 1 ENGINE UNDER COVER

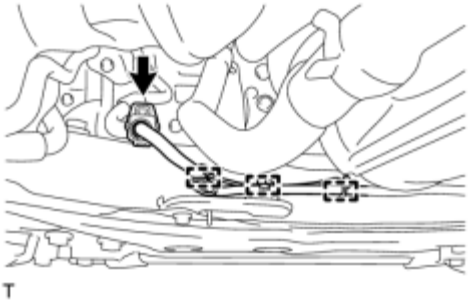
2. REMOVE NO. 2 ENGINE UNDER COVER

3. REMOVE FRONT NO. 3 ENGINE UNDER COVER INFO

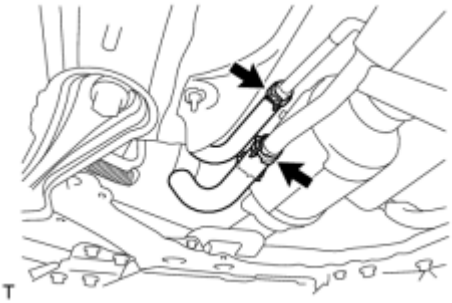
4. REMOVE FRONT CENTER FLOOR BRACE INFO

5. DRAIN COOLANT (for Engine with Exhaust Heat Recirculation System) INFO

6. REMOVE FRONT EXHAUST PIPE ASSEMBLY (w/ Exhaust Heat Recirculation System)

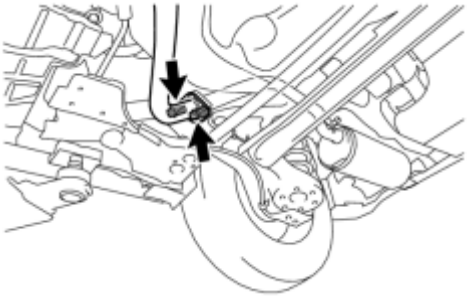



(a) Disconnect the 3 clamps and oxygen sensor connector.




(b) Disconnect the 2 heater water hoses.

(c) Remove the 4 bolts and 4 compression springs.

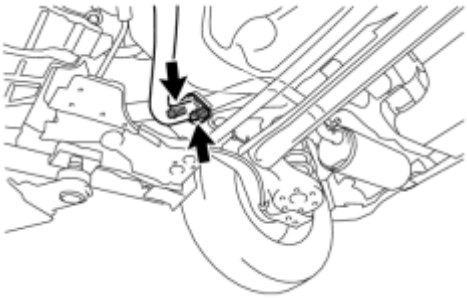




(d) Remove the front exhaust pipe assembly from the 3 exhaust pipe supports.

(e) Remove the 2 gaskets from the front exhaust pipe assembly and exhaust manifold.

7. REMOVE FRONT EXHAUST PIPE ASSEMBLY (w/o Exhaust Heat Recirculation System)



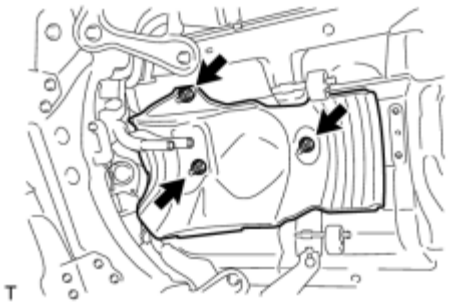


(a) Remove the 4 bolts and 4 compression springs.

(b) Remove the front exhaust pipe assembly from the 3 exhaust pipe supports.

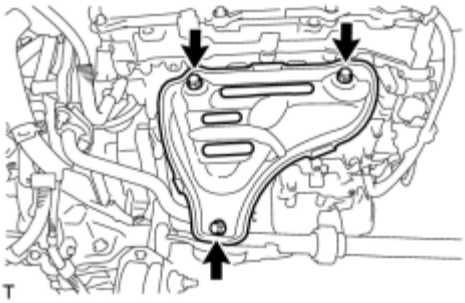
(c) Remove the 2 gaskets from the front exhaust pipe assembly and exhaust manifold.

8. REMOVE FRONT NO. 1 FLOOR HEAT INSULATOR



(a) Remove the 3 nuts and No. 1 floor heat insulator.

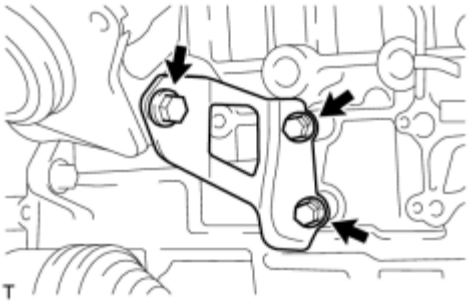
9. REMOVE NO. 1 EXHAUST MANIFOLD HEAT INSULATOR



(a) Remove the 3 bolts and No. 1 exhaust manifold heat insulator.

10. REMOVE AIR FUEL RATIO SENSOR INFO

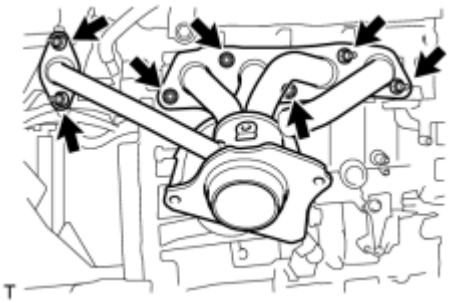
11. REMOVE MANIFOLD STAY



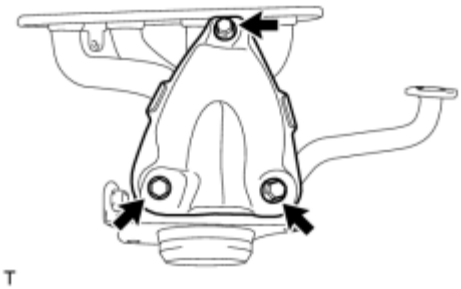
(a) Remove the 3 bolts and manifold stay.

12. REMOVE EXHAUST MANIFOLD

(a) Remove the 7 nuts, exhaust manifold and 2 gaskets.



13. REMOVE NO. 2 EXHAUST MANIFOLD HEAT INSULATOR



(a) Remove the 3 bolts and No. 2 exhaust manifold heat insulator.

# INSTALLATION

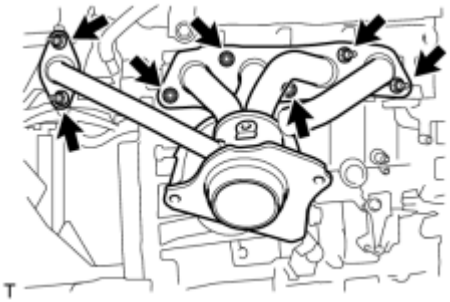
1. INSTALL NO. 2 EXHAUST MANIFOLD HEAT INSULATOR




(a) Install the No. 2 exhaust manifold heat insulator with the 3 bolts.

Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**

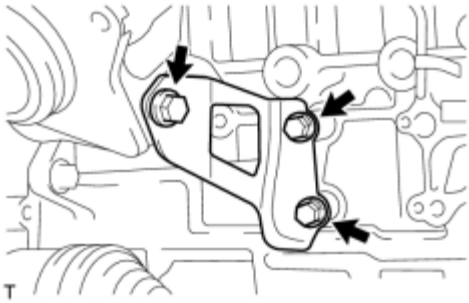
2. INSTALL EXHAUST MANIFOLD




(a) Install 2 new gaskets and the exhaust manifold with the 7 nuts.

Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

3. INSTALL MANIFOLD STAY




(a) Install the manifold stay with the 3 bolts.

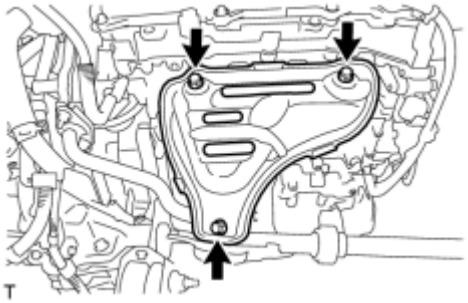
Torque: **43 N·m (440 kgf·cm, 32ft·lbf)**

4. INSTALL AIR FUEL RATIO SENSOR INFO

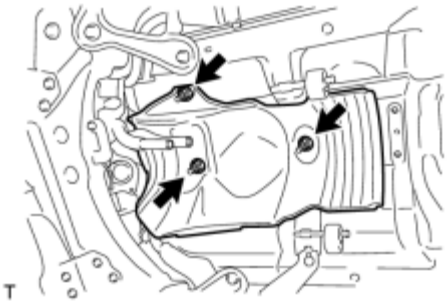
5. INSTALL NO. 1 EXHAUST MANIFOLD HEAT INSULATOR

(a) Install the No. 1 exhaust manifold heat insulator with the 3 bolts.

Torque: **12 N·m (122 kgf·cm, 9ft·lbf)**



6. INSTALL FRONT NO. 1 FLOOR HEAT INSULATOR



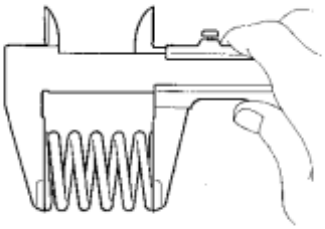
(a) Install the No. 1 floor heat insulator with the 3 nuts.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

7. INSTALL FRONT EXHAUST PIPE ASSEMBLY (w/ Exhaust Heat Recirculation System)

NOTICE:

When installing the water hose, ensure that the exhaust heat recirculation system is filled with coolant. Otherwise, the electric water pump may be damaged.



A77867

(a) Using a vernier caliper, measure the free length of the compression springs.

| | |
|---|---|
| Minimum (front) | 41.5 mm (1.64 in.) |
| Minimum (rear) | 38.5 mm (1.52 in.) |

HINT:

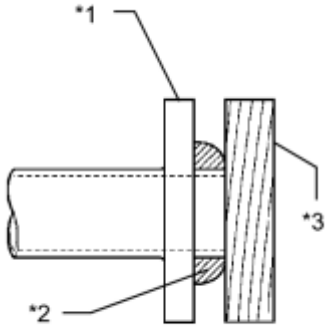
If the free length is less than minimum, replace the compression spring.

(b) Fully insert 2 new gaskets to the exhaust manifold and front exhaust pipe assembly.

(c) Using a plastic hammer and wooden block, tap in the new gaskets until its surface is flush with the exhaust manifold and front exhaust pipe assembly.

# Text in Illustration

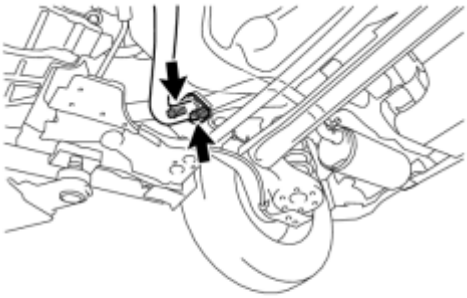
| | |
|---|---|
| *1 | Exhaust Manifold and Front Exhaust Pipe Assembly |




| | |
|---|---|
| *2 | Gasket |
| *3 | Wooden Block |

- Be careful with the installation direction of the gaskets.
- Do not reuse the gaskets.
- Do not damage the gaskets.
- Do not push in the gasket by using the exhaust pipe when connecting it.

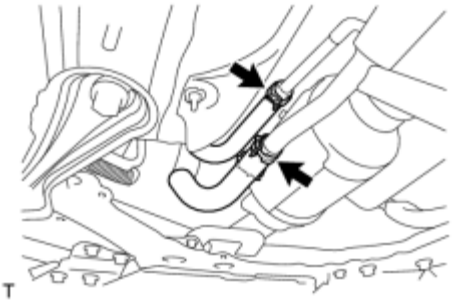
(d) Connect the front exhaust pipe assembly to the 3 exhaust pipe supports.



(e) Install the front exhaust pipe assembly with the 4 bolts and 4 compression springs.

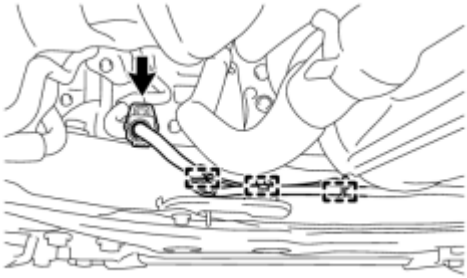


Torque: **43 N·m (440 kgf·cm, 32ft·lbf)**



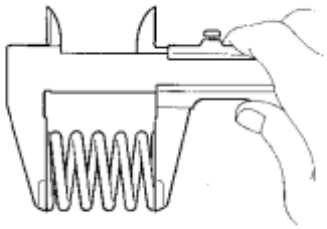
(f) Connect the 2 heater water hoses.

(g) Connect the 3 clamps and oxygen sensor connector.



T

8. INSTALL FRONT EXHAUST PIPE ASSEMBLY (w/o Exhaust Heat Recirculation System)



A77867

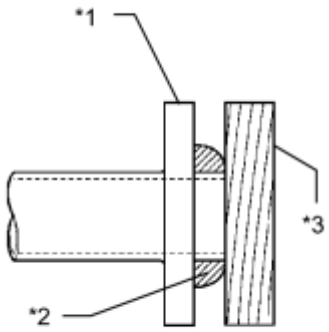
(a) Using a vernier caliper, measure the free length of the compression springs.

| | |
|---|---|
| Minimum (front) | 41.5 mm (1.64 in.) |
| Minimum (rear) | 38.5 mm (1.52 in.) |

HINT:

If the free length is less than minimum, replace the compression spring.

(b) Fully insert 2 new gaskets to the exhaust manifold and front exhaust pipe assembly.




(c) Using a plastic hammer and wooden block, tap in the new gaskets until its surface is flush with the exhaust manifold and front exhaust pipe assembly.

## Text in Illustration

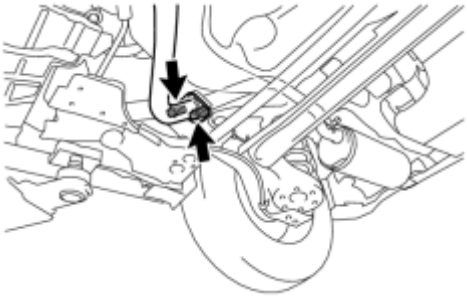
| | |
|---|---|
| *1 | Exhaust Manifold and Front Exhaust Pipe Assembly |
| *2 | Gasket |
| *3 | Wooden Block |

- Be careful with the installation direction of the gaskets.
- Do not reuse the gaskets.
- Do not damage the gaskets.
- Do not push in the gasket by using the exhaust pipe when connecting it.

(d) Connect the front exhaust pipe assembly to the 3 exhaust pipe supports.

(e) Install the front exhaust pipe assembly with the 4 bolts and 4 compression springs.

Torque: **43 N·m (440 kgf·cm, 32ft·lbf)**





9. ADD COOLANT (for Engine with Exhaust Heat Recirculation System) INFO

10. INSPECT FOR COOLANT LEAK (for Engine with Exhaust Heat Recirculation System) INFO

11. INSTALL FRONT CENTER FLOOR BRACE INFO

12. INSTALL FRONT NO. 3 ENGINE UNDER COVER INFO

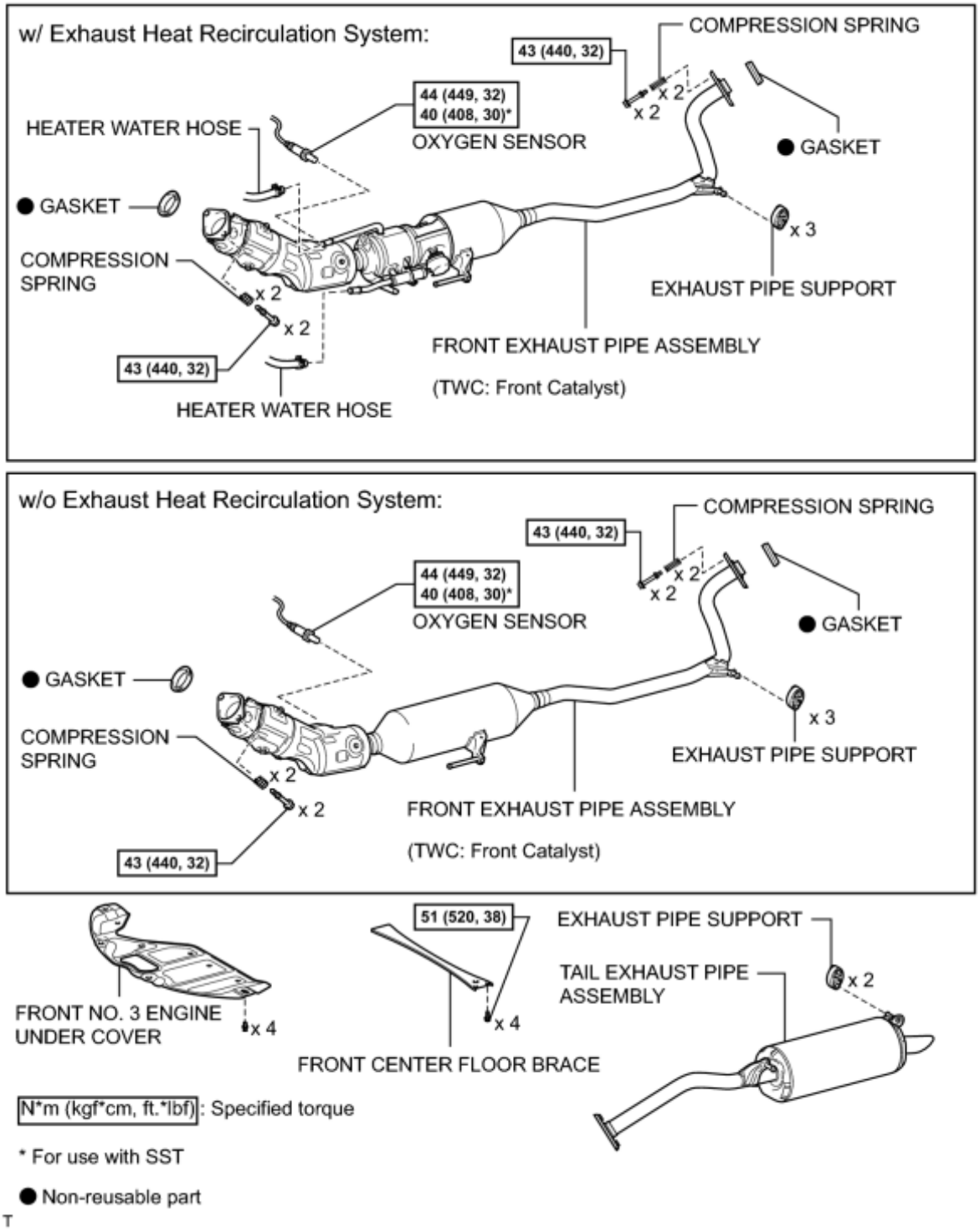
13. INSTALL NO. 2 ENGINE UNDER COVER

14. INSTALL NO. 1 ENGINE UNDER COVER

15. INSPECT FOR EXHAUST GAS LEAK

# COMPONENTS

# ILLUSTRATION

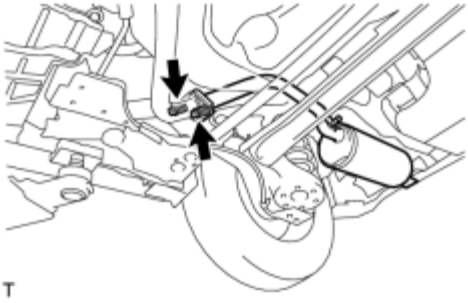



T

# REMOVAL

1. DRAIN COOLANT (for Engine with Exhaust Heat Recirculation System) INFO

2. REMOVE TAIL EXHAUST PIPE ASSEMBLY

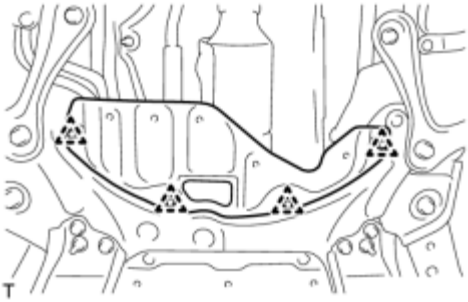



(a) Remove the 2 bolts and 2 compression springs.

(b) Remove the tail exhaust pipe assembly from the 2 exhaust pipe supports.

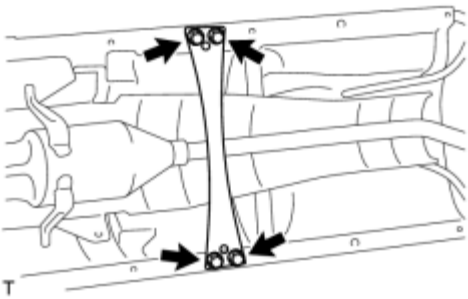
(c) Remove the gasket from the front exhaust pipe assembly.

3. REMOVE FRONT NO. 3 ENGINE UNDER COVER




(a) Remove the 4 clips and front No. 3 engine under cover.

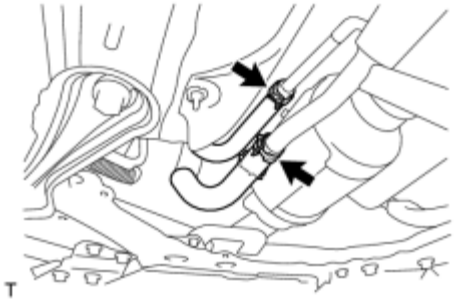
4. REMOVE FRONT CENTER FLOOR BRACE




(a) Remove the 4 bolts and front center floor brace.

5. REMOVE OXYGEN SENSOR INFO

6. REMOVE FRONT EXHAUST PIPE ASSEMBLY (w/ Exhaust Heat Recirculation System)



(a) Disconnect the 2 heater water hoses.



(b) Remove the 2 bolts and 2 compression springs.

(c) Remove the front exhaust pipe assembly from the 3 exhaust pipe supports.

(d) Remove the gasket from the exhaust manifold.

7. REMOVE FRONT EXHAUST PIPE ASSEMBLY (w/o Exhaust Heat Recirculation System)



(a) Remove the 2 bolts and 2 compression springs.

(b) Remove the front exhaust pipe assembly from the 3 exhaust pipe supports.

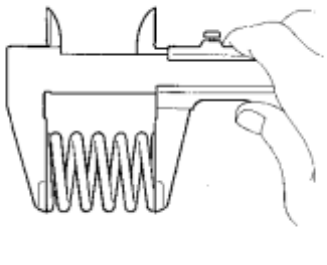
(c) Remove the gasket from the exhaust manifold.

# INSTALLATION

1. INSTALL FRONT EXHAUST PIPE ASSEMBLY (w/ Exhaust Heat Recirculation System)

NOTICE:

When installing the water hose, ensure that the exhaust heat recirculation system is filled with coolant. Otherwise, the electric water pump may be damaged.



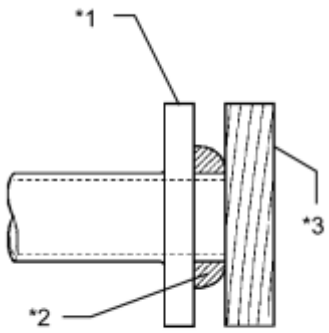

(a) Using a vernier caliper, measure the free length of the compression springs.

| | |
|---|---|
| Minimum | 41.5 mm (1.64 in.) |

HINT:

If the free length is less than minimum, replace the compression spring.

(b) Fully insert a new gasket to the exhaust manifold.




(c) Using a plastic hammer and wooden block, tap in the new gasket until its surface is flush with the exhaust manifold.

## Text in Illustration

| | |
|---|---|
| *1 | Exhaust Manifold |
| *2 | Gasket |
| *3 | Wooden Block |

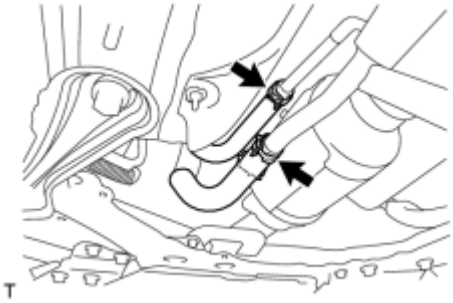
- Be careful with the installation direction of the gasket.
- Do not reuse the gasket.
- Do not damage the gasket.
- Do not push in the gasket by using the exhaust pipe when connecting it.

(d) Connect the front exhaust pipe assembly to the 3 exhaust pipe supports.

(e) Install the front exhaust pipe assembly with the 2 bolts and 2 compression springs.

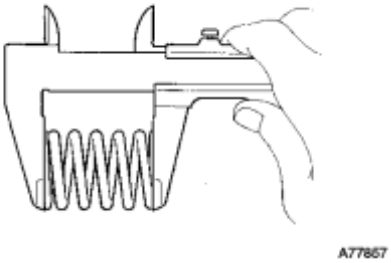
Torque: **43 N·m (440 kgf·cm, 32ft·lbf)**





(f) Connect the 2 heater water hoses.

2. INSTALL FRONT EXHAUST PIPE ASSEMBLY (w/o Exhaust Heat Recirculation System)



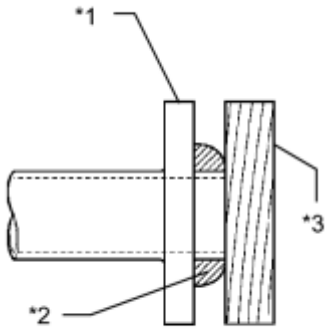
(a) Using a vernier caliper, measure the free length of the compression springs.

| | |
|---|---|
| Minimum | 41.5 mm (1.64 in.) |

HINT:

If the free length is less than minimum, replace the compression spring.

(b) Fully insert a new gasket to the exhaust manifold.



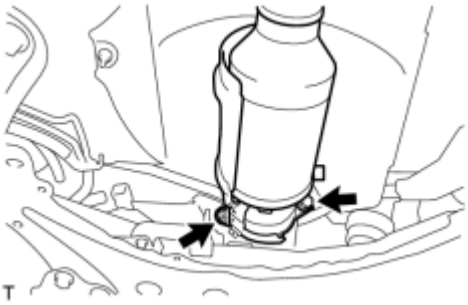

(c) Using a plastic hammer and wooden block, tap in the new gasket until its surface is flush with the exhaust manifold.

# Text in Illustration

| | |
|---|---|
| *1 | Exhaust Manifold |
| *2 | Gasket |
| *3 | Wooden Block |

- Be careful with the installation direction of the gasket.
- Do not reuse the gasket.
- Do not damage the gasket.
- Do not push in the gasket by using the exhaust pipe when connecting it.

(d) Connect the front exhaust pipe assembly to the 3 exhaust pipe supports.

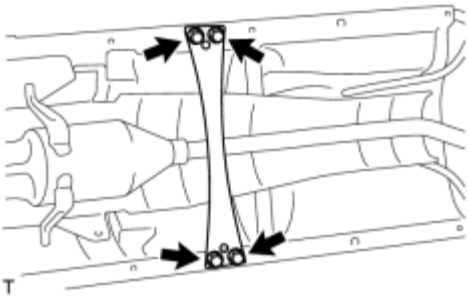


(e) Install the front exhaust pipe assembly with the 2 bolts and 2 compression springs.

Torque: **43 N·m (440 kgf·cm, 32ft·lbf)**

3. INSTALL OXYGEN SENSOR INFO

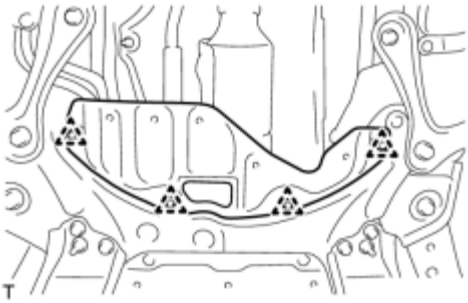
4. INSTALL FRONT CENTER FLOOR BRACE



(a) Install the front center floor brace with the 4 bolts.

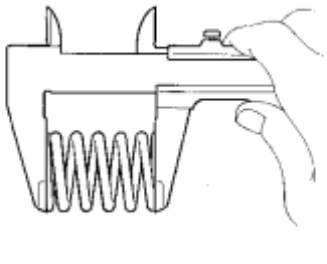
Torque: **51 N·m (520 kgf·cm, 38ft·lbf)**

5. INSTALL FRONT NO. 3 ENGINE UNDER COVER



(a) Install the front No. 3 engine under cover with the 4 clips.

6. INSTALL TAIL EXHAUST PIPE ASSEMBLY




(a) Using a vernier caliper, measure the free length of the compression springs.

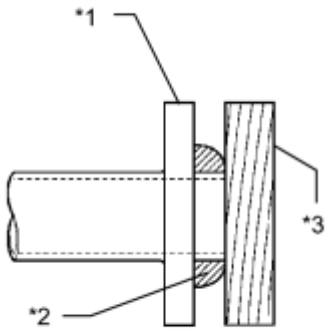
| | |
|---|---|
| Minimum | 38.5 mm (1.52 in.) |

HINT:

If the free length is less than minimum, replace the compression spring.

(b) Fully insert a new gasket to the front exhaust pipe assembly.

(c) Using a plastic hammer and wooden block, tap in the new gasket until its surface is flush with the front exhaust pipe assembly.

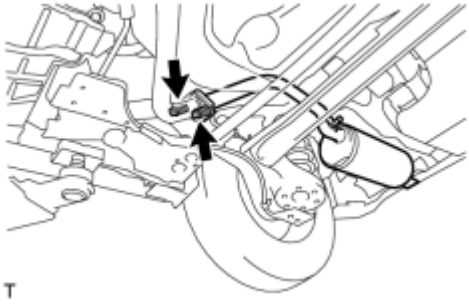



## Text in Illustration

| | |
|---|---|
| *1 | Front Exhaust Pipe Assembly |
| *2 | Gasket |
| *3 | Wooden Block |

- Be careful with the installation direction of the gasket.
- Do not reuse the gasket.
- Do not damage the gasket.
- Do not push in the gasket by using the exhaust pipe when connecting it.

(d) Connect the tail exhaust pipe assembly to the 2 exhaust pipe supports.




(e) Install the tail exhaust pipe assembly with the 2 bolts and 2 compression springs.

Torque: **43 N·m (440 kgf·cm, 32ft·lbf)**

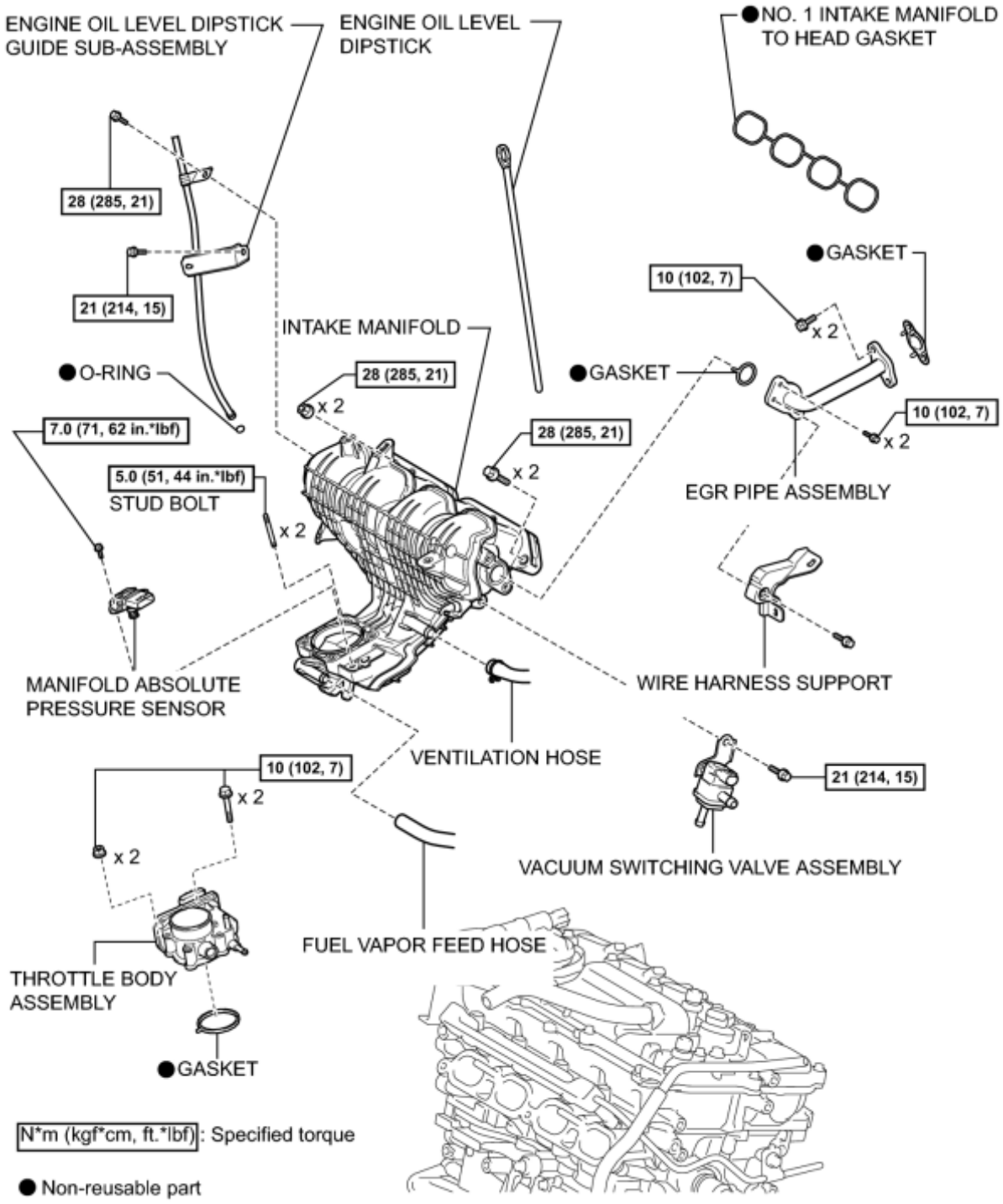
7. ADD COOLANT (for Engine with Exhaust Heat Recirculation System) INFO

8. INSPECT FOR COOLANT LEAK (for Engine with Exhaust Heat Recirculation System) INFO

9. INSPECT FOR EXHAUST GAS LEAK

# COMPONENTS

# ILLUSTRATION




T

# REMOVAL

1. REMOVE THROTTLE BODY ASSEMBLY

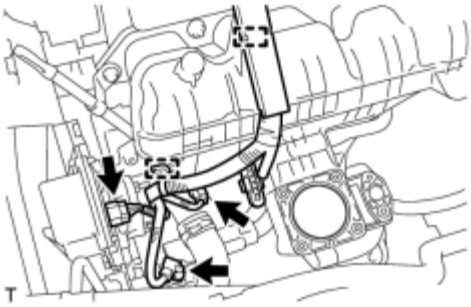
(a) Remove the throttle body assembly INFO.

2. REMOVE EGR PIPE ASSEMBLY INFO

3. REMOVE MANIFOLD ABSOLUTE PRESSURE SENSOR INFO

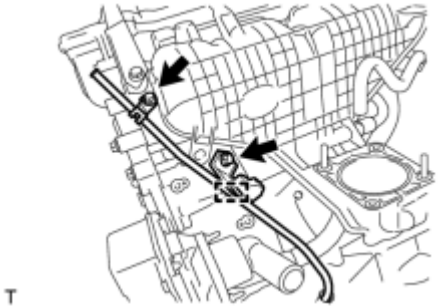
4. REMOVE VACUUM SWITCHING VALVE ASSEMBLY INFO

5. REMOVE INTAKE MANIFOLD



(a) Disconnect the 3 connectors and 2 wire harness clamps.

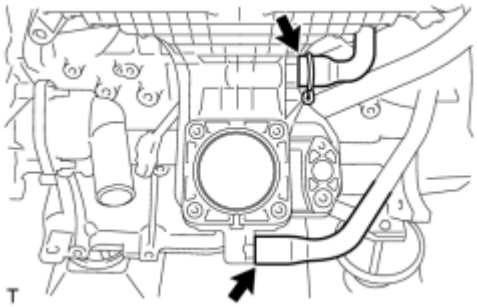
(b) Remove the engine oil level dipstick guide sub-assembly.



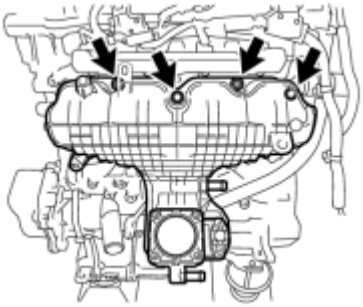
(c) Disconnect the wire harness clamp, and then remove the 2 bolts and engine oil level dipstick guide sub-assembly.

(d) Remove the O-ring from the engine oil level dipstick guide sub-assembly.

(e) Disconnect the fuel vapor feed hose and ventilation hose.



T



T

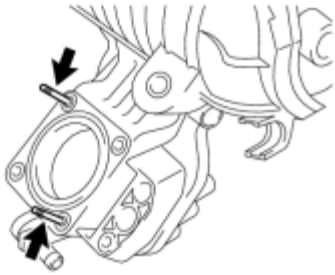
(f) Remove the 2 bolts, 2 nuts and intake manifold.

(g) Remove the No. 1 intake manifold to head gasket.

6. REPLACE STUD BOLT

HINT:

If a stud bolt is deformed or the threads are damaged, replace it.



T

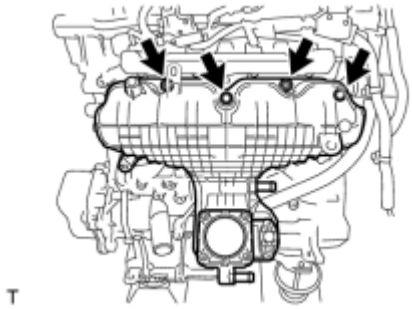
(a) Using an E6 "TORX" wrench, replace the 2 stud bolts.

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

# INSTALLATION

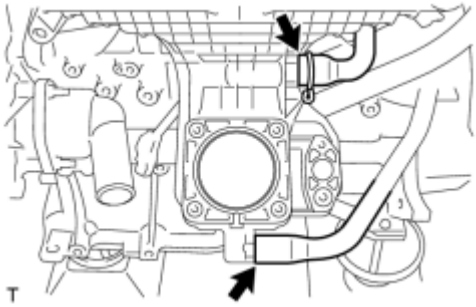
1. INSTALL INTAKE MANIFOLD

(a) Install a new No. 1 intake manifold to head gasket to the intake manifold.



(b) Install the intake manifold with the 2 bolts and 2 nuts.

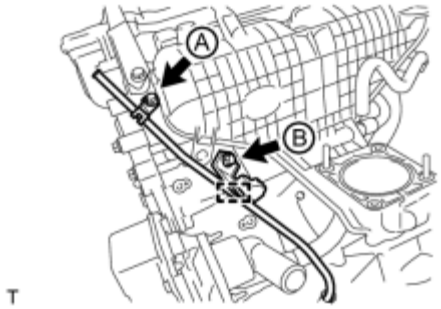
Torque: **28 N·m (285 kgf·cm, 21ft·lbf)**



(c) Connect the fuel vapor feed hose and ventilation hose.

(d) Install a new O-ring to the engine oil level dipstick guide sub-assembly.

(e) Apply a light coat of engine oil to the O-ring.



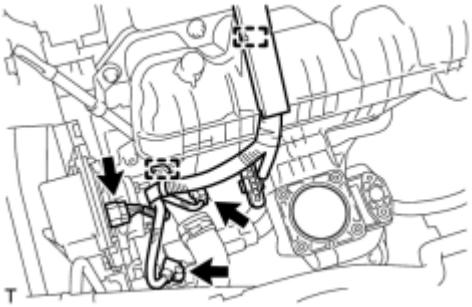

(f) Install the engine oil level dipstick guide sub-assembly with the 2 bolts and connect the wire harness clamp.

Bolt (A) - Torque: **28 N·m (285 kgf·cm, 21ft·lbf)**

Bolt (B) - Torque: **21 N·m (214 kgf·cm, 15ft·lbf)**

(g) Install the engine oil level dipstick.

(h) Connect the 2 wire harness clamps and 3 connectors.



2. INSTALL VACUUM SWITCHING VALVE ASSEMBLY INFO

3. INSTALL MANIFOLD ABSOLUTE PRESSURE SENSOR INFO

4. INSTALL EGR PIPE ASSEMBLY INFO

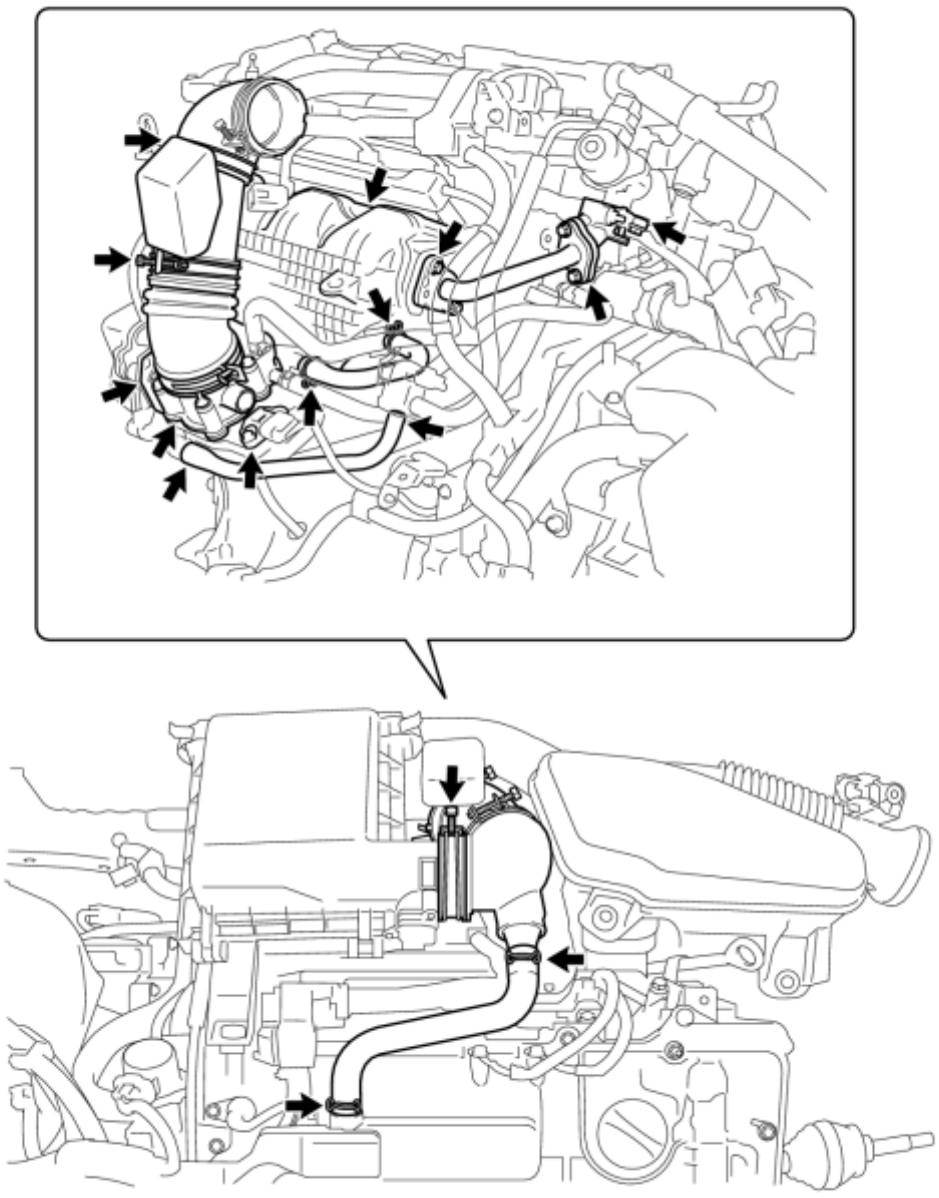
5. INSTALL THROTTLE BODY ASSEMBLY

(a) Install the throttle body assembly INFO.

# ON-VEHICLE INSPECTION

1. INSPECT INTAKE SYSTEM

(a) Check that there are no vacuum leaks at the points shown in the illustration.



T

# ON-VEHICLE INSPECTION

1. CHECK ENGINE OIL LEVEL

(a) Put the engine in inspection mode INFO.

(b) Warm up and stop the engine, then wait for 5 minutes. The oil level should be between the low level and full level marks on the engine oil level dipstick. If the engine oil level is low, check for leakage and add oil up to the full level mark.

NOTICE:

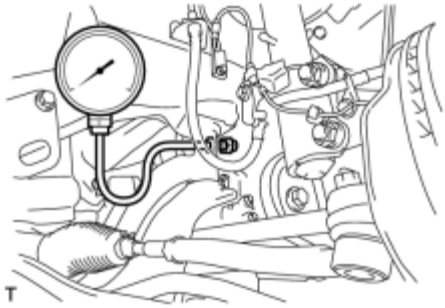
Do not fill with engine oil to above the full level mark.

2. CHECK ENGINE OIL

(a) Check the engine oil for deterioration, water contamination, discoloring or thinning. If the condition is visibly poor, replace the engine oil and oil filter element.

3. INSPECT ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Remove the oil pressure switch INFO.



(b) Install the oil pressure gauge with the adapter.

(c) Put the engine in inspection mode INFO.

(d) Warm up the engine.

(e) Check the oil pressure.

Standard Oil Pressure:

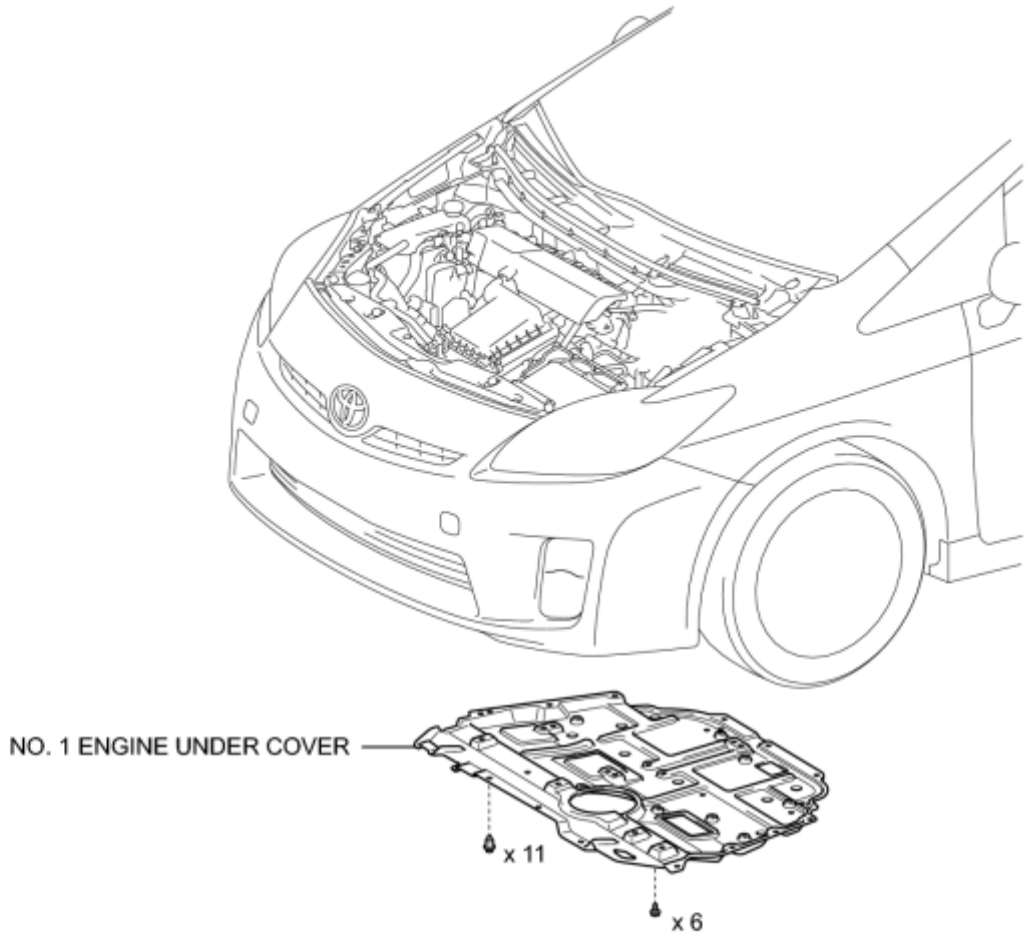
| Engine Condition | Oil Pressure |
|---|---|
| Idle | 60 kPa (0.6 kgf/cm$^2$, 8.7 psi) or more |
| 2500 rpm | 142 kPa (1.4 kgf/cm$^2$, 21 psi) or more |

(f) If the oil pressure is not as specified, check the oil pump INFO.

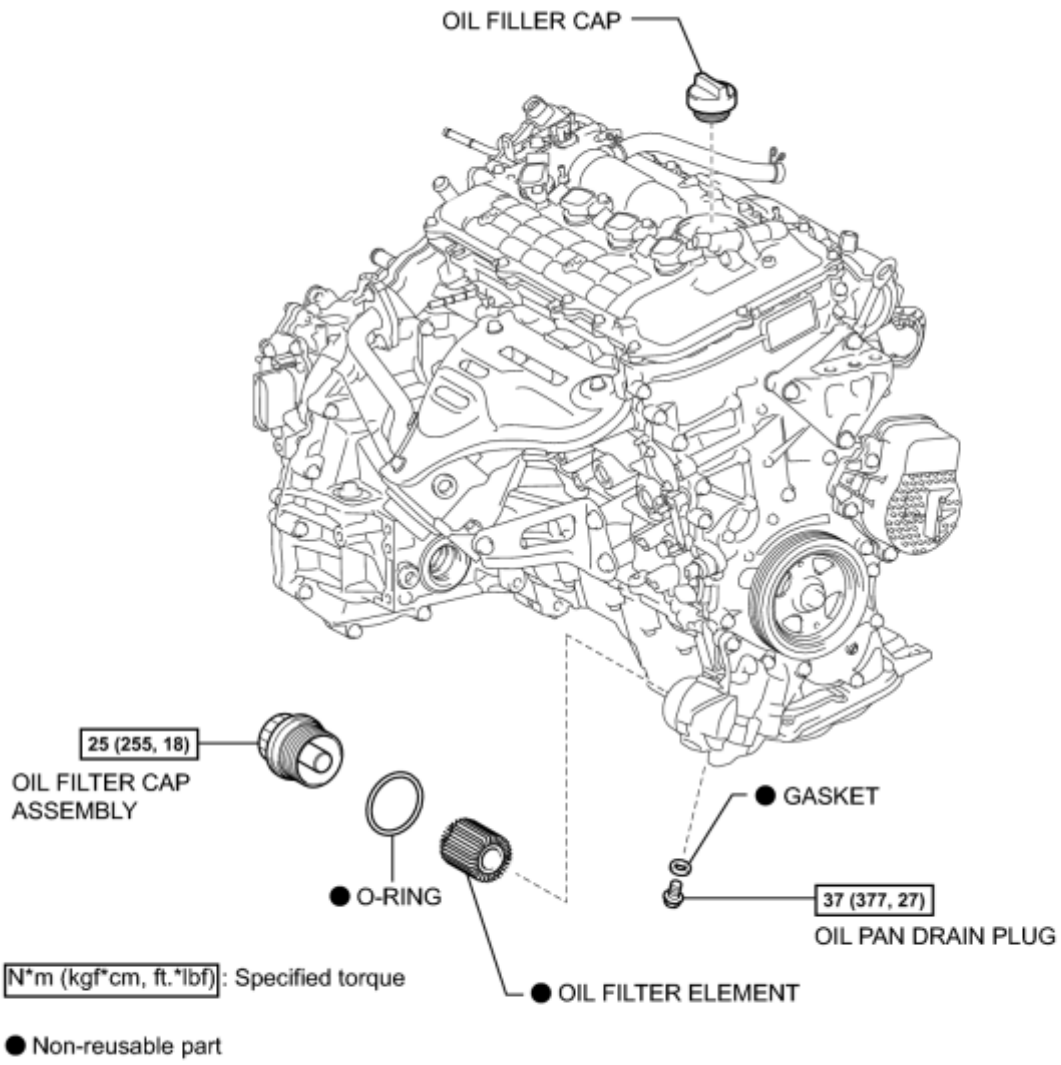
(g) Install the oil pressure switch INFO.

# COMPONENTS

# ILLUSTRATION




# ILLUSTRATION


OIL FILLER CAP
25 (255, 18)
OIL FILTER CAP ASSEMBLY
● O-RING
● GASKET
37 (377, 27)
OIL PAN DRAIN PLUG
N*m (kgf*cm, ft.*lbf): Specified torque
● OIL FILTER ELEMENT
● Non-reusable part

c

# REPLACEMENT

CAUTION:

- Prolonged and repeated contact with engine oil will result in the removal of natural oils from the skin, leading to dryness, irritation and dermatitis. In addition, used engine oil contains potentially harmful contaminants which may cause skin cancer.
- Wear protective clothing and gloves. Avoid contact with used oil. If contact occurs, wash your skin thoroughly with soap or waterless hand cleaner. Never use gasoline, thinners, or solvents to wash the skin.
- In order to protect the environment, dispose of used oil and used oil filters at designated disposal sites only.

1. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

2. REMOVE ENGINE UNDER COVER (w/ Cover)

3. REMOVE NO. 1 ENGINE UNDER COVER

4. DRAIN ENGINE OIL

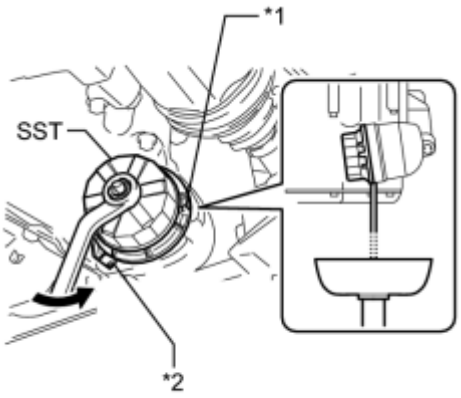
(a) Remove the oil filler cap.

(b) Remove the oil pan drain plug and gasket, and drain the oil into a container.

(c) Clean and install the oil pan drain plug with a new gasket.

Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

5. REMOVE OIL FILTER CAP ASSEMBLY




T

(a) Using SST, loosen the oil filter cap 4 revolutions, align the cap ribs vertically, and drain the remaining engine oil in the oil filter cap.

## Text in Illustration

| | |
|---|---|
| *1 | Cap Rib |
| *2 | Oil Filter Bracket Clip |

SST: 09228-06501

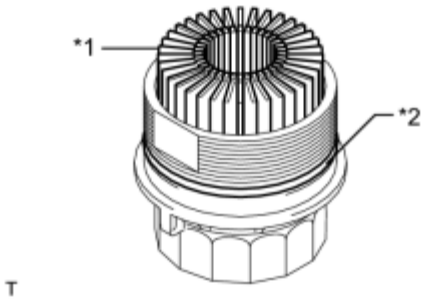
NOTICE:

Do not remove the oil filter bracket clip when removing the oil filter cap assembly.

HINT:

Set a container below the oil filter cap assembly before loosening the oil filter cap.

(b) Remove the oil filter cap assembly.




T

(c) Remove the oil filter element and O-ring from the oil filter cap.

## Text in Illustration

| | |
|---|---|
| *1 | Oil Filter Element |
| *2 | O-ring |

NOTICE:

Be sure to remove the O-ring (for the cap) by hand, without using any tools, to prevent damage to the groove for the O-ring on the cap.

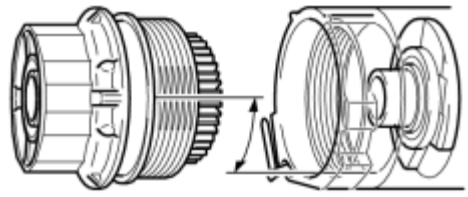
6. INSTALL OIL FILTER CAP ASSEMBLY

(a) Clean the oil filter cap threads and O-ring groove.

(b) Apply a small amount of engine oil to a new O-ring and install it to the oil filter cap.

(c) Set a new oil filter element in the oil filter cap.

(d) Remove any dirt or foreign matter from the installation surface and inside of the engine.



T

(e) Reapply a small amount of engine oil to the O-ring of the oil filter cap assembly. Align the cutout in the oil filter cap threads 90° to the grooves in the oil filter bracket and temporarily tighten the cap.

NOTICE:

Make sure that the O-ring does not get caught between the parts.

(f) Using SST, tighten the oil filter cap assembly.

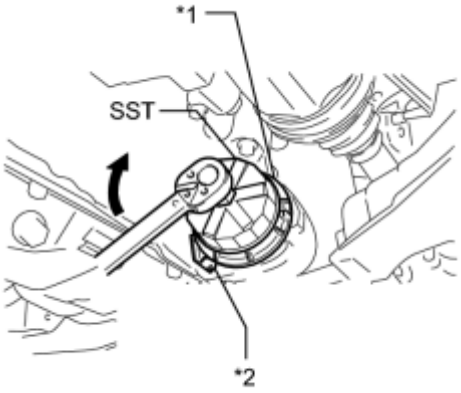
## Text in Illustration

| | |
|---|---|
| *1 | No Clearance |
| *2 | Oil Filter Bracket Clip |

Torque: **25 N·m (255 kgf·cm, 18ft·lbf)**

SST: 09228-06501

- After tightening the oil filter cap assembly, check for gaps between the installation surfaces.




T

- Do not remove the oil filter bracket clip when installing the oil filter cap assembly.
- Do not cross thread the oil filter cap assembly.

7. ADD ENGINE OIL

(a) Add new engine oil and install the oil filler cap.

***Standard Oil Grade (For USA)***

| Oil Grade | Oil Viscosity (SAE) |
|---|---|
| • ILSAC multigrade engine oil | 0W-20 |

***Standard Oil Grade (For Canada)***

| Oil Grade | Oil Viscosity (SAE) |
|---|---|
| • ILSAC multigrade engine oil | • 0W-20<br>• 5W-20<br>(0W-20 is best choice for fuel economy and good starting in cold weather.) |

***Standard Capacity***

| Item | Standard Condition |
|---|---|
| Drain and refill with oil filter change | 4.2 liters (4.4 US qts, 3.7 lmp. qts) |
| Drain and refill without oil filter change | 3.9 liters (4.1 US qts, 3.4 lmp. qts) |
| Dry fill | 4.7 liters (5.0 US qts, 4.1 lmp. qts) |

8. INSPECT FOR ENGINE OIL LEAK

(a) Put the engine in inspection mode INFO.

(b) Start the engine.

(c) Check for engine oil leaks from the connected parts of the oil filter cap and oil filter drain plug.

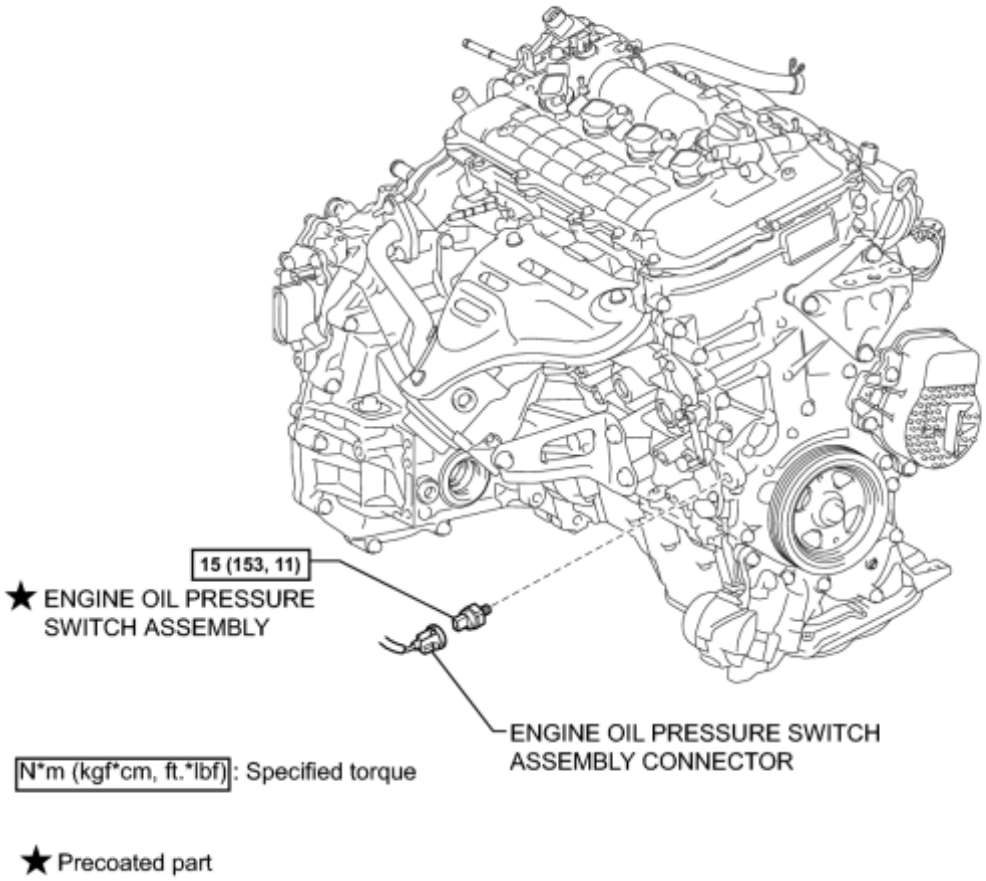
9. INSTALL NO. 1 ENGINE UNDER COVER

10. INSTALL ENGINE UNDER COVER (w/ Cover)

11. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

# COMPONENTS

# ILLUSTRATION



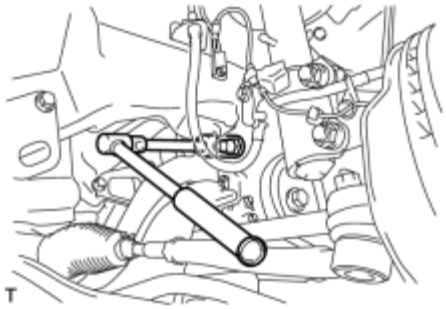

c

# REMOVAL

1. REMOVE FRONT WHEEL RH

2. REMOVE ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Disconnect the oil pressure switch connector.



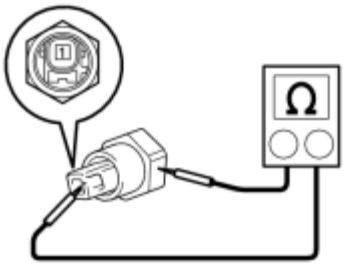
(b) Using a 24 mm deep socket wrench, remove the oil pressure switch.

# INSPECTION

1. INSPECT ENGINE OIL PRESSURE SWITCH ASSEMBLY

(a) Disconnect the oil pressure switch connector.

(b) Start the engine.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

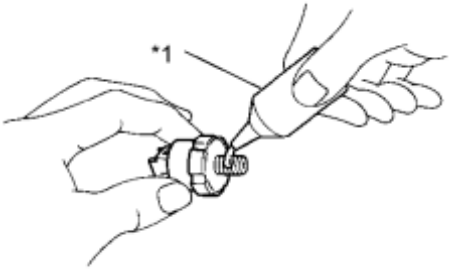
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - Switch body | Idling | 10 kΩ or higher |
| 1 - Switch body | Engine stopped | Below 1 Ω |

If the result is not as specified, replace the oil pressure switch assembly.

(d) Reconnect the oil pressure switch connector.

# INSTALLATION

1. INSTALL ENGINE OIL PRESSURE SWITCH ASSEMBLY



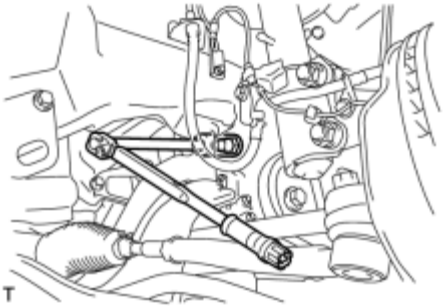

(a) Apply adhesive to 2 or 3 threads of the oil pressure switch.

## Text in Illustration

| | |
|---|---|
| *1 | Adhesive |

Adhesive:

Toyota Genuine Adhesive 1344, Three Bond 1344 or equivalent



(b) Using a 24 mm deep socket wrench, install the oil pressure switch.

Torque: **15 N·m (153 kgf·cm, 11ft·lbf)**

NOTICE:

Do not start the engine for at least 1 hour after installation.

(c) Connect the oil pressure switch connector.

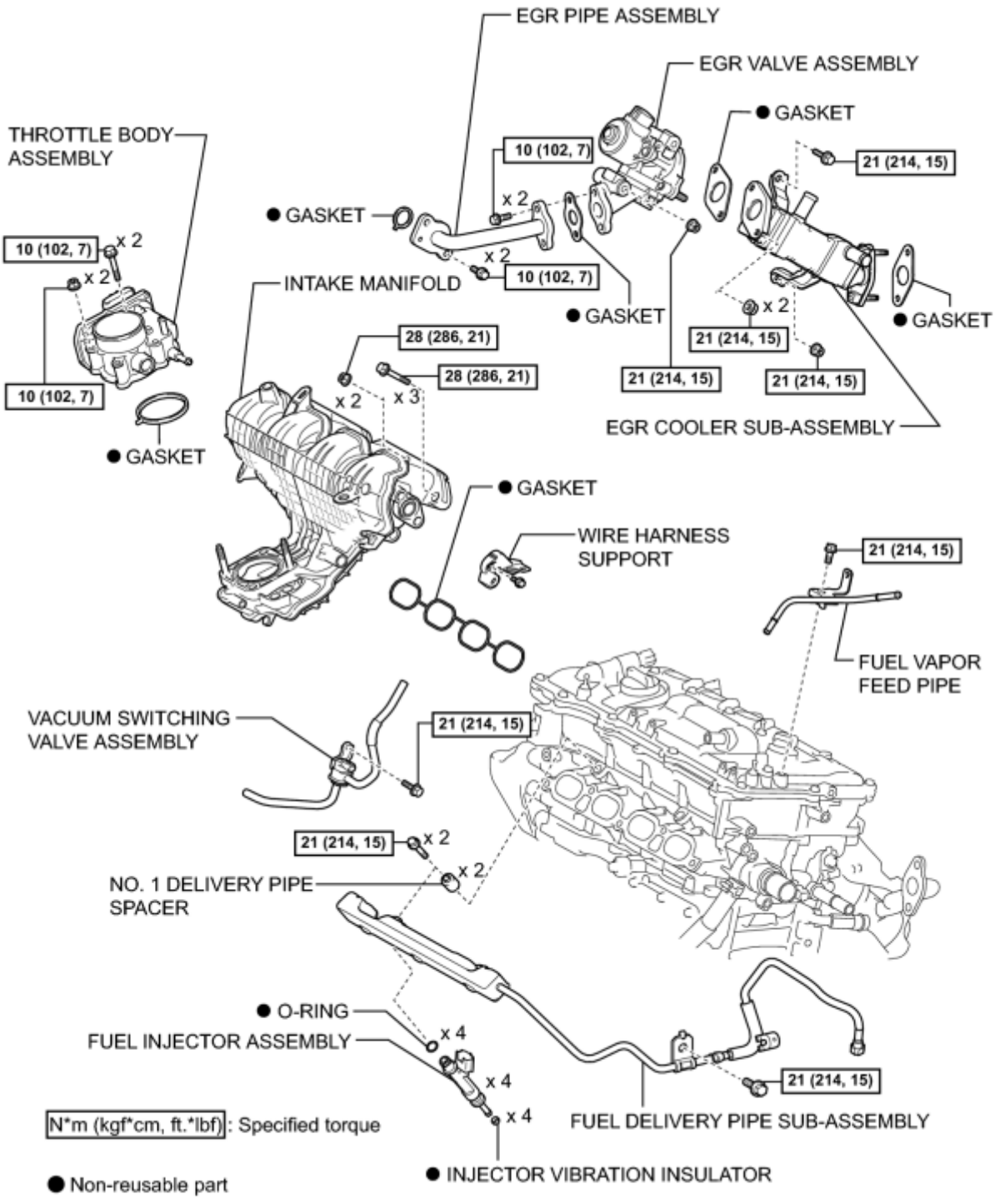
2. INSPECT FOR ENGINE OIL LEAK INFO

3. INSTALL FRONT WHEEL RH

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

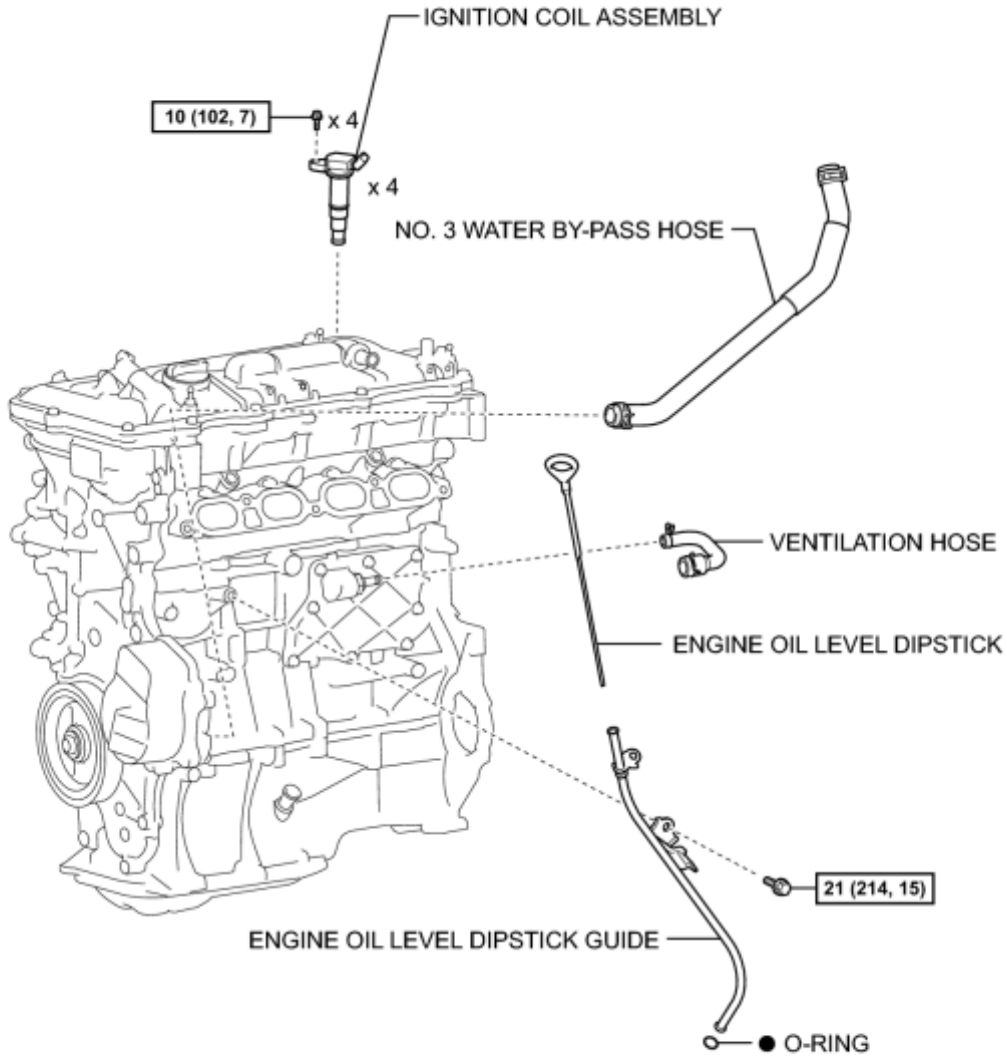
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION

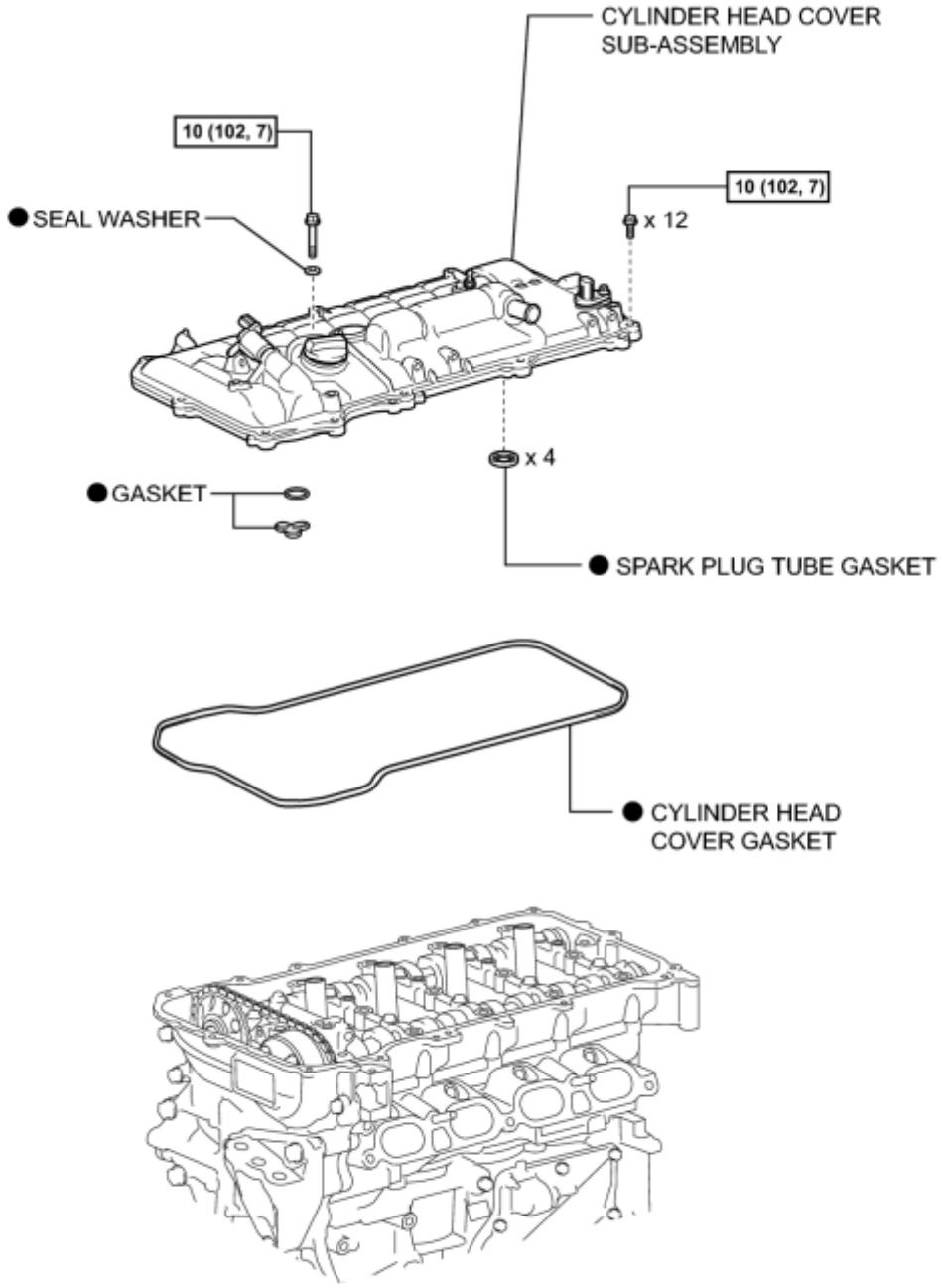



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# ILLUSTRATION

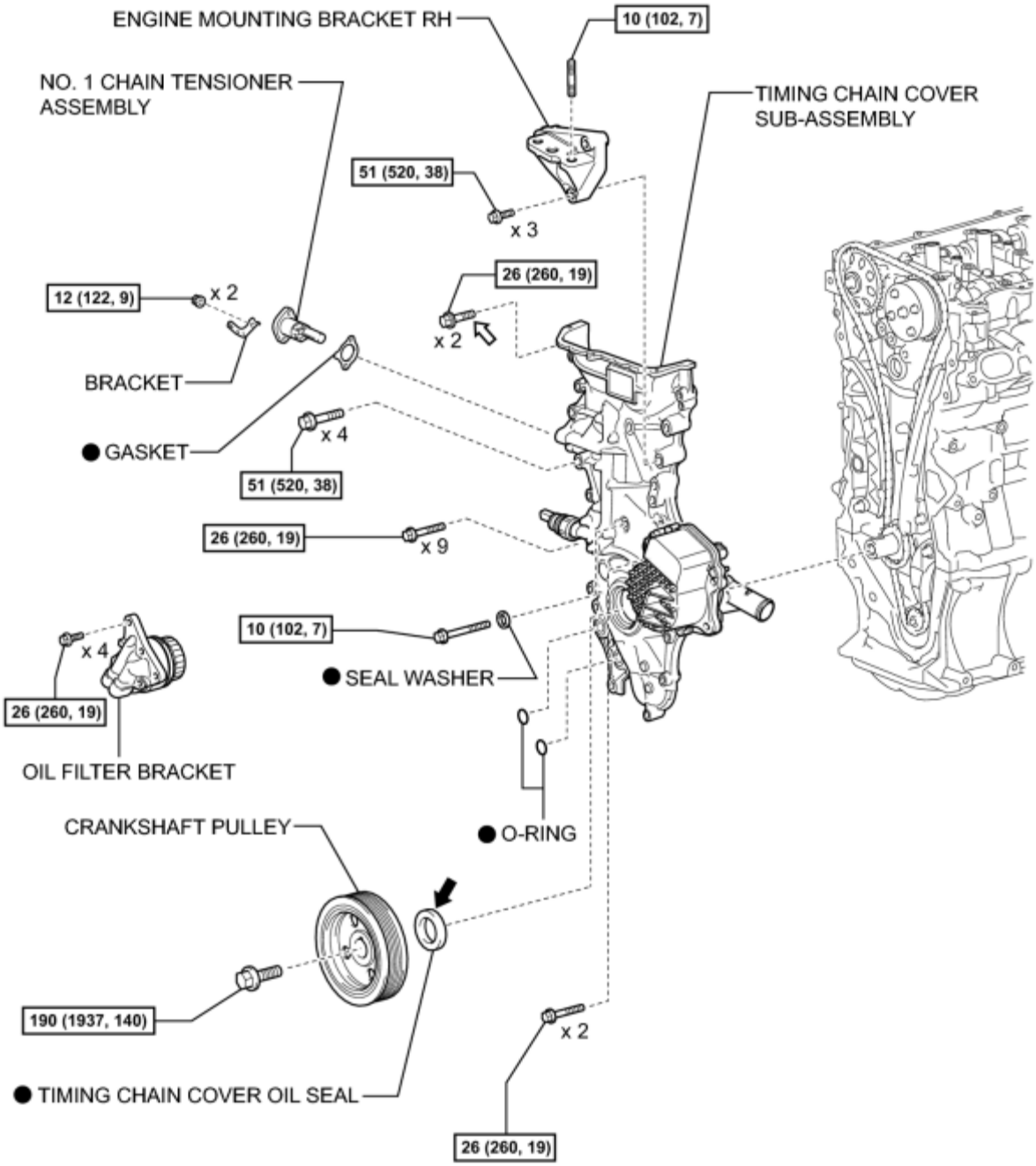



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

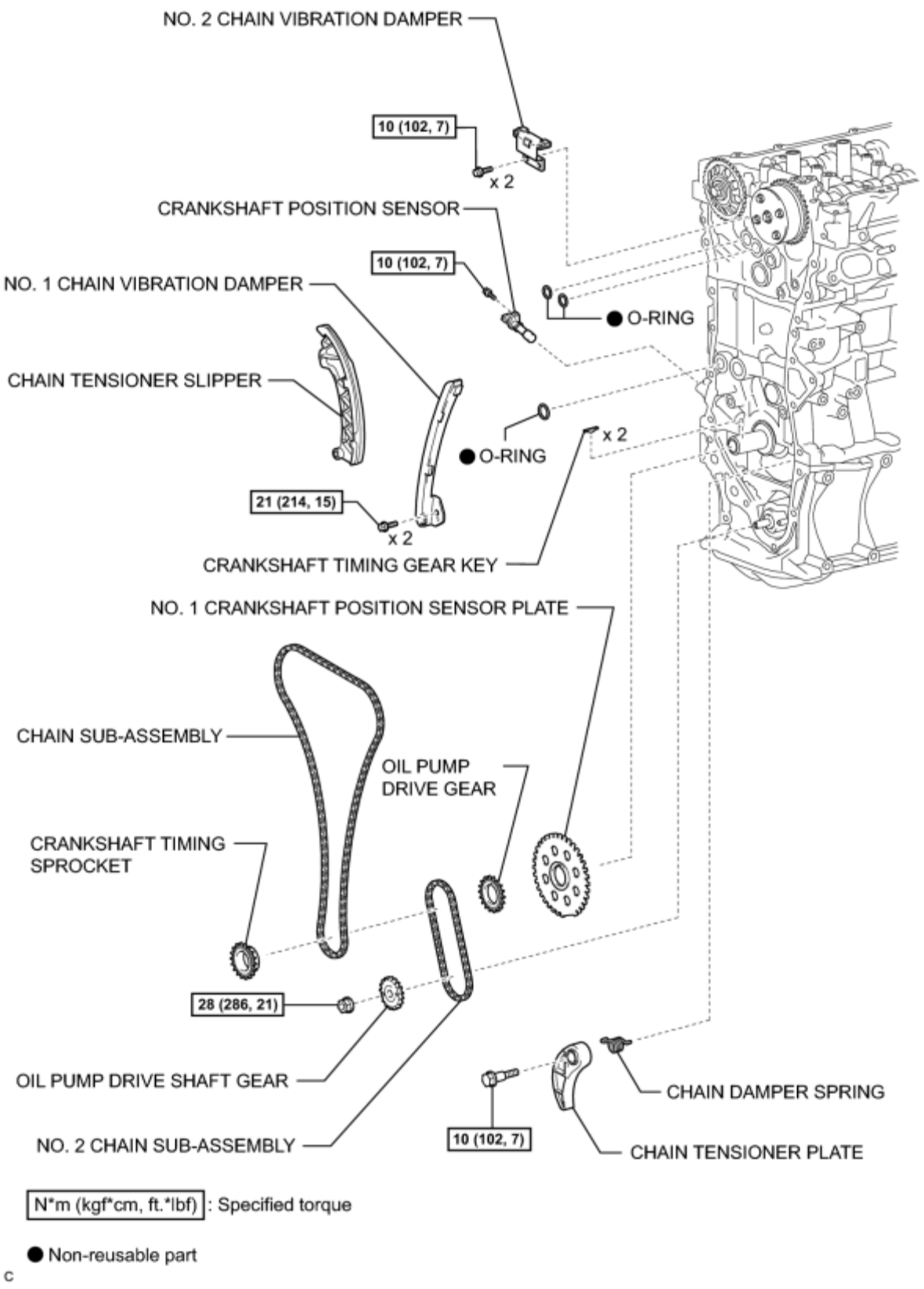
● Non-reusable part

⬅ MP grease

⇦ Adhesive 1324

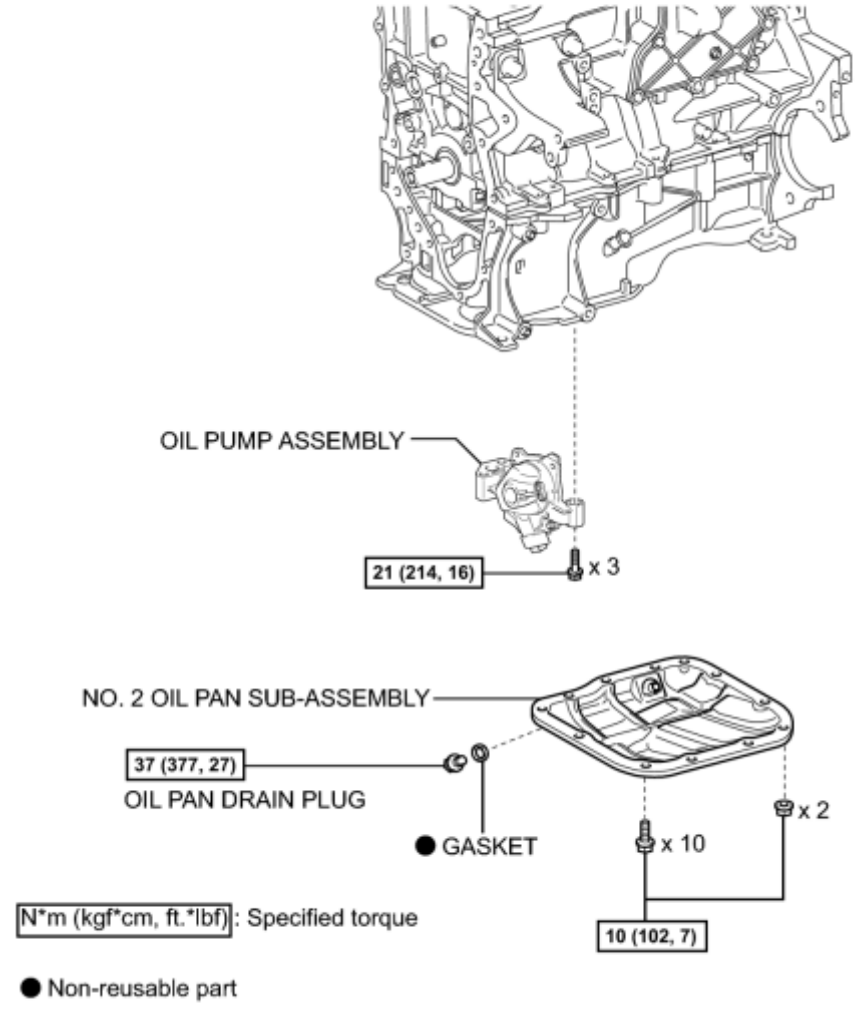
c

# ILLUSTRATION



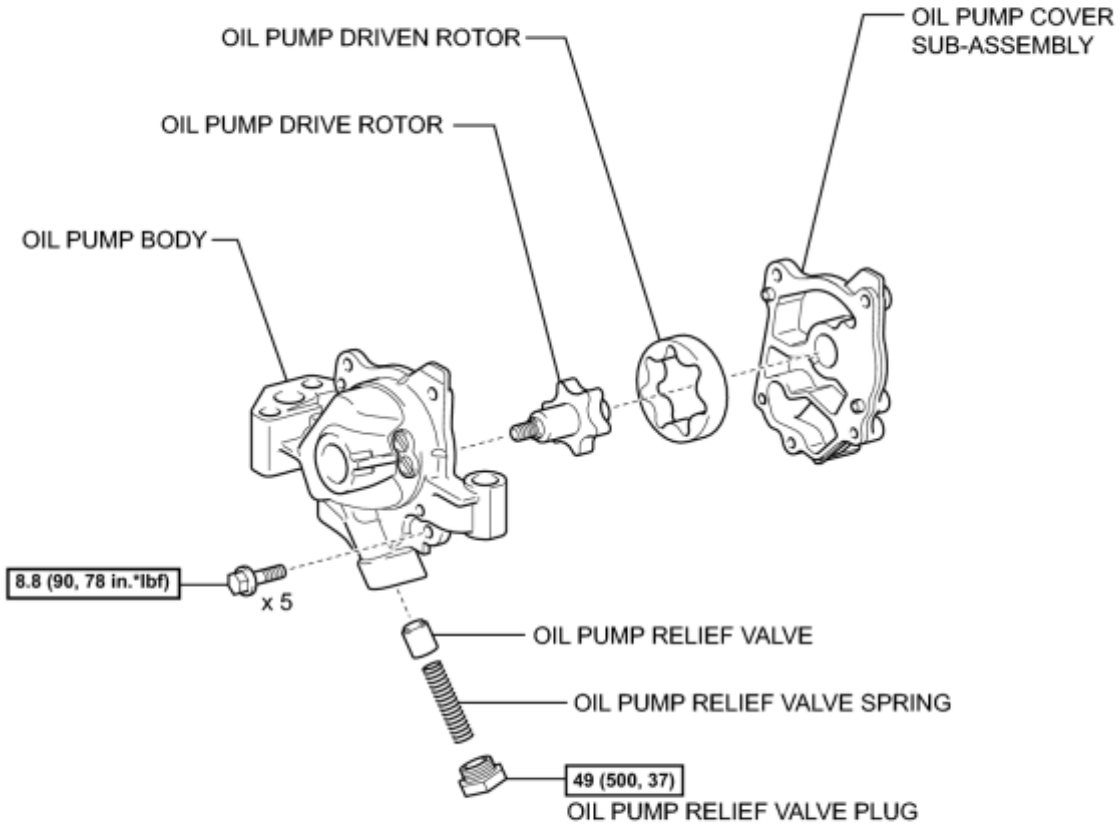

c

# ILLUSTRATION




T

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

1. REMOVE ENGINE ASSEMBLY WITH TRANSAXLE

HINT: INFO

2. INSTALL ENGINE ON ENGINE STAND INFO

3. REMOVE ENGINE HANGERS INFO

4. REMOVE THROTTLE BODY ASSEMBLY INFO

5. REMOVE ENGINE OIL LEVEL DIPSTICK GUIDE INFO

6. REMOVE EGR PIPE ASSEMBLY INFO

7. REMOVE EGR VALVE ASSEMBLY INFO

8. REMOVE EGR COOLER SUB-ASSEMBLY INFO

9. REMOVE INTAKE MANIFOLD INFO

10. REMOVE FUEL VAPOR FEED PIPE INFO

11. REMOVE FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

12. REMOVE NO. 1 DELIVERY PIPE SPACER INFO

13. REMOVE FUEL INJECTOR ASSEMBLY INFO

14. REMOVE WATER INLET WITH THERMOSTAT SUB-ASSEMBLY INFO

15. REMOVE IGNITION COIL ASSEMBLY INFO

16. REMOVE CYLINDER HEAD COVER SUB-ASSEMBLY INFO

17. REMOVE CYLINDER HEAD COVER GASKET INFO

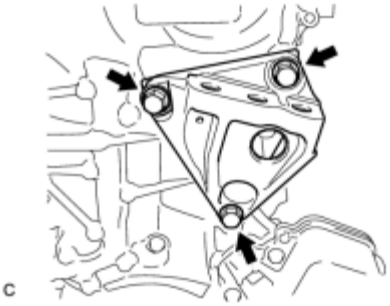
18. REMOVE SPARK PLUG TUBE GASKET INFO

19. SET NO. 1 CYLINDER TO TDC / COMPRESSION INFO

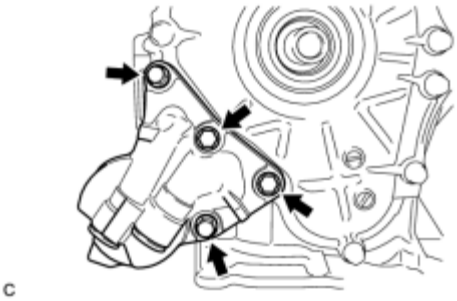
20. REMOVE CRANKSHAFT PULLEY INFO

21. REMOVE NO. 1 CHAIN TENSIONER ASSEMBLY INFO

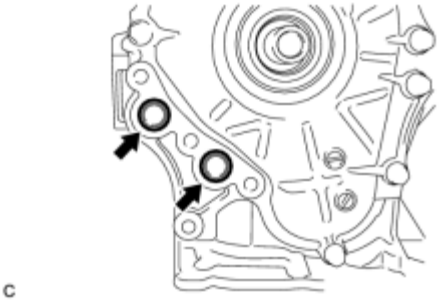
22. REMOVE TIMING CHAIN COVER SUB-ASSEMBLY



(a) Remove the 3 bolts and engine mounting bracket RH.



(b) Remove the 4 bolts and oil filter bracket.

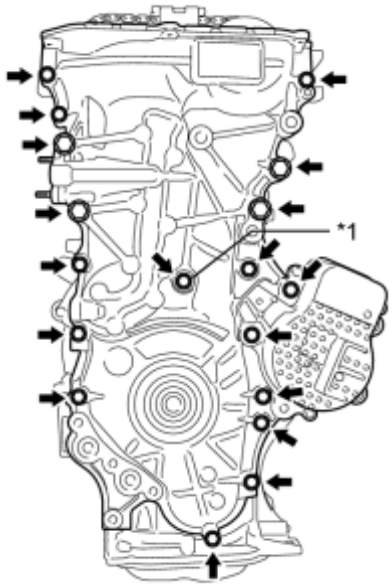


(c) Remove the 2 O-rings.

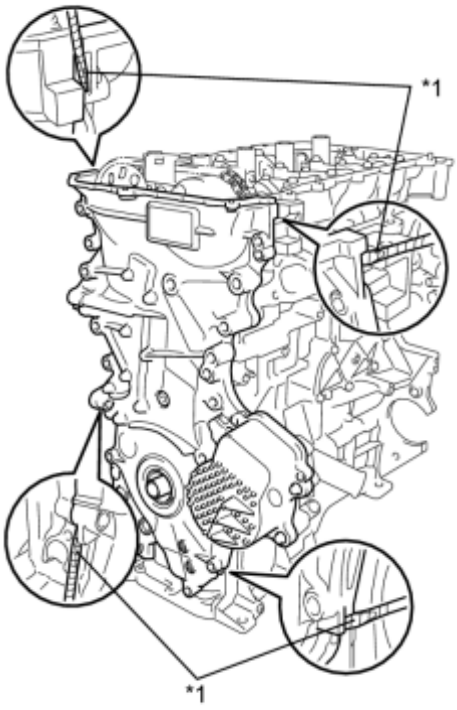
(d) Remove the 18 bolts and seal washer.

# Text in Illustration

| | |
|---|---|
| *1 | Seal Washer |




c




c

(e) Remove the timing chain cover by prying between the timing chain cover and cylinder head or cylinder block with a screwdriver.

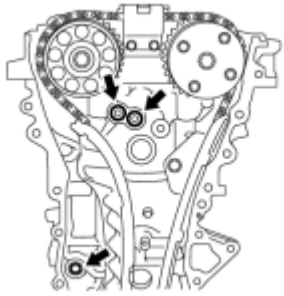
# Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

- Be careful not to damage the contact surfaces of the timing chain cover, cylinder block, and cylinder head.
- Pry the timing chain cover out evenly in order to prevent damaging the knock pins.

HINT:

Tape the screwdriver tip before use.



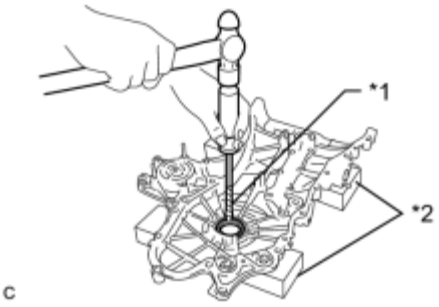
c

(f) Remove the 3 O-rings.

23. REMOVE TIMING CHAIN COVER OIL SEAL

(a) Place the timing chain cover on wooden blocks.

(b) Using a screwdriver, pry out the oil seal.




## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |
| *2 | Wooden Block |

HINT:

Tape the screwdriver tip before use.

NOTICE:

Do not damage the surface of the oil seal press fit hole.

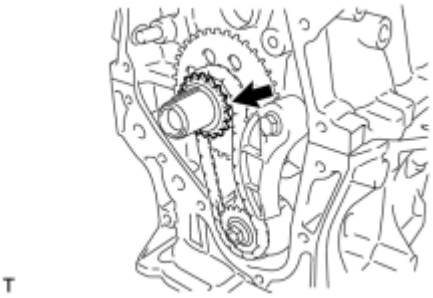
24. REMOVE CHAIN TENSIONER SLIPPER INFO

25. REMOVE NO. 1 CHAIN VIBRATION DAMPER INFO

26. REMOVE NO. 2 CHAIN VIBRATION DAMPER INFO

27. REMOVE CHAIN SUB-ASSEMBLY INFO

28. REMOVE CRANKSHAFT TIMING SPROCKET

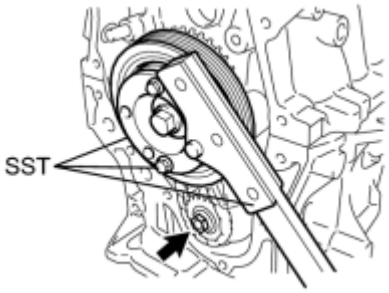



(a) Remove the crankshaft timing sprocket.

29. REMOVE NO. 2 CHAIN SUB-ASSEMBLY

(a) Temporarily tighten the crankshaft pulley and crankshaft pulley bolt.

(b) Using SST, remove the oil pump drive shaft sprocket nut while holding the crankshaft pulley.

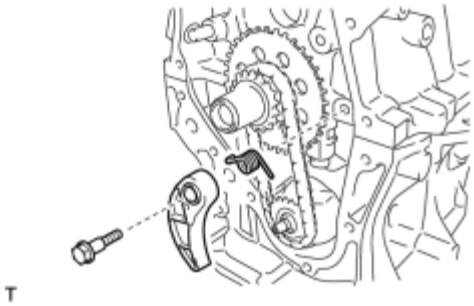



SST: 09213-58014

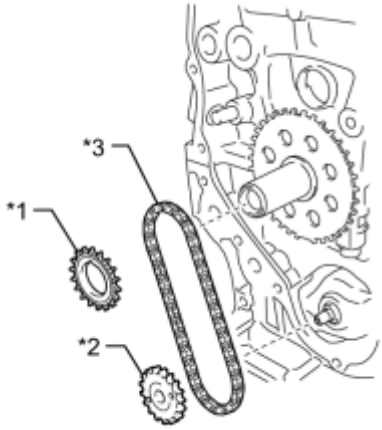
91551-80840

SST: 09330-00021

(c) Remove the SST, crankshaft pulley, and crankshaft pulley bolt.



(d) Remove the bolt, chain tensioner plate, and spring.




(e) Remove the oil pump drive gear, oil pump drive shaft gear, and No. 2 chain sub-assembly.

## Text in Illustration

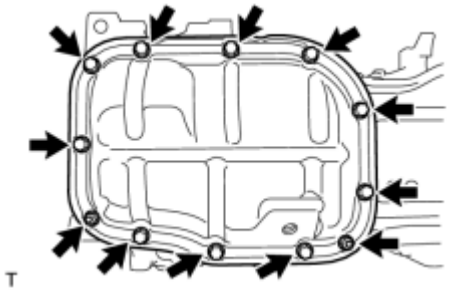
| | |
|---|---|
| *1 | Oil Pump Drive Gear |
| *2 | Oil Pump Drive Shaft Gear |
| *3 | No. 2 Chain Sub-assembly |

30. REMOVE NO. 1 CRANKSHAFT POSITION SENSOR PLATE INFO

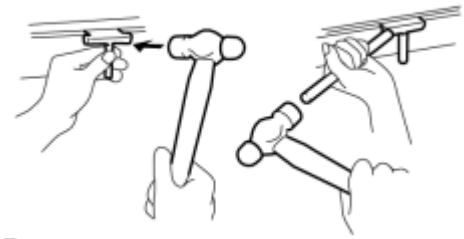
31. REMOVE OIL PAN DRAIN PLUG INFO

32. REMOVE NO. 2 OIL PAN SUB-ASSEMBLY

(a) Remove the 10 bolts and 2 nuts.



T



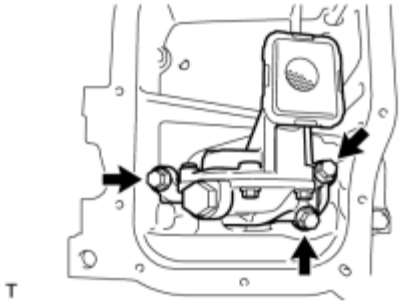
T

(b) Insert the blade of oil pan seal cutter between the crankcase and oil pan. Cut through the sealer and remove the oil pan.

NOTICE:

Be careful not to damage the contact surfaces of the crankcase, chain cover, and oil pan.

33. REMOVE OIL PUMP ASSEMBLY

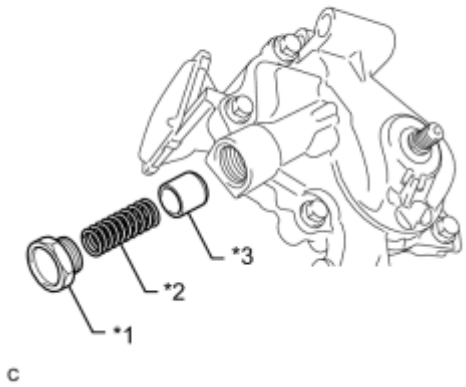


T

(a) Remove the 3 bolts and oil pump.

# DISASSEMBLY

1. REMOVE OIL PUMP RELIEF VALVE




c

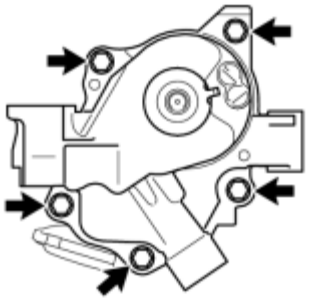
(a) Using a 27 mm socket wrench, remove the plug.

## Text in Illustration

| | |
|---|---|
| *1 | Plug |
| *2 | Spring |
| *3 | Valve |

(b) Remove the valve spring and relief valve.

2. REMOVE OIL PUMP COVER SUB-ASSEMBLY



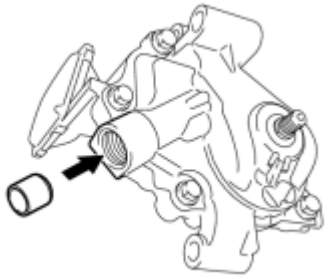
c

(a) Remove the 5 bolts and oil pump cover.

(b) Remove the oil pump drive and driven rotors from the oil pump.

# INSPECTION

1. INSPECT OIL PUMP RELIEF VALVE

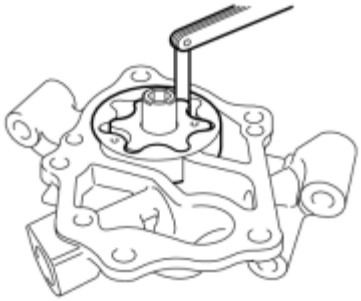


C

(a) Coat the oil pump relief valve with engine oil, then check that it falls smoothly into the valve hole by its own weight.

If this does not occur, repair or replace the oil pump assembly.

2. INSPECT OIL PUMP ROTOR



T

(a) Using a feeler gauge, measure the clearance between the drive and driven rotor tips.

Standard tip clearance:

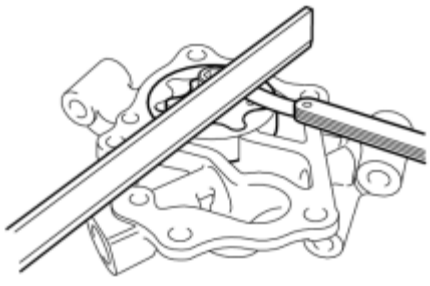
0.08 to 0.16 mm (0.00315 to 0.00631 in.)

Maximum tip clearance:

0.35 mm (0.0138 in.)

If the tip clearance is greater than the maximum, replace the oil pump assembly.

(b) Using a feeler gauge and precision straightedge, measure the clearance between the 2 rotors and precision straight edge.



T

Standard side clearance:

0.085 to 0.135 mm (0.00335 to 0.00532 in.)

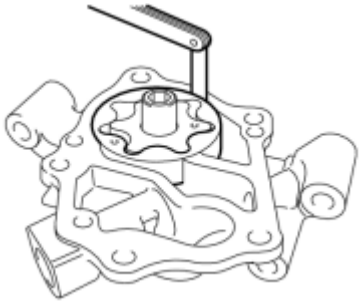
Maximum side clearance:

0.16 mm (0.00631 in.)

If the side clearance is greater than the maximum, replace the oil pump assembly.

(c) Using a feeler gauge, measure the clearance between the driven rotor and oil pump body.

Standard body clearance:



T

0.12 to 0.19 mm (0.00472 to 0.00750 in.)

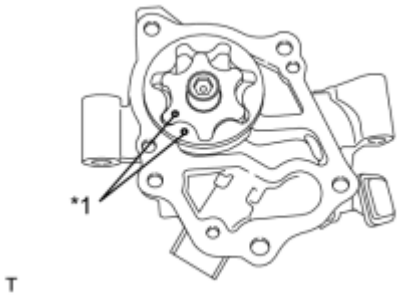
Maximum body clearance:

0.325 mm (0.0128 in.)

If the body clearance is greater than the maximum, replace the oil pump assembly.

# REASSEMBLY

1. INSTALL OIL PUMP COVER SUB-ASSEMBLY

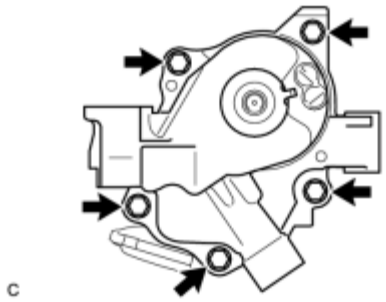



T

(a) Coat the oil pump drive and driven rotors with engine oil, and place them into the oil pump with the marks facing the oil pump cover side.

## Text in Illustration

| | |
|---|---|
| *1 | Mark |

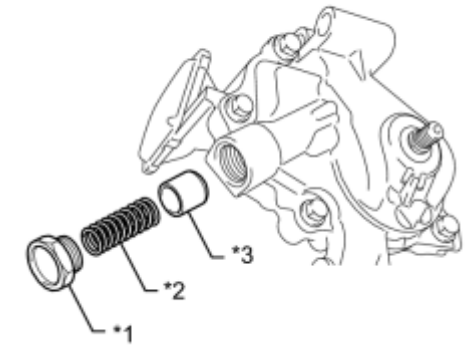


C

(b) Install the oil pump cover with the 5 bolts.

Torque: **8.8 N·m (90 kgf·cm, 78in·lbf)**

2. INSTALL OIL PUMP RELIEF VALVE




C

(a) Coat the relief valve with engine oil.

## Text in Illustration

| | |
|---|---|
| *1 | Plug |
| *2 | Spring |
| *3 | Valve |

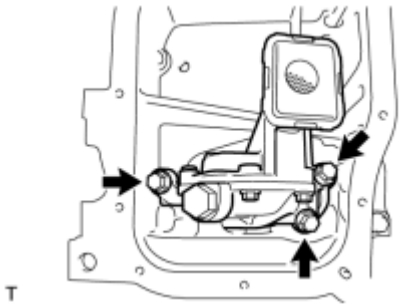
(b) Insert the relief valve and spring into the pump body hole.

(c) Using a 27 mm socket wrench, install the plug.

Torque: **49 N·m (500 kgf·cm, 37ft·lbf)**

# INSTALLATION

1. INSTALL OIL PUMP ASSEMBLY

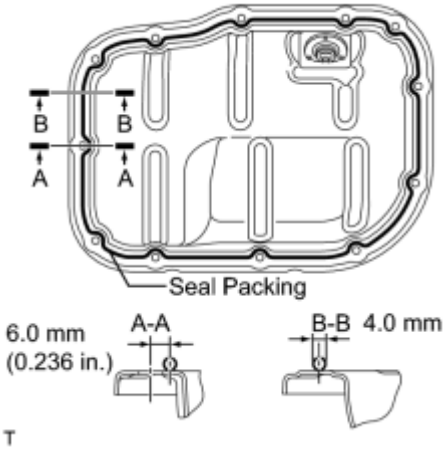


(a) Install the oil pump with the 3 bolts.

Torque: **21 N·m (214 kgf·cm, 16ft·lbf)**

2. INSTALL NO. 2 OIL PAN SUB-ASSEMBLY

(a) Remove any old packing material and be careful not to drop any oil on the contact surfaces of the cylinder block and oil pan.

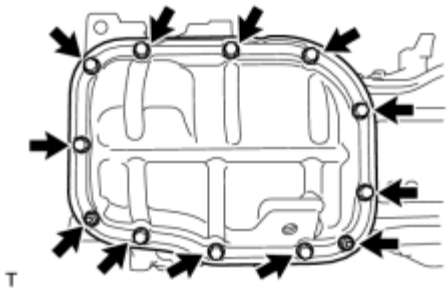



(b) Apply a continuous bead of seal packing (Diameter 4.0 mm (0.157 in.)) as shown in the illustration.

Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

- Remove any oil from the contact surfaces.
- Install the oil pan within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the oil pan.



(c) Install the No. 2 oil pan with the 10 bolts and 2 nuts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

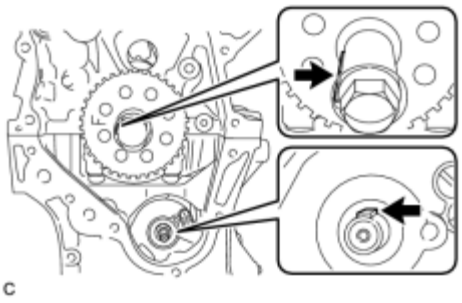
3. INSTALL OIL PAN DRAIN PLUG INFO

4. INSTALL CRANKSHAFT TIMING GEAR KEY INFO

5. INSTALL NO. 1 CRANKSHAFT POSITION SENSOR PLATE INFO

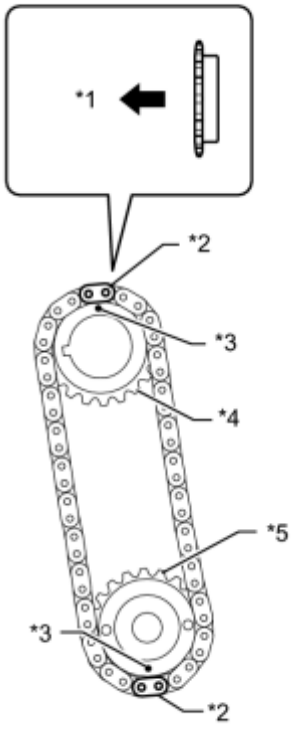
6. INSTALL NO. 2 CHAIN SUB-ASSEMBLY

(a) Temporarily install the crankshaft pulley bolt.




(b) Turn the crankshaft counterclockwise to position the timing gear key to the 9 o'clock position.

(c) Turn the drive shaft so that the cutout faces the 12 o'clock position.




(d) Align the yellow mark links with the timing marks of each gear as shown in the illustration.

## Text in Illustration

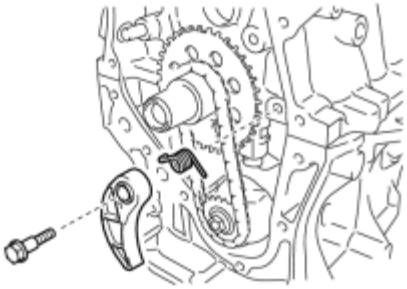
| | |
|---|---|
| *1 | Front |
| *2 | Mark Plate (Yellow) |
| *3 | Timing Mark |
| *4 | Oil Pump Drive Gear |
| *5 | Oil Pump Drive Shaft Gear |

HINT:

Be sure to position the mark plate at the front of the engine.

(e) Install the sprockets onto the crankshaft and oil pump shaft with the chain on the gears.

(f) Temporarily tighten the oil pump drive shaft gear with the nut.

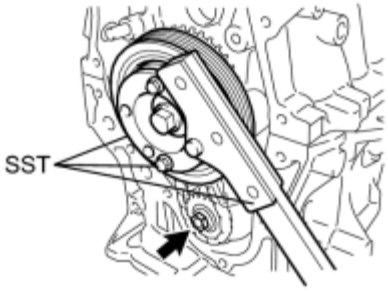


T

(g) Insert the damper spring into the adjusting hole, and then install the chain tensioner plate with the bolt.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

(h) Temporarily tighten the crankshaft pulley with the bolt.




(i) Using SST, install the oil pump drive shaft gear nut while holding the crankshaft pulley.

SST: 09213-58014

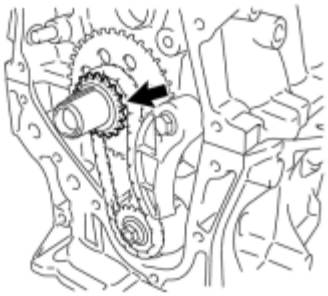
91551-80840

SST: 09330-00021

Torque: **28 N·m (286 kgf·cm, 21ft·lbf)**

(j) Remove the crankshaft pulley and bolt.

7. INSTALL CRANKSHAFT TIMING SPROCKET



T

(a) Install the crankshaft timing sprocket.

8. INSTALL NO. 1 CHAIN VIBRATION DAMPER INFO

9. SET NO. 1 CYLINDER TO TDC / COMPRESSION INFO

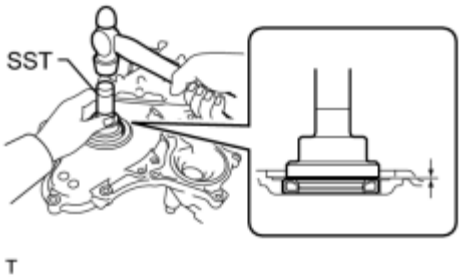
10. INSTALL CHAIN SUB-ASSEMBLY INFO

11. CHECK NO. 1 CYLINDER TO TDC / COMPRESSION INFO

12. INSTALL CHAIN TENSIONER SLIPPER INFO

13. INSTALL NO. 2 CHAIN VIBRATION DAMPER INFO

14. INSTALL TIMING CHAIN COVER OIL SEAL




T

(a) Using SST, tap in a new oil seal until its surface is flush with the timing chain cover edge.

SST: 09223-22010

- Keep the lip free from foreign matter.
- Do not tap on the oil seal at an angle.
- Make sure that the oil seal edge does not stick out of the timing chain case.

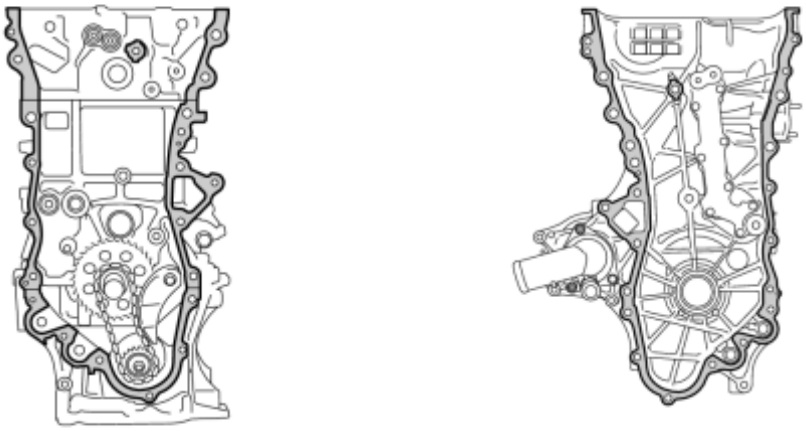
HINT:

Tap in the oil seal so that it is positioned within 1.0 mm from the edge of the timing chain case.

(b) Apply MP grease to the lip of the oil seal.

15. INSTALL TIMING CHAIN COVER SUB-ASSEMBLY

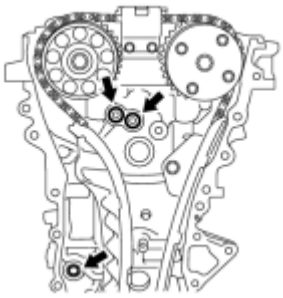
(a) Remove any old packing (FIPG) material and be careful not to drop any oil on the contact surfaces of the timing chain cover, cylinder head, and cylinder block.



: Clean and degrease

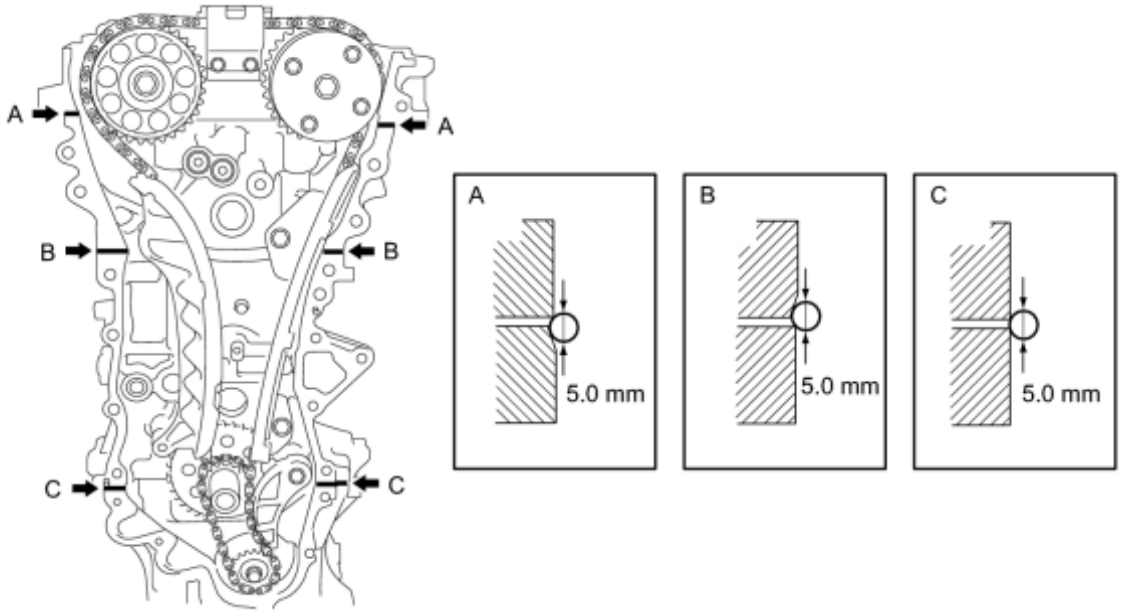
C

(b) Install 3 new O-rings.



c

(c) Apply seal packing as shown in the illustration.




c

Seal packing:

Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent

Seal diameter:

5.0 mm (0.197 in.)

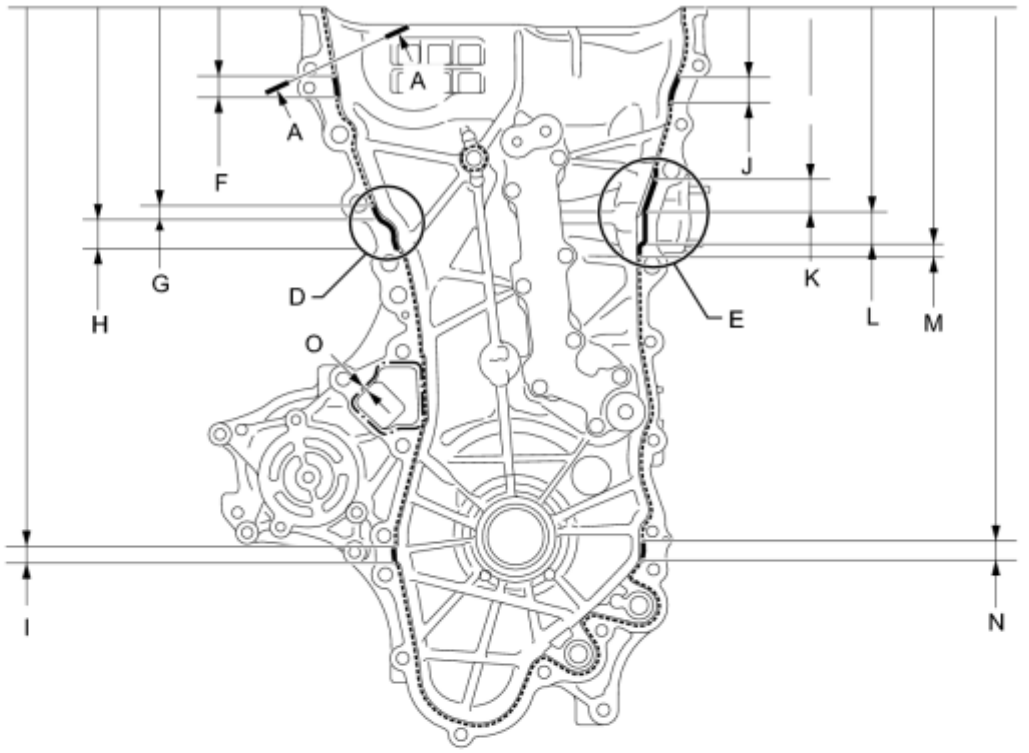
NOTICE:

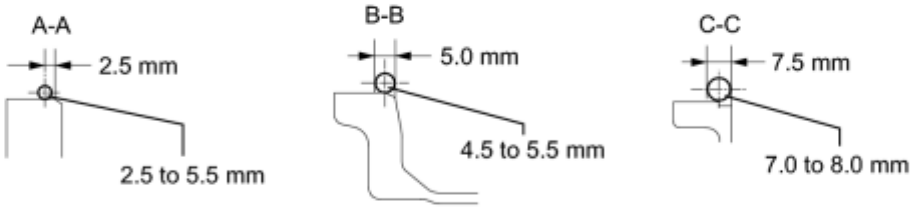
- Remove any oil from the contact surfaces.
- Install the chain cover within 3 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installing the timing chain cover sub-assembly.

(d) Apply seal packing to the timing chain cover in a line as shown in the following illustration.

NOTICE:

- When the contact surfaces are wet, wipe them with oil-free cloth before applying seal packing.
- Install the chain cover within 3 minutes and tighten the bolts within 15 minutes after applying seal packing.
- Do not start the engine for at least 2 hours after installation.







c

Seal Packing:

| Item | Seal Packing |
|---|---|

| Item | Seal Packing |
|---|---|
| Dashed line | Toyota Genuine Seal Packing Black, Three Bond 1207B or equivalent |
| Continuous line | |
| Alternate long and short dashed line | Toyota Genuine Seal Packing 1282B, Three Bond 1282B or equivalent |

Application Specification:

| Area | Seal Packing Diameter | Distance from Edge of Cover to: | Seal Packing Application Length | Distance from Top of Cover to Top of Seal Packing |
|---|---|---|---|---|
| Dashed line | 2.5 to 3.0 mm (0.0984 to 0.118 in.) | Center of seal packing<br>2.5 mm (0.0984 in.) | - | - |
| Continuous line | 4.5 to 5.5 mm (0.177 to 0.217 in.) or 7.0 to 8.0 mm (0.276 to 0.315 in.) | - | - | - |
| Alternate long and short dashed line | 4.0 mm (0.157 in.) | Center of seal packing<br>3.0 mm (0.118 in.) | - | - |
| A - A | 2.5 to 3.0 mm (0.0984 to 0.118 in.) | Center of seal packing<br>2.5 mm (0.0984 in.) | - | - |
| B - B | 4.5 to 5.5 mm (0.177 to 0.217 in.) | Opposite edge of seal packing<br>5.0 mm (0.197 in.) | - | - |
| C - C | 7.0 to 8.0 mm (0.276 to 0.315 in.) | Opposite edge of seal packing<br>7.5 mm (0.295 in.) | - | - |
| F | 4.5 to 5.5 mm (0.177 to 0.217 in.) | - | 15.5 mm (0.610 in.) | 50.4 mm (1.98 in.) |
| G | 4.5 to 5.5 mm (0.177 to 0.217 in.) | - | 10.3 mm (0.406 in.) | 143.1 mm (5.63 in.) |
| H | 7.0 to 8.0 mm (0.276 to 0.315 in.) | - | 19.5 mm (0.768 in.) | 153.4 mm (6.04 in.) |
| I | 4.5 to 5.5 mm (0.177 to 0.217 in.) | - | 16.0 mm (0.630 in.) | 385.8 mm (1.27 ft.) |

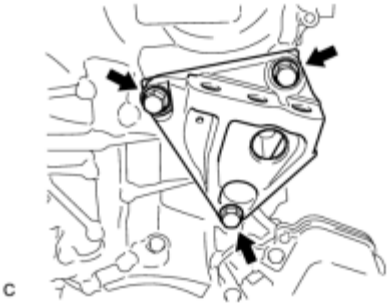
| Area | Seal Packing Diameter | Distance from Edge of Cover to: | Seal Packing Application Length | Distance from Top of Cover to Top of Seal Packing |
|---|---|---|---|---|
| J | 4.5 to 5.5 mm (0.177 to 0.217 in.) | - | 18.6 mm (0.732 in.) | 51.4 mm (2.02 in.) |
| K | 4.5 to 5.5 mm (0.177 to 0.217 in.) | - | 25.3 mm (0.996 in.) | 121.9 mm (4.80 in.) |
| L | 7.0 to 8.0 mm (0.276 to 0.315 in.) | - | 25.8 mm (1.02 in.) | 147.2 mm (5.80 in.) |
| M | 4.5 to 5.5 mm (0.177 to 0.217 in.) | - | 5.1 mm (0.201 in.) | 173.0 mm (6.81 in.) |
| N | 4.5 to 5.5 mm (0.177 to 0.217 in.) | - | 14.6 mm (0.575 in.) | 385.8 mm (1.27 ft.) |
| O | 4.0 mm (0.157 in.) | Center of seal packing<br><br>3.0 mm (0.118 in.) | - | - |

NOTICE:

- When the contact surfaces are wet, wipe them with oil-free cloth before applying seal packing.
- Install the timing chain cover within 3 minutes and tighten the bolts within 10 minutes after applying seal packing.
- After applying seal packing to the timing chain cover, install the engine mounting bracket and oil filter bracket within 10 minutes.
- Do not add engine oil for at least 2 hours after installation.

(e) Clean the bolt and fitting hole.

(f) Install the timing chain cover.




(g) Temporarily tighten the engine mounting bracket RH with the 3 bolts.

- Install the mounting bracket within 10 minutes after installing the chain cover.
- Do not start the engine for at least 2 hours after installation.

Bolt Length:

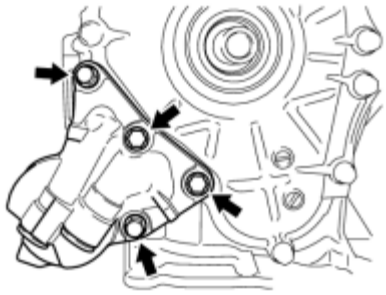
| Item | Length |
|---|---|
| Bolt | 80 mm (3.15 in.) |

(h) Install 2 new O-rings.



c

(i) Temporarily tighten the oil filter bracket with the 4 bolts.



c

- Install the oil filter bracket within 10 minutes after installing the chain cover.
- Do not start the engine for at least 2 hours after installation.

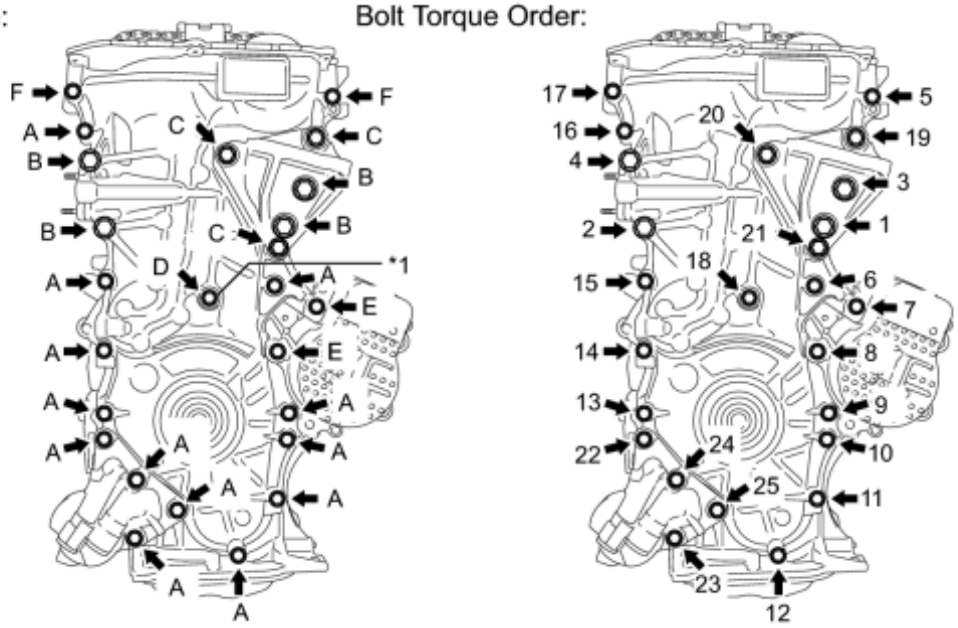
Bolt Length:

| Item | Length |
|---|---|
| Bolt | 35 mm (1.38 in.) |

(j) Install the timing chain cover with the 25 bolts and seal washer as shown in the illustration.

Torque:

Bolt Torque Order:




c

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Seal Washer | - | - |

Bolt A, E, F - Torque: **26 N·m (260 kgf·cm, 19ft·lbf)**

Bolt B, C - Torque: **51 N·m (520 kgf·cm, 38ft·lbf)**

Bolt D - Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**

NOTICE:

- Apply adhesive 1324 to screw part of the bolt F.
- When the contact surfaces are wet, wipe them with oil-free cloth before applying seal packing.
- Install the chain cover within 3 minutes and tighten the bolts within 15 minutes after applying the seal packing.
- Do not add engine oil for at least 2 hours after installing the chain cover.
- Do not start the engine for at least 2 hours after installing the chain cover.

Bolt Length:

| Item | Length |
|---|---|
| Bolt A, F | 35 mm (1.38 in.) |
| Bolt B | 55 mm (2.16 in.) |
| Bolt C | 80 mm (3.15 in.) |
| Bolt D | 40 mm (1.57 in.) |
| Bolt E | 55 mm (2.16 in.) |

16. INSTALL CRANKSHAFT PULLEY INFO

17. INSTALL NO. 1 CHAIN TENSIONER ASSEMBLY INFO

18. INSTALL SPARK PLUG TUBE GASKET INFO

19. INSTALL CYLINDER HEAD COVER GASKET INFO

20. INSTALL CYLINDER HEAD COVER SUB-ASSEMBLY INFO

21. INSTALL WATER INLET WITH THERMOSTAT SUB-ASSEMBLY INFO

22. INSTALL FUEL INJECTOR ASSEMBLY INFO

23. INSTALL NO. 1 DELIVERY PIPE SPACER INFO

24. INSTALL FUEL DELIVERY PIPE SUB-ASSEMBLY INFO

25. INSTALL FUEL VAPOR FEED PIPE INFO

26. INSTALL INTAKE MANIFOLD INFO

27. INSTALL EGR COOLER SUB-ASSEMBLY INFO

28. INSTALL EGR VALVE ASSEMBLY INFO

29. INSTALL EGR PIPE ASSEMBLY INFO

30. INSTALL ENGINE OIL LEVEL DIPSTICK GUIDE INFO

31. INSTALL THROTTLE BODY ASSEMBLY INFO

32. INSTALL ENGINE HANGERS INFO

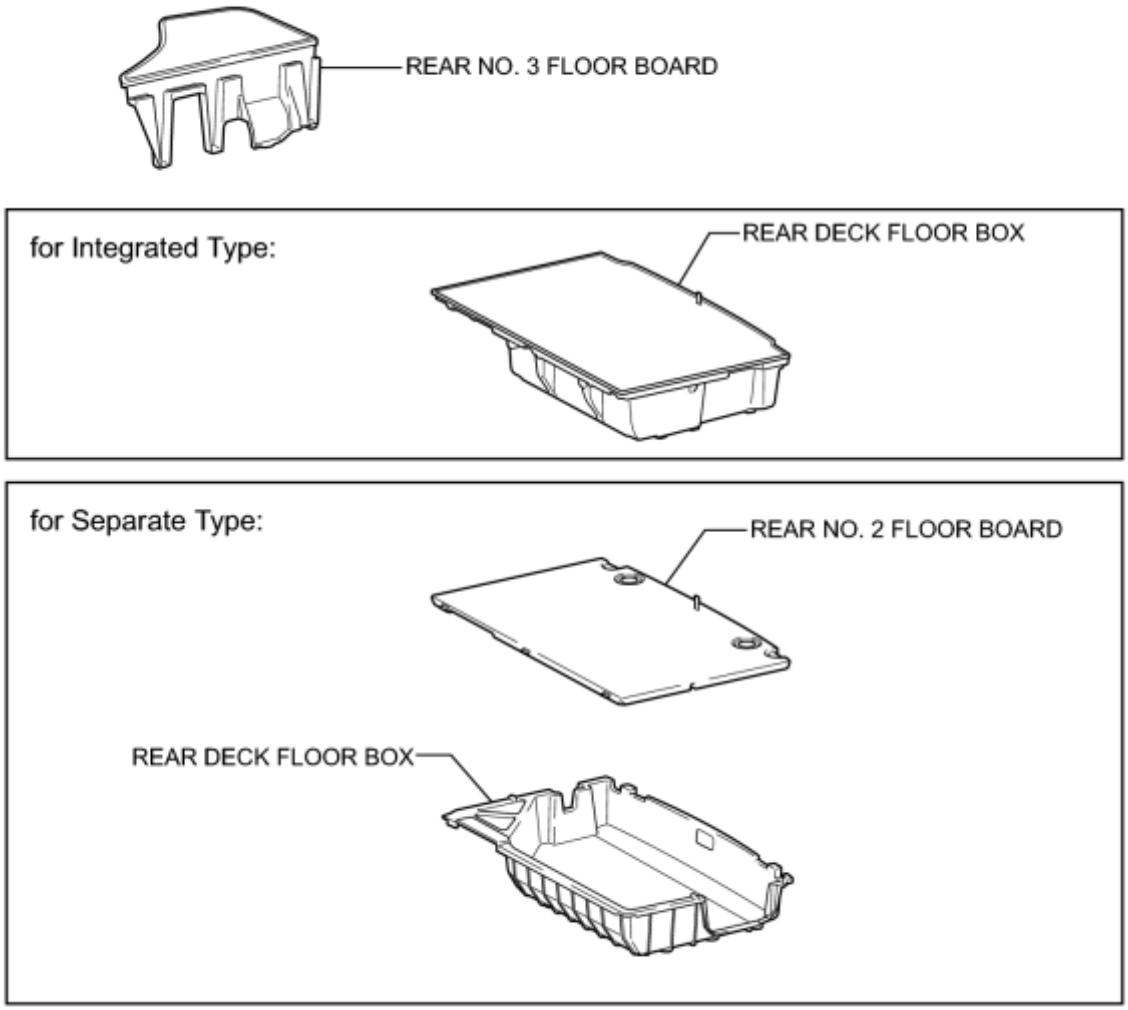
33. REMOVE ENGINE ON ENGINE STAND INFO

34. INSTALL ENGINE ASSEMBLY WITH TRANSAXLE

INFO

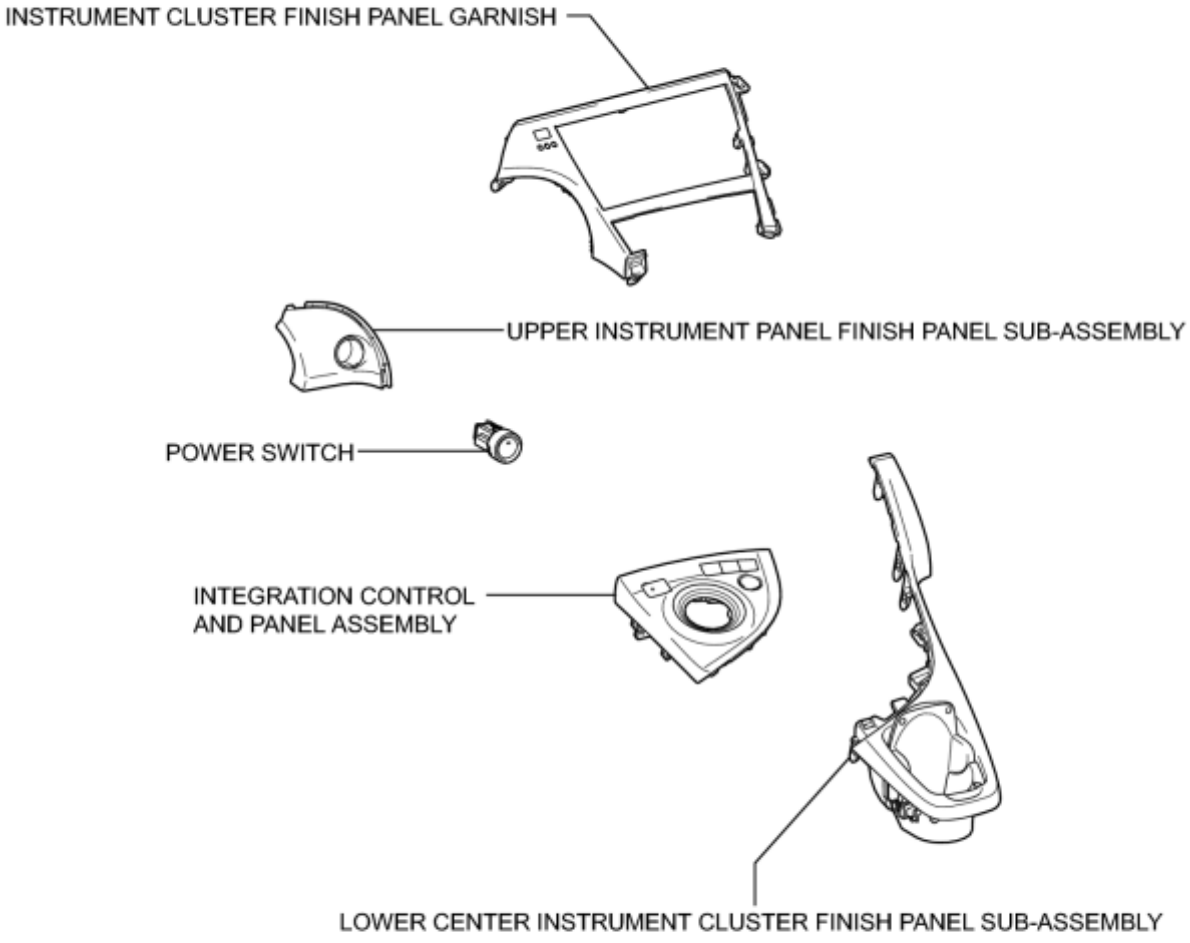
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION


INSTRUMENT CLUSTER FINISH PANEL GARNISH
UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY
POWER SWITCH
INTEGRATION CONTROL
AND PANEL ASSEMBLY
LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

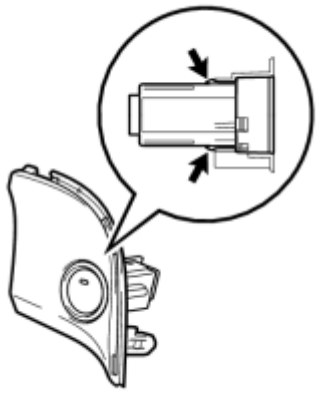
5. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

6. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

7. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

8. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

9. REMOVE POWER SWITCH

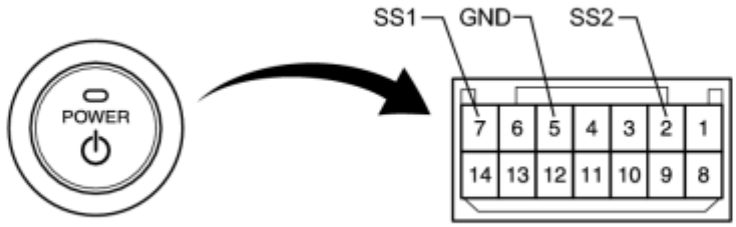


(a) Detach the 2 claws and remove the power switch.

# INSPECTION

1. INSPECT POWER SWITCH

(a) Measure the resistance according to the value(s) in the table below.



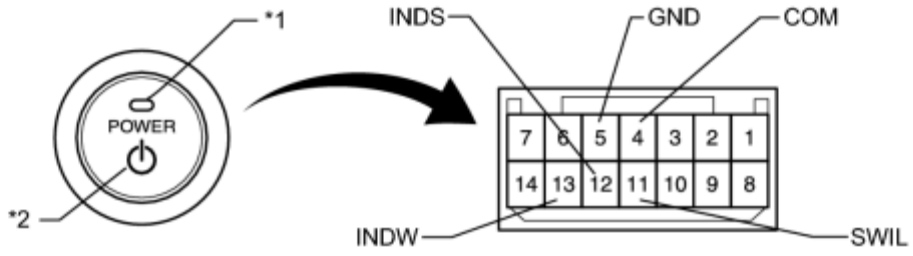

N

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 7 (SS1) - 5 (GND) | Pushed | Below 1 Ω |
| 2 (SS2) - 5 (GND) | Pushed | Below 1 Ω |
| 7 (SS1) - 5 (GND) | Not pushed | 10 kΩ or higher |
| 2 (SS2) - 5 (GND) | Not pushed | 10 kΩ or higher |

If the result is not as specified, replace the power switch.

(b) Apply battery voltage between the terminals of the switch, and check the illumination condition of the power switch.




N

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Indicator Light | *2 | Power Switch Illumination |

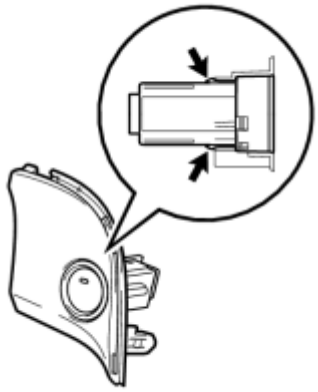
Standard Resistance:

| Measurement Condition | Specified Condition |
| --- | --- |
| Battery positive (+) →Terminal 11 (SWIL)<br><br>Battery negative (-) →Terminal 4 (COM) or 5 (GND) | Illuminates<br><br>(Power Switch Illumination) |
| Battery positive (+) →Terminal 12 (INDS)<br><br>Battery negative (-) →Terminal 4 (COM) or 5 (GND) | Illuminates<br><br>(Indicator Light) |
| Battery positive (+) →Terminal 13 (INDW)<br><br>Battery negative (-) →Terminal 4 (COM) or 5 (GND) | Illuminates<br><br>(Indicator Light) |

If the result is not as specified, replace the power switch.

# INSTALLATION

1. INSTALL POWER SWITCH



(a) Attach the 2 claws to install the power switch.

2. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

3. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

4. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

5. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

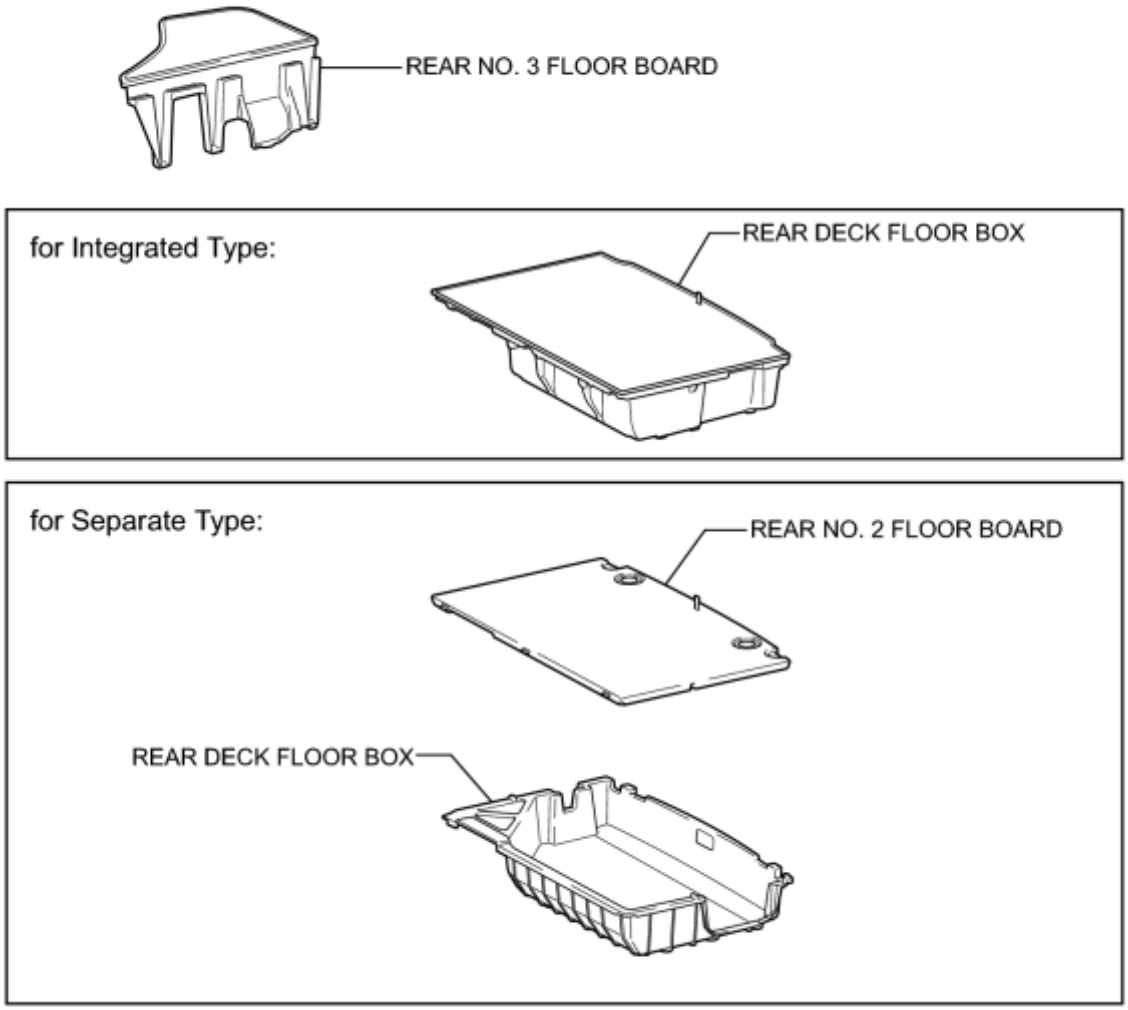
7. INSTALL REAR NO. 3 FLOOR BOARD INFO

8. INSTALL REAR DECK FLOOR BOX INFO

9. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

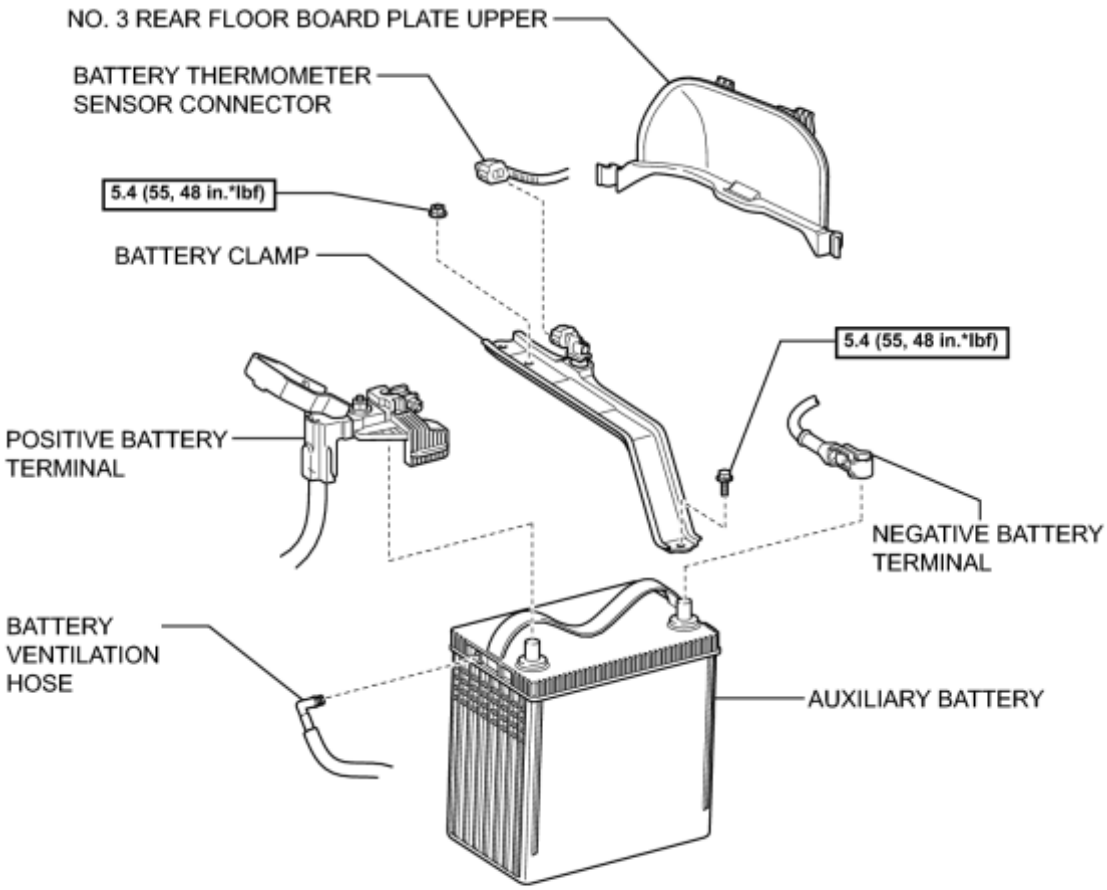
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION


NO. 3 REAR FLOOR BOARD PLATE UPPER
BATTERY THERMOMETER SENSOR CONNECTOR
5.4 (55, 48 in.*lbf)
BATTERY CLAMP
5.4 (55, 48 in.*lbf)
POSITIVE BATTERY TERMINAL
NEGATIVE BATTERY TERMINAL
BATTERY VENTILATION HOSE
AUXILIARY BATTERY
N*m (kgf*cm, ft.*lbf): Specified torque

c

# ON-VEHICLE INSPECTION

1. CHECK AUXILIARY BATTERY VOLTAGE

NOTICE:

If the battery is fully depleted or "READY" does not light up, recharge the battery. Check the battery again before the vehicle is returned to the customer.

(a) Check the battery for damage and deformation. If severe damage, deformation or leakage is found, replace the battery.

(b) Check the voltage.

(1) Turn the power switch off and turn on the headlights for 20 to 30 seconds. This will remove the surface charge from the battery.

(2) Measure the battery voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Positive (+) terminal - Negative (-) terminal | 20°C (68°F) | 12.5 to 12.9 V |

If the voltage is not as specified, charge the battery.

2. CHECK BATTERY TERMINAL

(a) Check that the battery terminals are not loose or corroded.

If the terminals are corroded, clean them.

3. CHECK FUSES

(a) Measure the resistance of each fuse for the auxiliary battery charging system.

Standard resistance:

Below 1 Ω

- If any of the results is not as specified, replace the fuse(s) as necessary.

4. CHECK AUXILIARY BATTERY VENTILATION HOSE

(a) Make sure that the hose is not kinked.

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

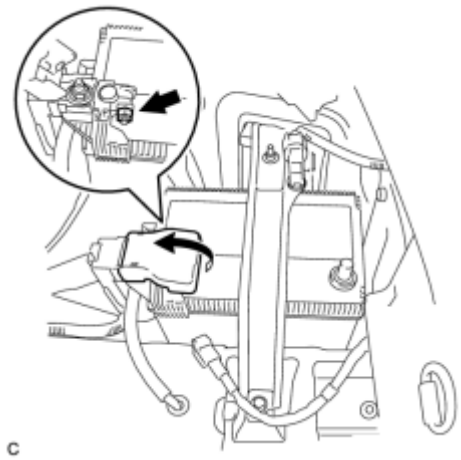
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE AUXILIARY BATTERY



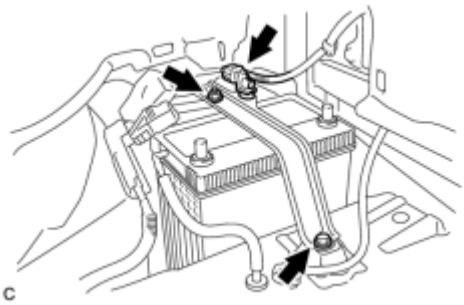
(a) Disengage the 2 claws and remove the No. 3 rear floor board plate upper.




(b) Open the battery terminal cap.

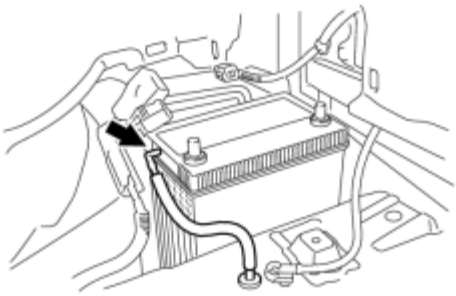
(c) Loosen the nut, and disconnect the positive (+) battery terminal.

(d) Remove the nut and bolt.




(e) Remove the battery thermometer sensor connector.

(f) Remove the battery clamp.



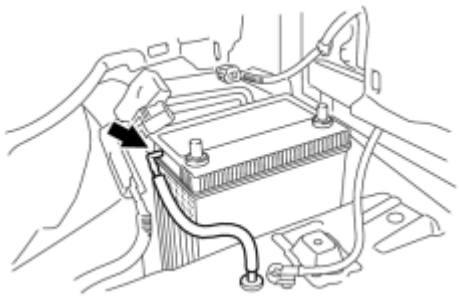
(g) Disconnect the battery ventilation hose.

(h) Remove the battery.

# INSTALLATION

1. INSTALL AUXILIARY BATTERY

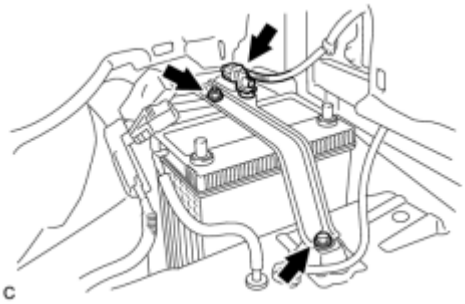
(a) Install the battery.



(b) Connect the battery ventilation hose to the battery without kinking it.

HINT:

Push in the battery ventilation hose to the battery until a click sound is heard.

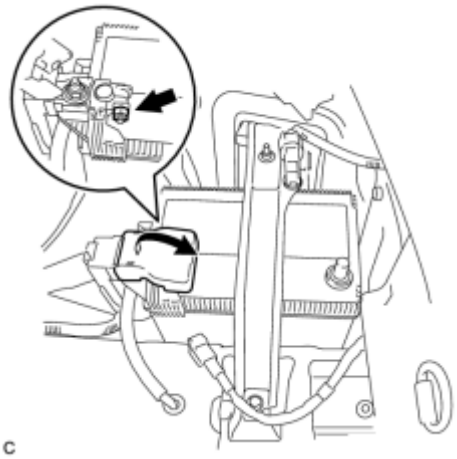



(c) Install the battery clamp with the bolt and nut.

Nut - Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

Bolt - Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

(d) Install the battery thermometer sensor connector




(e) Connect the positive (+) battery terminal with the nut.

(f) Install the battery terminal cap.

(g) Engage the 2 claws to install the No. 3 rear floor board plate upper.



2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

3. INSTALL REAR NO. 3 FLOOR BOARD INFO

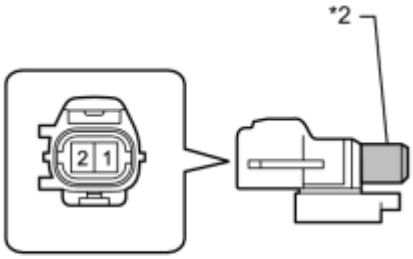
4. INSTALL REAR DECK FLOOR BOX INFO

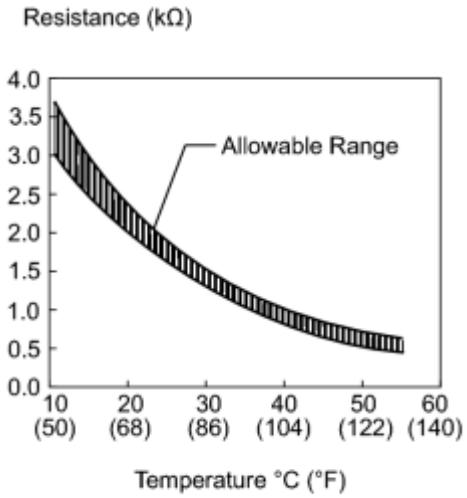
5. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# ON-VEHICLE INSPECTION

1. INSPECT BATTERY THERMOMETER SENSOR ASSEMBLY

*1




(a) Disconnect the connector from the battery thermometer sensor assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 10°C (50°F) | 3.00 to 3.73 kΩ |
| 1 - 2 | 15°C (59°F) | 2.45 to 2.88 kΩ |
| 1 - 2 | 20°C (68°F) | 1.95 to 2.30 kΩ |
| 1 - 2 | 25°C (77°F) | 1.60 to 1.80 kΩ |
| 1 - 2 | 30°C (86°F) | 1.28 to 1.47 kΩ |
| 1 - 2 | 35°C (95°F) | 1.00 to 1.22 kΩ |
| 1 - 2 | 40°C (104°F) | 0.80 to 1.00 kΩ |
| 1 - 2 | 45°C (113°F) | 0.65 to 0.85 kΩ |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 50°C (122°F) | 0.50 to 0.70 kΩ |
| 1 - 2 | 55°C (131°F) | 0.44 to 0.60 kΩ |
| 1 - 2 | 60°C (140°F) | 0.36 to 0.50 kΩ |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Battery Thermometer Sensor Assembly) |
| *2 | Sensing Portion |

NOTICE:

- Hold the sensor only by its connector. Touching the sensor may change the resistance value.
- When measuring, the sensor temperature must be the same as the ambient temperature.

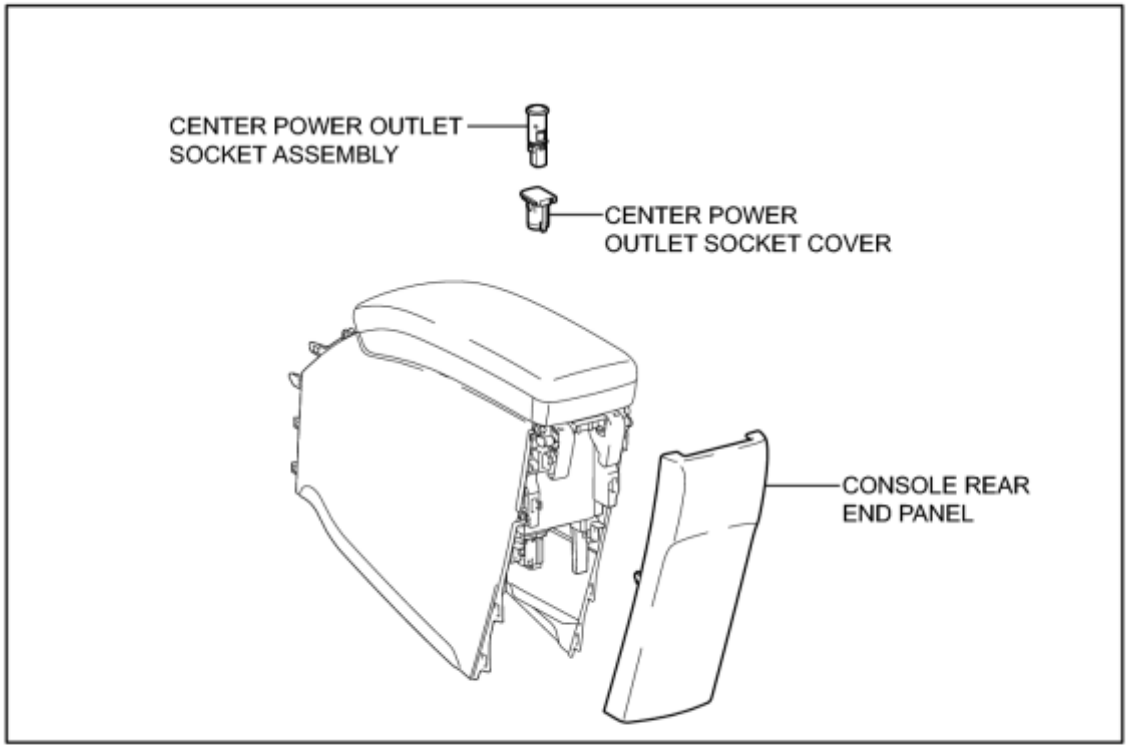
HINT:

As the temperature increases, the resistance decreases (see the graph).

If the resistance is not as specified, replace the battery thermometer sensor assembly.

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

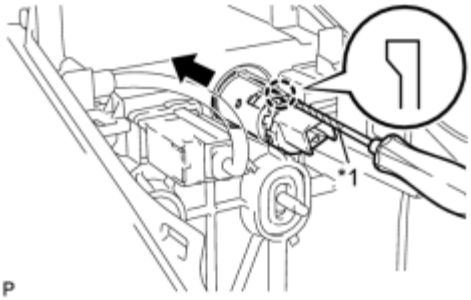
1. REMOVE REAR CONSOLE BOX ASSEMBLY

(a) Remove the rear console box assembly INFO.

2. REMOVE CONSOLE REAR END PANEL INFO

3. REMOVE CENTER POWER OUTLET SOCKET ASSEMBLY

(a) Disconnect the connector.




(b) Using a screwdriver, disengage the claw and remove the center power outlet socket assembly.

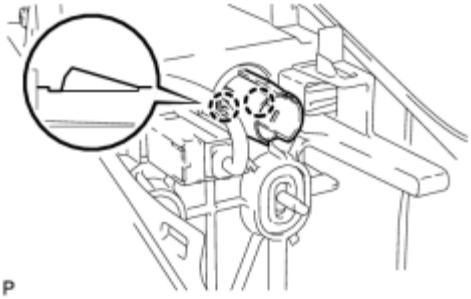
## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

HINT:

Tape the screwdriver tip before use.

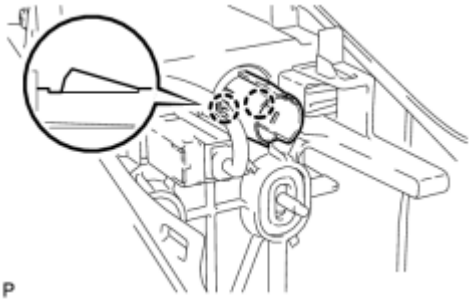
4. REMOVE CENTER POWER OUTLET SOCKET COVER




(a) Disengage the 2 claws and remove the center power outlet socket cover.

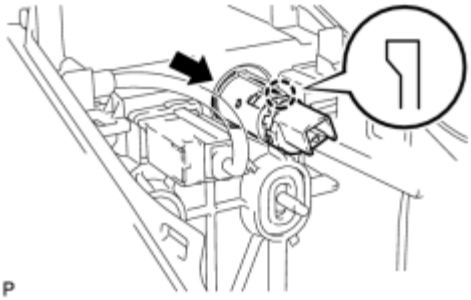
# INSTALLATION

1. INSTALL CENTER POWER OUTLET SOCKET COVER




(a) Engage the 2 claws and install the center power outlet socket cover.

2. INSTALL CENTER POWER OUTLET SOCKET ASSEMBLY




(a) Engage the claw and install the center power outlet socket assembly.

(b) Connect the connector.

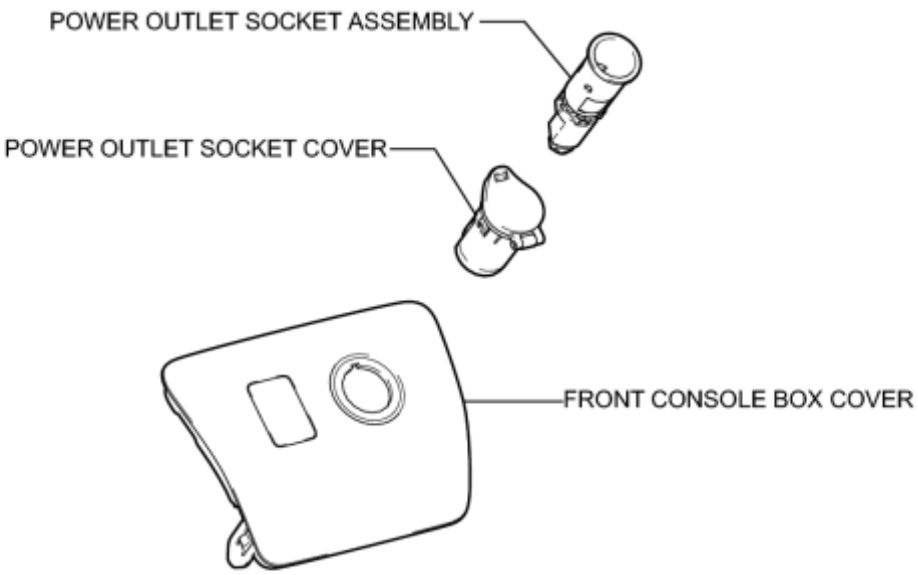
3. INSTALL CONSOLE REAR END PANEL INFO

4. INSTALL REAR CONSOLE BOX ASSEMBLY

(a) Install the rear console box assembly INFO.

# COMPONENTS

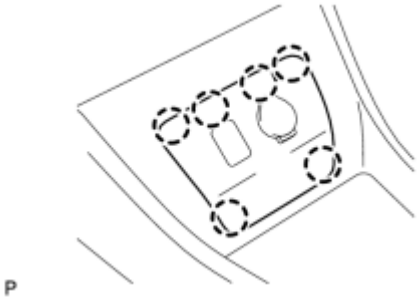
# ILLUSTRATION




P

# REMOVAL

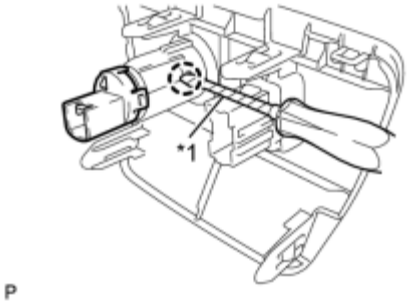
1. REMOVE FRONT CONSOLE BOX COVER



(a) Disengage the 6 claws.

(b) Disconnect each connector and remove the front console box cover.

2. REMOVE POWER OUTLET SOCKET ASSEMBLY




(a) Using a screwdriver, disengage the claw and remove the power outlet socket assembly.

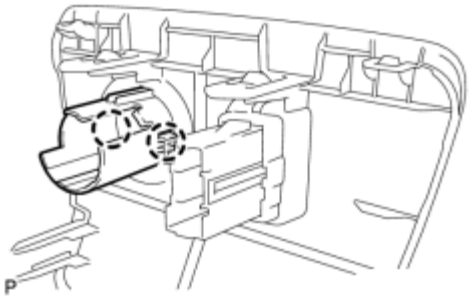
## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

HINT:

Tape the screwdriver tip before use.

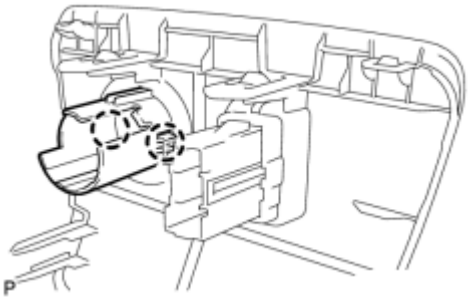
3. REMOVE POWER OUTLET SOCKET COVER



(a) Disengage the 2 claws and remove the power outlet socket cover.

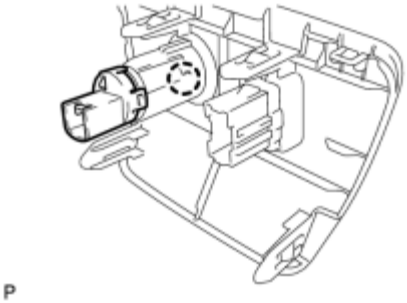
# INSTALLATION

1. INSTALL POWER OUTLET SOCKET COVER



(a) Engage the 2 claws to install the power outlet socket cover.

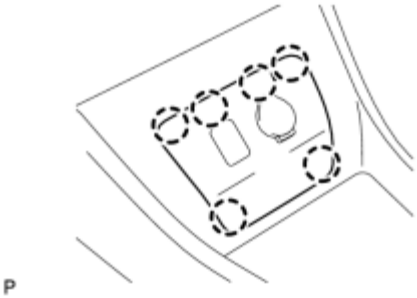
2. INSTALL POWER OUTLET SOCKET ASSEMBLY



(a) Engage the claw to install the power outlet socket assembly.

3. INSTALL FRONT CONSOLE BOX COVER

(a) Connect each connector.



(b) Engage the 6 claws to install the front console box cover.

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING BATTERY CABLE

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System | See Procedure |
|---|---|
| Advanced Parking Guide System | INFO |

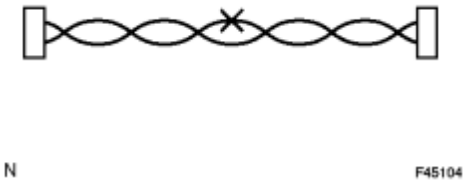
2. PRECAUTIONS FOR STEERING SYSTEM HANDLING

(a) Be careful when replacing parts. Incorrect replacement could affect the performance of the steering system and result in hazardous driving.

3. PRECAUTIONS FOR SRS AIRBAG SYSTEM HANDLING

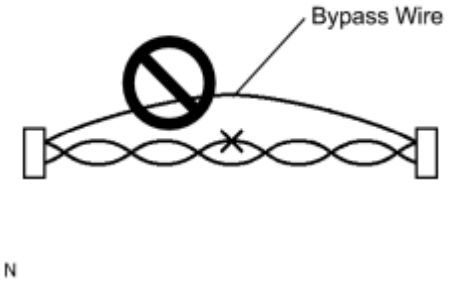
(a) This vehicle is equipped with an Supplemental Restraint System (SRS) which includes parts such as airbags for the driver and front passenger. Failure to carry out service operations in the correct sequence could cause unexpected SRS deployment during servicing and may cause a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precaution for the SRS INFO.

4. BUS WIRE REPAIR




(a) After repairing a bus wire with solder, wrap the repaired part with electrical tape.

- The CANL bus wire and CANH bus wire must be installed together at all times.
- When installing, make sure that these wires are twisted, because CAN bus wires are likely to be influenced by electrical noise if the bus wires are not twisted.
- The difference in length between the CANL bus wire and CANH bus wire should be 100 mm (3.937 in.) or less.
- Leave approximately 80 mm (3.150 in.) loose in the twisted wires around the connector.

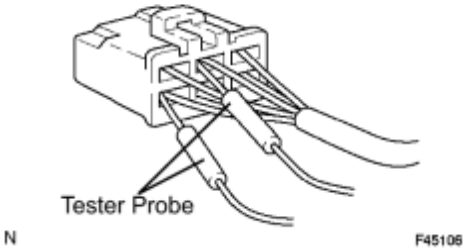



(b) Do not use bypass wiring between connectors.

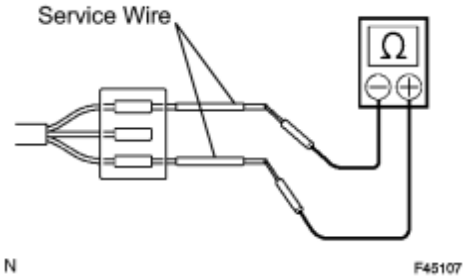
NOTICE:

The ability of the twisted bus wires to resist interference will be lost if bypass wiring is used.

5. CONNECTOR HANDLING




(a) When checking resistance with a tester, insert the tester probes from the backside (harness side) of the connector.



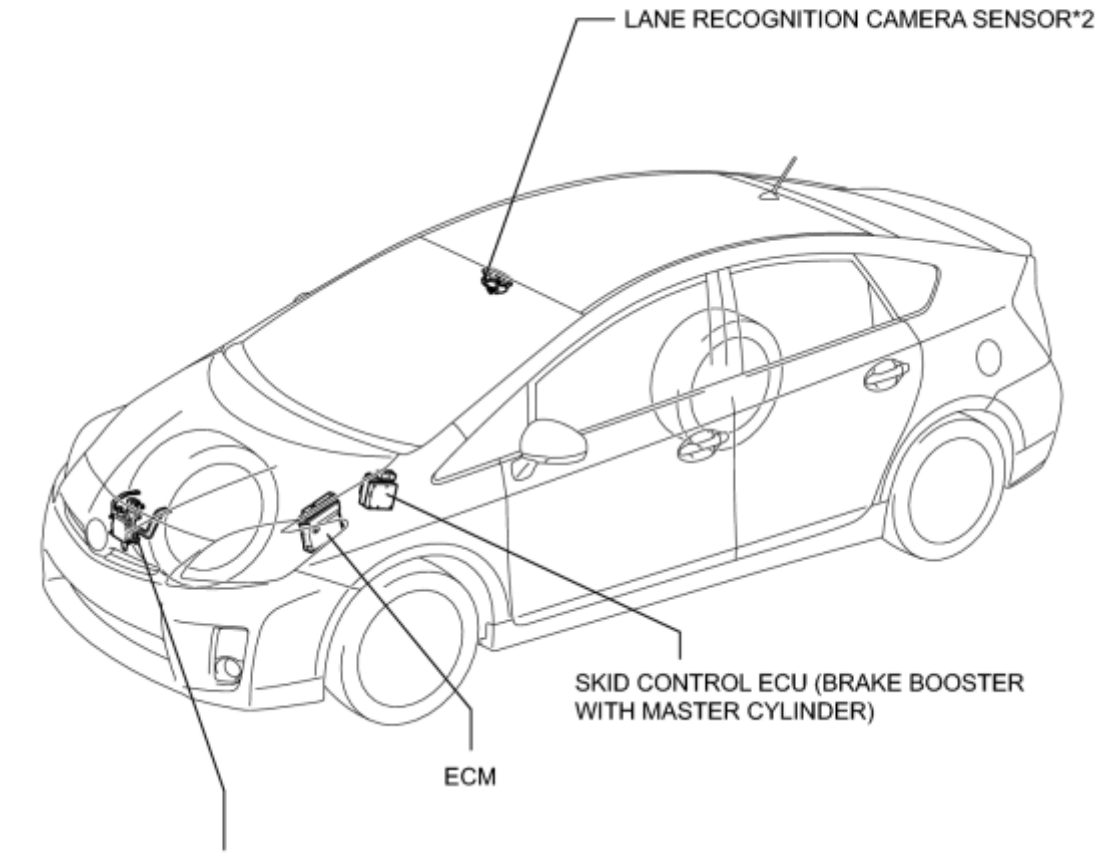

(b) Use service wires to check the connector if it is impossible to check continuity from the rear of the connector.

6. PRECAUTIONS FOR INSPECTING OR REPLACING CAN JUNCTION CONNECTOR

(a) If the CAN junction connector is removed from the vehicle for inspection or replacement, make sure to install the CAN junction connector and all wire harnesses to their original locations with tape and the clamps.

# PARTS LOCATION

# ILLUSTRATION

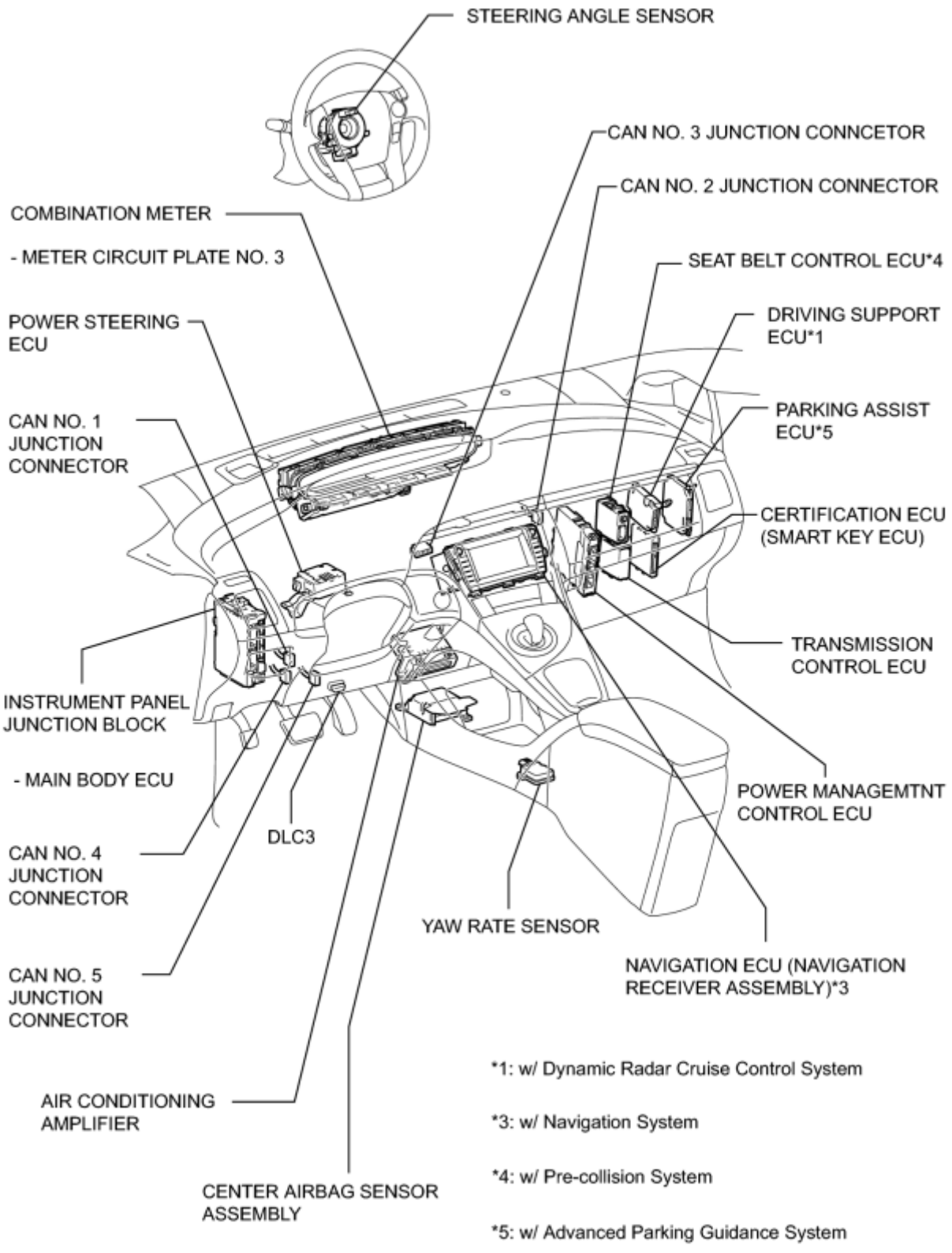



*1: w/ Dynamic Radar Cruise Control System

*2: w/ Lane-keeping Assist System

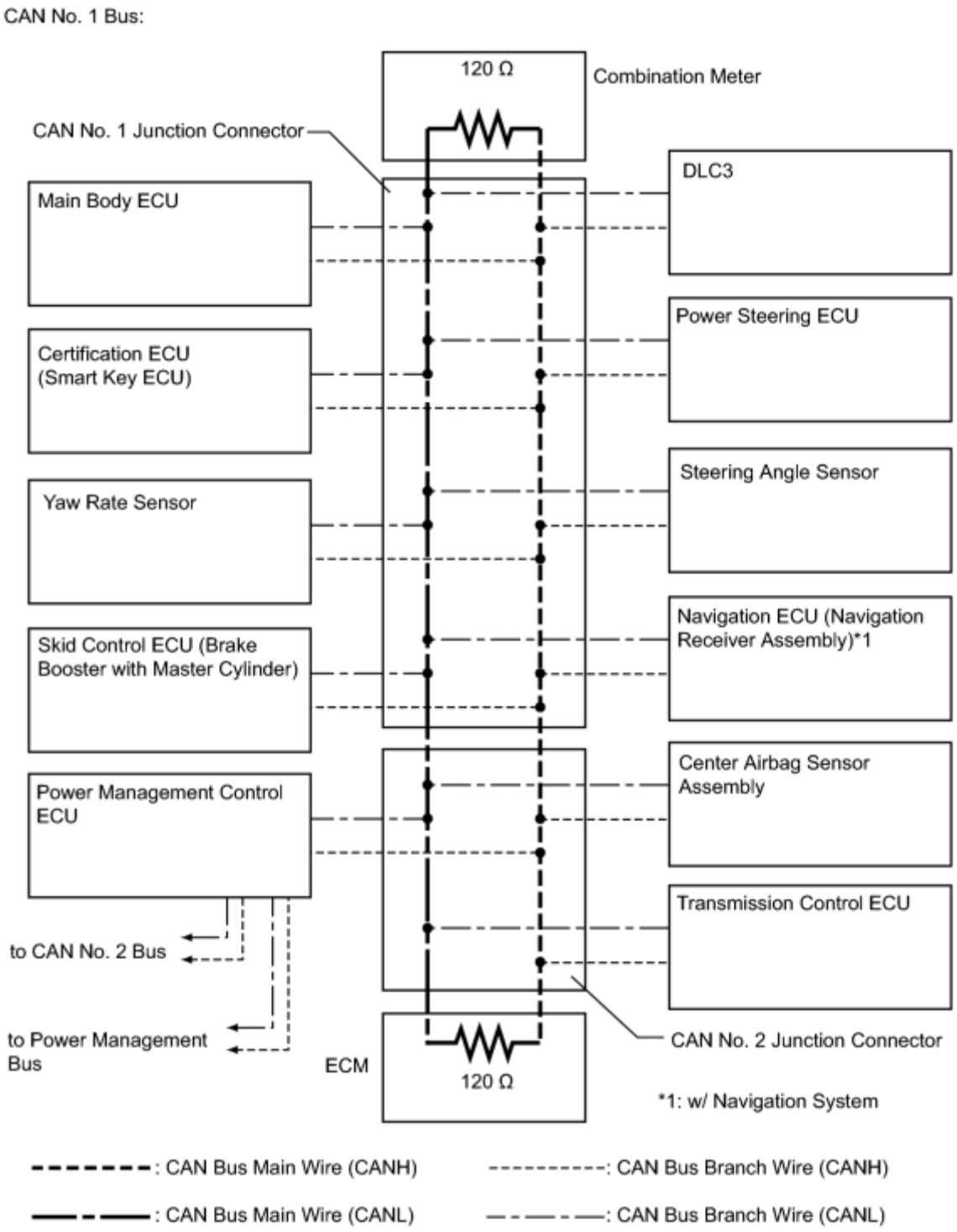
H

# ILLUSTRATION


STEERING ANGLE SENSOR
CAN NO. 3 JUNCTION CONNCETOR
CAN NO. 2 JUNCTION CONNECTOR
COMBINATION METER
- METER CIRCUIT PLATE NO. 3
SEAT BELT CONTROL ECU*4
POWER STEERING ECU
DRIVING SUPPORT ECU*1
CAN NO. 1 JUNCTION CONNECTOR
PARKING ASSIST ECU*5
CERTIFICATION ECU (SMART KEY ECU)
TRANSMISSION CONTROL ECU
INSTRUMENT PANEL JUNCTION BLOCK
- MAIN BODY ECU
POWER MANAGEMTNT CONTROL ECU
DLC3
CAN NO. 4 JUNCTION CONNECTOR
YAW RATE SENSOR
NAVIGATION ECU (NAVIGATION RECEIVER ASSEMBLY)*3
CAN NO. 5 JUNCTION CONNECTOR
AIR CONDITIONING AMPLIFIER
CENTER AIRBAG SENSOR ASSEMBLY
*1: w/ Dynamic Radar Cruise Control System
*3: w/ Navigation System
*4: w/ Pre-collision System
*5: w/ Advanced Parking Guidance System

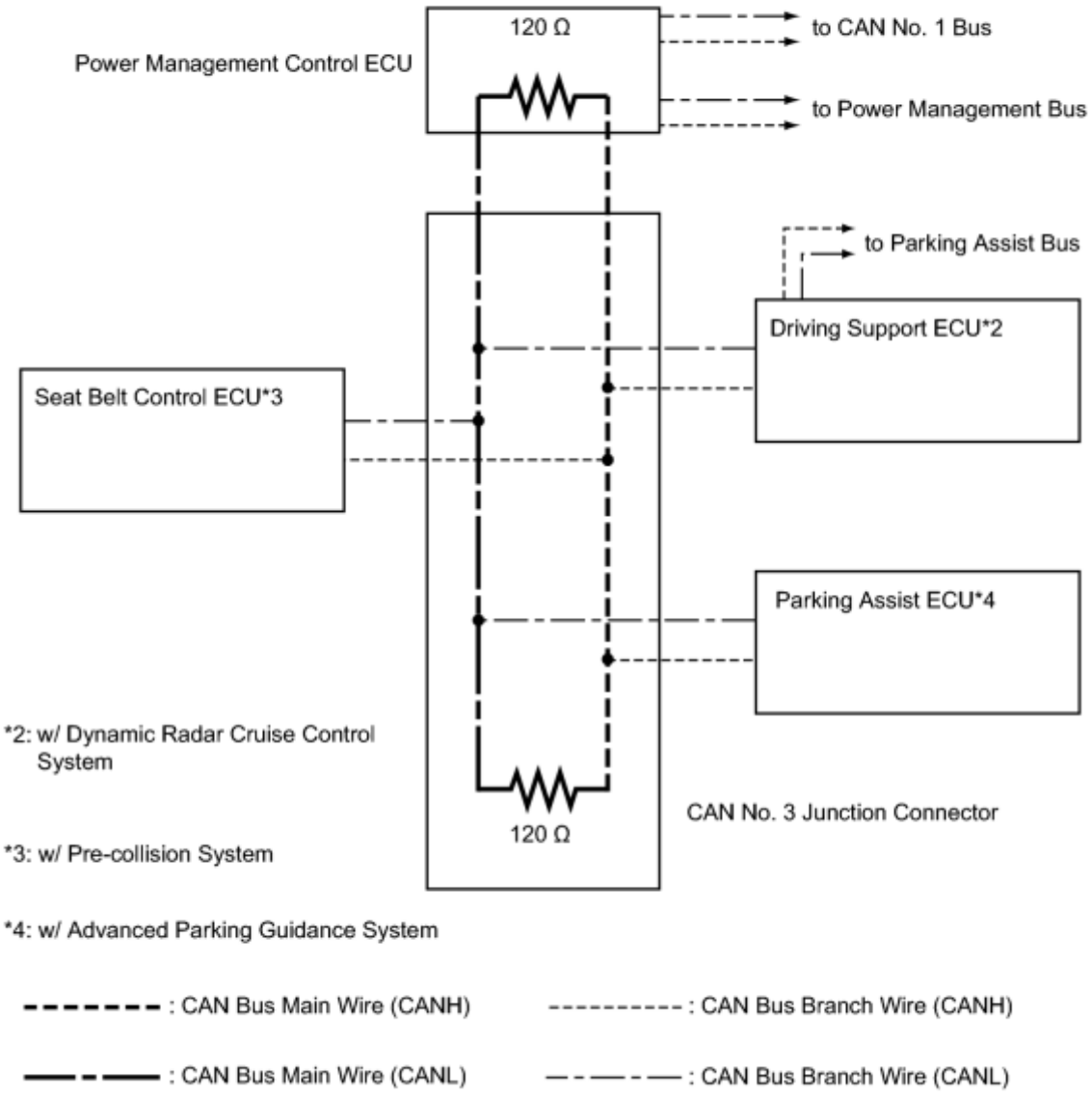
# SYSTEM DIAGRAM

1. CAN No. 1 BUS



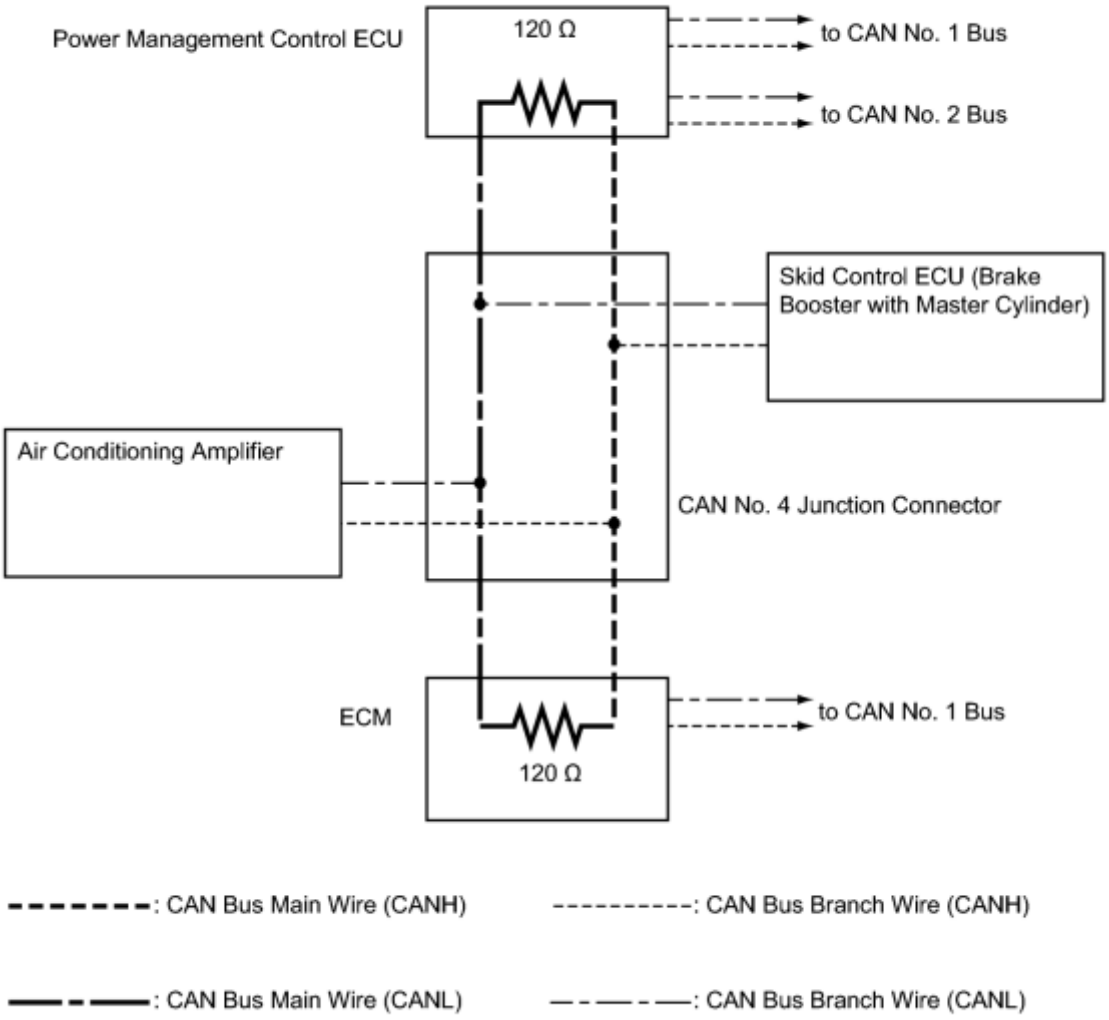

2. CAN No. 2 BUS

CAN No. 2 Bus:



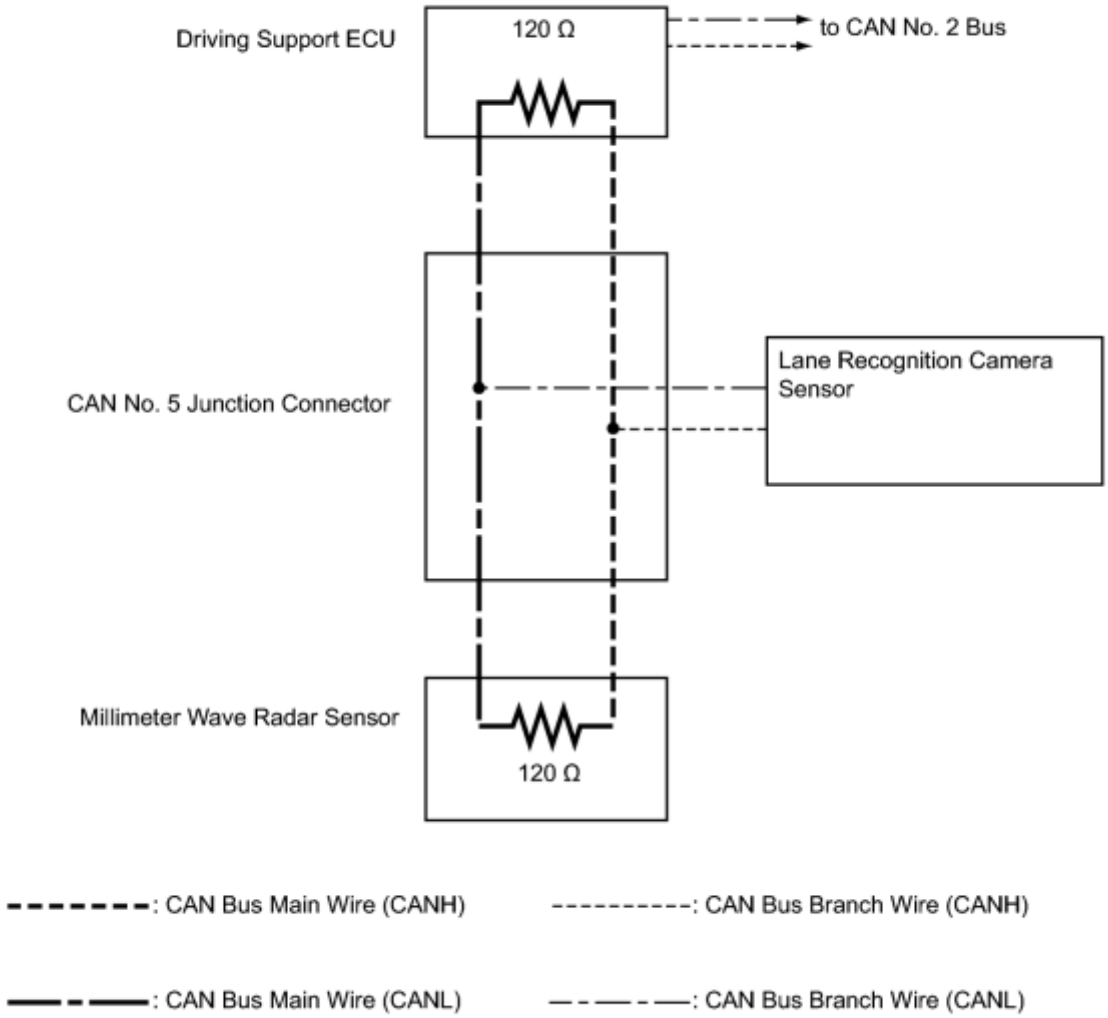

3. POWER MANAGEMENT BUS

Power Management Bus:




4. PARKING ASSIST BUS

Parking Assist Bus (w/ Dynamic Radar Cruise Control System):



# SYSTEM DESCRIPTION

1. BRIEF DESCRIPTION

(a) The Control Area Network (CAN) is a serial data communication system for real time application. It is a vehicle multiplex communication system which has a high communication speed and the ability to detect malfunctions.

(b) By pairing the CANH and CANL bus wires, the CAN performs communication based on differential voltage.

(c) Many ECUs or sensors installed on the vehicle operate by sharing information and communicating with each other.

(d) The CAN has two resistors of 120 Ω which are necessary to communicate with the main bus wire.

2. DEFINITION OF TERMS

(a) Main bus wire

(1) The main bus wire is a wire harness between the two terminating resistors on the bus (communication wire). This is the main bus in the CAN communication system.

(b) Branch wire

(1) The branch wire is a wire harness which diverges from the main bus wire to an ECU or sensor.

(c) Terminating resistors

(1) The termination circuit is a circuit which converts the communication current of CAN communication into the bus voltage. It consists of a resistor and condenser. Two termination circuits are necessary on the bus.

3. ECUS OR SENSORS WHICH COMMUNICATE THROUGH CAN COMMUNICATION SYSTEM

(a) CAN No. 1 Bus

(1) ECM

(2) Power management control ECU

(3) Combination meter

(4) Skid control ECU (Brake booster with master cylinder)

(5) Steering angle sensor

(6) Yaw rate sensor

(7) Power steering ECU

(8) Center airbag sensor assembly

(9) Certification ECU (Smart key ECU)

(10) Main body ECU

(11) Transmission control ECU

(12) Navigation ECU (Navigation receiver assembly)*1

(b) CAN No. 2 Bus

(1) Power management control ECU

(2) Driving support ECU*2

(3) Seat belt control ECU*3

(4) Parking assist ECU*4

(c) Power Management Bus

(1) Power management control ECU

(2) ECM

(3) Skid control ECU (Brake booster with master cylinder)

(4) Air conditioning amplifier

(d) Parking Assist Bus*2

(1) Driving support ECU

(2) Millimeter wave radar sensor

(3) Lane recognition camera sensor*5

HINT:

*1: w/ Navigation system

*2: w/ Dynamic radar cruise control system

*3: w/ Pre-collision system

*4: w/ Advanced parking guidance system

*5: w/ Lane-keeping assist system

4. CIRCUIT DESCRIPTION

(a) The CAN No. 1 bus, CAN No. 2 bus, power management bus and parking assist bus each have termination circuits with two resistors of 120 Ω. High speed communication at 500 kbps is possible.

5. TROUBLESHOOTING REMARKS

(a) DTCs for the CAN communication system can be checked using the Techstream. The DLC3 is connected to the CAN communication system, but no DTCs exist regarding problems in the DLC3 or the DLC3 branch wires. If there is any trouble in the DLC3 or the DLC3 branch wires, ECUs on the CAN network cannot output codes to the Techstream.

(b) Trouble in the CAN buses (communication wires) can be checked by measuring the resistance between terminals of the DLC3. However, an open circuit in a branch wire other than the DLC3 branch wires cannot be checked from the DLC3.

NOTICE:

Do not insert the tester probes directly into the DLC3. Be sure to use service wires.

6. DIAGNOSTIC TROUBLE CODE FOR CAN COMMUNICATION SYSTEM

(a) DTCs for the CAN communication system are as follows: U0073, U0100, U0101, U0104, U0122, U0123, U0124, U0126, U0129, U0131, U0140, U0142, U0146, U0151, U0155, U0164, U0235, U0293, U0327, U1000, U1002, U1100, U1104, U1105, U1107, U110B, U1119 and U1133.

7. NOTES REGARDING TROUBLESHOOTING

(a) Trouble in the CAN bus (communication line) can be checked through the DLC3 (except when there is a wire break other than in the branch wire of the DLC3).

NOTICE:

Do not insert the tester probes directly into the DLC3. Be sure to use service wires.

(b) DTCs regarding the CAN communication system can be checked using the Techstream.

(c) The CAN communication system cannot detect trouble in the branch wires for the DLC3 even though the DLC3 is also connected to the CAN communication system.

8. HOW TO DISTINGUISH CONNECTOR OF CAN JUNCTION CONNECTOR

(a) In the CAN communication system, the shape of connectors connected to the CAN junction connector which has an earth terminal is the same. The connectors connected to the CAN junction connector can be distinguished by the colors of the bus wires and the connecting side of the junction connector.

HINT:

See Terminals of ECU for bus wire color or the shape of connecting surface INFO.

# HOW TO PROCEED WITH TROUBLESHOOTING

NOTICE:

- DTCs for the CAN communication system are as follows: U0073, U0100, U0101, U0104, U0122, U0123, U0124, U0126, U0129, U0131, U0140, U0142, U0146, U0151, U0155, U0164, U0235, U0293, U0327, U1000, U1002, U1100, U1104, U1105, U1107, U110B, U1119 and U1133.
- Refer to troubleshooting of each system if DTCs regarding the CAN communication system are not output.

HINT:

*: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT



| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

(a) Interview the customer and confirm the problem.

NEXT



| | |
|---|---|
| 3. | CHECK BATTERY |

Standard Voltage:

11 to 14 V

HINT:

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT



| | |
|---|---|
| 4. | CHECK AND CLEAR DTCS* |

HINT:

- CAN communication DTCs are stored when there is an open or short in any of the communication wires. Any problems with the power source of a corresponding ECU or sensor, or problems in the ECU or the sensor itself also cause these DTCs to be stored.
- If a CAN communication wire connector is disconnected with the power switch on (IG), the ECUs of the corresponding system and related systems store a DTC.

NEXT

| | |
|---|---|
| 5. | CHECK FOR DLC3 BRANCH WIRE AND CAN NO. 1 BUS MAIN WIRE (CANH - CANL) |

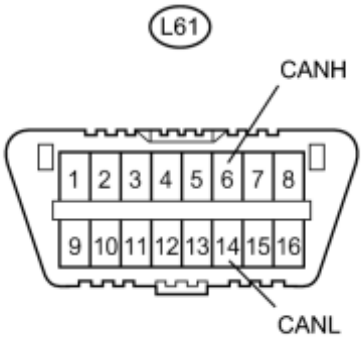
NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

*1




(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-14 (CANL) | Power switch off | 54 to 69 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | DLC3 |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (70 Ω or higher) | B |
| NG (Below 54 Ω) | C |

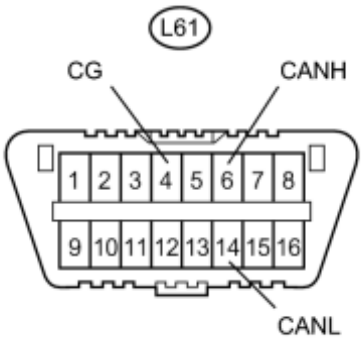
B INFO GO TO OPEN IN CAN MAIN BUS WIRE

C INFO GO TO SHORT IN CAN BUS LINES

A

| | |
|---|---|
| 6. | CHECK FOR SHORT TO GND IN CAN NO. 1 BUS (CANH, CANL - CG) |

*1




(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher |
| L61-14 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher |

***Text in Illustration***

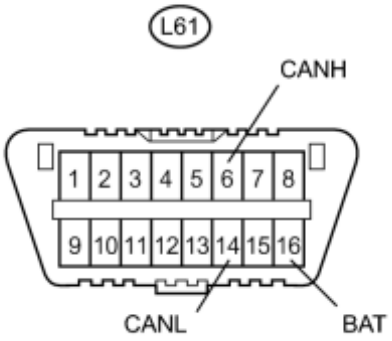
| | |
|---|---|
| *1 | DLC3 |

NG INFO GO TO SHORT TO GND IN CAN BUS WIRE

OK

| | |
|---|---|
| 7. | CHECK FOR SHORT TO +B IN CAN NO. 1 BUS (CANH, CANL - BAT) |

*1




(a) Disconnect the cable from the negative (-) battery terminal.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L61-14 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | DLC3 |

NG INFO GO TO SHORT TO +B IN CAN BUS WIRE

OK

▼

| | |
|---|---|
| 8. | CHECK INSTALLED SYSTEMS (ECU AND SENSOR) THAT USE CAN COMMUNICATION |

(a) Based on the vehicle equipment and specifications, confirm the systems that use CAN communication INFO .

NEXT

▼

| | |
|---|---|
| 9. | CHECK ECUS CONNECTED TO CAN BUS* |

(a) Select "CAN Bus Check" from the screen on the Techstream INFO.

(b) Observe the screen for approximately 1 minute to check the ECUs and sensors displayed on the screen.

Result:

| Result | Proceed to |
|---|---|
| All ECUs and sensors connected to the CAN communication system are displayed on the screen.<br><br>(CAN bus circuit is currently normal.) | A |
| • All ECUs except the power management control ECU connected to the CAN No. 2 bus are not displayed on the screen.<br>• The power management control ECU (power management1) outputs DTC U1002.<br><br>(Open or short in CAN No. 2 bus main wires.) | B |
| • All ECUs except the power management control ECU connected to the power management bus are not displayed on the screen.<br>• The power management control ECU (power management2) outputs DTC U1002.<br><br>(Open or short in power management bus main wires.) | C |
| The driving support ECU (Pre-Collision2) outputs DTC U1002.<br><br>(Open or short in parking assist bus main wires.) | D |
| All ECUs connected to the CAN No. 2 bus and power management bus are not displayed on the screen.<br><br>(Open in power management control ECU branch wires or power management control ECU malfunction.) | E |
| One of the ECUs and sensors connected to the CAN No. 1 bus is not displayed on the screen.<br><br>(Open in ECU or sensor branch wires, or communication interrupted.) | F |
| One of the ECUs and sensors connected to the CAN No. 2 bus or power management bus is not displayed on the screen.<br><br>(Open in ECU or sensor branch wires, or communication interrupted.) | G |
| Some ECUs and sensors repeatedly appear and disappear on the screen during this check.<br><br>(Open in one side of ECU or sensor branch wires.) | H |

NOTICE:

- The systems (ECUs and sensors) that adopt CAN communication vary depending on the vehicle and optional equipment. Check which systems (ECUs and sensors) are installed on the vehicle INFO.
- Non-installed ECUs or sensors will not be displayed. Do not mistake them for being in communication stop mode.
- The ECUs and sensors that repeatedly appear and disappear from the screen during this check are considered normal. (The response to the Techstream and its display are affected by signals output from other ECUs which have an open circuit in either of their CAN bus branch wires.)

HINT:

The ECUs connected to the CAN No. 2 bus and power management bus are displayed on the screen by the power management control ECU.

B INFO GO TO U1002 (POWER MANAGEMENT1)

C INFO GO TO U1002 (POWER MANAGEMENT2)

D INFO GO TO U1002 (PARKING ASSIST BUS)

E INFO GO TO POWER MANAGEMENT CONTROL ECU COMMUNICATION STOP MODE

F INFO GO TO COMMUNICATION STOP MODE TABLE

G INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

H INFO GO TO OPEN IN ONE SIDE OF CAN BRANCH LINE

A



| | |
|---|---|
| 10. | RECHECK DTC |

HINT:

- Sometimes CAN communication system DTCs are output, but all ECUs and sensors connected to the CAN communication system are displayed on the Techstream. In this case, previous or history DTCs may indicate the cause of the problem.
- ECUs related to a problem in the CAN bus will store DTCs to indicate communication malfunctions. Communication stop mode in the CAN bus can be determined by comparing the combination of DTCs that have been set. Refer to DTC Combination Table for the CAN bus.
- The power management control ECU will store communication error DTCs when the ECUs connected to the CAN No. 2 bus and power management bus cannot communicate, or if a network malfunction occurs.

Result:

| Result | Proceed to |
|---|---|
| Communication error DTCs other than the codes output from the power management control ECU are output.<br><br>(A malfunction occurred in the CAN No. 1 bus.) | A |
| The power management control ECU (Power Management1) outputs DTC 1002.<br><br>(A malfunction occurred in the CAN No. 2 bus.) | B |
| The power management control ECU (Power Management2) outputs DTC 1002.<br><br>(A malfunction occurred in the power management bus.) | C |
| The driving support ECU (Pre-Collision2) outputs DTC 1002.<br><br>(A malfunction occurred in the driving support bus.) | D |
| The power management ECU outputs DTCs other than DTC 1002. | E |

| Result | Proceed to |
|---|---|
| (A malfunction occurred in an ECU branch wire connected to the CAN No. 2 bus or power management bus.) | |

B INFO GO TO U1002 (POWER MANAGEMENT1)

C INFO GO TO U1002 (POWER MANAGEMENT2)

D INFO GO TO U1002 (PARKING ASSIST BUS)

E INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

A

▼

| | |
|---|---|
| 11. | DTC COMBINATION TABLE |

(a) Confirm trouble according to the combination of output DTCs regarding the CAN communication system INFO.

HINT:

Previous CAN communication system DTCs may be the cause if CAN communication system DTCs are output and all ECUs and sensors connected to the CAN communication system are displayed on "CAN Bus Check" of the Techstream.

NEXT

▼

| | |
|---|---|
| 12. | CIRCUIT INSPECTION |

NEXT

▼

| | |
|---|---|
| 13. | IDENTIFICATION OF PROBLEM |

NEXT

▼

| | |
|---|---|
| 14. | REPAIR OR REPLACEMENT |

NEXT

▼

| | |
|---|---|
| 15. | CONFIRMATION TEST* |

NEXT **END**

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Result of CAN No. 1 Bus Check*

| Symptom | Suspected Area | See page |
|---|---|---|
| Open in CAN Main Bus Wire | CAN Main Bus Wire | INFO |
| Short in CAN Bus Wires | CAN Bus Wires | INFO |
| Short to +B in CAN Bus Wire | CAN Bus Wire | INFO |
| Short to GND in CAN Bus Wire | CAN Bus Wire | INFO |
| Open in One Side of CAN Branch Wire | CAN Branch Wire | INFO |

HINT:

Refer to How to Proceed with Troubleshooting for the CAN No. 1 Bus Check procedure.

### *Communication Stop Mode Table*

| Symptom | Suspected Area | See page |
|---|---|---|
| "ABS/VSC/TRAC" is not displayed on the Techstream. | Skid Control ECU Communication Stop Mode | INFO |
| "EPS" is not displayed on the Techstream. | Power Steering ECU Communication Stop Mode | INFO |
| "Steering Angle Sensor" is not displayed on the Techstream. | Steering Angle Sensor Communication Stop Mode | INFO |
| "Yaw Rate/Deceleration Sensor" is not displayed on the Techstream. | Yaw Rate Sensor Communication Stop Mode | INFO |
| "Engine" is not displayed on the Techstream. | ECM Communication Stop Mode | INFO |
| "Transmission Control" is not displayed on the Techstream. | Transmission Control ECU Communication Stop Mode | INFO |
| "Main Body" is not displayed on the Techstream. | Main Body ECU Communication Stop Mode | INFO |
| "Hybrid Control" and "Electric Power Control" are not displayed on the Techstream. | Power Management Control ECU Communication Stop Mode | INFO |
| "Combination Meter" is not displayed on the Techstream. | Combination Meter ECU Communication Stop Mode | INFO |
| "Smart Access/Smart Key/Wireless Tuner" is not displayed on the Techstream. | Certification ECU Communication Stop Mode | INFO |
| "SRS Airbag" is not displayed on the Techstream. | Center Airbag Sensor Communication Stop | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Mode | |
| "AVN1" is not displayed on the Techstream. | Navigation ECU Communication Stop Mode | INFO |

# TERMINALS OF ECU

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.
- This section describes the standard CAN values for all CAN related components.

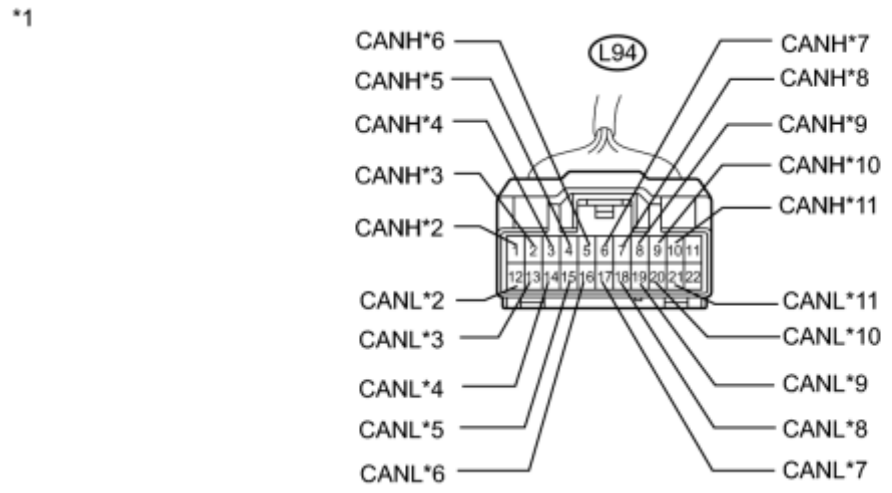
HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

1. CAN NO. 1 JUNCTION CONNECTOR

(a) Check the CAN No. 1 junction connector.

(1) Connection diagram




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector (to CAN No. 1 Junction Connector) | *2 | to Combination Meter |
| *3 | to Steering Angle Sensor | *4 | to Main Body ECU |
| *5 | to Power Steering ECU | *6 | to DLC3 |

| | | | |
|---|---|---|---|
| *7 | to Navigation ECU | *8 | to CAN No. 2 Junction Connector |
| *9 | to Yaw Rate Sensor | *10 | to Certification ECU |
| *11 | to Skid Control ECU | - | - |

(b) Check the connection diagram of the components which are connected to the CAN No. 1 junction connector.

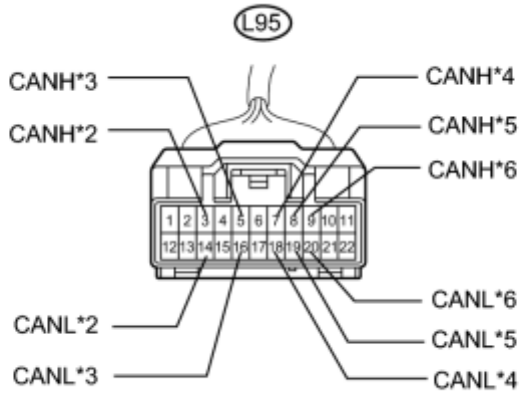
| Terminal No. (Symbol) | Wiring Color | Connected to |
|---|---|---|
| L94-1 (CANH) | P | Combination meter |
| L94-12 (CANL) | W | |
| L94-2 (CANH) | L | Steering angle sensor |
| L94-13 (CANL) | W | |
| L94-3 (CANH) | BR | Main body ECU |
| L94-14 (CANL) | W | |
| L94-4 (CANH) | R | Power steering ECU |
| L94-15 (CANL) | W | |
| L94-5 (CANH) | W | DLC3 |
| L94-16 (CANL) | Y | |
| L94-6 (CANH) | G | Navigation ECU |
| L94-17 (CANL) | W | |
| L94-7 (CANH) | V | CAN No. 2 junction connector |
| L94-18 (CANL) | W | |
| L94-8 (CANH) | Y | Yaw rate sensor |
| L94-19 (CANL) | L | |
| L94-9 (CANH) | BE | Certification ECU |
| L94-20 (CANL) | P | |
| L94-10 (CANH) | LG | Skid Control ECU |
| L94-21 (CANL) | L | |

2. CAN NO. 2 JUNCTION CONNECTOR

(a) Check the CAN No. 2 junction connector.

(1) Connection diagram

*1




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector (to CAN No. 2 Junction Connector) | *2 | to CAN No. 1 Junction Connector |
| *3 | to Center Airbag Sensor Assembly | *4 | to Transmission Control ECU |
| *5 | to Power Management Control ECU | *6 | to ECM |

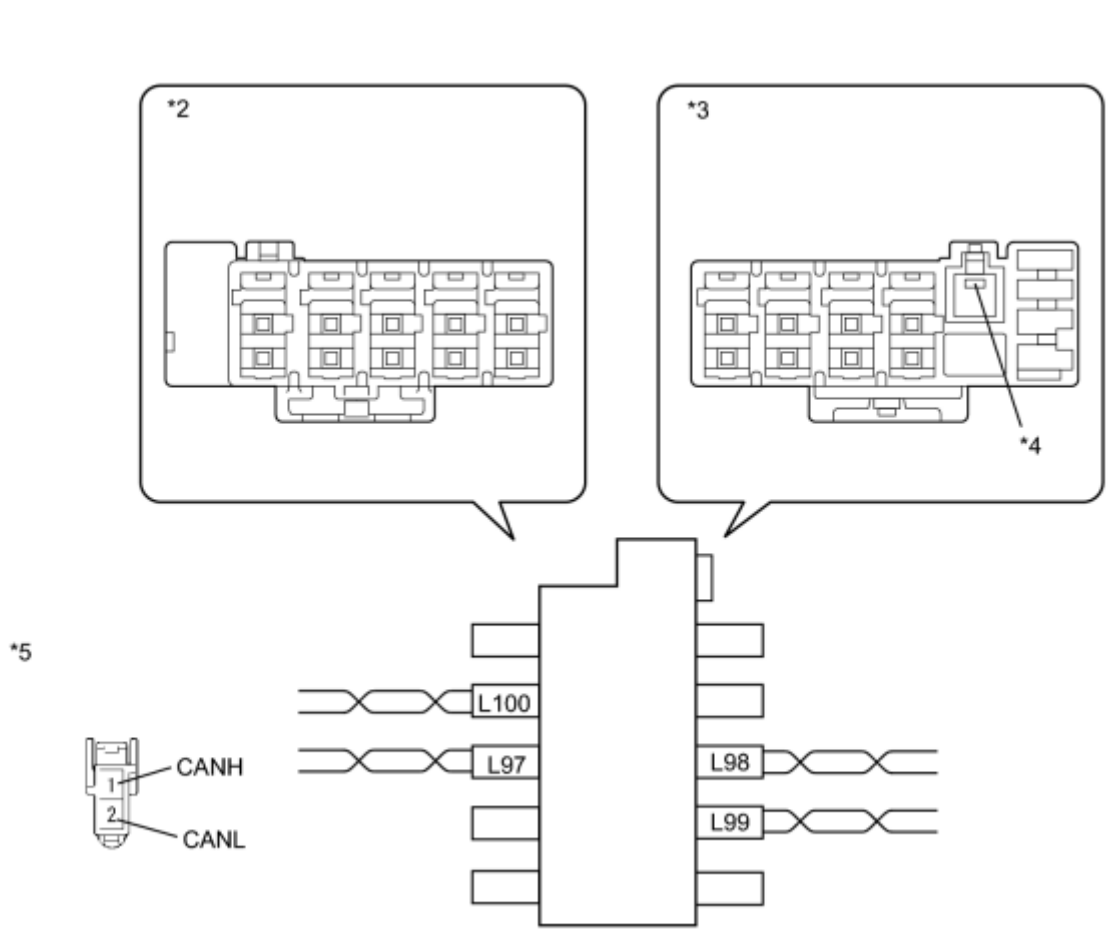
(b) Check the connection diagram of the components which are connected to the CAN No. 2 junction connector.

| Terminal No. (Symbol) | Wiring Color | Connected to |
|---|---|---|
| L95-3 (CANH) | V | CAN No. 1 junction connector |
| L95-14 (CANL) | W | |
| L95-5 (CANH) | R | Center airbag sensor assembly |
| L95-16 (CANL) | G | |
| L95-7 (CANH) | Y | Transmission control ECU |
| L95-18 (CANL) | BR | |
| L95-8 (CANH) | B | Power management control ECU |
| L95-19 (CANL) | W | |
| L95-9 (CANH) | P | ECM |
| L95-20 (CANL) | V | |

3. CAN NO. 3 JUNCTION CONNECTOR

(a) Check the CAN No. 3 junction connector.

(1) Connection diagram




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | CAN No. 3 Junction Connector | *2 | Junction Connector B Side |
| *3 | Junction Connector A Side | *4 | Earth Terminal |
| *5 | Front view of wire harness connector (to CAN No. 3 Junction Connector) | - | - |

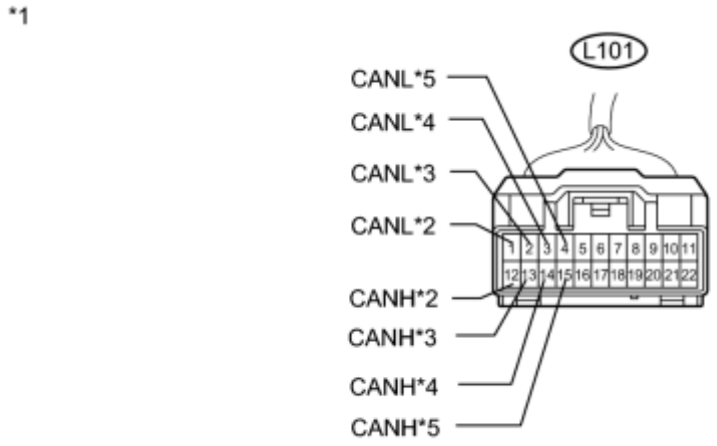
(b) Check the connection diagram of the components which are connected to the CAN No. 3 junction connector.

| Terminal No. (Symbol) | Wiring Color | Connected to |
|---|---|---|
| L97-1 (CANH) | P | Power management control ECU |
| L97-2 (CANL) | V | |
| L98-1 (CANH) | LG | Seat belt control ECU |
| L98-2 (CANL) | L | |
| L99-1 (CANH) | B | Driving support ECU |
| L99-2 (CANL) | W | |
| L100-1 (CANH) | Y | Parking assist ECU |
| L100-2 (CANL) | BR | |

4. CAN NO. 4 JUNCTION CONNECTOR

(a) Check the CAN No. 4 junction connector.

(1) Connection diagram




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector (to CAN No. 4 Junction Connector) | *2 | to Power Management Control ECU |
| *3 | to Air Conditioning Amplifier | *4 | to Skid Control ECU |
| *5 | to ECM | - | - |

(b) Check the connection diagram of the components which are connected to the CAN No. 4 junction connector.

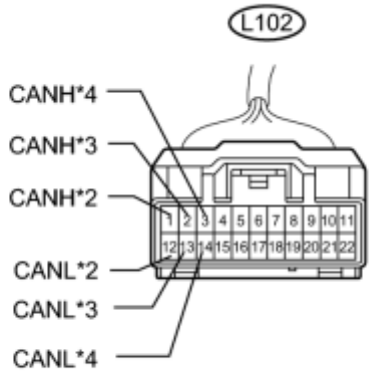
| Terminal No. (Symbol) | Wiring Color | Connected to |
|---|---|---|
| L101-12 (CANH) | LG | Power management control ECU |
| L101-1 (CANL) | L | |
| L101-13 (CANH) | Y | Air conditioning amplifier |
| L101-2 (CANL) | BR | |
| L101-14 (CANH) | P | Skid control ECU |
| L101-3 (CANL) | V | |
| L101-15 (CANH) | B | ECM |
| L101-4 (CANL) | W | |

5. CAN NO. 5 JUNCTION CONNECTOR

(a) Check the CAN No. 5 junction connector.

(1) Connection diagram

*1




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector (to CAN No. 5 Junction Connector) | *2 | to Millimeter Wave Radar Sensor |
| *3 | to Lane Recognition Camera Sensor | *4 | to Driving Support ECU |

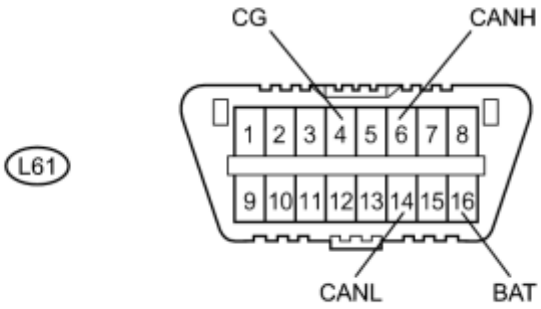
(b) Check the connection diagram of the components which are connected to the CAN No. 5 junction connector.

| Terminal No. (Symbol) | Wiring Color | Connected to |
|---|---|---|
| L102-1 (CANH) | LG | Millimeter wave radar sensor |
| L102-12 (CANL) | P | |
| L102-2 (CANH) | B | Lane recognition camera sensor |
| L102-13 (CANL) | W | |
| L102-3 (CANH) | Y | Driving support ECU |
| L102-14 (CANL) | L | |

6. DLC3

(a) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L61-6 (CANH) - L61-14 (CANL) | W - Y | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L61-6 (CANH) - L61-4 (CG) | W - G | HIGH-level CAN bus line - Chassis ground | Power switch off | 200 Ω or higher |
| L61-14 (CANL) - L61-4 (CG) | Y - G | LOW-level CAN bus line - Chassis ground | Power switch off | 200 Ω or higher |
| L61-6 (CANH) - L61-16 (BAT) | W - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L61-14 (CANL) - L61-16 (BAT) | Y - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

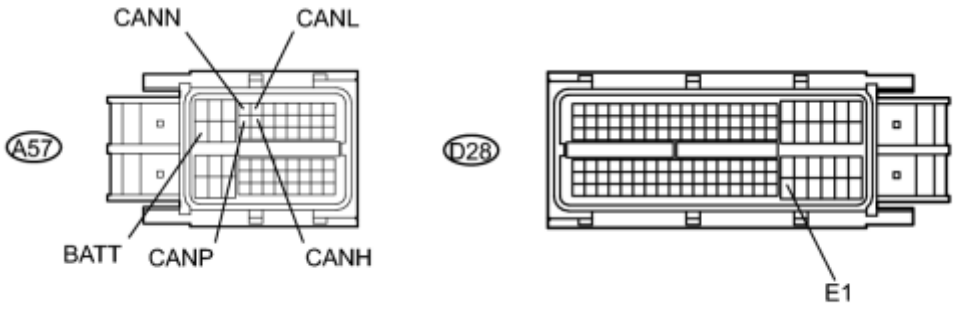
***Text in Illustration***

| | |
|---|---|
| *1 | DLC3 |

7. ECM

(a) Disconnect the ECM connectors.

*1




*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector (to ECM) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*for CAN No. 1 Bus Main Wire*

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A57-13 (CANH) - A57-5 (CANL) | P - V | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 108 to 132 Ω |
| A57-13 (CANH) - D28-104 (E1) | P - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A57-5 (CANL) - D28-104 (E1) | V - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A57-13 (CANH) - A57-20 (BATT) | P - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| A57-5 (CANL) - A57-20 (BATT) | V - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

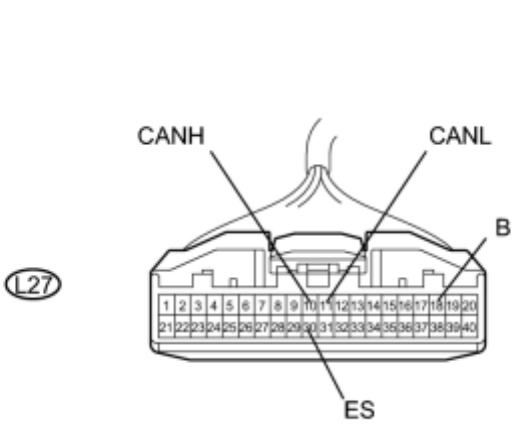
*for Power Management Bus Main Wire*

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A57-12 (CANP) - A57-4 (CANN) | B - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 108 to 132 Ω |
| A57-12 (CANP) - D28-104 (E1) | B - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A57-4 (CANN) - D28-104 (E1) | W - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A57-12 (CANP) - | B - R | HIGH-level CAN bus line - | Cable disconnected from | 6 kΩ or higher |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A57-20 (BATT) | | Battery positive (+) | negative (-) battery terminal | |
| A57-4 (CANN) - A57-20 (BATT) | W - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

8. COMBINATION METER

(a) Disconnect the combination meter connector.




*Text in Illustration*

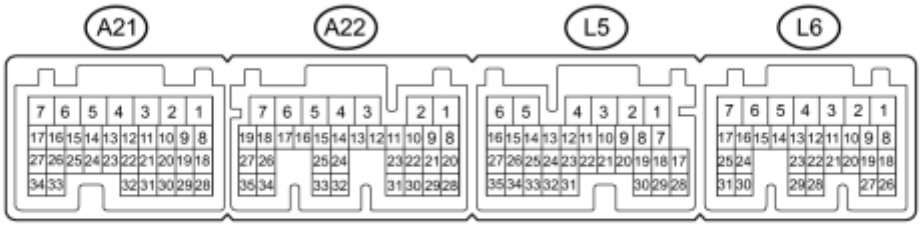
| | |
|---|---|
| *1 | Front view of wire harness connector (to Combination Meter) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-10 (CANH) - L27-11 (CANL) | P - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 108 to 132 Ω |
| L27-10 (CANH) - L27-30 (ES) | P - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L27-11 (CANL) - L27-30 (ES) | W - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L27-10 (CANH) - L27-18 (B) | P - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L27-11 (CANL) - L27-18 (B) | W - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

9. POWER MANAGEMENT CONTROL ECU

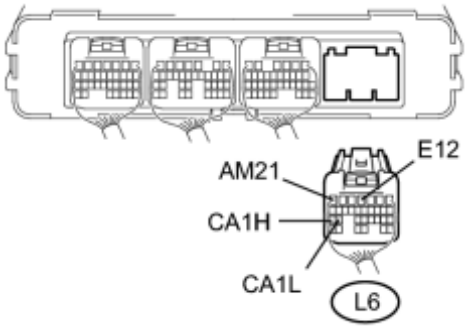



Y

(a) CAN No. 1 Bus Branch Wire

*1

(1) Disconnect the power management control ECU connector.




P

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(2) Measure the resistance according to the value(s) in the table below.

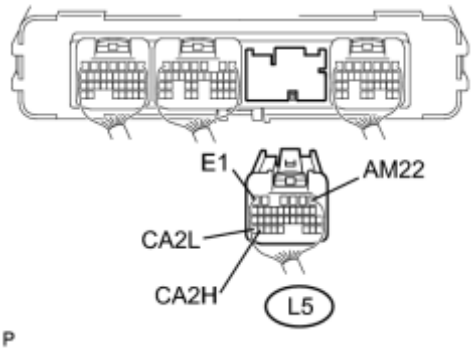
Standard Resistance:

*for CAN No. 1 Bus Branch Wire*

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L6-25 (CA1H) - L6-24 (CA1L) | B - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L6-25 (CA1H) - L6-4 (E12) | B - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L6-24 (CA1L) - L6-4 (E12) | W - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L6-25 (CA1H) - L6-7 (AM21) | B - W | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L6-24 (CA1L) - L6-7 (AM21) | W - W | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

(b) CAN No. 2 Bus Main Wire

*1




(1) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(2) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*for CAN No. 2 Bus Main Wire*

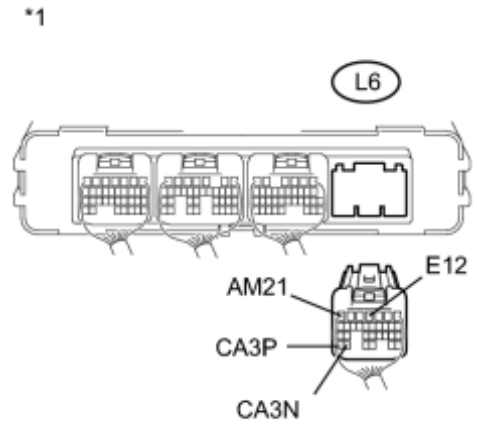
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-34 (CA2H) - L5-35 (CA2L) | P - V | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 108 to 132 Ω |
| L5-34 (CA2H) - L5-6 (E1) | P - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L5-35 (CA2L) - L5-6 (E1) | V - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L5-34 (CA2H) - L5-1 (AM22) | P - W | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L5-35 (CA2L) - L5-1 (AM22) | V - W | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

(c) Power Management Bus Main Wire

(1) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |




(2) Measure the resistance according to the value(s) in the table below.

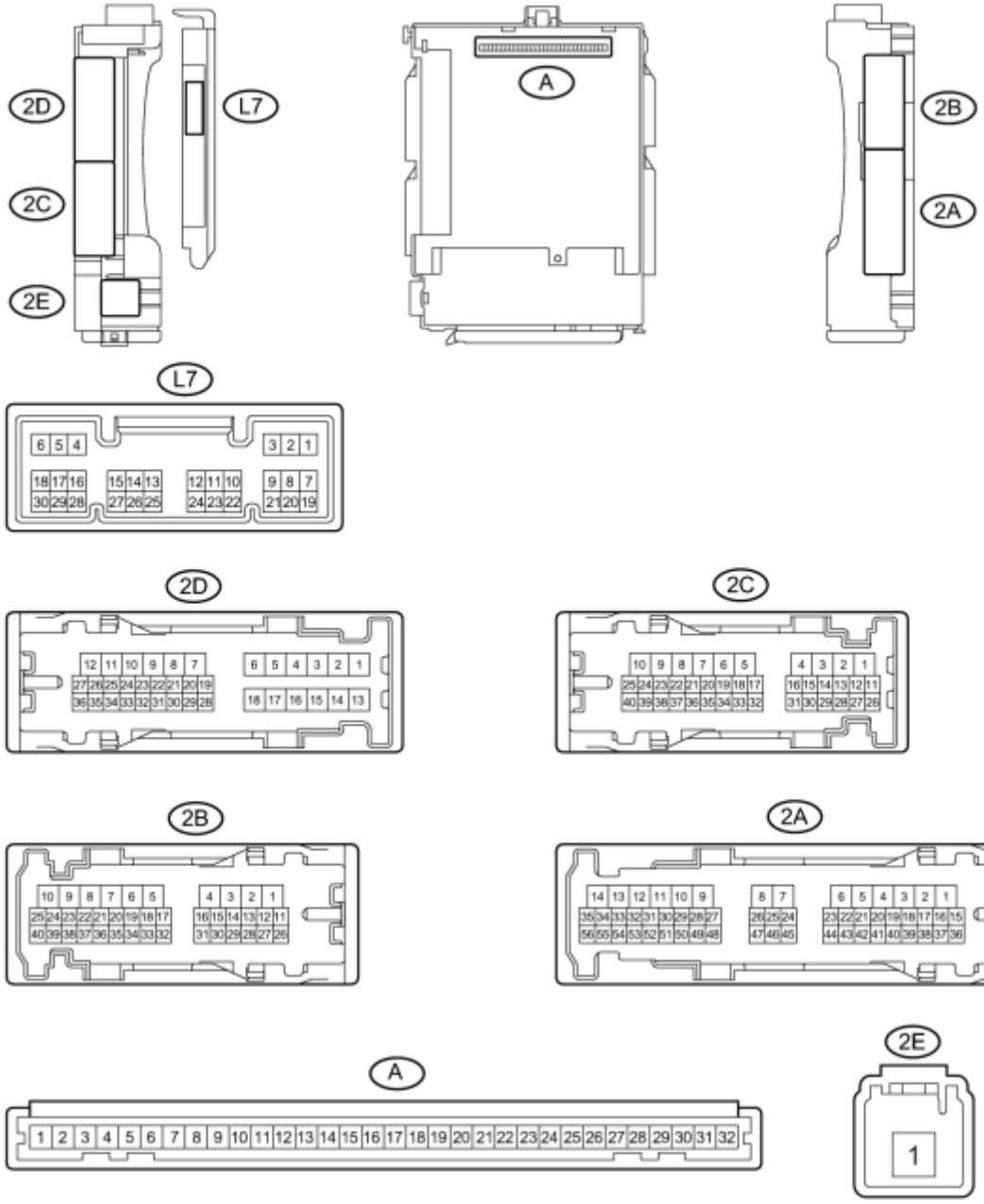
Standard Resistance:

*for Power Management Bus Main Wire*

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L6-31 (CA3P) - L6-30 (CA3N) | LG - L | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 108 to 132 Ω |
| L6-31 (CA3P) - L6-4 (E12) | LG - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L6-30 (CA3N) - L6-4 (E12) | L - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L6-31 (CA3P) - L6-7 (AM21) | LG - W | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L6-30 (CA3N) - L6-7 (AM21) | L - W | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

10. MAIN BODY ECU

*1

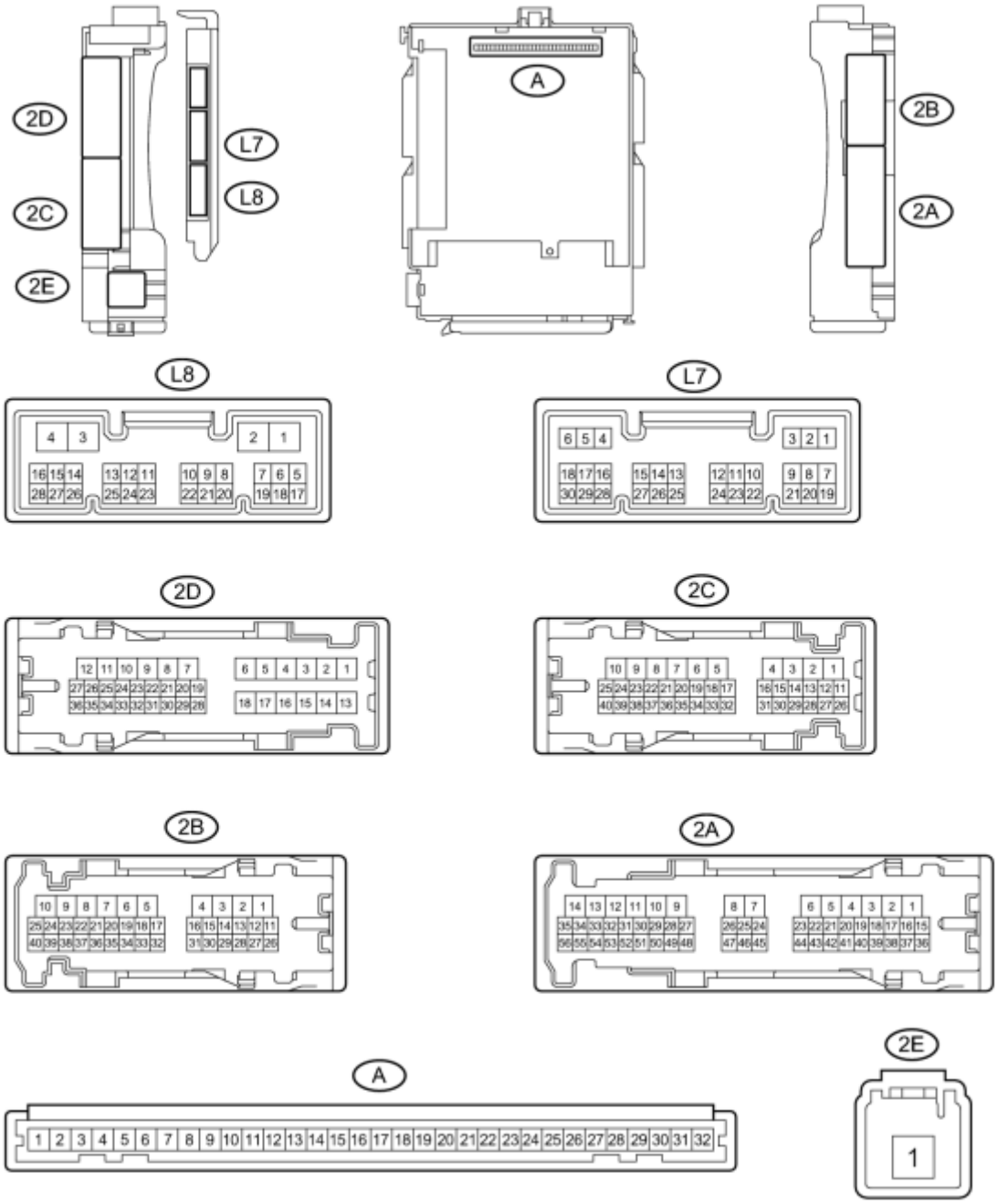



H

## *Text in Illustration*

| | |
|---|---|
| *1 | Instrument Panel Junction Block and Main Body ECU<br><br>(except Korea, w/o LED Headlight System and w/o Remote Air Conditioning System) |

*2

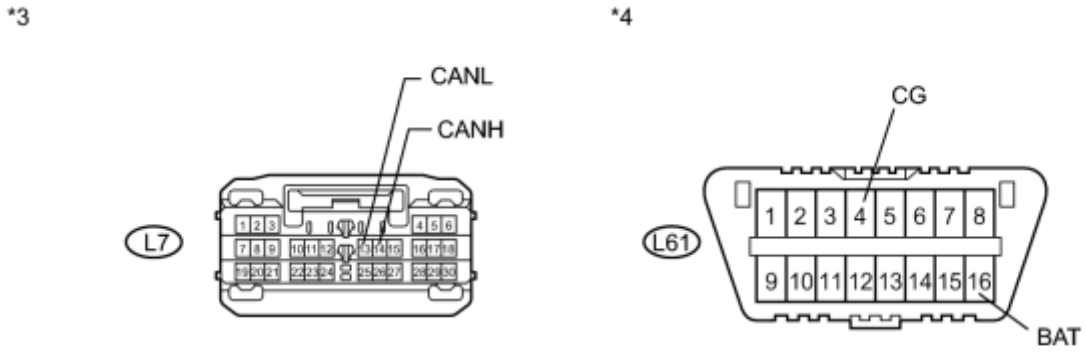



H

### *Text in Illustration*

| | |
|---|---|
| *2 | Instrument Panel Junction Block and Main Body ECU<br><br>(for Korea, w/ LED Headlight System or w/ Remote Air Conditioning System) |

(a) Disconnect the main body ECU connector.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *3 | Front view of wire harness connector<br><br>(to Main Body ECU) | *4 | DLC3 |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L7-14 (CANH) - L7-13 (CANL) | BR - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L7-14 (CANH) - L61-4 (CG) | BR - G | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L7-13 (CANL) - L61-4 (CG) | W - G | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L7-14 (CANH) - L61-16 (BAT) | BR - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L7-13 (CANL) - L61-16 (BAT) | W - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

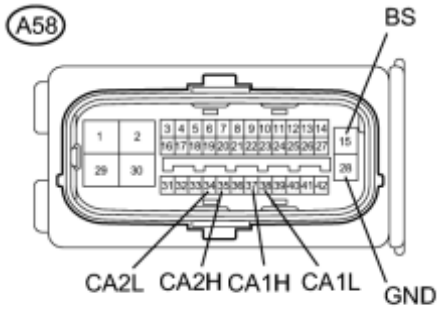
11. SKID CONTROL ECU (BRAKE BOOSTER WITH MASTER CYLINDER)

(a) Disconnect the skid control ECU (brake booster with master cylinder) connector.

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| *1 | (to Skid Control ECU) |




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*for CAN No. 1 Bus Branch Wire*

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A58-37 (CA1H) - A58-38 (CA1L) | LG - L | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| A58-37 (CA1H) - A58-28 (GND) | LG - W | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A58-38 (CA1L) - A58-28 (GND) | L - W | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A58-37 (CA1H) - A58-15 (BS) | LG - B | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| A58-38 (CA1L) - A58-15 (BS) | L - B | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

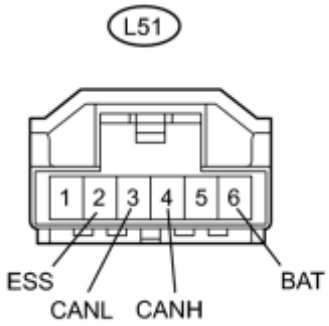
*for Power Management Bus Branch Wire*

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A58-35 (CA2H) - A58-34 (CA2L) | P - V | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| A58-35 (CA2H) - A58-28 (GND) | P - W | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A58-34 (CA2L) - A58-28 (GND) | V - W | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A58-35 (CA2H) - A58-15 (BS) | P - B | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| A58-34 (CA2L) - A58-15 (BS) | V - B | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

12. STEERING ANGLE SENSOR

*1

(a) Disconnect the steering angle sensor connector.




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Steering Angle Sensor) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L51-4 (CANH) - L51-3 (CANL) | L - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L51-4 (CANH) - L51-2 (ESS) | L - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L51-3 (CANL) - L51-2 (ESS) | W - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L51-4 (CANH) - L51-6 (BAT) | L - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L51-3 (CANL) - L51-6 (BAT) | W - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

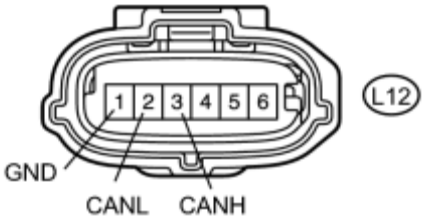
13. YAW RATE SENSOR

(a) Disconnect the yaw rate sensor connector.

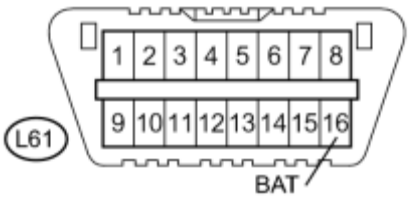
## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Yaw Rate Sensor) |
| *2 | DLC3 |

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L12-3 (CANH) - L12-2 (CANL) | Y - L | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L12-3 (CANH) - L12-1 (GND) | Y - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L12-2 (CANL) - L12-1 (GND) | L - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L12-3 (CANH) - L61-16 (BAT) | Y - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L12-2 (CANL) - L61-16 (BAT) | L - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

14. POWER STEERING ECU

(a) Disconnect the power steering ECU connectors.

*1




*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector (to Power Steering ECU) |

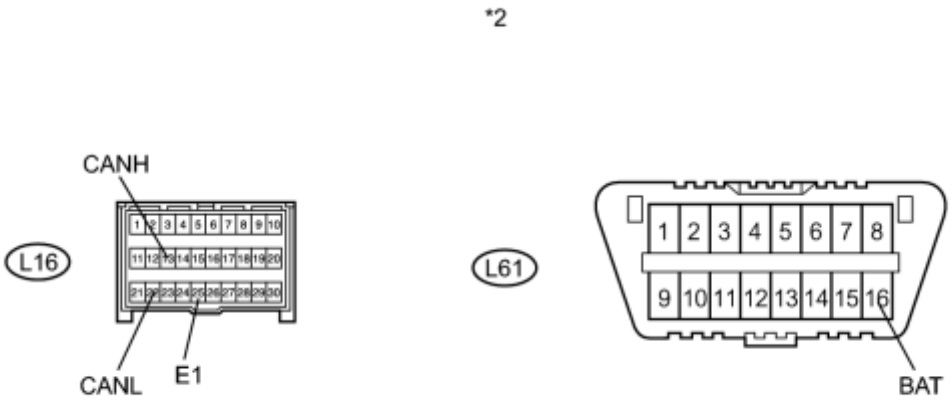
(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L54-1 (CANH) - L54-7 (CANL) | R - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L54-1 (CANH) - A27-2 (PGND) | R - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L54-7 (CANL) - A27-2 (PGND) | W - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L54-1 (CANH) - A27-1 (PIG) | R - W | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L54-7 (CANL) - A27-1 (PIG) | W - W | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

15. CENTER AIRBAG SENSOR ASSEMBLY

(a) Disconnect the center airbag sensor assembly connector.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Center Airbag Sensor Assembly) | *2 | DLC3 |

(b) Measure the resistance according to the value(s) in the table below.

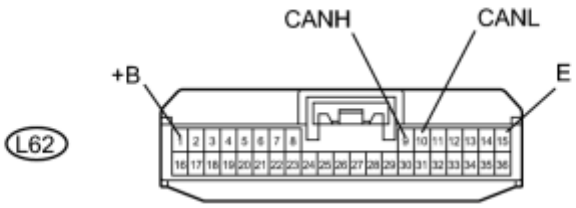
Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L16-13 (CANH) - L16-22 (CANL) | R - G | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L16-13 (CANH) - L16-25 (E1) | R - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L16-22 (CANL) - L16-25 (E1) | G - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L16-13 (CANH) - L61-16 (BAT) | R - R | CAN communication line H - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L16-22 (CANL) - L61-16 (BAT) | G - R | CAN communication line L - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

16. CERTIFICATION ECU (SMART KEY ECU)

(a) Disconnect the certification ECU connector.

*1




*Text in Illustration*

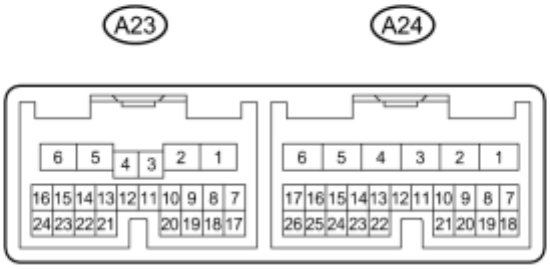
| | |
|---|---|
| *1 | Front view of wire harness connector (to Certification ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

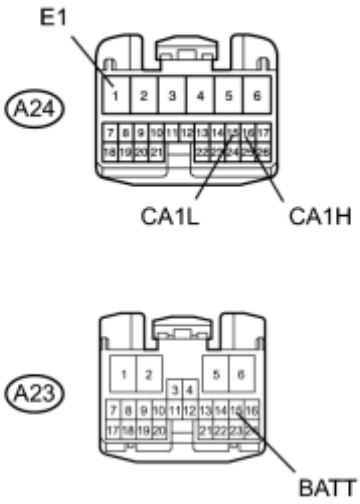
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-9 (CANH) - L62-10 (CANL) | BE - P | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L62-9 (CANH) - L62-15 (E) | BE - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L62-10 (CANL) - L62-15 (E) | P - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L62-9 (CANH) - L62-1 (+B) | BE - B | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L62-10 (CANL) - L62-1 (+B) | P - B | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

17. TRANSMISSION CONTROL ECU




H

*1




(a) Disconnect the transmission control ECU connectors.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

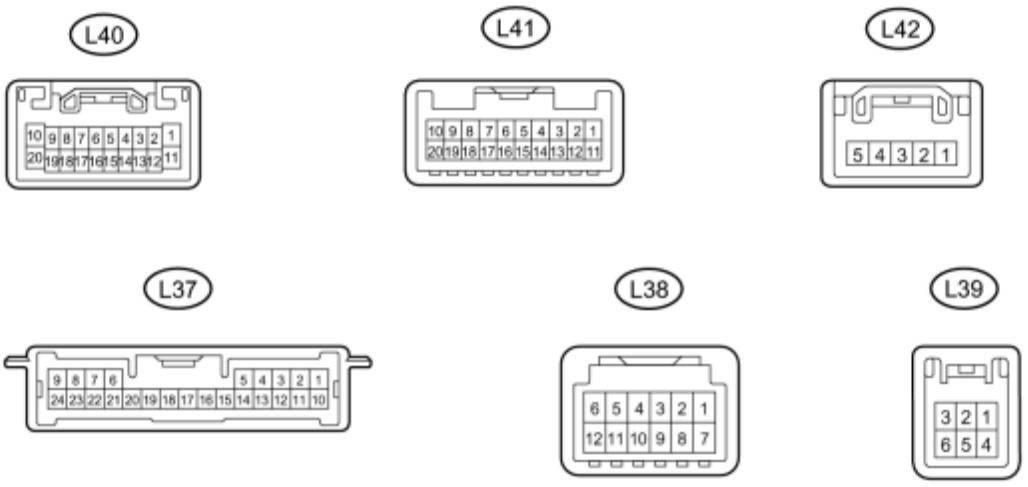
Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A24-16 (CA1H) - A24-15 (CA1L) | Y - BR | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| A24-16 (CA1H) - A24-1 (E1) | Y - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A24-15 (CA1L) - A24-1 (E1) | BR - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A24-16 (CA1H) - A23-15 (BATT) | Y - SB | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A24-15 (CA1L) - A23-15 (BATT) | BR - SB | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

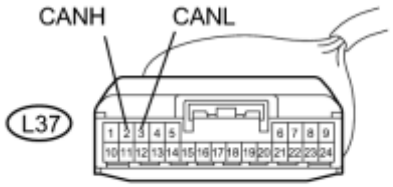
18. NAVIGATION ECU (NAVIGATION RECEIVER ASSEMBLY) (w/ Navigation System)

(a) w/ "Bluetooth" Audio System




H

*1




(1) Disconnect the navigation ECU connectors.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

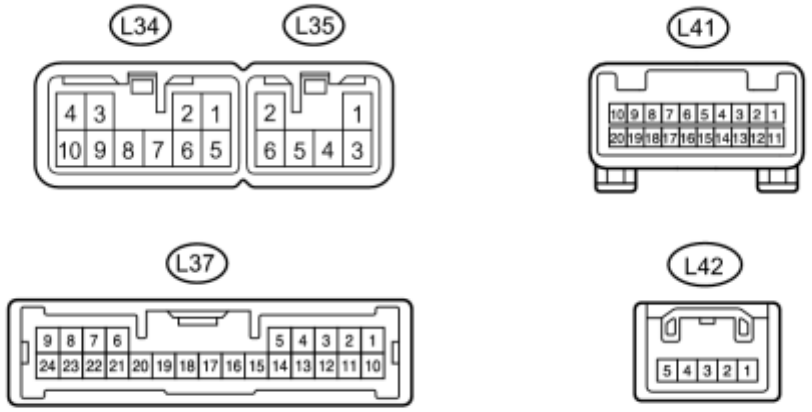



(2) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L37-2 (CANH) - L37-3 (CANL) | G - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L37-2 (CANH) - L40-20 (GND) | G - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L37-3 (CANL) - L40-20 (GND) | W - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L37-2 (CANH) - L40-1 (B) | G - SB | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L37-3 (CANL) - L40-1 (B) | W - SB | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

(b) w/o "Bluetooth" Audio System



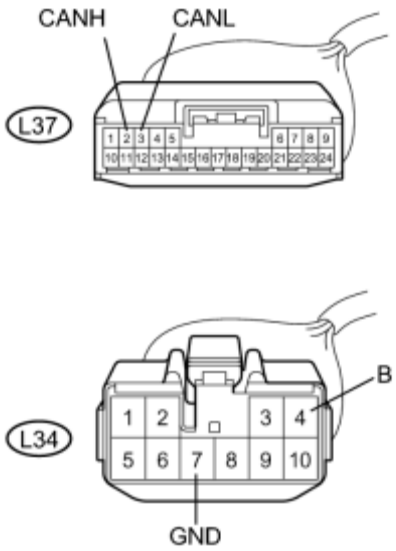

P

(1) Disconnect the navigation ECU connectors.

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

*1




(2) Measure the resistance according to the value(s) in the table below.

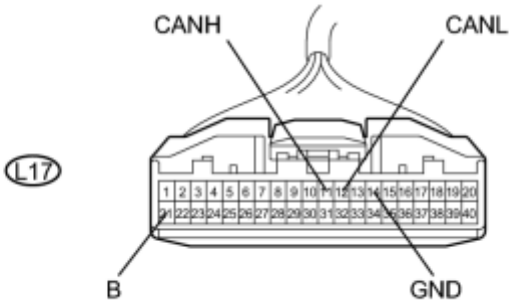
Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L37-2 (CANH) - L37-3 (CANL) | G - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L37-2 (CANH) - L34-7 (GND) | G - BR | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L37-3 (CANL) - L34-7 (GND) | W - BR | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L37-2 (CANH) - L34-4 (B) | G - SB | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L37-3 (CANL) - L34-4 (B) | W - SB | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

19. AIR CONDITIONING AMPLIFIER

(a) Disconnect the air conditioning amplifier connector.

*1




*Text in Illustration*

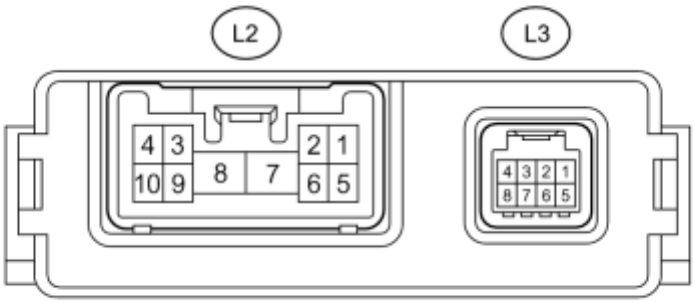
| | |
|---|---|
| *1 | Front view of wire harness connector (to Air Conditioning Amplifier) |

(b) Measure the resistance according to the value(s) in the table below.

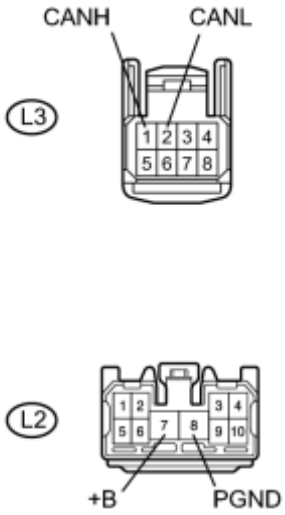
Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-11 (CANH) - L17-12 (CANL) | Y - BR | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L17-11 (CANH) - L17-14 (GND) | Y - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L17-12 (CANL) - L17-14 (GND) | BR - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L17-11 (CANH) - L17-21 (B) | Y - Y | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L17-12 (CANL) - L17-21 (B) | BR - Y | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

20. SEAT BELT CONTROL ECU (w/ Pre-collision System)




*1




(a) Disconnect the seat belt control ECU connectors.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Sear Belt Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

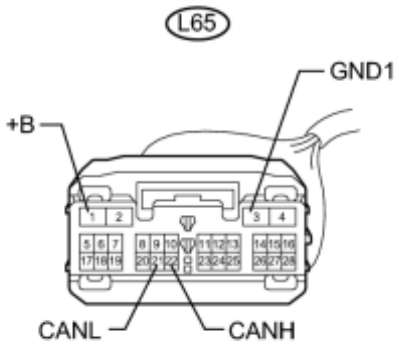
Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L3-1 (CANH) - L3-2 (CANL) | LG - L | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L3-1 (CANH) - L2-8 (PGND) | LG - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L3-2 (CANL) - L2-8 (PGND) | L - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L3-1 (CANH) - L2-7 (+B) | LG - B | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L3-2 (CANL) - L2-7 (+B) | L - B | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

21. PARKING ASSIST ECU (w/ Advanced Parking Guidance System)

*1




H

(a) Disconnect the parking assist ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Parking Assist ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

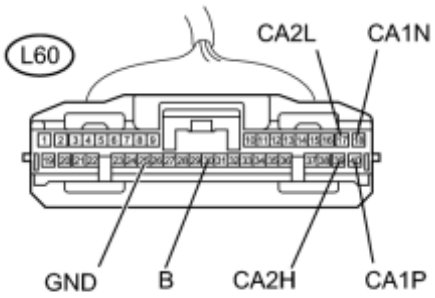
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L65-22 (CANH) - L65-21 (CANL) | Y - BR | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L65-22 (CANH) - L65-3 (GND1) | Y - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L65-21 (CANL) - L65-3 (GND1) | BR - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L65-22 (CANH) - L65-1 (+B) | Y - SB | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L65-21 (CANL) - L65-1 (+B) | BR - SB | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

22. DRIVING SUPPORT ECU (w/ Dynamic Radar Cruise Control System)

(a) Disconnect the driving support ECU connector.

## Text in Illustration

*1




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

# CAN No. 2 Bus Branch Wire

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L60-39 (CA2H) - L60-17 (CA2L) | B - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| L60-39 (CA2H) - L60-25 (GND) | B - W-B | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L60-17 (CA2L) - L60-25 (GND) | W - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L60-39 (CA2H) - L60-30 (B) | B - B | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L60-17 (CA2L) - L60-30 (B) | W - B | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

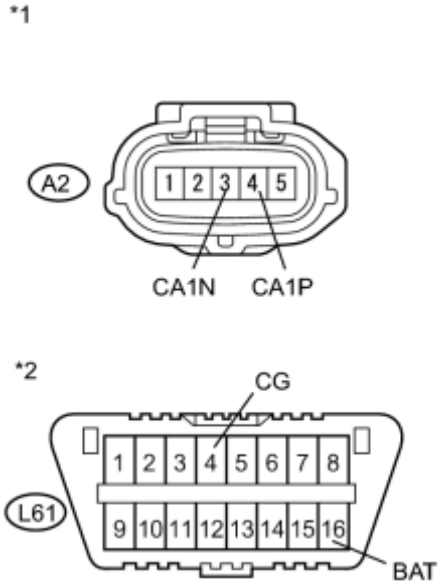
Standard Resistance:

# Parking Assist Bus Main Wire

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L60-40 (CA1P) - L60-18 (CA1N) | Y - L | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 108 to 132 Ω |
| L60-40 | Y - W- | HIGH-level | Power switch off | 200 Ω or |

| | | | | |
|---|---|---|---|---|
| (CA1P) - L60-25 (GND) | B | CAN bus line - Ground | | higher |
| L60-18 (CA1N) - L60-25 (GND) | L - W-B | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| L60-40 (CA1P) - L60-30 (B) | Y - B | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L60-18 (CA1N) - L60-30 (B) | L - B | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

23. MILLIMETER WAVE RADAR SENSOR (w/ Dynamic Radar Cruise Control System)




(a) Disconnect the millimeter wave radar sensor connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Millimeter Wave Radar Sensor) |
| *2 | DLC3 |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A2-4 (CA1P) - A2-3 (CA1N) | LG - P | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 108 to 132 Ω |
| A2-4 (CA1P)- L61-4 (CG) | LG - G | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |

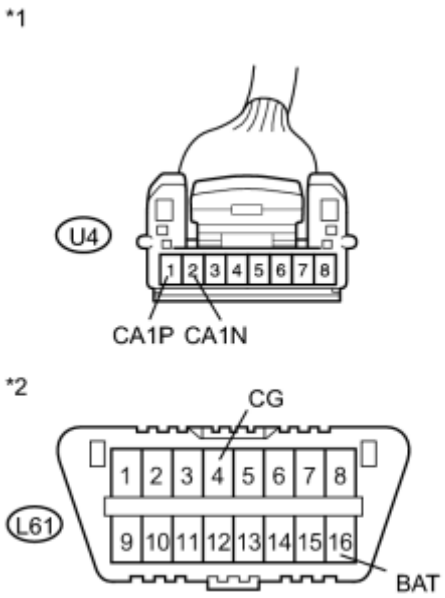
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A2-3 (CA1N) - L61-4 (CG) | P - G | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| A2-4 (CA1P) - L61-16 (BAT) | LG - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| A2-3 (CA1N) - L61-16 (BAT) | P - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

24. LANE RECOGNITION CAMERA SENSOR (w/ Lane-keeping Assist System)

(a) Disconnect the lane recognition camera sensor connector.

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Lane Recognition Camera Sensor) |
| *2 | DLC3 |




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| U4-1 (CA1P) - U4-2 (CA1N) | B - W | HIGH-level CAN bus line - LOW-level CAN bus line | Power switch off | 54 to 69 Ω |
| U4-1 (CA1P)- L61-4 (CG) | B - G | HIGH-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| U4-2 (CA1N) - L61-4 (CG) | W - G | LOW-level CAN bus line - Ground | Power switch off | 200 Ω or higher |
| U4-1 (CA1P) - L61-16 (BAT) | B - R | HIGH-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| U4-2 (CA1N) - L61-16 (BAT) | W - R | LOW-level CAN bus line - Battery positive (+) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

# DIAGNOSIS SYSTEM

1. ECUS OR SENSORS WHICH COMMUNICATE THROUGH CAN COMMUNICATION SYSTEM

(a) CAN No. 1 Bus

(1) ECM

(2) Power management control ECU

(3) Combination meter

(4) Main body ECU

(5) Power steering ECU

(6) Center airbag sensor assembly

(7) Skid control ECU (Brake booster with master cylinder)

(8) Steering angle sensor

(9) Yaw rate sensor

(10) Certification ECU (Smart key ECU)

(11) Transmission control ECU

(12) Navigation ECU (Navigation receiver assembly)*1

(b) CAN No. 2 Bus

(1) Power management control ECU

(2) Driving support ECU*2

(3) Seat belt control ECU*3

(4) Parking assist ECU*4

(c) Power Management Bus

(1) Power management control ECU

(2) ECM

(3) Skid control ECU (Brake booster with master cylinder)

(4) Air conditioning amplifier

(d) Driving Support Bus*2

(1) Driving support ECU

(2) Millimeter wave radar sensor

(3) Lane recognition camera sensor*5

HINT:

*1: w/ Navigation system

*2: w/ Dynamic radar cruise control system

*3: w/ Pre-collision system

*4: w/ Advanced parking guidance system

*5: w/ Lane-keeping assist system

2. CHECK FOR INSTALLED SYSTEMS (ECUS AND SENSORS) THAT ADOPT CAN COMMUNICATION

(a) The systems (ECUs and sensors) that adopt CAN communication vary depending on the vehicle and optional equipment. Check which systems (ECUs and sensors) are installed on the vehicle.

| ECU/Sensor Name | Techstream Display | Applicability |
|---|---|---|
| ECM | Engine | Installed on all vehicles |
| Power management ECU | • Hybrid Control<br>• Power Management1 | Installed on all vehicles |
| Transmission control ECU | Transmission Control | Installed on all vehicles |
| Combination meter | Combination Meter | Installed on all vehicles |
| Main body ECU | Main Body | Installed on all vehicles |
| Power steering ECU | EPS | Installed on all vehicles |
| Skid control ECU | ABS/VSC/TRAC | Installed on all vehicles |
| Steering angle sensor | Steering Angle Sensor | Installed on all vehicles |
| Yaw rate sensor | Yaw Rate/Deceleration Sensor | Installed on all vehicles |
| Center airbag sensor assembly | SRS Airbag | Installed on all vehicles |
| Certification ECU | Smart Access/Smart Key/Wireless Tuner | Installed on all vehicles |
| Air conditioning amplifier | Air Conditioner | Installed on all vehicles |
| Navigation ECU | AVN1 | w/ Navigation system |
| Driving support ECU | Cruise Control (ACC) | w/ Dynamic radar cruise control system |
| Millimeter wave radar sensor | - | w/ Dynamic radar cruise control |

| ECU/Sensor Name | Techstream Display | Applicability |
|---|---|---|
| | | system |
| Lane recognition camera sensor | - | w/ Lane-keeping assist system |
| Seat belt control ECU | Pre-Collision1 | w/ Pre-collision system |
| Parking assist ECU | Advanced Parking Guidance System | w/ Advanced parking guidance system |

3. CAN BUS CHECK

HINT:

The ECUs and sensors that are properly connected to the CAN communication system can be displayed using the Techstream.

(a) Using the Techstream, select "CAN Bus Check" from "System Select".

4. DTC TABLE BY ECU

HINT:

- In the CAN communication system, CAN communication system DTCs can be displayed by the ECU using the Techstream.
- If CAN communication system DTCs are output, trouble cannot be determined only by the DTCs. Perform troubleshooting according to How to Proceed with Troubleshooting INFO.

(a) Power Management Control ECU / Techstream Display "Hybrid Control"

| DTC Code | Detection Item |
|---|---|
| U0100-211 | Lost Communication with ECM/PCM "A" |
| U0100-212 | Lost Communication with ECM/PCM "A" |
| U0100-530 | Lost Communication with ECM/PCM "A" |
| U0122-732*1 | Lost Communication with Vehicle Dynamic Control Module |
| U0129-220 | Lost Communication with Brake System Control Module |
| U0129-222 | Lost Communication with Brake System Control Module |
| U0129-527 | Lost Communication with Brake System Control Module |
| U0129-528 | Lost Communication with Brake System Control Module |
| U0140-146 | Communication Error from Body ECU to HV ECU |
| U0151-763 | Communication Error from Airbag ECU to HV ECU |
| U0164-594 | Communication Error from A/C ECU to HV ECU |
| U0164-827 | Communication Error from A/C ECU to HV ECU |
| U1104-728 | Lost Communication with Driving Support ECU |
| U1107-436 | Lost Communication with Power Management Module |

HINT:

- DTC communication uses the CAN communication system.
- *1: Dynamic radar cruise control system DTC

(b) Power Management Control ECU / Techstream Display "Electric Power Control"

| DTC Code | Detection Item |
|---|---|
| U0129 | Vehicle Speed Signal Communication |
| U0140 | Lost Communication with Body Control Module |
| U0155 | Lost Communication with Instrument Panel Cluster (IPC) Control Module |
| U0293*2 | HV ECU Communication |

HINT:

- DTC communication uses the CAN communication system.
- *2: If U0293 is output alone, CAN communication is normal. Refer to Smart Key System INFO.

(c) Power Management Control ECU / Techstream Display "Power Management1"

| DTC Code | Detection Item |
|---|---|
| U0104 | Lost Communication with Cruise Control Module |
| U1002 | Lost Communication with Gateway Module |
| U1100 | Lost Communication with Pre-Collision Module |
| U110B | Lost Communication with Parking Assist Control Module "B" |

HINT:

- DTC communication uses the CAN communication system.
- "Power Management1" output DTC is communication error in the CAN No. 2 bus.

(d) Power Management Control ECU / Techstream Display "Power Management2"

| DTC Code | Detection Item |
|---|---|
| U0100 | Lost Communication with ECM / PCM |
| U0129 | Lost Communication with Brake System Control Module |
| U0164 | Lost Communication with HVAC Control Module |
| U1002 | Lost Communication with Gateway Module |

HINT:

- DTC communication uses the CAN communication system.
- "Power Management2" output DTC is communication error in the power management bus.

(e) ECM / Techstream Display "Engine"

| DTC Code | Detection Item |
|---|---|

| DTC Code | Detection Item |
|---|---|
| U0293 | Lost Communication with Hybrid Vehicle Control System |

HINT:

DTC communication uses the CAN communication system.

(f) Transmission Control ECU / Techstream Display "Transmission Control"

| DTC Code | Detection Item |
|---|---|
| U0146 | Lost Communication with Body ECU |

HINT:

DTC communication uses the CAN communication system.

(g) Power Steering ECU / Techstream Display "EPS"

| DTC Code | Detection Item |
|---|---|
| U0129 | Lost Communication with Brake System Control Module |
| U0293 | Lost Communication with Hybrid Control Module |
| U1104 | Lost Communication with Driving Support ECU |
| U1105 | Lost Communication with Parking Assist ECU |

HINT:

DTC communication uses the CAN communication system.

(h) Skid control ECU (Brake booster with master cylinder) / Techstream Display "ABS/VSC/TRAC"

| DTC Code | Detection Item |
|---|---|
| U0073 | Control Module Communication Bus OFF |
| U0123 | Lost Communication with Yaw Rate Sensor Module |
| U0124 | Lost Communication with Lateral Acceleration Sensor Module |
| U0126 | Lost Communication with Steering Angle Sensor Module |
| U0293 | Lost Communication with Hybrid Vehicle Control System |

HINT:

DTC communication uses the CAN communication system.

(i) Steering Angle Sensor / Techstream Display "Steering Angle Sensor"

HINT:

The steering angle sensor is connected to the CAN communication system, but CAN communication DTCs are not output.

(j) Yaw Rate Sensor / Techstream Display "Yaw Rate / Deceleration Sensor"

HINT:

The yaw rate and acceleration sensor is connected to the CAN communication system, but CAN communication DTCs are not output.

(k) Center Airbag Sensor Assembly / Techstream Display "SRS Airbag"

HINT:

The center airbag sensor assembly is connected to the CAN communication system, but CAN communication DTCs are not output.

(l) Main Body ECU (w/ LED Headlight System or w/ Remote Air Conditioning System)/ Techstream Display "Main Body"

| DTC Code | Detection Item |
|---|---|
| U0100 | Lost Communication with ECM/ PCM "A" |
| U0101 | Lost Communication with TCM |
| U0151 | Lost Communication with Restraints Control Module |
| U0155 | Lost Communication with Instrument Panel Cluster |
| U0164 | Lost Communication with HVAC Control Module |
| U0293 | Lost Communication with Hybrid Powertrain Control Module |
| U0327 | Software Incompatibility with Vehicle Security |
| U1133 | Lost Communication with PMN Module |

HINT:

DTC communication uses the CAN communication system.

(m) Main Body ECU (w/o LED Headlight System and w/o Remote Air Conditioning System)/ Techstream Display "Main Body"

HINT:

The main body ECU (w/o LED Headlight System and w/o Remote Air Conditioning System) is connected to the CAN communication system, but CAN communication DTCs are not output.

(n) Certification ECU / Techstream Display "Smart Access/ Smart Key/ Wireless Tuner"

| DTC Code | Detection Item |
|---|---|
| U0100 | Lost Communication with ECM / PCM "A" |
| U0142 | Lost Communication with Body Control Module "B" |

| DTC Code | Detection Item |
|---|---|
| U0155 | Lost Communication with Instrument Panel Cluster (IPC) Control Module |
| U0293 | Lost Communication with HV ECU |

HINT:

DTC communication uses the CAN communication system.

(o) Air Conditioning Amplifier / Techstream Display "Air Conditioner"

| DTC Code | Detection Item |
|---|---|
| U0100 | Communication Malfunction (Engine ECU) |
| U0101 | Lost Communication with TCM |
| U0131 | Communication Malfunction (Electric Power Steering ECU) |
| U0142 | Communication Malfunction (Main body ECU) |
| U0155 | Communication Malfunction (Meter ECU) |
| U0293 | Communication Malfunction (Navigation ECU) |

HINT:

DTC communication uses the CAN communication system.

(p) Combination Meter / Techstream Display "Combination Meter"

| DTC Code | Detection Item |
|---|---|
| U0100 | Lost Communication with ECM / PCM "A" |
| U0129 | Lost Communication with Brake System Control Module |
| U0131 | Lost Communication with Power Steering Control Module |
| U0142 | Lost Communication with Body Control Module "B" |
| U0151 | Lost Communication with Restraints Control Module |

HINT:

DTC communication uses the CAN communication system.

(q) Navigation ECU (Navigation receiver assembly) / Techstream Display "AVN1"

| DTC Code | Detection Item |
|---|---|
| U0073 | Sending Malfunction (Navigation to APGS) |

HINT:

DTC communication uses the CAN communication system.

(r) Seat Belt Control ECU / Techstream Display "Pre-Collision1"

| DTC Code | Detection Item |
|---|---|
| U0122 | Lost Communication with Vehicle Dynamics Control Module |
| U0140 | Lost Communication with J/B ECU |
| U0151 | Lost Communication with SRS Airbag ECU |
| U1104 | Lost Communication with Driving Support ECU |

HINT:

DTC communication uses the CAN communication system.

(s) Driving Support ECU / Techstream Display "Pre-Collision2"

| DTC Code | Detection Item |
|---|---|
| U0122 | Lost Communication with Vehicle Dynamics Control Module |
| U0123 | Lost Communication with Yaw Rate Sensor Module |
| U0126 | Lost Communication with Steering Angle Sensor Module |
| U0235*3 | Lost Communication with Cruise Control Front Distance Range Sensor |
| U0293 | Lost Communication with Hybrid Vehicle Control System |
| U1002 | Lost Communication with Gateway Module |
| U1100 | Lost Communication with Pre-Collision Module |
| U1104 | Lost Communication with Driving Support ECU |
| U1119*3 | Lost Communication with Object Recognition ECU |

HINT:

- DTC communication uses the CAN communication system.
- *3: If U0235 or U1119 is output alone, CAN communication is normal. Refer to Dynamic Radar Cruise Control System INFO.

(t) Driving Support ECU / Techstream Display "Cruise Control (ACC)"

| DTC Code | Detection Item |
|---|---|
| U0122 | Lost Communication with Vehicle Dynamics Control Module |
| U0123 | Lost Communication with Yaw Rate Sensor Module |
| U0126 | Lost Communication with Steering Angle Sensor Module |
| U0235*3 | Lost Communication with Cruise Control Front Distance Range Sensor |
| U0293 | Lost Communication with Hybrid Vehicle Control System |
| U1104 | Lost Communication with Driving Support ECU |

HINT:

- DTC communication uses the CAN communication system.
- *3: If U0235 is output alone, CAN communication is normal. Refer to Dynamic Radar Cruise Control System INFO.

(u) Driving Support ECU / Techstream Display "Lane Keeping Assist"

| DTC Code | Detection Item |
|---|---|
| U0122 | Lost Communication with Vehicle Dynamics Control Module |
| U0123 | Lost Communication with Yaw Rate Sensor Module |
| U0131 | Lost Communication with Power Steering Control Module |
| U0235*3 | Lost Communication with Cruise Control Front Distance Range Sensor |
| U0293 | Lost Communication with Hybrid Vehicle Control System |
| U1104 | Lost Communication with Driving Support ECU |
| U1119*4 | Lost Communication with Object Recognition ECU |

HINT:

- DTC communication uses the CAN communication system.
- *3: If U0235 is output alone, CAN communication is normal. Refer to Dynamic Radar Cruise Control System INFO.
- *4: If U1119 is output alone, CAN communication is normal. Refer to Lane-keeping Assist System INFO.

(v) Parking Assist ECU / Techstream Display "Advanced Parking Guidance System"

| DTC Code | Detection Item |
|---|---|
| U0073 | Control Module Communication Bus Off |
| U0126 | Lost Communication with Steering Angle Sensor Module |
| U0129 | Lost Communication with Brake System Control Module |
| U0131 | Lost Communication with Power Steering Control Module |
| U0140 | Lost Communication with Body Control Module |
| U0293 | Lost Communication with Hybrid Control Module |
| U1000*5 | CAN Communication Failure (Message Registry) |

HINT:

- DTC communication uses the CAN communication system.
- *5: If U1000 is output alone, CAN communication is normal. Refer to Parking Assist System INFO.

(w) Millimeter Wave Radar Sensor

HINT:

The millimeter wave radar sensor is connected to the CAN communication system, but CAN communication DTCs are not output.

(x) Lane Recognition Camera Sensor

HINT:

The lane recognition camera sensor is connected to the CAN communication system, but CAN communication DTCs are not output.

5. DTC COMBINATION TABLE

(a) CAN No. 1 Bus

| DTC | | Trouble Mode | | | |
|---|---|---|---|---|---|
| **Output ECU** | **Output DTC** | **Power Management ECU Communication Stop Mode** | **ECM Communication Stop Mode** | **Main Body ECU Communication Stop Mode** | **Combination Meter ECU Communication Stop Mode** |
| Power management control ECU (Hybrid Control) | U0100 | ○*1 | ○ | X | X |
| | U0122 | ○*1 | X | X | X |
| | U0129 | ○*1 | X | X | X |
| | U0140 | ○*1 | X | ○ | X |
| | U0151 | ○*1 | X | X | X |
| | U1107 | ○*1 | X | X | X |
| Power management control ECU (Electric Power Control) | U0129 | ○*1 | X | X | X |
| | U0140 | ○*1 | X | ○ | X |
| | U0155 | ○*1 | X | X | ○ |
| | U0293 | ○ | X | X | X |
| ECM | U0293 | ○ | ○*1 | X | X |
| Transmission control ECU | U0146 | X | X | ○ | X |
| Main body ECU*3 | U0100 | X | ○ | ○*1 | X |
| | U0101 | ○ | X | ○*1 | X |
| | U0151 | X | X | ○*1 | X |
| | U0155 | X | X | ○*1 | ○ |
| | U0164 | ○*4 | X | ○*1 | X |
| | U0293 | ○ | X | ○*1 | X |
| | U0327 | X | X | ○*1 | X |
| | U1133 | ○ | X | ○*1 | X |
| Combination meter | U0100 | X | ○ | X | ○*1 |
| | U0129 | X | X | X | ○*1 |
| | U0131 | X | X | X | ○*1 |
| | U0142 | X | X | ○ | ○*1 |

| DTC | | Trouble Mode | | | |
|---|---|---|---|---|---|
| Output ECU | Output DTC | Power Management ECU Communication Stop Mode | ECM Communication Stop Mode | Main Body ECU Communication Stop Mode | Combination Meter ECU Communication Stop Mode |
| | U0151 | X | X | X | ○*1 |
| Skid control ECU | U0073 | X | X | X | X |
| | U0123 | X | X | X | X |
| | U0124 | X | X | X | X |
| | U0126 | X | X | X | X |
| | U0293 | ○ | X | X | X |
| Power steering ECU | U0129 | X | X | X | X |
| | U0293 | ○ | X | X | X |
| | U1104 | ○*5 | X | X | X |
| | U1105 | ○*5 | X | X | X |
| Certification ECU | U0100 | X | ○ | X | X |
| | U0142 | X | X | ○ | X |
| | U0155 | X | X | X | ○ |
| | U0293 | ○ | X | X | X |
| Navigation ECU | U0073 | X | X | X | X |

| DTC | | Trouble Mode | | | |
|---|---|---|---|---|---|
| Output ECU | Output DTC | Power Steering ECU Communication Stop Mode | Skid Control ECU Communication Stop Mode | Steering Angle Sensor Communication Stop Mode | Yaw Rate Sensor Communication Stop Mode |
| Power management control ECU (Hybrid Control) | U0100 | X | X | X | X |
| | U0122 | X | ○ | X | X |
| | U0129 | X | ○ | X | X |
| | U0140 | X | X | X | X |
| | U0151 | X | X | X | X |
| | U1107 | X | X | X | X |
| Power management control ECU (Electric Power Control) | U0129 | X | ○ | X | X |
| | U0140 | X | X | X | X |
| | U0155 | X | X | X | X |
| | U0293 | X | X | X | X |
| ECM | U0293 | X | X | X | X |
| Transmission control ECU | U0146 | X | X | X | X |
| Main body | U0100 | X | X | X | X |

| DTC | | Trouble Mode | | | |
|---|---|---|---|---|---|
| Output ECU | Output DTC | Power Steering ECU Communication Stop Mode | Skid Control ECU Communication Stop Mode | Steering Angle Sensor Communication Stop Mode | Yaw Rate Sensor Communication Stop Mode |
| ECU*3 | U0101 | X | X | X | X |
| | U0151 | X | X | X | X |
| | U0155 | X | X | X | X |
| | U0164 | X | X | X | X |
| | U0293 | X | X | X | X |
| | U0327 | X | X | X | X |
| | U1133 | X | X | X | X |
| Combination meter | U0100 | X | X | X | X |
| | U0129 | X | ○ | X | X |
| | U0131 | ○ | X | X | X |
| | U0142 | X | X | X | X |
| | U0151 | X | X | X | X |
| Skid control ECU | U0073 | X | ○*1, 2 | X | ○ |
| | U0123 | X | ○*1 | X | ○ |
| | U0124 | X | ○*1 | X | ○ |
| | U0126 | X | ○*1 | ○ | X |
| | U0293 | X | ○*1 | X | X |
| Power steering ECU | U0129 | ○*1 | ○ | ○ | ○ |
| | U0293 | ○*1 | X | X | X |
| | U1104 | ○*1 | X | X | X |
| | U1105 | ○*1 | X | X | X |
| Certification ECU | U0100 | X | X | X | X |
| | U0142 | X | X | X | X |
| | U0155 | X | X | X | X |
| | U0293 | X | X | X | X |
| Navigation ECU | U0073 | X | X | X | X |

| DTC | | | | | |
|---|---|---|---|---|---|
| Output ECU | Output DTC | Center Airbag Sensor Communication Stop Mode | Certification ECU Communication Stop Mode | Transmission control Communication Stop Mode | Navigation ECU Communication Stop Mode |
| Power management | U0100 | X | X | X | X |
| | U0122 | X | X | X | X |
| | U0129 | X | X | X | X |

| DTC | | | | | |
|---|---|---|---|---|---|
| **Output ECU** | **Output DTC** | **Center Airbag Sensor Communication Stop Mode** | **Certification ECU Communication Stop Mode** | **Transmission control Communication Stop Mode** | **Navigation ECU Communication Stop Mode** |
| control ECU (Hybrid Control) | U0140 | X | X | X | X |
| | U0151 | ○ | X | X | X |
| | U1107 | X | X | X | X |
| Power management control ECU (Electric Power Control) | U0129 | X | X | X | X |
| | U0140 | X | X | X | X |
| | U0155 | X | X | X | X |
| | U0293 | X | X | X | X |
| ECM | U0293 | X | X | X | X |
| Transmission control ECU | U0146 | X | X | ○*1 | X |
| Main body ECU*3 | U0100 | X | X | X | X |
| | U0101 | X | X | X | X |
| | U0151 | ○ | X | X | X |
| | U0155 | X | X | X | X |
| | U0164 | X | X | X | X |
| | U0293 | X | X | X | X |
| | U0327 | X | ○ | X | X |
| | U1133 | X | X | X | X |
| Combination meter | U0100 | X | X | X | X |
| | U0129 | X | X | X | X |
| | U0131 | X | X | X | X |
| | U0142 | X | X | X | X |
| | U0151 | ○ | X | X | X |
| Skid control ECU | U0073 | X | X | X | X |
| | U0123 | X | X | X | X |
| | U0124 | X | X | X | X |
| | U0126 | X | X | X | X |
| | U0293 | X | X | X | X |
| Power steering ECU | U0129 | X | X | X | X |
| | U0293 | X | X | X | X |
| | U1104 | X | X | X | X |
| | U1105 | X | X | X | X |
| Certification | U0100 | X | ○*1 | X | X |

| DTC | | | | | |
|---|---|---|---|---|---|
| **Output ECU** | **Output DTC** | **Center Airbag Sensor Communication Stop Mode** | **Certification ECU Communication Stop Mode** | **Transmission control Communication Stop Mode** | **Navigation ECU Communication Stop Mode** |
| ECU | U0142 | X | ○*1 | X | X |
| | U0155 | X | ○*1 | X | X |
| | U0293 | X | ○*1 | X | X |
| Navigation ECU | U0073 | X | X | X | ○*1 |

HINT:

- ○: Set
- X: Not set or may be set according to the malfunctioning part when one side of the CAN branch wire opens.
- *1: DTC is not output during communication error, but will be output as a history DTC (past DTC) when communication returns to normal.
- *2: DTC U0100, U0123, U0124 and U0126 are not stored when DTC U0073 has already been stored.
- *3: w/ LED headlight system or w/ remote air conditioning system
- *4: If the power management bus circuit is normal
- *5: If the CAN No. 2 bus circuit is normal
- Skid Control ECU Communication Stop Mode INFO
- Power Steering ECU Communication Stop Mode INFO
- Steering Angle Sensor Communication Stop Mode INFO
- Yaw Rate Sensor Communication Stop Mode INFO
- ECM Communication Stop Mode INFO
- Transmission Control ECU Communication Stop Mode INFO
- Main Body ECU Communication Stop Mode INFO
- Combination Meter ECU Communication Stop Mode INFO
- Center Airbag Sensor Communication Stop Mode INFO
- Certification ECU Communication Stop Mode INFO
- Power Management ECU Communication Stop Mode INFO

# FAIL-SAFE CHART

1. FAIL-SAFE FUNCTION

(a) When communication fails in any of the CAN bus wires (communication wires), a fail-safe function(s) will operate. The fail-safe function that is specified for each system operates to prevent those systems from malfunctioning.

(b) The following table shows the effects on each system when communication is impossible. (For further details, see the pages for each system.)

| Function<br><br>(Function Description) | Control Master | System Related | Fail-safe Operation | DTC<br><br>(Driver Detectable) |
|---|---|---|---|---|
| Power switch<br><br>(Power source control) | Power management control ECU | • Transmission control ECU<br>• Skid control ECU<br>• Main body ECU | • Power switch does not change to on (READY) even when power switch is pressed with the brake pedal depressed<br>• Power switch off is prohibited | U0073<br><br>U0129<br><br>U0293<br><br>(Warning and indicator lights come on) |
| Hybrid driving control | Power management control ECU | ECM | Only motor operation is used (Engine is not used) | U0100<br><br>(Warning and indicator lights come on) |
| Shift position indicator display | Transmission control ECU | • Transmission control ECU<br>• Main body ECU<br>• Combination meter | Shift position indicator is not displayed | U0146<br><br>(Warning and indicator lights come on) |
| Regenerative braking control | Power management control ECU | Skid control ECU | Regenerative braking will stop<br><br>(ABS/VSC control gradually stops) | U0073<br><br>U0129<br><br>U0293<br><br>(Warning and indicator lights come on) |
| VSC control | Skid control ECU | • Power management | ABS/VSC control is | U0073 |

| Function<br><br>(Function Description) | Control Master | System Related | Fail-safe Operation | DTC<br><br>(Driver Detectable) |
|---|---|---|---|---|
| (Controls driving force while VSC operating) | | control ECU<br>• Yaw rate sensor<br>• Steering angle sensor | inoperative<br><br>(ABS/VSC control gradually stops) | U0123<br><br>U0124<br><br>U0126<br><br>U0293<br><br>(Warning and indicator lights come on) |
| ABS control<br><br>(Controls driving force while ABS operating) | Skid control ECU | Yaw rate sensor | ABS control is inoperative<br><br>(ABS control gradually stops) | U0073<br><br>U0123<br><br>U0124<br><br>(Warning and indicator lights come on) |
| TRAC control<br><br>(Engine power control by VSC/TRAC) | Skid control ECU | • Power management control ECU<br>• Yaw rate sensor<br>• Steering angle sensor | ABS/VSC control is inoperative<br><br>(ABS/VSC control gradually stops) | U0073<br><br>U0123<br><br>U0124<br><br>U0126<br><br>U0293<br><br>(Warning and indicator lights come on) |
| Electric power steering control<br><br>(Speed of vehicle induction type torque control) | Power steering ECU | • Power management control ECU<br>• Skid control ECU | Depression of EPS assist<br><br>(Deterioration of steering assist) | U0129<br><br>U0293<br><br>(Warning light comes on) |
| Air conditioning | Air conditioning amplifier | • Power management | Air conditioning function and PTC heater function | U0100 |

| Function<br><br>(Function Description) | Control Master | System Related | Fail-safe Operation | DTC<br><br>(Driver Detectable) |
|---|---|---|---|---|
| control<br><br>(Air conditioning control is in cabin) | | control ECU<br>• ECM<br>• Combination meter<br>• Main body ECU | stop | U0142<br><br>U0155<br><br>U0293<br><br>(Air conditioning is inoperative) |
| Entry function/Power door lock control | • Certification ECU<br>• Main Body ECU | • ECM<br>• Combination meter<br>• Power management control ECU | Unlock permitted | U0100<br><br>U0142<br><br>U0155<br><br>U0293<br><br>U0327<br><br>(Wireless door lock cannot operate) |
| Vehicle-to-vehicle distance control | Driving support ECU | • Power management control ECU<br>• Skid control ECU<br>• ECM<br>• Steering angle sensor<br>• Yaw rate sensor | Vehicle-to-vehicle distance control does not operate | U0122<br><br>U0123<br><br>U0126<br><br>U0293<br><br>(Warning and indicator lights come on) |
| Lane keeping assist system | Driving support ECU | • Main body ECU<br>• Skid control ECU<br>• Yaw rate sensor<br>• EPS ECU | Lane-keeping assist is inoperative | U0122<br><br>U0123<br><br>U0131<br><br>(Warning and indicator lights come on) |

| Function<br><br>(Function Description) | Control Master | System Related | Fail-safe Operation | DTC<br><br>(Driver Detectable) |
|---|---|---|---|---|
| Pre-collision system | Driving support ECU | • Power management control ECU<br>• Skid control ECU<br>• ECM<br>• Steering angle sensor<br>• Yaw rate sensor<br>• Seat belt control ECU | Pre-collision control is inoperative | U0122<br><br>U0123<br><br>U0126<br><br>U0293<br><br>U1104<br><br>U1100<br><br>(Warning and indicator lights come on) |
| | Seat belt control ECU | • Skid control ECU<br>• Driving support ECU<br>• Center airbag sensor<br>• Main body ECU | Pre-collision control is inoperative | U0122<br><br>U0140<br><br>U0151<br><br>U1104<br><br>(Warning and indicator lights come on) |
| Advanced parking guidance system | Parking assist ECU | • Power management control ECU<br>• EPS ECU<br>• Skid control ECU<br>• Steering angle sensor<br>• Main body ECU<br>• Air conditioning amplifier | Advanced parking guidance is inoperative | U0073<br><br>U0126<br><br>U0129<br><br>U0131<br><br>U0140<br><br>U0293 |

# DIAGNOSTIC TROUBLE CODE CHART

*Power Management Control ECU Output DTCs (Techstream Display/Power Management1)*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| U0104 | Lost Communication with Driving Support ECU | 1. Driving support ECU branch wire or connector<br><br>2. Power source circuit of driving support ECU<br><br>3. Driving support ECU | INFO |
| U1002 | Lost Communication with Gateway Module (Power Management1) | 1. Open or short in CAN No. 2 bus main wire or connector<br><br>2. Open or short in CAN No. 2 bus branch wire or connector<br><br>3. Power management control ECU<br><br>4. Driving support ECU<br><br>5. Seat belt control ECU<br><br>6. Parking assist ECU<br><br>7. CAN No. 3 junction connector | INFO |
| U1100 | Lost Communication with Seat Belt Control ECU | 1. Seat belt control ECU branch wire or connector<br><br>2. Power source circuit of seat belt control ECU<br><br>3. Seat belt control ECU | INFO |
| U110B | Lost Communication with Parking Assist Control Module "B" | 1. Parking assist ECU branch wire or connector<br><br>2. Power source circuit of parking assist ECU<br><br>3. Parking assist ECU | INFO |

*Power Management Control ECU Output DTCs (Techstream Display/Power Management2)*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| U0100 | Lost Communication with ECM / PCM | 1. ECM main wire or connector | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | 2. Power source circuit of ECM<br><br>3. ECM | |
| U0129 | Lost Communication with Brake System Control Module | 1. Skid control ECU branch wire or connector<br><br>2. Power source circuit of skid control ECU<br><br>3. Skid control ECU | INFO |
| U0164 | Lost Communication with A/C ECU | 1. Air conditioning amplifier branch wire or connector<br><br>2. Power source circuit of air conditioning amplifier<br><br>3. Air conditioning amplifier | INFO |
| U1002 | Lost Communication with Gateway Module (Power Management2) | 1. Open or short in power management bus main wire or connector<br><br>2. Open or short in power management bus branch wire or connector<br><br>3. Power management control ECU<br><br>4. ECM<br><br>5. Air conditioning amplifier<br><br>6. Skid control ECU<br><br>7. CAN No. 4 junction connector | INFO |

*Driving Support ECU Output DTCs (Techstream Display/Pre-Collision2)*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| U1002 | Lost Communication with Gateway Module (Parking Assist Bus) | 1. Open or short in parking assist bus main wire or connector<br><br>2. Open or short in parking assist bus branch wire or connector<br><br>3. Driving support ECU<br><br>4. CAN No. 5 junction connector | INFO |

| DTC | U0100 | Lost Communication with ECM / PCM |
|---|---|---|

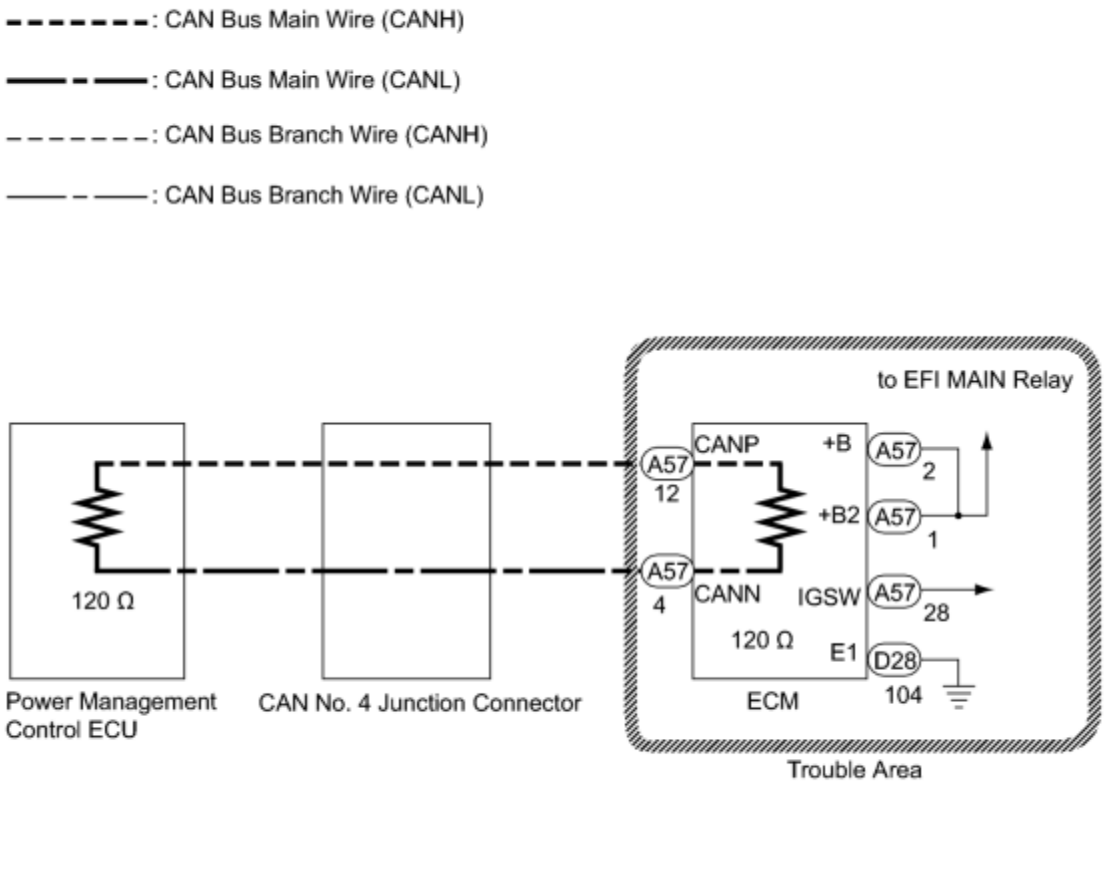
# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0100 | No communication from the ECM continues. | • ECM main wire or connector<br>• Power source circuit of ECM<br>• ECM |

HINT:

The diagnosis procedure is for when DTC U0100 is output by the power management control ECU (Techstream display: Power Management2).

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | RECONFIRM DTC OUTPUT |

(a) Reconfirm DTCs.

HINT:

If CAN power management bus DTC U1002 is output from the power management control ECU (Techstream display/Power Management2), troubleshoot for U1002 and check for malfunctions in the power management main bus circuit.

Result:

| Result | Proceed to |
|---|---|
| U1002 is not output from power management control ECU (Techstream display/Power Management2) | A |
| U1002 is output from power management control ECU (Techstream display/Power Management2) | B |

B ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

A ▼

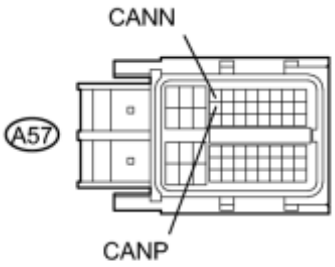
| | |
|---|---|
| 2. | CHECK CAN BUS WIRE FOR DISCONNECTION (ECM MAIN WIRE/POWER MANAGEMENT BUS) |

(a) Turn the power switch off.

(b) Disconnect the ECM connector.

*1

## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-12 (CANP) - A57-4 (CANN) | Power switch off | 108 to 132 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (ECM MAIN WIRE)

OK

▼

| | |
|---|---|
| 3. | CHECK ECM POWER SOURCE CIRCUIT |

(a) Check for the ECM power source circuit INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK ▶ **REPLACE ECM**

| DTC | U0104 | Lost Communication with Driving Support ECU |
|---|---|---|

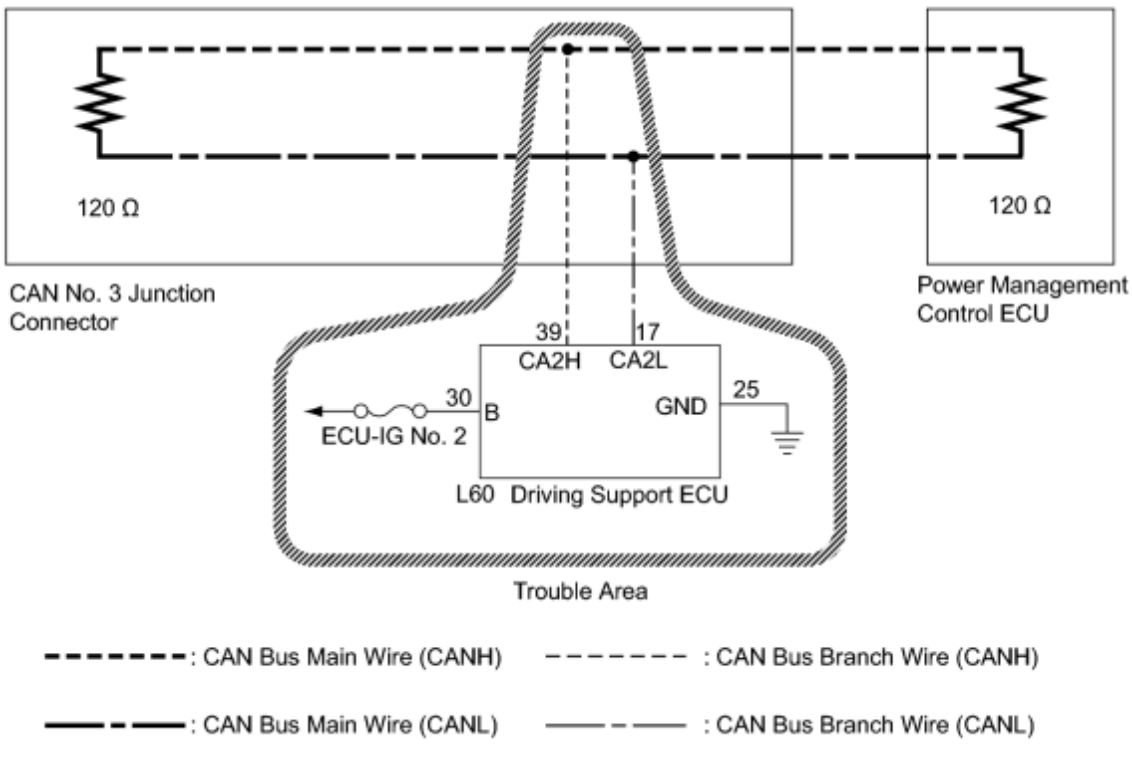
# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0104 | No communication from the driving support ECU continues. | • Driving support ECU branch wire or connector<br>• Power source circuit of driving support ECU<br>• Driving support ECU |

HINT:

The diagnosis procedure is for when DTC U0104 is output by the power management control ECU (Techstream display: Power Management1).

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | RECONFIRM DTC OUTPUT |

(a) Reconfirm DTCs.

HINT:

If CAN No. 2 bus DTC U1002 is output from the power the management control ECU (Techstream display/Power Management1), troubleshoot for U1002 and check for malfunctions in the CAN No. 2 main bus circuit.

Result:

| Result | Proceed to |
|---|---|
| U1002 is not output from power management control ECU (Techstream display/Power Management1) | A |
| U1002 is output from power management control ECU (Techstream display/Power Management1) | B |

B ▶ GO TO CIRCUITS INDICATED BY OUTPUT DTCS

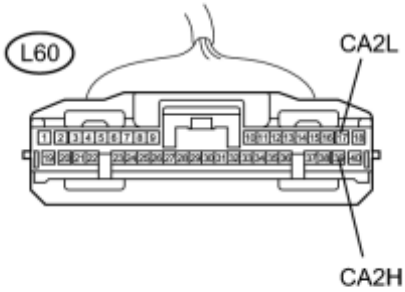
A

▼

| | |
|---|---|
| 2. | CHECK CAN BUS WIRE FOR DISCONNECTION (DRIVING SUPPORT ECU BRANCH WIRE) |

(a) Turn the power switch off.

*1




(b) Disconnect the driving support ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L60-39 (CA2H) - L60-17 (CA2L) | Power switch off | 54 to 69 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (DRIVING SUPPORT ECU BRANCH WIRE)

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Turn the power switch on (IG).

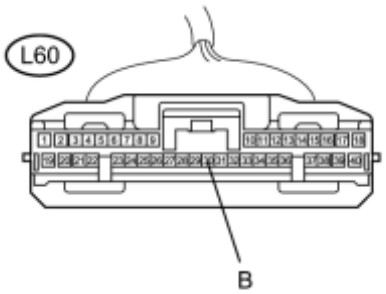
(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L60-30 (B) - Body ground | Power switch on (IG) | 11 to 14 V |

# Text in Illustration

*1




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

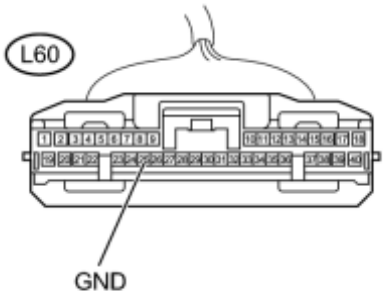
OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L60-25 (GND) - Body ground | Always | Below 1 Ω |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

NG ▶ HARNESS OR CONNECTOR (GROUND CIRCUIT)

OK ▶ **REPLACE DRIVING SUPPORT ECU**

| DTC | U0129 | Lost Communication with Brake System Control Module |
|---|---|---|

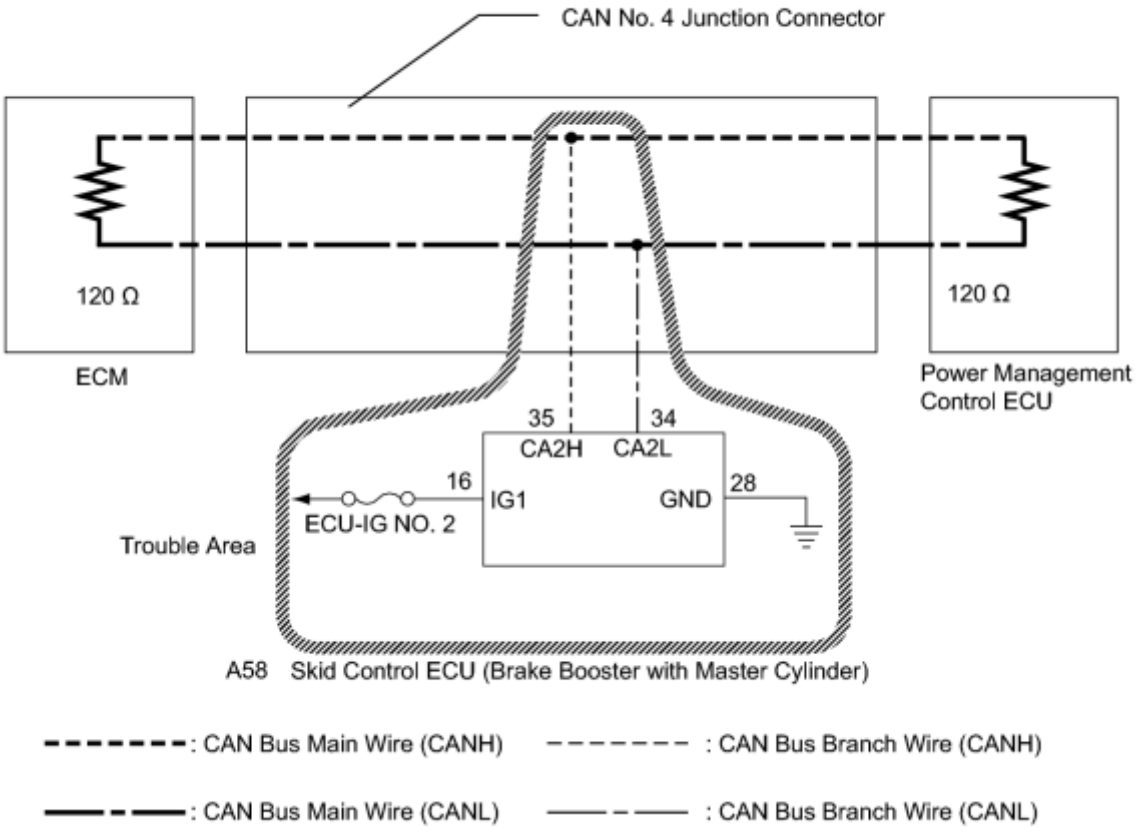
# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0129 | No communication from the skid control ECU continues. | • Skid control ECU branch wire or connector<br>• Power source circuit of skid control ECU<br>• Skid control ECU (Brake booster with master cylinder) |

HINT:

The diagnosis procedure is for when DTC U0129 is output by the power management control ECU (Techstream display: Power Management2).

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | RECONFIRM DTC OUTPUT |

(a) Reconfirm DTCs.

HINT:

If power management bus DTC U1002 is output from the power management control ECU (Techstream display/Power Management2), troubleshoot for U1002 and check for malfunctions in the power management main bus circuit.

Result:

| Result | Proceed to |
|---|---|
| U1002 is not output from power management control ECU (Techstream display/Power Management2) | A |
| U1002 is output from power management control ECU (Techstream display/Power Management2) | B |

B ▶ GO TO CIRCUITS INDICATED BY OUTPUT DTCS

A ▼

| | |
|---|---|
| 2. | CHECK DTC (BRAKE SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

OK:

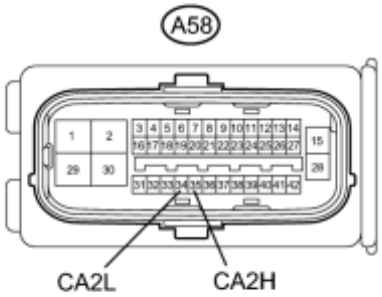
DTC C1241 is not output.

NG ▶ GO TO CIRCUITS INDICATED BY OUTPUT DTCS
OK
▼

| | |
|---|---|
| 3. | CHECK CAN BUS WIRE FOR DISCONNECTION (SKID CONTROL ECU) |

(a) Turn the power switch off.

*1




(b) Disconnect the skid control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A58-35 (CA2H) - A58-34 (CA2L) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (SKID CONTROL ECU BRANCH WIRE)
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER (SKID CONTROL ECU)**

| DTC | U0164 | Lost Communication with A/C ECU |
|---|---|---|

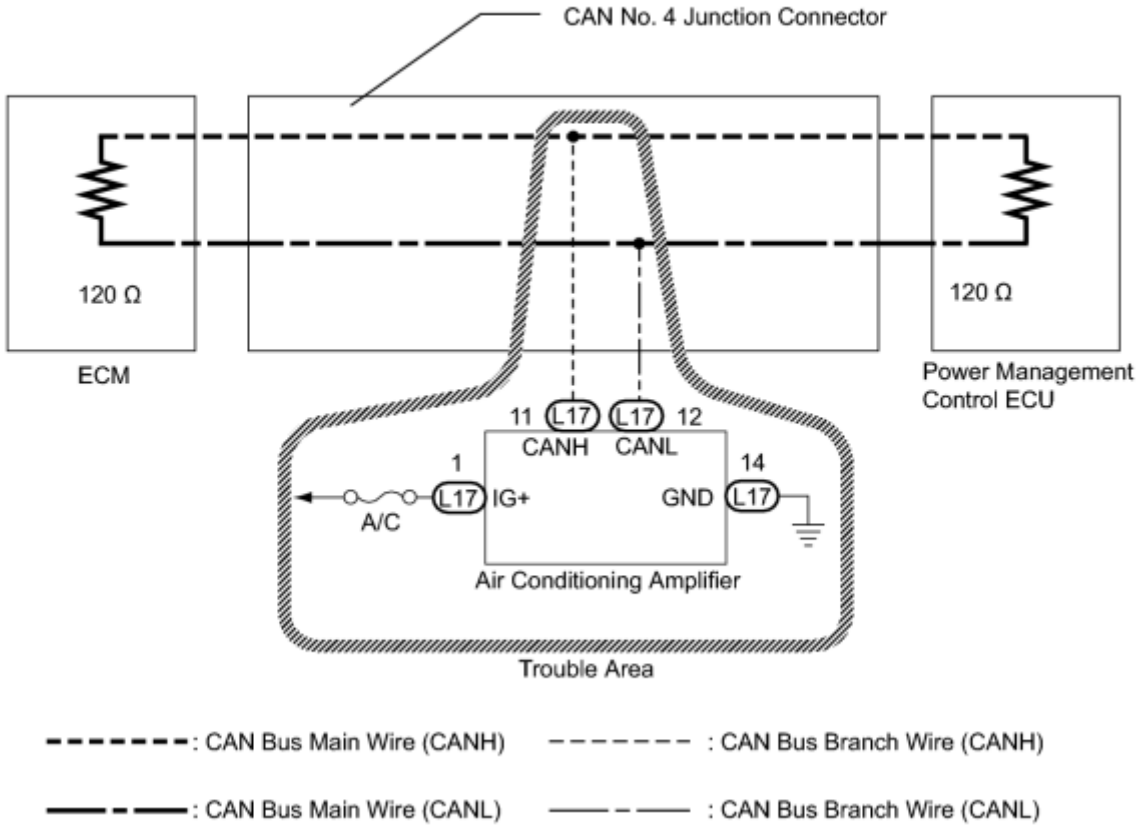
# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0164 | No communication from the air conditioning amplifier continues. | • Air conditioning amplifier branch wire or connector<br>• Power source circuit of air conditioning amplifier<br>• Air conditioning amplifier |

HINT:

The diagnosis procedure is for when DTC U0164 is output by the power management control ECU (Techstream display: Power Management2).

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | RECONFIRM DTC OUTPUT |

(a) Reconfirm DTCs.

HINT:

If power management bus DTC U1002 is output from the power management control ECU (Techstream display/Power Management2), troubleshoot for U1002 and check for malfunctions in the power management main bus circuit.

Result:

| Result | Proceed to |
|---|---|
| U1002 is not output from power management control ECU (Techstream display/Power Management2) | A |
| U1002 is output from power management control ECU (Techstream display/Power Management2) | B |

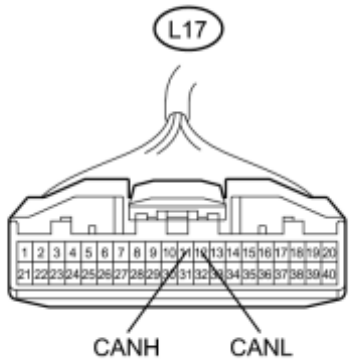
B ▶ GO TO CIRCUITS INDICATED BY OUTPUT DTCS

A ▼

| | |
|---|---|
| 2. | CHECK CAN BUS WIRE FOR DISCONNECTION (AIR CONDITIONING AMPLIFIER BRANCH WIRE) |

(a) Turn the power switch off.

*1




(b) Disconnect the air conditioning amplifier connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Conditioning Amplifier) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L17-11 (CANH) - L17-12 (CANL) | Power switch off | 54 to 69 Ω |

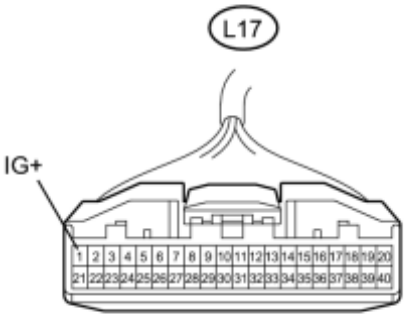
NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (AIR CONDITIONING AMPLIFIER BRANCH WIRE)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Turn the power switch on (IG).

*1




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L17-1 (IG+) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Conditioning Amplifier) |

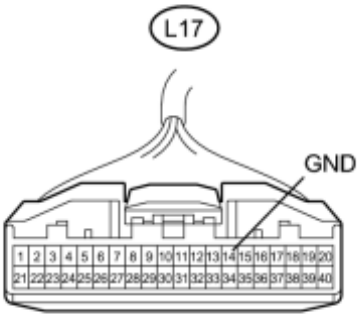
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK ▼

| | |
|---|---|
| 4. | CHECK FRONT AND SIDE MONITOR SYSTEM (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-14 (GND) - Body ground | Always | Below 1 Ω |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Conditioning Amplifier) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)
OK ▶ **REPLACE AIR CONDITIONING AMPLIFIER**

| DTC | U1002 | Lost Communication with Gateway Module (Power Management1) |
|---|---|---|

# DESCRIPTION

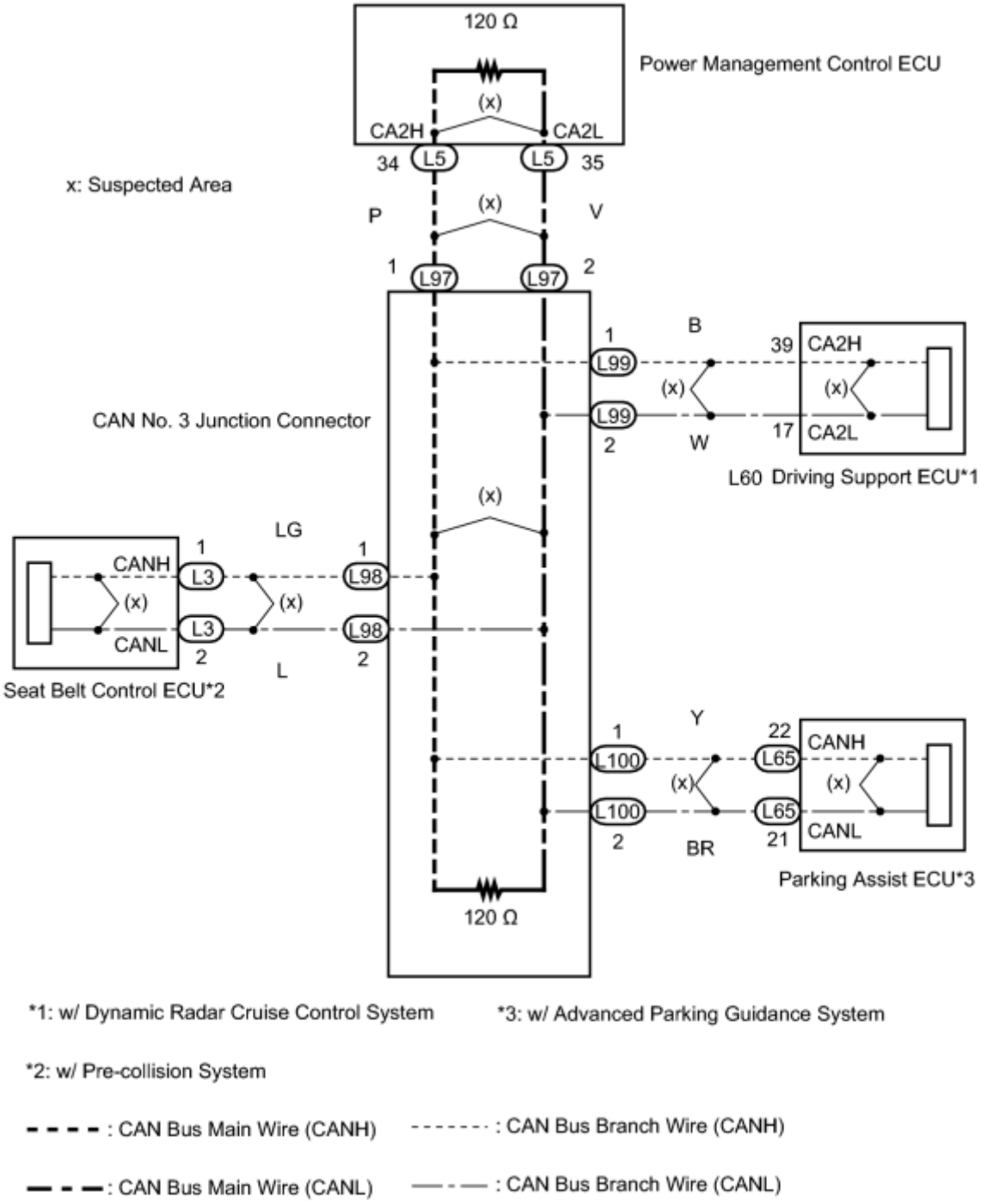
- The power management control ECU will store this DTC when no signals can be received from the ECUs that have been memorized as those that are connected to the CAN No. 2 bus.
- When the power management control ECU receives a response signal from the ECUs connected to the CAN No. 2 bus, the power management control ECU recognizes and memorizes that the ECU is connected to the CAN No. 2 bus. Based on this memorized data, the power management control ECU monitors for malfunctions in the ECUs connected to the CAN No. 2 bus when communicating with those ECUs. If the power management control ECU cannot receive response signals from the ECUs that have been memorized as those connected to the CAN No. 2 bus, the power management control ECU determines that a malfunction exists.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U1002 | Power management control ECU cannot receive signals from all ECUs that have been memorized as those connected to the CAN No. 2 bus. | • Open or short in CAN No. 2 bus main wire or connector<br>• Open or short in CAN No. 2 bus branch wire or connector<br>• Power management control ECU<br>• Driving support ECU<br>• Seat belt control ECU<br>• Parking assist ECU<br>• CAN No. 3 junction connector |

HINT:

The diagnosis procedure is for when DTC U1002 is output by the power management control ECU (Techstream display: Power Management1).

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.

- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

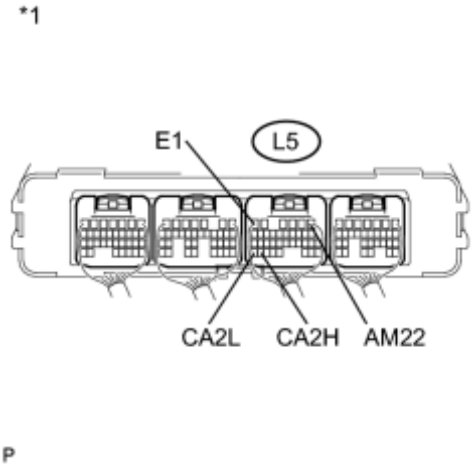
# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN NO. 2 BUS WIRE |

(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition | Result |
|---|---|---|---|
| L5-34 (CA2H) - L5-35 (CA2L) | Power switch off | 54 to 69 Ω | Below 54 Ω: Short circuit between bus lines |
| | | | 70 Ω or higher: Open circuit in a main bus line |
| L5-34 (CA2H) - L5-6 (E1) | Power switch off | 200 Ω or higher | Below 200 Ω: CANH ground short |
| L5-35 (CA2L) - L5-6 (E1) | Power switch off | 200 Ω or higher | Below 200 Ω: CANL ground short |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected |

| | |
|---|---|
| | (Power Management Control ECU) |

(c) Disconnected the cable from the negative (-) battery terminal.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Result |
|---|---|---|---|
| L5-34 (CA2H) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANH +B short |
| L5-35 (CA2L) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANL +B short |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| Open circuit in CAN main bus line | B |
| Short circuit between bus lines | C |
| • Ground short<br>• +B short | D |

D ▶ CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (POWER MANAGEMENT CONTROL ECU)

C ▶ CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (POWER MANAGEMENT CONTROL ECU)

B ▶ CHECK FOR OPEN IN CAN NO. 2 BUS MAIN WIRE (POWER MANAGEMENT CONTROL ECU MAIN WIRE)

A

▼

| | |
|---|---|
| 2. | CHECK CAN BUS BRANCH WIRE |

HINT:

For vehicles with the dynamic radar cruise control system, go to the next step.

(a) For vehicles without the dynamic radar cruise control system:

(1) Check for the parking assist ECU branch wire and ECU power source circuit INFO.

NG REPAIR OR REPLACE WIRE HARNESS

OK

| | |
|---|---|
| 3. | CHECK DTC OUTPUT |

(a) Clear the DTC.

(b) Turn the power switch off.

(c) Turn the power switch on (IG), recheck the DTC.

Result:

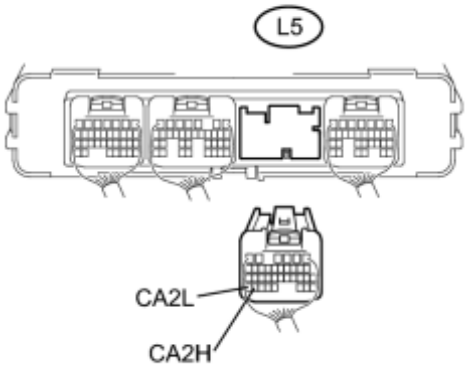
| Result | Proceed to |
|---|---|
| U1002 is output from power management control ECU<br><br>(Techstream display/ Power Management1) | A |
| Other DTC is output | B |

B GO TO CIRCUITS INDICATED BY OUTPUT DTCS

A **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 4. | CHECK FOR OPEN IN CAN NO. 2 BUS MAIN WIRE (POWER MANAGEMENT CONTROL ECU MAIN WIRE) |

*1




P

(a) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

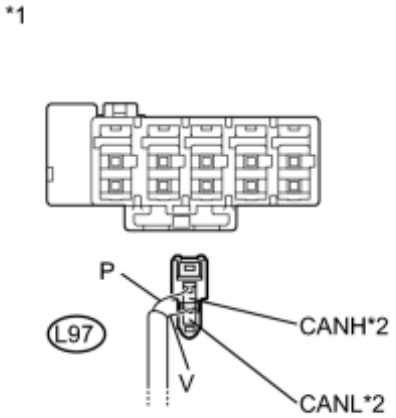
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-34 (CA2H) - L5-35 (CA2L) | Power switch off | 108 to 132 Ω |

NG CHECK FOR OPEN IN CAN NO. 2 BUS MAIN WIRE (CAN NO. 3 J/C)

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 5. | CHECK FOR OPEN IN CAN NO. 2 BUS MAIN WIRE (CAN NO. 3 J/C) |

(a) Reconnect the power management control ECU connector.




(b) Disconnect the power management control ECU main wire connector from the CAN No. 3 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 3 Junction Connector) |
| *2 | to Power Management Control ECU |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Connected to |
|---|---|---|---|
| L97-1 (CANH) - L97-2 (CANL) | Power switch off | 108 to 132 Ω | Power management control ECU |

NG REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 3 J/C - POWER MANAGEMENT CONTROL ECU)

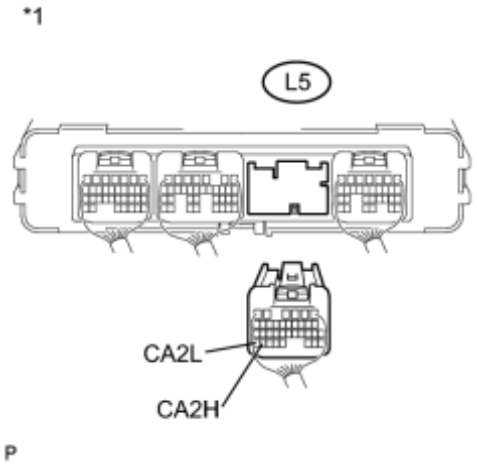
OK **REPLACE CAN NO. 3 JUNCTION CONNECTOR**

| | |
|---|---|
| 6. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

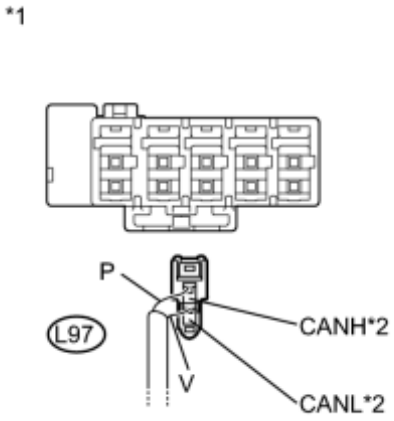
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-34 (CA2H) - L5-35 (CA2L) | Power switch off | 108 to 132 Ω |

NG ▶ CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (CAN NO. 3 J/C - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 7. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (CAN NO. 3 J/C - POWER MANAGEMENT CONTROL ECU) |

(a) Reconnect the power management control ECU connector.




(b) Disconnect the power management control ECU main wire connector from the CAN No. 3 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 3 Junction Connector) |
| *2 | to Power Management Control ECU |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Connected to |
|---|---|---|---|
| L97-1 (CANH) - L97-2 (CANL) | Power switch off | 108 to 132 Ω | Power management control ECU |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 3 J/C - POWER MANAGEMENT CONTROL ECU)

OK

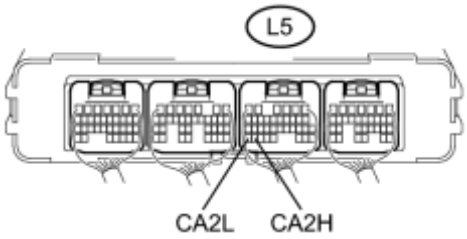
▼

| | |
|---|---|
| 8. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (CAN NO. 3 J/C) |

(a) Reconnect the power management control ECU main wire connector to the CAN No. 3 junction connector.

*1

(b) Connect the probes of an ohmmeter to terminals 34 (CA2H) and 35 (CA2L) of the power management control ECU.

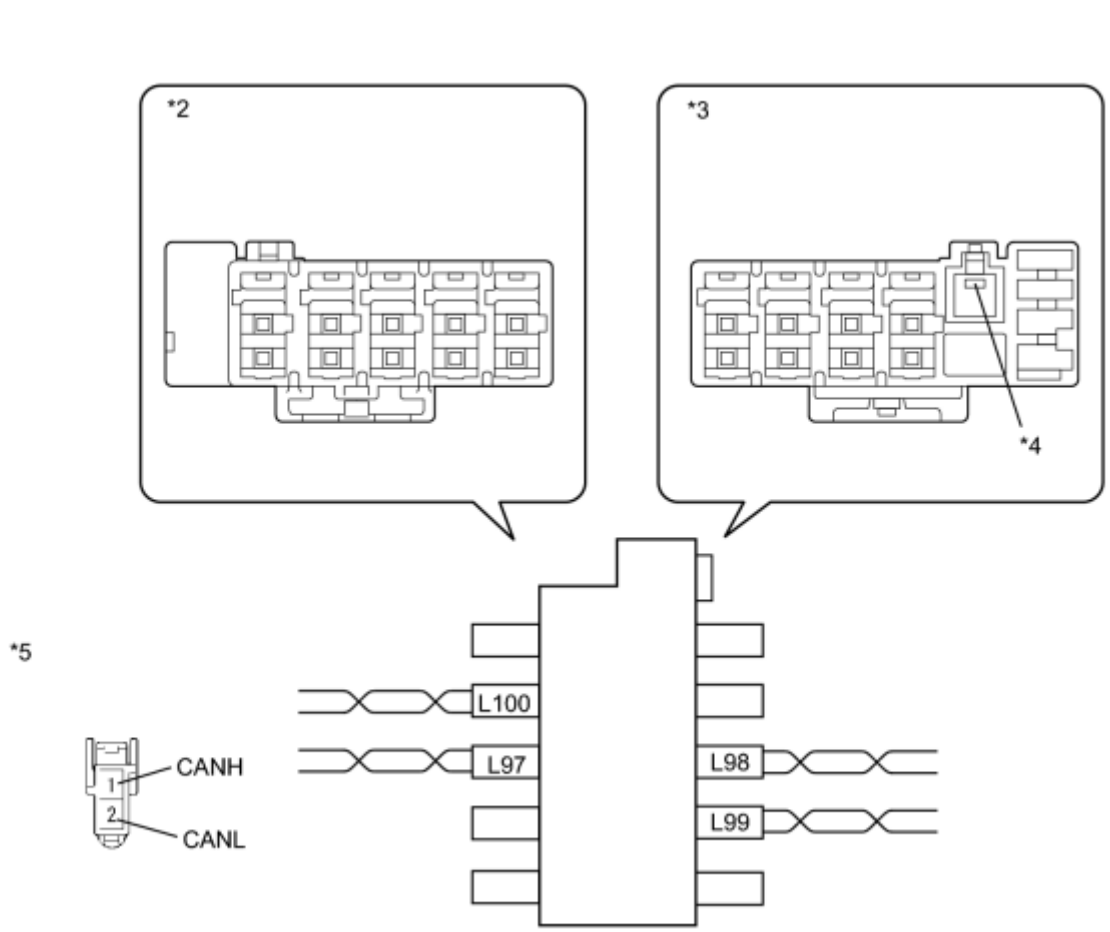



## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connector<br><br>(Power Management Control ECU) |

P

(c) While observing the resistance value shown on the ohmmeter, disconnect branch wire connectors (except L97) from the CAN No. 3 junction connector until the resistance becomes normal (between 54 and 69 Ω).




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | CAN No. 3 Junction Connector | *2 | Junction Connector B Side |
| *3 | Junction Connector A Side | *4 | Earth Terminal |
| *5 | Front view of wire harness connector<br><br>(to CAN No. 3 Junction Connector) | - | - |

| Terminal No. (Symbol) | Wiring Color | Connected to |
|---|---|---|
| L97-1 (CANH) | P | Power management control ECU |
| L97-2 (CANL) | V | |
| L98-1 (CANH) | LG | Seat belt control ECU |
| L98-2 (CANL) | L | |
| L99-1 (CANH) | B | Driving support ECU |
| L99-2 (CANL) | W | |
| L100-1 (CANH) | Y | Parking assist ECU |
| L100-2 (CANL) | BR | |

HINT:

- The connectors connected to the CAN junction connector can be distinguished by the colors of the bus wire.
- Reconnecting the connectors to non-specified positions on the CAN junction connector does not affect system operation.

Result:

| Result | Proceed to |
|---|---|
| The resistance is still below 54 Ω when all the specified connectors are disconnected.<br><br>(There is no short in the branch wires.) | A |
| The resistance becomes normal (between 54 and 69 Ω) when a connector is disconnected.<br><br>(There is a short in one or more of the branch wires.) | B |

B CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (ECUS)

A **REPLACE CAN NO. 3 JUNCTION CONNECTOR**

| | |
|---|---|
| 9. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (ECUS) |

(a) Reconnect the connector for the short-circuited branch wire to the CAN junction connector (the connector that caused the bus wire resistance to become normal (between 54 and 69 Ω) when it was disconnected).

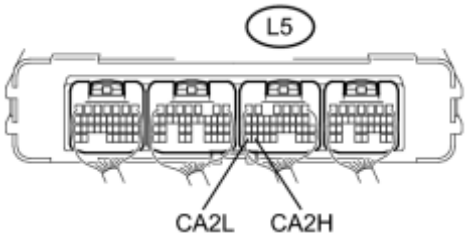
(b) Disconnect the connector that includes terminals CANH and CANL from the ECU to which the short-circuited branch wire is connected.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L5-34 (CA2H) - L5-35 (CA2L) | Power switch off | 54 to 69 Ω |




# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connector<br><br>(Power Management Control ECU) |

P

HINT:

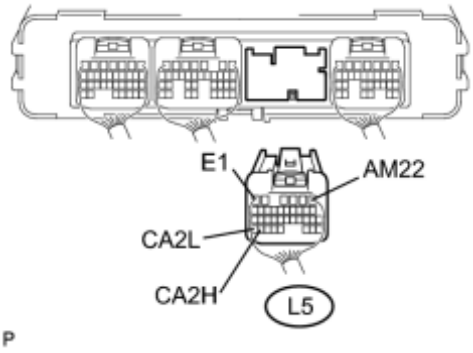
If the resistance becomes normal (between 54 and 69 Ω) when the connector is disconnected from the ECU, there may be a short in the ECU.

NG REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR BRANCH WIRE OR CONNECTOR

OK **REPLACE CORRESPONDING ECU OR SENSOR**

| | |
|---|---|
| 10. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (POWER MANAGEMENT CONTROL ECU) |

*1




(a) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Purpose |
|---|---|---|---|
| L5-34 (CA2H) - L5-6 (E1) | Power switch off | 200 Ω or higher | Inspection for CANH ground short |
| L5-35 (CA2L) - L5-6 (E1) | Power switch off | 200 Ω or higher | Inspection for CANL ground short |
| L5-34 (CA2H) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short |
| L5-35 (CA2L) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short |

HINT:

It is only necessary to perform the inspection in the above table for the result (short circuit) that was obtained in the Check CAN No. 2 Bus Wire inspection.

Find the necessary inspection from the Purpose column that matches the result in the Result column from the Check CAN No. 2 Bus Wire inspection.

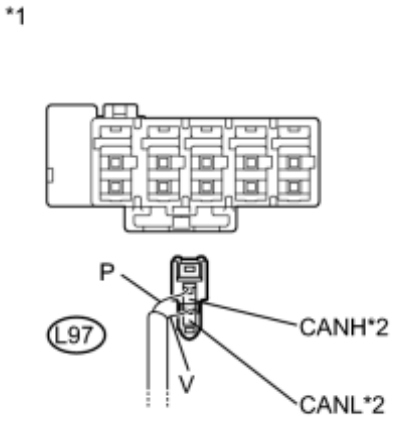
NG ▶ CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (CAN NO. 3 J/C - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 11. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (CAN NO. 3 J/C - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the power management control ECU main wire connector

from the CAN No. 3 junction connector.



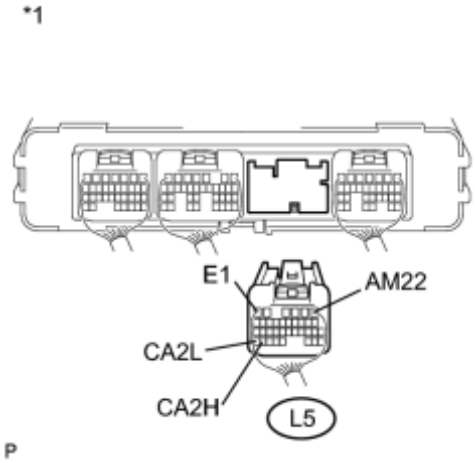

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 3 Junction Connector) |
| *2 | to Power Management Control ECU |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Purpose |
|---|---|---|---|
| L5-34 (CA2H) - L5-6 (E1) | Power switch off | 200 Ω or higher | Inspection for CANH ground short |
| L5-35 (CA2L) - L5-6 (E1) | Power switch off | 200 Ω or higher | Inspection for CANL ground short |
| L5-34 (CA2H) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short |
| L5-35 (CA2L) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short |




HINT:

It is only necessary to perform the inspection in the above table for the result (short circuit) that was obtained in the Check CAN No. 2 Bus Wire inspection.

Find the necessary inspection from the Purpose column that matches the result in the Result column from the Check CAN No. 2 Bus Wire inspection.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 3 J/C - POWER MANAGEMENT CONTROL ECU)

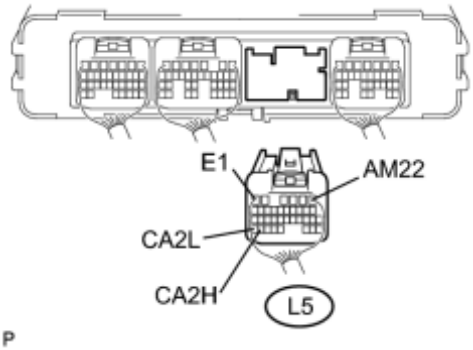
OK

▼

| | |
|---|---|
| 12. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (CAN NO. 3 J/C) |

(a) Reconnect the power management control ECU main wire connector to the CAN No. 3 junction connector.

*1




P

(b) Connect the probes of an ohmmeter to terminals CANH or CANL and GND or +B (AM22) of the power management control ECU.

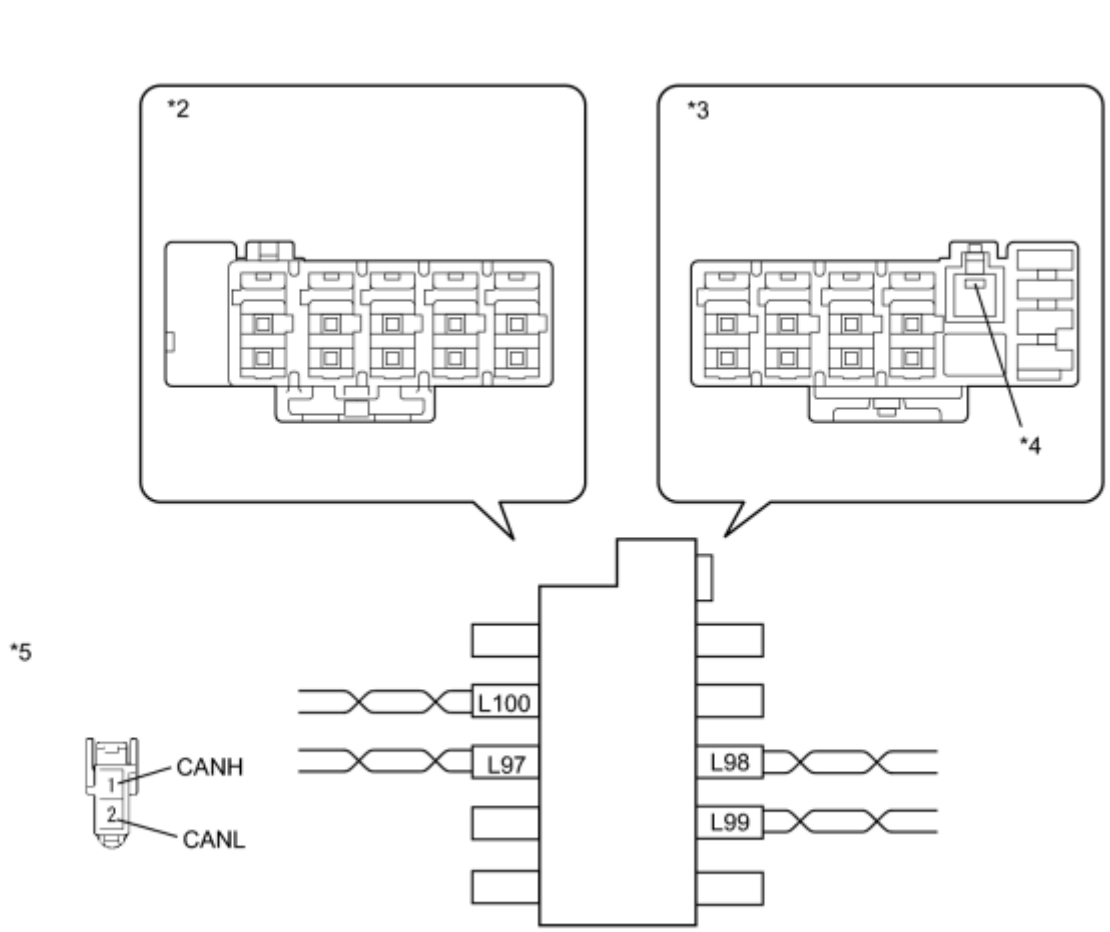
## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

HINT:

It is only necessary to perform the inspection for the result (short circuit) that was obtained in the Check CAN No. 2 Bus Wire inspection.

(c) While observing the resistance value shown on the ohmmeter, disconnect branch wire connector (except L97) from the CAN No. 3 junction connector until the resistance becomes normal (6 kΩ or higher (for +B short) or 200 Ω or higher (for ground short)).




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | CAN No. 3 Junction Connector | *2 | Junction Connector B Side |
| *3 | Junction Connector A Side | *4 | Earth Terminal |
| *5 | Front view of wire harness connector<br><br>(to CAN No. 3 Junction Connector) | - | - |

| Terminal No. (Symbol) | Wiring Color | Connected to |
|---|---|---|
| L97-1 (CANH) | P | Power management control ECU |
| L97-2 (CANL) | V | |
| L98-1 (CANH) | LG | Seat belt control ECU |
| L98-2 (CANL) | L | |
| L99-1 (CANH) | B | Driving support ECU |
| L99-2 (CANL) | W | |
| L100-1 (CANH) | Y | Parking assist ECU |
| L100-2 (CANL) | BR | |

HINT:

- The connectors connected to the CAN junction connector can be distinguished by the colors of the bus wire.
- Reconnecting the connectors to non-specified positions on the CAN junction connector does not affect system operation.

Result:

| Result | Proceed to |
|---|---|
| The resistance between terminals CANP and BAT, or the resistance between terminals CANN and BAT is still below 6 kΩ when all the specified connectors are disconnected from the CAN junction connector.<br><br>(There is no short to +B in the branch wires.) | A |
| The resistance between terminals CANP and GND, or the resistance between terminals CANN and GND is still below 200 Ω when all the specified connectors are disconnected from the CAN junction connector.<br><br>(There is no short to GND in the branch wires.) | |
| The resistance between terminals CANP and BAT, or the resistance between terminals CANN and BAT becomes normal (6 kΩ or higher) when a connector is disconnected from the CAN junction connector.<br><br>(There is a short to +B in one of the areas related to one or more of the disconnected branch wires.) | B |
| The resistance between terminals CANP and GND, or the resistance between terminals CANN and GND becomes normal (200 Ω or higher) when a connector is disconnected from the CAN junction connector.<br><br>There is a short to GND in one of the areas related to one or more of the disconnected branch wires.) | |

B CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (ECUS)

A **REPLACE CAN NO. 3 JUNCTION CONNECTOR**

| | |
|---|---|
| 13. | CHECK FOR SHORT IN CAN NO. 2 BUS WIRE (ECUS) |

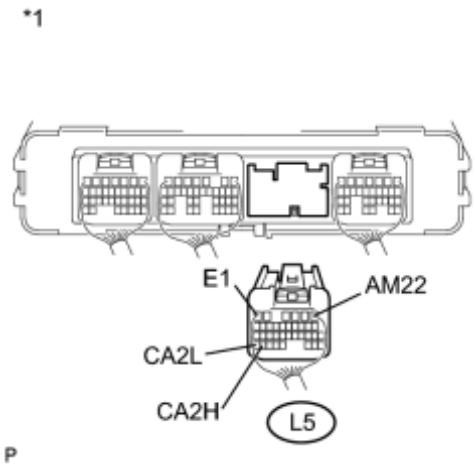
(a) Reconnect the connector for the bus wire that is shorted to +B or GND to the CAN junction connector (the connector that caused the bus wire resistance to change to 6 kΩ or higher (for +B short) or 200 Ω or higher (for ground short) when it was disconnected).

(b) Disconnect the connector that includes terminals CANH and CANL from the ECU to which the bus wire shorted to +B or GND is connected.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester | Condition | Specified | Purpose |
|---|---|---|---|




| Connection | | Condition | |
|---|---|---|---|
| L5-34 (CA2H) - L5-6 (E1) | Power switch off | 200 Ω or higher | Inspection for CANH ground short |
| L5-35 (CA2L) - L5-6 (E1) | Power switch off | 200 Ω or higher | Inspection for CANL ground short |
| L5-34 (CA2H) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short |
| L5-35 (CA2L) - L5-1 (AM22) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short |

HINT:

It is only necessary to perform the inspection in the above table for the result (short circuit) that was obtained in the Check CAN No. 2 Bus Wire inspection.

Find the necessary inspection from the Purpose column that matches the result in the Result column from the Check CAN No. 2 Bus Wire inspection.

# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

NG ▶ REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR BRANCH WIRE OR CONNECTOR

OK ▶ **REPLACE CORRESPONDING ECU OR SENSOR**

| DTC | U1002 | Lost Communication with Gateway Module (Power Management2) |
|---|---|---|

# DESCRIPTION

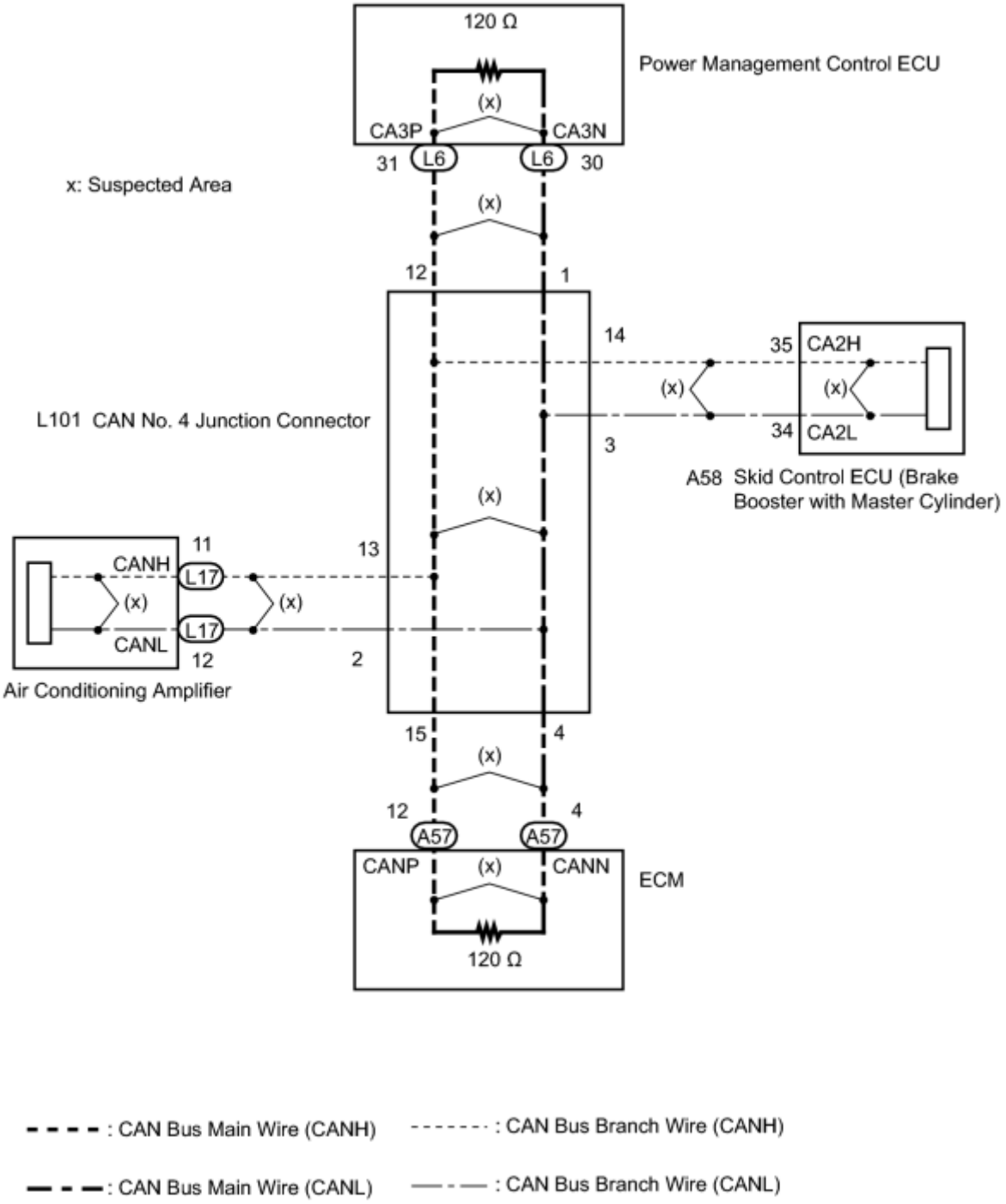
- The power management control ECU will store this DTC when no signals can be received from the ECUs that have been memorized as those that are connected to the power management bus.
- When the power management control ECU receives a response signal from the ECUs connected to the power management bus, the power management control ECU recognizes and memorizes that the ECU is connected to the power management bus. Based on this memorized data, the power management control ECU monitors for malfunctions in the ECUs connected to the power management bus when communicating with those ECUs. If the power management control ECU cannot receive response signals from the ECUs that have been memorized as those connected to the power management bus, the power management control ECU determines that a malfunction exists.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U1002 | Power management control ECU cannot receive signals from all ECUs that have been memorized as those connected to the power management bus. | • Open or short in power management bus main wire or connector<br>• Open or short in power management bus branch wire or connector<br>• Power management control ECU<br>• ECM<br>• Air conditioning amplifier<br>• Skid control ECU (Brake booster with master cylinder)<br>• CAN No. 4 junction connector |

HINT:

The diagnosis procedure is for when DTC U1002 is output by the power management control ECU (Techstream display: Power Management2).

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.

- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

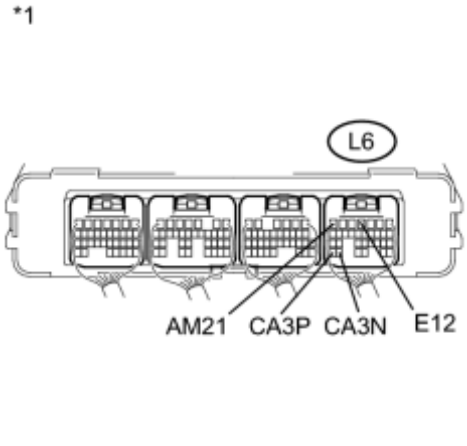
# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE |

(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition | Result |
|---|---|---|---|
| L6-31 (CA3P) - L6-30 (CA3N) | Power switch off | 54 to 69 Ω | Below 54 Ω: Short circuit between bus lines |
| | | | 70 Ω or higher: Open circuit in a main bus line |
| L6-31 (CA3P) - L6-4 (E12) | Power switch off | 200 Ω or higher | Below 200 Ω: CANH ground short |
| L6-30 (CA3N) - L6-4 (E12) | Power switch off | 200 Ω or higher | Below 200 Ω: CANL ground short |

(c) Disconnect the cable from the negative (-) battery terminal.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Result |
|---|---|---|---|
| L6-31 (CA3P) - L6-7 (AM21) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANH +B short |
| L6-30 (CA3N) - L6-7 (AM21) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANL +B short |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connector<br><br>(Power Management Control ECU) |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| Open circuit in CAN main bus wire | B |
| Short circuit between bus lines | C |
| • Ground short<br>• +B short | D |

D CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 4 J/C)

C CHECK FOR SHORT IN CAN BUS WIRES (POWER MANAGEMENT CONTROL ECU)

B CHECK FOR OPEN IN CAN BUS WIRE (POWER MANAGEMENT CONTROL ECU)

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Clear the DTCs.

(b) Turn the power switch off.

(c) Turn the power switch on (IG), recheck the DTC.

Result:

| Result | Proceed to |
|---|---|

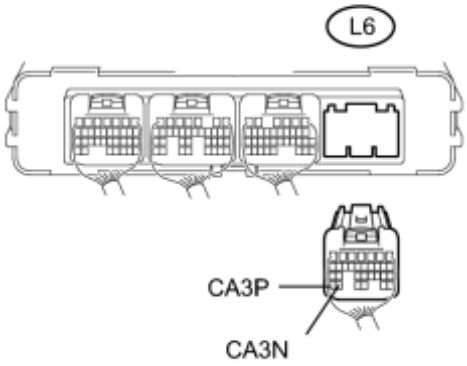
| Result | Proceed to |
|---|---|
| U1002 is output from power management control ECU<br><br>(Techstream display/Power Management2) | A |
| Other DTC is output | B |

B GO TO CIRCUITS INDICATED BY OUTPUT DTCS

A **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 3. | CHECK FOR OPEN IN CAN BUS WIRE (POWER MANAGEMENT CONTROL ECU) |

*1




P

(a) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L6-31 (CA3P) - L6-30 (CA3N) | Power switch off | 108 to 132 Ω |

NG CHECK FOR OPEN IN CAN BUS WIRE (ECM)

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 4. | CHECK FOR OPEN IN CAN BUS WIRE (ECM) |

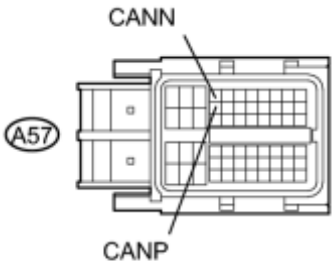
(a) Reconnect the power management control ECU connector.

(b) Disconnect the ECM connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

*1




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-12 (CANP) - A57-4 (CANN) | Power switch off | 108 to 132 Ω |

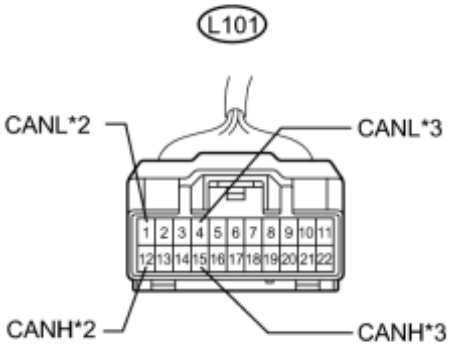
NG CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 4 J/C MAIN WIRE)

OK **REPLACE ECM**

| | |
|---|---|
| 5. | CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 4 J/C MAIN WIRE) |

(a) Reconnect the ECM connector.

*1




(b) Disconnect the CAN No. 4 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 4 Junction Connector) |
| *2 | to Power Management Control ECU |
| *3 | to ECM |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Connected to |
|---|---|---|---|
| L101-12 (CANH) - L101-1 (CANL) | Power switch off | 108 to 132 Ω | Power management control ECU |
| L101-15 (CANH) - L101-4 (CANL) | Power switch off | 108 to 132 Ω | ECM |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (to power management ECU main wire) | B |
| NG (to ECM main wire) | C |

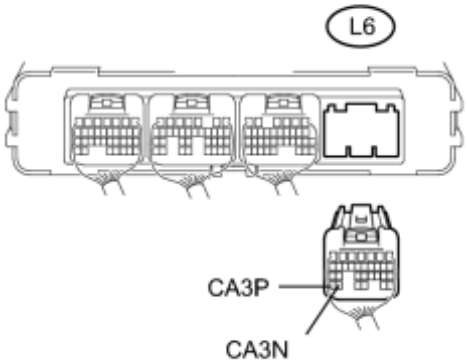
C REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 4 J/C - ECM)

B REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 4 J/C - POWER MANAGEMENT CONTROL ECU)

A **REPLACE CAN NO. 4 JUNCTION CONNECTOR**

| | |
|---|---|
| 6. | CHECK FOR SHORT IN CAN BUS WIRES (POWER MANAGEMENT CONTROL ECU) |

*1




P

(a) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L6-31 (CA3P) - L6-30 (CA3N) | Power switch off | 108 to 132 Ω |

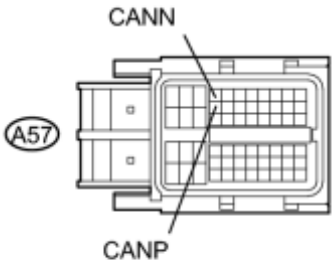
NG CHECK FOR SHORT IN CAN BUS WIRES (ECM)

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 7. | CHECK FOR SHORT IN CAN BUS WIRES (ECM) |

(a) Reconnect the power management control ECU connector.

*1




(b) Disconnect the ECM connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to ECM) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-12 (CANP) - A57-4 (CANN) | Power switch off | 108 to 132 Ω |

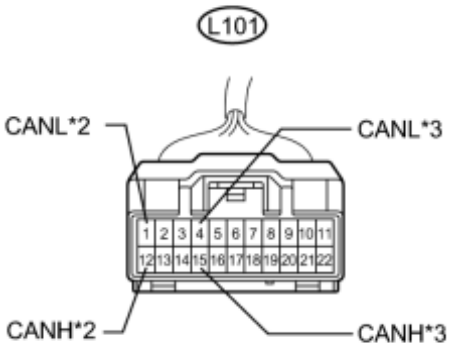
NG ▶ CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 4 J/C MAIN WIRE)

OK ▶ **REPLACE ECM**

| | |
|---|---|
| 8. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 4 J/C MAIN WIRE) |

(a) Reconnect the ECM connector.

*1




(b) Disconnect the CAN No. 4 junction connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Connected to |
|---|---|---|---|
| L101-12 (CANH) - L101-1 (CANL) | Power switch off | 108 to 132 Ω | Power management control ECU |
| L101-15 (CANH) - L101-4 (CANL) | Power switch off | 108 to 132 Ω | ECM |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 4 Junction Connector) |
| *2 | to power Management Control ECU |
| *3 | to ECM |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (to Power management ECU main wire) | B |
| NG (to ECM main wire) | C |

C REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 4 J/C - ECM)

B REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 4 J/C - POWER MANAGEMENT CONTROL ECU)

A

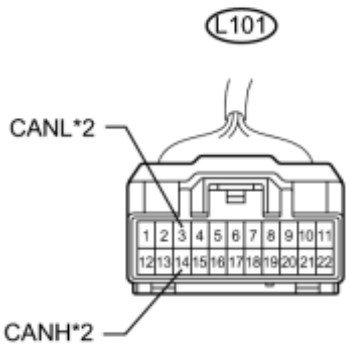
| | |
|---|---|
| 9. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 4 J/C - SKID CONTROL ECU) |

(a) Disconnect the skid control ECU (brake booster with master cylinder) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L101-14 (CANH) - L101-3 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 4 Junction Connector) |
| *2 | to Skid Control ECU |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 4 J/C - SKID CONTROL ECU)

OK

▼

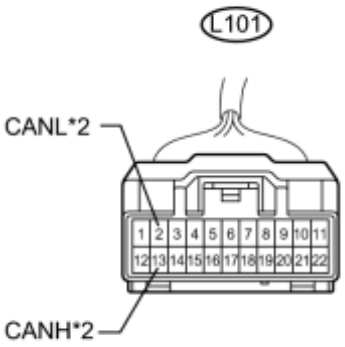
| | |
|---|---|
| 10. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 4 J/C - A/C ECU) |

(a) Disconnect the air conditioning amplifier connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L101-13 (CANH) - L101-2 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 4 Junction Connector) |
| *2 | to Air Conditioning Amplifier |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 4 J/C - A/C ECU)

OK

▼

| | |
|---|---|
| 11. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 4 J/C) |

(a) Reconnect the CAN No. 4 junction connector.

(b) Measure the resistance according to the value(s) in the table below.

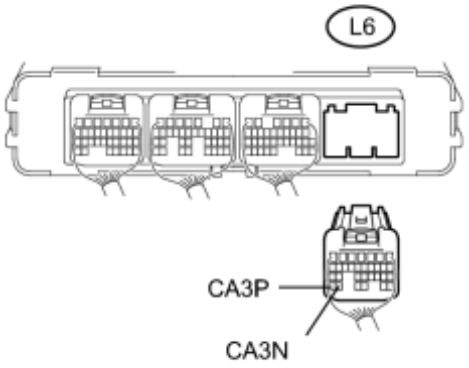
Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L6-31 (CA3P) - L6-30 (CA3N) | Power switch off | 108 to 132 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector |

| | |
|---|---|
| *1 | (to Power Management Control ECU) |




P

- The resistance must be measured after the ECM and CAN No. 4 J/C wire harness connector are reconnected.
- The resistance must be measured after the skid control ECU and air conditioning amplifier connector are disconnected.

NG ▶ REPLACE CAN NO. 4 JUNCTION CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK FOR SHORT IN CAN BUS WIRES (AIR CONDITIONING AMPLIFIER) |

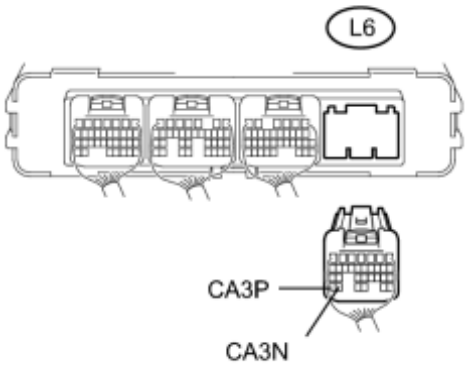
(a) Reconnect the air conditioning amplifier connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L6-31 (CA3P) - L6-30 (CA3N) | Power switch off | 108 to 132 Ω |

*1




P

# Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

- The resistance must be measured after the air conditioning amplifier connector is reconnected.
- The resistance must be measured after the skid control ECU connector is disconnected.

NG ▶ REPLACE AIR CONDITIONING AMPLIFIER

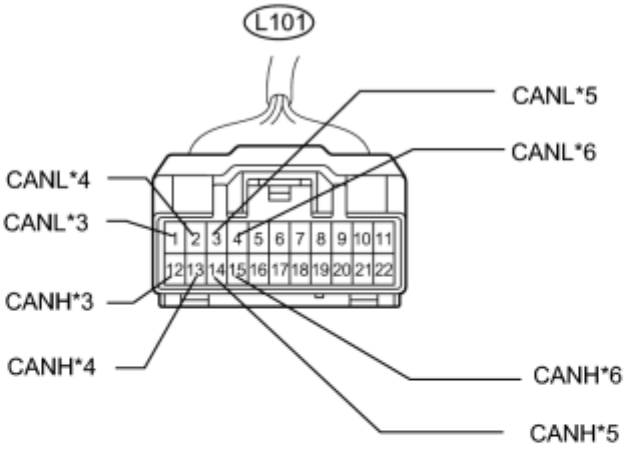
OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER (SKID CONTROL ECU)**

| | |
|---|---|
| 13. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 4 J/C) |

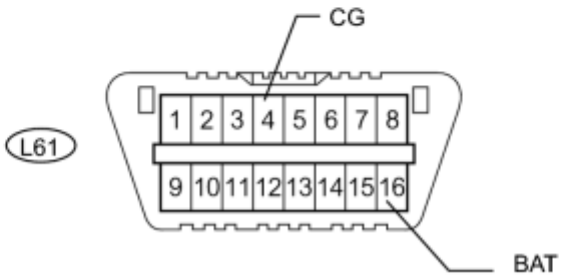
(a) Disconnect the CAN No. 4 junction connector.

(b) Measure the resistance according to the value(s) in the table below.

*1




*2




Standard Resistance:

| Tester Connection | Condition | Specified Condition | Purpose | Connected to |
|---|---|---|---|---|
| L101-12 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANH ground short | Power management control ECU |
| L101-1 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANL ground short | |
| L101-13 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANH ground short | Air conditioning amplifier |
| L101-2 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANL ground short | |
| L101-14 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANH ground short | Skid control ECU |
| L101-3 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANL ground short | |
| L101-15 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANH ground short | ECM |
| L101-4 (CANL) - | Power switch off | 200 Ω or | Inspection for | |

| Tester Connection | Condition | Specified Condition | Purpose | Connected to |
|---|---|---|---|---|
| L61-4 (CG) | | higher | CANL ground short | |
| L101-12 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short | Power management control ECU |
| L101-1 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short | |
| L101-13 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short | Air conditioning amplifier |
| L101-2 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short | |
| L101-14 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short | Skid control ECU |
| L101-3 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short | |
| L101-15 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short | ECM |
| L101-4 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short | |

HINT:

- It is only necessary to perform the inspection in the above table for the result (short circuit) that was obtained in the Check CAN Bus Wire inspection.
- Find the necessary inspection from the Purpose column that matches the result in the Result column from the Check CAN Bus Wire inspection.

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 4 Junction Connector) | *2 | DLC3 |
| *3 | to Power Management Control ECU | *4 | to Air Conditioning Amplifier |
| *5 | to Skid Control ECU | *6 | to ECM |

NG ▶ CHECK FOR SHORT IN CAN BUS WIRES (ECU)

OK ▶ **REPLACE CAN NO. 4 JUNCTION CONNECTOR**

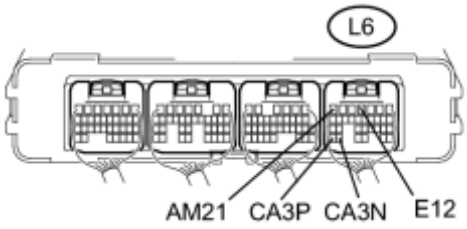
| | |
|---|---|
| 14. | CHECK FOR SHORT IN CAN BUS WIRES (ECU) |

(a) Disconnect the connector that includes terminals CANH and CANL from the ECU to which the bus wire shorted to B+ or shorted to GND is connected INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




P

| Tester Connection | Switch Condition | Specified Condition | Purpose |
|---|---|---|---|
| L6-31 (CA3P) - L6-4 (E12) | Power switch off | 200 Ω or higher | Below 200 Ω:<br><br>CANH ground short |
| L6-30 (CA3N) - L6-4 (E12) | Power switch off | 200 Ω or higher | Below 200 Ω:<br><br>CANL ground short |
| L6-31 (CA3P) - L6-7 (AM21) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANH +B short |
| L6-30 (CA3N) - L6-7 (AM21) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANL +B short |

- It is only necessary to perform the inspection in the above table for the result (open or short circuit) that was obtained in the Check CAN Bus Wire inspection.

  Find the necessary inspection from the Purpose column that matches the result in the Result column from the Check CAN Bus Wire inspection.

- If the resistance changes to normal when the connector is disconnected from the ECU, there may be a short in the ECU.

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connector<br><br>(Power Management Control ECU) |

NG ▶ REPAIR OR REPLACE CORRESPONDING ECU WIRE

OK ▶ **REPLACE CORRESPONDING ECU**

| DTC | U1002 | Lost Communication with Gateway Module (Parking Assist Bus) |
|---|---|---|

# DESCRIPTION

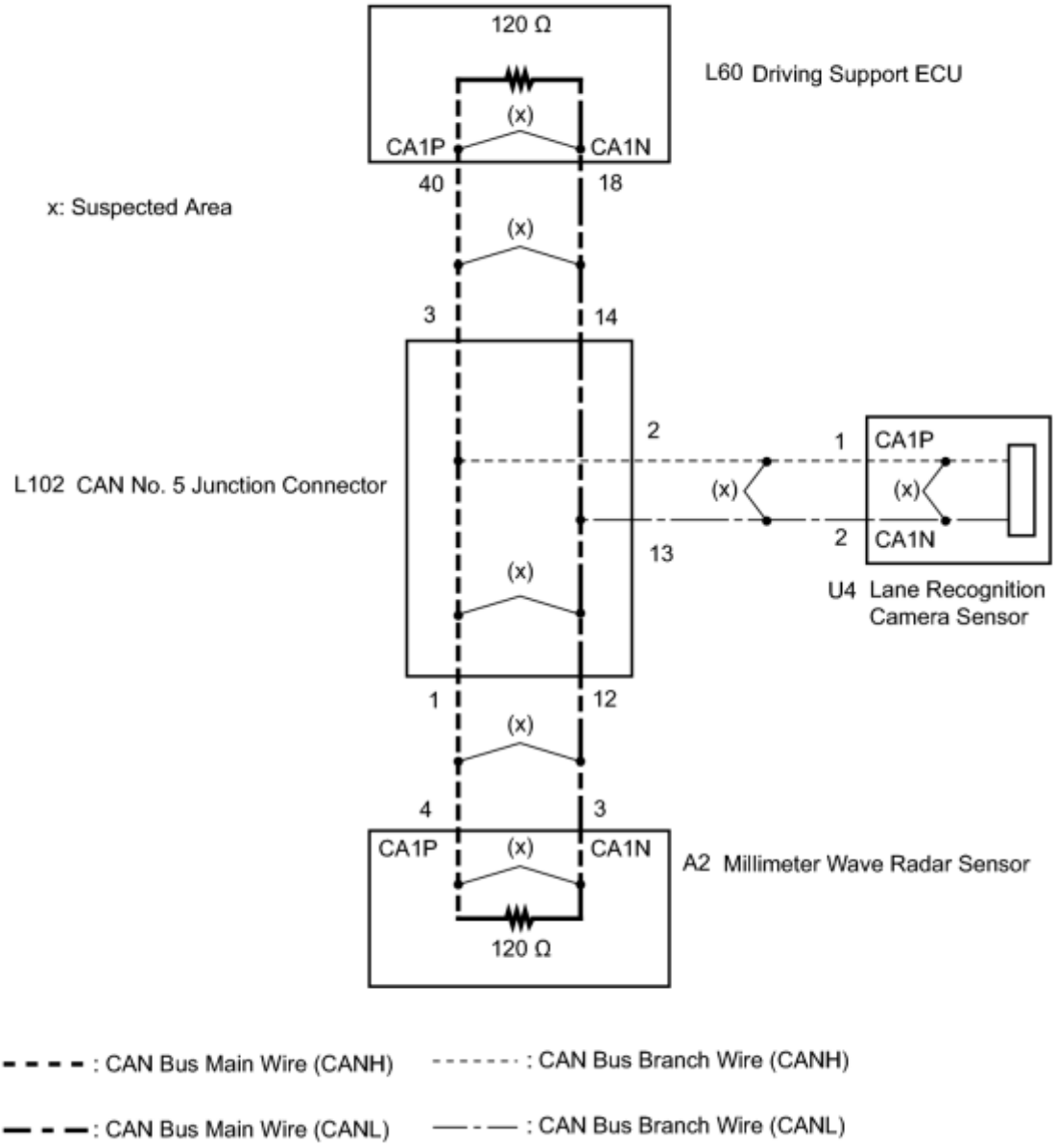
The driving support ECU will store this DTC when no signals can be received from the ECUs that have been memorized as those that are connected to the parking assist bus.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U1002 | Driving support ECU cannot receive signals from all ECUs that have been memorized as those connected to the parking assist bus. | • Open or short in parking assist bus main wire or connector<br>• Open or short in parking assist bus branch wire or connector<br>• Driving support ECU<br>• CAN No. 5 junction connector |

HINT:

The diagnosis procedure is for when DTC U1002 is output by the driving support ECU (Techstream display: Pre-Collision2).

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.

- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

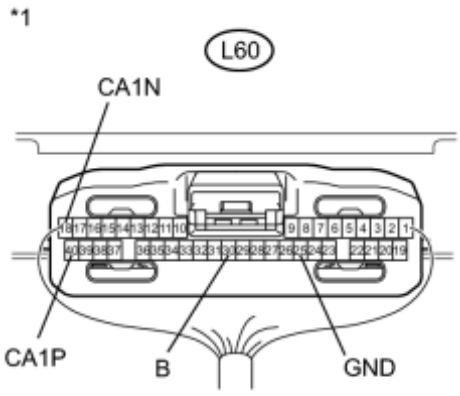
HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE |

(a) Turn the power switch off.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Result |
|---|---|---|---|
| L60-40 (CA1P) - L60-18 (CA1N) | Power switch off | 54 to 69 Ω | Below 54 Ω:<br><br>Short circuit between bus lines |
| | | | 70 Ω or more:<br><br>Open circuit in a main bus line |
| L60-40 (CA1P) - L60-25 (GND) | Power switch off | 200 Ω or higher | Below 200 Ω:<br><br>CANH ground short |
| L60-18 (CA1N) - L60-25 (GND) | Power switch off | 200 Ω or higher | Below 200 Ω:<br><br>CANL ground short |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Driving Support ECU) |

(c) Disconnect the cable from the negative (-) battery terminal.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Result |
|---|---|---|---|
| L60-40 (CA1P) - L60-30 (B) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANH +B short |
| L60-18 (CA1N) - L60-30 (B) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANL +B short |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| Open circuit in CAN main bus line | B |
| Short circuit between bus lines | C |
| • Ground short<br>• +B short | D |

D ▶ CHECK CAN BUS WIRE (CAN NO. 5 J/C)

C ▶ CHECK FOR SHORT IN CAN BUS WIRES (DRIVING SUPPORT ECU)

B ▶ CHECK FOR OPEN IN CAN BUS WIRE (DRIVING SUPPORT ECU)

A

▼

| | |
|---|---|
| 2. | CHECK CAN BUS BRANCH WIRE (LANE RECOGNITION CAMERA SENSOR) |

(a) Check for a lane recognition camera sensor communication malfunction INFO.

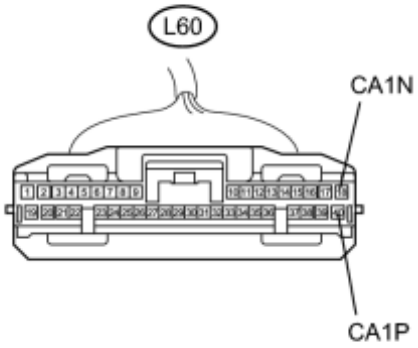
NG ▶ REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR WIRE OR CONNECTOR

OK ▶ **REPLACE DRIVING SUPPORT ECU**

| | |
|---|---|
| 3. | CHECK FOR OPEN IN CAN BUS WIRE (DRIVING SUPPORT ECU) |

(a) Disconnect the driving support ECU connector.

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L60-40 (CA1P) - L60-18 (CA1N) | Power switch off | 108 to 132 Ω |

NG CHECK FOR OPEN IN CAN BUS WIRE (MILLIMETER WAVE RADAR SENSOR)

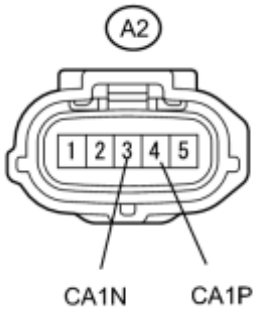
OK **REPLACE DRIVING SUPPORT ECU**

| | |
|---|---|
| 4. | CHECK FOR OPEN IN CAN BUS WIRE (MILLIMETER WAVE RADAR SENSOR) |

(a) Reconnect the driving support ECU connector.

*1

(b) Disconnect the millimeter wave radar sensor connector.




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Millimeter Wave Radar Sensor) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

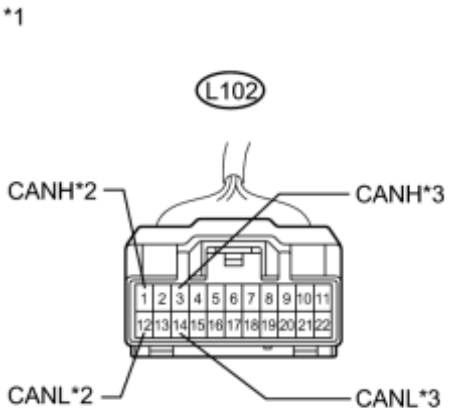
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A2-4 (CA1P) - A1-3 (CA1N) | Power switch off | 108 to 132 Ω |

NG CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 5 J/C)

OK **REPLACE MILLIMETER WAVE RADAR SENSOR ASSEMBLY**

| | |
|---|---|
| 5. | CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 5 J/C) |

(a) Reconnect the millimeter wave radar sensor connector.




(b) Disconnect the CAN No. 5 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 5 Junction Connector) |
| *2 | to Millimeter Wave Radar Sensor |
| *3 | to Driving Support ECU |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Connected to |
|---|---|---|---|
| L102-1 (CANH) - L102-12 (CANL) | Power switch off | 108 to 132 Ω | Millimeter wave radar sensor |
| L102-3 (CANH) - L102-14 (CANL) | Power switch off | 108 to 132 Ω | Lane recognition camera sensor |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (to Driving support ECU main wire) | B |
| NG (to Millimeter wave radar sensor main wire) | C |

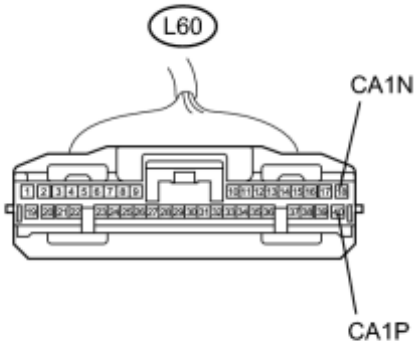
C REPAIR OR REPLACE CAN BUS MAIN WIRE (CAN NO. 5 J/C - MILLIMETER WAVE RADAR SENSOR)

B REPAIR OR REPLACE CAN BUS MAIN WIRE (CAN NO. 5 J/C - DRIVING SUPPORT ECU)

A **REPLACE CAN NO. 5 JUNCTION CONNECTOR**

| | |
|---|---|
| 6. | CHECK FOR SHORT IN CAN BUS WIRES (DRIVING SUPPORT ECU) |

*1




(a) Disconnect the driving support ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Driving Support ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L60-40 (CA1P) - L60-18 (CA1N) | Power switch off | 108 to 132 Ω |

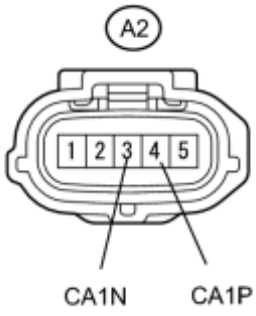
NG ▶ CHECK FOR SHORT IN CAN BUS WIRES (MILLIMETER WAVE RADAR SENSOR)

OK ▶ **REPLACE DRIVING SUPPORT ECU**

| | |
|---|---|
| 7. | CHECK FOR SHORT IN CAN BUS WIRES (MILLIMETER WAVE RADAR SENSOR) |

(a) Reconnect the driving support ECU connector.

*1




(b) Disconnect the millimeter wave radar sensor connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Millimeter Wave Radar Sensor) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A2-4 (CA1P) - A1-3 (CA1N) | Power switch off | 108 to 132 Ω |

NG ▶ CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 5 J/C MAIN WIRE)

OK

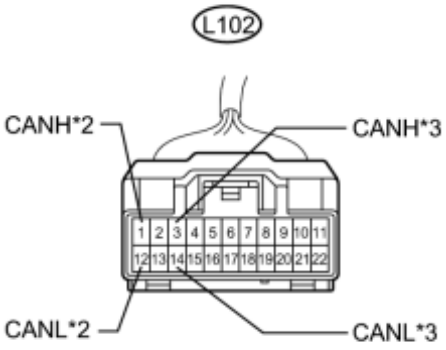
▼

| 8. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 5 J/C MAIN WIRE) |
|---|---|

(a) Reconnect the millimeter wave radar sensor connector.

*1

(b) Disconnect the CAN No. 5 junction connector.




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 5 Junction Connector) |
| *2 | to Millimeter Wave Radar Sensor |
| *3 | to Driving Support ECU |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Connected to |
|---|---|---|---|
| L102-1 (CANH) - L102-12 (CANL) | Power switch off | 108 to 132 Ω | Millimeter wave radar sensor |
| L102-3 (CANH) - L102-14 (CANL) | Power switch off | 108 to 132 Ω | Lane recognition camera sensor |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (to driving support ECU) | B |
| NG (to millimeter wave radar sensor) | C |

C ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE (CAN NO. 5 J/C - MILLIMETER WAVE RADAR SENSOR)

B ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE (CAN NO. 5 J/C - DRIVING SUPPORT ECU)

A

| | |
|---|---|
| 9. | CHECK FOR SHORT IN CAN BUS WIRES (LANE RECOGNITION CAMERA SENSOR BRANCH WIRE) |

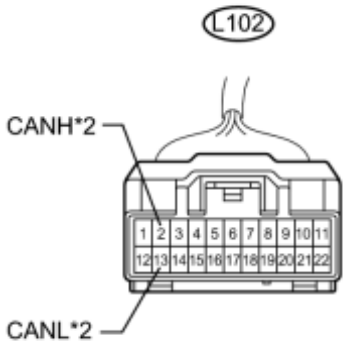
(a) Disconnect the lane recognition camera sensor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L102-2 (CANH) - L102-13 (CANL) | Power switch off | 1 MΩ or higher |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 5 Junction Connector) |

NG ▶ REPAIR OR REPLACE CAN BUS WIRE (LANE RECOGNITION CAMERA SENSOR BRANCH WIRE)

OK

| | |
|---|---|
| 10. | CHECK CAN BUS WIRE (LANE RECOGNITION CAMERA SENSOR) |

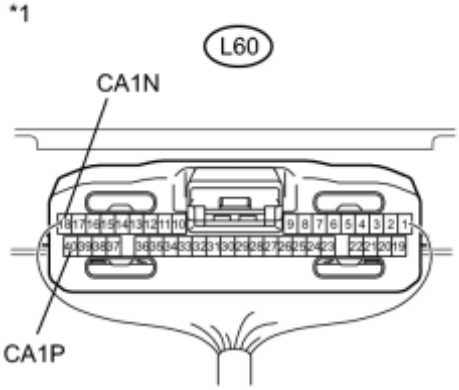
(a) Reconnect the CAN No. 5 junction connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L60-40 (CA1P) - L60-18 (CA1N) | Power switch off | 54 to 69 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected |

| | |
|---|---|
| | (Driving Support ECU) |

- The resistance must be measured after the CAN No. 5 junction connector is reconnected.
- The resistance must be measured after the lane recognition camera sensor connector is disconnected.

NG ▶ REPLACE CAN NO. 5 JUNCTION CONNECTOR

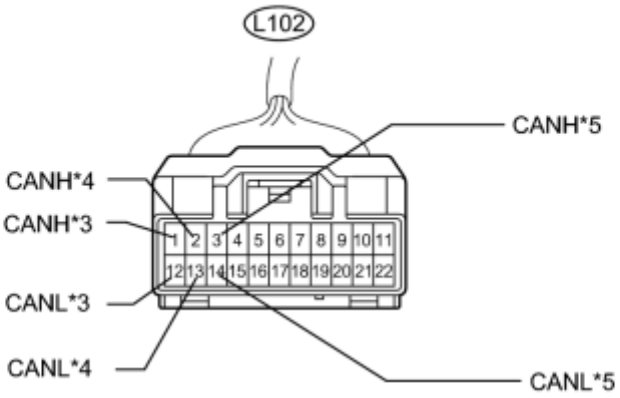
OK ▶ **REPLACE LANE RECOGNITION CAMERA SENSOR**

| | |
|---|---|
| 11. | CHECK CAN BUS WIRE (CAN NO. 5 J/C) |

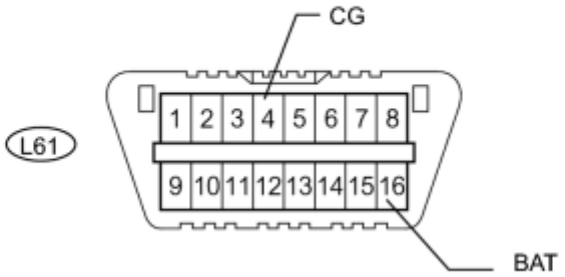
(a) Disconnect the CAN No. 5 junction connector.

(b) Measure the resistance according to the value(s) in the table below.

*1




*2




Standard Resistance:

| Tester Connection | Condition | Specified Condition | Purpose | Connected to |
|---|---|---|---|---|
| L102-1 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANH ground short | Millimeter wave radar sensor |
| L102-12 (CANL) - | Power switch off | 200 Ω or | Inspection for | |

| Tester Connection | Condition | Specified Condition | Purpose | Connected to |
|---|---|---|---|---|
| L61-4 (CG) | | higher | CANL ground short | |
| L102-2 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANH ground short | Lane recognition camera sensor |
| L102-13 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANL ground short | |
| L102-3 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANH ground short | Driving support ECU |
| L102-14 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | Inspection for CANL ground short | |
| L102-1 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short | Millimeter wave radar sensor |
| L102-12 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short | |
| L102-2 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short | Lane recognition camera sensor |
| L102-13 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short | |
| L102-3 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANH +B short | Driving support ECU |
| L102-14 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Inspection for CANL +B short | |

HINT:

- It is only necessary to perform the inspection in the above table for the result (short circuit) that was obtained in the Check CAN Bus Wire inspection.
- Find the necessary inspection from the Purpose column that matches the result in the Result column from the Check CAN Bus Wire inspection.

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 5 junction connector) | *2 | DLC3 |
| *3 | to Millimeter Wave Radar Sensor | *4 | to Lane Recognition Camera Sensor |
| *5 | to Driving Support ECU | - | - |

NG ▶ CHECK CAN BUS WIRE (ECU, SENSOR)

OK ▶ **REPLACE CAN NO. 5 JUNCTION CONNECTOR**

| | |
|---|---|
| 12. | CHECK CAN BUS WIRE (ECU, SENSOR) |

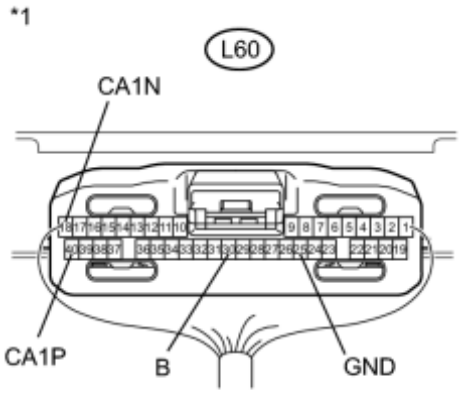
(a) Disconnect the ECU or sensor connected to the CAN bus wire that is shorted to B+ or shorted to GND.

HINT:

If the ECU or sensor has multiple connectors, disconnect the connector that includes the CAN bus wires. To determine the ECU or sensor that is connected to shorted bus wire, refer to Terminals of ECU tables INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition | Purpose |
|---|---|---|---|
| L60-40 (CA1P) - L60-25 (GND) | Power switch off | 200 Ω or higher | Below 200 Ω:<br><br>CANH ground short |
| L60-18 (CA1N) - L60-25 (GND) | Power switch off | 200 Ω or higher | Below 200 Ω:<br><br>CANL ground short |
| L60-40 (CA1P) - L60-30 (B) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANH +B short |
| L60-18 (CA1N) - L60-30 (B) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Below 6 kΩ:<br><br>CANL +B short |

- It is only necessary to perform the inspection in the above table for the result (short circuit) that was obtained in the Check CAN Bus Wire inspection.

  Find the necessary inspection from the Purpose column that matches the result in the Result column from the Check CAN Bus Wire inspection.

- If the resistance changes to normal when the connector is disconnected from the ECU, there may be a short in the ECU.

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Driving Support ECU) |

NG ▶ REPAIR OR REPLACE CORRESPONDING ECU OR SENSOR WIRE OR CONNECTOR

OK ▶ **REPLACE CORRESPONDING ECU**

| DTC | U1100 | Lost Communication with Seat Belt Control ECU |
|---|---|---|

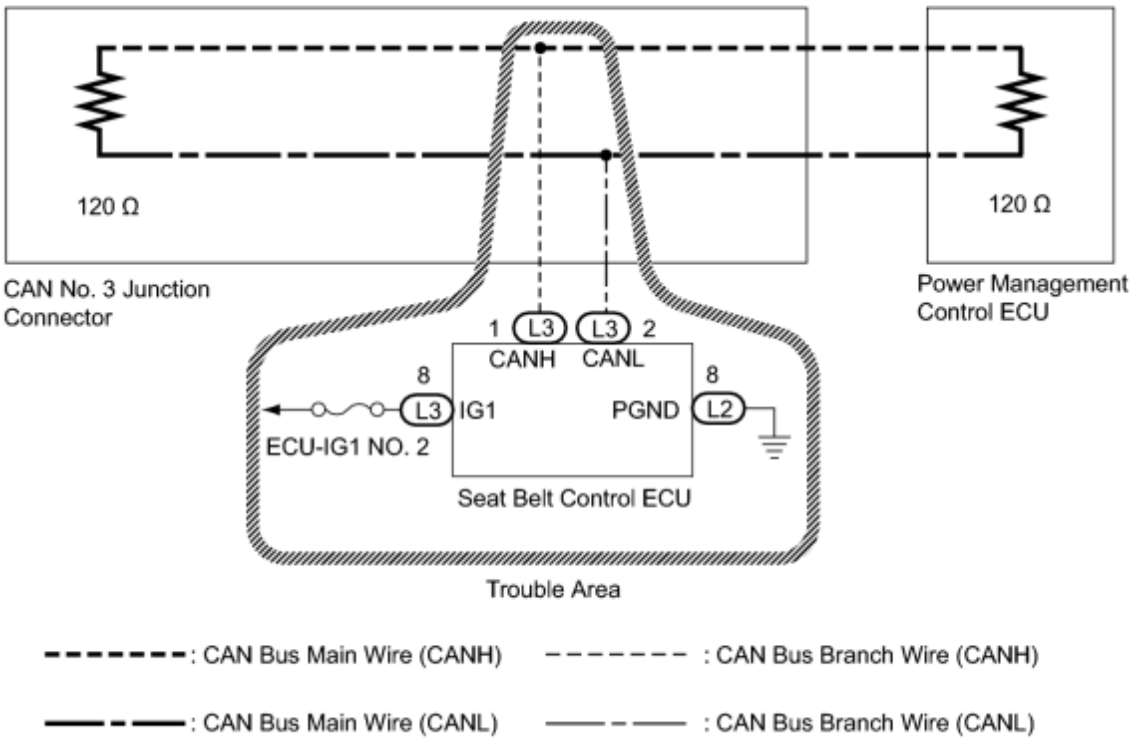
# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U1100 | No communication from the seat belt control ECU continues. | • Seat belt control ECU branch wire or connector<br>• Power source circuit of seat belt control ECU<br>• Seat belt control ECU |

HINT:

The diagnosis procedure is for when DTC U1100 is output by the power management control ECU (Techstream display: Power Management1).

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | RECONFIRM DTC OUTPUT |

(a) Reconfirm DTCs.

HINT:

If CAN No. 2 bus DTC U1002 is output from the power management control ECU (Techstream display/Power Management1), troubleshoot for U1002 and check for malfunctions in the CAN No. 2 main bus circuit.

Result:

| Result | Proceed to |
|---|---|
| U1002 is not output from power management control ECU (Techstream display/Power Management1) | A |
| U1002 is output from power management control ECU (Techstream display/Power Management1) | B |

B ▶ GO TO CIRCUITS INDICATED BY OUTPUT DTCS

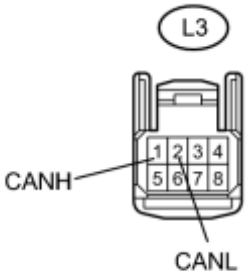
A ▼

| | |
|---|---|
| 2. | CHECK CAN BUS WIRE FOR DISCONNECTION (SEAT BELT CONTROL ECU BRANCH WIRE) |

(a) Turn the power switch off.

*1

(b) Disconnect the seat belt control ECU connector.




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Seat Belt Control ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L3-1 (CANH) - L3-2 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE SEAT BELT CONTROL ECU BRANCH WIRE OR CONNECTOR (SEAT BELT CONTROL ECU BRANCH WIRE)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Turn the power switch on (IG).

*1

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L3-8 (IG1) - Body ground | Power switch on (IG) | 11 to 14 V |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Seat Belt Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

*1




(a) Disconnect the seat belt control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Seat Belt Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L2-8 (PGND) - Body ground | Always | Below 1 Ω |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)
OK ▶ **REPLACE SEAT BELT CONTROL ECU**

| DTC | U110B | Lost Communication with Parking Assist Control Module "B" |
|---|---|---|

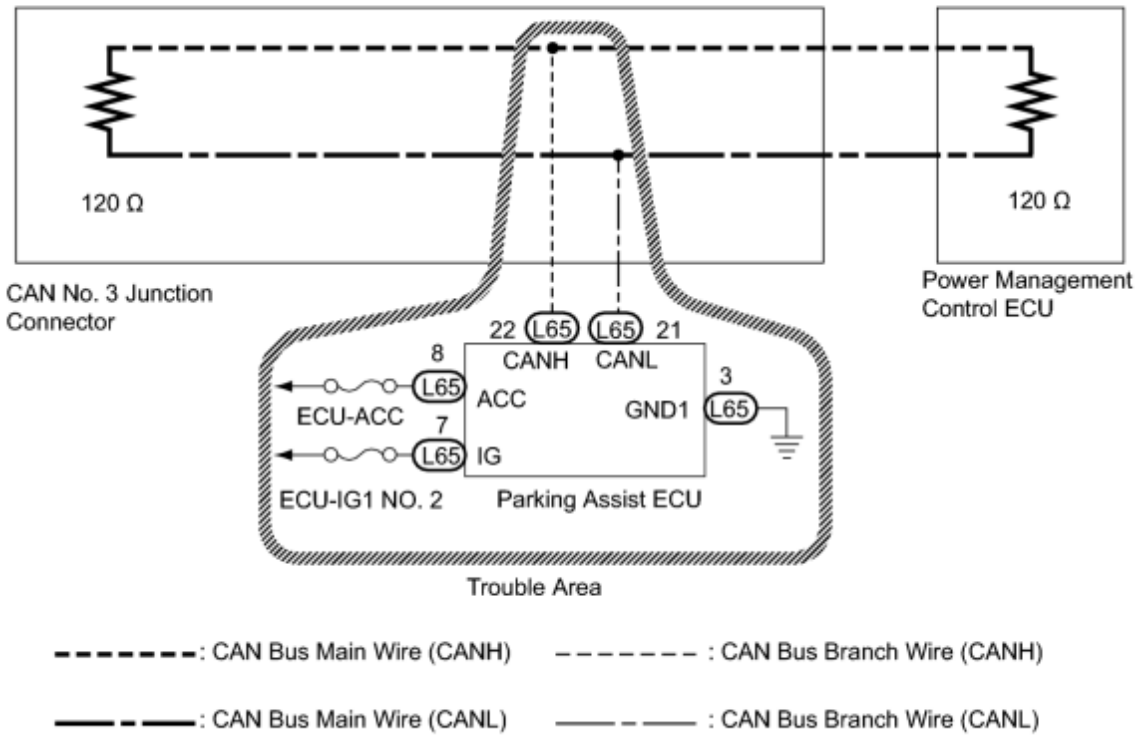
# DESCRIPTION

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U110B | No communication from the parking assist ECU continues. | • Parking assist ECU branch wire or connector<br>• Power source circuit of parking assist ECU<br>• Parking assist ECU |

HINT:

The diagnosis procedure is for when DTC U110B is output by the power management control ECU (Techstream display: Power Management1).

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | RECONFIRM DTC OUTPUT |

(a) Reconfirm DTCs.

HINT:

If CAN No. 2 bus DTC U1002 is output from the power management control ECU (Techstream display/Power Management1), troubleshoot for U1002 and check for malfunctions in the CAN No. 2 main bus circuit.

Result:

| Result | Proceed to |
|---|---|
| U1002 is not output from power management control ECU (Techstream display/Power Management1) | A |
| U1002 is output from power management control ECU (Techstream display/Power Management1) | B |

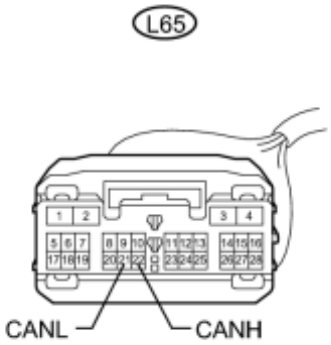
B ▶ GO TO CIRCUITS INDICATED BY OUTPUT DTCS

A ▼

| | |
|---|---|
| 2. | CHECK CAN BUS WIRE FOR DISCONNECTION (PARKING ASSIST ECU BRANCH WIRE) |

(a) Turn the power switch off.

*1




H

(b) Disconnect the parking assist ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Parking Assist ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

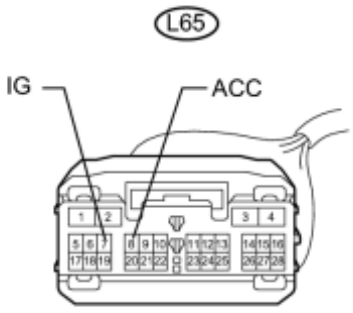
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L65-22 (CANH) - L65-21 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (PARKING ASSIST ECU BRANCH WIRE)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

*1




H

(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L65-8 (ACC) - Body ground | Power switch on (ACC) | 11 to 14 V |
| L65-7 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Parking Assist ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

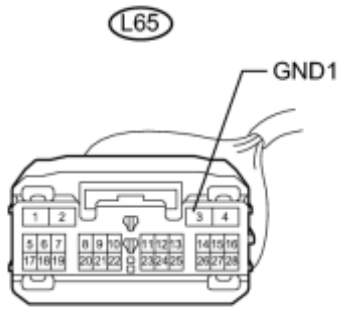
OK ▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

*1

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L65-3 (GND1) - Body ground | Always | Below 1 Ω |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Parking Assist ECU) |

H

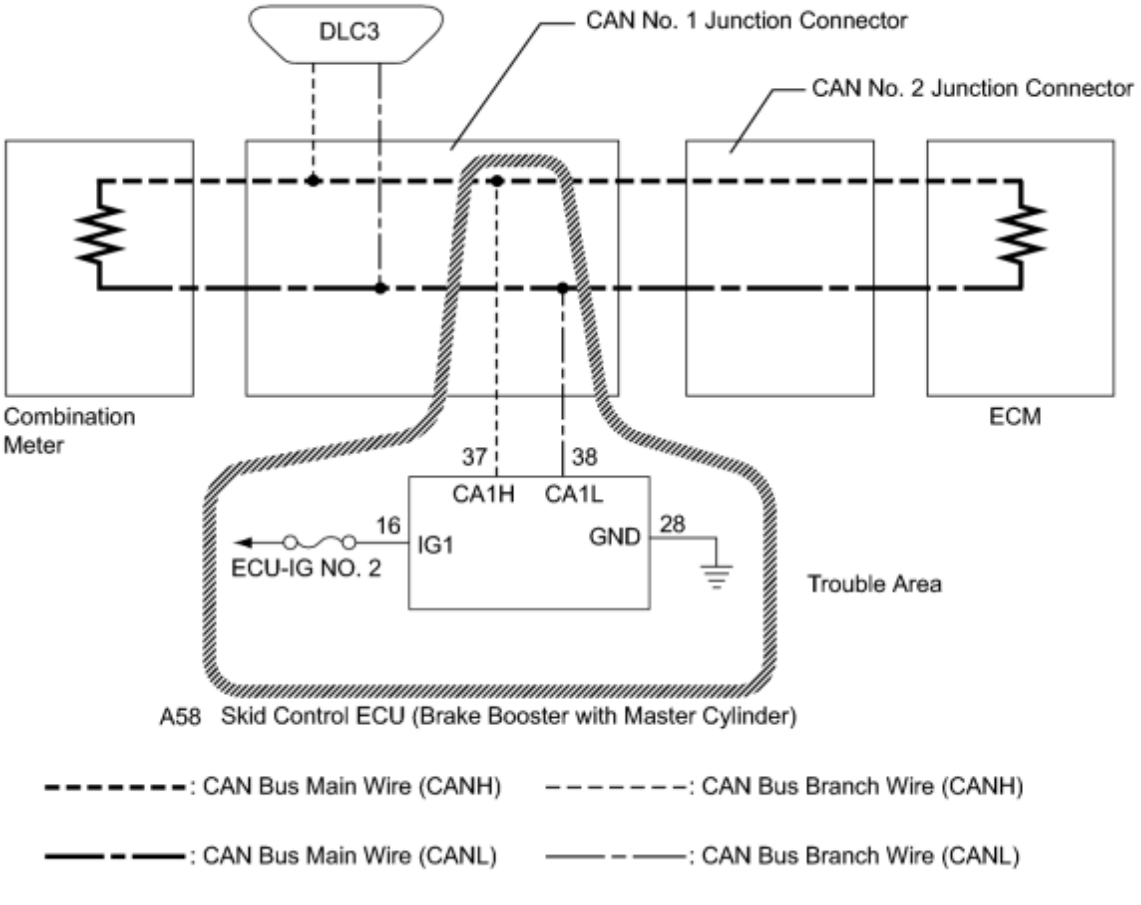
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)
OK ▶ **REPLACE PARKING ASSIST ECU**

Skid Control ECU Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Skid Control ECU Communication Stop Mode | • "ABS/VSC/TRAC" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Skid Control ECU Communication Stop Mode in DTC Combination Table. | • Skid control ECU branch wire or connector<br>• Power source circuit of skid control ECU<br>• Skid control ECU (Brake booster with master cylinder) |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC (BRAKE SYSTEM) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / ABS/VSC/TRAC / Trouble Codes.

OK:

DTC C1241 is not output.

NG ▶ GO TO CIRCUITS INDICATED BY OUTPUT DTCS

OK ▼

| | |
|---|---|
| 2. | CHECK CAN BUS WIRE FOR DISCONNECTION (SKID CONTROL ECU BRANCH WIRE) |

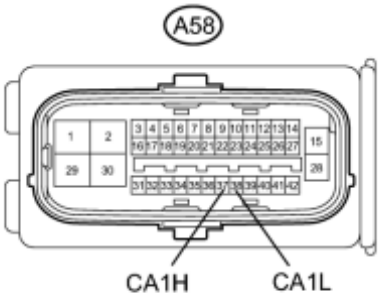
(a) Turn the power switch off.

(b) Disconnect the skid control ECU (brake booster with master cylinder) connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

*1




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A58-37 (CA1H) - A58-38 (CA1L) | Power switch off | 54 to 69 Ω |

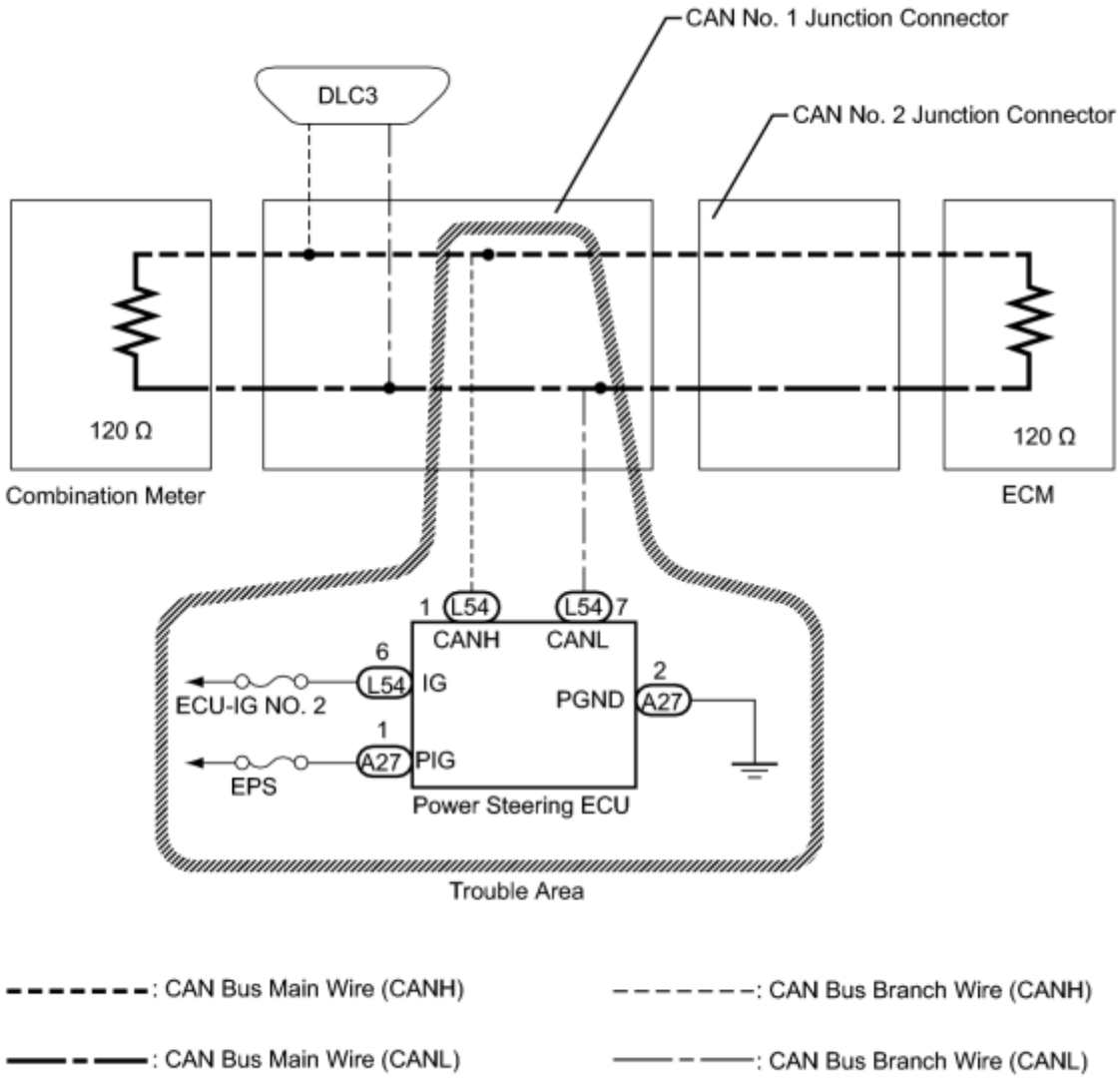
NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (SKID CONTROL ECU BRANCH WIRE)

OK ▶ **REPLACE BRAKE BOOSTER WITH MASTER CYLINDER**

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Power Steering ECU Communication Stop Mode | • "EPS" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Power Steering ECU Communication Stop Mode in DTC Combination Table. | • Power steering ECU branch wire or connector<br>• Power source circuit of power steering ECU<br>• Power steering ECU |

# WIRING DIAGRAM



# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

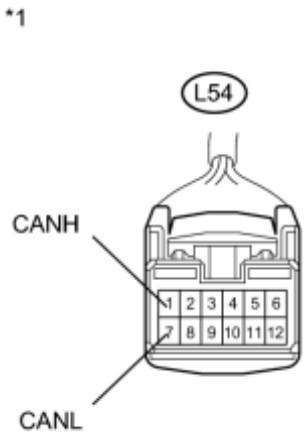
HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (POWER STEERING ECU BRANCH WIRE) |

(a) Turn the power switch off.




(b) Disconnect the power steering ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Steering ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L54-1 (CANH) - L54-7 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (POWER STEERING ECU BRANCH WIRE)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

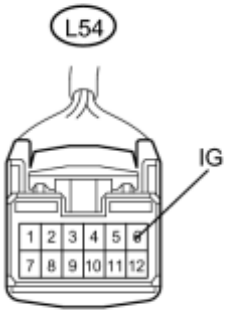
(a) Turn the power switch on (IG).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L54-6 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Steering ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

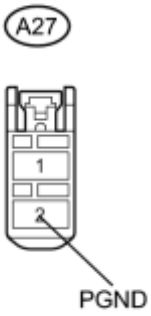
OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Turn the power switch off.

(b) Disconnect the power steering ECU connector.

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Steering ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

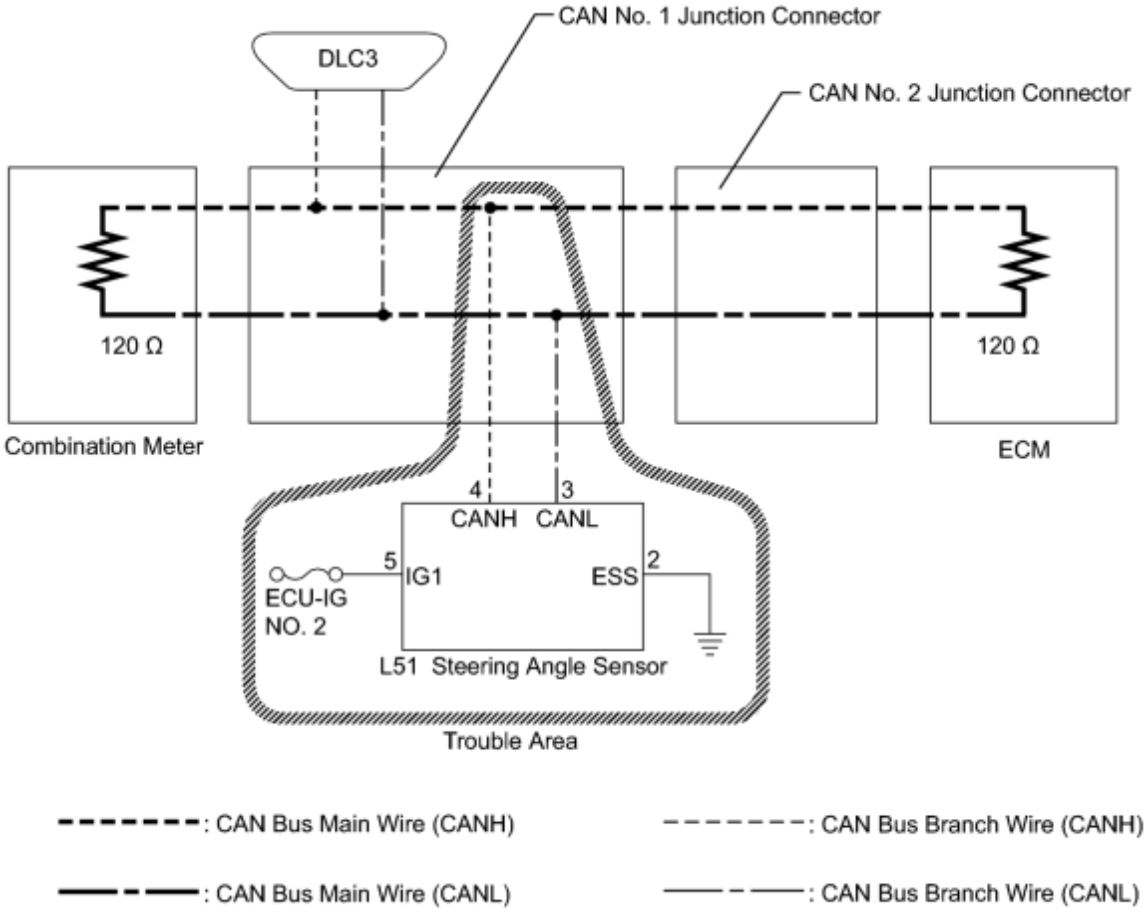
OK ▶ **REPLACE POWER STEERING ECU**

Steering Angle Sensor Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Steering Angle Sensor Communication Stop Mode | • "Steering Angle Sensor" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Steering Angle Sensor Communication Stop Mode in DTC Combination Table. | • Steering angle sensor branch wire or connector<br>• Power source circuit of steering angle sensor<br>• Steering angle sensor |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

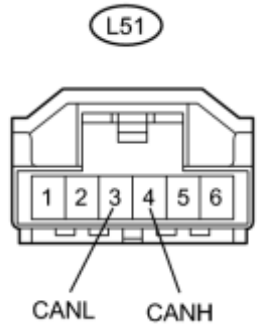
# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (STEERING ANGLE SENSOR BRANCH WIRE) |

(a) Turn the power switch off.

*1

(b) Disconnect the steering angle sensor connector.




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Steering Angle Sensor) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L51-4 (CANH) - L51-3 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (STEERING ANGLE SENSOR BRANCH WIRE)

OK ▼

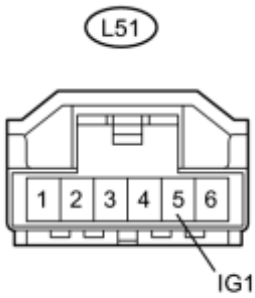
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Turn the power switch on (IG).

(b) Measure the voltage according to the value(s) in the table below.

*1

Standard Voltage:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L51-5 (IG1) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Steering Angle Sensor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK ▼

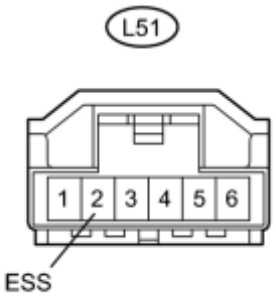
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

*1

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L51-2 (ESS) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Steering Angle Sensor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

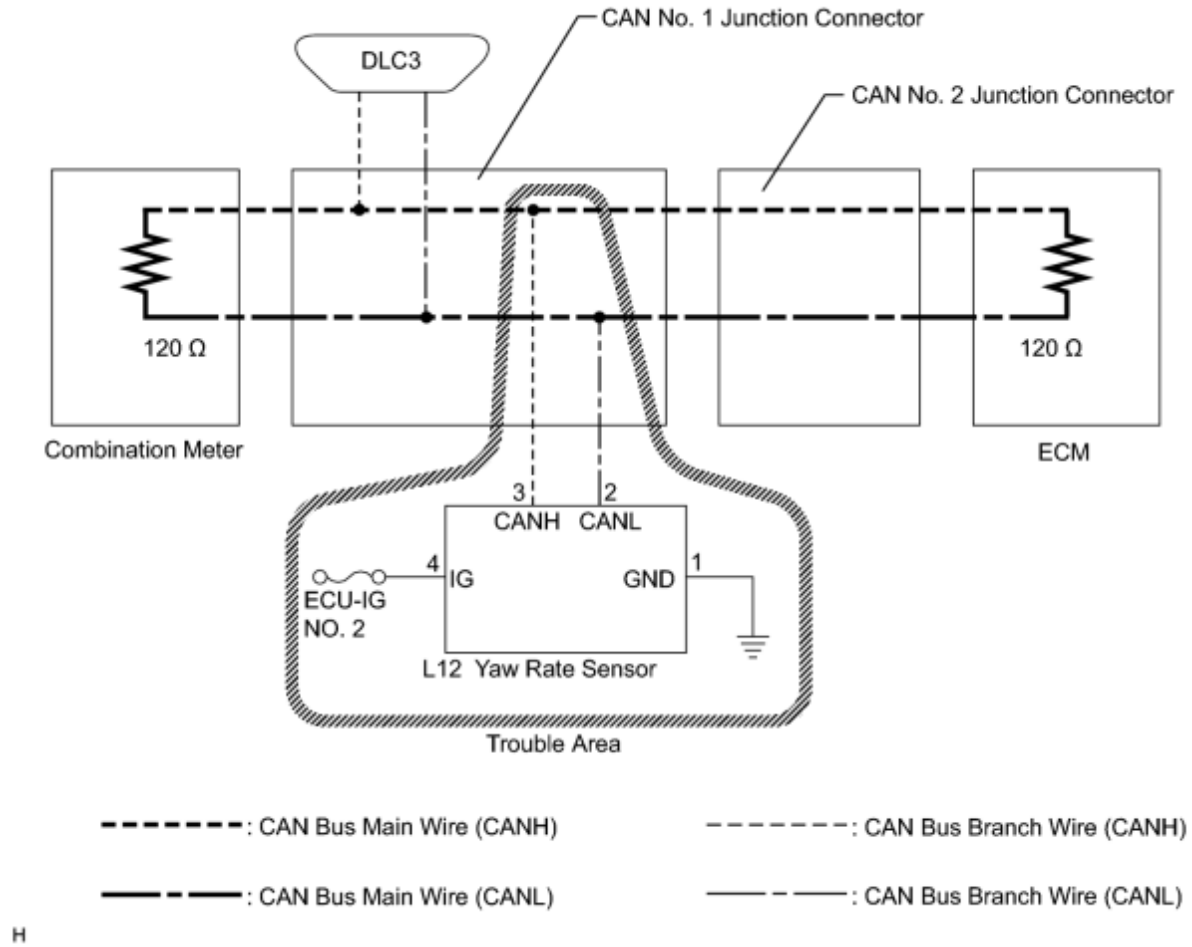
OK ▶ **REPLACE SPIRAL CABLE WITH STEERING ANGLE SENSOR SUB-ASSEMBLY**

| Yaw Rate Sensor Communication Stop Mode |
|---|

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Yaw Rate Sensor Communication Stop Mode | • "Yaw Rate/Decelerate Sensor" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Yaw Rate Sensor Communication Stop Mode in DTC Combination Table. | • Yaw rate sensor branch wire or connector<br>• Power source circuit of yaw rate sensor<br>• Yaw rate sensor |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

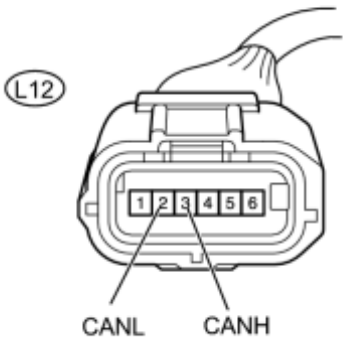
- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (YAW RATE SENSOR BRANCH WIRE) |

(a) Turn the power switch off.

*1




(b) Disconnect the yaw rate sensor connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Yaw Rate Sensor) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L12-3 (CANH) - L12-2 (CANL) | Power switch off | 54 to 69 Ω |

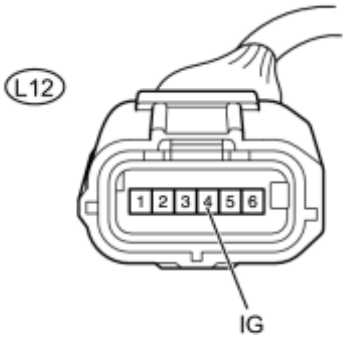
NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (YAW RATE SENSOR BRANCH WIRE)

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Turn the power switch on (IG).

*1




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L12-4 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Yaw Rate Sensor) |

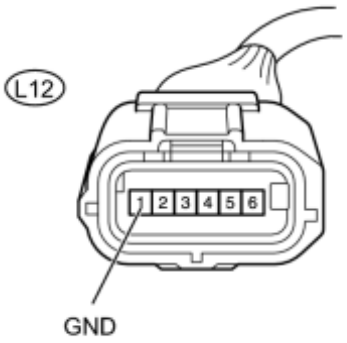
NG REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Turn the power switch off.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L12-1 (GND) - Body ground | Always | Below 1 Ω |

### *Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| | (to Yaw Rate Sensor) |

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

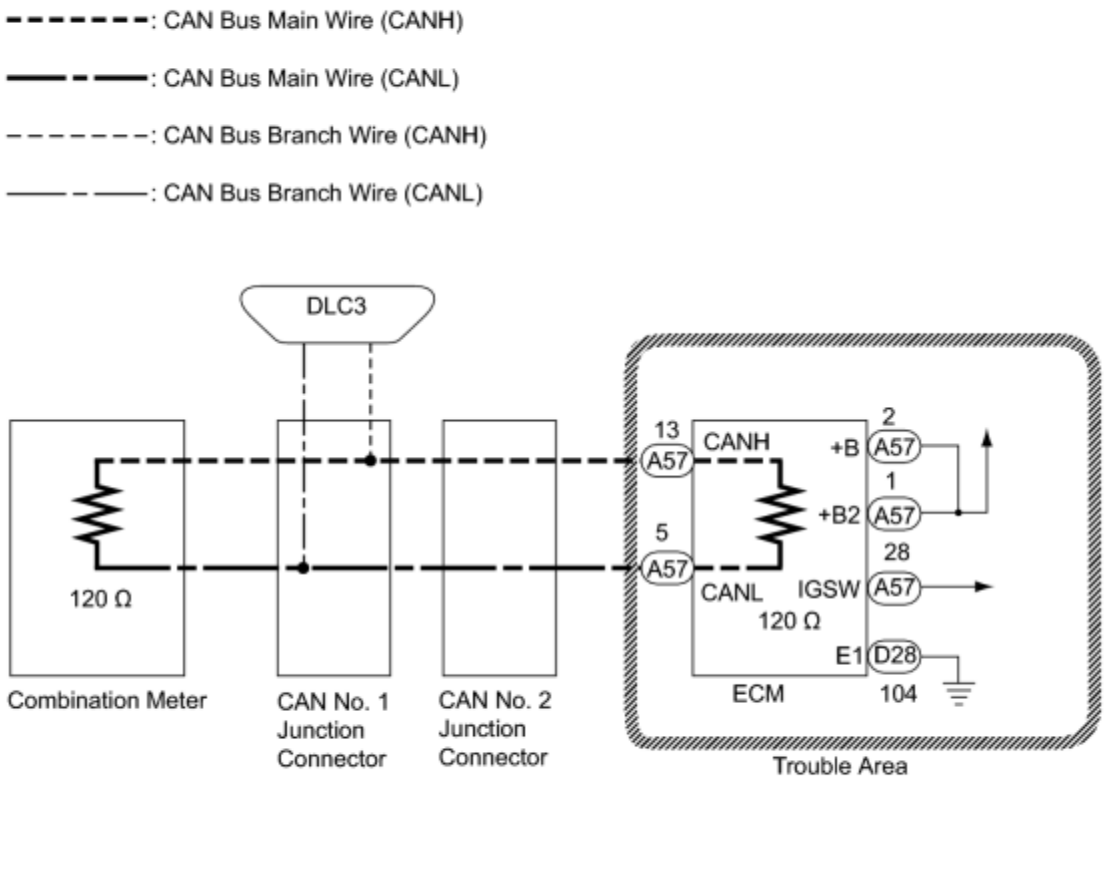
OK → **REPLACE YAW RATE SENSOR**

ECM Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| ECM Communication Stop Mode | • "Engine" and "ECT" are not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to ECM Communication Stop Mode in DTC Combination Table. | • Power source circuit of ECM<br>• ECM main wire or connector<br>• ECM |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

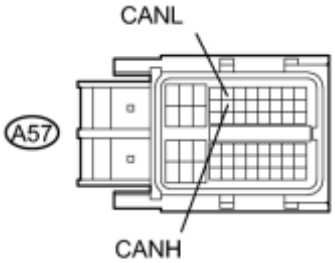
# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (ECM MAIN WIRE) |

(a) Turn the power switch off.

*1

(b) Disconnect the ECM connector.




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-13 (CANH) - A57-5 (CANL) | Power switch off | 108 to 132 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (ECM MAIN WIRE)

OK ▼

| | |
|---|---|
| 2. | CHECK ECM POWER SOURCE CIRCUIT |

(a) Check the ECM power source circuit INFO.

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)
OK ▶ **REPLACE ECM**

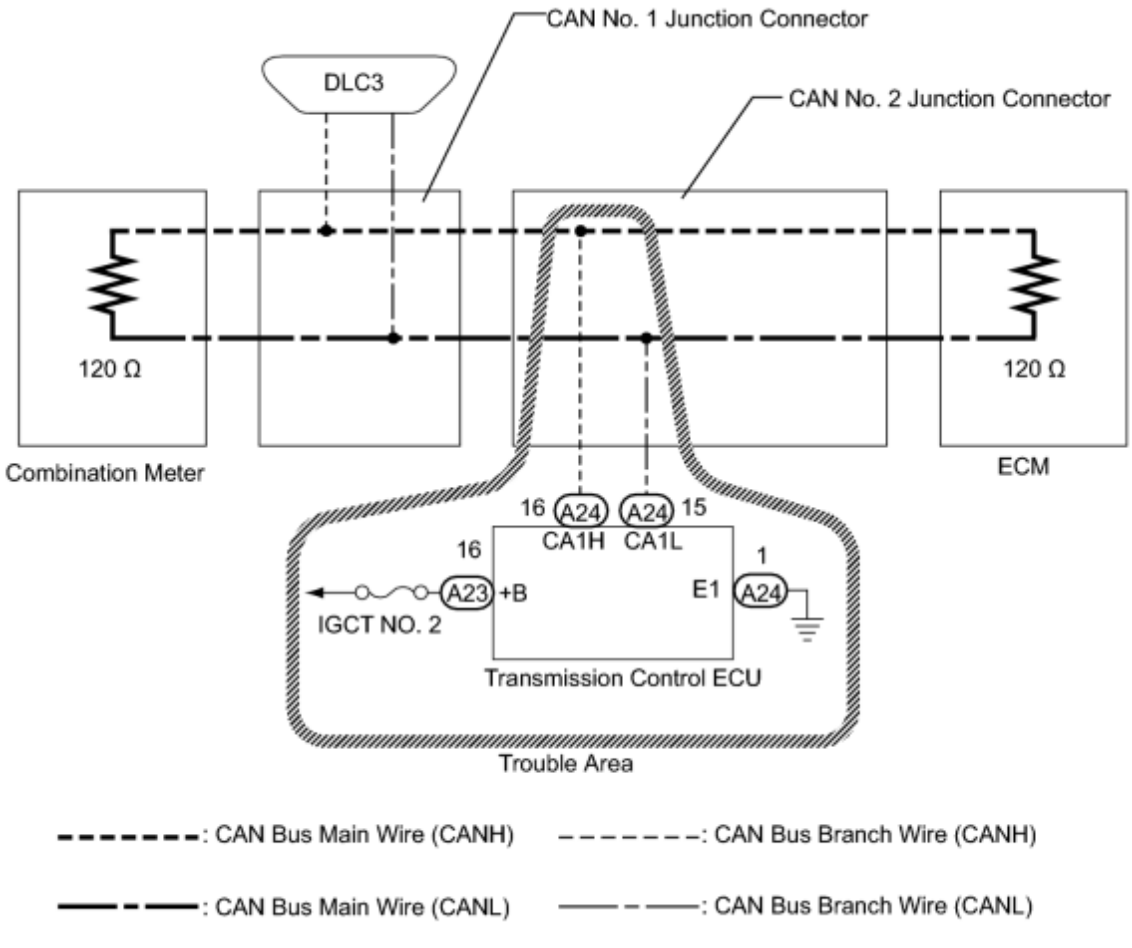
Transmission Control ECU Communication Stop Mode

# DESCRIPTION

The transmission control ECU drives the parking lock actuator in accordance with signals from the power management control ECU.

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Transmission Control ECU Communication Stop Mode | • "Transmission Control " is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Transmission Control Communication Stop Mode in DTC Combination Table. | • Transmission control ECU branch wire or connector<br>• Power source circuit of transmission control ECU<br>• Transmission control ECU |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

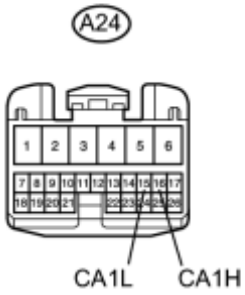
- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (TRANSMISSION CONTROL ECU BRANCH WIRE) |

(a) Turn the power switch off.

*1




(b) Disconnect the transmission control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A24-16 (CA1H) - A24-15 (CA1L) | Power switch off | 54 to 69 Ω |

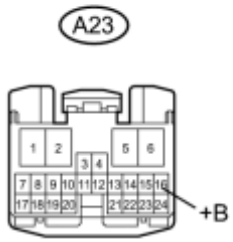
NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (ECM MAIN WIRE)

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Measure the voltage according to the value(s) in the table below.

*1




Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A23-16 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

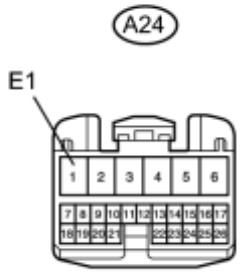
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

*1




(a) Disconnect the transmission control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A24-1 (E1) - Body ground | Always | Below 1 Ω |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

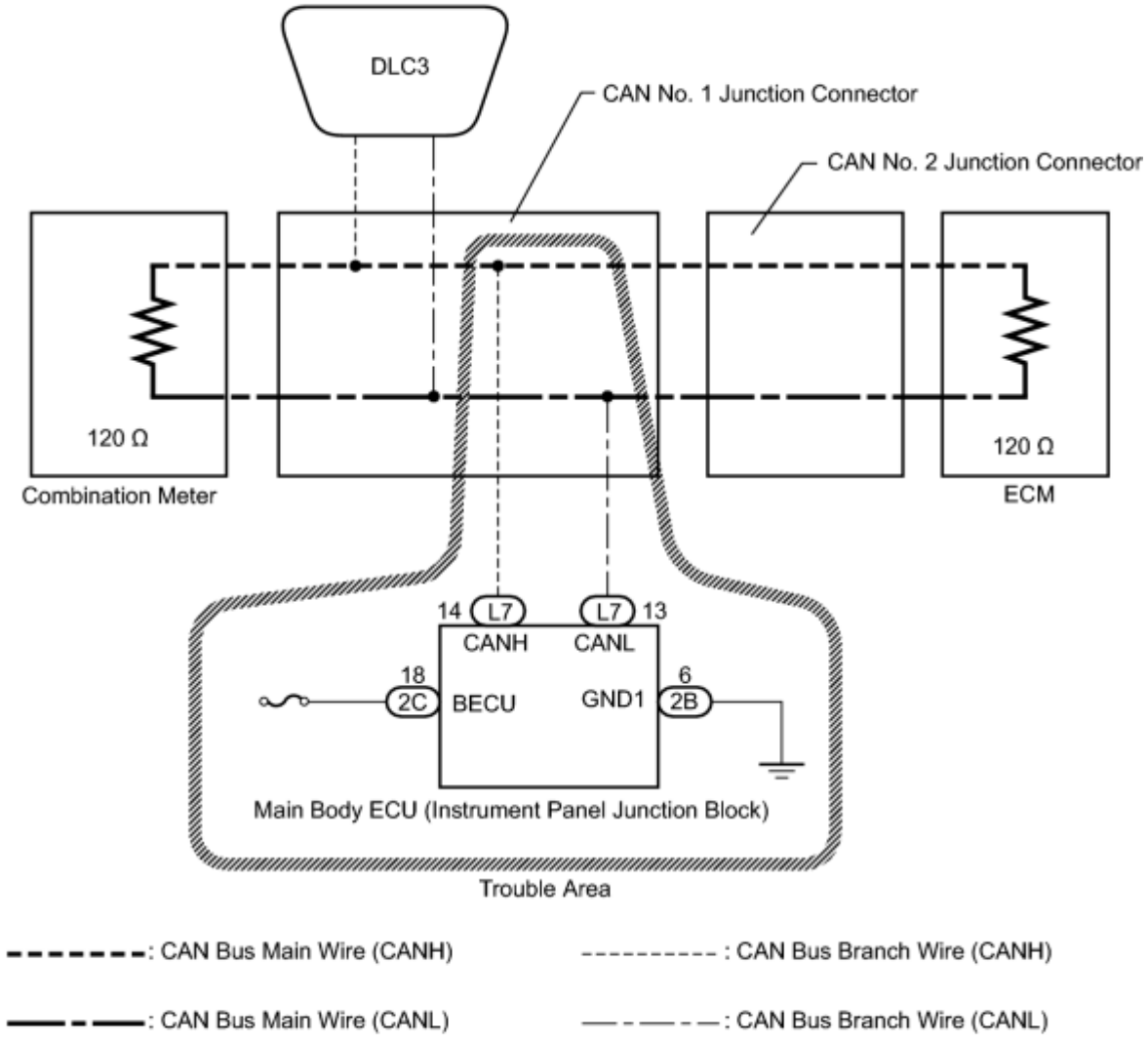
OK ▶ **REPLACE TRANSMISSION CONTROL ECU**

Main Body ECU Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Main Body ECU Communication Stop Mode | • "Main Body" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Main Body ECU Communication Stop Mode in DTC Combination Table. | • Main body ECU branch wire or connector<br>• Power source circuit of main body ECU<br>• Main body ECU |

# WIRING DIAGRAM




c

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

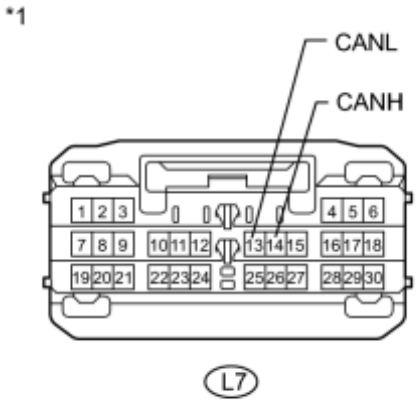
HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (MAIN BODY ECU BRANCH WIRE) |

(a) Turn the power switch off.




(b) Disconnect the main body ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Main Body ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L7-14 (CANH) - L7-13 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (MAIN BODY ECU BRANCH WIRE)

OK ▼

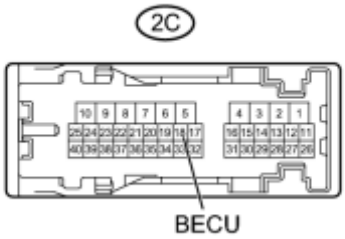
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Disconnect the instrument panel junction block connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block) |

*1




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2C-18 (BECU) - Body ground | Always | 11 to 14 V |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

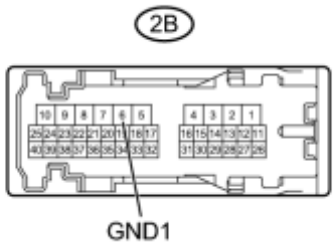
OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-6 (GND1) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

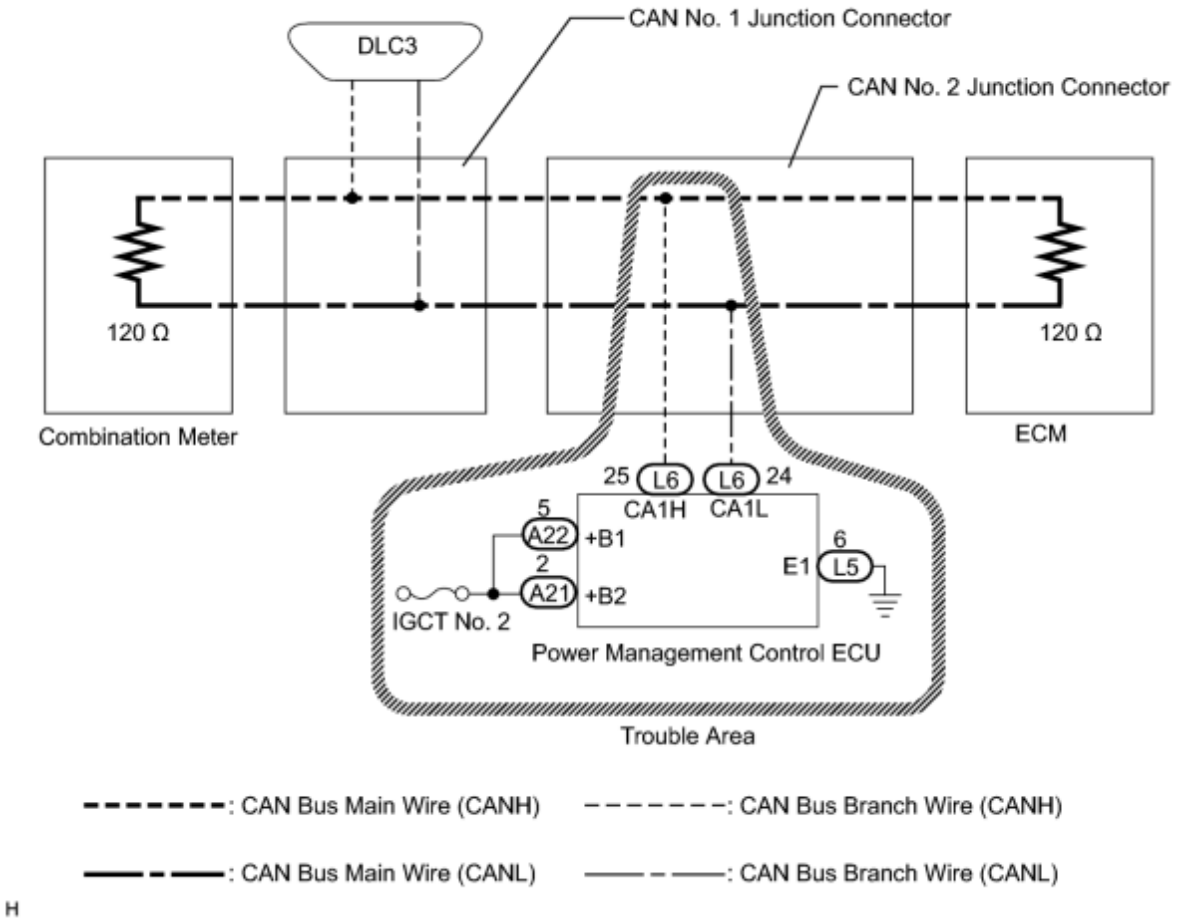
OK ▶ **REPLACE MAIN BODY ECU**

Power Management Control ECU Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Power Management Control ECU Communication Stop Mode | • "Electric Power Control" is not displayed on the CAN Bus Check screen of the Techstream.<br>• Applies to Power Management Control ECU Communication Stop Mode in DTC Combination Table. | • Power management control ECU branch wire or connector<br>• Power source circuit of power management control ECU<br>• Power management control ECU |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

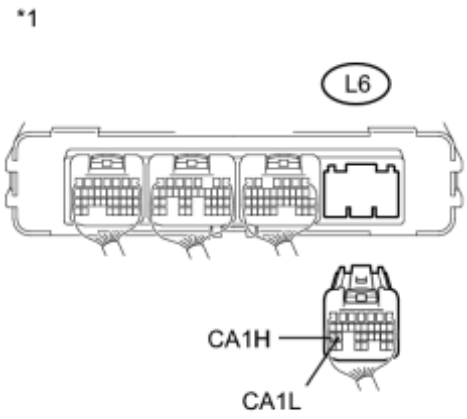
HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (POWER MANAGEMENT CONTROL ECU BRANCH WIRE) |

(a) Turn the power switch off.




(b) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Value |
|---|---|---|
| L6-25 (CA1H) - L6-24 (CA1L) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN NO. 1 BUS BRANCH WIRE OR CONNECTOR (POWER MANAGEMENT CONTROL ECU)

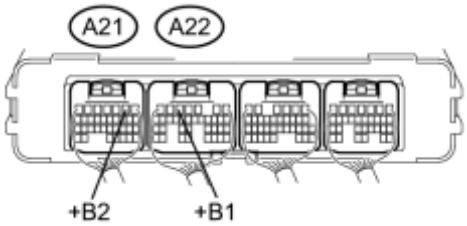
OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Measure the voltage according to the value(s) in the table below.

*1

Standard Voltage:




| Tester Connection | Condition | Specified Value |
|---|---|---|
| A21-2 (+B2) - Body Ground | Always | 11 to 14 V |
| A22-5 (+B1) - Body Ground | Always | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(to Power Management Control ECU) |

P

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE TERMINAL)

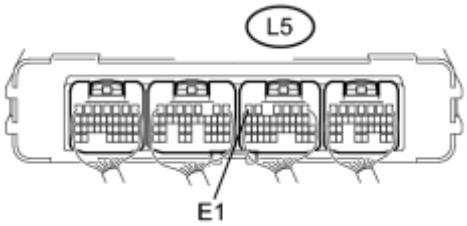
OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

*1

Standard Resistance:




| Tester Connection | Condition | Specified Value |
|---|---|---|
| L5-6 (E1) - Body Ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(to Power Management Control ECU) |

P

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND TERMINAL)

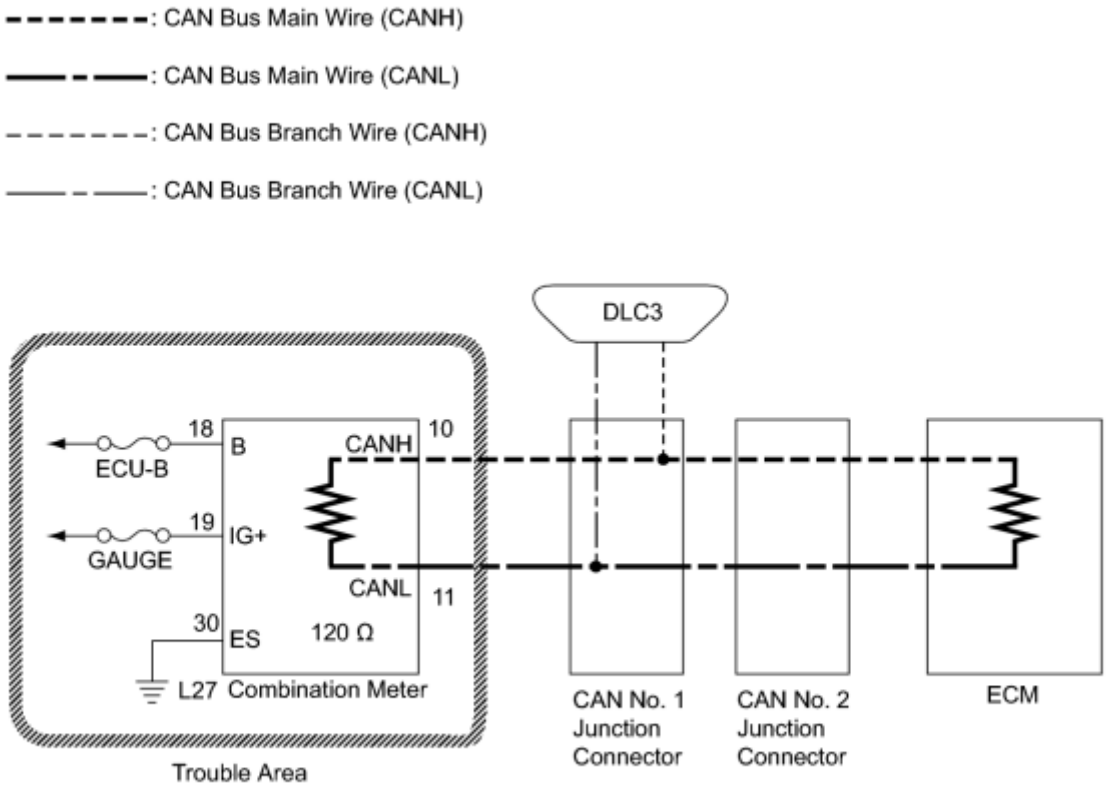
OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

Combination Meter ECU Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Combination Meter ECU Communication Stop Mode | • "Combination Meter" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Combination Meter ECU Communication Stop Mode in DTC Combination Table. | • Combination meter main wire or connector<br>• Power source circuit of combination meter<br>• Combination meter |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

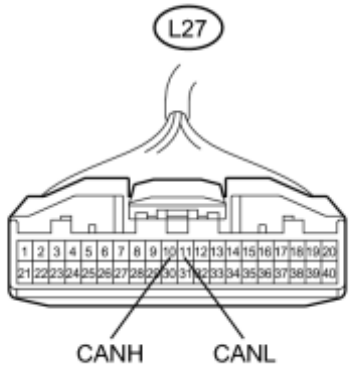
- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (COMBINATION METER MAIN WIRE) |

(a) Turn the power switch off.

*1




(b) Disconnect the combination meter connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L27-10 (CANH) - L27-11 (CANL) | Power switch off | 108 to 132 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (COMBINATION METER ECU)

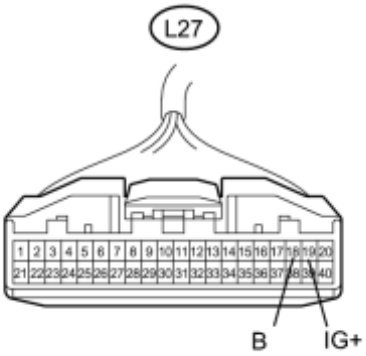
OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-19 (IG+) - Body ground | Power switch on (IG) | 11 to 14 V |
| L27-18 (B) - Body ground | Always | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter) |

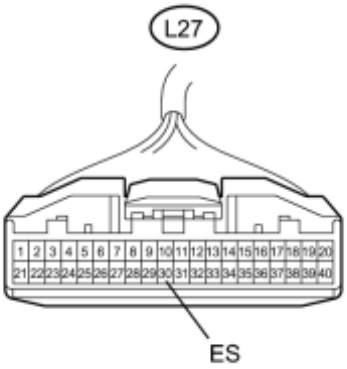
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-30 (ES) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

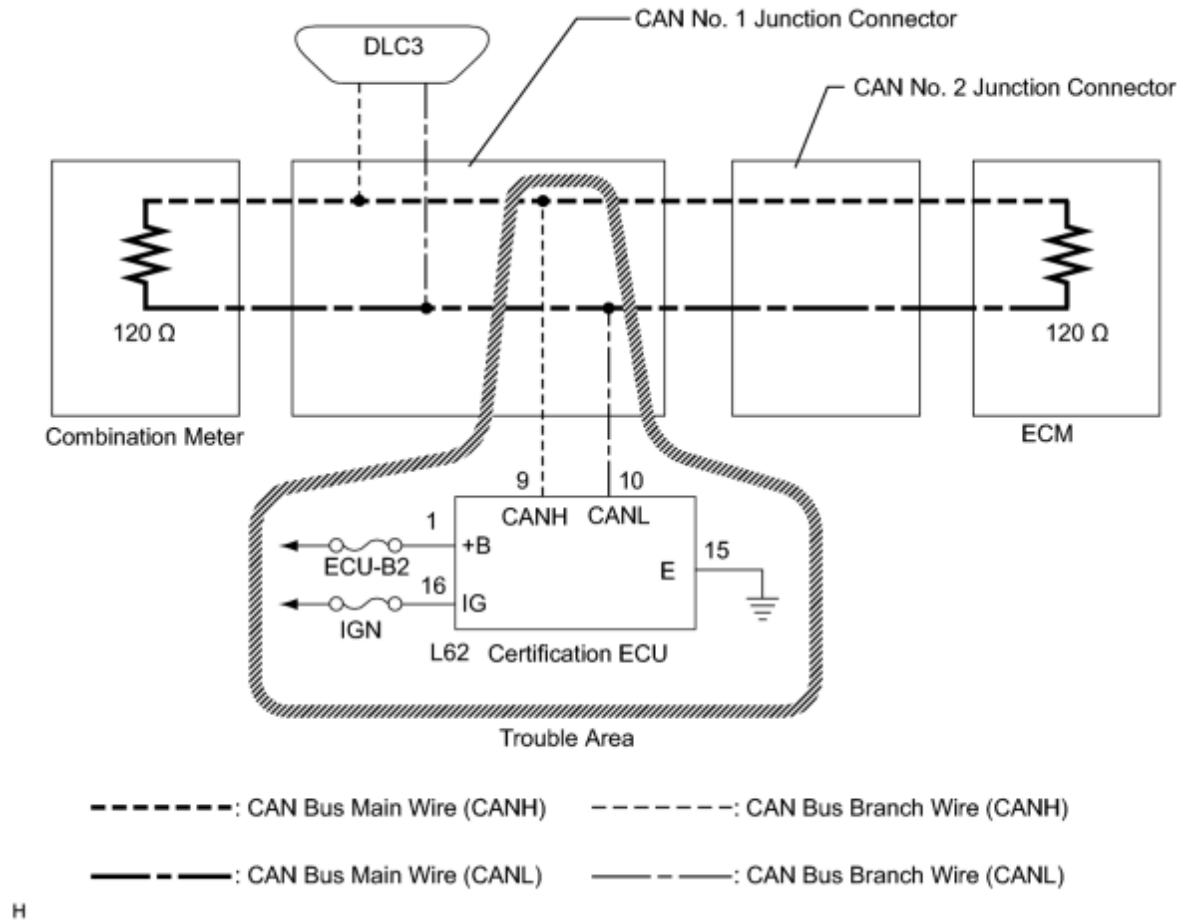
OK ▶ **REPLACE METER CIRCUIT PLATE NO. 3 (COMBINATION METER ECU)**

Certification ECU Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Certification ECU Communication Stop Mode | • "Smart Access/Smart Key/Wireless Tuner" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Certification ECU Communication Stop Mode in DTC Combination Table. | • Power source circuit of certification ECU<br>• Certification ECU branch wire or connector<br>• Certification ECU |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

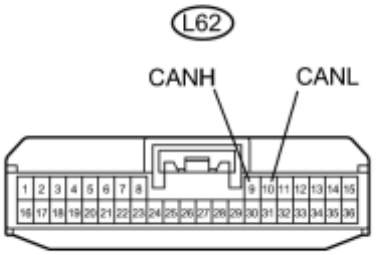
- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (CERTIFICATION ECU BRANCH WIRE) |

(a) Turn the power switch off.

*1




(b) Disconnect the certification ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

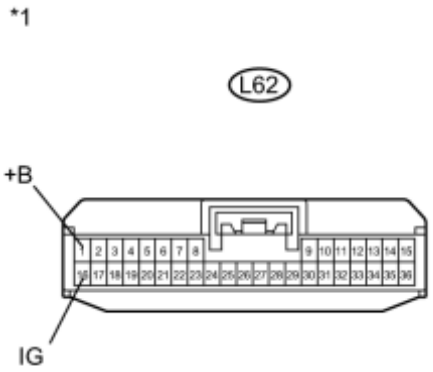
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L62-9 (CANH) - L62-10 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CERTIFICATION ECU BRANCH WIRE)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Measure the voltage according to the value(s) in the table below.




Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-1 (+B) - Body ground | Always | 11 to 14 V |
| L62-16 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

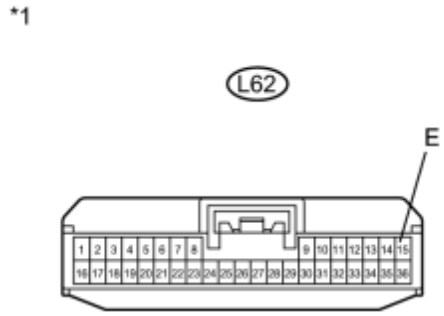
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-15 (E) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

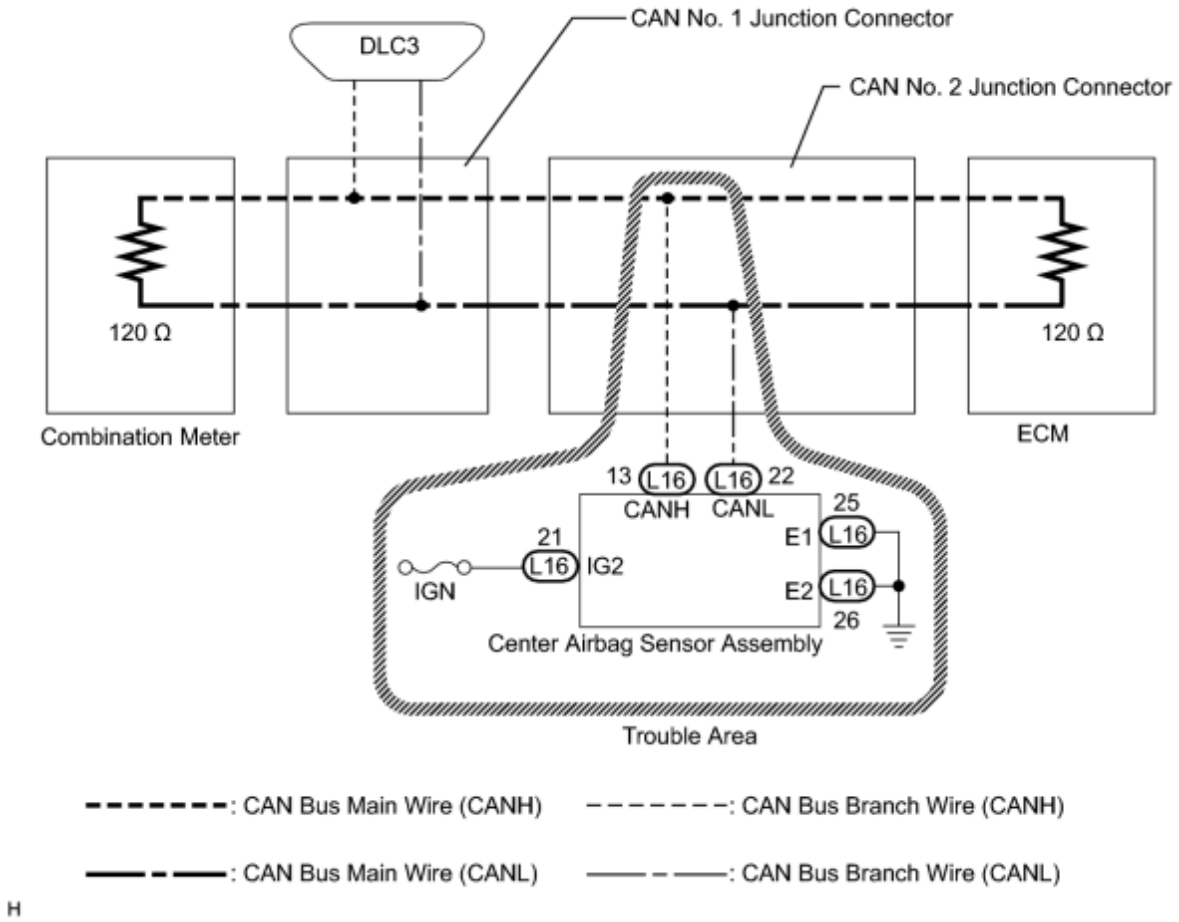
OK ▶ **REPLACE SMART KEY ECU (CERTIFICATION ECU)**

Center Airbag Sensor Communication Stop Mode

# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Center Airbag Sensor Communication Stop Mode | • "SRS Airbag" is not displayed on "CAN Bus Check" screen of the Techstream.<br>• Applies to Center Airbag Sensor Communication Stop Mode in DTC Combination Table. | • Center airbag sensor assembly branch wire or connector<br>• Power source circuit of center airbag sensor assembly<br>• Center airbag sensor assembly |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

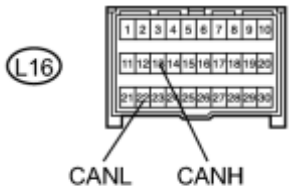
| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (CENTER AIRBAG SENSOR ASSEMBLY BRANCH WIRE) |

(a) Turn the power switch off.

*1

(b) Disconnect the center airbag sensor assembly connector.

## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Center Airbag Sensor Assembly) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L16-13 (CANH) - L16-22 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CENTER AIRBAG SENSOR ASSEMBLY BRANCH WIRE)

OK

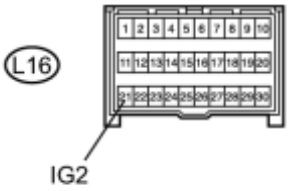
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L16-21 (IG2) - Body ground | Power switch on (IG) | 11 to 14 V |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Center Airbag Sensor Assembly) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE CIRCUIT)

OK

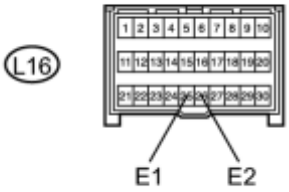
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L16-25 (E1) - Body ground | Always | Below 1 Ω |
| L16-26 (E2) - Body ground | Always | Below 1 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Center Airbag Sensor Assembly) |

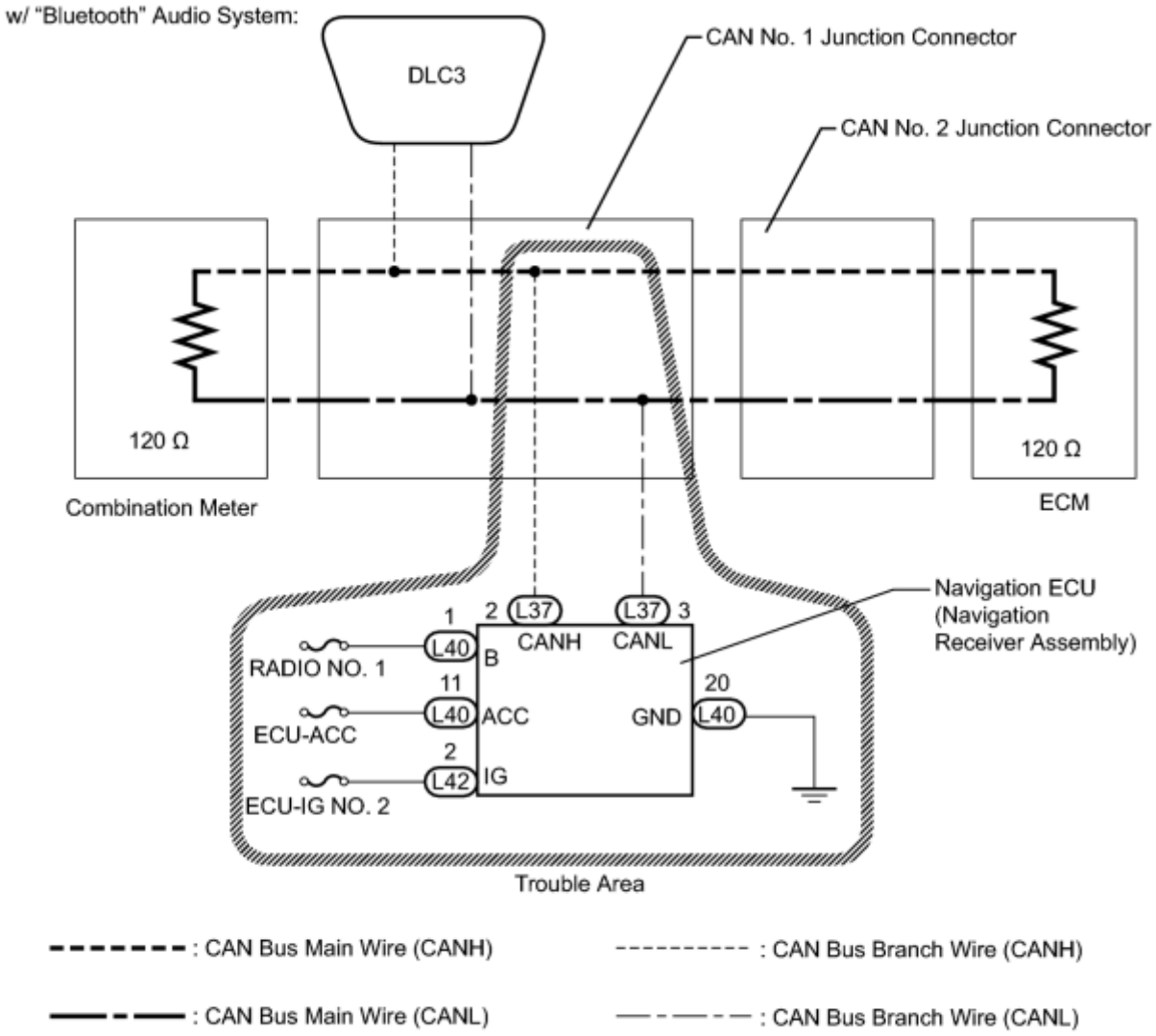
NG REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND CIRCUIT)

OK **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

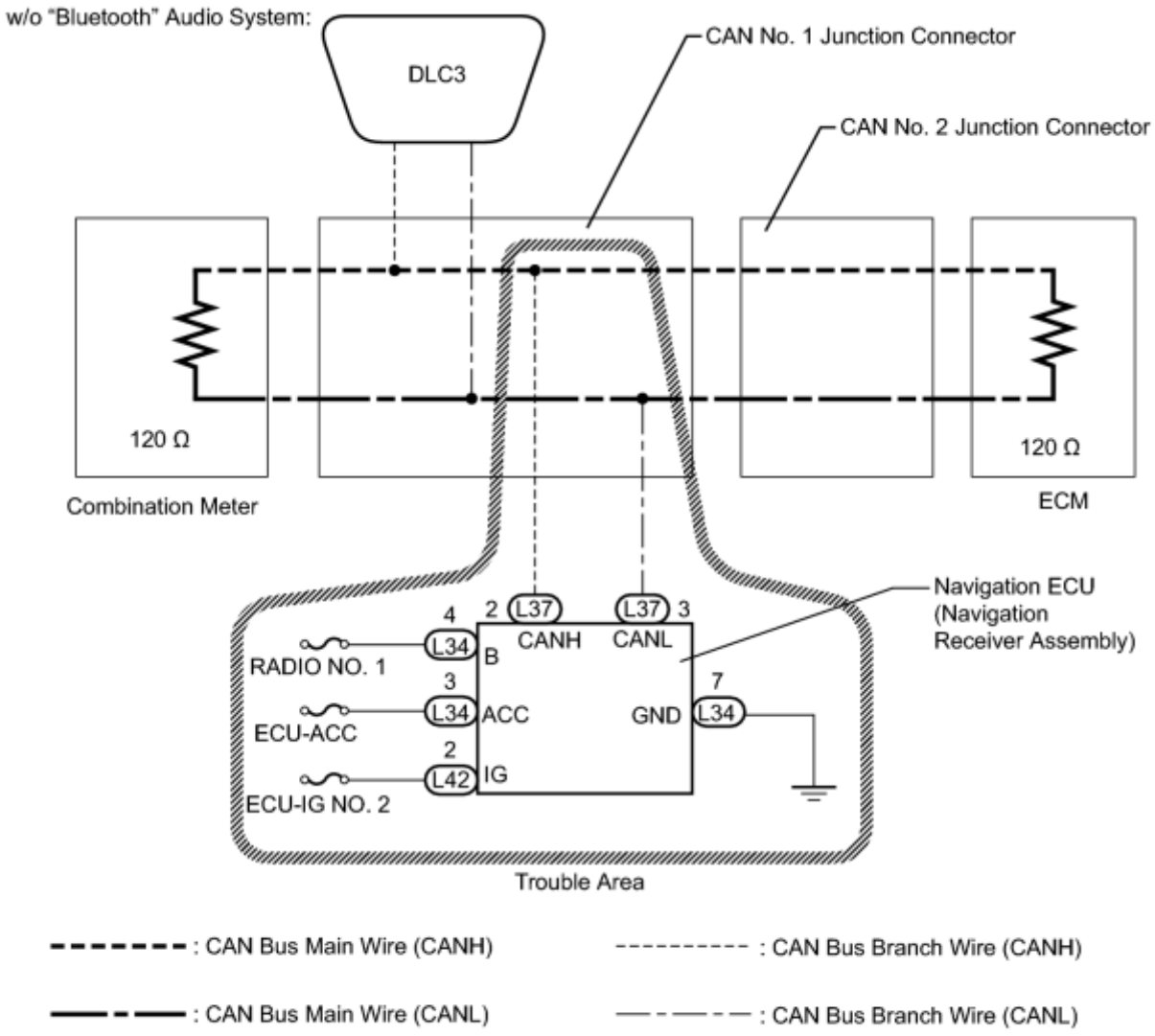
# DESCRIPTION

| Detection Item | Symptom | Trouble Area |
|---|---|---|
| Navigation ECU Communication Stop Mode | • "AVN1" is not displayed on the "CAN Bus Check" screen of the Techstream<br>• Applies to Navigation ECU Communication Stop Mode in DTC Combination Table | • Display and navigation ECU branch wire or connector<br>• Power source circuit of navigation ECU<br>• Navigation ECU (Navigation receiver assembly) |

# WIRING DIAGRAM




c




c

# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.
- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.

- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

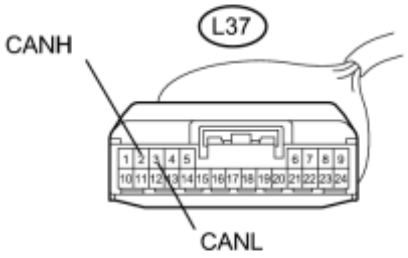
# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN BUS WIRE FOR DISCONNECTION (NAVIGATION ECU BRANCH WIRE) |

(a) Turn the power switch off.

*1

(b) Disconnect the navigation ECU connector.




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

H

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L37-2 (CANH) - L37-3 (CANL) | Power switch off | 54 to 69 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (NAVIGATION ECU BRANCH WIRE)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE TERMINAL) |

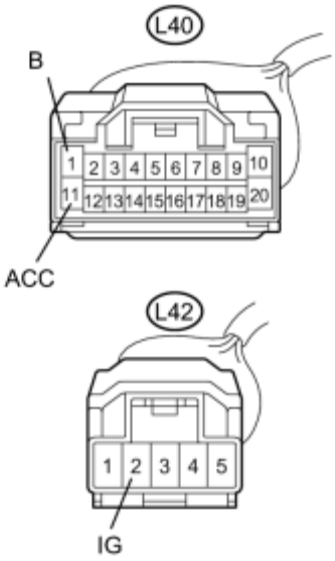
(a) w/ "Bluetooth" Audio System

(1) Measure the voltage according to the value(s) in the table below.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

*1



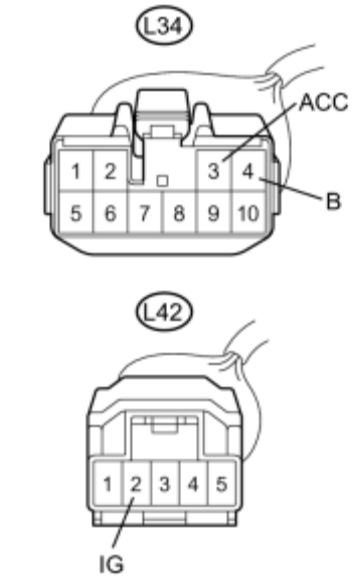

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L40-1 (B) - Body ground | Always | 11 to 14 V |
| L40-11 (ACC) - Body ground | Power switch on (ACC) | 11 to 14 V |
| L42-2 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

(b) w/o "Bluetooth" Audio System

(1) Measure the voltage according to the value(s) in the table below.

*1




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L34-4 (B) - Body ground | Always | 11 to 14 V |
| L34-3 (ACC) - Body ground | Power switch on (ACC) | 11 to 14 V |
| L42-2 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SOURCE TERMINAL)

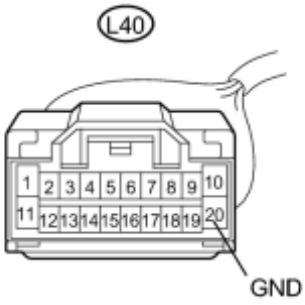
OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (GROUND TERMINAL) |

(a) w/ "Bluetooth" Audio System

(1) Measure the resistance according to the value(s) in the table below.

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

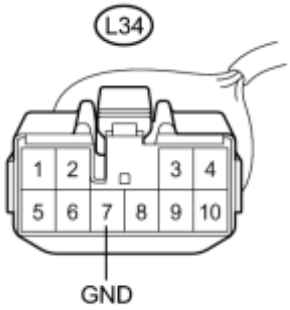
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L40-20 (GND) - Body ground | Always | Below 1 Ω |

(b) w/o "Bluetooth" Audio System

(1) Measure the resistance according to the value(s) in the table below.

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L34-7 (GND) - Body ground | Always | Below 1 Ω |

H

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (GROUND TERMINAL)

OK ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY (NAVIGATION ECU)**

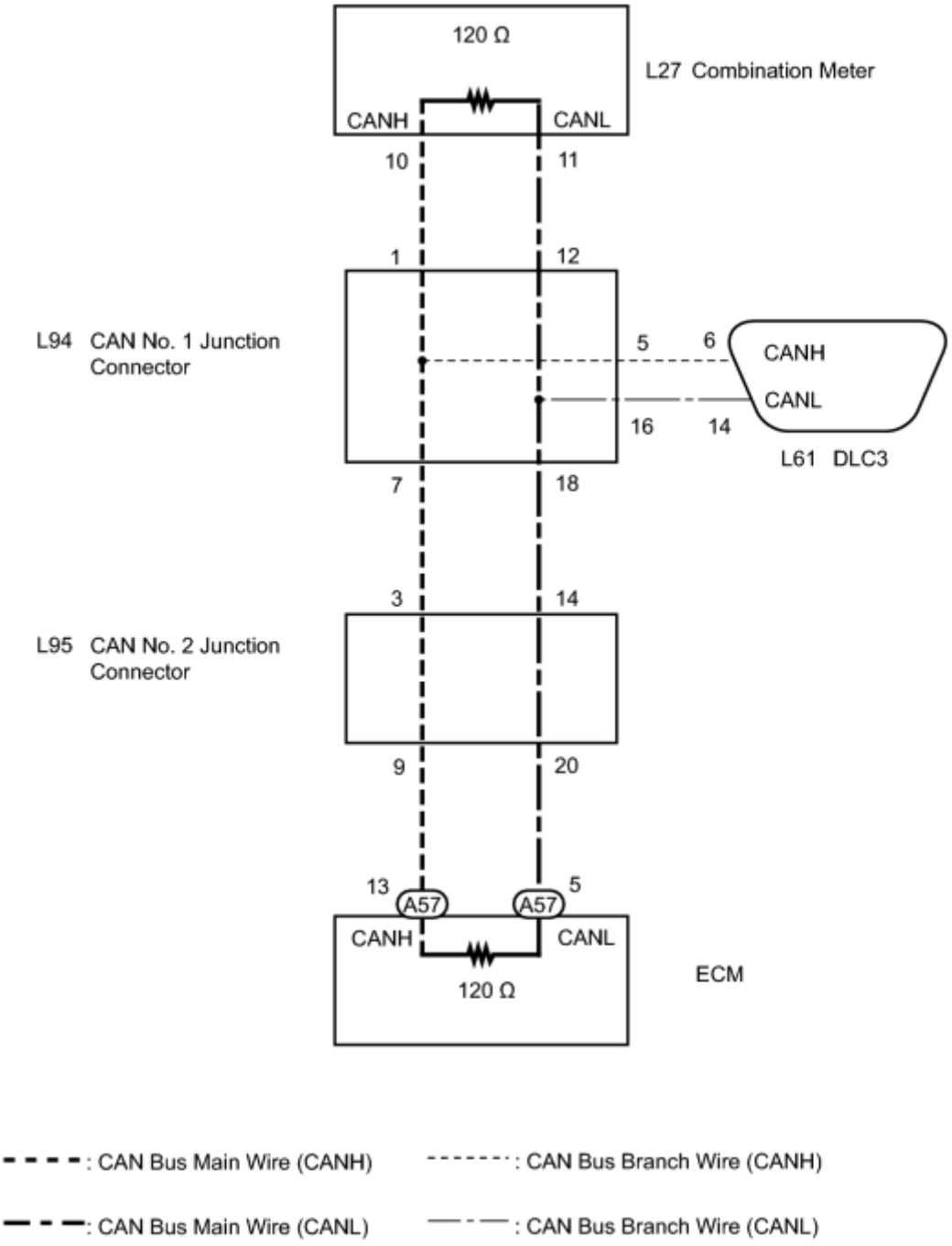
Open in CAN Main Bus Line

# DESCRIPTION

There may be an open circuit in the CAN bus main wire and/or the DLC3 branch wire when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is 70 Ω or higher.

| Symptom | Trouble Area |
|---|---|
| Resistance between terminals 6 (CANH) and 14 (CANL) of DLC3 is 70 Ω or higher. | • DLC3 branch wire or connector<br>• CAN bus main wire or connector<br>• Combination meter<br>• ECM<br>• CAN No. 1 junction connector<br>• CAN No. 2 junction connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.

- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR OPEN IN CAN BUS WIRE (DLC3 BRANCH WIRE) |

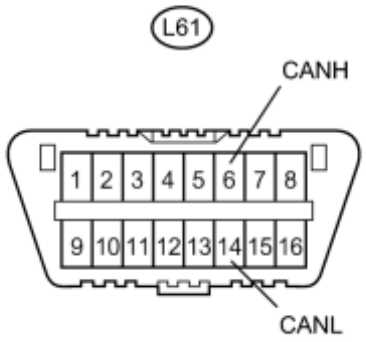
(a) Turn the power switch off.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-14 (CANL) | Power switch off | 108 to 132 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

NOTICE:

When the measured value is 133 Ω or higher and a CAN communication system DTC is output, there may be a fault besides disconnection of the DLC3 branch wire. For that reason, troubleshooting should be performed again from How to Proceed with Troubleshooting after repairing the trouble area INFO.

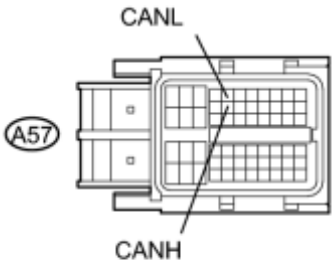
NG ▶ REPAIR OR REPLACE CAN BRANCH WIRE CONNECTED TO DLC3

OK

▼

| | |
|---|---|
| 2. | CHECK FOR OPEN IN CAN BUS WIRE (ECM) |

*1




(a) Disconnect the ECM connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to ECM) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A57-13 (CANH) - A57-5 (CANL) | Power switch off | 108 to 132 Ω |

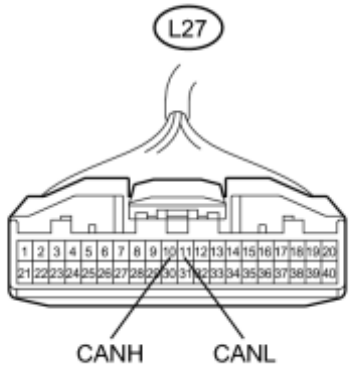
NG CHECK FOR OPEN IN CAN BUS WIRE (COMBINATION METER)

OK **REPLACE ECM**

| | |
|---|---|
| 3. | CHECK FOR OPEN IN CAN BUS WIRE (COMBINATION METER) |

(a) Reconnect the ECM connector.

*1




(b) Disconnect the combination meter connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector (to Combination Meter) |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L27-10 (CANH) - L27-11 (CANL) | Power switch off | 108 to 132 Ω |

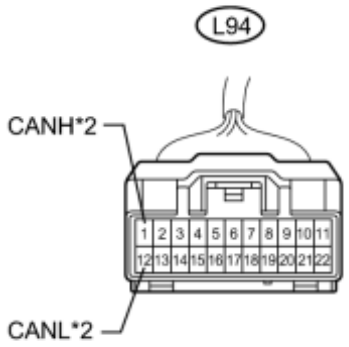
NG ▶ CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 1 J/C)

OK ▶ **REPLACE METER CIRCUIT PLATE NO. 3 (COMBINATION METER ECU)**

| | |
|---|---|
| 4. | CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 1 J/C) |

(a) Reconnect the combination meter connector.

*1




(b) Disconnect the CAN No. 1 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *2 | to Combination Meter |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-1 (CANH) - L94-12 (CANL) | Power switch off | 108 to 132 Ω |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 1 J/C - COMBINATION METER)

OK

▼

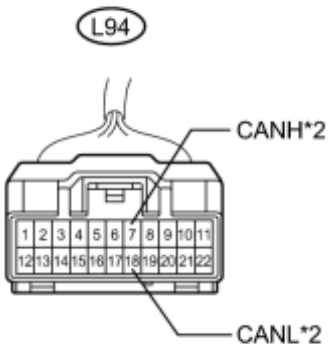
| | |
|---|---|
| 5. | CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 1 J/C - CAN NO. 2 J/C) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-7 (CANH) - L94-18 (CANL) | Power switch off | 108 to 132 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *2 | to CAN No. 2 Junction Connector |

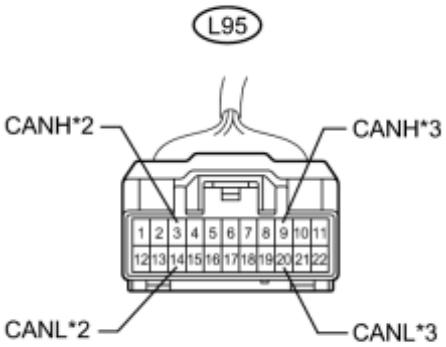
NG CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 2 J/C)

OK **REPLACE CAN NO. 1 JUNCTION CONNECTOR**

| | |
|---|---|
| 6. | CHECK FOR OPEN IN CAN BUS WIRE (CAN NO. 2 J/C) |

(a) Reconnect the CAN No. 1 junction connector.

*1




(b) Disconnect the CAN No. 2 junction connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition | Connected to |
|---|---|---|---|
| L95-3 (CANH) - L95-14 (CANL) | Power switch off | 108 to 132 Ω | CAN No. 1 junction connector |
| L95-9 (CANH) - L95-20 (CANL) | Power switch off | 108 to 132 Ω | ECM |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| | (to CAN No. 2 Junction Connector) |
| *2 | to CAN No. 1 Junction Connector |
| *3 | to ECM |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (to ECM main wire) | B |
| NG (to CAN No. 1 junction connector main wire) | C |

C REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 1 J/C - CAN NO. 2 J/C)

B REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 2 J/C - ECM)

A **REPLACE CAN NO. 2 JUNCTION CONNECTOR**

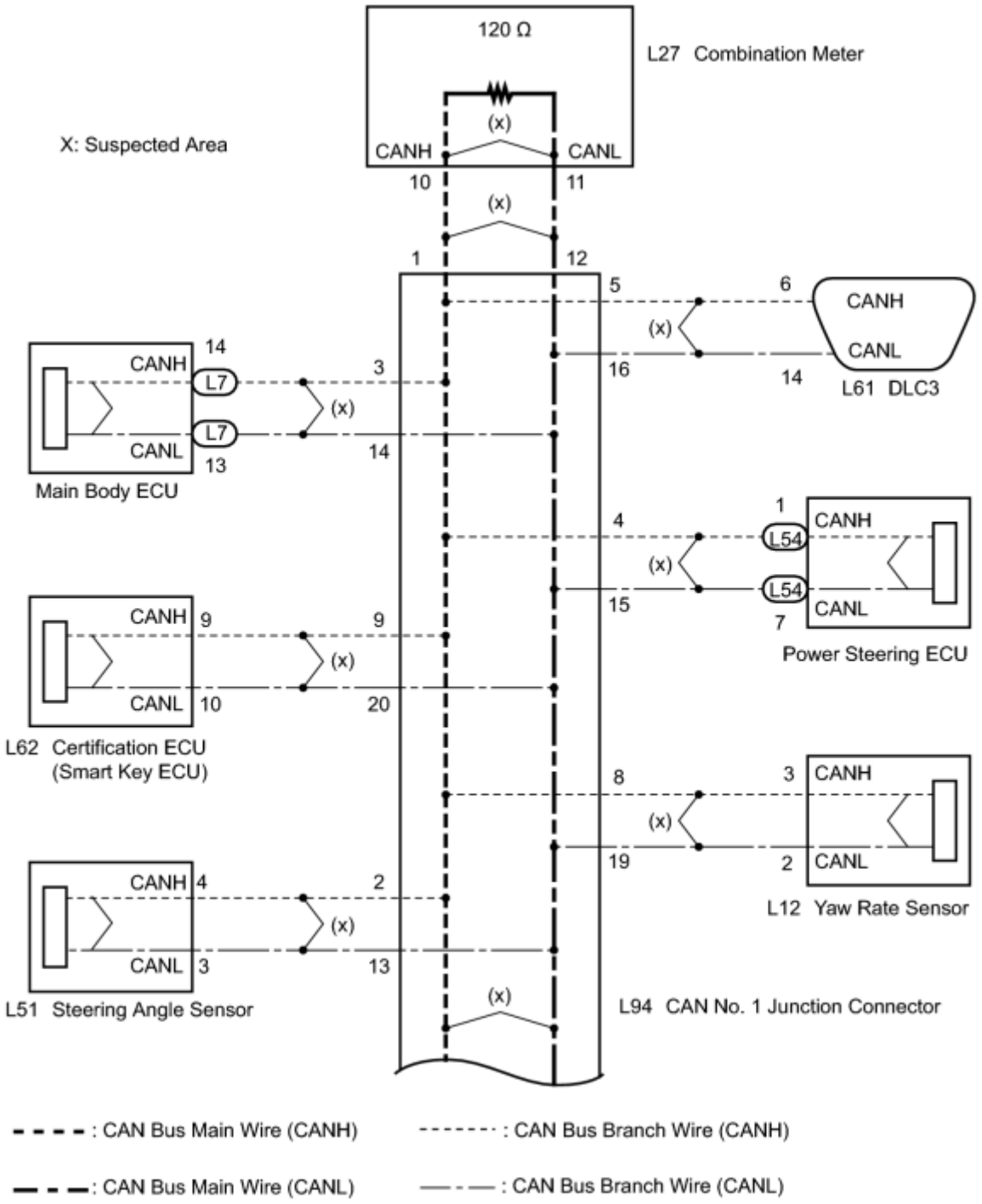
Check CAN Bus Lines for Short Circuit

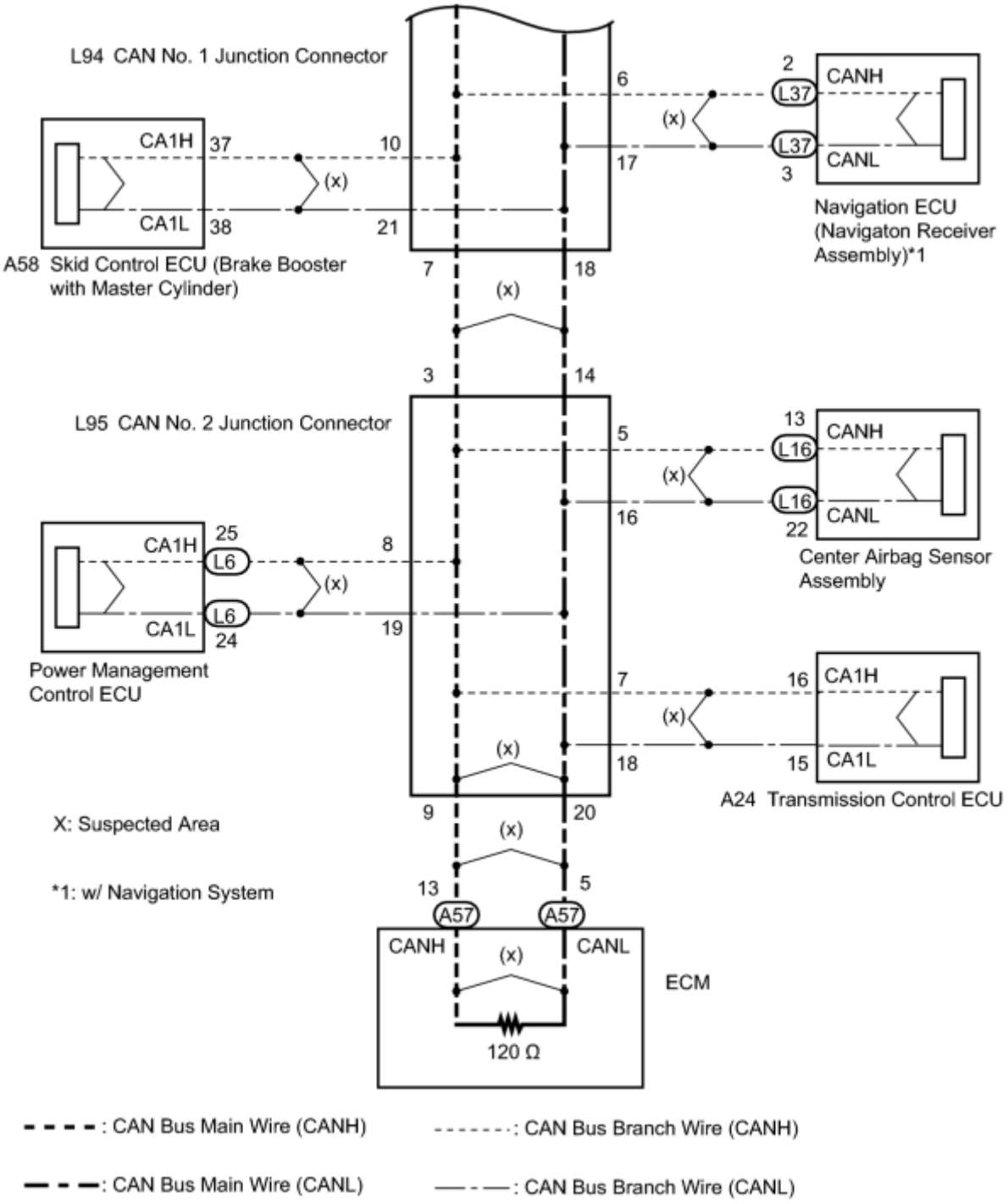
# DESCRIPTION

There may be a short circuit in the CAN bus main wire and/or CAN branch wire when the resistance between terminals 6 (CANH) and 14 (CANL) of the DLC3 is below 54 Ω.

| Symptom | Trouble Area |
|---|---|
| Resistance between terminals 6 (CANH) and 14 (CANL) of DLC3 is below 54 Ω. | • Short in CAN bus main wire<br>• Short in CAN bus branch wire<br>• Power management control ECU<br>• ECM<br>• Main body ECU<br>• Combination meter<br>• Skid control ECU (Brake booster with master cylinder)<br>• Steering angle sensor<br>• Yaw rate sensor<br>• Power steering ECU<br>• Center airbag sensor assembly<br>• Transmission control ECU<br>• Certification ECU (Smart key ECU)<br>• Navigation ECU (Navigation receiver assembly)<br>• CAN No. 1 junction connector<br>• CAN No. 2 junction connector |

# WIRING DIAGRAM


120 Ω
L27 Combination Meter
X: Suspected Area
CANH
CANL
10
11
(x)
1
12
5
6
CANH
CANL
16
14
L61 DLC3
14
CANH
L7
3
CANL
13
Main Body ECU
4
1
CANH
L54
15
7
Power Steering ECU
CANH
9
9
CANL
10
20
L62 Certification ECU
(Smart Key ECU)
8
3
CANH
19
2
CANL
L12 Yaw Rate Sensor
CANH
4
2
CANL
3
13
L51 Steering Angle Sensor
L94 CAN No. 1 Junction Connector
: CAN Bus Main Wire (CANH)
: CAN Bus Branch Wire (CANH)
: CAN Bus Main Wire (CANL)
: CAN Bus Branch Wire (CANL)




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.

- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

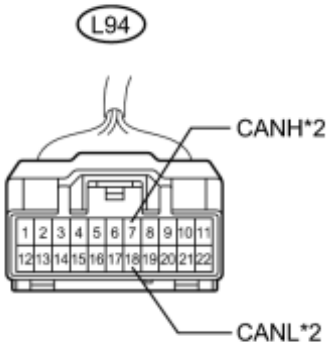
- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - CAN NO. 2 J/C) |

(a) Turn the power switch off.

*1




(b) Disconnect the CAN No. 1 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No.1 Junction Connector) |
| *2 | to CAN No. 2 Junction Connector |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-7 (CANH) - L94-18 (CANL) | Power switch off | 108 to 132 Ω |

NG ▶ CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 2 J/C - CAN NO. 1 J/C)

OK

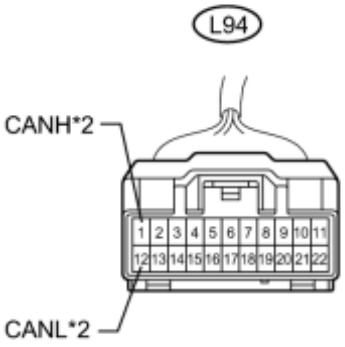
▼

| | |
|---|---|
| 2. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - COMBINATION METER) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-1 (CANH) - L94-12 (CANL) | Power switch off | 108 to 132 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *2 | to Combination Meter |

NG ▶ CHECK FOR SHORT IN CAN BUS WIRES (COMBINATION METER)

OK

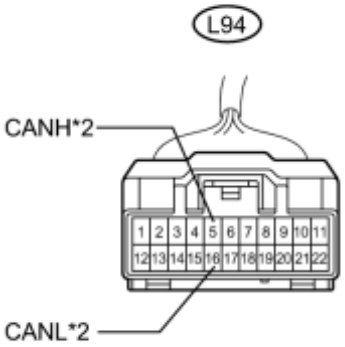
▼

| | |
|---|---|
| 3. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - DLC3) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-5 (CANH) - L94-16 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *2 | to DLC3 |

NG ▶ REPAIR OR REPLACE CAN BRANCH WIRE CONNECTED TO DLC3

OK

▼

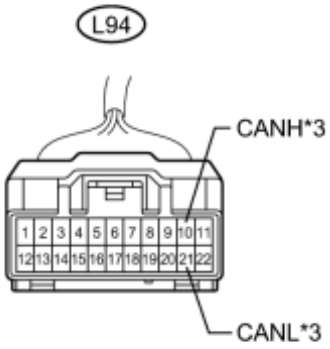
| | |
|---|---|
| 4. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - SKID CONTROL ECU) |

(a) Disconnect the skid control ECU (brake booster with master cylinder) connector.

(b) Measure the resistance according to the value(s) in the table below.

*2

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-10 (CANH) - L94-21 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *3 | to Skid Control ECU |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 1 J/C - SKID CONTROL ECU)

OK

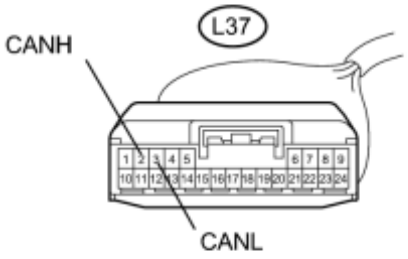
▼

| | |
|---|---|
| 5. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - NAVIGATION ECU) |

HINT:

For vehicles without the navigation system, go to the next step.

*1




(a) Disconnect the navigation ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation ECU) |

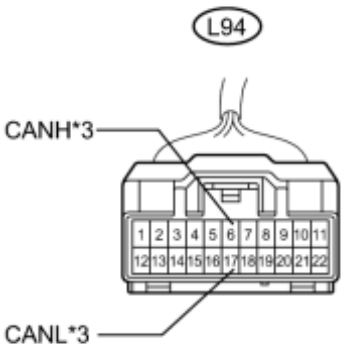
H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch | Specified |
|---|---|---|

*2




| | Condition | Condition |
|---|---|---|
| L94-6 (CANH) - L94-17 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1Junction Connector) |
| *3 | to Navigation ECU |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 1 J/C - NAVIGATION ECU)

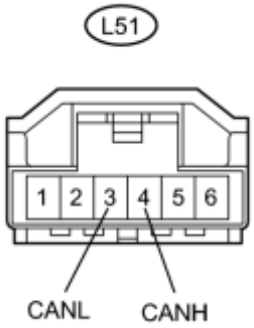
OK

▼

| | |
|---|---|
| 6. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - STEERING ANGLE SENSOR) |

*1

(a) Disconnect the steering angle sensor connector.

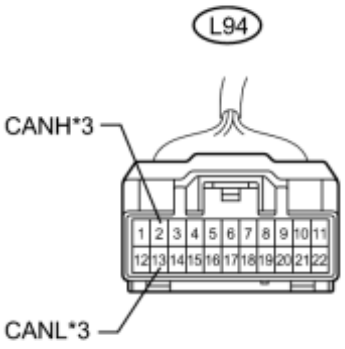



## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Steering Angle Sensor) |

*2

(b) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-2 (CANH) - L94-13 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *3 | to Steering Angle Sensor |

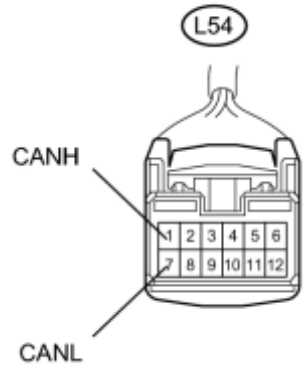
NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 1 J/C - STEERING ANGLE SENSOR)

OK

▼

| | |
|---|---|
| 7. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - POWER STEERING ECU) |

*1



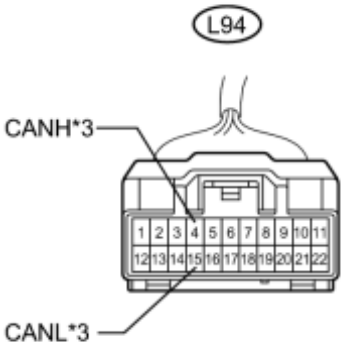

(a) Disconnect the power steering ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Steering ECU) |

(b) Measure the resistance according to the value(s) in the table below.

*2




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-4 (CANH) - L94-15 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *3 | to Power Steering ECU |

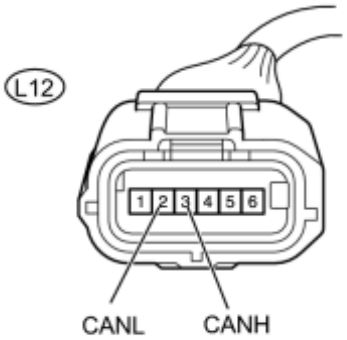
NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 1 J/C - POWER STEERING ECU)

OK

▼

| | |
|---|---|
| 8. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - YAW RATE SENSOR) |

*1




(a) Disconnect the yaw rate sensor connector.

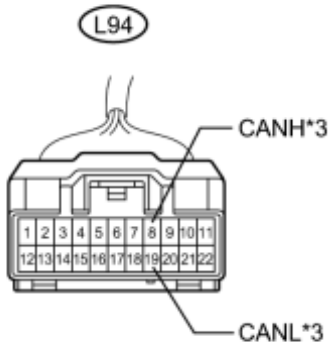
## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Yaw Rate Sensor) |

(b) Measure the resistance according to the value(s) in the table below.

*2

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-8 (CANH) - L94-19 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *3 | to Yaw Rate Sensor |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 1 J/C - YAW RATE SENSOR)

OK

▼

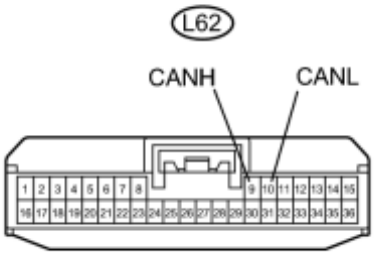
| | |
|---|---|
| 9. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - CERTIFICATION ECU) |

(a) Disconnect the certification ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU) |

*1

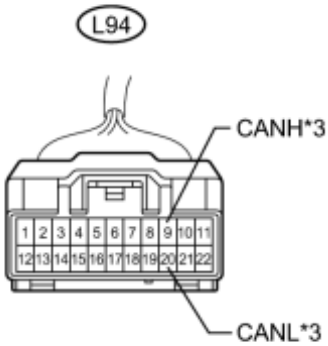



(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-9 (CANH) - L94-20 (CANL) | Power switch off | 108 to 132 Ω |

*2




## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *3 | to Certification ECU |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 1 J/C - CERTIFICATION ECU)

OK

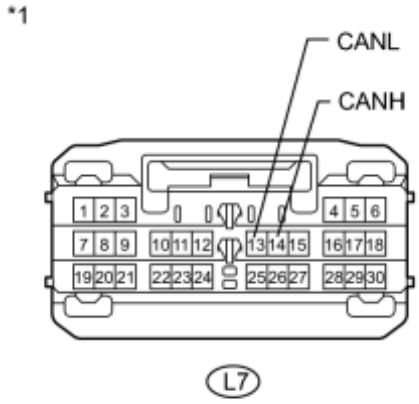
▼

| | |
|---|---|
| 10. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C - MAIN BODY ECU) |

(a) Disconnect the main body ECU connector.

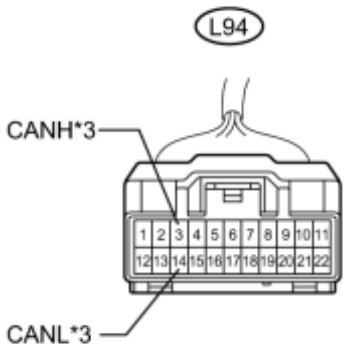
## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Main Body ECU) |




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-3 (CANH) - L94-14 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *3 | to Main Body ECU |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 1 J/C - MAIN BODY ECU)

OK

▼

| | |
|---|---|
| 11. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 1 J/C) |

(a) Reconnect the CAN No. 1 junction connector.

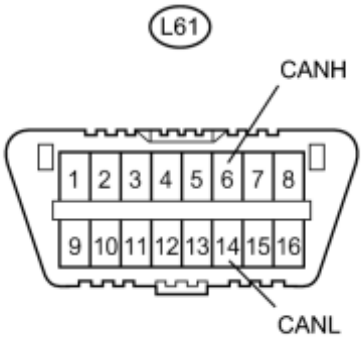
(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-14 (CANL) | Power switch off | 54 to 69 Ω |

*1

## Text in Illustration




| | |
|---|---|
| *1 | DLC3 |

- The resistance must be measured after the main wire connected ECUs (ECM and combination meter), CAN No. 1 junction connector and No. 2 junction connector are reconnected.
- The resistance must be measured after the CAN No. 1 junction connector branch wire connected ECU and sensor connectors are disconnected.

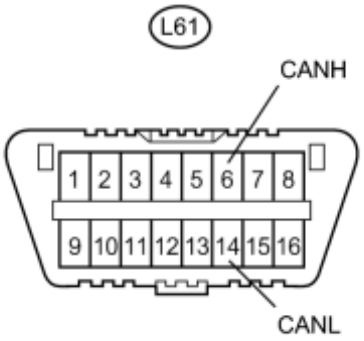
NG ▶ REPLACE CAN NO. 1 JUNCTION CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK FOR SHORT IN CAN BUS WIRES (ECU, SENSOR) |

*1




(a) Connect the probes of an ohmmeter to terminals 6 (CANH) and 14 (CANL) of the DLC3.

## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

(b) While observing the resistance value shown on the ohmmeter, reconnect each ECU and sensor connector until the resistance becomes abnormal (Below 54 Ω).

HINT:

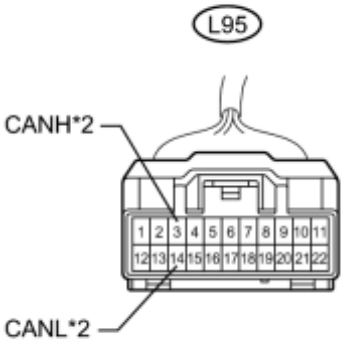
If the resistance becomes abnormal when an ECU connector is reconnected, there may be a short in the ECU.

NEXT ▶ **REPLACE CORRESPONDING ECU OR SENSOR**

| | |
|---|---|
| 13. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 2 J/C - CAN NO. 1 J/C) |

(a) Reconnect the CAN No. 1 junction connector.

*1




(b) Disconnect the CAN No. 2 junction connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L95-3 (CANH) - L95-14 (CANL) | Power switch off | 108 to 132 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *2 | to CAN No. 1 Junction Connector |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 1 J/C - CAN NO. 2 JUNCTION CONNECTOR)

OK

▼

| | |
|---|---|
| 14. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 2 J/C - ECM) |

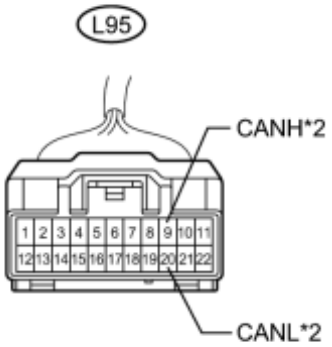
(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L95-9 (CANH) - L95-20 (CANL) | Power switch off | 108 to 132 Ω |

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *2 | to ECM |

*1

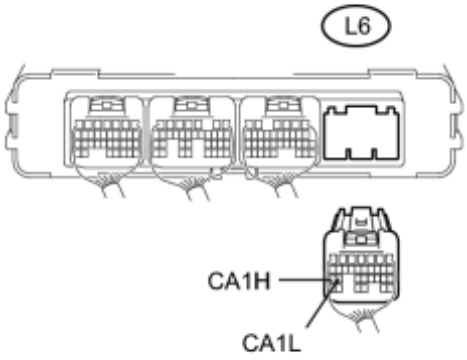



NG CHECK FOR SHORT IN CAN BUS WIRES (ECM)

OK

| | |
|---|---|
| 15. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 2 J/C - POWER MANAGEMENT CONTROL ECU) |

*1




P

(a) Disconnect the power management control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Power Management Control ECU) |

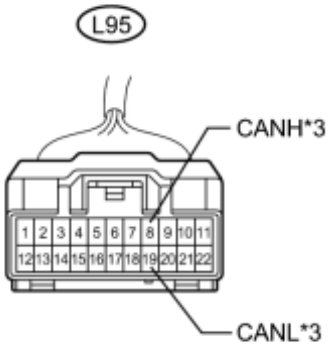
(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L95-8 (CANH) - L95-19 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

*2




| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *3 | to Power Management Control ECU |

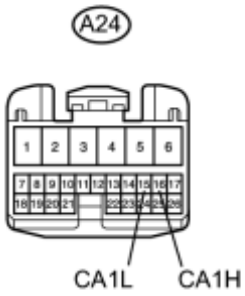
NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 2 J/C - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 16. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 2 J/C - TRANSMISSION CONTROL ECU) |

*1



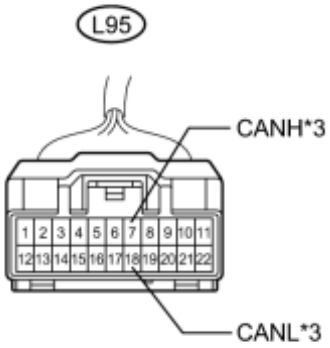

(a) Disconnect the transmission control ECU connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU) |

*2

(b) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L95-7 (CANH) - L95-18 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *3 | to Transmission Control ECU |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 2 J/C - TRANSSMISSION CONTROL ECU)

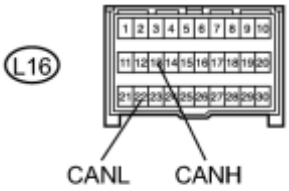
OK

▼

| | |
|---|---|
| 17. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 2 J/C - CENTER AIRBAG SENSOR ASSEMBLY) |

*1

(a) Disconnect the center airbag sensor assembly connector.



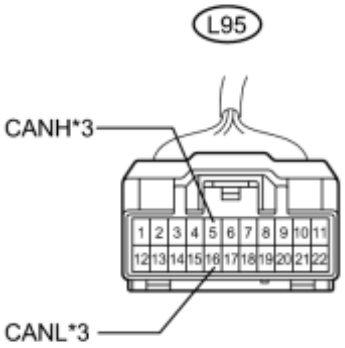

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Center Airbag Sensor Assembly) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L95-5 (CANH) - L95-16 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *3 | to Center Airbag Sensor Assembly |

NG ▶ REPAIR OR REPLACE CAN BUS BRANCH WIRE OR CONNECTOR (CAN NO. 2 J/C - CENTER AIRBAG SENSOR ASSEMBLY)

OK

| | |
|---|---|
| 18. | CHECK FOR SHORT IN CAN BUS WIRES (CAN NO. 2 J/C) |

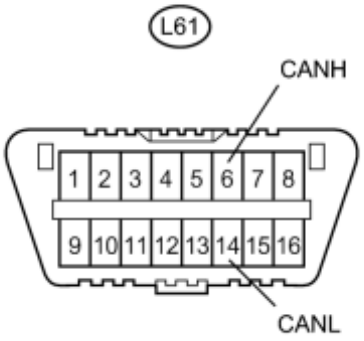
(a) Reconnect the CAN No. 2 junction connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-14 (CANL) | Power switch off | 54 to 69 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

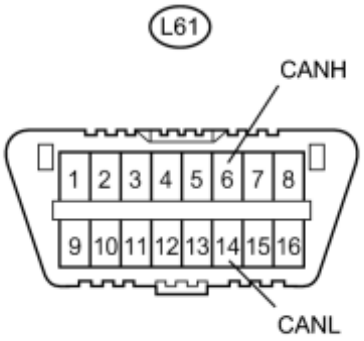
- The resistance must be measured after the main wire connected ECUs (ECM and combination meter), CAN No. 1 junction connector and No. 2 junction connector are reconnected.
- The resistance must be measured after the CAN No. 2 junction connector branch wire connected ECU and sensor connectors are disconnected.

NG ▶ REPLACE CAN NO. 2 JUNCTION CONNECTOR

OK

| | |
|---|---|
| 19. | CHECK FOR SHORT IN CAN BUS WIRES (ECU, SENSOR) |

*1




(a) Connect the probes of an ohmmeter to terminals 6 (CANH) and 14 (CANL) of the DLC3.

## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

(b) While observing the resistance value shown on the ohmmeter, reconnect each ECU and sensor connector until the resistance becomes abnormal (Below 54 Ω).

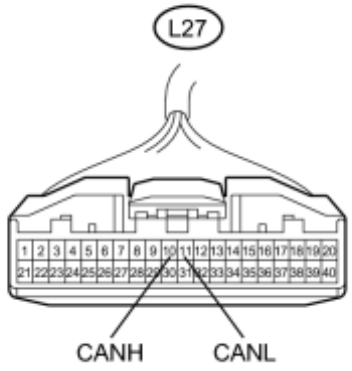
HINT:

If the resistance becomes abnormal when an ECU connector is reconnected, there may be a short in the ECU.

NEXT ▶ **REPLACE CORRESPONDING ECU OR SENSOR**

| | |
|---|---|
| 20. | CHECK FOR SHORT IN CAN BUS WIRES (COMBINATION METER) |

*1



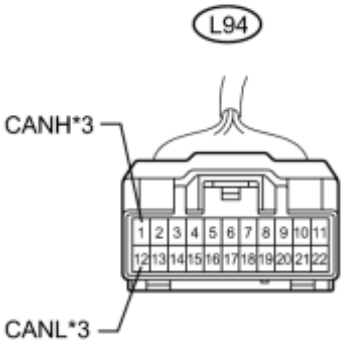

(a) Disconnect the combination meter connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter) |

(b) Measure the resistance according to the value(s) in the table below.

*2




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L94-1 (CANH) - L94-12 (CANL) | Power switch off | 1 MΩ or higher |

## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) |
| *3 | to Combination Meter |

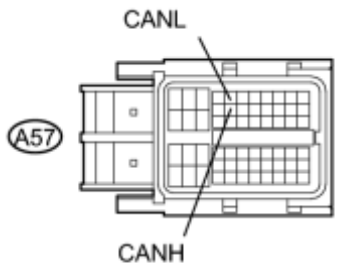
NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 1 J/C - COMBINATION METER)

OK ▶ **REPLACE METER CIRCUIT PLATE NO. 3 (COMBINATION METER ECU)**

| | |
|---|---|
| 21. | CHECK FOR SHORT IN CAN BUS WIRES (ECM) |

(a) Disconnect the ECM connector.

*1




## Text in Illustration

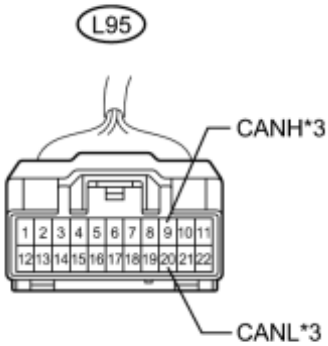
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ECM) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L95-9 (CANH) - L95-20 (CANL) | Power switch off | 1 MΩ or higher |

*2




## Text in Illustration

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *3 | to ECM |

NG ▶ REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 2 J/C - ECM)

OK ▶ **REPLACE ECM**

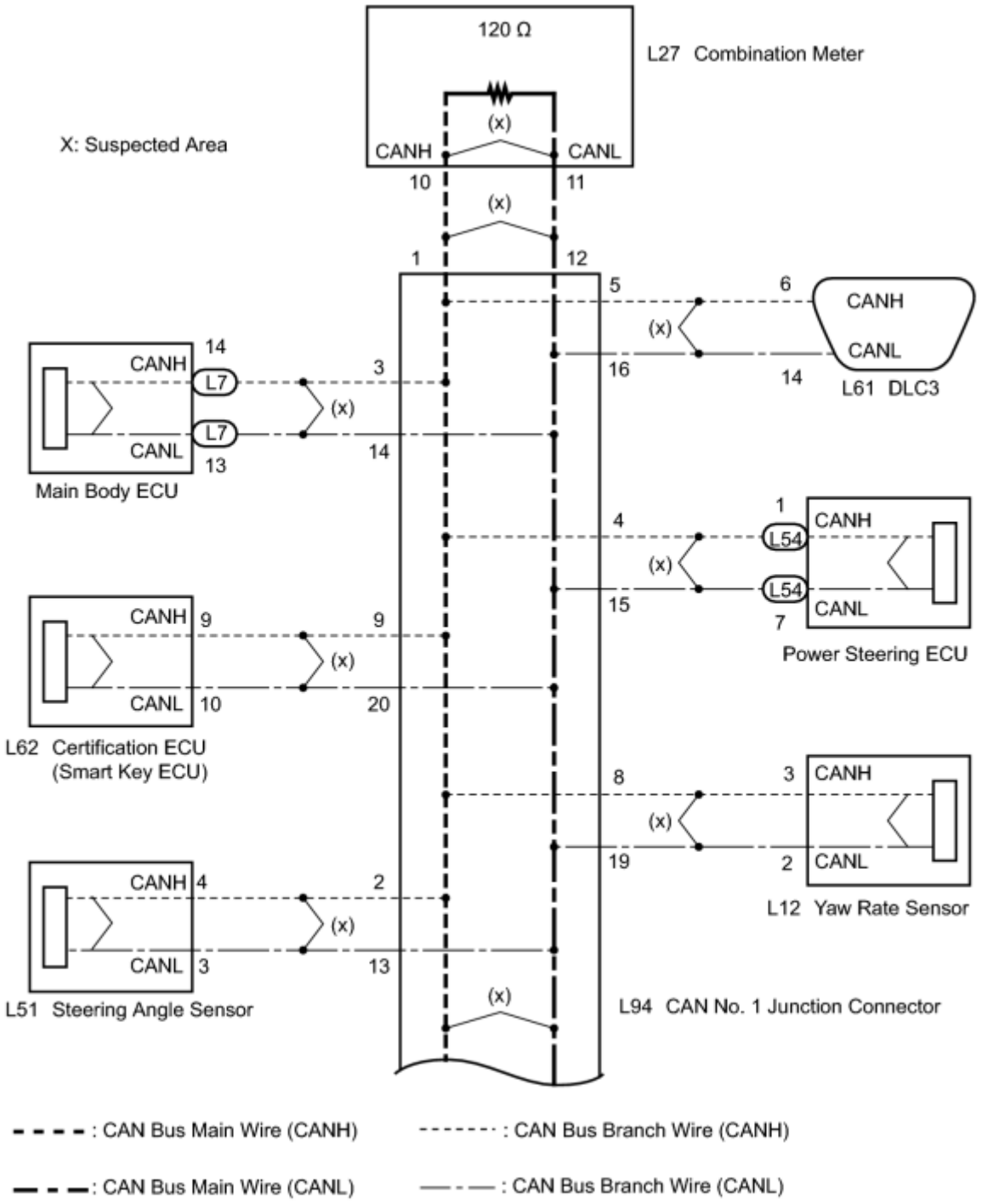
Check CAN Bus Line for Short to +B

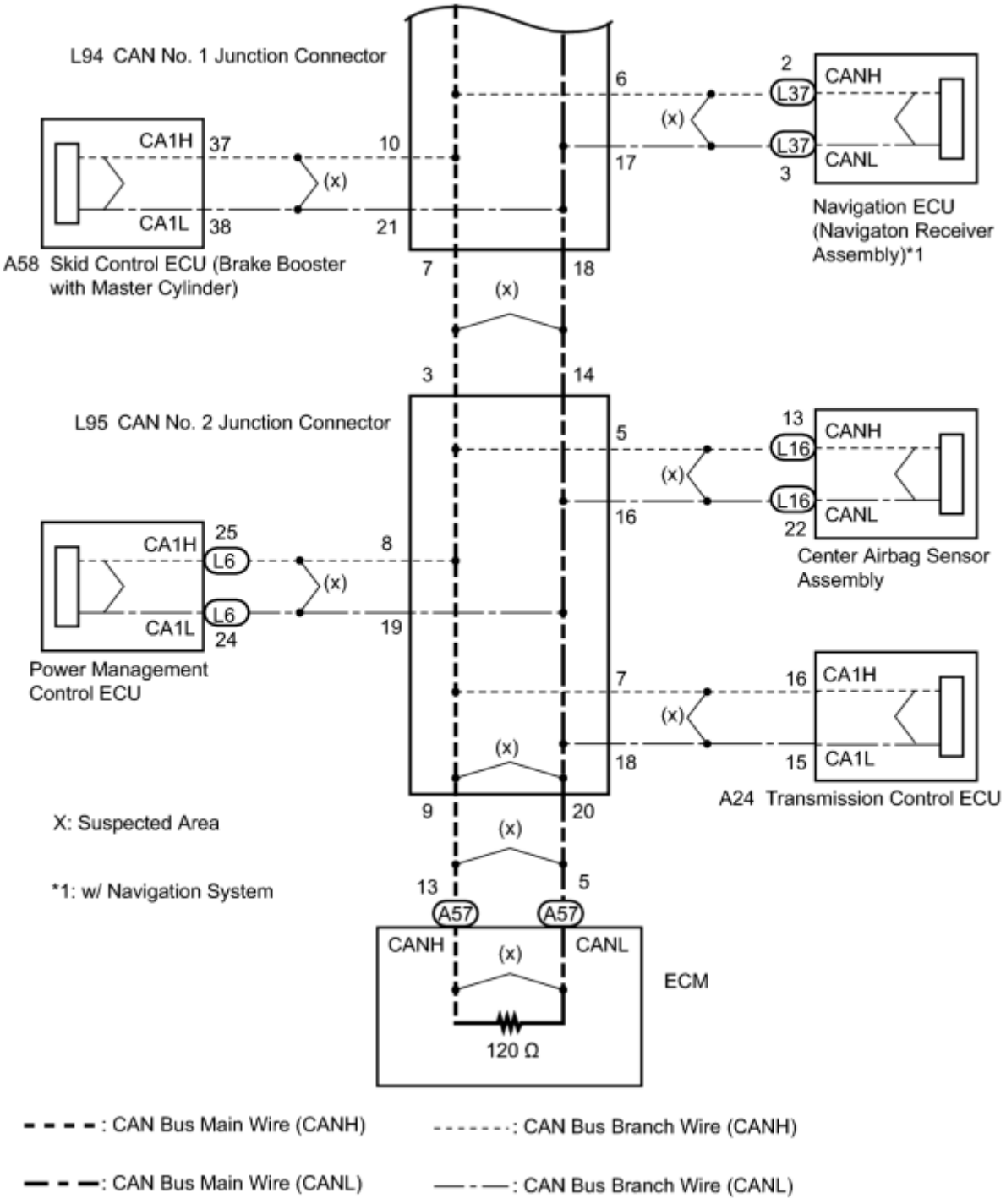
# DESCRIPTION

There may be a short circuit between the CAN bus main wire and +B when no resistance exists between terminals 6 (CANH) and 16 (BAT) or 14 (CANL) and 16 (BAT) of the DLC3.

| Symptom | Trouble Area |
|---|---|
| No resistance exists between terminals 6 (CANH) and 16 (BAT) or 14 (CANL) and 16 (BAT) of DLC3. | • Short to +B in CAN bus main wire<br>• Short to +B in CAN bus branch wire<br>• Power management control ECU<br>• ECM<br>• Main body ECU<br>• Combination meter<br>• Skid control ECU (Brake booster with master cylinder)<br>• Steering angle sensor<br>• Yaw rate sensor<br>• Power steering ECU<br>• Center airbag sensor assembly<br>• Transmission control ECU<br>• Certification ECU (Smart key ECU)<br>• Navigation ECU (Navigation receiver assembly)<br>• CAN No. 1 junction connector<br>• CAN No. 2 junction connector |

# WIRING DIAGRAM


120 Ω
L27 Combination Meter
X: Suspected Area
CANH
CANL
10
11
(x)
1
12
5
6
CANH
CANL
16
14
L61 DLC3
14
CANH
L7
3
CANL
13
Main Body ECU
4
1
CANH
L54
15
7
Power Steering ECU
CANH
9
9
CANL
10
20
L62 Certification ECU
(Smart Key ECU)
8
3
CANH
19
2
CANL
L12 Yaw Rate Sensor
CANH
4
2
CANL
3
13
L51 Steering Angle Sensor
L94 CAN No. 1 Junction Connector
: CAN Bus Main Wire (CANH)
: CAN Bus Branch Wire (CANH)
: CAN Bus Main Wire (CANL)
: CAN Bus Branch Wire (CANL)




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.

- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

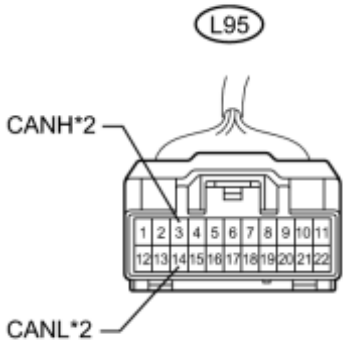
- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR SHORT TO +B IN CAN BUS WIRE (CAN NO. 1 J/C) |

(a) Disconnect the cable from the negative (-) battery terminal.

*1



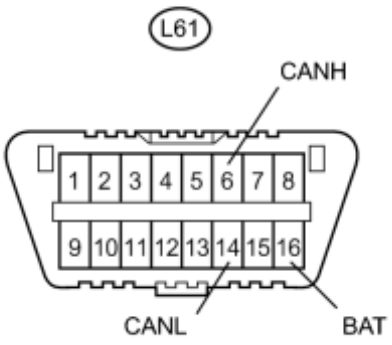

(b) Disconnect the CAN No. 2 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *2 | to CAN No. 1 Junction Connector |

(c) Measure the resistance according to the value(s) in the table below.

*3




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L61-14 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

## Text in Illustration

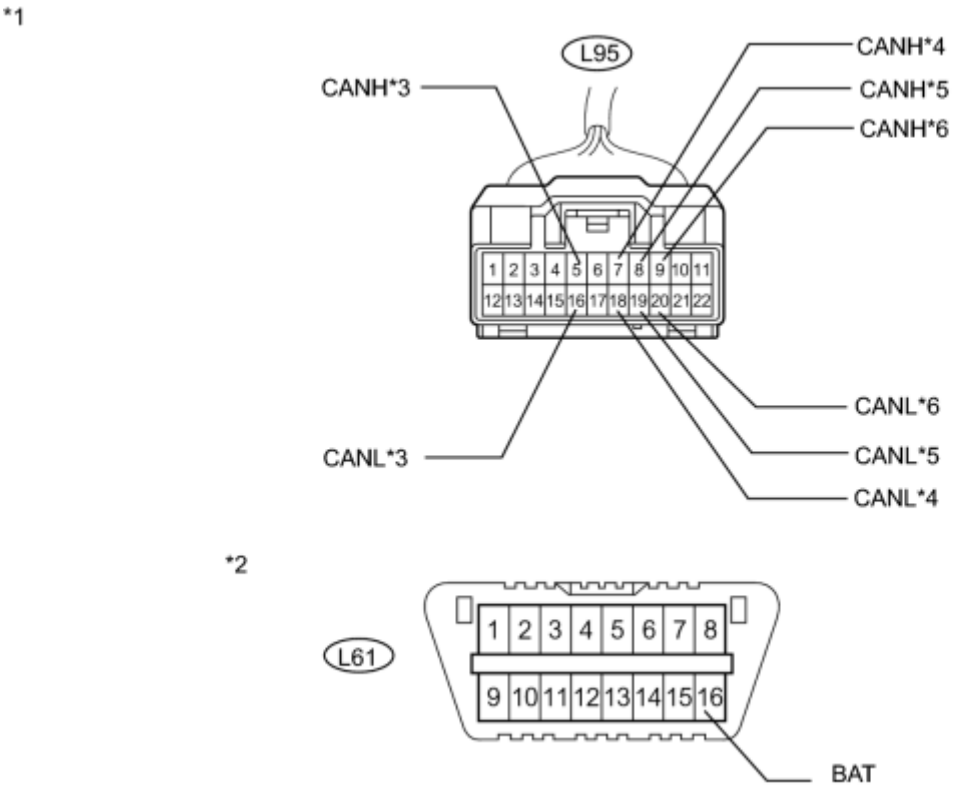
| | |
|---|---|
| *3 | DLC3 |

NG ▶ CHECK FOR SHORT TO +B IN CAN BUS WIRE (CAN NO. 1 J/C)

OK

▼

| | |
|---|---|
| 2. | CHECK FOR SHORT TO +B IN CAN BUS WIRE (CAN NO. 2 J/C) |




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Connected to |
|---|---|---|---|
| L95-5 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Center airbag sensor assembly |
| L95-16 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L95-7 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Transmission control ECU |
| L95-18 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L95-8 (CANH) - L61-16 | Cable disconnected from negative (-) | 6 kΩ or higher | Power management |

| Tester Connection | Condition | Specified Condition | Connected to |
|---|---|---|---|
| (BAT) | battery terminal | | control ECU |
| L95-19 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L95-9 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | ECM |
| L95-20 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) | *2 | DLC3 |
| *3 | to Center Airbag Sensor Assembly | *4 | to Transmission Control ECU |
| *5 | to Power Management Control ECU | *6 | to ECM |

Result:

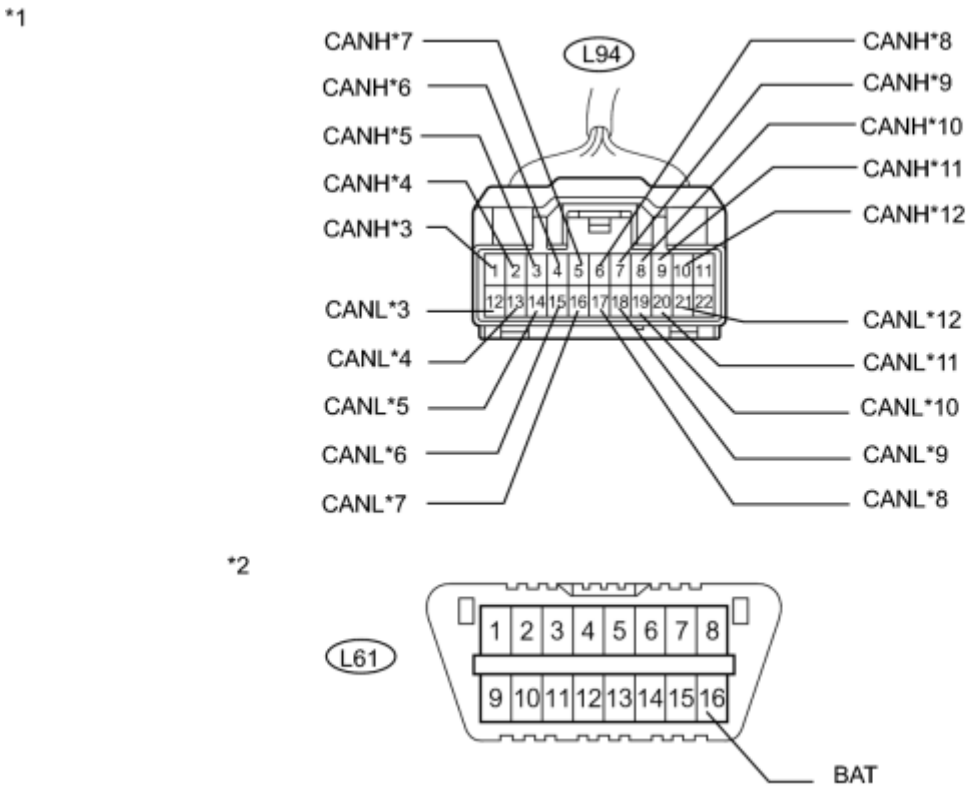
| Result | Proceed to |
|---|---|
| OK | A |
| NG (to ECU or sensor wire) | B |

B CHECK FOR SHORT TO +B IN CAN BUS WIRE (ECU, SENSOR)

A **REPLACE CAN NO. 2 JUNCTION CONNECTOR**

| | |
|---|---|
| 3. | CHECK FOR SHORT TO +B IN CAN BUS WIRE (CAN NO. 1 J/C) |

(a) Disconnect the CAN No. 1 junction connector.




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 1 Junction Connector) | *2 | DLC3 |
| *3 | to Combination Meter | *4 | to Steering Angle Sensor |
| *5 | to Main Body ECU | *6 | to Power Steering ECU |
| *7 | to DLC3 | *8 | to Navigation ECU |
| *9 | to CAN No. 2 Junction Connector | *10 | to Yaw Rate Sensor |
| *11 | to Certification ECU | *12 | to Skid Control ECU |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Connected to |
|---|---|---|---|
| L94-1 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Combination meter |
| L94-12 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-2 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Steering angle sensor |

| Tester Connection | Condition | Specified Condition | Connected to |
|---|---|---|---|
| L94-13 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-3 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Main body ECU |
| L94-14 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-4 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Power steering ECU |
| L94-15 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-5 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | DLC3 |
| L94-16 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-6 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Navigation ECU |
| L94-17 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-7 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | CAN No. 2 junction connector |
| L94-18 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-8 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Yaw rate sensor |
| L94-19 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-9 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Certification ECU |
| L94-20 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |
| L94-10 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | Skid control ECU |
| L94-21 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher | |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (to DLC3 branch wire) | B |
| NG (to CAN No. 2 J/C main wire) | C |

| Result | Proceed to |
|---|---|
| NG (to ECU or sensor wire) | D |

D CHECK FOR SHORT TO +B IN CAN BUS WIRE (ECU, SENSOR)

C REPAIR OR REPLACE CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 2 J/C - CAN NO. 1 J/C)

B REPAIR OR REPLACE CAN BRANCH WIRE CONNECTED TO DLC3

A **REPLACE CAN NO. 1 JUNCTION CONNECTOR**

| | |
|---|---|
| 4. | CHECK FOR SHORT TO +B IN CAN BUS WIRE (ECU, SENSOR) |

(a) Reconnect the CAN No. 1 Junction connector and CAN No. 2 junction connector.

(b) Disconnect the ECU or sensor connected to the CAN bus wire that is shorted to B+.

HINT:

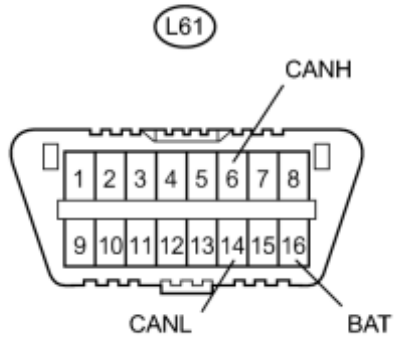
If the ECU or sensor has multiple connectors, disconnect the connector that includes the CAN bus wires. To determine the ECU or sensor that is connected to the shorted bus wire, refer to the terminals of ECU tables INFO.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |
| L61-14 (CANL) - L61-16 (BAT) | Cable disconnected from negative (-) battery terminal | 6 kΩ or higher |

*1




## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

HINT:

If the resistance changes to 6 kΩ or higher when the connector is disconnected from the ECU (or sensor), there may be a short in the ECU (or sensor).

NG REPAIR OR REPLACE CORRESPONDING ECU/SENSOR WIRE OR CONNECTOR

OK **REPLACE CORRESPONDING ECU OR SENSOR**

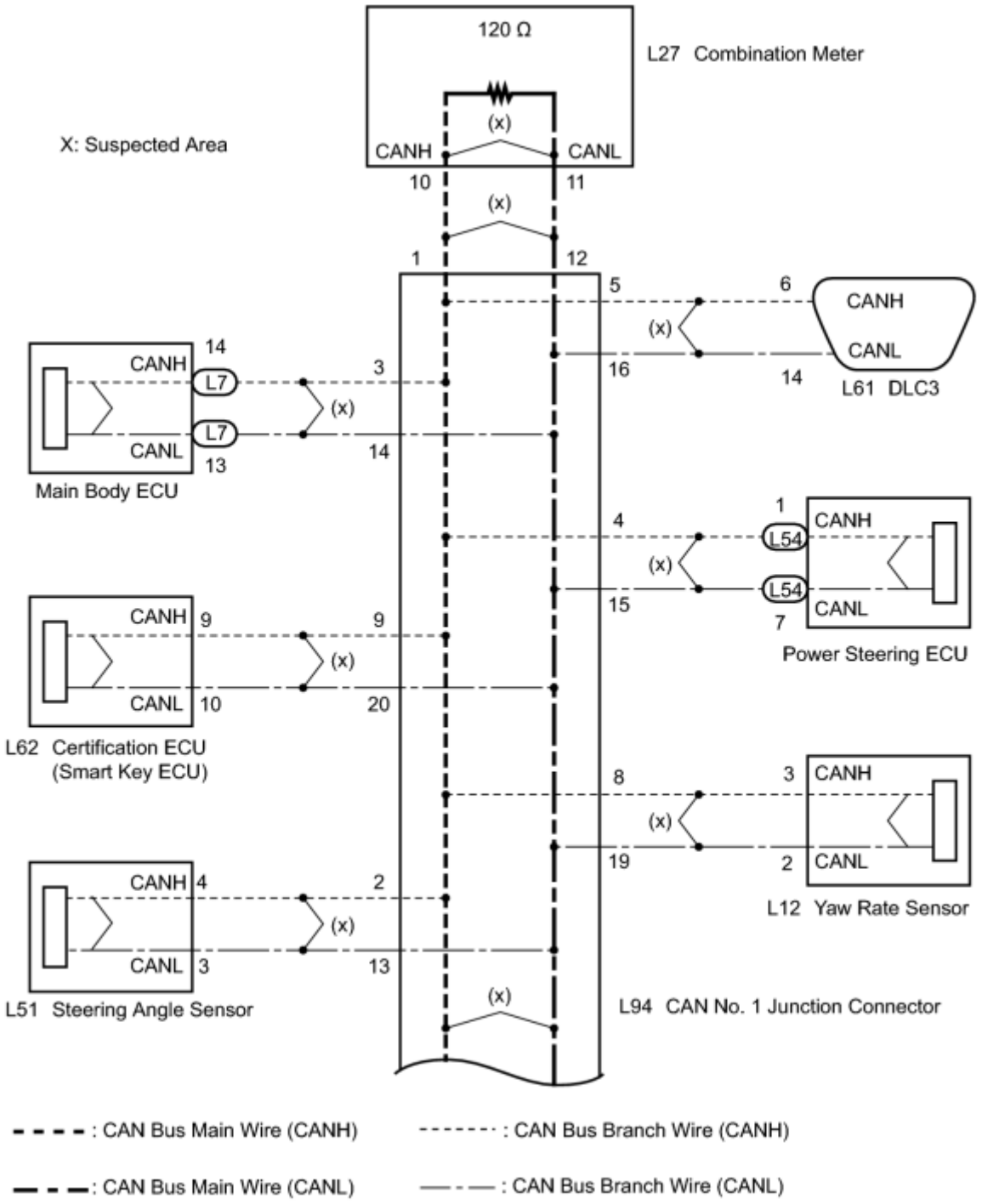
Check CAN Bus Line for Short to GND

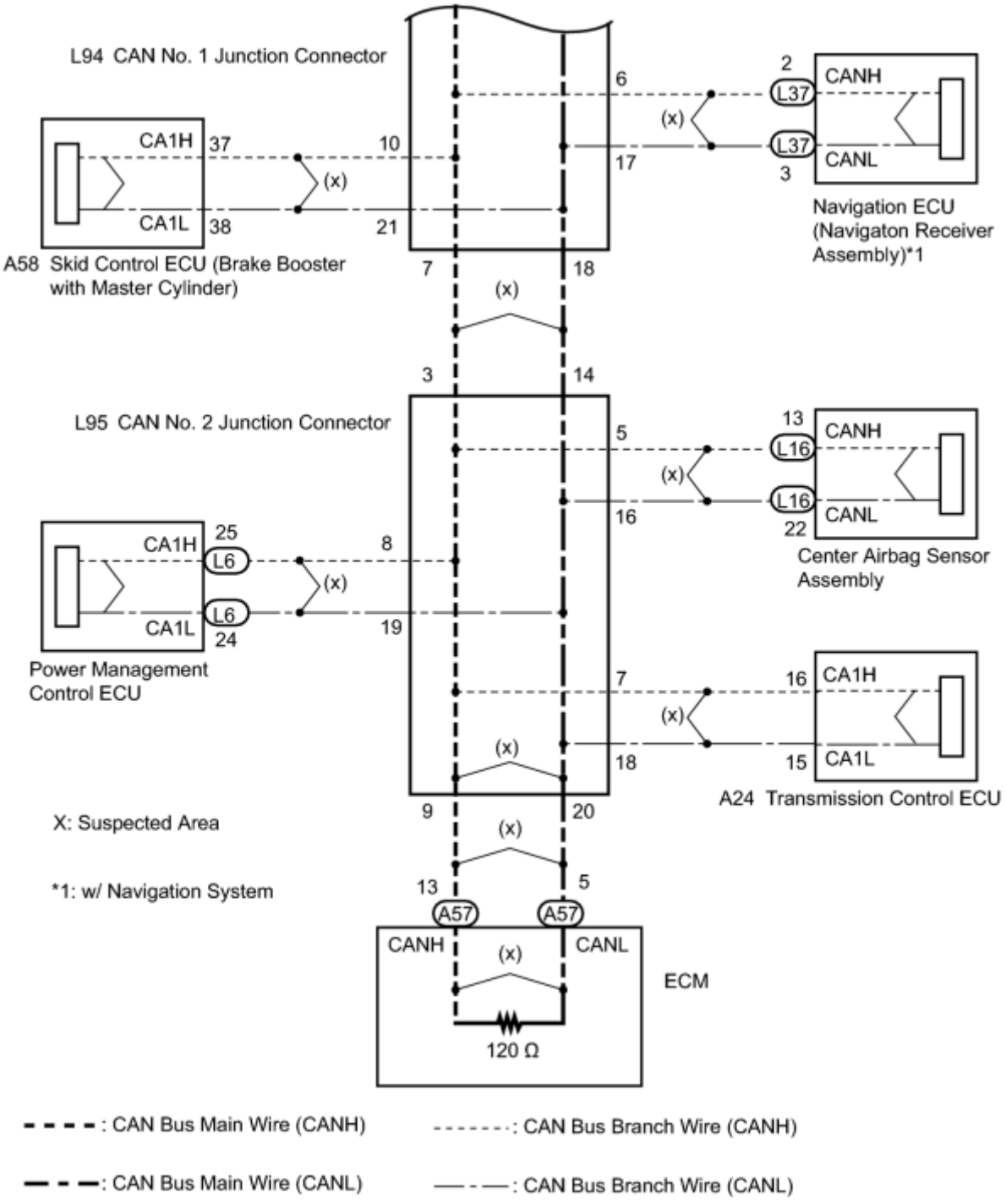
# DESCRIPTION

There may be a short circuit between the CAN bus main wire and GND when there is no resistance between terminals 6 (CANH) and 4 (CG) or 14 (CANL) and 4 (CG) of the DLC3.

| Symptom | Trouble Area |
|---|---|
| No resistance exists between terminals 6 (CANH) and 4 (CG) or 14 (CANL) and 4 (CG) of DLC3. | • Short to GND in CAN bus main wire<br>• Short to GND in CAN bus branch wire<br>• Power management control ECU<br>• ECM<br>• Main body ECU<br>• Combination meter<br>• Power steering ECU<br>• Skid control ECU (Brake booster with master cylinder)<br>• Steering angle sensor<br>• Yaw rate sensor<br>• Center airbag sensor assembly<br>• Transmission control ECU<br>• Certification ECU (Smart key ECU)<br>• Navigation ECU (Navigation receiver assembly)<br>• CAN No. 1 junction connector<br>• CAN No. 2 junction connector |

# WIRING DIAGRAM


120 Ω
L27 Combination Meter
X: Suspected Area
CANH
CANL
10
11
(x)
1
12
5
6
CANH
CANL
16
14
L61 DLC3
14
CANH
L7
3
CANL
13
Main Body ECU
4
1
CANH
L54
15
7
Power Steering ECU
CANH
9
9
CANL
10
20
L62 Certification ECU
(Smart Key ECU)
8
3
CANH
19
2
CANL
L12 Yaw Rate Sensor
CANH
4
2
CANL
3
13
L51 Steering Angle Sensor
L94 CAN No. 1 Junction Connector
: CAN Bus Main Wire (CANH)
: CAN Bus Branch Wire (CANH)
: CAN Bus Main Wire (CANL)
: CAN Bus Branch Wire (CANL)




# INSPECTION PROCEDURE

NOTICE:

- Turn the power switch off before measuring the resistances between CAN bus main wires and between CAN bus branch wires.
- Turn the power switch off before inspecting CAN bus wires for a ground short.

- After the power switch is turned off, check that the key reminder warning system and light reminder warning system are not operating.
- Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors. If any doors need to be opened in order to check connectors, open the doors and leave them open.

HINT:

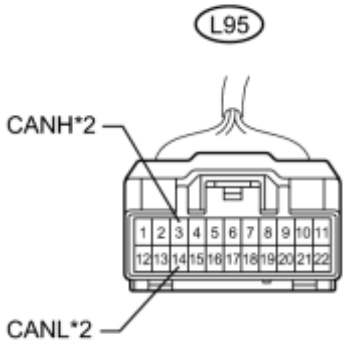
- Operating the power switch, any other switches or a door triggers related ECU and sensor communication on the CAN. This communication will cause the resistance value to change.
- Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR SHORT TO GND IN CAN BUS WIRE (CAN NO. 1 J/C) |

(a) Turn the power switch off.

*1

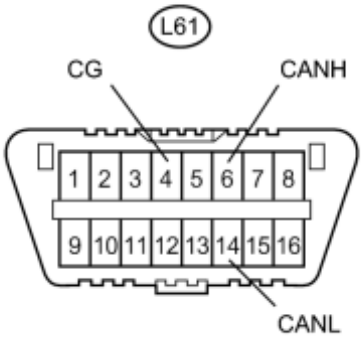



(b) Disconnect the CAN No. 2 junction connector.

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) |
| *2 | to CAN No. 1 Junction Connector |

*3




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher |
| L61-14 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher |

## Text in Illustration

| | |
|---|---|
| *3 | DLC3 |

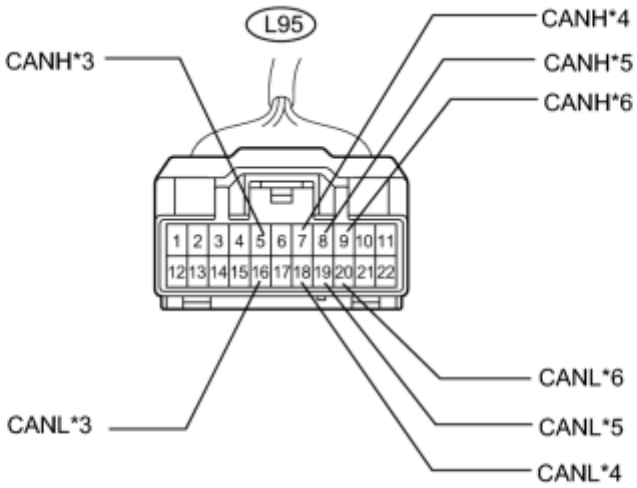
NG ▶ CHECK FOR SHORT TO GND IN CAN BUS WIRE (CAN NO. 1 J/C)

OK

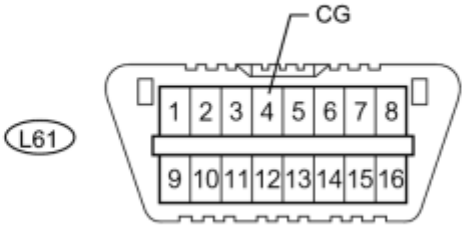
▼

| | |
|---|---|
| 2. | CHECK FOR SHORT TO GND IN CAN BUS WIRE (CAN NO. 2 J/C) |

*1




*2




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Connected to |
|---|---|---|---|
| L95-5 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Center airbag sensor assembly |
| L95-16 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L95-7 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Transmission control ECU |
| L95-18 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L95-8 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Power management control ECU |
| L95-19 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L95-9 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | ECM |
| L95-20 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to CAN No. 2 Junction Connector) | *2 | DLC3 |
| *3 | to Center Airbag Sensor Assembly | *4 | to Transmission Control ECU |
| *5 | to Power Management Control ECU | *6 | to ECM |

Result:

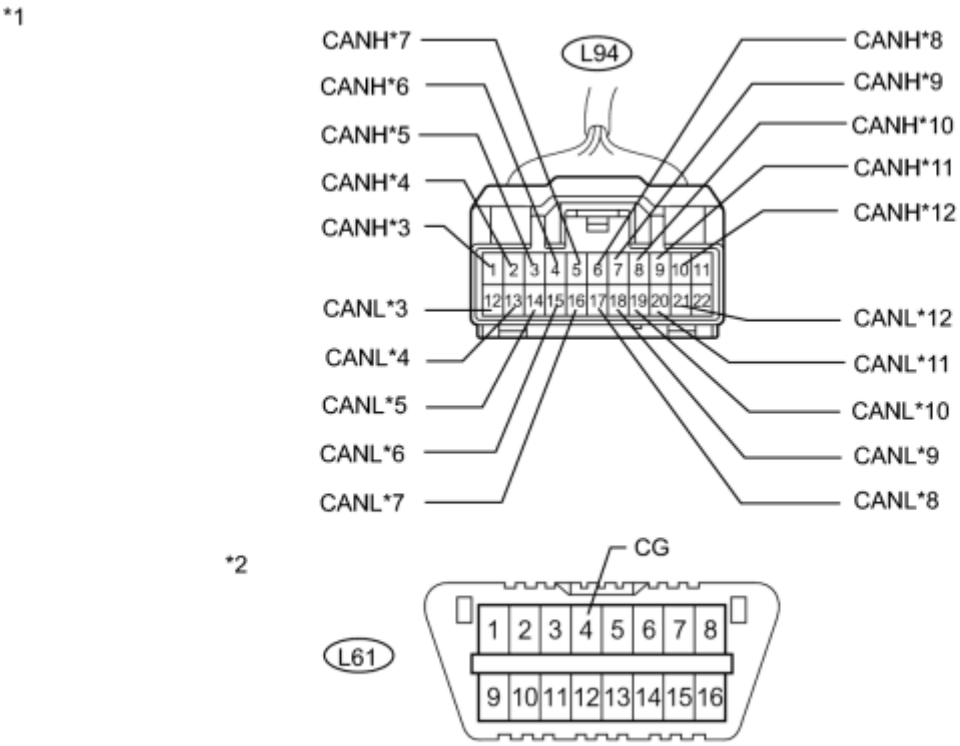
| Result | Proceed to |
|---|---|
| OK | A |
| NG (to ECU or sensor wire) | B |

B CHECK FOR SHORT TO GND IN CAN BUS WIRE (ECU, SENSOR)

A **REPLACE CAN NO. 2 JUNCTION CONNECTOR**

| | |
|---|---|
| 3. | CHECK FOR SHORT TO GND IN CAN BUS WIRE (CAN NO. 1 J/C) |

(a) Disconnect the CAN No. 1 junction connector.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector | *2 | DLC3 |

| | | | |
|---|---|---|---|
| | (to CAN No. 1 Junction Connector) | | |
| *3 | to Combination Meter | *4 | to Steering Angle Sensor |
| *5 | to Main Body ECU | *6 | to Power Steering ECU |
| *7 | to DLC3 | *8 | to Navigation ECU |
| *9 | to CAN No. 2 Junction Connector | *10 | to Yaw Rate Sensor |
| *11 | to Certification ECU | *12 | to Skid Control ECU |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition | Connected to |
|---|---|---|---|
| L94-1 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Combination meter |
| L94-12 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-2 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Steering angle sensor |
| L94-13 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-3 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Main body ECU |
| L94-14 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-4 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Power steering ECU |
| L94-15 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-5 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | DLC3 |
| L94-16 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-6 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Navigation ECU |
| L94-17 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-7 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | CAN No. 2 Junction Connector |
| L94-18 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-8 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Yaw rate sensor |
| L94-19 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-9 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Certification ECU |
| L94-20 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |
| L94-10 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher | Skid control ECU |
| L94-21 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher | |

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (to DLC3 branch wire) | B |
| NG (to CAN No. 2 J/C main wire) | C |
| NG (to ECU or sensor wire) | D |

D CHECK FOR SHORT TO GND IN CAN BUS WIRE (ECU, SENSOR)

C REPAIR CAN BUS MAIN WIRE OR CONNECTOR (CAN NO. 2 J/C - CAN NO. 1 J/C)

B REPAIR OR REPLACE CAN BRANCH WIRE CONNECTED TO DLC3

A **REPLACE CAN NO. 1 JUNCTION CONNECTOR**

| | |
|---|---|
| 4. | CHECK FOR SHORT TO GND IN CAN BUS WIRE (ECU, SENSOR) |

(a) Reconnect the CAN No. 1 junction connector and CAN No. 2 junction connector wire harness connector.

(b) Disconnect the ECU or sensor connected to the CAN bus wire that is shorted to ground.

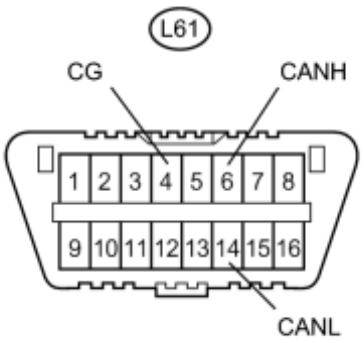
HINT:

If the ECU or sensor has multiple connectors, disconnect the connector that includes the CAN bus wires. To determine the ECU or sensor that is connected to the shorted bus wire, refer to the terminals of ECU tables INFO.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L61-6 (CANH) - L61-4 (CG) | Power switch off | 200 Ω or higher |
| L61-14 (CANL) - L61-4 (CG) | Power switch off | 200 Ω or higher |

HINT:

If the resistance changes to 200 Ω or higher when the connector is disconnected from the ECU (or sensor), there may be a short in the ECU (or sensor).

## Text in Illustration

| | |
|---|---|
| *1 | DLC3 |

NG REPAIR OR REPLACE CORRESPONDING ECU/SENSOR WIRE OR CONNECTOR

OK **REPLACE CORRESPONDING ECU OR SENSOR**

Open in One Side of CAN Branch Line

# DESCRIPTION

If some ECUs and sensors are not displayed on the "CAN Bus Check" screen of the Techstream and some ECUs and sensors repeatedly appear and disappear from the screen when the CAN main bus wires are normal (there is no open, short, short to B+ or short to GND in the main bus wires), there may be an open circuit in either of the CAN branch wires.

HINT:

If some ECUs and sensors repeatedly appear and disappear from the "CAN Bus Check" screen, communication between the normal ECUs (sensors) and the Techstream may be affected by the incomplete signals that are output from the ECU that has an open circuit in either of its CAN branch wires. In this case, the CAN branch wires for the ECUs and sensors that repeatedly appear and disappear from the screen are normal and the ECU that is not displayed on the screen may be the main cause of the problem (this ECU may have an open circuit in either of its CAN branch wires).

| Symptom | Trouble Area |
|---|---|
| 2 or more ECUs and/or sensors do not appear on the Techstream "Communication Bus Check" screen. | One side of CAN branch wire is open, or output signals are incomplete.<br><br>• Power management control ECU<br>• ECM<br>• Main body ECU<br>• Combination meter<br>• Power steering ECU<br>• Skid control ECU (Brake booster with master cylinder)<br>• Steering angle sensor<br>• Yaw rate sensor<br>• Center airbag sensor assembly<br>• Transmission control ECU<br>• Certification ECU (Smart key ECU)<br>• Navigation ECU (Navigation receiver assembly) |

# INSPECTION PROCEDURE

HINT:

Even after DTCs are cleared, if a DTC is stored again after driving the vehicle for a while, the malfunction may be occurring due to vibration of the vehicle. In such a case, wiggling the ECUs or wire harness while performing the inspection below may help determine the cause of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR OPEN IN ONE SIDE OF CAN NO. 1 BUS BRANCH WIRE |

(a) Confirm the systems (ECUs and sensors), which use CAN communication, equipped on the vehicle INFO.

(b) Using the Techstream, select and perform "CAN Bus Check" INFO.

(c) Observe the screen for approximately 1 minute to check the ECUs and sensors that are not displayed on the screen and also those that repeatedly appear and disappear from the screen.

(d) Check that the ECUs and sensors, which are connected to the ECUs or sensors that are not displayed on the screen.

(e) Check that the ECUs and sensors, which repeatedly appeared and disappeared from the "CAN Bus Check" screen, are constantly displayed.

NEXT ▶ **GO TO CORRESPONDING COMMUNICATION STOP MODE**

# PRECAUTION

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

1. PRECAUTIONS WHEN USING TECHSTREAM

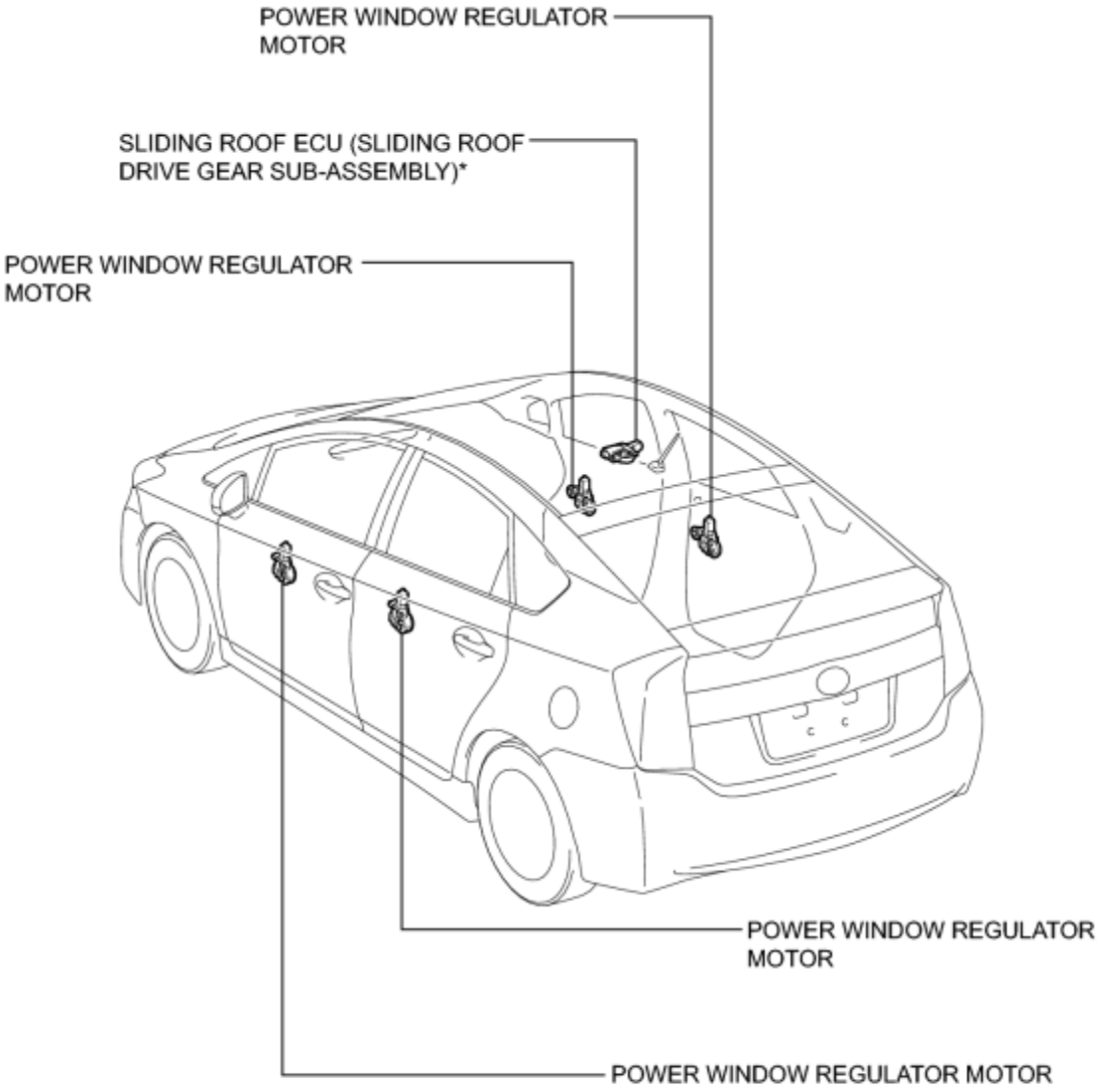
(a) When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy light switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

(b) After all DTCs are cleared, check if the trouble occurs again 6 seconds after the power switch is turned on (IG).

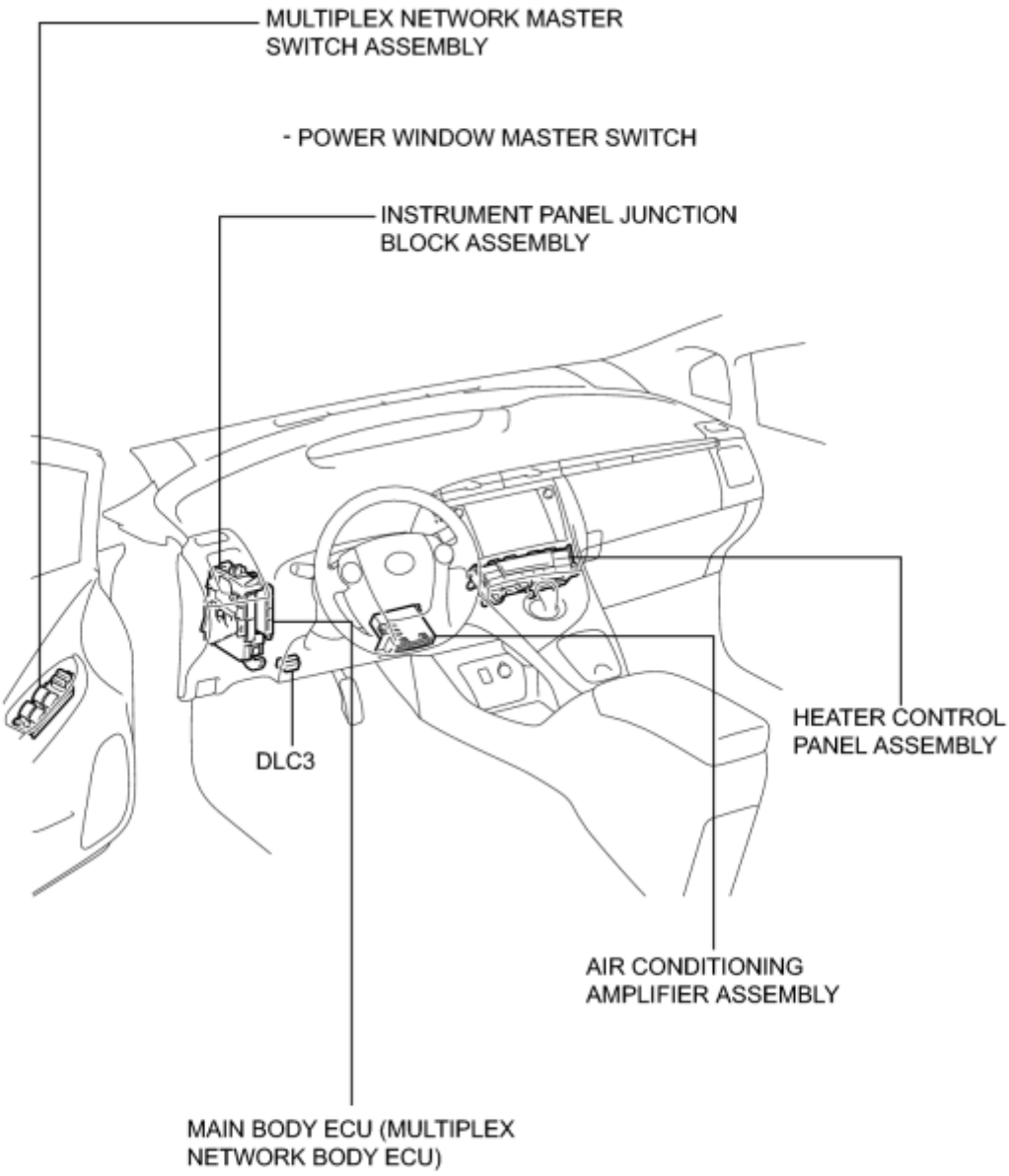
# PARTS LOCATION

# ILLUSTRATION

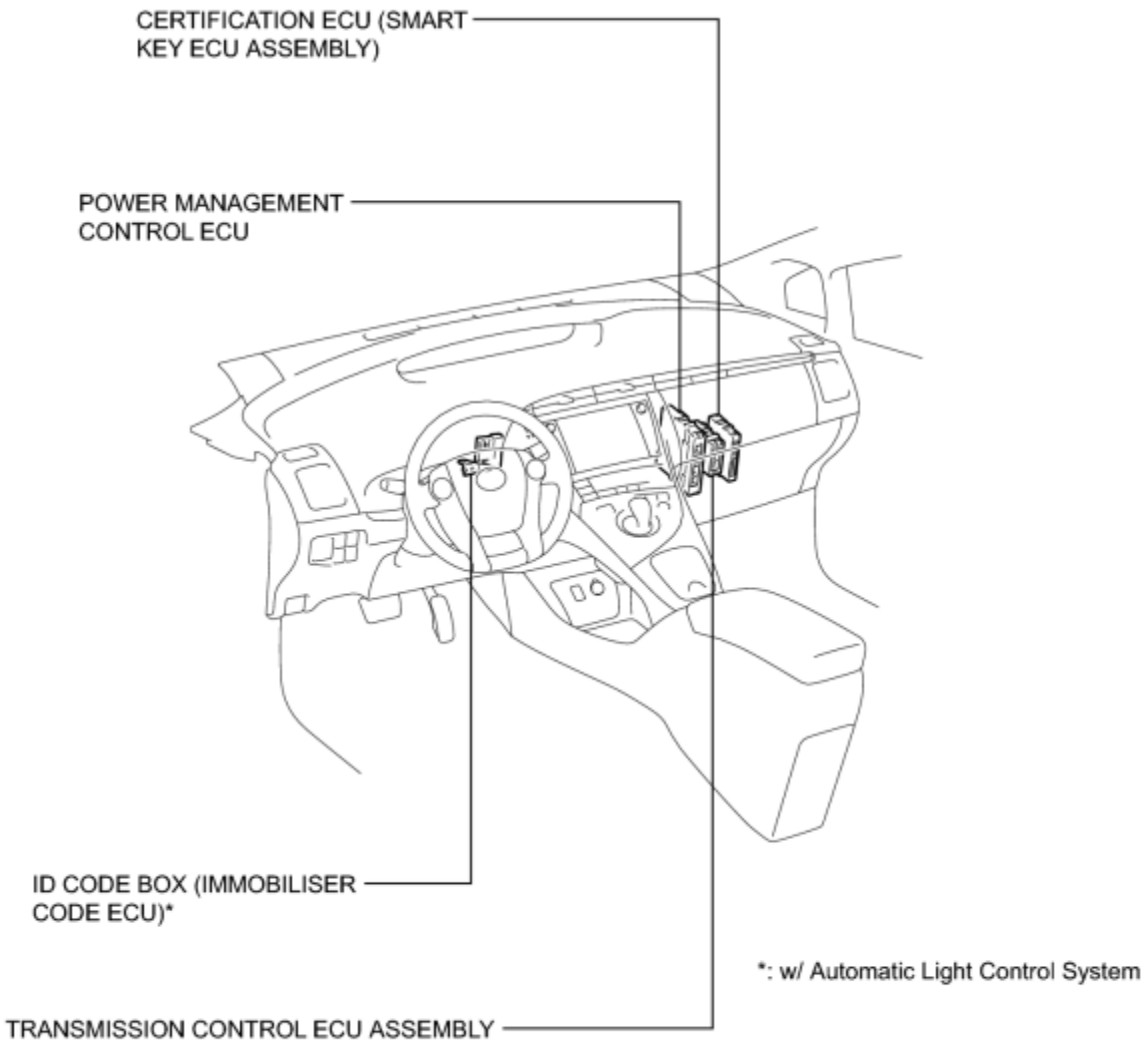



*: w/ Moonroof with Solar Panel

# ILLUSTRATION



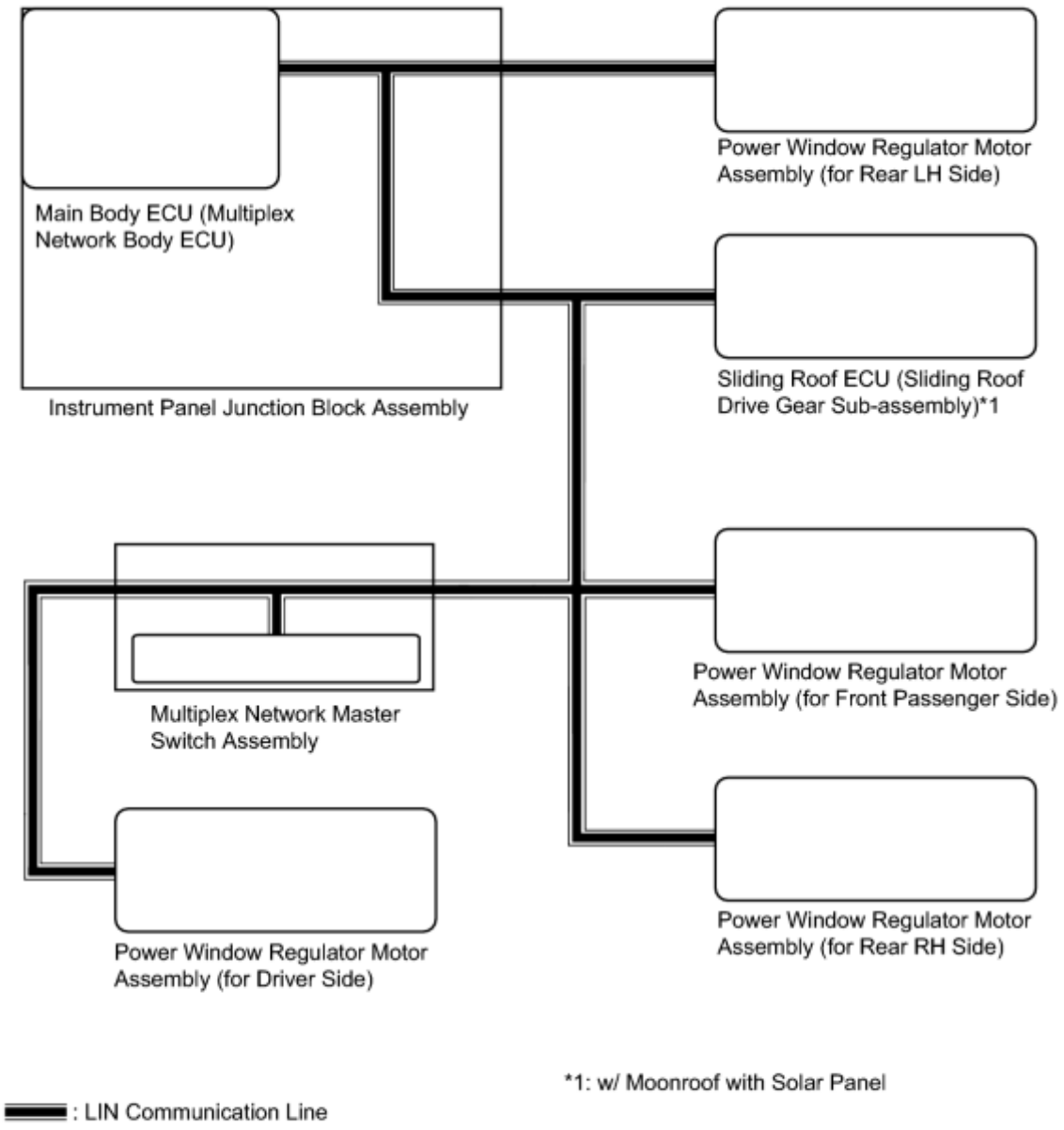

# ILLUSTRATION


CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)
POWER MANAGEMENT CONTROL ECU
ID CODE BOX (IMMOBILISER CODE ECU)*
TRANSMISSION CONTROL ECU ASSEMBLY
*: w/ Automatic Light Control System

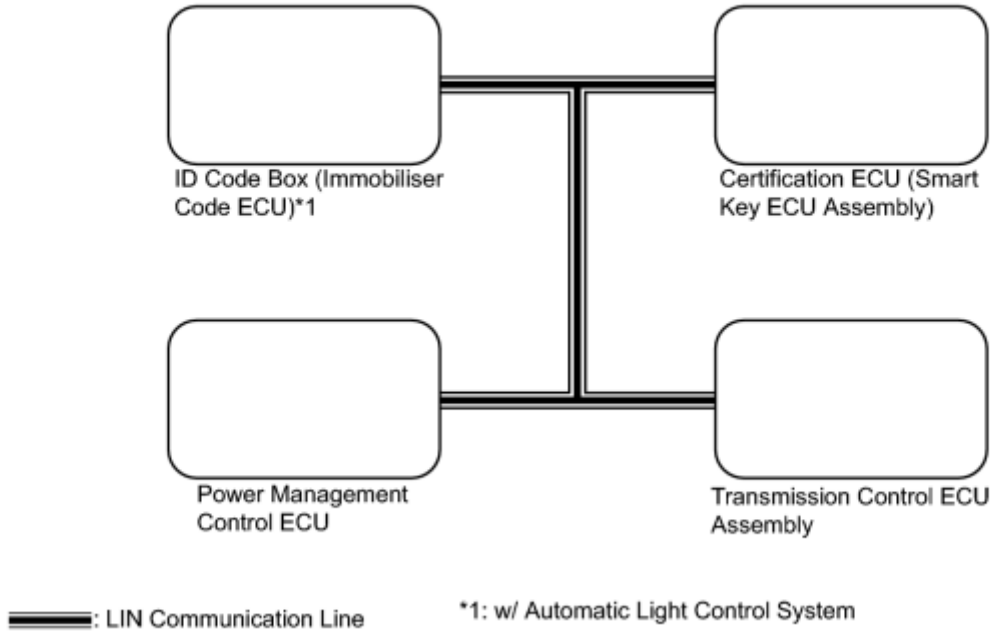
P

# SYSTEM DIAGRAM

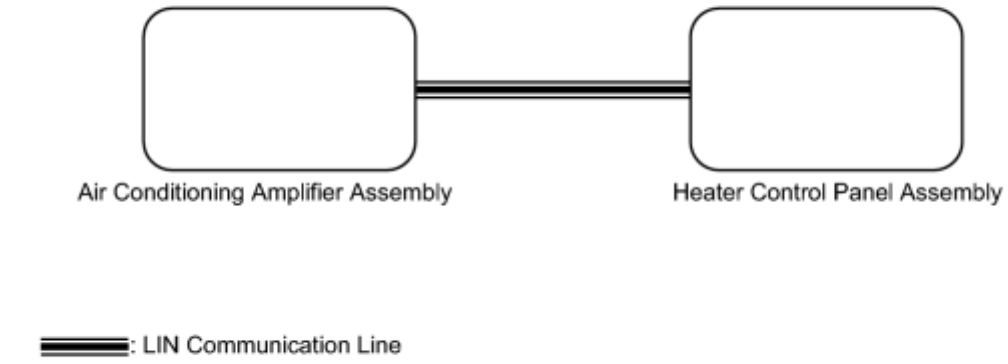
1. DOOR BUS LINES




2. CERTIFICATION BUS LINES




3. AIR CONDITIONING BUS LINES



# SYSTEM DESCRIPTION

1. LIN COMMUNICATION SYSTEM DESCRIPTION

The LIN communication system is used for communication between the components in the tables below. If communication cannot be performed through LIN communication because of an open in the communication lines or other reasons, the master control ECU of the relevant system will store a DTC. Refer to the table below about the communication bus lines and connected components.

HINT:

- Each component has a fail-safe function which activates to maintain the minimum performance of the system and protect the system.
- In the following table, "○" indicates that the function applies, and "-" indicates that it does not.

### *Door Bus Lines*

| Component | Master Control | LIN Communication DTC Output Function |
|---|---|---|
| Main Body ECU (Multiplex Network Body ECU) | ○ | ○ |
| Power Window Regulator Motor Assembly (for Driver Side) | - | - |
| Power Window Regulator Motor Assembly (for Front Passenger Side) | - | - |
| Power Window Regulator Motor Assembly (for Rear LH Side) | - | - |
| Power Window Regulator Motor Assembly (for Rear RH Side) | - | - |
| Multiplex Network Master Switch Assembly | - | - |
| Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)*1 | - | - |

- *1: w/ Moonroof with Solar Panel

### *Certification Bus Lines*

| Component | Master Control | LIN Communication DTC Output Function |
|---|---|---|
| Certification ECU (Smart Key ECU Assembly) | ○ | ○ |
| Power Management Control ECU | - | ○ |
| Transmission Control ECU Assembly | - | - |
| ID Code Box (Immobiliser Code ECU)*2 | - | - |

- *2: w/ Automatic Light Control System

### *Air Conditioning Bus Lines*

| Component | Master Control | LIN Communication DTC Output Function |
|---|---|---|
| Air Conditioning Amplifier Assembly | ○ | - |

| Component | Master Control | LIN Communication DTC Output Function |
|---|---|---|
| Heater Control Panel Assembly | - | - |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the LIN communication system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | CHECK COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM* |

(a) Using the Techstream, inspect the LIN communication function to ensure there are no malfunctions in the communication system INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

A ▼

| | |
|---|---|
| 5. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| 6. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO

(b) Data List / Active Test INFO

NEXT ▼

| | |
|---|---|
| 7. | REPAIR OR REPLACE |

NEXT ▼

| | |
|---|---|
| 8. | CONFIRMATION TEST |

NEXT ▶ **END**

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

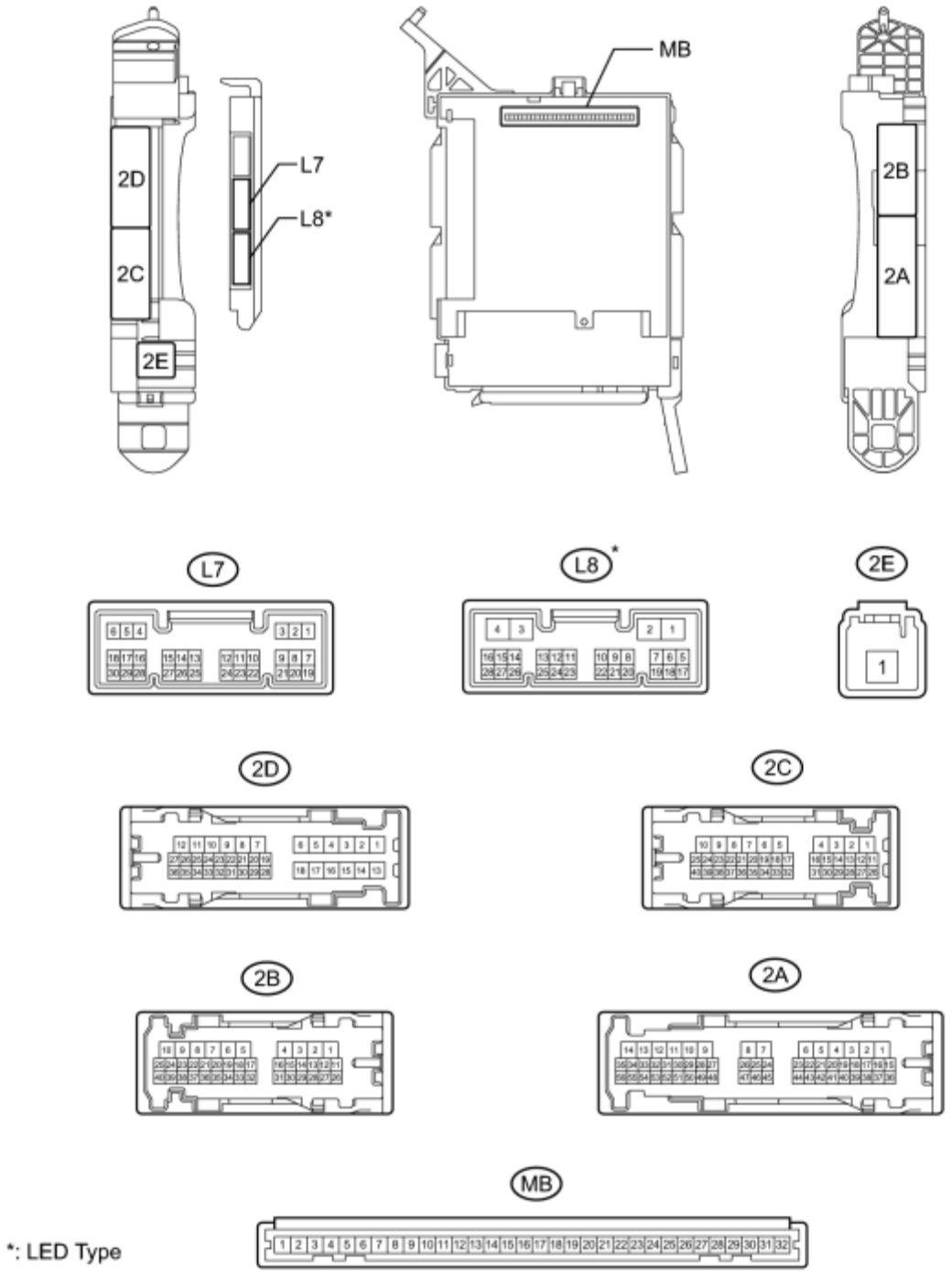
### *LIN Communication System*

| Symptom | Suspected Area | See page |
|---|---|---|
| LIN communication of the air conditioning system is malfunctioning | LIN communication line | INFO |
| | Heater control panel assembly | - |
| | Air conditioning amplifier assembly | - |

# TERMINALS OF ECU

1. CHECK MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

(a) Disconnect the 2C and 2B instrument panel junction block assembly connectors.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2C-18 (BECU) - Body ground | Y - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| 2B-6 (GND1) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the 2C and 2B instrument panel junction block assembly connectors.

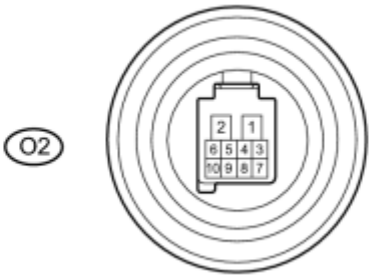
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2D-26 (LIN2) - 2B-6 (GND1) | P - W-B | LIN communication line | Power switch on (IG) | Pulse generation |
| 2A-27 (LIN2) - 2B-6 (GND1) | P - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the main body ECU (multiplex network body ECU) or instrument panel junction block assembly may be malfunctioning.

2. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

(a) Disconnect the O2 power window regulator motor assembly (for driver side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O2-2 (B) - O2-1 (GND) | L - W-B | Battery power supply | Power switch off | 11 to 14 V |
| O2-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the O2 power window regulator motor assembly (for driver side) connector.

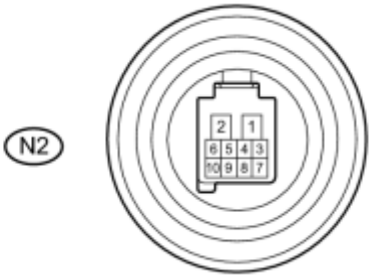
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O2-9 (LIN) - O2-1 (GND) | B - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the power window regulator motor assembly (for driver side) may be malfunctioning.

3. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

(a) Disconnect the N2 power window regulator motor assembly (for front passenger side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N2-2 (B) - N2-1 (GND) | R - W-B | Battery power supply | Power switch off | 11 to 14 V |
| N2-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the N2 power window regulator motor assembly (for front passenger side) connector.

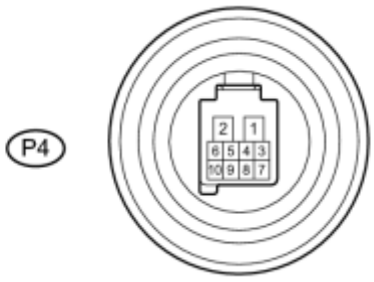
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N2-9 (LIN) - N2-1 (GND) | P - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the power window regulator motor assembly (for front passenger side) may be malfunctioning.

4. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)

(a) Disconnect the P4 power window regulator motor assembly (for rear RH side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| P4-2 (B) - P4-1 (GND) | R - W-B | Battery power supply | Power switch off | 11 to 14 V |
| P4-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the P4 power window regulator motor assembly (for rear RH side) connector.

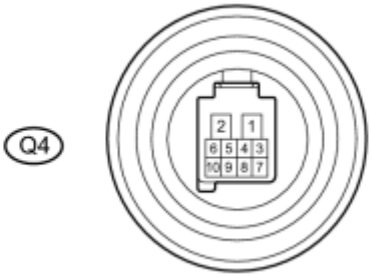
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| P4-9 (LIN) - P4-1 (GND) | P - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the power window regulator motor assembly (for rear RH side) may be malfunctioning.

5. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)

(a) Disconnect the Q4 power window regulator motor assembly (for rear LH side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q4-2 (B) - Q4-1 (GND) | R - W-B | Battery power supply | Power switch off | 11 to 14 V |
| Q4-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the Q4 power window regulator motor assembly (for rear LH side) connector.

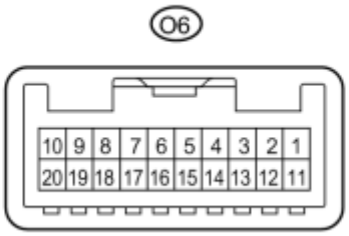
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q4-9 (LIN) - Q4-1 (GND) | P - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the power window regulator motor assembly (for rear LH side) may be malfunctioning.

6. CHECK MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY

(a) Disconnect the O6 multiplex network master switch assembly connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O6-11 (B) - O6-12 (GND) | L - W-B | Battery power supply | Power switch off | 11 to 14 V |
| O6-12 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the O6 multiplex network master switch assembly connector.

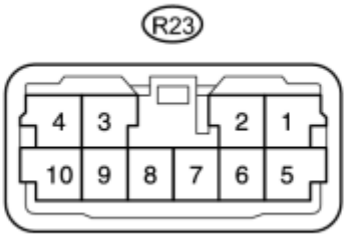
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O6-17 (LIN1) - O6-12 (GND) | P - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the multiplex network master switch assembly may be malfunctioning.

7. CHECK SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY) (w/ Moonroof with Solar Panel)

(a) Disconnect the R23 sliding roof ECU (sliding roof drive gear sub-assembly) connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| R23-1 (B) - R23-2 (E) | R - W-B | Battery power supply | Power switch off | 11 to 14 V |
| R23-2 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the R23 sliding roof ECU (sliding roof drive gear sub-assembly) connector.

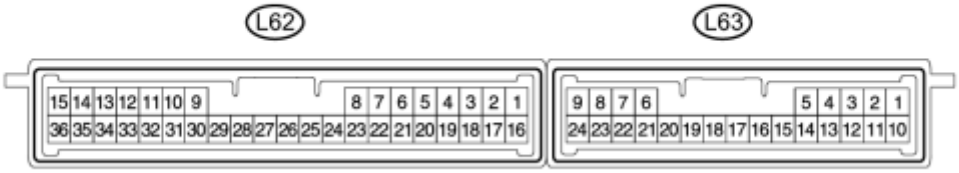
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| R23-4 (MPX1) - R23-2 (E) | P - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the sliding roof ECU (sliding roof drive gear sub-assembly) may be malfunctioning.

8. CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

(a) Disconnect the L62 certification ECU (smart key ECU assembly) connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-1 (+B) - L62-15 (E) | B - W-B | Battery power supply | Power switch off | 11 to 14 V |
| L62-15 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L62 certification ECU (smart key ECU assembly) connector.

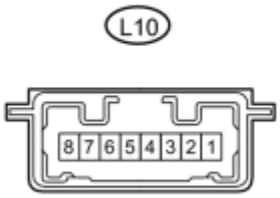
(d) Measure the voltage and check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-16 (IG) - L62-15 (E) | BE - W-B | Power switch power supply | Power switch on (IG) | 11 to 14 V |
| L62-16 (IG) - L62-15 (E) | BE - W-B | Power switch power supply | Power switch off | Below 1 V |
| L62-29 (LIN) - L62-15 (E) | L - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the certification ECU (smart key ECU assembly) may be malfunctioning.

9. CHECK ID CODE BOX (IMMOBILISER CODE ECU) (w/ Automatic Light Control System)

(a) Disconnect the L10 ID code box (immobiliser code ECU) connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L10-1 (+B) - L10-8 (GND) | B - W-B | Battery power supply | Power switch off | 11 to 14 V |
| L10-8 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L10 ID code box (immobiliser code ECU) connector.

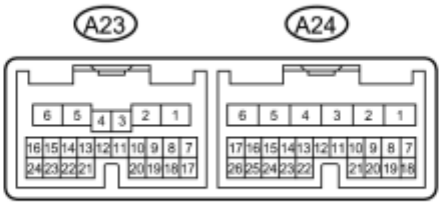
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L10-3 (LIN1) - L10-8 (GND) | L - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the ID code box (immobiliser code ECU) may be malfunctioning.

10. CHECK TRANSMISSION CONTROL ECU ASSEMBLY

(a) Disconnect the A23 and A24 transmission control ECU assembly connectors.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A23-15 (BATT) - Body ground | SB - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| A24-1 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| A24-5 (E02) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| A24-6 (E01) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the A23 and A24 transmission control ECU assembly connectors.

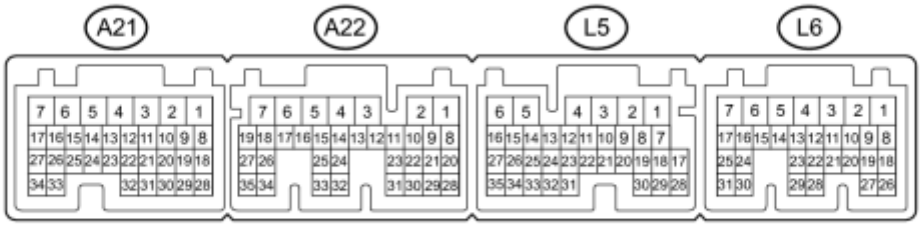
(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A24-24 (LIN) - A24-1 (E1) | L - W-B | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the transmission control ECU assembly may be malfunctioning.

11. CHECK POWER MANAGEMENT CONTROL ECU

(a) Disconnect the L5 and L6 power management control ECU connectors.




Y

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-1 (AM22) - Body ground | W - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| L6-7 (AM21) - Body ground | W - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| L5-6 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L5 and L6 power management control ECU connectors.

(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L6-11 (LIN2) - L5-6 (E1) | L - BR | LIN communication line | Power switch on (IG) | Pulse generation |

If the result is not as specified, the power management control ECU may be malfunctioning.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

The main body ECU (multiplex network body ECU) and certification ECU (smart key ECU assembly) control the LIN communication system. LIN communication system data and Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3).

When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) Check the DLC3 

.

3. INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

- If the voltage is below 11 V, recharge or replace the battery.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Power Source Control, Smart Key or Main Body / Trouble Codes.

(e) Check the details of the DTC(s) 

.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Power Source Control, Smart Key or Main Body / Trouble Codes.

(e) Clear the DTC(s).

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Communication D-Door Motor | Connection status between power window regulator motor assembly (for driver side) and main body ECU (multiplex network body ECU)/OK or STOP | OK: Connected<br><br>STOP: Not Connected | DTC is output if an error occurs in LIN communication. |
| Communication P-Door Motor | Connection status between power window regulator motor assembly (for front passenger side) and main body ECU (multiplex network body ECU)/OK or STOP | OK: Connected<br><br>STOP: Not Connected | DTC is output if an error occurs in LIN communication. |
| Communication RR-Door Motor | Connection status between power window regulator motor assembly (for rear RH side) and main body ECU (multiplex network body ECU)/OK or STOP | OK: Connected<br><br>STOP: Not Connected | DTC is output if an error occurs in LIN communication. |
| Communication RL-Door Motor | Connection status between power window regulator motor assembly (for rear LH side) and main body ECU (multiplex network body ECU)/OK or STOP | OK: Connected<br><br>STOP: Not Connected | DTC is output if an error occurs in LIN communication. |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Communication Slide Roof*1 | Connection status between sliding roof ECU (sliding roof drive gear sub-assembly) and main body ECU (multiplex network body ECU)/OK or STOP | OK: Connected<br><br>STOP: Not Connected | DTC is output if an error occurs in LIN communication. |
| Communication Master SW | Connection status between multiplex network master switch assembly and main body ECU (multiplex network body ECU)/OK or STOP | OK: Connected<br><br>STOP: Not Connected | DTC is output if an error occurs in LIN communication. |

- *1: w/ Moonroof with Solar Panel

# DIAGNOSTIC TROUBLE CODE CHART

1. MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU) DIAGNOSTIC TROUBLE CODE

***Main Body ECU (Multiplex Network Body ECU)***

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B1206 | P/W Master Switch Communication Stop | 1. Multiplex network master switch assembly<br>2. Main body ECU (multiplex network body ECU)<br>3. Instrument panel junction block assembly<br>4. Wire harness or connector<br>5. D FR DOOR fuse | INFO |
| B1273<br>*1 | Sliding Roof ECU Communication Stop | 1. Sliding roof ECU (sliding roof drive gear sub-assembly)<br>2. Main body ECU (multiplex network body ECU)<br>3. Instrument panel junction block assembly<br>4. Wire harness or connector<br>5. S/ROOF fuse | INFO |
| B2321 | Driver Side Door ECU Communication Stop | 1. Power window regulator motor assembly (for driver side)<br>2. Main body ECU (multiplex network body ECU)<br>3. Multiplex network master switch assembly<br>4. Wire harness or connector<br>5. D FR DOOR fuse | INFO |
| B2322 | Front Passenger Side Door ECU Communication Stop | 1. Power window regulator motor assembly (for front passenger side)<br>2. Main body ECU (multiplex network body ECU)<br>3. Instrument panel junction block assembly<br>4. Wire harness or connector | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | 5. P FR DOOR fuse | |
| B2323 | Rear Door RH ECU Communication Stop | 1. Power window regulator motor assembly (for rear RH side)<br><br>2. Main body ECU (multiplex network body ECU)<br><br>3. Instrument panel junction block assembly<br><br>4. Wire harness or connector<br><br>5. DOOR RR fuse | INFO |
| B2324 | Rear Door LH ECU Communication Stop | 1. Power window regulator motor assembly (for rear LH side)<br><br>2. Main body ECU (multiplex network body ECU)<br><br>3. Instrument panel junction block assembly<br><br>4. Wire harness or connector<br><br>5. DOOR RL fuse | INFO |
| B2325 | LIN Communication Bus Malfunction | 1. Power window regulator motor assembly (for driver side)<br><br>2. Power window regulator motor assembly (for front passenger side)<br><br>3. Power window regulator motor assembly (for rear RH side)<br><br>4. Power window regulator motor assembly (for rear LH side)<br><br>5. Multiplex network master switch assembly<br><br>6. Sliding roof ECU (sliding roof drive gear sub-assembly)*1<br><br>7. Main body ECU (multiplex network body ECU)<br><br>8. Instrument panel junction block assembly<br><br>9. Wire harness or connector | INFO |

- *1: w/ Moonroof with Solar Panel

2. CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) DIAGNOSTIC TROUBLE CODE

*Certification ECU (Smart Key ECU Assembly)*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B2785 | Communication Malfunction between ECUs Connected by LIN | 1. Certification ECU (smart key ECU assembly)<br>2. Power management control ECU<br>3. Transmission control ECU assembly<br>4. ID code box (immobiliser code ECU)*3<br>5. Wire harness or connector | INFO |
| B2786<br>*2 | No Response from Steering Lock ECU | 1. Transmission control ECU assembly<br>2. Certification ECU (smart key ECU assembly)<br>3. Wire harness or connector<br>4. P CON MAIN fuse | INFO |
| B2789<br>*3 | No Response from ID BOX | 1. ID code box (immobiliser code ECU)<br>2. Certification ECU (smart key ECU assembly)<br>3. Wire harness or connector<br>4. ECU-B2 fuse | INFO |
| B278C | Lost Communication with Power Source Control | 1. Power management control ECU<br>2. Certification ECU (smart key ECU assembly)<br>3. Wire harness or connector<br>4. AM2 fuse | INFO |

- *2: Although "No Response from Steering Lock ECU" is displayed on the tester, this message is shown if the certification ECU (smart key ECU assembly) cannot communicate with the transmission control ECU assembly.
- *3: w/ Automatic Light Control System

3. POWER MANAGEMENT CONTROL ECU DIAGNOSTIC TROUBLE CODE

*Power Management Control ECU*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B2287 | LIN Communication Master Malfunction | 1. Power management control ECU<br><br>2. Certification ECU (smart key ECU assembly)<br><br>3. Wire harness or connector | INFO |

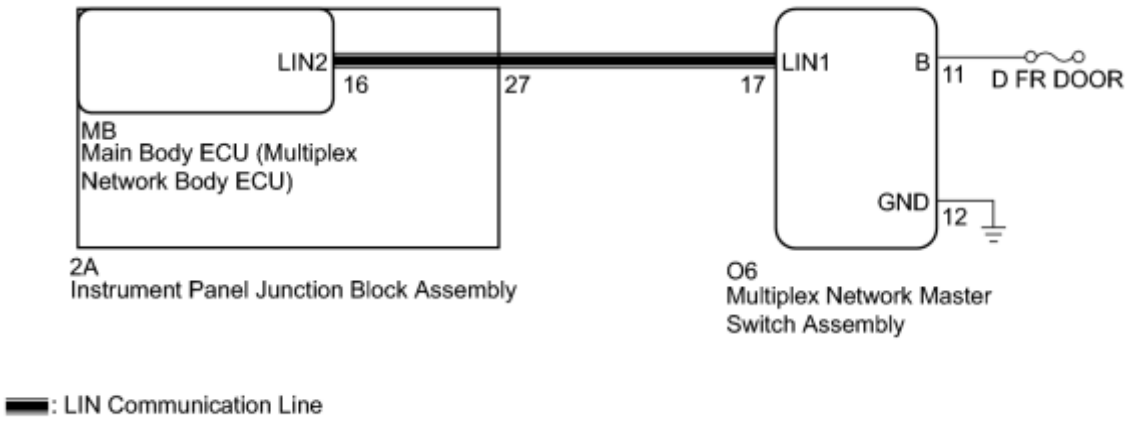
| DTC | B1206 | P/W Master Switch Communication Stop |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the multiplex network master switch assembly and main body ECU (multiplex network body ECU) stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1206 | No communication between multiplex network master switch assembly and main body ECU (multiplex network body ECU) for 10 seconds or more. | • Multiplex network master switch assembly<br>• Main body ECU (multiplex network body ECU)<br>• Instrument panel junction block assembly<br>• Wire harness or connector<br>• D FR DOOR fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

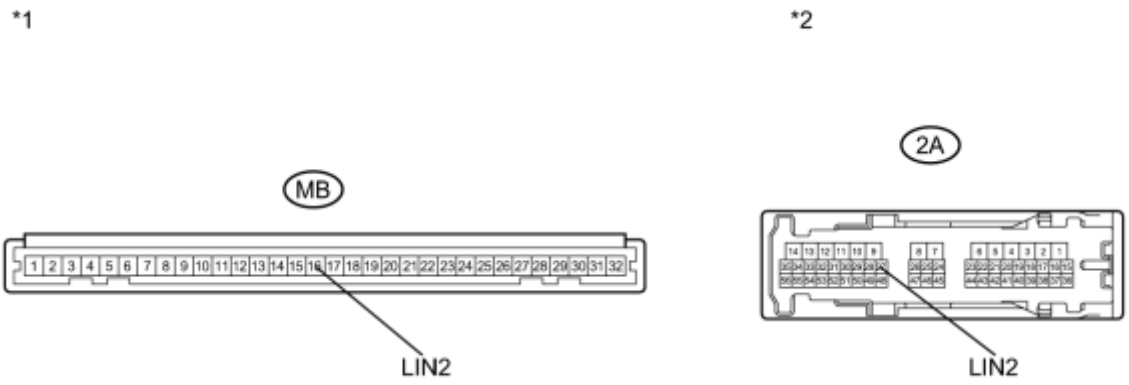
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When using the Techstream to troubleshoot with the power switch off:

  Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Remove the instrument panel junction block assembly INFO.




(b) Remove the main body ECU (multiplex network body ECU) from the instrument panel junction block assembly.

(c) Measure the resistance according to the value(s) in the table below.

HINT:

This inspection is to check the LIN line in the instrument panel junction block assembly that connects the wire harness to the built-in main body ECU (multiplex network body ECU).

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2) - MB-16 (LIN2) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) | *2 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) |

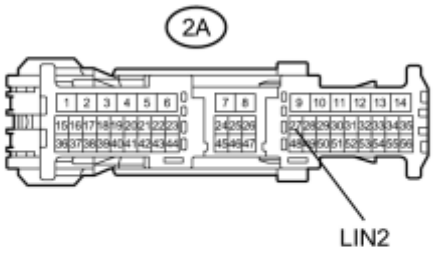
NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

▼

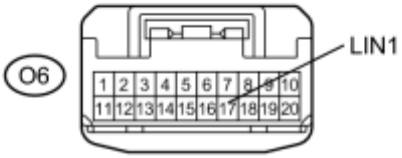
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - MULTIPLEX NETWORK MASTER SWITCH) |

*1




(a) Disconnect the O6 multiplex network master switch assembly connector.

*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2) - O6-17 (LIN1) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Multiplex Network Master Switch Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (MULTIPLEX NETWORK MASTER SWITCH - BATTERY, BODY GROUND) |

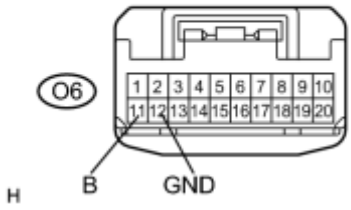
(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| | | |
|---|---|---|
| O6-11 (B) - O6-12 (GND) | Power switch off | 11 to 14 V |

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O6-12 (GND) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Multiplex Network Master Switch Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY |

(a) Replace the multiplex network master switch assembly INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B1206 is not output.

NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK ▶ **END (MULTIPLEX NETWORK MASTER SWITCH WAS DEFECTIVE)**

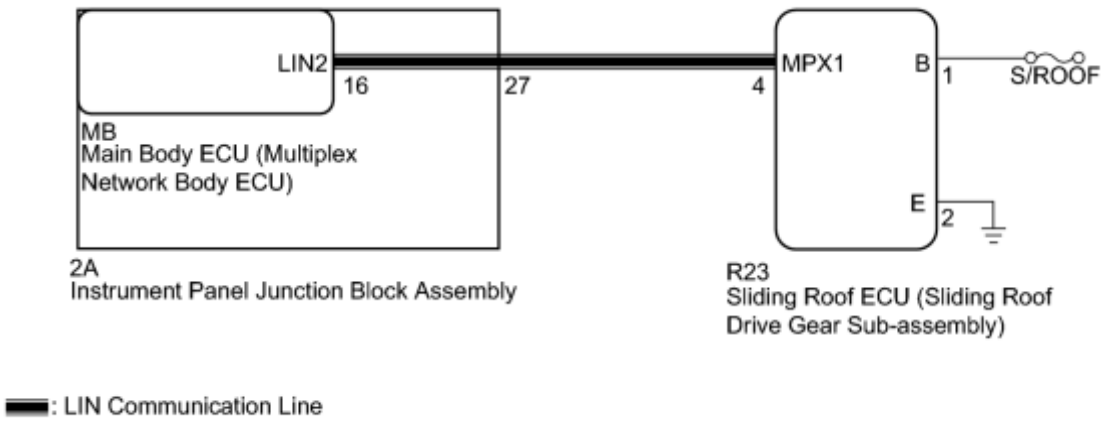
| DTC | B1273 | Sliding Roof ECU Communication Stop |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the sliding roof ECU (sliding roof drive gear sub-assembly) and main body ECU (multiplex network body ECU) stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1273 | No communication between sliding roof ECU (sliding roof drive gear sub-assembly) and main body ECU (multiplex network body ECU) for 10 seconds or more. | • Sliding roof ECU (sliding roof drive gear sub-assembly)<br>• Main body ECU (multiplex network body ECU)<br>• Instrument panel junction block assembly<br>• Wire harness or connector<br>• S/ROOF fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

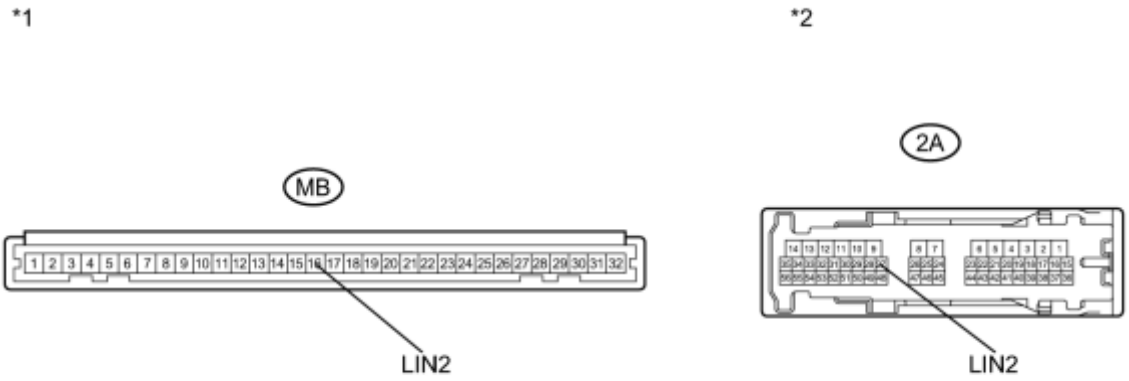
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When the sliding roof ECU (sliding roof drive gear sub-assembly) is replaced or removed and reinstalled, it requires initialization INFO.
- When using the Techstream to troubleshoot with the power switch off:

  Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Remove the instrument panel junction block assembly INFO.




(b) Remove the main body ECU (multiplex network body ECU) from the instrument panel junction block assembly.

(c) Measure the resistance according to the value(s) in the table below.

HINT:

This inspection is to check the LIN line in the instrument panel junction block assembly that connects the wire harness to the built-in main body ECU (multiplex network body ECU).

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2)- MB-16 (LIN2) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) | *2 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) |

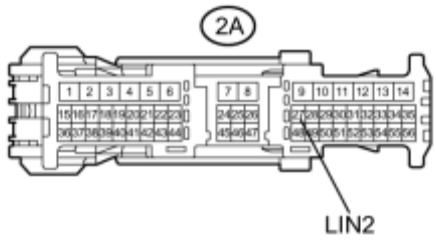
NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

▼

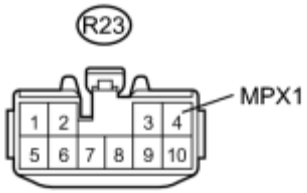
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - SLIDING ROOF ECU) |

*1




(a) Disconnect the R23 sliding roof ECU (sliding roof drive gear sub-assembly) connector.

*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2) - R23-4 (MPX1) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

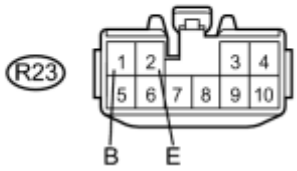
▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SLIDING ROOF ECU - BATTERY, BODY GROUND) |

(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R23-1 (B) - R23-2 (E) | Power switch off | 11 to 14 V |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R23-2 (E) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY) |

(a) Replace the sliding roof ECU (sliding roof drive gear sub-assembly) INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B1273 is not output.

NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK ▶ **END (SLIDING ROOF ECU WAS DEFECTIVE)**

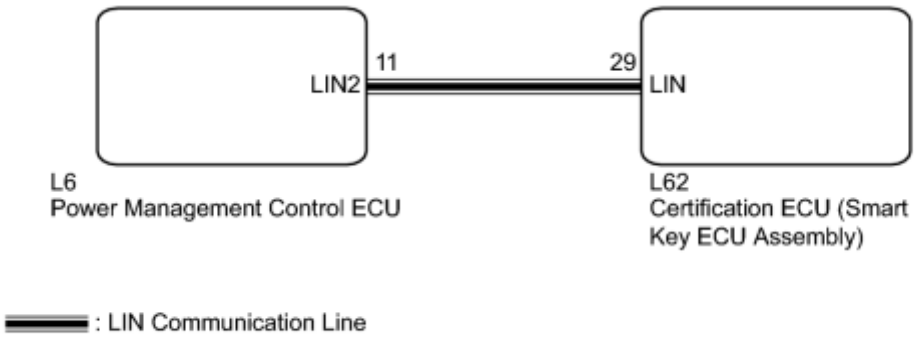
| DTC | B2287 | LIN Communication Master Malfunction |
|---|---|---|

# DESCRIPTION

This DTC is stored when there is an open, short or ECU communication malfunction between the power management control ECU and certification ECU (smart key ECU assembly).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2287 | There is an open, short or ECU communication malfunction between power management control ECU and certification ECU (smart key ECU assembly). | • Power management control ECU<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register the key.
- When using the Techstream to troubleshoot with the power switch off:

  Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| 1. | CHECK DTC OUTPUT |
|---|---|

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

HINT:

Check the both "Smart Key" and "Power Source Control" DTCs.

Result:

| Result | Proceed to |
|---|---|
| Only DTC B2287 is output. | A |
| DTC B2287 and B2785 are output simultaneously. | B |

HINT:

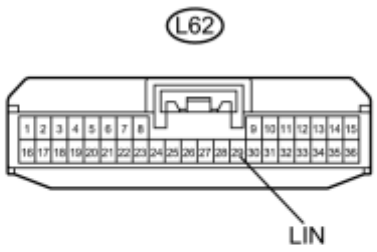
When DTC B2287 and B2785 are output simultaneously, perform troubleshooting for DTC B2785 first.

B GO TO DTC B2785

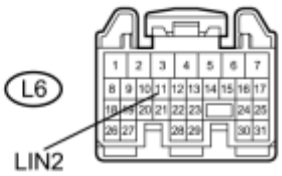
A

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER MANAGEMENT CONTROL ECU) |

*1




*2




(a) Disconnect the L6 power management control ECU and L62 certification ECU (smart key ECU assembly) connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-11 (LIN2) - L62-29 (LIN) | Always | Below 1 Ω |
| L6-11 (LIN2) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT

▼

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B2287 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (POWER MANAGEMENT CONTROL ECU WAS DEFECTIVE)**

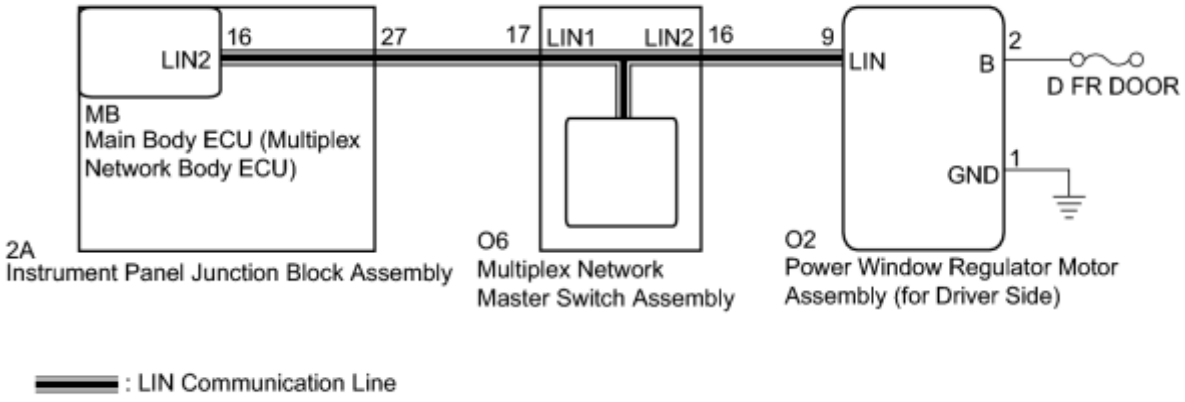
| DTC | B2321 | Driver Side Door ECU Communication Stop |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the power window regulator motor assembly (for driver side) and main body ECU (multiplex network body ECU) stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2321 | No communication between power window regulator motor assembly (for driver side) and main body ECU (multiplex network body ECU) for 10 seconds or more. | • Power window regulator motor assembly (for driver side)<br>• Main body ECU (multiplex network body ECU)<br>• Multiplex network master switch assembly<br>• Wire harness or connector<br>• D FR DOOR fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When a power window regulator motor assembly is replaced or removed and reinstalled, it requires initialization INFO.
- When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| Only DTC B2321 is output. | A |
| DTC B1206 and B2321 are output simultaneously. | B |

HINT:

When DTC B1206 and B2321 are output simultaneously, perform troubleshooting for DTC B1206 first.

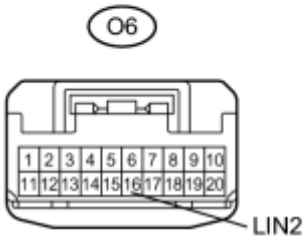
B GO TO DTC B1206

A

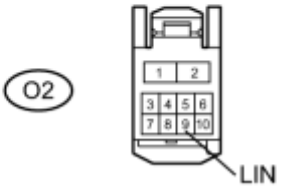
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MASTER SWITCH - DRIVER SIDE POWER WINDOW REGULATOR MOTOR) |

(a) Disconnect the O6 multiplex network master switch connector.

*1




*2




(b) Disconnect the O2 power window regulator motor (for driver side) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O6-16 (LIN2) - O2-9 (LIN) | Always | Below 1 Ω |
| O6-16 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

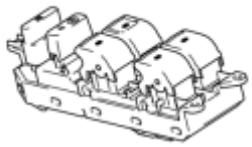
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Multiplex Network Master Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

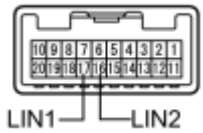
▼

| | |
|---|---|
| 3. | INSPECT MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY |



*1

(a) Remove the multiplex network master switch assembly INFO.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 16 (LIN2) - 17 (LIN1) | Always | Below 1 Ω |
| 16 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

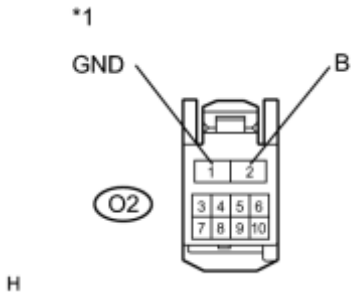
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Multiplex Network Master Switch Assembly) |

NG ▶ REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER WINDOW REGULATOR MOTOR - BATTERY, BODY GROUND) |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O2-2 (B) - Body ground | Power switch off | 11 to 14 V |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O2-1 (GND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for DRIVER SIDE) |

(a) Replace the power window regulator motor assembly (for driver side) INFO.

NEXT

▼

| | |
|---|---|
| 6. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Check for DTCs.

OK:

DTC B2321 is not output.

NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK ▶ **END (POWER WINDOW REGULATOR MOTOR ASSEMBLY WAS DEFECTIVE)**

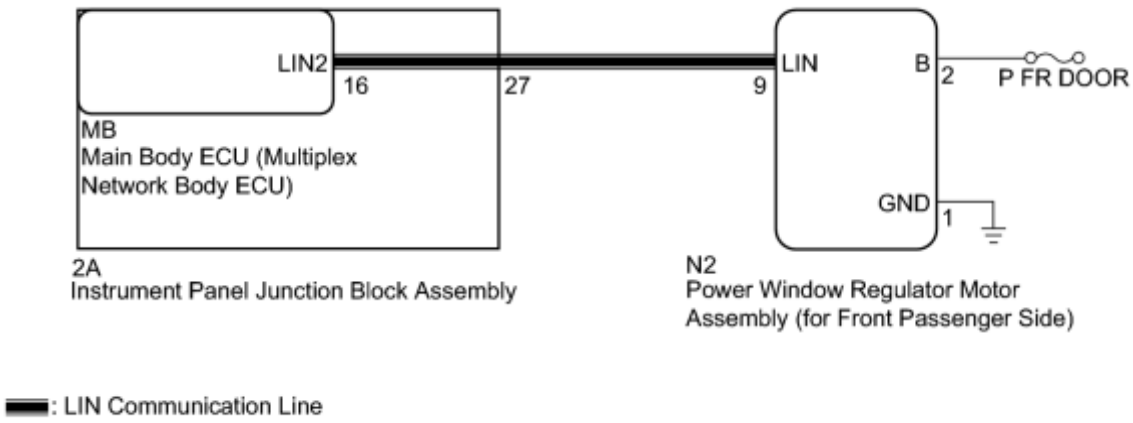
| DTC | B2322 | Front Passenger Side Door ECU Communication Stop |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the power window regulator motor assembly (for front passenger side) and main body ECU (multiplex network body ECU) stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2322 | No communication between power window regulator motor assembly (for front passenger side) and main body ECU (multiplex network body ECU) for 10 seconds or more. | • Power window regulator motor assembly (for front passenger side)<br>• Main body ECU (multiplex network body ECU)<br>• Instrument panel junction block assembly<br>• Wire harness or connector<br>• P FR DOOR fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

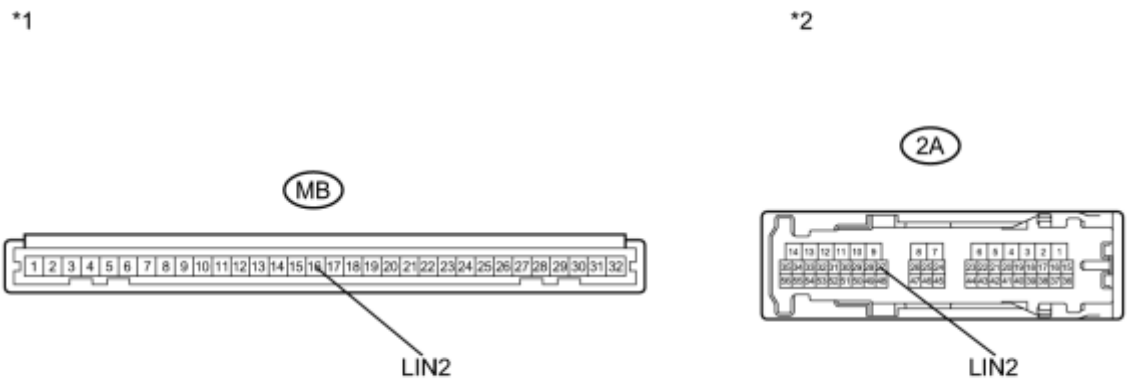
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When a power window regulator motor assembly is replaced or removed and reinstalled, it requires initialization INFO.
- When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Remove the instrument panel junction block assembly INFO.




(b) Remove the main body ECU (multiplex network body ECU) from the instrument panel junction block assembly.

(c) Measure the resistance according to the value(s) in the table below.

HINT:

This inspection is to check the LIN line in the instrument panel junction block assembly that connects the wire harness to the built-in main body ECU (multiplex network body ECU).

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2) - MB-16 (LIN2) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

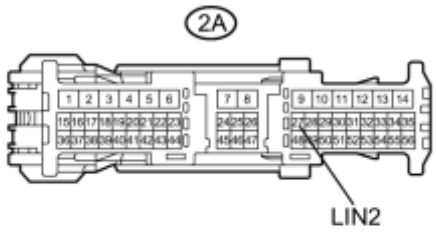
| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Instrument panel Junction Block Assembly) | *2 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

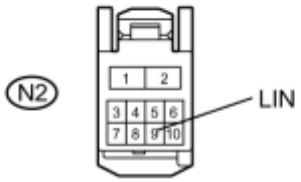
OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - POWER WINDOW REGULATOR MOTOR) |

*1




*2




(a) Disconnect the N2 power window regulator motor assembly (for front passenger side) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2) - N2-9 (LIN) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

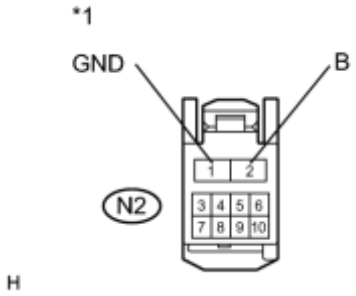
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER WINDOW REGULATOR MOTOR - BATTERY, |

| | |
|---|---|
| | BODY GROUND) |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| N2-2 (B) - Body ground | Power switch off | 11 to 14 V |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| N2-1 (GND) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for FRONT PASSENGER SIDE) |

(a) Replace the power window regulator motor assembly (for front passenger side) INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Check for DTCs.

OK:

DTC B2322 is not output.

NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK ▶ **END (POWER WINDOW REGULATOR MOTOR ASSEMBLY WAS DEFECTIVE)**

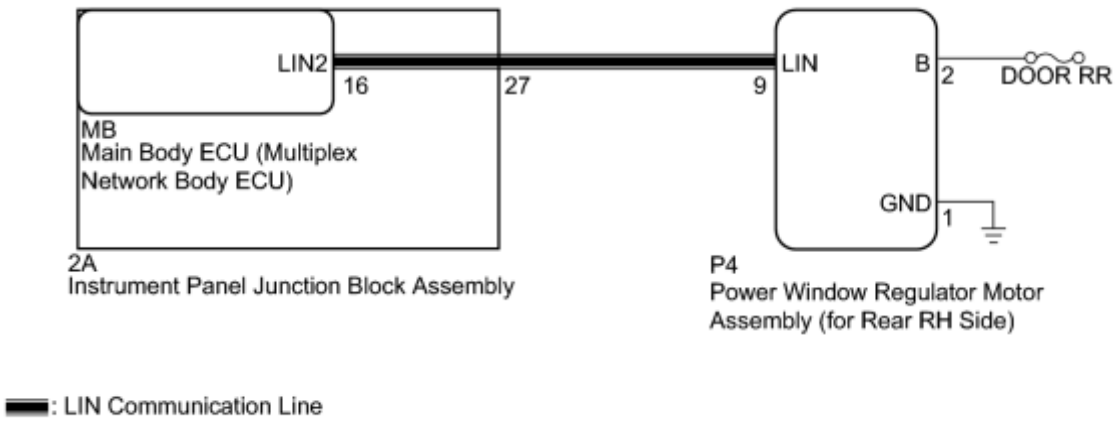
| DTC | B2323 | Rear Door RH ECU Communication Stop |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the power window regulator motor assembly (for rear RH side) and main body ECU (multiplex network body ECU) stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2323 | No communication between power window regulator motor assembly (for rear RH side) and main body ECU (multiplex network body ECU) for 10 seconds or more. | • Power window regulator motor assembly (for rear RH side)<br>• Main body ECU (multiplex network body ECU)<br>• Instrument panel junction block assembly<br>• Wire harness or connector<br>• DOOR RR fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

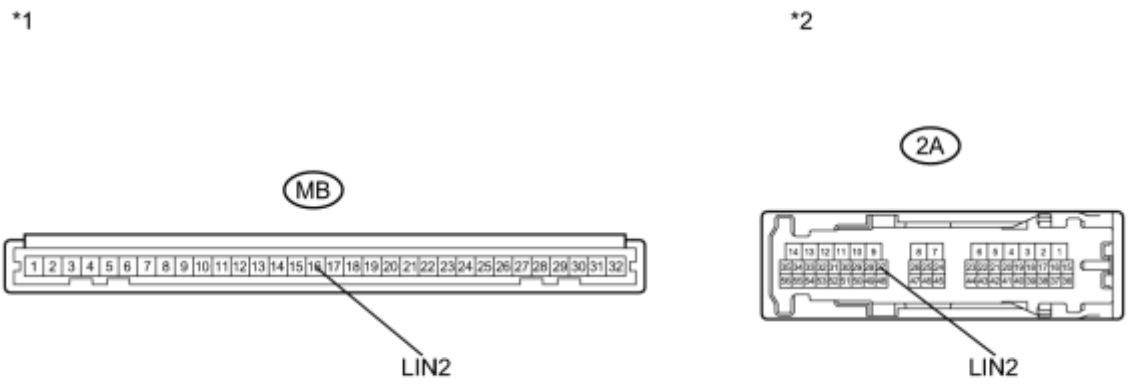
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When a power window regulator motor assembly is replaced or removed and reinstalled, it requires initialization INFO.
- When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Remove the instrument panel junction block assembly INFO.




(b) Remove the main body ECU (multiplex network body ECU) from the instrument panel junction block assembly.

(c) Measure the resistance according to the value(s) in the table below.

HINT:

This inspection is to check the LIN line in the instrument panel junction block assembly that connects the wire harness to the built-in main body ECU (multiplex network body ECU).

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2) - MB-16 (LIN2) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

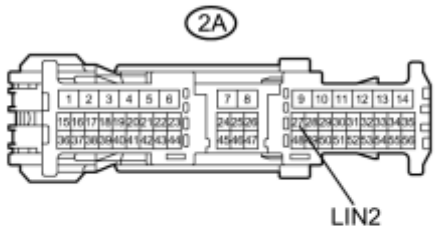
| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) | *2 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

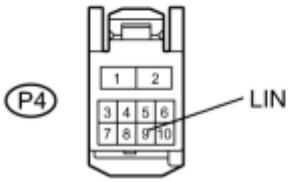
OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - POWER WINDOW REGULATOR MOTOR) |

*1




*2




(a) Disconnect the P4 power window regulator motor assembly (for rear RH side) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-27 (LIN2) - P4-9 (LIN) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

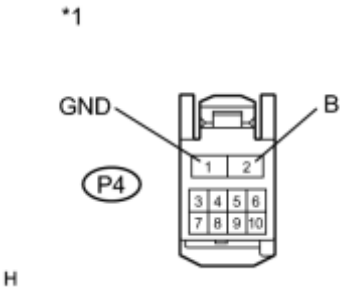
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear RH Side)) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER WINDOW REGULATOR MOTOR - BATTERY, |

| | |
|---|---|
| | BODY GROUND) |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| P4-2 (B) - Body ground | Power switch off | 11 to 14 V |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| P4-1 (GND) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear RH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | REPLACE POWER WINDOW REGULATOR MOTOR (for REAR RH SIDE) |

(a) Replace the power window regulator motor assembly (for rear RH side) INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Check for DTCs.

OK:

DTC B2323 is not output.

NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK ▶ **END (POWER WINDOW REGULATOR MOTOR ASSEMBLY WAS DEFECTIVE)**

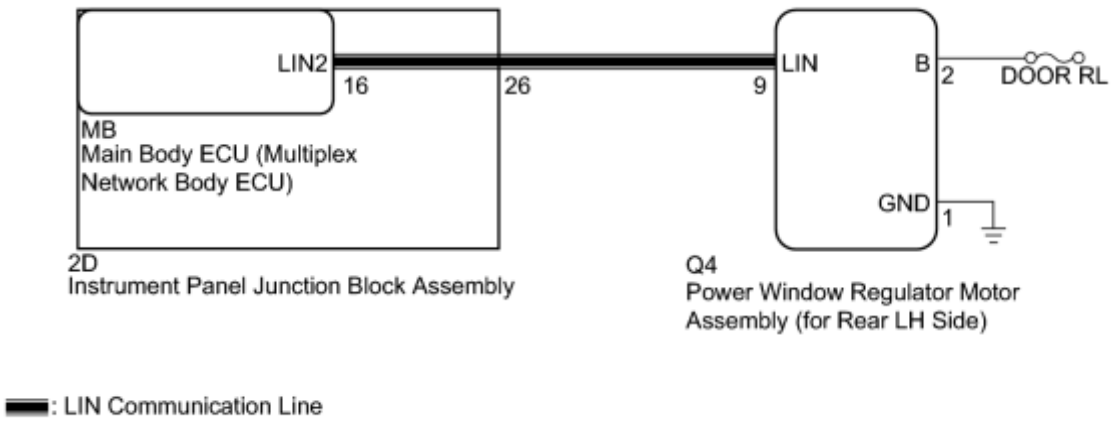
| DTC | B2324 | Rear Door LH ECU Communication Stop |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the power window regulator motor assembly (for rear LH side) and main body ECU (multiplex network body ECU) stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2324 | No communication between power window regulator motor assembly (for rear LH side) and main body ECU (multiplex network body ECU) for 10 seconds or more. | • Power window regulator motor assembly (for rear LH side)<br>• Main body ECU (multiplex network body ECU)<br>• Instrument panel junction block assembly<br>• Wire harness or connector<br>• DOOR RL fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

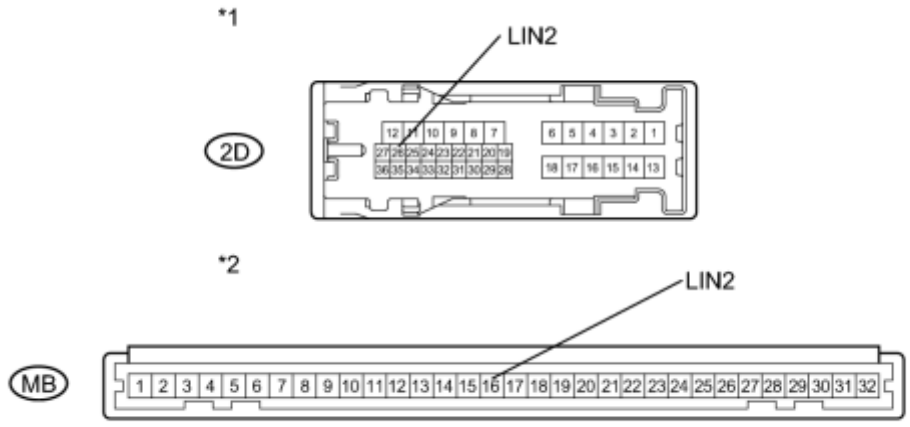
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When a power window regulator motor assembly is replaced or removed and reinstalled, it requires initialization INFO.
- When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Remove the instrument panel junction block assembly INFO.




(b) Remove the main body ECU (multiplex network body ECU) from the instrument panel junction block assembly.

(c) Measure the resistance according to the value(s) in the table below.

HINT:

This inspection is to check the LIN line in the instrument panel junction block assembly that connects the wire harness to the built-in main body ECU (multiplex network body ECU).

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2D-26 (LIN2) - MB-16 (LIN2) | Always | Below 1 Ω |
| 2D-26 (LIN2) - Body ground | Always | 10 kΩ or higher |

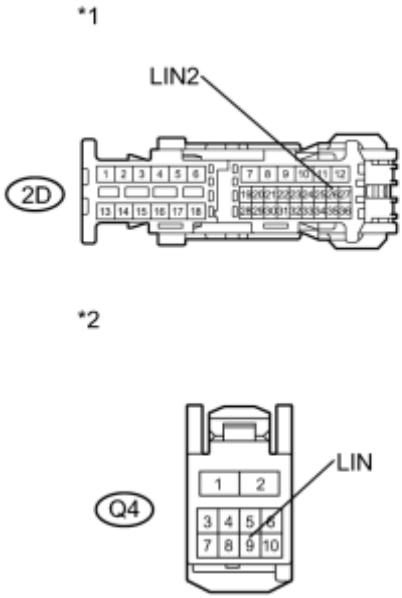
***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) | *2 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - POWER WINDOW REGULATOR MOTOR) |




(a) Disconnect the Q4 power window regulator motor assembly (for rear LH side) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2D-26 (LIN2) - Q4-9 (LIN) | Always | Below 1 Ω |
| 2D-26 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

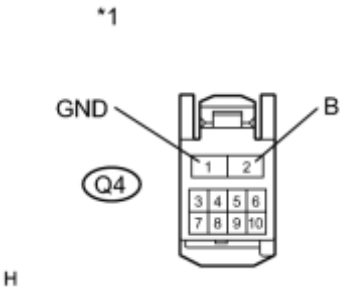
| | |
|---|---|
| *1 | Front view of wire harness or connector<br><br>(to Instrument Panel Junction Block Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear LH Side)) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER WINDOW REGULATOR MOTOR - BATTERY, |

| | |
|---|---|
| | BODY GROUND) |




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Q4-2 (B) - Body ground | Power switch off | 11 to 14 V |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Q4-1 (GND) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness or connector<br><br>(to Power Window Regulator Motor Assembly (for Rear LH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for REAR LH SIDE) |

(a) Replace the power window regulator motor assembly (for rear LH side) INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Check for DTCs.

OK:

DTC B2324 is not output.

NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK ▶ **END (POWER WINDOW REGULATOR MOTOR ASSEMBLY WAS DEFECTIVE)**

| DTC | B2325 | LIN Communication Bus Malfunction |
|---|---|---|

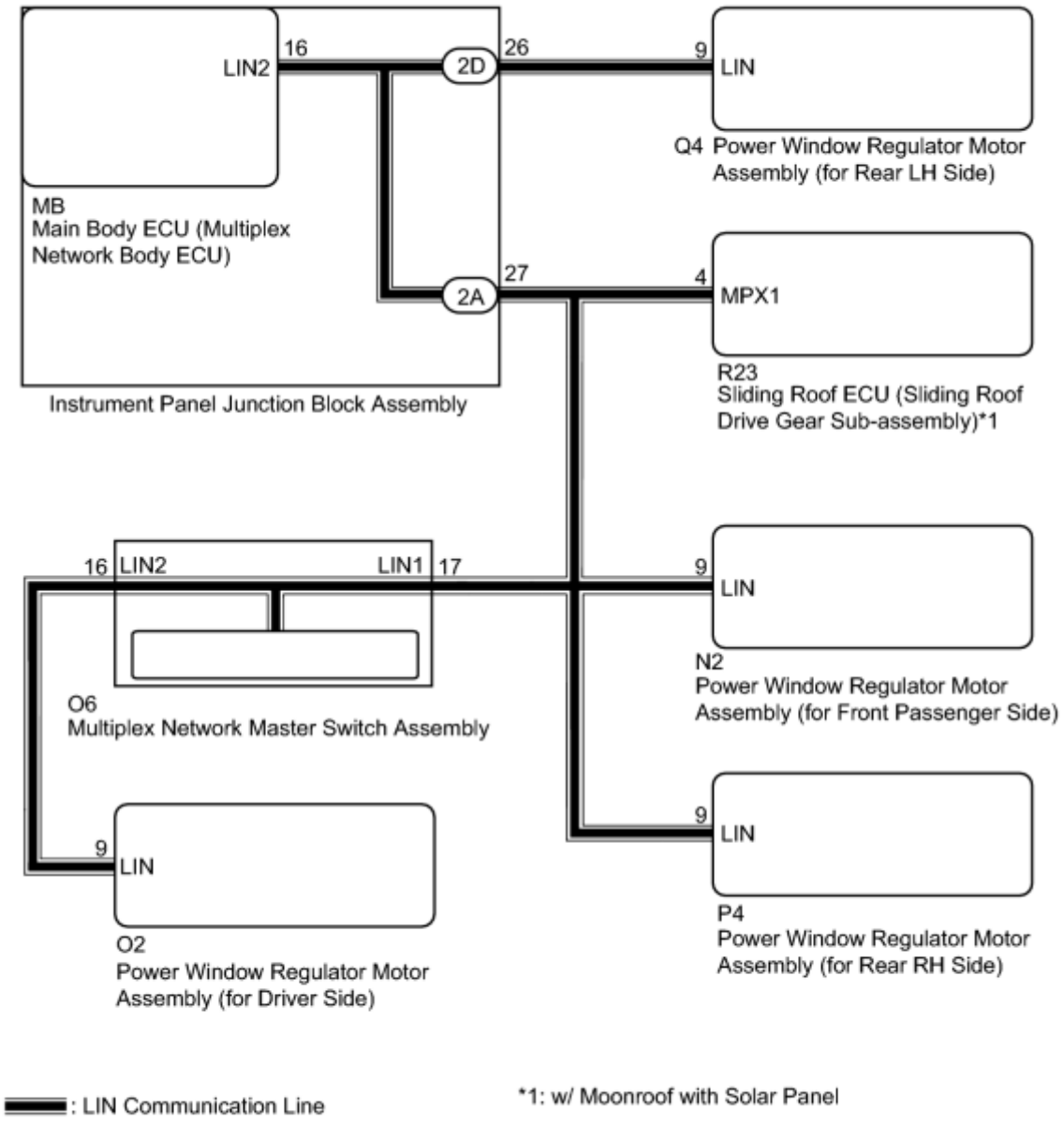
# DESCRIPTION

The main body ECU (multiplex network body ECU) monitors communication between all the ECUs connected to the door bus lines. When the main body ECU (multiplex network body ECU) detects errors in communication with all the ECUs connected to the door bus lines at 2.6-second intervals and 3 times in a row, DTC B2325 will be stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2325 | Main body ECU (multiplex network body ECU) detects errors in communication with the ECUs connected to the door bus lines 3 times in a row. | • Power window regulator motor assembly (for driver side)<br>• Power window regulator motor assembly (for front passenger side)<br>• Power window regulator motor assembly (for rear RH side)<br>• Power window regulator motor assembly (for rear LH side)<br>• Multiplex network master switch assembly<br>• Sliding roof ECU (sliding roof drive gear sub-assembly)*1<br>• Main body ECU (multiplex network body ECU)<br>• Instrument panel junction block assembly<br>• Wire harness or connector |

- *1: w/ Moonroof with Solar Panel

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

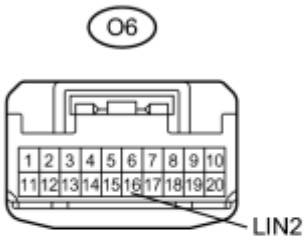
- When the sliding roof ECU (sliding roof drive gear assembly) is replaced or removed and reinstalled, it requires initialization INFO.
- When a power window regulator motor assembly is replaced or removed and reinstalled, it requires initialization INFO.
- When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

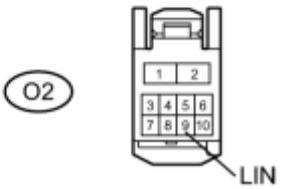
| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (POWER WINDOW REGULATOR MOTOR (DRIVER SIDE) - MASTER SWITCH) |

*1




(a) Disconnect the O6 multiplex network master switch connector.

*2




(b) Disconnect the O2 power window regulator motor (for driver side) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O6-16 (LIN2) - O2-9 (LIN) | Always | Below 1 Ω |
| O6-16 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Multiplex Network Master Switch Assembly) |
| *2 | Front view of wire harness connector |

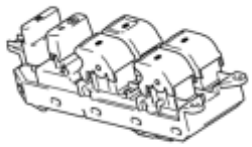
| | |
|---|---|
| | (to Power Window Regulator Motor Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

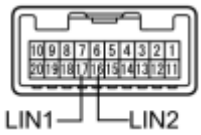
▼

| | |
|---|---|
| 2. | INSPECT MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY |



*1

(a) Remove the multiplex network master switch assembly INFO.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 16 (LIN2) - 17 (LIN1) | Always | Below 1 Ω |
| 16 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Multiplex Network Master Switch Assembly) |

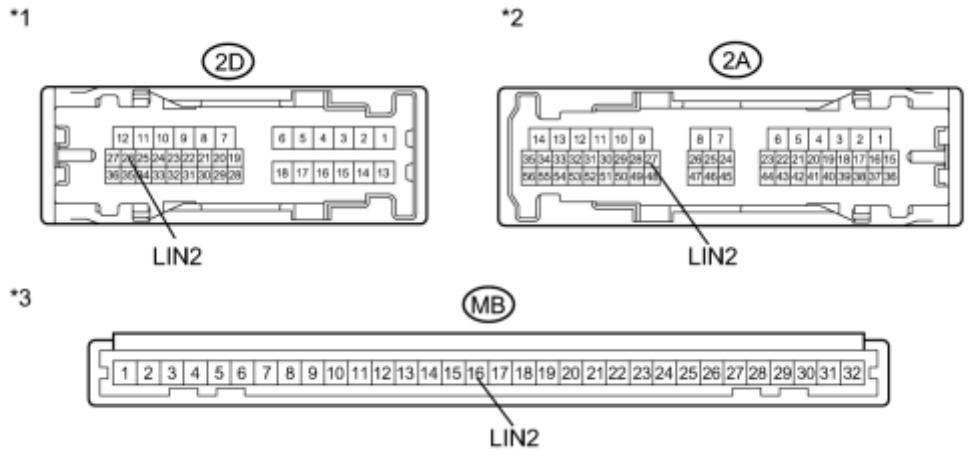
NG ▶ REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 3. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Remove the instrument panel junction block assembly INFO.




(b) Remove the main body ECU (multiplex network body ECU) from the instrument panel junction block assembly.

(c) Measure the resistance according to the value(s) in the table below.

HINT:

This inspection is to check the LIN line in the instrument panel junction block assembly that connects the wire harness to the built-in main body ECU (multiplex network body ECU).

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2D-26 (LIN2) - MB-16 (LIN2) | Always | Below 1 Ω |
| 2A-27 (LIN2) - MB-16 (LIN2) | Always | Below 1 Ω |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

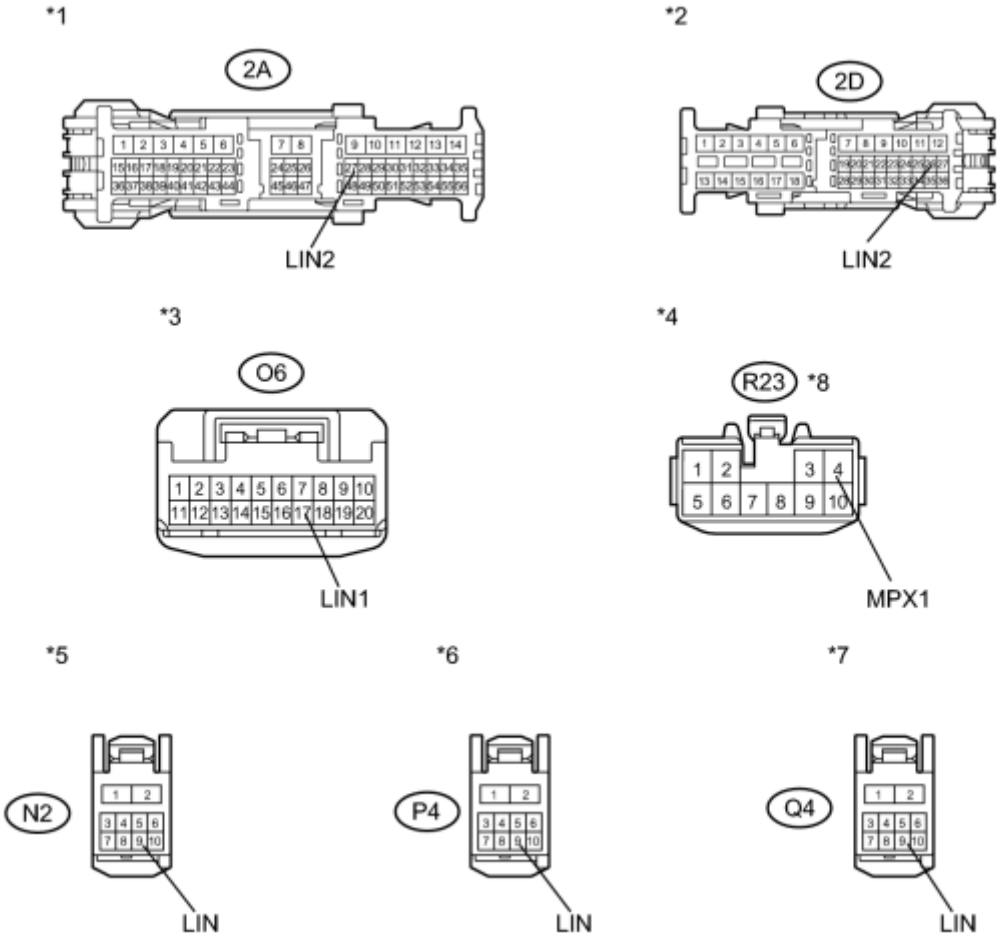
| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) | *2 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) |
| *3 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) | - | - |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (INSTRUMENT JUNCTION BLOCK - EACH ECU) |




(a) Disconnect the R23*1, N2, P4 and Q4 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2D-26 (LIN2) - Q4-9 (LIN) | Always | Below 1 Ω |
| 2A-27 (LIN2) - P4-9 (LIN) | Always | Below 1 Ω |
| 2A-27 (LIN2) - O6-17 (LIN1) | Always | Below 1 Ω |
| 2A-27 (LIN2) - N2-9 (LIN) | Always | Below 1 Ω |
| 2A-27 (LIN2) - R23-4 (LIN)*1 | Always | Below 1 Ω |
| 2D-26 (LIN2) - Body ground | Always | 10 kΩ or higher |
| 2A-27 (LIN2) - Body ground | Always | 10 kΩ or higher |

- *1 w/ Moonroof with Solar Panel

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block Assembly) | *2 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block Assembly) |
| *3 | Front view of wire harness connector<br><br>(to Multiplex Network Master Switch Assembly) | *4 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Driver Gear Sub-assembly)) |
| *5 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Front Passenger Side)) | *6 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear RH Side)) |
| *7 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear LH Side)) | *8 | w/ Moonroof with Solar Panel |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT (POWER WINDOW REGULATOR MOTOR ASSEMBLY (for REAR LH SIDE)) |

(a) Reconnect the O6, 2A, 2D, R23*1, P4, O2 and N2 connectors.

- *1: w/ Moonroof with Solar Panel

(b) Clear the DTC INFO.

(c) After 10 seconds have elapsed, check if the trouble occurs again.

(d) Check for DTCs again.

Result:

| Result | Proceed to |
|---|---|
| DTC B2325 is output | A |
| DTC B2325 is not output | B |

B ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for REAR LH SIDE)

A

▼

| | |
|---|---|
| 6. | CHECK DTC OUTPUT (MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY) |

(a) Reconnect the Q4 connector.

(b) Disconnect the O6 connector.

(c) Clear the DTC INFO.

(d) After 10 seconds have elapsed, check if the trouble occurs again.

(e) Check for DTCs again.

Result:

| Result | Proceed to |
|---|---|
| DTC B2325 is output | A |
| DTC B2325 is not output | B |

B REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY

A

| | |
|---|---|
| 7. | CHECK DTC OUTPUT (POWER WINDOW REGULATOR MOTOR ASSEMBLY (for REAR RH SIDE)) |

(a) Reconnect the O6 connector.

(b) Disconnect the P4 connector.

(c) Clear the DTC INFO.

(d) After 10 seconds have elapsed, check if the trouble occurs again.

(e) Check for DTCs again.

Result:

| Result | Proceed to |
|---|---|
| DTC B2325 is output | A |
| DTC B2325 is not output | B |

B REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for REAR RH SIDE)

A

| | |
|---|---|
| 8. | CHECK DTC OUTPUT (POWER WINDOW REGULATOR MOTOR ASSEMBLY (for DRIVER SIDE)) |

(a) Reconnect the P4 connector.

(b) Disconnect the O2 connector.

(c) Clear the DTC INFO.

(d) After 10 seconds have elapsed, check if the trouble occurs again.

(e) Check for DTCs again.

Result:

| Result | Proceed to |
|---|---|
| DTC B2325 is output | A |
| DTC B2325 is not output | B |

B REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for DRIVER SIDE)

A

| | |
|---|---|
| 9. | CHECK DTC OUTPUT (POWER WINDOW REGULATOR MOTOR ASSEMBLY (for FRONT PASSENGER SIDE)) |

(a) Reconnect the O2 connector.

(b) Disconnect the N2 connector.

(c) Clear the DTC INFO.

(d) After 10 seconds have elapsed, check if the trouble occurs again.

(e) Check for DTCs again.

Result:

| Result | Proceed to |
|---|---|
| DTC B2325 is output (w/ Moonroof with Solar Panel) | A |
| DTC B2325 is output (w/o Moonroof with Solar Panel) | B |
| DTC B2325 is not output | C |

C REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for FRONT PASSENGER SIDE)

B REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

A

| | |
|---|---|
| 10. | CHECK DTC OUTPUT (SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)) |

(a) Reconnect the N2 connector.

(b) Disconnect the R23 connector.

(c) Clear the DTC INFO.

(d) After 10 seconds have elapsed, check if the trouble occurs again.

(e) Check for DTCs again.

Result:

| Result | Proceed to |
|---|---|
| DTC B2325 is output | A |
| DTC B2325 is not output | B |

B REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

A **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| DTC | B2785 | Communication Malfunction between ECUs Connected by LIN |
|---|---|---|

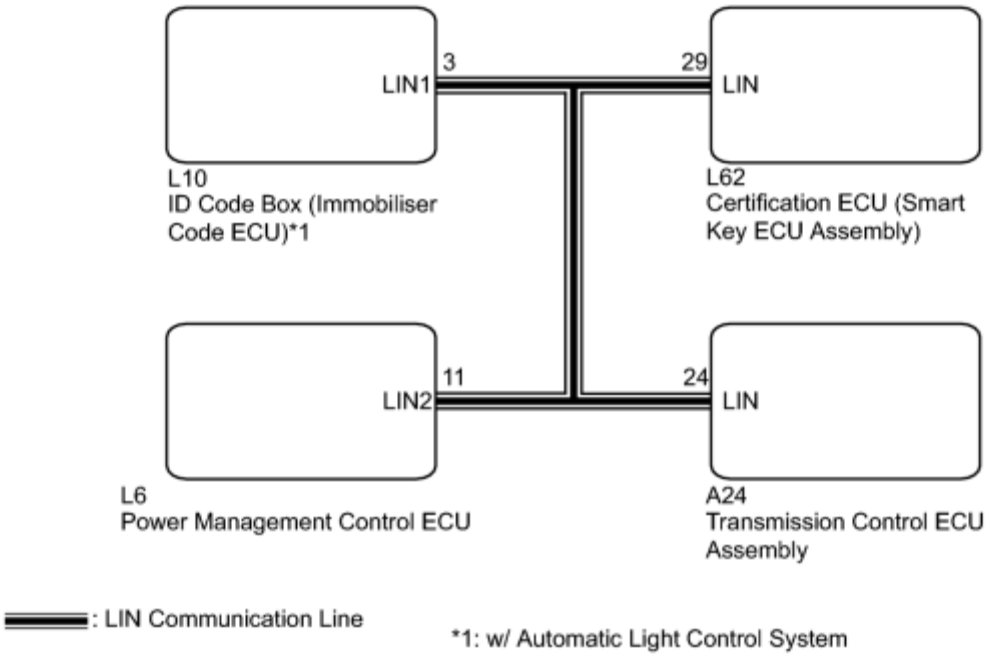
# DESCRIPTION

The certification ECU (smart key ECU assembly) monitors communication between all the ECUs connected to the certification bus lines. When the certification ECU (smart key ECU assembly) detects errors in communication with all the ECUs connected to the certification bus lines at a set interval and 3 times in a row, DTC B2785 will be stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2785 | • Errors in LIN communication between ECUs and an open or short in communication lines<br>• LIN communication from the certification ECU (smart key ECU assembly) detects errors in communication 3 times in a row. | • Certification ECU (smart key ECU assembly)<br>• Power management control ECU<br>• Transmission control ECU assembly<br>• ID code box (immobiliser code ECU)*1<br>• Wire harness or connector |

- *1: w/ Automatic Light Control System

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register the key.
- If the transmission control ECU assembly is replaced, register the ECU code.
- If the ID code box (immobiliser code ECU) is replaced, register the ECU code and ECU communication ID.
- When using the Techstream to troubleshoot with the power switch off:

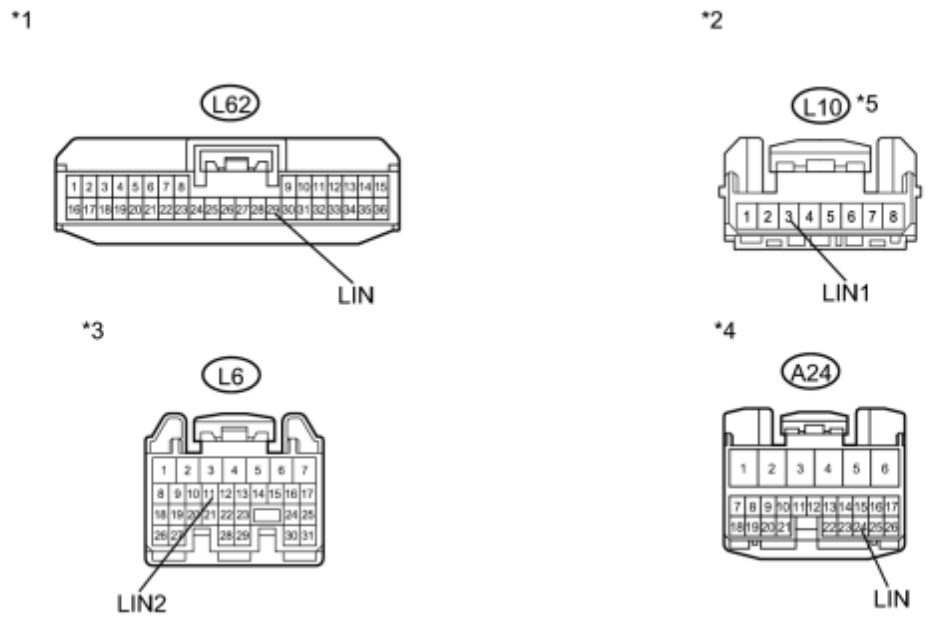
  Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - EACH ECU) |

(a) Disconnect the L62, L6, L10*1 and A24 connectors.

- *1: w/ Automatic Light Control System




(b) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-29 (LIN) - A24-24 (LIN) | Always | Below 1 Ω |
| L62-29 (LIN) - L6-11 (LIN2) | Always | Below 1 Ω |
| L62-29 (LIN) - L10-3 (LIN1)*1 | Always | Below 1 Ω |
| L62-29 (LIN) - Body ground | Always | 10 kΩ or higher |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-29 (LIN) - Body ground | Always | Below 1 V |

- *1: w/ Automatic Light Control System

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) | *2 | Front view of wire harness connector<br><br>(to ID code box (Immobiliser Code ECU)) |
| *3 | Front view of wire harness connector<br><br>(to Power Management Control ECU) | *4 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |
| *5 | w/ Automatic Light Control System | - | - |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (TRANSMISSION CONTROL ECU ASSEMBLY) |

(a) Reconnect the L62, L6 and L10*1 connectors.

- *1: w/ Automatic Light Control System

(b) Clear the DTC INFO.

(c) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC B2785 is output | A |
| DTC B2785 is not output | B |

B REPLACE TRANSMISSION CONTROL ECU ASSEMBLY

A

| | |
|---|---|
| 3. | CHECK DTC OUTPUT (POWER MANAGEMENT CONTROL ECU) |

(a) Reconnect the A24 connector.

(b) Disconnect the L6 connector.

(c) Clear the DTC INFO.

(d) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC B2785 is output (w/ Automatic Light Control System) | A |
| DTC B2785 is output (w/o Automatic Light Control System) | B |
| DTC B2785 is not output | C |

C REPLACE POWER MANAGEMENT CONTROL ECU

B REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

A

| | |
|---|---|
| 4. | CHECK DTC OUTPUT (ID CODE BOX (IMMOBILISER CODE ECU)) |

(a) Reconnect the L6 connector.

(b) Disconnect the L10 connector.

(c) Clear the DTC INFO.

(d) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC B2785 is output | A |
| DTC B2785 is not output | B |

B REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

A **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

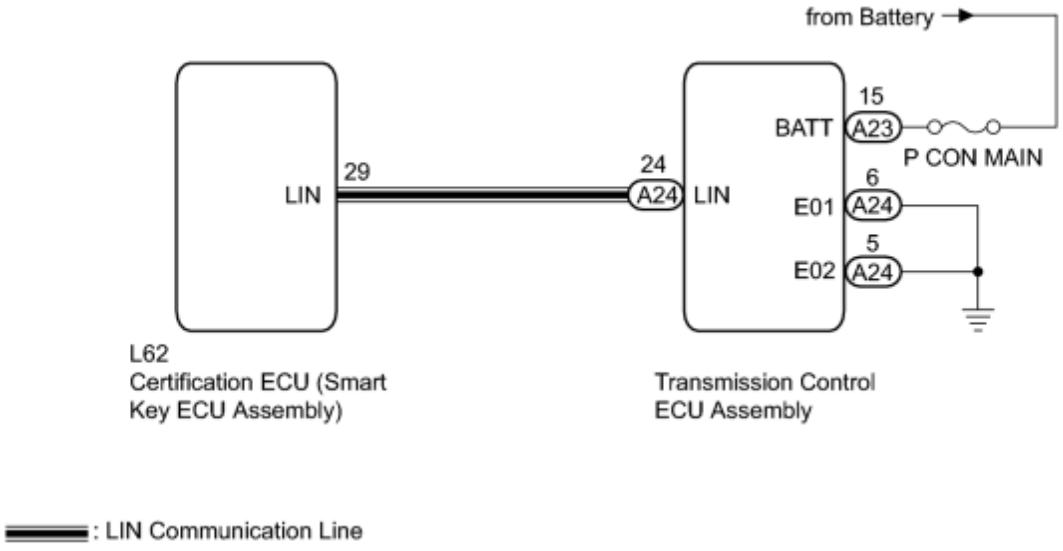
| DTC | B2786 | No Response from Steering Lock ECU |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the certification ECU (smart key ECU assembly) and transmission control ECU assembly stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2786 | No communication between transmission control ECU assembly and certification ECU (smart key ECU assembly) for 10 seconds or more. | • Transmission control ECU assembly<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector<br>• P CON MAIN fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

Although "No Response from Steering Lock ECU" is displayed on the Techstream, this message is shown if the certification ECU (smart key ECU assembly) cannot communicate with the transmission control ECU assembly.

NOTICE:

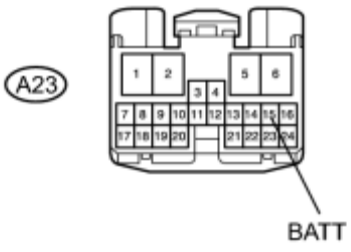
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- If the certification ECU (smart key ECU assembly) is replaced, register the key.
- If the transmission control ECU assembly is replaced, register the ECU code.
- When using the Techstream to troubleshoot with the power switch off:

  Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

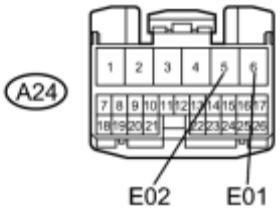
# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (TRANSMISSION CONTROL ECU ASSEMBLY - BATTERY AND BODY GROUND) |

*1




(a) Disconnect the A23 and A24 transmission control ECU assembly connectors.




(b) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A24-6 (E01) - Body ground | Always | Below 1 Ω |
| A24-5 (E02) - Body ground | Always | Below 1 Ω |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A23-15 (BATT) - Body ground | Power switch off | 11 to 14 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

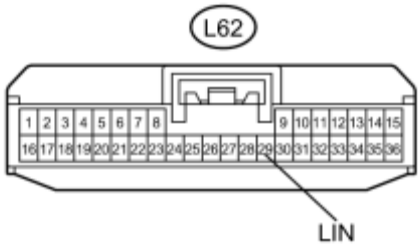
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

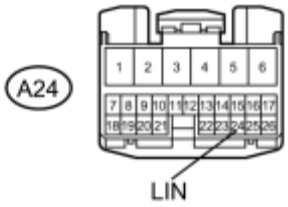
▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - TRANSMISSION CONTROL ECU ASSEMBLY) |

*1




*2




(a) Disconnect the L62 certification ECU (smart key ECU assembly) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-29 (LIN) - A24-24 (LIN) | Always | Below 1 Ω |
| L62-29 (LIN) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Transmission Control ECU Assembly) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | REPLACE TRANSMISSION CONTROL ECU ASSEMBLY |

(a) Replace the transmission control ECU assembly INFO.

NEXT

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B2786 is not output.

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK **END (TRANSMISSION CONTROL ECU ASSEMBLY WAS DEFECTIVE)**

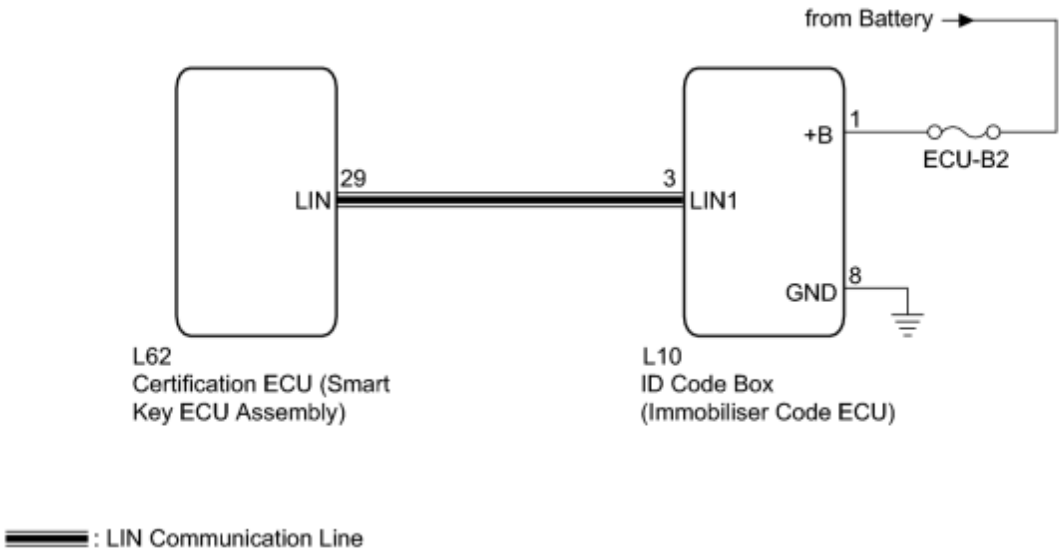
| DTC | B2789 | No Response from ID BOX |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the certification ECU (smart key ECU assembly) and ID code box (immobiliser code ECU) stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2789 | No communication between certification ECU (smart key ECU assembly) and ID code box (immobiliser code ECU) for 10 seconds or more. | • ID code box (immobiliser code ECU)<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector<br>• ECU-B2 fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

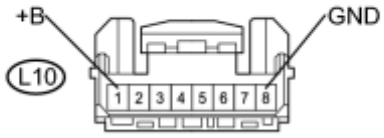
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- If the certification ECU (smart key ECU assembly) is replaced, register the key.
- If the ID code box (immobiliser code ECU) is replaced, register the ECU code and ECU communication ID.
- When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (ID CODE BOX - BATTERY AND BODY GROUND) |

*1




(a) Disconnect the L10 ID code box connector.

(b) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L10-8 (GND) - Body ground | Always | Below 1 Ω |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L10-1 (+B) - Body ground | Power switch off | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ID Code Box (Immobiliser Code ECU)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

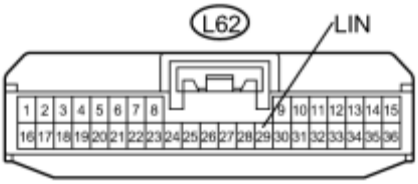
OK

▼

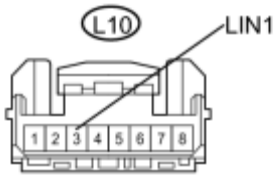
| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - ID CODE BOX) |

(a) Disconnect the L62 certification ECU (smart key ECU assembly) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-29 (LIN) - L10-3 (LIN1) | Always | Below 1 Ω |
| L62-29 (LIN) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to ID Code Box (Immobiliser Code ECU)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | REPLACE ID CODE BOX (IMMOBILISER CODE ECU) |

(a) Replace the ID code box (immobiliser code ECU) INFO.

NEXT

▼

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B2789 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (ID CODE BOX (IMMOBILISER CODE ECU) WAS DEFECTIVE)**

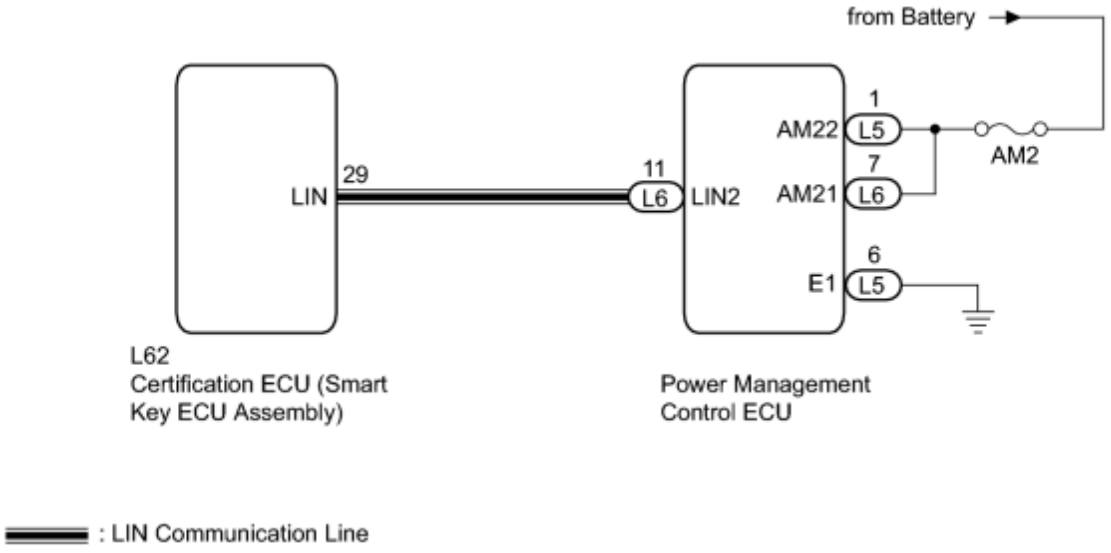
| DTC | B278C | Lost Communication with Power Source Control |
|---|---|---|

# DESCRIPTION

This DTC is stored when LIN communication between the certification ECU (smart key ECU assembly) and power management control ECU stops for 10 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B278C | No communication between the certification ECU (smart key ECU assembly) and power management control ECU for 10 seconds or more. | • Power management control ECU<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector<br>• AM2 fuse |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

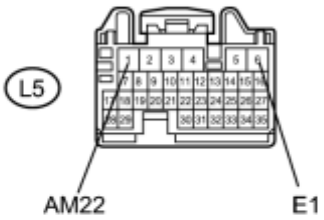
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- If the certification ECU (smart key ECU assembly) is replaced, register the key.
- When using the Techstream to troubleshoot with the power switch off:

Connect the Techstream to the DLC3, and turn the courtesy switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

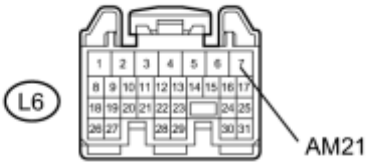
# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BATTERY AND BODY GROUND) |

*1




(a) Disconnect the L5 and L6 power management control ECU connectors.




(b) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-6 (E1) - Body ground | Always | Below 1 Ω |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-1 (AM22) - Body ground | Power switch off | 11 to 14 V |
| L6-7 (AM21) - Body ground | Power switch off | 11 to 14 V |

***Text in Illustration***

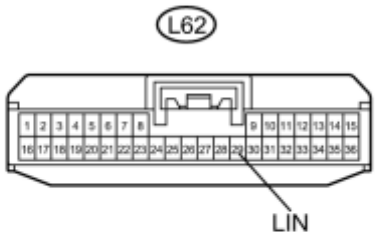
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

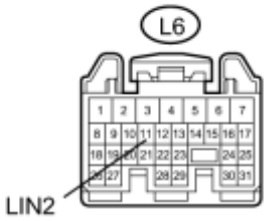
OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER MANAGEMENT CONTROL ECU) |

*1




*2




(a) Disconnect the L62 certification ECU (smart key ECU assembly) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-29 (LIN) - L6-11 (LIN2) | Always | Below 1 Ω |
| L62-29 (LIN) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | REPLACE POWER MANAGEMENT CONTROL ECU |

(a) Replace the power management control ECU INFO.

NEXT

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

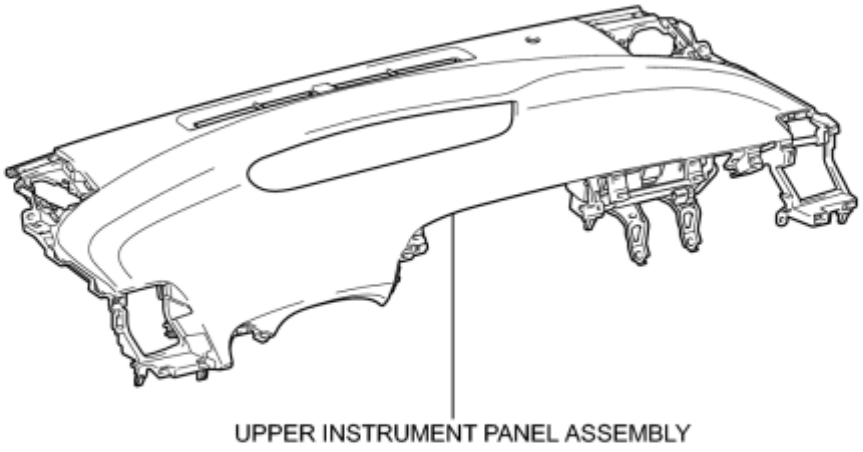
DTC B278C is not output.

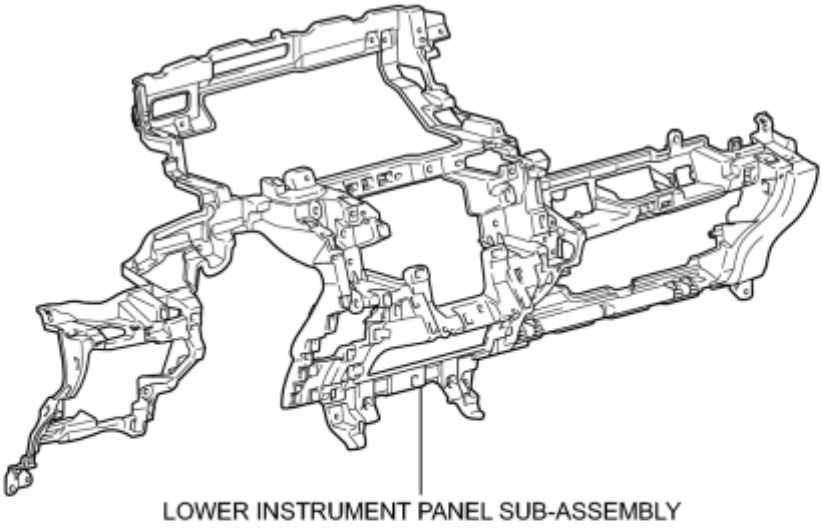
NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (POWER MANAGEMENT CONTROL ECU WAS DEFECTIVE)**

# COMPONENTS

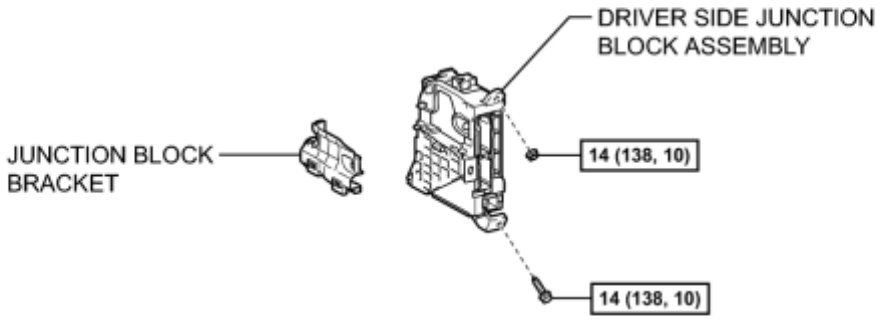
# ILLUSTRATION

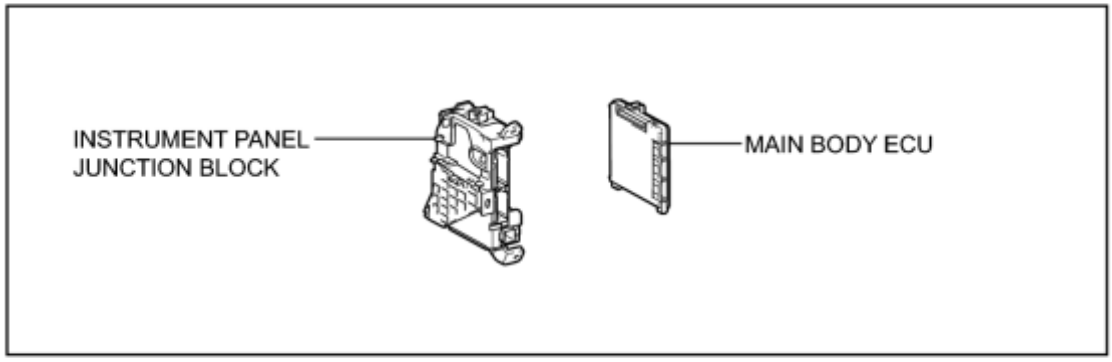



P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

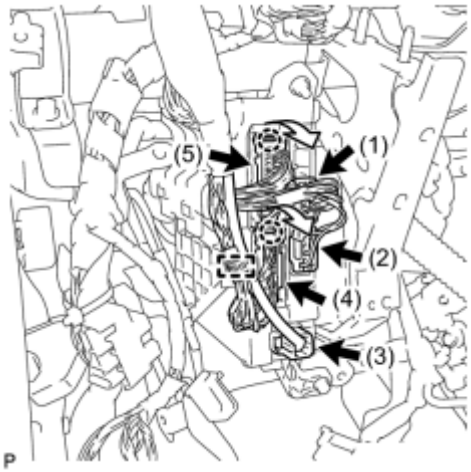
Refer to the procedure up to Remove Upper Instrument Panel Assembly INFO.

2. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY

HINT:

Refer to the procedure up to Remove Lower Instrument Panel Sub-assembly INFO.

3. REMOVE DRIVER SIDE JUNCTION BLOCK ASSEMBLY



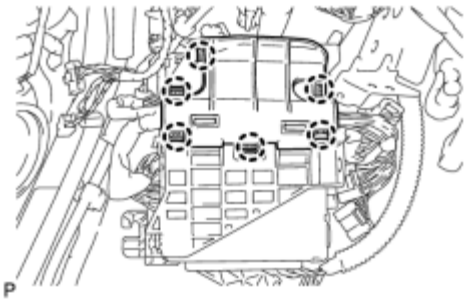

(a) Disengage the clamp and disconnect the wire harness.

(b) Disconnect the 3 connectors (1), (2) and (3).

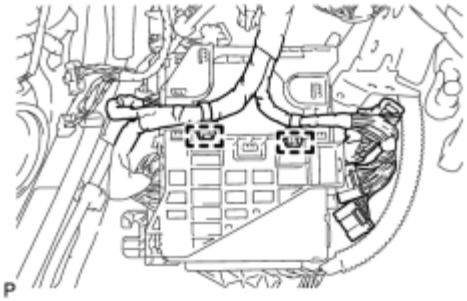
(c) Disengage the 2 claws and disconnect the 2 connectors (4) and (5) as shown in the illustration.

(d) Remove the bolt and nut, and disconnect the driver side junction block assembly.




(e) Disengage the 6 claws and remove the junction block bracket.



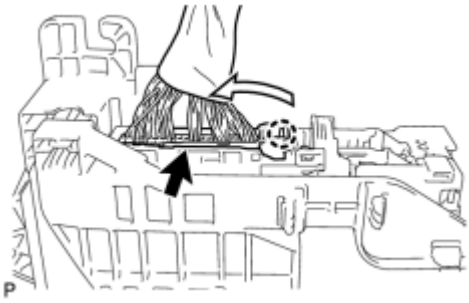

(f) Disengage the 2 clamps and disconnect the wire harness.




(g) Disengage the claw and disconnect the connector as shown in the illustration.

(h) Disengage the claw and release the connector lock as shown in the illustration.

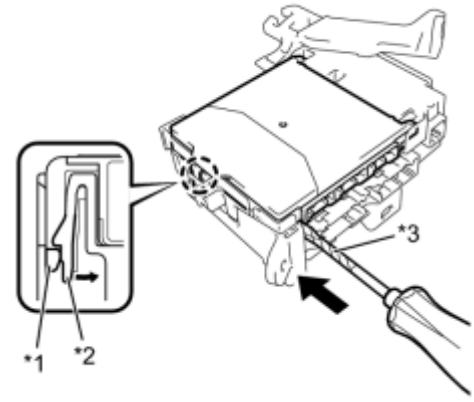




(i) Disengage the claw and disconnect the connector as shown in the illustration.

(j) Remove the driver side junction block assembly.

4. REMOVE MAIN BODY ECU




(a) Press the claw of the junction block as shown in the illustration to release the lock.

## Text in Illustration

| | |
|---|---|
| *1 | Main Body ECU |
| *2 | Driver Side Junction Block |
| *3 | Protective Tape |

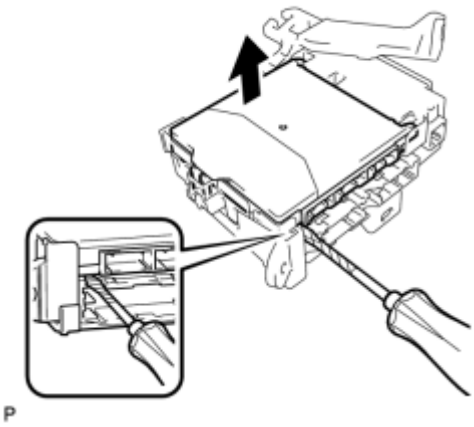
(b) With the junction block lock released, insert a screwdriver with its tip taped horizontally between the main body ECU and junction block.

NOTICE:

Use a screwdriver with a radius of between 5.0 mm (0.197 in.) and 6.3 mm (0.248 in.) and a length of approximately 90 mm (3.54 in.).

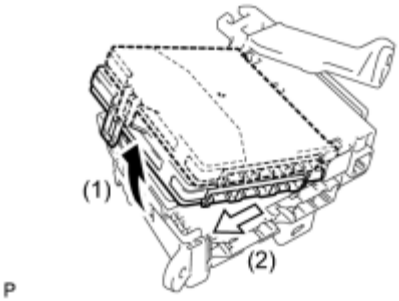
(c) Using the screwdriver, carefully raise the main body ECU up to the

position where the connector becomes disengaged.



NOTICE:

Do not twist the screwdriver to raise the multiplex network body ECU.




(d) Raise the main body ECU as shown by arrow (1), and then pull it out as shown by arrow (2) shown in the illustration.

NOTICE:

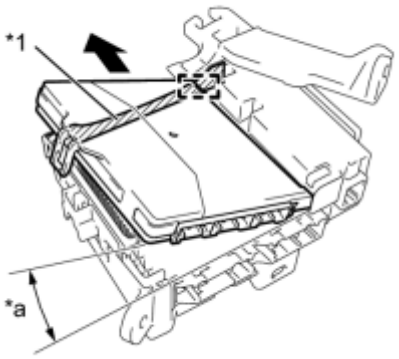
Do not touch the ECU connector.

# INSTALLATION

1. INSTALL MAIN BODY ECU

NOTICE:

- Make sure that no foreign objects get on the connecting surfaces.
- Do not touch the ECU connector.




P

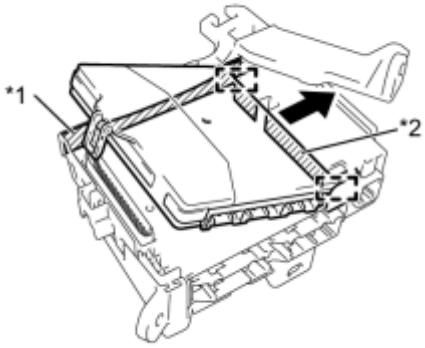
(a) Insert the main body ECU up to the position it contacts the housing sidewall of the guide as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Housing Sidewall |
| *a | 20° |

HINT:

Make sure to keep the angle 20° or more as shown in the illustration.

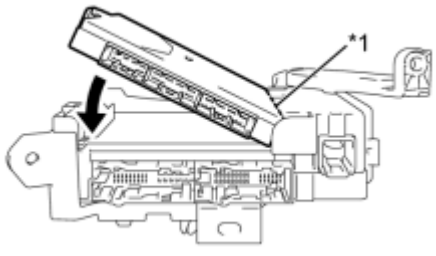



P

(b) Slide the guide of the main body ECU along the housing sidewall so that it contacts junction block fuses as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Housing Sidewall |
| *2 | Junction Block Fuse |



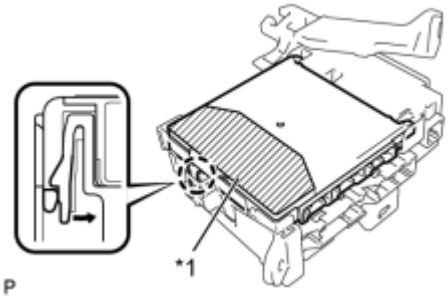

P

(c) While contacting the main body ECU to side A of the junction block (point of rotation), rotate it downward as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Side A Contact Portion |

(d) Press the push area until the claw engages to install the main body ECU.




## Text in Illustration

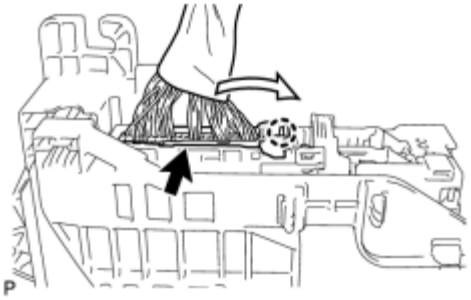
| | |
|---|---|
| *1 | Push Area |

- Make sure to press only the push area.
- Confirm the engagement of the main body ECU and junction block by listening for the lock sound.

  HINT:

  If a lock sound cannot be heard, visually check the lock part engagement. The engagement can also be confirmed if the main body ECU and junction block are flush.

2. INSTALL DRIVER SIDE JUNCTION BLOCK ASSEMBLY




(a) Engage the claw to install the connector as shown in the illustration.

NOTICE:

Be sure to engage each connector securely.




(b) Engage the claw to lock the connector lock as shown in the illustration.

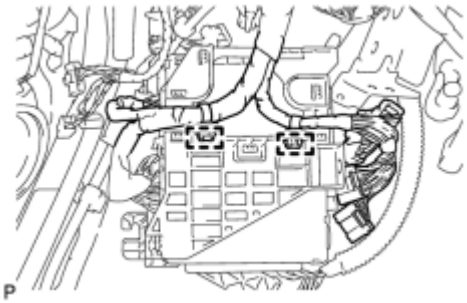


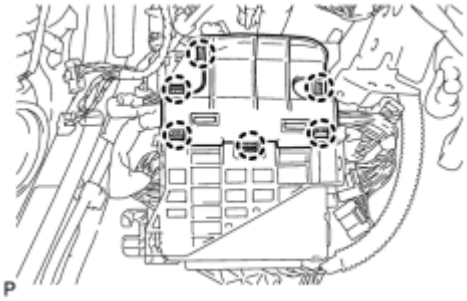

(c) Engage the claw to connect the connector as shown in the illustration.

NOTICE:

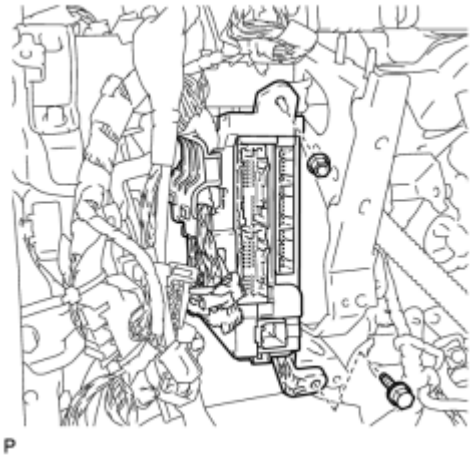
Be sure to engage each connector securely.

(d) Engage the 2 clamps to connect the wire harness.



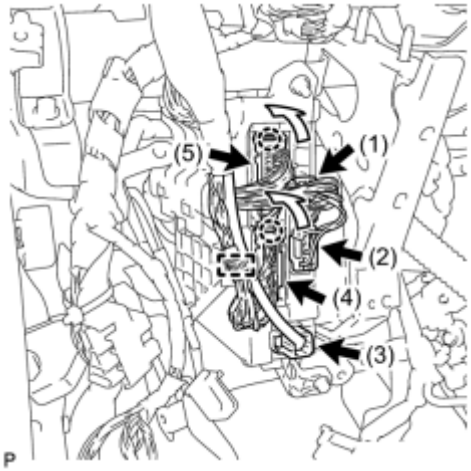


(e) Engage the 6 claws to install the junction block cover.



(f) Install the driver side junction block assembly with the bolt and nut.

Torque: **14 N·m (138 kgf·cm, 10ft·lbf)**




(g) Engage the 2 claws to connect the 2 connectors (5) and (4) as shown in the illustration.

NOTICE:

Be sure to engage each connector securely.

(h) Connect the 3 connectors (3), (2) and (1) as shown in the illustration.

NOTICE:

Be sure to engage each connector securely.

(i) Engage the clamp to connect the wire harness.

3. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY

HINT:

Refer to the procedure from Install Lower Instrument Panel Sub-assembly INFO.

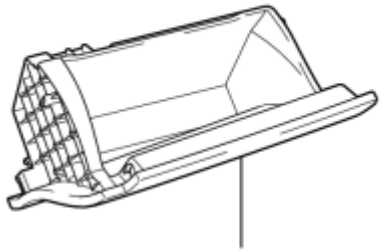
4. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

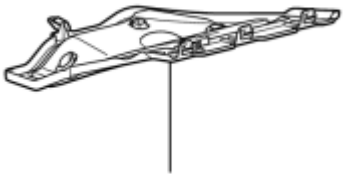
Refer to the procedure from Install Upper Instrument Panel Assembly INFO.

# COMPONENTS

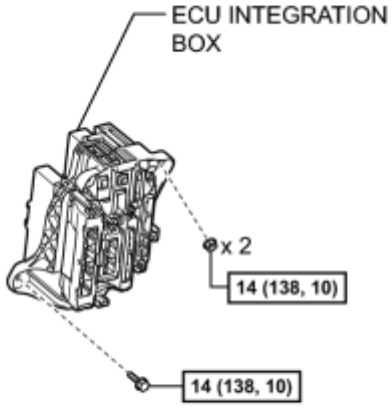
# ILLUSTRATION



GLOVE COMPARTMENT DOOR ASSEMBLY



NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




P

# REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

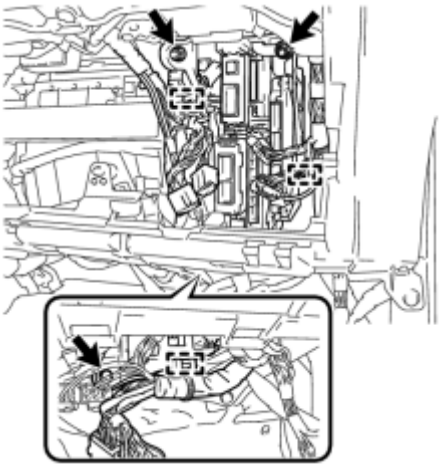
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

2. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

3. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO

4. REMOVE ECU INTEGRATION BOX

(a) Disconnect each connector.

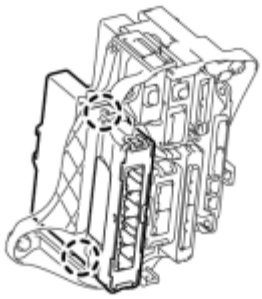


P

(b) Disengage the 3 clamps and disconnect the wire harness.

(c) Remove the bolt, 2 nuts and ECU integration box.

5. REMOVE POWER MANAGEMENT CONTROL ECU

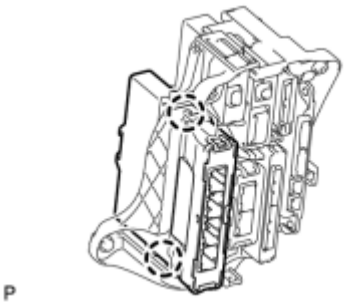


P

(a) Disengage the 2 claws and remove the power management control ECU.

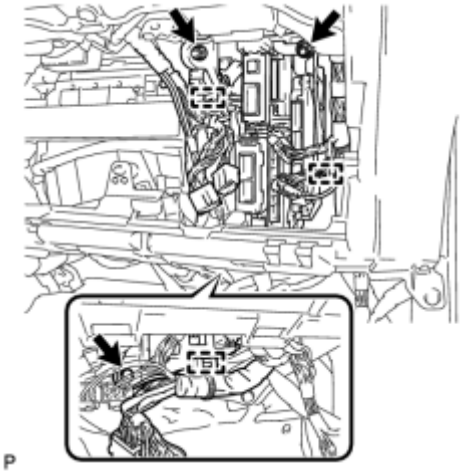
# INSTALLATION

1. INSTALL POWER MANAGEMENT CONTROL ECU



(a) Engage the 2 claws to install the power management control ECU.

2. INSTALL ECU INTEGRATION BOX



(a) Install the ECU integration box with the 2 nuts and bolt.

Torque: **14 N·m (138 kgf·cm, 10ft·lbf)**

(b) Engage the 3 clamps to connect the wire harness.

(c) Connect each connector.

3. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

4. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

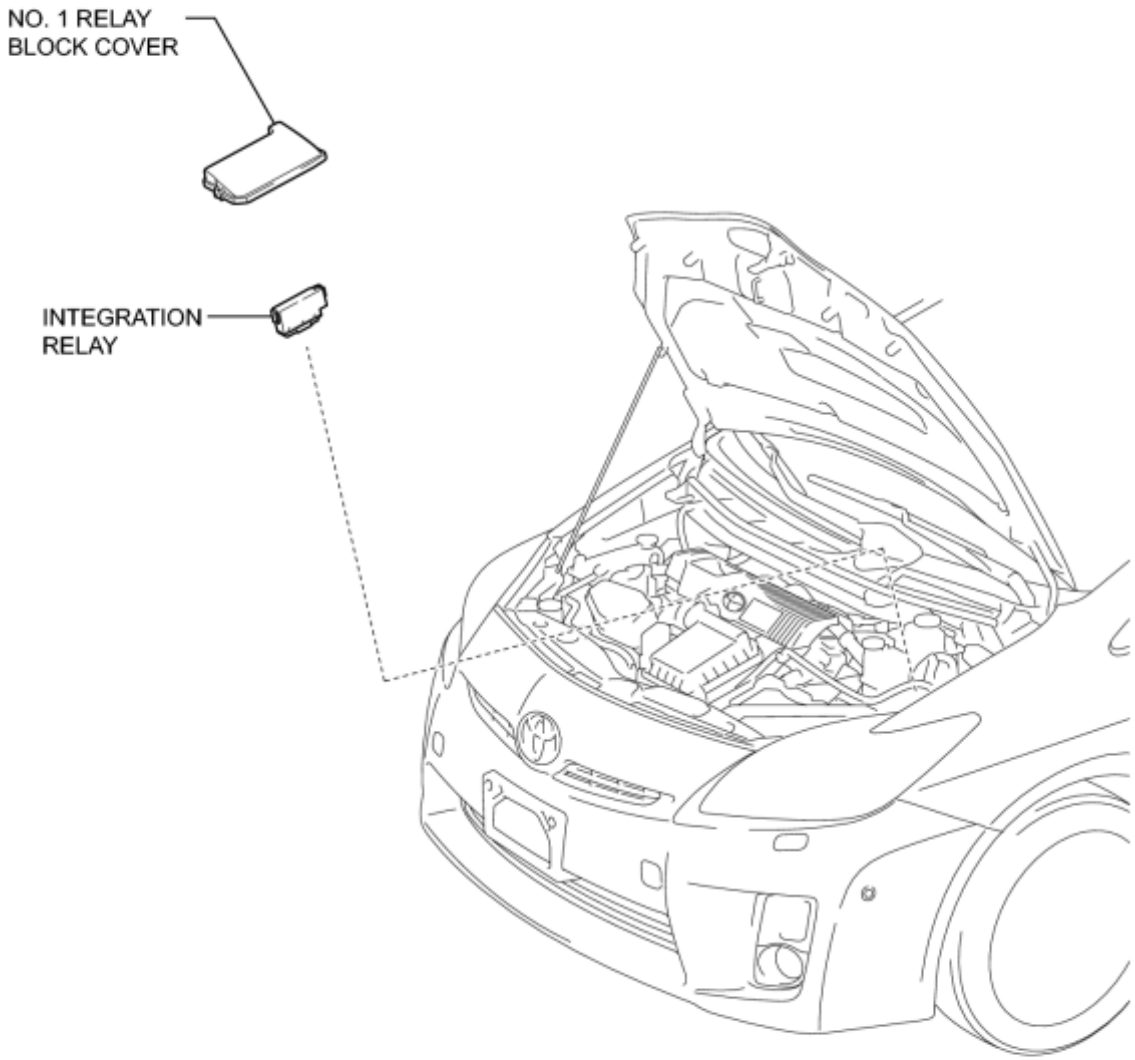
5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

# COMPONENTS

# ILLUSTRATION




P

# ON-VEHICLE INSPECTION

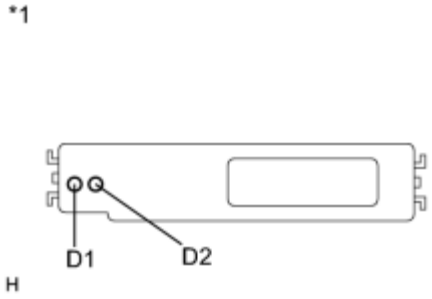
1. INSPECT INTEGRATION NO.1 RELAY

(a) Diagnosis Terminal

(1) Measure the voltage according to the value(s) in the table below.

Standard Voltage :

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D1 - Body ground | Always | 3.5 to 5.0 V |
| D2 - Body ground | Always | 3.5 to 5.0 V |




## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Integration Relay) |

If the result is not as specified, one of the electrical load connected to the integration relay may be malfunctioning.

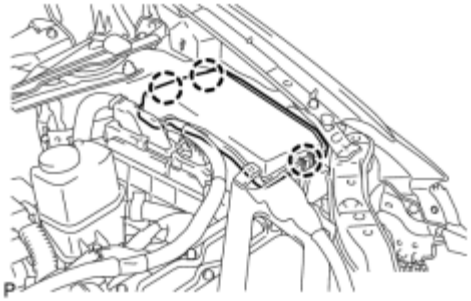
# REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

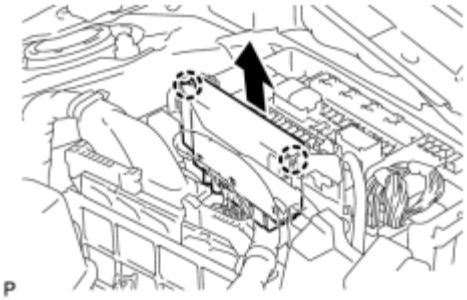
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

2. REMOVE NO. 1 RELAY BLOCK COVER

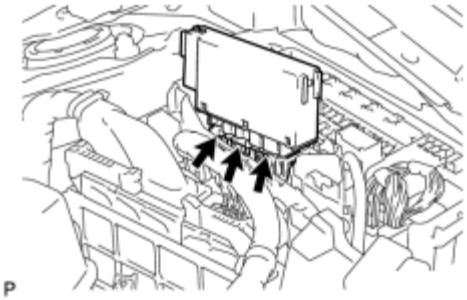


(a) Disengage the 3 claws and remove the No. 1 relay block cover.

3. REMOVE INTEGRATION NO.2 RELAY



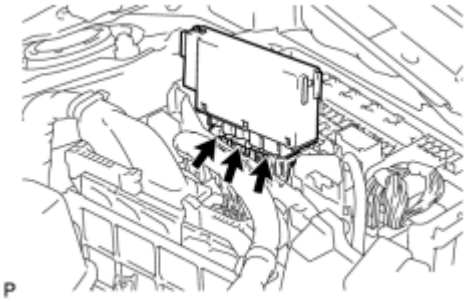
(a) Disengage the 2 claws and pull up the integration relay as shown in the illustration.



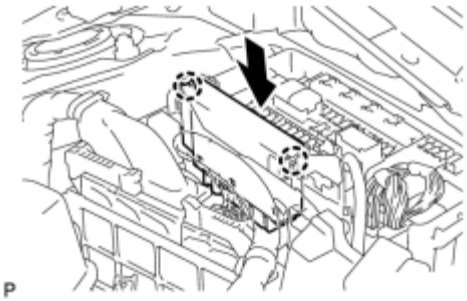
(b) Disconnect the 3 connectors and remove the integration relay.

# INSTALLATION

1. INSTALL INTEGRATION NO.2 RELAY

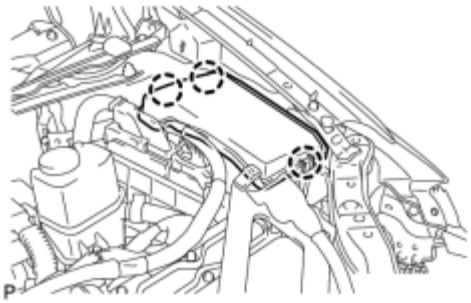


(a) Connect the 3 connectors.



(b) Engage the 2 claws to install the integration relay as shown in the illustration.

2. INSTALL NO. 1 RELAY BLOCK COVER



(a) Engage the 3 claws to install the No. 1 relay block cover.

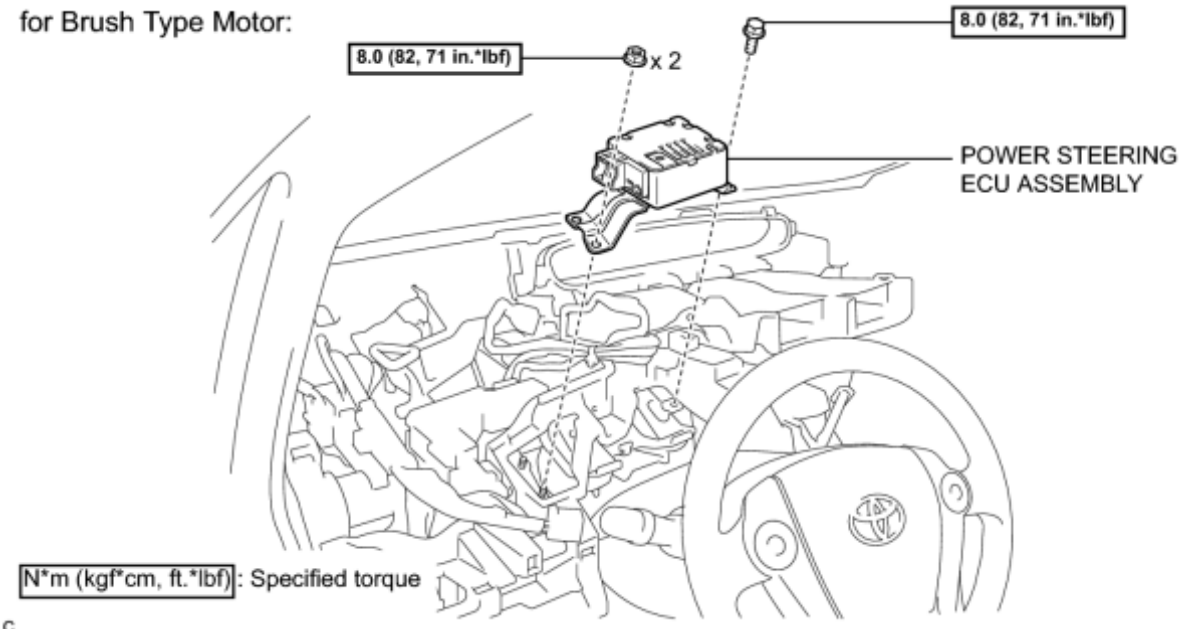
3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

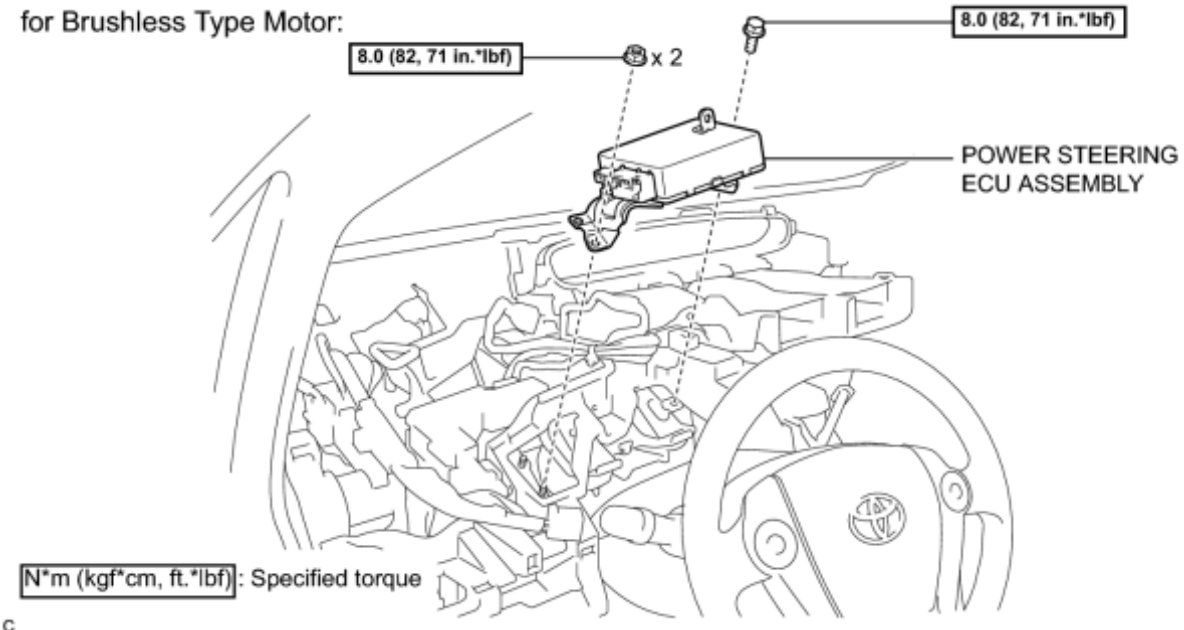
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION




c

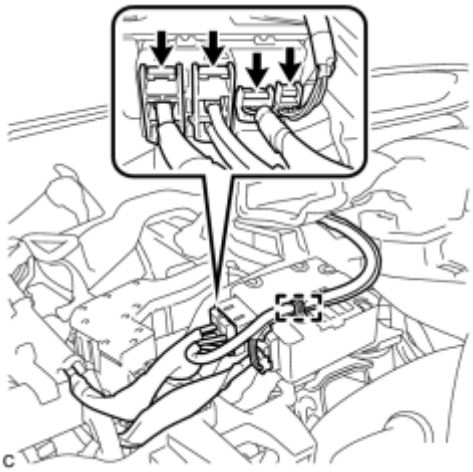
# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL

HINT:

Refer to the instructions for Removal of the upper instrument panel INFO.

2. REMOVE POWER STEERING ECU ASSEMBLY (for Brush Type Motor)



(a) Disengage the wire harness clamp from the power steering ECU assembly.

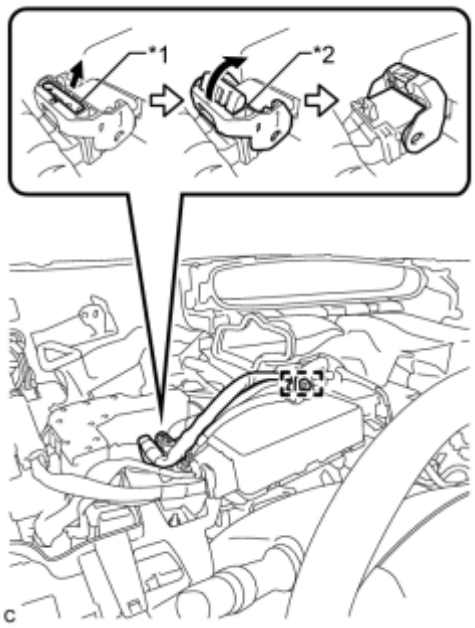
(b) Disconnect the 4 connectors from the power steering ECU assembly.



(c) Remove the bolt, 2 nuts, and the power steering ECU assembly.

3. REMOVE POWER STEERING ECU ASSEMBLY (for Brushless Type Motor)

(a) Disengage the wire harness clamp from the power steering ECU assembly.



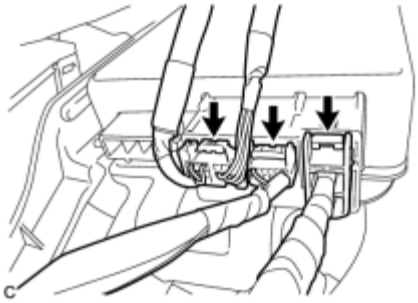

## Text in Illustration

| | |
|---|---|
| *1 | Lock of the Lock Lever |
| *2 | Lock Lever |

(b) Disconnect the connector from the power steering ECU assembly.

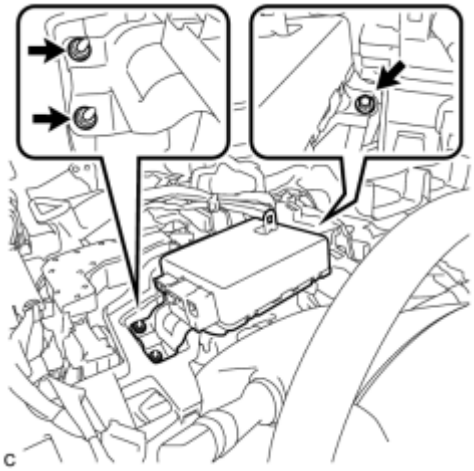
HINT:

As shown in the illustration, pull out the lock of the lock lever and turn the lock lever to disconnect the connector.




(c) Disconnect the 3 connectors from the power steering ECU assembly.

(d) Remove the bolt, 2 nuts, and the power steering ECU assembly.


C

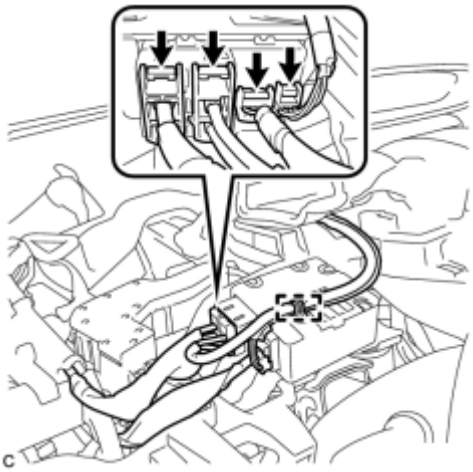
# INSTALLATION

1. INSTALL POWER STEERING ECU ASSEMBLY (for Brush Type Motor)



(a) Install the power steering ECU assembly with the bolt and 2 nuts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**



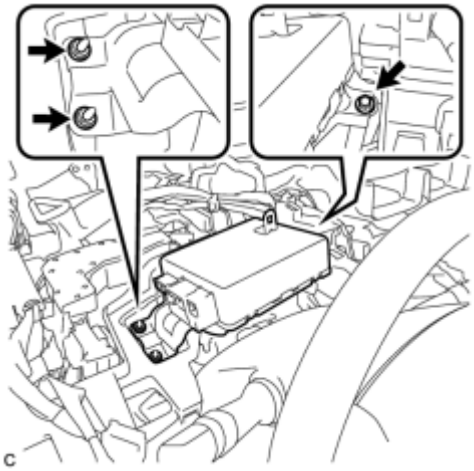
(b) Connect the 4 connectors to the power steering ECU assembly.

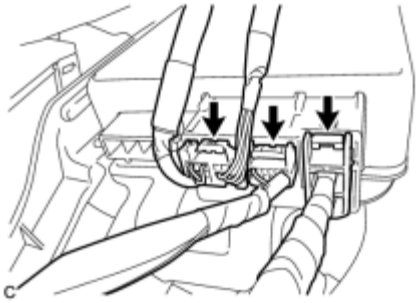
(c) Engage the wire harness clamp to the power steering ECU assembly.

2. INSTALL POWER STEERING ECU ASSEMBLY (for Brushless Type Motor)

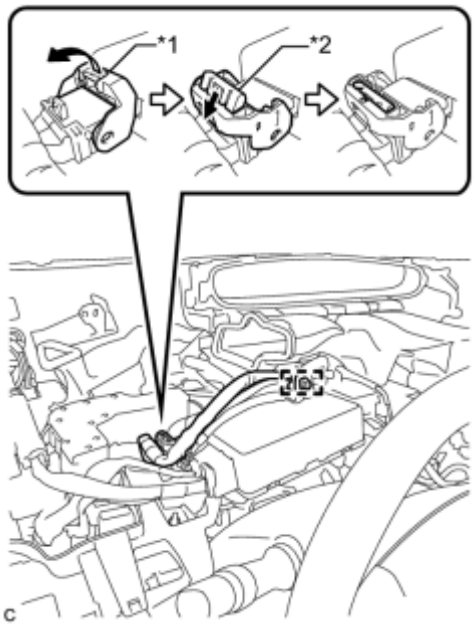
(a) Install the power steering ECU assembly with the bolt and 2 nuts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**





(b) Connect the 3 connectors to the power steering ECU assembly.




(c) Connect the connector to the power steering ECU assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Lock Lever |
| *2 | Lock of the Lock Lever |

HINT:

As shown in the illustration, return the lock lever to its original position to connect the connector and securely push in the lock of the lock lever.

(d) Engage the wire harness clamp to the power steering ECU assembly.

3. INSTALL UPPER INSTRUMENT PANEL

HINT:

Refer to the instructions for Installation of the upper instrument panel INFO.

4. TORQUE SENSOR ZERO POINT CALIBRATION (for Brush Type Motor)

(a) Perform the torque sensor zero point calibration INFO.

5. ASSIST MAP WRITING (for Brush Type Motor)

(a) Perform assist map writing INFO.

6. ROTATION ANGLE SENSOR INITIALIZATION AND TORQUE SENSOR ZERO POINT CALIBRATION (for Brushless Type Motor)

(a) Clear the rotation angle sensor calibration value, initialize the rotation angle sensor, and calibrate the torque sensor zero point INFO.

7. ASSIST MAP WRITING (for Brushless Type Motor)

(a) Perform assist map writing INFO.

# PRECAUTION

1. DETERMINING POWER STEERING SYSTEM TYPE

(a) Two types of power steering system are available for this model. A different type of motor is used for each system; a brushless type motor and a brush type motor. Refer to the table below to determine which type of motor is used.

***Types***

| Type of Motor | Model |
|---|---|
| Brushless Type Motor | Mexico package models and models with 215/45R17 tires |
| Brush Type Motor | Other than those above |

2. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTICE:

When disconnecting the battery negative (-) cable, initialize the following system after the cable is reconnected:

| System | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

3. HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

(a) The vehicle is equipped with a Supplemental Restraint System (SRS). Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident.

Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System INFO.

4. PRECAUTIONS FOR REMOVAL, INSTALLATION AND REPLACEMENT OF ELECTRONIC POWER STEERING COMPONENTS

(a) Be sure to align the front wheels straight ahead when removing and installing the power steering gear assembly.

(b) When disconnecting the No. 2 steering intermediate shaft assembly, be sure to place matchmarks before starting the operation.

(c) After replacing the steering column assembly or power steering ECU, calibrate the torque sensor zero point INFO.

5. HANDLING PRECAUTION

(a) When handling electronic parts:

(1) Avoid any impact to parts such as ECUs and relays. Replace them with new ones if dropped or subjected to a severe blow.

(2) Do not expose to high temperatures or humidity.

(3) In order to prevent deformation or malfunctions due to static electricity, do not touch the connector terminals.

(b) When handling the power steering ECU:

(1) When the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.

(c) When handling the steering column assembly:

(1) Avoid any impact to the steering column assembly, especially to the motor and torque sensor. Replace them with new ones if dropped or subjected to a severe blow.

(2) Do not pull the wire harness when moving the steering column assembly.

(3) When the steering column assembly has been replaced, perform the torque sensor zero point calibration after initializing the torque sensor zero point INFO.

(d) When disconnecting and reconnecting the connectors:

(1) Before disconnecting the connectors related to the power steering system, turn the power switch on (IG), center the steering wheel, turn the power switch off, and then disconnect the connectors.

(2) Before reconnecting the connectors related to the power steering system, ensure that the power switch is off. Then center the steering wheel and turn the power switch on (IG).

NOTICE:

Do not turn the power switch on (IG) when the steering wheel is not centered.

(3) If the above operations are not carried out properly, the steering center point (zero point) will deviate, which may lead to a difference in steering effort between turning right and left. If there is a difference in steering effort between turning right and left, perform the torque sensor zero point calibration after initializing the torque sensor zero point INFO.

6. PRECAUTIONS FOR CAN COMMUNICATION

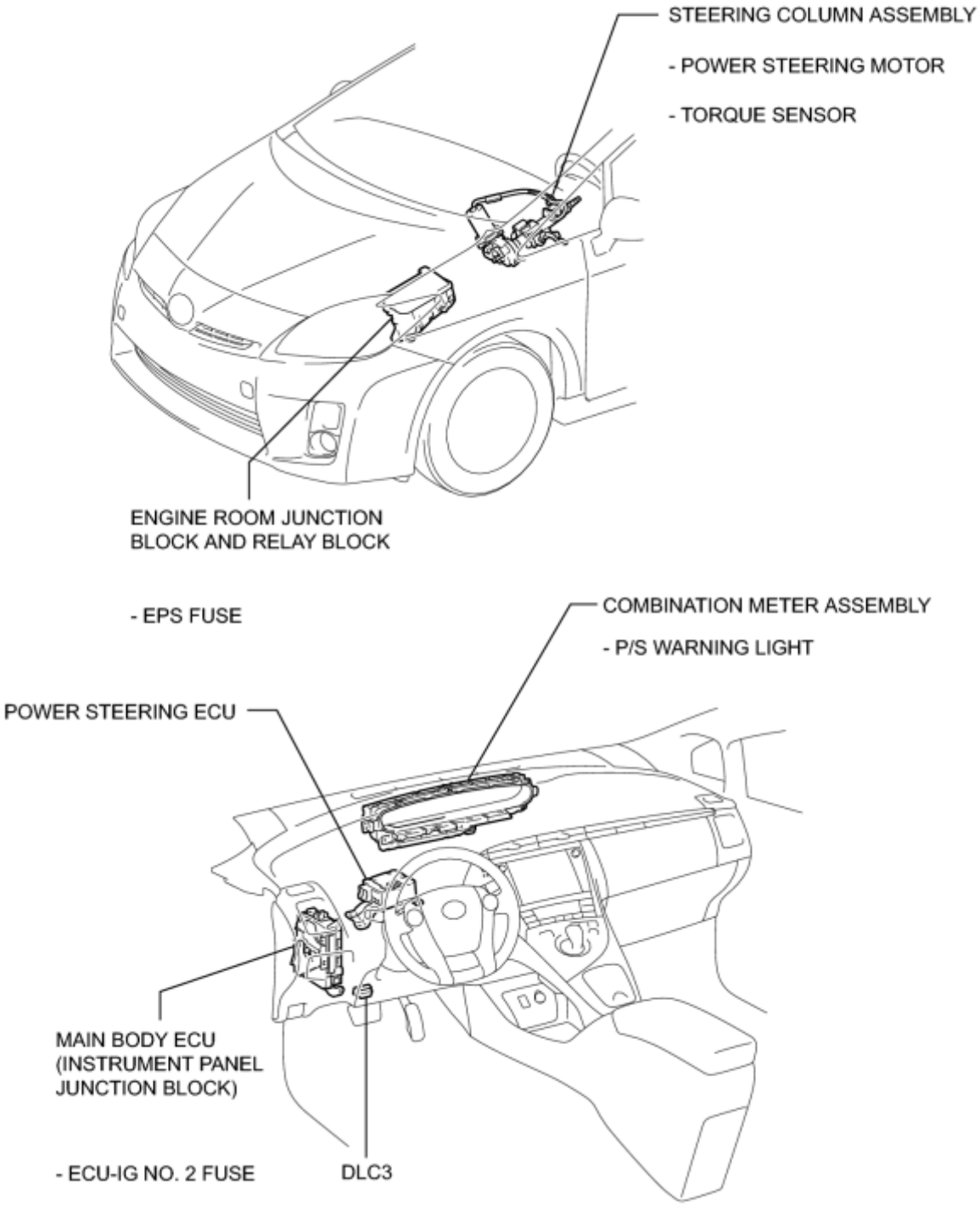
(a) CAN communication lines are used to receive information from the skid control ECU and the power management control ECU, and to transmit warnings to the combination meter. When there are any problems in the CAN communication lines, DTCs of the CAN communication line are output.

(b) Perform troubleshooting of the communication line problems when the CAN communication DTCs are output. Be sure to start troubleshooting on the electronic power steering system after confirming that the CAN communication system is normal.

(c) Since the CAN communication line has its own length and route, it cannot be temporarily repaired with a bypass wire, etc.

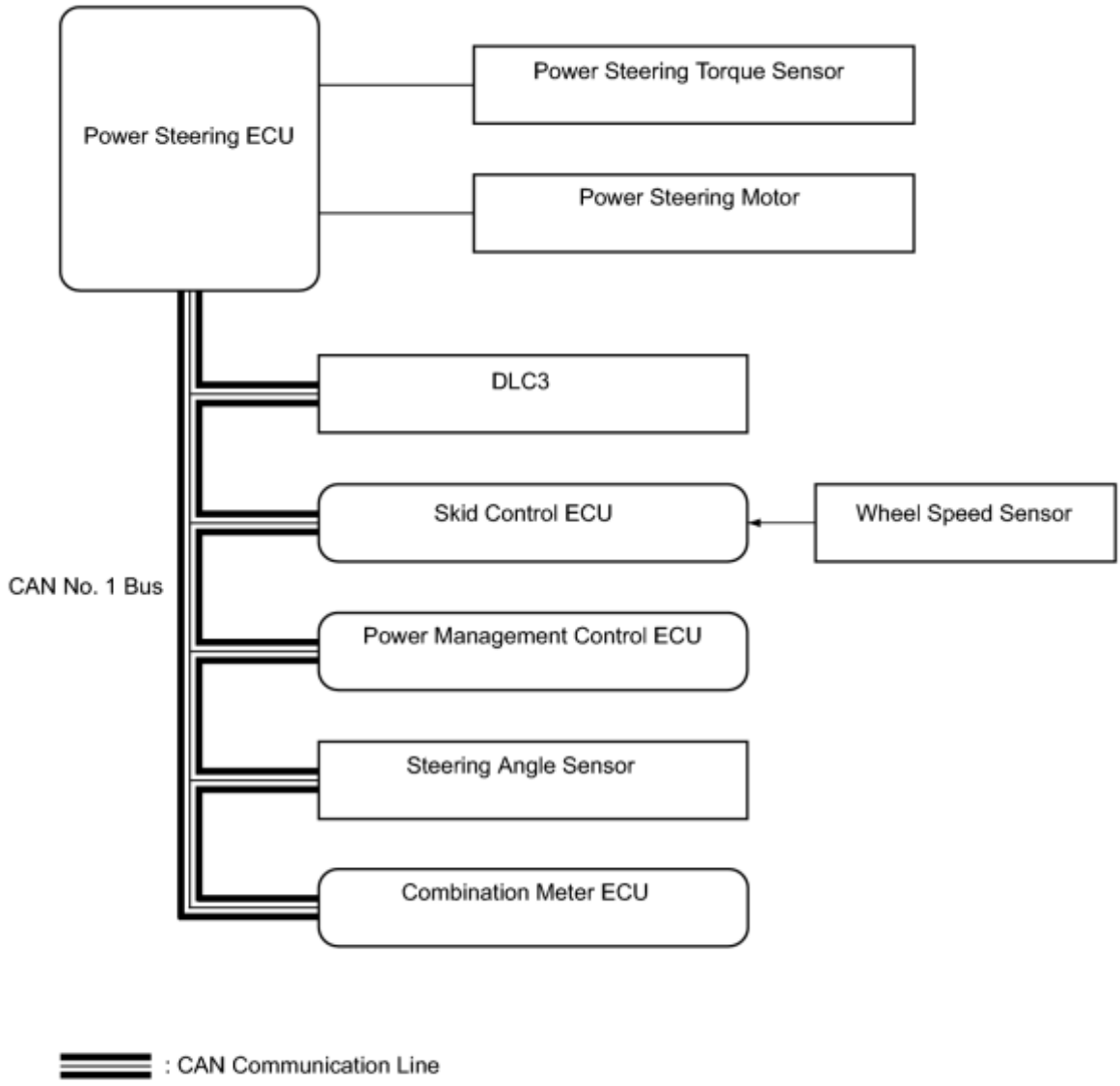
# PARTS LOCATION

# ILLUSTRATION




P

# SYSTEM DIAGRAM



# SYSTEM DESCRIPTION

1. DESCRIPTION

The power steering system generates torque through the operation of the motor and the reduction gear installed on the column shaft in order to assist steering effort.

The power steering ECU determines the direction and the amount of assisting power in accordance with the vehicle speed signals and signals from the torque sensor built into the steering column assembly. As a result, steering effort is controlled to be light during low speed driving and moderately high during high speed driving.

(a) Power steering ECU:

The power steering ECU calculates assisting power based on steering torque signals from the torque sensor and vehicle speed signals from the skid control ECU.

(b) Torque sensor:

The torque sensor detects the steering effort generated when the steering wheel is turned and converts it to an electrical signal.

(c) Power steering motor:

The power steering motor is activated by the current from the power steering ECU and generates torque to assist the steering effort.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the power steering system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 3. | CHECK DTC AND FREEZE FRAME DATA* |

HINT:

Refer to Clear DTCs INFO.

NEXT

| | |
|---|---|
| 4. | PROBLEM SYMPTOM CONFIRMATION |

Result:

| Result | Proceed to |
|---|---|
| Symptom does not occur. | A |
| Symptom occurs. | B |

B Go to step 6

A

| | |
|---|---|
| 5. | SYMPTOM SIMULATION |

NEXT

| | |
|---|---|
| 6. | CHECK CAN COMMUNICATION SYSTEM* |

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| CAN system DTC is not output | A |
| CAN system DTC is output | B |

HINT:

- If any CAN communication system DTCs are output, perform troubleshooting on the CAN communication system first.
- If communication to the power steering ECU cannot be established through the Techstream, inspect terminals CANH and CANL of the DLC3 and the power steering ECU, and the IG circuit of the power steering ECU.

B INFO PROCEED TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 7. | CHECK FOR DTC* |

(a) Check for DTCs INFO.

HINT:

Refer to Diagnostic Trouble Code Chart when any DTCs are output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B Go to step 9

A

| | |
|---|---|
| 8. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in problem symptoms table | A |
| Fault is listed in problem symptoms table | B |

B Go to step 9

A

| | |
|---|---|
| 9. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Refer to Terminals of ECU INFO.

(b) Refer to Data List / Active Test INFO.

NEXT

| | |
|---|---|
| 10. | REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 11. | CONFIRMATION TEST |

NEXT **END**

# CALIBRATION

1. TORQUE SENSOR ZERO POINT CALIBRATION

NOTICE:

Perform the torque sensor zero point calibration if any of the following conditions occur:

- The steering column assembly (containing the torque sensor) has been replaced.
- The power steering ECU has been replaced.
- There is a difference in steering effort between turning right and left.

HINT:

When torque sensor zero point calibration is performed, the assist map is written automatically at the same time.

(a) Inspection before calibration.

(1) Turn the power switch off.

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Turn the Techstream on.

(5) Calibrate the power steering ECU. Enter the following menus: Chassis / EMPS / Data List.

(6) Check the values by referring to the table below.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| IG Power Supply | ECU power source voltage/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (IG) |

Standard voltage:

11 to 14 V

NOTICE:

If the IG power supply voltage is 9 V or less, calibration cannot be performed. In this case, charge or replace the battery, and then perform calibration.

(b) Perform the torque sensor zero point calibration.

NOTICE:

If DTC C1516 (Torque Sensor Zero Point Adjustment Incomplete) is stored, the torque sensor zero point cannot be calibrated. Clear the DTC before starting calibration.

(1) Set the steering wheel to the center point and align the front wheels straight ahead.

(2) Turn the power switch off.

(3) Connect the Techstream to the DLC3.

(4) Turn the power switch on (READY).

(5) Turn the Techstream on.

(6) Calibrate the power steering ECU. Enter the following menus: Chassis / EMPS / Utility / Torque Sensor Adjustment.

NOTICE:

- Do not touch the steering wheel during the torque sensor zero point calibration.
- Perform the calibration only when the vehicle is stopped.

(7) Check for DTCs INFO.

NOTICE:

- After zero point calibration is completed normally, confirm that DTC is not output.
- If DTC C1515, C1516, C1534 or C1581 is output, perform troubleshooting for the corresponding DTC.

Result:

| Result | See Procedure |
|---|---|
| DTC C1515 is output. | INFO |
| DTC C1516 is output. | INFO |
| DTC C1534 is output. | INFO |
| DTC C1581 is output. | INFO |

2. ASSIST MAP WRITING

HINT:

If DTC C1581 is output after torque sensor zero point calibration, perform assist map writing.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Utility / Signal Check.

HINT:

- Follow the instructions on the Techstream to perform Signal Check.
- With DTC C1581 output, performing Signal Check will cause the power steering ECU to enter Test Mode and the assist map will be written automatically.

(f) Check for DTCs INFO.

HINT:

After writing the assist map, if DTC C1581 is output, perform the troubleshooting procedure for DTC C1581 INFO.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

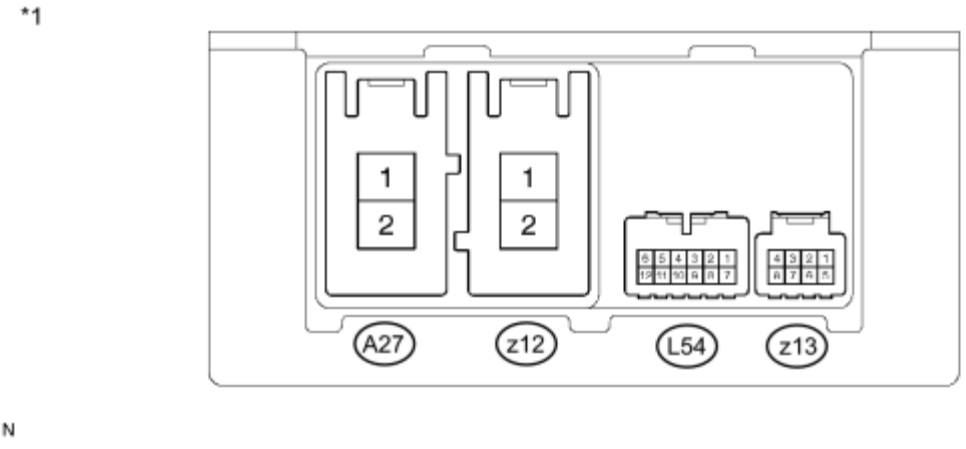
### *Power Steering System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Heavy steering | Front tires (improperly inflated, unevenly worn) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Front suspension (lower ball joint) | INFO |
| | Steering column | INFO |
| | Torque sensor (built into steering column) | - |
| | Power steering motor | - |
| | Speed sensor | INFO |
| | Battery and power source system | - |
| | Power steering ECU power source voltage and relay | INFO |
| | Power steering ECU | INFO |
| | Skid control ECU | - |
| Steering effort differs between turning right and left, or steering effort is uneven. | Calibration of torque sensor zero point are not completed | INFO |
| | Front tires (improperly inflated, unevenly worn) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Front suspension (lower ball joint) | INFO |
| | Power steering gear | INFO |
| | Torque sensor (built into steering column) | - |
| | Steering column | INFO |
| | Power steering motor | - |
| | Power steering ECU | INFO |
| While driving, steering effort does not change in accordance with vehicle speed or the steering wheel does not return properly. | Front suspension (lower ball joint) | INFO |
| | Speed sensor | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Skid control ECU | - |
| | Combination meter | - |
| | Torque sensor (built into steering column) | - |
| | Power steering motor | - |
| | Power steering ECU | INFO |
| | CAN communication system | - |
| A knocking (or clunking) sound occurs when turning the steering wheel back and forth while power steering is operating. | Front suspension (lower ball joint) | INFO |
| | Steering intermediate shaft | - |
| | Power steering ECU | INFO |
| Noise occurs when turning the steering wheel during low-speed driving. | Power steering gear | INFO |
| | Steering column | INFO |
| Friction occurs when turning the steering wheel during low-speed driving. | Power steering motor | - |
| | Steering column | INFO |
| A high-pitched sound (squeaking) occurs when turning the steering wheel slowly with the vehicle stopped. | Power steering motor | - |
| The steering wheel vibrates and noise occurs when turning the steering wheel from lock to lock with the vehicle stopped. | Power steering gear | INFO |
| | Steering column | INFO |
| P/S warning light remains on. | P/S warning light | INFO |

# TERMINALS OF ECU

1. CHECK POWER STEERING ECU




***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Steering ECU) |

(a) Measure the voltage and resistance according to the value(s) in the table below.

NOTICE:

- Check if the power steering ECU connectors are securely connected by pulling on them from the backside.
- If the P/S warning light is illuminated due to a malfunction, the fail-safe function may cause the voltage of the power steering ECU's terminals to become 0 V.

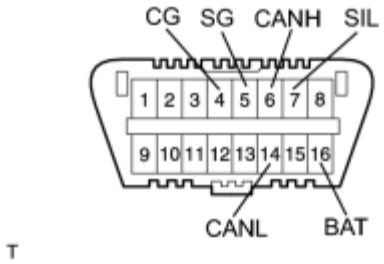
| Terminals No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A27-1 (PIG) - Body ground | W - Body ground | Power steering motor power supply input signal | Always | 11 to 14 V |
| A27-2 (PGND) - Body ground | W-B - Body ground | Power ground | Always | Below 1 Ω |
| z12-1 (M1) - Body ground | R - Body ground | Power steering motor output signal 1 | Power switch on (READY), steering wheel turned to left | 11 to 14 V |
| | | | Power switch on (READY), steering wheel turned to right | Below 1 V |
| z12-2 (M2) - Body ground | B - Body ground | Power steering motor output signal 2 | Power switch on (READY), steering wheel turned to left | Below 1 V |
| | | | Power switch on (READY), steering wheel turned to right | 11 to 14 V |

| Terminals No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L54-1 (CANH) - L54-7 (CANL) | R - W | CAN communication line (CAN HI signal) | Power switch off | 54 to 69 Ω |
| L54-6 (IG) - Body ground | B - Body ground | IG power source | Power switch on (IG) | 11 to 14 V |
| L54-7 (CANL) - L54-1 (CANH) | W - R | CAN communication line (CAN LO signal) | Power switch off | 54 to 69 Ω |
| z13-5 (TRQ1) - Body ground | W - Body ground | Torque sensor 1 input signal | Power switch on (READY), steering wheel not turned (without load) | 2.3 to 2.7 V |
| | | | Power switch on (READY), steering wheel turned to right | 2.5 to 4.7 V |
| | | | Power switch on (READY), steering wheel turned to left | 0.3 to 2.5 V |
| z13-6 (TRQV) - Body ground | R - Body ground | Torque sensor power source | Power switch on (READY) | 7.5 to 8.5 V |
| z13-7 (TRQ2) - Body ground | Y - Body ground | Torque sensor 2 input signal | Power switch on (READY), steering wheel not turned (without load) | 2.3 to 2.7 V |
| | | | Power switch on (READY), steering wheel turned to right | 2.5 to 4.7 V |
| | | | Power switch on (READY), steering wheel turned to left | 0.3 to 2.5 V |
| z13-8 (TRQG) - Body ground | B - Body ground | Torque sensor ground | Always | Below 1 Ω |

If the result is not as specified, the ECU may have a malfunction.

# DIAGNOSIS SYSTEM

1. CHECK DLC3




T

(a) The ECU uses ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

| Symbol (Terminal No.) | Terminal Description | Condition | Specified Condition |
|---|---|---|---|
| SIL (7) - SG (5) | Bus "+" line | During transmission | Pulse generation |
| CG (4) - Body ground | Chassis ground | Always | Below 1 Ω |
| SG (5) - Body ground | Signal ground | Always | Below 1 Ω |
| BAT (16) - Body ground | Battery positive | Always | 11 to 14 V |
| CANH (6) - CANL (14) | CAN bus line | Power switch off* | 54 to 69 Ω |
| CANH (6) - CG (4) | HIGH-level CAN bus line | Power switch off* | 200 Ω or higher |
| CANL (14) - CG (4) | LOW-level CAN bus line | Power switch off* | 200 Ω or higher |
| CANH (6) - BAT (16) | HIGH-level CAN bus line | Power switch off* | 6 Ω or higher |
| CANL (14) - BAT (16) | LOW-level CAN bus line | Power switch off* | 6 Ω or higher |

NOTICE:

*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch or any other switches or the doors.

(b) If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

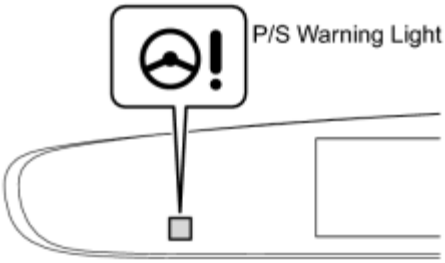
HINT:

Connect the Techstream cable to the DLC3, turn the power switch on (IG) and attempt to use the Techstream. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the Techstream.

- If communication is normal when the Techstream is connected to another vehicle, inspect the DLC3 of the original vehicle.

- If communication is still not possible when the Techstream is connected to another vehicle, the problem may be in the Techstream itself. Consult the Service Department listed in the Techstream instruction manual.

2. CHECK WARNING LIGHT




(a) If a problem occurs in the power steering system, the P/S warning light on the combination meter comes on to inform the driver of the problem.

# DTC CHECK / CLEAR

1. CHECK DTCs

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Read the DTCs following the display on the Techstream. Enter the following menus: Chassis / EMPS / Trouble Codes.

(f) Refer to the Diagnostic Trouble Code Chart for DTC information 

.

2. CLEAR DTCs

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Clear the DTCs following the display on the Techstream. Enter the following menus: Chassis / EMPS / Trouble Codes.

(f) According to the display on the Techstream, select the trouble code data display with the clear button.

(g) Turn the power switch off.

(h) Disconnect the Techstream from the DLC3.

# FREEZE FRAME DATA

1. FREEZE FRAME DATA

NOTICE:

- Freeze frame data values will vary depending on the measurement conditions, surroundings, or vehicle conditions. For this reason, there may be a problem even if the values are within specifications.
- Turn the power switch on (IG) and park the vehicle on level ground. Check the freeze frame data by using the Techstream.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Check the freeze frame data on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Meter Vehicle Velocity | Vehicle speed from meter/<br>Min.: 0 km/h (mph)<br>Max.: 300 km/h (186.4 mph) | 0 km/h (0 mph) | Turn the power switch on (READY) and vehicle stopped |
| | | No significant fluctuation | Turn the power switch on (READY) and vehicle driven at constant speed |
| Motor Actual Current | Current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Turn the power switch on (READY) and power steering is in operation |
| Command Value Current | Requested current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Turn the power switch on (READY) and power steering is in operation |
| Thermistor Temperature | ECU substrate temperature/<br>Min.: -40°C (-40°F)<br>Max.: 150°C (302°F) | -40 to 150°C (-40 to 302°F) | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| PIG Power Supply | Power source voltage to activate motor/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) |
| IG Power Supply | ECU power source voltage/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) |
| Steering Wheel Torque | Steering wheel torque/<br>Min.: -327.68 Nm<br>Max.: 7 Nm | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| Torque Sensor 1 Output | Torque sensor 1 output value/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| | | 2.5 to 4.7 V | Turn the power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 0.3 to 2.5 V | Turn the power switch on (READY) and steering wheel turned to left with vehicle stopped |
| Torque Sensor 2 Output | Torque sensor 2 output value/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| | | 2.5 to 4.7 V | Turn the power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 0.3 to 2.5 V | Turn the power switch on (READY) and steering wheel turned to left with vehicle stopped |
| TRQ1 Zero Point Value | Zero point value of torque sensor 1/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| TRQ2 Zero Point Value | Zero point value of torque sensor 2/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Motor Terminal Volt(+) | Motor terminal M1 voltage/<br><br>Min.: 0 V<br><br>Max.: 25.5 V | 11 to 14 V | Turn the power switch on (READY) and steering wheel turned to right |
| | | Below 1 V | Turn the power switch on (READY) and steering wheel turned to left |
| Motor Terminal Volt(-) | Motor terminal M2 voltage/<br><br>Min.: 0 V<br><br>Max.: 25.5 V | Below 1 V | Turn the power switch on (READY) and steering wheel turned to right |
| | | 11 to 14 V | Turn the power switch on (READY) and steering wheel turned to left |
| Ready Status | Ready status/<br><br>READY or OFF | READY or OFF | - |

# FAIL-SAFE CHART

If a problem occurs in the power steering system, the P/S warning light will come on in the combination meter and the power steering assist will be stopped, locked at a particular point, or decreased simultaneously to protect the system.

| DTC No. | DTC Detection Condition | Fail-safe |
|---|---|---|
| C1511<br>C1512<br>C1513<br>C1514<br>C1515<br>C1516 | Torque sensor malfunction | Power assist stopped |
| C1517 | Torque sensor malfunction | Power assist stopped |
| C1524 | Motor malfunction | Power assist stopped |
| C1531<br>C1532 | Power steering ECU malfunction | Power assist stopped |
| C1533 | Temperature sensor malfunction in power steering ECU | Assist force restricted |
| C1534 | EEPROM abnormal | Power assist stopped |
| C1535 | Steering wheel location data error | Power assist stopped |
| C1551 | IG power source voltage error | Power assist stopped |
| C1552 | PIG power source voltage error | Power assist stopped |
| C1553 | Overvoltage at IG and PIG terminals | Power assist stopped |
| C1554 | Power source relay malfunction | Power assist stopped |
| C1555 | Motor relay malfunction | Power assist stopped |
| C1581 | ECU malfunction (Assist map number un-writing) | Permission of control assist map |
| C1582 | Assist map number mismatch | Controlled using current default map |
| U0129 | Skid control ECU communication error | Amount of power assist remains constant at speed of 70 km/h (43 mph) |
| U0293 | HV ECU communication error | Power assist stopped |
| U1105 | Parking assist ECU communication error | Power assist stopped |

HINT:

- The amount of power assist may be decreased to prevent the motor and ECUs from overheating if the steering wheel is continuously turned when the vehicle is either stopped or driven at a low speed, or if the steering wheel is kept in either full lock position for a long time. In such cases, the amount of power assist returns to normal if the steering wheel is not turned for approximately 10 minutes with the power switch on (READY).
- If the battery is not sufficiently charged or the voltage decreases temporarily, the amount of power assist will be reduced and the P/S warning light will come on. In such cases, the amount of power assist returns normal when the battery voltage recovers.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) According to the display on the Techstream, read the "Data List".

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Meter Vehicle Velocity | Vehicle speed from meter/<br>Min.: 0 km/h (mph)<br>Max.: 300 km/h (186.4 mph) | 0 km/h (0 mph) | Turn the power switch on (READY) and vehicle stopped |
| | | No significant fluctuation | Turn the power switch on (READY) and vehicle driven at constant speed |
| Motor Actual Current | Current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Turn the power switch on (READY) and power steering is in operation |
| Command Value Current | Requested current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Turn the power switch on (READY) and power steering is in operation |
| Thermistor Temperature | ECU substrate temperature/ | -40 to 150°C (-40 to 302°F) | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Min.: -40°C (-40°F)<br><br>Max.: 150°C (302°F) | | |
| PIG Power Supply | Power source voltage to activate motor/<br><br>Min.: 0 V<br><br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) |
| IG Power Supply | ECU power source voltage/<br><br>Min.: 0 V<br><br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) |
| Steering Angle Sens Sig | Steering angle sensor signal state/<br><br>OK or NG(1) or NG(2) or NG(3) | OK: Steering angle sensor signal received<br><br>NG(1): The learning has not completed<br><br>NG(2): Steering Sensor Abnormal<br><br>NG(3): Communication Error | - |
| Steering Wheel Torque | Steering wheel torque/<br><br>Min.: -327.68 Nm<br><br>Max.: 7 Nm | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| Torque Sensor 1 Output | Torque sensor 1 output value/<br><br>Min.: 0 V<br><br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| | | 2.5 to 4.7 V | Turn the power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 0.3 to 2.5 V | Turn the power switch on (READY) and steering wheel turned to left with vehicle stopped |
| Torque Sensor 2 Output | Torque sensor 2 output value/<br><br>Min.: 0 V<br><br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| | | 2.5 to 4.7 V | Turn the power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 0.3 to 2.5 V | Turn the power switch on (READY) |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | | and steering wheel turned to left with vehicle stopped |
| TRQ1 Zero Point Value | Zero point value of torque sensor 1/<br><br>Min.: 0 V<br><br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| TRQ2 Zero Point Value | Zero point value of torque sensor 2/<br><br>Min.: 0 V<br><br>Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| Motor Terminal Volt(+) | Motor terminal M1 voltage/<br><br>Min.: 0 V<br><br>Max.: 25.5 V | 11 to 14 V | Turn the power switch on (READY) and steering wheel turned to right |
| | | Below 1 V | Turn the power switch on (READY) and steering wheel turned to left |
| Motor Terminal Volt(-) | Motor terminal M2 voltage/<br><br>Min.: 0 V<br><br>Max.: 25.5 V | Below 1 V | Turn the power switch on (READY) and steering wheel turned to right |
| | | 11 to 14 V | Turn the power switch on (READY) and steering wheel turned to left |
| IG ON/OFF Times | Number of times of power switch ON/OFF after fail detection/<br><br>Min.: 0 time<br><br>Max.: 65535 times | - | This value indicates the number of times of IG ON/OFF after the latest DTC detection. |
| Motor Overheat Record | Continuous overheat prevention control record/<br><br>Unrec or Rec | Unrec | - |
| Motor Lo Power Record | PIG power source voltage drop record/<br><br>Unrec or Rec | Unrec | - |
| Eng Rev Inter Record | Record of READY ON signal interruption/<br><br>Unrec or Rec | Unrec | - |
| Str Angle Inter Record | Record of steering sensor signal interruption occurrence | Unrec | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | display/<br><br>Unrec or Rec | | |
| Spd Sig Invalid Record | Vehicle speed signal invalid record/<br><br>Unrec or Rec | Unrec | - |
| Battery Voltage Lo Record | Battery voltage reduction history/<br><br>Min.: 0 times, Max.: 65535 times | 0 to 65535 | - |
| Ready Status | Ready status/<br><br>READY or OFF | READY or OFF | - |
| The Number of DTCs | Number of detected DTCs when freeze frame data stored/<br><br>Min.: 0<br><br>Max.: 255 | 0 to 255 | - |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If any DTCs are displayed during the DTC check, inspect the circuit listed for those DTCs. For details of each DTC, refer to the page indicated in the DTC chart.

### *Power Steering System*

| DTC Code | Detection Item | Trouble Area | Return-to-normal Condition | P/S Warning Light | See page |
|---|---|---|---|---|---|
| C1511 | Torque Sensor Circuit Malfunction | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1512 | Torque Sensor Circuit Malfunction | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1513 | Torque Sensor Circuit Malfunction | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1514 | Torque Sensor Power Supply Abnormal | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1515 | Torque Sensor Zero Point Adjustment Undone | - | After calibrating torque sensor zero point | ○ | INFO |
| C1516 | Torque Sensor Zero Point Adjustment Incomplete | - | After calibrating torque sensor zero point normally | ○ | INFO |
| C1517 | Torque Hold Abnormal | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1524 | Motor Circuit Malfunction | 1. Steering column assembly (Power steering motor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1531 | ECU Malfunction | Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1532 | ECU Malfunction | Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1533 | ECU Malfunction | Power steering ECU | Power switch on (IG) | ○ | INFO |

| DTC Code | Detection Item | Trouble Area | Return-to-normal Condition | P/S Warning Light | See page |
|---|---|---|---|---|---|
| | | | again | | |
| C1534 | ECU Malfunction | Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1535 | ECU Malfunction | Power steering ECU | - | ○ | INFO |
| C1551 | IG Power Supply Voltage Malfunction | 1. ECU-IG No. 2 fuse<br>2. IG power source circuit<br>3. Power steering ECU | Power switch on (IG) again and after normal confirmation | ○ | INFO |
| C1552 | PIG Power Supply Voltage Malfunction | 1. EPS fuse<br>2. PIG power source circuit<br>3. Power steering ECU | Power switch on (IG) again and after normal confirmation | ○ | INFO |
| C1553 | PIG Power Supply Overvoltage | 1. IG and PIG power source circuits<br>2. Power steering ECU | Power switch on (IG) again and after normal confirmation | ○ | INFO |
| C1554 | Power Supply Relay Failure | 1. EPS fuse<br>2. PIG power source circuit<br>3. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1555 | Motor Relay Welding Failure | 1. Steering column assembly (Power steering motor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1581 | Assist Map Number Un-Writing | 1. Power steering ECU<br>2. Hybrid control system<br>3. CAN communication system | Assist map written | ○ | INFO |
| C1582 | Assist Map Number Mismatch | 1. Power steering ECU<br>2. CAN communication system<br>3. Power management ECU | Power switch on (IG) again | ○ | INFO |
| U0129 | Lost Communication with | 1. CAN communication | Power switch on (IG) | ○ | INFO |

| DTC Code | Detection Item | Trouble Area | Return-to-normal Condition | P/S Warning Light | See page |
|---|---|---|---|---|---|
| | Brake System Control Module | system<br><br>2. Skid control ECU | again or after normal confirmation | | |
| U0293 | Lost Communication with HV ECU | 1. CAN communication system<br><br>2. Power management control ECU | Power switch on (IG) again or after normal confirmation | ○ | INFO |
| U1105 | Lost Communication with Parking Assist ECU | 1. CAN communication system<br><br>2. Parking assist ECU | Power switch on (IG) again or after normal confirmation | X | INFO |

HINT:

- ○: Warning light comes on
- X: Warning light turns off (normal reset)
- *1: Depending on some detection conditions, there is a case that the warning light does not come on.

# ON-VEHICLE INSPECTION

1. CHECK STEERING EFFORT (TORQUE)

NOTICE:

Some of these service operations may affect the SRS airbags. Read the precautionary notices concerning the SRS airbag system before servicing.

(a) Stop the vehicle on a level, paved road and align the wheels facing straight ahead.

(b) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

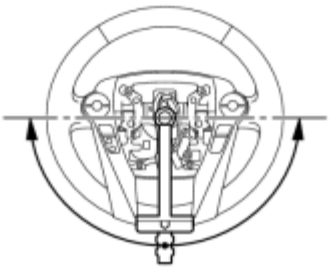
(c) Remove the steering pad INFO.

(d) Connect the cable to the negative (-) battery terminal.

(e) Using a torque wrench, check that the steering wheel set nut is properly tightened.

Torque: **50 N·m (510 kgf·cm, 37ft·lbf)**

(f) Turn the power switch to on (READY) so that the power steering is ready to operate.



C

(g) Turn the steering wheel 90 degrees to the right and check the steering effort (torque) while continuing to turn it further in the same direction.

Steering effort (Reference):

6.0 N*m (61 kgf*cm, 53 in.*lbf) or less

(h) Align the front wheels facing straight ahead.

(i) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(j) Install the steering pad INFO.

(k) Connect the cable to the negative (-) battery terminal.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

(l) Clear the DTCs INFO.

(m) Inspect the airbag warning light INFO.

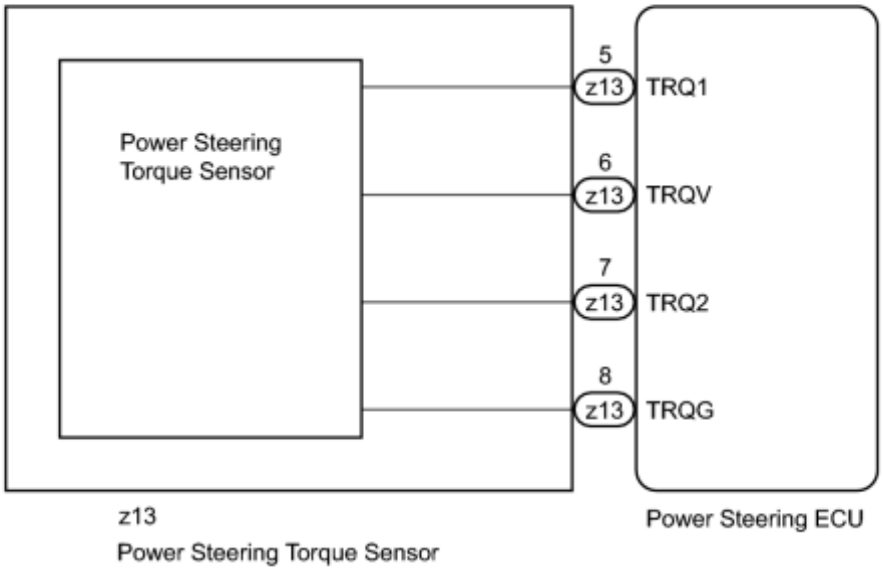
| | | |
|---|---|---|
| DTC | C1511 | Torque Sensor Circuit Malfunction |
| DTC | C1512 | Torque Sensor Circuit Malfunction |
| DTC | C1513 | Torque Sensor Circuit Malfunction |
| DTC | C1514 | Torque Sensor Power Supply Abnormal |
| DTC | C1517 | Torque Hold Abnormal |

# DESCRIPTION

The power steering ECU calculates assisting power based on steering torque signals from the torque sensor. If these DTCs are stored in the power steering ECU, the ECU stops steering power assist as a fail-safe function.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1511 | Torque sensor (TRQ1) signal error or stop | • Steering column assembly (Torque sensor)<br>• Power steering ECU |
| C1512 | Torque sensor (TRQ2) signal error or stop | |
| C1513 | Deviation between torque sensor TRQ1 and TRQ2 exceeds specified value | |
| C1514 | Torque sensor power source voltage error | |
| C1517 | Temporary control due to malfunction related to torque sensor continues for long time | |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.
- If the steering column assembly has been replaced with a new one, perform the torque sensor zero point calibration after performing the initialization of the torque sensor zero point value INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (TORQUE SENSOR - ECU) |

(a) Check the installation condition of the torque sensor connector.

OK:

Torque sensor connector is securely connected to the power steering ECU.

NG ▶ CONNECT CONNECTOR

OK

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (TORQUE SENSOR1, TORQUE SENSOR2) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the items "Torque sensor 1 output" and "Torque sensor 2 output" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Torque Sensor 1 Output | Torque sensor 1 output value/ Min.: 0 V Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| | | 2.5 to 4.7 V | Turn the power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 0.3 to 2.5 V | Turn the power switch on (READY) and steering wheel turned to left with vehicle stopped |
| Torque Sensor 2 Output | Torque sensor 2 output value/ Min.: 0 V Max.: 5 V | 2.3 to 2.7 V | Turn the power switch on (READY) and steering wheel not turned (without load) |
| | | 2.5 to 4.7 V | Turn the power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 0.3 to 2.5 V | Turn the power switch on (READY) and steering wheel turned to left with vehicle stopped |

OK:

Normal condition value is displayed on the Techstream during each steering operation.

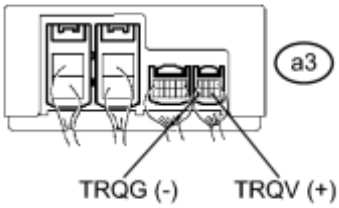
NG CHECK POWER STEERING ECU (TOQUE SENSOR OUTPUT)

OK **REPLACE POWER STEERING ECU**

| | |
|---|---|
| 3. | CHECK POWER STEERING ECU (TOQUE SENSOR OUTPUT) |

(a) Turn the power switch on (READY).

*1




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z13-6 (TRQV) - z13-8 (TRQG) | Power switch on (READY) | 7.5 to 8.5 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Steering ECU) |

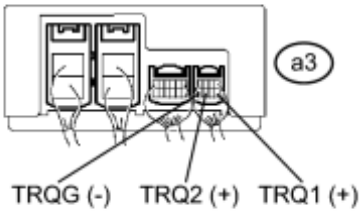
NG ▶ REPLACE POWER STEERING ECU

OK

▼

| | |
|---|---|
| 4. | CHECK STEERING COLUMN ASSEMBLY (TORQUE SENSOR) |

*1




(a) Turn the power switch on (READY).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition (Steering Wheel Position) | Specified Condition |
|---|---|---|
| z13-5 (TRQ1) - z13-8 (TRQG) | Power switch on (READY)<br><br>Center position | 2.3 to 2.7 V |
| z13-7 (TRQ2) - z13-8 (TRQG) | Power switch on (READY)<br><br>Center position | 2.3 to 2.7 V |
| z13-5 (TRQ1) - z13-8 (TRQG) | Power switch on (READY)<br><br>Turned to right | 2.5 to 4.7 V |
| z13-7 (TRQ2) - z13-8 (TRQG) | Power switch on (READY)<br><br>Turned to right | 2.5 to 4.7 V |
| z13-5 (TRQ1) - z13-8 (TRQG) | Power switch on (READY)<br><br>Turned to left | 0.3 to 2.5 V |
| z13-7 (TRQ2) - z13-8 (TRQG) | Power switch on (READY)<br><br>Turned to left | 0.3 to 2.5 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Steering ECU) |

NG ▶ REPLACE STEERING COLUMN ASSEMBLY

OK ▶ **REPLACE POWER STEERING ECU**

| DTC | C1515 | Torque Sensor Zero Point Adjustment Undone |
|---|---|---|

# DESCRIPTION

This DTC does not indicate a malfunction. The power steering ECU stores this DTC when it determines that the torque sensor zero point calibration has not been performed.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1515 | Torque sensor zero point calibration not performed | There is no malfunction if DTC is not output after performing the torque sensor zero point calibration. |

# INSPECTION PROCEDURE

NOTICE:

- If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.
- If the steering column assembly has been replaced with a new one, perform the torque sensor zero point calibration after performing the initialization of the torque sensor zero point value INFO.

# PROCEDURE

| 1. | PERFORM ZERO POINT CALIBRATION (TORQUE SENSOR) |
|---|---|

(a) Perform the torque sensor zero point calibration INFO.

NEXT

| 2. | CHECK FOR DTC |
|---|---|

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is still output even after performing torque sensor zero point calibration 3 times*1. | A |
| DTC is still output even after performing torque sensor zero point calibration once or twice*2. | B |
| Normal system code is output. | C |

HINT:

- *1: The power steering ECU must be replaced if DTC C1515 is still output even after the torque sensor zero point calibration is performed 3 times.

- *2: Perform the torque sensor zero point calibration again if DTC C1515 is still output even after the calibration is performed once or twice.

C ▶ END
B ▶ PERFORM ZERO POINT CALIBRATION AGAIN (TORQUE SENSOR)
A

| | |
|---|---|
| 3. | REPLACE POWER STEERING ECU |

(a) Replace the power steering ECU INFO.

NEXT

| | |
|---|---|
| 4. | PERFORM ZERO POINT CALIBRATION (TORQUE SENSOR) |

(a) Perform the torque sensor zero point calibration INFO.

NEXT

| | |
|---|---|
| 5. | CHECK FOR DTC |

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is still output even after performing torque sensor zero point calibration 3 times*1. | A |
| DTC is still output even after performing torque sensor zero point calibration twice*2. | B |
| Normal system code is output. | C |

HINT:

- *1: The steering column assembly must be replaced if DTC C1515 is still output even after the torque sensor zero point calibration is performed 3 times.
- *2: Perform the torque sensor zero point calibration again if DTC C1515 is still output even after the calibration is performed twice.

C ▶ END
B ▶ PERFORM ZERO POINT CALIBRATION AGAIN (TORQUE SENSOR)
A ▶ **REPLACE STEERING COLUMN ASSEMBLY**

| DTC | C1516 | Torque Sensor Zero Point Adjustment Incomplete |
|---|---|---|

# DESCRIPTION

This DTC does not indicate a malfunction. The power steering ECU stores this DTC if it determines that the torque sensor zero point calibration has not been completed successfully.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1516 | Torque sensor zero point calibration is not completed successfully. | There is no malfunction if DTC is not output after performing the torque sensor zero point calibration. |

# INSPECTION PROCEDURE

NOTICE:

- If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.
- If the steering column assembly has been replaced with a new one, perform the torque sensor zero point calibration after performing the initialization of the torque sensor zero point value INFO.

# PROCEDURE

| 1. | CLEAR DTC |
|---|---|

(a) Clear the DTCs INFO.

NEXT

| 2. | PERFORM ZERO POINT CALIBRATION (TORQUE SENSOR) |
|---|---|

(a) Perform the torque sensor zero point calibration INFO.

NEXT

| 3. | CHECK FOR DTC |
|---|---|

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is still output even after performing torque sensor zero point calibration 3 times*1. | A |

| Result | Proceed to |
|---|---|
| DTC is still output even after performing torque sensor zero point calibration once or twice*2. | B |
| Normal system code is output. | C |

HINT:

- *1: The power steering ECU must be replaced if DTC C1516 is still output even after the torque sensor zero point calibration is performed 3 times.
- *2: Perform the torque sensor zero point calibration again if DTC C1516 is still output even after the calibration is performed once or twice.

C ▶ END
B ▶ PERFORM ZERO POINT CALIBRATION AGAIN (TORQUE SENSOR)
A ▼

| | |
|---|---|
| 4. | REPLACE POWER STEERING ECU |

(a) Replace the power steering ECU INFO.

NEXT ▼

| | |
|---|---|
| 5. | PERFORM ZERO POINT CALIBRATION (TORQUE SENSOR) |

(a) Perform the torque sensor zero point calibration INFO.

NEXT ▼

| | |
|---|---|
| 6. | CHECK FOR DTC |

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is still output even after performing torque sensor zero point calibration 3 times*1. | A |
| DTC is still output even after performing torque sensor zero point calibration twice*2. | B |
| Normal system code is output. | C |

HINT:

- *1: The steering column assembly must be replaced if DTC C1516 is still output even after the torque sensor zero point calibration is performed 3 times.
- *2: Perform the torque sensor zero point calibration again if DTC C1516 is still output even after the calibration is performed twice.

C ▶ END
B ▶ PERFORM ZERO POINT CALIBRATION AGAIN (TORQUE SENSOR)
A ▶ **REPLACE STEERING COLUMN ASSEMBLY**

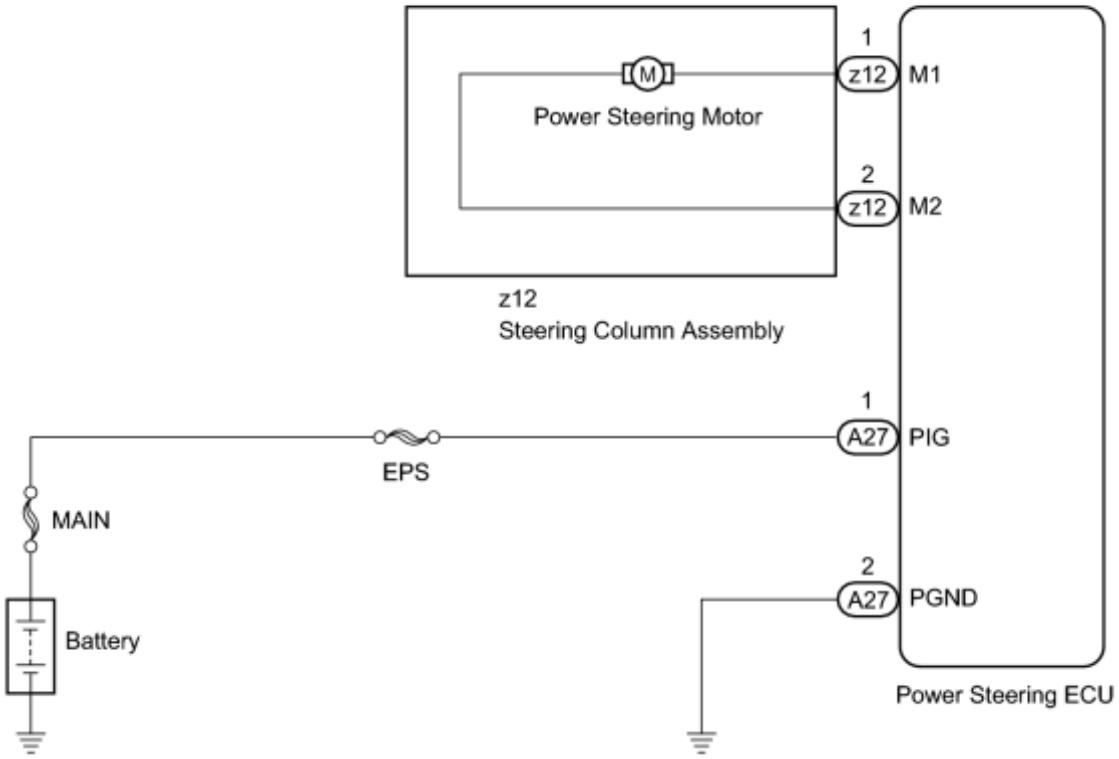
| | | |
|---|---|---|
| DTC | C1524 | Motor Circuit Malfunction |
| DTC | C1555 | Motor Relay Welding Failure |

# DESCRIPTION

The power steering ECU supplies current to the power steering motor through the motor circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1524 | Short (or open) in motor circuit or abnormal voltage in motor circuit | • Steering column assembly (Power steering motor)<br>• Power steering ECU |
| C1555 | Predriver (Motor relay circuit) malfunction | |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

- If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.
- If the steering column assembly has been replaced with a new one, perform the torque sensor zero point calibration after performing the initialization of the torque sensor zero point value INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER STEERING ECU |

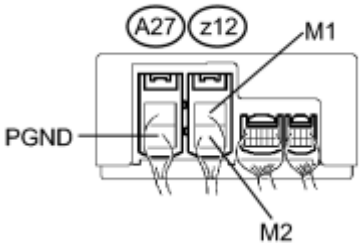
(a) Turn the power switch on (READY).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition (Steering Wheel Position) | Specified Condition |
|---|---|---|
| z12-1 (M1) - A27-2 (PGND) | Power switch on (READY) (Turned to right) | Below 1 V |
| z12-1 (M1) - A27-2 (PGND) | Power switch on (READY) (Turned to left) | 11 to 14 V |
| z12-2 (M2) - A27-2 (PGND) | Power switch on (READY) (Turned to right) | 11 to 14 V |
| z12-2 (M2) - A27-2 (PGND) | Power switch on (READY) (Turned to left) | Below 1 V |

*1




*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected (Power Steering ECU) |

NG ▶ CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BODY GROUND)

OK

▼

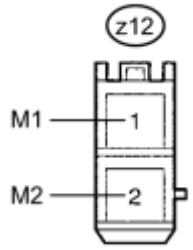
| | |
|---|---|
| 2. | CHECK STEERING COLUMN ASSEMBLY (POWER STEERING MOTOR) |

(a) Disconnect the connector from the power steering ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z12-1 (M1) - z12-2 (M2) | Always | 0.08 to 0.15 Ω |
| z12-1 (M1) - Body ground | Always | 1 MΩ or higher |
| z12-2 (M2) - Body ground | Always | 1 MΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>( to Power Steering ECU) |

NG ▶ REPLACE STEERING COLUMN ASSEMBLY

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BODY GROUND) |

(a) Disconnect the connector from the power steering ECU.

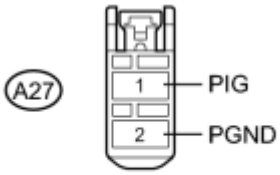
(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

*1

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A27-1 (PIG) - Body ground | Power switch on (READY) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.




H

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Steering ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER STEERING ECU**

| | | |
|---|---|---|
| DTC | C1531 | ECU Malfunction |
| DTC | C1532 | ECU Malfunction |
| DTC | C1533 | ECU Malfunction |
| DTC | C1534 | ECU Malfunction |
| DTC | C1535 | ECU Malfunction |

# DESCRIPTION

The fail-safe function operates to stop power assist when DTCs indicating ECU malfunctions are stored. However, the power assist operation continues when DTC C1533 or C1534 is stored because it indicates an EEPROM error in the ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1531 | ECU internal malfunction (CPU malfunction) | Power steering ECU |
| C1532 | ECU internal malfunction (Peripheral circuit malfunction) | |
| C1533 | ECU internal malfunction (Substrate temperature sensor malfunction) | |
| C1534 | ECU internal malfunction (EEPROM error) | |
| C1535 | ECU internal malfunction (Steering wheel location data error) | |

# INSPECTION PROCEDURE

NOTICE:

If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Check for DTCs INFO.

OK:

DTCs other than C1531, C1532, C1533, C1534 and C1535 are not output.

NG ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

OK ▶ **REPLACE POWER STEERING ECU**

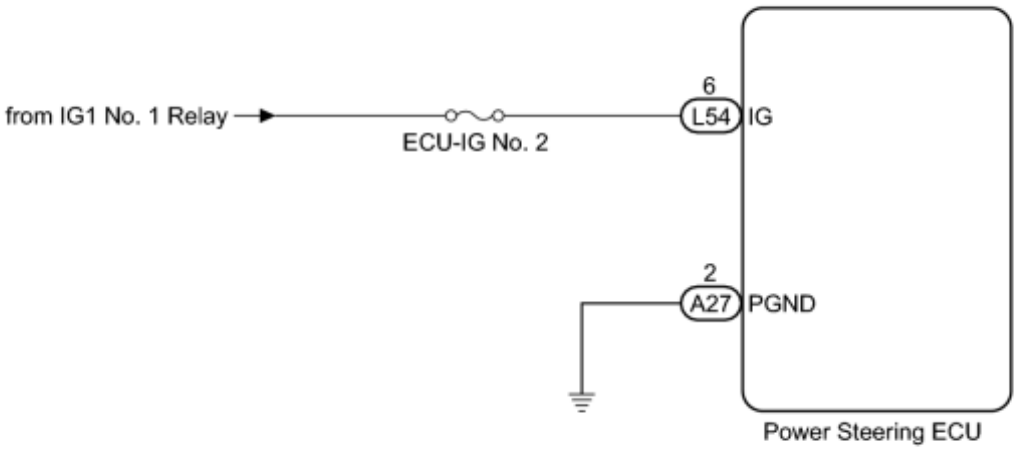
| DTC | C1551 | IG Power Supply Voltage Malfunction |
|---|---|---|

# DESCRIPTION

The power steering ECU distinguishes the power switch status as on (IG) or off through the IG power source circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1551 | Open or short in IG power source circuit with power switch on (IG) | • ECU-IG No. 2 fuse<br>• IG power source circuit<br>• Power steering ECU |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.

HINT:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (IG POWER SUPPLY) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the item "IG power supply" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| IG power supply | IG power supply/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (IG) |

OK:

The normal condition value is displayed on the Techstream.

NG ▶ CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BODY GROUND)

OK ▶ **CHECK INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BODY GROUND) |

(a) Disconnect the connectors from the power steering ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L54-6 (IG) - A27-2 (PGND) | Power switch on (IG) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
| --- | --- | --- |
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER STEERING ECU**

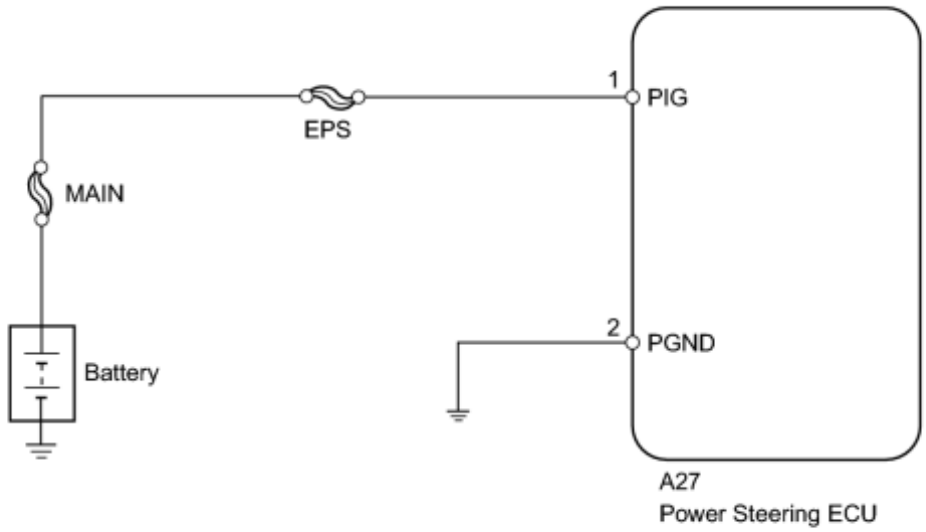
| | | |
|---|---|---|
| DTC | C1552 | PIG Power Supply Voltage Malfunction |
| DTC | C1554 | Power Supply Relay Failure |

# DESCRIPTION

When a problem occurs in the system, the power source relay circuit and the motor relay circuit are shut off to stop the power assist. The ECU must be replaced when there is a problem with the relays because the relays are built into the ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1552 | PIG power source circuit malfunction | • EPS fuse<br>• PIG power source circuit<br>• Power steering ECU |
| C1554 | Power source relay circuit malfunction | • EPS fuse<br>• PIG power source circuit<br>• Power steering ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.

HINT:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the item "PIG power supply" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| PIG Power Supply | Power source voltage to activate motor/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) |

OK:

The normal condition value is displayed on the Techstream.

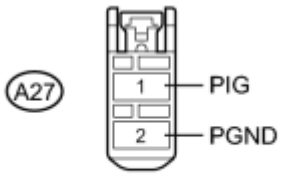
NG ▶ CHECK HARNESS AND CONNECTOR (BATTERY - POWER STEERING ECU - BODY GROUND)

OK ▶ **CHECK INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (BATTERY - POWER STEERING ECU - BODY GROUND) |

(a) Disconnect the connector from the power steering ECU.

*1




H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A27-1 (PIG) - Body ground | Power switch on (READY) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Steering ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER STEERING ECU**

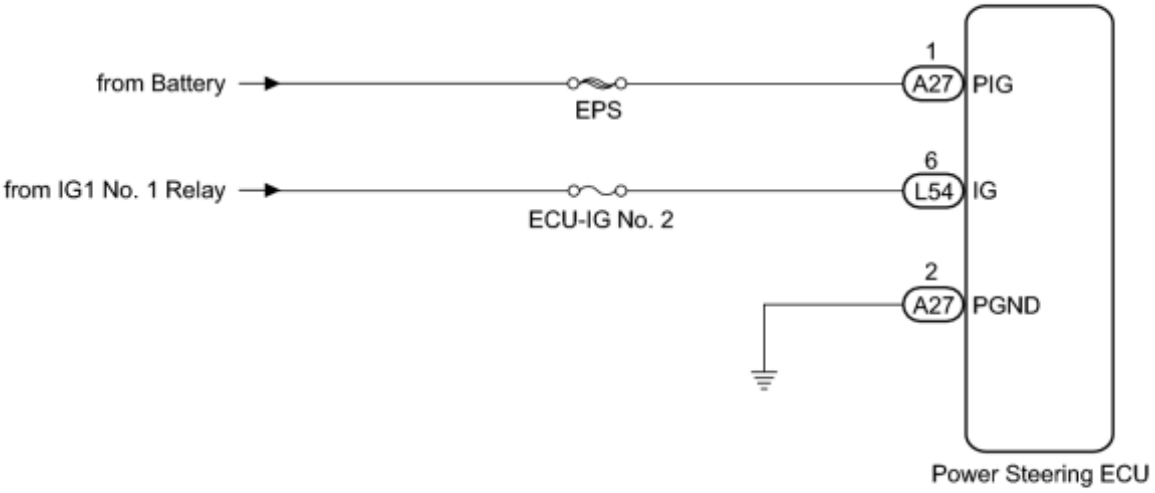
| DTC | C1553 | PIG Power Supply Overvoltage |
|---|---|---|

# DESCRIPTION

If the power steering ECU determines that the motor power source voltage and the IG voltage are not within the specified range, it stops the power assist as a fail-safe function.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1553 | • PIG power source overvoltage<br>• IG power source overvoltage | • IG and PIG power source circuits<br>• Power steering ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.

# PROCEDURE

| 1. | CHECK HARNESS AND CONNECTOR (IG, PIG) |
|---|---|

(a) Disconnect the connectors from the power steering ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-1 (PIG) - A27-2 (PGND) | Always | 11 to 14 V |
| L54-6 (IG) - A27-2 (PGND) | Power switch on (IG) | 11 to 14 V |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE POWER STEERING ECU**

| DTC | C1581 | Assist Map Number Un-Writing |
|---|---|---|

# DESCRIPTION

DTC C1581 will be stored if the power steering ECU determines that the assist map is not written in the ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1581 | Assist map is not written in power steering ECU | • Power steering ECU<br>• Hybrid control system<br>• CAN communication system |

# INSPECTION PROCEDURE

NOTICE:

If the power steering ECU has been replaced with a new one, perform the assist map writing and the torque sensor zero point calibration INFO.

# PROCEDURE

| 1. | PERFORM ASSIST MAP WRITING |
|---|---|

(a) Perform the assist map writing INFO.

NEXT

| 2. | CHECK FOR DTC |
|---|---|

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is still output even after performing assist map writing 3 times. | A |
| DTC is still output even after performing assist map writing once or twice*1 | B |
| DTC is not output. | C |

HINT:

*1: Perform the assist map writing again if DTC C1581 is still output even after the assist map writing is performed once or twice.

C END

B ▶ PERFORM ASSIST MAP WRITING AGAIN

A ▼

| | |
|---|---|
| 3. | CHECK FOR DTC (CAN COMMUNICATION SYSTEM) |

(a) Check for DTCs INFO.

OK:

DTC is not output.

HINT:

If the CAN communication system DTC is output, first troubleshoot the CAN communication system malfunction, then perform the assist map writing again INFO.

NG ▶ GO TO CAN COMMUNICATION SYSTEM

OK ▼

| | |
|---|---|
| 4. | CHECK FOR DTC (HYBRID CONTROL SYSTEM) |

(a) Check for DTCs INFO.

OK:

DTC is not output.

HINT:

If the hybrid control system DTC is output, first troubleshoot the hybrid control system, then perform the assist map writing again INFO.

NG ▶ REPAIR CIRCUITS INDICATED BY OUTPUT DTCS

OK ▶ **REPLACE POWER STEERING ECU**

| DTC | C1582 | Assist Map Number Mismatch |
|---|---|---|

# DESCRIPTION

When an incorrect skid control ECU is installed after the assist map has been recorded in the power steering ECU, then DTC C1582 is stored because the data does not match the vehicle specifications.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1582 | Assist map number mismatch | • Power steering ECU<br>• CAN communication system<br>• Power management control ECU |

# INSPECTION PROCEDURE

NOTICE:

If the power steering ECU has been replaced with a new one, perform the torque sensor zero point calibration INFO.

# PROCEDURE

| 1. | CHECK FOR DTC (CAN COMMUNICATION SYSTEM) |
|---|---|

(a) Using the Techstream, check for DTCs and confirm that there are no problems in the CAN communication system INFO.

OK:

DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM
OK ▼

| 2. | CHECK POWER MANAGEMENT CONTROL ECU |
|---|---|

(a) Check if a power management control ECU that complies with the vehicle specifications is installed.

OK:

The power management control ECU that complies with vehicle specifications is installed.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPLACE POWER STEERING ECU**

| | | |
|---|---|---|
| DTC | U0129 | Lost Communication with Brake System Control Module |
| DTC | U0293 | Lost Communication with HV ECU |
| DTC | U1105 | Lost Communication with Parking Assist ECU |

# DESCRIPTION

The power steering ECU receives signals from the power management control ECU, the skid control ECU and the parking assist ECU via the CAN communication system.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0129 | Lost communication with brake system control module | • CAN communication system<br>• Skid control ECU |
| U0293 | Lost communication with power management control ECU | • CAN communication system<br>• Power management control ECU |
| U1105 | Lost communication with parking assist ECU | • CAN communication system<br>• Parking assist ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Clear the DTCs INFO.

(b) Check for DTCs INFO.

OK:

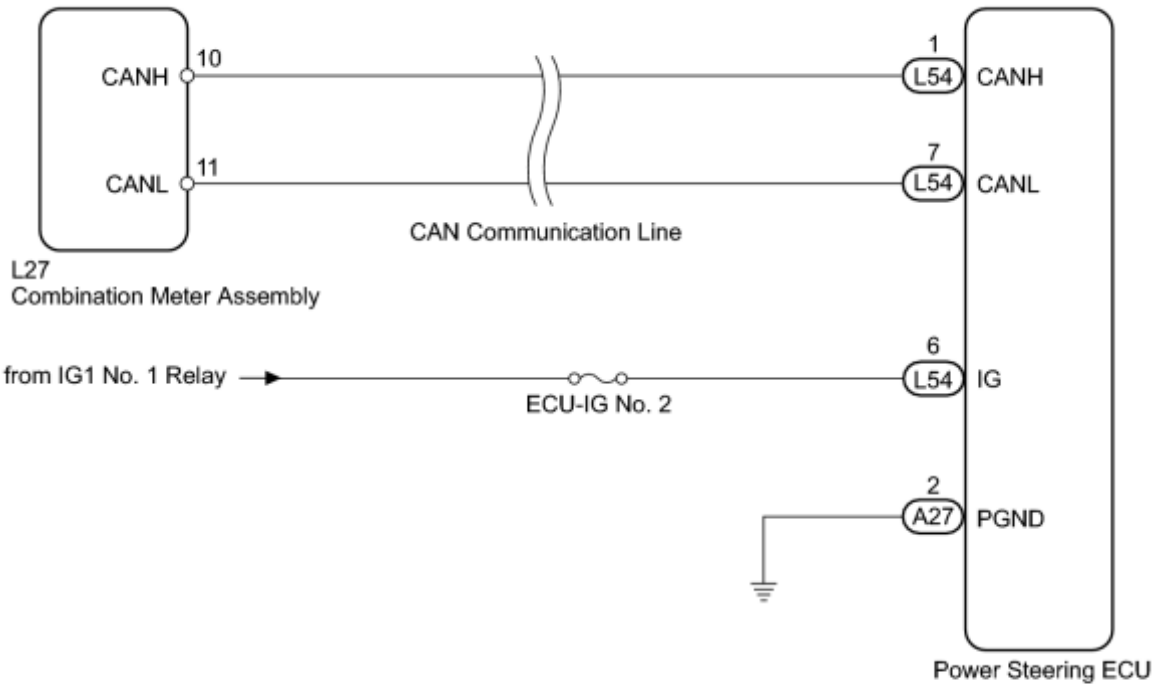
DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM
OK ▶ **CHECK INTERMITTENT PROBLEMS**

# DESCRIPTION

If the power steering ECU detects a malfunction, the P/S warning light comes on. At this time, the power steering ECU stores the appropriate DTC in its memory.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC (CAN COMMUNICATION SYSTEM) |

(a) Check for DTCs INFO.

OK:

DTC is not output.

NG GO TO CAN COMMUNICATION SYSTEM

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BODY GROUND) |

(a) Disconnect the connectors from the power steering ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L54-6 (IG) - A27-2 (PGND) | Power switch on (IG) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(f) Perform the Active Test of the combination meter using the Techstream.

***Combination Meter***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. EPS | EPS warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |

(g) Check that the EPS warning light operates in accordance with the Active Test.

HINT:

Reconnect the connectors and restore the vehicle to its previous condition before checking the combination meter.

NG ▶ REPLACE MATER CIRCUIT PLATE NO.3

OK ▶ **REPLACE POWER STEERING ECU**

# PRECAUTION

1. DETERMINING POWER STEERING SYSTEM TYPE

(a) Two types of power steering system are available for this model. A different type of motor is used for each system; a brushless type motor and a brush type motor. Refer to the table below to determine which type of motor is used.

***Types***

| Type of Motor | Model |
|---|---|
| Brushless Type Motor | Mexico package models and models with 215/45R17 tires |
| Brush Type Motor | Other than those above |

2. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTICE:

When disconnecting the battery negative (-) cable, initialize the following system after the cable is reconnected:

| System | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

3. HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

(a) The vehicle is equipped with a Supplemental Restraint System (SRS). Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident.

Before servicing (including inspection, replacement, removal and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System INFO.

4. PRECAUTIONS FOR REMOVAL, INSTALLATION AND REPLACEMENT OF ELECTRONIC MOTOR POWER STEERING COMPONENTS

(a) Be sure to align the front wheels straight ahead when removing and installing the power steering gear assembly.

(b) When disconnecting the No. 2 steering intermediate shaft assembly, be sure to place matchmarks before starting the operation.

(c) After replacing the steering column assembly or power steering ECU, clear the rotation angle sensor calibration value, initialize the rotation angle sensor, and calibrate the torque sensor zero point INFO.

5. HANDLING PRECAUTION

(a) When handling the electronic parts:

(1) Avoid any impact to electronic parts such as ECUs and relays. Replace them with new ones if dropped or subjected to a severe blow.

(2) Do not expose any electronic parts to high temperatures or humidity.

(3) Do not touch the connector terminals in order to prevent deformation or malfunctions due to static electricity.

(b) When handling the power steering ECU:

(1) When the power steering ECU has been replaced with a new one, perform the assist map writing, the rotation angle sensor value initialization and the torque sensor zero point calibration INFO.

(c) When handling the steering column assembly:

(1) Avoid any impact to the steering column assembly, especially to the motor and torque sensor. Replace them with new ones if dropped or subjected to a severe blow.

(2) Do not pull the wire harness when moving the steering column assembly.

(3) When the steering column assembly has been replaced, perform the rotation angle sensor value initialization and the torque sensor zero point calibration after initializing the torque sensor zero point.

(d) When disconnecting and reconnecting the connectors:

(1) Before disconnecting the connectors related to the power steering system, turn the power switch on (IG), center the steering wheel, turn the power switch off, and then disconnect the connectors.

(2) Before reconnecting the connectors related to the power steering system, ensure that the power switch is off. Then center the steering wheel and turn the power switch on (IG).

NOTICE:

Do not turn the power switch on (IG) when the steering wheel is not centered.

(3) If the above operations are not carried out properly, the steering center point (zero point) will deviate, which may lead to a difference in steering effort between turning right and left. If there is a difference in steering effort between turning right and left, perform the rotation angle sensor value initialization and the torque sensor zero point calibration after initializing the torque sensor zero point INFO.

6. PRECAUTIONS FOR CAN COMMUNICATION

(a) CAN communication lines are used to receive information from the skid control ECU and the power management control ECU, and to transmit warnings to the combination meter.

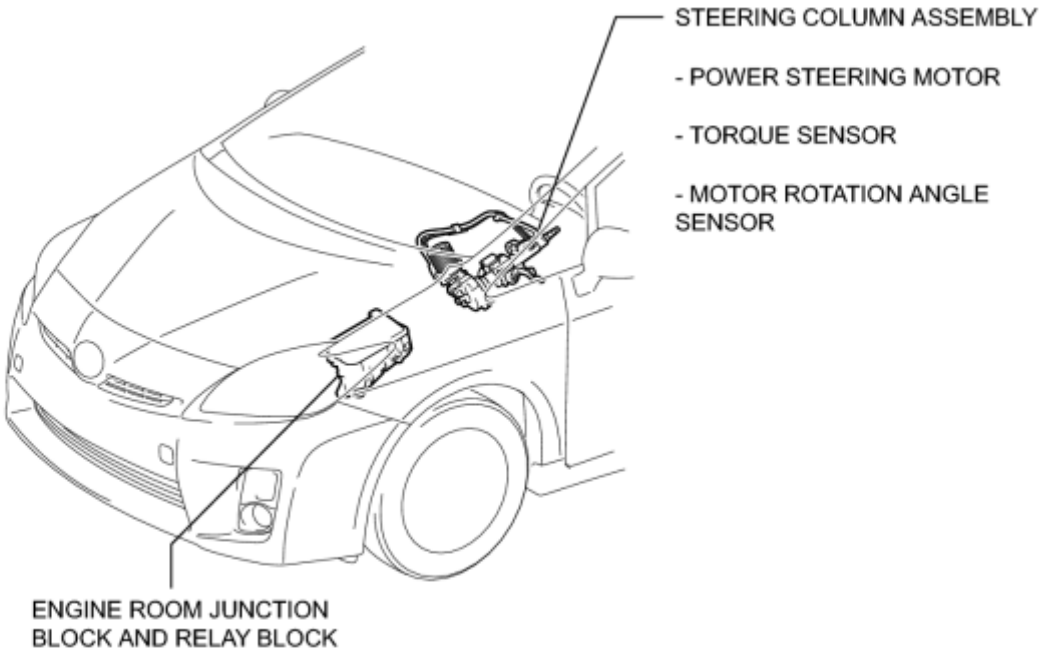
When there are any problems in the CAN communication lines, DTCs of the CAN communication line are output.

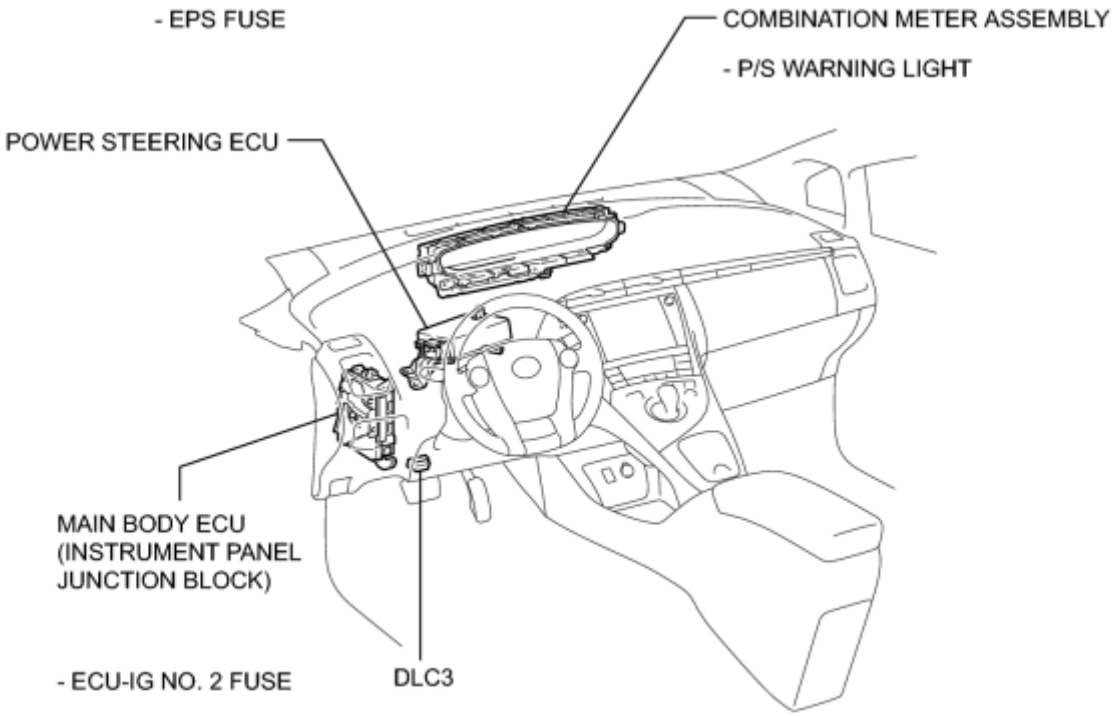
(b) Perform troubleshooting for the communication line problems when the CAN communication DTCs are output. Be sure to start troubleshooting on the power steering system after confirming that the CAN communication system is normal.

(c) Since the CAN communication line has its own length and route, it cannot be repaired temporarily with a bypass wire, etc.

# PARTS LOCATION

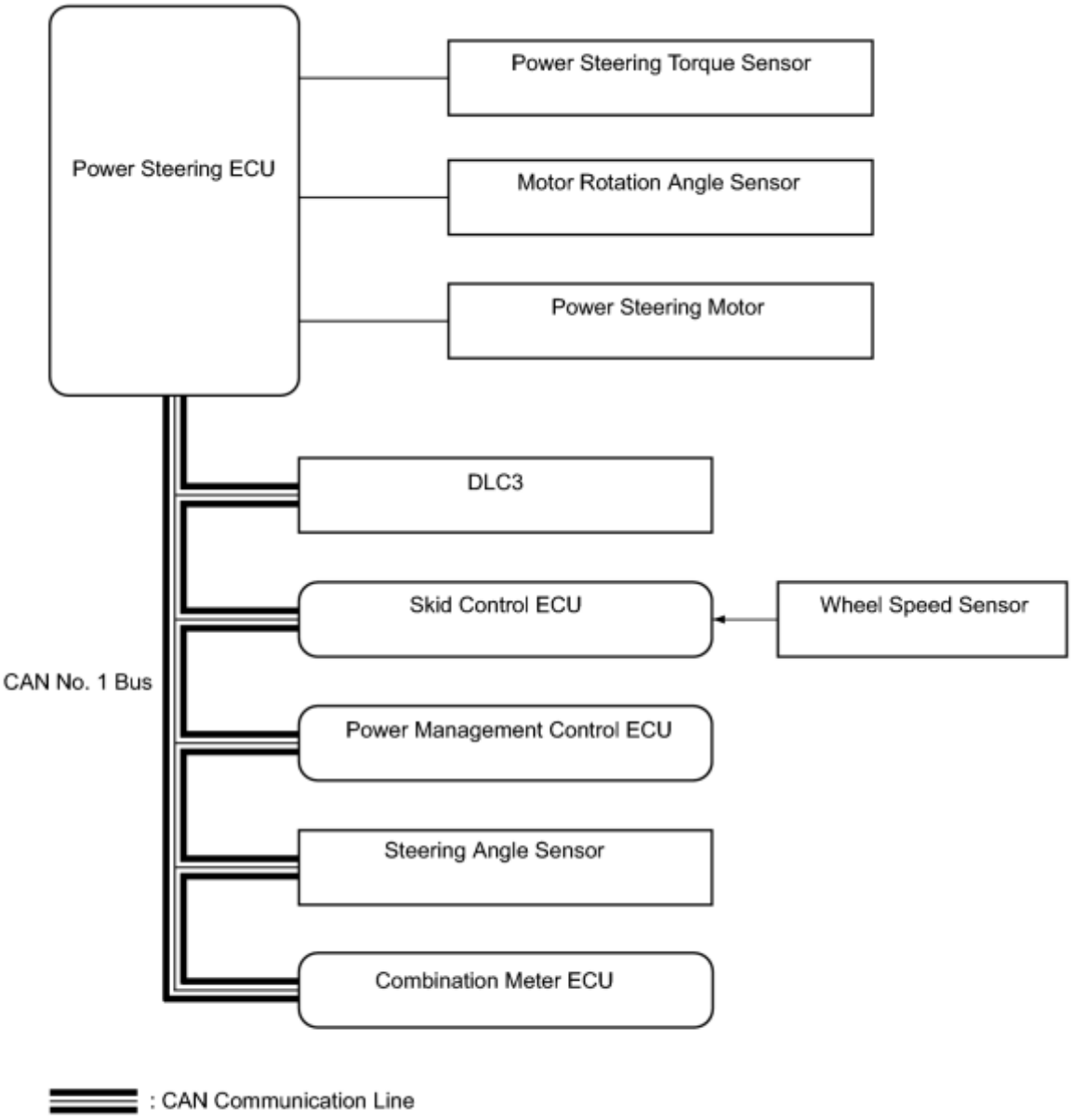
# ILLUSTRATION




P

# SYSTEM DIAGRAM



# SYSTEM DESCRIPTION

1. DESCRIPTION

- The power steering system generates torque through the operation of the motor and the reduction gear installed on the column shaft in order to assist steering effort.
- The power steering ECU determines directions and the amount of assisting power in accordance with vehicle speed signals and signals from the torque sensor built into the steering column assembly. As a result, the power steering ECU adjusts the steering effort so that it is lighter during low speed driving and heavier during high speed driving.

(a) Power steering ECU:

The power steering ECU calculates assisting power based on steering torque signals from the torque sensor and vehicle speed signals from the skid control ECU.

(b) Torque sensor:

The torque sensor detects the steering effort generated when the steering wheel is turned and converts it to an electrical signal.

(c) Power steering motor:

The power steering motor is activated by the current from the power steering ECU and generates torque to assist the steering effort.

(d) Motor rotation angle sensor:

The motor rotation angle sensor consists of the resolver sensor, which excels in reliability and durability. The rotation angle sensor detects the rotation angle of the motor and outputs it to the power steering ECU. As a result, it ensures efficient EPS control.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use these procedures to troubleshoot the power steering system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

NEXT

| | |
|---|---|
| 3. | CHECK DTC AND FREEZE FRAME DATA* |

HINT:

Refer to Clear DTCs INFO.

NEXT

| | |
|---|---|
| 4. | PROBLEM SYMPTOM CONFIRMATION |

Result:

| Result | Proceed to |
|---|---|
| Symptom does not occur. | A |
| Symptom occurs. | B |

B Go to step 6

A

| | |
|---|---|
| 5. | SYMPTOM SIMULATION |

NEXT

| | |
|---|---|
| 6. | CHECK CAN COMMUNICATION SYSTEM* |

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| CAN system DTC is not output | A |
| CAN system DTC is output | B |

HINT:

- If any CAN communication system DTCs are output, perform troubleshooting on the CAN communication system first.
- If communication to the power steering ECU cannot be established through the Techstream, inspect terminals CANH and CANL of the DLC3 and the power steering ECU, and the IG circuit of the power steering ECU.

B INFO PROCEED TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 7. | CHECK FOR DTC* |

(a) Check for DTCs INFO.

HINT:

Refer to Diagnostic Trouble Code Chart when any DTCs are output INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B Go to step 9

A

| | |
|---|---|
| 8. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in problem symptoms table | A |
| Fault is listed in problem symptoms table | B |

B Go to step 9

A

| | |
|---|---|
| 9. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Refer to Terminals of ECU INFO.

(b) Refer to Data List / Active Test INFO.

NEXT

| | |
|---|---|
| 10. | REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 11. | CONFIRMATION TEST |

NEXT **END**

# CALIBRATION

1. ROTATION ANGLE SENSOR VALUE INITIALIZATION AND TORQUE SENSOR ZERO POINT CALIBRATION

NOTICE:

Clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point if any of the following has occurred:

- The power steering ECU has been replaced.
- The steering column assembly has been replaced.
- Steering effort differs between left and right.

(a) Inspection before calibration

(1) Turn the power switch off.

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Turn the Techstream on.

(5) Calibrate the power steering ECU. Enter the following menus: Chassis / EMPS / Data List.

(6) Check the values by referring to the table below.

***Power Steering ECU***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| IG Power Supply | ECU power source voltage/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (IG) |

Standard voltage:

11 to 14 V

NOTICE:

If the IG power supply voltage is 9 V or less, calibration cannot be performed. In this case, charge or replace the battery, and then perform calibration.

(b) Rotation angle sensor calibration value clear, rotation angle sensor value initialization, and torque sensor zero point calibration

NOTICE:

- If DTC C1516 (Torque Sensor Zero Point Adjustment Incomplete) is stored, the torque sensor zero point cannot be calibrated. Clear the DTC before starting calibration.
- If DTC C1526 (Rotation Angle Sensor Initialization Incomplete) is stored, the rotation angle sensor value cannot be initialized. Clear the DTC before starting initialization.

(1) Set the steering wheel to the center point and align the front tires straight ahead.

(2) Turn the power switch off.

(3) Connect the Techstream to the DLC3.

(4) Turn the power switch on (IG).

(5) Turn the Techstream on.

(6) Enter the following menus: Chassis / EMPS / Utility / Torque Sensor Adjustment.

NOTICE:

- Do not turn the steering wheel sharply.
- Do not touch the steering wheel during the torque sensor zero point calibration (for 3 seconds).

(7) Check for DTCs INFO.

NOTICE:

- After rotation angle sensor value initialization and zero point calibration is completed normally, confirm that DTC is not output.
- If DTC C1515, C1516, C1525, C1526, C1534 or C1581 is output, perform troubleshooting for the corresponding DTC.

Result:

| Result | See Procedure |
|---|---|
| DTC C1515 is output. | INFO |
| DTC C1516 is output. | INFO |
| DTC C1525 is output. | INFO |
| DTC C1526 is output. | INFO |
| DTC C1534 is output. | INFO |
| DTC C1581 is output. | INFO |

2. ASSIST MAP WRITING

HINT:

If DTC C1581 is output after torque sensor zero point calibration, perform assist map writing.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Utility / Signal Check.

HINT:

- Follow the instructions on the Techstream to perform Signal Check.
- With DTC C1581 output, performing Signal Check will cause the power steering ECU to enter Test Mode and the assist map will be written automatically.

(f) Check for DTCs INFO.

HINT:

After writing the assist map, if DTC C1581 is output, perform the troubleshooting procedure for DTC C1581 INFO.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Power Steering System*

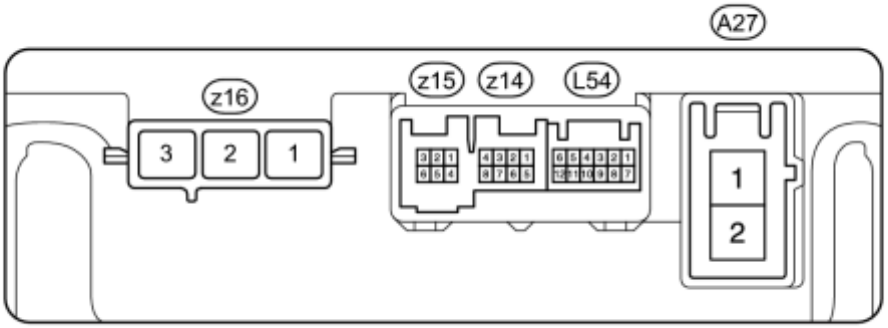
| Symptom | Suspected Area | See page |
|---|---|---|
| Heavy steering | Front tires (improperly inflated, unevenly worn) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Front suspension (lower ball joint) | INFO |
| | Steering column | INFO |
| | Torque sensor (built into steering column) | - |
| | Power steering motor | - |
| | Speed sensor | INFO |
| | Battery and power source system | - |
| | Power steering ECU power source voltage and relay | INFO |
| | Power steering ECU | INFO |
| | Skid control ECU | - |
| Steering effort differs between turning right and left, or steering effort is uneven. | Initialization of rotation angle sensor and calibration of torque sensor zero point are not completed | INFO |
| | Front tires (improperly inflated, unevenly worn) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Front suspension (lower ball joint) | INFO |
| | Power steering gear | INFO |
| | Torque sensor (built into steering column) | - |
| | Steering column | INFO |
| | Power steering motor | - |
| | Power steering ECU | INFO |
| While driving, steering effort does not change in accordance with vehicle speed or the steering wheel does not return properly. | Front suspension (lower ball joint) | INFO |
| | Speed sensor | INFO |
| | Skid control ECU | - |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Combination meter | - |
| | Torque sensor (built into steering column) | - |
| | Power steering motor | - |
| | Power steering ECU | INFO |
| | CAN communication system | - |
| A knocking (or clunking) sound occurs when turning the steering wheel back and forth while power steering is operating. | Front suspension (lower ball joint) | INFO |
| | Steering intermediate shaft | - |
| | Power steering ECU | INFO |
| Noise occurs when turning the steering wheel during low-speed driving. | Power steering gear | INFO |
| | Steering column | INFO |
| Friction occurs when turning the steering wheel during low-speed driving. | Power steering motor | - |
| | Steering column | INFO |
| A high-pitched sound (squeaking) occurs when turning the steering wheel slowly with the vehicle stopped. | Power steering motor | - |
| The steering wheel vibrates and noise occurs when turning the steering wheel from lock to lock with the vehicle stopped. | Power steering gear | INFO |
| | Steering column | INFO |
| P/S warning light remains on. | P/S warning light | INFO |

# TERMINALS OF ECU

1. CHECK POWER STEERING ECU

*1




*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Steering ECU) |

HINT:

As connector z16 uses a lock lever, each terminal cannot be checked while the connector is still connected to the power steering ECU.

| Terminal No. (Symbols) | Wiring Color | Terminal Description |
|---|---|---|
| z16-1 (V) | W | V phase motor output |
| z16-2 (U) | B | U phase motor output |
| z16-3 (W) | R | W phase motor output |

(a) Measure the voltage and resistance according to the value(s) in the table below.

NOTICE:

When the P/S warning light is illuminated during a malfunction, the fail-safe function may cause the voltage of the power steering ECU terminals to become 0 V.

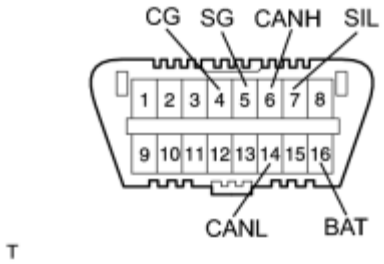
| Terminal No. (Symbols) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A27-1 (PIG) - A27-2 (PGND) | W - W-B | Power source | Always | 11 to 14 V |
| A27-2 (PGND) - Body ground | W-B - Body ground | Power ground | Always | Below 1 Ω |

| Terminal No. (Symbols) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L54-1 (CANH) - L54-7 (CANL) | R - W | CAN communication line | Power switch off | 54 to 69 Ω |
| L54-6 (IG) - A27-2 (PGND) | B - W-B | IG power source | Power switch on (IG) | 11 to 14 V |
| z15-1 (RZV) - A27-2 (PGND) | R - W-B | Rotation angle sensor excitation output signal | Power switch on (READY)<br>Steering wheel turned | 0.68 to 4.42 V |
| z15-3 (RZG) - A27-2 (PGND) | B - W-B | Rotation angle sensor excitation circuit GND | Always | Below 1 Ω |
| z15-5 (RZCS) - A27-2 (PGND) | L - W-B | Rotation angle sensor COS aspect output signal | Power switch on (READY)<br>Steering wheel turned | 0.68 to 4.42 V |
| z15-6 (RZSN) - A27-2 (PGND) | Y - W-B | Rotation angle sensor SIN aspect output signal | Power switch on (READY)<br>Steering wheel turned | 0.68 to 4.42 V |
| z14-5 (TRQ1) - z14-8 (TRQG) | - | Torque sensor signal | Power switch on (READY)<br>Steering wheel not turned (without load) | 2.3 to 2.7 V |
| | | | Power switch on (READY)<br>Steering wheel turned to right with vehicle stopped | 2.5 to 3.8 V |
| | | | Power switch on (READY)<br>Steering wheel turned to left with vehicle stopped | 1.2 to 2.5 V |
| z14-6 (TRQV) - z14-8 (TRQG) | - | Torque sensor voltage source | Power switch on (IG) | 4.5 to 5.5 V |
| z14-7 (TRQ2) - z14-8 (TRQG) | - | Torque sensor signal | Power switch on (READY)<br>Steering wheel not turned (without load) | 2.3 to 2.7 V |
| | | | Power switch on (READY)<br>Steering wheel turned to right with vehicle stopped | 1.2 to 2.5 V |
| | | | Power switch on (READY)<br>Steering wheel turned to left with vehicle stopped | 2.5 to 3.8 V |
| z14-8 (TRQG) - Body ground | - Body ground | Torque sensor ground | Always | Below 1 Ω |

If the result is not as specified, the ECU may have a malfunction.

# DIAGNOSIS SYSTEM

1. CHECK DLC3




T

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.

| Symbol (Terminal No.) | Terminal Description | Condition | Specified Condition |
|---|---|---|---|
| SIL (7) - SG (5) | Bus "+" line | During transmission | Pulse generation |
| CG (4) - Body ground | Chassis ground | Always | Below 1 Ω |
| SG (5) - Body ground | Signal ground | Always | Below 1 Ω |
| BAT (16) - Body ground | Battery positive | Always | 11 to 14 V |
| CANH (6) - CANL (14) | CAN bus line | Power switch off* | 54 to 69 Ω |
| CANH (6) - CG (4) | HIGH-level CAN bus line | Power switch off* | 200 Ω or higher |
| CANL (14) - CG (4) | LOW-level CAN bus line | Power switch off* | 200 Ω or higher |
| CANH (6) - BAT (16) | HIGH-level CAN bus line | Power switch off* | 6 Ω or higher |
| CANL (14) - BAT (16) | LOW-level CAN bus line | Power switch off* | 6 Ω or higher |

NOTICE:

*: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch or any other switches or the doors.

(b) If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

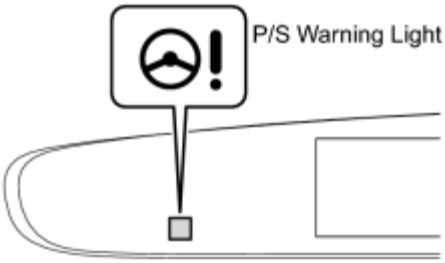
HINT:

Connect the Techstream cable to the DLC3, turn the power switch on (IG) and attempt to use the Techstream. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the Techstream.

- If communication is normal when the Techstream is connected to another vehicle, inspect the DLC3 of the original vehicle.

- If communication is still not possible when the Techstream is connected to another vehicle, the problem may be in the Techstream itself. Consult the Service Department listed in the Techstream instruction manual.

2. CHECK WARNING LIGHT




(a) When a problem occurs in the power steering system, the P/S warning light on the combination meter comes on to inform the driver of the problem.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Read the DTCs following the display on the Techstream. Enter the following menus: Chassis / EMPS / Trouble Codes.

(f) Refer to the Diagnostic Trouble Code Chart for DTC information 

.

2. CLEAR DTC

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Clear the DTCs following the display on the Techstream. Enter the following menus: Chassis / EMPS / Trouble Codes.

(f) According to the display on the Techstream, select the trouble code data display with the clear button.

(g) Turn the power switch off.

(h) Disconnect the Techstream from the DLC3.

# FREEZE FRAME DATA

1. FREEZE FRAME DATA

NOTICE:

- It is difficult to show the specified values (judgment values) clearly because freeze frame data values change significantly due to differences in measurement conditions, surroundings, or vehicle conditions. For this reason, there may be a problem even when the values are within specifications.
- Turn the power switch on (IG) and park the vehicle on level ground. Check the freeze frame data by using the Techstream.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Check the freeze frame data on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Meter Vehicle Velocity | Vehicle speed from meter/<br>Min.: 0 km/h (0 mph)<br>Max.: 300 km/h (186.4 mph) | 0 km/h (0 mph) | Power switch on (READY) and vehicle stopped |
| | | No significant fluctuation | Power switch on (READY) and vehicle driven at a constant speed |
| Motor Actual Current | Amount of current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| Command Value Current | Demanded amount of current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| Steering Angle Velocity | Steering angle speed/<br>Min.: -32768 deg/s<br>Max.: 32767 deg/s | Value changes in proportion to steering effort | Power switch on (READY) and steering wheel is turned |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Thermistor Temperature | ECU substrate temperature/<br>Min.: -40°C (-40°F)<br>Max.: 150°C (302°F) | -40°C to 150°C (-40°F to 302°F) | Power switch on (READY) |
| PIG Power Supply | Power source voltage to active motor/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) and power steering is in operation |
| IG Power Supply | ECU power source voltage/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (IG) |
| Steering Wheel Torque | Steering wheel torque/<br>Min.: -327.68 Nm<br>Max.: 7 Nm | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| Motor Rotation Angle | Motor rotation angle/<br>Min.: 0 deg<br>Max.: 1441.77 deg | During steering operation, motor rotation angle value changes from 0 to 360° | Power switch on (READY) and power steering is in operation |
| Command Val Current 2 | Demanded amount of current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| PIG2 Voltage | Coil rear pressurization voltage/<br>Min.: 0 V<br>Max.: 45.955 V | Approximately 27 V | Power switch on (READY) and steering wheel is not turned |
| | | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Voltage | Motor power supply voltage/<br>Min.: 0 V | Approximately 27 V | Power switch on (READY) and steering wheel is not turned |
| | | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | Max.: 45.955 V | | |
| Motor Terminal Volt (U) | Motor terminal voltage (U phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Terminal Volt (V) | Motor terminal voltage (V phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Terminal Volt (W) | Motor terminal voltage (W phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Torque Sensor 1 Output | Torque sensor voltage/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Power switch on (READY) and steering wheel is not turned (without load) |
| | | 2.5 to 3.8 V | Power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 1.2 to 2.5 V | Power switch on (READY) and steering wheel turned to left with vehicle stopped |
| Torque Sensor 2 Output | Torque sensor voltage/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Power switch on (READY) and steering wheel is not turned (without load) |
| | | 1.2 to 2.5 V | Power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 2.5 to 3.8 V | Power switch on (READY) and steering wheel turned to left with vehicle stopped |
| TRQ1 Zero Point Value | Torque sensor voltage/<br>Min.: 0 V<br>Max.: 5 V | Values differ depending on vehicle | Power switch on (READY) and steering wheel is not turned |
| TRQ2 Zero Point Value | Torque sensor | Values differ depending on vehicle | Power switch on (READY) and steering wheel is not turned |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | voltage/<br><br>Min.: 0 V<br><br>Max.: 5 V | | |
| Ready Status | Ready status/<br><br>READY or OFF | READY or OFF | - |

# FAIL-SAFE CHART

If a problem occurs in the power steering system, the P/S warning light will come on in the combination meter and the power steering assist will be stopped, locked at a particular point, or decreased simultaneously to protect the system.

### *Power Steering System*

| DTC No. | Detection Condition | Fail-safe |
|---|---|---|
| C1511 | Torque sensor malfunction | Power assist stopped |
| C1512 | | |
| C1513 | | |
| C1514 | | |
| C1515 | | |
| C1516 | | |
| C1517 | | |
| C1521 | Motor circuit malfunction | |
| C1522 | | |
| C1523 | | |
| C1524 | | |
| C1525 | Motor rotation angle sensor malfunction | |
| C1526 | | |
| C1528 | | |
| C1531 | ECU malfunction | |
| C1532 | | |
| C1533 | | Assist force restricted |
| C1534 | | |
| C1541 | Vehicle speed signal malfunction | Amount of power assist is locked at 100 km/h (62 mph) level of power assist |
| C1551 | IG power source voltage error | Power assist stopped |
| C1552 | PIG power source voltage error | |
| C1554 | Power source relay malfunction | |
| C1555 | Motor relay malfunction | |
| C1581 | Assist map not written in power steering ECU | Controlled using default map |
| C1582 | Assist map mismatch written in power steering ECU | Controlled using current default map |
| U0129 | Skid control ECU communication error | Amount of power assist is locked at 100 km/h (62 mph) level of power assist |
| U0293 | HV ECU communication error | Power assist stopped |
| U1104 | Driving support ECU communication | Power assist control normally (Lane keeping assist system |

| DTC No. | Detection Condition | Fail-safe |
|---|---|---|
| | error | does not operate) |
| U1105 | Parking assist ECU communication error | Power assist control normally (Parking assist system does not operate) |

HINT:

- The amount of power assist may be decreased to prevent the motor and ECUs from overheating if the steering wheel is continuously turned when the vehicle is either stopped or driven at a low speed, or if the steering wheel is kept at either full lock position for a long time. In such cases, the amount of power assist returns to normal if the steering wheel is not turned for approximately 10 minutes with the power switch on (READY).
- If the battery is not sufficiently charged or the voltage decreases temporarily, the amount of power assist will be reduced and the P/S warning light will come on. In such cases, the amount of power assist returns to normal when the battery voltage recovers.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) According to the display on the Techstream, read the "Data List".

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Meter Vehicle Velocity | Vehicle speed from meter/<br>Min.: 0 km/h (0 mph)<br>Max.: 300 km/h (186.4 mph) | 0 km/h (0 mph) | Power switch on (READY) and vehicle stopped |
| | | No significant fluctuation | Power switch on (READY) and vehicle driven at a constant speed |
| Motor Actual Current | Amount of current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| Command Value Current | Demanded amount of current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Steering Angle Velocity | Steering angle speed/<br>Min.: -32768 deg/s<br>Max.: 32767 deg/s | Value changes in proportion to steering effort | Power switch on (READY) and steering wheel is turned |
| Thermistor Temperature | ECU substrate temperature/<br>Min.: -40°C (-40°F)<br>Max.: 150°C (302°F) | -40°C to 150°C (-40°F to 302°F) | Power switch on (READY) |
| PIG Power Supply | Power source voltage to active motor/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) and power steering is in operation |
| IG Power Supply | ECU power source voltage/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (IG) |
| Steering Angle Sens Sig | Steering angle sensor signal state/<br>OK or NG(1) or NG(2) or NG(3) | OK: Steering angle sensor signal is received<br>NG(1): The learning has not completed<br>NG(2): Steering Sensor Abnormal<br>NG(3): Communication Error | - |
| Steering Wheel Torque | Steering wheel torque/<br>Min.: -327.68 Nm<br>Max.: 7 Nm | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |
| Motor Rotation Angle | Motor rotation angle/<br>Min.: 0 deg<br>Max.: 1441.77 deg | During steering operation, motor rotation angle value changes from 0 to 360° | Power switch on (READY) and power steering is in operation |
| Command Val Current 2 | Demanded amount of current to motor/<br>Min.: -327.68 A<br>Max.: 327.67 A | Value changes in proportion to steering effort | Power switch on (READY) and power steering is in operation |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| PIG2 Voltage | Coil rear pressurization voltage/<br>Min.: 0 V<br>Max.: 45.955 V | Approximately 27 V | Power switch on (READY) and steering wheel is not turned |
| | | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Voltage | Motor power supply voltage/<br>Min.: 0 V<br>Max.: 45.955 V | Approximately 27 V | Power switch on (READY) and steering wheel is not turned |
| | | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Terminal Volt (U) | Motor terminal voltage (U phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Terminal Volt (V) | Motor terminal voltage (V phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Terminal Volt (W) | Motor terminal voltage (W phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Torque Sensor 1 Output | Torque sensor voltage/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Power switch on (READY) and steering wheel is not turned (without load) |
| | | 2.5 to 3.8 V | Power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 1.2 to 2.5 V | Power switch on (READY) and steering wheel turned to left with vehicle stopped |
| Torque Sensor 2 Output | Torque sensor voltage/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Power switch on (READY) and steering wheel is not turned (without load) |
| | | 1.2 to 2.5 V | Power switch on (READY) and steering wheel turned to right with vehicle stopped |
| | | 2.5 to 3.8 V | Power switch on (READY) and |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | | steering wheel turned to left with vehicle stopped |
| TRQ1 Zero Point Value | Torque sensor voltage/<br><br>Min.: 0 V<br><br>Max.: 5 V | Values differ depending on vehicle | Power switch on (READY) and steering wheel is not turned |
| TRQ2 Zero Point Value | Torque sensor voltage/<br><br>Min.: 0 V<br><br>Max.: 5 V | Values differ depending on vehicle | Power switch on (READY) and steering wheel is not turned |
| IG ON/OFF Times | Number of times of power switch ON/OFF after fail detection/<br><br>Min.: 0 time<br><br>Max.: 65535 times | - | This value indicates the number of times of IG ON/OFF after the latest DTC detection. |
| Motor Overheat Record | Continuous overheat prevention control record/<br><br>Unrec or Rec | Unrec | - |
| Motor Lo Power Record | PIG power source voltage drop record/<br><br>Unrec or Rec | Unrec | - |
| Eng Rev Inter Record | Record of READY ON signal interruption/<br><br>Unrec or Rec | Unrec | - |
| Str Angle Inter Record | Record of steering sensor signal interruption occurrence display/<br><br>Unrec or Rec | Unrec | - |
| Spd Sig Invalid Record | Record of vehicle speed signal invalid/<br><br>Unrec or Rec | Unrec | - |
| Battery Voltage Lo Record | Battery voltage reduction history/<br><br>Min.: 0 times, Max.: 65535 times | 0 to 65535 | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Ready Status | Ready status/<br><br>READY or OFF | READY or OFF | - |
| The Number of DTCs | Number of detected DTCs when freeze frame data stored/<br><br>Min.: 0<br><br>Max.: 255 | 0 to 255 | - |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If any DTCs are displayed during the DTC check, inspect the circuit listed for those DTCs. For details of each DTC, refer to the page indicated in the DTC chart.

### *Power Steering System*

| DTC Code | Detection Item | Trouble Area | Return-to-normal Condition | P/S Warning Light | See page |
|---|---|---|---|---|---|
| C1511 | Torque Sensor Circuit Malfunction | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1512 | Torque Sensor Circuit Malfunction | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1513 | Torque Sensor Circuit Malfunction | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1514 | Torque Sensor Power Supply Abnormal | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1515 | Torque Sensor Zero Point Adjustment Undone | - | Zero point calibration occurs | ○ | INFO |
| C1516 | Torque Sensor Zero Point Adjustment Incomplete | - | Clear DTC | ○ | INFO |
| C1517 | Torque Hold Abnormal | 1. Steering column assembly (Torque sensor)<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1521 | Motor Circuit Malfunction | Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1522 | Motor Circuit Malfunction | 1. Steering column assembly<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1523 | Motor Circuit Malfunction | 1. Steering column assembly<br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1524 | Motor Circuit Malfunction | 1. Steering column | Power switch on (IG) | ○ | INFO |

| DTC Code | Detection Item | Trouble Area | Return-to-normal Condition | P/S Warning Light | See page |
|---|---|---|---|---|---|
| | | assembly<br><br>2. Power steering ECU | again | | |
| C1525 | Rotation Angle Sensor Initialization Undone | - | Rotation angle sensor calibration occurs | ○ | INFO |
| C1526 | Rotation Angle Sensor Initialization Incomplete | - | Clear DTC | ○ | INFO |
| C1528 | Motor Rotation Angle Sensor Malfunction | 1. Steering column assembly (Motor rotation angle sensor)<br><br>2. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1531 | ECU Malfunction | Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1532 | ECU Malfunction | Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1533 | ECU Malfunction | Power steering ECU | After normal judgment | X | INFO |
| C1534 | ECU Malfunction | Power steering ECU | After normal judgment | X | INFO |
| C1541 | Vehicle Speed Signal Malfunction | 1. Speed sensor circuit<br><br>2. Skid control ECU<br><br>3. CAN communication system<br><br>4. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1551 | IG Power Supply Voltage Malfunction | 1. ECU-IG No. 2 fuse<br><br>2. IG power source circuit<br><br>3. Power steering ECU | Power switch on (IG) again or after normal confirmation | ○ | INFO |
| C1552 | PIG Power Supply Voltage Malfunction | 1. EPS fuse<br><br>2. PIG power source circuit<br><br>3. Power steering ECU | Power switch on (IG) again or after normal confirmation | ○ | INFO |
| C1554 | Power Supply Relay Failure | 1. EPS fuse<br><br>2. PIG power source circuit<br><br>3. Power steering ECU | Power switch on (IG) again | ○ | INFO |
| C1555 | Motor Relay Welding Failure | 1. Steering column | Power switch on (IG) again | ○ | INFO |

| DTC Code | Detection Item | Trouble Area | Return-to-normal Condition | P/S Warning Light | See page |
|---|---|---|---|---|---|
| | | assembly<br><br>2. Power steering ECU | | | |
| C1581 | Assist Map Number Un-Writing | 1. Power steering ECU<br><br>2. CAN communication system<br><br>3. Hybrid control system | Assist map written | ○ | INFO |
| C1582 | Assist Map Number Mismatch | 1. Power steering ECU<br><br>2. CAN communication system<br><br>3. Power management control ECU | Power switch on (IG) again | ○ | INFO |
| U0129 | Lost Communication with Brake System Control Module | 1. CAN communication system<br><br>2. Skid control ECU | After normal confirmation | ○ | INFO |
| U0293 | Lost Communication with HV ECU | 1. CAN communication system<br><br>2. Power management control ECU | After normal confirmation | ○ | INFO |
| U1104 | Lost Communication with Driving Support ECU | 1. CAN communication system<br><br>2. Driving support ECU | After normal confirmation | X | INFO |
| U1105 | Lost Communication with Parking Assist ECU | 1. CAN communication system<br><br>2. Parking assist ECU | After normal confirmation | X | INFO |

HINT:

- ○: Warning light comes on
- X: Warning light turns off (normal reset)

# ON-VEHICLE INSPECTION

1. CHECK STEERING EFFORT (TORQUE)

NOTICE:

Some of these service operations may affect the SRS airbags. Read the precautionary notices concerning the SRS airbag system before servicing.

(a) Stop the vehicle on a level, paved surface and align the wheels straight ahead.

(b) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

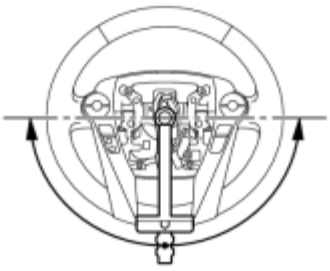
(c) Remove the steering pad INFO.

(d) Connect the cable to the negative (-) battery terminal.

(e) Using a torque wrench, check that the steering wheel set nut is properly tightened.

Torque: **50 N·m (510 kgf·cm, 37ft·lbf)**

(f) Turn the power switch on (READY) so that the power steering is ready to operate.



C

(g) Turn the steering wheel 90 degrees to the right and check the steering effort (torque) while continuing to turn it further in the same direction.

Standard steering effort (Reference):

6.0 N*m (61 kgf*cm, 53 in.*lbf) or less

(h) Align the front wheels facing straight ahead.

(i) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(j) Install the steering pad INFO.

(k) Connect the cable to the negative (-) battery terminal.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

(l) Clear the DTCs INFO.

(m) Inspect the airbag warning light INFO.

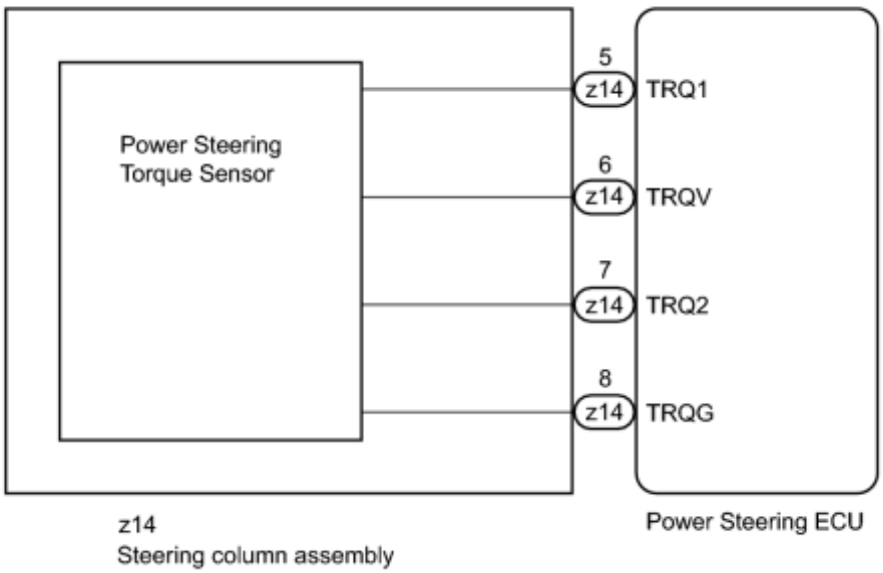
| | | |
|---|---|---|
| DTC | C1511 | Torque Sensor Circuit Malfunction |
| DTC | C1512 | Torque Sensor Circuit Malfunction |
| DTC | C1513 | Torque Sensor Circuit Malfunction |
| DTC | C1514 | Torque Sensor Power Supply Abnormal |
| DTC | C1517 | Torque Hold Abnormal |

# DESCRIPTION

The torque sensor converts the rotation torque input from the steering wheel into electric signals and sends them to the power steering ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1511 | Torque sensor malfunction | • Steering column assembly (Torque sensor)<br>• Power steering ECU |
| C1512 | | |
| C1513 | | |
| C1514 | | |
| C1517 | | |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION (TORQUE SENSOR - ECU) |

(a) Check the installation condition of the torque sensor connector.

OK:

Torque sensor connector is securely connected to the power steering ECU.

NG ▶ CONNECT CONNECTOR

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (TORQUE SENSOR1, TORQUE SENSOR2) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the items "Torque sensor 1 output" and "Torque sensor 2 output" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Torque Sensor 1 Output | Torque sensor voltage/<br>Min.: 0 V<br>Max.: 5 V | 2.3 to 2.7 V | Power switch on (READY)<br>Steering wheel not turned (without load) |
| | | 2.5 to 3.8 V | Power switch on (READY)<br>Steering wheel turned to right with vehicle stopped |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | 1.2 to 2.5 V | Power switch on (READY)<br><br>Steering wheel turned to left with vehicle stopped |
| Torque Sensor 2 Output | Torque sensor voltage/<br><br>Min.: 0 V<br><br>Max.: 5 V | 2.3 to 2.7 V | Power switch on (READY)<br><br>Steering wheel not turned (without load) |
| | | 1.2 to 2.5 V | Power switch on (READY)<br><br>Steering wheel turned to right with vehicle stopped |
| | | 2.5 to 3.8 V | Power switch on (READY)<br><br>Steering wheel turned to left with vehicle stopped |

OK:

Normal condition value is displayed on the Techstream during each steering operation.

NG ▶ CHECK POWER STEERING ECU (TRQV VOLTAGE)

OK ▶ **REPLACE POWER STEERING ECU**

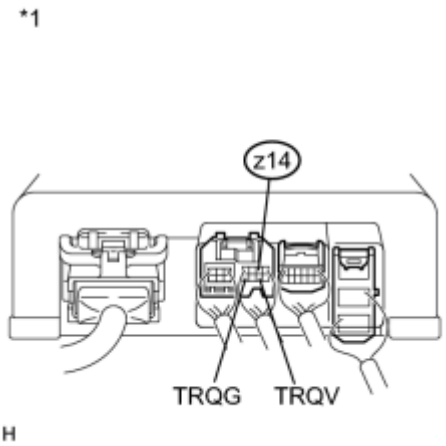
| | |
|---|---|
| 3. | CHECK POWER STEERING ECU (TRQV VOLTAGE) |

(a) Turn the power switch on (READY).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z14-6 (TRQV) - z14-8 (TRQG) | Power switch on (READY) | 4.5 to 5.5 V |




*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Steering ECU) |

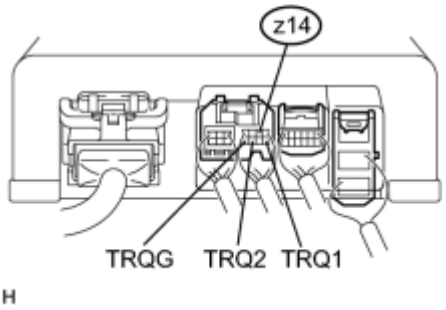
NG ▶ REPLACE POWER STEERING ECU

OK

▼

| | |
|---|---|
| 4. | CHECK POWER STEERING ECU (TRQ1, TRQ2 VOLTAGE) |

*1




(a) Turn the power switch on (READY).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition (Steering Wheel Position) | Specified Condition |
|---|---|---|
| z14-5 (TRQ1) - z14-8 (TRQG) | Power switch on (READY)<br>Steering wheel not turned (without load) | 2.3 to 2.7 V |
| | Power switch on (READY)<br>Steering wheel turned to right with vehicle stopped | 2.5 to 3.8 V |
| | Power switch on (READY)<br>Steering wheel turned to left with vehicle stopped | 1.2 to 2.5 V |
| z14-7 (TRQ2) - z14-8 (TRQG) | Power switch on (READY)<br>Steering wheel not turned (without load) | 2.3 to 2.7 V |
| | Power switch on (READY)<br>Steering wheel turned to right with vehicle stopped | 1.2 to 2.5 V |
| | Power switch on (READY)<br>Steering wheel turned to left with vehicle stopped | 2.5 to 3.8 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br>(Power Steering ECU) |

NG ▶ REPLACE STEERING COLUMN ASSEMBLY

OK

**REPLACE POWER STEERING ECU**

| | | |
|---|---|---|
| DTC | C1515 | Torque Sensor Zero Point Adjustment Undone |
| DTC | C1525 | Rotation Angle Sensor Initialization Undone |

# DESCRIPTION

These DTCs do not indicate a malfunction. The power steering ECU outputs these DTCs when it determines that the rotation angle sensor value initialization and torque sensor zero point calibration have not been performed.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1515 | This DTC is detected when torque sensor zero point calibration has not been performed. | There is no malfunction if this DTC is not output again after performing zero point calibration. |
| C1525 | This DTC is detected when rotation angle sensor value initialization has not been performed. | There is no malfunction if this DTC is not output again after performing rotation angle sensor value initialization. |

# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | INITIALIZE ROTATION ANGLE SENSOR VALUE AND CALIBRATE TORQUE SENSOR ZERO POINT |

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point INFO.

NEXT

| | |
|---|---|
| 2. | CHECK FOR DTC |

(a) Check for DTCs INFO.

Result:

| Condition | Proceed to |
|---|---|
| DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times*1. | A |
| DTCs are still output even after performing rotation angle sensor value initialization and steering | B |

| Condition | Proceed to |
|---|---|
| zero point calibration once or twice*2. | |
| Normal system code is output. | C |

HINT:

- *1: The power steering ECU must be replaced if DTC C1515 or C1525 is still output even after the rotation angle sensor value initialization and torque sensor zero point calibration is performed 3 times.
- *2: Perform the rotation angle sensor value initialization and torque sensor zero point calibration again if DTC C1515 or C1525 is still output even after the rotation angle sensor value initialization and calibration is performed once or twice.

C ▶ END

B ▶ PERFORM ROTATION ANGLE SENSOR VALUE INITIALIZATION AND ZERO POINT CALIBRATION AGAIN

A ▼

| | |
|---|---|
| 3. | REPLACE POWER STEERING ECU |

(a) Replace the power steering ECU INFO.

NEXT ▼

| | |
|---|---|
| 4. | INITIALIZE ROTATION ANGLE SENSOR VALUE AND CALIBRATE TORQUE SENSOR ZERO POINT |

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point INFO.

NEXT ▼

| | |
|---|---|
| 5. | CHECK FOR DTC |

(a) Check for DTCs INFO.

Result:

| Condition | Proceed to |
|---|---|
| DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times*1. | A |
| DTCs are still output even after performing rotation angle sensor value initialization and steering zero point calibration twice*2. | B |
| Normal system code is output. | C |

HINT:

- *1: The steering column assembly must be replaced if DTC C1515 or C1525 is still output even after the rotation angle sensor value initialization and torque sensor zero point calibration is performed 3 times.
- *2: Perform the rotation angle sensor value initialization and torque sensor zero point calibration again if DTC C1515 or C1525 is still output even after the rotation angle sensor value initialization and calibration is performed twice.

NOTICE:

If replacing the steering column assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point INFO.

C ▶ END

B ▶ PERFORM ROTATION ANGLE SENSOR VALUE INITIALIZATION AND ZERO POINT CALIBRATION AGAIN

A ▶ **REPLACE STEERING COLUMN ASSEMBLY**

| | | |
|---|---|---|
| DTC | C1516 | Torque Sensor Zero Point Adjustment Incomplete |
| DTC | C1526 | Rotation Angle Sensor Initialization Incomplete |

# DESCRIPTION

These DTCs do not indicate a malfunction. The power steering ECU outputs these DTCs when it determines that the rotation angle sensor value initialization and torque sensor zero point calibration are incomplete.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1516 | Torque sensor zero point calibration is incomplete due to the steering wheel being touched during calibration. | There is no malfunction if this DTC is not output again after clearing the DTCs and torque sensor calibration value, and performing zero point calibration. |
| C1526 | Rotation angle sensor value initialization is incomplete due to the steering wheel being touched during calibration. | There is no malfunction if this DTC is not output again after clearing the DTCs and torque sensor calibration value, and performing rotation angle sensor value initialization. |

# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CLEAR DTC |

(a) Clear the DTCs INFO.

NEXT

| | |
|---|---|
| 2. | INITIALIZE ROTATION ANGLE SENSOR VALUE AND CALIBRATE TORQUE SENSOR ZERO POINT |

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point INFO.

NEXT

| | |
|---|---|
| 3. | CHECK FOR DTC |

(a) Check for DTCs INFO.

Result:

| Condition | Proceed to |
|---|---|
| DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times*1. | A |
| DTCs are still output even after performing rotation angle sensor value initialization and steering zero point calibration once or twice*2. | B |
| Normal system code is output. | C |

HINT:

- *1: The power steering ECU must be replaced if DTC C1516 or C1526 is still output even after the rotation angle sensor value initialization and torque sensor zero point calibration is performed 3 times.
- *2: Perform the rotation angle sensor value initialization and torque sensor zero point calibration again if DTC C1516 or C1526 is still output even after the rotation angle sensor value initialization and calibration is performed once or twice.

C ▶ END

B ▶ PERFORM ROTATION ANGLE SENSOR VALUE INITIALIZATION AND ZERO POINT CALIBRATION AGAIN

A ▼

| | |
|---|---|
| 4. | REPLACE POWER STEERING ECU |

(a) Replace the power steering ECU INFO.

NEXT ▼

| | |
|---|---|
| 5. | CLEAR DTC |

(a) Clear the DTCs INFO.

NEXT ▼

| | |
|---|---|
| 6. | INITIALIZE ROTATION ANGLE SENSOR VALUE AND CALIBRATE TORQUE SENSOR ZERO POINT |

(a) Initialize the rotation angle sensor value and calibrate the torque sensor zero point INFO.

NEXT ▼

| | |
|---|---|
| 7. | CHECK FOR DTC |

(a) Check for DTCs INFO.

Result:

| Condition | Proceed to |
|---|---|
| DTCs are still output after performing rotation angle sensor value initialization and steering zero point calibration 3 times*1. | A |
| DTCs are still output even after performing rotation angle sensor value initialization and steering zero point calibration twice*2. | B |
| Normal system code is output. | C |

HINT:

- *1: The steering column assembly must be replaced if DTC C1516 or C1526 is still output even after the rotation angle sensor value initialization and torque sensor zero point calibration is performed 3 times.
- *2: Perform the rotation angle sensor value initialization and torque sensor zero point calibration again if DTC C1516 or C1526 is still output even after the rotation angle sensor value initialization and calibration is performed twice.

NOTICE:

If replacing the steering column assembly, clear the rotation angle sensor calibration value, initialize the rotation angle sensor value, and calibrate the torque sensor zero point INFO.

C ▶ END

B ▶ PERFORM ROTATION ANGLE SENSOR VALUE INITIALIZATION AND ZERO POINT CALIBRATION AGAIN

A ▶ **REPLACE STEERING COLUMN ASSEMBLY**

| | | |
|---|---|---|
| DTC | C1521 | Motor Circuit Malfunction |
| DTC | C1531 | ECU Malfunction |
| DTC | C1532 | ECU Malfunction |
| DTC | C1533 | ECU Malfunction |
| DTC | C1534 | ECU Malfunction |

# DESCRIPTION

If the power steering ECU detects these DTCs, it will shut off the motor relay circuit (built into the power steering ECU) and stop power assist. However, power assist continues if DTC C1533 or C1534 is output.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1521 | Motor overcurrent | Power steering ECU |
| C1531 | ECU internal malfunction (CPU malfunction) | |
| C1532 | ECU internal malfunction (Peripheral circuit malfunction) | |
| C1533 | ECU internal malfunction (Substrate temperature sensor malfunction) | |
| C1534 | ECU internal malfunction (EEPROM error) | |

# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Clear the DTCs INFO.

(b) Check for DTCs. INFO

OK:

DTC is not output.

NG ▶ REPLACE POWER STEERING ECU

OK ▶ **CHECK INTERMITTENT PROBLEMS**

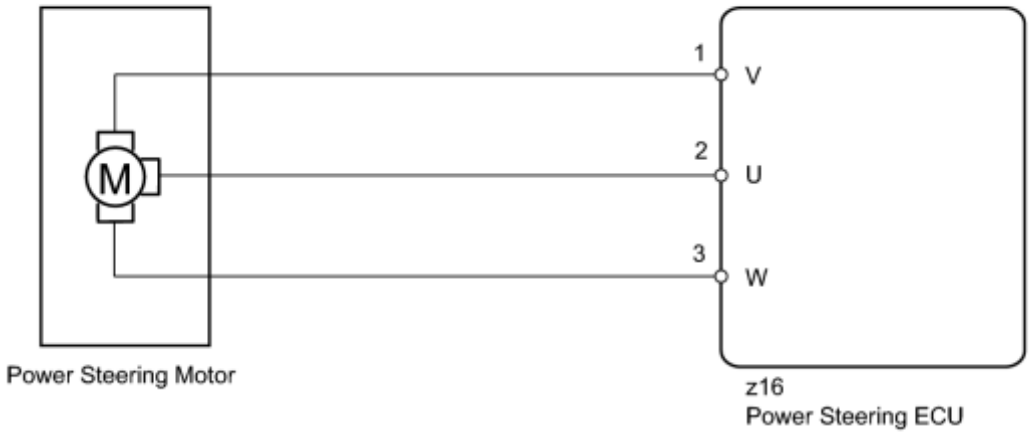
| | | |
|---|---|---|
| DTC | C1522 | Motor Circuit Malfunction |
| DTC | C1523 | Motor Circuit Malfunction |
| DTC | C1524 | Motor Circuit Malfunction |
| DTC | C1555 | Motor Relay Welding Failure |

# DESCRIPTION

The power steering ECU supplies the current to the power steering motor through the motor circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1522 | Motor current sensor malfunction | • Steering column assembly<br>• Power steering ECU |
| C1523 | Excessively large current deviation | |
| C1524 | Short (or open) in motor circuit or abnormal voltage or current in motor circuit | |
| C1555 | Motor relay circuit malfunction | |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (MOTOR VOLTAGE) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the items "Motor Terminal Volt(U)", "Motor Terminal Volt(V)" and "Motor Terminal Volt(W)" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Motor Terminal Volt (U) | Motor terminal voltage (U phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Terminal Volt (V) | Motor terminal voltage (V phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |
| Motor Terminal Volt (W) | Motor terminal voltage (W phase)/<br>Min.: 0 V<br>Max.: 46.667 V | Value changes within 4 to 35 V range | Power switch on (READY) and steering wheel is turned |

Result:

| Result | Proceed to |
|---|---|
| During steering operation, value changes within 4 to 35 V range | A |
| During steering operation, voltage is not generated | B |

B ▶ REPLACE STEERING COLUMN ASSEMBLY

A ▶ **REPLACE POWER STEERING ECU**

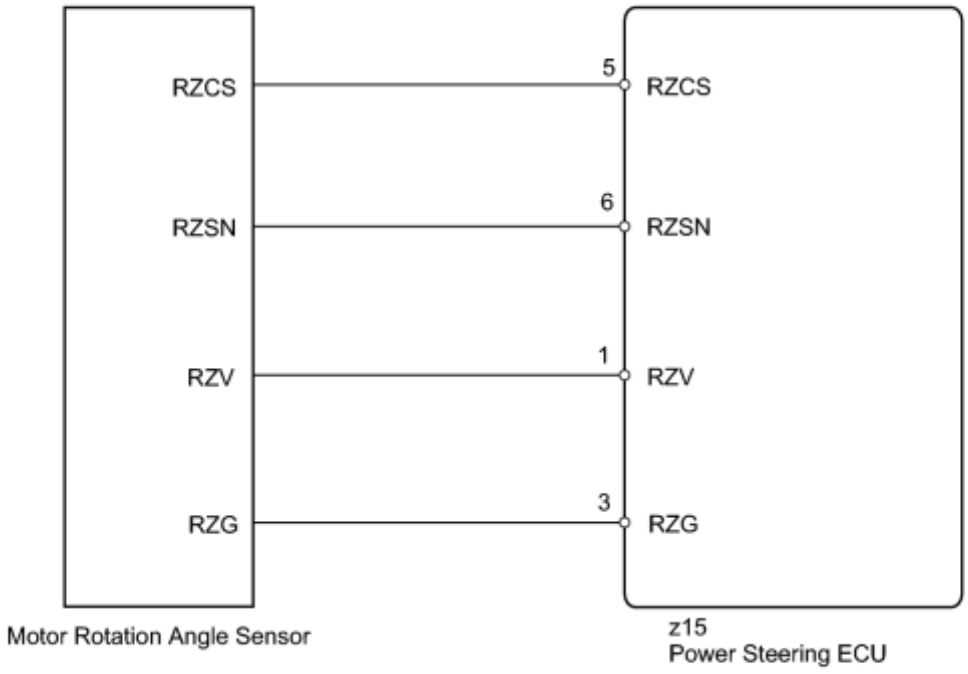
| DTC | C1528 | Motor Rotation Angle Sensor Malfunction |
|---|---|---|

# DESCRIPTION

The motor rotation angle sensor detects the motor rotation angle and sends this information to the power steering ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1528 | Motor rotation angle sensor malfunction | • Steering column assembly (Motor rotation angle sensor)<br>• Power steering ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION |

(a) Check the installation condition of the motor rotation angle sensor connector.

OK:

Motor rotation angle sensor connector is securely connected to the power steering ECU.

NG ▶ CONNECT CONNECTOR

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (MOTOR ROTATION ANGLE SENSOR) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the item "Motor Rotation Angle" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Motor Rotation Angle | Motor rotation angle/<br><br>Min.: 0 deg<br><br>Max.: 1441.77 deg | During steering operation, motor rotation angle value changes from 0 to 360° | Power switch on (READY) and power steering in operation |

OK:

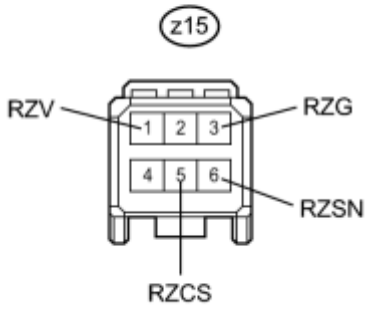
During steering operation, motor rotation angle value changes from 0 to 360°.

NG ▶ CHECK STEERING COLUMN ASSEMBLY

OK ▶ **REPLACE POWER STEERING ECU**

| | |
|---|---|
| 3. | CHECK STEERING COLUMN ASSEMBLY |

*1




H

(a) Disconnect the connector from the motor rotation angle sensor.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z15-6 (RZSN) - z15-3 (RZG) | Always | 75.2 to 112.8 Ω |
| z15-1 (RZV) - z15-3 (RZG) | Always | 27.6 to 41.4 Ω |
| z15-5 (RZCS) - z15-3 (RZG) | Always | 73.2 to 110.8 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Motor Rotation Angle Sensor) |

NG ▶ REPLACE STEERING COLUMN ASSEMBLY

OK ▶ **REPLACE POWER STEERING ECU**

| DTC | C1541 | Vehicle Speed Signal Malfunction |
|---|---|---|

# DESCRIPTION

The power steering ECU receives vehicle speed signals from the skid control ECU via CAN communication. The ECU provides appropriate assisting force in accordance with the vehicle speed, based on the signals.

If the ECU detects this DTC, it adjusts the amount of power assistance for a speed of 100 km/h (62 mph) and continues the system control.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1541 | This DTC is detected when vehicle speed signals via CAN communication are cut off for 3 seconds or more. | • Speed sensor circuit<br>• Skid control ECU<br>• CAN communication system<br>• Power steering ECU |

# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| 1. | CHECK OTHER DTC OUTPUT (CAN COMMUNICATION SYSTEM) |
|---|---|

(a) Check if DTC U0129 is output.

Result:

| Result | Proceed to |
|---|---|
| No output | A |
| U0129 is output | B |

HINT:

DTC U0129 indicates a skid control ECU communication malfunction in the power steering system.

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK OTHER DTC OUTPUT (ELECTRONICALLY CONTROLLED BRAKE SYSTEM) |

(a) Check for DTCs of the electronically controlled brake system INFO.

OK:

DTC of speed sensor malfunction is not output.

NOTICE:

If replacing the power steering ECU, initialize the rotation angle sensor and calibrate the torque sensor zero point INFO.

NG ▶ REPAIR CIRCUIT INDICATED BY OUTPUT CODE (for Electronically Controlled Brake System)
OK ▶ **REPLACE POWER STEERING ECU**

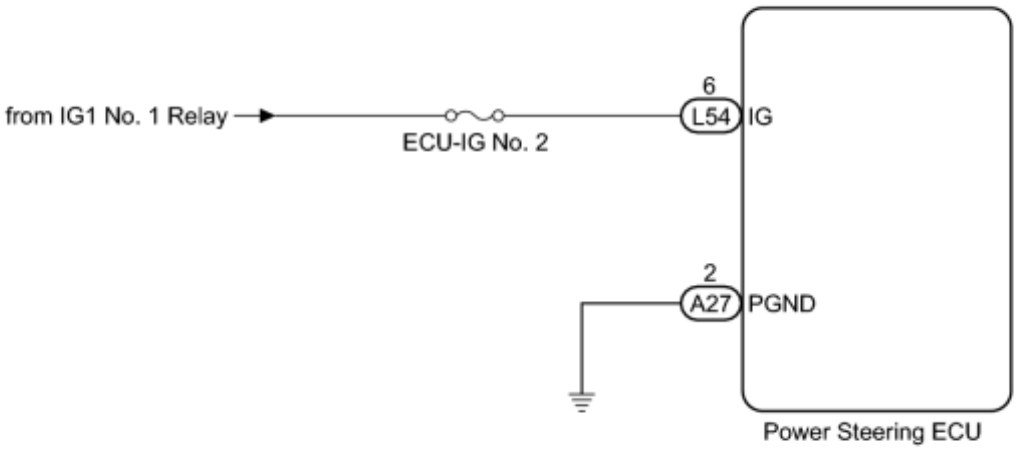
| DTC | C1551 | IG Power Supply Voltage Malfunction |
|---|---|---|

# DESCRIPTION

The power steering ECU distinguishes the power switch status as on (IG) or off through the IG power source circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1551 | IG power source circuit malfunction inside ECU | • ECU-IG No. 2 fuse<br>• IG power source circuit<br>• Power steering ECU |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

HINT:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (IG POWER SUPPLY) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the item "IG power supply" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| IG power supply | IG power supply/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (IG) |

OK:

The normal condition value is displayed on the Techstream.

NG ▶ CHECK HARNESS AND CONNECTOR (BATTERY - POWER STEERING ECU)

OK ▶ **CHECK INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (BATTERY - POWER STEERING ECU) |

(a) Disconnect the connectors from the power steering ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L54-6 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
| --- | --- | --- |
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER STEERING ECU**

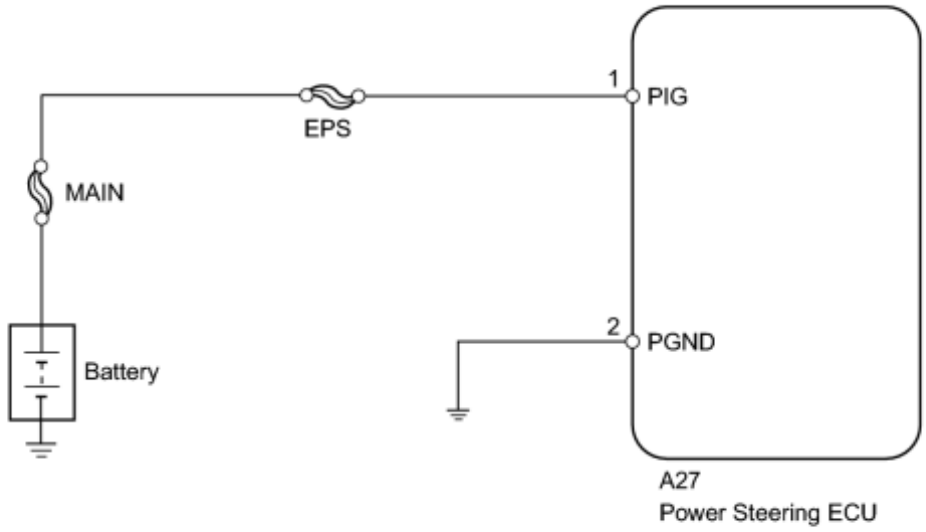
| | | |
|---|---|---|
| DTC | C1552 | PIG Power Supply Voltage Malfunction |
| DTC | C1554 | Power Supply Relay Failure |

# DESCRIPTION

When a problem occurs in the power steering system, the power source relay circuit is shut off to stop the power assist.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1552 | PIG power source circuit malfunction inside ECU | • EPS fuse<br>• PIG power source circuit<br>• Power steering ECU |
| C1554 | Power source relay circuit malfunction | • EPS fuse<br>• PIG power source circuit<br>• Power steering ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor initialization and torque sensor zero point calibration INFO.

HINT:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (PIG POWER SUPPLY) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (READY).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Select the item "PIG power supply" in the Data List and read the value displayed on the Techstream.

***EMPS***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| PIG power supply | PIG power supply/<br>Min.: 0 V<br>Max.: 20.1531 V | 11 to 14 V | Power switch on (READY) and power steering in operation |

OK:

The normal condition value is displayed on the Techstream.

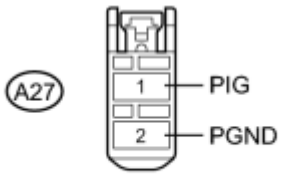
NG ▶ CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BATTERY AND BODY GROUND)

OK ▶ **CHECK INTERMITTENT PROBLEMS**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BATTERY AND BODY GROUND) |

(a) Disconnect the connector from the power steering ECU.

*1




H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-1 (PIG) - Body ground | Always | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Steering ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER STEERING ECU**

| DTC | C1581 | Assist Map Number Un-Writing |
|---|---|---|

# DESCRIPTION

The power steering ECU outputs this DTC when it determines that the assist map is not written in the ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1581 | Assist map not written in power steering ECU | • Power steering ECU<br>• Hybrid control system<br>• CAN communication system |

# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| 1. | PERFORM ASSIST MAP WRITING |
|---|---|

(a) Perform the assist map writing INFO.

NEXT

| 2. | CHECK FOR DTC |
|---|---|

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is still output even after performing assist map writing 3 times. | A |
| DTC is still output even after performing assist map writing once or twice*1 | B |
| DTC is not output. | C |

HINT:

*1: Perform the assist map writing again if DTC C1581 is still output even after the assist map writing is performed once or twice.

C END

B ▶ PERFORM ASSIST MAP WRITING AGAIN

A ▼

| | |
|---|---|
| 3. | CHECK FOR DTC (CAN COMMUNICATION SYSTEM) |

(a) Check for DTCs INFO.

OK:

DTC is not output.

HINT:

If the CAN communication system DTC is output, first troubleshoot the CAN communication system malfunction, then perform the assist map writing again INFO.

NG ▶ GO TO CAN COMMUNICATION SYSTEM

OK ▼

| | |
|---|---|
| 4. | CHECK FOR DTC (HYBRID CONTROL SYSTEM) |

(a) Check for DTCs INFO.

OK:

DTC is not output.

HINT:

If the hybrid control system DTC is output, first troubleshoot the hybrid control system, then perform the assist map writing again INFO.

NG ▶ GO TO HYBRID CONTROL SYSTEM

OK ▶ **REPLACE POWER STEERING ECU**

| DTC | C1582 | Assist Map Number Mismatch |
|---|---|---|

# DESCRIPTION

When an incorrect skid control ECU is installed after the assist map has been recorded in the power steering ECU, then DTC C1582 is stored because the data does not match the vehicle specifications.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C1582 | Assist map number mismatch | • Power steering ECU<br>• CAN communication system<br>• Power management control ECU |

# INSPECTION PROCEDURE

NOTICE:

If the power steering ECU has been replaced with a new one, perform the rotation angle sensor value initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| 1. | CHECK FOR DTC (CAN COMMUNICATION SYSTEM) |
|---|---|

(a) Using the Techstream, check for DTCs and confirm that there are no problems in the CAN communication system INFO.

OK:

DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM
OK ▼

| 2. | CHECK POWER MANAGEMENT CONTROL ECU |
|---|---|

(a) Check if a power management control ECU that complies with the vehicle specifications is installed.

OK:

The power management control ECU that complies with vehicle specifications is installed.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **REPLACE POWER STEERING ECU**

| | | |
|---|---|---|
| DTC | U0129 | Lost Communication with Brake System Control Module |
| DTC | U0293 | Lost Communication with HV ECU |
| DTC | U1104 | Lost Communication with Driving Support ECU |
| DTC | U1105 | Lost Communication with Parking Assist ECU |

# DESCRIPTION

The power steering ECU receives signals from the power management control ECU, the skid control ECU, the driving support ECU and the parking assist ECU via the CAN communication system.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0129 | Lost communication with brake system control module | • CAN communication system<br>• Skid control ECU |
| U0293 | Lost communication with power management control ECU | • CAN communication system<br>• Power management control ECU |
| U1104 | Lost communication with driving support ECU | • CAN communication system<br>• Driving support ECU |
| U1105 | Lost communication with parking assist ECU | • CAN communication system<br>• Parking assist ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Clear the DTCs INFO.

(b) Check for DTCs INFO.

OK:

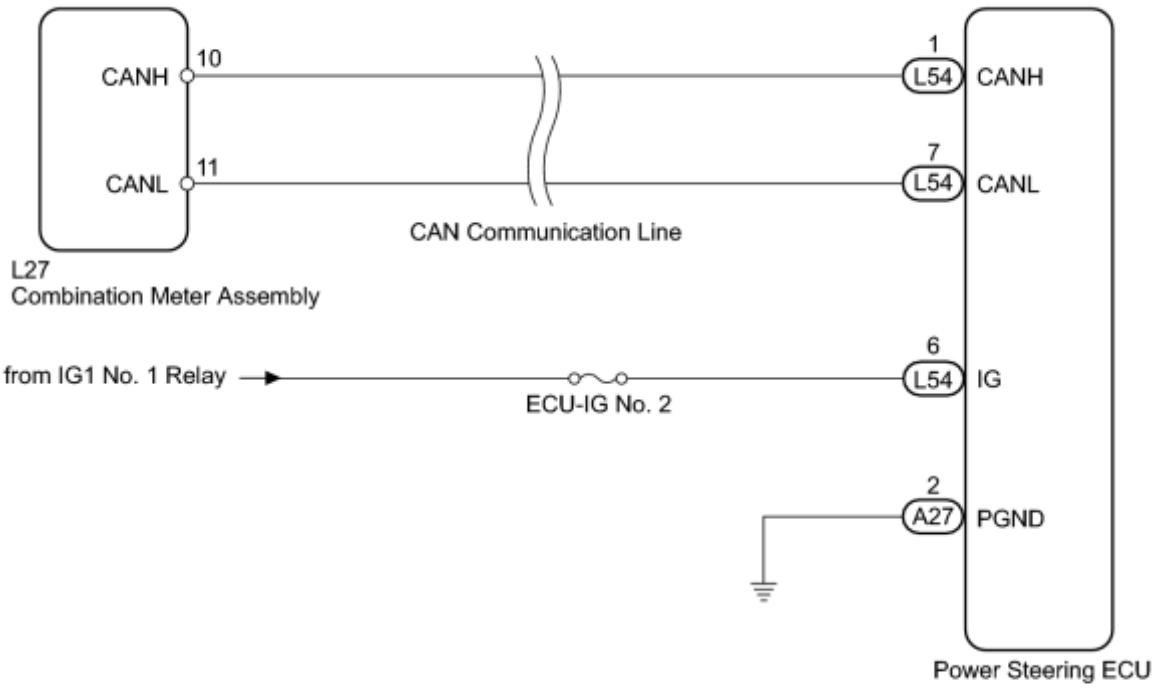
DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM
OK ▶ **CHECK INTERMITTENT PROBLEMS**

# DESCRIPTION

If the power steering ECU detects a malfunction, the P/S warning light comes on. At this time, the power steering ECU stores a DTC in its memory.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC (CAN COMMUNICATION SYSTEM) |

(a) Check for DTCs INFO.

OK:

DTC is not output.

NG GO TO CAN COMMUNICATION SYSTEM

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BODY GROUND) |

(a) Disconnect the connectors from the power steering ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L54-6 (IG) - A27-2 (PGND) | Power switch on (IG) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(f) Perform the Active Test of the combination meter using the Techstream.

*Combination Meter*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. EPS | EPS warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |

(g) Check that the EPS warning light operates in accordance with the Active Test.

HINT:

Reconnect the connectors and restore the vehicle to its previous condition before checking the combination meter.

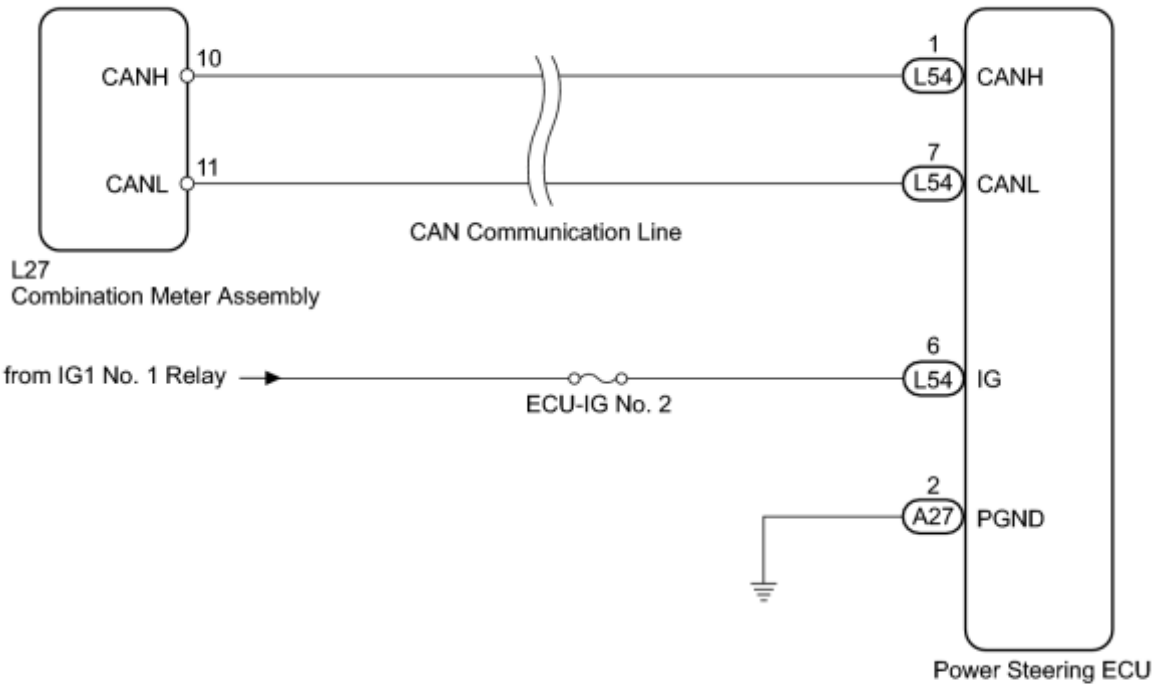
NG ▶ REPLACE MATER CIRCUIT PLATE NO.3

OK ▶ **REPLACE POWER STEERING ECU**

# DESCRIPTION

If the power steering ECU detects a malfunction, the P/S warning light comes on. At this time, the power steering ECU stores a DTC in its memory.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

If the steering column assembly or power steering ECU has been replaced, perform the rotation angle sensor initialization and torque sensor zero point calibration INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC (CAN COMMUNICATION SYSTEM) |

(a) Check for DTCs INFO.

OK:

DTC is not output.

NG GO TO CAN COMMUNICATION SYSTEM

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER STEERING ECU - BODY GROUND) |

(a) Disconnect the connectors from the power steering ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L54-6 (IG) - A27-2 (PGND) | Power switch on (IG) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A27-2 (PGND) - Body ground | Always | Below 1 Ω |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(f) Perform the Active Test of the combination meter using the Techstream.

*Combination Meter*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. EPS | EPS warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |

(g) Check that the EPS warning light operates in accordance with the Active Test.

HINT:

Reconnect the connectors and restore the vehicle to its previous condition before checking the combination meter.

NG ▶ REPLACE MATER CIRCUIT PLATE NO.3

OK ▶ **REPLACE POWER STEERING ECU**

# REMOVAL

CAUTION:

Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing INFO.

1. PRECAUTION

NOTICE:

Be sure to read Precaution thoroughly before servicing INFO.

2. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

3. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

4. REMOVE STEERING PAD

HINT:

Refer to the instructions for Removal of the steering pad INFO.

5. REMOVE STEERING WHEEL ASSEMBLY INFO

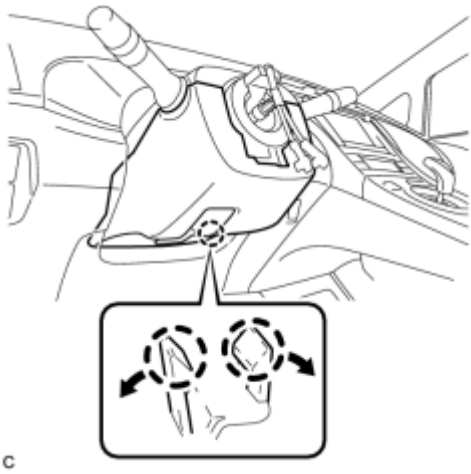
6. REMOVE LOWER STEERING COLUMN COVER

NOTICE:

Removing the lower steering column cover in the incorrect order will cause the parts to break.

(a) Push the right and left sides of the lower steering column cover to disengage the 4 claws.



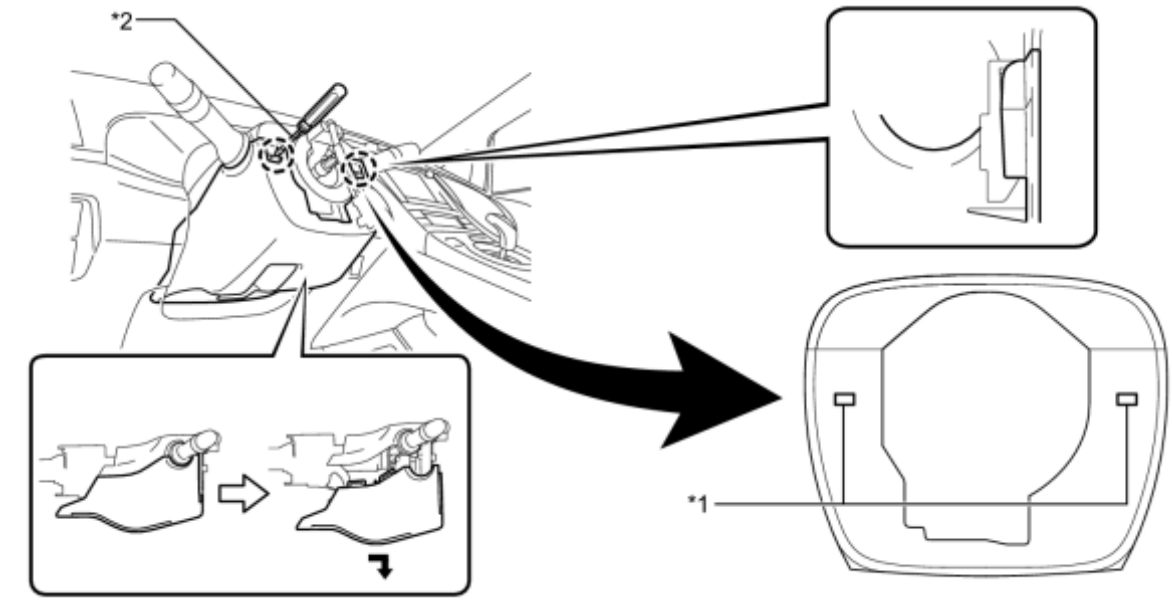




(b) Insert fingers into the opening of the tilt lever of the lower steering column cover to disengage the 2 claws.

HINT:

Spread the claws to disengage them.

(c) Using a screwdriver, insert the tip into each service hole to disengage the 2 claws to remove the lower steering column cover as shown in the illustration.




C

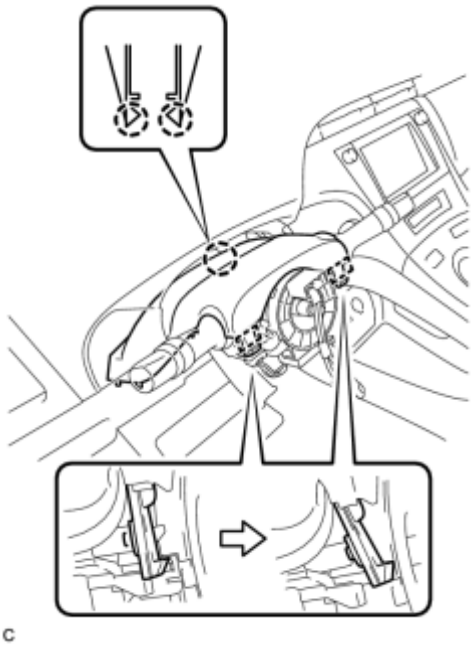
### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Service Hole | *2 | Protective Tape |

HINT:

Tape the screwdriver tip before use.

7. REMOVE UPPER STEERING COLUMN COVER

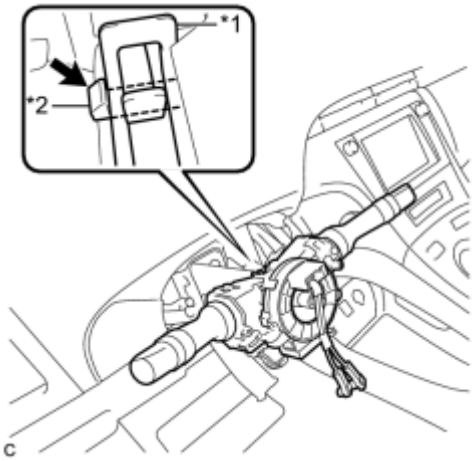


C

(a) Disengage the 2 claws and 2 pins to remove the upper steering column cover.

8. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

(a) Disconnect the connectors from the turn signal switch assembly with spiral cable sub-assembly.




(b) Using pliers, expand the clamp.

## Text in Illustration

| | |
|---|---|
| *1 | Clamp |
| *2 | Claw |

(c) While holding the clamp expanded, raise the claw using a screwdriver to disengage it, and then remove the turn signal switch assembly with spiral cable sub-assembly from the steering column assembly.

9. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY

HINT:

Refer to the instructions for Removal of the driver side knee airbag assembly INFO.

10. REMOVE UPPER INSTRUMENT PANEL

HINT:

Refer to the instructions for Removal of the upper instrument panel INFO.

11. REMOVE BRAKE PEDAL SUPPORT ASSEMBLY

HINT:

Refer to the instructions for Removal of the brake pedal support assembly INFO.

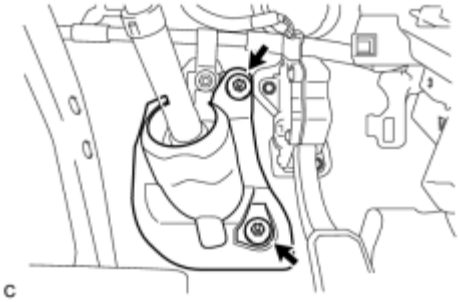
12. REMOVE NO. 1 HEATER TO REGISTER DUCT INFO

13. REMOVE NO. 2 AIR DUCT SUB-ASSEMBLY

(a) Disengage the 2 claws to remove the No. 2 air duct sub-assembly.



14. REMOVE COLUMN HOLE COVER SILENCER SHEET

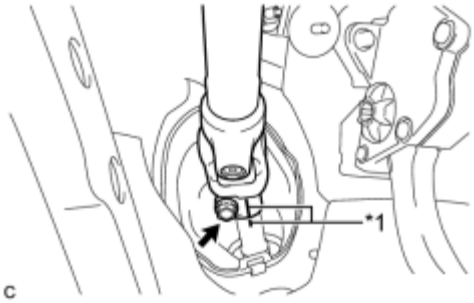


(a) Turn back the floor carpet.

(b) Remove the 2 clips and column hole cover silencer sheet.

15. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY

(a) Put matchmarks on the No. 2 steering intermediate shaft assembly and steering intermediate shaft.




# Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

NOTICE:

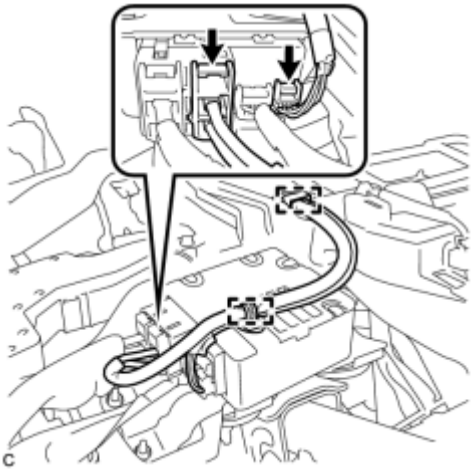
Do not separate the No. 2 steering intermediate shaft assembly from the steering intermediate shaft.

(b) Remove the bolt.

(c) Separate the No. 2 steering intermediate shaft assembly from the steering intermediate shaft.

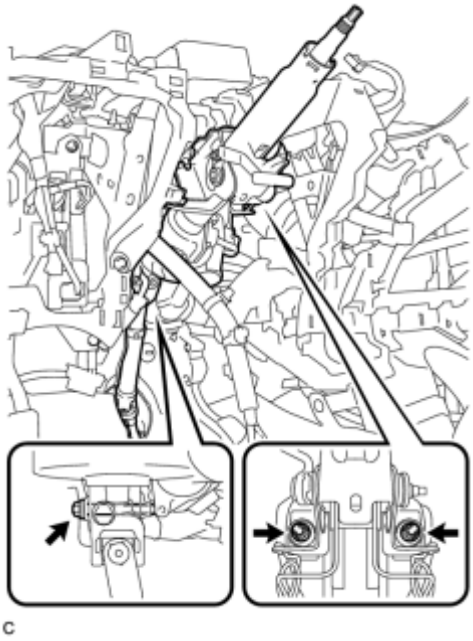
16. REMOVE STEERING POST ASSEMBLY (for Brush Type Motor)

(a) Disengage the 2 wire harness clamps.



(b) Disconnect the 2 connectors from the power steering ECU assembly.

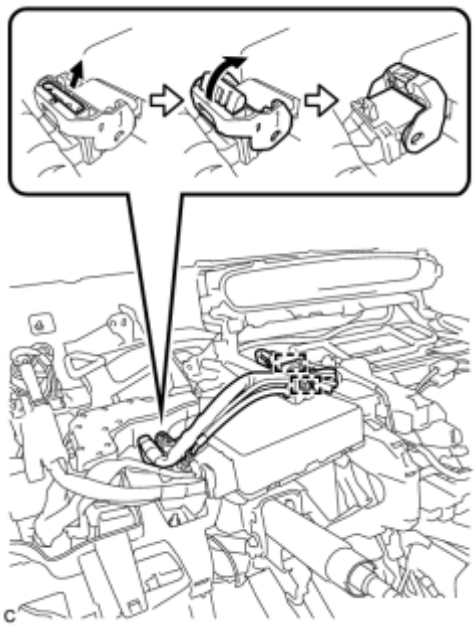
(c) Disconnect the connectors and disengage the wire harness clamps from the steering post assembly.



(d) Remove the bolt, 2 nuts and steering post assembly.

17. REMOVE STEERING POST ASSEMBLY (for Brushless Type Motor)

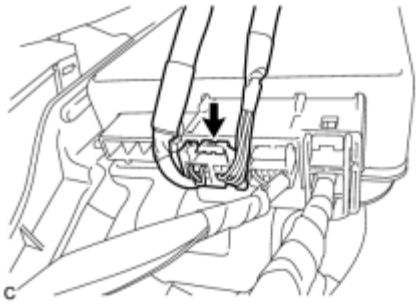
(a) Disengage the 2 wire harness clamps.



(b) Disconnect the connector from the power steering ECU assembly.

HINT:

As shown in the illustration, turn the lock lever to disconnect the connector.



(c) Disconnect the connector from the power steering ECU assembly.

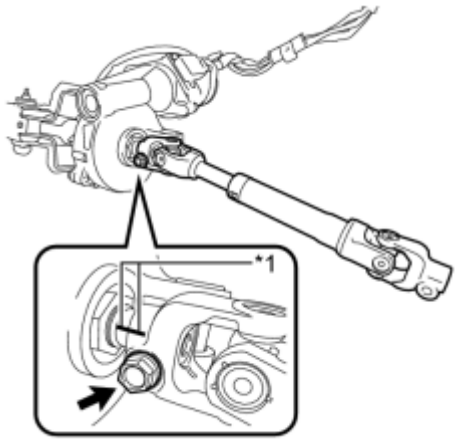
(d) Disconnect the connectors and disengage the wire harness clamps from the steering post assembly.

(e) Remove the bolt, 2 nuts and steering post assembly.



C

18. REMOVE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY




C

(a) Put matchmarks on the No. 2 steering intermediate shaft assembly and steering column assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

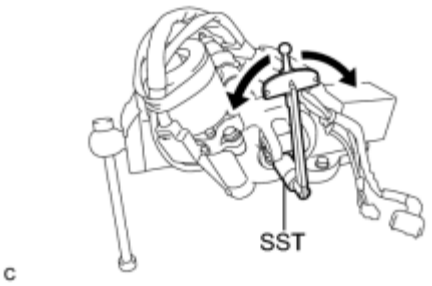
(b) Remove the bolt and No. 2 steering intermediate shaft assembly from the steering column assembly.

# INSPECTION

NOTICE:

When using a vise, do not overtighten it.

1. INSPECT PRELOAD




c

(a) Secure the steering column assembly in a vise.

(b) Using SST, turn the main shaft and measure the preload.

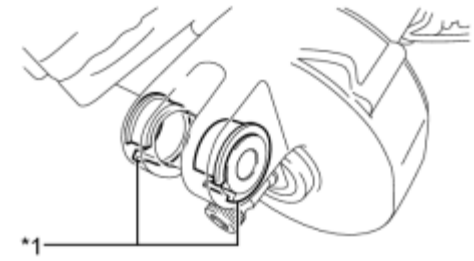
SST: 09616-00011

Preload (for Brush Type Motor) - Torque: **1.1 N·m (11 kgf·cm, 10in·lbf)** or less

Preload (for Brushless Type Motor) - Torque: **0.9 to 1.5 N·m (10 to 15 kgf·cm, 8 to 12in·lbf)**

If the preload is not as specified, replace the steering column assembly with a new one.

2. INSPECT BUSHING




c

(a) Check that the 2 bushings are securely installed to the steering column assembly.

## Text in Illustration

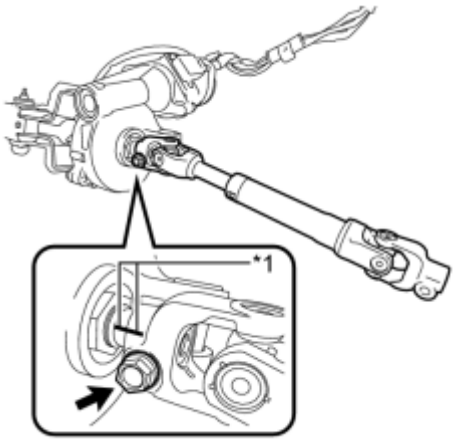
| | |
|---|---|
| *1 | Bushing |

If the bushings are missing or damaged, replace the steering column assembly with a new one.

# INSTALLATION

1. INSPECT BUSHING INFO

2. INSTALL NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY




C

(a) Align the matchmarks on the No. 2 steering intermediate shaft assembly and steering column assembly to install the No. 2 steering intermediate shaft assembly.

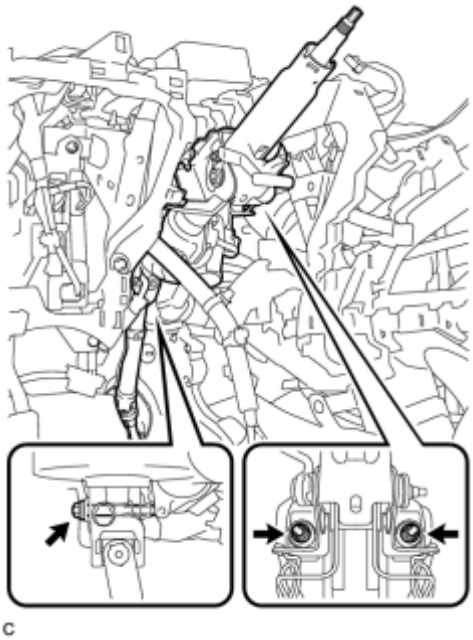
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

(b) Install the bolt.

Torque: **35 N·m (359 kgf·cm, 26ft·lbf)**

3. INSTALL STEERING POST ASSEMBLY (for Brush Type Motor)



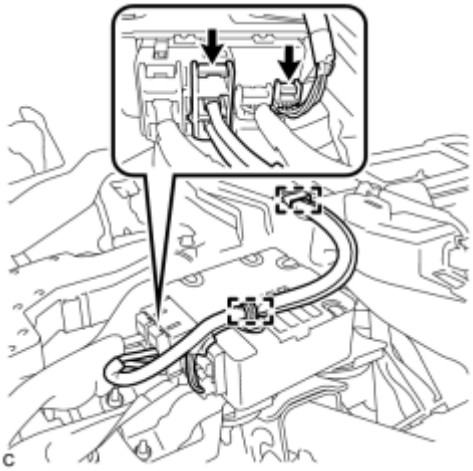
C

(a) Install the steering post assembly with the bolt and 2 nuts.

Torque: **25 N·m (255 kgf·cm, 18ft·lbf)**

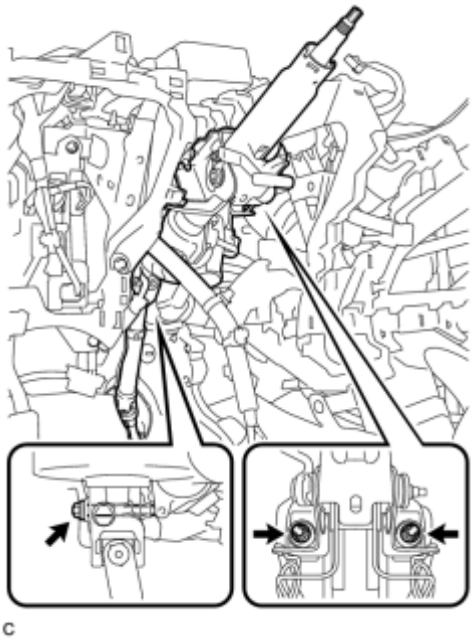
(b) Connect the connectors and engage the wire harness clamps to the steering post assembly.

(c) Connect the 2 connectors to the power steering ECU assembly.



(d) Engage the 2 wire harness clamps.

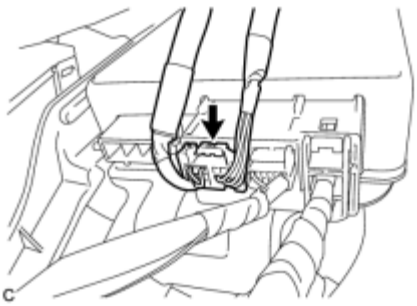
4. INSTALL STEERING POST ASSEMBLY (for Brushless Type Motor)



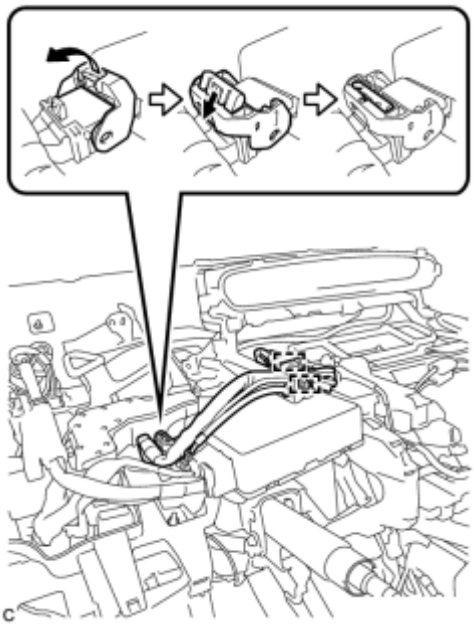
(a) Install the steering post assembly with the bolt and 2 nuts.

Torque: **25 N·m (255 kgf·cm, 18ft·lbf)**

(b) Connect the connectors and engage the wire harness clamps to the steering post assembly.



(c) Connect the connector to the power steering ECU assembly.



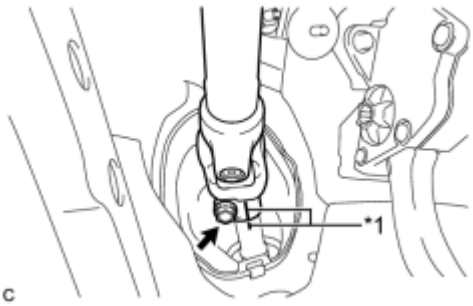
(d) Connect the connector to the power steering ECU assembly.

HINT:

As shown in the illustration, securely return the lock lever to its original position to connect the connector.

(e) Engage the 2 wire harness clamps.

5. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY




(a) Align the matchmarks on the No. 2 steering intermediate shaft assembly and steering intermediate shaft to connect the No. 2 steering intermediate shaft assembly to the steering intermediate shaft.

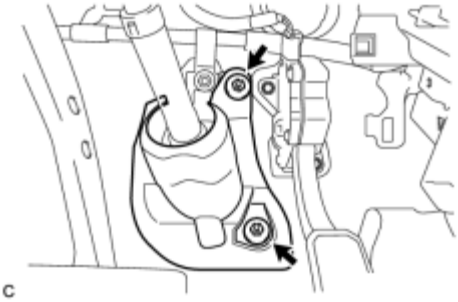
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

(b) Install the bolt.

Torque: **35 N·m (357 kgf·cm, 26ft·lbf)**

6. INSTALL COLUMN HOLE COVER SILENCER SHEET



(a) Install the column hole cover silencer sheet with the 2 clips.

(b) Install the floor carpet.

7. INSTALL NO. 2 AIR DUCT SUB-ASSEMBLY



(a) Engage the 2 claws to install the No. 2 air duct sub-assembly.

8. INSTALL NO. 1 HEATER TO REGISTER DUCT INFO

9. INSTALL BRAKE PEDAL SUPPORT ASSEMBLY

HINT:

Refer to the instructions for Installation of the brake pedal support assembly INFO.

10. INSTALL UPPER INSTRUMENT PANEL

HINT:

Refer to the instructions for Installation of the upper instrument panel INFO.

11. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY

HINT:

Refer to the instructions for Installation of the driver side knee airbag assembly INFO.

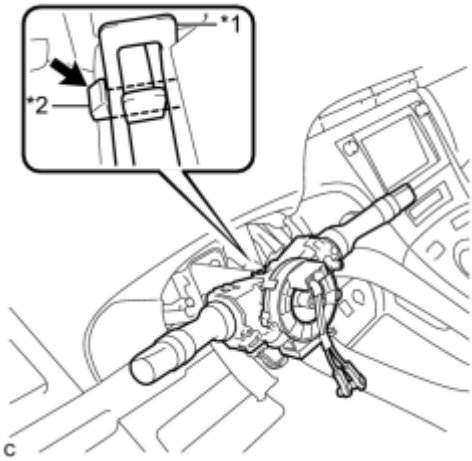
12. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

13. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY

(a) Using pliers, expand the clamp.

## Text in Illustration

| | |
|---|---|
| *1 | Clamp |
| *2 | Claw |

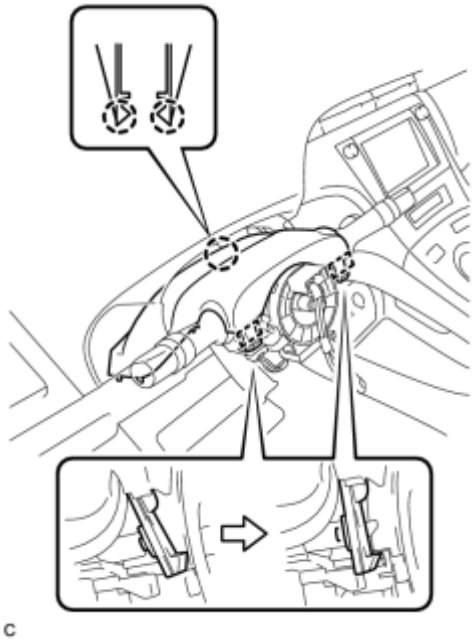



(b) While holding the clamp expanded, install the turn signal switch assembly with spiral cable sub-assembly to the steering column assembly and engage the claw.

(c) Return the clamp to its original position.

(d) Connect the connectors to the turn signal switch assembly with spiral cable sub-assembly.

14. INSTALL UPPER STEERING COLUMN COVER

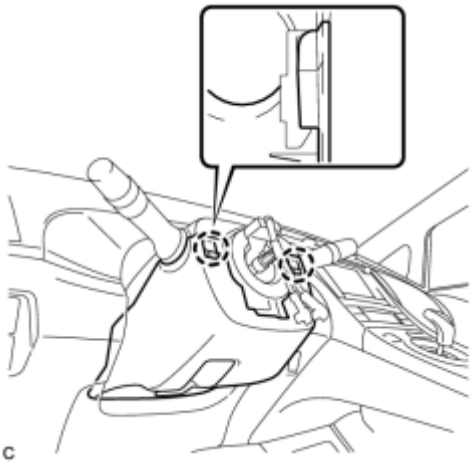


(a) Engage the 2 claws and 2 pins to install the upper steering column cover.

15. INSTALL LOWER STEERING COLUMN COVER

NOTICE:

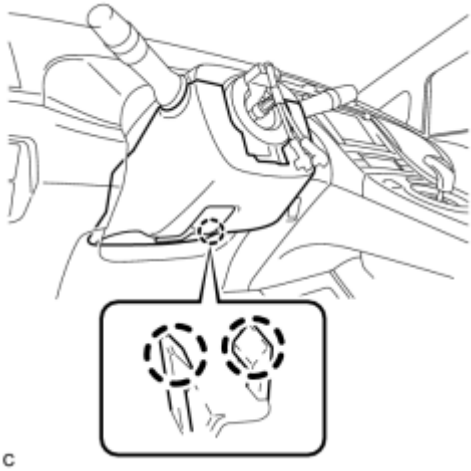
If the lower steering column cover is installed in the incorrect order, it will not be possible to assemble the lower steering column cover.



(a) Engage the 2 claws to install the lower steering column cover.



(b) Engage the 4 claws.



(c) Engage the 2 claws.

HINT:

Press the area around the claws to engage them.

16. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

17. ADJUST SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY INFO

18. INSTALL STEERING WHEEL ASSEMBLY INFO

19. INSTALL STEERING PAD

HINT:

Refer to the instructions for Installation of the steering pad INFO.

20. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

21. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

- Connect the cable to the negative (-) battery terminal with the front wheels facing straight ahead.
- When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

22. INSPECT STEERING PAD INFO

23. TORQUE SENSOR ZERO POINT CALIBRATION (for Brush Type Motor)

(a) Perform the torque sensor zero point calibration INFO.

24. ROTATION ANGLE SENSOR INITIALIZATION AND TORQUE SENSOR ZERO POINT CALIBRATION (for Brushless Type Motor)

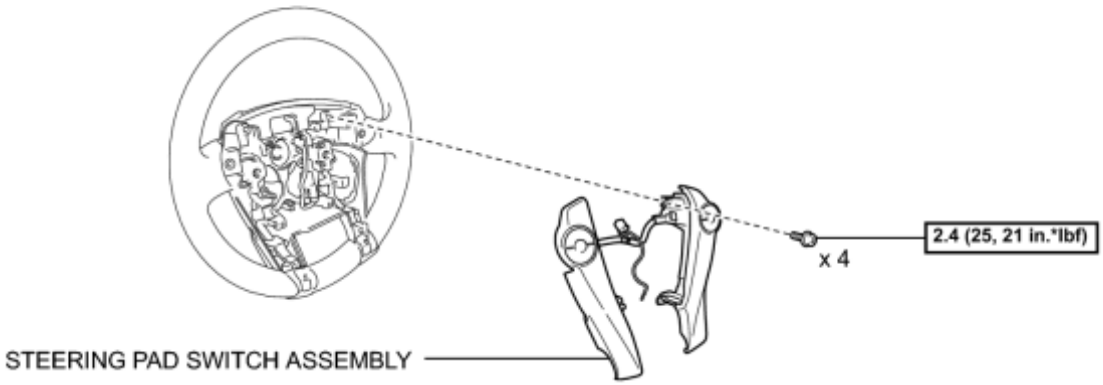
(a) Clear the rotation angle sensor calibration value, initialize the rotation angle sensor, and calibrate the torque sensor zero point INFO.

25. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

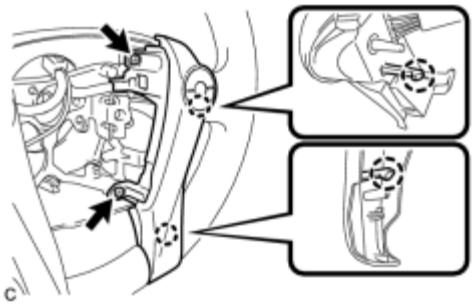
# REMOVAL

1. REMOVE STEERING PAD

HINT:

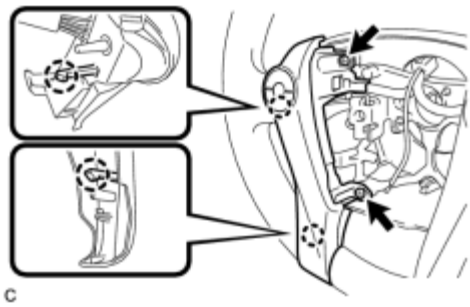
Refer to the instructions for Removal of the steering pad INFO.

2. REMOVE STEERING PAD SWITCH ASSEMBLY



(a) Remove the 2 screws.

(b) Disengage the 2 claws to remove the steering pad switch assembly (RH side) from the steering wheel sub-assembly.



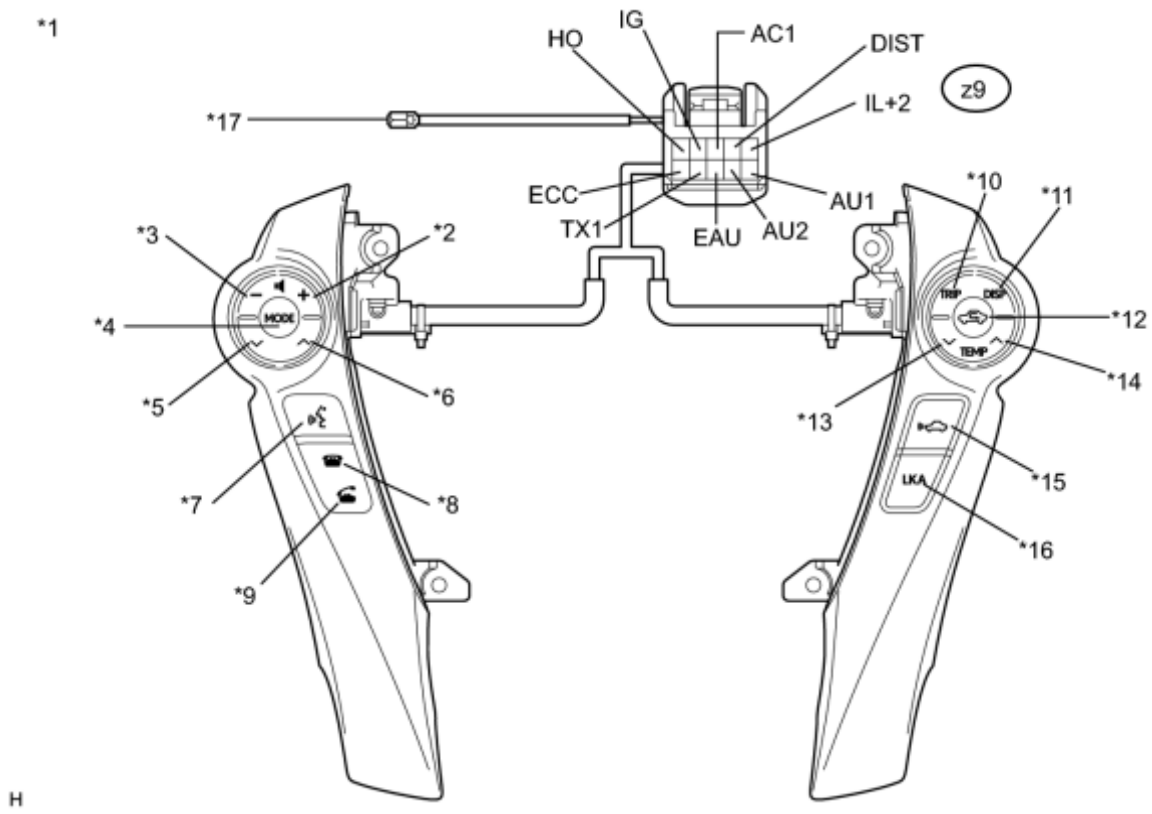
(c) Remove the 2 screws.

(d) Disengage the 2 claws to remove the steering pad switch assembly (LH side) from the steering wheel sub-assembly.

# INSPECTION

1. INSPECT STEERING PAD SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z9-1 (HO) - Terminal A | Always | Below 1 Ω |
| z9-3 (AC1) - z9-8 (EAU) | No switch pushed | 95 to 105 kΩ |
| z9-3 (AC1) - z9-8 (EAU) | R/F switch: ON | 323 to 335 Ω |
| z9-3 (AC1) - z9-8 (EAU) | TEMP+ switch: pushed | 980 to 1020 Ω |
| z9-3 (AC1) - z9-8 (EAU) | TEMP- switch: pushed | 3048 to 3172 Ω |
| z9-4 (DIST) - z9-6 (ECC) | Distance control switch: ON | Below 2.5 Ω |
| z9-4 (DIST) - z9-6 (ECC) | No switch pushed | 10 kΩ or higher |
| z9-4 (DIST) - z9-6 (ECC) | Lane keeping assist switch: ON | 236 to 244 Ω |
| z9-9 (AU2) - z9-8 (EAU) | No switch pushed | 95 to 105 kΩ |
| z9-9 (AU2) - z9-8 (EAU) | MODE switch: pushed | Below 2.5 Ω |
| z9-9 (AU2) - z9-8 (EAU) | Voice switch: pushed | 3048 to 3172 Ω |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| z9-9 (AU2) - z9-8 (EAU) | On Hook switch: pushed | 323 to 335 Ω |
| z9-9 (AU2) - z9-8 (EAU) | Off Hook switch: pushed | 980 to 1020 Ω |
| z9-10 (AU1) - z9-8 (EAU) | No switch pushed | 95 to 105 kΩ |
| z9-10 (AU1) - z9-8 (EAU) | Seek+ switch: pushed | Below 2.5 Ω |
| z9-10 (AU1) - z9-8 (EAU) | Seek- switch: pushed | 323 to 335 Ω |
| z9-10 (AU1) - z9-8 (EAU) | Volume+ switch: pushed | 980 to 1020 Ω |
| z9-10 (AU1) - z9-8 (EAU) | Volume- switch: pushed | 3048 to 3172 Ω |

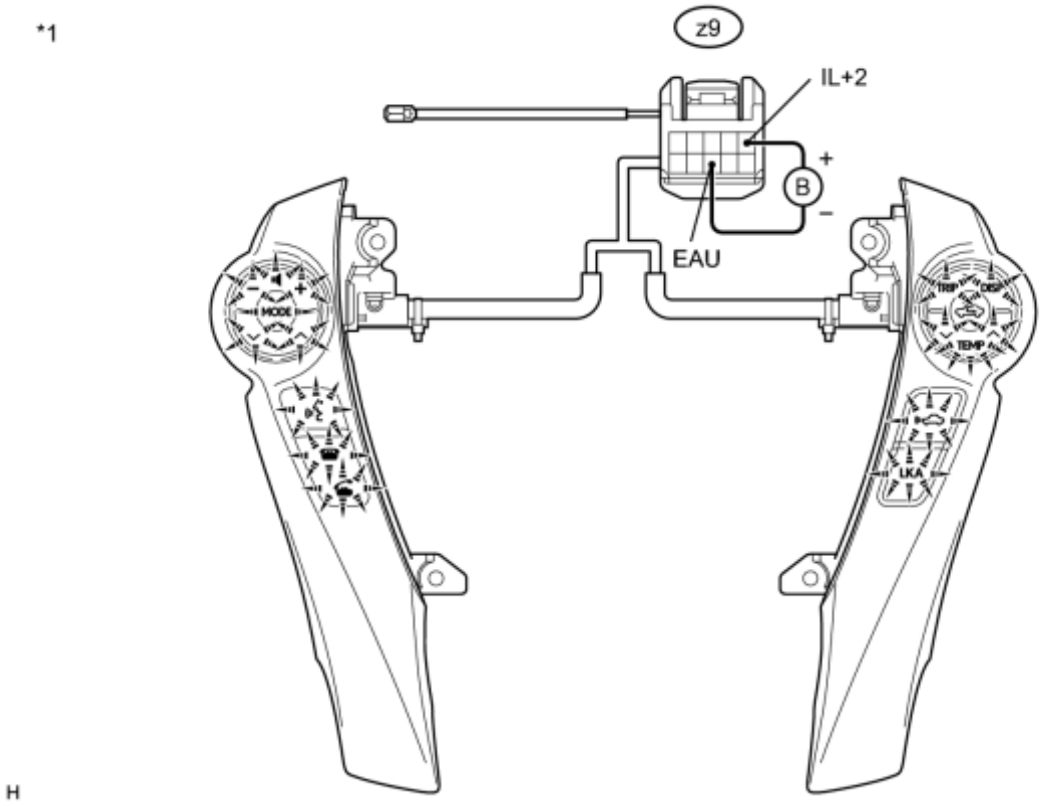
HINT:

If the result is not as specified, replace the steering pad switch assembly.

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Steering Pad Switch Assembly) | *2 | Volume+ |
| *3 | Volume- | *4 | MODE |
| *5 | Seek- | *6 | Seek+ |
| *7 | Voice switch | *8 | On Hook |
| *9 | Off Hook | *10 | TRIP switch |
| *11 | DISP switch | *12 | R/F switch |
| *13 | TEMP- | *14 | TEMP+ |
| *15 | Distance control switch | *16 | Lane keeping assist switch |
| *17 | Terminal-A | - | - |

(b) Check the illumination




(1) Connect a positive (+) lead to terminal IL+2 and a negative (-) lead to terminal EAU of the steering pad switch assembly connector.

(2) Check that the switch illumination comes on.

OK:

Steering pad switch illumination comes on.

HINT:

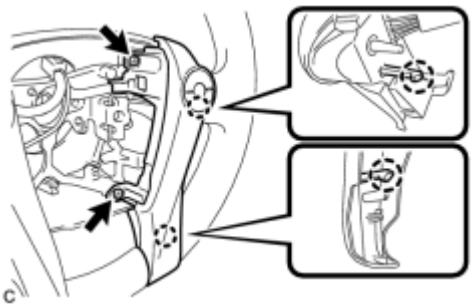
If the result is not as specified, replace the steering pad switch assembly.

### *Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Steering Pad Switch Assembly) |

# INSTALLATION

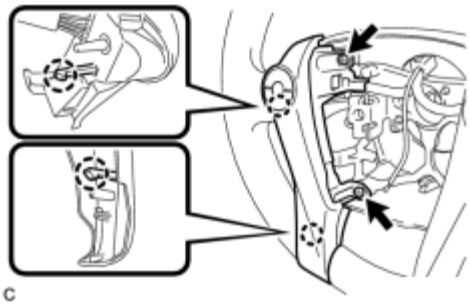
1. INSTALL STEERING PAD SWITCH ASSEMBLY



(a) Engage the 2 claws to install the steering pad switch assembly (RH side) to the steering wheel sub-assembly.

(b) Install the 2 screws.

Torque: **2.4 N·m (25 kgf·cm, 21in·lbf)**



(c) Engage the 2 claws to install the steering pad switch assembly (LH side) to the steering wheel sub-assembly.

(d) Install the 2 screws.

Torque: **2.4 N·m (25 kgf·cm, 21in·lbf)**

2. INSTALL STEERING PAD

HINT:

Refer to the instructions for Installation of the steering pad INFO.

# PRECAUTION

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

1. HANDLING PRECAUTIONS FOR STEERING SYSTEM

(a) Care must be taken when replacing parts. Incorrect replacement may affect the performance of the steering system and result in a driving hazard.

2. HANDLING PRECAUTIONS FOR SRS AIRBAG SYSTEM

(a) The vehicle is equipped with a Supplemental Restraint System (SRS). Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing. This may cause a serious accident. Before servicing (including inspection, replacement, removal, and installation of parts), be sure to read the precautionary notices for the Supplemental Restraint System INFO.

3. HANDLING PRECAUTIONS FOR STEERING COLUMN (for Brushless Type Motor)

(a) When handling the steering column assembly:

(1) Avoid any impact to the steering column assembly, especially to the motor or the torque sensor. Replace the steering column assembly with a new one if it is dropped or subjected to any severe impacts.

(2) Do not pull the wire harness when moving the steering column assembly.

(3) When the steering column assembly has been replaced, perform the rotation angle sensor value initialization and the torque sensor zero point calibration after initializing the torque sensor zero point. INFO.

(4) Do not release the tilt lever when the steering column assembly is not installed on the vehicle.

(b) When disconnecting or reconnecting the connectors:

(1) Before disconnecting the connectors related to the power steering system, turn the power switch on (IG), center the steering wheel, turn the power switch off, and then disconnect the connectors.

(2) Before reconnecting the connectors related to the power steering system, ensure that the power switch is off. Then center the steering wheel and turn the power switch on (IG).

NOTICE:

Do not turn the power switch on (IG) when the steering wheel is not centered.

(3) If the above operations are not carried out properly, the steering center point (zero point) will deviate, which may lead to a difference in steering effort between turning right and left. If there is a difference in steering effort between turning right and left, perform the rotation angle sensor value initialization and the torque sensor zero point calibration after initializing the torque sensor zero point INFO.

4. HANDLING PRECAUTIONS FOR STEERING COLUMN (for Brush Type Motor)

(a) When handling the steering column assembly:

(1) Avoid any impact to the steering column assembly, especially to the motor or the torque sensor. Replace the steering column assembly with a new one if it is dropped or subjected to any severe impacts.

(2) Do not pull the wire harness when moving the steering column assembly.

(3) When the steering column assembly has been replaced, perform the torque sensor zero point calibration after initializing the torque sensor zero point INFO.

(4) Do not release the tilt lever when the steering column assembly is not installed on the vehicle.

(b) When disconnecting or reconnecting the connectors:

(1) Before disconnecting the connectors related to the power steering system, turn the power switch on (IG), center the steering wheel, turn the power switch off, and then disconnect the connectors.

(2) Before reconnecting the connectors related to the power steering system, ensure that the power switch is off. Then center the steering wheel and turn the power switch on (IG).

NOTICE:

Do not turn the power switch on (IG) when the steering wheel is not centered.

(3) If the above operations are not carried out properly, the steering center point (zero point) will deviate, which may lead to a difference in steering effort between turning right and left. If there is a difference in steering effort between turning right and left, perform the torque sensor zero point calibration after initializing the torque sensor zero point INFO.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Steering System*

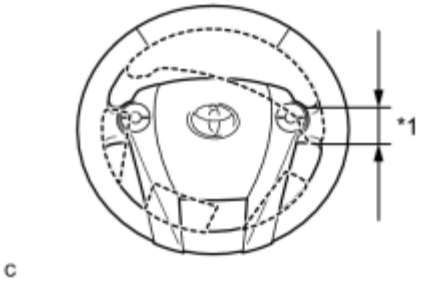
| Symptom | Suspected Area | See page |
|---|---|---|
| Heavy steering | Front tires (improperly inflated, unevenly worn) | INFO |
| | Front wheel alignment (Incorrect) | INFO |
| | Steering system joints (Worn) | - |
| | Steering column | INFO |
| | Torque sensor (built into steering column) | - |
| | Power steering motor | - |
| | Speed sensor | INFO |
| | Battery and power source system | - |
| | Power steering ECU power source voltage and relay (for Brushless Type Motor) | INFO |
| | Power steering ECU power source voltage and relay (for Brush Type Motor) | INFO |
| | Power steering gear | INFO |
| | Power steering ECU | INFO |
| | Skid control ECU | - |
| Poor return | Front tires (improperly inflated, unevenly worn) | INFO |
| | Front wheel alignment (Incorrect) | INFO |
| | Steering column | INFO |
| | Power steering gear | INFO |
| | Power steering ECU | INFO |
| Excessive free play | Steering system joints (Worn) | - |
| | Front suspension (lower ball joint) | INFO |
| | Intermediate shaft, universal joint, sliding yoke (Worn) | - |
| | Front axle hub (Hub bearing) | INFO |
| | Power steering gear | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| A knocking (or clunking) sound occurs when turning the steering wheel back and forth while power steering is operating. | Front suspension (lower ball joint) | INFO |
| | Steering intermediate shaft | - |
| | Power steering ECU | INFO |
| Friction occurs when turning the steering wheel during low-speed driving | Power steering motor | - |
| | Steering column | INFO |
| A high-pitched sound (squeaking) occurs when turning the steering wheel slowly with the vehicle stopped. | Power steering motor | - |
| | Steering column | INFO |
| Steering wheel vibrates and noise occurs when steering wheel turned while vehicle stopped | Power steering motor | - |
| | Steering column | INFO |

# ON-VEHICLE INSPECTION

1. INSPECT STEERING WHEEL FREE PLAY

(a) Stop the vehicle and position the front wheels straight ahead.




C

(b) Gently turn the steering wheel right and left, and check steering wheel free play.

## Text in Illustration

| | |
|---|---|
| *1 | Maximum Free Play |

Maximum free play:

30 mm (1.18 in.)

HINT:

If the free play exceeds the maximum, check the steering system INFO.

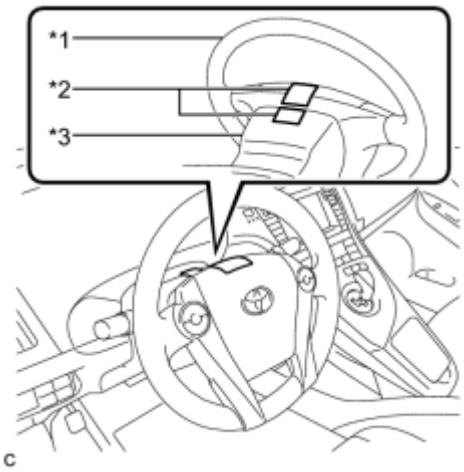
# ADJUSTMENT

1. STEERING OFF CENTER ADJUSTMENT PROCEDURE

HINT:

This is the steering wheel off center adjustment procedure.

(a) Inspect steering wheel off center.

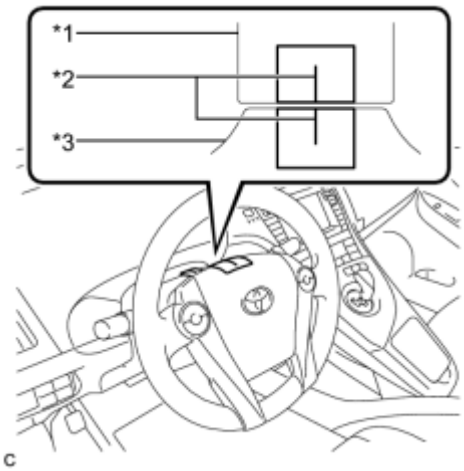



(1) Apply masking tape to the top center of the steering wheel and steering column upper cover.

## Text in Illustration

| | |
|---|---|
| *1 | Steering Wheel |
| *2 | Masking Tape |
| *3 | Upper Steering Column Cover |

(2) Drive the vehicle in a straight line for 100 meters at a constant speed of 35 mph (56 km/h), while holding the steering wheel to maintain the course.




(3) Draw a line on the masking tape as shown in the illustration.

## Text in Illustration

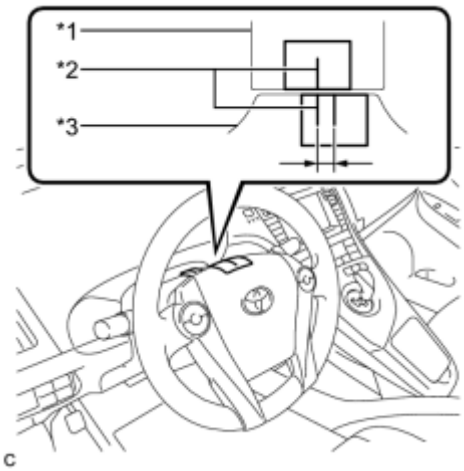
| | |
|---|---|
| *1 | Upper Steering Column Cover |
| *2 | Marked Line |
| *3 | Steering Wheel |

(4) Turn the steering wheel to the center position.

HINT:

Look at the upper surface of the steering wheel, steering spoke and SRS airbag line to find the center position.

(5) Draw a new line on the masking tape on the steering wheel as shown




in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Upper Steering Column Cover |
| *2 | Marked Line |
| *3 | Steering Wheel |

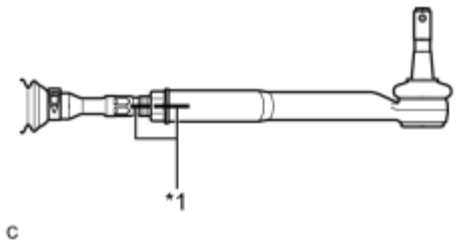
(6) Measure the distance between the 2 lines on the masking tape on the steering wheel.

(7) Convert the measured distance to steering angle.

HINT:

- Measured distance 1 mm (0.0394 in.) = Steering angle of approximately 1 degree.
- Make a note of the steering angle.

(b) Adjust steering angle.




(1) Put matchmarks on the RH and LH tie rod ends and rack ends respectively where it can be easily seen.

## Text in Illustration

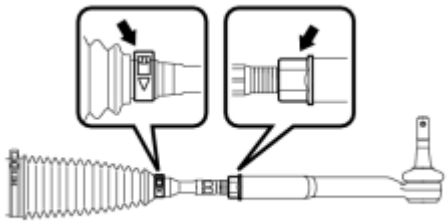
| | |
|---|---|
| *1 | Matchmark |

(2) Using a paper gauge, measure the distance from the RH and LH tie rod ends to the rack end screws.

HINT:

- Measure both RH and LH sides.
- Make a note of the measured values.

(3) Remove the RH and LH boot clips from the rack boots.



C

(4) Loosen the RH and LH lock nuts.

(5) Turn the RH and LH rack ends by the same amount (but in different directions) according to the steering angle.

HINT:

One 360 degree turn of rack end (1.5 mm (0.0591 in.) horizontal movement) equals to 12 degrees of steering angle.

(6) Tighten the RH and LH lock nuts to the specified torque.

Torque: **74 N·m (755 kgf·cm, 55ft·lbf)**

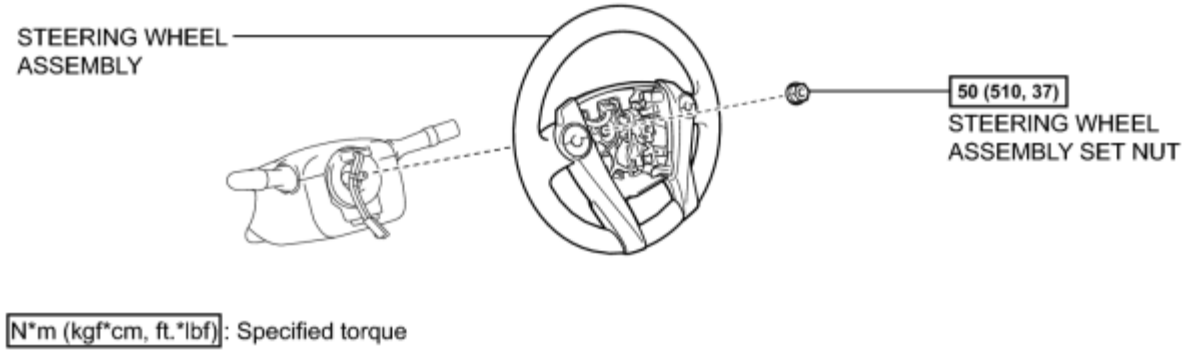
NOTICE:

Make sure that the difference in length between the RH and LH tie rod ends and rack end screws is within 1.5 mm (0.0591 in.).

(7) Install the RH and LH boot clips.

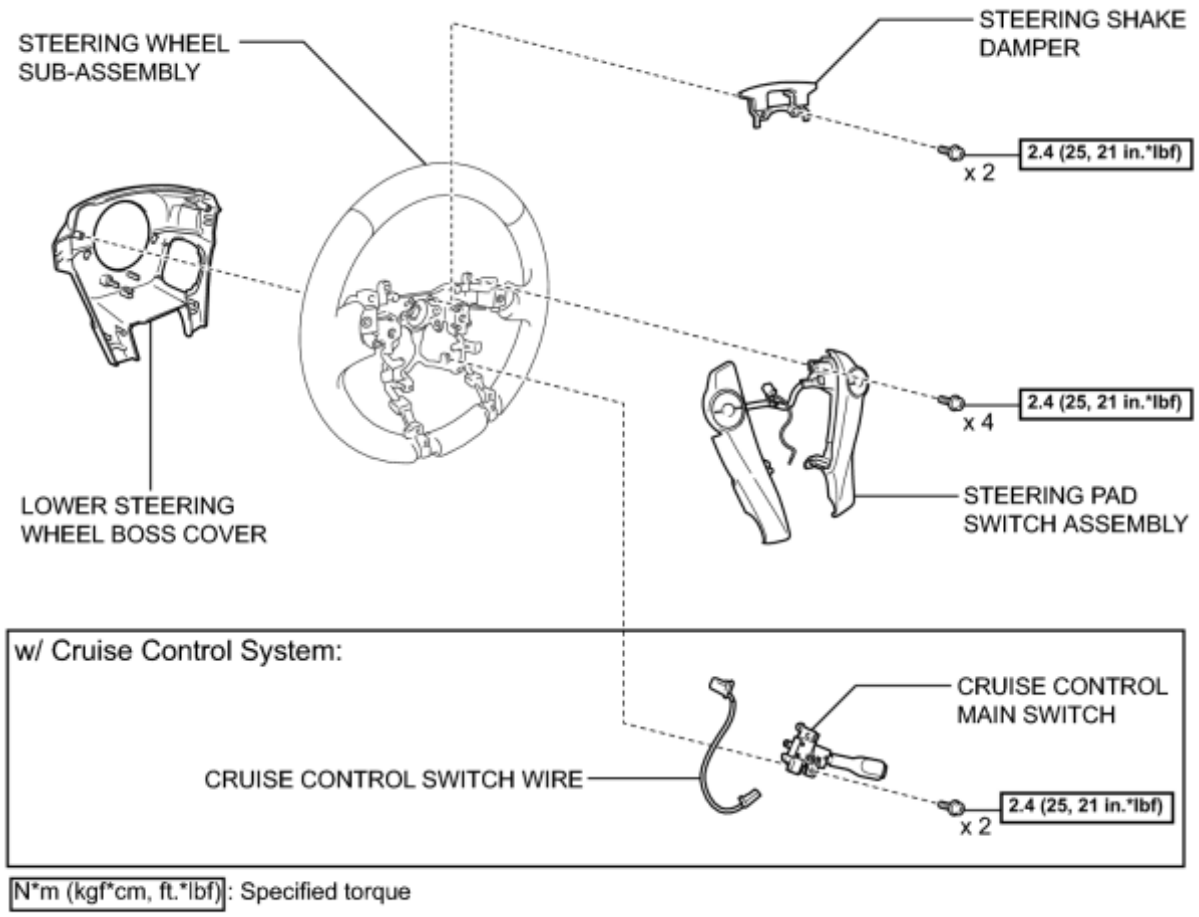
# COMPONENTS

# ILLUSTRATION




c

# ILLUSTRATION


STEERING WHEEL SUB-ASSEMBLY
STEERING SHAKE DAMPER
2.4 (25, 21 in.*lbf)
x 2
LOWER STEERING WHEEL BOSS COVER
2.4 (25, 21 in.*lbf)
x 4
STEERING PAD SWITCH ASSEMBLY
w/ Cruise Control System:
CRUISE CONTROL MAIN SWITCH
CRUISE CONTROL SWITCH WIRE
2.4 (25, 21 in.*lbf)
x 2
N*m (kgf*cm, ft.*lbf): Specified torque

c

# REMOVAL

CAUTION:

Some of these service operations affect the SRS airbag system. Read the precautionary notices concerning the SRS airbag system before servicing INFO.

1. PRECAUTION

NOTICE:

Be sure to read Precaution thoroughly before servicing INFO.

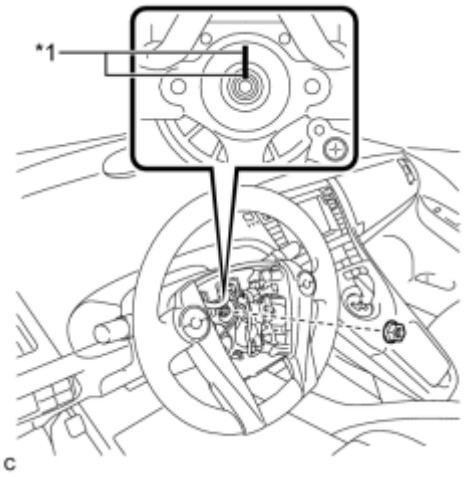
2. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

3. REMOVE STEERING PAD

HINT:

Refer to the instructions for Removal of the steering pad INFO.

4. REMOVE STEERING WHEEL ASSEMBLY




(a) Remove the steering wheel assembly set nut.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

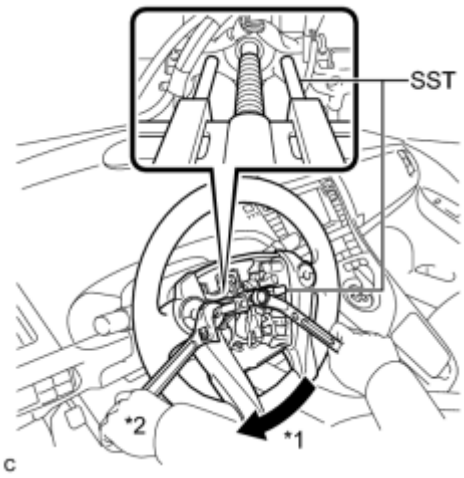
(b) Put matchmarks on the steering wheel assembly and steering main shaft.

(c) Disconnect the connectors from the spiral cable.

(d) Using SST, remove the steering wheel assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Turn |




| | |
|---|---|
| *2 | Hold |

SST: 09950-50013

09951-05010

09952-05010

09953-05020

09955-04071

NOTICE:

Apply a small amount of grease to the threads and tip of SST (09953-05020) before use.

5. REMOVE STEERING SHAKE DAMPER




(a) Remove the 2 screws and steering shake damper from the steering wheel assembly.

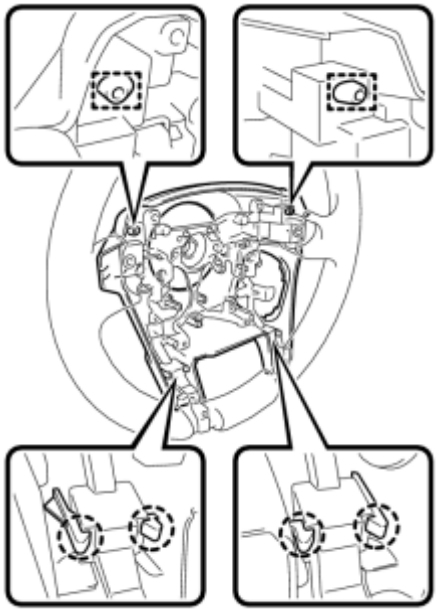
6. REMOVE STEERING PAD SWITCH ASSEMBLY INFO

7. REMOVE CRUISE CONTROL MAIN SWITCH (w/ Cruise Control System) INFO

8. REMOVE CRUISE CONTROL SWITCH WIRE (w/ Cruise Control System)

9. REMOVE LOWER STEERING WHEEL BOSS COVER

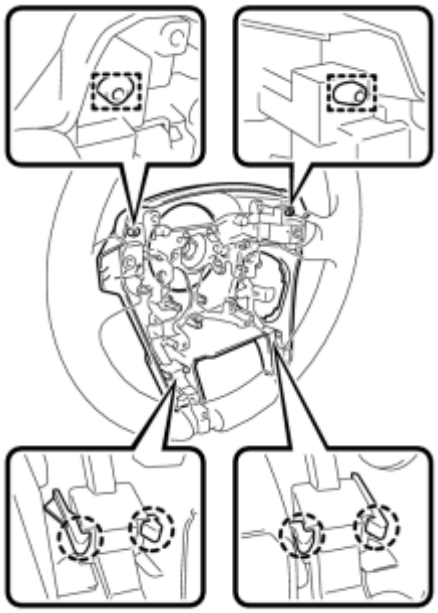
(a) Disengage the 2 pins and 4 claws to remove the lower steering wheel boss cover from the steering wheel sub-assembly.



C

# INSTALLATION

1. INSTALL LOWER STEERING WHEEL BOSS COVER



C

(a) Engage the 2 pins and 4 claws to install the lower steering wheel boss cover to the steering wheel sub-assembly.

2. INSTALL CRUISE CONTROL SWITCH WIRE (w/ Cruise Control System)

3. INSTALL CRUISE CONTROL MAIN SWITCH (w/ Cruise Control System) INFO

4. INSTALL STEERING PAD SWITCH ASSEMBLY INFO

5. INSTALL STEERING SHAKE DAMPER



C

(a) Install the steering shake damper to the steering wheel assembly with the 2 screws.

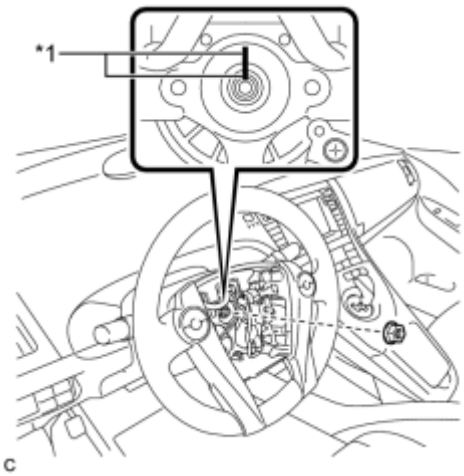
Torque: **2.4 N·m (25 kgf·cm, 21in·lbf)**

6. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

7. ADJUST SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY INFO

8. INSTALL STEERING WHEEL ASSEMBLY

(a) Align the matchmarks on the steering wheel assembly and steering




main shaft.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

(b) Install the steering wheel assembly set nut.

Torque: **50 N·m (510 kgf·cm, 37ft·lbf)**

(c) Connect the connectors to the spiral cable sub-assembly.

9. INSTALL STEERING PAD

HINT:

Refer to the instructions for Installation of the steering pad INFO.

10. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

11. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

- Connect the cable to the negative (-) battery terminal with the front wheels facing straight ahead.
- When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

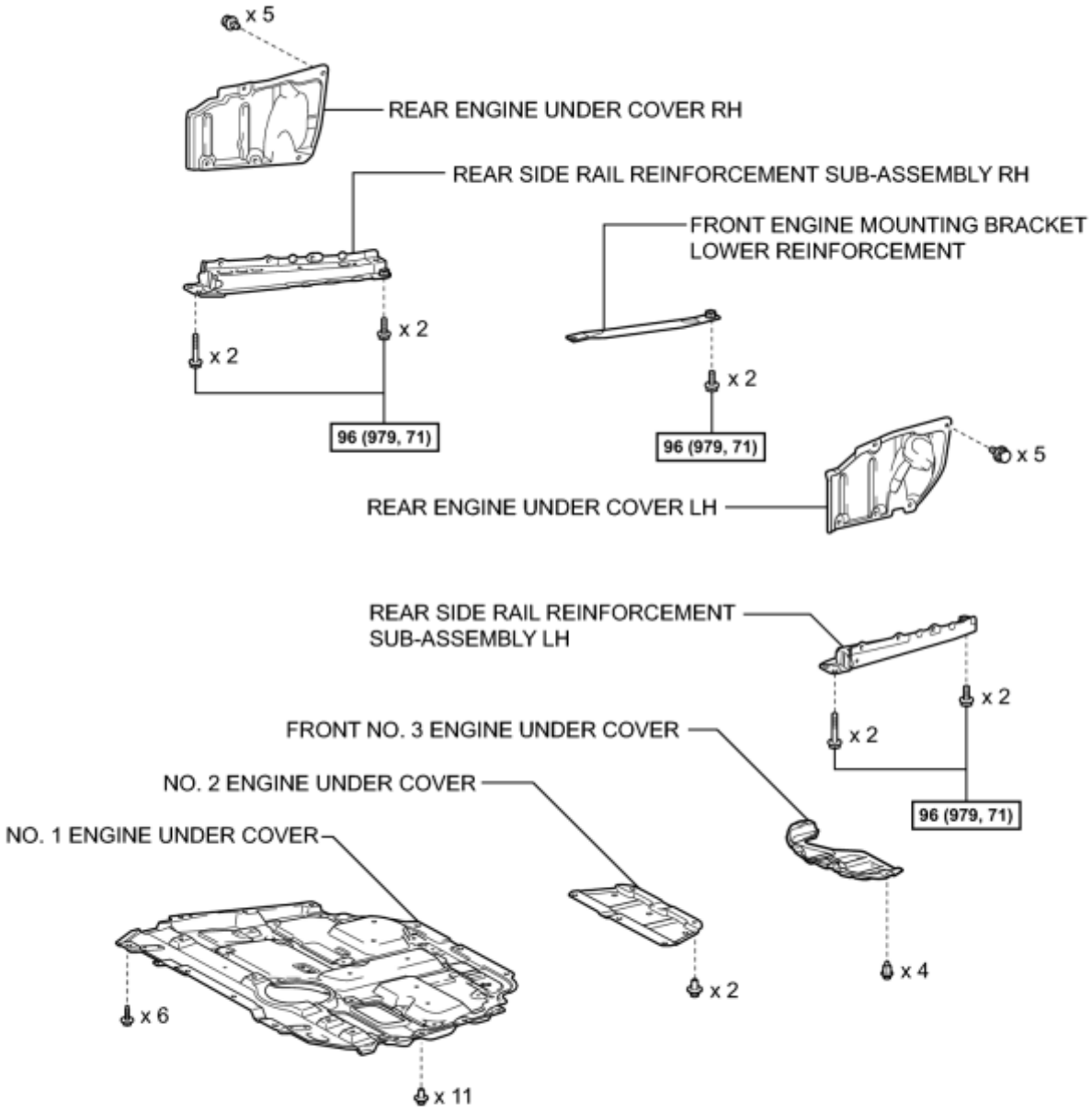
12. INSPECT STEERING PAD INFO

13. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

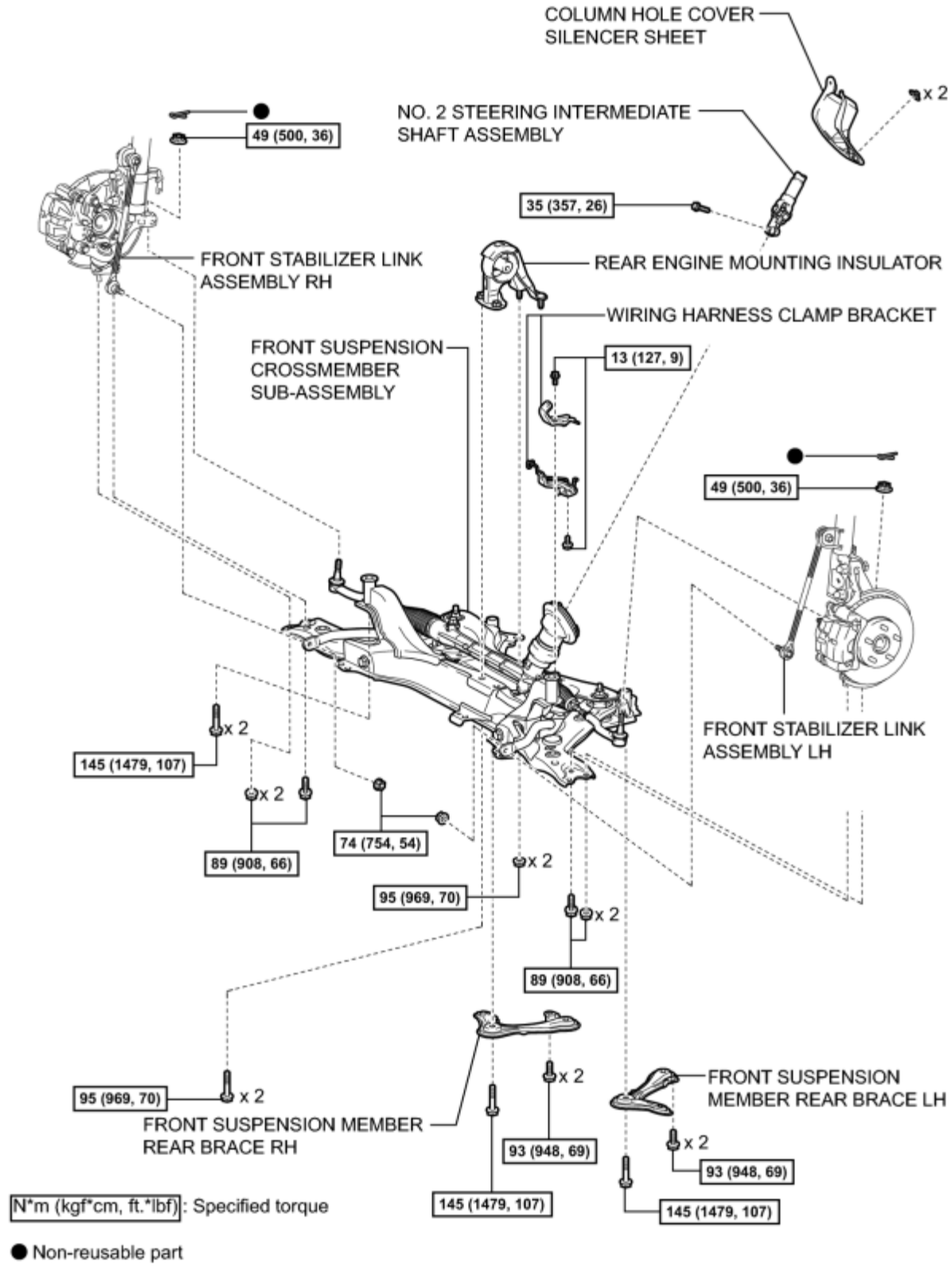
# COMPONENTS

# ILLUSTRATION

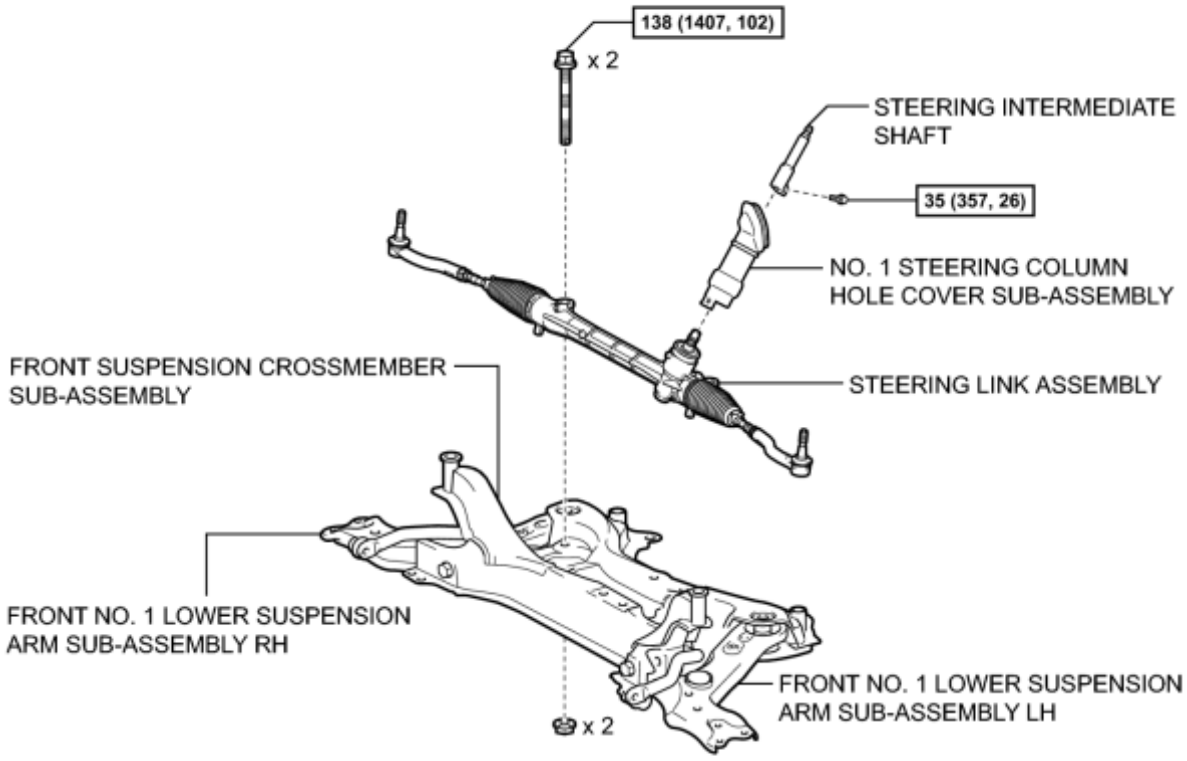



N*m (kgf*cm, ft.*lbf) : Specified torque

# ILLUSTRATION

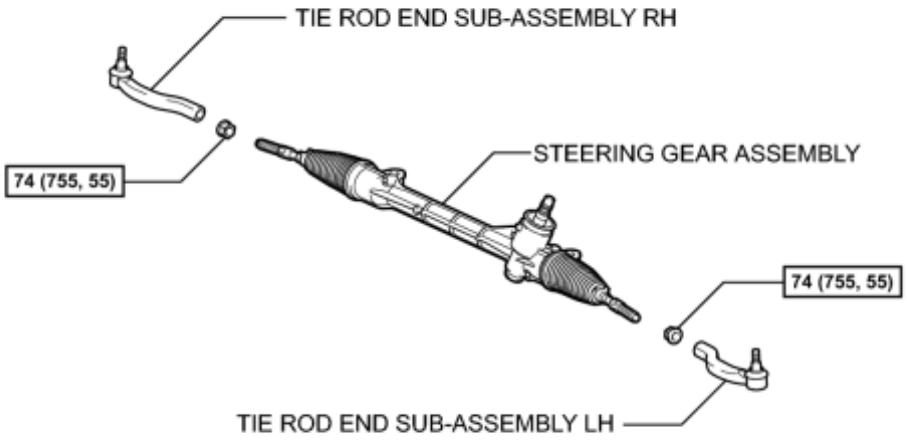



# ILLUSTRATION



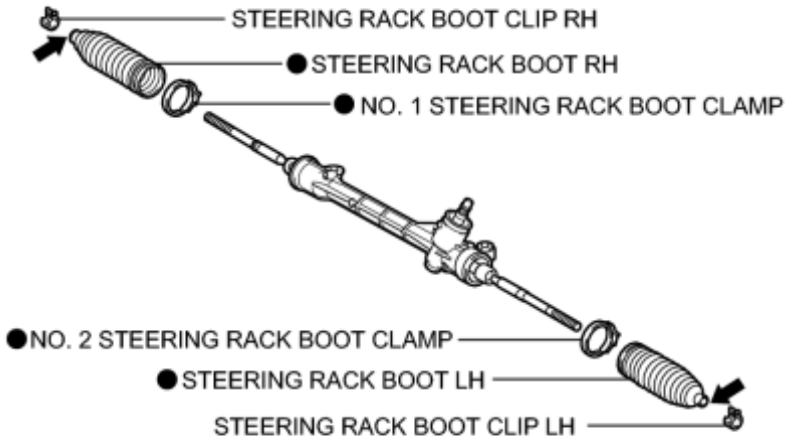

N*m (kgf*cm, ft.*lbf) : Specified torque

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

# ILLUSTRATION




● Non-reusable part

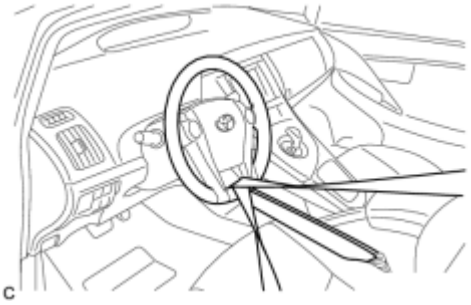
⬅ Lithium soap base glycol grease

c

# REMOVAL

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. SECURE STEERING WHEEL



(a) Secure the steering wheel with the seat belt in order to prevent rotation.

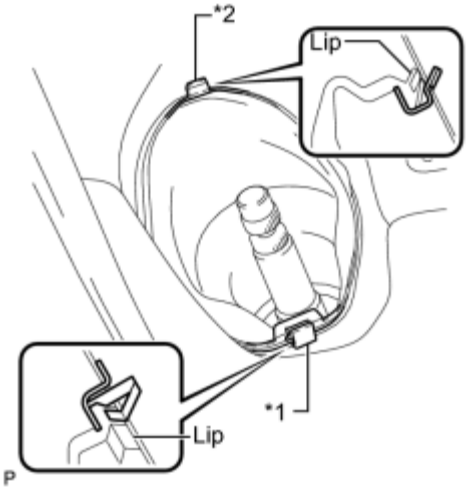
HINT:

This operation is useful to prevent damage to the spiral cable.

3. REMOVE COLUMN HOLE COVER SILENCER SHEET INFO

4. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

5. SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY




(a) Remove clip A, detach clip B from the body and disconnect the No. 1 steering column hole cover sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Clip A |
| *2 | Clip B |

NOTICE:

Do not damage clips A and B.

6. REMOVE FRONT WHEELS

7. REMOVE NO. 1 ENGINE UNDER COVER

8. REMOVE NO. 2 ENGINE UNDER COVER

9. REMOVE FRONT NO. 3 ENGINE UNDER COVER

10. REMOVE REAR ENGINE UNDER COVER LH

11. REMOVE REAR ENGINE UNDER COVER RH

HINT:

Perform the same procedure as for the LH side.

12. SEPARATE FRONT STABILIZER LINK ASSEMBLY LH INFO

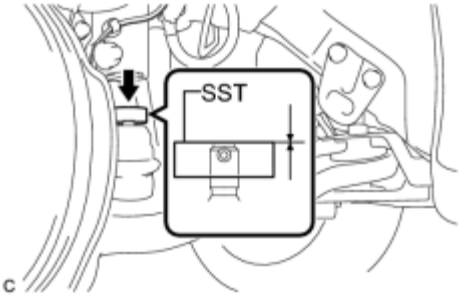
13. SEPARATE FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

14. SEPARATE TIE ROD END SUB-ASSEMBLY LH

(a) Remove the clip and nut.




(b) Install SST to the tie rod end.

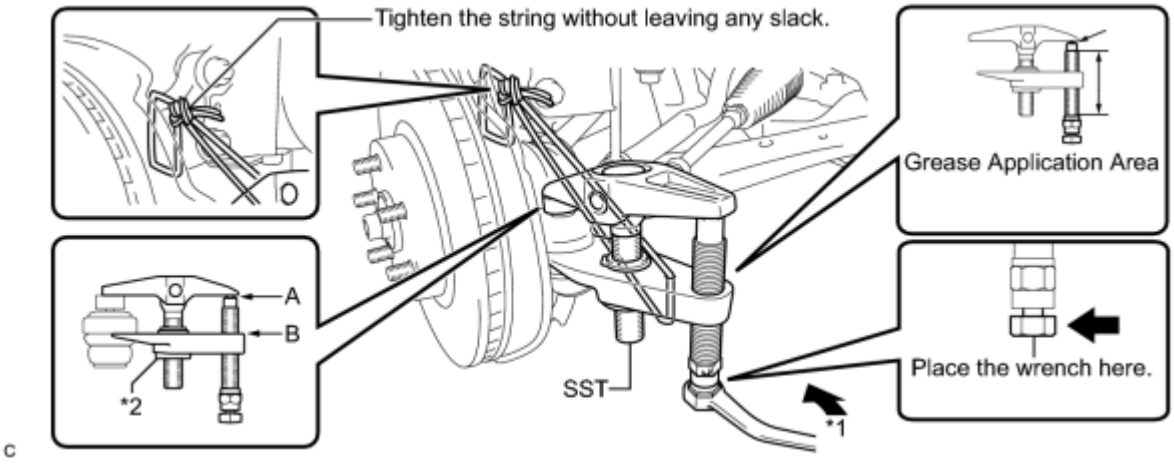
SST: 09960-20010

09961-02060

NOTICE:

Make sure that the upper ends of the tie rod end and SST are aligned.

(c) Using SST, separate the tie rod end from the steering knuckle.




### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Turn | *2 | Nut |

SST: 09960-20010

09961-02010

CAUTION:

Apply grease to the bolt threads and the tip of SST.

NOTICE:

- Be sure to tighten the string firmly to secure SST to the steering knuckle to prevent SST from falling off.
- Install SST with the center nut so that A and B shown in the illustration are parallel. Otherwise, the dust cover may be damaged.
- Be sure to place the wrench on the part indicated in the illustration.
- Do not damage the front disc brake dust cover.
- Do not damage the ball joint dust cover.
- Do not damage the steering knuckle.

15. SEPARATE TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

16. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

17. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

18. REMOVE FRONT ENGINE MOUNTING BRACKET LOWER REINFORCEMENT INFO

19. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH INFO

20. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

21. REMOVE FRONT SUSPENSION MEMBER REAR BRACE LH INFO

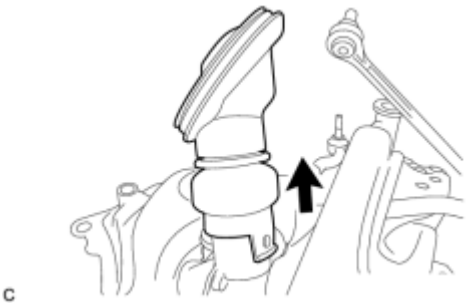
22. REMOVE FRONT SUSPENSION MEMBER REAR BRACE RH

HINT:

Perform the same procedure as for the LH side.

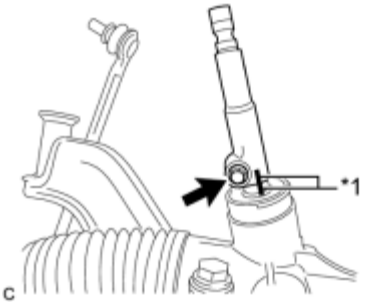
23. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

24. REMOVE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY




(a) Remove the No. 1 steering column hole cover sub-assembly from the steering link assembly.

25. REMOVE STEERING INTERMEDIATE SHAFT



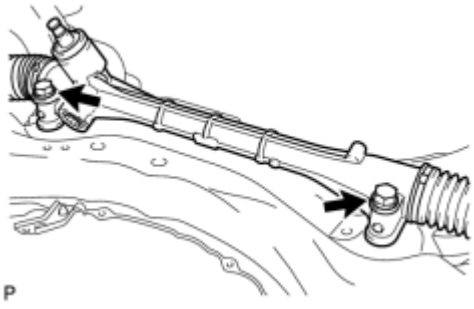

(a) Put matchmarks on the steering intermediate shaft and steering link assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

(b) Remove the bolt and steering intermediate shaft from the steering link assembly.

26. REMOVE STEERING LINK ASSEMBLY




(a) Remove the 2 bolts, 2 nuts and steering link assembly from the front suspension crossmember sub-assembly.

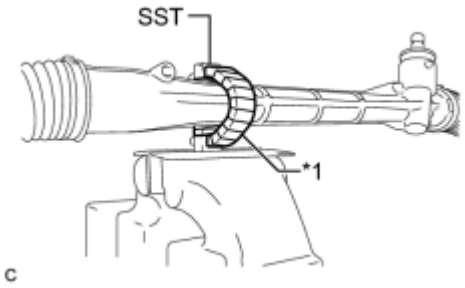
NOTICE:

Keep the nut from rotating while turning the bolt because the nut has its own stopper.

27. SECURE STEERING LINK ASSEMBLY

(a) Using SST, secure the steering link assembly in a vise.

## Text in Illustration




c

| | |
|---|---|
| *1 | Protective Tape |

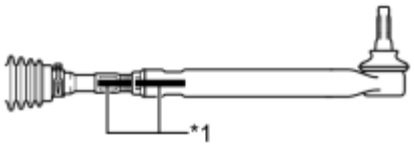
SST: 09612-00012

HINT:

Tape SST before use.

28. REMOVE TIE ROD END SUB-ASSEMBLY LH

# Text in Illustration




c

| | |
|---|---|
| *1 | Matchmark |

(a) Put matchmarks on the tie rod end sub-assembly LH and steering gear assembly.

(b) Remove the tie rod end sub-assembly LH and lock nut.

29. REMOVE TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

# DISASSEMBLY

1. REMOVE STEERING RACK BOOT CLIP LH

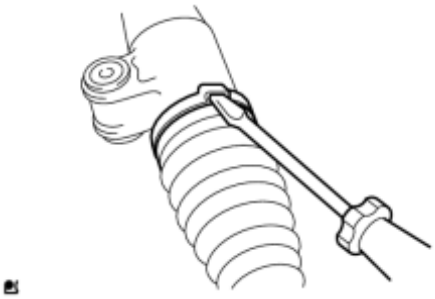
(a) Using pliers, remove the steering rack boot clip LH.

2. REMOVE STEERING RACK BOOT CLIP RH

HINT:

Perform the same procedure as for the LH side.

3. REMOVE NO. 2 STEERING RACK BOOT CLAMP



(a) Using a screwdriver, remove the No. 2 steering rack boot clamp.

NOTICE:

Be careful not to damage the steering rack boot.

4. REMOVE NO. 1 STEERING RACK BOOT CLAMP

HINT:

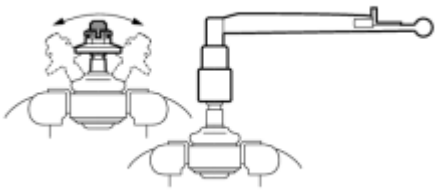
Perform the same procedure as for the No. 2 steering rack boot clamp.

5. REMOVE STEERING RACK BOOT LH

6. REMOVE STEERING RACK BOOT RH

# INSPECTION

1. INSPECT TIE ROD END SUB-ASSEMBLY LH



c

(a) Secure the tie rod end sub-assembly LH in a vise.

NOTICE:

Do not overtighten the vise.

(b) Install the nut to the stud bolt.

(c) Flip the ball joint back and forth 5 times.

(d) Set a torque wrench to the nut, turn the ball joint continuously at a rate of 2 to 4 seconds per turn, and check the turning torque on the 5th turn.

Standard turning torque:

0.3 to 1.9 N*m (3 to 19 kgf*cm, 3 to 17 in.*lbf)

HINT:

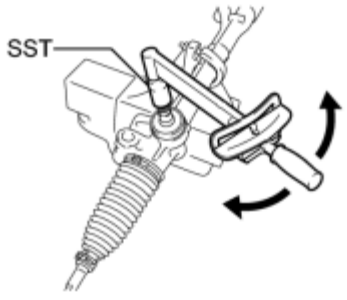
If the turning torque is not within the specified range, replace the tie rod end sub-assembly LH with a new one.

2. INSPECT TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

3. INSPECT TOTAL PRELOAD




c

(a) Using SST and a torque wrench, inspect the total preload.

SST: 09616-00011

Standard preload:

0.7 to 1.1 N*m (7 to 11 kgf*cm, 6 to 9 in.*lbf)

NOTICE:

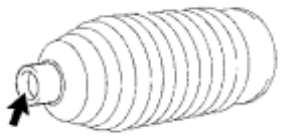
Inspect the total preload around the steering rack center position.

HINT:

If the total preload is not within the specified range, replace the steering gear assembly with a new one.

# REASSEMBLY

1. INSTALL STEERING RACK BOOT LH



P C57755

(a) Apply lithium soap base glycol grease to the inside of the small opening of a new steering rack boot LH.

(b) Install the steering rack boot LH to the groove on the rack housing.

NOTICE:

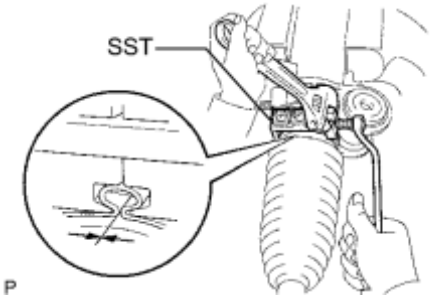
- Be careful not to damage or twist the boot.
- Make sure that the boot is free of rust and foreign matter.

2. INSTALL STEERING RACK BOOT RH

HINT:

Perform the same procedure as for the LH side.

3. INSTALL NO. 2 STEERING RACK BOOT CLAMP




P

(a) Using SST, tighten a new No. 2 steering rack boot clamp, as shown in the illustration.

SST: 09521-24010

Clearance:

3.0 mm (0.118 in.) or less

NOTICE:

Be careful not to damage the steering rack boot.

4. INSTALL NO. 1 STEERING RACK BOOT CLAMP

HINT:

Perform the same procedure as for the No. 2 steering rack boot clamp.

SST: 09521-24010

5. INSTALL STEERING RACK BOOT CLIP LH

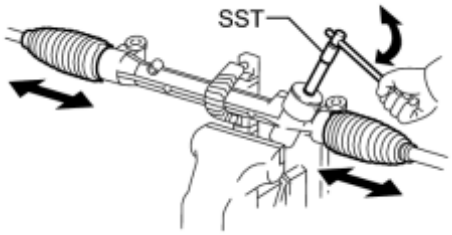
(a) Using pliers, install the steering rack boot clip LH.

6. INSTALL STEERING RACK BOOT CLIP RH

HINT:

Perform the same procedure as for the LH side.

7. INSPECT STEERING GEAR ASSEMBLY




(a) Using SST, rotate the pinion shaft to see if both the left and the right steering rack boots expand and contract smoothly.

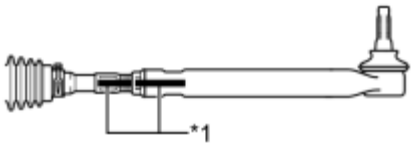
SST: 09616-00011

HINT:

If the operation cannot be done as specified, use a new steering rack boot clamp and reinstall the steering rack boots.

# INSTALLATION

1. INSTALL TIE ROD END SUB-ASSEMBLY LH




C

(a) Install the lock nut and tie rod end sub-assembly LH to the steering gear assembly until the matchmarks are aligned.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

HINT:

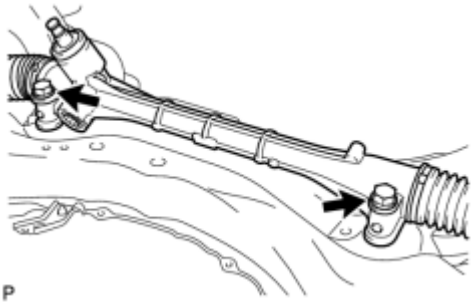
After adjusting the toe-in, tighten the lock nut.

2. INSTALL TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

3. INSTALL STEERING LINK ASSEMBLY



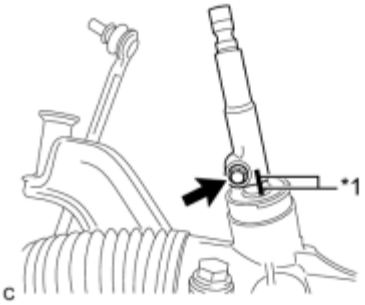
P

(a) Install the steering link assembly to the front suspension crossmember sub-assembly with the 2 bolts and 2 nuts.

- Keep the nut from rotating while turning the bolt because the nut has its own stopper.
- Make sure to tighten the bolts starting from the left side of the vehicle.

Torque: **138 N·m (1407 kgf·cm, 102ft·lbf)**

4. INSTALL STEERING INTERMEDIATE SHAFT




C

(a) Align the matchmarks and install the steering intermediate shaft to the steering link assembly.

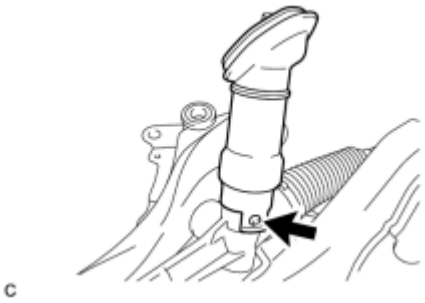
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

(b) Install the bolt.

Torque: **35 N·m (357 kgf·cm, 26ft·lbf)**

5. INSTALL NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY




(a) Align the round hole in the No. 1 steering column hole cover sub-assembly with the protrusion of the steering link assembly to install the cover.

6. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY INFO

7. INSTALL FRONT SUSPENSION MEMBER REAR BRACE LH INFO

8. INSTALL FRONT SUSPENSION MEMBER REAR BRACE RH

HINT:

Perform the same procedure as for the LH side.

9. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH INFO

10. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

11. INSTALL FRONT ENGINE MOUNTING BRACKET LOWER REINFORCEMENT INFO

12. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

13. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

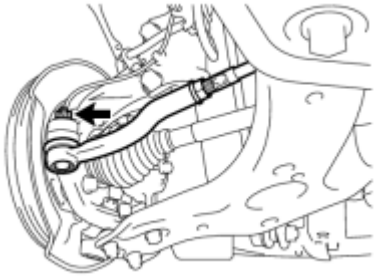
HINT:

Perform the same procedure as for the LH side.

14. CONNECT TIE ROD END SUB-ASSEMBLY LH

(a) Connect the tie rod end sub-assembly LH to the steering knuckle with the nut.

Torque: **49 N·m (500 kgf·cm, 36ft·lbf)**



C

NOTICE:

Further tighten the nut up to 60° if the holes for the clip are not aligned.

(b) Install a new clip.

15. CONNECT TIE ROD END SUB-ASSEMBLY RH

HINT:

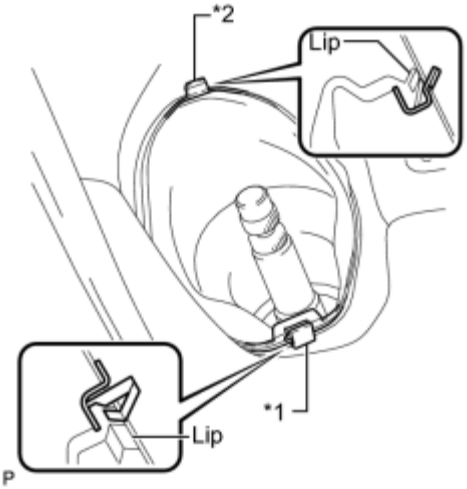
Perform the same procedure as for the LH side.

16. CONNECT FRONT STABILIZER LINK ASSEMBLY LH INFO

17. CONNECT FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.




P

18. CONNECT NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY

(a) Place clip A as shown in the illustration and engage clip B to the body to connect the No. 1 steering column hole cover sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Clip A |
| *2 | Clip B |

NOTICE:

Make sure that the lips of the No. 1 steering column hole cover sub-assembly are not damaged.

19. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

20. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

21. INSTALL COLUMN HOLE COVER SILENCER SHEET INFO

22. INSTALL REAR ENGINE UNDER COVER LH

23. INSTALL REAR ENGINE UNDER COVER RH

HINT:

Perform the same procedure as for the LH side.

24. INSTALL FRONT NO. 3 ENGINE UNDER COVER

25. INSTALL NO. 2 ENGINE UNDER COVER

26. INSTALL NO. 1 ENGINE UNDER COVER

27. INSTALL FRONT WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

28. STABILIZE SUSPENSION INFO

29. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

(a) Inspect and adjust the front wheel alignment INFO.

# ADJUSTMENT

NOTICE:

If the wheel alignment has been adjusted, and if suspension or underbody components have been removed/installed or replaced, be sure to perform the following initialization procedure in order for the system to function normally:

- Perform zero point calibration of the yaw rate and acceleration sensor.

1. INSPECT TIRES

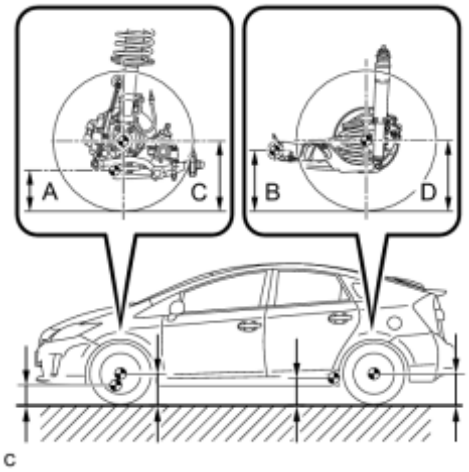
INFO.

2. MEASURE VEHICLE HEIGHT

- Before inspecting the wheel alignment, adjust the vehicle height to the specified value.
- Be sure to perform measurement on a level surface.
- If it is necessary to go under the vehicle for measurement, confirm that the parking brake is applied and the vehicle is secured with chocks.
- Inspect while the vehicle is unloaded.

(a) Bounce the vehicle up and down at the corners to stabilize the suspension.

(b) Measure the vehicle height.



C

## Measurement points:

A: Ground clearance of front No. 1 lower suspension arm bushing set bolt center

B: Ground clearance of rear axle beam bushing set bolt center

C: Ground clearance of front wheel center

D: Ground clearance of rear wheel center

Vehicle Height (Unloaded Vehicle):

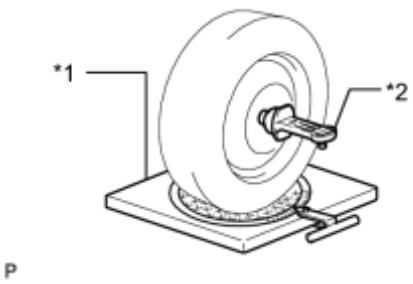
| Tire Size | Front C - A | Rear D - B |
|---|---|---|
| 195/65R15 | 108 mm (4.25 in.)<br><br>90 mm (3.54 in.)* | 26 mm (1.02 in.)<br><br>9 mm (0.354 in.)* |
| 215/45R17 | 103 mm (4.06 in.) | 21 mm (0.827 in.) |

* For vehicle height for Rough Road Package.

3. INSPECT CAMBER, CASTER AND STEERING AXIS INCLINATION

NOTICE:

Inspect while the vehicle is unloaded.




(a) Install a camber-caster-kingpin gauge and place the front wheels on the center of a wheel alignment tester.

## Text in Illustration

| | |
|---|---|
| *1 | Wheel Alignment Tester |
| *2 | Gauge |

(b) Inspect the camber, caster and steering axis inclination.

Camber (Unloaded Vehicle):

| Tire Size | Camber Inclination | Right-left Difference |
|---|---|---|
| 195/65R15 | -0°13' +/- 45' (-0.22° +/- 0.75°)<br><br>-0°07' +/- 45' (-0.12° +/- 0.75°)* | 45' (0.75°) or less |
| 215/45R17 | -0°12' +/- 45' (-0.20° +/- 0.75°) | |

* For vehicle height for Rough Road Package.

Caster (Unloaded Vehicle):

| Tire Size | Caster Inclination | Right-left Difference |
|---|---|---|
| 195/65R15 | 5°53' +/- 45' (5.88° +/- 0.75°)<br><br>5°40' +/- 45' (5.67° +/- 0.75°)* | 45' (0.75°) or less |
| 215/45R17 | 5°50' +/- 45' (5.83° +/- 0.75°) | |

* For vehicle height for Rough Road Package.

Steering Axis Inclination (Unloaded Vehicle):

| Tire Size | Steering Axis Inclination |
|---|---|
| 195/65R15 | 12°16' (12.27°)<br><br>11°52' (11.87°)* |

| Tire Size | Steering Axis Inclination |
|---|---|
| 215/45R17 | 12°10' (12.17°) |

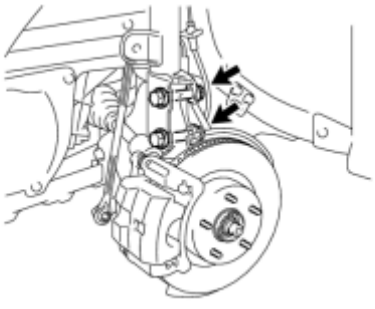
* For vehicle height for Rough Road Package.

4. ADJUST CAMBER

NOTICE:

Inspect toe-in after the camber has been adjusted.

(a) Remove the front wheel.



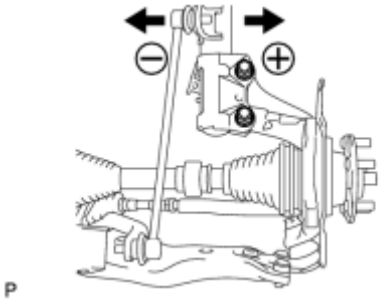

(b) Loosen the 2 nuts.

NOTICE:

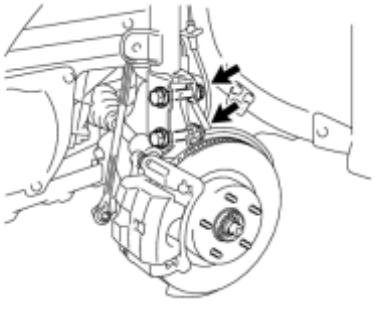
Keep the bolts inserted.

(c) Clean the installation surfaces of the front shock absorber and the steering knuckle.

(d) Temporarily install the 2 nuts. (Step A)




(e) Fully push or pull the front axle hub in the direction of the required adjustment. (Step B)




(f) Tighten the nuts.

Torque: **240 N·m (2447 kgf·cm, 177ft·lbf)**

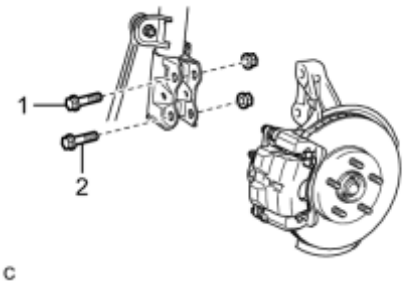
NOTICE:

Keep the bolts from rotating when tightening the nuts.

(g) Install the front wheel.

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

(h) Check the camber.




c

If the measured value is not within the specification, calculate the required adjustment amount using the formula below.

Camber adjustment amount = center of the specified range - measured value

Check the combination of the installed bolts. Select appropriate bolts from the tables below to adjust the camber to the specified values.

HINT:

Try to adjust the camber to the center of the specified values.

| Move the axle hub toward (+) in step B | Move the axle hub toward (-) in step B |
|---|---|
| Refer to table (1) (Move the axle hub toward the positive side) | Refer to table (2) (Move the axle hub toward the negative side) |

Table (1) (Move the axle hub toward the positive side)

| Installed Bolt / Adjusting Value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 |  90105-17019 |  90105-17019 |  90105-17019 |  90105-17019 |  90105-17016 |  90105-17017 |  90105-17018 |
| | 2 |  90105-17019 |  90105-17016 |  90105-17017 |  90105-17018 |  90105-17018 |  90105-17018 |  90105-17018 |
| -1°30' to -1°15' (-1.50° to -1.25°) | | | | | | | | G |
| -1°15' to -1°00' (-1.25° to -1°) | | | | | | | G | A |
| -1°00' to -0°45' (-1° to -0.75°) | | | | | | G | A | B |
| -0°45' to -0°30' (-0.75° to -0.5°) | | | | | G | A | B | C |
| -0°30' to -0°15' (-0.5° to -0.25°) | | | | G | A | B | C | D |
| -0°15' to 0° (-0.25° to 0°) | | | G | A | B | C | D | E |
| 0° to 0°15' (0° to 0.25°) | | A | B | C | D | E | F | |
| 0°15' to 0°30' (0.25° to 0.5°) | | B | C | D | E | F | | |
| 0°30' to 0°45' (0.5° to 0.75°) | | C | D | E | F | | | |
| 0°45' to 1°00' (0.75° to 1°) | | D | E | F | | | | |
| 1°00' to 1°15' (1° to 1.25°) | | E | F | | | | | |
| 1°15' to 1°30' (1.25° to 1.5°) | | F | | | | | | |

Selected Bolt Combination

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 |  90105-17019 |  90105-17019 |  90105-17019 |  90105-17016 |  90105-17017 |  90105-17018 |  90105-17019 |
| 2 |  90105-17016 |  90105-17017 |  90105-17018 |  90105-17018 |  90105-17018 |  90105-17018 |  90105-17019 |

Table (2) (Move the axle hub toward the negative side)

| Installed Bolt / Adjusting Value | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | 1 |  90105-17019 |  90105-17019 |  90105-17019 |  90105-17019 |  90105-17016 |  90105-17017 |  90105-17018 |
| | 2 |  90105-17019 |  90105-17016 |  90105-17017 |  90105-17018 |  90105-17018 |  90105-17018 |  90105-17018 |
| -1°30' to -1°15' (-1.50° to -1.25°) | | F | | | | | | |
| -1°15' to -1°00' (-1.25° to -1°) | | E | F | | | | | |
| -1°00' to -0°45' (-1° to -0.75°) | | D | E | F | | | | |
| -0°45' to -0°30' (-0.75° to -0.5°) | | C | D | E | F | | | |
| -0°30' to -0°15' (-0.5° to -0.25°) | | B | C | D | E | F | | |
| -0°15' to 0° (-0.25° to 0°) | | A | B | C | D | E | F | |
| 0° to 0°15' (0° to 0.25°) | | | G | A | B | C | D | E |
| 0°15' to 0°30' (0.25° to 0.5°) | | | | G | A | B | C | D |
| 0°30' to 0°45' (0.5° to 0.75°) | | | | | G | A | B | C |
| 0°45' to 1°00' (0.75° to 1°) | | | | | | G | A | B |
| 1°00' to 1°15' (1° to 1.25°) | | | | | | | G | A |
| 1°15' to 1°30' (1.25° to 1.5°) | | | | | | | | G |

Selected Bolt Combination

| | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|
| 1 |  90105-17019 |  90105-17019 |  90105-17019 |  90105-17016 |  90105-17017 |  90105-17018 |  90105-17019 |
| 2 |  90105-17016 |  90105-17017 |  90105-17018 |  90105-17018 |  90105-17018 |  90105-17018 |  90105-17019 |

NOTICE:

Replace the nut with a new one when replacing the bolt.

The body and suspension may be damaged if the camber is not correctly adjusted according to the tables above.

(i) Repeat the steps mentioned above. In Step A, replace 1 or 2 selected bolts.

HINT:

Replace one bolt at a time when replacing both bolts.

5. INSPECT TOE-IN

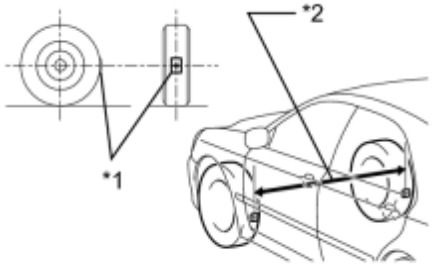
NOTICE:

Inspect while the vehicle is unloaded.

(a) Bounce the vehicle up and down at the corners to stabilize the suspension.

(b) Release the parking brake and move the shift lever to N.

(c) Push the vehicle straight ahead approximately 5 m (16.4 ft.). (Step C)




(d) Put tread center marks on the rearmost points of the front wheels and measure the distance between the marks (dimension B).

## Text in Illustration

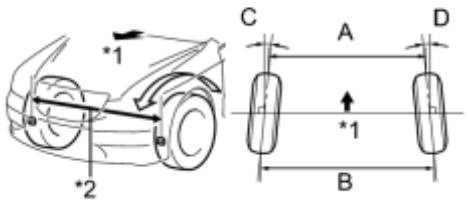
| | |
|---|---|
| *1 | Tread Center Mark |
| *2 | Dimension B |

(e) Slowly push the vehicle straight ahead to cause the front wheels to rotate 180° using the front tire valve as a reference point.

HINT:

Do not allow the wheels to rotate more than 180°. If the wheels rotate more than 180°, perform the procedure from Step C again.

(f) Measure the distance between the tread center marks on the front side of the wheels (dimension A).




## Text in Illustration

| | |
|---|---|
| *1 | Front of the Vehicle |
| *2 | Dimension A |

## To-in (Unloaded Vehicle)

| Specified Condition |
| --- |
| C + D: 0°12' +/- 0°12' (0.20° +/- 0.20°)<br><br>C + D: 0°18' +/- 0°12' (0.30° +/- 0.20°)* |
| B - A: 2.0 +/- 2.0 mm (0.0787 +/- 0.0787 in.)<br><br>B - A: 3.0 +/- 2.0 mm (0.118 +/- 0.0787 in.)* |

* For vehicle height for Rough Road Package.

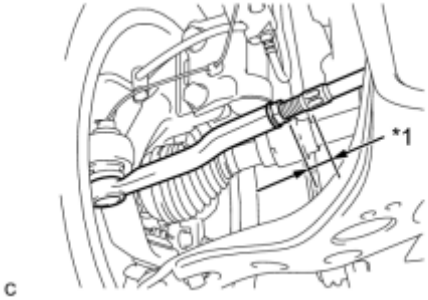
HINT:

Measure "B - A" only when "C + D" cannot be measured.

If the toe-in is not within the specified range, adjust it at the rack ends.

6. ADJUST TOE-IN

(a) Make sure that the thread length of the right and left rack ends are approximately the same.




c

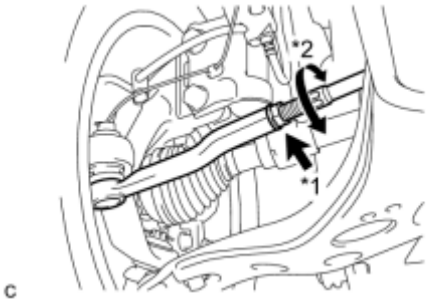
## Text in Illustration

| | |
| --- | --- |
| *1 | Thread Length |

Standard difference:

1.5 mm (0.0591 in.) or less

(b) Remove the boot clips.




c

(c) Loosen the tie rod end lock nuts.

## Text in Illustration

| | |
| --- | --- |
| *1 | Loosen |
| *2 | Turn |

(d) Adjust the rack ends if the difference in thread length between the right and left rack ends is not within the specified range.

(1) Extend the shorter rack end if the measured toe-in deviates toward the outer-side.

(2) Shorten the longer rack end if the measured toe-in deviates toward the inner-side.

(e) Turn the right and left rack ends by an equal amount to adjust the toe-in to the center value.

(f) Make sure that the thread lengths of the right and left rack ends are the same.

(g) Tighten the tie rod end lock nuts.

Torque: **74 N·m (755 kgf·cm, 55ft·lbf)**

(h) Place the boots on the seats and install the clips.

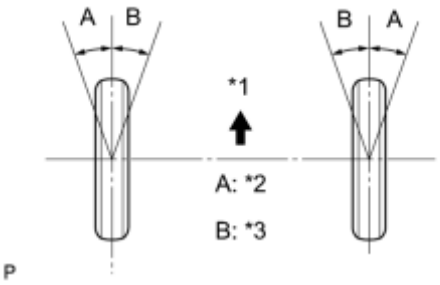
HINT:

Make sure that the boots are not twisted.

7. INSPECT WHEEL ANGLE

## Text in Illustration

| | |
|---|---|
| *1 | Front of the Vehicle |
| *2 | Inside |
| *3 | Outside |




(a) Put tread center marks on the rearmost points of a turning radius gauge.

(b) Turn the steering wheel to the left and right full lock positions, and measure the turning angle.

NOTICE:

Inspect while the vehicle is unloaded.

Wheel Angle (Unloaded Vehicle):

| Tire Size | Inside Wheel | Outside Wheel Reference |
|---|---|---|
| 195/65R15 | 40°50' +/- 2° (40.83° +/- 2°)<br><br>37°42' +/- 2° (37.70° +/- 2°)* | 33°50' (33.83°)<br><br>32°13' (32.22°)* |
| 215/45R17 | 37°27' +/- 2° (37.45° +/- 2°) | 31°56' (31.93°) |

* For vehicle height for Rough Road Package.

If the angles are not as specified, check and adjust the right and left rack end lengths.

8. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

9. PERFORM YAW RATE AND ACCELERATION SENSOR CALIBRATION

INFO.

10. PERFORM INITIALIZATION (w/ Height Control Sensor)

NOTICE:

Some systems need to be initialized after the wheel alignment is adjusted INFO.

# INSPECTION

NOTICE:

If the wheel alignment has been adjusted, and if suspension or underbody components have been removed/installed or replaced, be sure to perform the following initialization procedure in order for the system to function normally:

- Perform zero point calibration of the yaw rate and acceleration sensor and test mode inspection.

1. INSPECT TIRES

INFO.

2. MEASURE VEHICLE HEIGHT INFO

3. INSPECT CAMBER

NOTICE:

Inspect while the vehicle is unloaded.

(a) Install a camber-caster-kingpin gauge.

(b) Inspect the camber.

Camber (Unloaded Vehicle):

| Tire Size | Camber Inclination | Right-left Difference |
|---|---|---|
| 195/65R15 | -1°29' +/- 30' (-1.48° +/- 0.50°) | 30' (0.50°) or less |
| 215/45R17 | -1°28' +/- 30' (-1.47° +/- 0.50°) | |

HINT:

Camber is not adjustable. If the measurement is not within the specified range, inspect the suspension parts for damage and/or wear, and replace them if necessary.

4. INSPECT TOE-IN

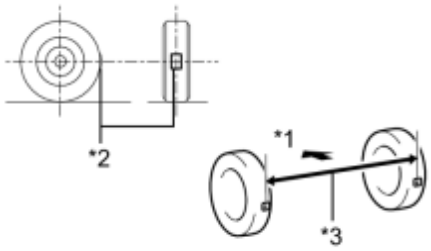
NOTICE:

Inspect while the vehicle is unloaded.

(a) Bounce the vehicle up and down at the corners to stabilize the suspension.

(b) Release the parking brake and move the shift lever to N.

(c) Push the vehicle straight ahead approximately 5 m (16.4 ft.). (Step A)




(d) Put tread center marks on the rearmost points of the rear wheels and measure the distance between the marks (dimension B).

## Text in Illustration

| | |
|---|---|
| *1 | Front of the Vehicle |
| *2 | Tread Center Mark |
| *3 | Dimension B |

(e) Slowly push the vehicle straight ahead to cause the rear wheels to rotate 180° using the rear tire valve as a reference point.

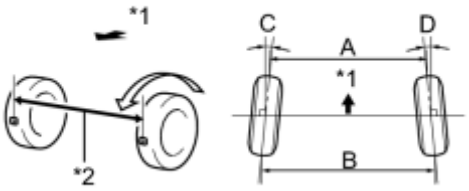
HINT:

Do not allow the wheels to rotate more than 180°. If the wheels rotate more than 180°, perform the procedure from Step A again.

(f) Measure the distance between the tread center marks on the front side of the wheels (dimension A).

## Text in Illustration

| | |
|---|---|
| *1 | Front of the Vehicle |
| *2 | Dimension A |




Toe-in (Unloaded Vehicle):

| Tire Size | Specified Condition | Right-left Difference |
|---|---|---|
| 195/65R15 | C + D: 0°17' +/- 18' ( 0.29° +/- 0.30°)<br><br>C + D: 0°10' +/- 18' ( 0.17° +/- 0.30°)* | 45' (0.75°) or less |
| | B - A: 2.9 +/- 3 mm (0.114 +/- 0.118 in.)<br><br>B - A: 1.7 +/- 3 mm (0.0669 +/- 0.118 in.)* | - |
| 215/45R17 | C + D: 0°15' +/- 18' ( 0.25° +/- 0.30°) | 45' (0.75°) or less |
| | B - A: 2.5 +/- 3 mm (0.0984 +/- 0.118 in.) | - |

* For vehicle height for Rough Road Package.

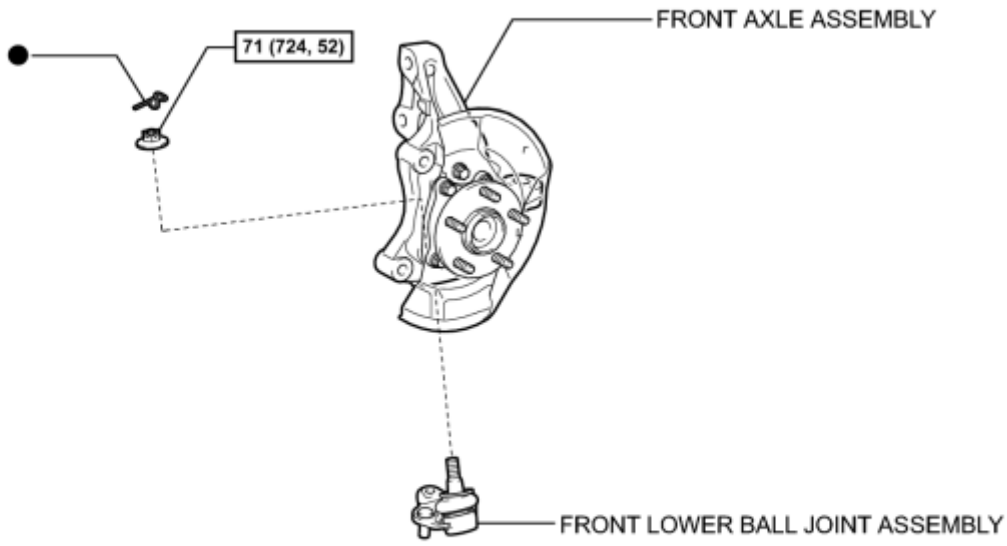
HINT:

Measure "B - A" only when "C + D" cannot be measured.

If the toe-in is not within the specified range, inspect the suspension parts and replace them if necessary.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# REMOVAL

HINT:

- Use the same procedure for the LH side and RH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT AXLE ASSEMBLY

HINT:

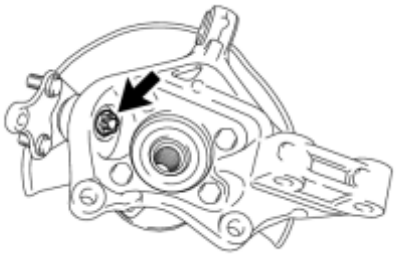
Refer to the procedure up to Remove Front Axle Assembly INFO.

2. REMOVE FRONT LOWER BALL JOINT ASSEMBLY

(a) Secure the front axle assembly in a vise.

NOTICE:

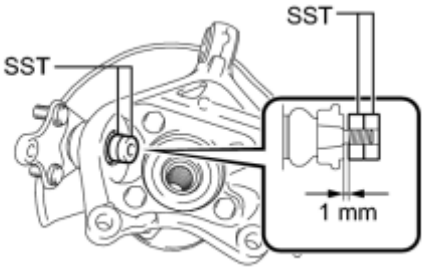
When using a vise, do not overtighten it.



c

(b) Remove the clip and nut.

(c) Install SST to the front lower ball joint as shown in the illustration.




c

SST: 09960-20010

09961-02050

09961-02050

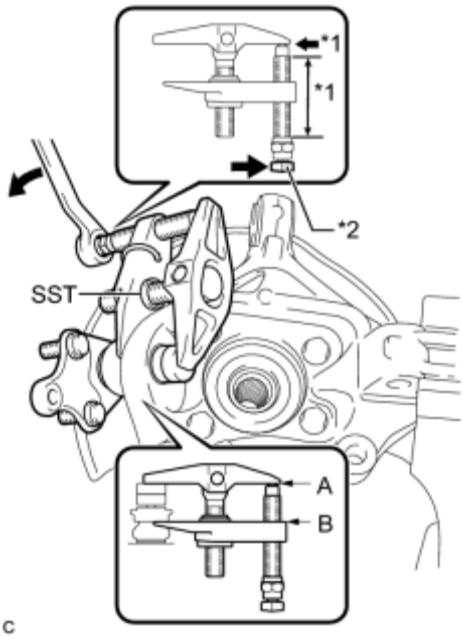
NOTICE:

Check that the clearance measurement between SST and the front axle assembly is 1 mm (0.0394 in.).

(d) Using SST, remove the front lower ball joint assembly from the front axle assembly as shown in the illustration.

SST: 09960-20010

09961-02010




09961-02050

09961-02050

# Text in Illustration

| | |
|---|---|
| *1 | Apply grease |
| *2 | Place the wrench here. |

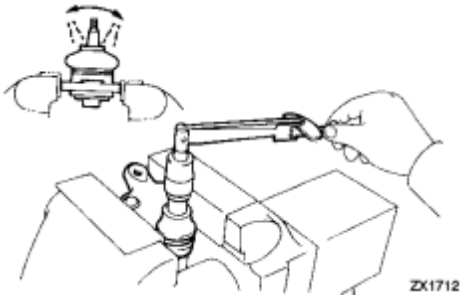
CAUTION:

Apply grease to the threads and end of the SST bolt.

- Install SST so that A and B are parallel.
- Be sure to place the wrench on the part indicated in the illustration.
- Do not damage the front lower ball joint dust cover.

# INSPECTION

1. INSPECT FRONT LOWER BALL JOINT ASSEMBLY




(a) Inspect the turning torque of the ball joint.

(1) Secure the front lower ball joint assembly in a vise using aluminum plates.

(2) Install the nut to the front lower ball joint stud.

(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: **0.98 to 4.90 N·m (10 to 50 kgf·cm, 8.7 to 43in·lbf)**

HINT:

If the turning torque is not within the specified range, replace the front lower ball joint assembly with a new one.

(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.

# INSTALLATION

HINT:

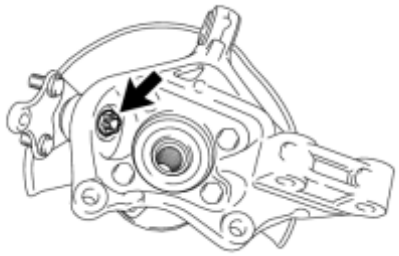
- Use the same procedure for the LH side and RH side.
- The procedure listed below is for the LH side.

1. INSTALL FRONT LOWER BALL JOINT ASSEMBLY

(a) Secure the front axle assembly in a vise.

NOTICE:

When using a vise, do not overtighten it.



C

(b) Install the front lower ball joint assembly to the front axle assembly with the nut.

Torque: **71 N·m (724 kgf·cm, 52ft·lbf)**

(c) Install a new clip.

NOTICE:

Further tighten the nut up to 60° if the holes for the cotter pin are not aligned.

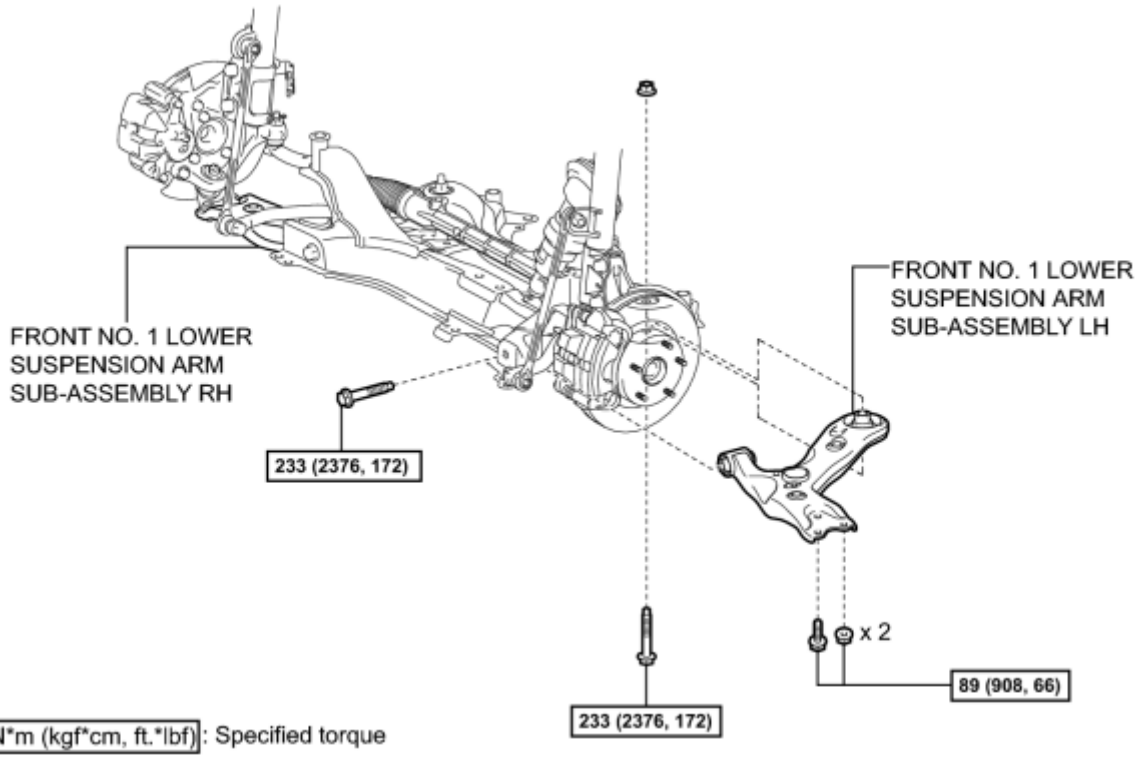
2. INSTALL FRONT AXLE ASSEMBLY

HINT:

Refer to the procedure from Install Front Axle Assembly INFO.

# COMPONENTS

# ILLUSTRATION




c

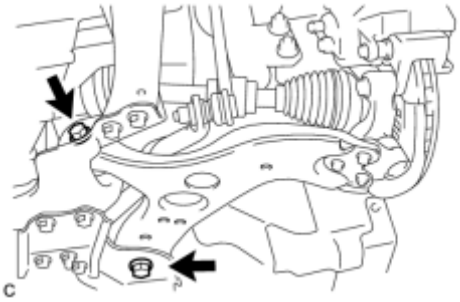
# REMOVAL

1. REMOVE FRONT WHEELS

2. REMOVE NO. 1 ENGINE UNDER COVER

3. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

4. REMOVE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH




(a) Remove the 2 bolts, nut, and front No. 1 lower suspension arm sub-assembly LH from the front suspension member.

NOTICE:

Because the nut has its own stopper, do not turn the nut. Loosen the bolt with the nut secured.

5. REMOVE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Refer to the procedure up to Remove Front No. 1 Lower Suspension Arm Sub-assembly RH INFO.

# INSTALLATION

1. TEMPORARILY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Refer to the procedure from Temporarily Tighten Front No. 1 Lower Suspension Arm Sub-assembly RH INFO.

2. TEMPORARILY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH



(a) Temporarily install the front No. 1 lower suspension arm LH to the front suspension crossmember with the 2 bolts and nut.

NOTICE:

Because the nut has its own stopper, do not turn the nut. Tighten the bolt with the nut secured.

3. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

4. INSTALL FRONT WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

5. STABILIZE SUSPENSION

(a) Lower the vehicle.

(b) Press down on the vehicle several times to stabilize the suspension.

6. FULLY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH




(a) Fully tighten the bolt A and B.

Torque: **233 N·m (2376 kgf·cm, 172ft·lbf)**

NOTICE:

Because the nut has its own stopper, do not turn the nut. Tighten the bolt with the nut secured.

7. INSTALL NO. 1 ENGINE UNDER COVER

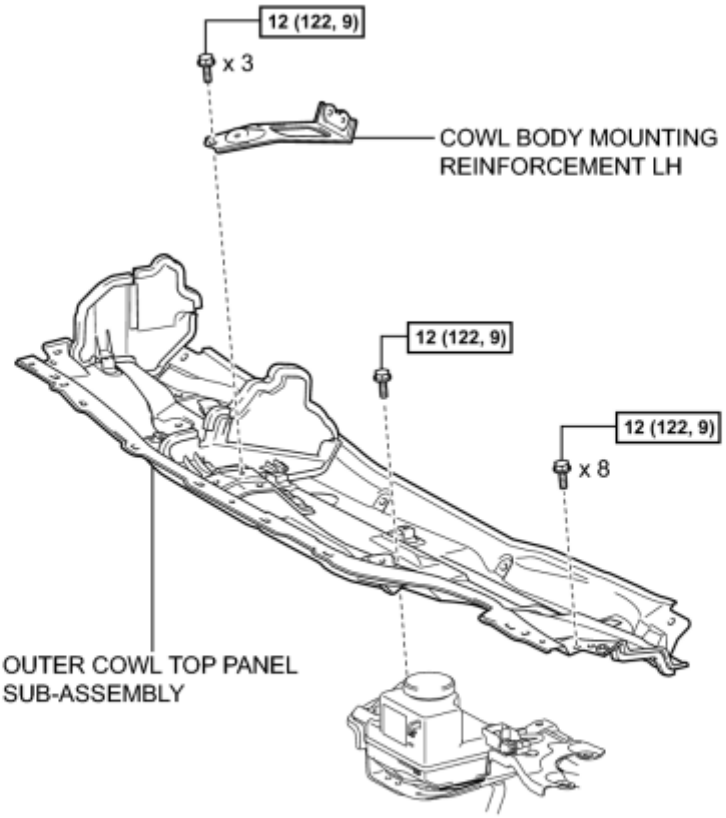
8. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT:

Inspect and adjust the front wheel alignment INFO.

# COMPONENTS

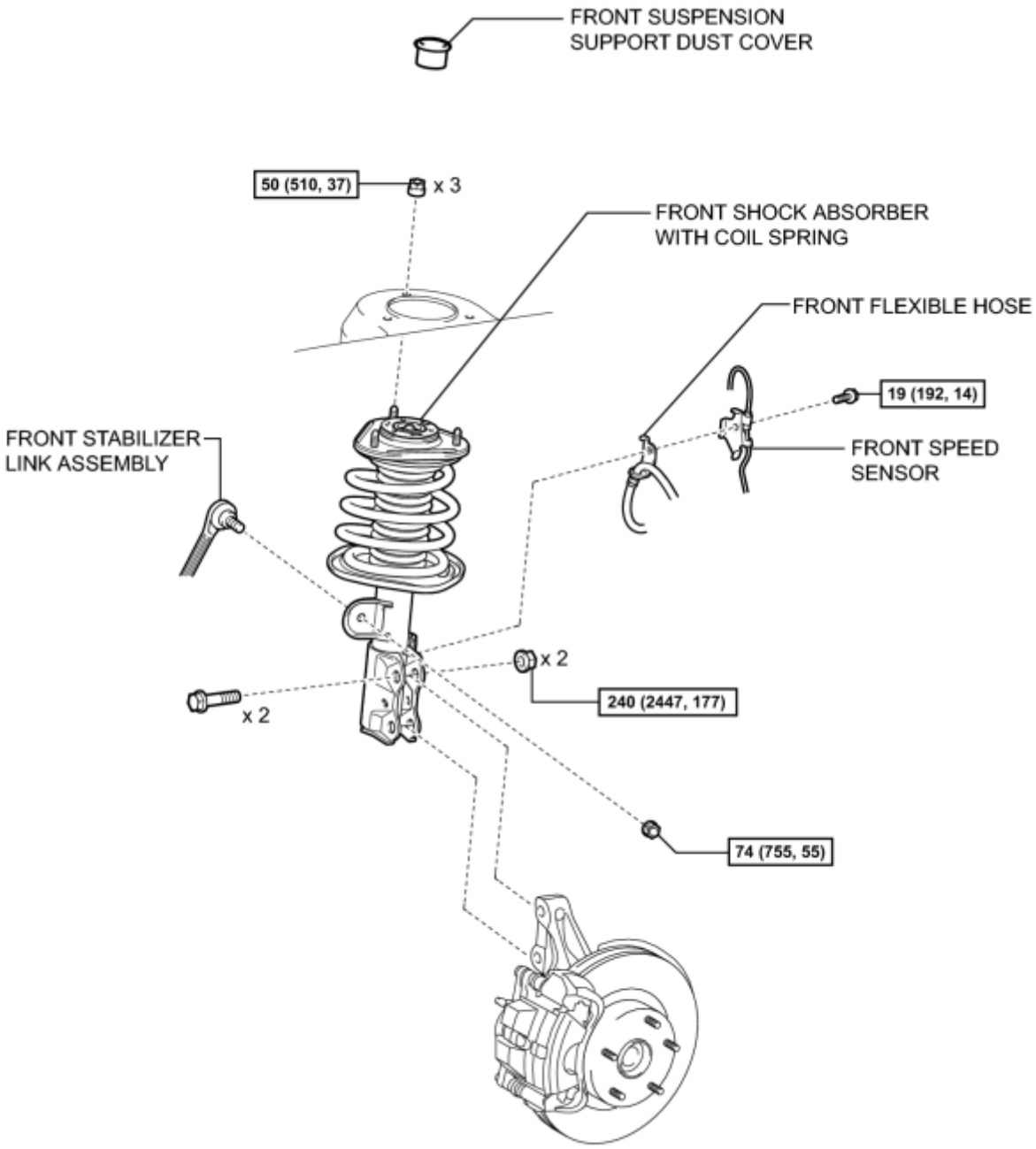
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

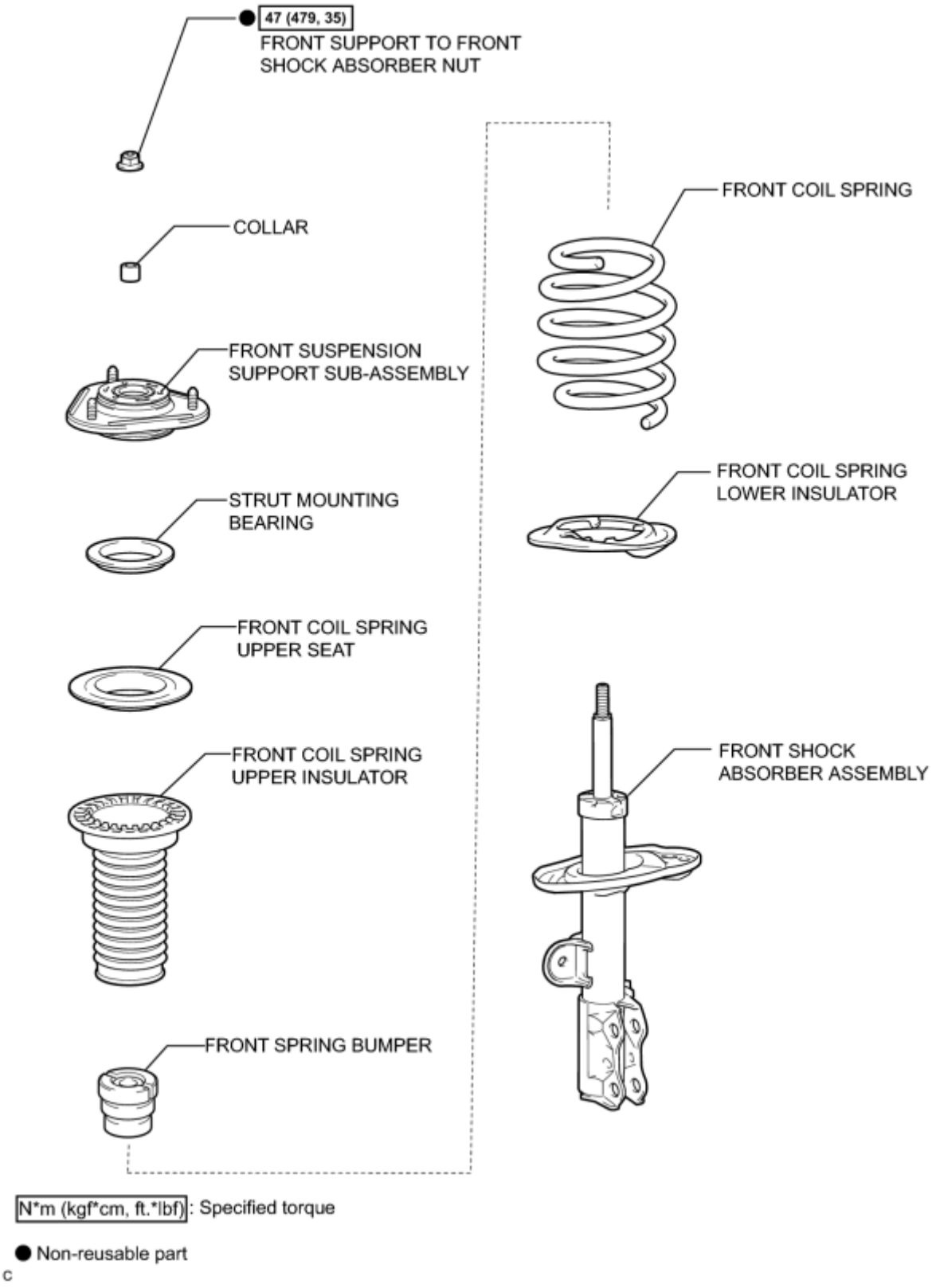
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# REMOVAL

HINT:

- Use the same procedure for the LH side and RH side.
- The procedure listed below is for the LH side.

1. REMOVE FRONT WHEEL

2. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

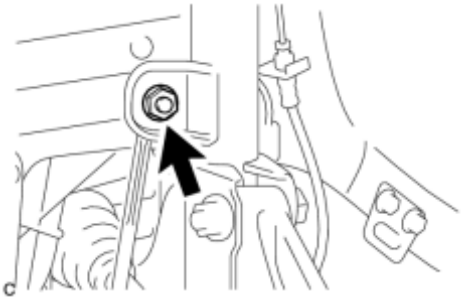
HINT:

Refer to the procedure up to Remove Windshield Wiper Motor and Link Assembly INFO.

3. REMOVE COWL BODY MOUNTING REINFORCEMENT LH INFO

4. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

5. SEPARATE FRONT STABILIZER LINK ASSEMBLY

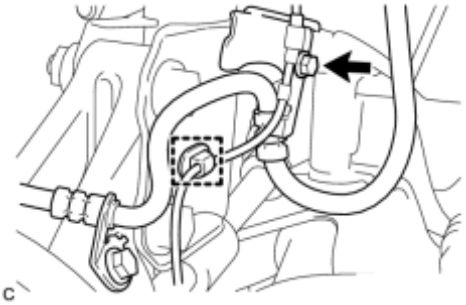


(a) Remove the nut and separate the stabilizer link assembly from the front shock absorber with coil spring.

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud bolt.

6. SEPARATE FRONT SPEED SENSOR



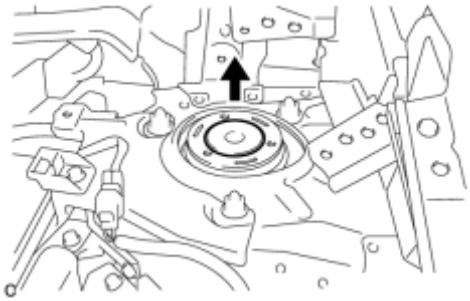
(a) Remove the bolt and clamp, and separate the front speed sensor and front flexible hose from the front shock absorber with coil spring.

NOTICE:

Be sure to separate the front speed sensor from the front shock absorber with coil spring completely.

7. REMOVE FRONT SUSPENSION SUPPORT DUST COVER

(a) Remove the front suspension support dust cover.

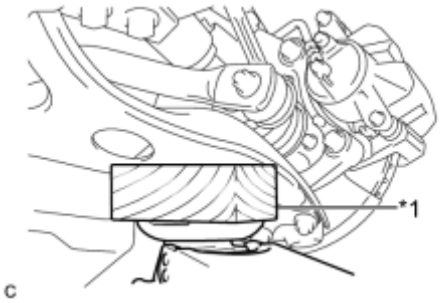


8. REMOVE FRONT SHOCK ABSORBER WITH COIL SPRING



(a) Loosen the front support to front shock absorber nut of the front shock absorber.

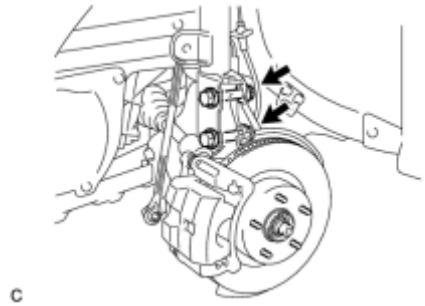
- Do not remove the front support to front shock absorber nut.
- Loosen the nut only when the front shock absorber with coil spring needs to be disassembled.



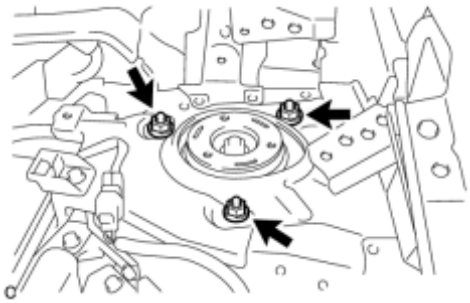

(b) Support the front axle using a jack and wooden block.

## Text in Illustration

| | |
|---|---|
| *1 | Wooden Block |




(c) Remove the 2 bolts and 2 nuts, and separate the front shock absorber with coil spring (lower side) from the steering knuckle.

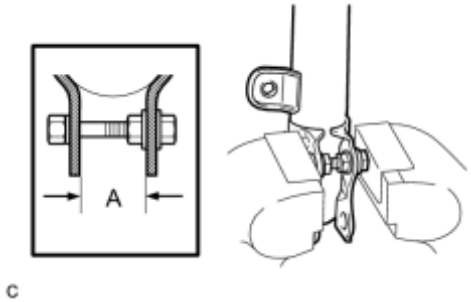


(d) Remove the 3 nuts and front shock absorber with coil spring.

NOTICE:

Make sure that the front speed sensor is completely separated from the front shock absorber with coil spring.

9. SECURE FRONT SHOCK ABSORBER WITH COIL SPRING



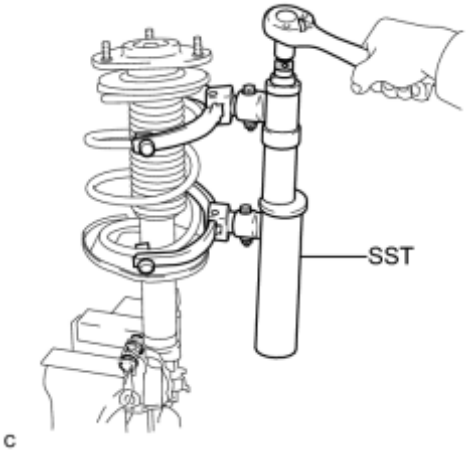

C

(a) Install a bolt and nut to the front shock absorber as shown in the illustration and secure the front shock absorber in a vise.

Standard length A:

40 mm (1.575 in.)

10. REMOVE FRONT SUPPORT TO FRONT SHOCK ABSORBER NUT




C

(a) Using SST, compress the front coil spring.

SST: 09727-30021

09727-00010

09727-00021

09727-00031

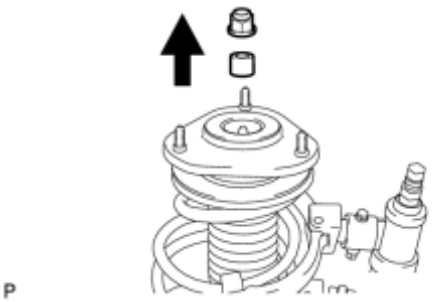
NOTICE:

Do not use an impact wrench. It will damage SST.

HINT:

If the front coil spring is compressed at an angle, using 2 SST will make the work easier.

(b) Check that the front coil spring is sufficiently compressed.



P

(c) Remove the front support to front shock absorber nut and collar.

11. REMOVE FRONT SUSPENSION SUPPORT SUB-ASSEMBLY

12. REMOVE STRUT MOUNTING BEARING

13. REMOVE FRONT COIL SPRING UPPER SEAT

14. REMOVE FRONT COIL SPRING UPPER INSULATOR

15. REMOVE FRONT COIL SPRING

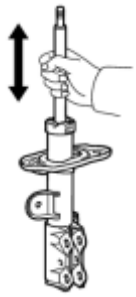
16. REMOVE FRONT SPRING BUMPER

17. REMOVE FRONT COIL SPRING LOWER INSULATOR

18. REMOVE FRONT SHOCK ABSORBER ASSEMBLY

# INSPECTION

1. INSPECT FRONT SHOCK ABSORBER ASSEMBLY



P

(a) Compress and extend the shock absorber rod 4 times or more.

Standard:

There is no abnormal resistance or sound.

HINT:

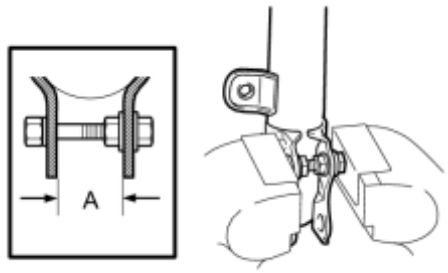
If there is any abnormality, replace the front shock absorber assembly with a new one.

# INSTALLATION

HINT:

- Use the same procedure for the LH side and RH side.
- The procedure listed below is for the LH side.

1. SECURE FRONT SHOCK ABSORBER ASSEMBLY



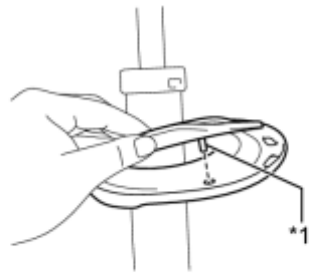

c

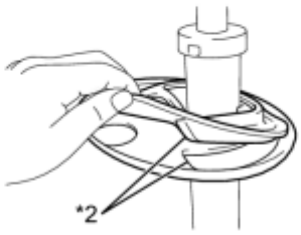
(a) Install the bolt and nut to the front shock absorber as shown in the illustration and secure the front shock absorber in a vise.

Standard length A:

40 mm (1.575 in.)

2. INSTALL FRONT COIL SPRING LOWER INSULATOR




c

(a) Install the front coil spring lower insulator to the front shock absorber assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Positioning Pin |
| *2 | Depression |

NOTICE:

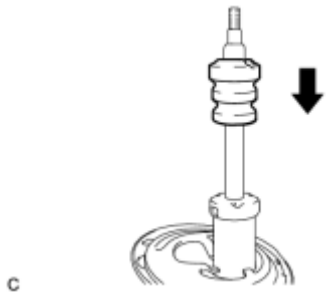
When installing the insulator, fit the insulator to the depression of the spring seat and align the positioning pin into the hole.

3. INSTALL FRONT SPRING BUMPER

(a) Install the front spring bumper to the front shock absorber assembly.

NOTICE:

Face the smaller diameter end of the front spring bumper downward.



C

4. INSTALL FRONT COIL SPRING

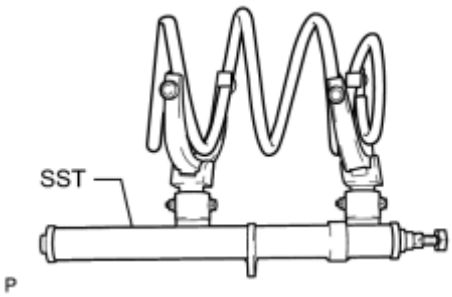
(a) Using SST, compress the front coil spring.

SST: 09727-30021

09727-00010

09727-00021

09727-00031




P

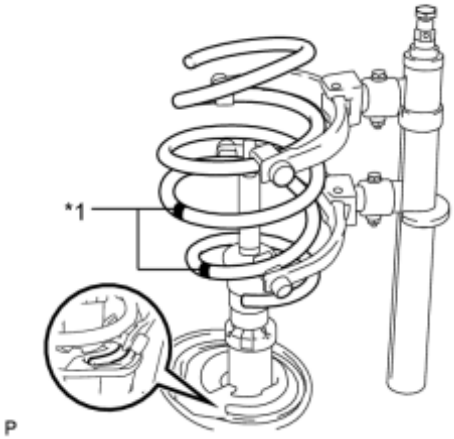
NOTICE:

Do not use an impact wrench. It will damage the SST.

HINT:

If the front coil spring is compressed at an angle, using 2 SST will make the work easier.

(b) Install the front coil spring.




P

# Text in Illustration

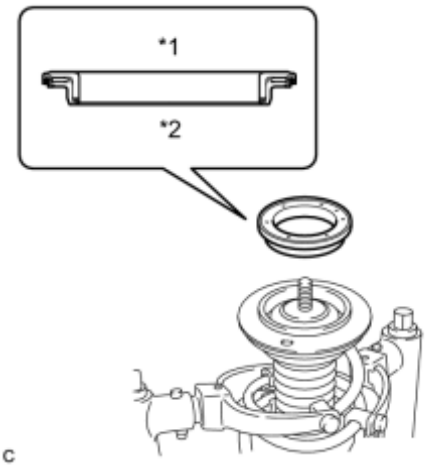
| | |
|---|---|
| *1 | Paint Mark |

- Make sure that the end of the front coil spring is positioned in the depression of the lower spring seat.
- Make sure to install the coil spring with the paint mark facing downward.

5. INSTALL FRONT COIL SPRING UPPER INSULATOR

6. INSTALL FRONT COIL SPRING UPPER SEAT

7. INSTALL STRUT MOUNTING BEARING




c

(a) Install the strut mounting bearing.

## Text in Illustration

| | |
|---|---|
| *1 | Upper Side |
| *2 | Lower Side |

NOTICE:

Do not install the bearing upside down.

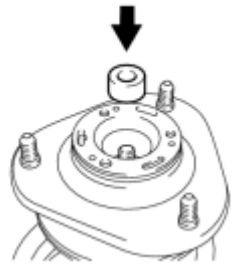
8. INSTALL FRONT SUSPENSION SUPPORT SUB-ASSEMBLY

(a) Install the front suspension support sub-assembly to the front shock absorber assembly.

NOTICE:

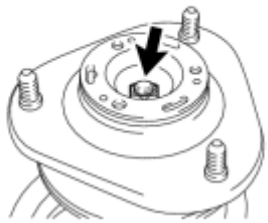
When installing, align the cutout on the front suspension support sub-assembly and the shock absorber piston rod end.

9. TEMPORARILY TIGHTEN FRONT SUPPORT TO FRONT SHOCK ABSORBER NUT



c

(a) Install the collar to the front shock absorber assembly.



c

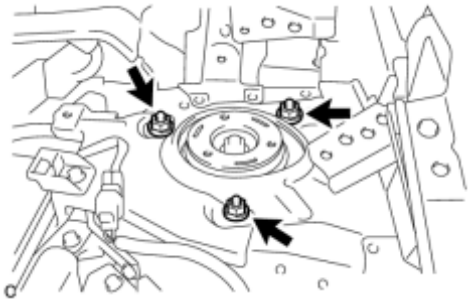
(b) Temporarily tighten a new front support to front shock absorber nut.

(c) Remove SST from the front coil spring.

NOTICE:

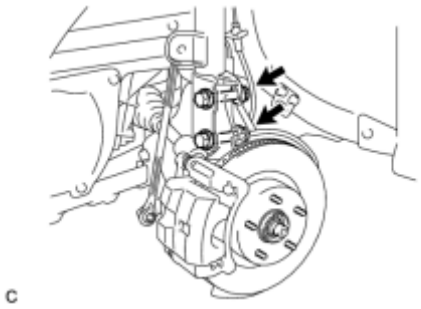
Do not use an impact wrench. It will damage SST.

10. INSTALL FRONT SHOCK ABSORBER WITH COIL SPRING



(a) Install the front shock absorber with coil spring (upper side) with the 3 nuts.

Torque: **50 N·m (510 kgf·cm, 37ft·lbf)**



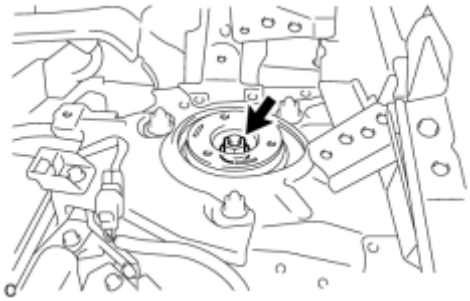
(b) Install the front shock absorber with coil spring (lower side) to the steering knuckle with the 2 bolts and 2 nuts.

Torque: **240 N·m (2447 kgf·cm, 177ft·lbf)**

NOTICE:

While keeping the bolts from rotating, tighten the nuts.

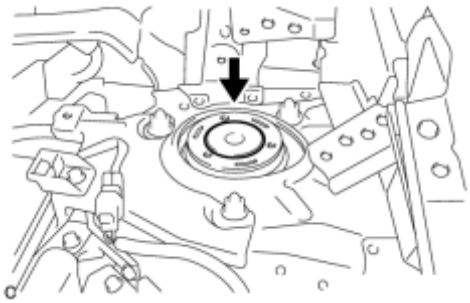
11. FULLY TIGHTEN FRONT SUPPORT TO FRONT SHOCK ABSORBER NUT



(a) Fully tighten the front support to front shock absorber nut.

Torque: **47 N·m (479 kgf·cm, 35ft·lbf)**

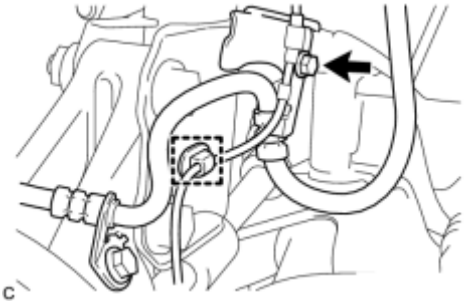
12. INSTALL FRONT SUSPENSION SUPPORT DUST COVER



(a) Install the front suspension support dust cover.

13. INSTALL FRONT SPEED SENSOR

(a) Install the front speed sensor and front flexible hose to the front shock



absorber with the bolt and clamp.

Torque: **19 N·m (192 kgf·cm, 14ft·lbf)**

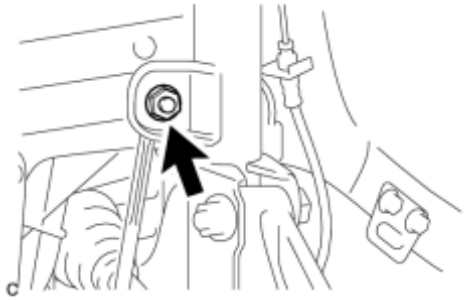
NOTICE:

Do not twist the front speed sensor when installing it.

HINT:

Install the front flexible hose first and then the speed sensor harness bracket.

14. INSTALL FRONT STABILIZER LINK ASSEMBLY



(a) Install the front stabilizer link assembly to the front shock absorber with coil spring with the nut.

Torque: **74 N·m (755 kgf·cm, 55ft·lbf)**

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud bolt.

15. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

16. INSTALL COWL BODY MOUNTING REINFORCEMENT LH INFO

17. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

HINT:

Refer to the procedure from Install Windshield Wiper Motor and Link Assembly INFO.

18. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

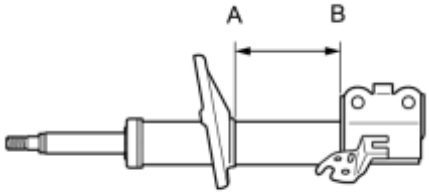
19. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT:

Inspect and adjust the front wheel alignment INFO.

# DISPOSAL

1. DISPOSE OF FRONT SHOCK ABSORBER ASSEMBLY




P

(a) Position the front shock absorber assembly level with the piston rod fully extended. Using a drill, make a hole in the cylinder between A and B shown in the illustration to discharge the gas inside.

NOTICE:

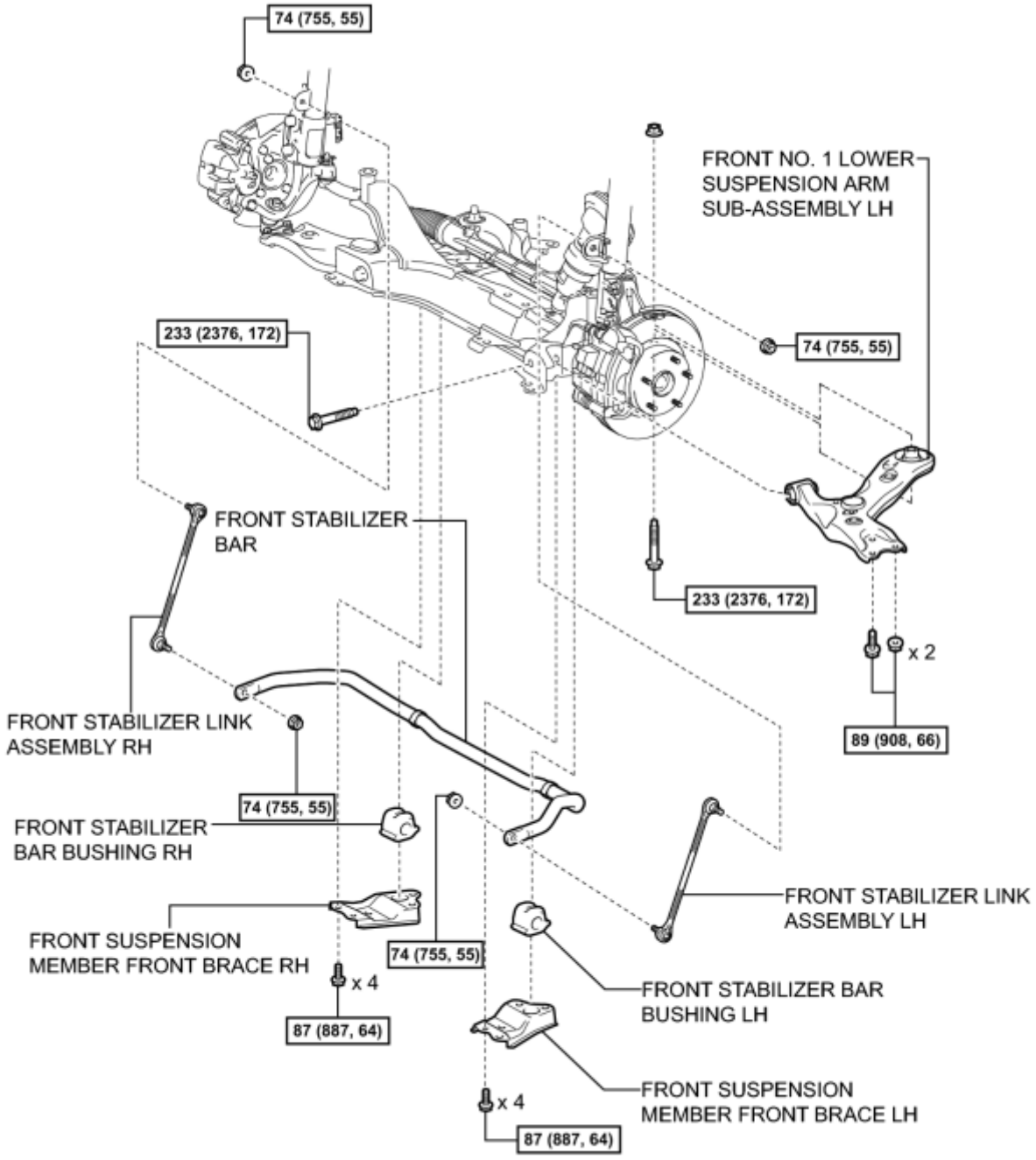
Always use proper safety equipment and be careful when drilling because shards of metal fly about.

HINT:

The gas is colorless, odorless and non-poisonous.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

c

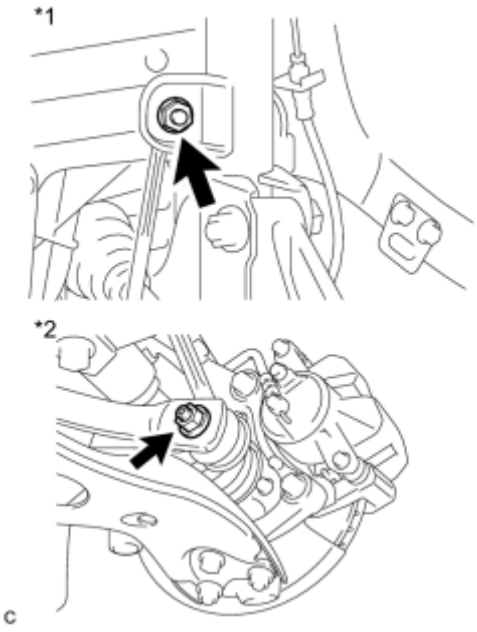
# REMOVAL

1. REMOVE FRONT WHEELS

2. REMOVE NO. 1 ENGINE UNDER COVER

3. REMOVE NO. 2 ENGINE UNDER COVER

4. REMOVE FRONT STABILIZER LINK ASSEMBLY LH




(a) Remove the 2 nuts and front stabilizer link assembly LH.

## Text in Illustration

| | |
|---|---|
| *1 | Upper Side |
| *2 | Lower Side |

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud bolt.

5. REMOVE FRONT STABILIZER LINK ASSEMBLY RH

HINT:

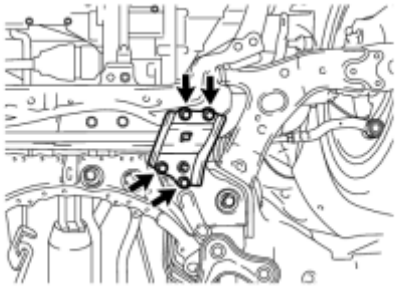
Perform the same procedure as for the LH side.

6. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

7. REMOVE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

8. REMOVE FRONT SUSPENSION MEMBER FRONT BRACE LH

(a) Remove the 4 bolts and front suspension member front brace LH.



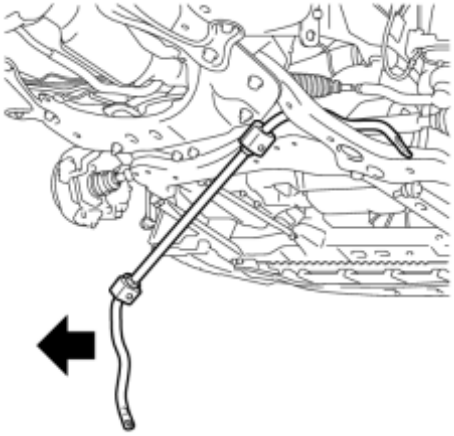
C

9. REMOVE FRONT SUSPENSION MEMBER FRONT BRACE RH

HINT:

Perform the same procedure as for the LH side.

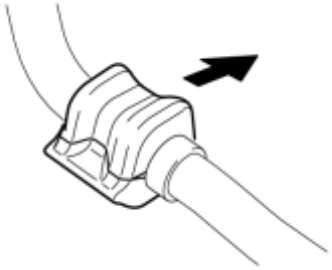
10. REMOVE FRONT STABILIZER BAR



C

(a) Remove the front stabilizer bar with front stabilizer bar bushing from the front suspension crossmember sub-assembly.

11. REMOVE FRONT STABILIZER BAR BUSHING LH



P

(a) Remove the front stabilizer bar bushing LH from the front stabilizer bar.

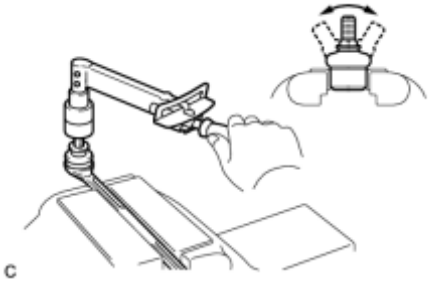
12. REMOVE FRONT STABILIZER BAR BUSHING RH

HINT:

Perform the same procedure as for the LH side.

# INSPECTION

1. INSPECT FRONT STABILIZER LINK ASSEMBLY




(a) Inspect the turning torque of the ball joint.

(1) Secure the front stabilizer link assembly in a vise using aluminum plates.

(2) Install the nut to the front stabilizer link assembly stud.

(3) Using a torque wrench, turn the nut continuously at a rate of 3 to 5 seconds per turn and take the torque reading on the 5th turn.

Torque: **0.05 to 1.96 N·m (0.5 to 20 kgf·cm, 0.4 to 17in·lbf)**

HINT:

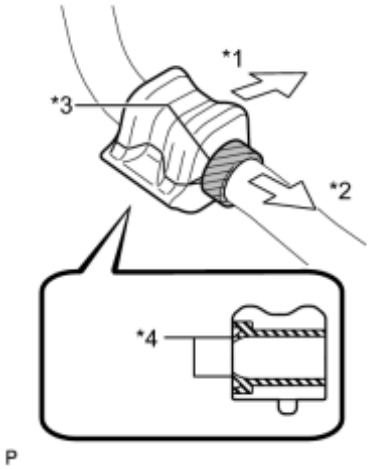
If the turning torque is not within the specified range, replace the front stabilizer link assembly with a new one.

(b) Inspect the dust cover.

(1) Check that the dust cover is not cracked and that there is no grease on it.

# INSTALLATION

1. INSTALL FRONT STABILIZER BAR BUSHING LH




P

(a) Install the front stabilizer bar bushing to the front stabilizer bar as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Front of the Vehicle |
| *2 | Inside of the Vehicle |
| *3 | Stopper |
| *4 | Dust Lip |

- Install the front stabilizer bar bushing so that the dust lips face outward of the vehicle.
- Install the front stabilizer bar bushing so that the cutouts face rearward of the vehicle.

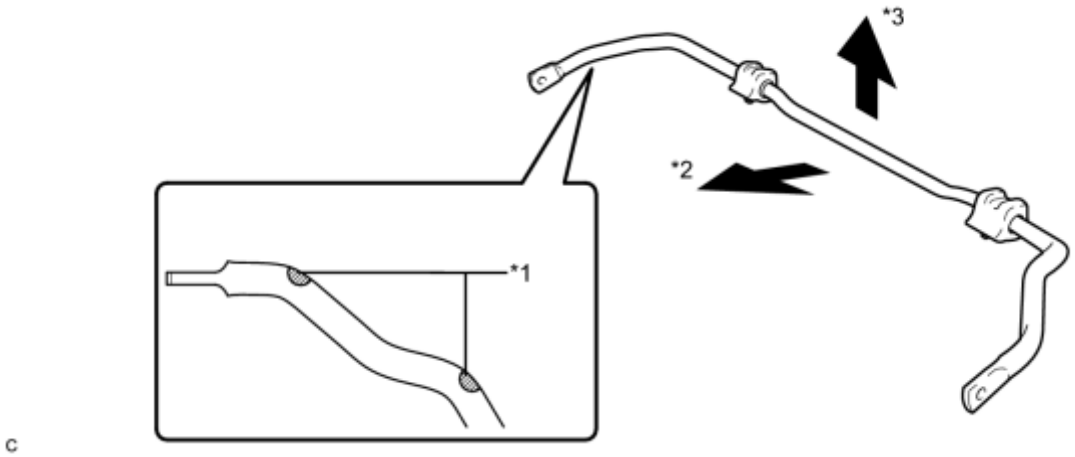
2. INSTALL FRONT STABILIZER BAR BUSHING RH

HINT:

Perform the same procedure as for the LH side.

3. INSTALL FRONT STABILIZER BAR

(a) Install the front stabilizer bar to the front suspension crossmember sub-assembly so that the identification mark is positioned on the right side of the vehicle.



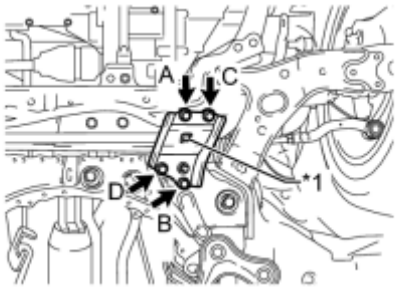

C

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Identification Mark | *2 | Front of the Vehicle |
| *3 | Top of the Vehicle | - | - |

4. INSTALL FRONT SUSPENSION MEMBER FRONT BRACE LH

(a) Install the front suspension member front brace LH with the 4 bolts.



c

## Text in Illustration

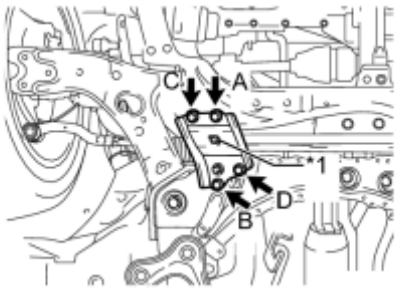
| | |
|---|---|
| *1 | Protrusion |

Torque: **87 N·m (887 kgf·cm, 64ft·lbf)**

- Temporarily tighten bolt A, and then fully tighten the 4 bolts in the order of B, C, D, and A.
- After installing the front suspension member front brace LH, make sure that the protrusion of the No. 1 front stabilizer bar bushing comes out.

5. INSTALL FRONT SUSPENSION MEMBER FRONT BRACE RH

(a) Install the front suspension member front brace RH with the 4 bolts.



c

## Text in Illustration

| | |
|---|---|
| *1 | Protrusion |

Torque: **87 N·m (887 kgf·cm, 64ft·lbf)**

- Temporarily tighten bolt A, and then fully tighten the 4 bolts in the order of B, C, D, and A.
- After installing the front suspension member front brace RH, make sure that the protrusion of the No. 1 front stabilizer bar bushing comes out.

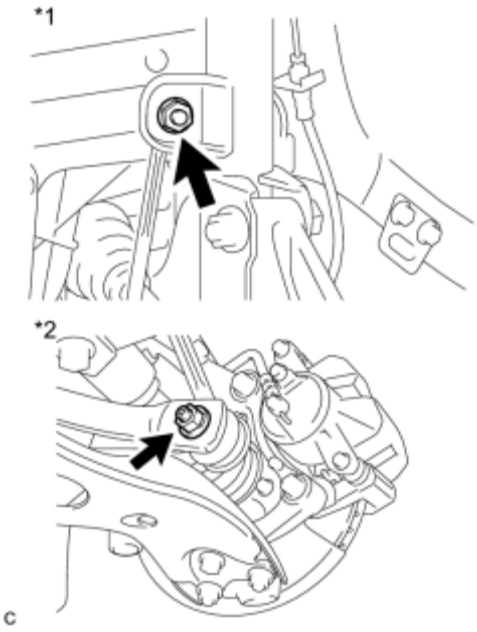
6. TEMPORARILY INSTALL FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

7. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

8. INSTALL FRONT STABILIZER LINK ASSEMBLY LH

(a) Install the front stabilizer link assembly LH with the 2 nuts.

## Text in Illustration




| | |
|---|---|
| *1 | Upper Side |
| *2 | Lower Side |

Torque: **74 N·m (755 kgf·cm, 55ft·lbf)**

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud bolt.

9. INSTALL FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure for as the LH side.

10. INSTALL FRONT WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

11. STABILIZE SUSPENSION INFO

12. FULLY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

13. INSTALL NO. 2 ENGINE UNDER COVER

14. INSTALL NO. 1 ENGINE UNDER COVER

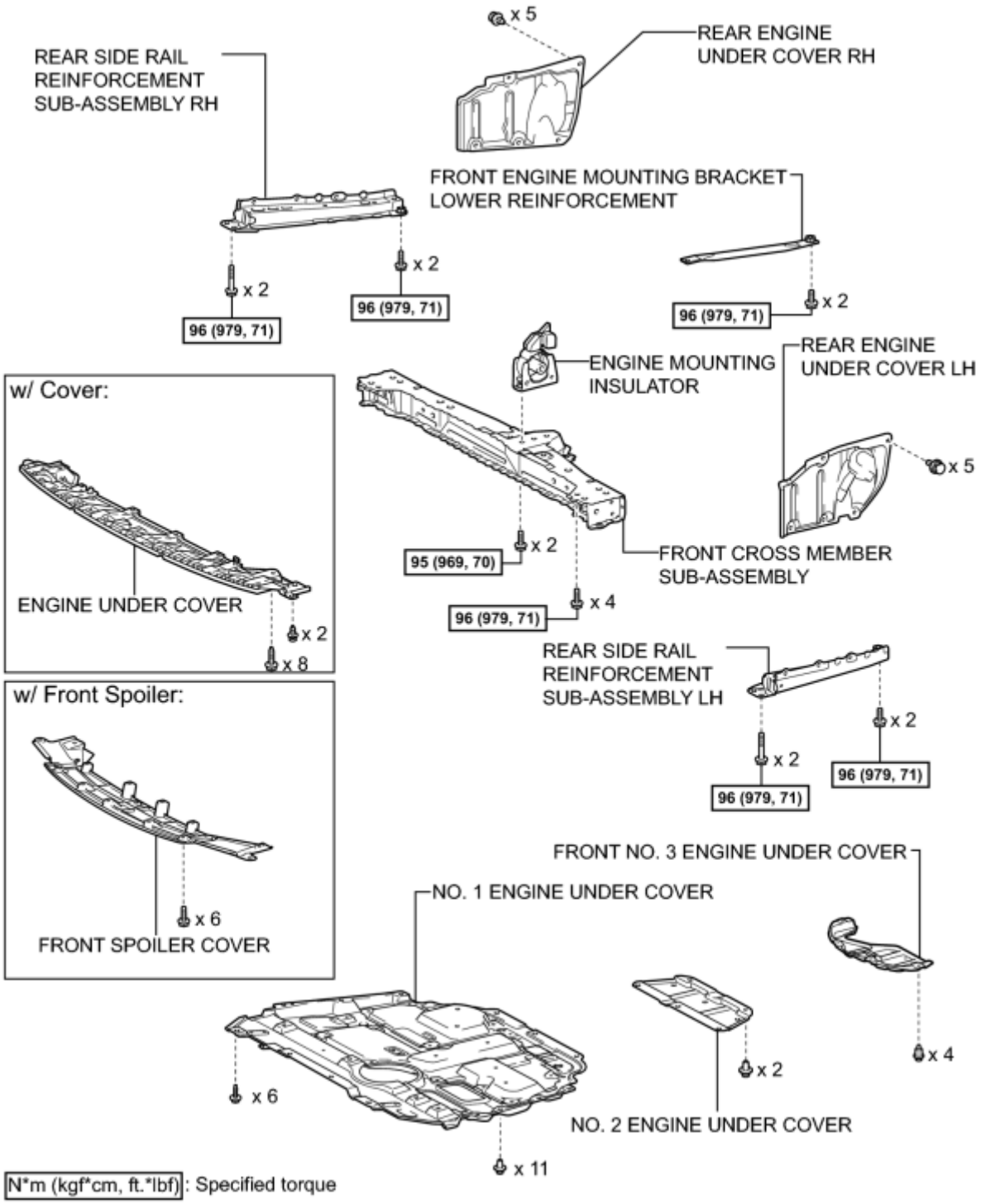
15. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT:

Inspect and adjust the front wheel alignment INFO.

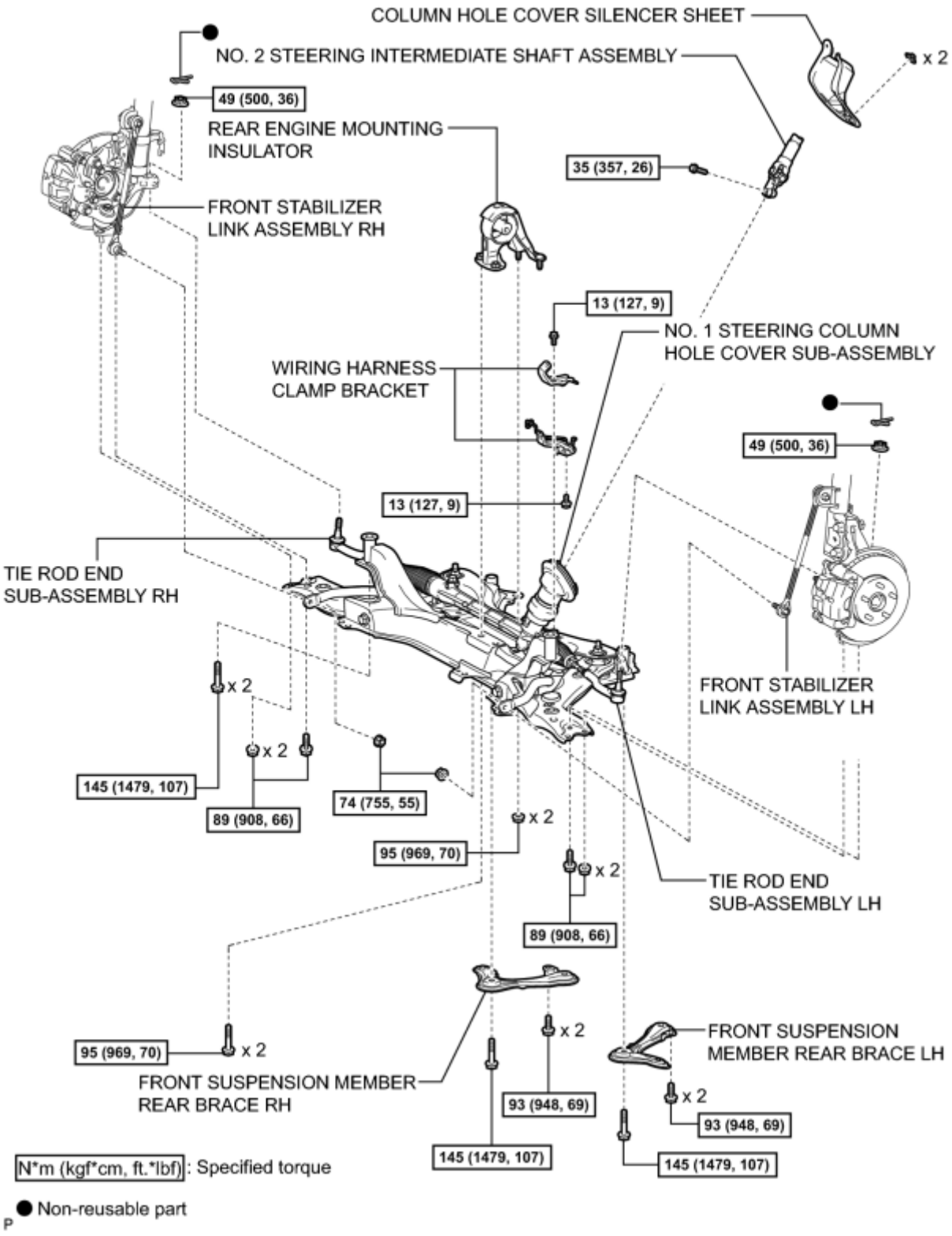
# COMPONENTS

# ILLUSTRATION

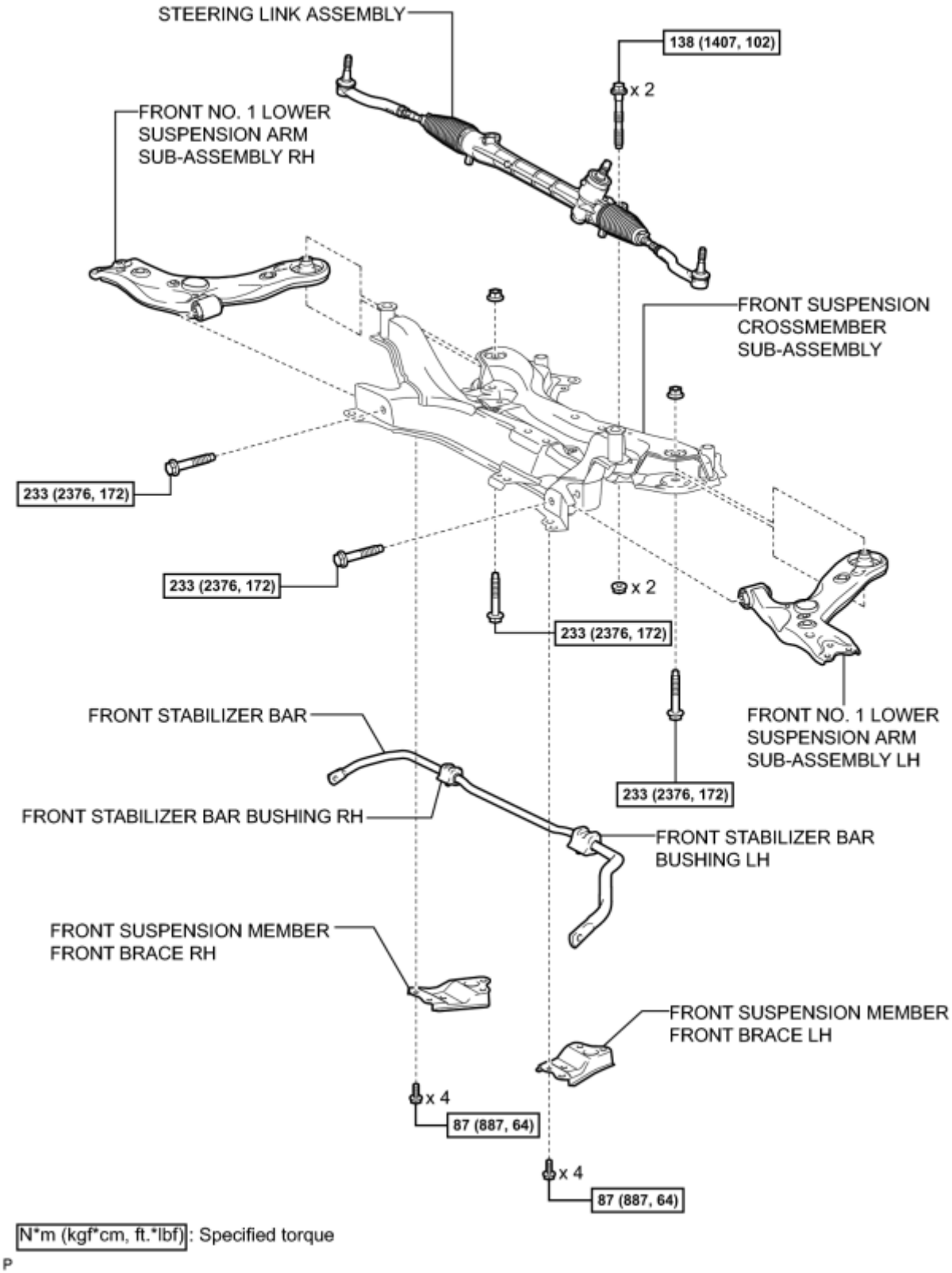



P

# ILLUSTRATION




# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

2. SECURE STEERING WHEEL INFO

3. REMOVE COLUMN HOLE COVER SILENCER SHEET INFO

4. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

5. SEPARATE NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

6. REMOVE FRONT WHEELS

7. REMOVE NO. 1 ENGINE UNDER COVER

8. REMOVE NO. 2 ENGINE UNDER COVER

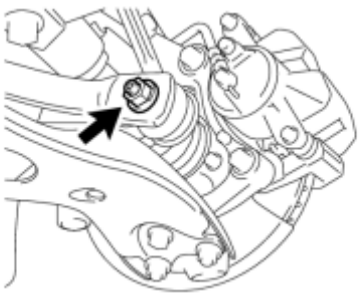
9. REMOVE FRONT NO. 3 ENGINE UNDER COVER

10. REMOVE REAR ENGINE UNDER COVER LH

11. REMOVE REAR ENGINE UNDER COVER RH

12. REMOVE FRONT SPOILER COVER (w/ Front Spoiler)

13. REMOVE ENGINE UNDER COVER (w/ Cover)




14. SEPARATE FRONT STABILIZER LINK ASSEMBLY LH

(a) Remove the nut and separate the stabilizer link assembly LH from the front stabilizer bar.

HINT:

If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud bolt.

15. SEPARATE FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

16. SEPARATE TIE ROD END SUB-ASSEMBLY LH INFO

17. SEPARATE TIE ROD END SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

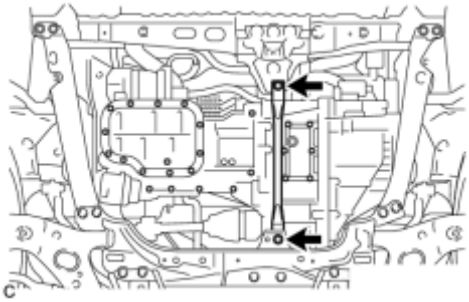
18. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

19. SEPARATE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

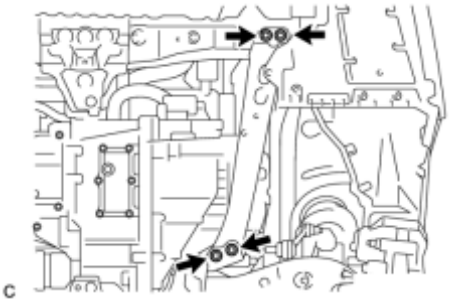
Perform the same procedure as for the LH side.

20. REMOVE FRONT ENGINE MOUNTING BRACKET LOWER REINFORCEMENT



(a) Remove the 2 bolts and front engine mounting bracket lower reinforcement.

21. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH



(a) Remove the 4 bolts and rear side rail reinforcement sub-assembly LH.

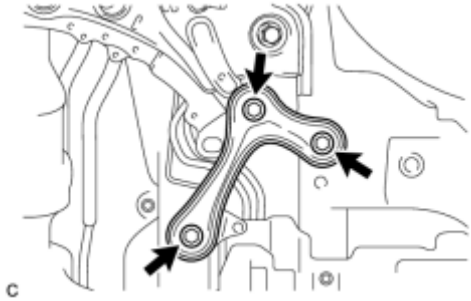
22. REMOVE REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

23. REMOVE FRONT SUSPENSION MEMBER REAR BRACE LH

(a) Remove the 3 bolts and front suspension member rear brace LH.

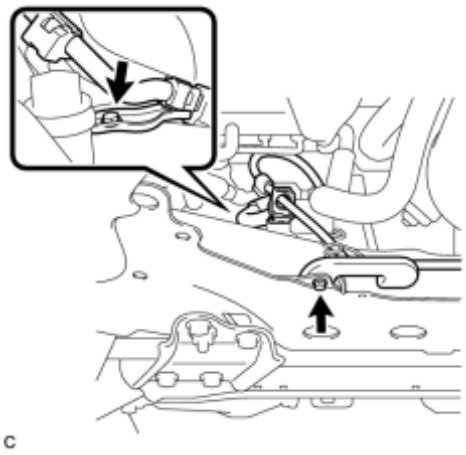


24. REMOVE FRONT SUSPENSION MEMBER REAR BRACE RH

HINT:

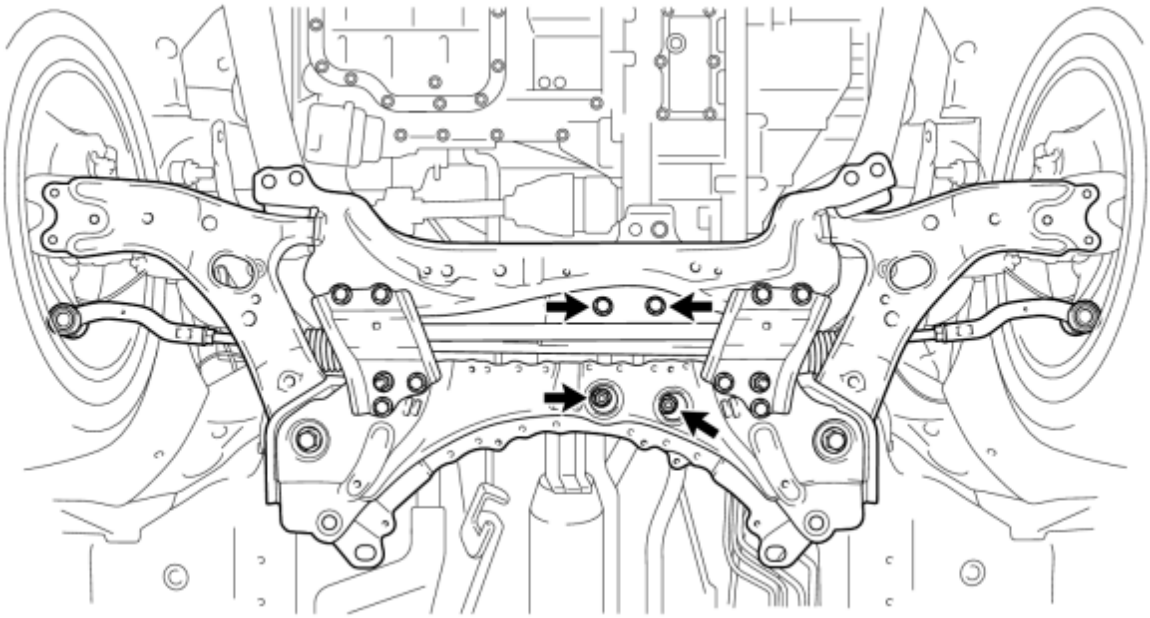
Perform the same procedure as for the LH side.

25. REMOVE FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY



(a) Remove the 2 bolts and 2 wire harness clamp brackets from the front suspension crossmember sub-assembly.

(b) Remove the 2 bolts and 2 nuts, and separate the front suspension crossmember sub-assembly from the rear engine mounting insulator.



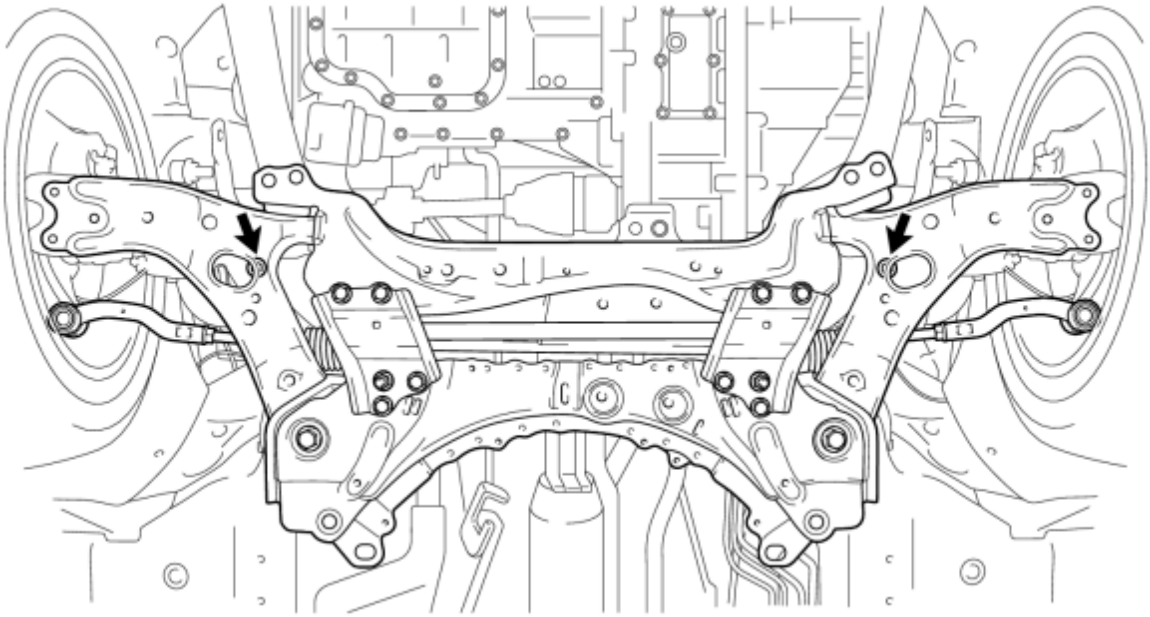
C



C

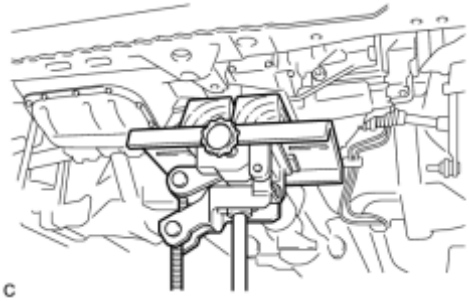
(c) Using a transmission jack, support the front suspension crossmember sub-assembly.

(d) Remove the 2 bolts and front suspension crossmember sub-assembly.



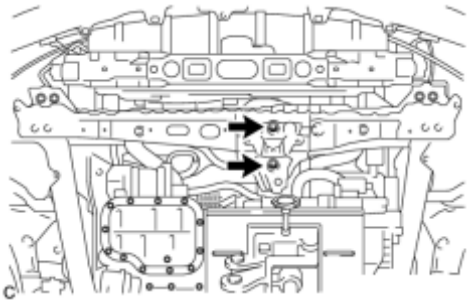
C

26. REMOVE FRONT CROSS MEMBER SUB-ASSEMBLY



C

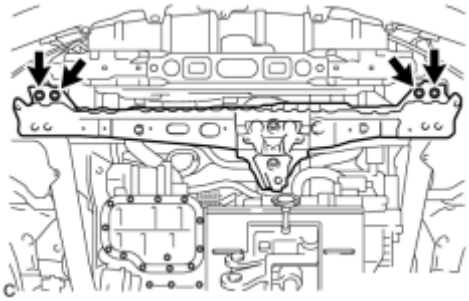
(a) Using a transmission jack, support the engine assembly with transaxle.



C

(b) Remove the 2 bolts and separate the front cross member sub-assembly from the engine mounting insulator.

(c) Remove the 4 bolts and front cross member sub-assembly.

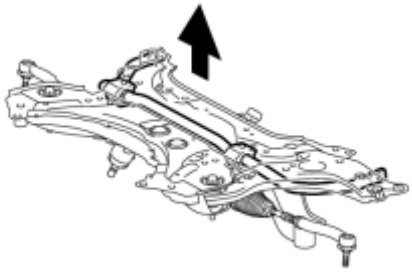


C

27. REMOVE FRONT SUSPENSION MEMBER FRONT BRACE LH INFO

28. REMOVE FRONT SUSPENSION MEMBER FRONT BRACE RH INFO

29. REMOVE FRONT STABILIZER BAR

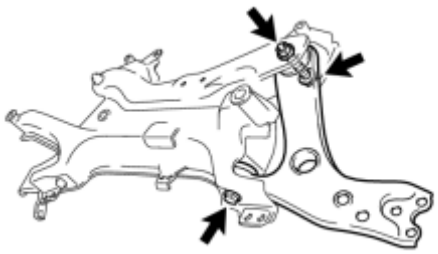


P

(a) Remove the front stabilizer bar with front stabilizer bar bushings from the front suspension crossmember sub-assembly.

30. REMOVE STEERING LINK ASSEMBLY INFO

31. REMOVE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH



C

(a) Remove the 2 bolts, nut and front No. 1 lower suspension arm sub-assembly LH from the front suspension crossmember.

NOTICE:

Because the nut has its own stopper, do not turn the nut. Loosen the bolt with the nut secured.

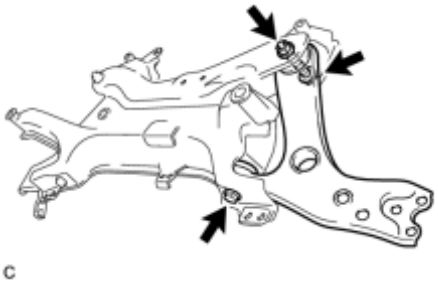
32. REMOVE FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

# INSTALLATION

1. TEMPORARILY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH




(a) Temporarily tighten the front No. 1 lower suspension arm sub-assembly LH to the front suspension crossmember with the 2 bolts and nut.

NOTICE:

Because the nut has its own stopper, do not turn the nut. Tighten the bolt with the nut secured.

2. TEMPORARILY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

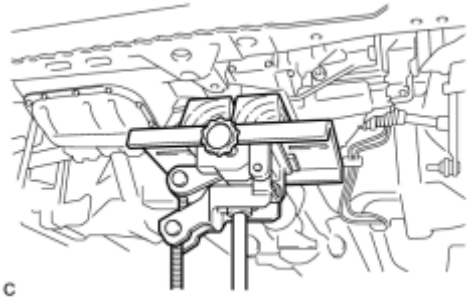
3. INSTALL STEERING LINK ASSEMBLY INFO

4. INSTALL FRONT STABILIZER BAR INFO

5. INSTALL FRONT SUSPENSION MEMBER FRONT BRACE LH INFO

6. INSTALL FRONT SUSPENSION MEMBER FRONT BRACE RH INFO

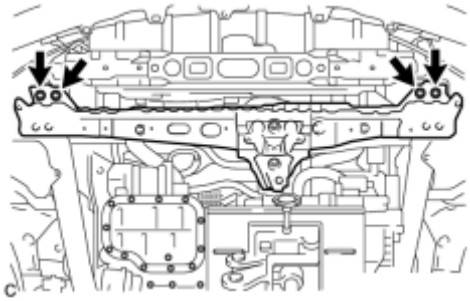
7. INSTALL FRONT CROSS MEMBER SUB-ASSEMBLY

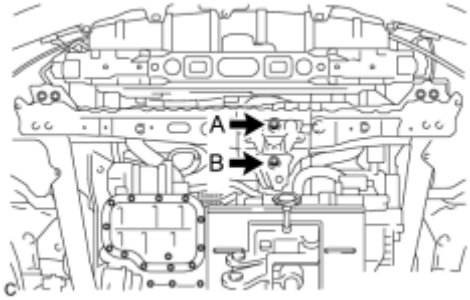



(a) Using a transmission jack, support the engine assembly with transaxle.

(b) Install the front cross member sub-assembly with the 4 bolts.

Torque: **96 N·m (979 kgf·cm, 71ft·lbf)**






(c) Connect the engine mounting insulator with the 2 bolts.

Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**

NOTICE:

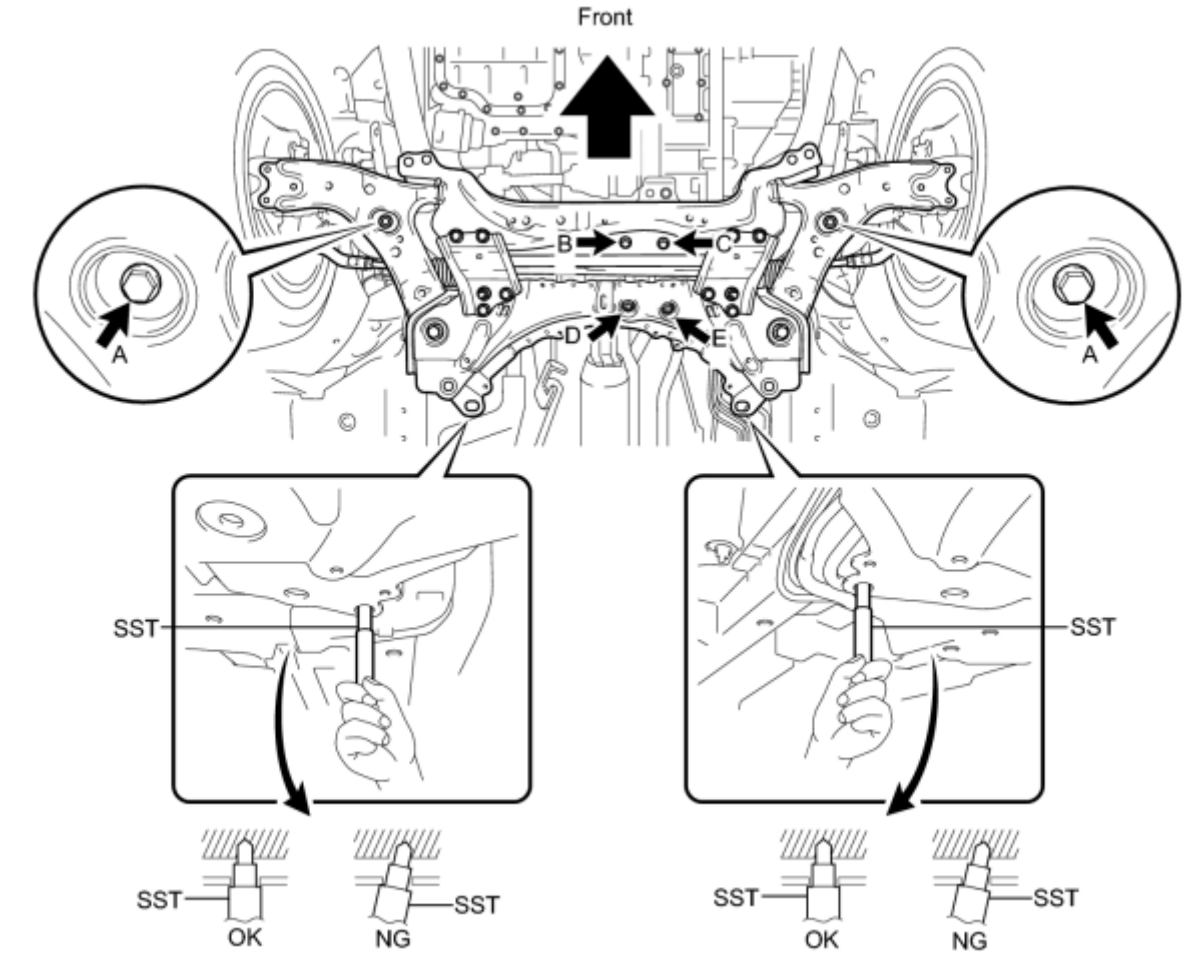
Temporarily tighten bolt B and then fully tighten the 2 bolts in the order of A and B.

8. INSTALL FRONT SUSPENSION CROSSMEMBER SUB-ASSEMBLY



(a) Support the front suspension crossmember with a transmission jack.

(b) While inserting SST into the reference holes on the front suspension crossmember RH and LH alternately, tighten 2 bolts A, 2 bolts B, C and 2 nuts on the RH and LH sides to the respective specified torque in several steps.




c

SST: 09670-00020

Bolt A - Torque: **145 N·m (1479 kgf·cm, 107ft·lbf)**

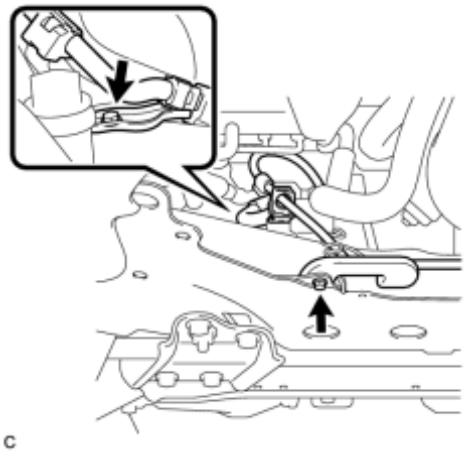
Bolt B, C, Nut D, E - Torque: **95 N·m (969 kgf·cm, 70ft·lbf)**

NOTICE:

Temporarily tighten bolt B, and then fully tighten the 2 bolts and 2 nuts in the order of C, E, D, and B.

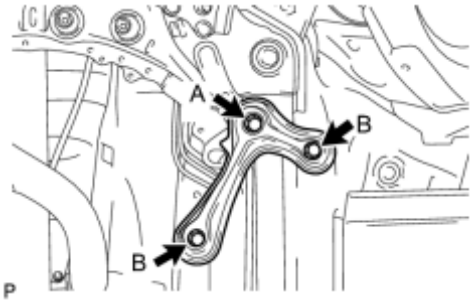
(c) Install the 2 wire harness clamp brackets with the 2 bolts.

Torque: **13 N·m (127 kgf·cm, 9ft·lbf)**



C

9. INSTALL FRONT SUSPENSION MEMBER REAR BRACE LH




P

(a) Install the front suspension member rear brace LH with the 3 bolts.

Bolt A - Torque: **145 N·m (1479 kgf·cm, 107ft·lbf)**

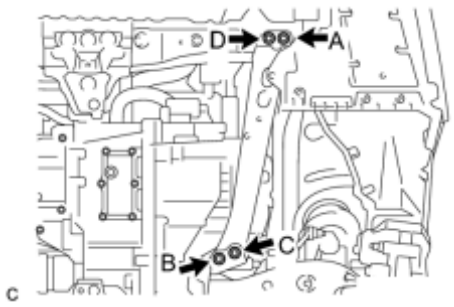
Bolt B - Torque: **93 N·m (948 kgf·cm, 69ft·lbf)**

10. INSTALL FRONT SUSPENSION MEMBER REAR BRACE RH

HINT:

Perform the same procedure as for the LH side.

11. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY LH




C

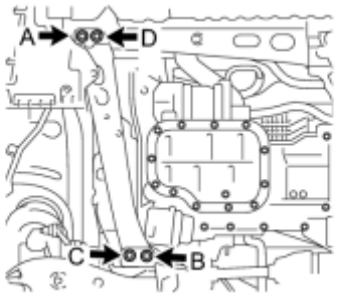
(a) Install the rear side rail reinforcement sub-assembly LH with the 4 bolts.

Torque: **96 N·m (979 kgf·cm, 71ft·lbf)**

NOTICE:

Temporarily tighten bolts A and B, and then fully tighten the 4 bolts in the order of C, B, D and A.

12. INSTALL REAR SIDE RAIL REINFORCEMENT SUB-ASSEMBLY RH



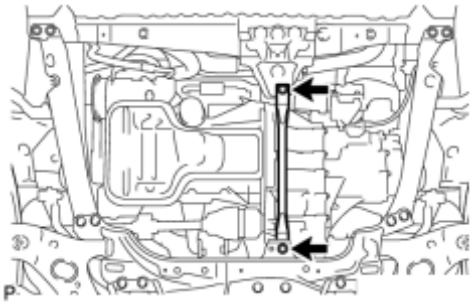

(a) Install the rear side rail reinforcement sub-assembly RH with the 4 bolts.

Torque: **96 N·m (979 kgf·cm, 71ft·lbf)**

NOTICE:

Temporarily tighten bolts A and B, and then fully tighten the 4 bolts in the order of C, B, D and A.

13. INSTALL FRONT ENGINE MOUNTING BRACKET LOWER REINFORCEMENT



(a) Install the front engine mounting bracket lower reinforcement with the 2 bolts.

Torque: **96 N·m (979 kgf·cm, 71ft·lbf)**

14. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

15. CONNECT FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

16. CONNECT TIE ROD END SUB-ASSEMBLY LH INFO

17. CONNECT TIE ROD END SUB-ASSEMBLY RH

HINT:

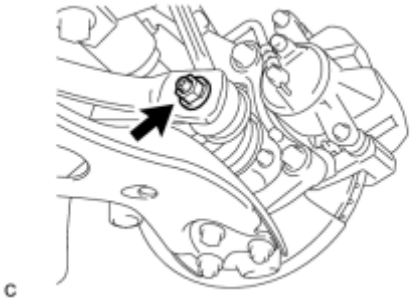
Perform the same procedure as for the LH side.

18. INSTALL FRONT STABILIZER LINK ASSEMBLY LH

(a) Install the front stabilizer link assembly LH to the front stabilizer bar with the nut.

Torque: **74 N·m (755 kgf·cm, 55ft·lbf)**

HINT:




If the ball joint turns together with the nut, use a hexagon wrench (6 mm) to hold the stud bolt.

19. INSTALL FRONT STABILIZER LINK ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

20. CONNECT NO. 1 STEERING COLUMN HOLE COVER SUB-ASSEMBLY INFO

21. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

22. INSTALL COLUMN HOLE COVER SILENCER SHEET INFO

23. INSTALL FRONT WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

24. STABILIZE SUSPENSION

(a) Lower the vehicle.

(b) Press down on the vehicle several times to stabilize the suspension.

25. FULLY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY LH INFO

26. FULLY TIGHTEN FRONT NO. 1 LOWER SUSPENSION ARM SUB-ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

27. INSTALL FRONT SPOILER COVER (w/ Front Spoiler)

28. INSTALL ENGINE UNDER COVER (w/ Cover)

29. INSTALL REAR ENGINE UNDER COVER LH

30. INSTALL REAR ENGINE UNDER COVER RH

31. INSTALL FRONT NO. 3 ENGINE UNDER COVER

32. INSTALL NO. 2 ENGINE UNDER COVER

33. INSTALL NO. 1 ENGINE UNDER COVER

34. INSPECT AND ADJUST FRONT WHEEL ALIGNMENT

HINT:

Inspect and adjust the front wheel alignment INFO.

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Suspension System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Vehicle pulls to one side while driving | Tire (worn or improperly inflated) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Front hub bearing (worn) | INFO |
| | Front shock absorber (worn) | INFO |
| | Steering gear (out of adjustment or broken) | INFO |
| | Suspension parts (worn) | - |
| Bottoming | Vehicle (overloaded) | - |
| | Front coil spring (weak) | INFO |
| | Front shock absorber (worn) | INFO |
| Sways/pitches | Tire (worn or improperly inflated) | INFO |
| | Front stabilizer bar (bent or broken) | INFO |
| | Front coil spring (weak) | INFO |
| | Front shock absorber (worn) | INFO |
| Wheel shimmy | Tire (worn or improperly inflated) | INFO |
| | Wheel (out of balance) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Front lower suspension arm (worn) | INFO |
| | Front shock absorber (worn) | INFO |
| | Front lower ball joint (worn) | INFO |
| | Front hub bearing (worn) | INFO |
| Abnormal tire wear | Tire (worn or improperly inflated) | INFO |
| | Wheel (out of balance) | INFO |
| | Front wheel alignment (incorrect) | INFO |
| | Suspension parts (worn) | - |

# PROBLEM SYMPTOMS TABLE

HINT:

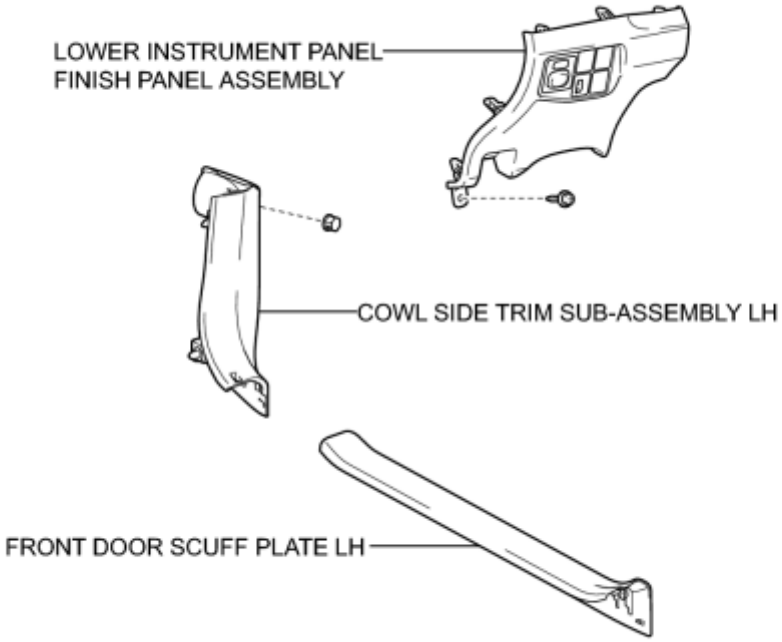
Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Rear Suspension System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Vehicle pulls to one side while driving. | Tire (worn or improperly inflated) | INFO |
| | Rear wheel alignment (incorrect) | INFO |
| | Rear shock absorber (worn) | INFO |
| | Rear axle hub (worn) | INFO |
| | Suspension parts (worn) | - |
| Bottoming | Vehicle (overloaded) | - |
| | Rear coil spring (weak) | INFO |
| | Rear shock absorber (worn) | INFO |
| Sway/pitches | Tire (worn or improperly inflated) | INFO |
| | Rear coil spring (weak) | INFO |
| | Rear shock absorber (worn) | INFO |
| Wheel shimmy | Tire (worn or improperly inflated) | INFO |
| | Wheel (out of balance) | INFO |
| | Rear wheel alignment (incorrect) | INFO |
| | Rear shock absorber (worn) | INFO |
| | Rear axle hub (worn) | INFO |
| Abnormal tire wear | Tire (worn or improperly inflated) | INFO |
| | Wheel (out of balance) | INFO |
| | Rear wheel alignment (incorrect) | INFO |
| | Suspension parts (worn) | - |

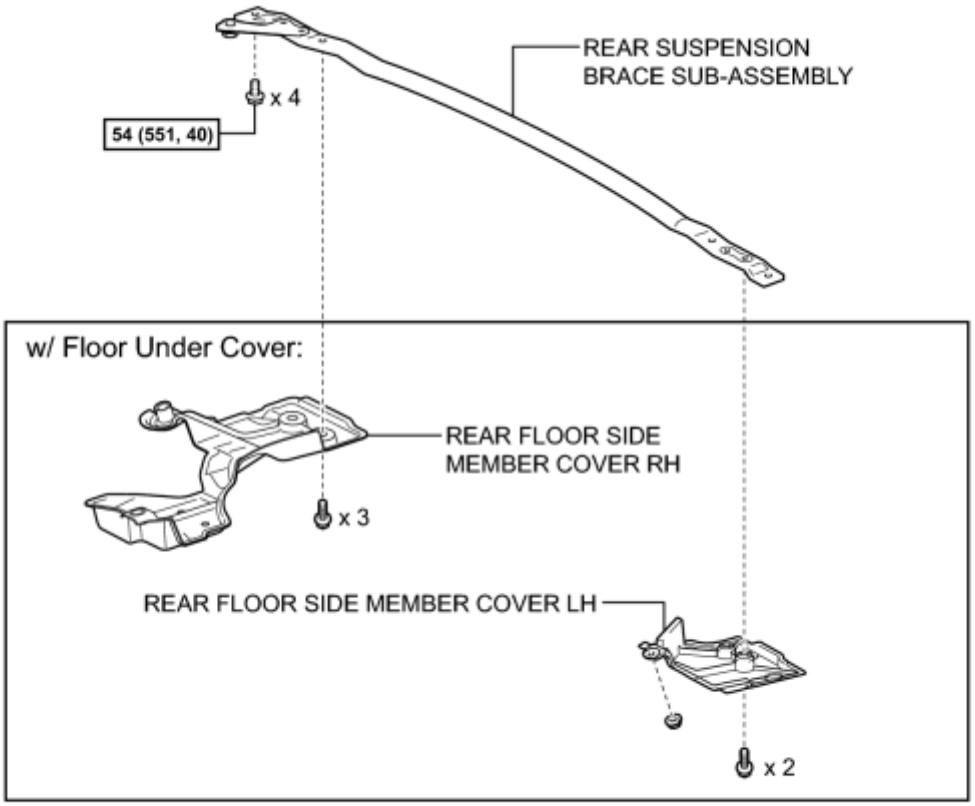
# COMPONENTS

# ILLUSTRATION




c

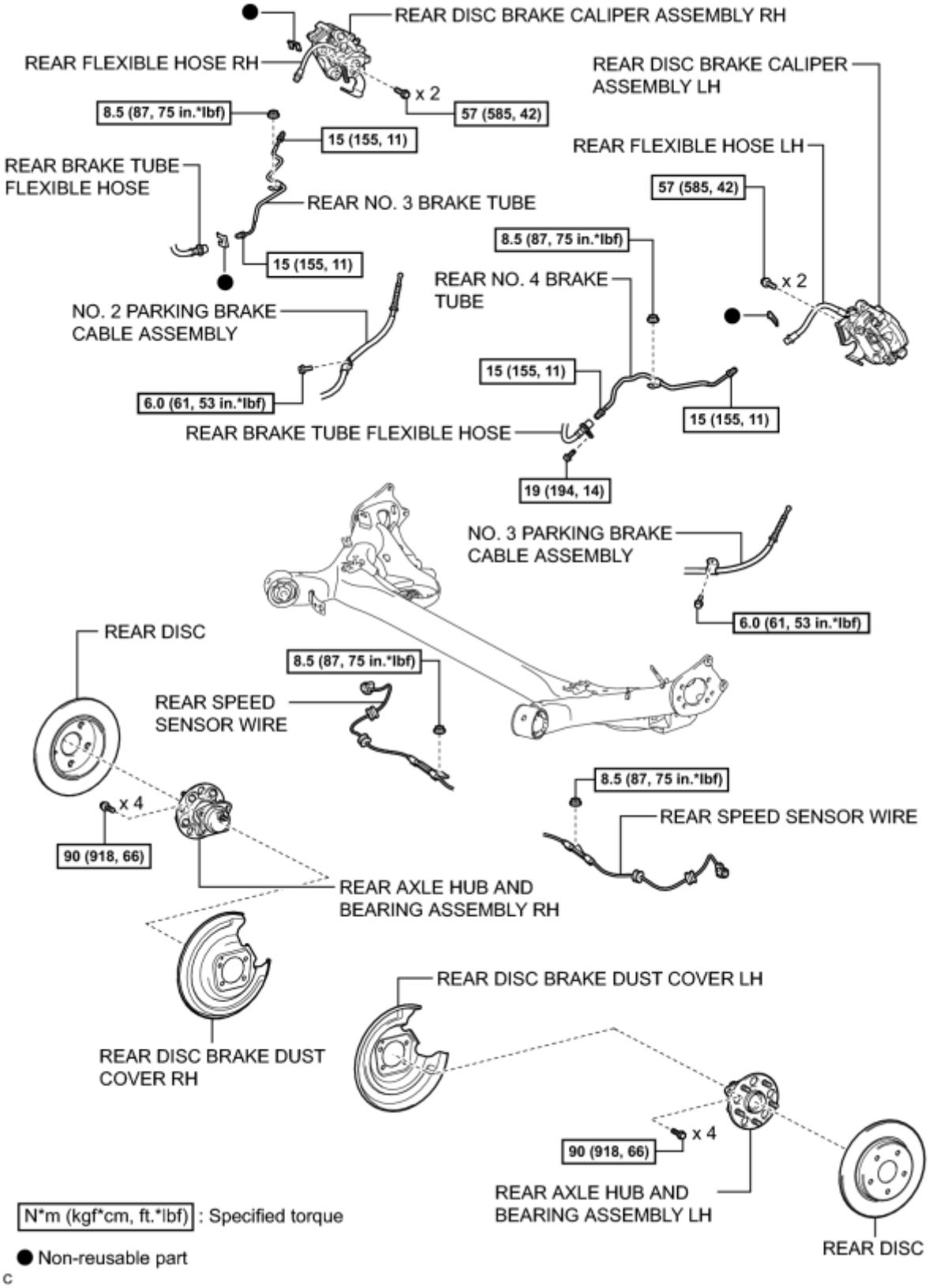
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

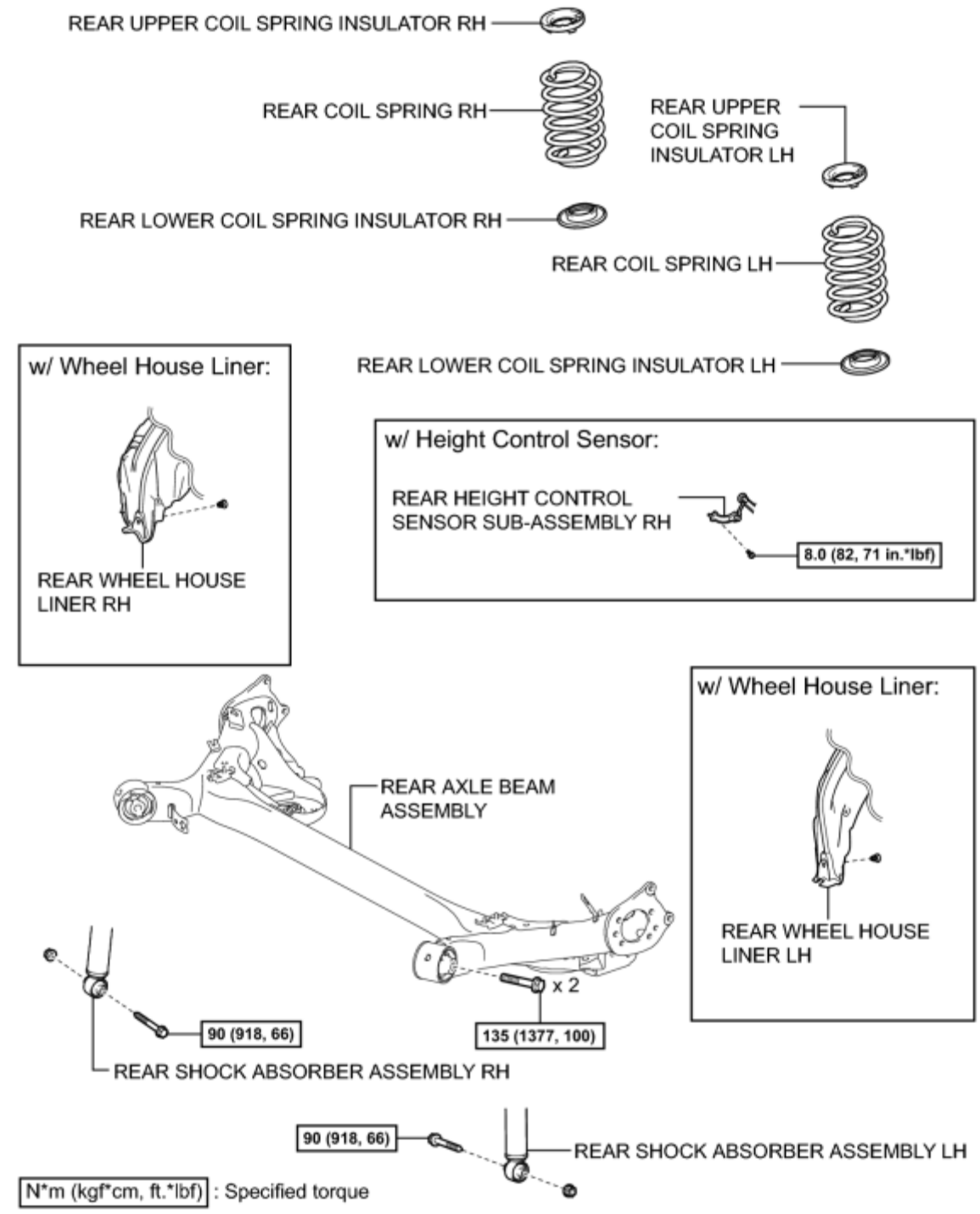
c

# ILLUSTRATION



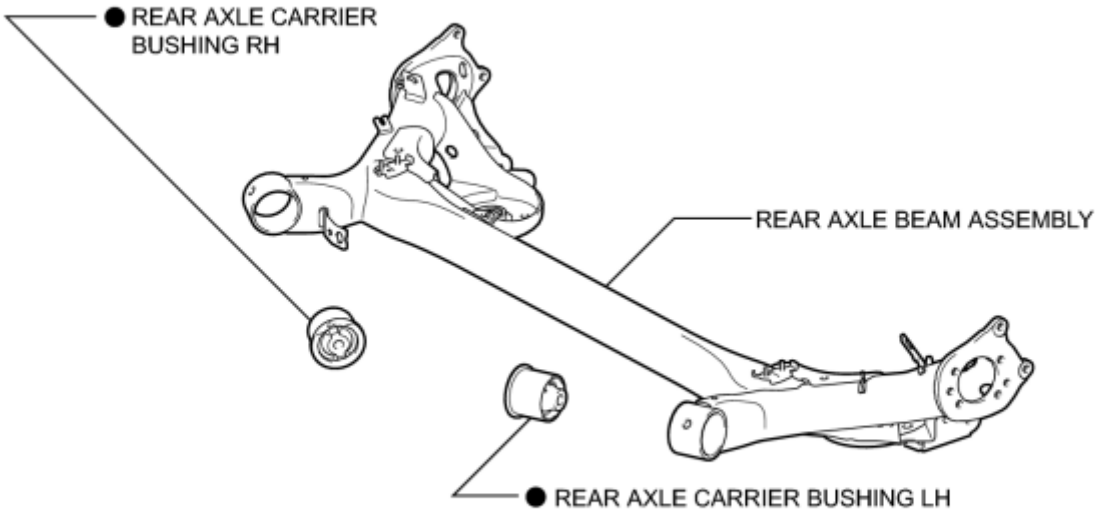

c

# ILLUSTRATION




c

# ILLUSTRATION




● Non-reusable part

P

# REMOVAL

1. DISABLE BRAKE CONTROL INFO

2. REMOVE REAR WHEELS

3. REMOVE FRONT DOOR SCUFF PLATE LH INFO

4. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

5. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

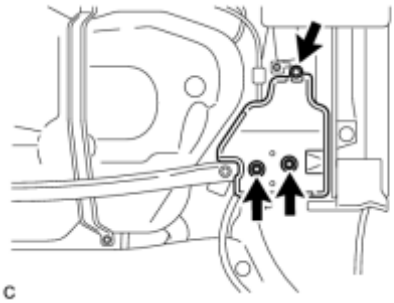
6. LOOSEN PARKING BRAKE CABLE INFO

7. DRAIN BRAKE FLUID

NOTICE:

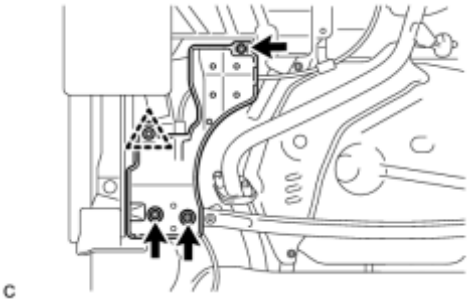
If brake fluid leaks onto any painted surface, immediately wash it off.

8. REMOVE REAR FLOOR SIDE MEMBER COVER LH (w/ Floor Under Cover)




(a) Remove the nut, 2 bolts and rear floor side member cover LH.

9. REMOVE REAR FLOOR SIDE MEMBER COVER RH (w/ Floor Under Cover)

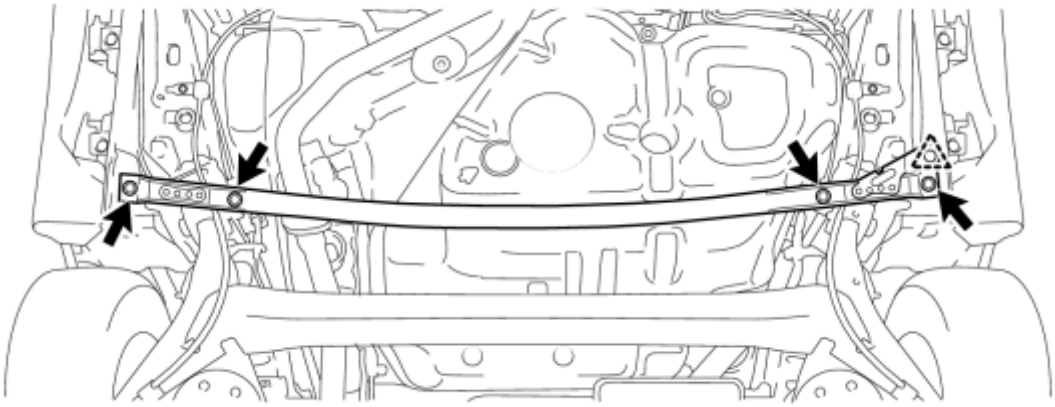



(a) Remove the 3 bolts.

(b) Disengage the clip and remove the rear floor side member cover RH.

10. REMOVE REAR SUSPENSION BRACE SUB-ASSEMBLY

(a) Remove the 4 bolts.



C

(b) Disengage the clip and remove the rear suspension brace sub-assembly.

11. DISCONNECT REAR SPEED SENSOR WIRE (for LH Side) INFO

12. DISCONNECT REAR SPEED SENSOR WIRE (for RH Side)

HINT:

Perform the same procedure as for the LH side.

13. SEPARATE REAR SPEED SENSOR WIRE (for LH Side) INFO

14. SEPARATE REAR SPEED SENSOR WIRE (for RH Side)

HINT:

Perform the same procedure as for the LH side.

15. DISCONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

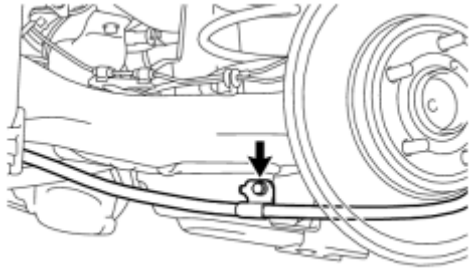
16. DISCONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY

HINT:

Perform the same procedure as for the No. 3 parking brake cable assembly.

17. SEPARATE NO. 3 PARKING BRAKE CABLE ASSEMBLY

(a) Remove the bolt and separate the No. 3 parking brake cable assembly.



P

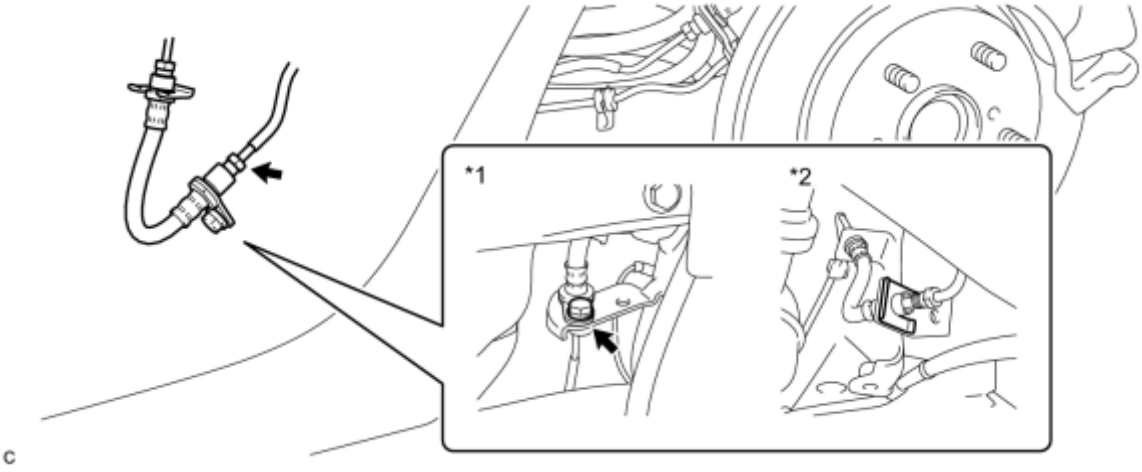
18. SEPARATE NO. 2 PARKING BRAKE CABLE ASSEMBLY

HINT:

Perform the same procedure as for the No. 3 parking brake cable assembly.

19. SEPARATE REAR BRAKE TUBE FLEXIBLE HOSE

(a) Using a union nut wrench, disconnect the 2 brake lines while holding the rear brake tube flexible hose with a wrench.




C

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | LH Side | *2 | RH Side |

NOTICE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt or dust to enter the brake line from the connecting points.

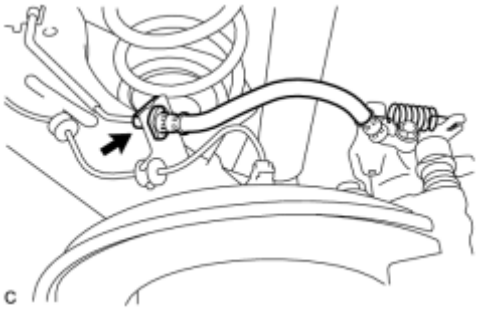
(b) for LH Side

(1) Remove the bolt and separate the rear brake tube flexible hose from the rear axle beam assembly.

(c) for RH Side

(1) Remove the clip and separate the rear brake tube flexible hose from the rear axle beam assembly.

20. REMOVE REAR DISC BRAKE CALIPER ASSEMBLY LH

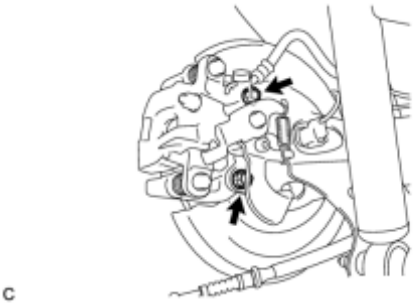



(a) Using a union nut wrench, disconnect the brake line while holding the rear flexible hose LH with a wrench.

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt or dust to enter the brake line from the connecting points.




(b) Remove the clip and separate the rear flexible hose LH.




(c) Remove the 2 bolts and rear disc brake caliper assembly LH with rear flexible hose LH.

21. REMOVE REAR DISC BRAKE CALIPER ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

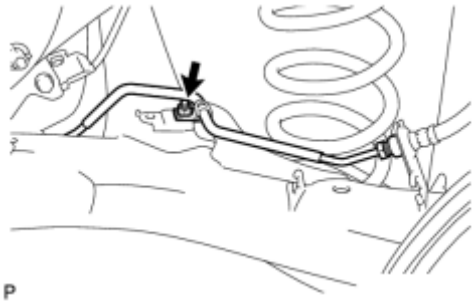
22. REMOVE REAR DISC (for LH Side) INFO

23. REMOVE REAR DISC (for RH Side)

HINT:

Perform the same procedure as for the LH side.

24. REMOVE REAR NO. 4 BRAKE TUBE




(a) Remove the nut and rear No. 4 brake tube from the rear axle beam assembly.

25. REMOVE REAR NO. 3 BRAKE TUBE

HINT:

Perform the same procedure as for the rear No. 4 brake tube.

26. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY LH INFO

27. REMOVE REAR AXLE HUB AND BEARING ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

28. SEPARATE REAR WHEEL HOUSE LINER LH (w/ Wheel House Liner) INFO

29. SEPARATE REAR WHEEL HOUSE LINER RH (w/ Wheel House Liner)

HINT:

Perform the same procedure as for the LH side.

30. SEPARATE REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH (w/ Height Control Sensor) INFO

31. REMOVE REAR COIL SPRING LH INFO

32. REMOVE REAR COIL SPRING RH

HINT:

Perform the same procedure as for the LH side.

33. REMOVE REAR UPPER COIL SPRING INSULATOR LH

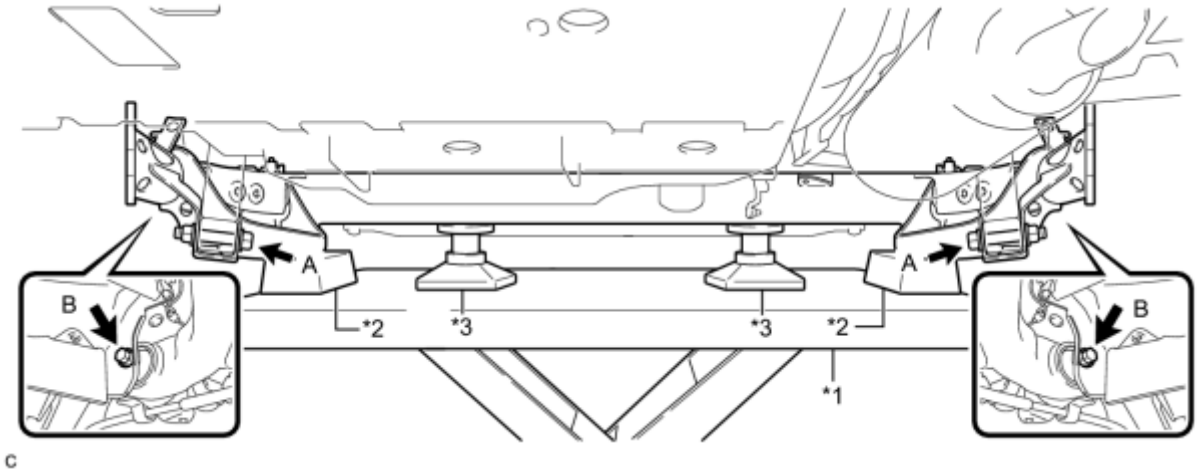
34. REMOVE REAR UPPER COIL SPRING INSULATOR RH

35. REMOVE REAR LOWER COIL SPRING INSULATOR LH

36. REMOVE REAR LOWER COIL SPRING INSULATOR RH

37. REMOVE REAR AXLE BEAM ASSEMBLY

(a) Support the rear axle beam assembly with a jack using 2 wooden blocks and 2 attachments or equivalent tools to replicate standard vehicle height conditions as shown in the illustration.




c

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Jack | *2 | Wooden Block |
| *3 | Attachment | - | - |

NOTICE:

Make sure to secure the rear axle beam assembly to prevent it from dropping.

(b) Remove the 2 bolts (A) and 2 nuts while holding the 2 nuts and separate the rear axle beam assembly from the rear shock absorber assemblies LH and RH.

NOTICE:

Since the stopper nuts are used, turn the bolts.

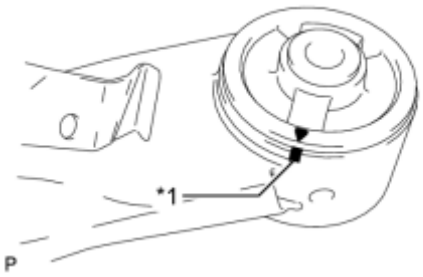
(c) Remove the 2 bolts (B) and rear axle beam assembly.

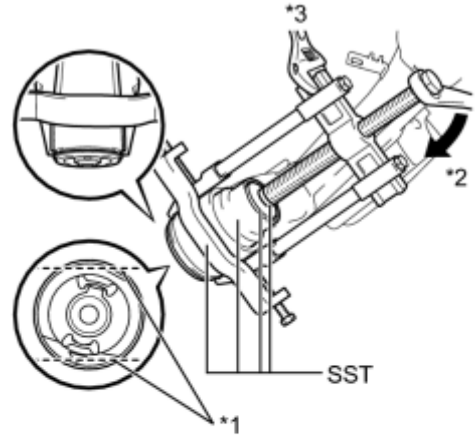
38. REMOVE REAR AXLE CARRIER BUSHING LH

(a) Put a matchmark on the rear axle beam assembly so that the mark aligns with the arrow mark on the rear axle carrier bushing LH. (If the rear axle beam assembly is reused.)

# Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

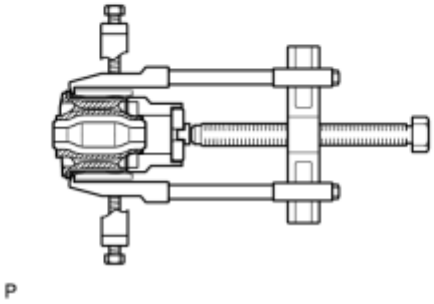



(b) Using a chisel and hammer, bend the 2 ribs on the rear axle carrier bushing LH.

## Text in Illustration

| | |
|---|---|
| *1 | Bend Portion |
| *2 | Turn |
| *3 | Hold |




NOTICE:

When removing the rear axle carrier bushing, do not erase the matchmark on the rear axle beam assembly.

(c) Using SST, remove the rear axle carrier bushing LH from the rear axle beam assembly.

SST: 09710-26011

09710-05061

SST: 09950-40011

09951-04020

09952-04010

09953-04030

09954-04020

09955-04051

09957-04010

09958-04011

SST: 09950-60010

09951-00530

NOTICE:

Apply grease to the threads and tip of the SST center bolt before use.

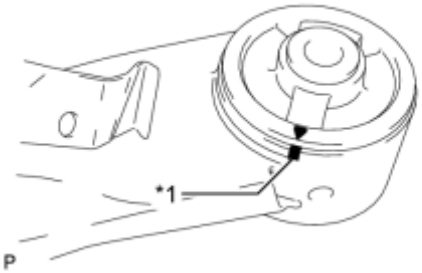
39. REMOVE REAR AXLE CARRIER BUSHING RH

HINT:

Perform the same procedure as for the LH side.

# INSTALLATION

1. INSTALL REAR AXLE CARRIER BUSHING LH




(a) Align the arrow mark on a new rear axle carrier bushing LH with the matchmark on the rear axle beam assembly and temporarily install the rear axle carrier bushing LH to the rear axle beam assembly. (If the rear axle beam assembly is reused.)

## Text in Illustration

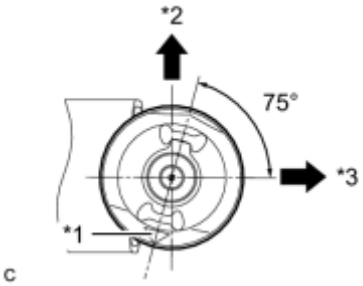
| | |
|---|---|
| *1 | Matchmark |

NOTICE:

Be sure to install the rear axle carrier bushing in the same direction as it was before removal.

The rear axle carrier bushing has to be installed in a specific direction.

(b) Temporarily install the new rear axle carrier bushing LH as shown in the illustration.




## Text in Illustration

| | |
|---|---|
| *1 | Mark |
| *2 | Upper Side of the Vehicle |
| *3 | Front of the Vehicle |

NOTICE:

Be sure to install the rear axle carrier bushing in the same direction as it was before removal.

The rear axle carrier bushing has to be installed in a specific direction.

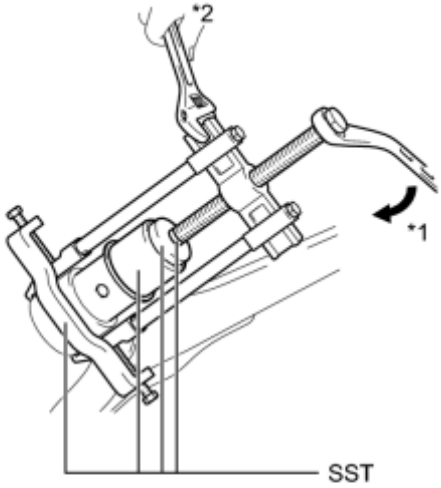
(c) Using SST, install the rear axle carrier bushing LH to the rear axle beam assembly.

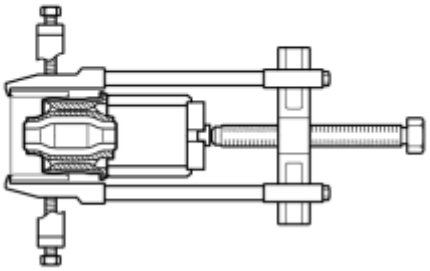
## Text in Illustration

| | |
|---|---|
| *1 | Turn |
| *2 | Hold |

SST: 09710-04101

SST: 09950-40011



P

09951-04020

09952-04010

09953-04030

09954-04020

09955-04051

09957-04010

09958-04011

SST: 09950-60010

09951-00620

- Do not damage the rubber portion when installing the rear axle carrier bushing.
- Apply grease to the threads and tip of the SST center bolt before use.

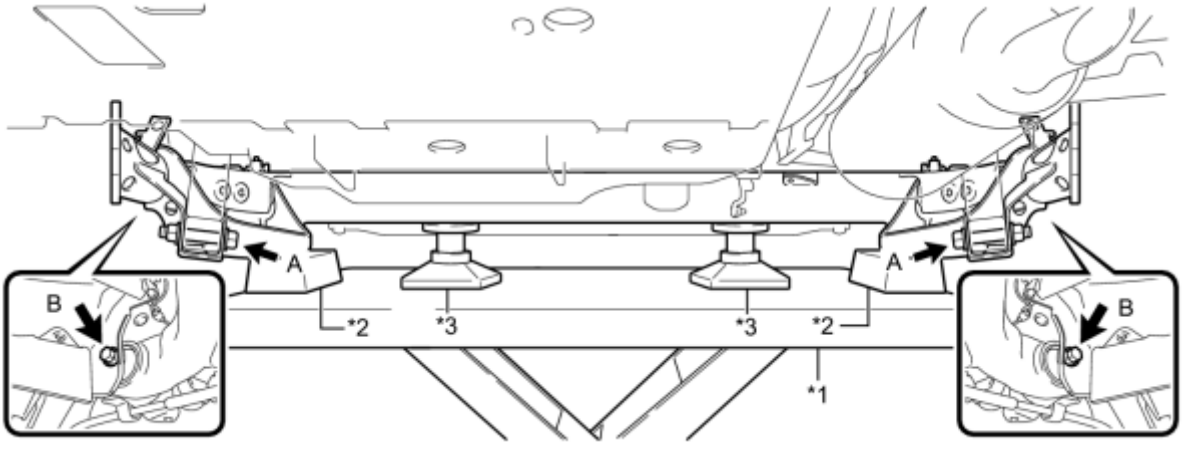
2. INSTALL REAR AXLE CARRIER BUSHING RH

HINT:

Perform the same procedure as for the LH side.

3. TEMPORARILY TIGHTEN REAR AXLE BEAM ASSEMBLY

(a) Slowly jack up the rear axle beam assembly with a jack using 2 wooden blocks and 2 attachments or equivalent tools and temporarily install the rear axle beam assembly to the body with the 2 bolts (B).




C

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Jack | *3 | Attachment |
| *2 | Wooden Block | - | - |

NOTICE:

Make sure to secure the rear axle beam assembly to prevent it from dropping.

(b) Temporarily tighten the rear axle beam assembly to the rear shock absorber assemblies LH and RH with the 2 bolts (A) and 2 nuts.

NOTICE:

Since the stopper nuts are used, turn the bolts.

HINT:

Insert the bolts with the threaded end facing the outside of the vehicle.

4. INSTALL REAR UPPER COIL SPRING INSULATOR LH INFO

5. INSTALL REAR UPPER COIL SPRING INSULATOR RH

HINT:

Perform the same procedure as for the LH side.

6. INSTALL REAR LOWER COIL SPRING INSULATOR LH

7. INSTALL REAR LOWER COIL SPRING INSULATOR RH

8. INSTALL REAR COIL SPRING LH INFO

9. INSTALL REAR COIL SPRING RH

HINT:

Perform the same procedure as for the LH side.

10. INSTALL REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH (w/ Height Control Sensor) INFO

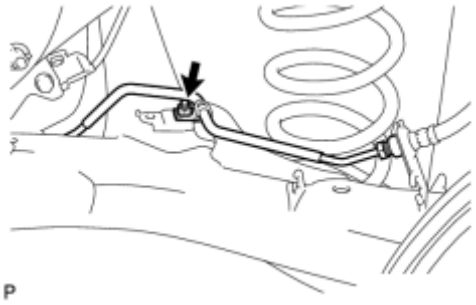
11. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY LH INFO

12. INSTALL REAR AXLE HUB AND BEARING ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

13. INSTALL REAR NO. 4 BRAKE TUBE




(a) Install the rear No. 4 brake tube to the rear axle beam assembly with the nut.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

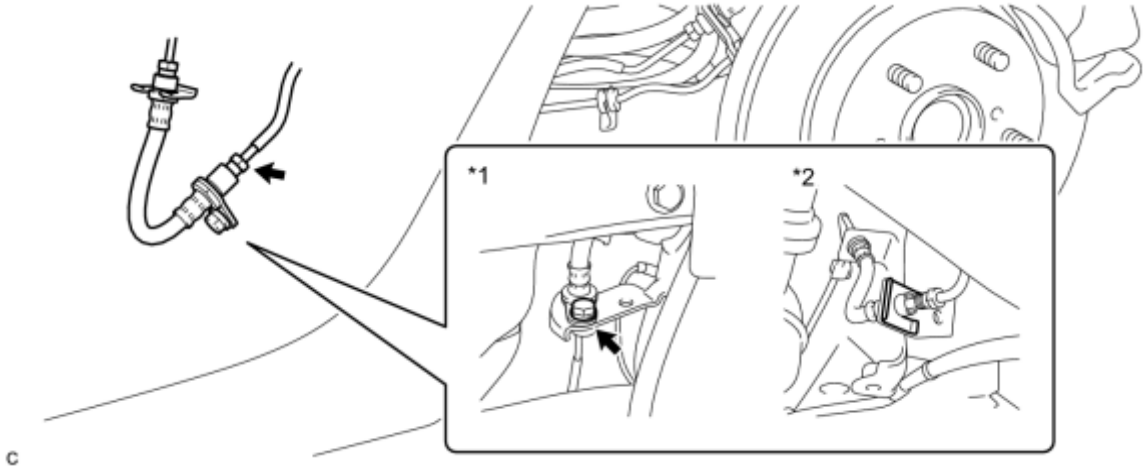
14. INSTALL REAR NO. 3 BRAKE TUBE

HINT:

Perform the same procedure as for the rear No. 4 brake tube.

15. CONNECT REAR BRAKE TUBE FLEXIBLE HOSE

(a) for LH Side




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | LH Side | *2 | RH Side |

(1) Install the rear brake tube flexible hose with the bolt.

Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**

(b) for RH Side

(1) Install the rear brake tube flexible hose with a new clip.

NOTICE:

Install the clip as far as it will go.

(c) Using a union nut wrench, connect the 2 brake lines to the rear brake tube flexible hose.

Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

NOTICE:

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake line from the connecting points.
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.

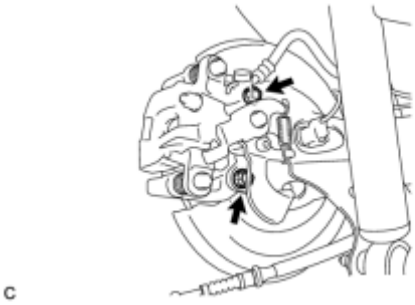
16. INSTALL REAR DISC (for LH Side) INFO

17. INSTALL REAR DISC (for RH Side)

HINT:

Perform the same procedure as for the LH side.

18. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY LH




(a) Install the rear disc brake caliper assembly LH with rear flexible hose LH with the 2 bolts.

Torque: **57 N·m (585 kgf·cm, 42ft·lbf)**




(b) Connect the rear flexible hose LH to the rear axle beam assembly with a new clip.

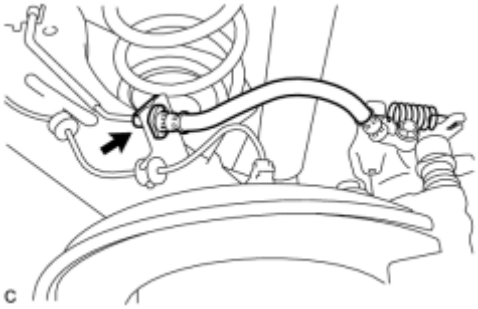
NOTICE:

Install the clip as far as it will go.

(c) Using a union nut wrench, connect the brake line to the rear flexible hose LH while holding the rear flexible hose LH with a wrench.

Torque: **15 N·m (155 kgf·cm, 11ft·lbf)**

- Do not bend or damage the brake line.
- Do not allow any foreign matter such as dirt and dust to enter the brake




line from the connecting points.

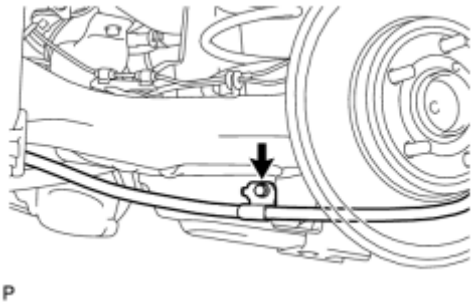
- Use the formula to calculate special torque values for situations where the union nut wrench is combined with a torque wrench INFO.

19. INSTALL REAR DISC BRAKE CALIPER ASSEMBLY RH

HINT:

Perform the same procedure as for the LH side.

20. INSTALL NO. 3 PARKING BRAKE CABLE ASSEMBLY




(a) Install the No. 3 parking brake cable assembly to the rear axle beam assembly with the bolt.

Torque: **6.0 N·m (61 kgf·cm, 53in·lbf)**

21. INSTALL NO. 2 PARKING BRAKE CABLE ASSEMBLY

HINT:

Perform the same procedure as for the No. 3 parking brake cable assembly.

22. CONNECT NO. 3 PARKING BRAKE CABLE ASSEMBLY INFO

23. CONNECT NO. 2 PARKING BRAKE CABLE ASSEMBLY

HINT:

Perform the same procedure as for the LH side.

24. INSTALL REAR SPEED SENSOR WIRE (for LH Side) INFO

25. INSTALL REAR SPEED SENSOR WIRE (for RH Side)

HINT:

Perform the same procedure as for the LH side.

26. CONNECT REAR SPEED SENSOR WIRE (for LH Side) INFO

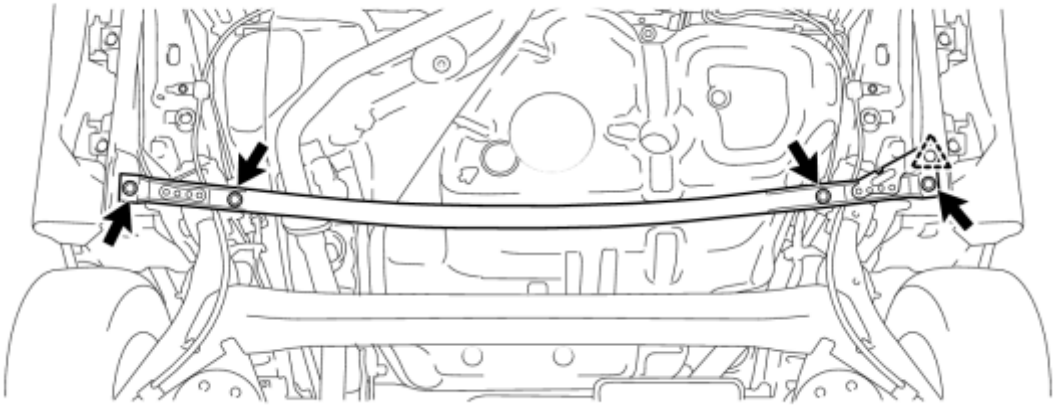
27. CONNECT REAR SPEED SENSOR WIRE (for RH Side)

HINT:

Perform the same procedure as for the LH side.

28. INSTALL REAR SUSPENSION BRACE SUB-ASSEMBLY

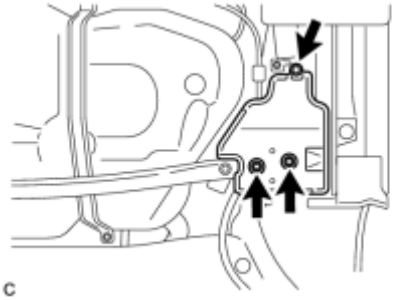
(a) Install the rear suspension brace sub-assembly with the 4 bolts and clip.



C

Torque: **54 N·m (551 kgf·cm, 40ft·lbf)**

29. INSTALL REAR FLOOR SIDE MEMBER COVER LH (w/ Floor Under Cover)

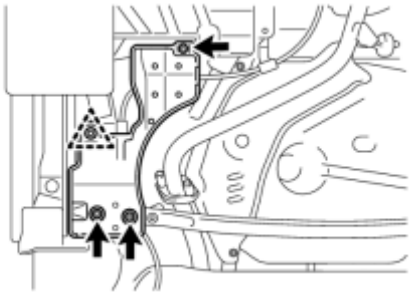


C

(a) Install the rear floor side member cover LH with the nut and 2 bolts.

30. INSTALL REAR FLOOR SIDE MEMBER COVER RH (w/ Floor Under Cover)

(a) Engage the clip to temporarily install the rear floor side member cover RH.




(b) Install the rear floor side member cover RH with the 3 bolts.

31. ADJUST PARKING BRAKE

INFO.

32. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

33. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

34. INSTALL FRONT DOOR SCUFF PLATE LH INFO

35. BLEED BRAKE LINE INFO

36. PERFORM INITIALIZATION AND CALIBRATION OF LINEAR SOLENOID VALVE

HINT:

If the brake control has been disabled, make sure to perform initialization and calibration of the linear solenoid valve INFO.

37. INSTALL REAR WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

38. STABILIZE SUSPENSION INFO

39. FULLY TIGHTEN REAR AXLE BEAM ASSEMBLY INFO

40. INSTALL REAR WHEEL HOUSE LINER LH (w/ Wheel House Liner) INFO

41. INSTALL REAR WHEEL HOUSE LINER RH (w/ Wheel House Liner)

HINT:

Perform the same procedure as for the LH side.

42. INSPECT REAR WHEEL ALIGNMENT

INFO.

43. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

44. PERFORM YAW RATE AND ACCELERATION SENSOR CALIBRATION

INFO.

45. CHECK FOR SPEED SENSOR SIGNAL

INFO.

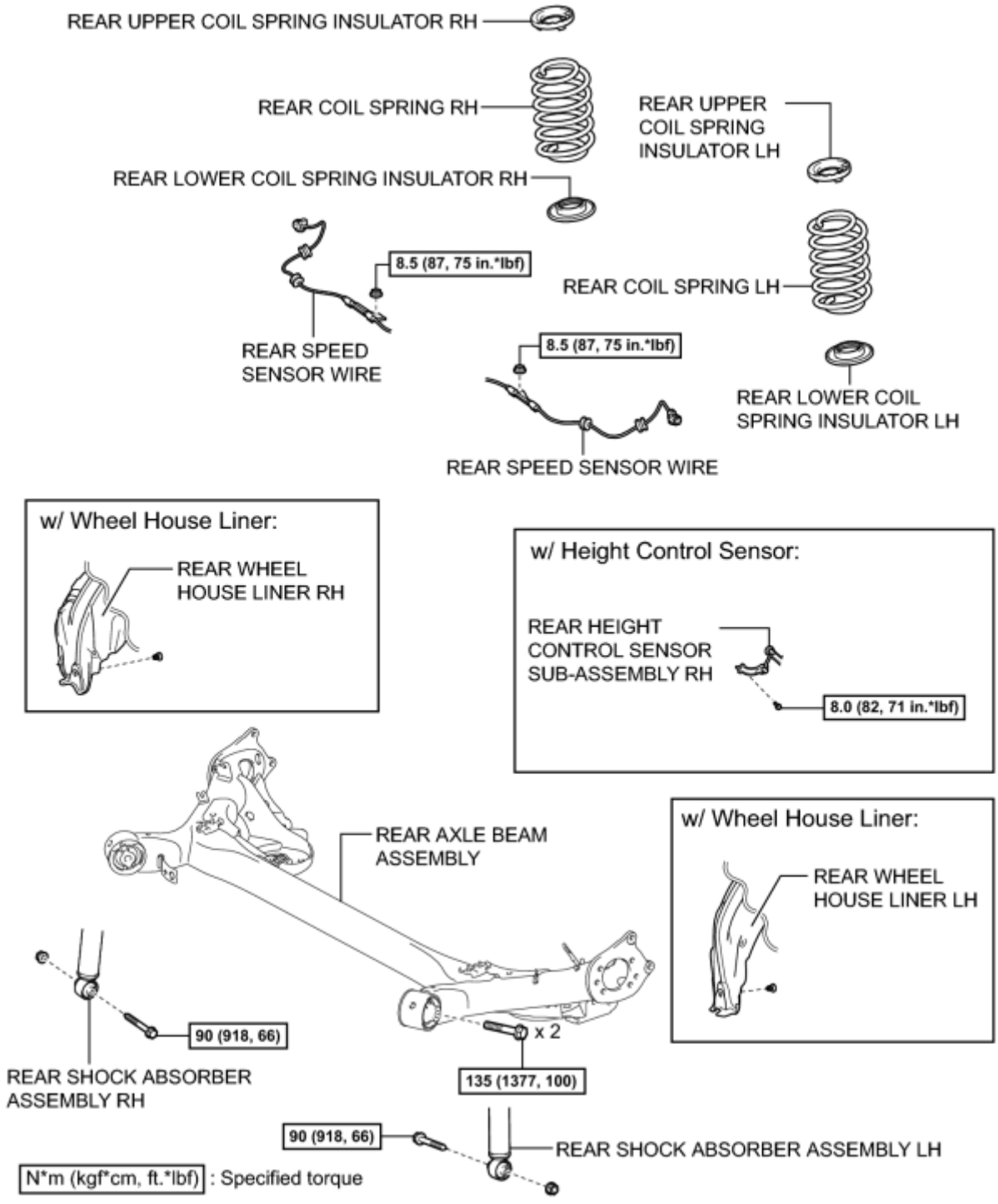
46. PERFORM INITIALIZATION (w/ Height Control Sensor)

NOTICE:

Some systems need to be initialized after the rear height control sensor sub-assembly RH is replaced INFO.

# COMPONENTS

# ILLUSTRATION




c

# REMOVAL

1. REMOVE REAR WHEELS

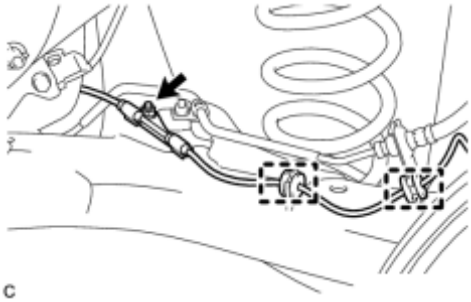
2. DISCONNECT REAR SPEED SENSOR WIRE (for LH Side) INFO

3. DISCONNECT REAR SPEED SENSOR WIRE (for RH Side)

HINT:

Perform the same procedure as the LH side.

4. SEPARATE REAR SPEED SENSOR WIRE (for LH Side)



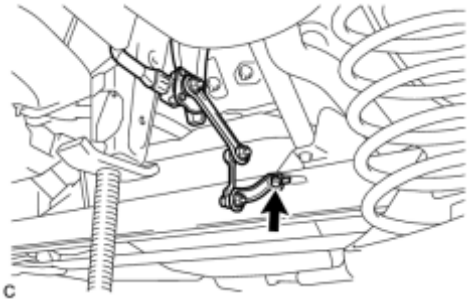

(a) Remove the nut and separate the 2 clamps and rear speed sensor wire.

5. SEPARATE REAR SPEED SENSOR WIRE (for RH Side)

HINT:

Perform the same procedure as the LH side.

6. SEPARATE REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH (w/ Height Control Sensor)




(a) Remove the bolt and separate the rear height control sensor sub-assembly RH from the rear axle beam assembly.

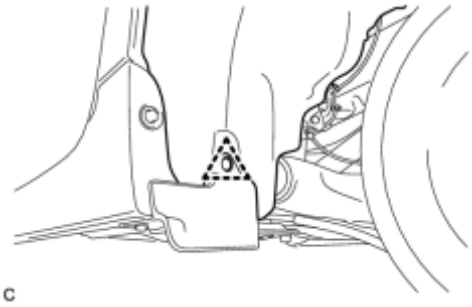
(b) Using a vinyl tape, secure the rear height control sensor sub-assembly RH as shown in the illustration.

## Text in Illustration




| | |
|---|---|
| *1 | Vinyl Tape |

7. SEPARATE REAR WHEEL HOUSE LINER LH (w/ Wheel House Liner)




(a) Remove the clip and turn back the rear wheel house liner LH to separate the rear wheel house liner LH.

8. SEPARATE REAR WHEEL HOUSE LINER RH (w/ Wheel House Liner)

HINT:

Perform the same procedure as the LH side.

9. REMOVE REAR COIL SPRING LH

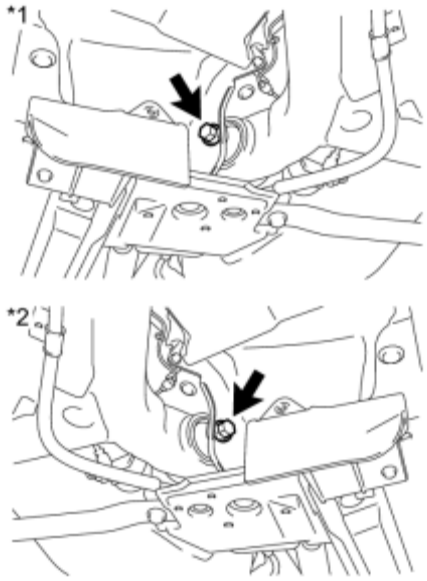
(a) Loosen the 2 bolts.

## Text in Illustration

| | |
|---|---|
| *1 | LH Side |
| *2 | RH Side |

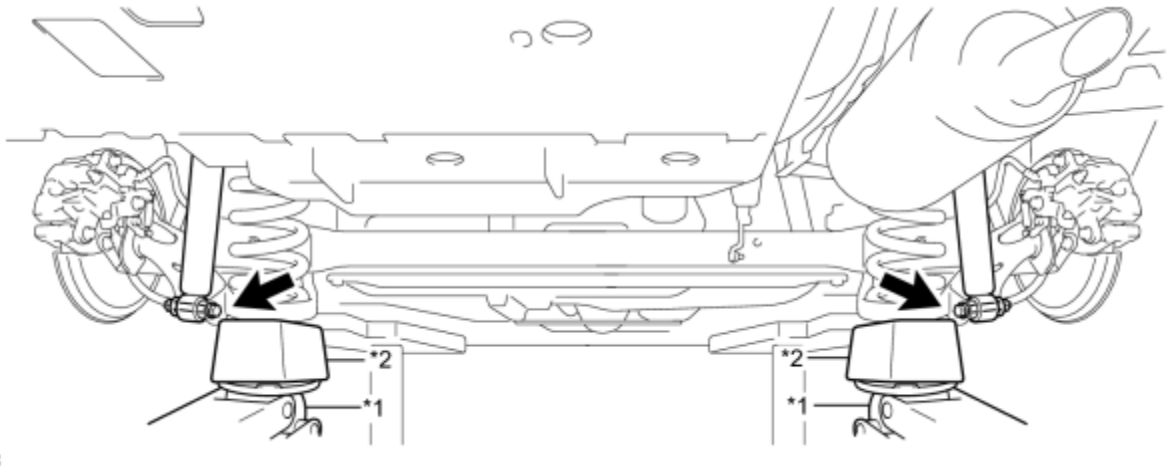
NOTICE:

Do not remove the bolts.




c

(b) Support the spring seat of the rear axle beam assembly using 2 jacks and 2 wooden blocks.




c

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Jack | *2 | Wooden Block |

CAUTION:

Do not jack up the rear axle beam assembly too high as the vehicle may fall.

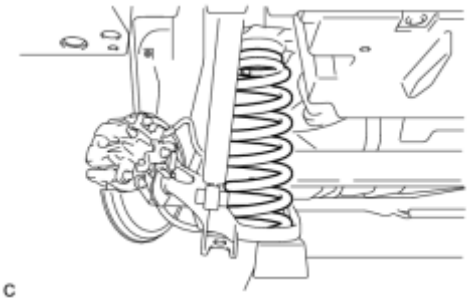
HINT:

Support the rear shock absorber at a position where it compresses by approximately 20 to 30 mm (0.787 to 1.18 in.).

(c) Remove the 2 bolts while holding the 2 nuts and separate the rear axle beam assembly from the rear shock absorber assemblies LH and RH.

NOTICE:

Since the stopper nuts are used, turn the bolts.

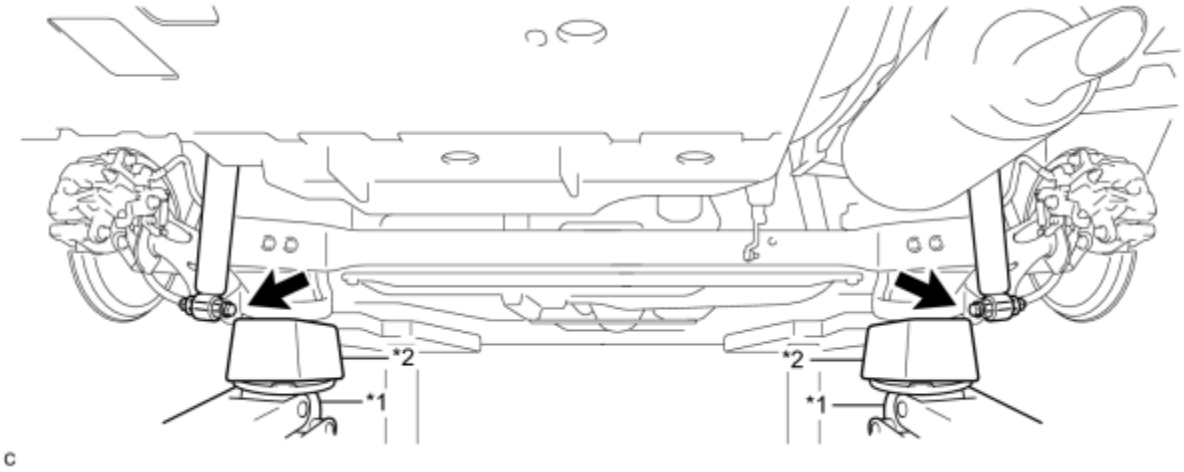


(d) Slowly lower the rear axle beam assembly using 2 jacks and 2 wooden blocks, and remove the rear coil spring LH.

NOTICE:

When moving the rear axle beam assembly beyond full rebound, make sure that the rear axle beam assembly is not out of position for more than 10 minutes.

(e) Slowly jack up the rear axle beam assembly using 2 jacks and 2 wooden blocks, and temporarily tighten the rear axle beam assembly to the rear shock absorber assemblies LH and RH with the 2 bolts and 2 nuts.




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Jack | *2 | Wooden Block |

NOTICE:

Since the stopper nuts are used, turn the bolts.

10. REMOVE REAR COIL SPRING RH

HINT:

Perform the same procedure as the LH side.

11. REMOVE REAR UPPER COIL SPRING INSULATOR LH

12. REMOVE REAR UPPER COIL SPRING INSULATOR RH

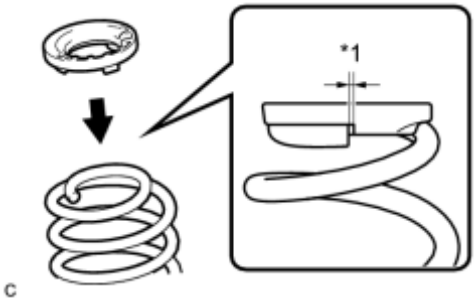
13. REMOVE REAR LOWER COIL SPRING INSULATOR LH

14. REMOVE REAR LOWER COIL SPRING INSULATOR RH

# INSTALLATION

1. INSTALL REAR UPPER COIL SPRING INSULATOR LH

(a) Install the rear upper coil spring insulator LH to the rear coil spring LH.




c

## Text in Illustration

| | |
|---|---|
| *1 | 10 mm or less |

NOTICE:

Install the rear upper coil spring insulator so that the dimension between the stopper and the upper end of the rear coil spring is 10 mm (0.394 in.) or less.

2. INSTALL REAR UPPER COIL SPRING INSULATOR RH

HINT:

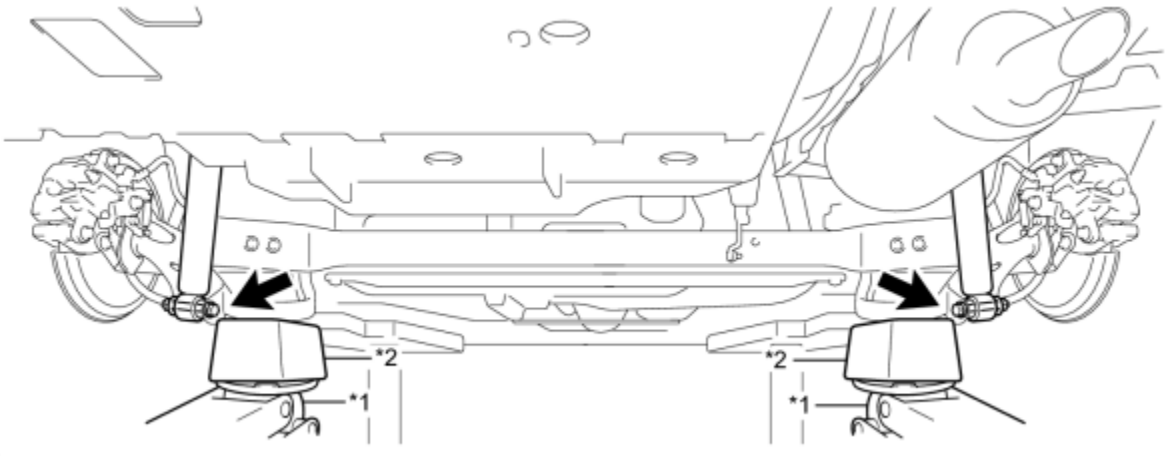
Perform the same procedure as the LH side.

3. INSTALL REAR LOWER COIL SPRING INSULATOR LH

4. INSTALL REAR LOWER COIL SPRING INSULATOR RH

5. INSTALL REAR COIL SPRING LH

(a) Support the spring seat of the rear axle beam assembly using 2 jacks and 2 wooden blocks.




c

***Text in Illustration***

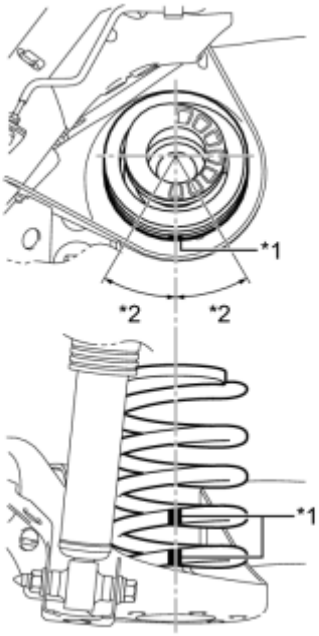
| | | | |
|---|---|---|---|
| *1 | Jack | *2 | Wooden Block |

(b) Remove the 2 bolts while holding the 2 nuts and separate the rear axle beam assembly from the rear shock absorber assemblies LH and RH.

NOTICE:

Since the stopper nuts are used, turn the bolts.

(c) Slowly lower the rear axle beam assembly using 2 jacks and 2 wooden blocks.




c

(d) Set the rear coil spring LH to the rear axle beam assembly.

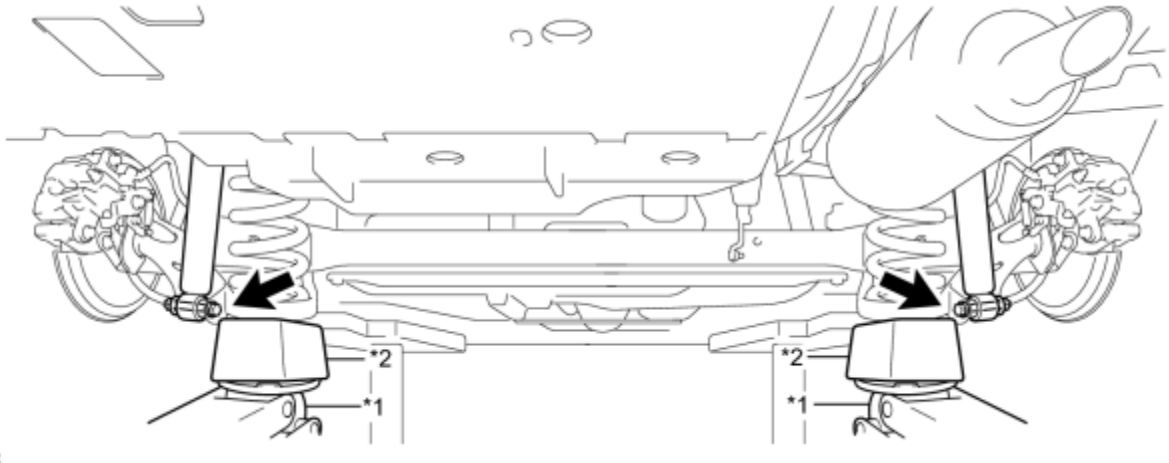
## Text in Illustration

| | |
|---|---|
| *1 | Identification Mark |
| *2 | 30° or less |

NOTICE:

Set the rear coil spring so that the identification marks are positioned as shown in the illustration.

(e) Slowly jack up the rear axle beam assembly using 2 jacks and 2 wooden blocks and temporarily install the rear axle beam assembly and rear coil spring LH with the 2 bolts and 2 nuts.




c

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Jack | *2 | Wooden Block |

NOTICE:

Since the stopper nuts are used, turn the bolts.

HINT:

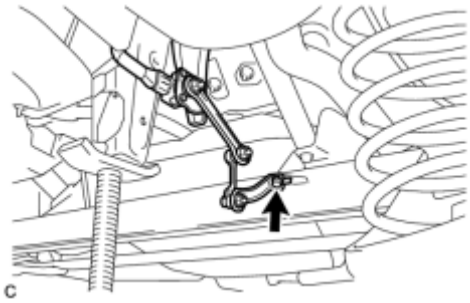
Insert the bolt with the threaded end facing the outside of the vehicle.

6. INSTALL REAR COIL SPRING RH

HINT:

Perform the same procedure as the LH side.

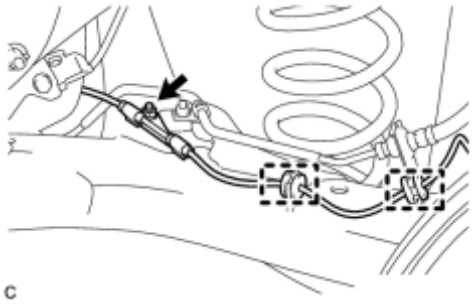
7. INSTALL REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH (w/ Height Control Sensor)




(a) Install the rear height control sensor sub-assembly RH to the rear axle beam assembly with the bolt.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

8. INSTALL REAR SPEED SENSOR WIRE (for LH Side)




(a) Install the rear speed sensor wire to the rear axle beam assembly with the nut and 2 clamps.

Torque: **8.5 N·m (87 kgf·cm, 75in·lbf)**

NOTICE:

Do not twist the rear speed sensor wire when installing it.

9. INSTALL REAR SPEED SENSOR WIRE (for RH Side)

HINT:

Perform the same procedure as the LH side.

10. CONNECT REAR SPEED SENSOR WIRE (for LH Side) INFO

11. CONNECT REAR SPEED SENSOR WIRE (for RH Side)

HINT:

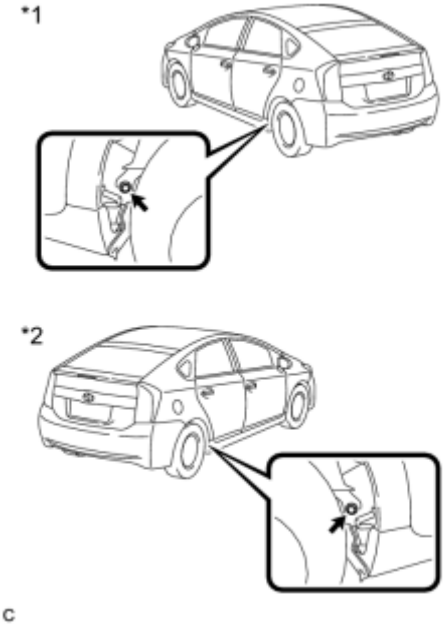
Perform the same procedure as the LH side.

12. INSTALL REAR WHEELS

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

13. STABILIZE SUSPENSION INFO

14. FULLY TIGHTEN REAR AXLE BEAM ASSEMBLY




(a) Fully tighten the 2 bolts.

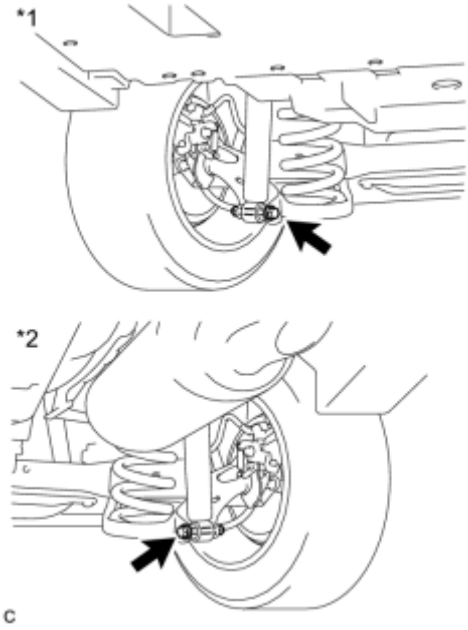
## Text in Illustration

| | |
|---|---|
| *1 | LH Side |
| *2 | RH Side |

Torque: **135 N·m (1377 kgf·cm, 100ft·lbf)**

NOTICE:

The final torque must be applied under the standard vehicle height conditions.




(b) Fully tighten the 2 bolts.

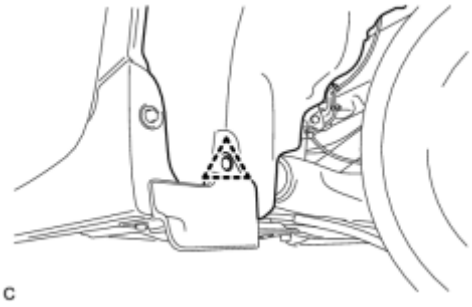
## Text in Illustration

| | |
|---|---|
| *1 | LH Side |
| *2 | RH Side |

Torque: **90 N·m (918 kgf·cm, 66ft·lbf)**

- Since the stopper nut are used, turn the bolts.
- The final torque must be applied under the standard vehicle height conditions.

15. INSTALL REAR WHEEL HOUSE LINER LH (w/ Wheel House Liner)




(a) Install the rear wheel house liner LH with the clip.

16. INSTALL REAR WHEEL HOUSE LINER RH (w/ Wheel House Liner)

HINT:

Perform the same procedure as the LH side.

17. INSPECT REAR WHEEL ALIGNMENT

INFO.

18. PLACE FRONT WHEELS FACING STRAIGHT AHEAD

19. PERFORM YAW RATE AND ACCELERATION SENSOR CALIBRATION

INFO.

20. CHECK FOR SPEED SENSOR SIGNAL

INFO.

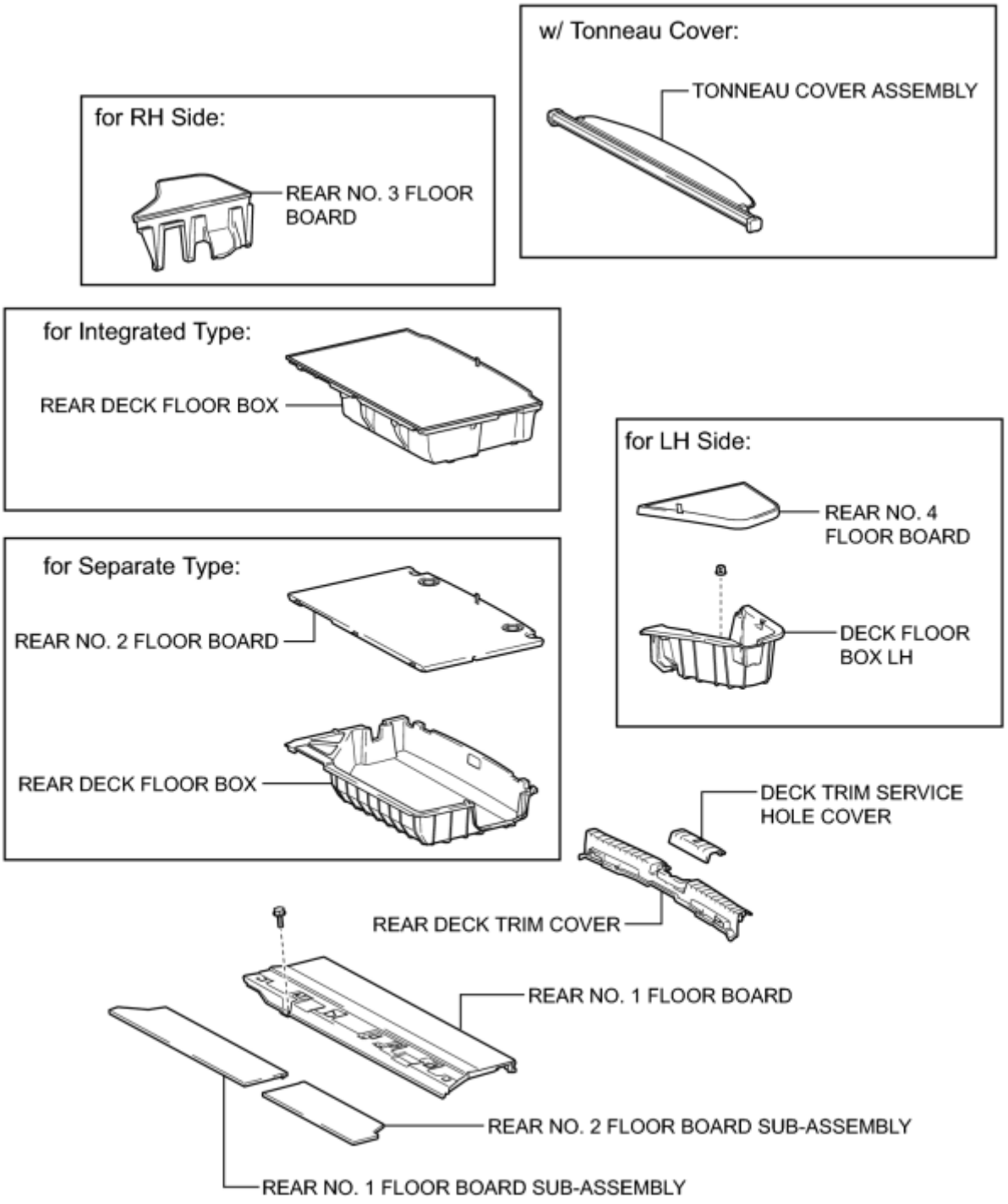
21. PERFORM INITIALIZATION (w/ Height Control Sensor)

NOTICE:

Some systems need to be initialized after the rear height control sensor sub-assembly RH is replaced INFO.

# COMPONENTS

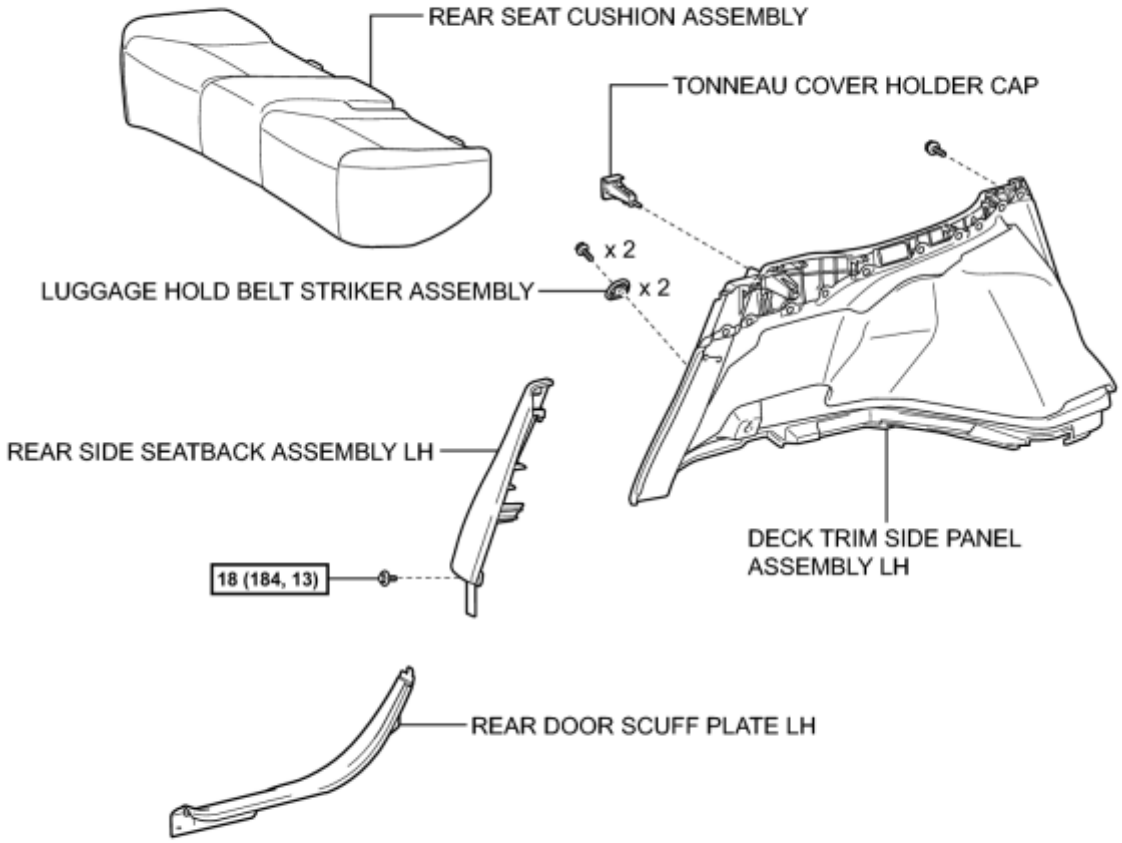
# ILLUSTRATION




c

# ILLUSTRATION

for LH Side:

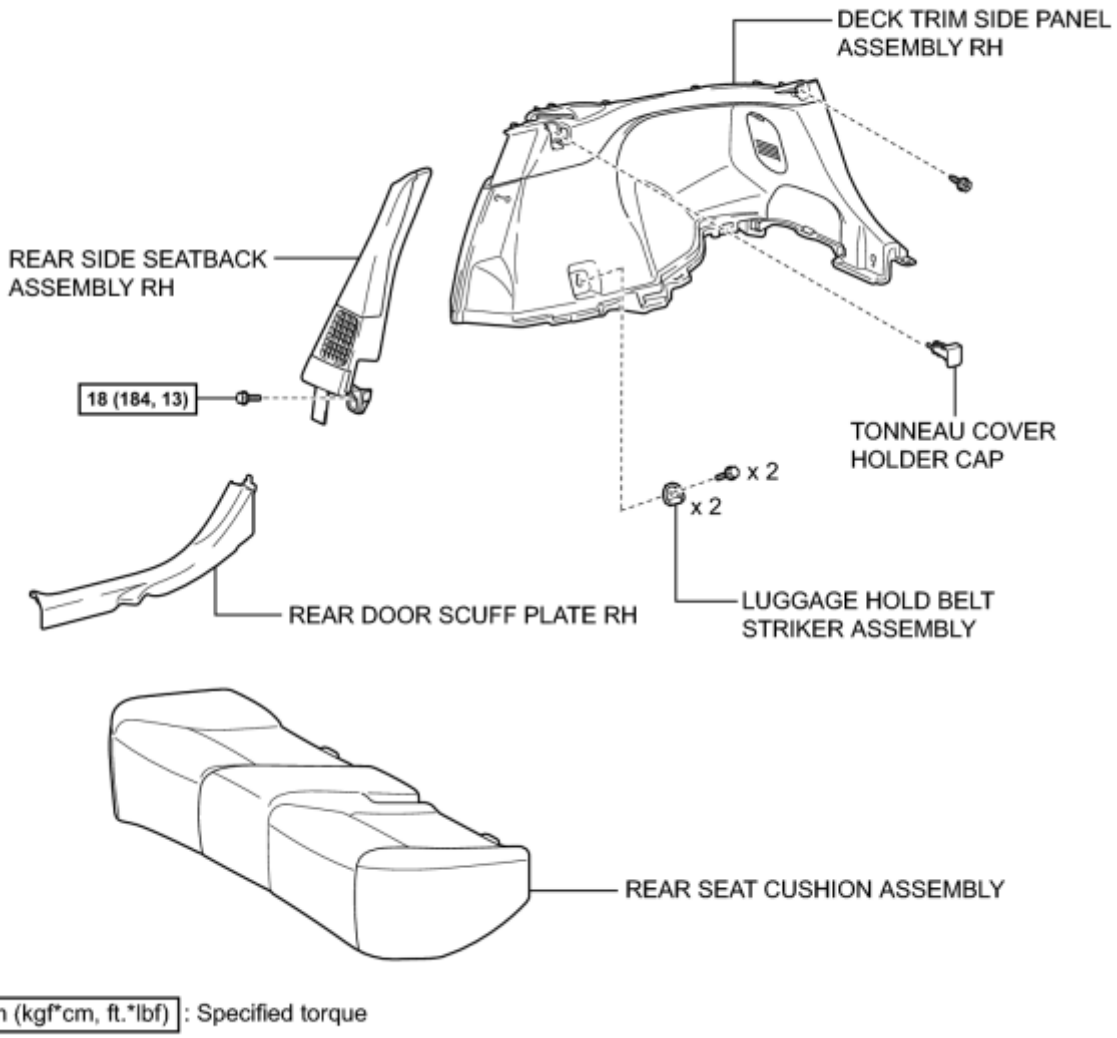



N*m (kgf*cm, ft.*lbf) : Specified torque

c

# ILLUSTRATION

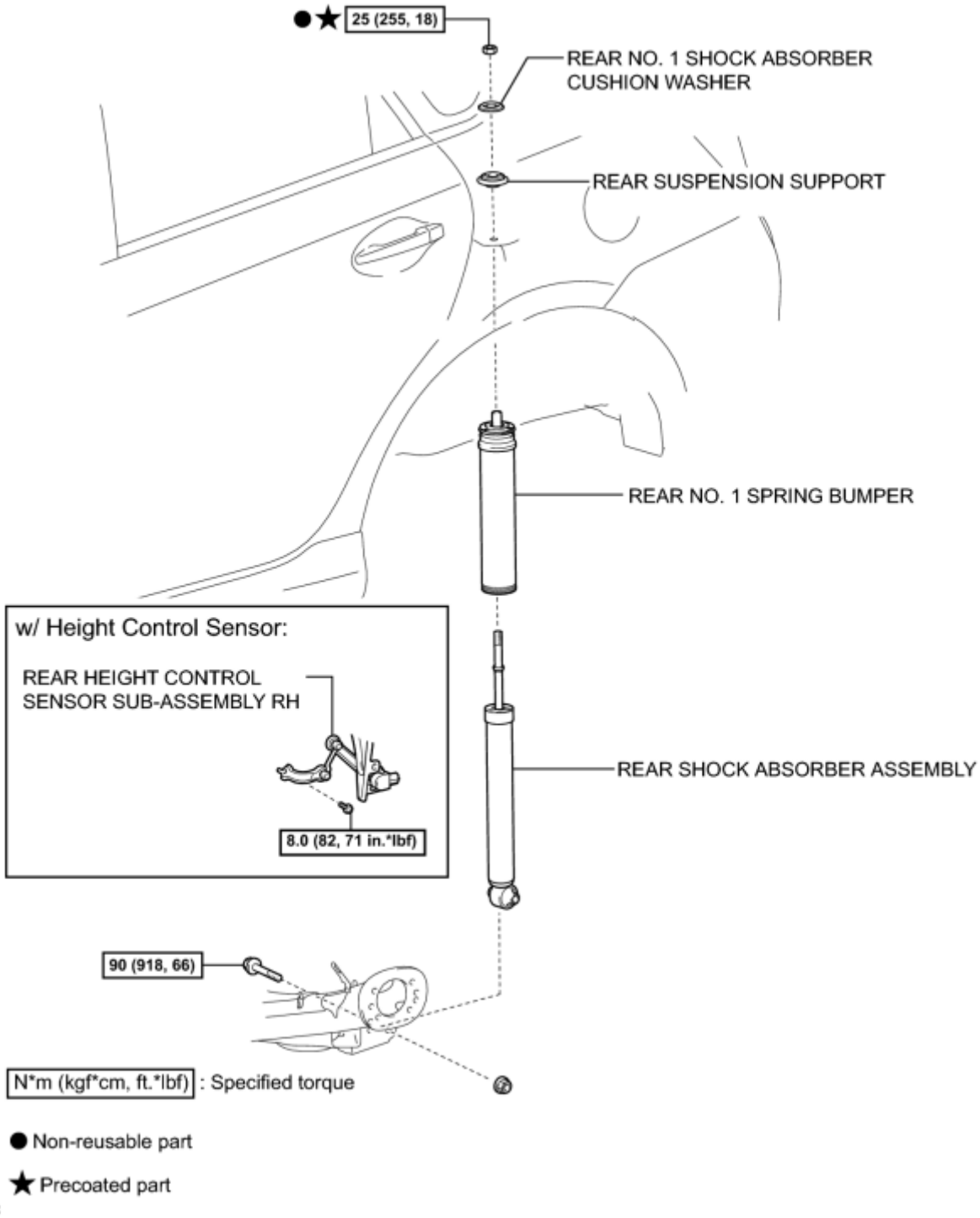
for RH Side:




N*m (kgf*cm, ft.*lbf) : Specified torque

c

# ILLUSTRATION


●★ 25 (255, 18)
REAR NO. 1 SHOCK ABSORBER CUSHION WASHER
REAR SUSPENSION SUPPORT
REAR NO. 1 SPRING BUMPER
w/ Height Control Sensor:
REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH
8.0 (82, 71 in.*lbf)
REAR SHOCK ABSORBER ASSEMBLY
90 (918, 66)
N*m (kgf*cm, ft.*lbf) : Specified torque
● Non-reusable part
★ Precoated part

c

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 4 FLOOR BOARD (for LH Side) INFO

5. REMOVE DECK FLOOR BOX LH (for LH Side) INFO

6. REMOVE REAR NO. 3 FLOOR BOARD (for RH Side) INFO

7. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

8. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

9. REMOVE REAR NO. 1 FLOOR BOARD INFO

10. REMOVE DECK TRIM SERVICE HOLE COVER INFO

11. REMOVE REAR DECK TRIM COVER INFO

12. REMOVE REAR DOOR SCUFF PLATE LH (for LH Side) INFO

13. REMOVE REAR DOOR SCUFF PLATE RH (for RH Side) INFO

14. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

15. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

16. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

17. REMOVE TONNEAU COVER HOLDER CAP (for LH Side) INFO

18. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

19. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (for RH Side) INFO

20. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side) INFO

21. REMOVE TONNEAU COVER HOLDER CAP (for RH Side) INFO

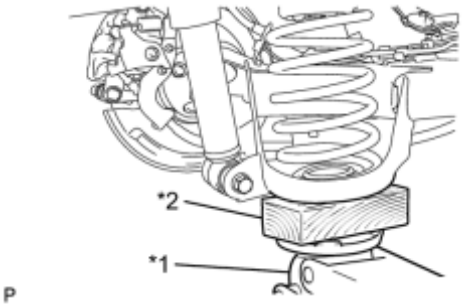
22. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

23. REMOVE REAR WHEEL

24. SEPARATE REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH (w/ Height Control Sensor) INFO

25. REMOVE REAR NO. 1 SHOCK ABSORBER CUSHION WASHER

(a) Support the spring seat of the rear axle beam assembly using a jack and wooden block.




## Text in Illustration

| | |
|---|---|
| *1 | Jack |
| *2 | Wooden Block |

CAUTION:

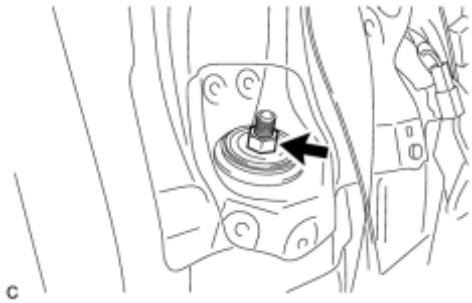
Do not jack up the rear axle beam assembly too high as the vehicle may fall.

NOTICE:

Keep supporting the rear axle beam assembly with a jack until the installation of the rear shock absorber assembly has been completed.

HINT:

Support the rear shock absorber at a position where it compresses by approximately 20 to 30 mm (0.787 to 1.18 in.).




(b) Using a hexagon socket wrench, secure the rear shock absorber rod and remove the lock nut.

NOTICE:

Securely insert the hexagon socket wrench to the rear shock absorber rod to prevent damage to the rear shock absorber assembly when removing the nut.

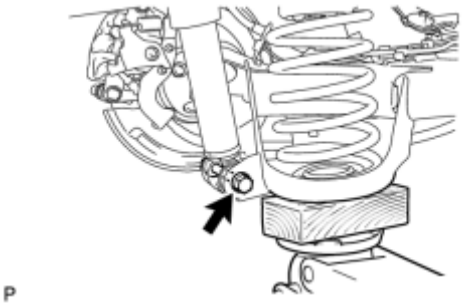
(c) Remove the rear No. 1 shock absorber cushion washer.




26. REMOVE REAR SUSPENSION SUPPORT

(a) Remove the rear suspension support.

27. REMOVE REAR SHOCK ABSORBER ASSEMBLY

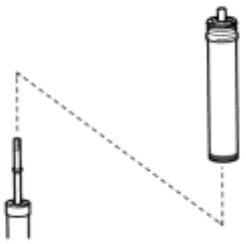



(a) Remove the bolt while holding the nut and remove the rear shock absorber assembly.

NOTICE:

Since the stopper nut is used, turn the bolt.

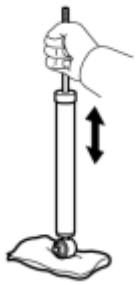
28. REMOVE REAR NO. 1 SPRING BUMPER



(a) Remove the rear No. 1 spring bumper from the rear shock absorber assembly.

# INSPECTION

1. INSPECT REAR SHOCK ABSORBER ASSEMBLY



(a) Compress and extend the rear shock absorber rod, and check that there is no abnormal resistance or unusual sound during operation.

If there is any abnormality, replace the shock absorber with a new one.

NOTICE:

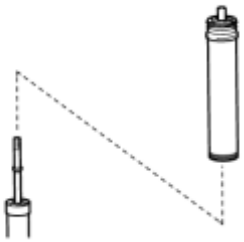
When disposing of the rear shock absorber assembly, see DISPOSAL INFO.

# INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

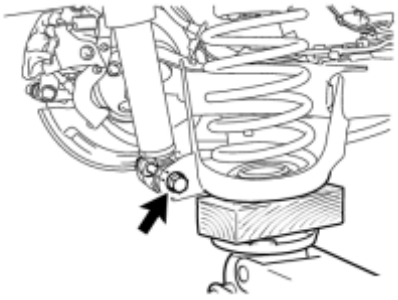
1. INSTALL REAR NO. 1 SPRING BUMPER



(a) Install the rear No. 1 spring bumper to the rear shock absorber assembly.

2. TEMPORARILY TIGHTEN REAR SHOCK ABSORBER ASSEMBLY

(a) Insert the upper end of the rear shock absorber assembly with the rear No. 1 spring bumper to the vehicle body.



P

(b) Temporarily tighten the rear shock absorber assembly to the rear axle beam assembly with the bolt and nut.

NOTICE:

Since the stopper nut is used, turn the bolt.

HINT:

Insert the bolt with the threaded end facing the outside of the vehicle.

3. INSTALL REAR SUSPENSION SUPPORT

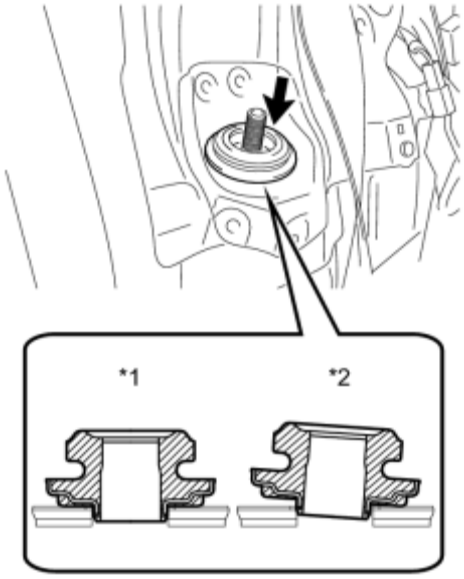
(a) Install the rear suspension support.

## Text in Illustration

| | |
|---|---|
| *1 | Correct |
| *2 | Incorrect |

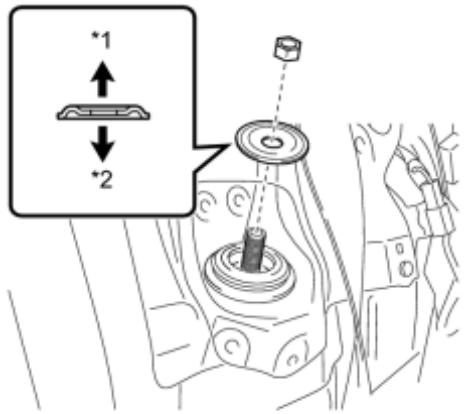
NOTICE:

Make sure that the rear suspension support is correctly installed as shown in the illustration.




c

4. INSTALL REAR NO. 1 SHOCK ABSORBER CUSHION WASHER




c

(a) Apply a few drops of adhesive to the threads of a new nut.

## Text in Illustration

| | |
|---|---|
| *1 | Upper Side |
| *2 | Lower Side |

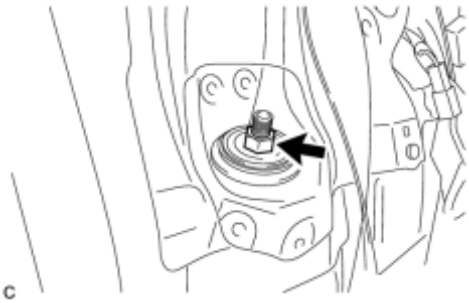
Adhesive:

Toyota genuine adhesive 1324, three bond 1324 or equivalent

(b) Install the rear No. 1 shock absorber cushion washer.

NOTICE:

Be sure to install the rear No. 1 shock absorber cushion washer in the correct direction.



c

(c) Using a union nut wrench, fully tighten the lock nut while holding the rod of the rear shock absorber assembly with a hexagon socket wrench.

Torque: **25 N·m (255 kgf·cm, 18ft·lbf)**

- Securely insert the hexagon socket wrench to the rear shock absorber rod to prevent damage to the rear shock absorber assembly when tightening the nut.
- Use the formula to calculate special torque values for situations

where the union nut wrench is combined with a torque wrench INFO.

5. INSTALL REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH (w/ Height Control Sensor) INFO

6. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

7. INSTALL TONNEAU COVER HOLDER CAP (for LH Side) INFO

8. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

9. INSTALL REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

10. INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

11. INSTALL TONNEAU COVER HOLDER CAP (for RH Side) INFO

12. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side) INFO

13. INSTALL REAR SIDE SEATBACK ASSEMBLY RH (for RH Side) INFO

14. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

15. INSTALL REAR DOOR SCUFF PLATE LH (for LH Side) INFO

16. INSTALL REAR DOOR SCUFF PLATE RH (for RH Side) INFO

17. INSTALL REAR DECK TRIM COVER INFO

18. INSTALL DECK TRIM SERVICE HOLE COVER INFO

19. INSTALL REAR NO. 1 FLOOR BOARD INFO

20. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

21. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

22. INSTALL DECK FLOOR BOX LH (for LH Side) INFO

23. INSTALL REAR NO. 4 FLOOR BOARD (for LH Side) INFO

24. INSTALL REAR NO. 3 FLOOR BOARD (for RH Side) INFO

25. INSTALL REAR DECK FLOOR BOX INFO

26. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

27. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

28. INSTALL REAR WHEEL

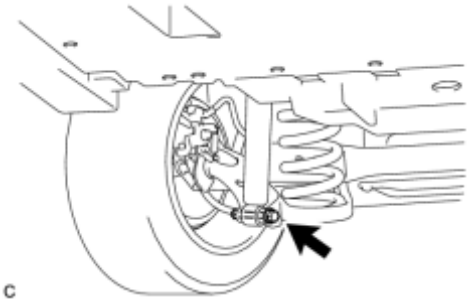
Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

29. STABILIZE SUSPENSION

(a) Lower the vehicle.

(b) Bounce the vehicle up and down several times to stabilize the suspension.

30. FULLY TIGHTEN REAR SHOCK ABSORBER ASSEMBLY




(a) Fully tighten the bolt.

Torque: **90 N·m (918 kgf·cm, 66ft·lbf)**

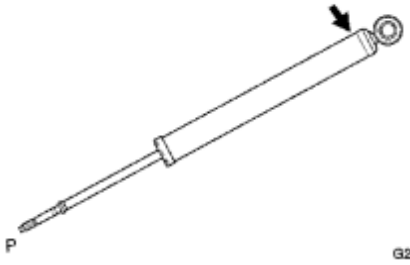
- Since the stopper nut is used, turn the bolt.
- The final torque must be applied under the standard vehicle height conditions.

31. PERFORM INITIALIZATION (w/ Height Control Sensor)

NOTICE:

Some systems need to be initialized after the rear height control sensor sub-assembly RH is replaced INFO.

# DISPOSAL




1. DISPOSE OF REAR SHOCK ABSORBER ASSEMBLY

(a) Disposal using a drill

(1) Fully extend the piston rod and secure the rear shock absorber assembly at an angle in a vise.

(2) Using a drill, slowly make a hole at the position indicated by the arrow in the illustration to discharge the gas inside.

NOTICE:

Be careful when drilling because shards of metal may fly about, so always use proper safety equipment.

HINT:

The gas is colorless, odorless and non-poisonous.

# HOW TO PROCEED WITH TROUBLESHOOTING

1. DIAGNOSIS OF TIRE VIBRATION

| | |
|---|---|
| 1. | TIGHTEN WHEEL NUTS |

NEXT

▼

| | |
|---|---|
| 2. | INSPECT TIRES INFO |

NG ▶ Go to step 3

OK ▶ Go to step 4

| | |
|---|---|
| 3. | REPAIR OR REPLACE TIRE(S) |

NEXT

▼

| | |
|---|---|
| 4. | INSPECT AND/OR ADJUST WHEEL BALANCE INFO |

NEXT

▼

| | |
|---|---|
| 5. | INSPECT FRONT AXLE HUB BEARING LOOSENESS AND AXLE HUB RUNOUT INFO |

NG ▶ Go to step 6

OK ▶ Go to step 7

| | |
|---|---|
| 6. | REPAIR FRONT AXLE HUB BEARING LOOSENESS AND AXLE HUB RUNOUT INFO |

NEXT

▼

| | |
|---|---|
| 7. | INSPECT REAR AXLE HUB BEARING LOOSENESS AND AXLE HUB RUNOUT INFO |

NG ▶ Go to step 8

OK ▶ Go to step 9

| | |
|---|---|
| 8. | REPAIR REAR AXLE HUB BEARING LOOSENESS AND AXLE HUB RUNOUT INFO |

NEXT

▼

| | |
|---|---|
| 9. | PERFORM ROAD TEST |

NEXT

| | |
|---|---|
| 10. | RETURN VEHICLE TO CUSTOMER |

2. DIAGNOSIS OF IRREGULAR TIRE WEAR

| | |
|---|---|
| 1. | INSPECT TIRES INFO |

NEXT

| | |
|---|---|
| 2. | REPAIR OR REPLACE TIRE(S) |

NEXT

| | |
|---|---|
| 3. | INSPECT AND/OR ADJUST FRONT WHEEL ALIGNMENT INFO |

NEXT

| | |
|---|---|
| 4. | INSPECT REAR WHEEL ALIGNMENT INFO |

NEXT

| | |
|---|---|
| 5. | PERFORM ROAD TEST |

NEXT

| | |
|---|---|
| 6. | RETURN VEHICLE TO CUSTOMER |

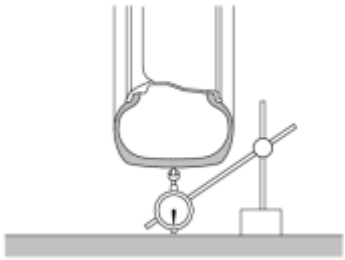
# INSPECTION

1. INSPECT TIRES

(a) Check the tires for wear and proper inflation pressure.

Cold Tire Inflation Pressure:

| Tire Size | Front<br><br>kPa (kgf/cm$^2$, psi) | Rear<br><br>kPa (kgf/cm$^2$, psi) |
|---|---|---|
| P195/65R15 89S | 240 (2.4, 35) | 230 (2.3, 33) |
| P215/45R17 87V | 230 (2.3, 33) | 220 (2.2, 32) |
| 195/65R15 91H | 220 (2.2, 32) | 220 (2.2, 32) |



C

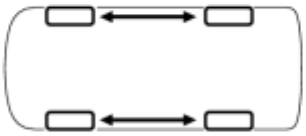
(b) Using a dial indicator, check the runout of the tires.

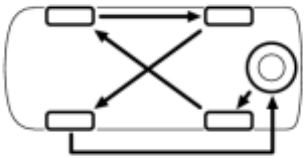
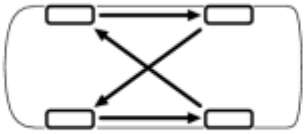
Maximum tire runout:

1.4 mm (0.0551 in.)

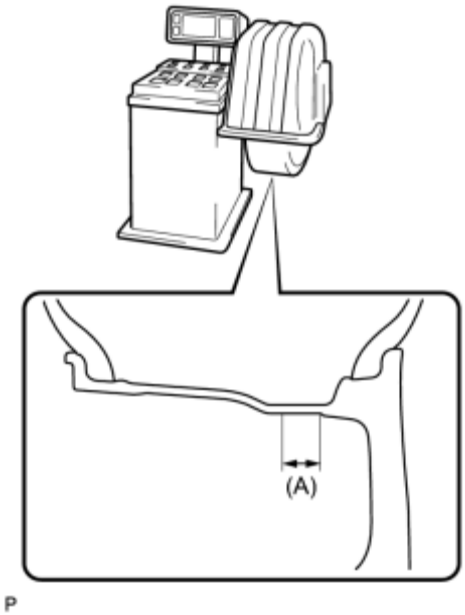
2. ROTATE TIRES

(a) Rotate the tires as shown in the illustration.

| Area | Rotate Tire<br><br>Vehicle Front Facing Left |
|---|---|
| North America |  <br>C |
| Mexico | |

| Area | Rotate Tire<br><br>Vehicle Front Facing Left |
|---|---|
| |  <br>C |
| Korea |  <br>C |

3. INSPECT WHEEL BALANCE



P

(a) Check and adjust the off-the-car balance.

Maximum imbalance after adjustment:

8.0 g (0.0176 lb)

- Use a cleaning detergent to remove dirt, oil and water from the surface where the balance weight is to be adhered.
- Do not touch the adhesive surface of the tape.
- Adhere a sticking type balance weight to the flat surface (A) shown in the illustration.

  Width (A):

  25 mm (0.984 in.)

- Push the balance weight securely with your finger to adhere it to the position.
- Do not reuse the balance weight.

HINT:

The inner side balance weight should be installed by clipping it to the rim.

4. INSPECT FRONT AXLE HUB BEARING LOOSENESS

(a) Inspect the front axle hub bearing looseness INFO.

5. INSPECT REAR AXLE HUB BEARING LOOSENESS

(a) Inspect the rear axle hub bearing looseness INFO.

6. INSPECT FRONT AXLE HUB RUNOUT

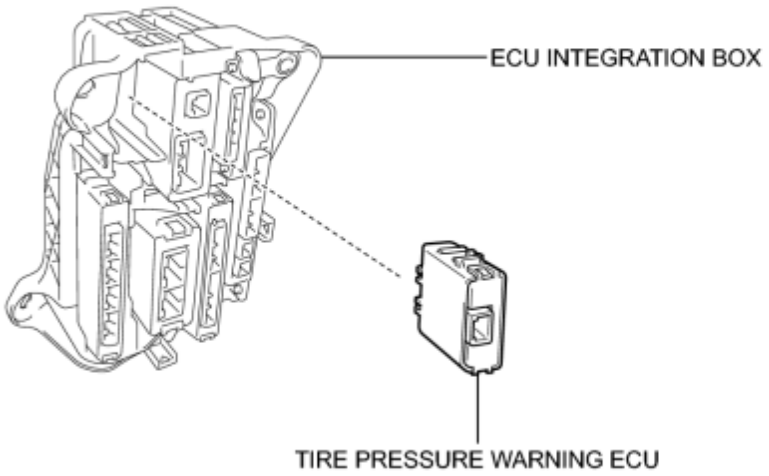
(a) Inspect the front axle hub runout INFO.

7. INSPECT REAR AXLE HUB RUNOUT

(a) Inspect the rear axle hub runout INFO.

# COMPONENTS

# ILLUSTRATION




c

# REMOVAL

NOTICE:

When replacing the tire pressure warning ECU, read the transmitter IDs registered in the tire pressure warning ECU and make a note of them before removing the tire pressure warning ECU.

1. REMOVE ECU INTEGRATION BOX

HINT:

Refer to the procedures up to Remove ECU Integration Box INFO.

2. REMOVE TIRE PRESSURE WARNING ECU



C

(a) Disengage the 2 claws to remove the tire pressure warning ECU.

# INSTALLATION

1. INSTALL TIRE PRESSURE WARNING ECU



C

(a) Engage the 2 claws to install the tire pressure warning ECU.

2. INSTALL ECU INTEGRATION BOX

HINT:

Refer to the procedures from Install ECU Integration Box INFO.

3. REGISTER OF TRANSMITTER ID

(a) Register all transmitter IDs INFO.

4. PERFORM INITIALIZATION

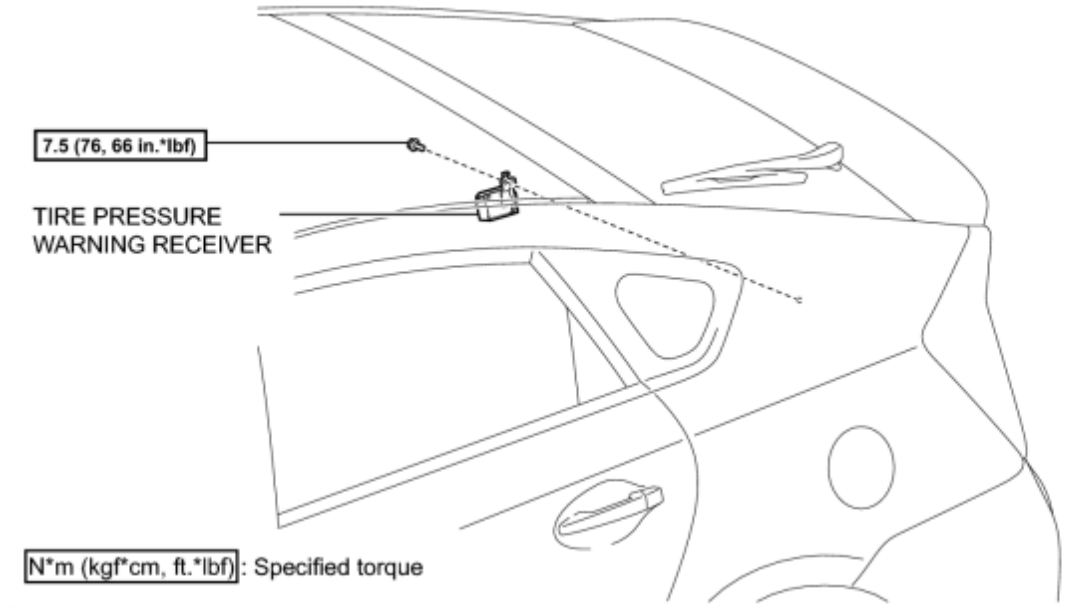
(a) Perform initialization INFO.

5. INSPECT TIRE PRESSURE WARNING SYSTEM

(a) Inspect the tire pressure warning system INFO.

# COMPONENTS

# ILLUSTRATION




c

# REMOVAL

1. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

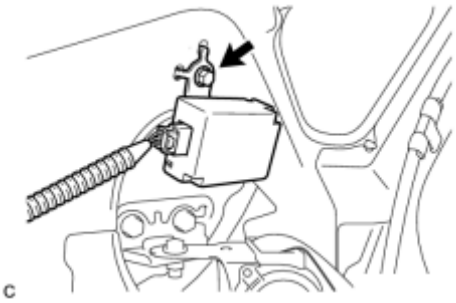
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

2. REMOVE ROOF SIDE INNER GARNISH ASSEMBLY LH

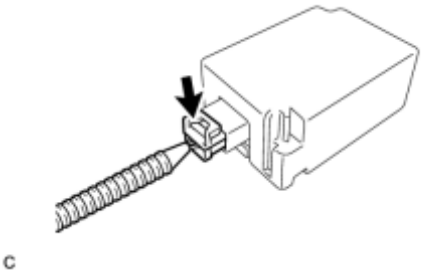
HINT:

- Refer to the procedures up to Remove Roof Side Inner Garnish Assembly INFO.
- Removal should be performed only for the left side.

3. REMOVE TIRE PRESSURE WARNING RECEIVER



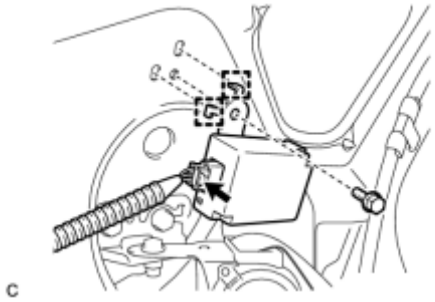

(a) Remove the bolt.




(b) Disconnect the connector to remove the tire pressure warning receiver.

# INSTALLATION

1. INSTALL TIRE PRESSURE WARNING RECEIVER




(a) Connect the connector.

(b) Engage the 2 tabs into the holes as shown in the illustration to install the tire pressure warning receiver.

(c) Install the bolt.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

2. INSTALL ROOF SIDE INNER GARNISH ASSEMBLY LH

HINT:

- Refer to the procedures from Install Roof Side Inner Garnish Assembly INFO.
- Installation should be performed only for the left side.

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

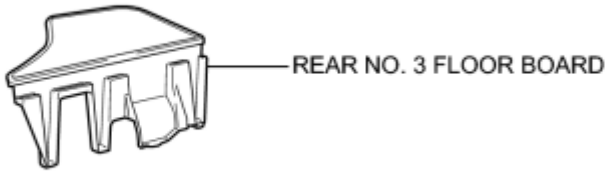
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

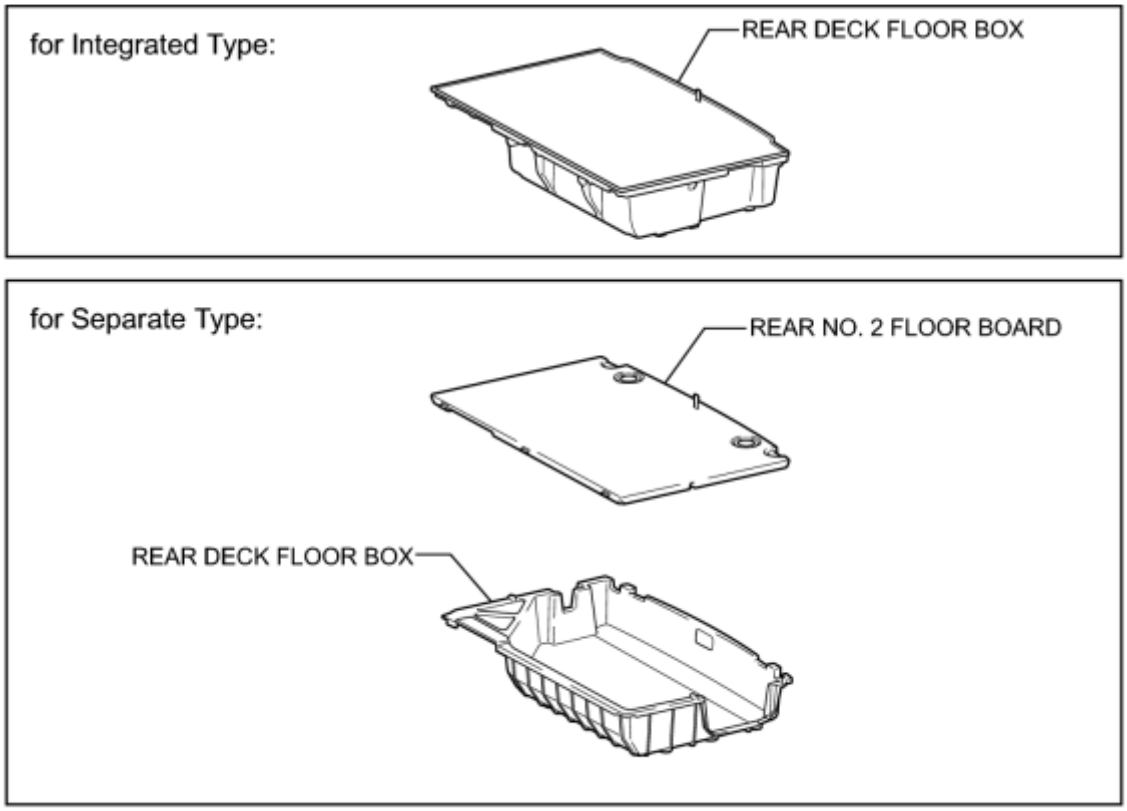
4. INSPECT TIRE PRESSURE WARNING SYSTEM

(a) Inspect the tire pressure warning system INFO.

# COMPONENTS

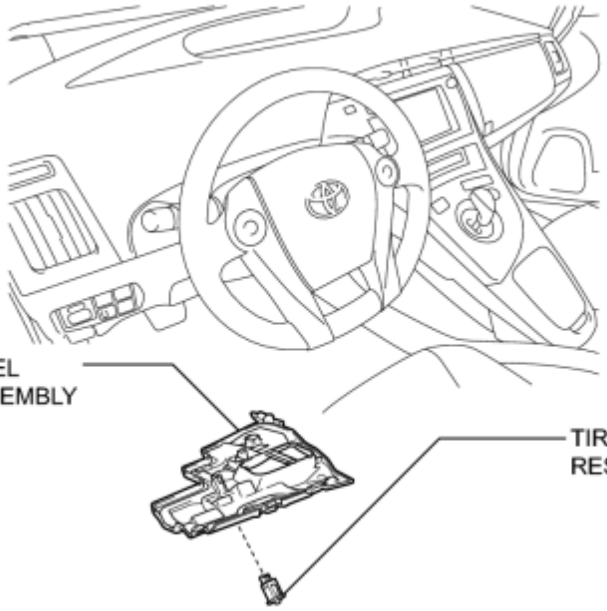
# ILLUSTRATION




P

# ILLUSTRATION


NO. 1 INSTRUMENT PANEL
UNDER COVER SUB-ASSEMBLY
TIRE PRESSURE WARNING
RESET SWITCH

c

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

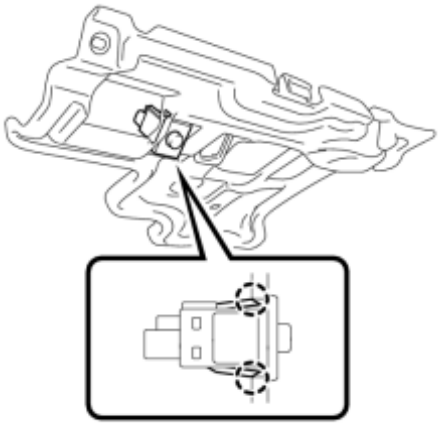
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

6. REMOVE TIRE PRESSURE WARNING RESET SWITCH



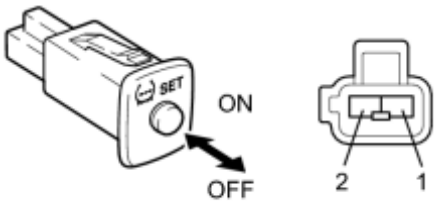
C

(a) Disengage the 2 claws to remove the tire pressure warning reset switch from the No. 1 instrument panel under cover sub-assembly.

# INSPECTION

1. INSPECT TIRE PRESSURE WARNING RESET SWITCH

Component without harness connected:
(Tire Pressure Warning Reset Switch)




(a) Remove the tire pressure warning reset switch.

(b) Measure the resistance according to the value(s) in the table below.

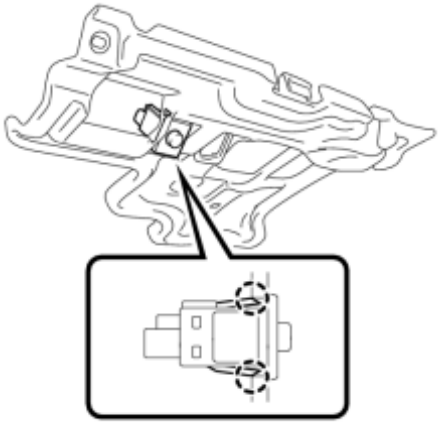
Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | ON | Below 1 Ω |
| | OFF | 10 kΩ or higher |

If the result is not as specified, replace the tire pressure warning reset switch.

# INSTALLATION

1. INSTALL TIRE PRESSURE WARNING RESET SWITCH



C

(a) Engage the 2 claws to install the tire pressure warning reset switch to the No. 1 instrument panel under cover sub-assembly.

2. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

4. INSPECT TIRE PRESSURE WARNING SYSTEM

(a) Inspect the tire pressure warning system INFO.

5. INSTALL REAR NO. 3 FLOOR BOARD INFO

6. INSTALL REAR DECK FLOOR BOX INFO

7. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# PRECAUTION

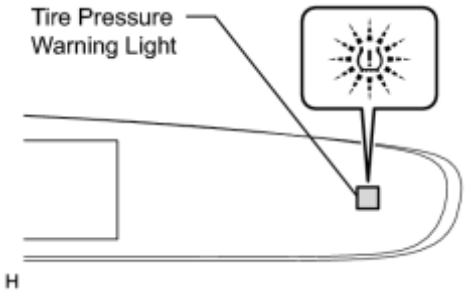
1. PRECAUTION FOR DISCONNECTING THE BATTERY CABLE

NOTICE:

When disconnecting the battery negative (-) cable, initialize the following system after the cable is reconnected:

| System | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. TIRE PRESSURE WARNING SYSTEM PRECAUTION




(a) When the tire pressure warning light comes on, immediately check the tire pressure of the tire and adjust it to the specified value (The tire pressure warning light will come on after blinking for 1 minute, the system may be malfunctioning. In this case, refer to following troubleshooting to repair the malfunction) INFO.

(b) When the tire pressure warning light comes on after blinking for 1 minute, there is a malfunction in the system. Check for DTCs.

(c) It is necessary to register the transmitter ID in the tire pressure warning ECU after replacing the tire pressure warning valve and transmitter and/or tire pressure warning ECU INFO.

(d) When replacing the tire pressure warning ECU:

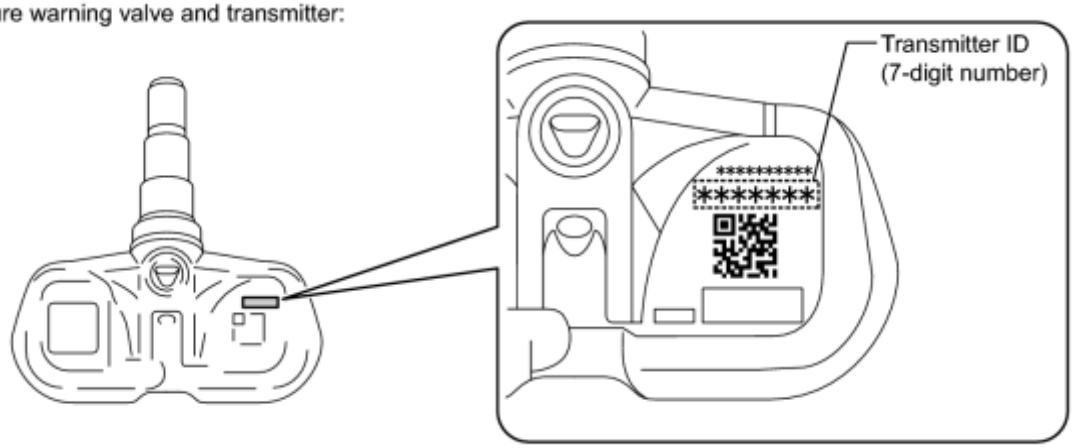
(1) Using the Data List, read the transmitter IDs registered in the ECU and make a note of them before removing the tire pressure warning ECU.

(2) Register the transmitter IDs after installing a new tire pressure warning ECU.

(e) When replacing the tire pressure warning valve and transmitter:

(1) Take a note of the 7-digit number (transmitter ID) written on the new tire pressure warning valve and transmitter when replacing the old one. Register the transmitter IDs in the tire pressure warning ECU after replacing the tire pressure warning valve and transmitter and installing the tires and wheels on the vehicle.

Tire pressure warning valve and transmitter:




H

NOTICE:

The transmitter ID is written on the tire pressure warning valve and transmitter. It will be unable to be read after installing the tire pressure warning valve and transmitter on the tire and wheel. Therefore, take a note of the transmitter ID before installing the tire pressure warning valve and transmitter.

(f) Tire and wheel replacement or tire rotation:

- After the tires or wheels are replaced with a new tire pressure warning valve and transmitter, it is necessary to register the transmitter IDs.
- It is not necessary to register the transmitter IDs after tire rotation is performed.
- After dropping the tire pressure warning valve and transmitter into the tire, disengage the bead from the wheel.

  NOTICE:

  Be careful not to damage the tire pressure warning valve and transmitter because of interference between the sensor and tire bead.

- The initialization is necessary to reset the warning threshold in accordance with the variant tire pressure settings due to the tire types.

(g) When replacing the tire pressure warning ECU and the tire pressure warning valve and transmitters, it is necessary to perform the initialization INFO after the registration INFO.

(h) Precautions about the tire pressure:

- Tire pressure decreases naturally.
- In winter, tire pressure may decrease due to low ambient temperatures (tire pressure decreases by approximately 10 kPa (0.1 kgf/cm$^2$, 1.5 psi) for every 10°C (50°F) drop in the ambient temperature).

  Therefore, the tire pressure warning system is more likely to indicate a warning if the tire pressures are not adjusted appropriately. If the daily temperature variation is large, pressurize the tires high so that the tire pressures are suitable under cold conditions. As a result, incorrect tire pressure warning operation should decrease.

3. IN CASE OF TIRE AND WHEEL REPLACEMENT

(a) When tires and wheels are replaced, always ensure that each transmitter ID is correctly registered.

(b) Before removing the tires from the disc wheels or reinstalling the tires to the disc wheels, be sure to follow the correct procedures for removal and installation of the tire pressure warning valve and transmitter. Failure to do so may cause the tire pressure warning valve and transmitters to break INFO.

4. INITIALIZATION PRECAUTION

(a) Initialize the tire pressure warning system after any of the following is performed:

- Replacing the tire pressure warning ECU and/or the tire pressure warning valve and transmitter
- When rotating tires on vehicles with differing front and rear tire inflation pressures

HINT:

The tire pressure warning system will not operate properly if it is not initialized INFO.

5. FAIL-SAFE FUNCTION

(a) When a system malfunction occurs in the tire pressure warning system, the tire pressure warning light and master warning light comes on after blinking for 1 minute to informs the driver of the system failure.

(b) The result of this diagnosis is stored in the tire pressure warning ECU.

6. CHECK TIRE PRESSURE AFTER REPAIRS

(a) After repairs confirm that the actual tire pressures are displayed in the Data List INFO.

7. REMOVAL AND INSTALLATION OF TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) When installing a tire, make sure that the tire pressure warning valve and transmitter does not interfere with the tire bead in order to prevent damage to the tire pressure warning valve and transmitter.

(b) After completing the operation, remove the valve core to rapidly release the air in the tire and check that the warning light comes on. If the warning light does not come on, the system may be defective.

(c) If there is air leakage, tighten the nut to a torque of 4.0 N*m (41 kgf*cm, 35 in.*lbf) and push the valve core 2 or 3 times to remove any dirt attached to the valve core. If air continues to leak, replace the grommet, washer, and nut.

(d) When installing the tire pressure warning valve and transmitter, make sure that the rim, grommet, washer, and nut are clean. Use a manufacturer-specified valve cap.

(e) When putting air into the tire, first install the tire pressure valve straight onto the stem of the tire pressure warning valve and transmitter.

8. TIRE AND WHEEL REPLACEMENT

(a) To prevent damage to the tire pressure warning valve and transmitter, drop the tire pressure warning valve and transmitter into the tire whenever removing the tire from the wheel.

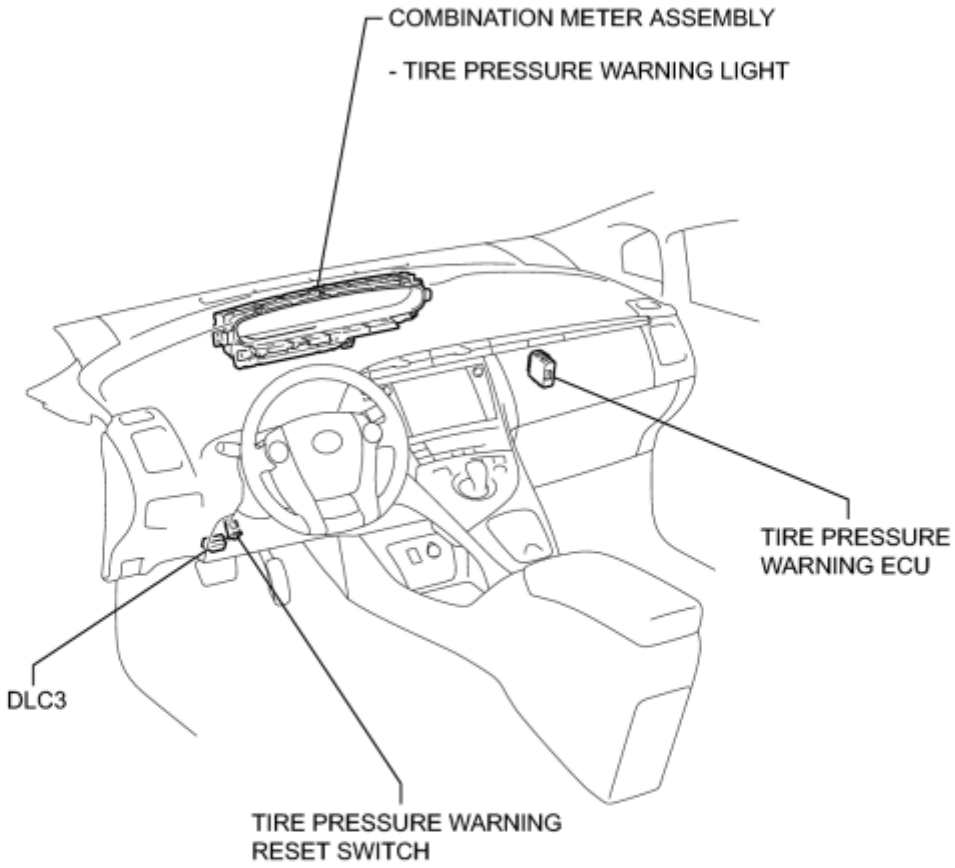
NOTICE:

Always use a new grommet, washer and nut when installing the tire pressure warning valve and transmitter.

(b) If tires and wheels are replaced, register the transmitter IDs INFO.

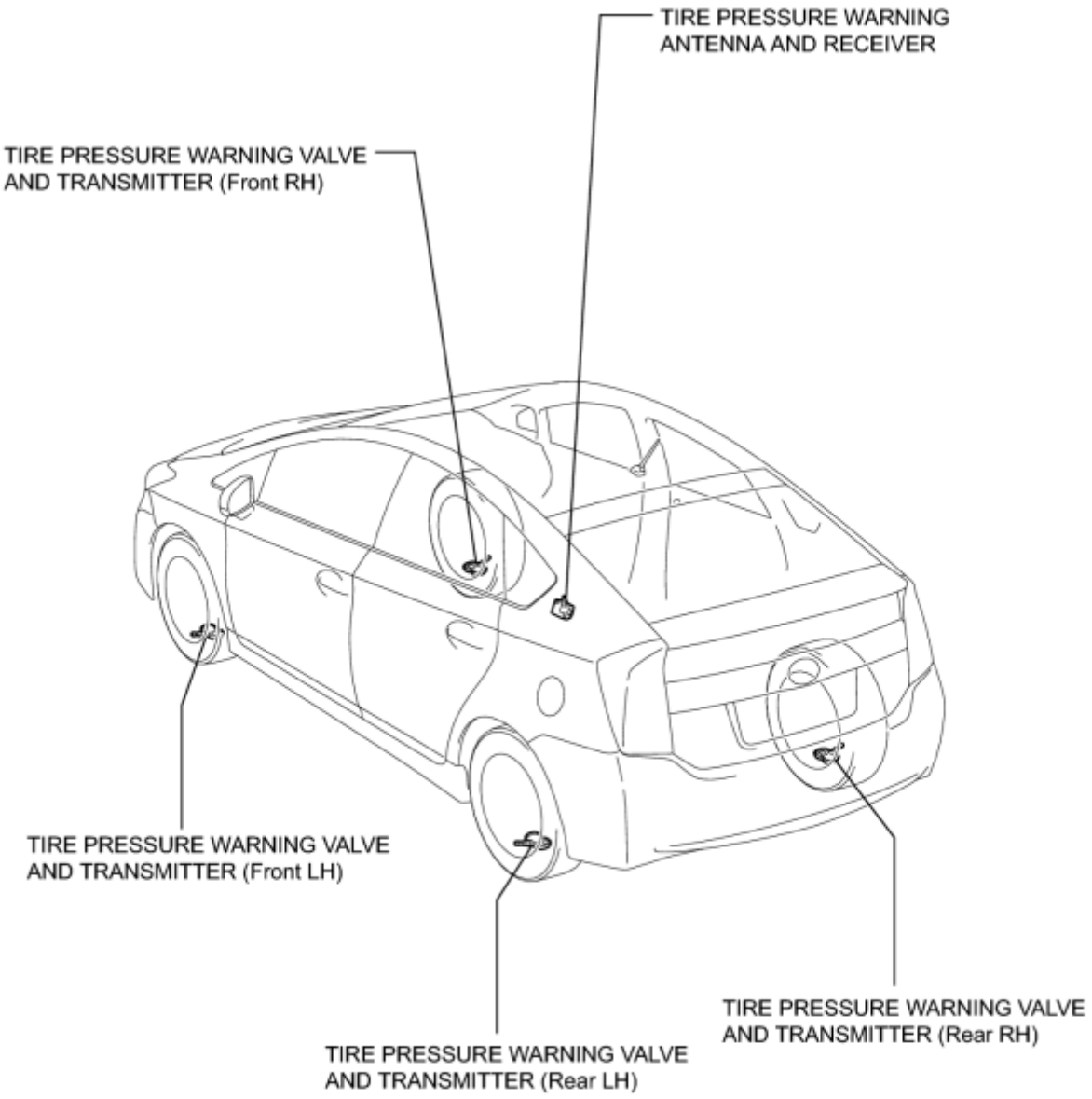
# PARTS LOCATION

# ILLUSTRATION



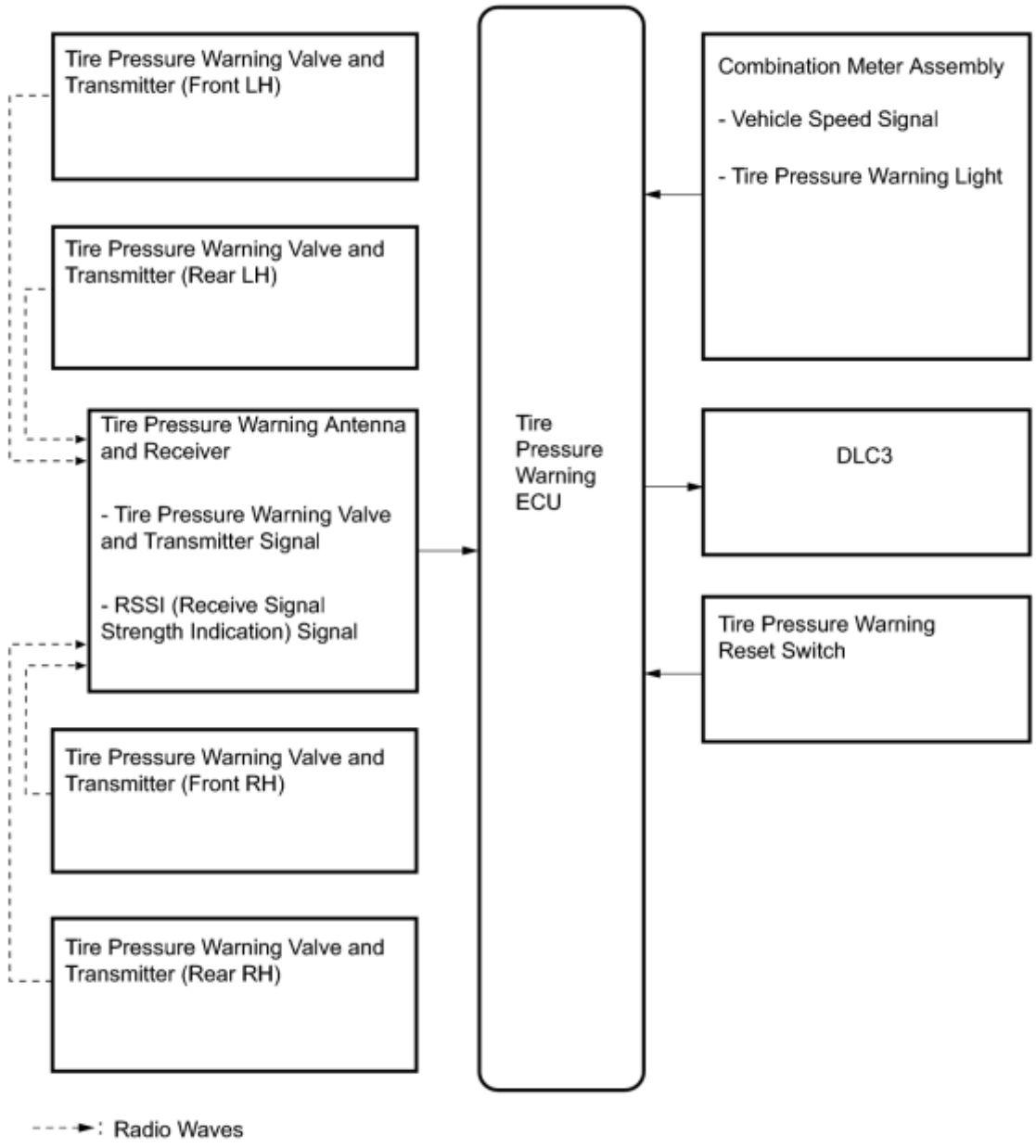

P

# ILLUSTRATION


TIRE PRESSURE WARNING
ANTENNA AND RECEIVER
TIRE PRESSURE WARNING VALVE
AND TRANSMITTER (Front RH)
TIRE PRESSURE WARNING VALVE
AND TRANSMITTER (Front LH)
TIRE PRESSURE WARNING VALVE
AND TRANSMITTER (Rear LH)
TIRE PRESSURE WARNING VALVE
AND TRANSMITTER (Rear RH)

P

# SYSTEM DIAGRAM



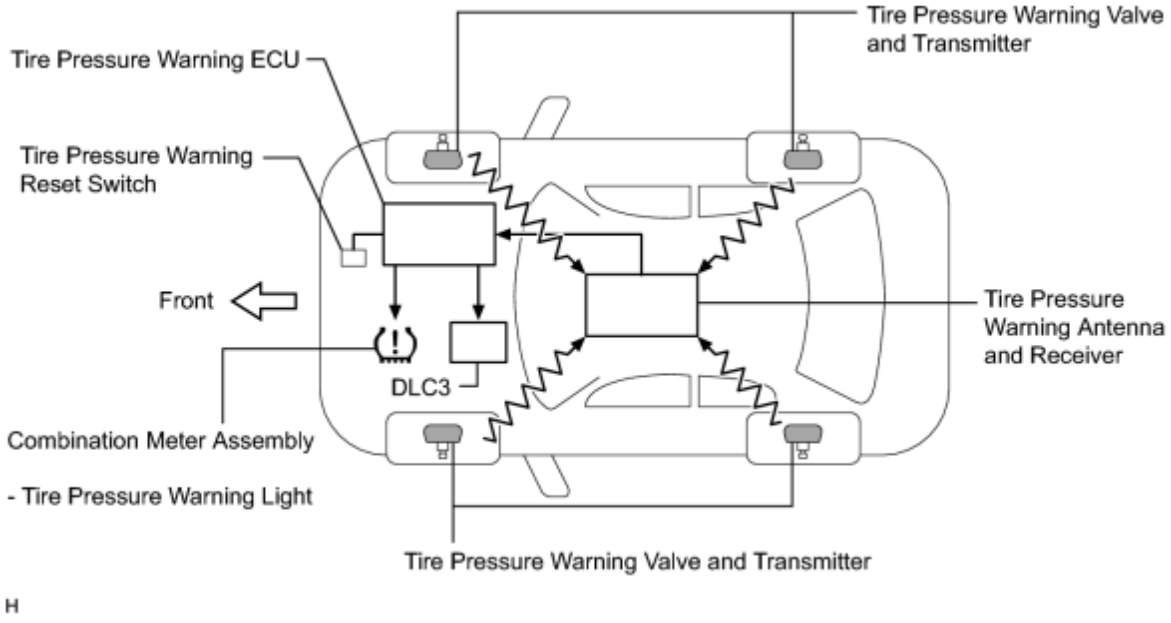

HINT:

Each tire pressure warning valve and transmitter sends information on the temperature inside the tire, the transmitter ID, and the tire pressure.

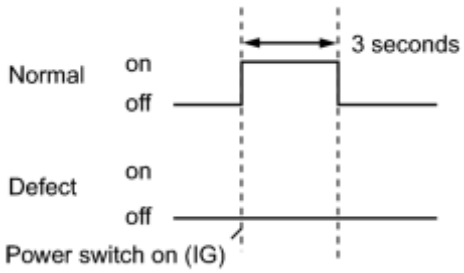
# SYSTEM DESCRIPTION

1. DESCRIPTION OF SYSTEM

(a) A tire pressure warning valve and transmitter is equipped with a tire pressure sensor and a transmitter and is installed in each tire and wheel assembly. The sensor measures the tire pressure. The measured value and transmitter ID are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU from the tire pressure warning antenna and receiver. If the transmitter ID has already been registered, the ECU compares the measured air pressure value with the standard value. When the value is less than the standard value registered in the tire pressure warning ECU, the warning light on the combination meter comes on. The tire pressure warning reset switch addresses the differences in the air pressure settings by the type of tires.




2. INITIAL CHECK




(a) After the power switch is turned to on (IG), the tire pressure warning light comes on for 3 seconds and then go off.

HINT:

If the warning light does not come on for 3 seconds, troubleshoot the tire pressure warning light circuit INFO.

3. WHEN TIRE PRESSURE WARNING LIGHT IS LIT

(a) When the tire pressure warning light does not go off, or when it comes on during driving, check the tire pressure. If the tire pressure warning light comes on within several hours of adjusting the tire pressure, the tire may have a slow air leak.

(b) Under the following conditions, the system may not function properly:

(1) The system will be disabled in the following conditions:

(When the condition becomes normal, the system will work properly.)

- If tires not equipped with the tire pressure warning valve and transmitters are used.
- If the ID code on the tire pressure warning valve and transmitters is not registered in the tire pressure warning ECU.
- If the tire inflation pressure is absolute pressure: 600 kPa (6.0 kgf/cm$^2$, 87 psi) or more; relative pressure: 500 kPa (5.0 kgf/cm$^2$, 73 psi) or more.
- If the tire pressure warning valve and transmitter battery voltage drops. (battery life: 10 years)

(2) The system may be disabled in the following conditions:

(When the condition becomes normal, the system will work properly.)

- If electronic devices or facilities using similar radio wave frequencies are nearby.
- If a radio set at similar frequencies is in used in the vehicle.
- If a window tint that affects the radio wave signal is installed.
- If there is a lot of snow or ice on the vehicle, in particular around the wheels or wheel housings.
- If non-genuine wheels are used.
- If tire chains are used.

(c) After removing and installing the ECU or a sensor, check for a diagnostic trouble code and verify that it is a normal system code.

4. FUNCTION OF COMPONENTS

| Components | Function |
|---|---|
| Tire pressure warning valve and transmitter | Combined as a single unit with a disc wheel air valve, it measures tire pressure and temperature and transmits an ID number for measurement value and identification. Built-in the battery. |
| Tire pressure warning antenna and receiver | Receives and transmits a necessary signal from the transmitters to the tire pressure warning ECU. |
| Tire pressure warning ECU | Receives a signal from the receiver and identifies it as vehicle's own signal. If the measured value is equal to or lower than the specified value, it transmits a signal to illuminate the tire pressure warning light on the combination meter. |
| Tire pressure warning light | Located in the combination meter, it informs the driver of lowered tire pressure and system failure. |
| Tire pressure warning reset switch | Allows entering initialization mode for when the standard pressure is changed |

5. TIRE PRESSURE WARNING RESET SWITCH

- By operating the tire pressure warning reset switch, the tire pressure warning ECU can be set to issue a warning at an inflation pressure that corresponds to the standard pressure of tires.

Therefore, the warning threshold must be set to the proper value in order to comply with the local regulations.

- Operate the tire pressure warning reset switch only after the inflation pressures of all tires have been adjusted on the vehicle.
- To initialize the system, press and hold the tire pressure warning reset switch for 3 seconds or longer with the power switch on (IG). When the system receives the initialization signal, the warning light blinks 3 times (1 second on, 1 second off).
- During initialization, the tire pressure warning valve and transmitter measures the inflation pressure of the tire, and registers the signals that are transmitted into the tire pressure warning ECU at a frequency of once per minute. The initialization process is completed when signals from all the tires have been received. It takes a few minutes.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedures to troubleshoot the tire pressure warning system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

(a) Interview the customer to confirm the trouble.

HINT:

It is important to collect as much specific information as possible from the customer to allow for a quick repair.

NEXT

| | |
|---|---|
| 3. | ADJUST TIRE PRESSURE* |

(a) Turn the power switch off.

(b) Set the all tire pressure to the specified value INFO.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Read the "ID Tire Inflation Pressure" values.

(g) Check the Data List INFO.

HINT:

- It takes about 2 or 3 minutes to display the updated tire pressure data.
- If the problem is that the tire pressure decreases, wait until all of the tire pressure data is received by the ECU. If the data is received, the tire pressure warning light will go off.

Result:

| Condition | Proceed to |
|---|---|
| Tire pressure warning light goes off | A |
| Tire pressure warning light remains on | B |

A GO TO STEP 9

B

| | |
|---|---|
| 4. | CHECK FOR DTC* |

(a) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is output | A |
| DTC is not output | B |

B GO TO STEP 6

A

| | |
|---|---|
| 5. | DTC CHART |

(a) Refer to Diagnostic Trouble Code Chart INFO.

NEXT **GO TO STEP 7**

| | |
|---|---|
| 6. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

NEXT

| | |
|---|---|
| 7. | CIRCUIT INSPECTION* |

(a) Refer to Electronic Circuit Inspection Procedure INFO.

NEXT

| | |
|---|---|
| 8. | REPAIR OR REPLACE |

(a) Repair or replace parts based on the diagnosis result.

NEXT

| | |
|---|---|
| 9. | CONFIRMATION TEST* |

(a) Check the Data List to confirm that the tire inflation pressure has been received INFO.

(b) Perform initialization INFO.

(c) Confirm that the initialization has been completed.

# REGISTRATION

1. DESCRIPTION OF CODE REGISTRATION

It is necessary to register the transmitter ID in the tire pressure warning ECU when replacing the tire pressure warning valve and transmitter and/or tire pressure warning ECU.

Prepare all transmitter ID data before starting registration.

(a) Before registration

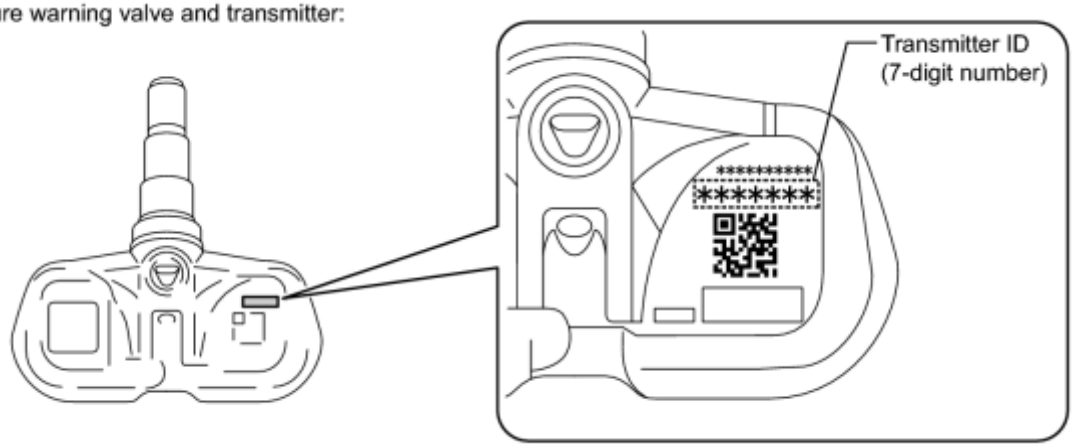
(1) When replacing the tire pressure warning ECU:

- Read the registered transmitter IDs that are stored in the old ECU using the Techstream and note them down.
- If reading stored transmitter IDs is impossible due to malfunctions of components such as the tire pressure warning antenna and receiver, remove the tires from the wheels and check the IDs located on the tire pressure warning valve and transmitters INFO.

(2) When replacing a tire pressure warning valve and transmitter:

- Take note of the 7-digit number (transmitter ID) written on the tire pressure warning valve and transmitter.

Tire pressure warning valve and transmitter:




H

NOTICE:

- The transmitter ID is written on the tire pressure warning valve and transmitter. It will be unable to be read after installing the tire pressure warning valve and transmitter on the tire and wheel. Therefore, take a note of the transmitter ID before installing the tire pressure warning valve and transmitter.
- The ID registration must be performed for all tire pressure warning valve and transmitters. Check the Data List, replace the exchanged ID with a new ID, and make a new DATA LIST of all 4 tires for the vehicle.

2. REGISTER TRANSMITTER ID (Using Techstream)

(a) Set the all tire pressure to the specified value INFO.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Utility / ID Registration.

(g) Perform the following procedures displayed on the screen.

(h) Confirmation of transmitter ID registration.

(1) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(2) Read the "ID Tire Inflation Pressure" values.

(3) Confirm that the data of tire pressure of all tires are displayed on the Techstream.

NOTICE:

- It takes about 2 or 3 minutes to display the updated tire pressure data. If the values are not displayed after a few minutes, perform troubleshooting according to the inspection procedure for DTCs C2121/21 to C2124/24 INFO.
- If the IDs have not been registered, DTC C2171/71 is set in the tire pressure warning ECU after 3 minutes or more.
- If normal pressure values are displayed, the IDs have been registration correctly.
- If the tire pressure values are not displayed after a few minutes, the IDs may be incorrect or the system may have a malfunction.
- After all IDs are registered, DTC C2126/26 (Transmitter ID not Received) is set in the tire pressure warning ECU and the tire pressure warning light blinks for 1 minute and then comes on. When the tire pressure warning ECU successfully receives radio waves from all the transmitters whose IDs are stored in the ECU, DTC C2126/26 is deleted and the tire pressure warning light goes off.

# INITIALIZATION

1. DESCRIPTION OF INITIALIZATION

(a) Perform initialization in the following cases:

- Before delivery of a new vehicle.
- After replacement of the tire pressure warning ECU*.
- After replacement of any of the tire pressure warning valve and transmitters*.

*: Perform initialization after the transmitter ID registration is completed INFO.

(b) Before initialization

(1) Set the all tire pressure to the specified value INFO.

NOTICE:

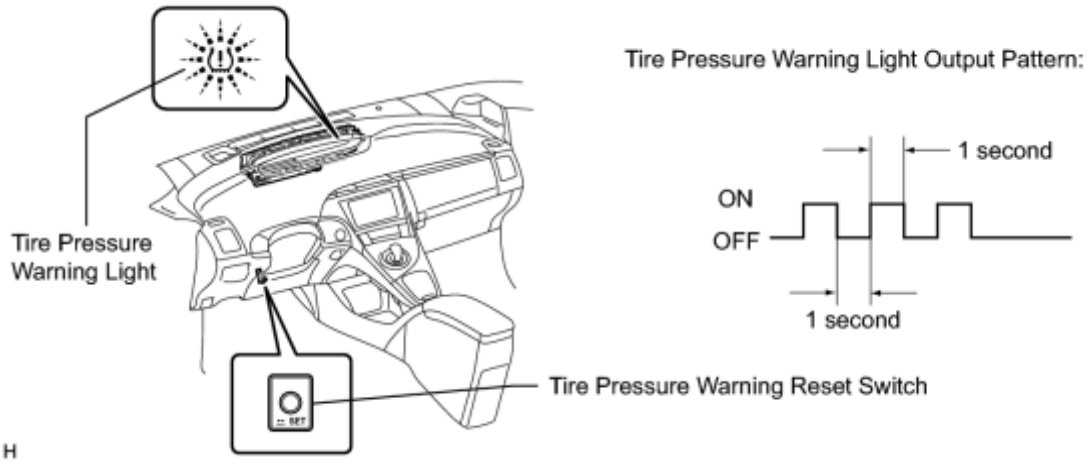
Make sure the tires are cooled down.

2. INITIALIZATION PROCEDURE

(a) Adjust all tire (except spare tire) to the standard tire inflation pressure, as indicated on the tire and loading information label on the vehicle.

(b) Turn the power switch on (IG).

(c) Push and hold the tire pressure warning reset switch for 3 seconds or more so that the tire pressure warning light blinks 3 times.




(d) Turn the power switch off.

(e) Connect the Techstream to the DLC3.

(f) Turn the power switch on (IG).

(g) Turn the Techstream on.

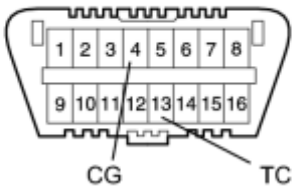
(h) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(i) Check that the initialization has been completed.

(j) Confirm that the tire pressure data of all wheels are displayed on the Techstream.

- The initialization is normally completed within 2 or 3 minutes.
- If the initialization has not been completed successfully, DTC C2177/77 is set after a vehicle speed 8 km/h (5 mph) or more continues for 20 minutes or more.
- The initialization can be terminated by connecting terminals TC and CG of the DLC3.

Front View of DLC3:




T

# Tire Pressure Monitor

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| | | | |
|---|---|---|---|
| | pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | | |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

- The initialization is completed when the "ID Tire Information Pressure" display shows the correct pressures.
- *: It may take about 2 or 3 minutes until the values are displayed. If the values are not displayed after a few minutes, perform troubleshooting according to the inspection procedure for DTCs C2121/21 to C2124/24 INFO.

# TEST MODE PROCEDURE

1. ENTER TEST MODE

HINT:

- Operation of the tire pressure warning reset switch can be checked in TEST MODE.
- During TEST MODE, the system is not initialized by pushing the tire pressure warning reset switch. The circuit of the tire pressure warning reset switch can be inspected during this mode.

(a) Turn the power switch off.

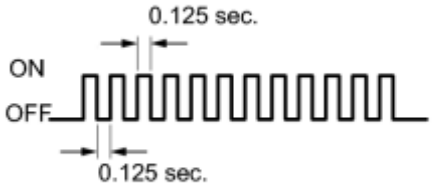
(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Check that the tire pressure warning light comes on for 3 seconds and then goes off.

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Utility / Signal Check.




(g) Confirm that the tire pressure warning light in the combination meter blinks at 0.125 second intervals.

P

2. PERFORM SIGNAL CHECK

HINT:

- When entering signal check mode, the tire pressure warning ECU sets all the signal check DTCs first.

  After completing signal check for each inspection item, the DTCs for systems that are determined to be normal by the tire pressure warning ECU will be cleared.

  The DTCs for other inspection items may not be cleared when only a certain signal is inspected.

- When signal check returns to normal mode, all the signal check DTCs will be cleared.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Utility / Signal Check.

HINT:

Every time the test mode DTC clear conditions are satisfied, the tire pressure warning light comes on for 1 second. Then, the tire pressure warning light blinks at 0.125 second intervals.

(f) Turn the power switch on (IG) and wait for 3 seconds or more to check the RSSI signal (C2196/96).

(g) Drive the vehicle at 20 km/h (12 mph) or more for 3 seconds or more to check the vehicle speed signal (C2191/91).

(h) Loosen the valve core and rapidly reduce the pressure (at least 40 kPa (0.4 $kg/cm^2$, 5.8 psi) within 30 seconds or more) to check the transmitter data (C2181/81 to C2184/84).

HINT:

The transmitter ID can be transmitted by rapidly reducing the tire pressure.

(i) Check that the tire pressure warning system test mode DTCs are cleared.

| Test Mode DTC | Test Signal | Test Mode DTC Clear Condition |
|---|---|---|
| C2181/81 to C2184/84 | Transmitter Data | Data is received from the transmitter which has a registered ID in the tire pressure warning ECU |
| C2191/91 | Vehicle Speed Signal | Vehicle speed of 20 km/h (12 mph) or more is detected for 3 seconds or more |
| C2196/96 | RSSI Signal | RSSI signal between 49 mV and 4.95 V is received for 3 seconds or more |

(j) Check the tire pressure warning reset switch.

(1) Press the tire pressure warning reset switch.

(2) Check the tire pressure warning light.

| Test Signal | Normal Condition |
|---|---|
| Tire Pressure Warning Reset Switch | • Switch ON: Tire pressure warning light comes on<br>• Switch OFF: Tire pressure warning light blinks at 0.125 sec. intervals |

(k) Result

HINT:

After the signal check is completed, check for a signal check DTC to confirm the system status.

| Condition | Procedure |
|---|---|
| Test mode DTC is output | Repair the faulty part and enter SIGNAL CHECK again |
| Test mode DTCs are cleared | No problem |

(l) End of SIGNAL CHECK

(1) After completing the test mode (SIGNAL CHECK), turn the power switch off and disconnect the Techstream.

(m) DTC of SIGNAL CHECK (TEST DIAGNOSIS)

(1) If a trouble code is displayed during the test mode DTC check, check the circuit listed for that code. For details of each code, refer to the "See Procedure" below.

| DTC No. | Detection Item | Trouble Area | See Procedure |
|---|---|---|---|
| C2181/81 | Transmitter ID1 not received | • Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU | INFO |
| C2182/82 | Transmitter ID2 not received | • Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU | INFO |
| C2183/83 | Transmitter ID3 not received | • Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU | INFO |
| C2184/84 | Transmitter ID4 not received | • Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU | INFO |
| C2191/91 | Vehicle speed signal error | • Vehicle speed sensor<br>• Combination meter assembly<br>• Wire harness or connector<br>• Tire pressure warning ECU | INFO |
| C2196/96 | RSSI signal error | • Tire pressure warning antenna and receiver<br>• Harness or connector<br>• Tire pressure warning ECU | INFO |

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Tire Pressure Warning System*

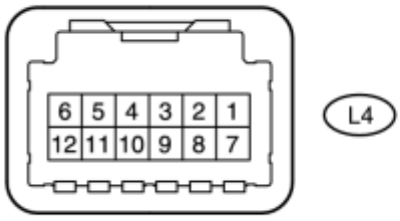
| Symptom | Suspected Area | See page |
|---|---|---|
| Tire pressure warning light does not illuminate, despite tire pressure decreasing | Initialization | INFO |
| | Check Data List (ID Tire Inflation Pressure) | INFO |
| | ID code check (Registration) | INFO |
| Tire pressure warning light remains illuminated (Goes off during initial check) | ECU power source circuit | INFO |
| | Tire pressure warning light circuit | INFO |
| Tire pressure warning light remains illuminated (Comes on during initial check) | Check Data List (ID Tire inflation pressure) | INFO |
| | Tire pressure warning light circuit | INFO |
| | ID code check (Registration) | INFO |
| | Initialization | INFO |
| Initialization cannot be done | Tire pressure warning reset switch | INFO |
| DTC check cannot be done | ECU power source circuit | INFO |
| | TC and CG terminal circuit | INFO |

# TERMINALS OF ECU

1. CHECK TIRE PRESSURE WARNING ECU

HINT:

Inspect the connectors from the back side while the connectors are connected.




P

(a) Disconnect the R2 tire pressure warning antenna and receiver connector.

(b) Measure the voltage according to the value(s) in the table below.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L4-12 (RDA) - Body ground | B - Body ground | Tire pressure warning antenna and receiver signal | Power switch on (IG) | 11 to 14 V |

(c) Connect the R2 tire pressure warning antenna and receiver connector.

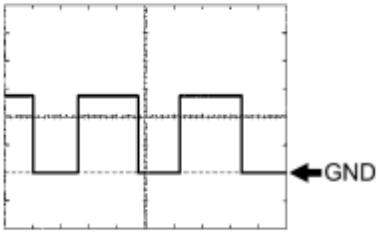
(d) Measure the voltage and resistance according to the value(s) in the table below. If the result is not as specified, the ECU may have a malfunction.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L4-1 (CLSW) - Body ground | Y -Body ground | Tire pressure warning reset switch | • Power switch on (IG)<br>• Tire pressure warning reset switch ON | 8.5 to 15 V |
| | | | • Power switch on (IG)<br>• Tire pressure warning reset switch OFF | Below 1.5 V |
| L4-2 (SPD) - Body ground | V - Body ground | Vehicle speed signal | Vehicle running | Pulse generation (see waveform 1) |
| L4-3 (TC) - Body ground | L - Body ground | TC terminal | Terminal TC not connected | 11 to 14 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L4-4 (TACH) - Body ground | L - Body ground | RSSI (receive signal strength indication) signal | Power switch on (IG) | Pulse generation (see waveform 2) |
| L4-5 (IND) - Body ground | G - Body ground | Tire pressure warning light output signal | • Power switch on (IG)<br>• Tire pressure warning light OFF | Below 0.5 V |
| | | Tire pressure warning reset switch | After turning power switch on (IG), tire pressure warning light illuminates for 3 seconds | 0.9 to 3.2 V |
| L4-6 (RF5V) - Body ground | R - Body ground | Tire pressure warning antenna and receiver power source | Power switch on (IG) | 11 to 14 V |
| L4-7 (IG) - Body ground | B - Body ground | IG power source | Power switch on (IG) | 11 to 14 V |
| L4-9 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| L4-10 (SIL) - Body ground | P - Body ground | Diagnostic communication | Power switch on (IG) | 8 to 14 V |
| L4-11 (GND2) - Body ground | G - Body ground | Tire pressure warning antenna and receiver ground | Always | Below 1 Ω |

(e) Using an oscilloscope, check the waveform 1.

# Waveform 1:




P

| Item | Contents |
|---|---|
| Terminal | L4-2 (SPD) - Body ground |
| Tool setting | 5 V/DIV, 20 ms./DIV. |
| Vehicle condition | Driving at approximately 20 km/h (12 mph) |

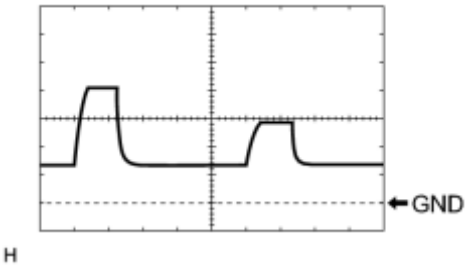
HINT:

The wavelength becomes shorter as the vehicle speed increases.

(f) Using an oscilloscope, check the waveform 2.

# Waveform 2:

| Item | Contents |
|---|---|
| Terminal | L4-4 (TACH) - Body ground |
| Tool setting | 0.5 V/DIV., 10 ms./DIV. |




| | |
|---|---|
| Vehicle condition | Power switch on (IG) |

HINT:

The shape of waves like figure appears approximately 2 times every 3 minutes.

# DIAGNOSIS SYSTEM

1. CHECK BATTERY VOLTAGE

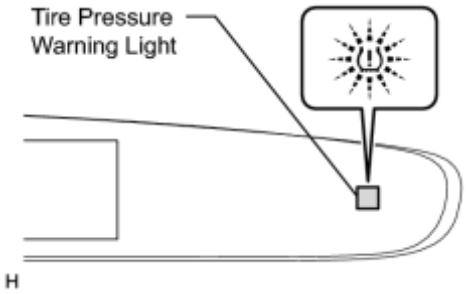
Standard voltage:

11 to 14 V

If the voltage is below 11 V, recharge the battery before proceeding to the next step.

2. CHECK DLC3 INFO

3. DIAGNOSIS SYSTEM




(a) Warning light

(1) When there is a problem with the tire pressure warning system, the tire pressure warning light blinks at 0.5 second intervals, and comes on after 1 minute.

NOTICE:

When the malfunction has been corrected, the tire pressure warning light does not come on.

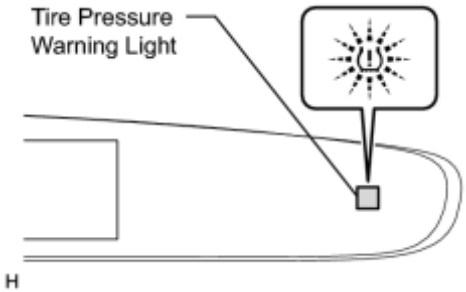
(b) DTCs (Normal mode)

(1) DTCs are memorized in the tire pressure warning ECU and read by the blinks of the tire pressure warning light or by using the Techstream INFO.

(c) Test mode

(1) By switching from normal mode into test mode (input signal check), you can inspect the tire pressure warning antenna and receiver, each tire pressure warning valve and transmitter, RSSI signal and vehicle speed sensor INFO.

4. CHECK TIRE PRESSURE WARNING LIGHT




(a) Turn the power switch on (IG).

(b) Check that the tire pressure warning light comes on for 3 seconds.

If the warning check result is not normal, proceed to troubleshooting for the tire pressure warning light circuit INFO.

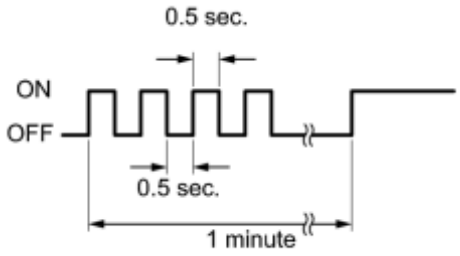
5. TIRE PRESSURE WARNING LIGHT CHART

HINT:

The table below indicates the state of the tire pressure warning light after the power switch is turned on (IG).

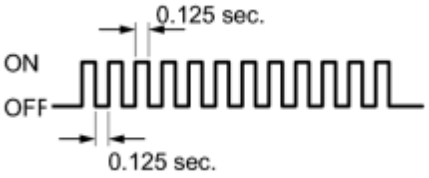
| | Immediately after turning the power switch on(IG) | Always | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | Warning light output pattern | | | | | | |
| | Comes on for 3 sec. | Goes off | Comes on | Blinks for 1 minute and then illuminates*1 | Blinks*2 | Blinks*3 | Blinks*4 | Outputs DTC |
| Normal | ○ | ○ | - | - | - | - | - | - |
| Low tire pressure | ○ | - | ○ | - | - | - | - | - |
| System fail | ○ | - | - | ○ | - | - | - | - |
| Test mode | ○ | - | - | - | ○ | - | - | - |
| Initialization | ○ | - | - | - | - | ○ | - | - |
| ECU connector poorly connected | - | - | - | ○ *5 | - | - | - | - |
| TC ground (DTC is output) | ○ | - | - | - | - | - | - | ○ |
| TC ground (DTC is not output) | ○ | - | - | - | - | - | ○ | - |

- *1: Comes on and goes off repeatedly at 0.5 second intervals, and stays on after 1 minute.



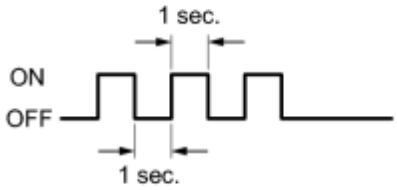

P

- *2: Comes on and goes off repeatedly at 0.125 second intervals.



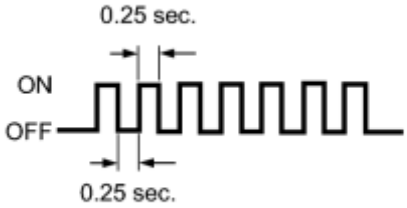

P

- *3: Blinks 3 times (1 second on, 1 second off).

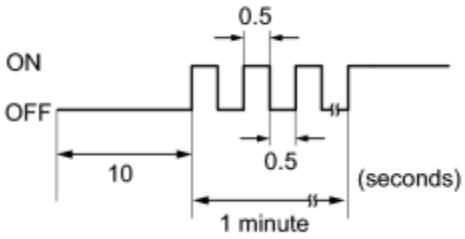



P

- *4: Comes on and goes off repeatedly at 0.25 second intervals.



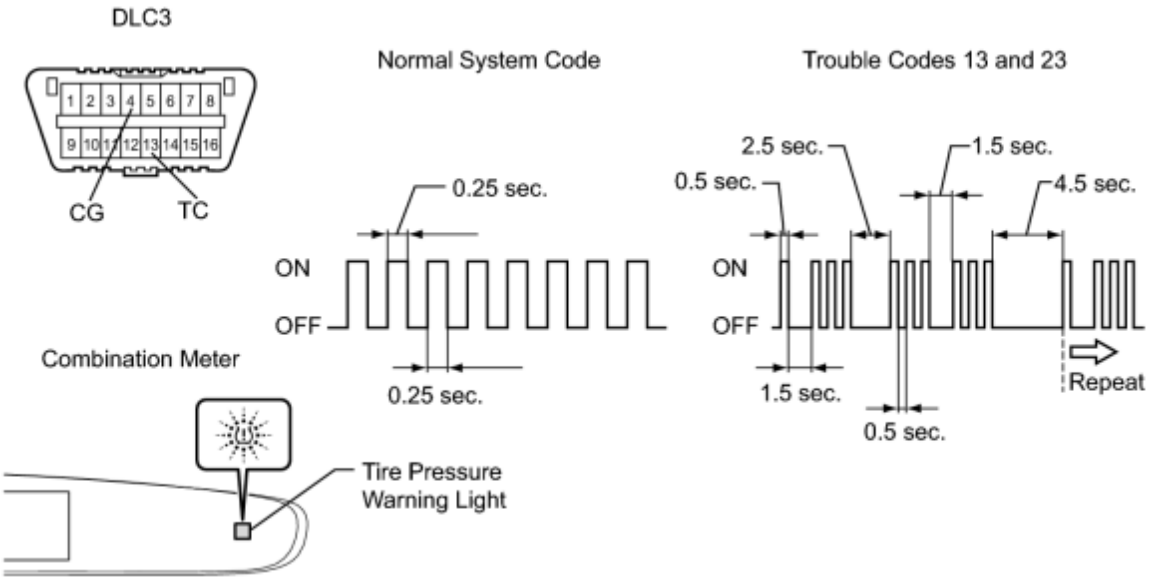

- *5: When determining if there is a short circuit (10 seconds), the light goes off. Then it blinks at 0.5 second intervals, and stays on after 1 minute.



# DTC CHECK / CLEAR

1. DTC CHECK (USING SST CHECK WIRE)

(a) Turn the power switch off.




(b) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

SST: 09843-18040

(c) Turn the power switch on (IG).

(d) Read and record any DTCs from the tire pressure warning light on the combination meter. Refer to the illustration as examples of the normal system code and codes 13 and 23.

HINT:

- If the tire pressure warning light does not indicate any DTCs or the normal system code, inspect the tire pressure warning light circuit or TC and CG terminal circuit.

| Trouble Area | See Procedure |
|---|---|
| Tire pressure warning light circuit | INFO |
| TC and CG terminal circuit | INFO |

- If 2 or more malfunctions are indicated at the same time, the lowest numbered DTC is displayed first.

(e) Refer to Diagnostic Trouble Code Chart INFO for DTC information.

(f) After completing the check, turn the power switch off and remove SST from the DLC3.

SST: 09843-18040

2. DTC CHECK (USING TECHSTREAM)

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Trouble Codes.

(f) Read the DTCs following the prompts on the Techstream.

HINT:

Refer to the Techstream operator's manual for further details.

3. CLEAR DTC

HINT:

After repairing the malfunctions, clear the DTCs.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Trouble Codes.

(f) Clear the DTCs following prompts on the Techstream.

HINT:

Refer to the Techstream operator's manual for further details.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) According to the display on the Techstream, read the Data List.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Mode Status | Tire pressure warning system mode/<br><br>NORMAL or TEST | NORMAL: Normal mode<br><br>TEST: Test mode | - |
| Main Tire | Number of main tire ID to be registered/<br><br>0 or 1 or 2 or 3 or 4 | 0 to 4 displayed | - |
| Vehicle Speed | Vehicle speed reading/<br><br>min.: 0 km/h (0 mph), max.: 255 km/h (158 mph) | Actual vehicle speed | Speed indicated on the combination meter |
| Registered ID1 Code | Registered ID1 code/<br><br>min.: 0, max.: FFFFFFF*1 | ID No. registered in transmitter ID1 displayed | - |
| Registered ID2 Code | Registered ID2 code/ | ID No. registered in transmitter ID2 | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | min.: 0, max.: FFFFFFF*1 | displayed | |
| Registered ID3 Code | Registered ID3 code/<br><br>min.: 0, max.: FFFFFFF*1 | ID No. registered in transmitter ID3 displayed | - |
| Registered ID4 Code | Registered ID4 code/<br><br>min.: 0, max.: FFFFFFF*1 | ID No. registered in transmitter ID4 displayed | - |
| ID Transmission Status | ID code transmission status/<br><br>FINISH or NOW | FINISH or NOW | - |
| Initialization Switch | Tire pressure warning reset switch/<br><br>ON, OFF | ON: Switch on<br><br>OFF: Switch off | - |
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.*2 |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.*2 |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.*2 |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | kgf/cm$^2$, 78 psi) | | |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.*2 |
| ID1 Temperature in Tire | ID1 temperature in tire/<br><br>min.: -40°C (-40°F), max.: 215°C (419°F) | Actual tire temperature | If -40°C (-40°F) is displayed, data has not been received. |
| ID2 Temperature in Tire | ID2 temperature in tire/<br><br>min.: -40°C (-40°F), max.: 215°C (419°F) | Actual tire temperature | If -40°C (-40°F) is displayed, data has not been received. |
| ID3 Temperature in Tire | ID3 temperature in tire/<br><br>min.: -40°C (-40°F), max.: 215°C (419°F) | Actual tire temperature | If -40°C (-40°F) is displayed, data has not been received. |
| ID4 Temperature in Tire | ID4 temperature in tire/<br><br>min.: -40°C (-40°F), max.: 215°C (419°F) | Actual tire temperature | If -40°C (-40°F) is displayed, data has not been received. |
| ID1 Battery Voltage | ID1 battery voltage/OVER or LESS | OVER | - |
| ID2 Battery Voltage | ID2 battery voltage/OVER or LESS | OVER | - |
| ID3 Battery Voltage | ID3 battery voltage/OVER or LESS | OVER | - |
| ID4 Battery Voltage | ID4 battery voltage/OVER or LESS | OVER | - |
| Initialization Switch Info | Tire pressure warning reset switch setting information/<br><br>WITH or WITHOUT | WITH | - |
| ID1 Initial Threshold of Low-pressure | ID1 initial threshold of low-pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative | Tire pressure after initialization | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | | |
| ID2 Initial Threshold of Low-pressure | ID2 initial threshold of low-pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Tire pressure after initialization | - |
| ID3 Initial Threshold of Low-pressure | ID3 initial threshold of low-pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Tire pressure after initialization | - |
| ID4 Initial Threshold of Low-pressure | ID4 initial threshold of low-pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Tire pressure after initialization | - |
| Number of Trouble Code | Number of DTCs recorded/min.: 0, max.: 255 | Min.: 0, Max.: - | - |

HINT:

*1: Displayed only when the ID No. is not registered.

*2: It may take about 2 or 3 minutes until the values are displayed. If the values are not displayed after a few minutes, perform troubleshooting according to the inspection procedure for DTCs C2121/21 to C2124/24 INFO.

2. Active Test

Using the Techstream to perform Active Tests allows the relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in trouble shooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(f) Check the operation by referring to the table below.

***Combination Meter***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Tire Pressure Warning System | Tire pressure warning light | Tire pressure warning light OFF or ON | Confirm that the vehicle is stopped, engine idling |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is displayed during the DTC check, inspect the circuit listed for that code. For details of each code, refer to the relevant page listed under respective "DTC Code" in the DTC chart.

### *Tire Pressure Warning System*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| C2111/11 | Transmitter ID1 Operation Stop | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2112/12 | Transmitter ID2 Operation Stop | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2113/13 | Transmitter ID3 Operation Stop | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2114/14 | Transmitter ID4 Operation Stop | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2121/21 | No Signal from Transmitter ID1 | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2122/22 | No Signal from Transmitter ID2 | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2123/23 | No Signal from Transmitter ID3 | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | |
| C2124/24 | No Signal from Transmitter ID4 | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2126/26 | Transmitter ID not Received in Main Mode | 1. ID registration failure<br><br>2. Tire pressure warning valve and transmitter<br><br>3. Tire pressure warning antenna and receiver<br><br>4. Wire harness or connector<br><br>5. Tire pressure warning ECU | INFO |
| C2141/41 | Transmitter ID1 Error | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2142/42 | Transmitter ID2 Error | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2143/43 | Transmitter ID3 Error | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2144/44 | Transmitter ID4 Error | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning ECU | INFO |
| C2165/65 | Abnormal Temperature Inside ID1 Tire | 1. Tires<br><br>2. Tire pressure warning valve and transmitter | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | 3. Tire pressure warning ECU | |
| C2166/66 | Abnormal Temperature Inside ID2 Tire | 1. Tires<br><br>2. Tire pressure warning valve and transmitter<br><br>3. Tire pressure warning ECU | INFO |
| C2167/67 | Abnormal Temperature Inside ID3 Tire | 1. Tires<br><br>2. Tire pressure warning valve and transmitter<br><br>3. Tire pressure warning ECU | INFO |
| C2168/68 | Abnormal Temperature Inside ID4 Tire | 1. Tires<br><br>2. Tire pressure warning valve and transmitter<br><br>3. Tire pressure warning ECU | INFO |
| C2171/71 | Transmitter ID not Registered | Tire pressure warning ECU | INFO |
| C2175/75 | Vehicle Speed or RSSI Signal Error | 1. Combination meter<br><br>2. Tire pressure warning valve and transmitter<br><br>3. Tire pressure warning antenna and receiver<br><br>4. Wire harness or connector<br><br>5. Tire pressure warning ECU | INFO |
| C2176/76 | Receiver Error | Tire pressure warning ECU | INFO |
| C2177/77 | Initialization not Completed | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2181/81 | Transmitter ID1 not Received (Test Mode DTC) | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | |
| C2182/82 | Transmitter ID2 not Received (Test Mode DTC) | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2183/83 | Transmitter ID3 not Received (Test Mode DTC) | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2184/84 | Transmitter ID4 not Received (Test Mode DTC) | 1. Tire pressure warning valve and transmitter<br><br>2. Tire pressure warning antenna and receiver<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2191/91 | Vehicle Speed Signal Error (Test Mode DTC) | 1. Vehicle speed sensor<br><br>2. Combination meter assembly<br><br>3. Wire harness or connector<br><br>4. Tire pressure warning ECU | INFO |
| C2196/96 | RSSI Signal Error (Test Mode DTC) | 1. Tire pressure warning antenna and receiver<br><br>2. Wire harness or connector<br><br>3. Tire pressure warning ECU | INFO |

| | | |
|---|---|---|
| DTC | C2111/11 | Transmitter ID1 Operation Stop |
| DTC | C2112/12 | Transmitter ID2 Operation Stop |
| DTC | C2113/13 | Transmitter ID3 Operation Stop |
| DTC | C2114/14 | Transmitter ID4 Operation Stop |

# DESCRIPTION

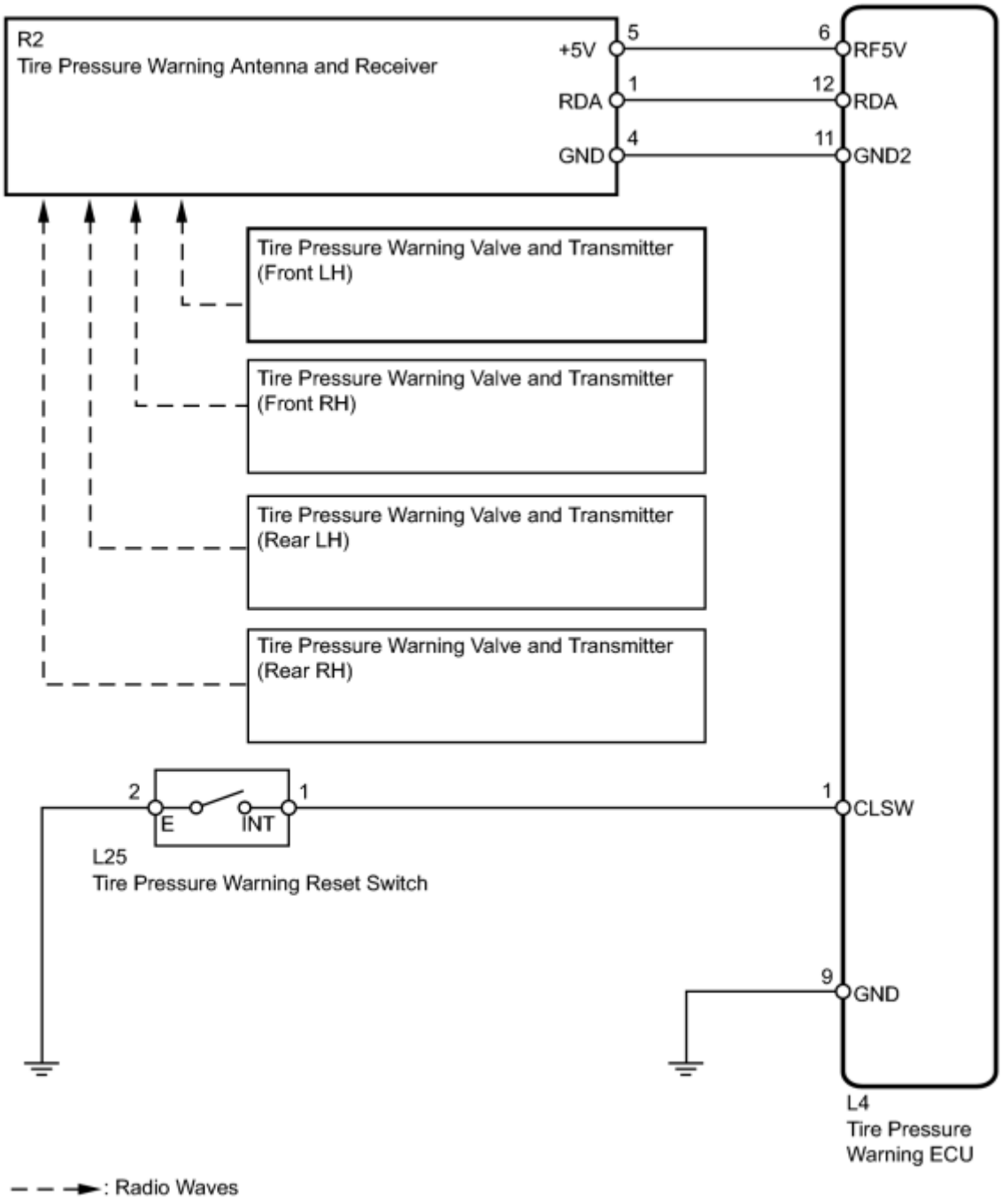
The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the tire pressures. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on. The tire pressure warning ECU stores a DTC when the tire pressure warning valve and transmitter stops transmitting signals. At this time, forcibly transmit the signals by releasing the tire pressure rapidly. The stored DTC is cleared when the signal transmission is resumed.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2111/11<br>C2112/12<br>C2113/13<br>C2114/14 | Tire pressure warning valve and transmitters stop transmitting signals | • Tire pressure warning valve and transmitter<br>• Tire pressure warning ECU |

HINT:

It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM FORCED TRANSMISSION OF TRANSMITTER ID OF ALL WHEELS |

(a) Set the tire pressure to the specified value INFO.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(g) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation | ID4 tire inflation pressure / | Actual tire inflation | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Pressure | min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | pressure | 14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

*: It may take about 2 or 3 minutes until the values are displayed. If the values are not displayed after a few minutes, perform troubleshooting according to the inspection procedure for DTCs C2121/21 to C2124/24 INFO.

(h) Rapidly release the tire pressure for each wheel at least 40 kPa (0.4 kgf/cm$^2$, 5.8 psi) within 30 seconds.

(1) Check that each tire pressure data displayed on the Techstream has changed.

OK:

Each tire pressure data displayed on the Techstream will change to the value of the tire pressure.

NOTICE:

- It takes about 2 or 3 minutes to display the updated tire pressure data.
- When the "ID Tire Inflation Pressure" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

(2) After confirming that all of the tire pressure data displayed on the Techstream have changed, set the tire pressure to the appropriate specified values.

HINT:

If the tire pressure data displayed on the Techstream has not changed after rechecking, inspect for another problem INFO.

NG ▶ GO TO TRANSMITTER AND RECEIVER INSPECTION PROCEDURE

OK ▶ **END**

| | | |
|---|---|---|
| DTC | C2121/21 | No Signal from Transmitter ID1 |
| DTC | C2122/22 | No Signal from Transmitter ID2 |
| DTC | C2123/23 | No Signal from Transmitter ID3 |
| DTC | C2124/24 | No Signal from Transmitter ID4 |
| DTC | C2181/81 | Transmitter ID1 not Received (Test Mode DTC) |
| DTC | C2182/82 | Transmitter ID2 not Received (Test Mode DTC) |
| DTC | C2183/83 | Transmitter ID3 not Received (Test Mode DTC) |
| DTC | C2184/84 | Transmitter ID4 not Received (Test Mode DTC) |

# DESCRIPTION

The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the tire pressures. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on.

The tire pressure warning valve and transmitters constantly send radio waves to the tire pressure warning antenna and receiver.

Under the conditions below, the tire pressure warning antenna and receiver is unable to receive the signals from the tire pressure warning valve and transmitters, and a DTC is stored.

- Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.
- Devices using similar radio frequencies are used in the vehicle.
- The ID of the tire pressure warning valve and transmitter is mistyped during registration.
- A tire/wheel/transmitter from a different vehicle is installed.

HINT:

When no transmitter ID is received from a tire pressure warning valve and transmitter for a total of 20 minutes while the vehicle speed is more than 8 km/h (5 mph) or no transmitter ID is received from all the tire pressure warning valve and transmitters for a total of 20 minutes, DTCs are set.

DTCs from C2121/21 to C2124/24 can only be cleared by using the Techstream. DTCs from C2181/81 to C2184/84 can be cleared when the transmitter in the tire pressure warning valve and transmitter sends a forced transmission signal or test mode ends. DTCs from C2181/81 to C2184/84 are output only in test mode.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2121/21<br><br>C2122/22<br><br>C2123/23<br><br>C2124/24 | Following condition (a) or (b) is met:<br><br>(a) When all conditions below are met:<br><br>• Tire pressure warning valve and transmitter is not in stop mode.<br>• Any transmitter ID is not received from tire pressure warning valve and transmitters. | • Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | • For 20 minutes or more, vehicle speed is more than 8 km/h (5 mph) or no vehicle speed signal or RSSI signal is received.<br><br>(b) When all conditions below are met:<br><br>• Tire Pressure warning valve and transmitter is not in stop mode.<br>• No transmitter ID is received from tire pressure warning valve and transmitters for 20 minutes or more. | |
| C2181/81<br><br>C2182/82<br><br>C2183/83<br><br>C2184/84 | Test mode procedure is performed. | • Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU |

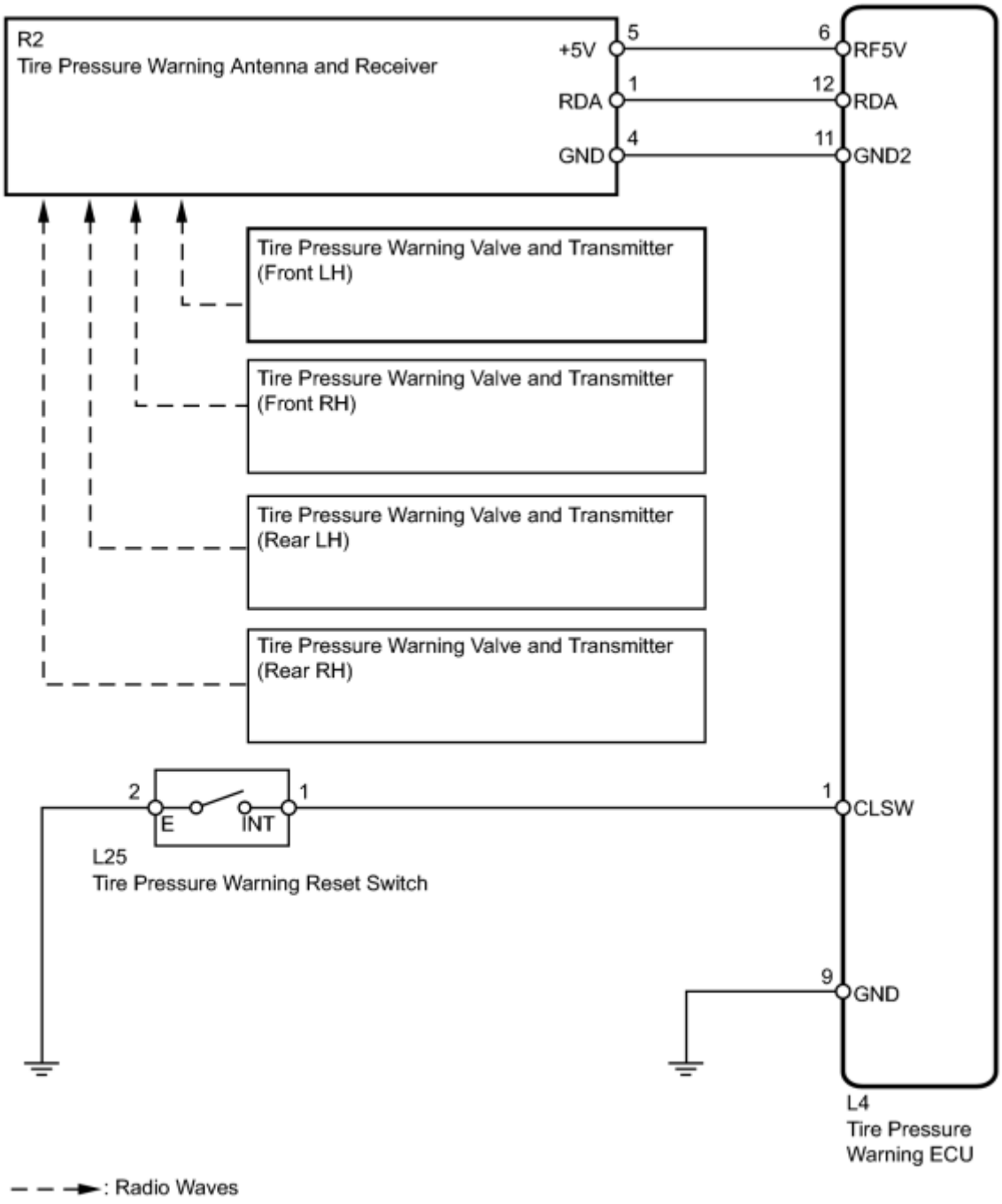
NOTICE:

When DTCs C2121/21 to C2124/24 are set, DTC C2175/75 may be set simultaneously. In such cases, troubleshoot DTCs C2121/21 to C2124/24 first, then troubleshoot DTC C2175/75.

HINT:

It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.

- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU and/or any of the valve and transmitters have been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FREQUENCY RECEIVING CONDITION |

(a) Check that the vehicle is not located in an area such as described below:

(1) Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.

HINT:

If the vehicle is located in area described above, the tire pressure warning light may come on only in a particular area.

(2) Devices using similar radio frequencies are used in the vehicle.

OK:

Facilities, or devices that use similar radio frequencies are not located in the vicinity of the vehicle.

HINT:

Radio transmissions may be interrupted due to the surroundings or devices installed by the user.

NG ▶ CHECK IF ANY DEVICE IS INSTALLED BY USER

OK

▼

| | |
|---|---|
| 2. | IDENTIFY TRANSMITTER CORRESPONDING TO DTC |

(a) Set the tire pressure to the specified values INFO.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(g) Check the values by referring to the table below.

*Tire Pressure Monitor*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

*: It may take about 2 or 3 minutes until the values are displayed.

(h) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.4 kg/cm$^2$, 5.8 psi) within 30 seconds.

(i) Check the Data List.

NOTICE:

- It takes about 2 or 3 minutes to display the updated tire pressure data.
- When the "ID Tire Inflation Pressure" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.
- Record the transmitter ID of which "ID Tire Inflation Pressure" data corresponds to each tire.

(j) After confirming that the "ID Tire Inflation Pressure" data for one tire (ID1 to ID4) has changed, repeat this procedure one by one. Identify the transmitter that corresponds to the DTC.

Result:

| Result | Proceed to |
|---|---|
| One or more of transmitters abnormal | A |
| All normal | B |
| All abnormal | C |

B ▶ END

A ▶ CHECK TRANSMITTER ID

C

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (ECU - RECEIVER) |

(a) Disconnect the L4 ECU connector.

(b) Disconnect the R2 receiver connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L4-12 (RDA) - R2-1 (RDA) | Always | Below 1 Ω |
| L4-11 (GND2) - R2-4 (GND) | | |
| L4-6 (RF5V) - R2-5 (+5V) | | |
| L4-12 (RDA) - Body ground | | 10 kΩ or higher |
| L4-11 (GND2) - Body ground | | |
| L4-6 (RF5V) - Body ground | | |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 4. | CHECK TRANSMITTER ID |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

*Tire Pressure Monitor*

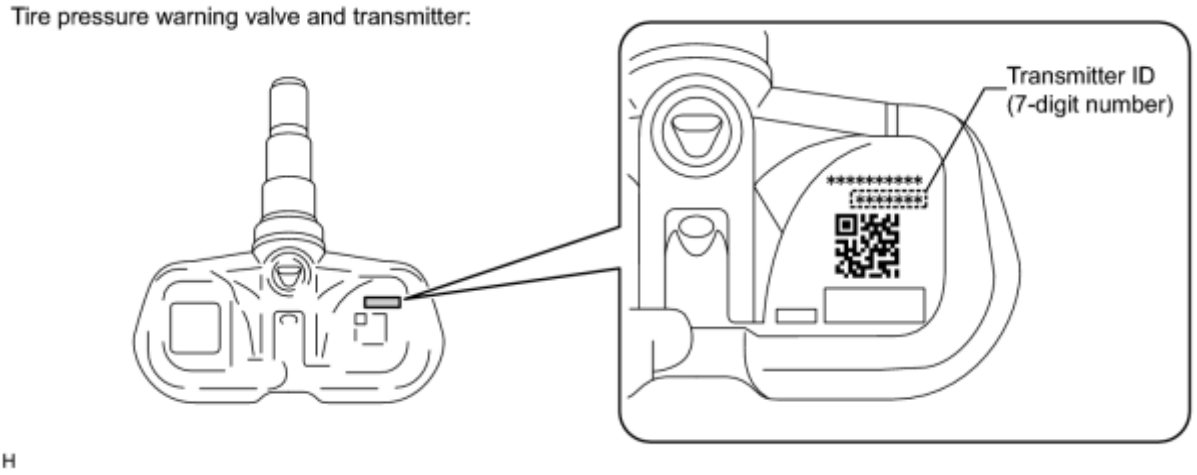
| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

*: Displayed only when the ID No. is not registered.

(g) Check the ID number on the identified transmitter by removing it from the tire and wheel.




H

(h) Confirm that the ID number on the transmitter and recorded transmitter ID match.

Result:

| Result | Proceed to |
|---|---|
| Match | A |
| Do not match | B |

B ▶ REGISTRATION OF TRANSMITTER ID

A

▼

| | |
|---|---|
| 5. | REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER |

(a) Replace the tire pressure warning valve and transmitter INFO.

NEXT

| | |
|---|---|
| 6. | REGISTRATION OF TRANSMITTER ID |

(a) Perform registration INFO.

NEXT

| | |
|---|---|
| 7. | PERFORM INITIALIZATION |

(a) Perform initialization INFO.

NEXT

| | |
|---|---|
| 8. | READ VALUE USING TECHSTREAM (DATA LIST) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
|---|---|
| All tire pressure readings are equal to specified values. | A |
| Tire pressure values are not displayed. | B |

A ▶ END

B

| | |
|---|---|
| 9. | REPLACE TIRE PRESSURE WARNING ANTENNA AND RECEIVER |

(a) Replace the tire pressure warning antenna and receiver INFO.

NEXT

| | |
|---|---|
| 10. | READ VALUE USING TECHSTREAM (DATA LIST) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation | ID3 tire inflation pressure / | Actual tire inflation | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Pressure | min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | pressure | 14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
|---|---|
| All tire pressure readings are equal to specified values. | A |
| Tire pressure values are not displayed. | B |

B ▶ REPLACE TIRE PRESSURE WARNING ECU

A ▶ **END**

| DTC | C2126/26 | Transmitter ID not Received in Main Mode |
|---|---|---|

# DESCRIPTION

After all IDs are registered, DTC C2126/26 is set in the tire pressure warning ECU and the tire pressure warning light blinks for 1 minute and then comes on.

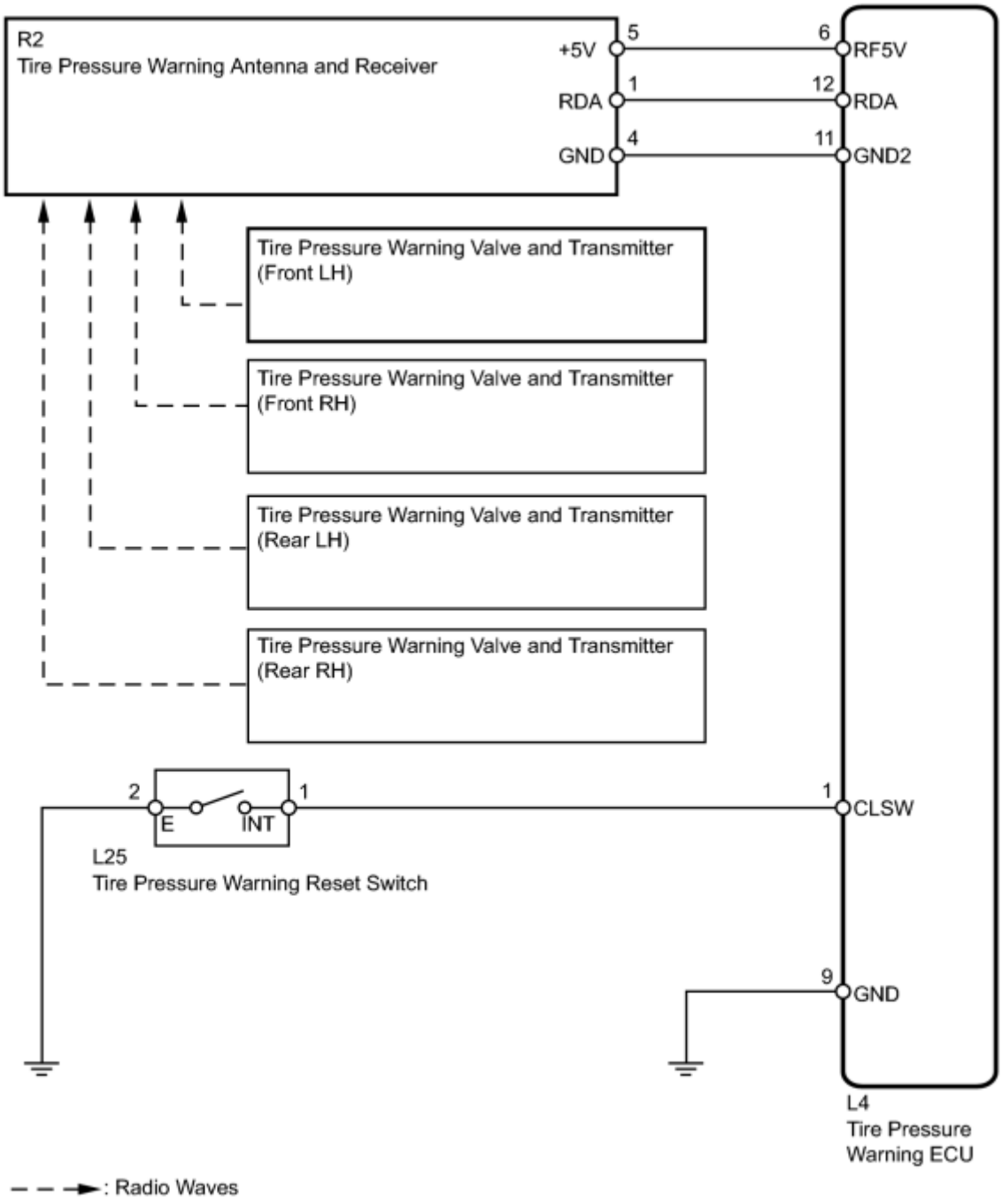
When the tire pressure waning ECU successfully receives radio waves from all the transmitters whose IDs are stored in the ECU, DTC C2126/26 is cleared and the tire pressure warning light goes off.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2126/26 | After ID registration is completed, ECU does not receive radio waves from transmitters whose IDs are stored in ECU. | • ID registration failure<br>• Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU |

HINT:

If the IDs stored in the tire pressure warning ECU differ from the transmitter IDs, DTC C2126/26 is set. Check that the IDs in the ECU are the same as the transmitter IDs.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.

- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU after the ECU and/or valve and transmitter has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | IDENTIFY TRANSMITTER NOT RECEIVED |

(a) Set the tire pressure to the specified values INFO.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(g) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | | |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

*: It may take about 2 or 3 minutes until the values are displayed.

(h) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.4 kgf/cm$^2$, 5.8 psi) within 30 seconds.

(i) Check the Data List.

NOTICE:

- It takes about 2 or 3 minutes to display the updated tire pressure data.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.
- Record the "ID Tire Inflation Pressure" data transmitter ID that corresponds to each tire.

(j) After confirming that the "ID Tire Inflation Pressure" data for one tire (ID1 to ID4) has changed, repeat this procedure one by one. Identify the transmitter not received.

Result:

| Condition | Proceed to |
|---|---|
| One or more of transmitters abnormal | A |
| All normal | B |

B ▶ END

A

▼

| | |
|---|---|
| 2. | CHECK TRANSMITTER ID |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

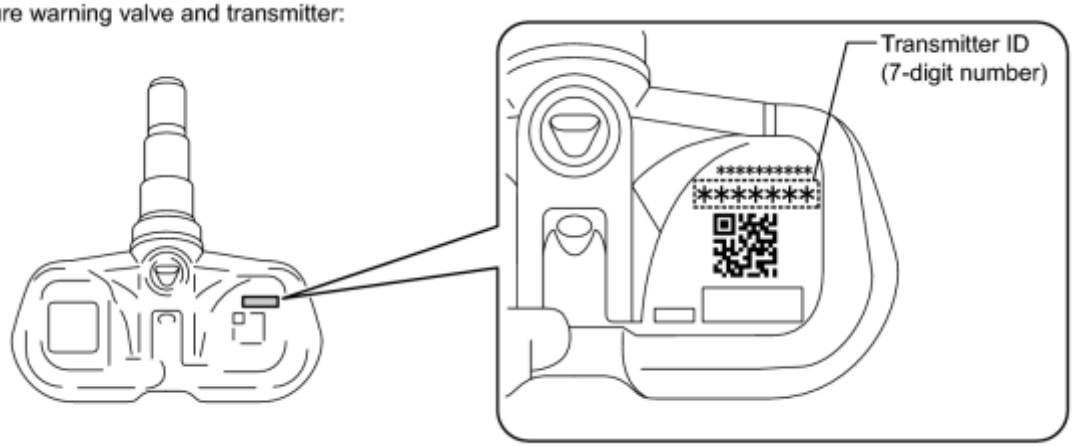
| Tester Display | Measurement Item/Display | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Registered ID1 Code | Registered ID1 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID1 displayed | - |
| Registered ID2 Code | Registered ID2 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID2 displayed | - |
| Registered ID3 Code | Registered ID3 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID3 displayed | - |
| Registered ID4 Code | Registered ID4 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID4 displayed | - |

HINT:

*: Displayed only when the ID No. is not registered.

(g) Check the ID number on the identified transmitter by removing it from the tire and wheel.

Tire pressure warning valve and transmitter:




H

(h) Confirm that the ID number on the transmitter and recorded transmitter ID match.

Result:

| Result | Proceed to |
|---|---|
| Match | A |
| Do not match | B |

B ▶ REGISTRATION OF TRANSMITTER ID

A

▼

| | |
|---|---|
| 3. | REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER |

(a) Replace the tire pressure warning valve and transmitter INFO.

NEXT

▼

| | |
|---|---|
| 4. | REGISTRATION OF TRANSMITTER ID |

(a) Perform registration INFO.

NEXT

▼

| | |
|---|---|
| 5. | PERFORM INITIALIZATION |

(a) Perform initialization INFO.

| | |
|---|---|
| 6. | CONFIRM TIRE INFLATION PRESSURE (DATA LIST) |

(a) Turn the power switch off.

(b) Connect Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | | |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
|---|---|
| Tire pressure values are not displayed. | A |
| All tire pressure readings are equal to specified values. | B |

B ▶ END

A

▼

| 7. | REPLACE TIRE PRESSURE WARNING ANTENNA AND RECEIVER |
|---|---|

(a) Replace the tire pressure warning antenna and receiver INFO.

NEXT

▼

| 8. | CONFIRM TIRE INFLATION PRESSURE (DATA LIST) |
|---|---|

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
|---|---|
| All tire pressure readings are equal to specified values. | A |
| Tire pressure values are not displayed. | B |

B ▶ REPLACE TIRE PRESSURE WARNING ECU

A ▶ **END**

| | | |
|---|---|---|
| DTC | C2141/41 | Transmitter ID1 Error |
| DTC | C2142/42 | Transmitter ID2 Error |
| DTC | C2143/43 | Transmitter ID3 Error |
| DTC | C2144/44 | Transmitter ID4 Error |

# DESCRIPTION

The tire pressure warning valve and transmitters that are installed in the tire and wheel assemblies measure the tire pressures. The measured values are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU. The ECU compares the measured air pressure values with the air pressure threshold. When the measured air pressure value is less than this threshold, the warning light in the combination meter comes on.

When the internal circuit of the tire pressure warning valve and transmitter is malfunctioning, one of these DTCs is output.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2141/41<br>C2142/42<br>C2143/43<br>C2144/44 | If an "ERROR" signal is received 3 times consecutively, the tire pressure warning valve and transmitter will be judged as defective and a DTC will be output.<br><br>This will happen in situations where the inflation pressure is outside the range -100 to 538 kPa (-1.0 to 5.4 kgf/cm$^2$, -14 to 78 psi), the temperature inside the tire is outside the specified range -40 to 120°C (-40 to 253°F), or an error occurs in the tire pressure warning valve and transmitter or the surrounding area. | • Tire pressure warning valve and transmitter<br>• Tire pressure warning ECU |

HINT:

It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU and/or any of the valve and transmitters have been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | IDENTIFY TRANSMITTER CORRESPONDING TO DTC |

(a) Set the tire pressure to the specified value INFO.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(g) Display the "ID Tire Inflation Pressure" data for each wheel using the Techstream.

(h) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.4 kg/cm$^2$, 5.8 psi) within 30 seconds. If "ID Tire Inflation Pressure" displayed on the Techstream (ID1 to ID4) does not change, the tire pressure warning valve and transmitter corresponding to the unchanged "ID Tire Inflation Pressure" data was the cause of the output DTC.

HINT:

- Identify the malfunctioning tire pressure warning valve and transmitter by repeatedly decreasing the tire pressure for each tire.
- Record which "ID Tire Inflation Pressure" data (ID1 to ID4) corresponds to each tire.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | | |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

*: It may take about 2 or 3 minutes until the values are displayed. If the values are not displayed after a few minutes, perform troubleshooting according to the inspection procedure for DTCs C2121/21 to C2124/24 INFO.

(i) Check the Data List.

Result:

| Result | Detection Condition |
|---|---|
| One of "ID Tire Inflation Pressure" data (ID1 to ID4) changed. | Normal |
| "ID Tire Inflation Pressure" data did not change. | Transmitter corresponding to DTC |

NOTICE:

- When the "ID Tire Inflation Pressure" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.
- Record the transmitter IDs and positions of transmitters that are normal.

(j) When the "ID Tire inflation Pressure" data (ID1 to ID4) has changed, repeat this procedure to identify the tire pressure warning valve and transmitter that corresponds to the DTC.

(k) When all of the "ID Tire Inflation Pressure" data (ID1 to ID4) have changed, identify the malfunctioning tire pressure warning valve and transmitter using the recorded ID numbers and output DTCs.

NEXT



| | |
|---|---|
| 2. | REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER |

(a) Replace the identified tire pressure warning valve and transmitter with a new one INFO.

HINT:

- Before installing a new tire pressure warning valve and transmitter, read and write down its transmitter ID.
- The IDs for the tire pressure warning valve and transmitters which are not replaced should be checked using the Techstream and recorded.

NEXT



| | |
|---|---|
| 3. | REGISTRATION OF TRANSMITTER ID |

(a) Register the transmitter ID for all wheels INFO.

NEXT



| | |
|---|---|
| 4. | PERFORM INITIALIZATION |

(a) Perform initialization INFO.

NEXT



| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
| --- | --- |
| Tire pressure values are not displayed. | A |
| All tire pressure readings are equal to specified values. | B |

B ▶ END

A ▶ **REPLACE TIRE PRESSURE WARNING ECU**

| | | |
|---|---|---|
| DTC | C2165/65 | Abnormal Temperature Inside ID1 Tire |
| DTC | C2166/66 | Abnormal Temperature Inside ID2 Tire |
| DTC | C2167/67 | Abnormal Temperature Inside ID3 Tire |
| DTC | C2168/68 | Abnormal Temperature Inside ID4 Tire |

# DESCRIPTION

Each tire pressure warning valve and transmitter measures the internal temperature of its tire as well as tire pressure, and transmits the information to the tire pressure warning ECU along with the transmitter ID. If the measured temperature is out of the specified range, the tire pressure warning ECU recognizes it as a malfunction, outputs DTCs, and the tire pressure warning light blinks for 1 minute and then remains on.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2165/65<br>C2166/66<br>C2167/67<br>C2168/68 | Temperature inside the tire exceeds 119°C (246.2°F). | • Tires<br>• Tire pressure warning valve and transmitter<br>• Tire pressure warning ECU |

HINT:

It is necessary to perform the procedure to identify the tire pressure warning valve and transmitter that is malfunctioning because it cannot be identified by the output DTC.

# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU and/or any of the valve and transmitters have been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK TIRES |

(a) Check that the tires are not flat, and there is no indication of air pressure drop.

OK:

The tires are normal.

HINT:

If a tire is damaged, the tire pressure warning valve and transmitter may also have been damaged at the same time.

NG ▶ REPLACE TIRE AND TIRE PRESSURE WARNING VALVE AND TRANSMITTER

OK

▼

| | |
|---|---|
| 2. | IDENTIFY TRANSMITTER CORRESPONDING TO DTC |

(a) Set the tire pressure to the specified value INFO.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(g) Display the "ID Tire Inflation Pressure" data for each wheel using the Techstream.

(h) Rapidly reduce the tire pressure for each wheel at least 40 kPa (0.4 kg/cm$^2$, 5.8 psi) within 30 seconds.

(i) Check the Data List.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | | |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

*: It may take about 2 or 3 minutes until the values are displayed. If the values are not displayed after a few minutes, perform troubleshooting according to the inspection procedure for DTCs C2121/21 to C2124/24 INFO.

Result:

| Result | Detection Condition |
|---|---|
| One of "ID Tire Inflation Pressure" data (ID1 to ID4) changed. | Normal |
| No "ID Tire Inflation Pressure" data changed. | Transmitter corresponding to DTC |

NOTICE:

- It may take about 2 to 3 minutes to display the updated data.
- When the "ID Tire Inflation Pressure" data has not changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck the data.
- Record the transmitter IDs and transmitter positions that are normal.

(j) When the "ID Tire Inflation Pressure" data (ID1 to ID4) has changed, repeat this procedure to identify the tire pressure warning valve and transmitter that corresponds to the DTC.

(k) When all of the "ID Tire Inflation Pressure" data (ID1 to ID4) have changed, identify the malfunctioning tire pressure warning valve and transmitter based on the recorded ID numbers and output DTC.

NEXT

| 3. | REPLACE TIRE PRESSURE WARNING VALVE AND TRANSMITTER |
|---|---|

(a) Replace the identified tire pressure warning valve and transmitter with a new one INFO.

HINT:

- Before installing a new tire pressure warning valve and transmitter, read and write down its transmitter ID.
- The IDs for the tire pressure warning valve and transmitters which are not replaced should be checked using the Techstream and recorded.

NEXT

| 4. | CHECK REGISTRATION OF TRANSMITTER ID |
|---|---|

(a) Register the transmitter IDs for 4 tires INFO.

NEXT

| 5. | PERFORM INITIALIZATION |
|---|---|

(a) Perform initialization INFO.

NEXT

| 6. | READ VALUE USING TECHSTREAM (DATA LIST) |
|---|---|

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

### *Tire Pressure Monitor*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
| --- | --- |
| Tire pressure values are not displayed. | A |
| All tire pressure readings are equal to specified values. | B |

B ▶ END

A ▶ **REPLACE TIRE PRESSURE WARNING ECU**

| | | |
|---|---|---|
| DTC | C2171/71 | Transmitter ID not Registered |

# DESCRIPTION

The IDs of each tire pressure warning valve and transmitter are registered to the tire pressure warning ECU.

When the ECU detects that transmitter ID code is not registered in the ECU, a DTC is output.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2171/71 | Transmitter ID code is not registered. (When an ID code is unregistered for 3 minutes or more) | Tire pressure warning ECU |

# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CONFIRM REGISTRATION CONDITION (REGISTERED ID CODES) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Registered ID1 code | Registered ID1 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID1 displayed | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Registered ID2 code | Registered ID2 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID2 displayed | - |
| Registered ID3 code | Registered ID3 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID3 displayed | - |
| Registered ID4 code | Registered ID4 code/<br>min.: 0<br>max.: FFFFFFF* | ID No. registered in transmitter ID4 displayed | - |

HINT:

*: Displayed only when the ID No. is not registered.

OK:

The registered transmitter ID codes are displayed on the Techstream.

NG PERFORM REGISTRATION (TRANSMITTER ID)

OK **REPLACE TIRE PRESSURE WARNING ECU**

| | |
|---|---|
| 2. | PERFORM REGISTRATION (TRANSMITTER ID) |

(a) Register the transmitter IDs for all the wheels INFO.

NEXT

| | |
|---|---|
| 3. | PERFORM INITIALIZATION |

(a) Perform initialization INFO.

NEXT

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (DATA LIST) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | | |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
|---|---|
| All tire pressure readings are equal to specified values. | A |
| Tire pressure values are not displayed. | B |

B REPLACE TIRE PRESSURE WARNING ECU

A **END**

| | | |
|---|---|---|
| DTC | C2175/75 | Vehicle Speed or RSSI Signal Error |

# DESCRIPTION

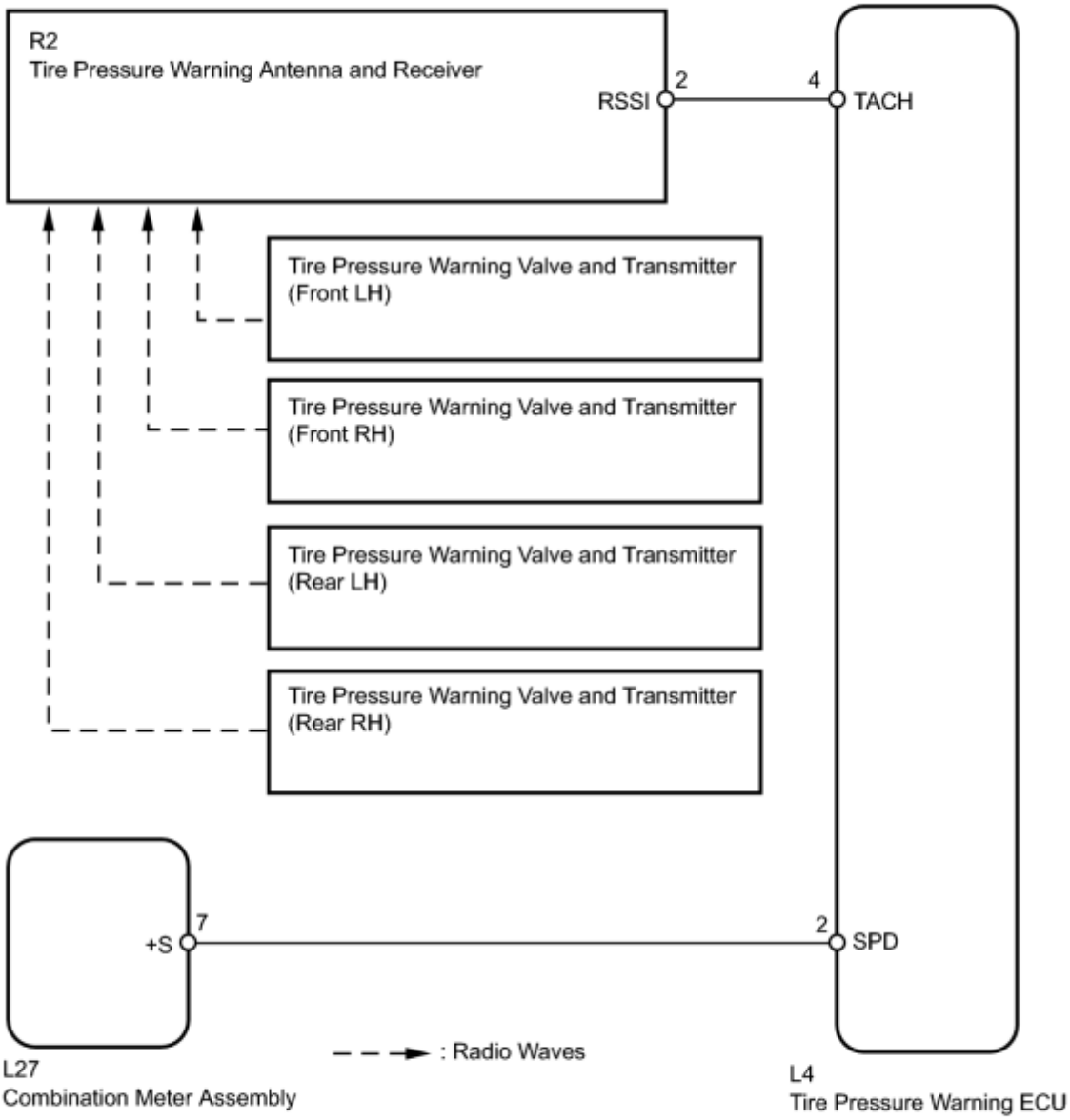
The tire pressure warning ECU receives a vehicle speed signal from the combination meter assembly and a RSSI signal from the tire pressure warning antenna and receiver. The tire pressure warning ECU uses these signals to detect DTCs C2121/21 to C2124/24 (No Signal from Transmitter) and DTC C2177/77 (Initialization not Completed).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2175/75 | After following condition (a) or (b) is met, the transmitter ID is not received from the tire pressure warning valve and transmitters for a total of 20 minutes:<br><br>(a) No vehicle speed signal for 15 minutes<br><br>(b) RSSI signal 49 mV or less, or 4.95 V or more twice continuously | • Combination meter assembly<br>• Tire pressure warning valve and transmitter<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU |

HINT:

This DTC is set at the same time as DTCs C2121/21 to C2124/24 are being set.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | READ OUTPUT DTC (DTCs C2121/21 to C2124/24) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Trouble Codes.

(f) Read DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTCs C2121/21 to C2124/24 are not output | A |
| DTCs C2121/21 to C2124/24 are output | B |

NOTICE:

When DTCs C2121/21 to C2124/24 is output, troubleshoot that DTCs first. Then troubleshoot DTCs C2175/75.

B ▶ GO TO DTCs C2121/21 to C2124/24

A ▼

| | |
|---|---|
| 2. | PERFORM SIGNAL CHECK (VEHICLE SPEED SIGNAL AND RSSI SIGNAL) |

(a) Enter the signal check mode in Test Mode Procedure INFO.

(b) Turn the power switch on (IG) and wait for 3 seconds or more to erase DTC C2196/96.

(c) Drive the vehicle at 20 km/h (12 mph) or more for 10 seconds to erase DTC C2191/91.

(d) Check for test mode DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTCs C2191/91 and C2196/96 are cleared | A |
| DTC C2191/91 is output | B |
| DTC C2196/96 is output | C |

HINT:

DTCs C2181/81 to C2184/84 (Transmitter ID not Received) are output at this time, but they are not related to this check.

C ▶ GO TO DTC C2196/96
B ▶ GO TO DTC C2191/91
A ▼

| | |
|---|---|
| 3. | RECONFIRM DTC OUTPUT (DTC C2175/75) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Drive the vehicle at 50 km/h or more for at least 20 minutes.

(e) Turn the Techstream on.

(f) Enter the following menus: Chassis / Tire Pressure Monitor / Trouble Codes.

(g) Read DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC C2175/75 is not output | A |
| DTC C2175/75 is output | B |

HINT:

If the DTC is not output, it can be determined that the system is functioning normally and that the DTC was stored due to radio wave interference.

B ▶ REPLACE TIRE PRESSURE WARNING ECU
A ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| DTC | C2176/76 | Receiver Error |

# DESCRIPTION

The signals are transmitted to the tire pressure warning antenna and receiver on the body as radio waves and then sent to the tire pressure warning ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2176/76 | Malfunction in the tire pressure warning ECU internal circuit | Tire pressure warning ECU |

# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT (C2176/76) |

(a) Clear the DTC INFO.

(b) Turn the power switch off.

(c) Turn the power switch on (IG) and check for DTC INFO.

OK:

DTC C2176/76 is not output.

NG ▶ REPLACE TIRE PRESSURE WARNING ECU
OK ▶ **END**

| DTC | C2177/77 | Initialization not Completed |
|---|---|---|

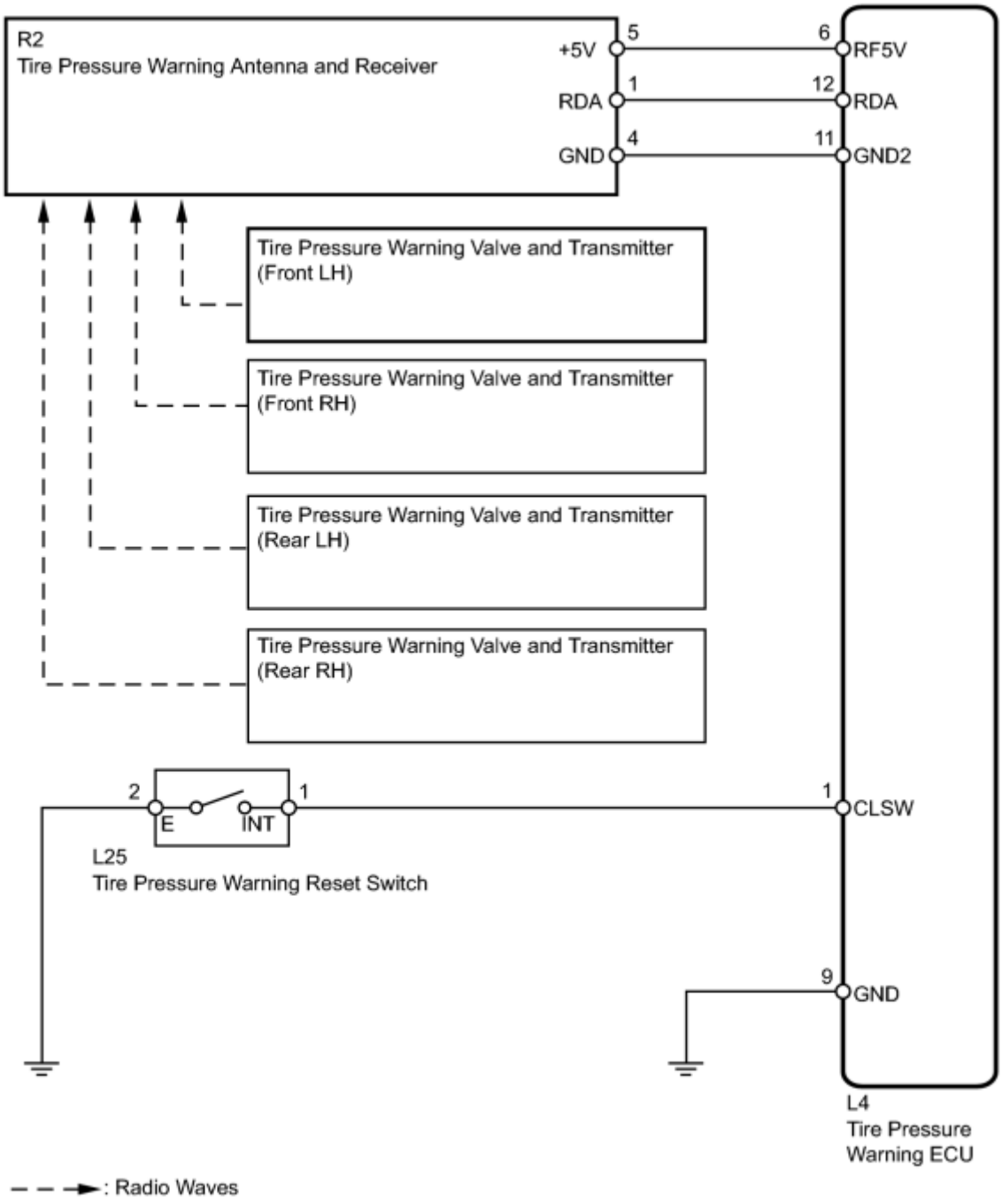
# DESCRIPTION

Initialization is necessary if one of the following occurs:

- Tire pressure warning ECU is replaced.
- Tire pressure warning valve and transmitter is replaced.
- Tires with a different tire standard pressure are installed.
- Tires are rotated.
- A new vehicle is delivered.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2177/77 | • All conditions below are met:<br>• During initialization<br>• Tire pressure warning valve and transmitter is not in stop mode<br>• Signal is not received from tire pressure warning valve and transmitter for 20 minutes or more<br>• Vehicle speed is more than 8 km/h (5 mph) for a total of 20 minutes | • Tire pressure warning valve and transmitter<br>• Tire pressure warning ECU<br>• Tire pressure warning antenna and receiver<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.

- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU and/or any of the valve and transmitters have been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FREQUENCY RECEIVING CONDITION |

(a) Check that the vehicle is not located in an area such as described below:

(1) Facilities or devices that use similar radio frequencies are located in the vicinity of the vehicle.

HINT:

If the vehicle is located in an area described above, the tire pressure warning light may come on after blinking 1 minute only in a particular area due to interfering radio frequencies.

(2) Devices using similar radio frequencies are used in the vehicle.

OK:

Facilities, or devices that use similar radio frequencies are not located in the vicinity of the vehicle.

HINT:

Radio transmissions may be interrupted due to the surroundings, or devices installed by the user.

NG ▶ CHECK IF ANY DEVICE IS INSTALLED BY USER

OK

▼

| | |
|---|---|
| 2. | CONFIRM TIRE INFLATION PRESSURE (DATA LIST) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation Pressure | ID2 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
|---|---|
| All tire pressure readings are equal to specified values. | A |
| Tire pressure values are not displayed. | B |

B GO TO DTC C2121/21 TO C2124/24

A

| | |
|---|---|
| 3. | PERFORM INITIALIZATION |

(a) Perform initialization INFO.

NEXT

| | |
|---|---|
| 4. | CONFIRM TIRE INFLATION PRESSURE (DATA LIST) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check the values by referring to the table below.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ID1 Tire Inflation Pressure | ID1 tire inflation pressure/<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID2 Tire Inflation | ID2 tire inflation pressure / | Actual tire inflation | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Pressure | min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | pressure | 14 psi) is displayed for relative pressure, data has not been received.* |
| ID3 Tire Inflation Pressure | ID3 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |
| ID4 Tire Inflation Pressure | ID4 tire inflation pressure /<br><br>min.: Absolute pressure / 0 kPa (0 kgf/cm$^2$, 0 psi), Relative pressure / -100 kPa (-1.0 kgf/cm$^2$, -14 psi)<br><br>max.: Absolute pressure / 638 kPa (6.4 kgf/cm$^2$, 93 psi), Relative pressure / 538 kPa (5.4 kgf/cm$^2$, 78 psi) | Actual tire inflation pressure | If 0 kPa (0 kgf/cm$^2$, 0 psi) is displayed for absolute pressure or -100 kPa (-1.0 kgf/cm$^2$, -14 psi) is displayed for relative pressure, data has not been received.* |

HINT:

- *: It may take about 2 or 3 minutes until the values are displayed.
- When no "ID Tire Inflation Pressure" data has changed, reset the tire pressure to the appropriate specified value and rotate the tire 90 to 270 degrees. Then rapidly release the tire pressure and recheck it.

Result:

| Result | Proceed to |
|---|---|
| All tire pressure readings are equal to specified values. | A |
| Tire pressure values are not displayed. | B |

B ▶ GO TO DTC C2121/21 TO C2124/24

A ▶ **END**

| DTC | C2191/91 | Vehicle Speed Signal Error (Test Mode DTC) |
|---|---|---|

# DESCRIPTION

The tire pressure warning ECU receives a vehicle speed signal from the combination meter. This DTC is stored upon entering test mode, and cleared when a vehicle speed signal of 20 km/h (12 mph) is detected for 3 seconds or more. This DTC is output only in test mode.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2191/91 | Test mode procedure is performed | • Combination meter<br>• Vehicle speed sensor<br>• Wire harness or connector<br>• Tire pressure warning ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (VEHICLE SPEED) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Data List.

(f) Check that the values indicated on the Techstream and on the combination meter are the same.

***Tire Pressure Monitor***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle Speed | Vehicle speed/<br><br>min.: 0 km/h (0 mph)<br><br>max.: 255 km/h (158 mph) | Almost same as actual vehicle speed | Speed indicated on combination meter |

OK:

Vehicle speed indicated on the Techstream and on the combination meter are the same.

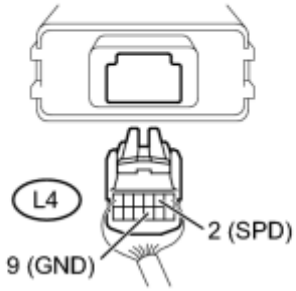
NG ▶ INSPECT TIRE PRESSURE WARNING ECU (SPD SIGNAL)

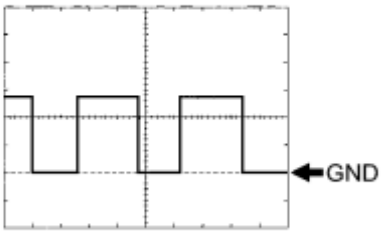
OK ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 2. | INSPECT TIRE PRESSURE WARNING ECU (SPD SIGNAL) |

(a) Disconnect the L4 ECU connector.

*1




(b) Jack up the vehicle.

(c) Move the shift lever to N.

(d) Turn the power switch on (IG).

(e) Check the waveform of the ECU connector using an oscilloscope while turning the wheel slowly.

OK:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L4-2 (SPD) - L4-9 (GND) | Power switch on (IG) | Correct waveform appears as shown |

### *Text in Illustration*

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Tire Pressure Warning ECU) |

### *Tool Setting*

| Item | Contents |
|---|---|
| Tool Setting | 5 V/DIV., 20 ms/DIV. |
| Vehicle Condition | Driving wheels rotating slowly |

HINT:

The wavelength becomes shorter as the vehicle speed increases.

NG ▶ CHECK HARNESS AND CONNECTOR (ECU - COMBINATION METER)

OK ▶ **REPLACE TIRE PRESSURE WARNING ECU**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (ECU - COMBINATION METER) |

(a) Disconnect the L4 ECU connector.

(b) Disconnect the L27 meter connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L4-2 (SPD) - L27-7 (+S) | Always | Below 1 Ω |
| L4-2 (SPD) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE MATER CIRCUIT PLATE NO.3**

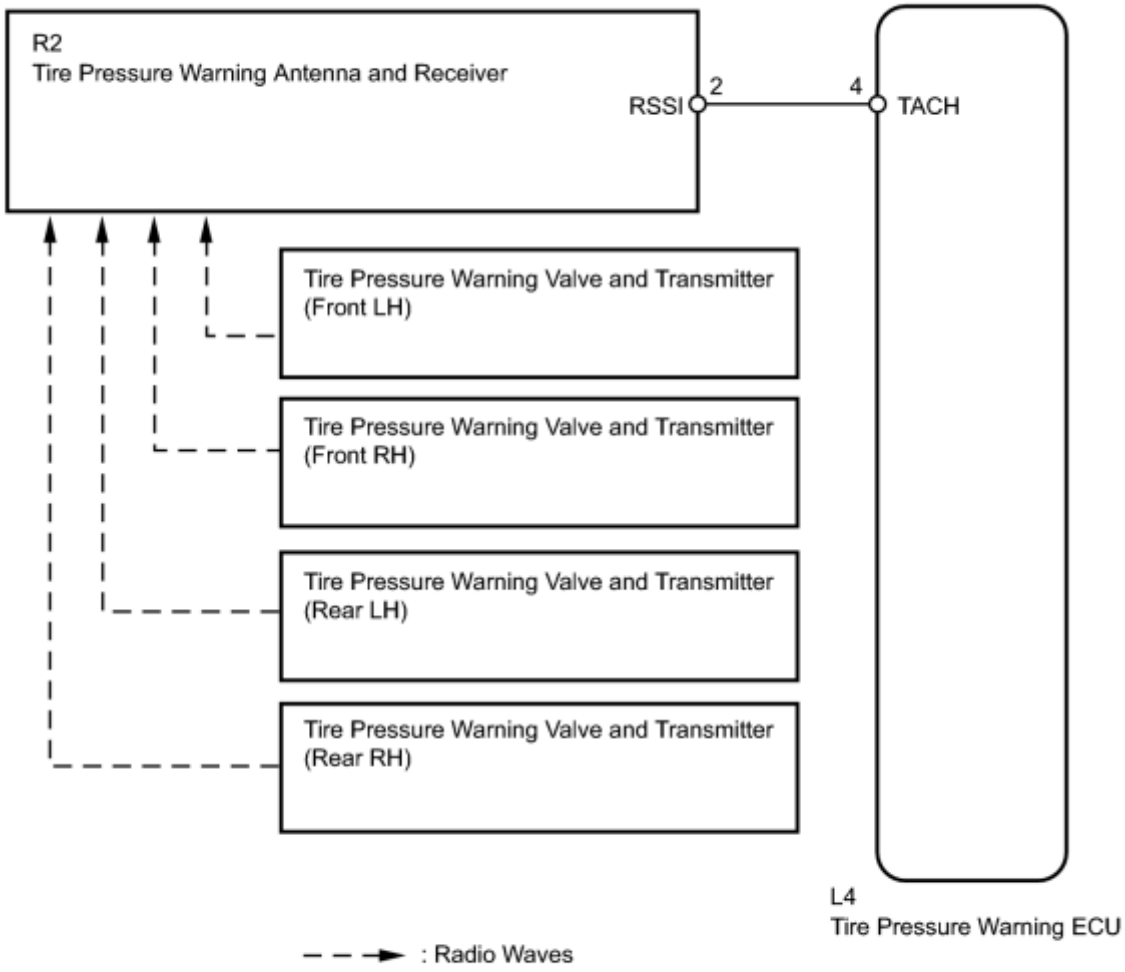
| | | |
|---|---|---|
| DTC | C2196/96 | RSSI Signal Error (Test Mode DTC) |

# DESCRIPTION

The tire pressure warning ECU receives a RSSI signal from the tire pressure warning antenna and receiver. This DTC is stored upon entering test mode, and cleared when an RSSI signal between 49 mV and 4.95 V is received for 3 seconds or more.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| C2196/96 | Test mode procedure is performed | • Tire pressure warning antenna and receiver<br>• Wire harness or connector<br>• Tire pressure warning ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK OUTPUT DTC (DTCs C2121/21 to C2124/24) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / Tire Pressure Monitor / Trouble Codes.

(f) Read the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTCs C2121/21 to C2124/24 are not output | A |
| DTCs C2121/21 to C2124/24 are output | B |

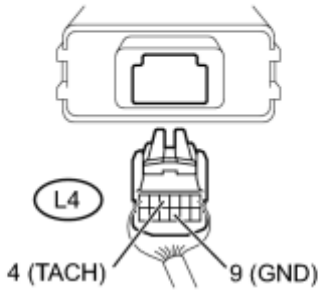
B ▶ GO TO DTCs C2121/21 to C2124/24

A

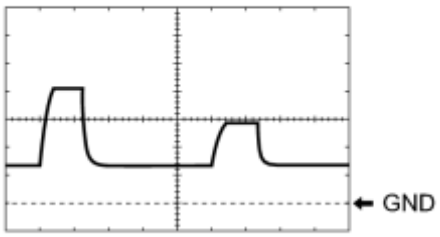
▼

| | |
|---|---|
| 2. | INSPECT TIRE PRESSURE WARNING ECU (RSSI SIGNAL) |

*1




(a) Disconnect the L4 ECU connector.




(b) Turn the power switch on (IG).

(c) Check the waveform of the ECU connector using an oscilloscope while idling the engine.

OK:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L4-4 (TACH) - L4-9 (GND) | Power switch on (IG) | Correct waveform appears as shown |

*Text in Illustration*

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Tire Pressure Warning ECU) |

*Tool Setting*

| Item | Contents |
|---|---|
| Tool Setting | 0.5 V/DIV., 10 ms/DIV. |

HINT:

- The shape of waves like figure appears approximately 2 times every 3 minutes.
- Figure is one example, and the voltage with few changes might be detected between 49 mV and 4.95 V.

NG ▶ CHECK HARNESS AND CONNECTOR (TIRE PRESSURE WARNING ECU - ANTENNA AND RECEIVER)

OK ▶ **REPLACE TIRE PRESSURE WARNING ECU**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TIRE PRESSURE WARNING ECU - ANTENNA AND RECEIVER) |

(a) Disconnect the L4 ECU connector.

(b) Disconnect the R2 tire pressure warning antenna and receiver connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L4-4 (TACH) - R2-2 (RSSI) | Always | Below 1 Ω |
| L4-4 (TACH) - Body ground | Always | 10 kΩ or higher |

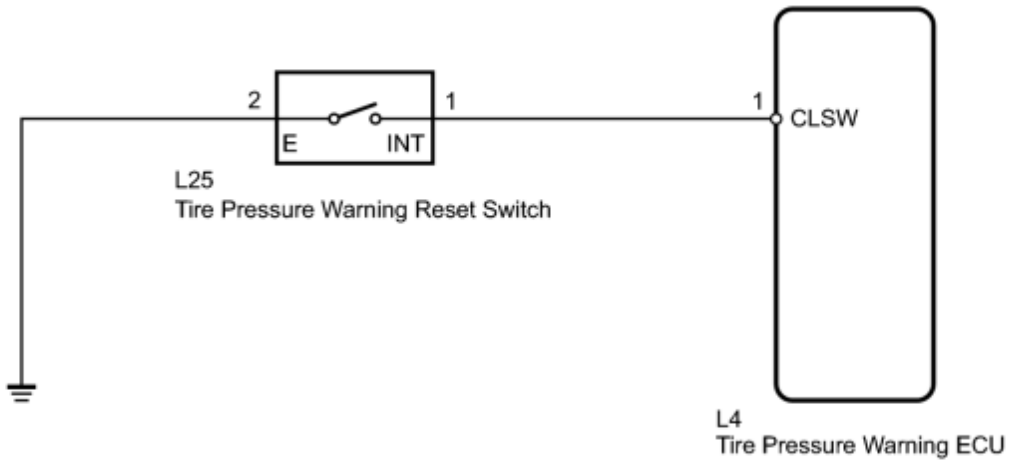
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE TIRE PRESSURE WARNING ANTENNA AND RECEIVER**

# DESCRIPTION

Initialization can be started by pressing the tire pressure warning reset switch and holding it for 3 seconds or more. If the ECU receives the signal from the switch, the tire pressure warning light blinks 3 times (1 second on, 1 second off).

# WIRING DIAGRAM




N

# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU, after the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK TIRE PRESSURE WARNING RESET SWITCH FUNCTION |

(a) Perform the tire pressure warning reset switch test in Test Mode Procedure INFO.

OK:

Reset switch ON

Tire pressure warning light comes on.

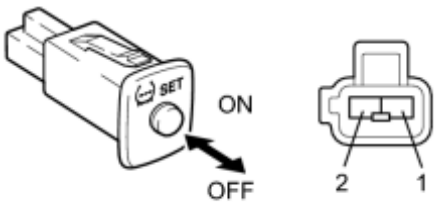
Reset switch OFF

Tire pressure warning light blinks.

NG ▶ INSPECT TIRE PRESSURE WARNING RESET SWITCH
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | INSPECT TIRE PRESSURE WARNING RESET SWITCH |

Component without harness connected:
(Tire Pressure Warning Reset Switch)




(a) Disconnect the tire pressure warning reset switch connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (INT) - 2 (E) | ON | Below 1 Ω |
| | OFF | 10 kΩ or higher |

NG ▶ REPLACE TIRE PRESSURE WARNING RESET SWITCH
OK ▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (TIRE PRESSURE WARNING RESET SW - TIRE PRESSURE WARNING ECU) |

(a) Disconnect the tire pressure warning reset switch L25 connector and tire pressure warning ECU L4 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L4-1 (CLSW) - L25-1 (INT) | Always | Below 1 Ω |
| L4-1 (CLSW) - Body ground | | 10 kΩ or higher |
| L25-2 (E) - Body ground | | Below 1 Ω |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR
OK ▶ **REPLACE TIRE PRESSURE WARNING ECU**

# DESCRIPTION

If the tire pressure warning ECU detects any trouble, the tire pressure warning light blinks (stays on after blinking for 1 minute) and tire pressure monitor is cancelled at the same time. At this time, the ECU records a DTC in the memory.

Connecting terminals TC and CG of the DLC3 makes the tire pressure warning light blink to output DTCs.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU if the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK OPERATION OF TIRE PRESSURE WARNING LIGHT (ACTIVE TEST) |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(f) Check the condition of the tire pressure warning light by using the Techstream.

***Combination Meter***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicat. Tire Pressure Warning System | Tire pressure warning light | Tire pressure warning light OFF or ON | Confirm that the vehicle is stopped, engine idling |

OK:

The warning light turns on when using the Techstream.

NG ▶ GO TO METER / GAUGE SYSTEM

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (COMBINATION METER - TIRE PRESSURE WARNING ECU) |

(a) Disconnect the L27 combination meter connector.

(b) Disconnect the L4 tire pressure warning ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-3 (TIRE) - L4-5 (IND) | Always | Below 1 Ω |
| L27-3 (TIRE) - Body ground | | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

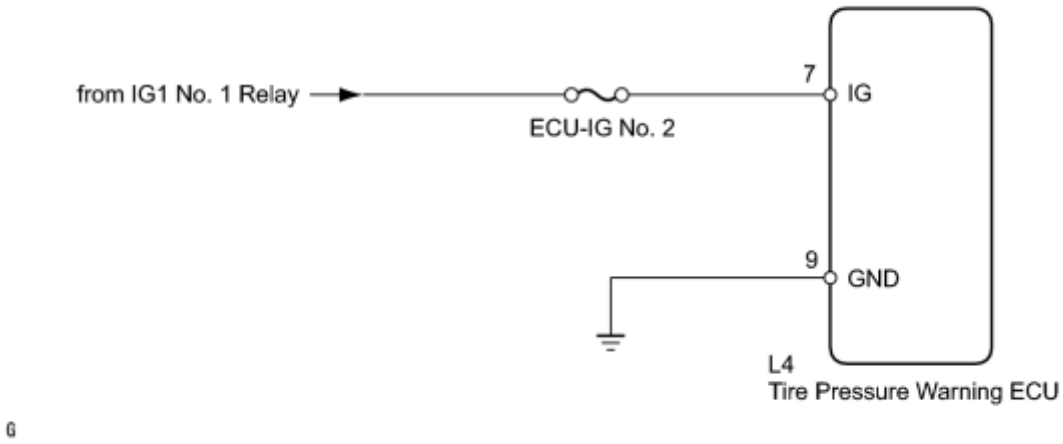
OK ▶ **REPLACE TIRE PRESSURE WARNING ECU**

| ECU Power Source Circuit |
|---|

# DESCRIPTION

This is the power source for the tire pressure warning ECU.

# WIRING DIAGRAM




G

# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU after the ECU has been replaced.

# PROCEDURE

| 1. | INSPECT FUSE (ECU-IG No. 2) |
|---|---|

(a) Remove the ECU-IG No. 2 fuse from the instrument panel junction block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| EUC-IG No. 2 | Always | Below 1 Ω |

NG REPLACE FUSE

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (ECU - BATTERY AND BODY GROUND) |

*1




(a) Disconnect the L4 ECU connector.

P

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L4-7 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |
| | Power switch off | Below 1 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L4-9 (GND) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>to Tire Pressure Warning ECU |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# DESCRIPTION

DTC output mode is set by connecting terminals 13 (TC) and 4 (CG) of the DLC3. The DTCs are indicated by the blinking of the tire pressure warning light.

# WIRING DIAGRAM




Y

HINT:

When various warning lights blink continuously, a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in an ECU connected to this circuit may have occurred.

# INSPECTION PROCEDURE

NOTICE:

- When replacing the tire pressure warning ECU, read the transmitter IDs stored in the old ECU using the Techstream and write them down before removal.
- It is necessary to perform initialization INFO after registration INFO of the transmitter IDs into the tire pressure warning ECU after the ECU has been replaced.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (DLC3 - TIRE PRESSURE WARNING ECU) |

(a) Disconnect the L4 ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

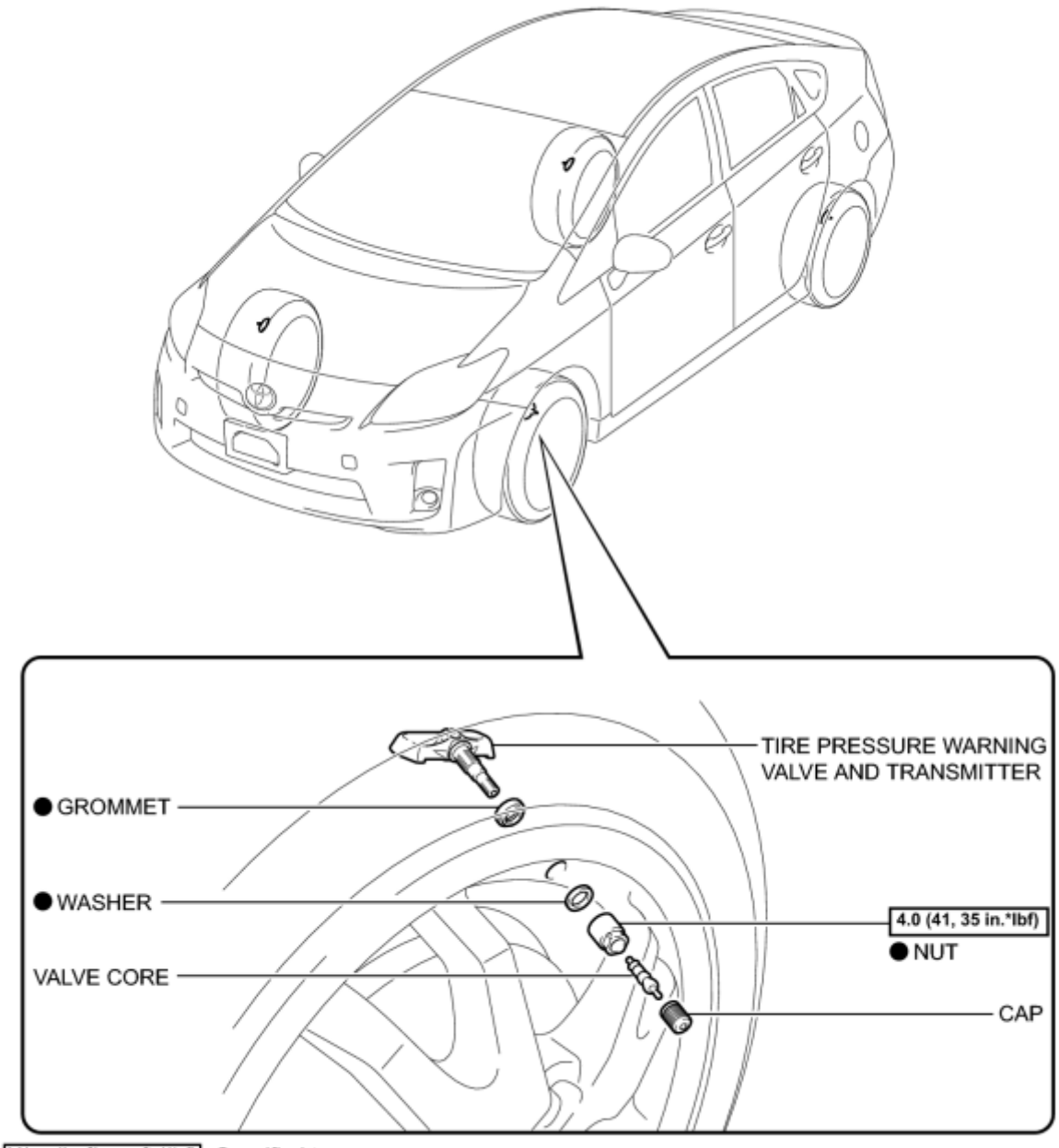
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L4-3 (TC) - L61-13 (TC) | Always | Below 1 Ω |
| L61-4 (CG) - Body ground | | |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

c

# REMOVAL

1. REMOVE FRONT WHEEL

2. REMOVE REAR WHEEL

3. REMOVE TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Remove the valve core and cap to release the air from the tire.

(b) After ensuring that a sufficient amount of air has been released, remove the nut and washer used to secure the tire pressure warning valve and transmitter. Drop the tire pressure warning valve and transmitter with the grommet into the tire.

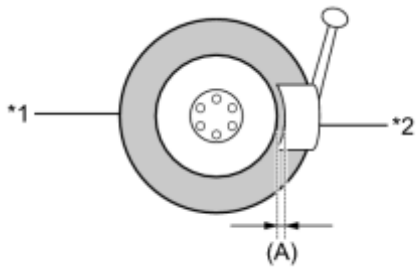
NOTICE:

Keep the removed cap and valve core.

HINT:

The grommet may remain attached to the rim.

(c) After dropping the tire pressure warning valve and transmitter into the tire, disengage the bead using the shoe of a tire remover.




c

## Text in Illustration

| | |
|---|---|
| *1 | Tire |
| *2 | Shoe |

- Be careful not to damage the tire pressure warning valve and transmitter due to interference between the valve and the tire bead.
- Set the tire remover shoe as shown in the illustration.

  Width (A):

  10 to 20 mm (0.394 to 0.787 in.)

(d) Separate the upper bead.

(e) Take out the tire pressure warning valve and transmitter with the grommet from the tire and separate the lower bead.

(f) Remove the grommet from the tire pressure warning valve and transmitter.

# INSTALLATION

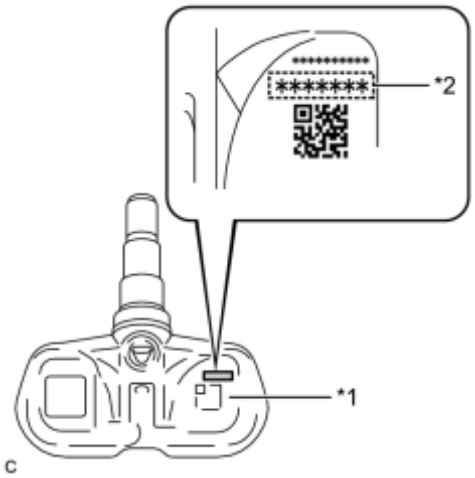
NOTICE:

- Always use a new grommet, washer and nut when installing the tire pressure warning valve and transmitter.
- If installing a new tire pressure warning valve and transmitter, write down the ID number before installation.
- Check that there is no oil, water or lubricant around the rim hole, tire pressure warning valve and transmitter, washer and nut. Failing to do so may result in improper installation.

1. INSTALL TIRE PRESSURE WARNING VALVE AND TRANSMITTER

(a) Install a new grommet to the tire pressure warning valve and transmitter.

(b) Insert the tire pressure warning valve and transmitter into the valve installation hole. Insert it from the inside of the rim so that the printed surface can be seen.




c

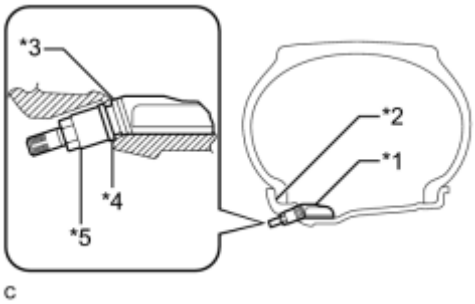
## Text in Illustration

| | |
|---|---|
| *1 | Printed Surface |
| *2 | 7-digit Number Transmitter ID |

- Check that there is no visible deformation, damage, or other abnormalities on the tire pressure warning valve and transmitter.
- Check that there is no foreign matter on the grommet and around the rim hole.
- If the tire pressure warning valve and transmitter is installed upside down, it may be damaged or fail to transmit signals when driving at high speeds.

(c) Install a new washer on the tire pressure warning valve and transmitter with the grommet from the rim side and tighten a new nut.

## Text in Illustration




c

| | |
|---|---|
| *1 | Tire Pressure Warning Valve and Transmitter |
| *2 | Rim |
| *3 | Grommet |
| *4 | Washer |
| *5 | Nut |

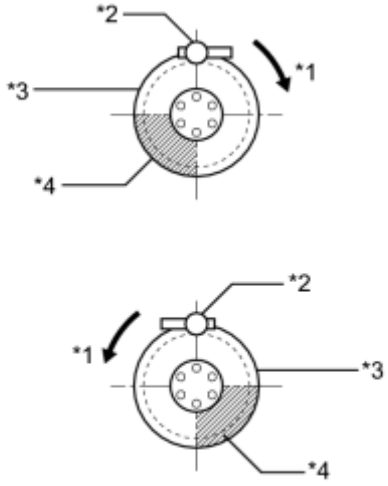
Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

- No further tightening is required once the nut is tightened to the

specified torque.

- Check that there is no foreign matter on the washer and nut.

(d) Set the wheel onto the mounting machine and install the lower bead. Position the main body of the tire pressure warning valve and transmitter in the shaded area shown in the illustration.




c

# Text in Illustration

| | |
|---|---|
| *1 | Rim Rotating Direction |
| *2 | Mount Tool of the Mounting Machine |
| *3 | Rim |
| *4 | Area for Tire Pressure Warning Valve and Transmitter |

- If the tire pressure warning valve and transmitter is positioned outside this area, it will interfere with the tire bead and may be damaged.
- If the use of lubricant is required when installing the bead, do not apply lubricant directly to the tire pressure warning valve and transmitter.

(e) Install the upper bead.

NOTICE:

Make sure that the tire bead and tool do not interfere with the main body of the tire pressure warning valve and transmitter and that it is not clamped by the bead.

(f) Install the valve core.

(g) After the tire is inflated, the valve nut may be loose. Retighten the nut to the specified torque.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

NOTICE:

No further tightening is required once the nut is tightened to the specified torque.

(h) Check for air leaks with soapy water.

If there is air leakage, push the valve core 2 or 3 times to remove any dirt attached to the valve core. If air continues leak, replace the grommet, washer and nut.

(i) Install the cap.

2. INSTALL FRONT WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

3. INSTALL REAR WHEEL

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

4. INSPECT TIRES INFO

5. REGISTER TRANSMITTER ID

(a) Register all transmitter IDs INFO.

6. PERFORM INITIALIZATION

(a) Perform initialization INFO.

7. INSPECT TIRE PRESSURE WARNING SYSTEM

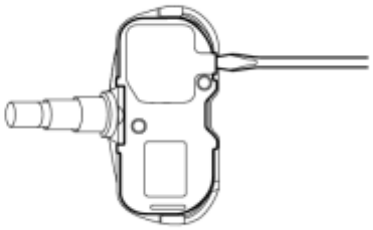
(a) Inspect the tire pressure warning system INFO.

# DISPOSAL

NOTICE:

The tire pressure warning valve and transmitter is powered by a lithium battery. When disposing of the tire pressure warning valve and transmitter, remove the battery and dispose of it correctly.

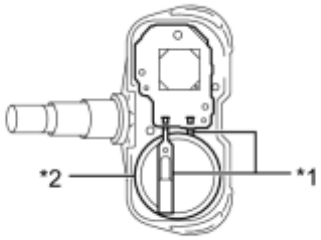
1. DISPOSE OF TIRE PRESSURE WARNING VALVE AND TRANSMITTER



c

(a) Using the tip of a screwdriver, pry off the back cover.

(b) Cut the 2 terminals that connect the battery to the base board to remove the battery.




c

## Text in Illustration

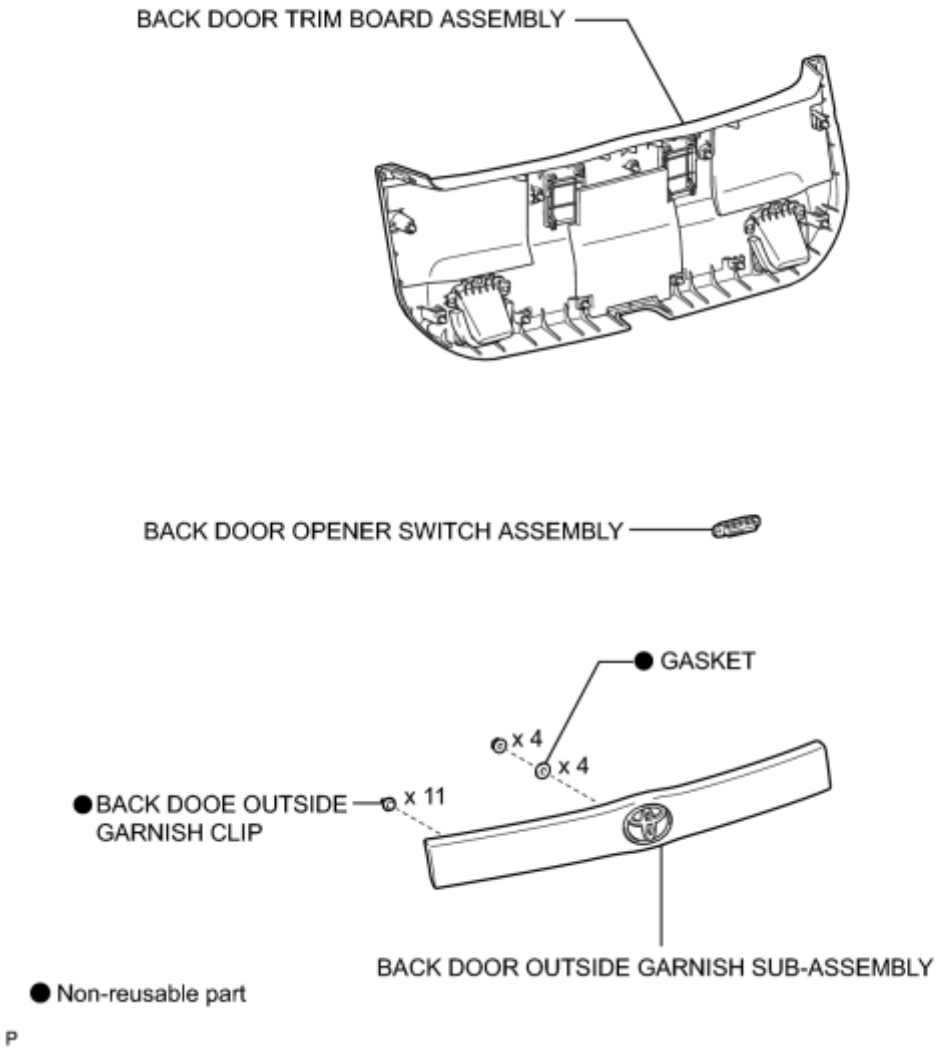
| | |
|---|---|
| *1 | Terminal |
| *2 | Lithium Battery |

HINT:

The battery and base board are covered with silicone.

# COMPONENTS

# ILLUSTRATION



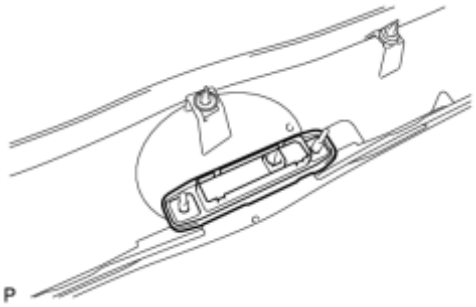

P

# REMOVAL

1. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

2. REMOVE BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

3. REMOVE BACK DOOR OPENER SWITCH ASSEMBLY

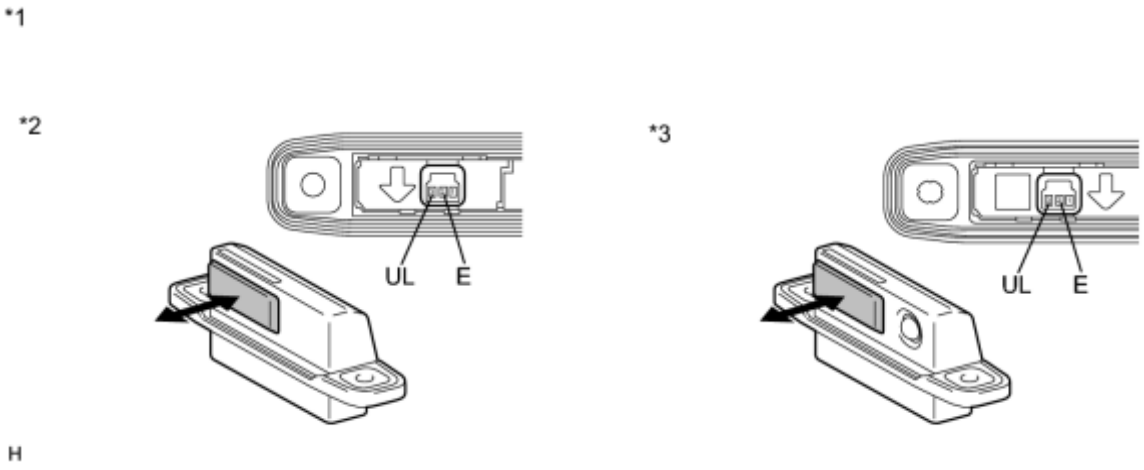



(a) Remove the back door opener switch assembly.

# INSPECTION

1. INSPECT BACK DOOR OPENER SWITCH ASSEMBLY

(a) Check the operation of the opener switch.




(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 2 (E) - 3 (UL) | Back door opener switch not pushed | 10 kΩ or higher |
| 2 (E) - 3 (UL) | Back door opener switch pushed | Below 1 Ω |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Back Door Opener Switch Assembly (Opener Switch)) | *2 | w/o Entry Back Door Open |
| *3 | w/ Entry Back Door Open | - | - |

If the result is not specified, replace the back door opener switch assembly.

(b) Check operation of the lock switch (w/ Entry Back Door Open).

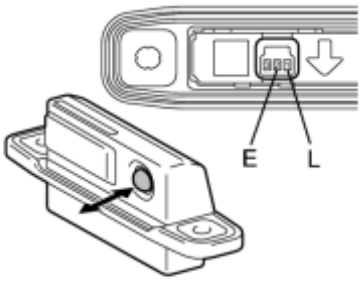
(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Position | Specified Condition |
|---|---|---|
| 1(L) - 2(E) | Back door lock switch not | 10 kΩ or higher |

*1

| | | |
|---|---|---|
| | pushed | |
| 1(L) - 2(E) | Back door lock switch pushed | Below 1 Ω |




H

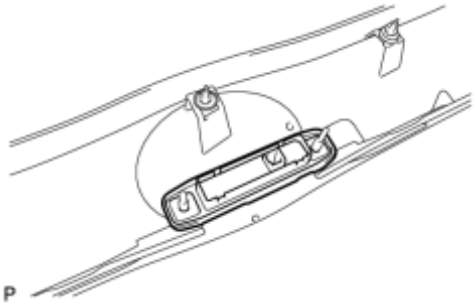
# Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Back Door Opener Switch Assembly (Lock Switch)) |

If the result is not specified, replace the back door opener switch assembly.

# INSTALLATION

1. INSTALL BACK DOOR OPENER SWITCH ASSEMBLY



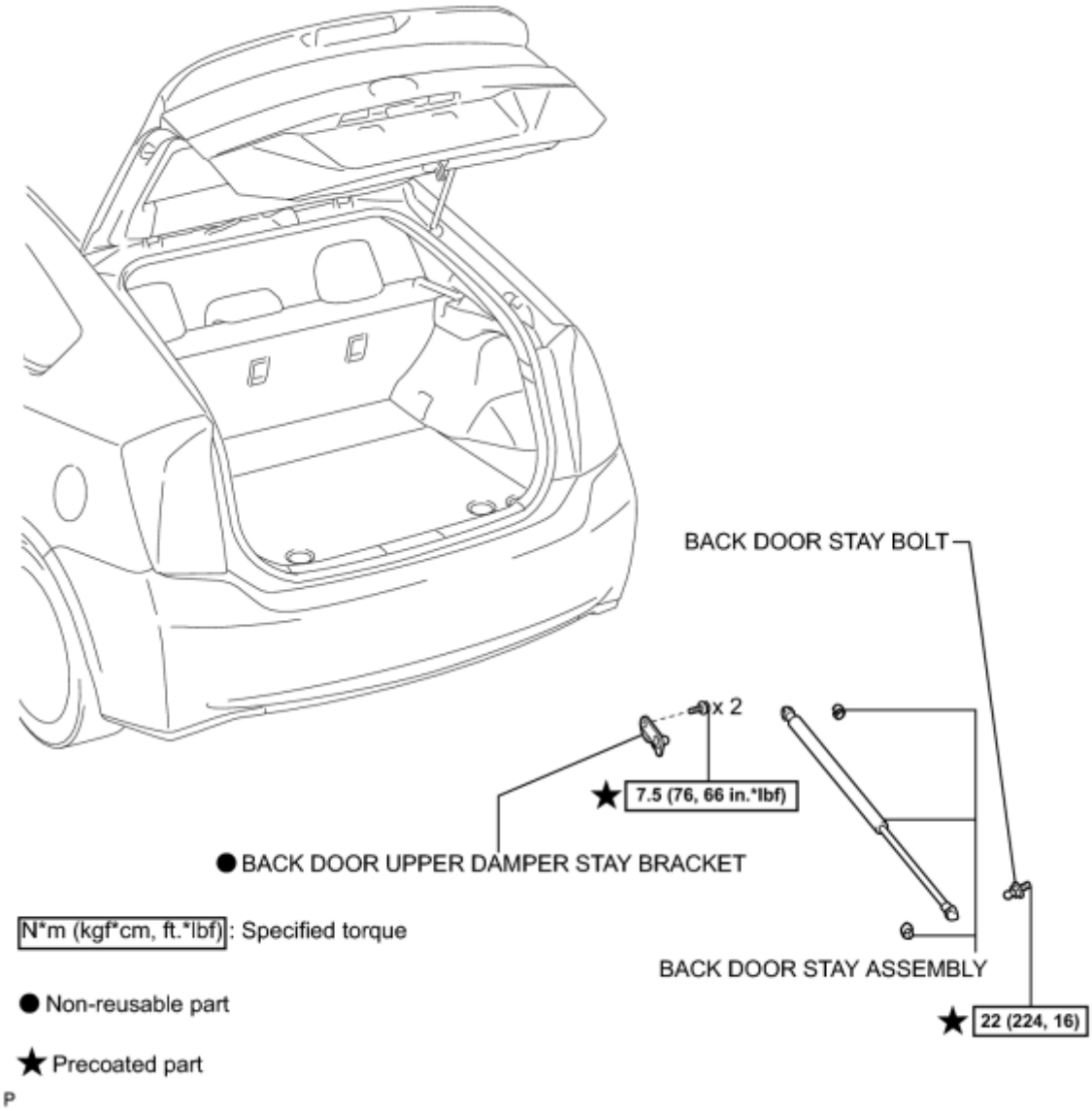

(a) Install the back door opener switch assembly.

2. INSTALL BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

3. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION



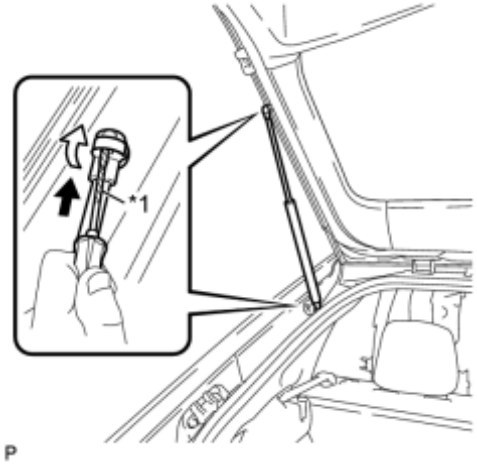

P

# REMOVAL

1. REMOVE BACK DOOR STAY ASSEMBLY

NOTICE:

- Avoid touching the piston rod as much as possible to prevent foreign matter from attaching to it. Be sure to hold the cylinder while servicing.
- Do not wear cotton gloves or other similar materials when handling the piston rod. Fibers may attach to the rod and result in gas leaks.
- Do not apply any horizontal load to the door stay in order to prevent the piston rod from deforming.




(a) Using a screwdriver, remove the stop ring along the groove.

HINT:

Tape the screwdriver tip before use.

## Text in Illustration

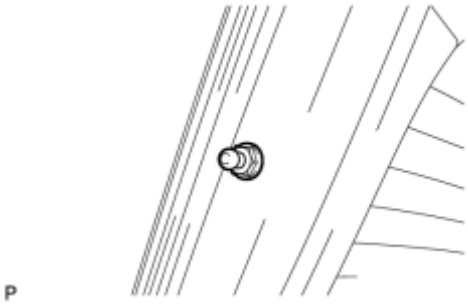
| | |
|---|---|
| *1 | Protective Tape |

(b) Release the ball joint and remove the back door stay assembly.

NOTICE:

Remove the back door stay assembly while supporting the back door by hand.

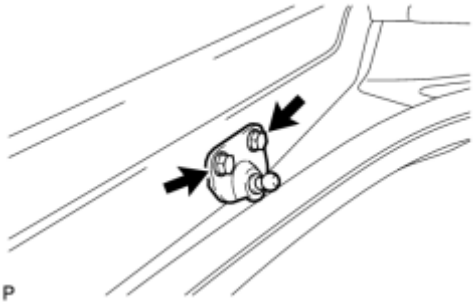
2. REMOVE BACK DOOR STAY BOLT




(a) Remove the back door stay bolt.

3. REMOVE BACK DOOR UPPER DAMPER STAY BRACKET

(a) Remove the 2 bolts and back door upper damper stay bracket.


P

# INSTALLATION

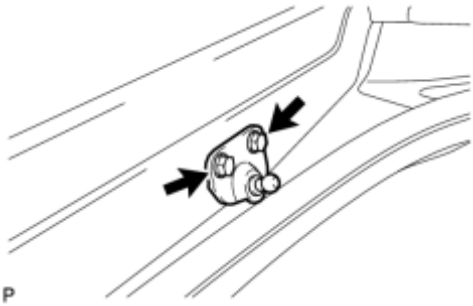
1. INSTALL BACK DOOR UPPER DAMPER STAY BRACKET

(a) Clean the threaded portion on the vehicle body with a non-residue solvent.

(b) Apply adhesive to the threads of the 2 bolts.

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent




(c) Install a new back door upper damper stay bracket with the 2 bolts.

Torque: **7.5 N·m (76 kgf·cm, 66in·lbf)**

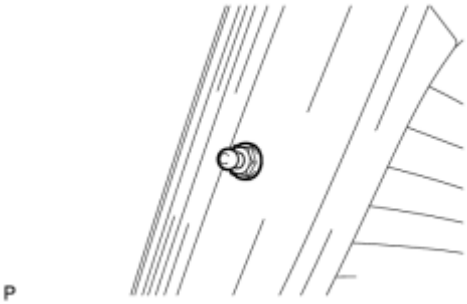
2. INSTALL BACK DOOR STAY BOLT

(a) Clean the threaded portion on the vehicle body with a non-residue solvent.

(b) Apply adhesive to the threads of the back door stay bolt.

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent




(c) Install the back door stay bolt.

Torque: **22 N·m (224 kgf·cm, 16ft·lbf)**

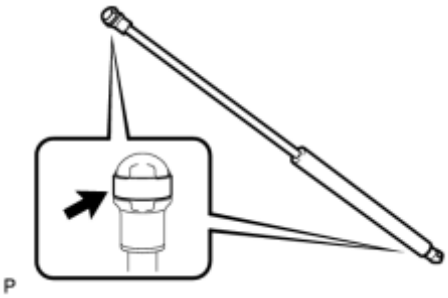
3. INSTALL BACK DOOR STAY ASSEMBLY

NOTICE:

- Avoid touching the piston rod as much as possible to prevent foreign matter from attaching to it. Be sure to hold the cylinder while servicing.

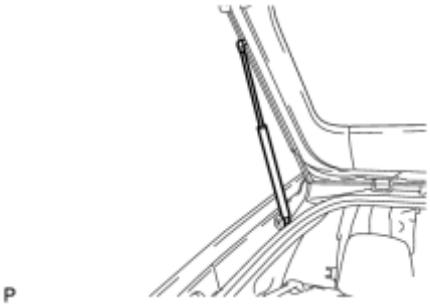
- Do not wear cotton gloves or other similar materials when handling the piston rod. Fibers may attach to the rod and result in gas leaks.
- Do not apply any horizontal load to the door stay in order to prevent the rod from deforming.

(a) When reusing the back door stay assembly:



P

(1) Install the 2 stop rings to the back door stay assembly.



P

(b) Install the back door stay assembly.

NOTICE:

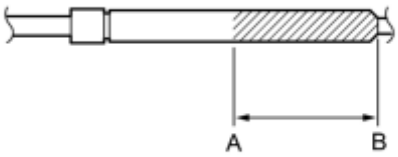
Install the back door stay assembly while supporting the back door by hand.

(c) Check that the back door stay assembly is engaged in the ball joint and that the back door stay assembly cannot be pulled out.

# DISPOSAL

1. DISPOSE OF BACK DOOR STAY ASSEMBLY

(a) Secure the back door stay assembly horizontally in a vise with the piston rod pulled out.




P

(b) Wear safety glasses. Use a metal saw to slowly cut a groove between A and B shown in the illustration to release the gas.

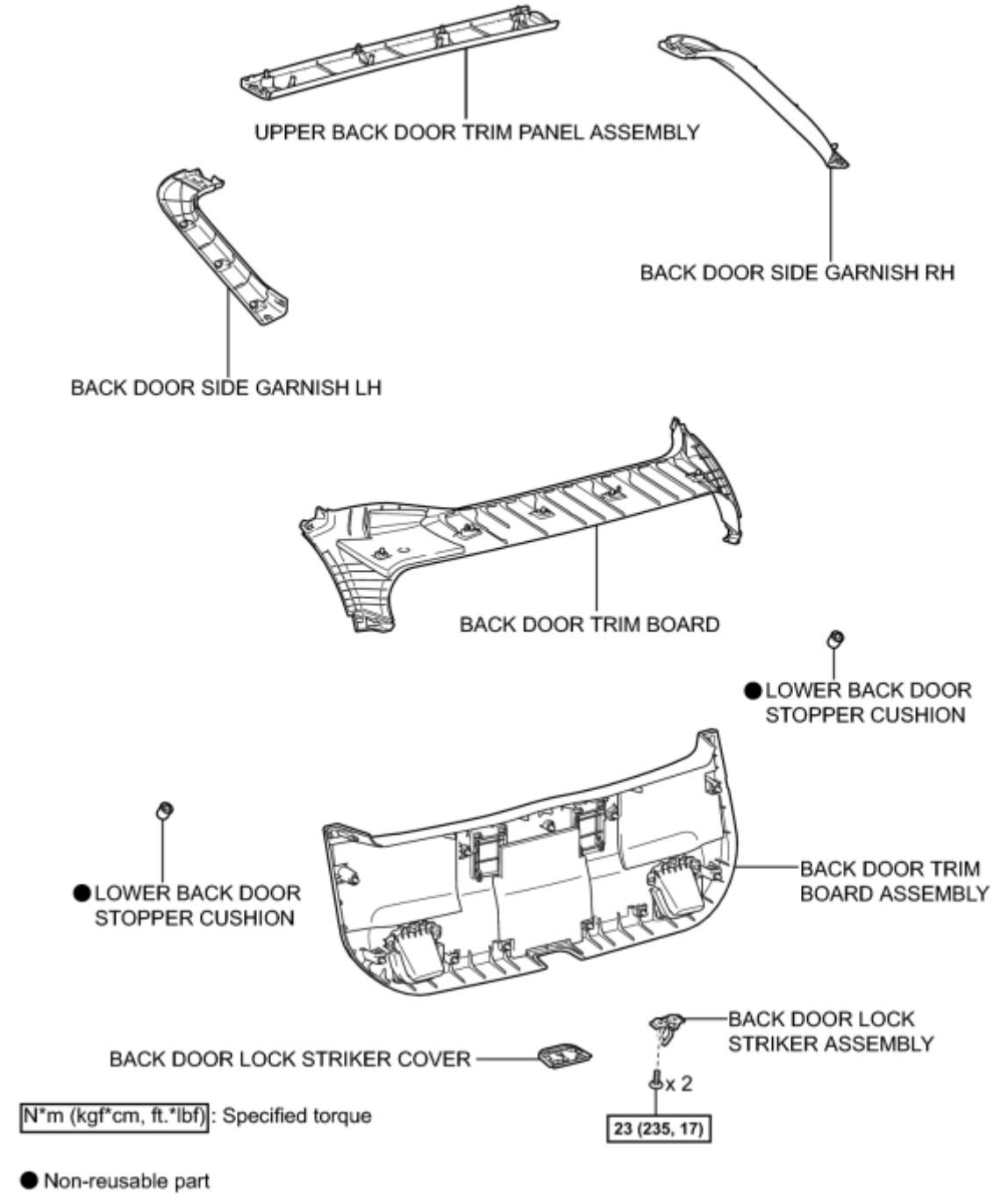
| Area | Measurement |
|---|---|
| A-B | 50 mm (1.97 in.) |

NOTICE:

Although the gas inside the back door stay assembly is colorless, odorless and harmless, metal debris may scatter. Therefore, cover the back door stay assembly with a piece of cloth or other material.

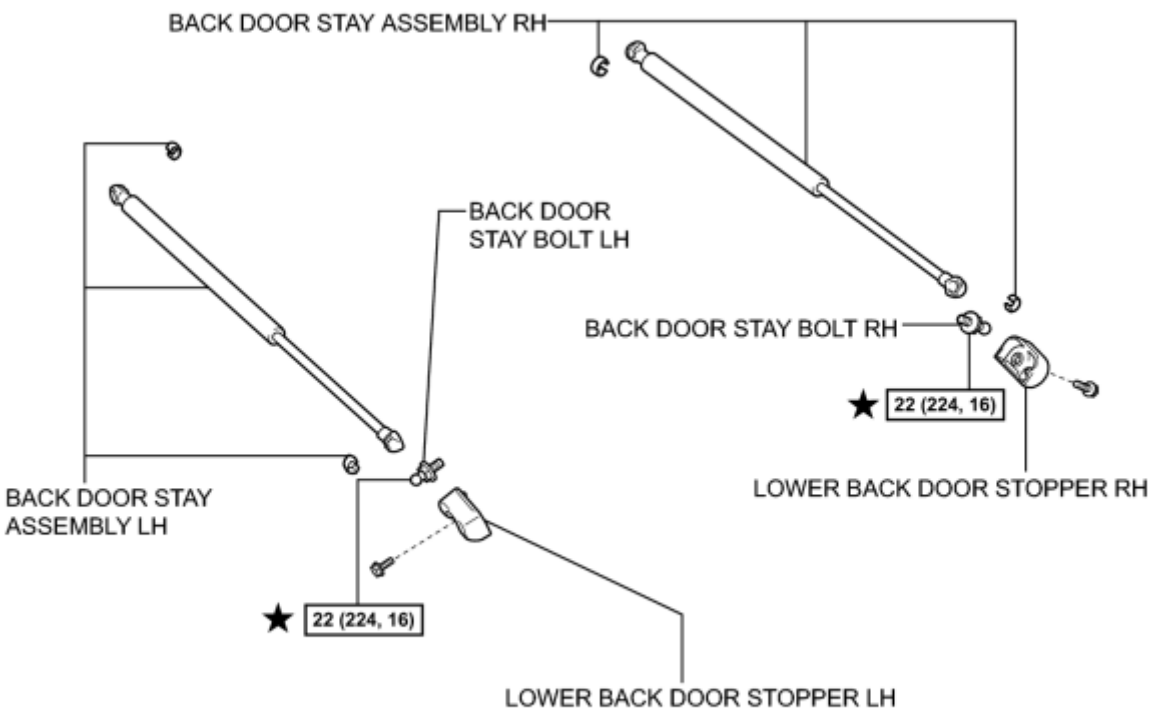
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION

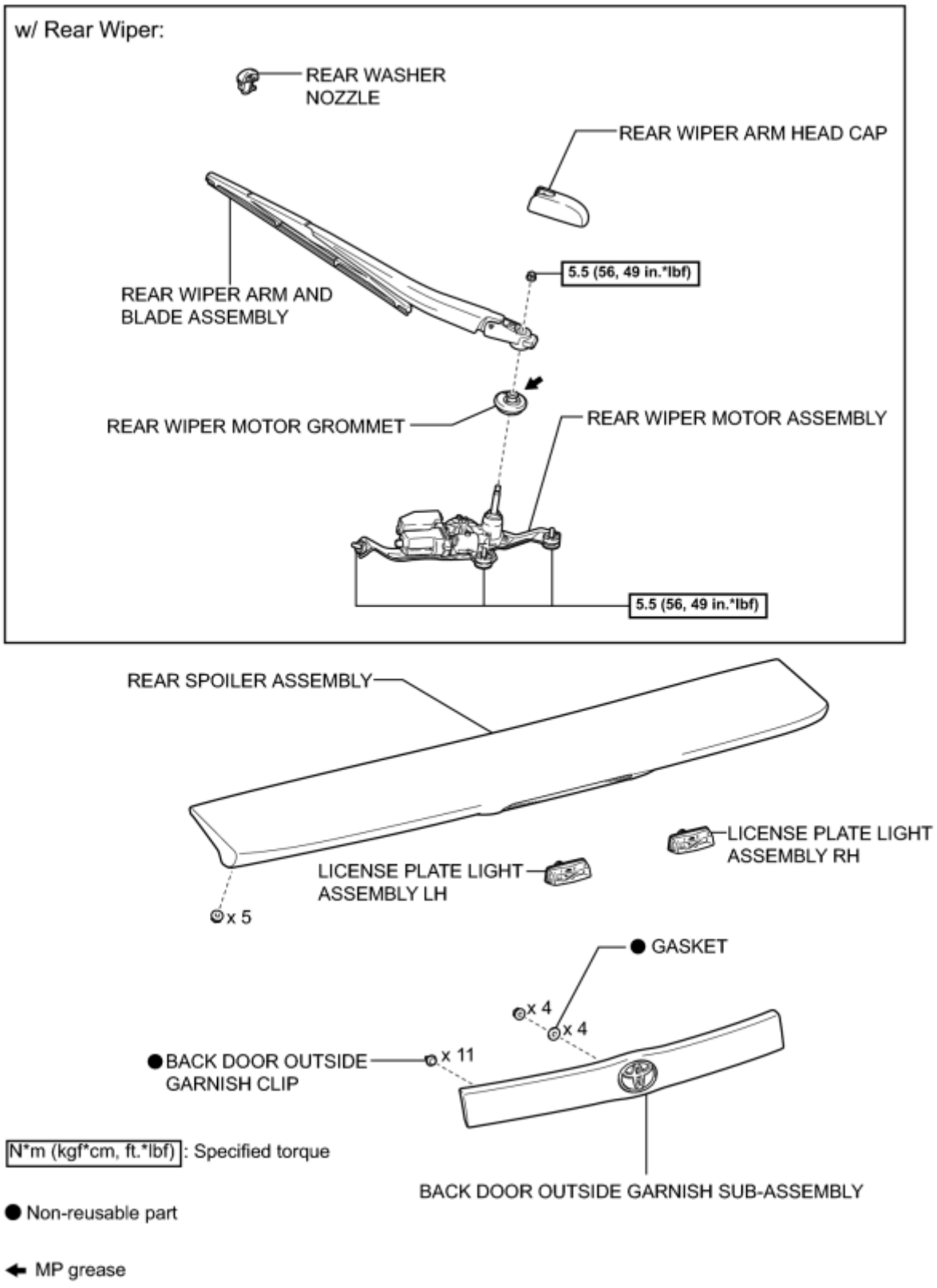



N*m (kgf*cm, ft.*lbf): Specified torque

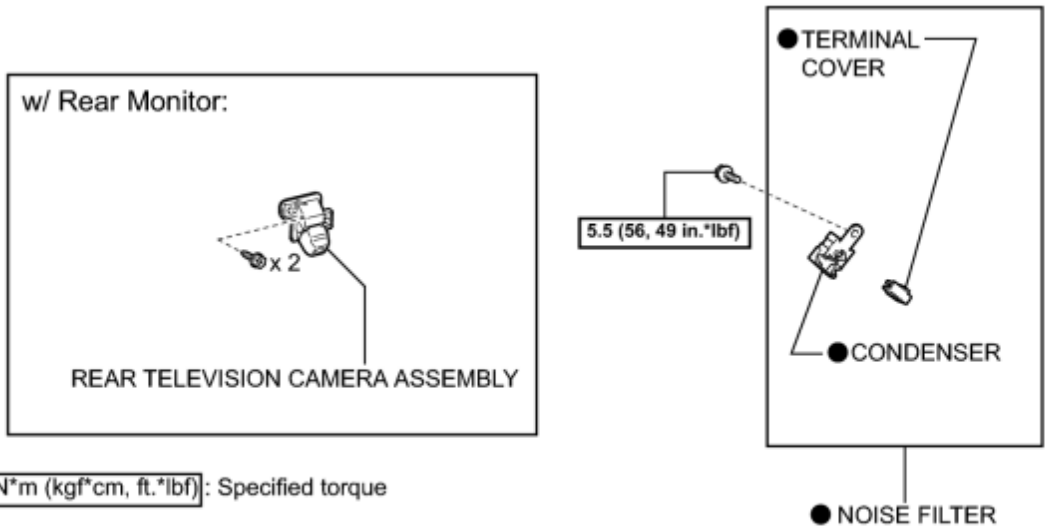
★ Precoated part

P

# ILLUSTRATION




# ILLUSTRATION



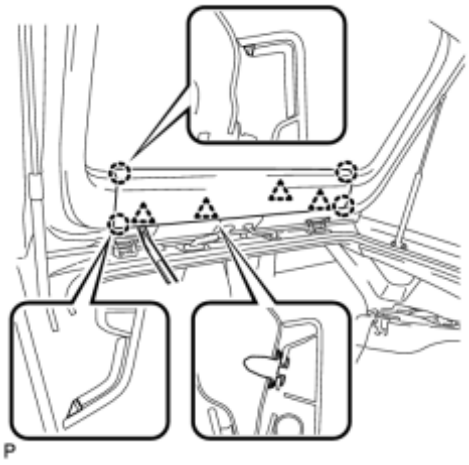

N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

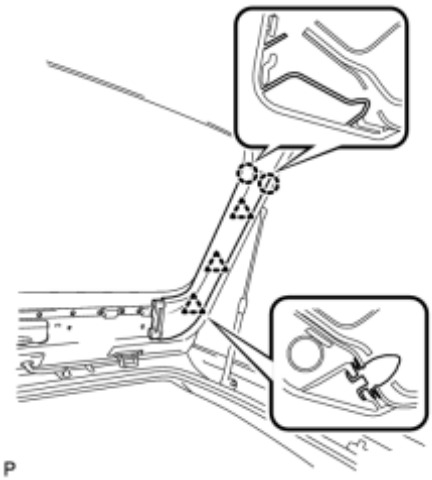
# DISASSEMBLY

1. REMOVE UPPER BACK DOOR TRIM PANEL ASSEMBLY




(a) Using a moulding remover, disengage the 4 clips and 4 claws, and remove the upper back door trim panel assembly.

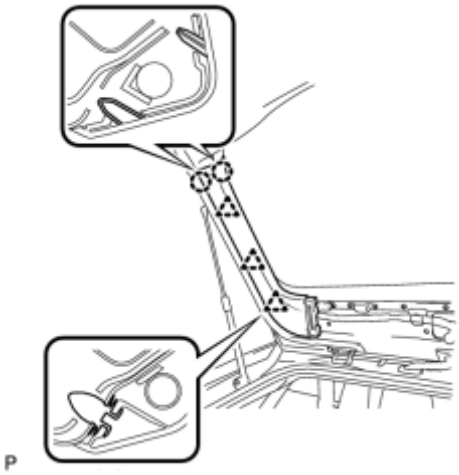
2. REMOVE BACK DOOR SIDE GARNISH RH



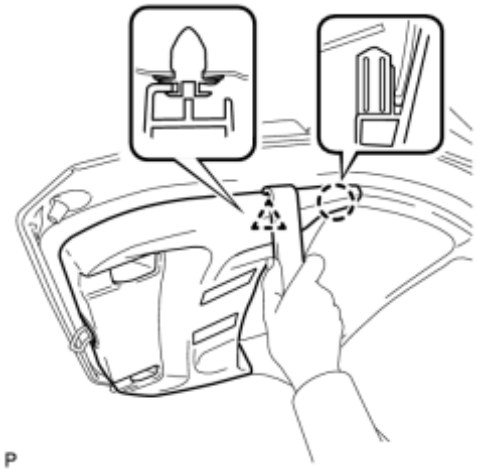

(a) Disengage the 3 clips and 2 claws, and remove the back door side garnish RH.

3. REMOVE BACK DOOR SIDE GARNISH LH

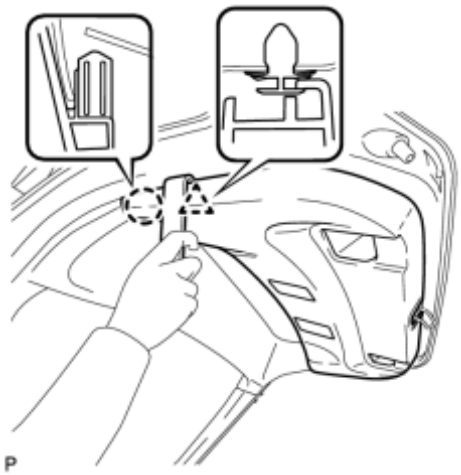
(a) Disengage the 3 clips and 2 claws, and remove the back door side garnish LH.



4. REMOVE BACK DOOR TRIM BOARD ASSEMBLY

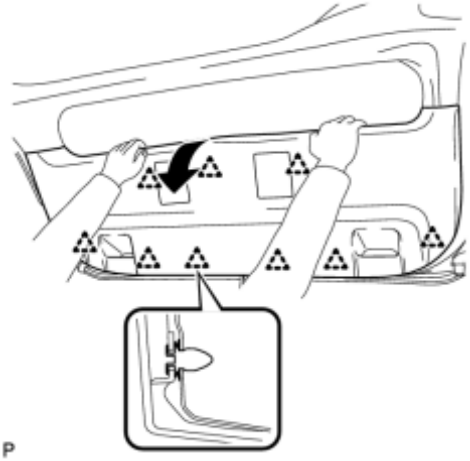


(a) Using a moulding remover, disengage the clip and claw.



(b) Using a moulding remover, disengage the clip and claw.

(c) Disengage the 9 clips and remove the back door trim board assembly as shown in the illustration.



P

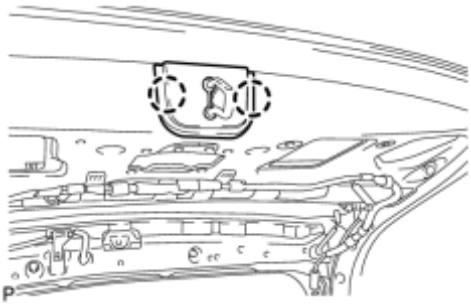
5. REMOVE BACK DOOR TRIM BOARD



P

(a) Disengage the 5 clips and 2 guides, and remove the back door trim board.

6. REMOVE BACK DOOR LOCK STRIKER COVER

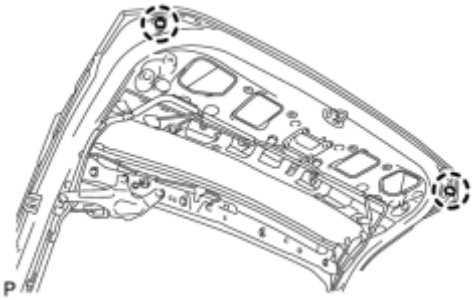


P

(a) Disengage the 2 claws and remove the back door lock striker cover.

7. REMOVE LOWER BACK DOOR STOPPER CUSHION

(a) Disengage the claws to remove the 2 lower back door stopper cushions.

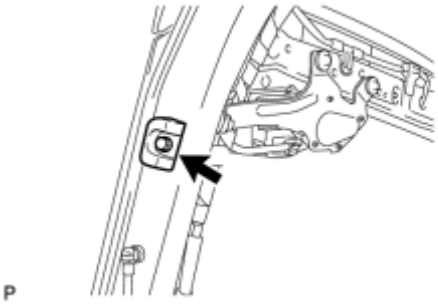


8. REMOVE BACK DOOR LOCK STRIKER ASSEMBLY



(a) Using a T40 "TORX" socket wrench, remove the 2 screws and back door lock striker assembly.

9. REMOVE LOWER BACK DOOR STOPPER LH



(a) Remove the bolt and lower back door stopper LH.

10. REMOVE LOWER BACK DOOR STOPPER RH

HINT:

Use the same procedure for the RH side and LH side.

11. REMOVE BACK DOOR STAY ASSEMBLY LH INFO

12. REMOVE BACK DOOR STAY ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

13. REMOVE BACK DOOR STAY BOLT LH INFO

14. REMOVE BACK DOOR STAY BOLT RH

HINT:

Use the same procedure for the RH side and LH side.

15. REMOVE BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

16. REMOVE LICENSE PLATE LIGHT ASSEMBLY LH INFO

17. REMOVE LICENSE PLATE LIGHT ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

18. REMOVE REAR SPOILER ASSEMBLY INFO

19. REMOVE REAR WASHER NOZZLE (w/ Rear Wiper) INFO

20. REMOVE REAR WIPER ARM HEAD CAP (w/ Rear Wiper) INFO

21. REMOVE REAR WIPER ARM AND BLADE ASSEMBLY (w/ Rear Wiper) INFO

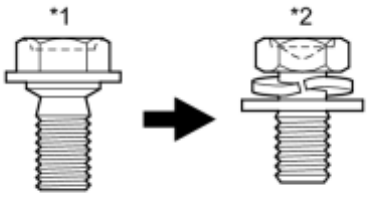
22. REMOVE REAR WIPER MOTOR GROMMET (w/ Rear Wiper) INFO

23. REMOVE REAR WIPER MOTOR ASSEMBLY (w/ Rear Wiper) INFO

24. REMOVE REAR TELEVISION CAMERA ASSEMBLY (w/ Rear Monitor) INFO

25. REMOVE NOISE FILTER INFO

# ADJUSTMENT




P

***Text in Illustration***

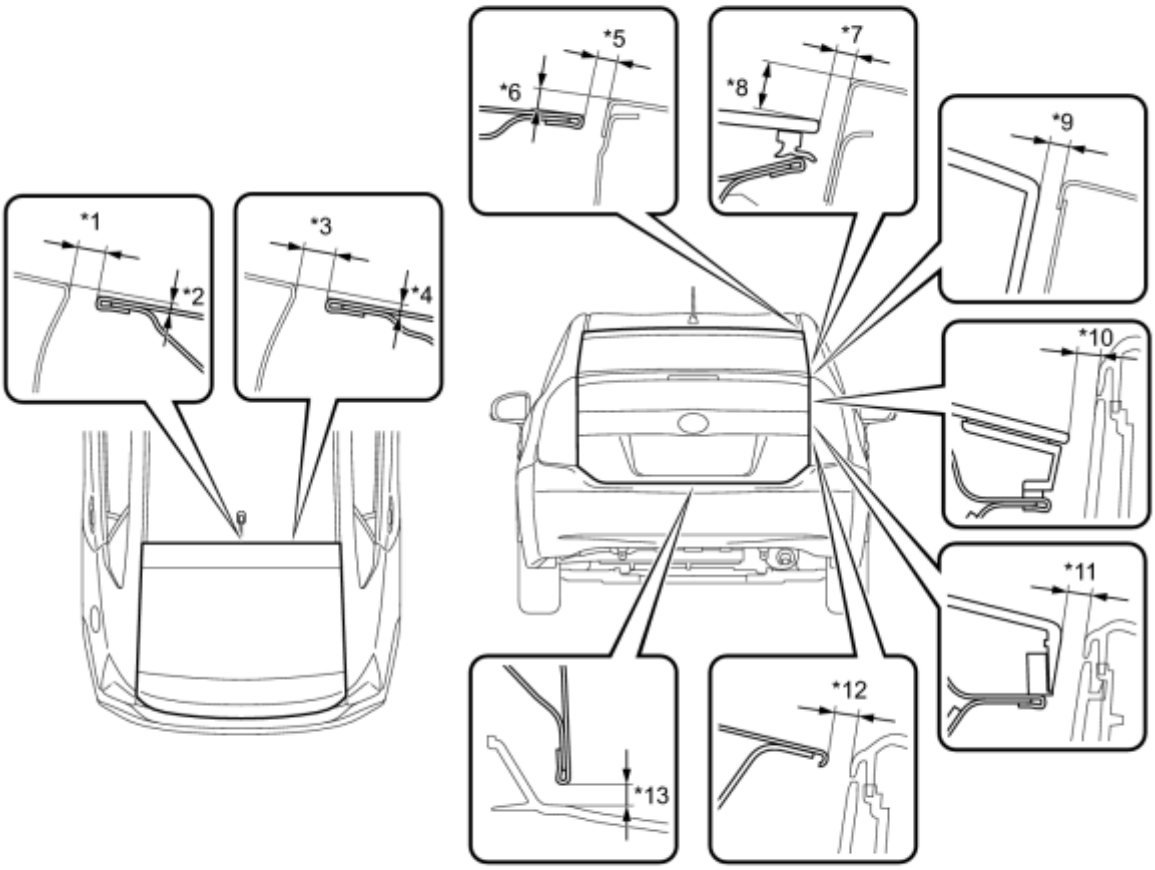
| | |
|---|---|
| *1 | Centering Bolt |
| *2 | Standard Bolt |

HINT:

- Use the same procedure for the RH side and LH side.
- The following procedure is for the LH side.
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts installed. Substitute the centering bolts with standard bolts (with washers) when making adjustments.
- Specified torque for standard bolts is shown in the standard bolt chart INFO.

1. INSPECT BACK DOOR

(a) Check that the clearance measurements of areas *1 through *13 are within each standard range.




P

### *Standard Clearance*

| Area | Measurement | Area | Measurement |
|---|---|---|---|
| *1 | 5.7 to 8.7 mm (0.224 to 0.343 in.) | *2 | 0 to 3.0 mm (0 to 0.118 in.) |
| *3 | 5.7 to 8.7 mm (0.224 to 0.343 in.) | *4 | 0 to 3.0 mm (0 to 0.118 in.) |
| *5 | 3.2 to 6.2 mm (0.126 to 0.244 in.) | *6 | 3.6 to 6.6 mm (0.142 to 0.260 in.) |
| *7 | 2.85 to 6.85 mm (0.112 to 0.270 in.) | *8 | 9.65 to 13.65 mm (0.380 to 0.537 in.) |
| *9 | 2.85 to 6.85 mm (0.112 to 0.270 in.) | *10 | 4.0 to 8.0 mm (0.157 to 0.315 in.) |
| *11 | 4.5 to 8.5 mm (0.177 to 0.335 in.) | *12 | 3.85 to 7.85 mm (0.152 to 0.309 in.) |
| *13 | 4.35 to 7.35 mm (0.171 to 0.289 in.) | - | - |

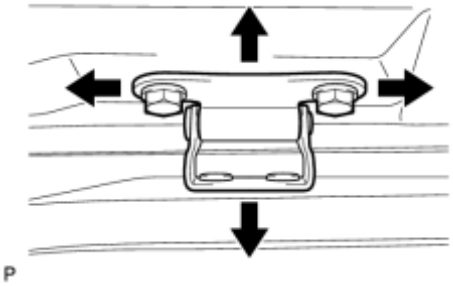
2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE DECK TRIM SERVICE HOLE COVER INFO

5. REMOVE REAR DECK TRIM COVER INFO

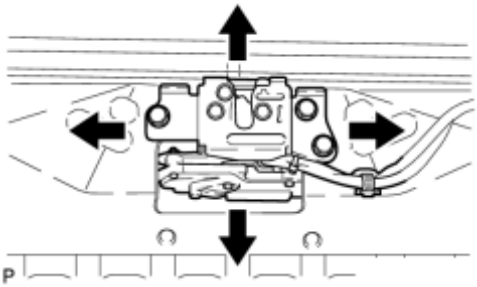
6. ADJUST BACK DOOR




(a) Before adjusting the upper end of the back door up and down or left and right, loosen the bolts.

(b) Tighten the body side hinge after the adjustment.

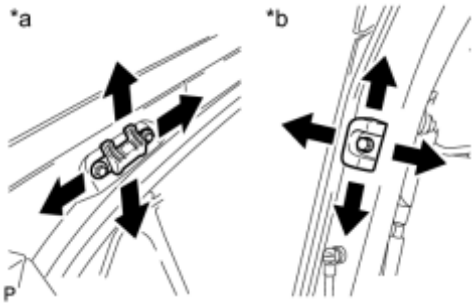
Torque: **19 N·m (194 kgf·cm, 14ft·lbf)**




(c) Loosen the 3 bolts.

(d) Tighten the bolts after the adjustment.

Torque: **7.5 N·m (77 kgf·cm, 66in·lbf)**




(e) After adjusting the back door position, adjust the positions of the lower back door stopper and lower back door stopper cushion.

## Text in Illustration

| | |
|---|---|
| *a | Vehicle Body Side |
| *b | Door Side |

7. INSTALL REAR DECK TRIM COVER INFO

8. INSTALL DECK TRIM SERVICE HOLE COVER INFO

9. INSTALL REAR DECK FLOOR BOX INFO

10. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# REASSEMBLY

1. INSTALL NOISE FILTER INFO

2. INSTALL REAR TELEVISION CAMERA ASSEMBLY (w/ Rear Monitor) INFO

3. INSTALL REAR WIPER MOTOR ASSEMBLY (w/ Rear Wiper) INFO

4. INSTALL REAR WIPER MOTOR GROMMET (w/ Rear Wiper) INFO

5. INSTALL REAR WIPER ARM AND BLADE ASSEMBLY (w/ Rear Wiper) INFO

6. INSTALL REAR WIPER ARM HEAD CAP (w/ Rear Wiper) INFO

7. INSTALL REAR WASHER NOZZLE (w/ Rear Wiper) INFO

8. INSPECT REAR WASHER NOZZLE (w/ Rear Wiper) INFO

9. ADJUST REAR WASHER NOZZLE (w/ Rear Wiper) INFO

10. INSTALL REAR SPOILER ASSEMBLY INFO

11. INSTALL LICENSE PLATE LIGHT ASSEMBLY LH INFO

12. INSTALL LICENSE PLATE LIGHT ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

13. INSTALL BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

14. INSTALL BACK DOOR STAY BOLT LH INFO

15. INSTALL BACK DOOR STAY BOLT RH

HINT:

Use the same procedure for the RH side and LH side.

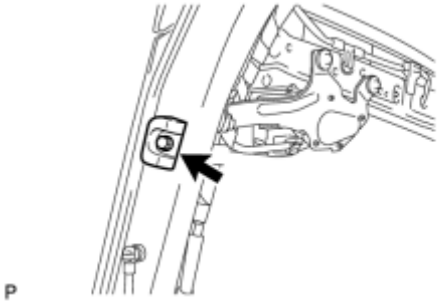
16. INSTALL BACK DOOR STAY ASSEMBLY LH INFO

17. INSTALL BACK DOOR STAY ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

18. INSTALL LOWER BACK DOOR STOPPER LH



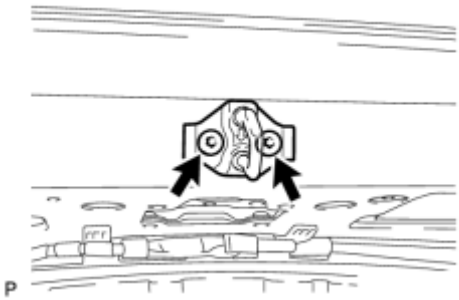
(a) Install the lower back door stopper LH with the bolt.

19. INSTALL LOWER BACK DOOR STOPPER RH

HINT:

Use the same procedure for the RH side and LH side.

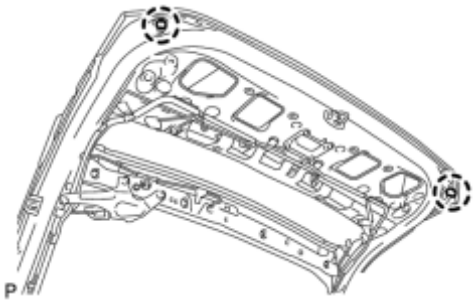
20. INSTALL BACK DOOR LOCK STRIKER ASSEMBLY



(a) Using a T40 "TORX" socket wrench, install the back door lock striker assembly with the 2 screws.

Torque: **23 N·m (235 kgf·cm, 17ft·lbf)**

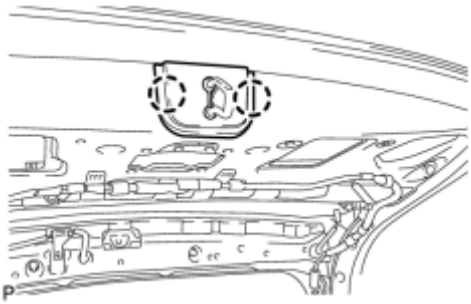
21. INSTALL LOWER BACK DOOR STOPPER CUSHION



(a) Engage the claws to install the 2 new lower back door stopper cushions.

22. INSTALL BACK DOOR LOCK STRIKER COVER

(a) Engage the 2 claws to install the back door lock striker cover.

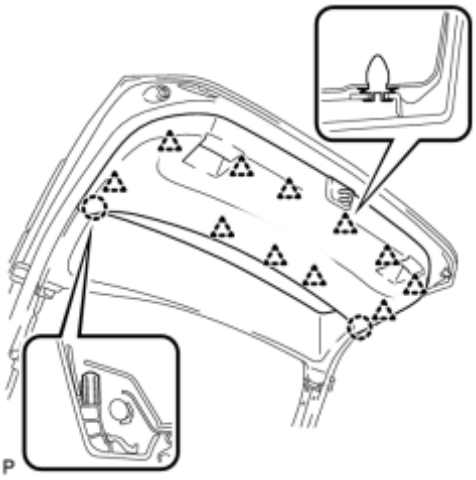


23. INSTALL BACK DOOR TRIM BOARD



(a) Engage the 5 clips and 2 guides to install the back door trim board.

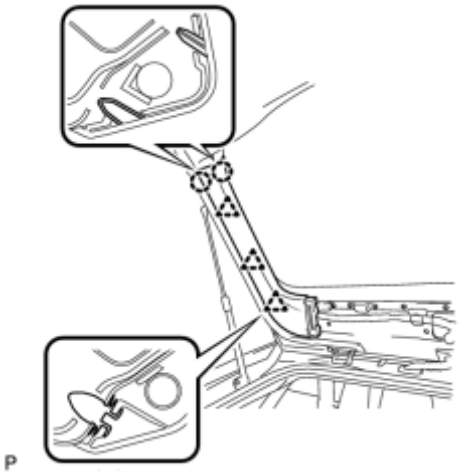
24. INSTALL BACK DOOR TRIM BOARD ASSEMBLY



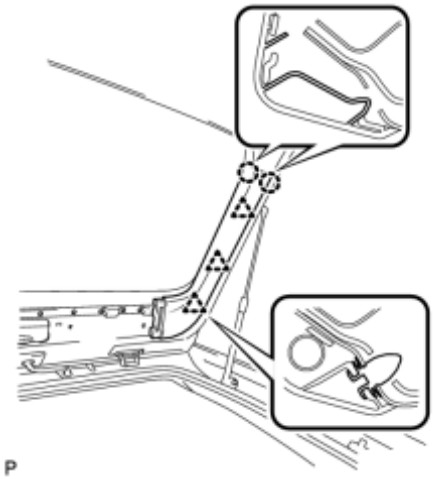
(a) Engage the 11 clips and 2 claws to install the back door panel trim assembly.

25. INSTALL BACK DOOR SIDE GARNISH LH

(a) Engage the 3 clips and 2 claws to install the back door side garnish LH.

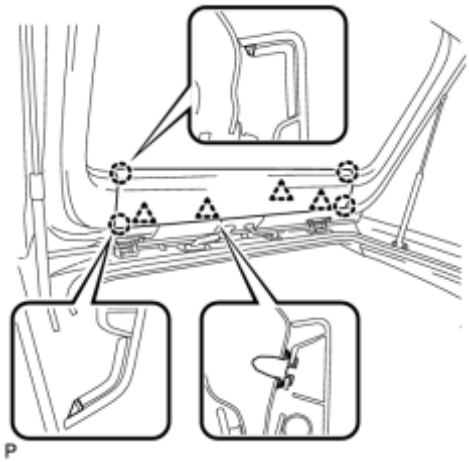



26. INSTALL BACK DOOR SIDE GARNISH RH




(a) Engage the 3 clips and 2 claws to install the back door side garnish RH.

27. INSTALL UPPER BACK DOOR TRIM PANEL ASSEMBLY



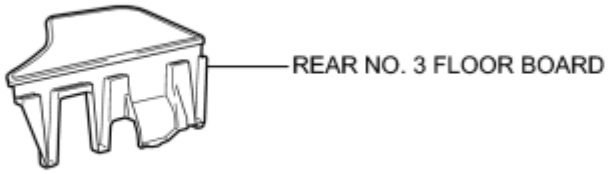

(a) Engage the 4 clips and 4 claws to install the upper back door trim panel assembly.

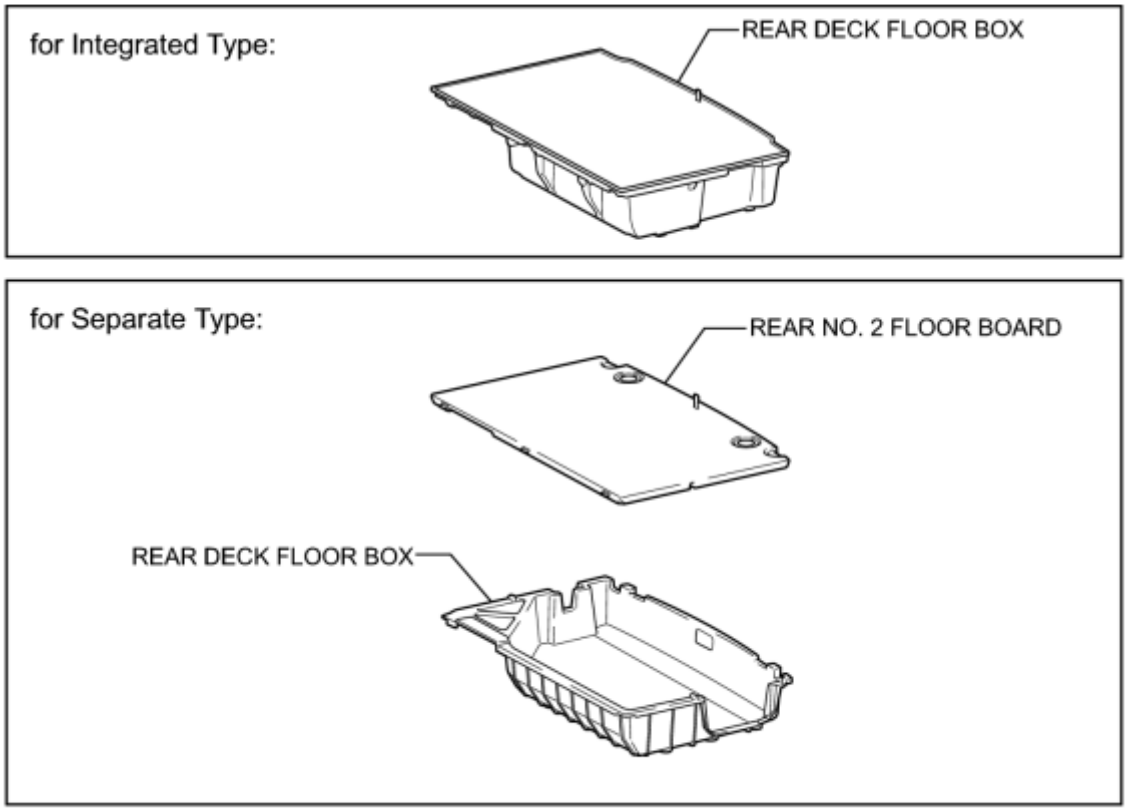
28. ADJUST REAR TELEVISION CAMERA OPTICAL AXIS (CAMERA POSITION SETTINGS (w/ Advanced Parking Guidance System)

INFO

# COMPONENTS

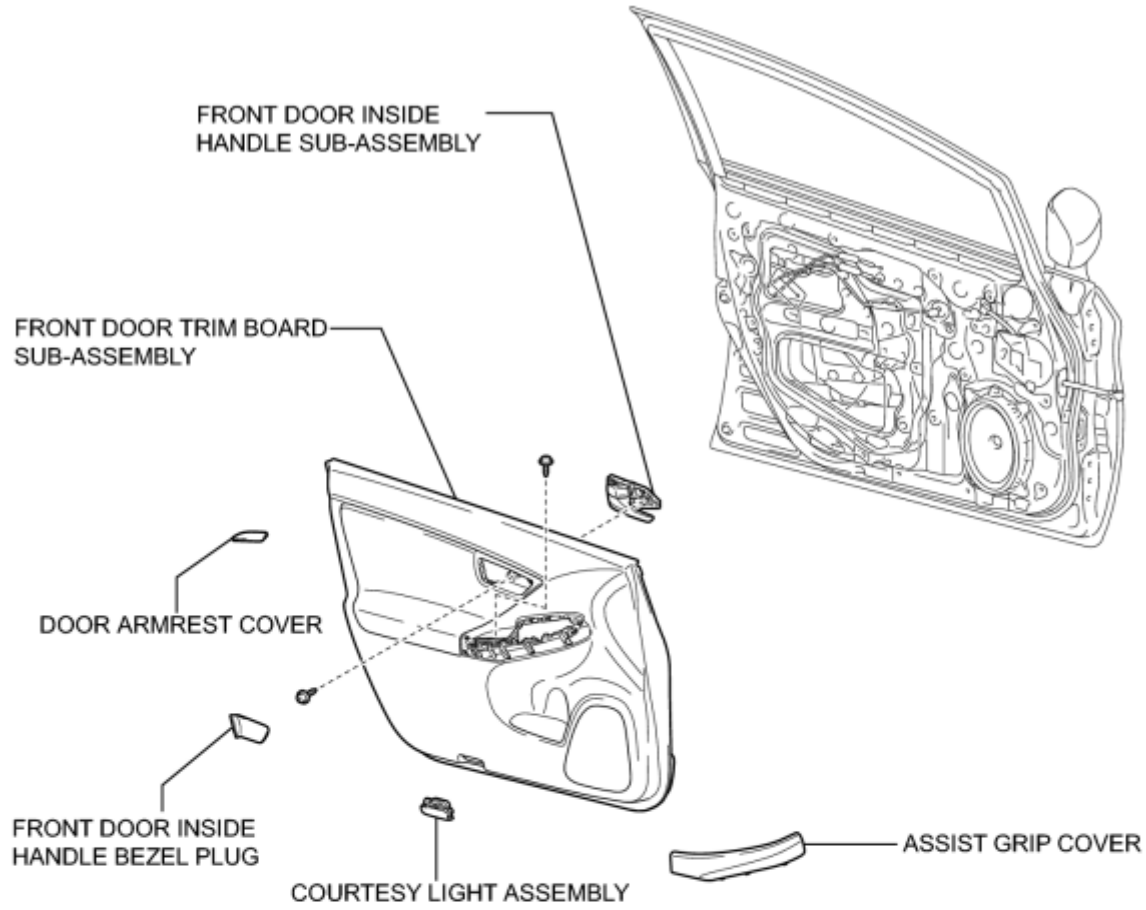
# ILLUSTRATION

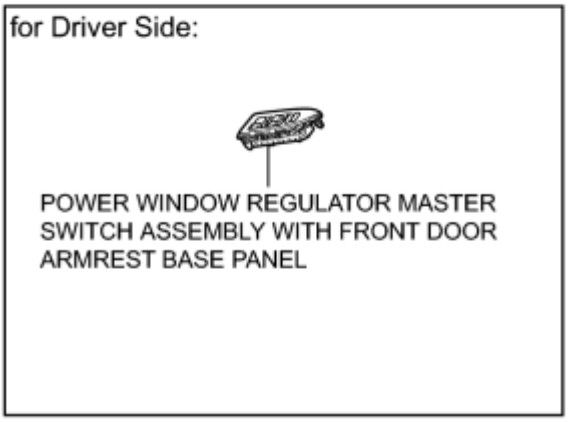


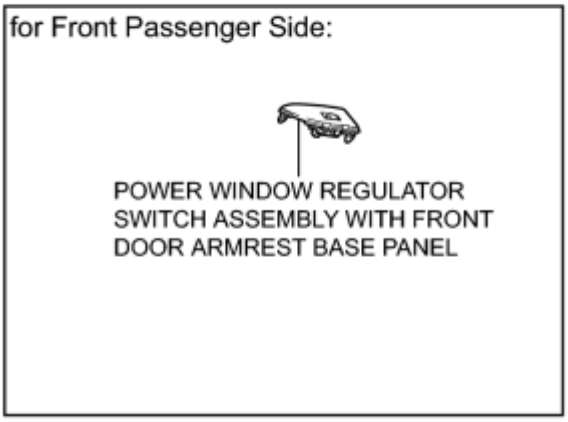




P

# ILLUSTRATION

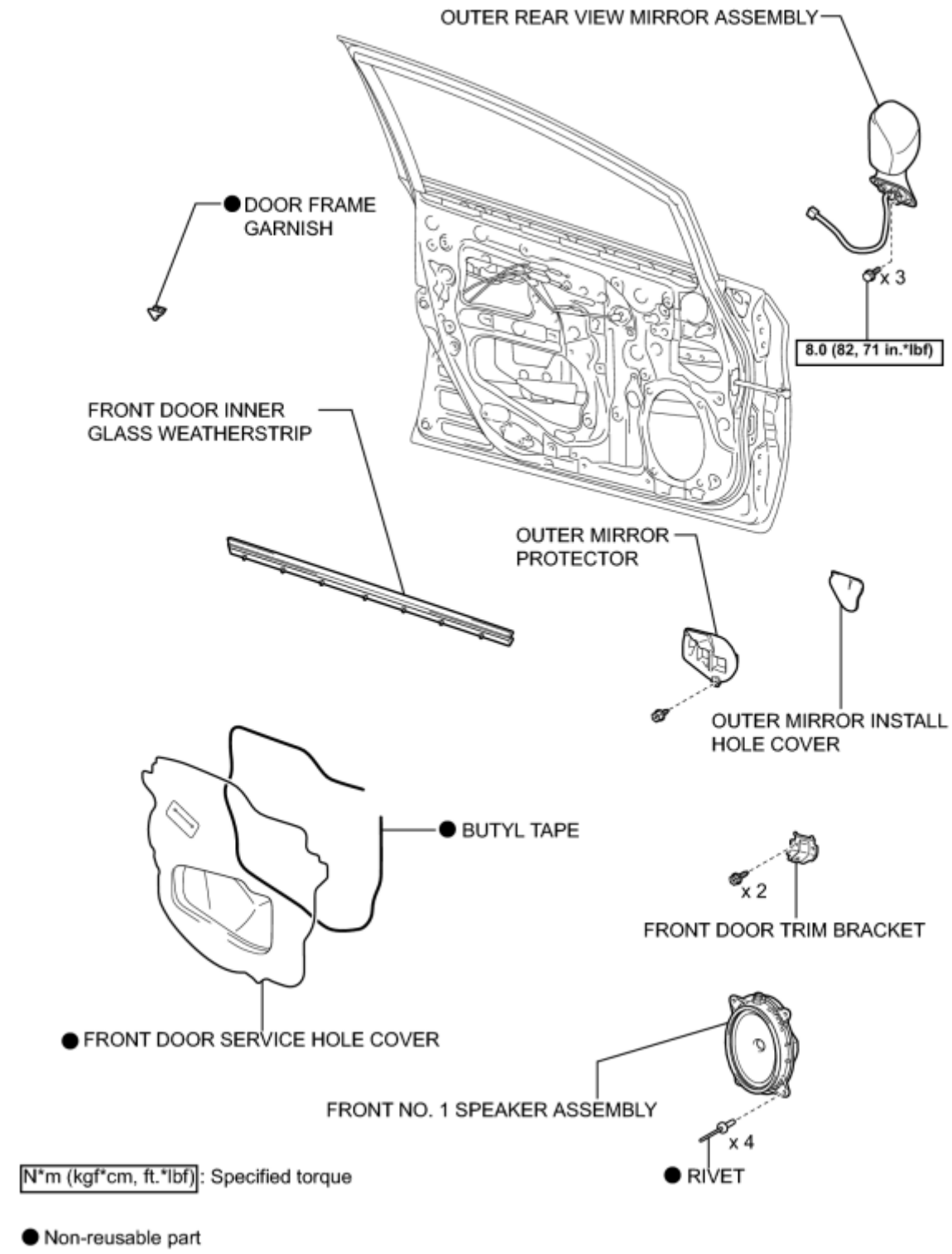


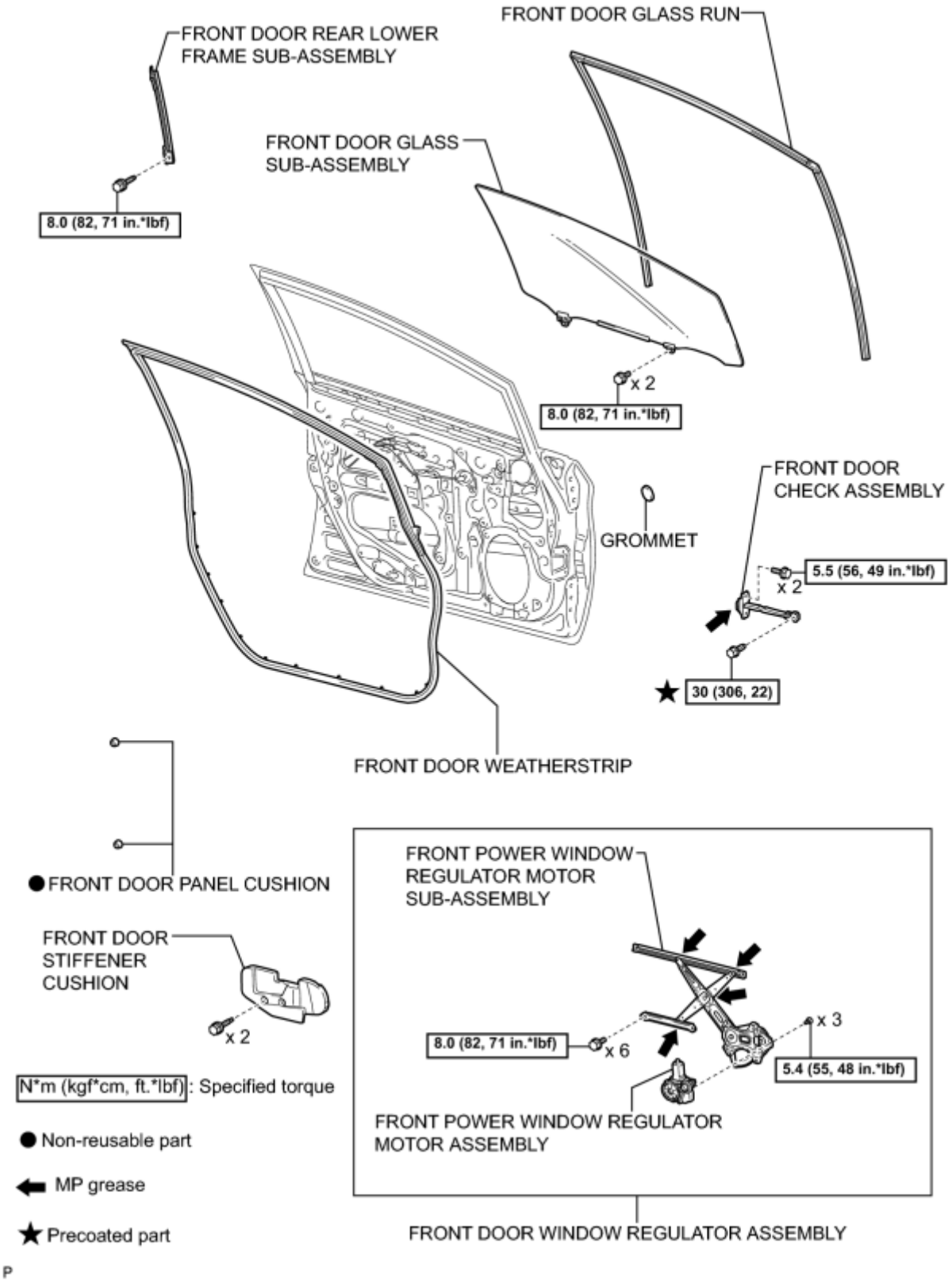




P

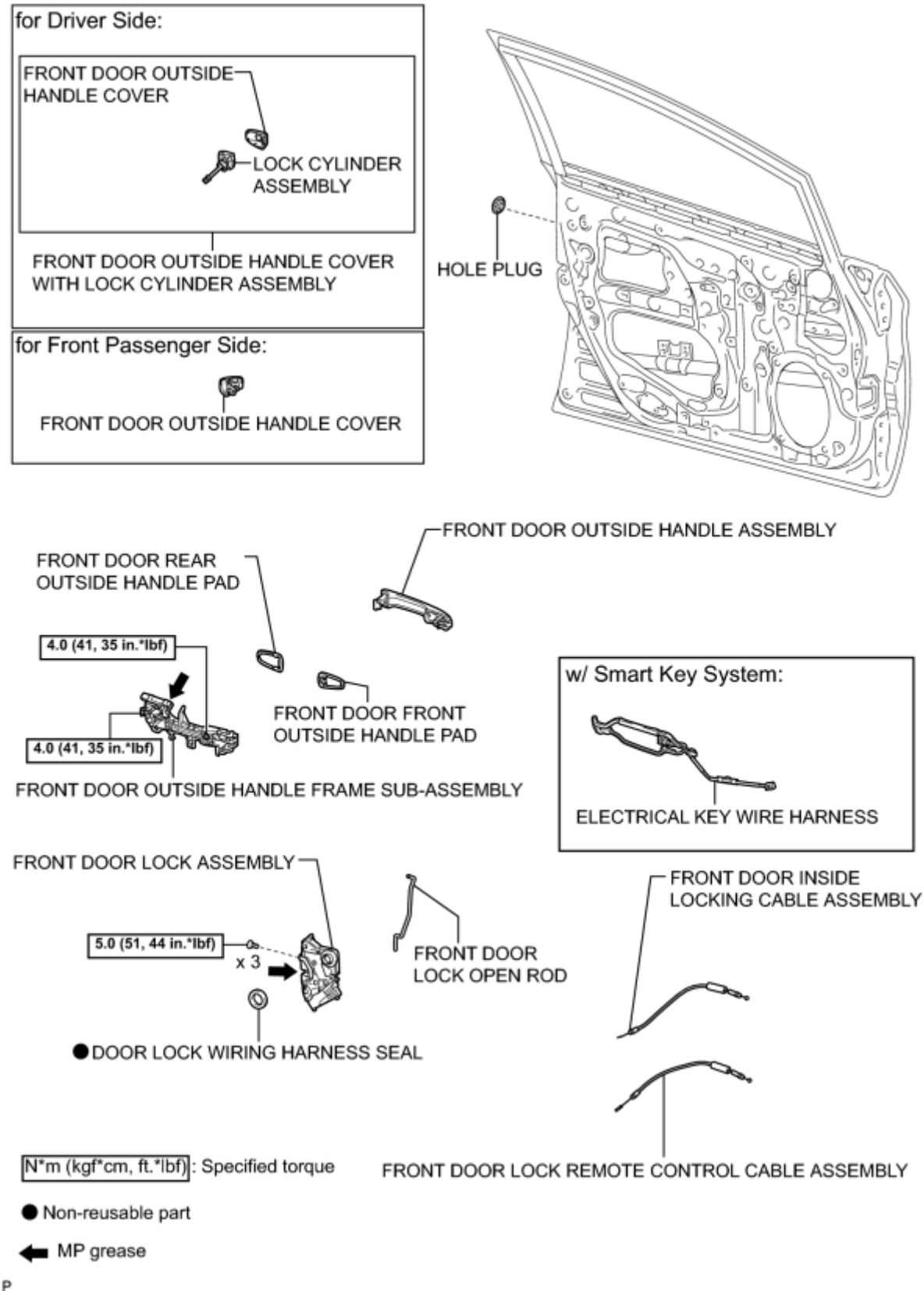
# ILLUSTRATION



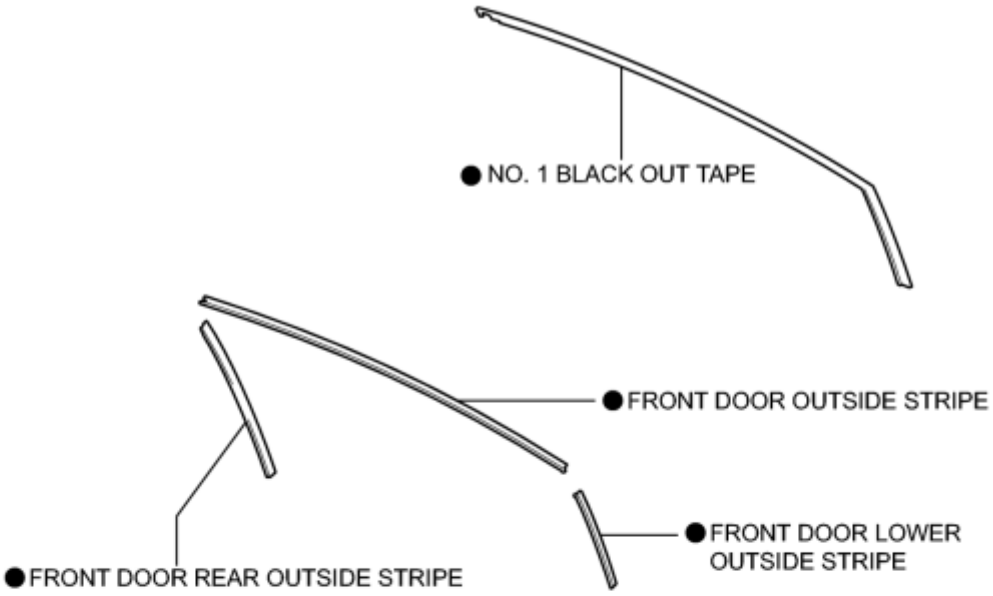

# ILLUSTRATION

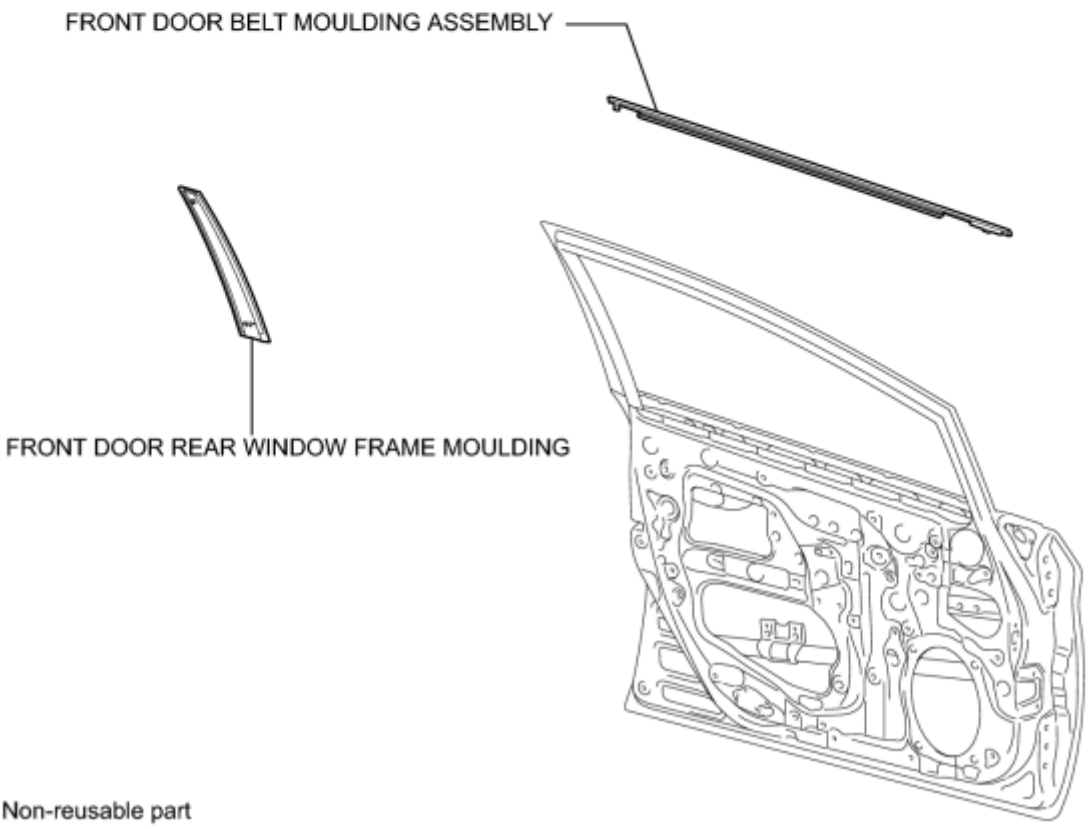



# ILLUSTRATION




# ILLUSTRATION




● Non-reusable part

P

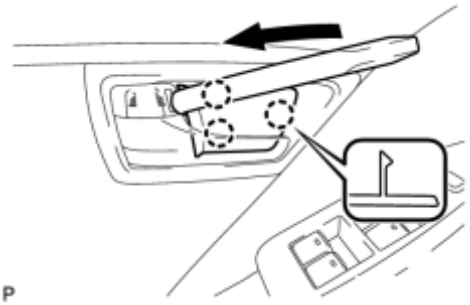
# DISASSEMBLY

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

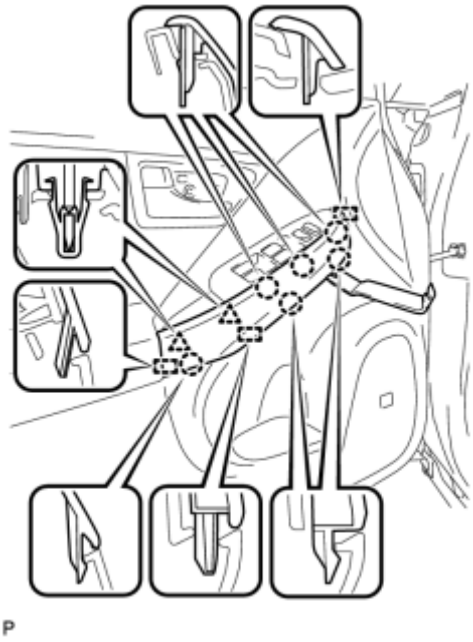
3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG




(a) Using a moulding remover, disengage the 3 claws and remove the front door inside handle bezel plug.

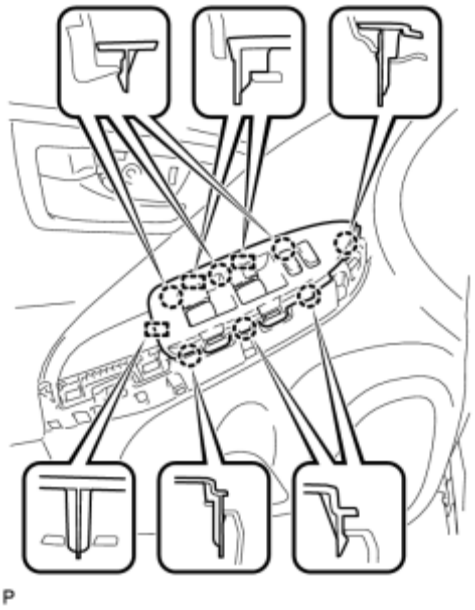
5. REMOVE ASSIST GRIP COVER




(a) Using a moulding remover, disengage the 6 claws, 2 clips and 3 guides, and remove the assist grip cover.

6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side)

(a) Disengage the 7 claws and 3 guides.

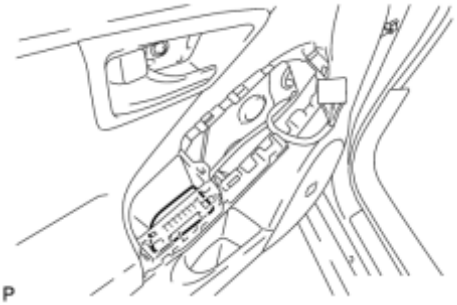


P

(b) Disconnect the connector and remove the power window regulator master switch assembly with front door armrest base panel.

7. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

8. REMOVE DOOR ARMREST COVER



P

(a) Remove the door armrest cover.

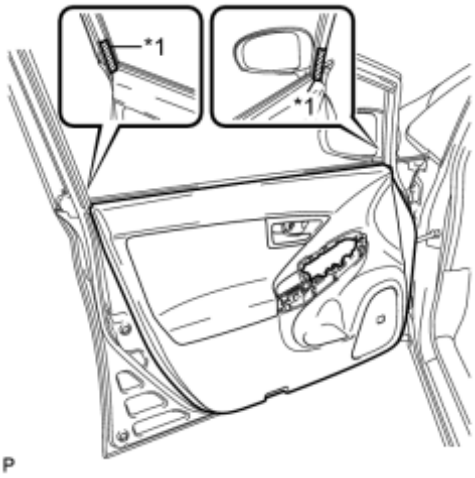
9. REMOVE COURTESY LIGHT ASSEMBLY INFO

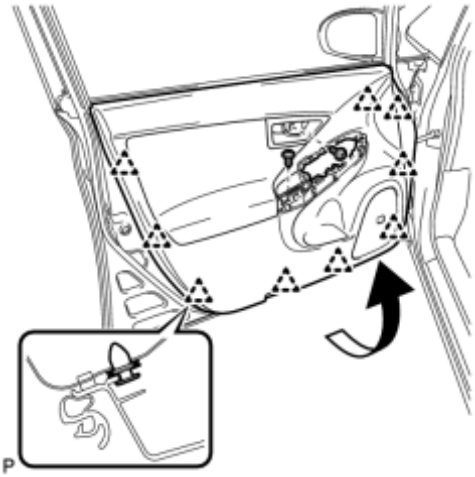
10. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY

(a) Put protective tape around the front door panel.

# Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |



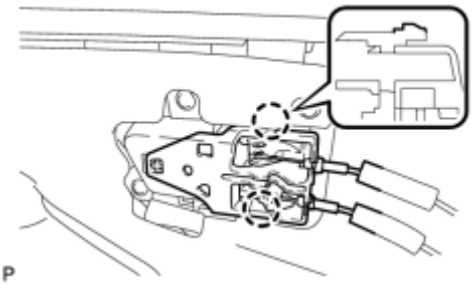




(b) Remove the 2 screws.

(c) Using a clip remover, disengage the 9 clips.

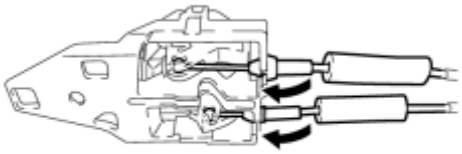
(d) Pull out the front door trim board sub-assembly in the direction indicated by the arrow in the illustration.

(e) Raise the front door trim board sub-assembly and remove the front door trim board sub-assembly together with the front door inner glass weatherstrip.




(f) Disengage the 2 claws and disconnect the front door inside handle sub-assembly.

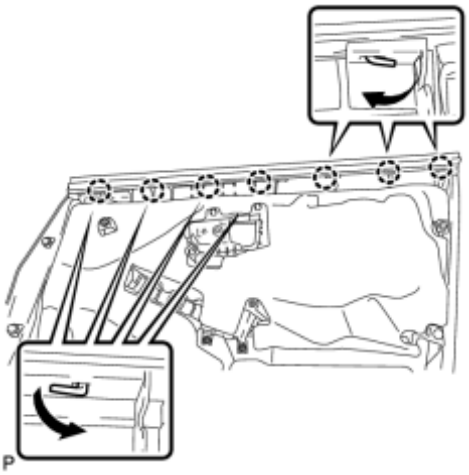
11. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY



(a) Disconnect the front door lock remote control cable and front door inside locking cable, and remove the front door inside handle sub-assembly.

P

12. REMOVE FRONT DOOR INNER GLASS WEATHERSTRIP



(a) Disengage the 7 claws and remove the front door inner glass weatherstrip from the front door trim board sub-assembly as shown in the illustration.

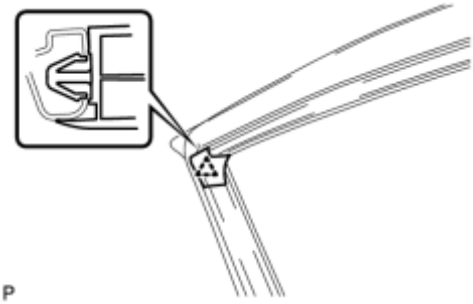
P

13. REMOVE OUTER MIRROR PROTECTOR INFO

14. REMOVE OUTER MIRROR INSTALL HOLE COVER INFO

15. REMOVE OUTER REAR VIEW MIRROR ASSEMBLY INFO

16. REMOVE DOOR FRAME GARNISH



(a) Disengage the clip and remove the door frame garnish.

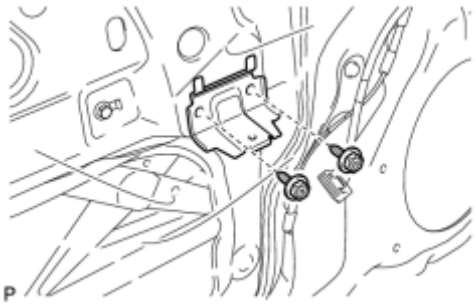
HINT:

This garnish needs to be replaced with a new one because the clip will break when removing the door frame garnish.

P

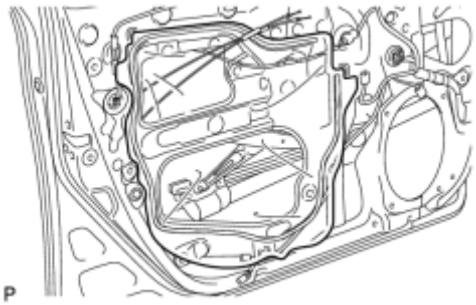
17. REMOVE FRONT NO. 1 SPEAKER ASSEMBLY INFO

18. REMOVE FRONT DOOR TRIM BRACKET



(a) Remove the 2 screws and front door trim bracket.

19. REMOVE FRONT DOOR SERVICE HOLE COVER

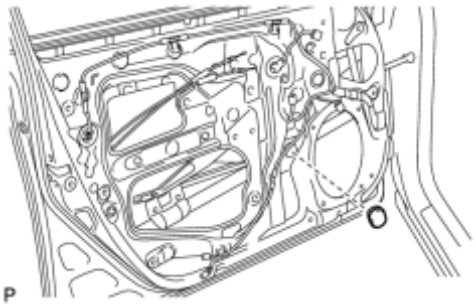


(a) Remove the front door service hole cover.

HINT:

Remove any remaining butyl tape from the door.

20. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY



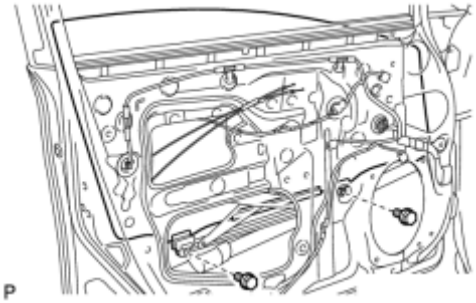
(a) Remove the grommet.

(b) Connect the power window regulator master switch assembly and move the front door glass sub-assembly so that the door glass bolts can be seen.

(c) Disconnect the cable from the negative (-) battery terminal and power window regulator master switch assembly.

NOTICE:

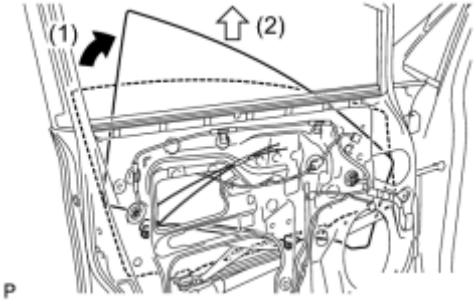
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.



(d) Remove the 2 bolts.

NOTICE:

After the bolts are removed, do not allow the door glass to fall.

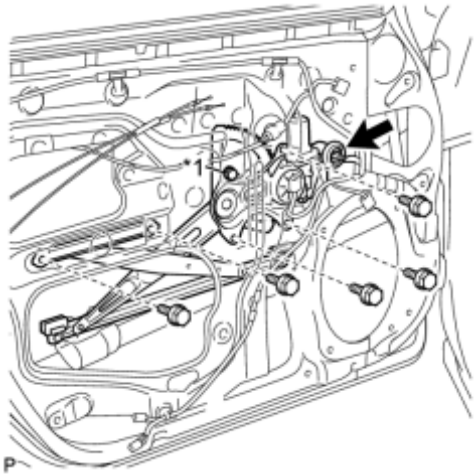



(e) Remove the front door glass sub-assembly as indicated by the arrows, in the order shown in the illustration.

NOTICE:

Do not damage the door glass.

21. REMOVE FRONT DOOR WINDOW REGULATOR ASSEMBLY




(a) Disconnect the connector.

(b) Loosen the temporary bolt.

***Text in Illustration***

| | |
|---|---|
| *1 | Temporary Bolt |

NOTICE:

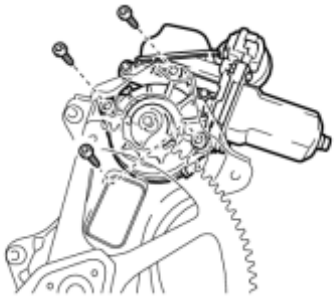
Do not remove the temporary bolt. If the temporary bolt is removed, the front door window regulator may fall and cause damage.

(c) Remove the 5 bolts.

(d) Remove the front door window regulator assembly.

(e) Remove the temporary bolt from the front door window regulator assembly.

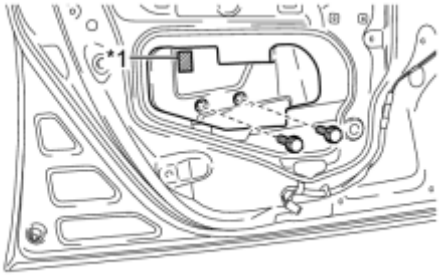
22. REMOVE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY



P

(a) Using a T25 "TORX" socket wrench, remove the 3 screws and front power window regulator motor assembly.

23. REMOVE FRONT DOOR STIFFENER CUSHION



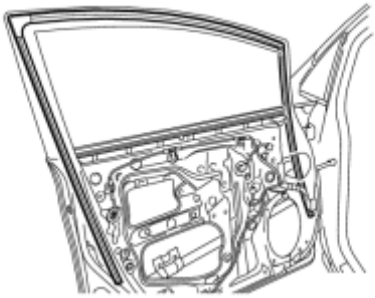

P

(a) Remove the 2 bolts and front door stiffener cushion.

## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape |

24. REMOVE FRONT DOOR GLASS RUN

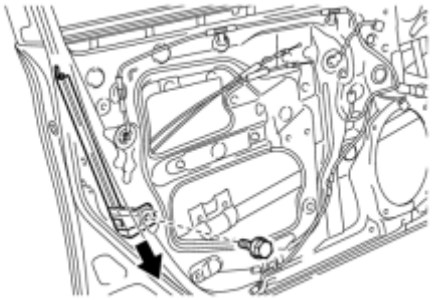


P

(a) Remove the front door glass run.

25. REMOVE FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY

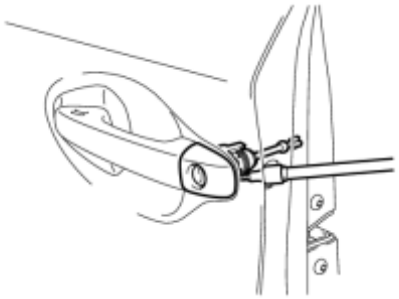
(a) Remove the bolt and front door rear lower frame sub-assembly as shown in the illustration.



26. REMOVE FRONT DOOR OUTSIDE HANDLE COVER WITH LOCK CYLINDER ASSEMBLY (for Driver Side)



(a) Remove the hole plug.

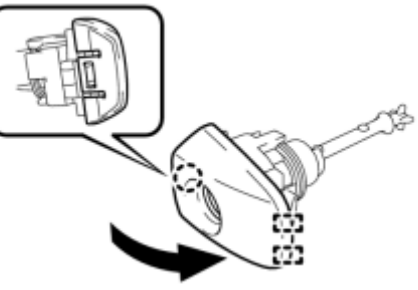


(b) Using a T30 "TORX" socket wrench, loosen the screw and remove the front door outside handle cover with lock cylinder assembly.

HINT:

The screw cannot be removed because it is integrated into the front door outside handle frame sub-assembly.

27. REMOVE FRONT DOOR OUTSIDE HANDLE COVER (for Driver Side)

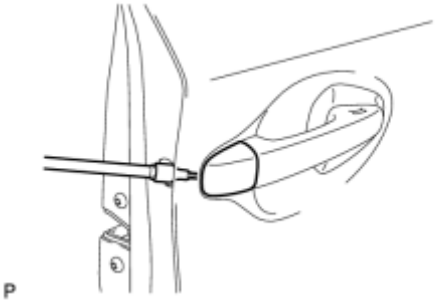


(a) Using a screwdriver, disengage the claw and 2 guides, and remove the front door outside handle cover as shown in the illustration.

28. REMOVE FRONT DOOR OUTSIDE HANDLE COVER (for Front Passenger Side)



(a) Remove the hole plug.



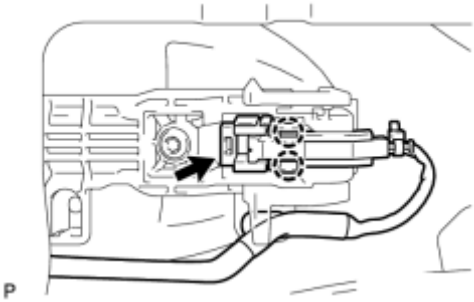
(b) Using a T30 "TORX" socket wrench, loosen the screw and remove the front door outside handle cover.

HINT:

The screw cannot be removed because it is integrated into the front door outside handle frame sub-assembly.

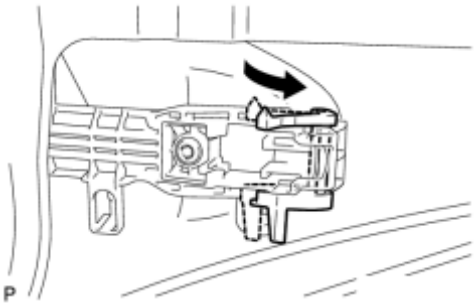
29. REMOVE FRONT DOOR OUTSIDE HANDLE ASSEMBLY

(a) w/ smart key system

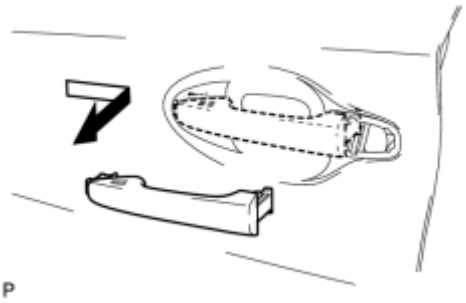


(1) Disengage the 2 claws.

(2) Disconnect the connector.

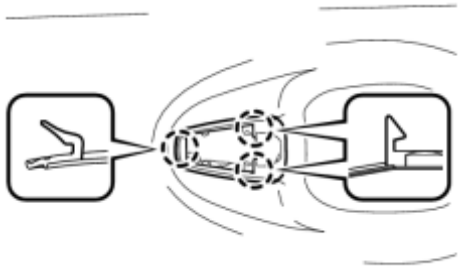


(b) Move the lever in the direction indicated by the arrow in the illustration.



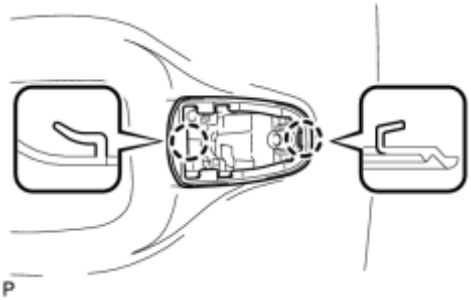
(c) Remove the front door outside handle assembly as shown in the illustration.

30. REMOVE FRONT DOOR FRONT OUTSIDE HANDLE PAD



(a) Disengage the 3 claws and remove the front door front outside handle pad.

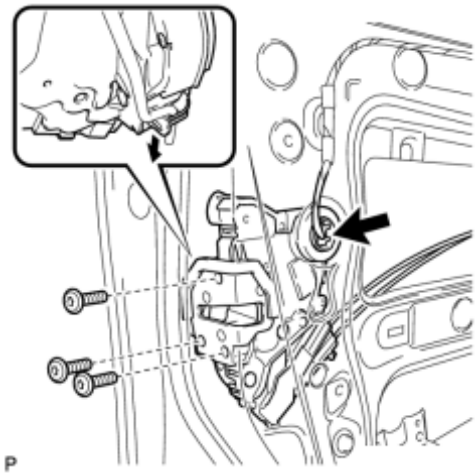
31. REMOVE FRONT DOOR REAR OUTSIDE HANDLE PAD



(a) Disengage the 2 claws and remove the front door rear outside handle pad.

32. REMOVE FRONT DOOR LOCK ASSEMBLY

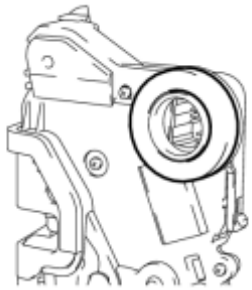
(a) Disconnect the connector.



P

(b) Using a T30 "TORX" socket wrench, remove the 3 screws.

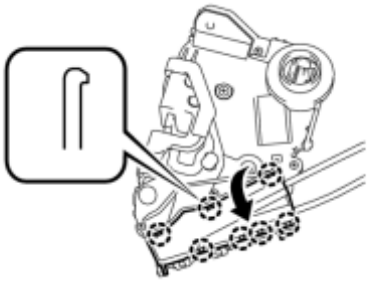
(c) Slide the front door lock assembly downward, and remove the front door lock assembly and cables as a unit.



P

(d) Remove the door lock wiring harness seal from the front door lock assembly.

33. REMOVE FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY



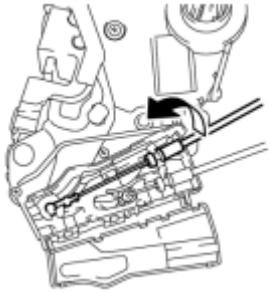
P

(a) Using a screwdriver, disengage the 7 claws as shown in the illustration.

HINT:

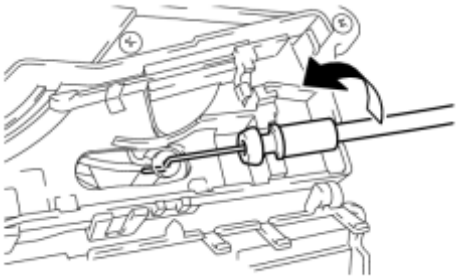
Tape the screwdriver tip before use.

(b) Remove the front door lock remote control cable assembly as shown in the illustration.



P

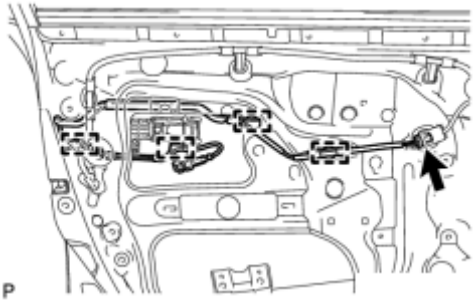
34. REMOVE FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY



P

(a) Remove the front door inside locking cable assembly as shown in the illustration.

35. REMOVE ELECTRICAL KEY WIRE HARNESS (w/ Smart Key System)



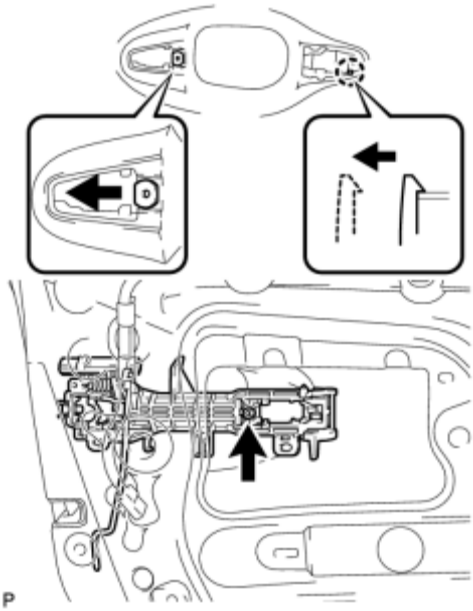
P

(a) Disconnect the connector.

(b) Disengage the 4 clamps and remove the electrical key wire harness.

36. REMOVE FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY

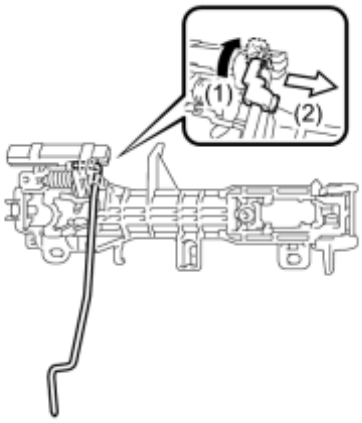
(a) Using a T30 "TORX" socket wrench, loosen the screw.



P

(b) Slide the front door outside handle frame sub-assembly to disengage the door handle nut and claw of the front door outside handle frame sub-assembly, and then remove it.

37. REMOVE FRONT DOOR LOCK OPEN ROD

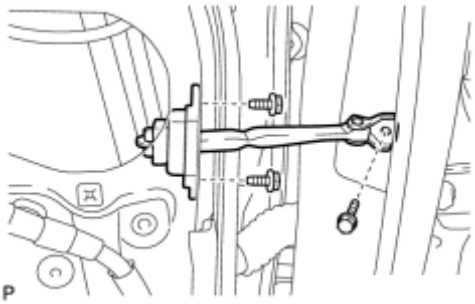



P

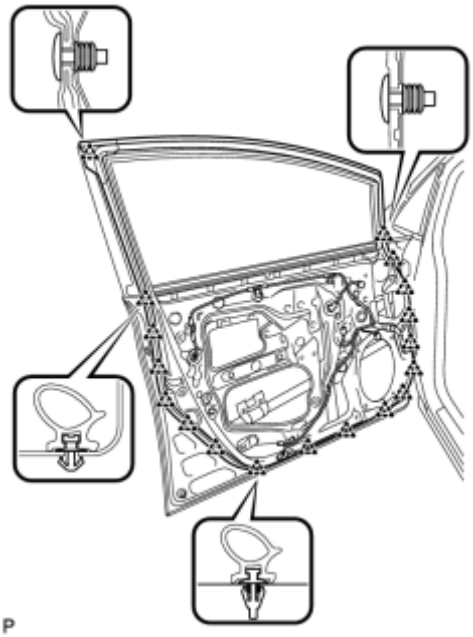
(a) Remove the front door lock open rod as indicated by the arrows, in the order shown in the illustration.

38. REMOVE FRONT DOOR CHECK ASSEMBLY

(a) Remove the 3 bolts and front door check assembly.

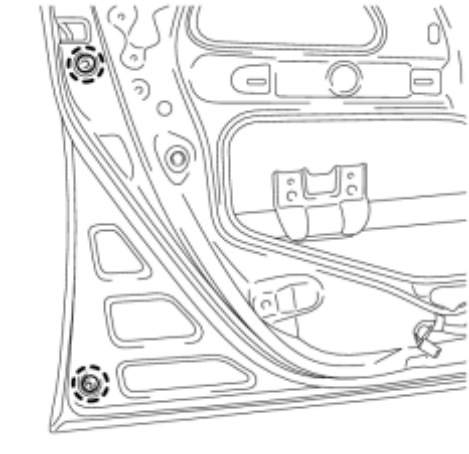


39. REMOVE FRONT DOOR WEATHERSTRIP



(a) Using a clip remover, disengage the 18 clips and remove the front door weatherstrip.

40. REMOVE FRONT DOOR PANEL CUSHION



(a) Disengage the 2 claws and remove the 2 front door panel cushions.

41. REMOVE FRONT DOOR BELT MOULDING ASSEMBLY INFO

42. REMOVE FRONT DOOR REAR WINDOW FRAME MOULDING INFO

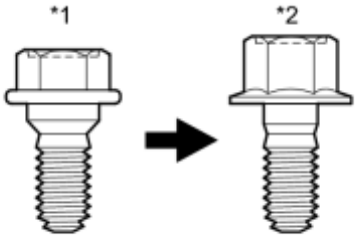
43. REMOVE NO. 1 BLACK OUT TAPE INFO

44. REMOVE FRONT DOOR OUTSIDE STRIPE INFO

45. REMOVE FRONT DOOR LOWER OUTSIDE STRIPE INFO

46. REMOVE FRONT DOOR REAR OUTSIDE STRIPE INFO

# ADJUSTMENT




P

***Text in Illustration***

| | |
|---|---|
| *1 | Centering Bolt |
| *2 | Standard Bolt |

CAUTION:

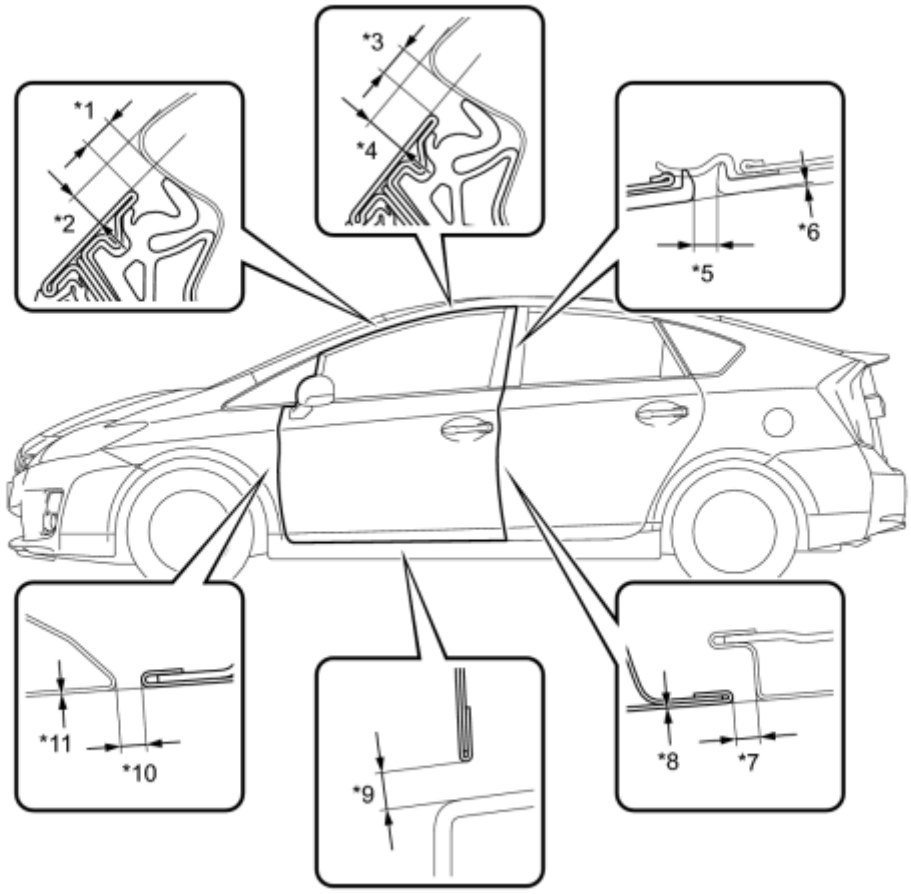
Before adjusting the door positions of vehicles equipped with side and curtain shield airbags, be sure to disconnect the battery. After adjustment, check that the SRS warning light is operating normally and there are no SRS DTCs output.

HINT:

- Use the same procedure for the RH side and LH side.
- The following procedure is for the LH side.
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts installed on it. Substitute the centering bolts with standard bolts when making adjustments.
- Specified torque for standard bolts is shown in the standard bolt chart INFO.

1. INSPECT FRONT DOOR

(a) Check that the clearance measurements of areas *1 through *11 are within each standard range.




P

### *Standard Clearance*

| Area | Measurement | Area | Measurement |
|---|---|---|---|
| *1 | 3.57 to 6.57 mm (0.141 to 0.259 in.) | *2 | 4.57 to 7.57 mm (0.180 to 0.298 in.) |
| *3 | 3.57 to 6.57 mm (0.141 to 0.259 in.) | *4 | 5.17 to 8.17 mm (0.204 to 0.322 in.) |
| *5 | 2.8 to 5.8 mm (0.110 to 0.228 in.) | *6 | -1.3 to 1.7 mm (-0.0512 to 0.0669 in.) |
| *7 | 2.7 to 5.7 mm (0.106 to 0.1224 in.) | *8 | -1.5 to 1.5 mm (-0.0591 to 0.0591 in.) |
| *9 | 4.15 to 7.15 mm (0.163 to 0.282 in.) | *10 | 2.8 to 5.8 mm (0.110 to 0.228 in.) |
| *11 | -1.5 to 1.5 mm (-0.0591 to 0.0591 in.) | - | - |

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

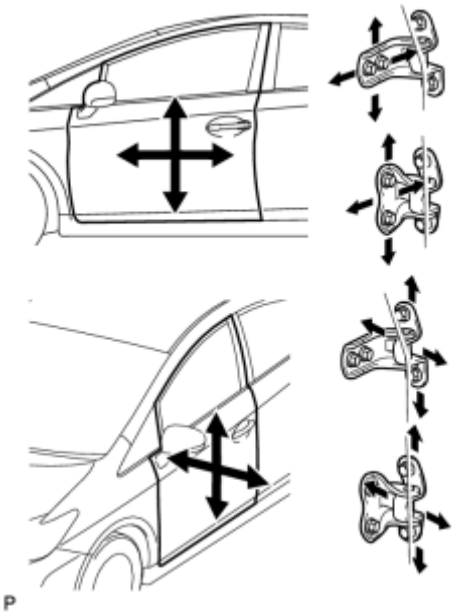
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. ADJUST FRONT DOOR



(a) Using SST, loosen the hinge bolts on the vehicle body and adjust the door position.

SST: 09812-00010

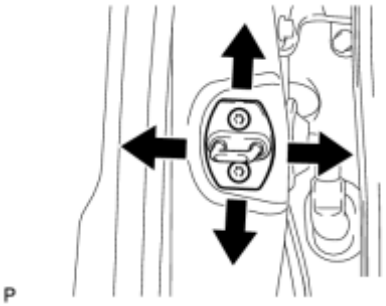
(b) Tighten the hinge bolts on the vehicle body after the adjustment.

Torque: **26 N·m (265 kgf·cm, 19ft·lbf)**

(c) Loosen the hinge bolts on the door and adjust the door position.

(d) Tighten the hinge bolts on the door after the adjustment.

Torque: **26 N·m (265 kgf·cm, 19ft·lbf)**



(e) Using a T40 "TORX" socket wrench, slightly loosen the striker mounting screws.

(f) Using a brass bar and a hammer, hit the striker to adjust its position.

(g) Using a T40 "TORX" socket wrench, tighten the striker mounting screws after the adjustment.

Torque: **23 N·m (235 kgf·cm, 17ft·lbf)**

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

8. INSTALL REAR NO. 3 FLOOR BOARD INFO

9. INSTALL REAR DECK FLOOR BOX INFO

10. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

11. INSPECT SRS WARNING LIGHT

INFO

# REASSEMBLY

1. REPAIR INSTRUCTION INFO

2. INSTALL NO. 1 BLACK OUT TAPE INFO

3. INSTALL FRONT DOOR LOWER OUTSIDE STRIPE INFO

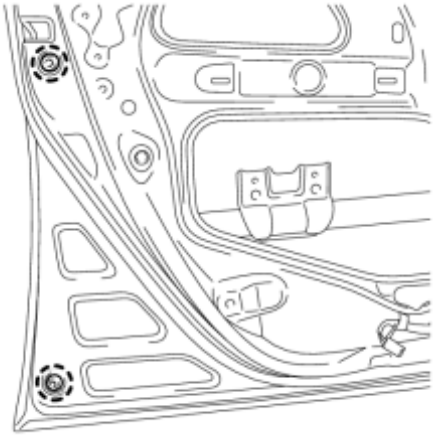
4. INSTALL FRONT DOOR REAR OUTSIDE STRIPE INFO

5. INSTALL FRONT DOOR OUTSIDE STRIPE INFO

6. INSTALL FRONT DOOR REAR WINDOW FRAME MOULDING INFO

7. INSTALL FRONT DOOR BELT MOULDING ASSEMBLY INFO

8. INSTALL FRONT DOOR PANEL CUSHION

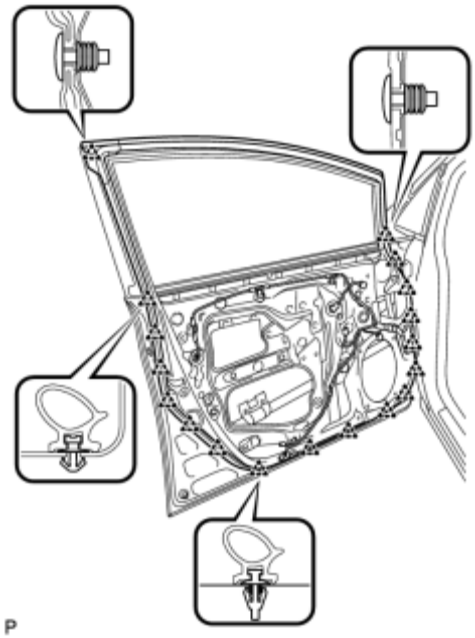


P

(a) Engage the 2 claws and install 2 new front door panel cushions.

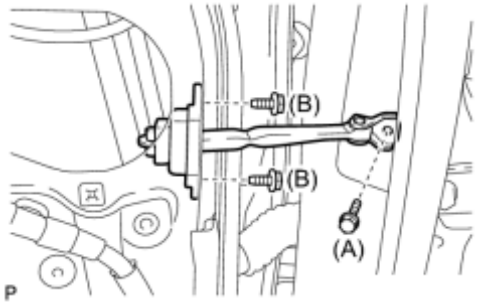
9. INSTALL FRONT DOOR WEATHERSTRIP

(a) Engage the 18 clips and install the front door weatherstrip.



10. INSTALL FRONT DOOR CHECK ASSEMBLY

(a) Apply MP grease to the sliding areas of the front door check assembly.




(b) Apply adhesive to the threads of the bolt (A).

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent

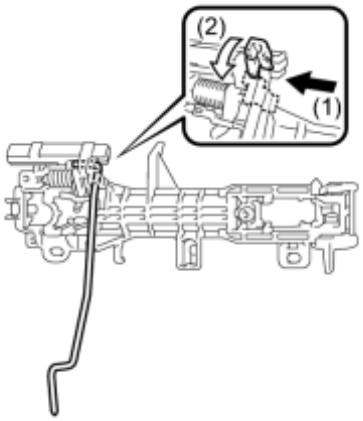
(c) Install the front door check assembly with the 3 bolts.

(A) - Torque: **30 N·m (306 kgf·cm, 22ft·lbf)**

(B) - Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

11. INSTALL FRONT DOOR LOCK OPEN ROD

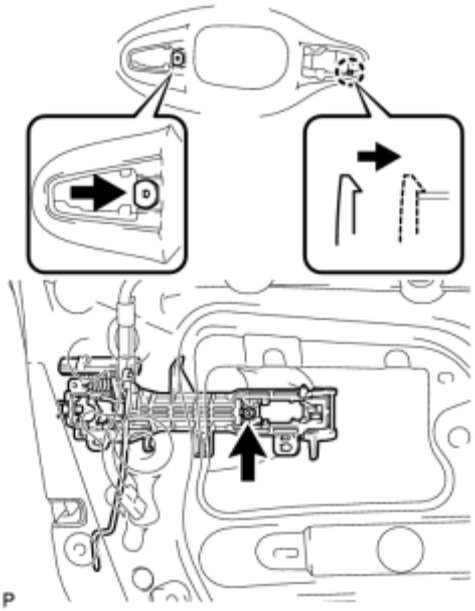
(a) Install the front door lock open rod as indicated by the arrows, in the order shown in the illustration.




P

12. INSTALL FRONT DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY

(a) Apply MP grease to the sliding parts on the front door outside handle frame sub-assembly.



P

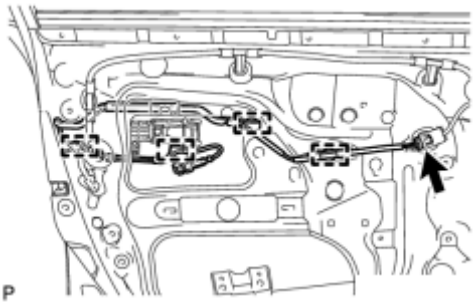
(b) Engage the door handle nut and claw.

(c) Using a T30 "TORX" socket wrench, install the front door outside handle frame sub-assembly with the screw.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

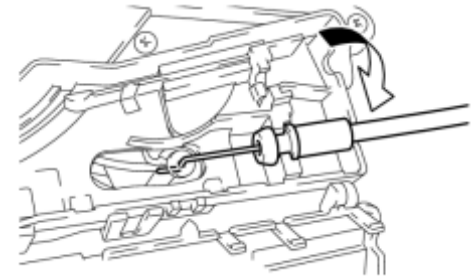
13. INSTALL ELECTRICAL KEY WIRE HARNESS (w/ Smart Key System)

(a) Engage the 4 clamps and install the electrical key wire harness.



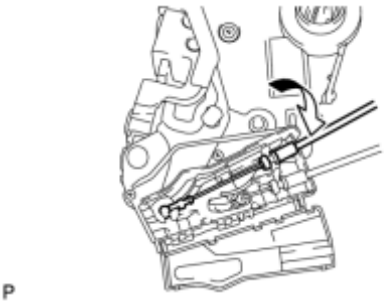
(b) Connect the connector.

14. INSTALL FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY

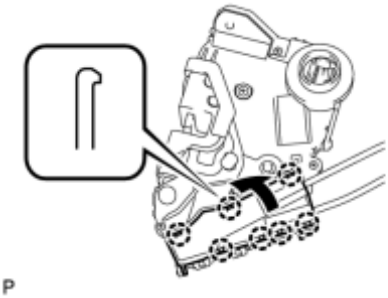


(a) Install the front door inside locking cable assembly as shown in the illustration.

15. INSTALL FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY



(a) Install the front door lock remote control cable assembly as shown in the illustration.



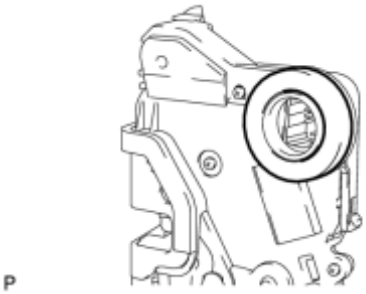
(b) Engage the 7 claws as shown in the illustration.

16. INSTALL FRONT DOOR LOCK ASSEMBLY

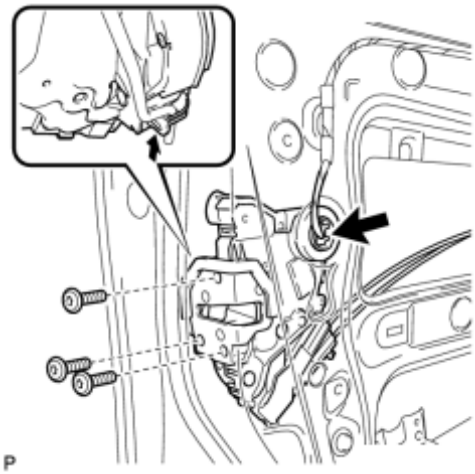
NOTICE:

- When reusing the removed front door lock assembly, replace the door lock wiring harness seal on the connector with a new one.
- Do not allow grease or dust to adhere to the door lock wiring harness seal surface of the connector.
- Reusing the door lock wiring harness seal or using a damaged door lock wiring harness seal may cause water intrusion. This may result in a malfunction of the front door lock assembly.

(a) Apply MP grease to the sliding parts of the front door lock assembly.




(b) Install a new door lock wiring harness seal to the front door lock assembly.




(c) Insert the front door lock open rod to the front door lock assembly.

(d) Make sure that the front door lock open rod is securely connected to the front door lock assembly.

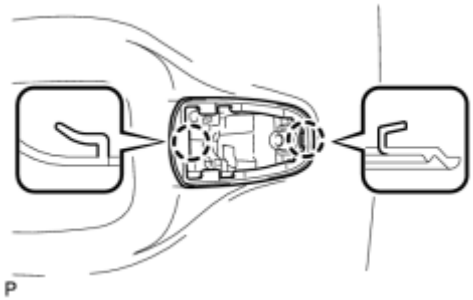
(e) Using a T30 "TORX" socket wrench, install the front door lock assembly with the 3 screws.

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

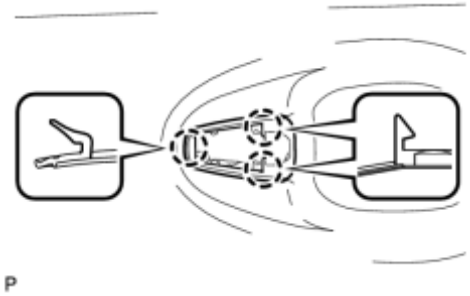
(f) Connect the connector.

17. INSTALL FRONT DOOR REAR OUTSIDE HANDLE PAD

(a) Engage the 2 claws and install the front door rear outside handle pad.

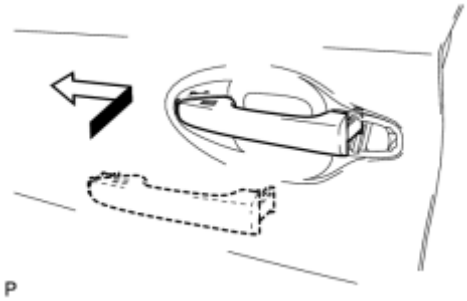


18. INSTALL FRONT DOOR FRONT OUTSIDE HANDLE PAD



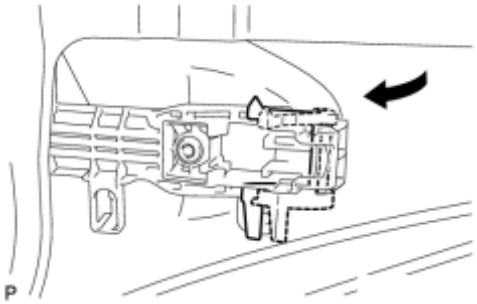
(a) Engage the 3 claws and install the front door front outside handle pad.

19. INSTALL FRONT DOOR OUTSIDE HANDLE ASSEMBLY



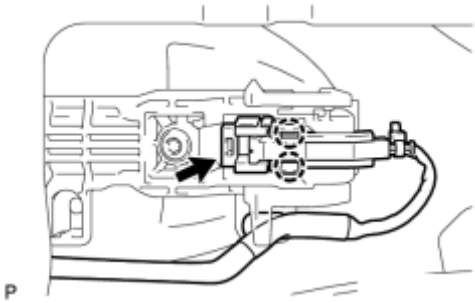
(a) Insert the front end of the front door outside handle assembly into the front door outside handle frame.

(b) Insert the rear end of the front door outside handle assembly into the front door outside handle frame, then slide the front door outside handle assembly toward the front of the vehicle to install it.



(c) Move the lever back in the direction indicated by the arrow in the illustration to lock the door outside handle assembly.

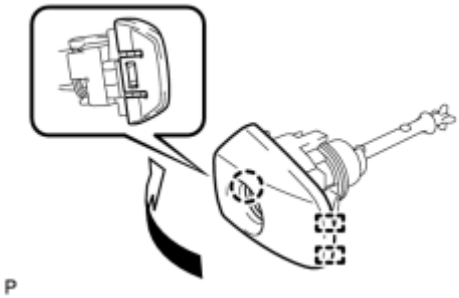
(d) w/ smart key system:



(1) Connect the connector.

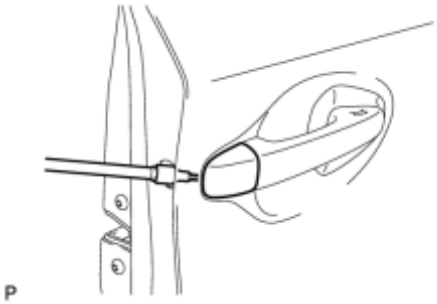
(2) Engage the 2 claws.

20. INSTALL FRONT DOOR OUTSIDE HANDLE COVER (for Driver Side)



(a) Engage the claw and 2 guides, and install the front door outside handle cover to the front door lock cylinder.

21. INSTALL FRONT DOOR OUTSIDE HANDLE COVER (for Front Passenger Side)



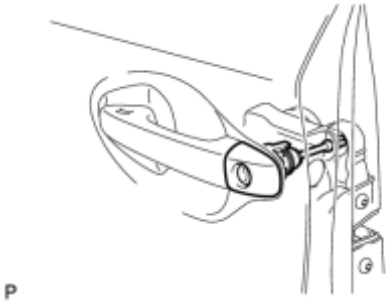
(a) Using a T30 "TORX" socket wrench, install the front door outside handle cover with the screw.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

(b) Install the hole plug.



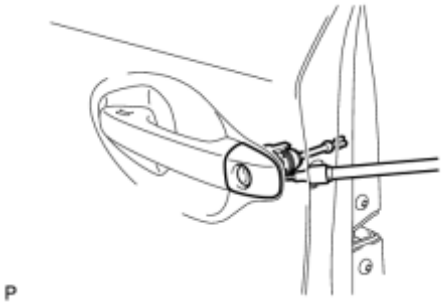
22. INSTALL FRONT DOOR OUTSIDE HANDLE COVER WITH LOCK CYLINDER ASSEMBLY (for Driver Side)



(a) Install the front door outside handle cover with lock cylinder assembly.

HINT:

Make sure that the front door lock cylinder rod is inserted into the front door lock assembly.



(b) Using a T30 "TORX" socket wrench, install the front door lock cylinder with the screw.

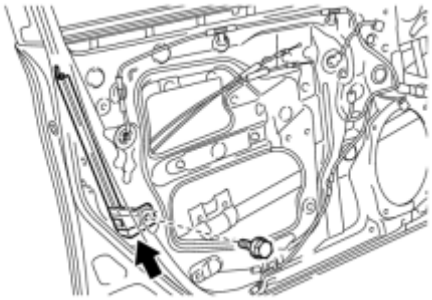
Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**



(c) Install the hole plug.

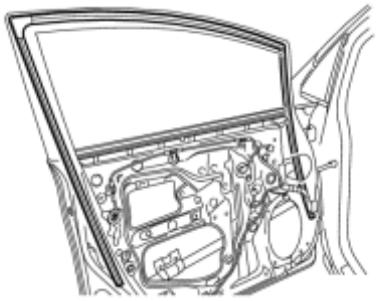
23. INSTALL FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY

(a) Install the front door rear lower frame sub-assembly with the bolt as shown in the illustration.



Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

24. INSTALL FRONT DOOR GLASS RUN



(a) Install the front door glass run.

25. INSTALL FRONT DOOR STIFFENER CUSHION

(a) When reusing the front door stiffener cushion:

(1) Clean the front door stiffener cushion.

(2) Remove the double-sided tape from the front door stiffener cushion.

(3) Wipe off any tape adhesive residue with cleaner.

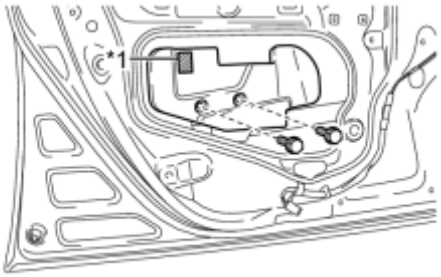



(4) Apply new double-sided tape to the front door stiffener cushion as shown in the illustration.

| Area | Dimension |
|---|---|
| *1 | 40.0 mm (1.575 in.) |
| *2 | 17.0 mm (0.669 in.) |
| *3 | 3.0 mm (0.118 in.) |

(b) Clean the front door panel sub-assembly.

(c) Insert the front door stiffener cushion with the 2 bolts.




P

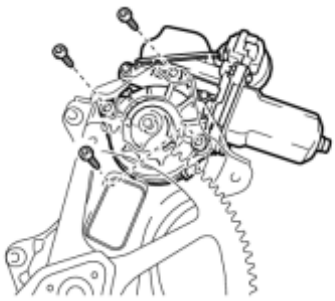
## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape |

26. INSTALL FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY

NOTICE:

The regulator arm must be below the intermediate position when installing the power window regulator motor.



P

(a) Using a T25 "TORX" socket wrench, install the front power window regulator motor assembly with the 3 screws.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

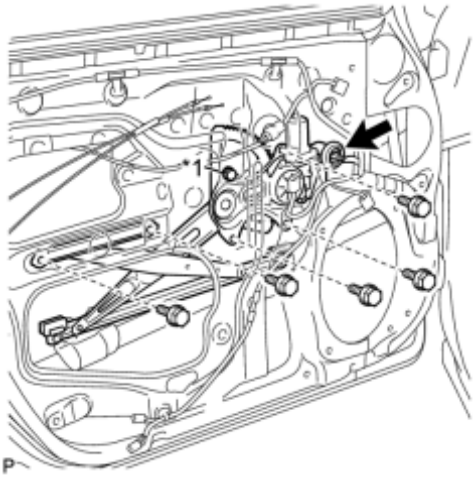
HINT:

A new front window regulator uses self-tapping screws to thread new installation holes when the self-tapping screws are inserted.

27. INSTALL FRONT DOOR WINDOW REGULATOR ASSEMBLY

(a) Apply MP grease to the sliding parts of the front door window regulator assembly.

(b) Install the temporary bolt to the front door window regulator assembly.




P

(c) Temporarily install the front door window regulator assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Temporary Bolt |

(d) Tighten the temporary bolt and 5 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

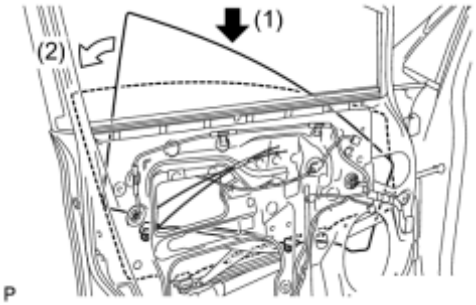
(e) Connect the connector.

28. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY

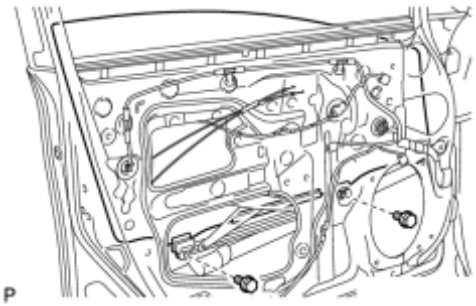
(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the power window regulator master switch assembly and move the front door glass sub-assembly so that the door glass bolts can be seen.

(c) Disconnect the cable from the negative (-) battery terminal and power window regulator master switch assembly.

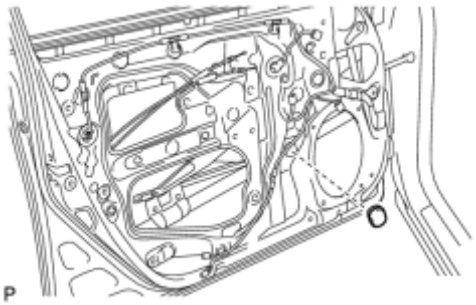



(d) Insert the front door glass sub-assembly into the front door panel along the front door glass run as indicated by the arrows, in the order shown in the illustration.




(e) Install the front door glass sub-assembly with the 2 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**




(f) Install the grommet.

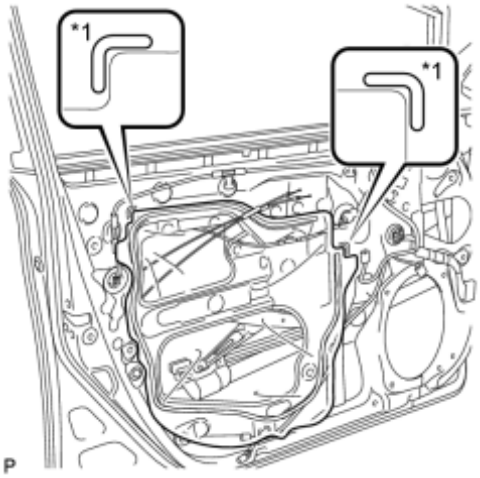
(g) Connect the cable to the negative (-) battery terminal.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

29. INSTALL FRONT DOOR SERVICE HOLE COVER

(a) Apply butyl tape to the front door panel.




(b) Pass the front door lock remote control cable assembly and front door inside locking cable assembly through a new front door service hole cover.

(c) Attach the front door service hole cover according to the reference points on the front door panel.

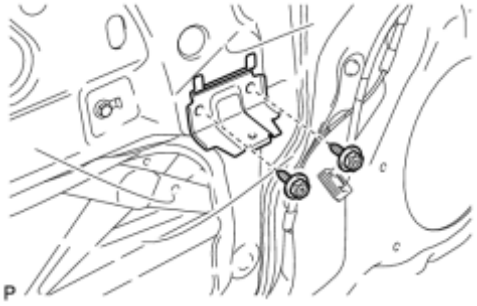
***Text in Illustration***

| | |
|---|---|
| *1 | Reference Point |

NOTICE:

Securely install the front door service hole cover preventing wrinkles and air bubbles.

30. INSTALL FRONT DOOR TRIM BRACKET

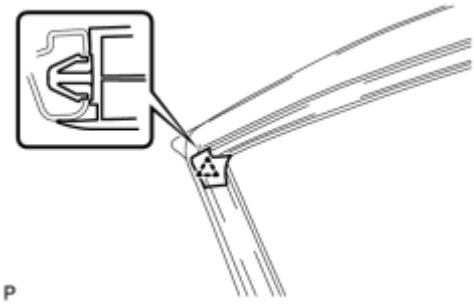



(a) Install the front door trim bracket with the 2 screws.

31. INSTALL FRONT NO. 1 SPEAKER ASSEMBLY INFO

32. INSTALL DOOR FRAME GARNISH

(a) Engage the clip to install a new door frame garnish.



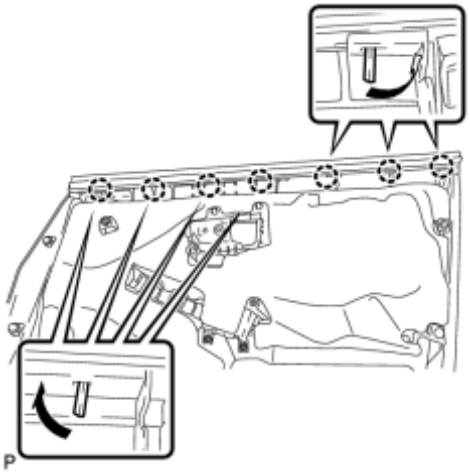
P

33. INSTALL OUTER REAR VIEW MIRROR ASSEMBLY INFO

34. INSTALL OUTER MIRROR INSTALL HOLE COVER INFO

35. INSTALL OUTER MIRROR PROTECTOR INFO

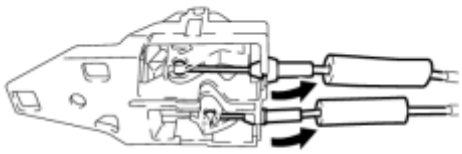
36. INSTALL FRONT DOOR INNER GLASS WEATHERSTRIP



P

(a) Engage the 7 claws and install the front door inner glass weatherstrip to the front door trim board sub-assembly as shown in the illustration.

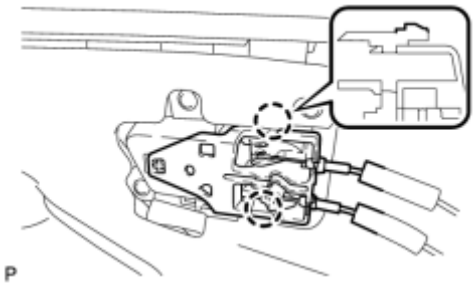
37. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY



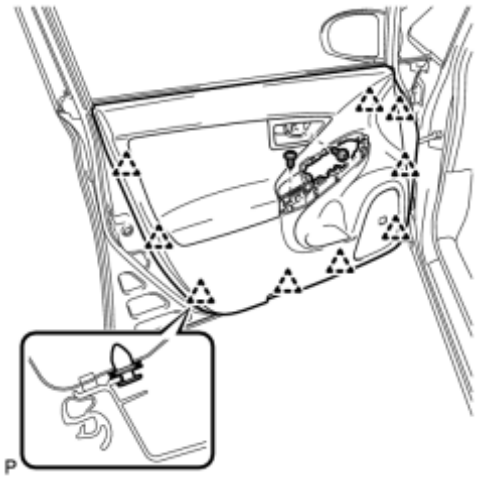
P

(a) Connect the front door lock remote control cable assembly and front door inside locking cable assembly to the front door inside handle.

(b) Engage the 2 claws and install the front door inside handle sub-assembly to the front door trim board sub-assembly.




38. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY



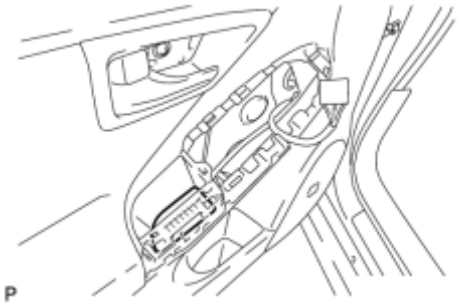

(a) Engage the 9 clips and install the front door trim board sub-assembly.

(b) Install the 2 screws.

(c) Remove the 2 pieces of protective tape.

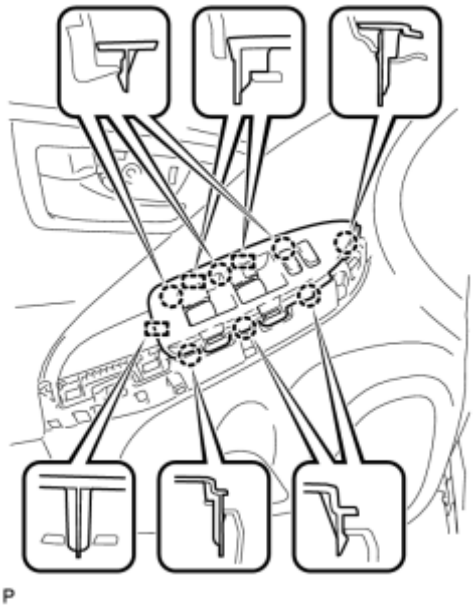
39. INSTALL COURTESY LIGHT ASSEMBLY INFO

40. INSTALL DOOR ARMREST COVER




(a) Install the door armrest cover.

41. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side)

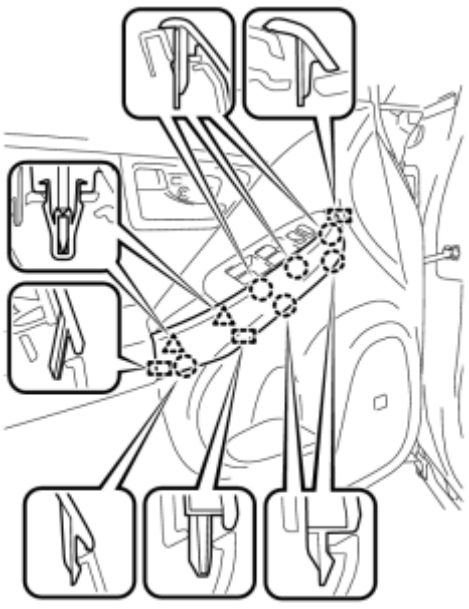


(a) Connect the connector.

(b) Engage the 7 claws and 3 guides, and install the power window regulator master switch assembly with front door armrest base panel.

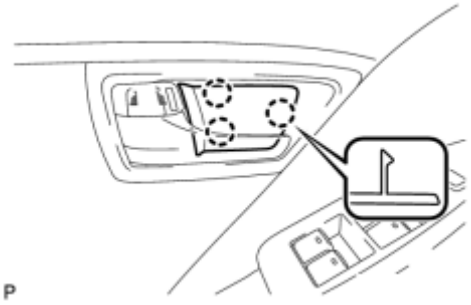
42. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

43. INSTALL ASSIST GRIP COVER



(a) Engage the 6 claws, 2 clips and 3 guides, and install the assist grip cover.

44. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG




(a) Engage the 3 claws and install the front door inside handle bezel plug.

45. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

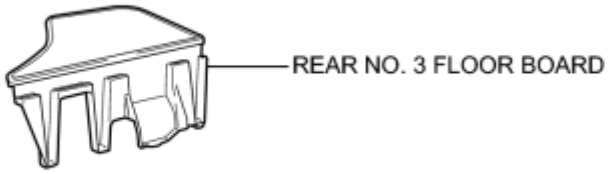
46. INSTALL REAR NO. 3 FLOOR BOARD INFO

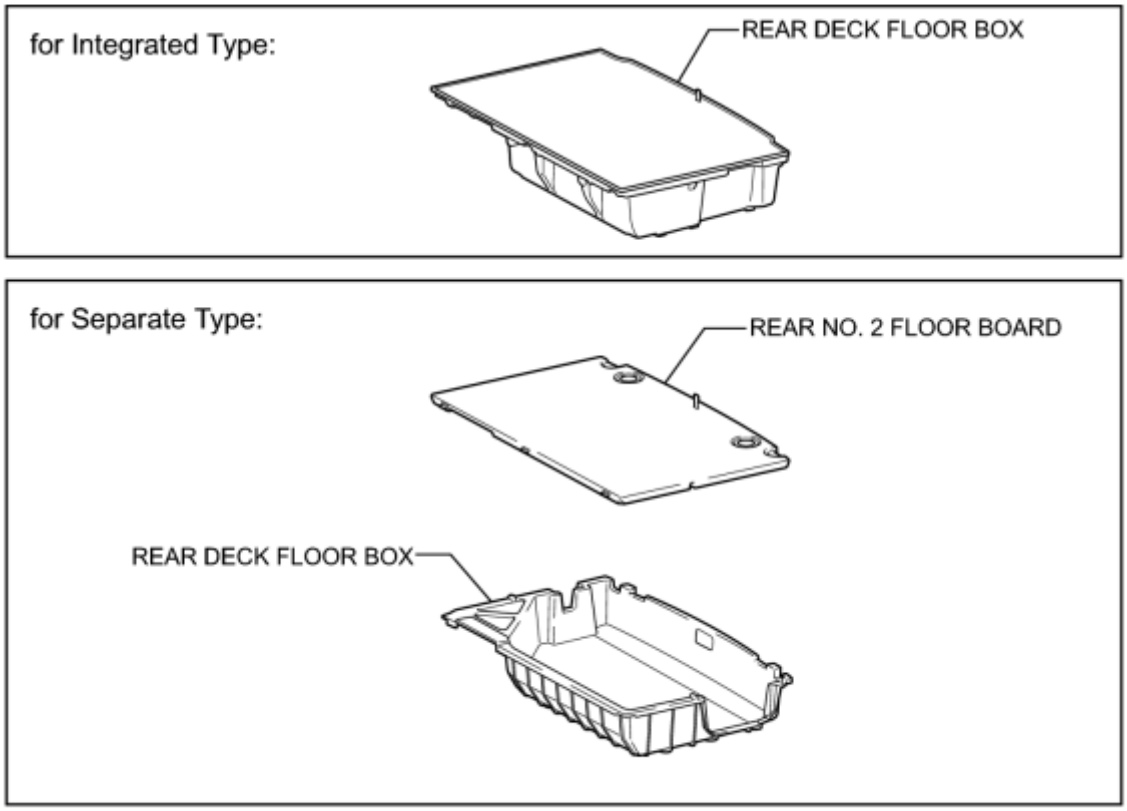
47. INSTALL REAR DECK FLOOR BOX INFO

48. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

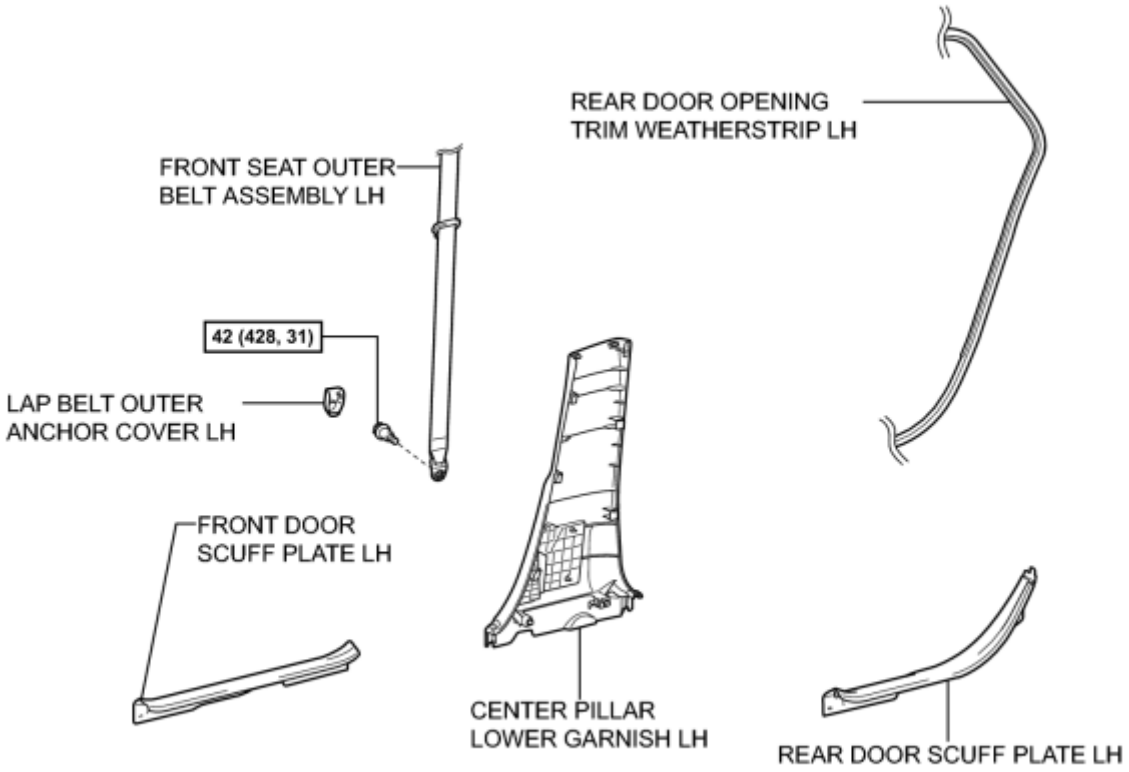
# ILLUSTRATION




P

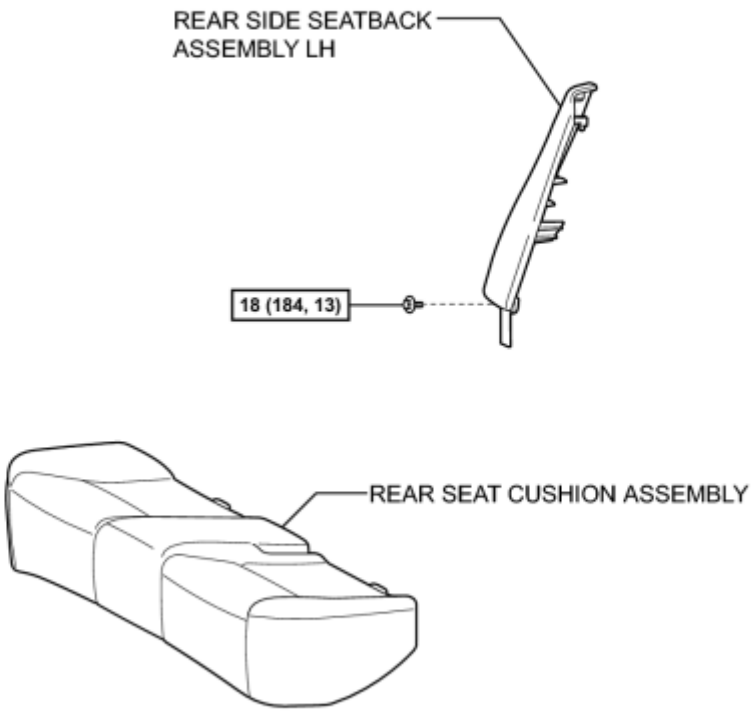
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

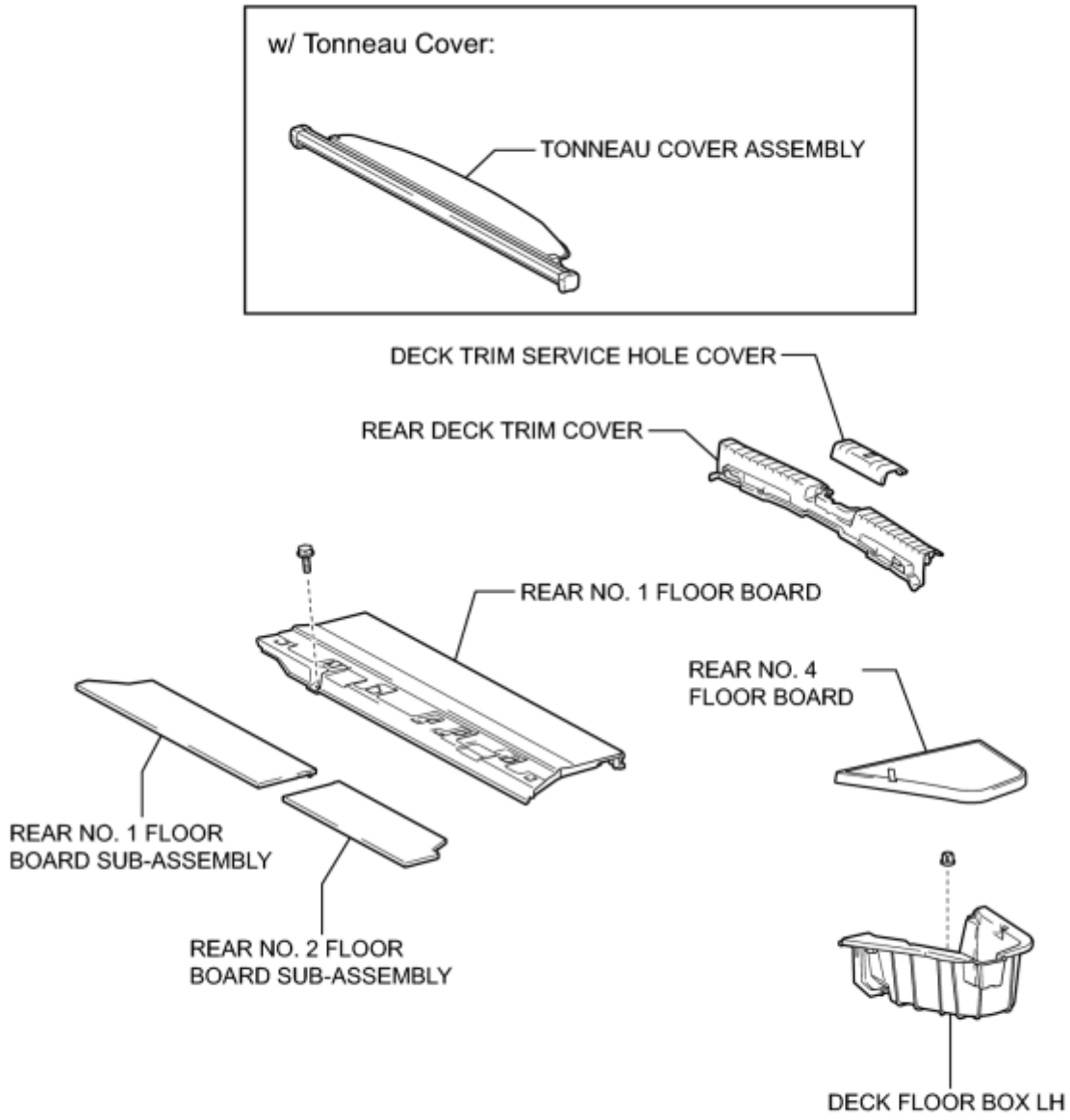
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

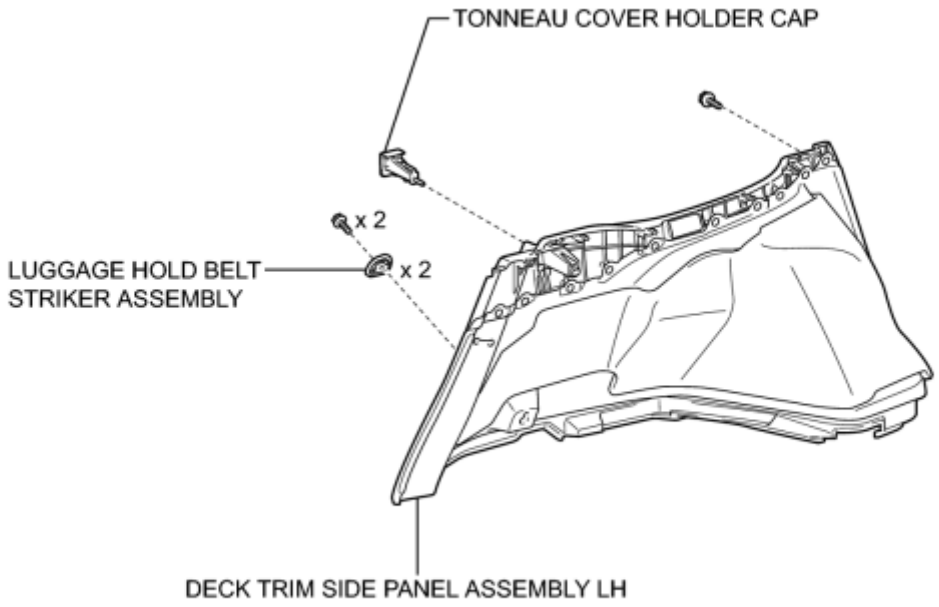
P

# ILLUSTRATION



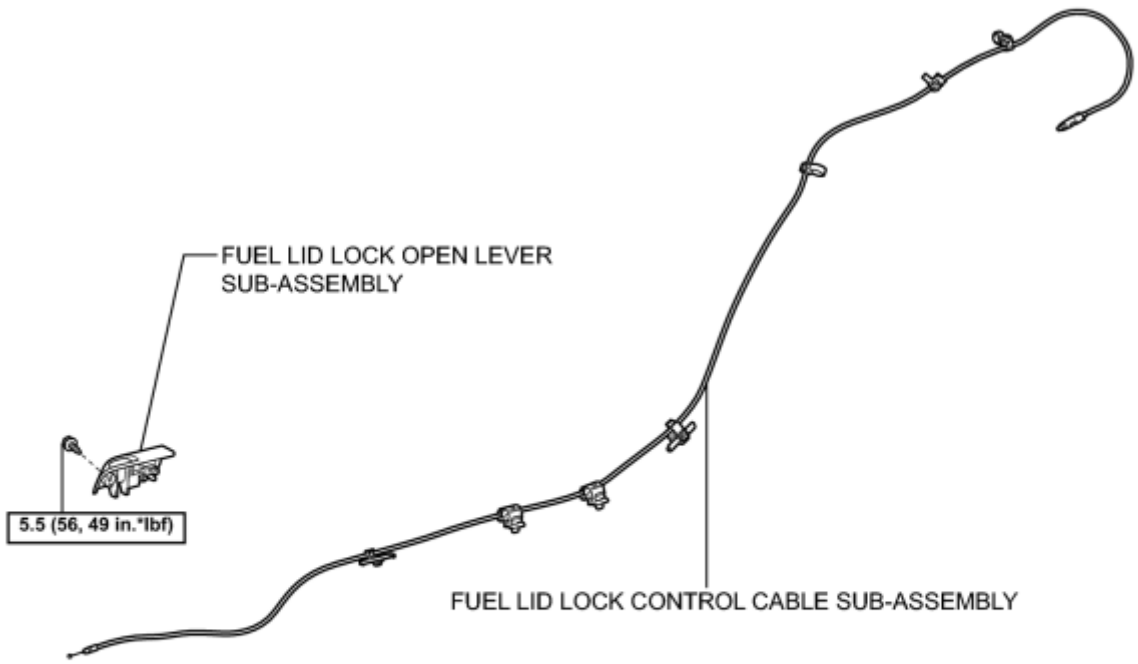

P

# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT SEAT ASSEMBLY LH

HINT:

Refer to the procedure up to Remove Front Seat Assembly LH INFO.

6. REMOVE FRONT DOOR SCUFF PLATE LH INFO

7. REMOVE REAR DOOR SCUFF PLATE LH INFO

8. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH INFO

9. REMOVE LAP BELT OUTER ANCHOR COVER LH INFO

10. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH INFO

11. REMOVE CENTER PILLAR LOWER GARNISH LH INFO

12. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

13. REMOVE REAR SIDE SEATBACK ASSEMBLY LH INFO

14. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

15. REMOVE REAR NO. 4 FLOOR BOARD INFO

16. REMOVE DECK FLOOR BOX LH INFO

17. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

18. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

19. REMOVE REAR NO. 1 FLOOR BOARD INFO

20. REMOVE DECK TRIM SERVICE HOLE COVER INFO

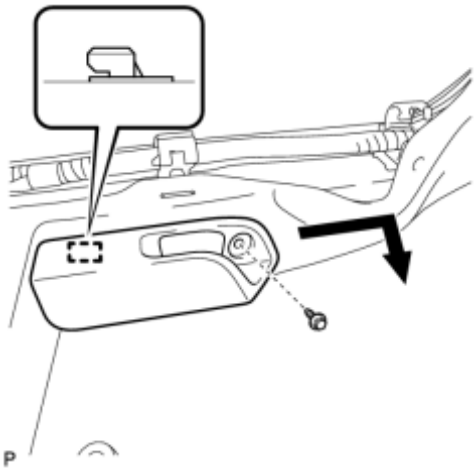
21. REMOVE REAR DECK TRIM COVER INFO

22. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

23. REMOVE TONNEAU COVER HOLDER CAP INFO

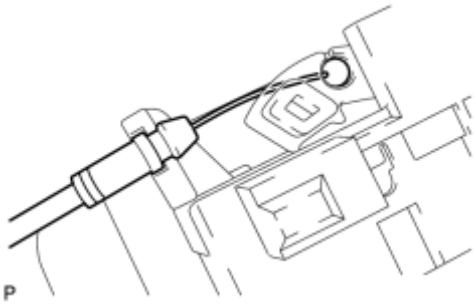
24. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH INFO

25. REMOVE FUEL LID LOCK OPEN LEVER SUB-ASSEMBLY




(a) Remove the screw.

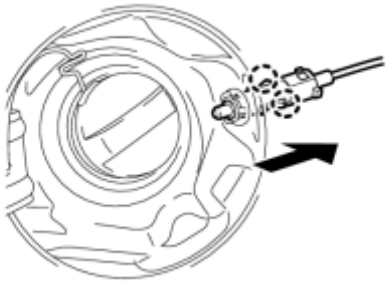
(b) Disengage the guide and disconnect the fuel lid lock open lever sub-assembly as shown in the illustration.




(c) Disconnect the fuel lid lock control cable sub-assembly.

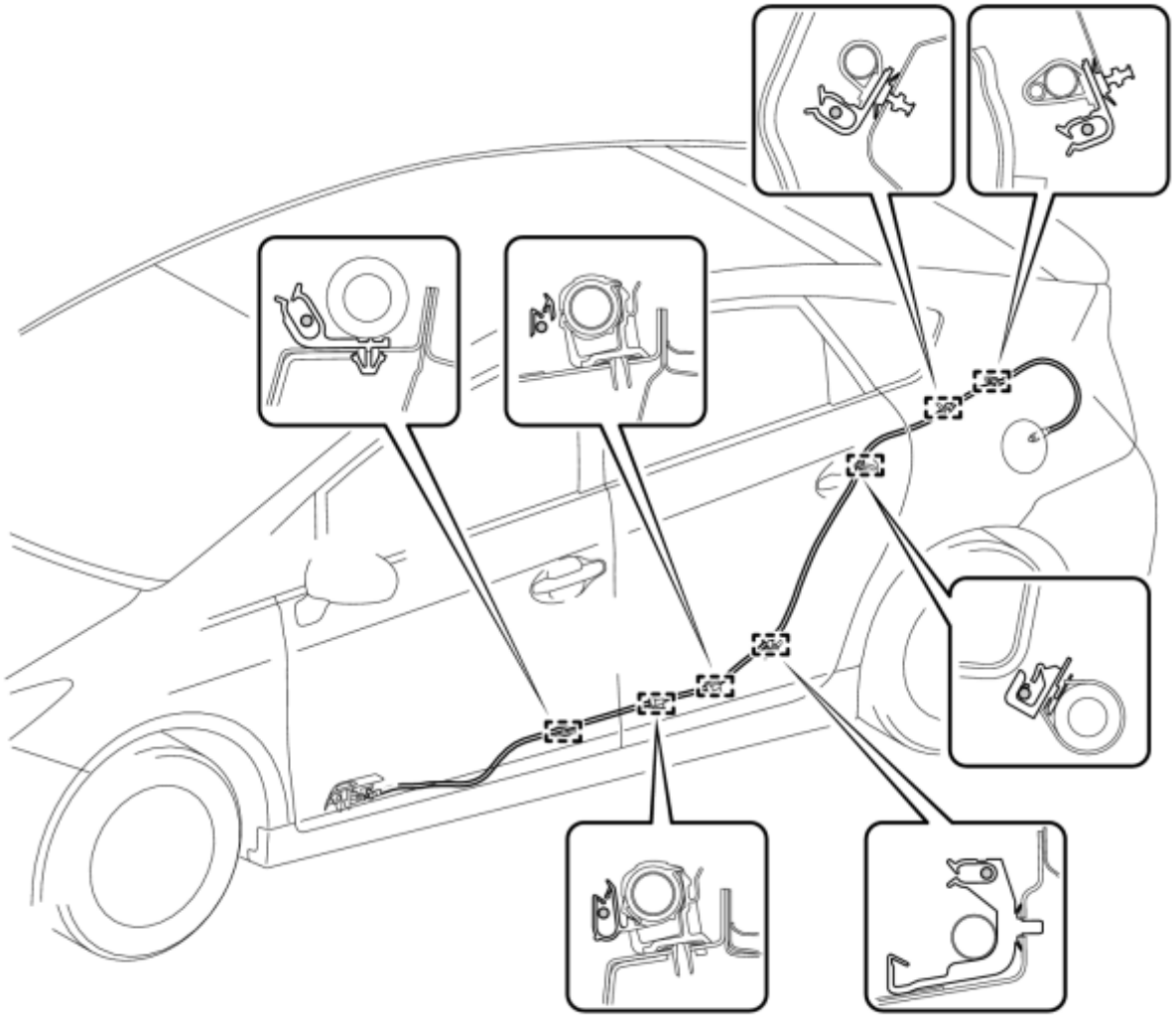
26. REMOVE FUEL LID LOCK CONTROL CABLE SUB-ASSEMBLY

(a) Disengage the 2 claws and disconnect the fuel lid lock control cable sub-assembly.



P

(b) Disengage the 7 clamps and remove the fuel lid lock control cable sub-assembly.

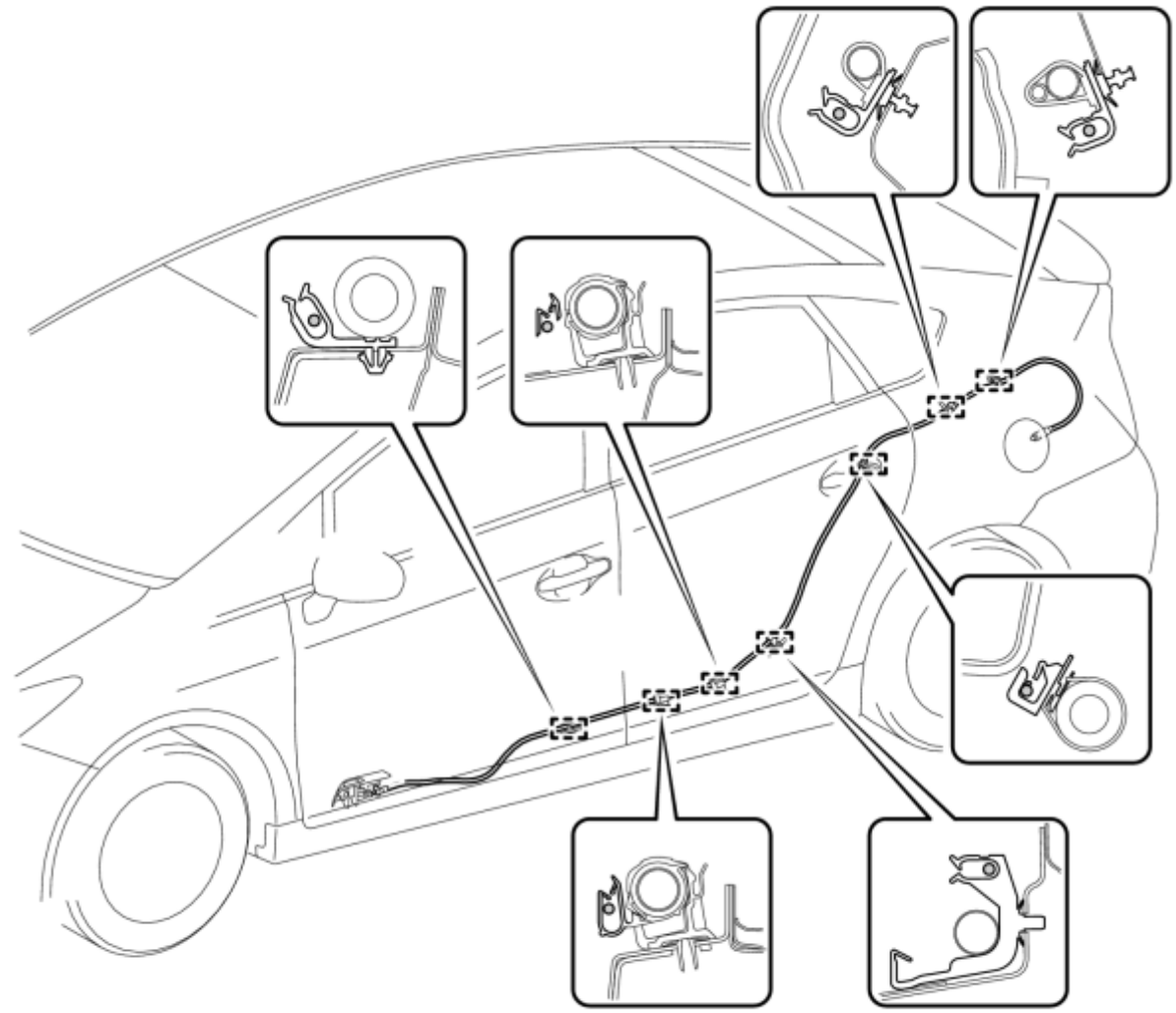


P

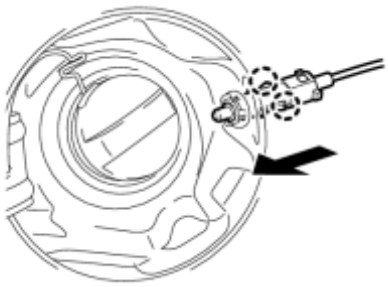
# INSTALLATION

1. INSTALL FUEL LID LOCK CONTROL CABLE SUB-ASSEMBLY

(a) Engage the 7 clamps.



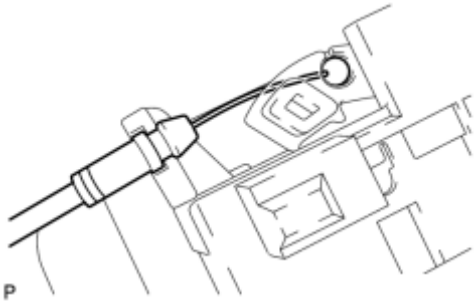
P



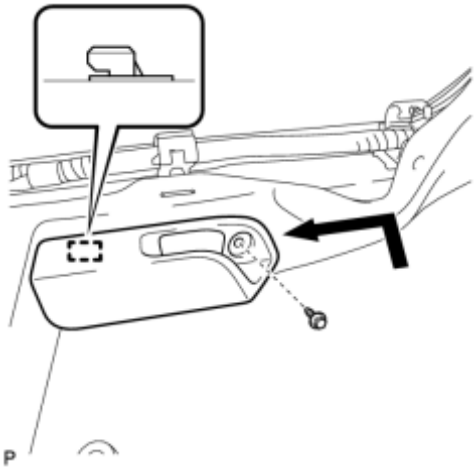
P

(b) Engage the 2 claws and connect the fuel lid lock control cable sub-assembly.

2. INSTALL FUEL LID LOCK OPEN LEVER SUB-ASSEMBLY




(a) Connect the fuel lid lock control cable sub-assembly.




(b) Engage the guide and install the fuel lid lock open lever sub-assembly with the screw.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

3. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH INFO

4. INSTALL TONNEAU COVER HOLDER CAP INFO

5. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

6. INSTALL REAR DECK TRIM COVER INFO

7. INSTALL DECK TRIM SERVICE HOLE COVER INFO

8. INSTALL REAR NO. 1 FLOOR BOARD INFO

9. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

10. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

11. INSTALL DECK FLOOR BOX LH INFO

12. INSTALL REAR NO. 4 FLOOR BOARD INFO

13. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

14. INSTALL REAR SIDE SEATBACK ASSEMBLY LH INFO

15. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

16. INSTALL CENTER PILLAR LOWER GARNISH LH INFO

17. CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH INFO

18. INSTALL LAP BELT OUTER ANCHOR COVER LH INFO

19. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH INFO

20. INSTALL REAR DOOR SCUFF PLATE LH INFO

21. INSTALL FRONT DOOR SCUFF PLATE LH INFO

22. INSTALL FRONT SEAT ASSEMBLY LH

HINT:

Refer to the procedure from Install Front Seat Assembly LH INFO

23. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

24. INSTALL REAR NO. 3 FLOOR BOARD INFO

25. INSTALL REAR DECK FLOOR BOX INFO

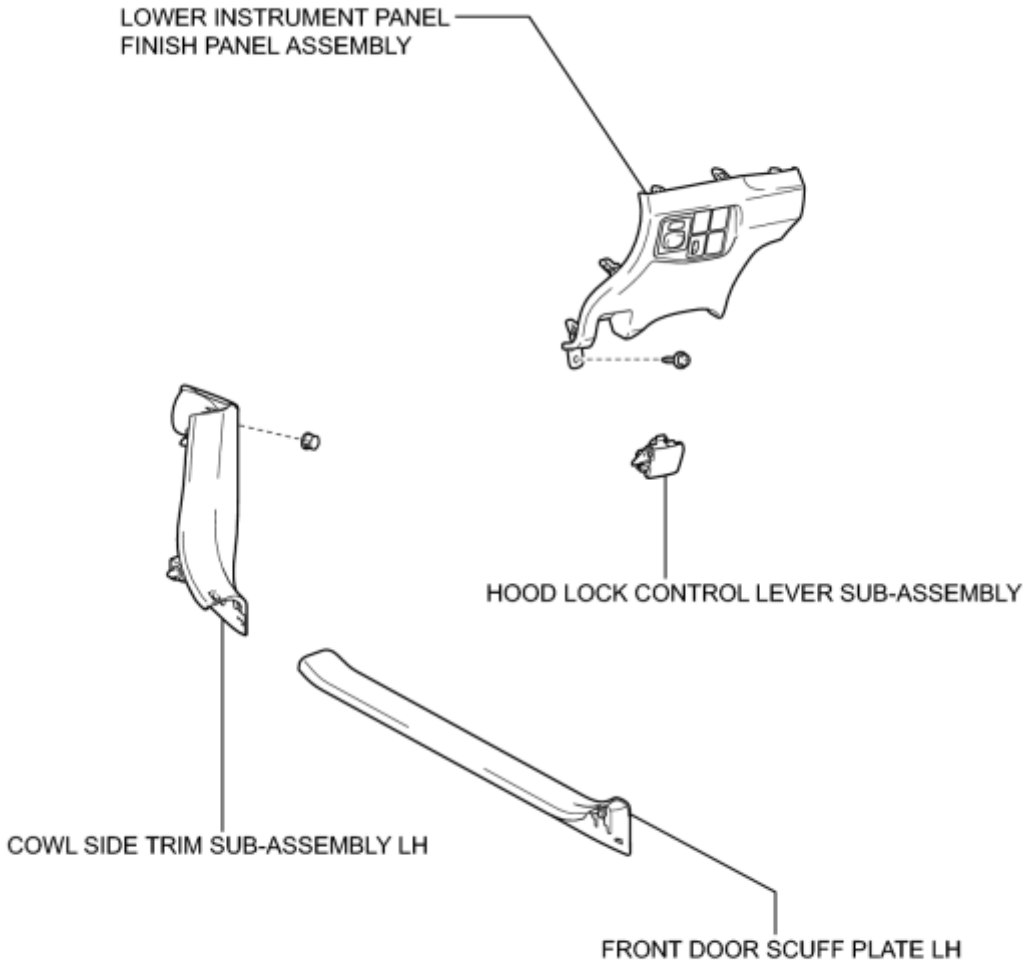
26. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

27. INSPECT SRS WARNING LIGHT

INFO

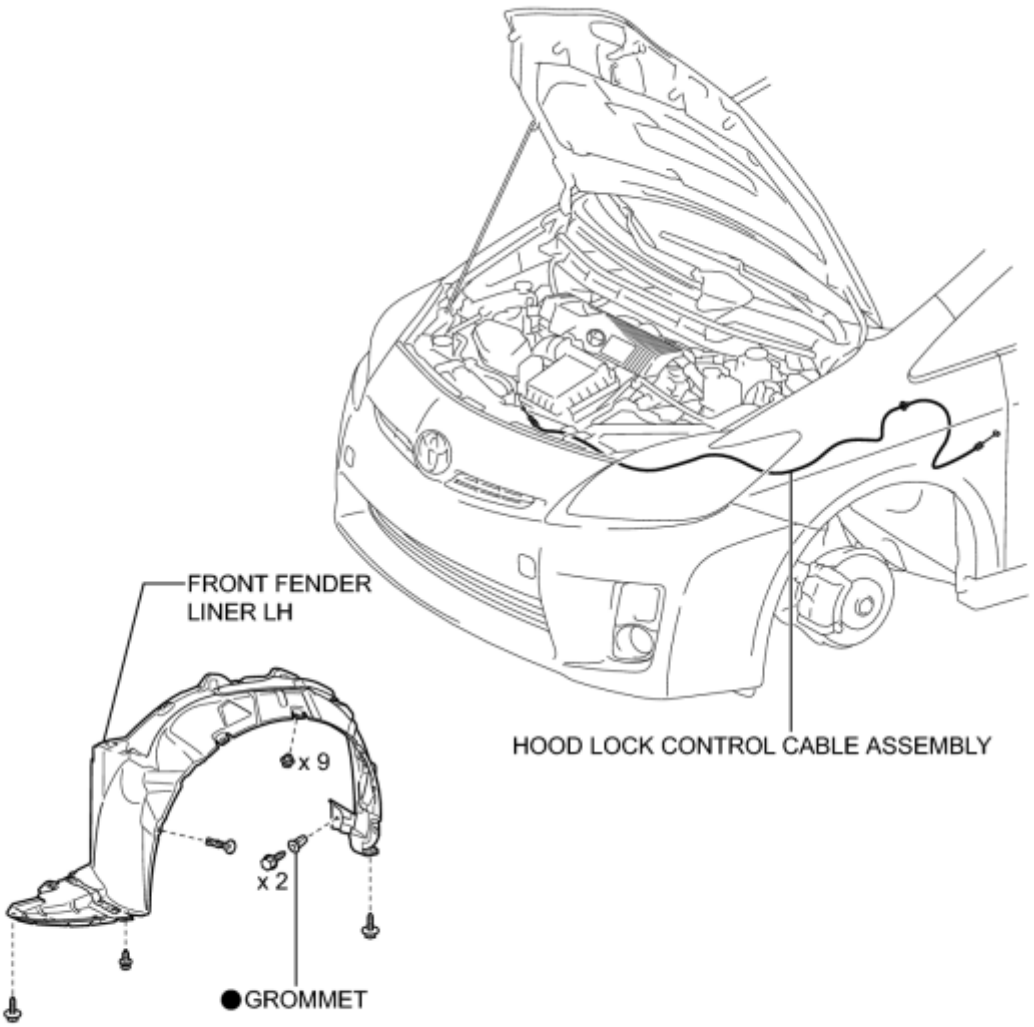
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION




● Non-reusable part

P

# REMOVAL

1. REMOVE FRONT WHEEL LH

2. REMOVE FRONT FENDER LINER LH

HINT:

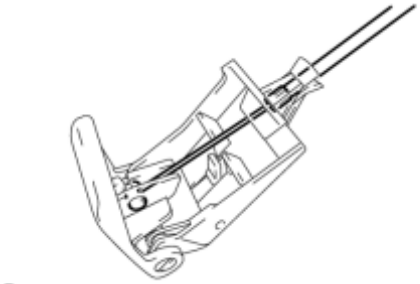
Use the same procedure for the RH side and LH side INFO.

3. REMOVE FRONT DOOR SCUFF PLATE LH INFO

4. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

5. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

6. REMOVE HOOD LOCK CONTROL LEVER SUB-ASSEMBLY



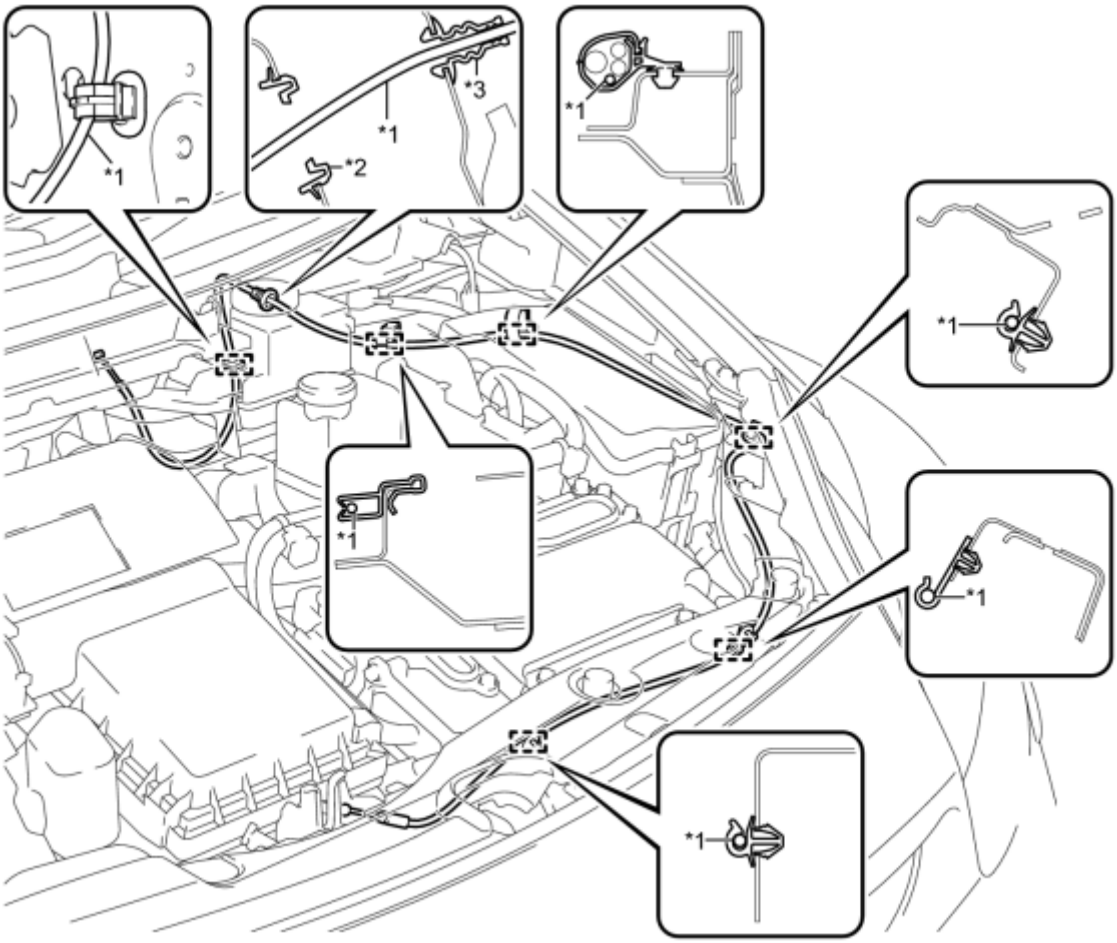

(a) Disconnect the hood lock control cable assembly from the hood lock control lever sub-assembly.

7. REMOVE HOOD LOCK CONTROL CABLE ASSEMBLY




(a) Disconnect the hood lock control cable assembly.

(b) Using a screwdriver, disengage each clamp shown in the illustration.




### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Hood Lock Control Cable | *2 | Grommet |
| *3 | Hood Cable Grommet | - | - |

HINT:

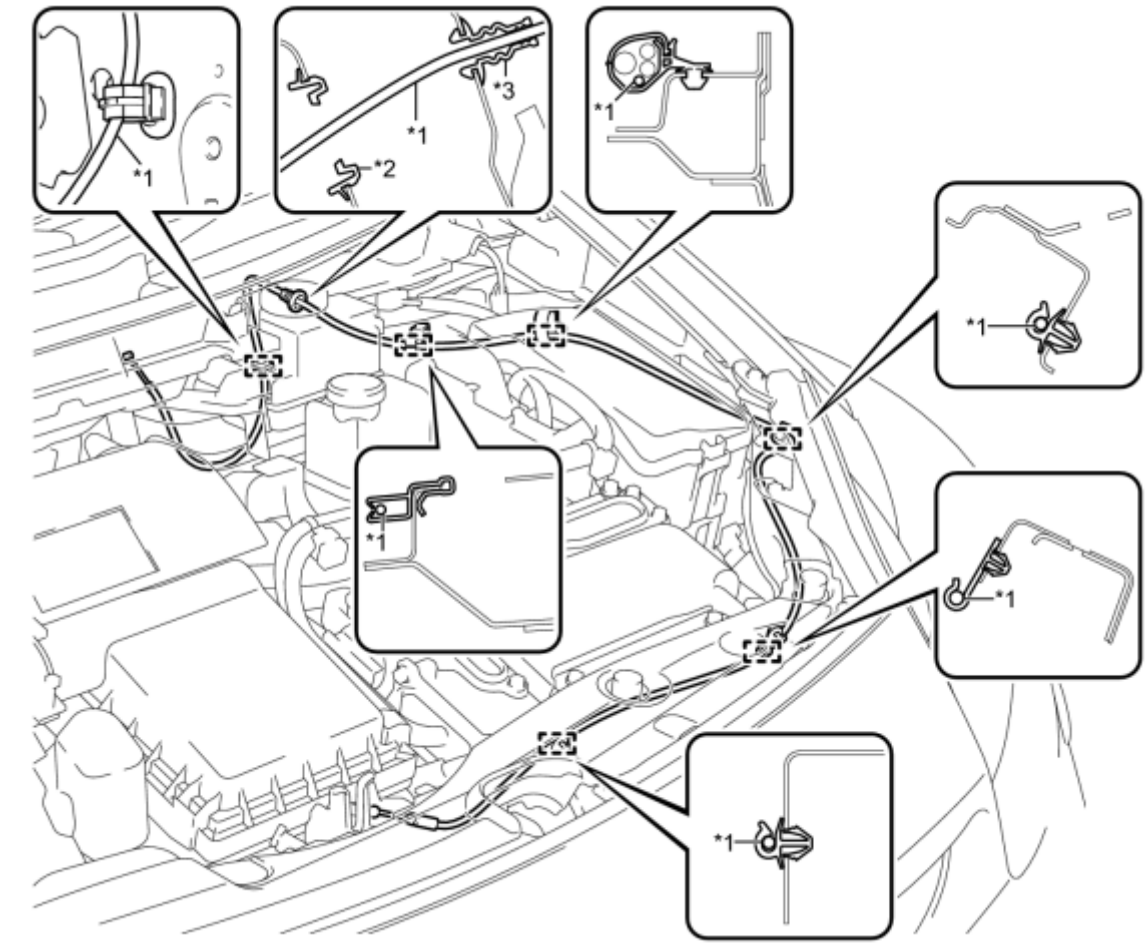
Tape the screwdriver tip before use.

(c) Pull the hood lock control cable assembly from the engine compartment and remove it.

# INSTALLATION

1. INSTALL HOOD LOCK CONTROL CABLE ASSEMBLY

(a) Pass the hood lock control cable assembly into the engine compartment.




P

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Hood Lock Control Cable | *2 | Grommet |
| *3 | Hood Cable Grommet | - | - |

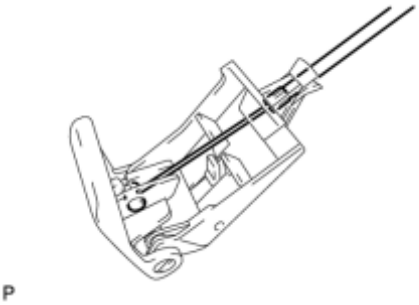
(b) Pass the cable through the upper radiator support.

(c) Engage each clamp shown in the illustration.

(d) Connect the hood lock control cable assembly.




2. INSTALL HOOD LOCK CONTROL LEVER SUB-ASSEMBLY




(a) Connect the hood lock control cable assembly to install the hood lock control lever sub-assembly.

3. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

4. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

5. INSTALL FRONT DOOR SCUFF PLATE LH INFO

6. INSTALL FRONT FENDER LINER LH

HINT:

Use the same procedure for the RH side and LH side INFO.

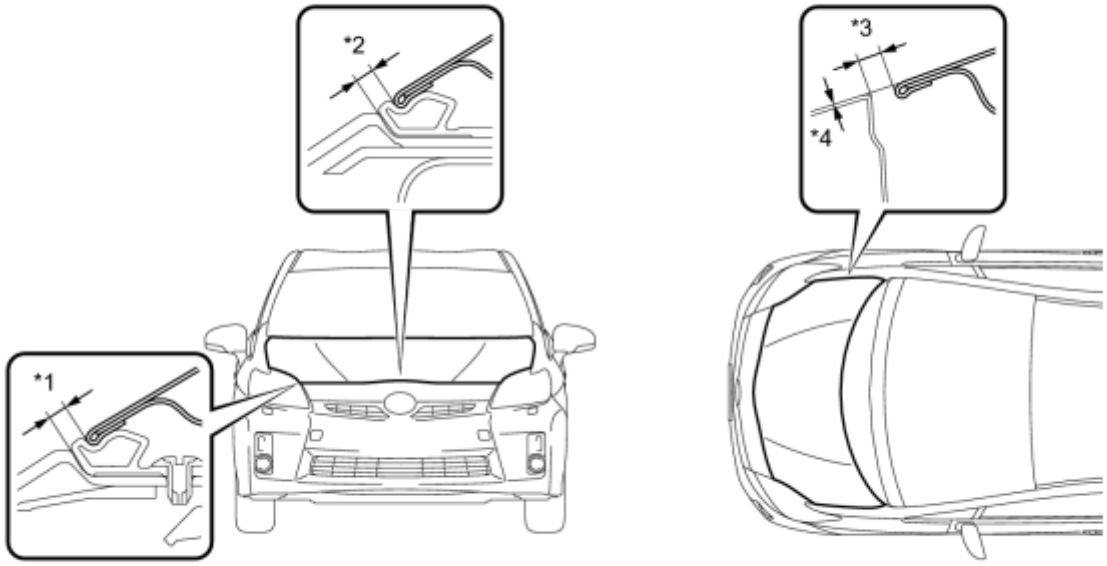
7. INSTALL FRONT WHEEL LH

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# ON-VEHICLE INSPECTION

1. INSPECT HOOD SUB-ASSEMBLY

(a) Check that the clearance measurements of areas *1 through *4 are within each standard range.



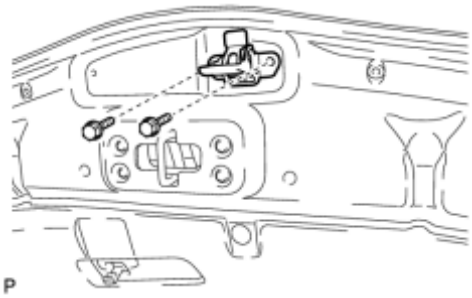

P

### *Standard Clearance*

| Area | Measurement | Area | Measurement |
|---|---|---|---|
| *1 | 2.0 to 6.0 mm (0.0787 to 0.236 in.) | *2 | 2.0 to 6.0 mm (0.0787 to 0.236 in.) |
| *3 | 2.5 to 5.5 mm (0.0984 to 0.217 in.) | *4 | -1.5 to 1.5 mm (-0.0591 to 0.0591 in.) |

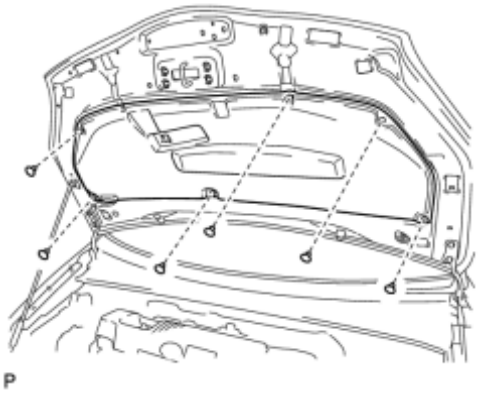
# DISASSEMBLY

1. REMOVE HOOD AUXILIARY CATCH HOOK ASSEMBLY




(a) Remove the 2 bolts and hood auxiliary catch hook assembly.

2. REMOVE HOOD INSULATOR

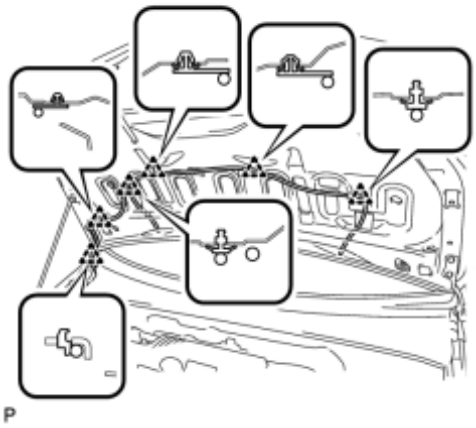



(a) Using a clip remover, remove the 6 clips and hood insulator.

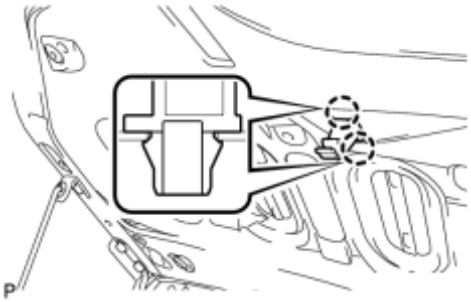
3. REMOVE WASHER NOZZLE SUB-ASSEMBLY INFO

4. DISCONNECT WASHER HOSE ASSEMBLY

(a) Using a clip remover, disengage the 6 clips and disconnect the washer hose assembly.

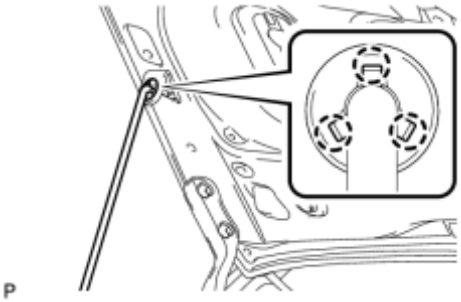



5. REMOVE HOOD STAY HOLDER




(a) Disengage the 2 claws and remove the hood stay holder.

6. REMOVE HOOD SUPPORT ROD




(a) Disengage the 3 claws and remove the hood support rod.

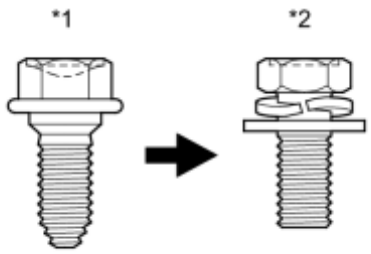
7. REMOVE HOOD STAY BRACKET

(a) Remove the bolt and hood stay bracket.



P

# ADJUSTMENT




P

*Text in Illustration*

| | |
|---|---|
| *1 | Centering Bolt |
| *2 | Standard Bolt |

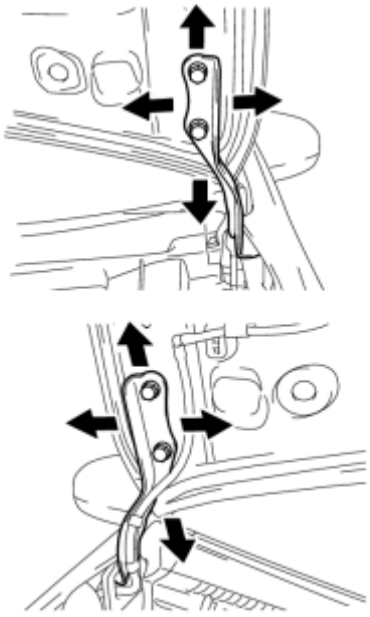
HINT:

- Centering bolts are used to mount the hood hinge and hood lock. The hood and hood lock cannot be adjusted with the centering bolts installed. Substitute the centering bolts with standard bolts when making adjustments.
- Specified torque for standard bolts is shown in the standard bolt chart INFO.

1. INSPECT HOOD SUB-ASSEMBLY INFO

2. ADJUST HOOD SUB-ASSEMBLY

(a) Horizontally and vertically adjust the hood.



P

(1) Loosen the 4 hinge bolts of the hood.

(2) Adjust the clearance between the hood and front fender by moving the hood.

(3) Tighten the 4 hinge bolts after the adjustment.

Torque: **13 N·m (133 kgf·cm, 10ft·lbf)**

(b) Adjust the height of the front end of the hood using the cushion rubbers.

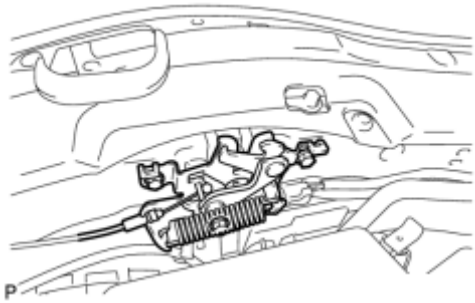



(1) Adjust the 2 cushion rubbers so that the heights of the hood and fender are aligned.

HINT:

Raise or lower the front end of the hood by turning the 2 cushion rubbers.

(c) Adjust the hood lock.




(1) Loosen the 3 bolts.

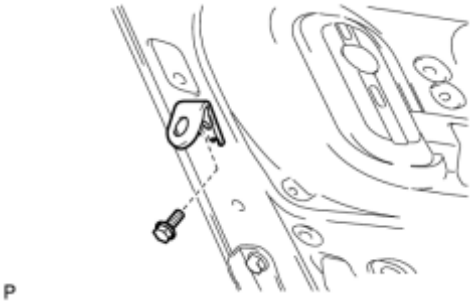
(2) Tighten the bolts after the adjustment.

Torque: **7.5 N·m (77 kgf·cm, 66in·lbf)**

(3) Check that the striker can engage with the hood lock smoothly.

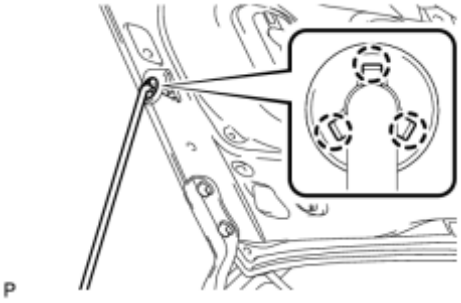
# REASSEMBLY

1. INSTALL HOOD STAY BRACKET



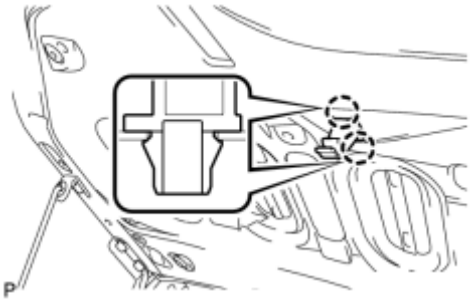

(a) Install the hood stay bracket with the bolt.

2. INSTALL HOOD SUPPORT ROD




(a) Engage the 3 claws and install the hood support rod.

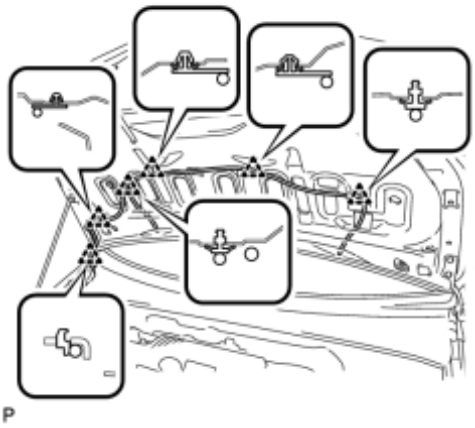
3. INSTALL HOOD STAY HOLDER




(a) Engage the 2 claws and install the hood stay holder.

4. CONNECT WASHER HOSE ASSEMBLY

(a) Engage the 6 clips and connect the washer hose assembly.



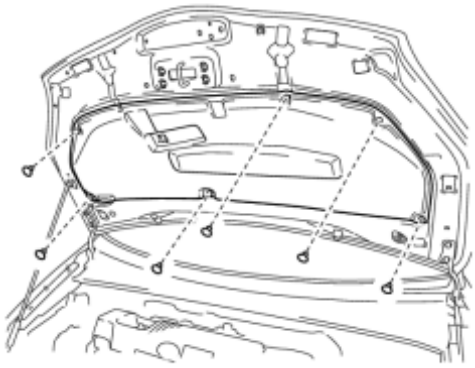
P

5. INSTALL WASHER NOZZLE SUB-ASSEMBLY INFO

6. INSPECT WASHER NOZZLE SUB-ASSEMBLY INFO

7. ADJUST WASHER NOZZLE SUB-ASSEMBLY INFO

8. INSTALL HOOD INSULATOR



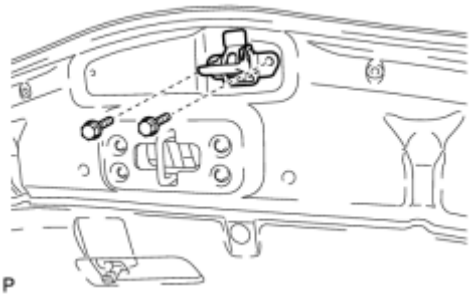
P

(a) Install the hood insulator with the 6 clips.

9. INSTALL HOOD AUXILIARY CATCH HOOK ASSEMBLY

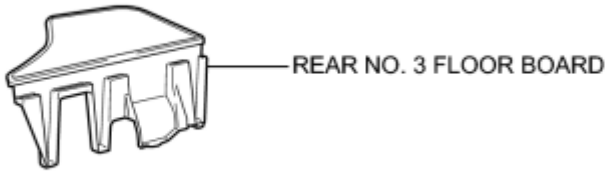
(a) Install the hood auxiliary catch hook assembly with the 2 bolts.

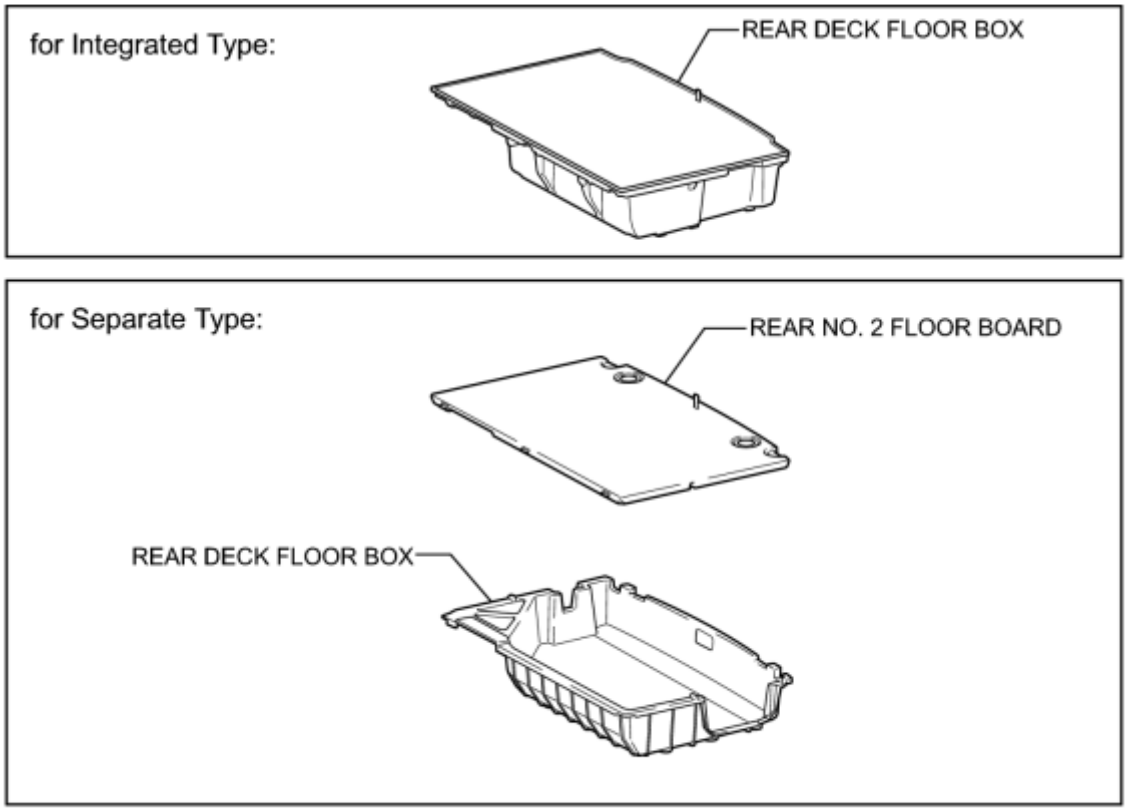
Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**


P

# COMPONENTS

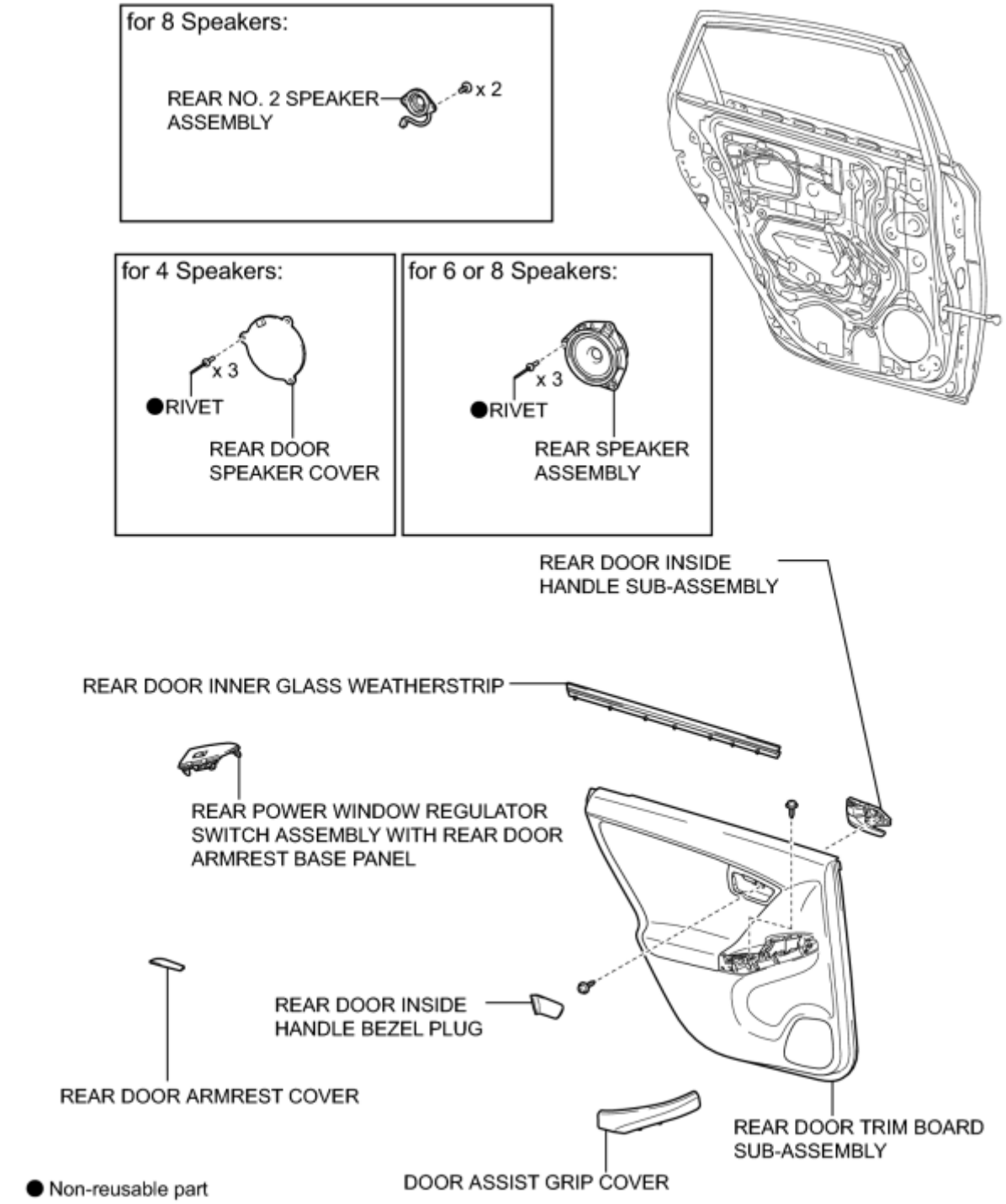
# ILLUSTRATION



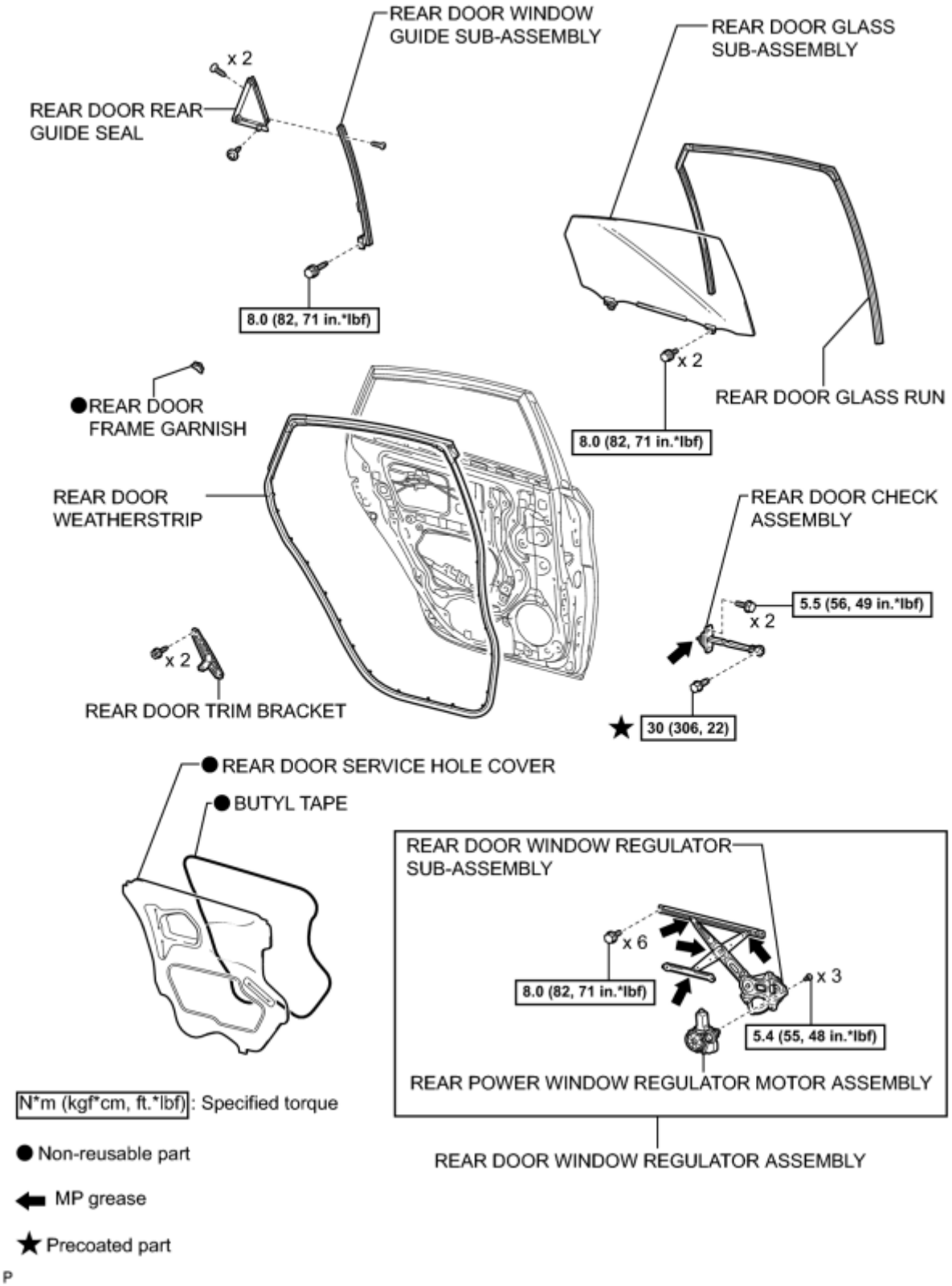

P

# ILLUSTRATION

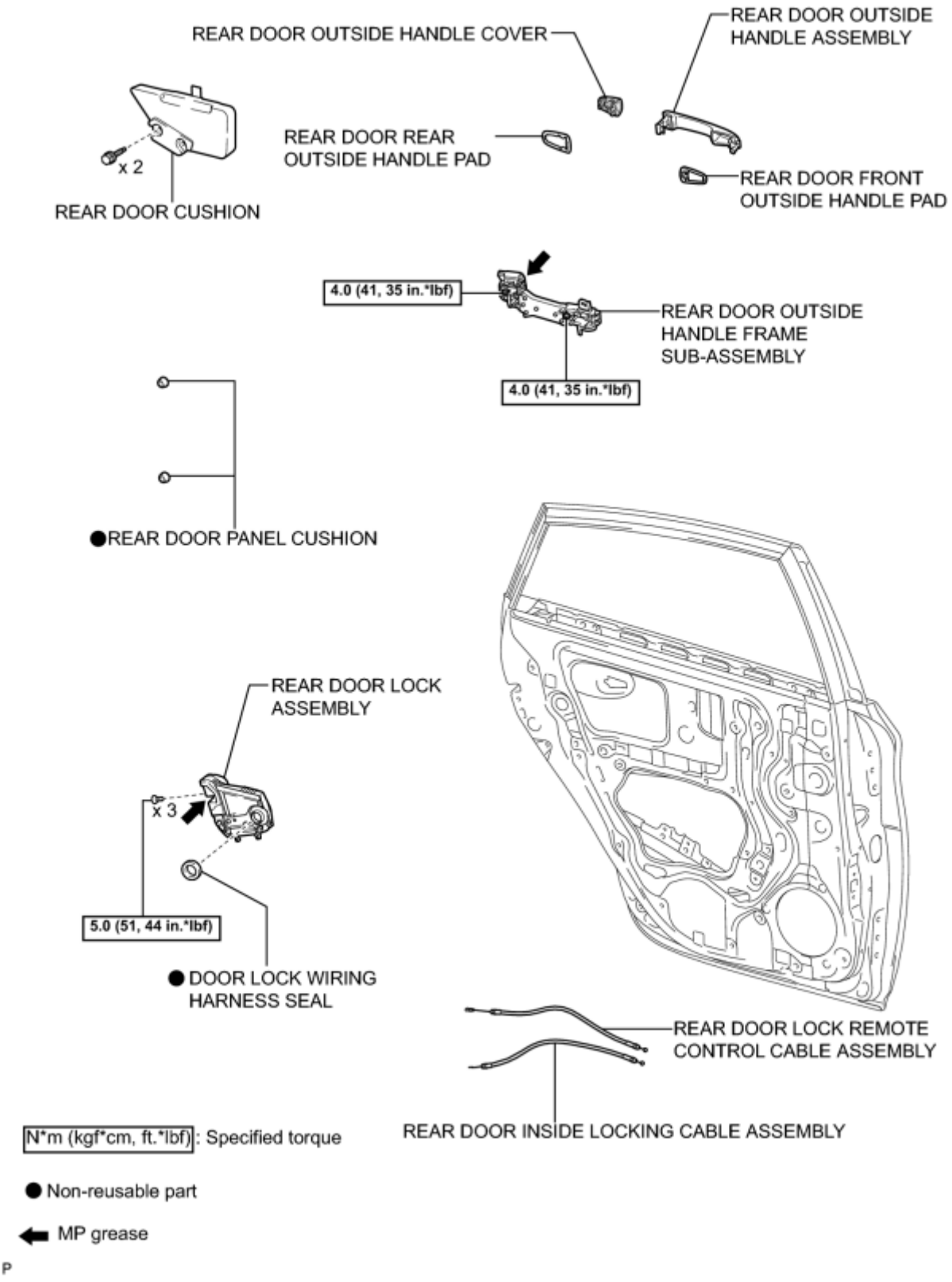



P

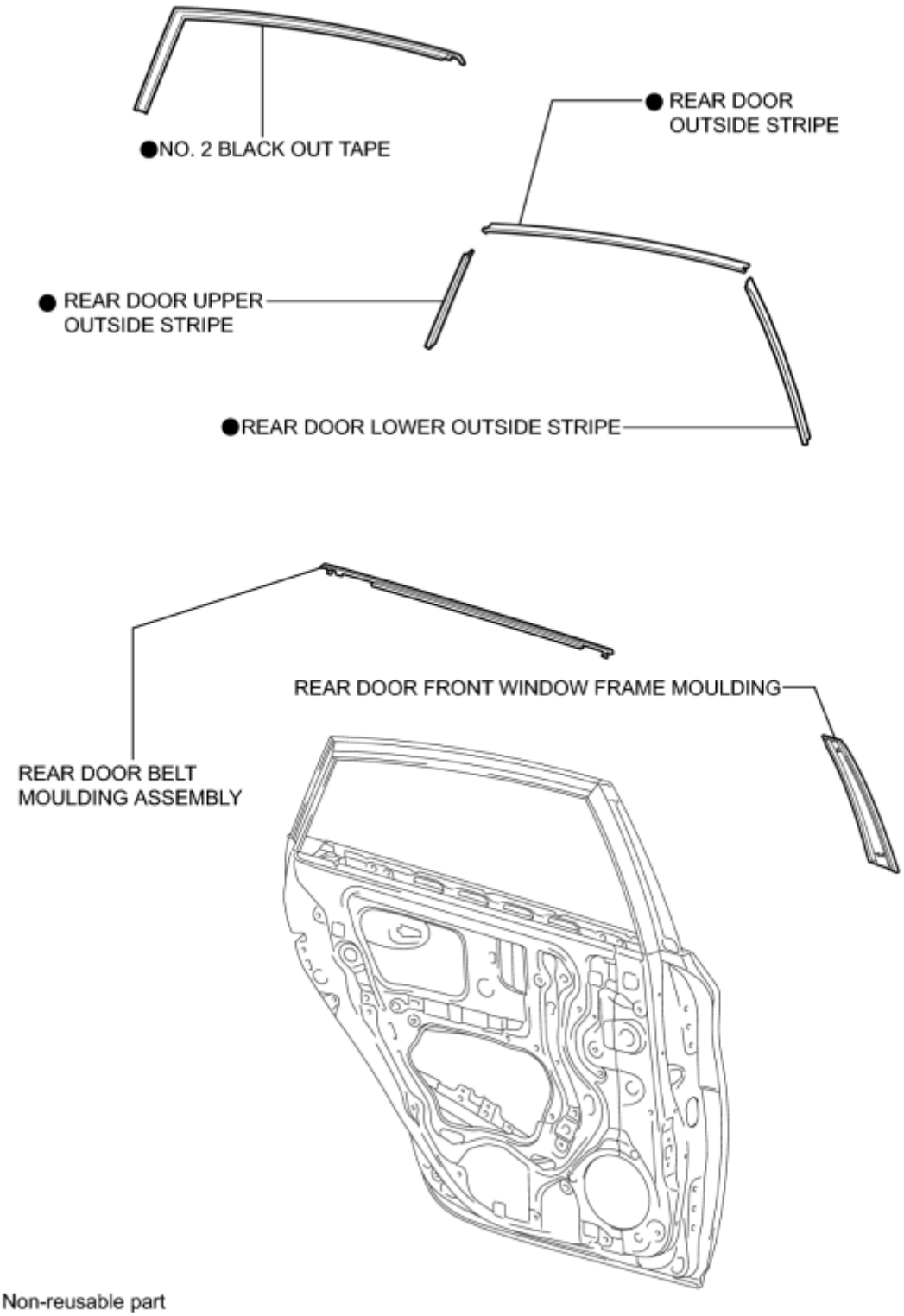
# ILLUSTRATION




# ILLUSTRATION




# ILLUSTRATION


● NO. 2 BLACK OUT TAPE
● REAR DOOR OUTSIDE STRIPE
● REAR DOOR UPPER OUTSIDE STRIPE
● REAR DOOR LOWER OUTSIDE STRIPE
REAR DOOR BELT MOULDING ASSEMBLY
REAR DOOR FRONT WINDOW FRAME MOULDING
● Non-reusable part

P

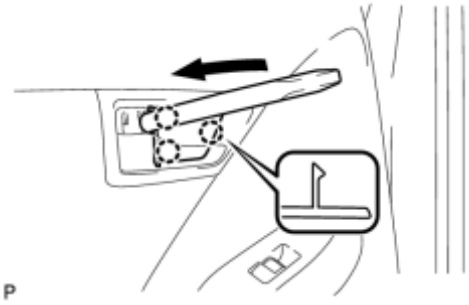
# DISASSEMBLY

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

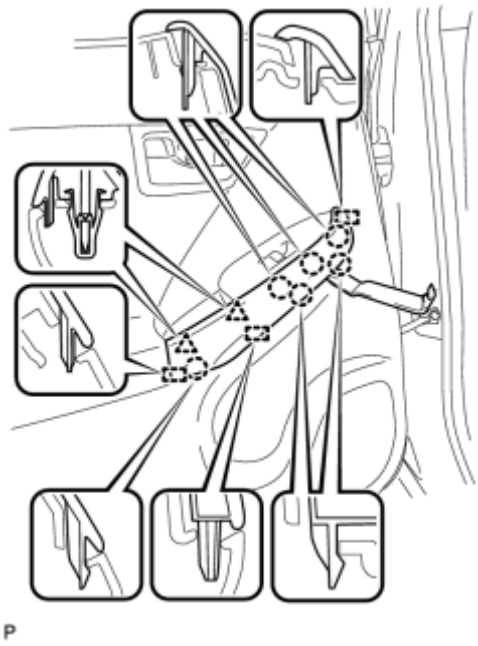
3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG




(a) Using a moulding remover, disengage the 3 claws and remove the rear door inside handle bezel plug.

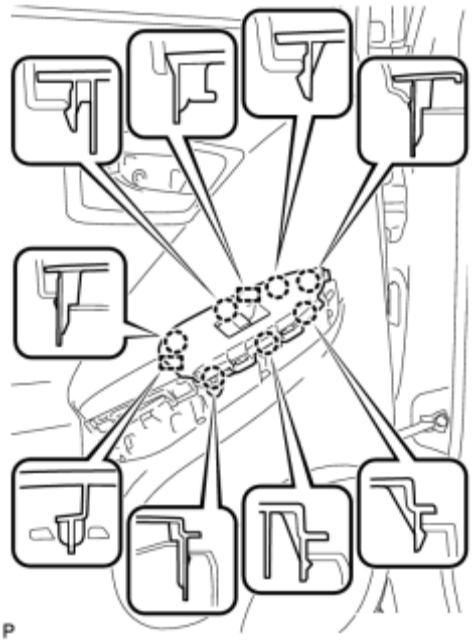
5. REMOVE DOOR ASSIST GRIP COVER




(a) Using a moulding remover, disengage the 6 claws, 2 clips and 3 guides, and remove the door assist grip cover.

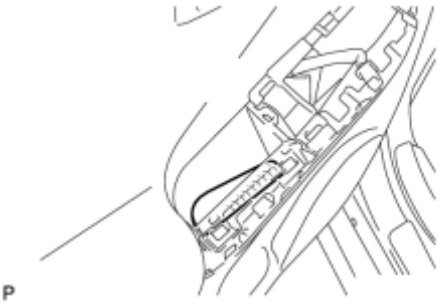
6. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL

(a) Disengage the 7 claws and 2 guides.



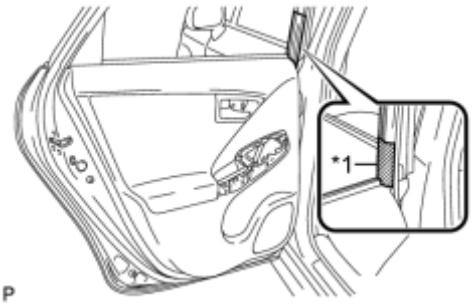
(b) Disconnect the connector and remove the rear power window regulator switch assembly with rear door armrest base panel.

7. REMOVE REAR DOOR ARMREST COVER



(a) Remove the rear door armrest cover.

8. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY

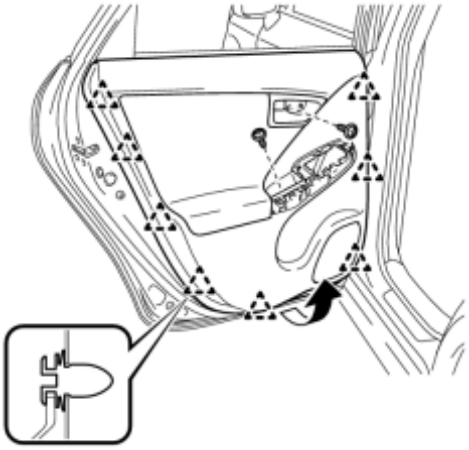



(a) Put protective tape around the rear door panel.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

(b) Remove the 2 screws.



P

(c) Using a clip remover, disengage the 8 clips.

(d) Pull out the rear door trim board sub-assembly in the direction indicated by the arrow in the illustration.

(e) Raise the rear door trim board sub-assembly and remove the rear door trim board sub-assembly together with the rear door inner glass weatherstrip.



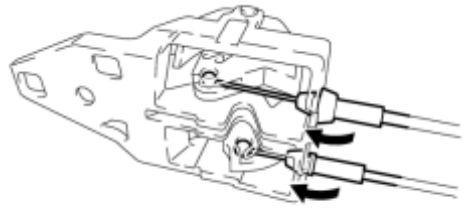
P

(f) Disengage the 2 claws and disconnect the rear door inside handle sub-assembly.

(g) for 8 Speakers:

(1) Disconnect the connector.

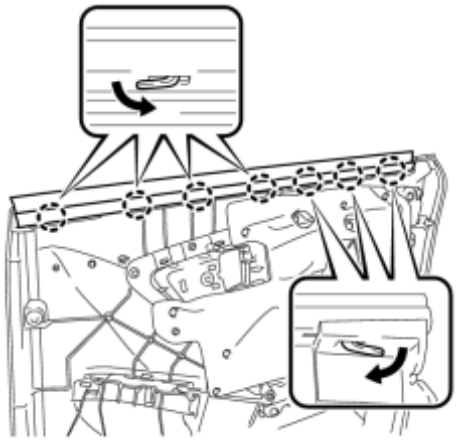
9. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY



P

(a) Disconnect the rear door lock remote control cable assembly and rear door inside locking cable assembly, and remove the rear door inside handle sub-assembly.

10. REMOVE REAR DOOR INNER GLASS WEATHERSTRIP

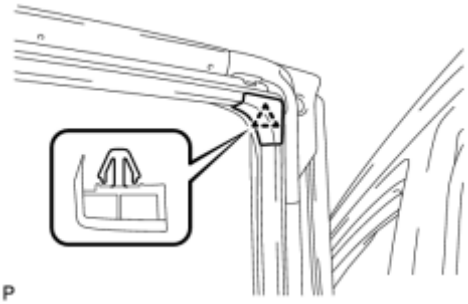


P

(a) Disengage the 7 claws and remove the rear door inner glass weatherstrip from the rear door trim board sub-assembly as shown in the illustration.

11. REMOVE REAR NO. 2 SPEAKER ASSEMBLY (for 8 Speakers) INFO

12. REMOVE REAR DOOR FRAME GARNISH



P

(a) Disengage the clip and remove the rear door frame garnish.

HINT:

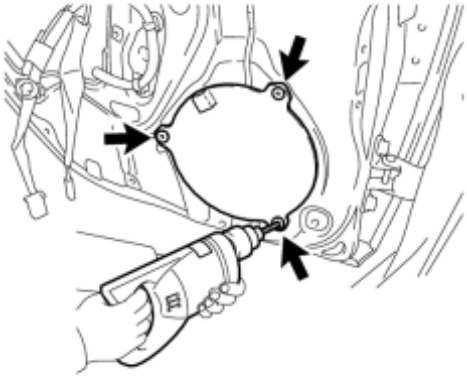
This garnish needs to be replaced with a new one because the clip will break when removing the rear door frame garnish.

13. REMOVE REAR DOOR SPEAKER COVER (for 4 Speakers)

(a) Disconnect the connector.

(b) Using a drill bit with a diameter of less than 4 mm (0.158 in.), drill out the 3 rivet heads and remove the rear door speaker cover.

- Do not drill the rivet at an angle as this will cause damage to the drill and drill hole. Line up the drill and rivet, and carefully drill out the rivet head.
- Be careful as the cut rivet will be very hot.



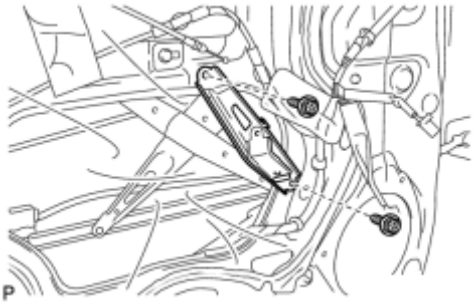
P

(c) Continue drilling and push out the remaining rivet fragments.

(d) Using a vacuum cleaner, remove the rivet fragments and shavings from the inside of the door.

14. REMOVE REAR SPEAKER ASSEMBLY (for 6 or 8 Speakers) INFO

15. REMOVE REAR DOOR TRIM BRACKET

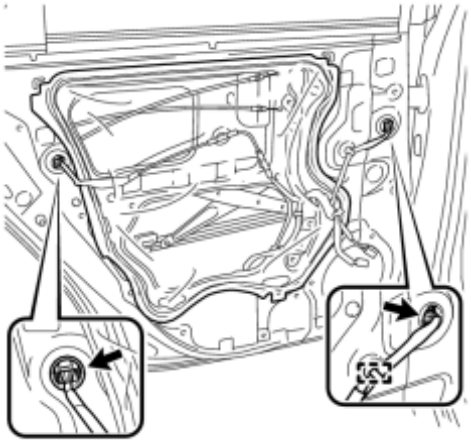


P

(a) Remove the 2 screws and rear door trim bracket.

16. REMOVE REAR DOOR SERVICE HOLE COVER

(a) Disconnect the 2 connectors.



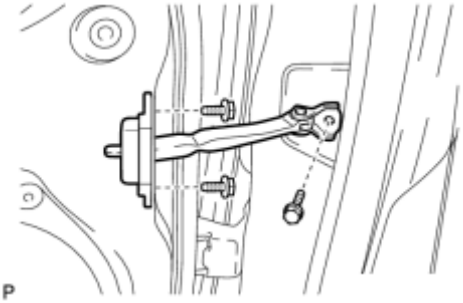
P

(b) Disengage the clamp and remove the rear door service hole cover.

HINT:

Remove any remaining butyl tape from the door.

17. REMOVE REAR DOOR CHECK ASSEMBLY

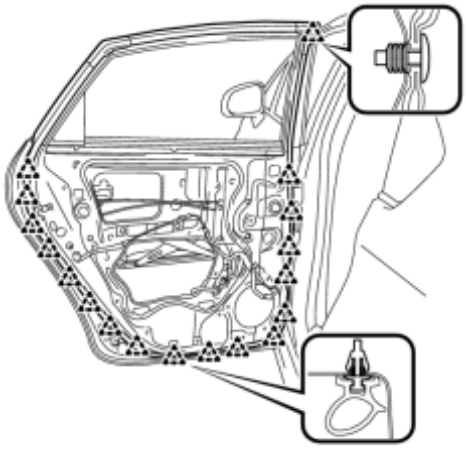


P

(a) Remove the 3 bolts and rear door check assembly.

18. REMOVE REAR DOOR WEATHERSTRIP

(a) Using a clip remover, disengage the 18 clips and remove the front door weatherstrip.



P

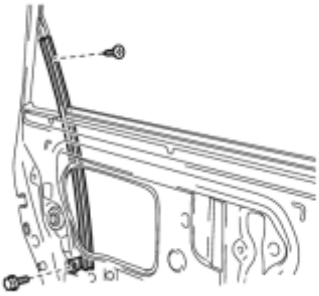
19. REMOVE REAR DOOR GLASS RUN



P

(a) Remove the rear door glass run.

20. REMOVE REAR DOOR WINDOW GUIDE SUB-ASSEMBLY



P

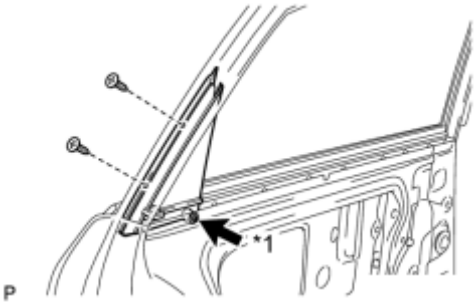
(a) Remove the screw.

(b) Remove the bolt and rear door window guide sub-assembly.

21. REMOVE REAR DOOR REAR GUIDE SEAL

(a) Loosen the temporary screw.

# Text in Illustration




| | |
|---|---|
| *1 | Temporary Screw |

(b) Remove the 2 screws and rear door rear guide seal.

(c) Remove the temporary screw from the rear door window division bar sub-assembly.

22. REMOVE REAR DOOR GLASS SUB-ASSEMBLY

(a) Connect the rear power window regulator motor connector.

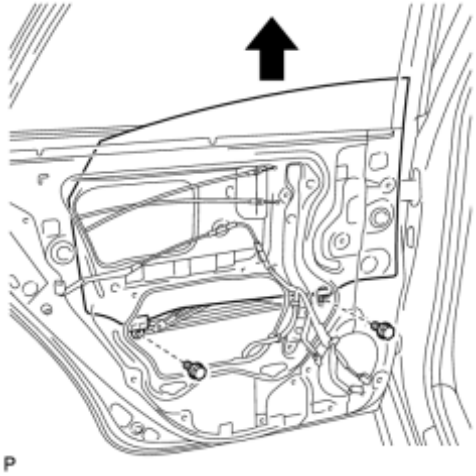
(b) Connect the power window regulator switch assembly and move the rear door glass sub-assembly so that the door glass bolts can be seen.

(c) Disconnect the power window regulator switch assembly and rear power window regulator motor connector.

(d) Disconnect the cable from the negative (-) battery terminal.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

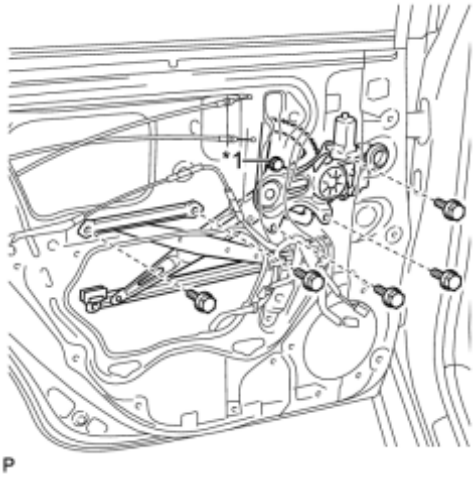



(e) Remove the 2 bolts and rear door glass sub-assembly as shown in the illustration.

- After the bolts are removed, do not allow the door glass to fall.
- Do not damage the door glass.

23. REMOVE REAR DOOR WINDOW REGULATOR ASSEMBLY

(a) Loosen the temporary bolt.




## Text in Illustration

| | |
|---|---|
| *1 | Temporary Bolt |

NOTICE:

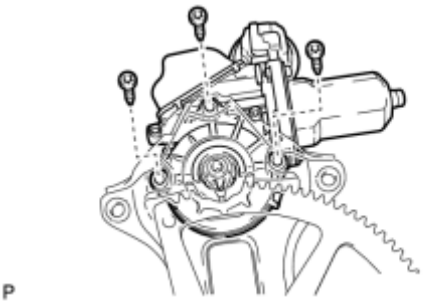
Do not remove the temporary bolt. If the temporary bolt is removed, the rear door window regulator may fall and cause damage.

(b) Remove the 5 bolts.

(c) Remove the rear door window regulator assembly.

(d) Remove the temporary bolt from the rear door window regulator assembly.

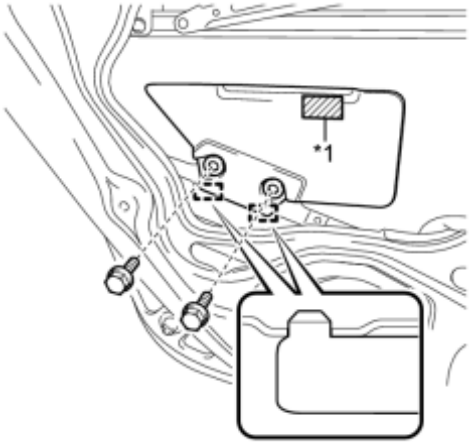
24. REMOVE REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY




(a) Using a T25 "TORX" socket wrench, remove the 3 screws and rear power window regulator motor assembly.

25. REMOVE REAR DOOR CUSHION

(a) Remove the 2 bolts.

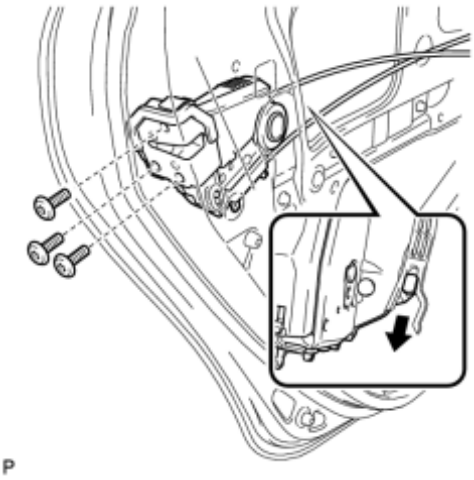



(b) Disengage the 2 guides and remove the rear door cushion.

***Text in Illustration***

| | |
|---|---|
| *1 | Double-sided Tape |

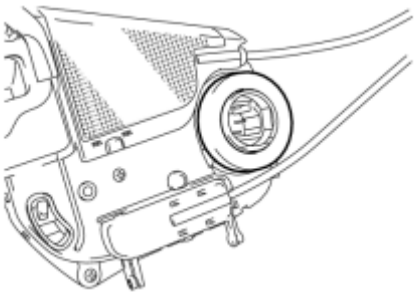
26. REMOVE REAR DOOR LOCK ASSEMBLY




(a) Using a T30 "TORX" socket wrench, remove the 3 screws.

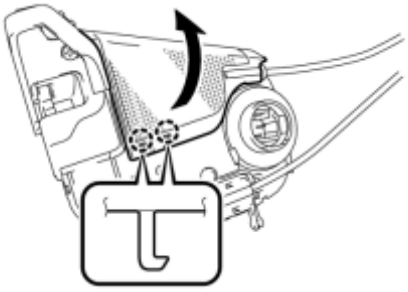
(b) Move the rear door lock assembly downward and pull the release plate out of the rear door outside handle frame.

(c) Remove the door lock wiring harness seal from the rear door lock assembly.



P

27. REMOVE REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY

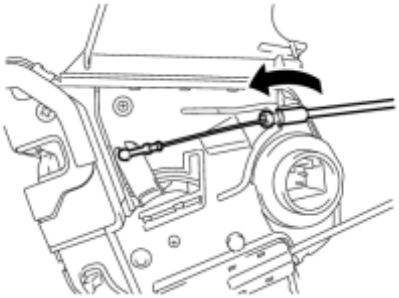


P

(a) Using a screwdriver, disengage the 2 claws as shown in the illustration.

HINT:

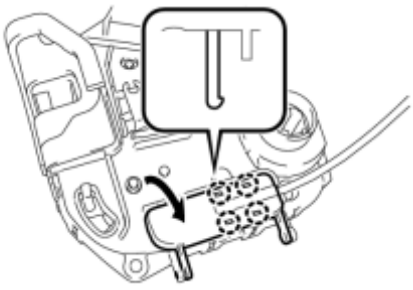
Tape the screwdriver tip before use.



P

(b) Remove the rear door lock remote control cable assembly as shown in the illustration.

28. REMOVE REAR DOOR INSIDE LOCKING CABLE ASSEMBLY



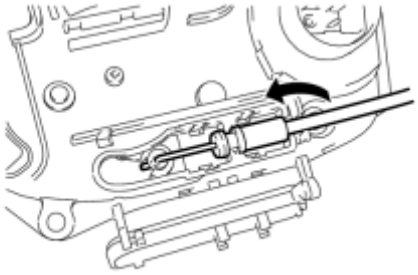
P

(a) Using a screwdriver, disengage the 4 claws as shown in the illustration.

HINT:

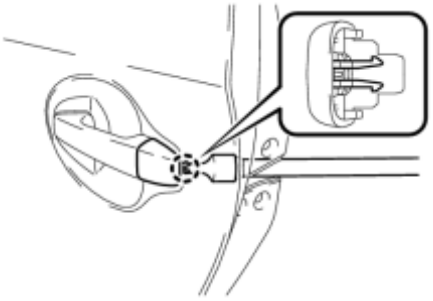
Tape the screwdriver tip before use.

(b) Remove the rear door inside locking cable assembly as shown in the illustration.



P

29. REMOVE REAR DOOR OUTSIDE HANDLE COVER



P

(a) Using a T30 "TORX" socket wrench, loosen the screw.

HINT:

The screw cannot be removed because it is integrated into the rear door outside handle frame sub-assembly.

(b) Disengage the claw and remove the rear door outside handle cover.

30. REMOVE REAR DOOR OUTSIDE HANDLE ASSEMBLY

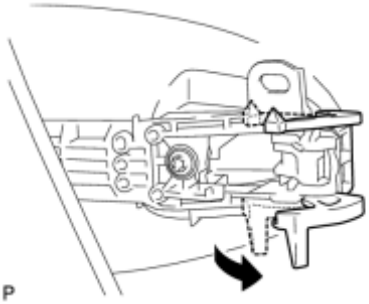


P

(a) Pull and hold the release plate of the rear door outside handle frame sub-assembly as shown in the illustration.

NOTICE:

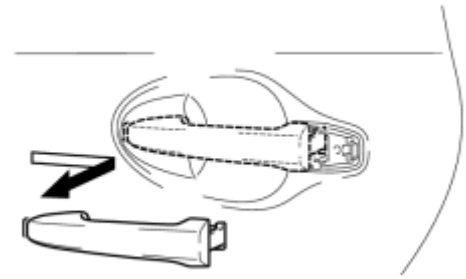
The release plate may interfere with the rear door outside handle assembly and may be damaged when removing the rear door outside handle assembly, unless the release plate of the rear door outside handle frame sub-assembly is pulled and held.



P

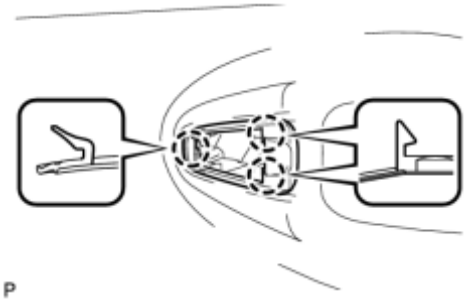
(b) Move the lever in the direction indicated by the arrow in the illustration.

(c) Remove the rear door outside handle assembly as shown in the illustration.



P

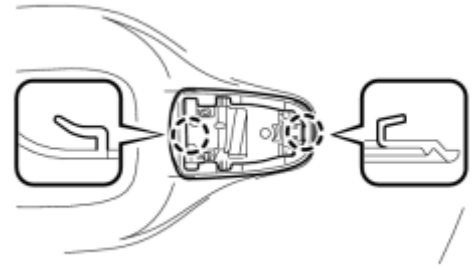
31. REMOVE REAR DOOR FRONT OUTSIDE HANDLE PAD



P

(a) Disengage the 3 claws and remove the rear door front outside handle pad.

32. REMOVE REAR DOOR REAR OUTSIDE HANDLE PAD

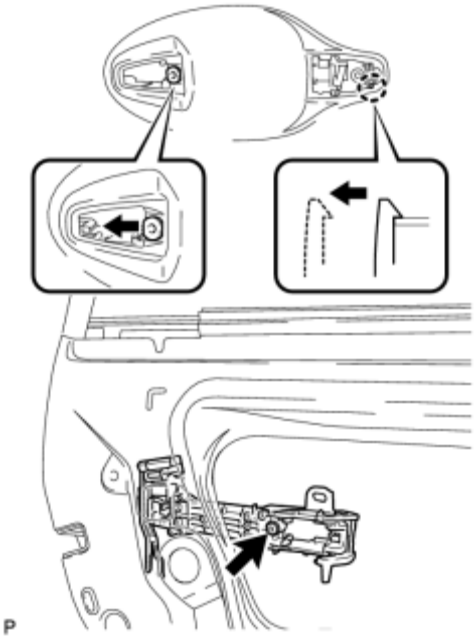


P

(a) Disengage the 2 claws and remove the rear door rear outside handle pad.

33. REMOVE REAR DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY

(a) Using a T30 "TORX" socket wrench, loosen the screw.



P

(b) Slide the rear door outside handle frame sub-assembly to disengage the door handle nut and claw of the rear door outside handle frame sub-assembly, and then remove it.

34. REMOVE REAR DOOR PANEL CUSHION



P

(a) Disengage the 2 claws and remove the 2 rear door panel cushions.

35. REMOVE REAR DOOR BELT MOULDING ASSEMBLY INFO

36. REMOVE REAR DOOR FRONT WINDOW FRAME MOULDING INFO

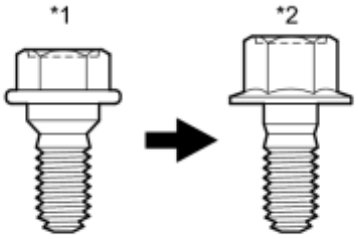
37. REMOVE NO. 2 BLACK OUT TAPE INFO

38. REMOVE REAR DOOR OUTSIDE STRIPE INFO

39. REMOVE REAR DOOR UPPER OUTSIDE STRIPE INFO

40. REMOVE REAR DOOR LOWER OUTSIDE STRIPE INFO

# ADJUSTMENT




P

***Text in Illustration***

| | |
|---|---|
| *1 | Centering Bolt |
| *2 | Standard Bolt |

CAUTION:

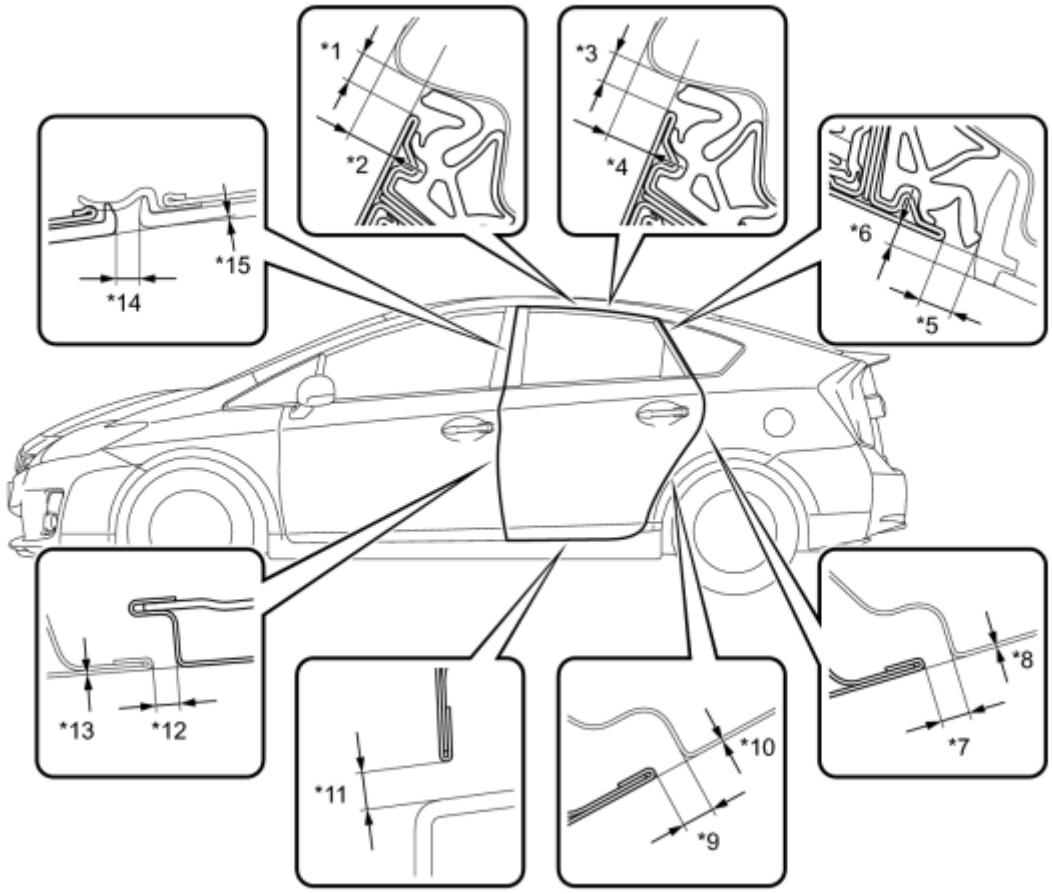
Before adjusting the door positions of vehicles equipped with side and curtain shield airbags, be sure to disconnect the battery. After adjustment, check that the SRS warning light is operating normally and there are no SRS DTCs output.

HINT:

- Use the same procedure for the RH side and LH side.
- The following procedure is for the LH side.
- Centering bolts are used to mount the door hinge to the vehicle body and door. The door cannot be adjusted with the centering bolts installed. Substitute the centering bolts with standard bolts when making adjustments.
- Specified torque for standard bolts is shown in the standard bolt chart INFO.

1. INSPECT REAR DOOR

(a) Check that the clearance measurements of areas *1 through *15 are within each standard range.




P

### *Standard Clearance*

| Area | Measurement | Area | Measurement |
|---|---|---|---|
| *1 | 3.57 to 6.57 mm (0.141 to 0.259 in.) | *2 | 6.17 to 9.17 mm (0.243 to 0.361 in.) |
| *3 | 3.57 to 6.57 mm (0.141 to 0.259 in.) | *4 | 5.97 to 8.97 mm (0.235 to 0.353 in.) |
| *5 | 4.62 to 7.62 mm (0.182 to 0.300 in.) | *6 | 1.72 to 4.72 mm (0.0677 to 0.186 in.) |
| *7 | 2.7 to 5.7 mm (0.106 to 0.224 in.) | *8 | -1.5 to 1.5 mm (-0.0591 to 0.0591 in.) |
| *9 | 2.7 to 5.7 mm (0.106 to 0.224 in.) | *10 | -1.5 to 1.5 mm (-0.0591 to 0.0591 in.) |
| *11 | 4.15 to 7.15 mm (0.163 to 0.282 in.) | *12 | 2.7 to 5.7 mm (0.106 to 0.224 in.) |
| *13 | -1.5 to 1.5 mm (-0.0591 to 0.0591 in.) | *14 | 2.8 to 5.8 mm (0.110 to 0.228 in.) |
| *15 | -1.3 to 1.7 mm (-0.0512 to 0.0669 in.) | - | - |

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

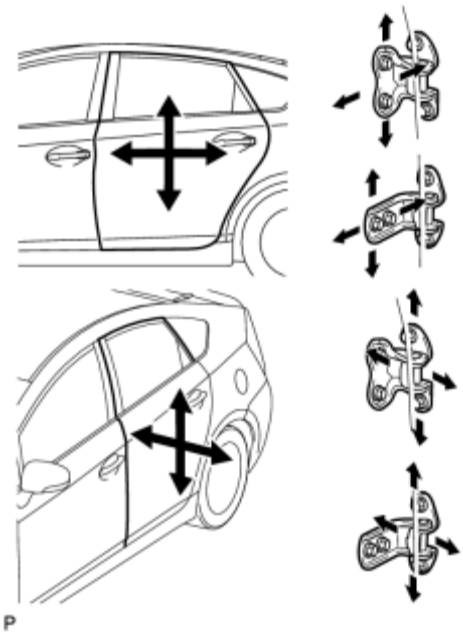
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. ADJUST REAR DOOR




(a) Using SST, loosen the hinge bolts on the vehicle body and adjust the door position.

SST: 09812-00010

(b) Tighten the hinge bolts on the vehicle body after the adjustment.

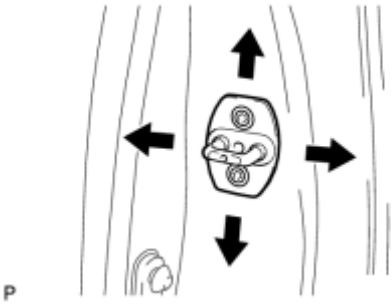
Torque: **26 N·m (265 kgf·cm, 19ft·lbf)**

(c) Loosen the hinge bolts on the door and adjust the door position.

(d) Tighten the hinge bolts on the door after the adjustment.

Torque: **26 N·m (265 kgf·cm, 19ft·lbf)**

(e) Using a T40 "TORX" socket wrench, slightly loosen the striker mounting screws.




(f) Using a brass bar and a hammer, hit the striker to adjust its position.

(g) Using a T40 "TORX" socket wrench, tighten the striker mounting screws after the adjustment.

Torque: **23 N·m (235 kgf·cm, 17ft·lbf)**

7. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

8. INSTALL REAR NO. 3 FLOOR BOARD INFO

9. INSTALL REAR DECK FLOOR BOX INFO

10. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

11. INSPECT SRS WARNING LIGHT

INFO

# REASSEMBLY

1. REPAIR INSTRUCTION INFO

2. INSTALL NO. 2 BLACK OUT TAPE INFO

3. INSTALL REAR DOOR LOWER OUTSIDE STRIPE INFO

4. INSTALL REAR DOOR UPPER OUTSIDE STRIPE INFO

5. INSTALL REAR DOOR OUTSIDE STRIPE INFO

6. INSTALL REAR DOOR FRONT WINDOW FRAME MOULDING INFO

7. INSTALL REAR DOOR BELT MOULDING ASSEMBLY INFO

8. INSTALL REAR DOOR PANEL CUSHION



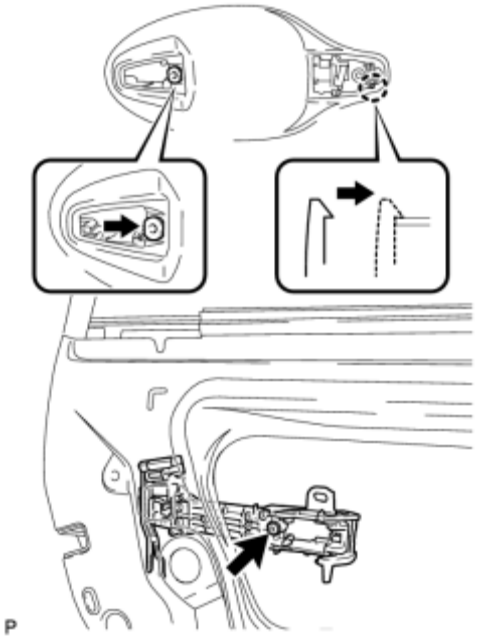
P

(a) Engage the 2 claws and install 2 new rear door panel cushions.

9. INSTALL REAR DOOR OUTSIDE HANDLE FRAME SUB-ASSEMBLY

(a) Apply MP grease to the sliding parts of the rear door outside handle frame sub-assembly.

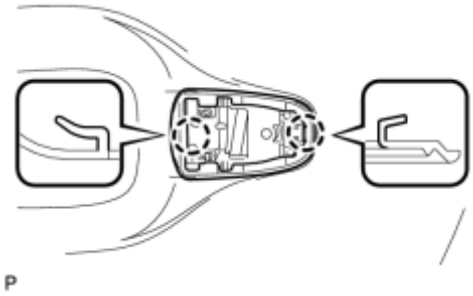
(b) Engage the door handle nut and claw.



(c) Using a T30 "TORX" socket wrench, install the rear door outside handle frame sub-assembly with the screw.

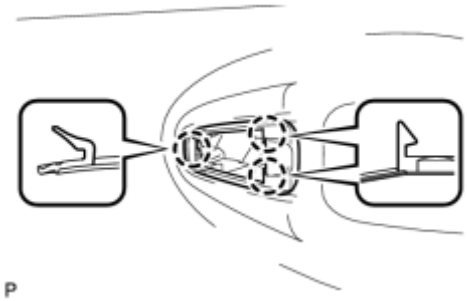
Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

10. INSTALL REAR DOOR REAR OUTSIDE HANDLE PAD



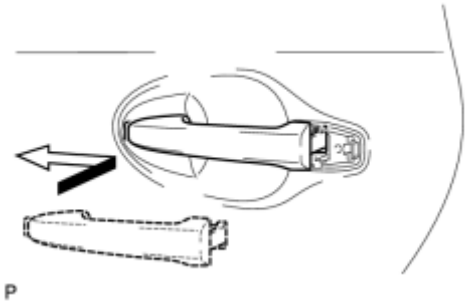
(a) Engage the 2 claws and install the rear door rear outside handle pad.

11. INSTALL REAR DOOR FRONT OUTSIDE HANDLE PAD



(a) Engage the 3 claws to install the rear door front outside handle pad.

12. INSTALL REAR DOOR OUTSIDE HANDLE ASSEMBLY

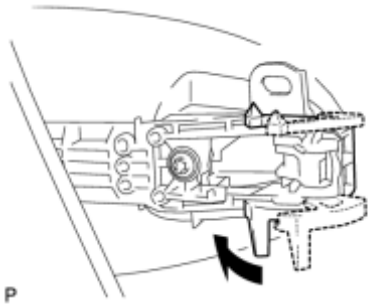


(a) Insert the front end of the rear door outside handle assembly into the rear door outside handle frame.

NOTICE:

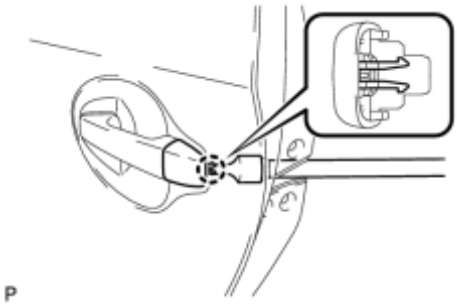
If the bellcrank lever is not pulled and held when installing the outside handle, the bellcrank lever will interfere with the outside handle and the release plate will be damaged.

(b) Insert the rear end of the rear door outside handle assembly into the rear door outside handle frame. Next, slide the rear door outside handle assembly toward the front of the vehicle to install it.



(c) Move the lever back in the direction indicated by the arrow in the illustration to lock the door outside handle assembly.

13. INSTALL REAR DOOR OUTSIDE HANDLE COVER



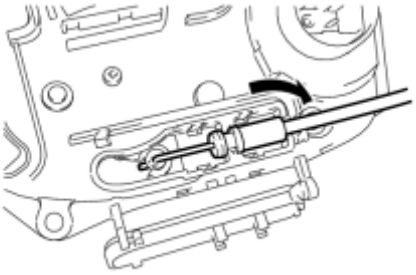
(a) Engage the claw and install the rear door outside handle cover.

(b) Using a T30 "TORX" socket wrench, install the rear door outside handle cover with the screw.

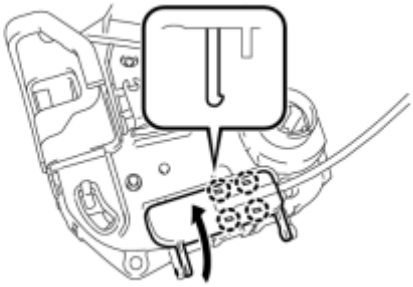
Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

14. INSTALL REAR DOOR INSIDE LOCKING CABLE ASSEMBLY

(a) Install the rear door inside locking cable assembly as shown in the illustration.



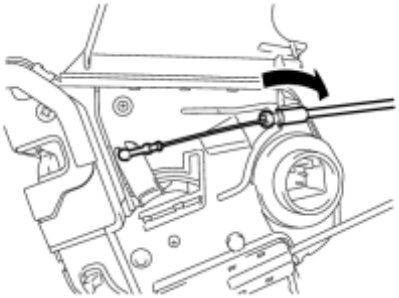
P



P

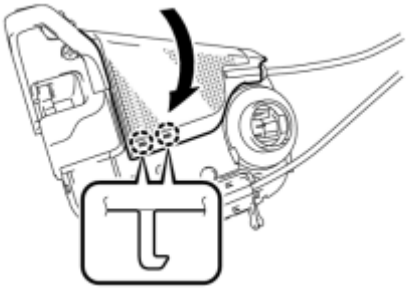
(b) Engage the 4 claws as shown in the illustration.

15. INSTALL REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY



P

(a) Install the rear door lock remote control cable assembly as shown in the illustration.



P

(b) Engage the 2 claws as shown in the illustration.

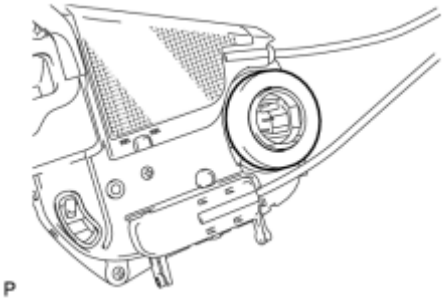
16. INSTALL REAR DOOR LOCK ASSEMBLY

NOTICE:

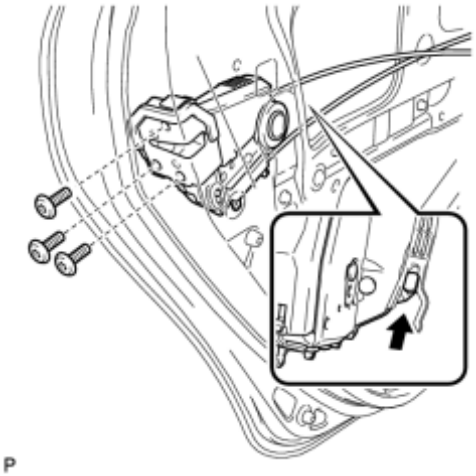
- When reusing the removed rear door lock assembly, replace the door lock wiring harness seal on the connector with a new one.

- Do not allow grease or dust to adhere to the door lock wiring harness seal surface of the connector.
- Reusing the door lock wiring harness seal or using a damaged door lock wiring harness seal may cause water intrusion. This may result in a malfunction of the rear door lock assembly.

(a) Apply MP grease to the sliding parts of the rear door lock assembly.




(b) Install a new door lock wiring harness seal to the rear door lock assembly.




(c) Insert the rear door lock assembly to the rear door outside handle release plate, and set it to the rear door panel.

(d) Make sure that the rear door outside handle frame release plate is securely connected to the rear door lock assembly.

(e) Using a T30 "TORX" socket wrench, install the rear door lock assembly with the 3 screws.

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

17. INSTALL REAR DOOR CUSHION

(a) When reusing the rear door cushion:

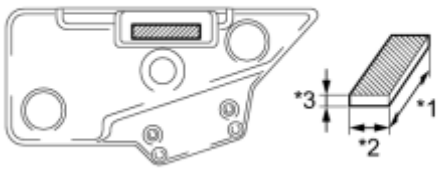
(1) Clean the rear door cushion.

(2) Remove the double-sided tape from the rear door cushion.

(3) Wipe off any tape adhesive residue with cleaner.

(4) Apply new double-sided tape to the rear door cushion as shown in the

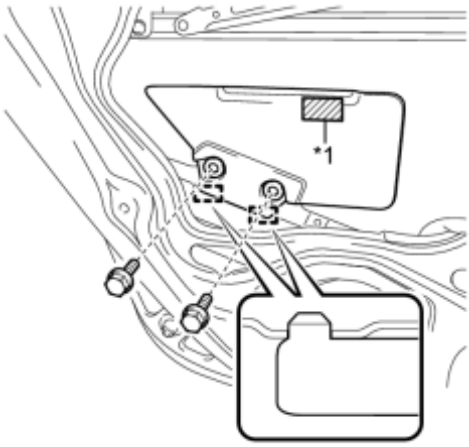
illustration.




P

| Area | Dimension |
|---|---|
| *1 | 54.0 mm (2.126 in.) |
| *2 | 17.0 mm (0.669 in.) |
| *3 | 3.0 mm (0.118 in.) |

(b) Clean the rear door panel sub-assembly.




P

(c) Engage the 2 guides.

(d) Install the rear door cushion with the 2 bolts.

***Text in Illustration***

| | |
|---|---|
| *1 | Double-sided Tape |

18. INSTALL REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY

NOTICE:

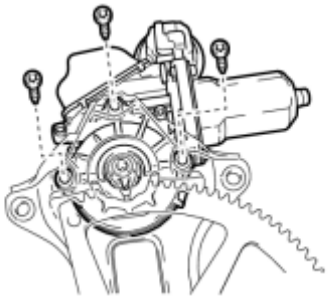
The regulator arm must be below the intermediate position when installing the rear power window regulator motor assembly.

(a) Using a T25 "TORX" socket wrench, install the rear power window regulator motor assembly with the 3 screws.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

HINT:

A new rear window regulator uses self-tapping screws to thread new installation holes when the self-tapping screws are inserted.

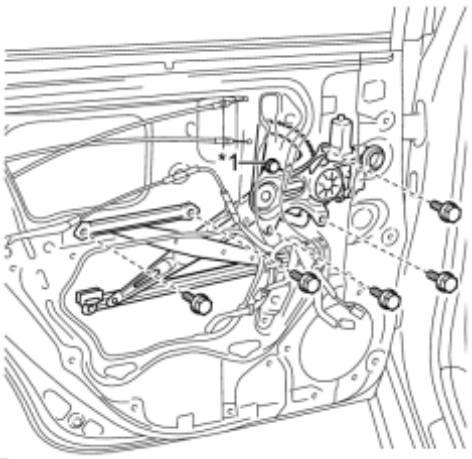


P

19. INSTALL REAR DOOR WINDOW REGULATOR ASSEMBLY

(a) Apply MP grease to the sliding parts of the rear door window regulator assembly.

(b) Install the temporary bolt to the rear door window regulator assembly.




P

(c) Temporarily install rear door window regulator assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Temporary Bolt |

(d) Tighten the temporary bolt and 5 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

20. INSTALL REAR DOOR GLASS SUB-ASSEMBLY

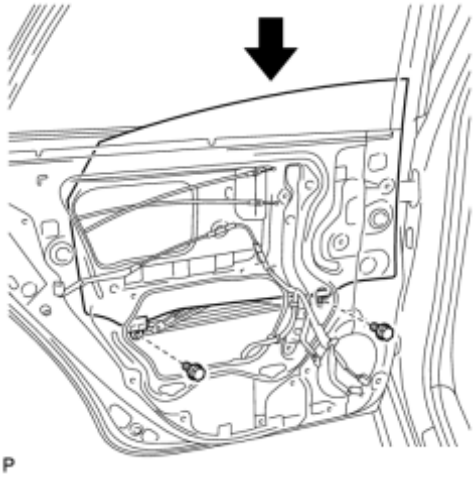
(a) Connect the cable to the negative (-) battery terminal and the rear power window regulator motor connector.

(b) Connect the power window regulator switch assembly and move the rear door glass sub-assembly so that the door glass bolts can be seen.

(c) Disconnect the power window regulator switch assembly and rear power window regulator motor connector.

(d) Disconnect the cable from the negative (-) battery terminal.

(e) Insert the rear door glass sub-assembly into the rear door panel along the rear door glass run as shown in the illustration.



(f) Install the rear door glass sub-assembly with the 2 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

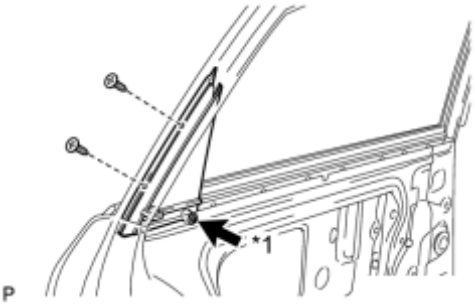
(g) Connect the cable to the negative (-) battery terminal.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

21. INSTALL REAR DOOR REAR GUIDE SEAL

(a) Install the temporary screw to the rear door rear guide seal.




(b) Temporarily install the rear door rear guide seal.

## Text in Illustration

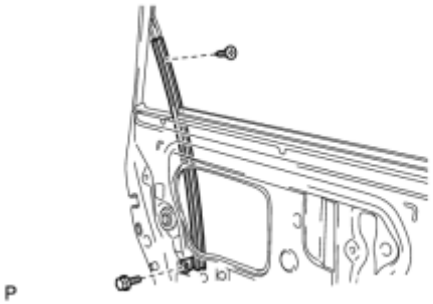
| | |
|---|---|
| *1 | Temporary Screw |

(c) Install the 2 screws.

(d) Tighten the temporary screw to install the rear door rear guide seal.

22. INSTALL REAR DOOR WINDOW GUIDE SUB-ASSEMBLY

(a) Install the screw.




(b) Install the rear door window guide sub-assembly with the bolt.

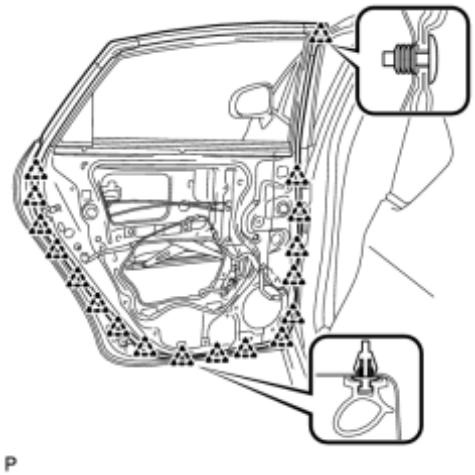
Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

23. INSTALL REAR DOOR GLASS RUN




(a) Install the rear door glass run.

24. INSTALL REAR DOOR WEATHERSTRIP




(a) Engage the 18 clips and install the rear door weatherstrip.

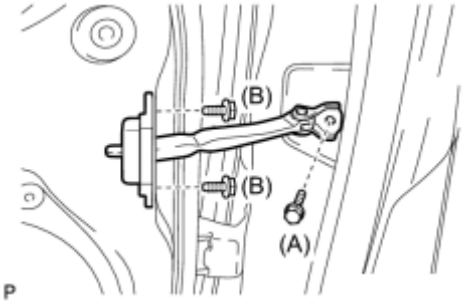
25. INSTALL REAR DOOR CHECK ASSEMBLY

(a) Apply MP grease to the sliding areas of the rear door check assembly.

(b) Apply adhesive to the threads of the bolt (A).

Adhesive:

Toyota Genuine Adhesive 1324, Three Bond 1324 or equivalent



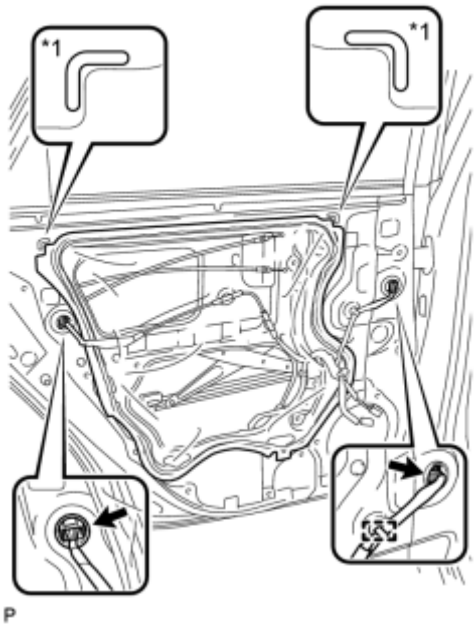

(c) Install the rear door check assembly with the 3 bolts.

(A) - Torque: **30 N·m (306 kgf·cm, 22ft·lbf)**

(B) - Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

26. INSTALL REAR DOOR SERVICE HOLE COVER

(a) Apply butyl tape to the rear door panel.




(b) Pass the rear door lock remote control cable, rear door inside locking cable and each connector through a new rear door service hole cover.

(c) Attach the rear door service hole cover according to the reference points on the rear door panel.

***Text in Illustration***

| | |
|---|---|
| *1 | Reference Point |

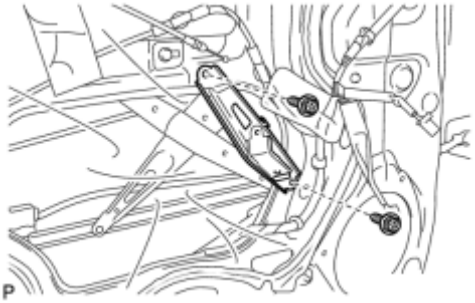
NOTICE:

Securely install the rear door service hole cover preventing wrinkles and air bubbles.

(d) Connect the 2 connectors.

(e) Engage the clamp.

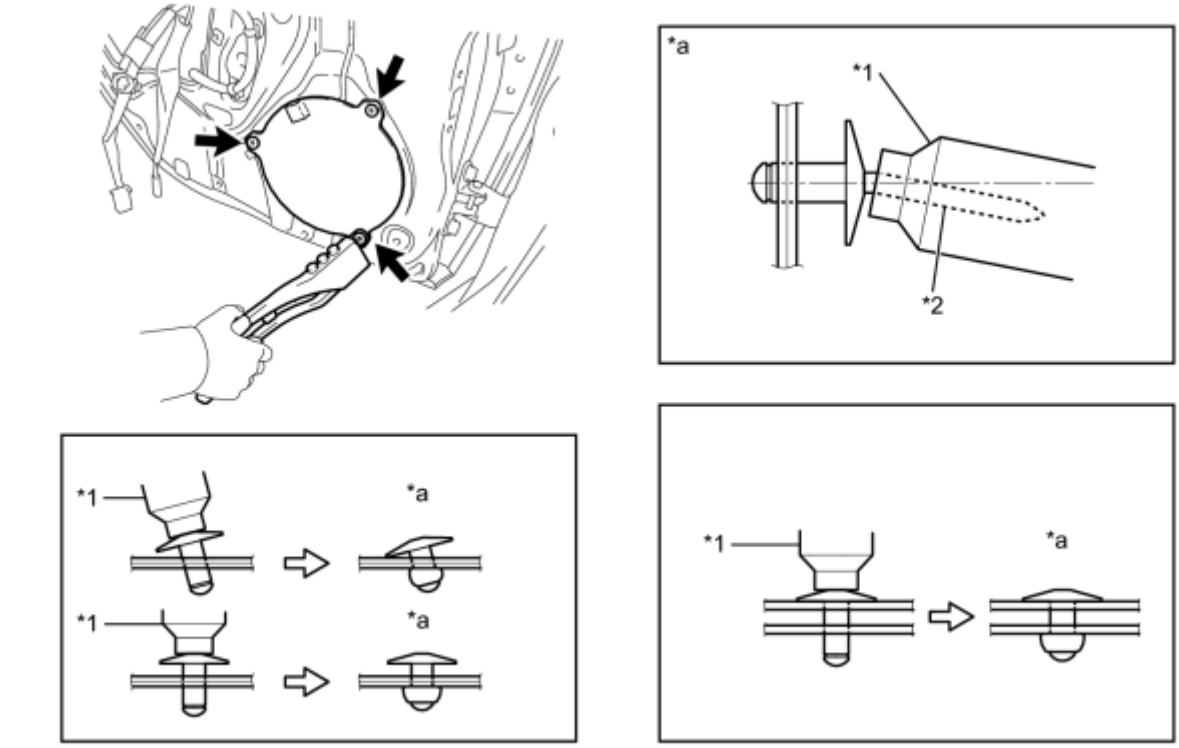
27. INSTALL REAR DOOR TRIM BRACKET



(a) Install the rear door trim bracket with the 2 screws.

28. INSTALL REAR DOOR SPEAKER COVER (for 4 Speakers)

(a) Using an air riveter or a hand riveter, install the rear door speaker cover with 3 new rivets.




P

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Riveter | *2 | Mandrel |
| *a | INCORRECT | - | - |

NOTICE:

- Do not pry the rivet with the riveter, as this will cause damage to the riveter and mandrel.
- Confirm that the rivet is seated properly against the moulding. Do not tilt the riveter when installing the rivet to the moulding. Do not leave any clearance between the rivet head and moulding.
- Do not leave any clearance between the moulding and door frame. Firmly hold the 2 items together while installing the rivet.

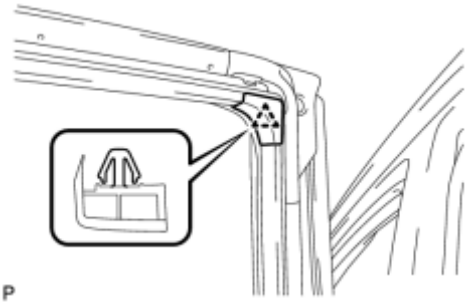
HINT:

If the rivet cannot be cut, pull it once and cut it.

(b) Connect the connector.

29. INSTALL REAR SPEAKER ASSEMBLY (for 6 or 8 Speakers) INFO

30. INSTALL REAR DOOR FRAME GARNISH

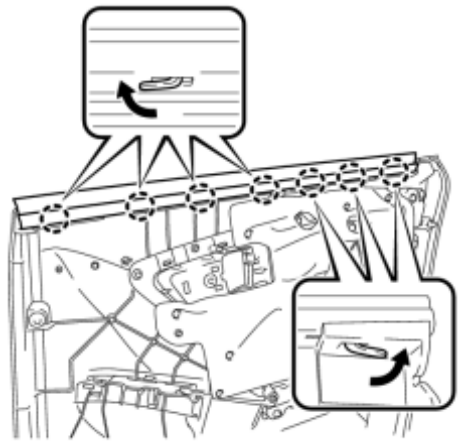


P

(a) Engage the clip to install a new rear door frame garnish.

31. INSTALL REAR NO. 2 SPEAKER ASSEMBLY (for 8 Speakers) INFO

32. INSTALL REAR DOOR INNER GLASS WEATHERSTRIP



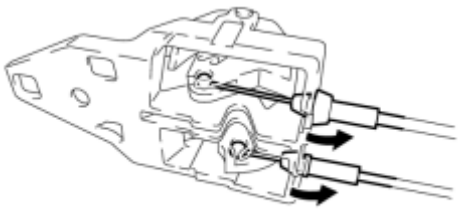
P

(a) Engage the 7 claws and install the rear door inner glass weatherstrip to the rear door trim board sub-assembly as shown in the illustration.

33. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY

(a) Connect the rear door lock remote control cable assembly and rear

door inside locking cable assembly to the rear door inside handle.



P



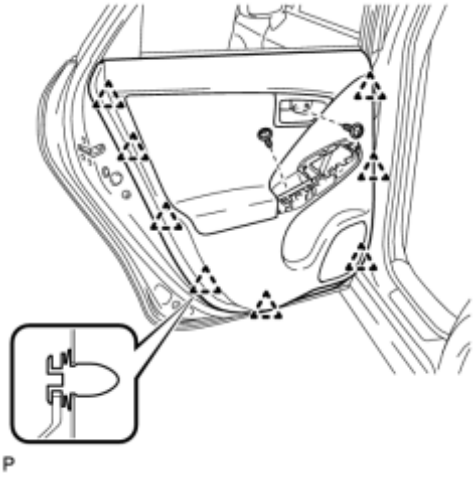
P

(b) Engage the 2 claws and install the rear door inside handle sub-assembly to the rear door trim board sub-assembly.

34. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY

(a) for 8 Speakers:

(1) Connect the connector.



P

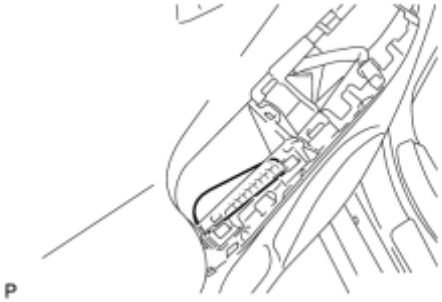
(b) Engage the 8 clips and install the rear door trim board sub-assembly.

(c) Install the 2 screws.

(d) Remove the protective tape.

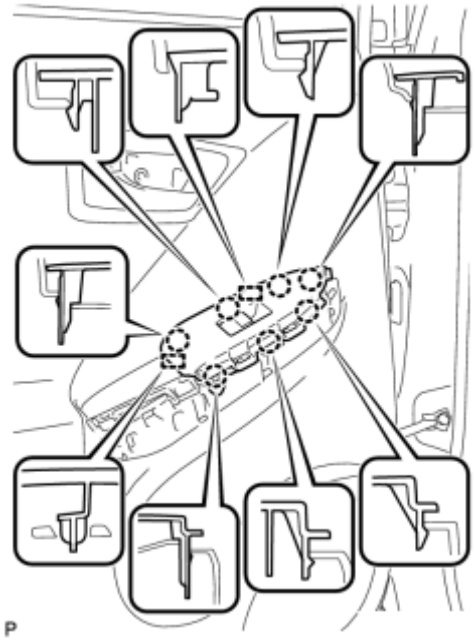
35. INSTALL REAR DOOR ARMREST COVER

(a) Install the rear door armrest cover.



36. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL

(a) Connect the connector.



(b) Engage the 7 claws and 2 guides, and install the rear power window regulator switch assembly with rear door armrest base panel.

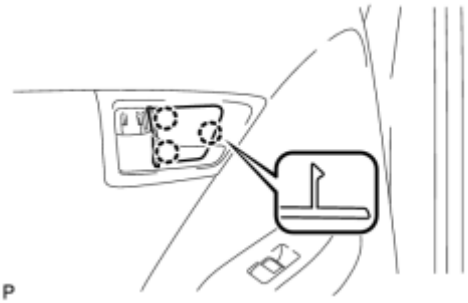
37. INSTALL DOOR ASSIST GRIP COVER

(a) Engage the 6 claws, 2 clips and 3 guides, and install the assist grip cover.



P

38. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG



P

(a) Engage the 3 claws and install the rear door inside handle bezel plug.

39. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

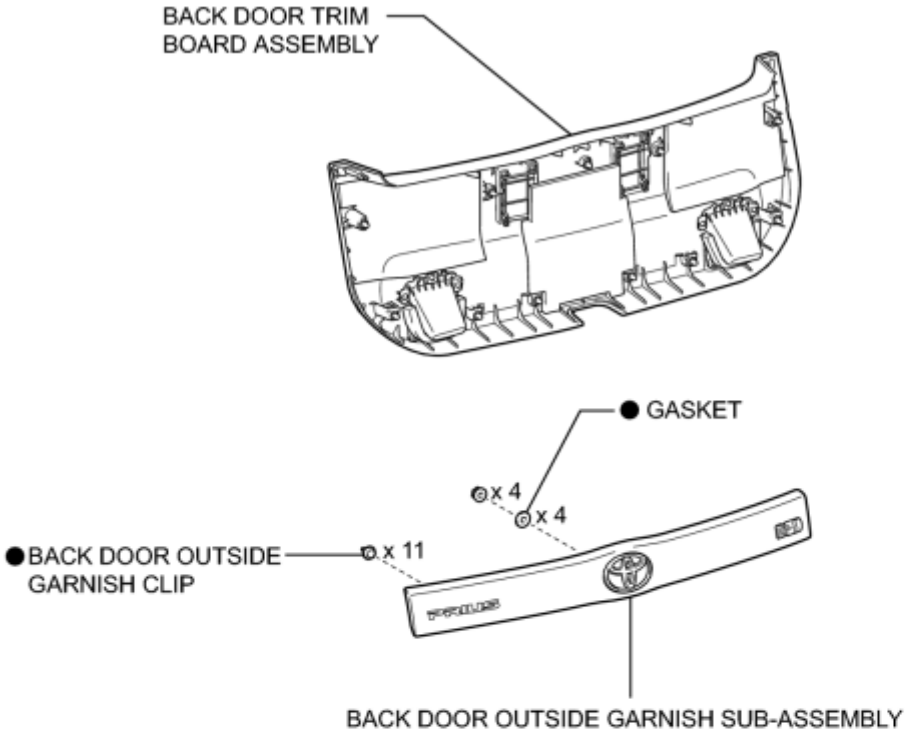
40. INSTALL REAR NO. 3 FLOOR BOARD INFO

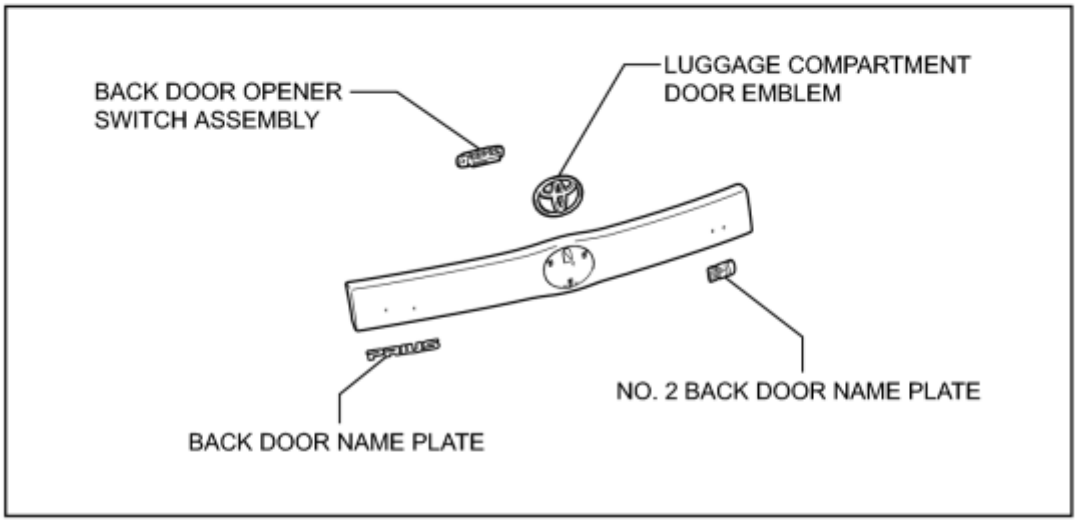
41. INSTALL REAR DECK FLOOR BOX INFO

42. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION



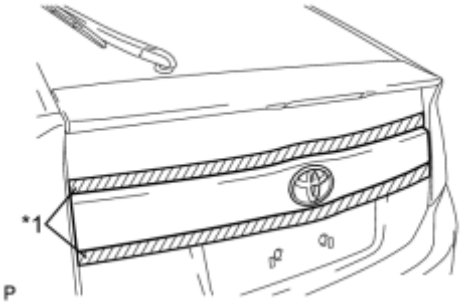

● Non-reusable part

P

# REMOVAL

1. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

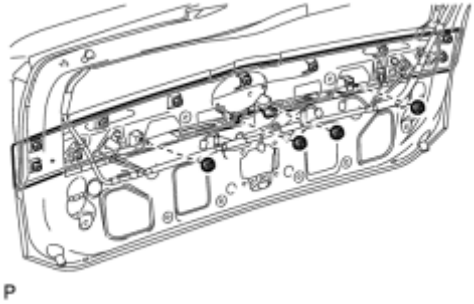
2. REMOVE BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY



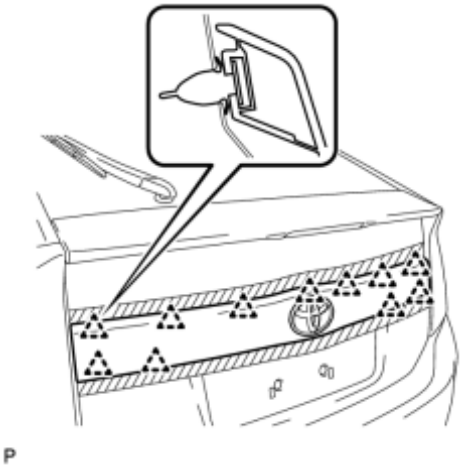

(a) Put protective tape around the back door outside garnish sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |




(b) Remove the 4 nuts.




(c) Disengage the 11 clips and remove the back door outside garnish sub-assembly.

(d) Remove the 11 clips (back door outside garnish clip) from the back door outside garnish sub-assembly.

(e) Remove the 4 gaskets from the back door outside garnish sub-assembly.

3. REMOVE BACK DOOR OPENER SWITCH ASSEMBLY INFO

4. REMOVE LUGGAGE COMPARTMENT DOOR EMBLEM INFO

5. REMOVE NO. 2 BACK DOOR NAME PLATE INFO

6. REMOVE BACK DOOR NAME PLATE INFO

# INSTALLATION

1. INSTALL NO. 2 BACK DOOR NAME PLATE INFO

2. INSTALL BACK DOOR NAME PLATE INFO

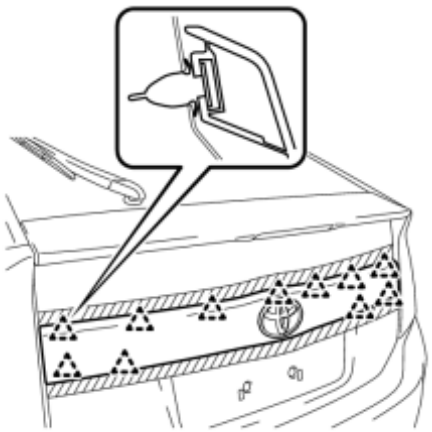
3. INSTALL LUGGAGE COMPARTMENT DOOR EMBLEM INFO

4. INSTALL BACK DOOR OPENER SWITCH ASSEMBLY INFO

5. INSTALL BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY

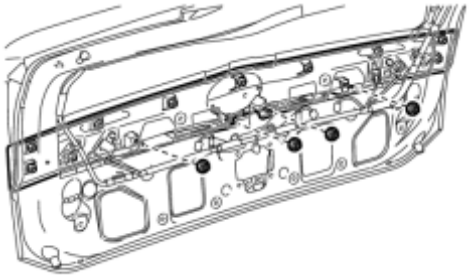
(a) Install the 4 new gaskets to the back door outside garnish sub-assembly.

(b) Install 11 new clips (back door outside garnish clip) to the back door outside garnish sub-assembly.



P

(c) Engage the 11 clips to install the back door outside garnish sub-assembly.



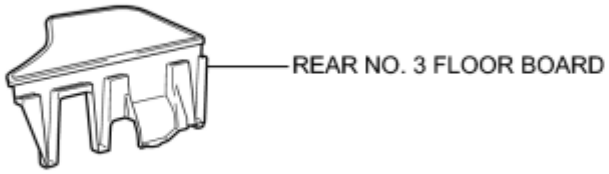
P

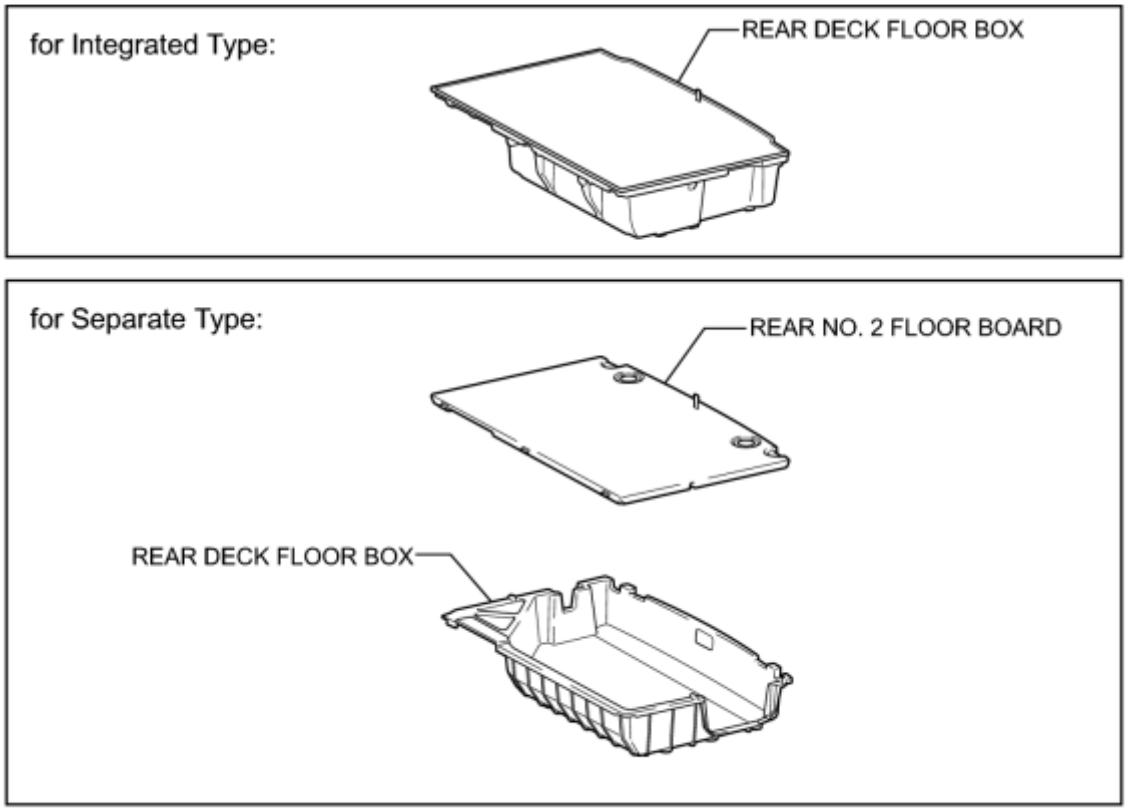
(d) Install the 4 nuts.

6. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

# COMPONENTS

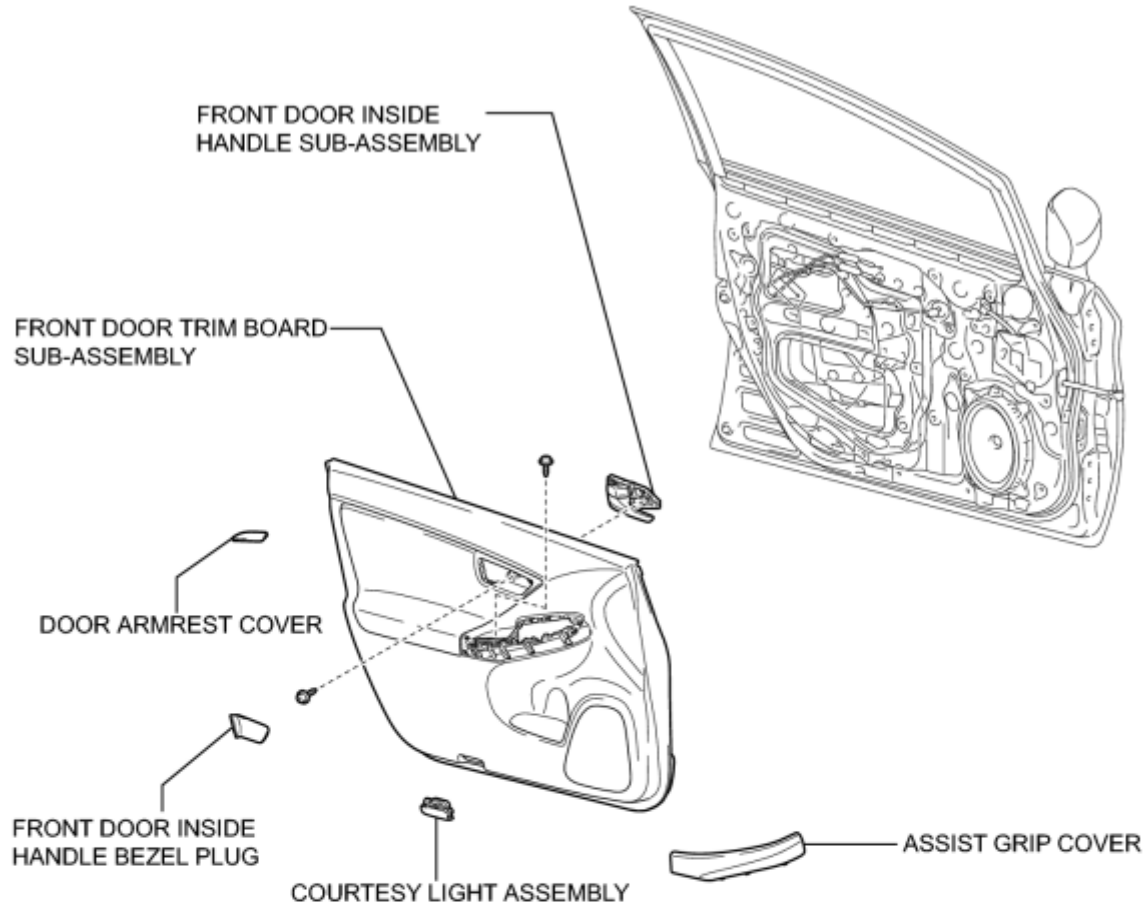
# ILLUSTRATION

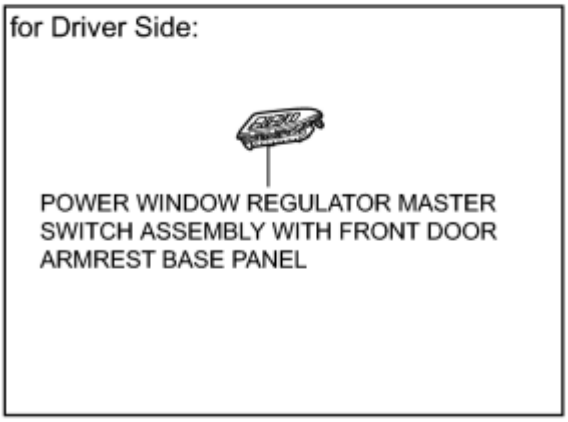


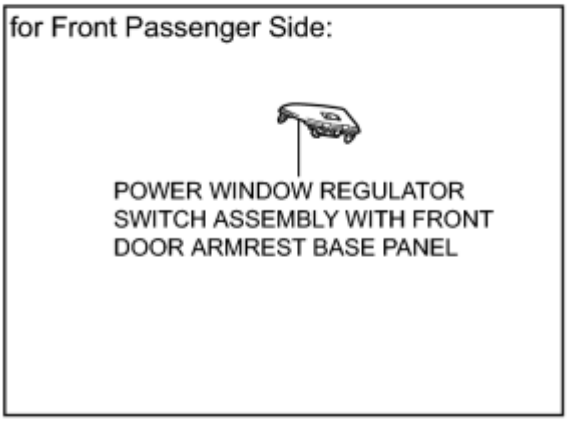




P

# ILLUSTRATION

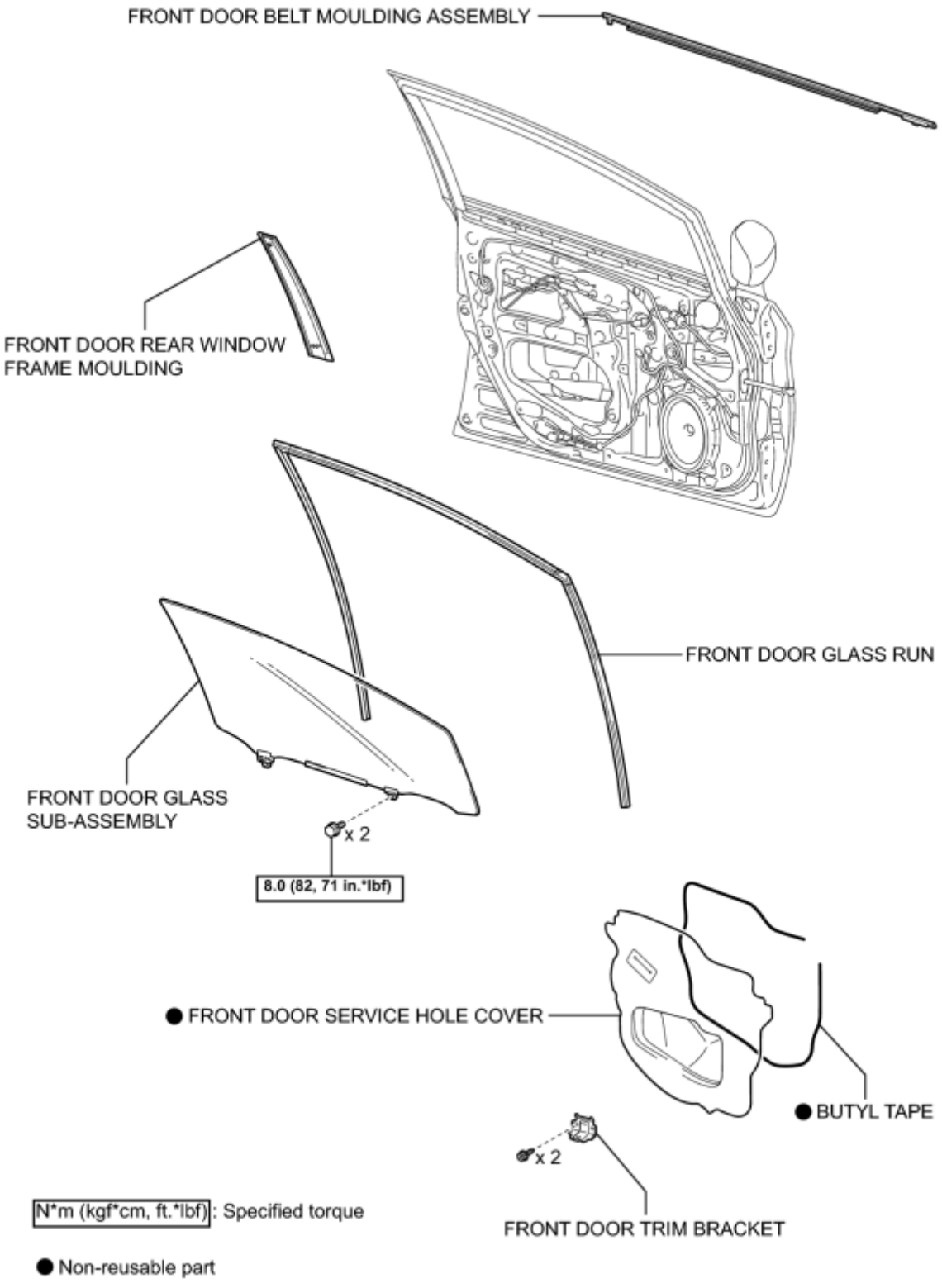


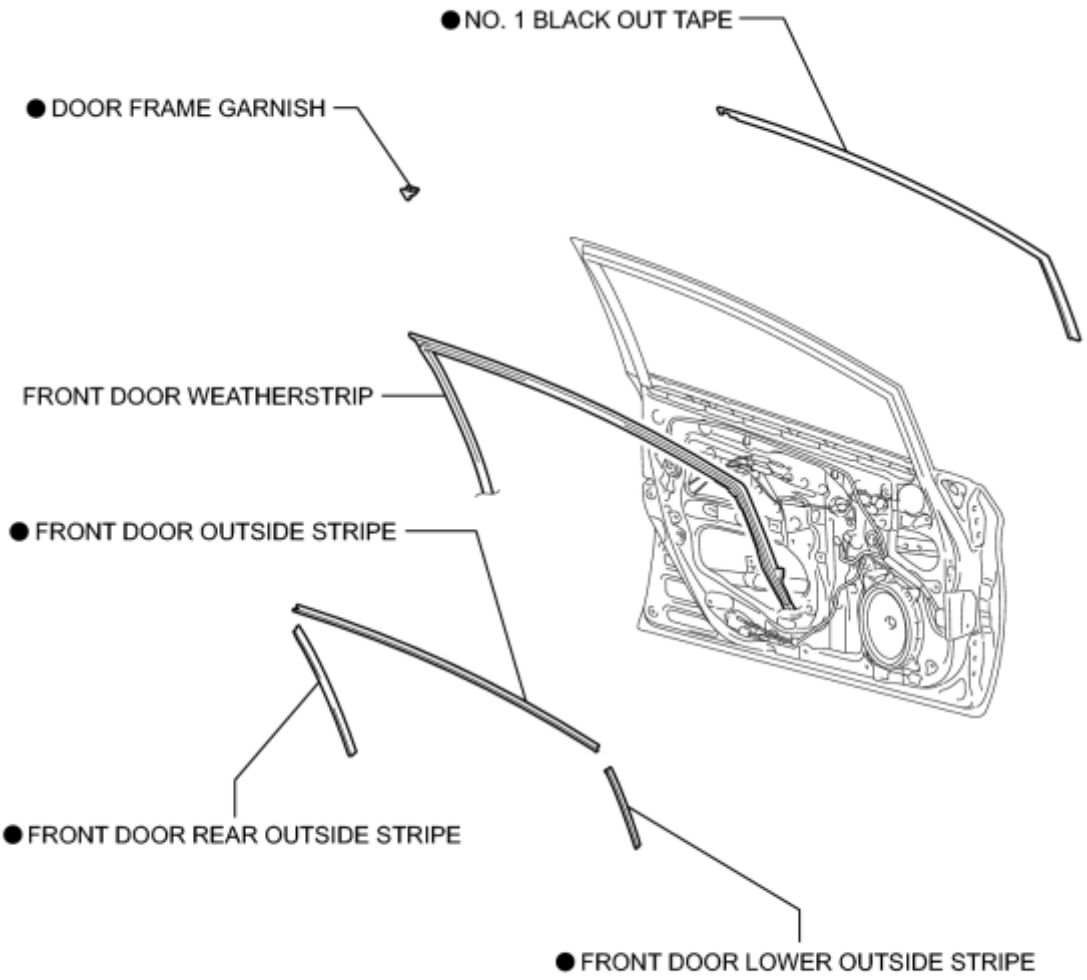

P

# ILLUSTRATION




P

# ILLUSTRATION




● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE ASSIST GRIP COVER INFO

6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

7. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

8. REMOVE DOOR ARMREST COVER INFO

9. REMOVE COURTESY LIGHT ASSEMBLY INFO

10. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

12. REMOVE DOOR FRAME GARNISH INFO

13. REMOVE FRONT DOOR TRIM BRACKET INFO

14. REMOVE FRONT DOOR SERVICE HOLE COVER INFO

15. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY INFO

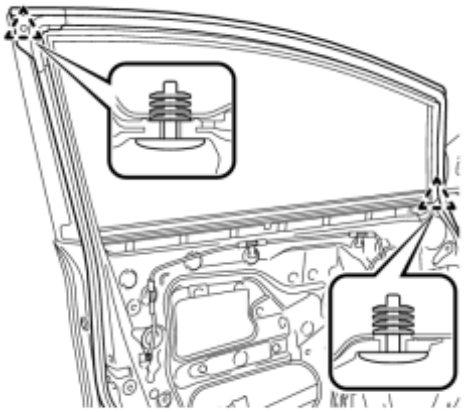
16. REMOVE FRONT DOOR GLASS RUN INFO

17. REMOVE FRONT DOOR BELT MOULDING ASSEMBLY INFO

18. REMOVE FRONT DOOR REAR WINDOW FRAME MOULDING INFO

19. DISCONNECT FRONT DOOR WEATHERSTRIP

(a) Using a clip remover, disengage the 2 clips and remove the upper part of the front door weatherstrip to the extent that allows removal of the front door strip and black out tape.



P

20. REMOVE NO. 1 BLACK OUT TAPE

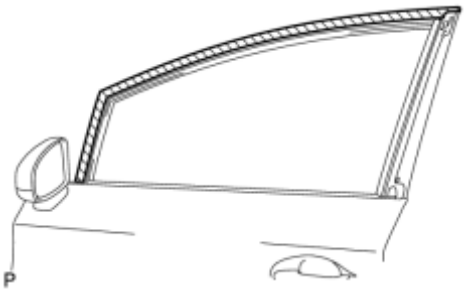
(a) Using a heat light, heat the No. 1 black out tape and vehicle body.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.



P

(b) Pull back on one of the ends of the No. 1 black out tape to remove it.

HINT:

When pulling on the tape, pull it parallel to the body.

21. REMOVE FRONT DOOR OUTSIDE STRIPE

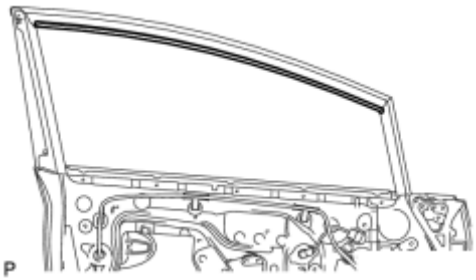
(a) Using a heat light, heat the front door outside stripe and vehicle body.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.



(b) Pull back on one of the ends of the front door outside stripe to remove it.

HINT:

When pulling on the stripe, pull it parallel to the body.

22. REMOVE FRONT DOOR LOWER OUTSIDE STRIPE

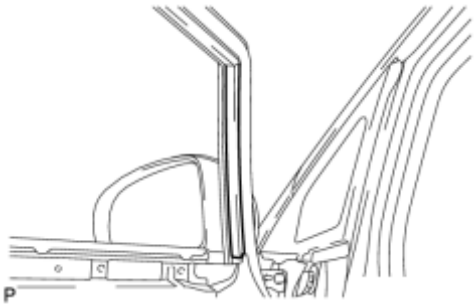
(a) Using a heat light, heat the front door lower outside stripe and vehicle body.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.



(b) Pull back on one of the ends of the front door lower outside stripe to remove it.

HINT:

When pulling on the stripe, pull it parallel to the body.

23. REMOVE FRONT DOOR REAR OUTSIDE STRIPE

(a) Using a heat light, heat the front door rear outside stripe and vehicle body.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.

(b) Pull back on one of the ends of the front door rear outside stripe to



P

remove it.

HINT:

When pulling on the stripe, pull it parallel to the body.

# INSTALLATION

1. REPAIR INSTRUCTION

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.

(2) Wipe off any tape adhesive residue with cleaner.

(b) Installation temperature

(1) When the ambient temperature is below 15°C (59°F), perform the installation procedure after warming the vehicle body surface (installation surface of the door frame) and tape up to between 20 and 30°C (68 and 86°F) using a heat light. When the ambient temperature is above 35°C (95°F), cool the vehicle body surface (installation surface of the door frame) and tape down to between 20 and 30°C (68 and 86°F) prior to installation.

HINT:

- The most appropriate temperature for installing the tape is 25°C (77°F).
- When the temperature is low, the tape turns stiff and comes off easily. When the temperature is high, the tape looses elasticity.

(c) Before installation

(1) Remove any coating roughness or dirt on and around the vehicle body surface where the tape will be installed (installation surface of the door frame). If any roughness or dirt remains when pressing the tape onto the surface, air will be trapped under the tape and result in a poor appearance.

HINT:

Spray water on the shop floor to settle any dust.

(d) Key points for handling the tape

(1) The tape bends and rolls up easily. Store the tape between flat pieces of cardboard or other similar objects and keep it dry and level.

NOTICE:

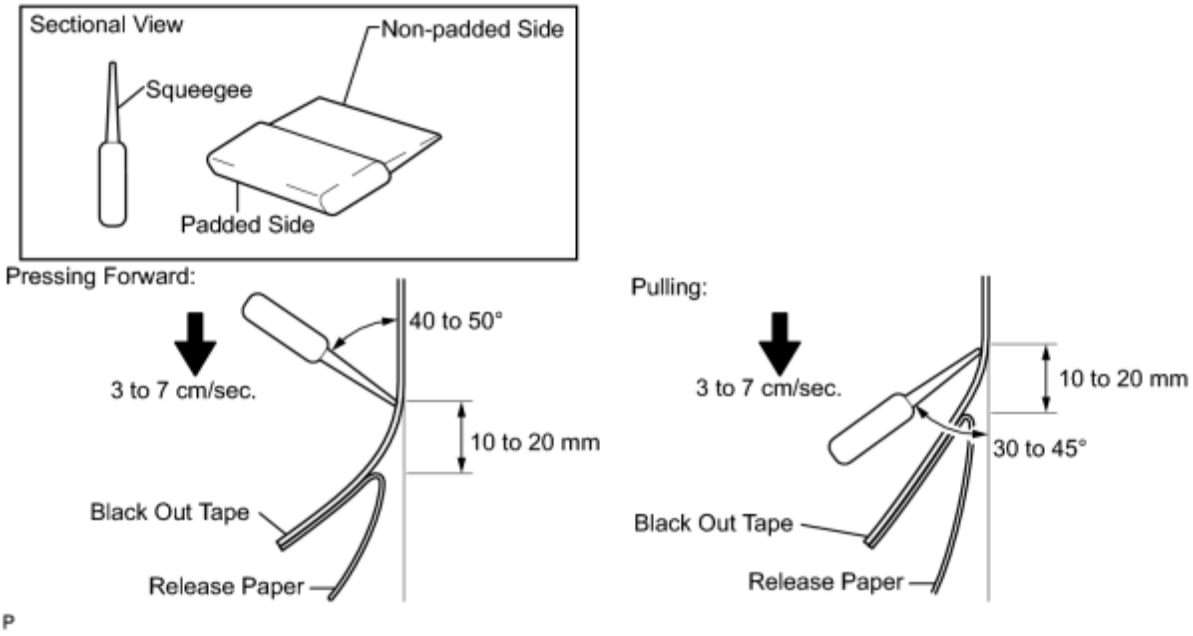
Do not bend the tape or leave it in high temperature places.

(e) Key points for installation of the tape (how to use a squeegee and installation procedure for flat surfaces)

NOTICE:

- Position the tape accurately to achieve a neat finish and to avoid peeling.
- The tape cannot be reused because it deforms and will not fit any more after being removed.

(1) To avoid air bubbles, slightly raise the part of the tape that is going to be applied so that its adhesive surface does not touch the vehicle body while applying the tape. Tilt the squeegee at 40 to 50° (pressing forward) or 30 to 45° (pulling) to the vehicle body surface and press the tape onto the vehicle body surface with a force of 20 to 30 N (2 to 3 kgf, 4.5 to 6.7 lbf) at a constant slow speed of 3 to 7 cm (1.18 to 2.76 in.) per second.




NOTICE:

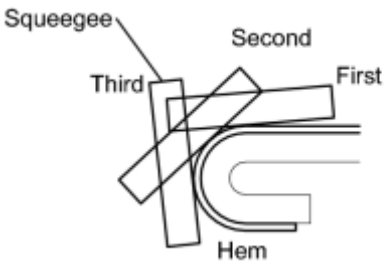
Be sure to observe the specified pressing speed, force and angle of the squeegee to avoid wrinkles or air bubbles.

HINT:

- Either angle of the squeegee (pressing forward or pulling) is acceptable.
- Be sure to apply the tape while removing the release paper 10 to 20 mm (0.394 to 0.787 in.) from the edge of the squeegee.

(f) Key points for installation of the tape (how to use a squeegee and installation procedure for hemmed surfaces)

(1) If it is difficult to apply the tape, install it in several steps as shown in the illustration. Use your fingers or the padded surface of a squeegee to slowly apply the tape to the hem of the vehicle, especially for a small



P

hem.

HINT:

When applying tape to the backside of a hem, remove the release paper and use your fingers or the padded surface of a squeegee.

(g) Key points for installation of the tape (how to use a squeegee and installation procedure for corners)

(1) Remove the release paper and apply the tape carefully with your fingers.

(2) Before applying the tape to each corner, heat the tape using a heat light and gradually apply it, avoiding wrinkles on the tape to achieve a neat finish.

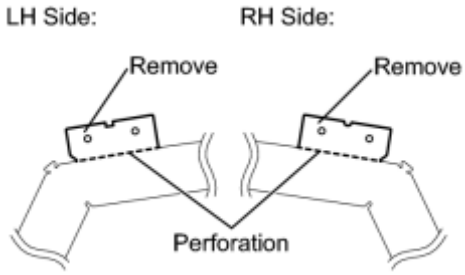
(h) Check after installation

(1) After completing the application, check if the tape is applied neatly. If the tape is not applied neatly, reapply using new tape.

NOTICE:

Do not reuse the tape.

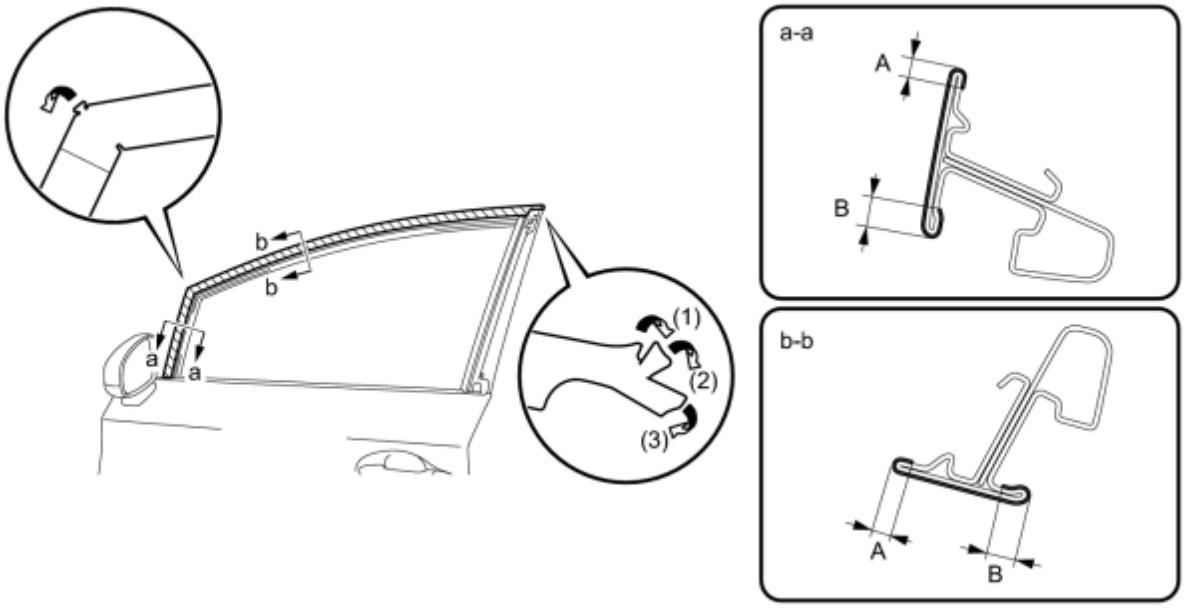
2. INSTALL NO. 1 BLACK OUT TAPE



P

(a) Remove the portion of the No. 1 black out tape at the perforation as shown in the illustration.

(b) Refer to the illustration to position the No. 1 black out tape.




P

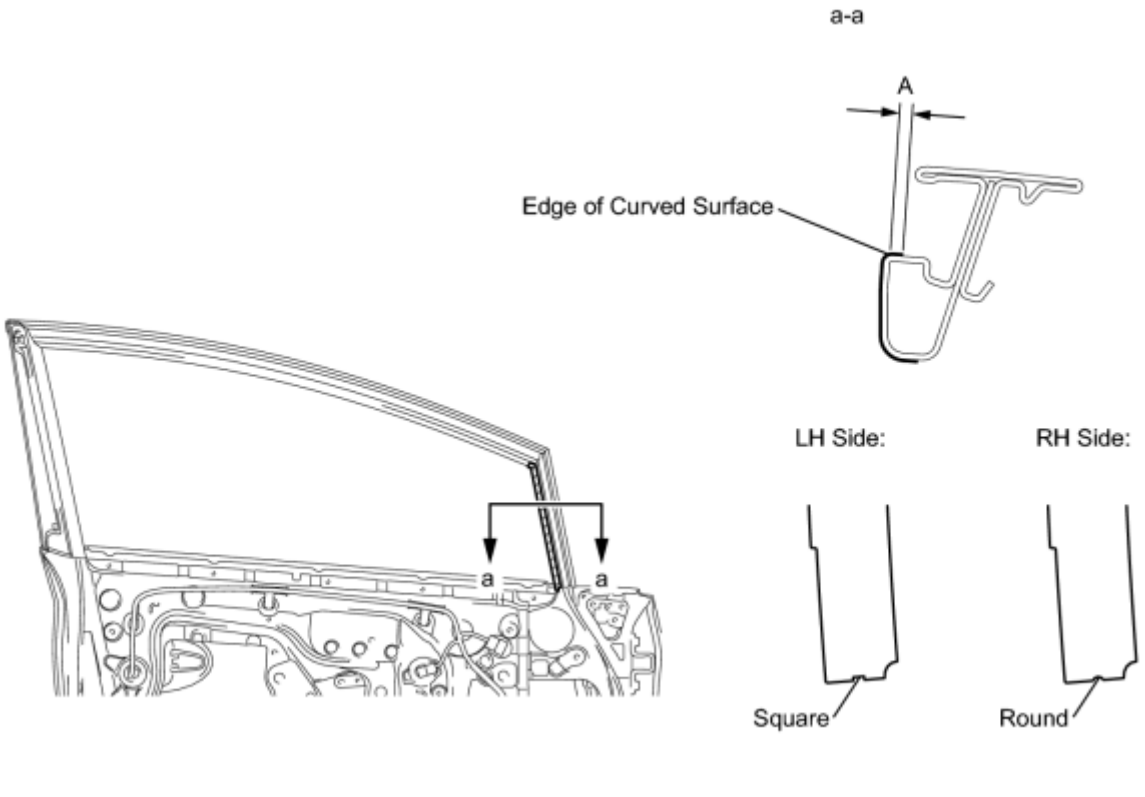
### *Standard Measurement*

| Dimension | Measurement |
|---|---|
| A | 2 to 4 mm (0.0787 to 0.157 in.) |
| B | 4 to 6 mm (0.157 to 0.236 in.) |

(c) Remove the release paper and apply the tape.

3. INSTALL FRONT DOOR LOWER OUTSIDE STRIPE

(a) Refer to the illustration to position the front door lower outside stripe.



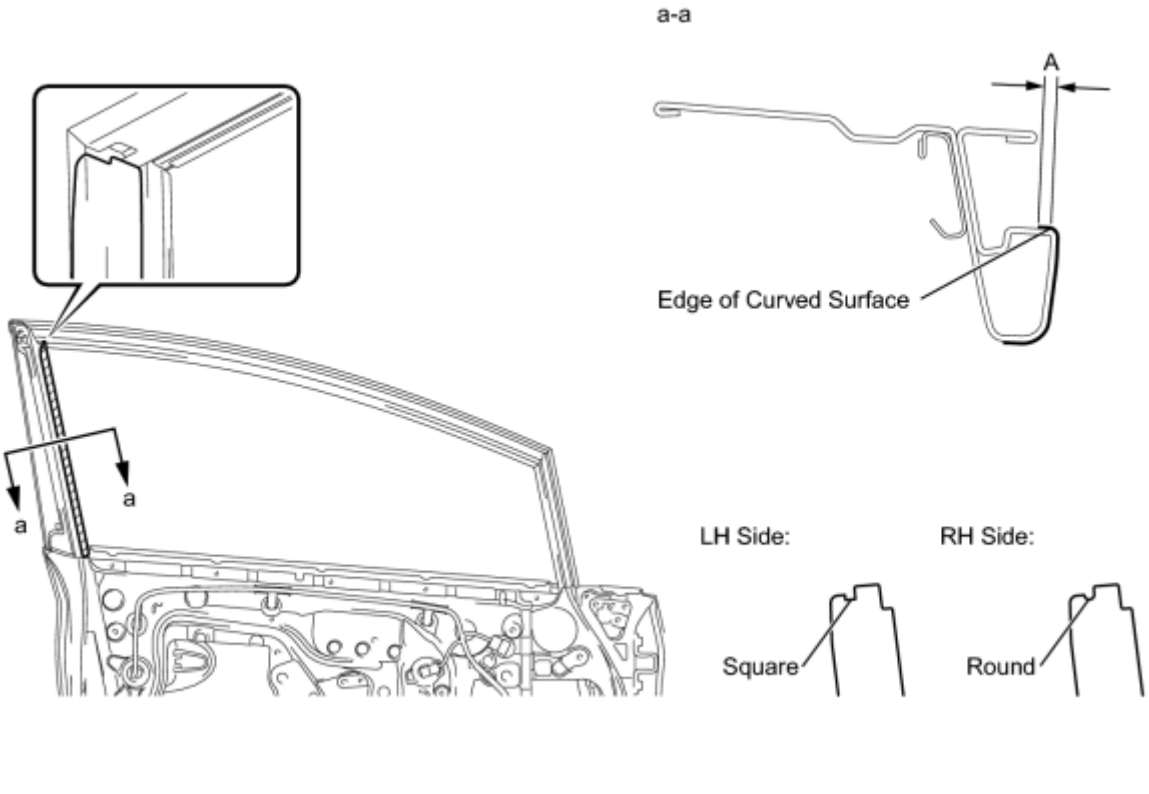

### *Standard Measurement*

| Dimension | Measurement |
|---|---|
| A | 2.0 mm (0.0787 in.) |

(b) Remove the release paper and apply the stripe.

4. INSTALL FRONT DOOR REAR OUTSIDE STRIPE

(a) Refer to the illustration to position the front door rear outside stripe.




P

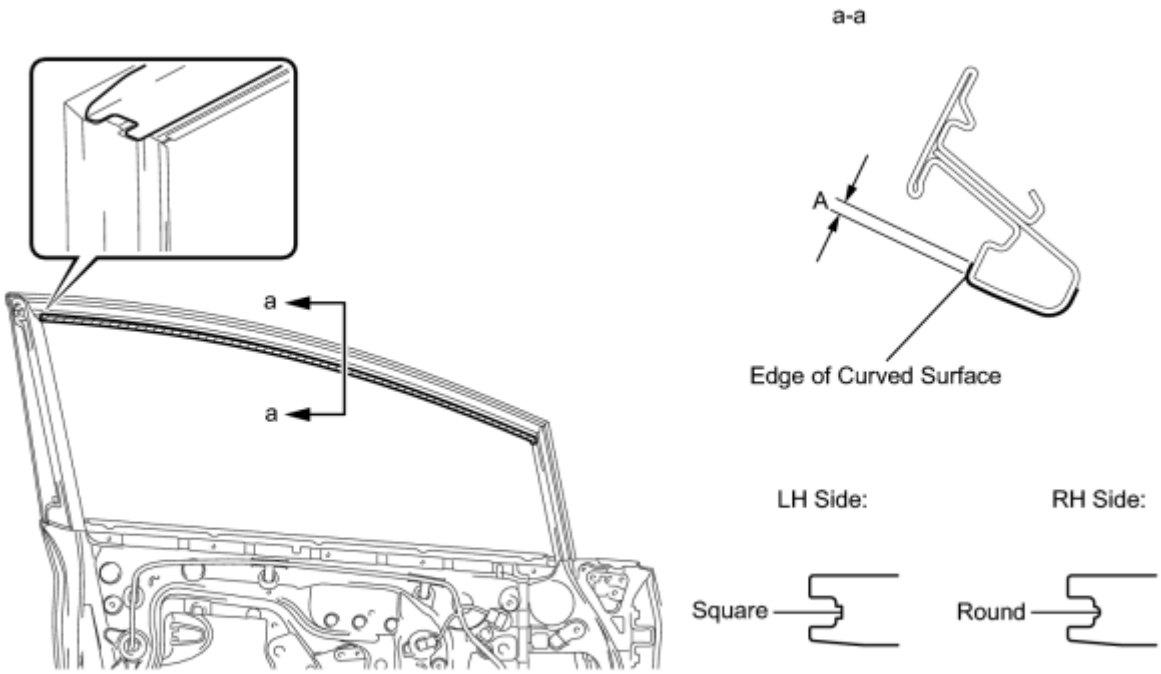
### *Standard Measurement*

| Dimension | Measurement |
|---|---|
| A | 2.0 mm (0.0787 in.) |

(b) Remove the release paper and apply the stripe.

5. INSTALL FRONT DOOR OUTSIDE STRIPE

(a) Refer to the illustration to position the front door outside stripe.



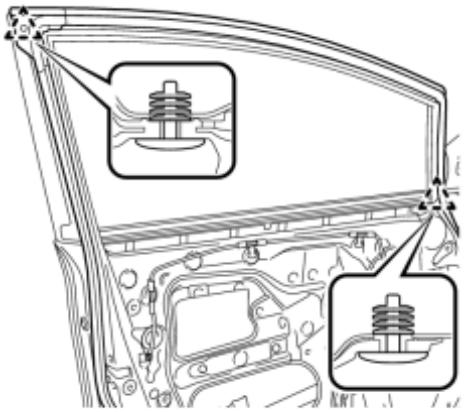

P

*Standard Measurement*

| Dimension | Measurement |
|---|---|
| A | 2.0 mm (0.0787 in.) |

(b) Remove the release paper and apply the stripe.

6. CONNECT FRONT DOOR WEATHERSTRIP



(a) Engage the 2 clips and connect the front door weatherstrip.

P

7. INSTALL FRONT DOOR REAR WINDOW FRAME MOULDING INFO

8. INSTALL FRONT DOOR BELT MOULDING ASSEMBLY INFO

9. INSTALL FRONT DOOR GLASS RUN INFO

10. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY INFO

11. INSTALL FRONT DOOR SERVICE HOLE COVER INFO

12. INSTALL FRONT DOOR TRIM BRACKET INFO

13. INSTALL DOOR FRAME GARNISH INFO

14. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

15. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

16. INSTALL COURTESY LIGHT ASSEMBLY INFO

17. INSTALL DOOR ARMREST COVER INFO

18. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

19. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

20. INSTALL ASSIST GRIP COVER INFO

21. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

22. INSTALL REAR NO. 3 FLOOR BOARD INFO

23. INSTALL REAR DECK FLOOR BOX INFO

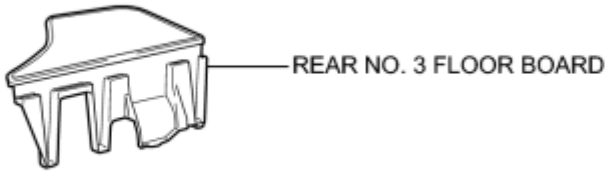
24. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

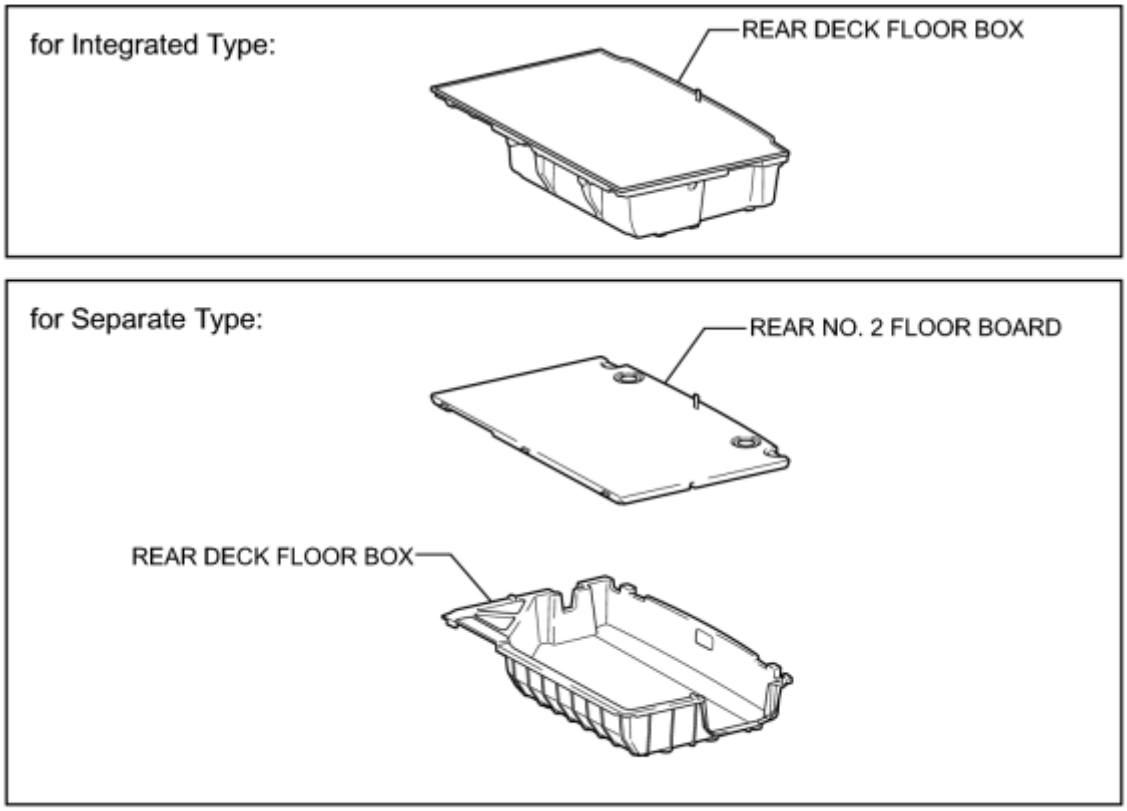
25. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

# COMPONENTS

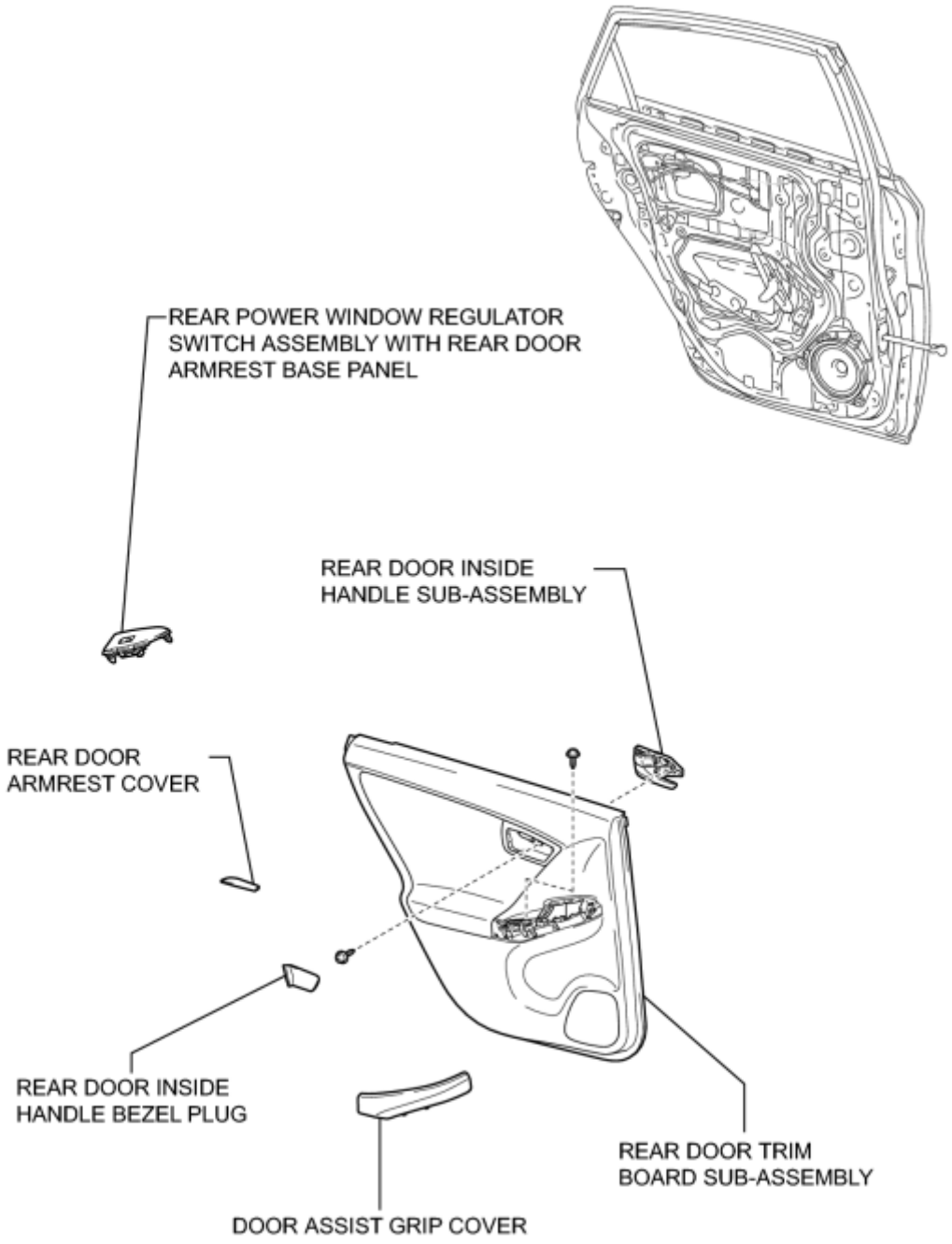
# ILLUSTRATION



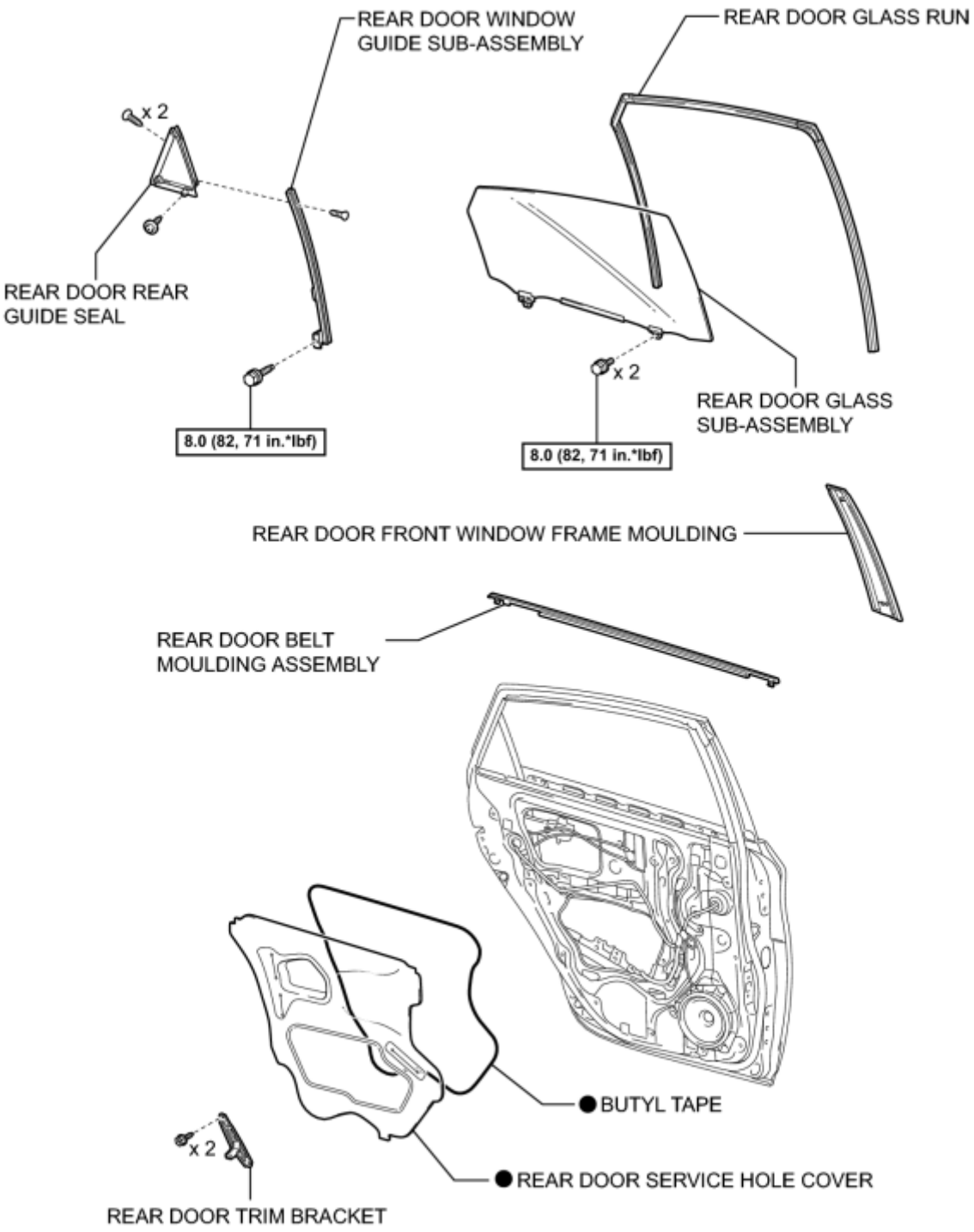

P

# ILLUSTRATION




P

# ILLUSTRATION

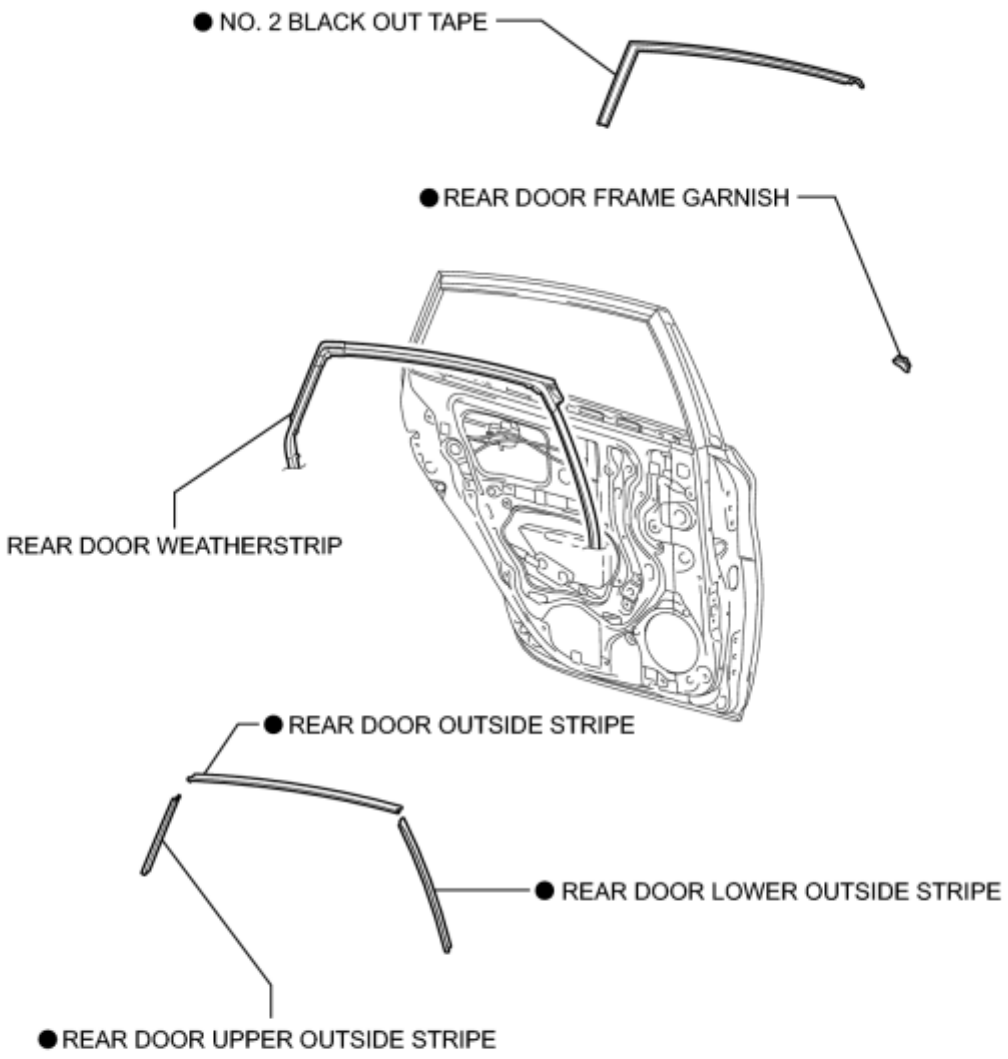



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# ILLUSTRATION




● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE DOOR ASSIST GRIP COVER INFO

6. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

7. REMOVE REAR DOOR ARMREST COVER INFO

8. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

9. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. REMOVE REAR DOOR FRAME GARNISH INFO

11. REMOVE REAR DOOR TRIM BRACKET INFO

12. REMOVE REAR DOOR SERVICE HOLE COVER INFO

13. REMOVE REAR DOOR GLASS RUN INFO

14. REMOVE REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

15. REMOVE REAR DOOR REAR GUIDE SEAL INFO

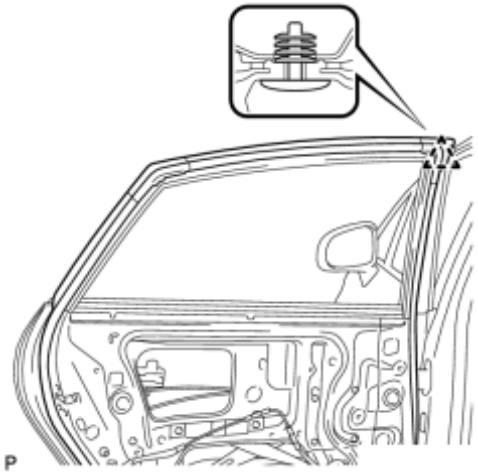
16. REMOVE REAR DOOR GLASS SUB-ASSEMBLY INFO

17. REMOVE REAR DOOR BELT MOULDING ASSEMBLY INFO

18. REMOVE REAR DOOR FRONT WINDOW FRAME MOULDING INFO

19. DISCONNECT REAR DOOR WEATHERSTRIP

(a) Using a clip remover, disengage the clip and remove the upper part of the rear door weatherstrip to the extent that allows removal of the rear door strip and black out tape.



20. REMOVE NO. 2 BLACK OUT TAPE

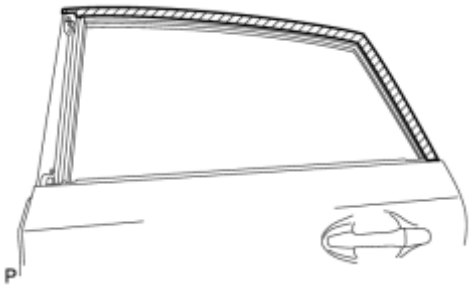
(a) Using a heat light, heat the No. 2 black out tape and vehicle body.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.



(b) Pull back on one of the ends of the No. 2 black out tape to remove it.

HINT:

When pulling on the tape, pull it parallel to the body.

21. REMOVE REAR DOOR OUTSIDE STRIPE

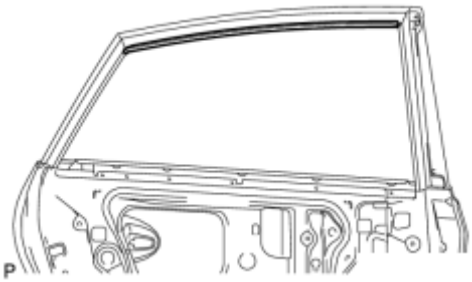
(a) Using a heat light, heat the rear door outside stripe and vehicle body.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.



(b) Pull back on one of the ends of the rear door outside stripe to remove it.

HINT:

When pulling on the stripe, pull it parallel to the body.

22. REMOVE REAR DOOR UPPER OUTSIDE STRIPE

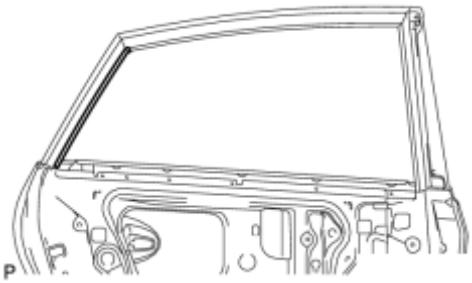
(a) Using a heat light, heat the rear door upper outside stripe and vehicle body.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.



(b) Pull back on one of the ends of the rear door upper outside stripe to remove it.

HINT:

When pulling on the stripe, pull it parallel to the body.

23. REMOVE REAR DOOR LOWER OUTSIDE STRIPE

(a) Using a heat light, heat the rear door lower outside stripe and vehicle body.

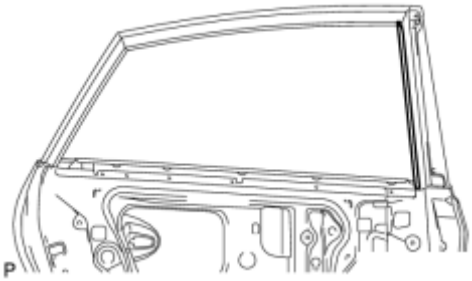
***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |

NOTICE:

Do not heat the vehicle body excessively.

(b) Pull back on one of the ends of the rear door lower outside stripe to



remove it.

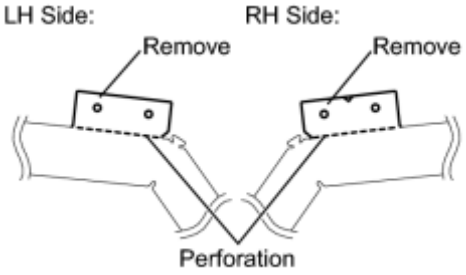
HINT:

When pulling on the stripe, pull it parallel to the body.

# INSTALLATION

1. REPAIR INSTRUCTION INFO

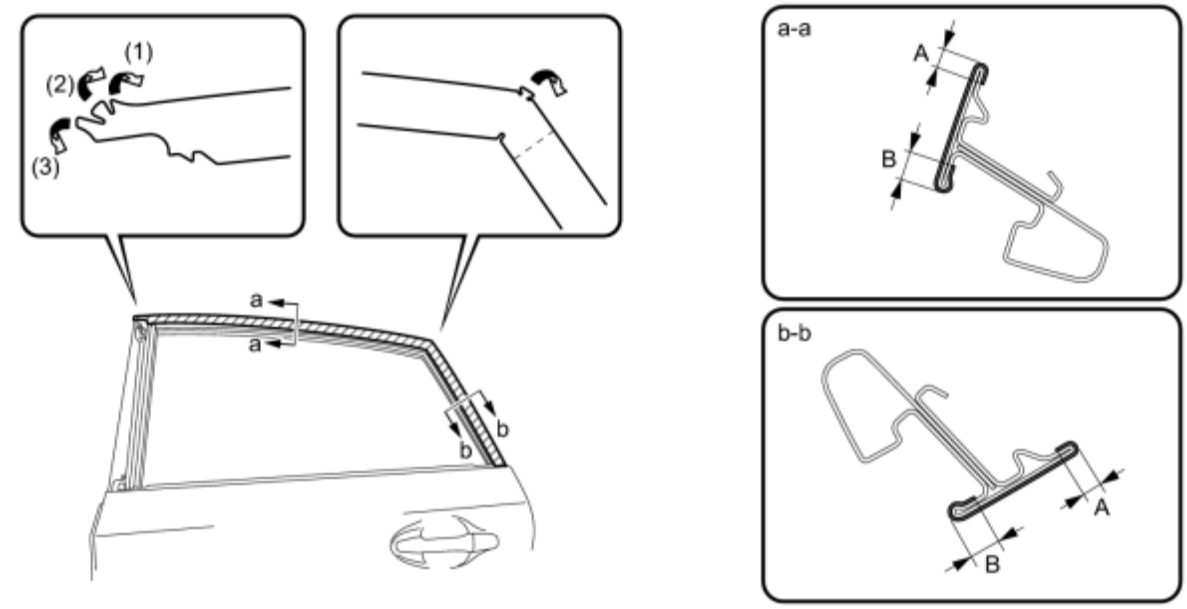
2. INSTALL NO. 2 BLACK OUT TAPE




P

(a) Remove the portion of the No. 2 black out tape at the perforation as shown in the illustration.

(b) Refer to the illustration to position the No. 2 black out tape.




P

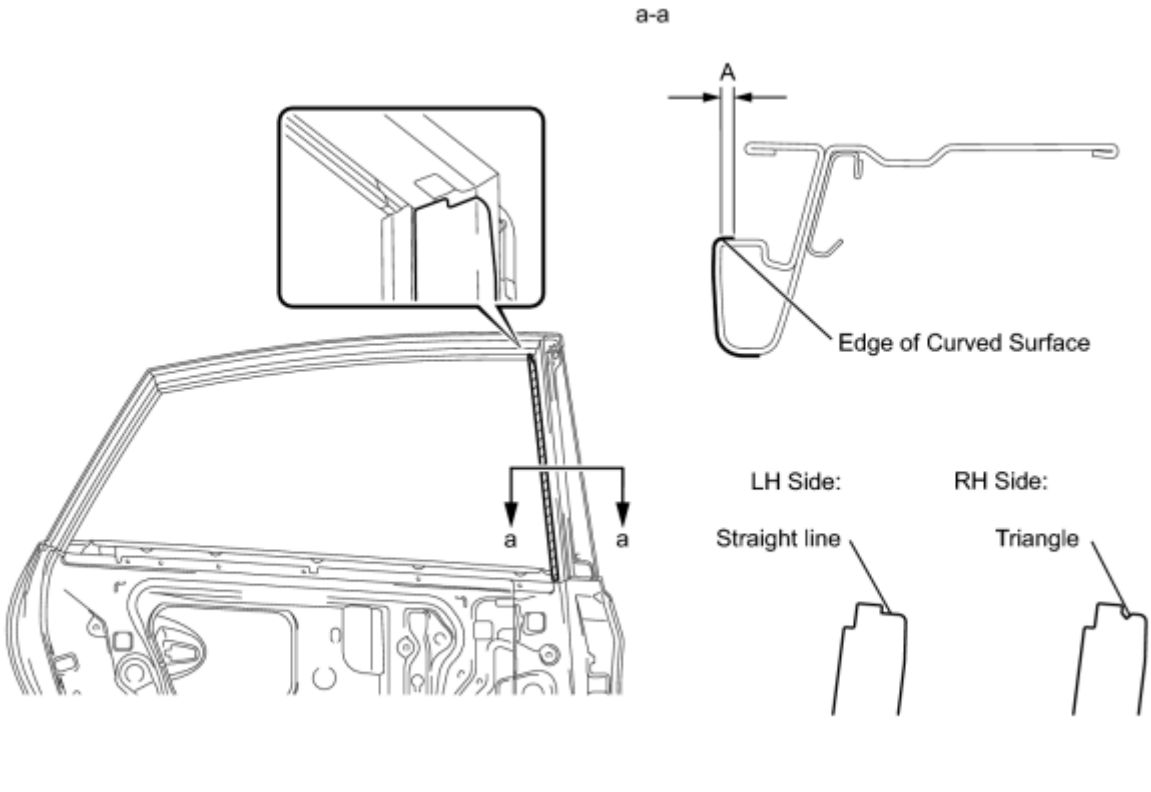
***Standard Measurement***

| Dimension | Measurement |
|---|---|
| A | 2 to 4 mm (0.0787 to 0.157 in.) |
| B | 4 to 6 mm (0.157 to 0.236 in.) |

(c) Remove the release paper and apply the tape.

3. INSTALL REAR DOOR LOWER OUTSIDE STRIPE

(a) Refer to the illustration to position the rear door lower outside stripe.



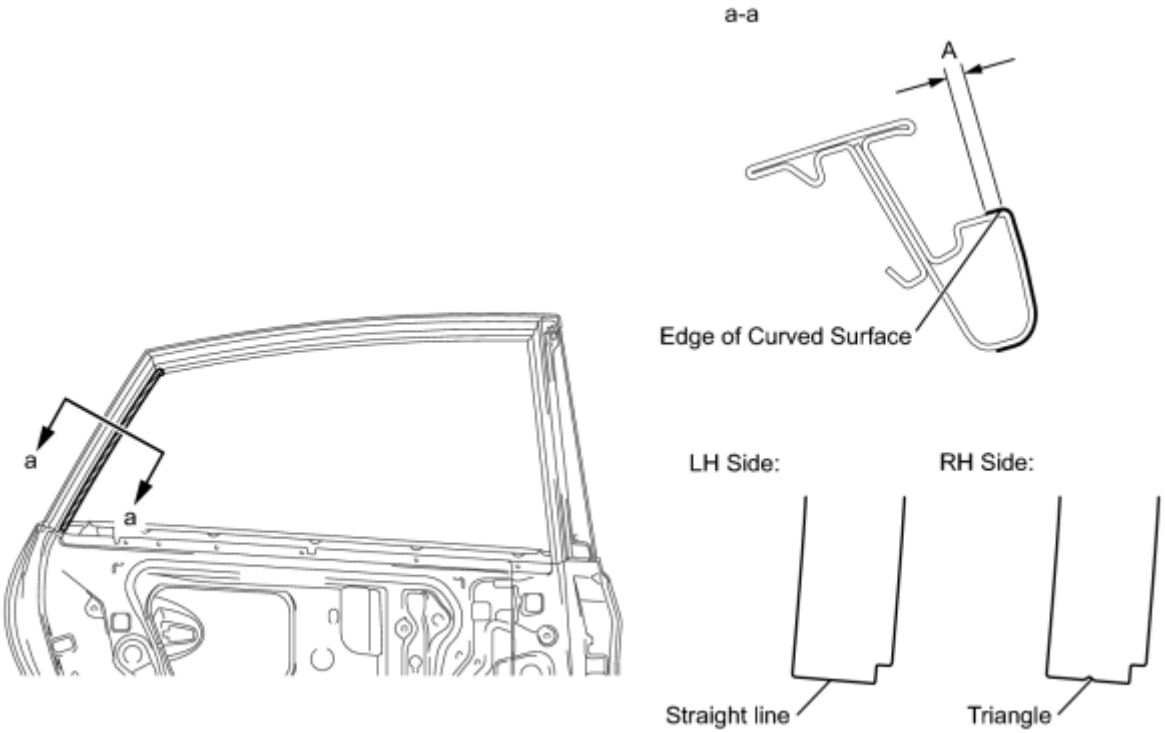

### *Standard Measurement*

| Dimension | Measurement |
|---|---|
| A | 2.0 mm (0.0787 in.) |

(b) Remove the release paper and apply the stripe.

4. INSTALL REAR DOOR UPPER OUTSIDE STRIPE

(a) Refer to the illustration to position the rear door upper outside stripe.



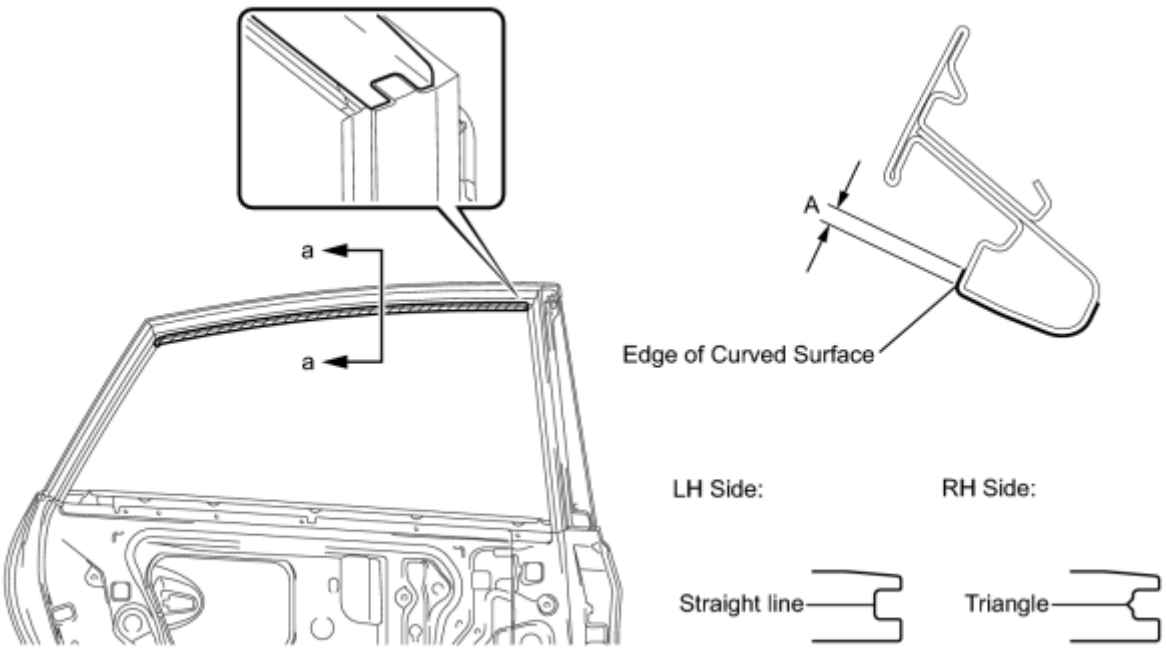

### *Standard Measurement*

| Dimension | Measurement |
|---|---|
| A | 2.0 mm (0.0787 in.) |

(b) Remove the release paper and apply the stripe.

5. INSTALL REAR DOOR OUTSIDE STRIPE

(a) Refer to the illustration to position the rear door outside stripe.




P

*Standard Measurement*

| Dimension | Measurement |
|---|---|
| A | 2.0 mm (0.0787 in.) |

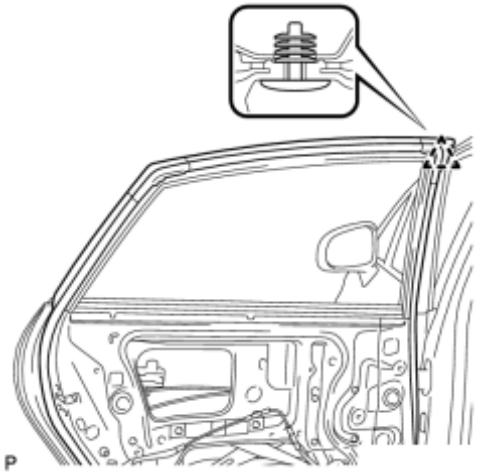
(b) Remove the release paper and apply the stripe.

6. INSTALL REAR DOOR FRONT WINDOW FRAME MOULDING INFO

7. INSTALL REAR DOOR BELT MOULDING ASSEMBLY INFO

8. CONNECT REAR DOOR WEATHERSTRIP

(a) Engage the clip and connect the rear door weatherstrip.




9. INSTALL REAR DOOR GLASS SUB-ASSEMBLY INFO

10. INSTALL REAR DOOR REAR GUIDE SEAL INFO

11. INSTALL REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

12. INSTALL REAR DOOR GLASS RUN INFO

13. INSTALL REAR DOOR SERVICE HOLE COVER INFO

14. INSTALL REAR DOOR TRIM BRACKET INFO

15. INSTALL REAR DOOR FRAME GARNISH INFO

16. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

17. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

18. INSTALL REAR DOOR ARMREST COVER INFO

19. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

20. INSTALL DOOR ASSIST GRIP COVER INFO

21. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

22. INSTALL REAR NO. 3 FLOOR BOARD INFO

23. INSTALL REAR DECK FLOOR BOX INFO

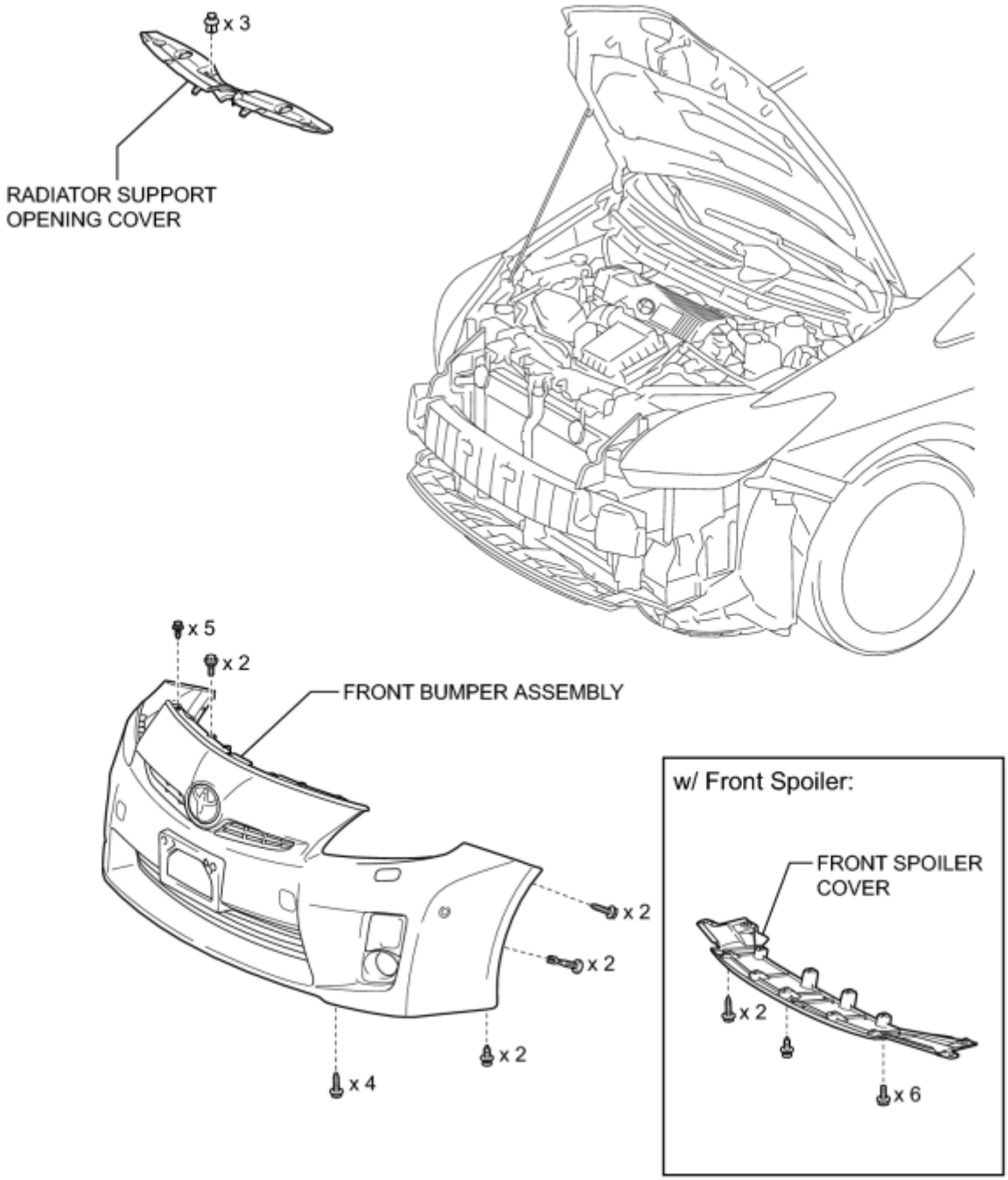
24. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

25. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

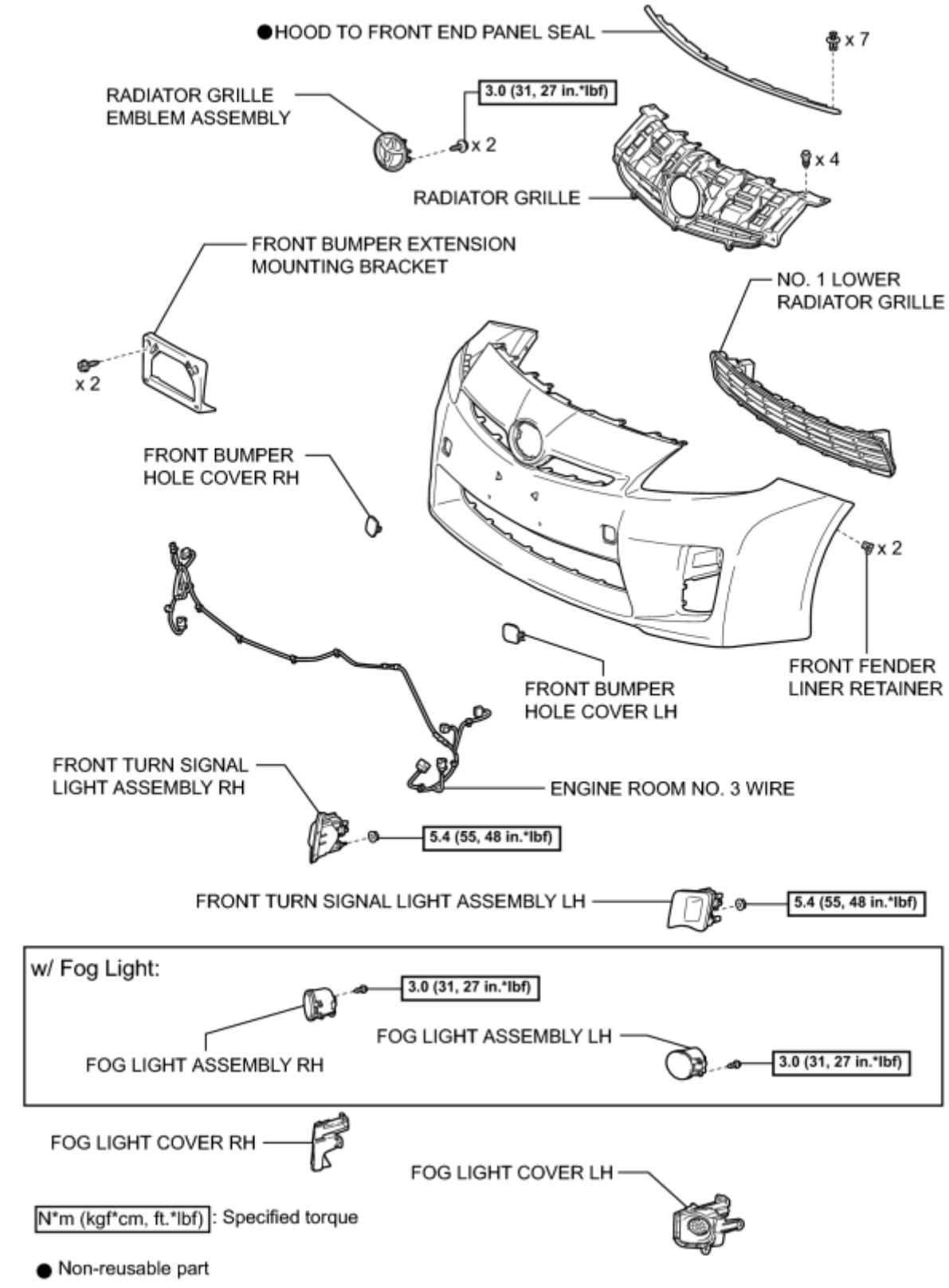
# COMPONENTS

# ILLUSTRATION



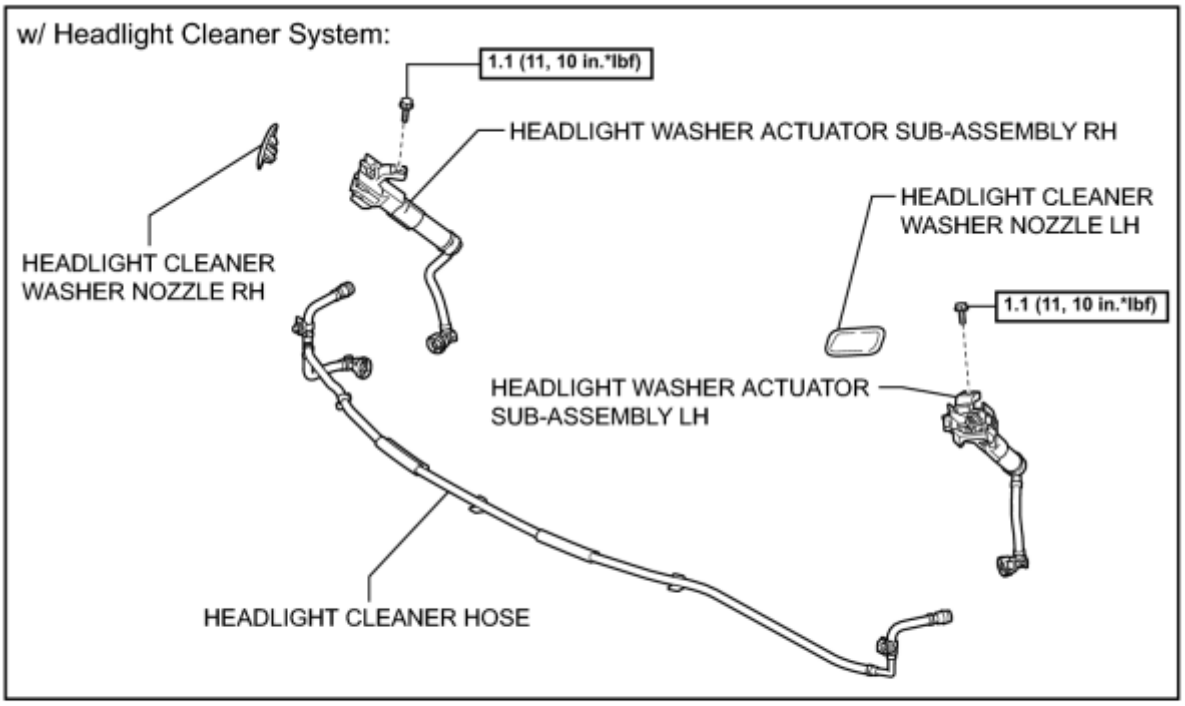

P

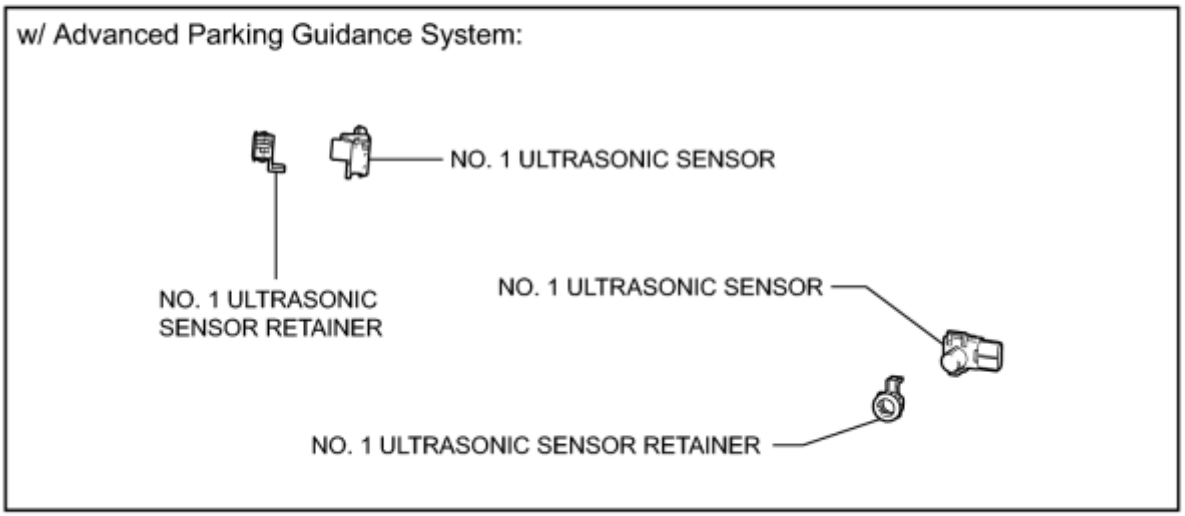
# ILLUSTRATION




P

# ILLUSTRATION

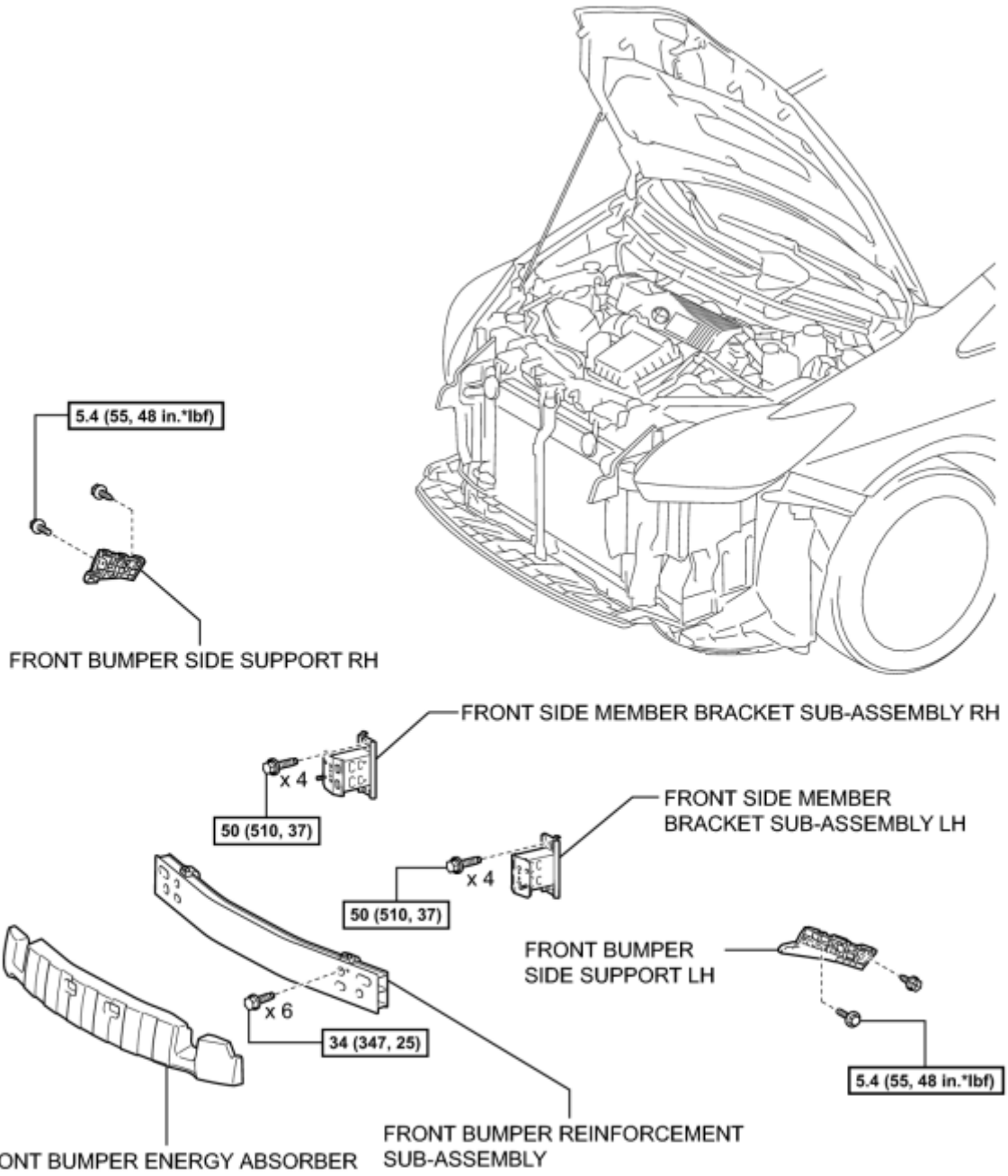



N*m (kgf*cm, ft.*lbf) : Specified torque

P

# ILLUSTRATION

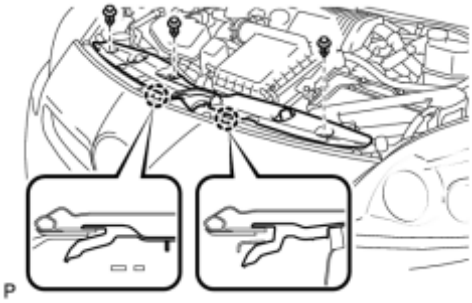



N*m (kgf*cm, ft.*lbf) : Specified torque

P

# REMOVAL

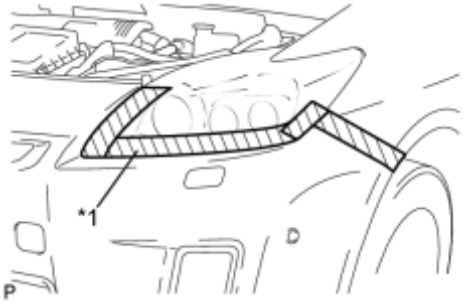
1. REMOVE RADIATOR SUPPORT OPENING COVER



(a) Remove the 3 clips.

(b) Disengage the 2 claws and remove the radiator support opening cover.

2. REMOVE FRONT BUMPER ASSEMBLY



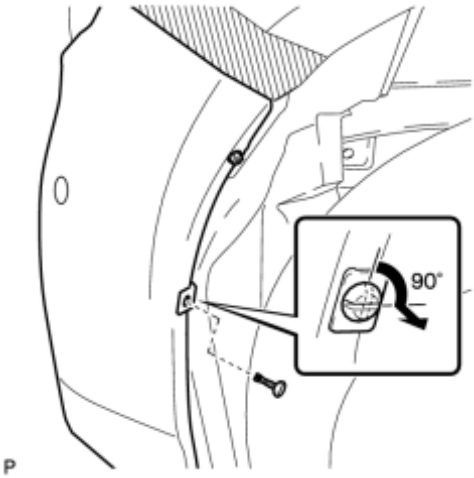

(a) Put protective tape around the front bumper assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

HINT:

Use the same procedure for the RH side and LH side.




(b) Using a screwdriver, turn the pins 90 degrees and remove the pin hold clip.

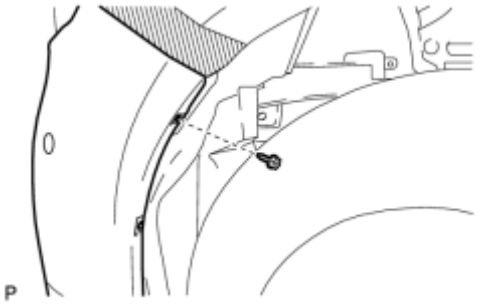
HINT:

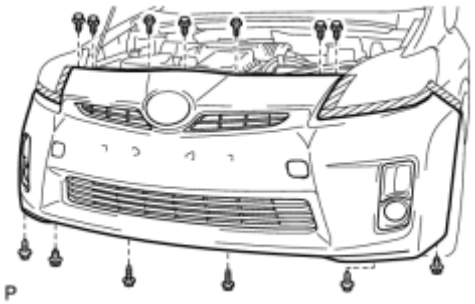
Use the same procedure for the RH side and LH side.

(c) Remove the screw.

HINT:

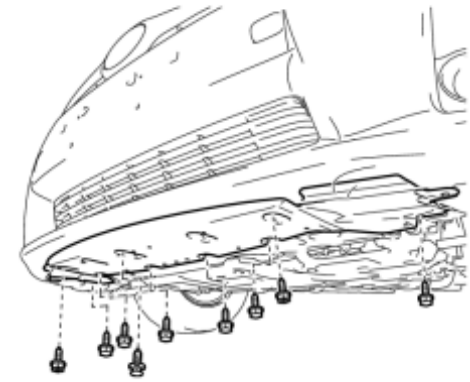
Use the same procedure for the RH side and LH side.





(d) Remove the 2 bolts and 4 screws.

(e) Using a clip remover, remove the 7 clips.



(f) Using a clip remover, remove the clip. (w/ Front Spoiler)

(g) Remove the 6 bolts and 2 screws, and front spoiler cover. (w/ Front Spoiler)

(h) Disengage the 3 claws and remove the front bumper assembly.

HINT:

Use the same procedure for the RH side and LH side.

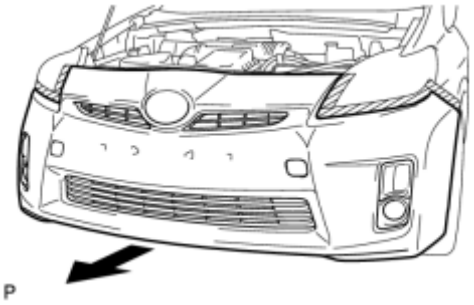



(i) Disconnect each connector.

(j) Disconnect the headlight cleaner hose and drain the washer fluid. (w/ Headlight Cleaner System)

HINT:

Use a container to collect the washer fluid.




(k) Remove the front bumper assembly as shown in the illustration.

# DISASSEMBLY

1. REMOVE HEADLIGHT CLEANER WASHER NOZZLE LH (w/ Headlight Cleaner System) INFO

2. REMOVE HEADLIGHT CLEANER WASHER NOZZLE RH (w/ Headlight Cleaner System)

HINT:

Use the same procedure for the RH side and LH side.

3. REMOVE HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY LH (w/ Headlight Cleaner System) INFO

4. REMOVE HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY RH (w/ Headlight Cleaner System)

HINT:

Use the same procedure for the RH side and LH side.

5. REMOVE NO. 1 ULTRASONIC SENSOR (w/ Advanced Parking Guidance System) INFO

6. REMOVE NO. 1 ULTRASONIC SENSOR RETAINER (w/ Advanced Parking Guidance System) INFO

7. REMOVE FRONT TURN SIGNAL LIGHT ASSEMBLY LH INFO

8. REMOVE FRONT TURN SIGNAL LIGHT ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

9. REMOVE FOG LIGHT ASSEMBLY LH (w/ Fog Light) INFO

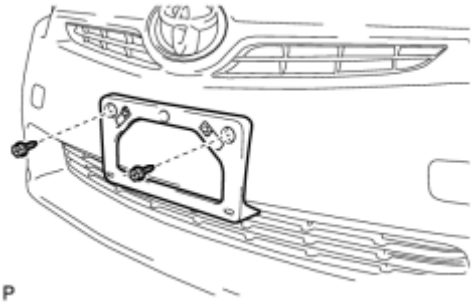
10. REMOVE FOG LIGHT ASSEMBLY RH (w/ Fog Light)

HINT:

Use the same procedure for the RH side and LH side.

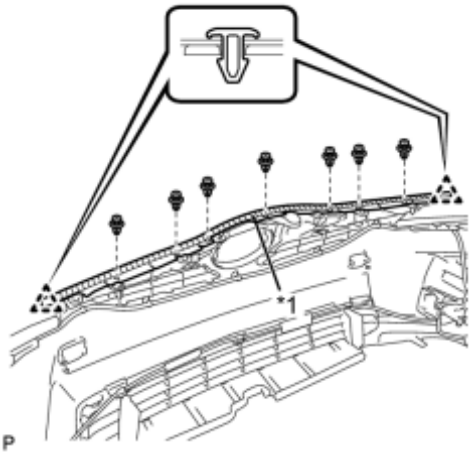
11. REMOVE FRONT BUMPER EXTENSION MOUNTING BRACKET

(a) Remove the 2 screws and front bumper extension mounting bracket.



P

12. REMOVE HOOD TO FRONT END PANEL SEAL




P

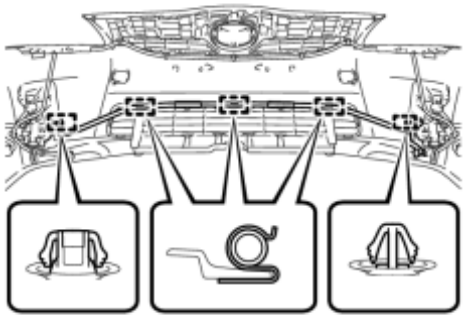
(a) Remove the 7 clips.

## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape |

(b) Disengage the 2 clips and remove the hood to front end panel seal.

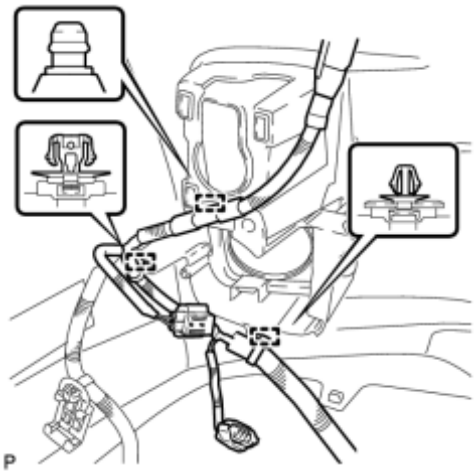
13. REMOVE HEADLIGHT CLEANER HOSE (w/ Headlight Cleaner System)



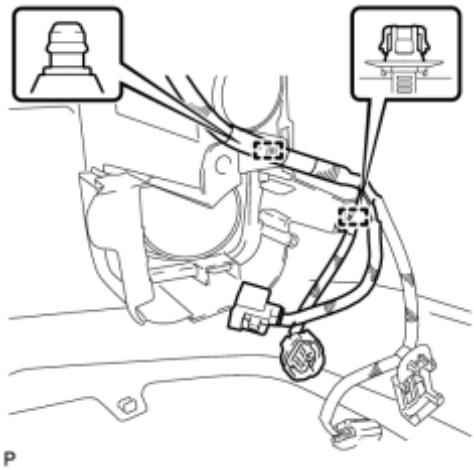
(a) Disengage the 5 clamps and remove the headlight cleaner hose.

P

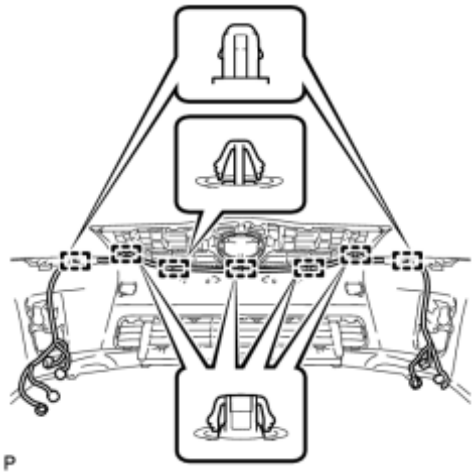
14. REMOVE ENGINE ROOM NO. 3 WIRE



(a) Disengage the 3 clamps.



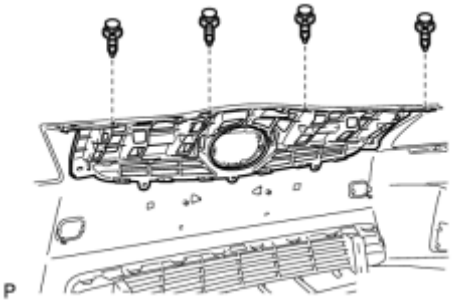
(b) Disengage the 2 clamps.

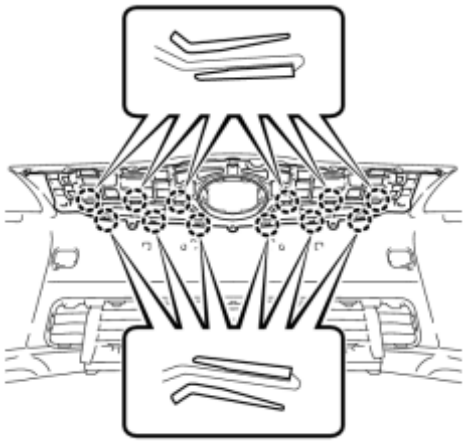


(c) Disengage the 7 clamps and remove the engine room No. 3 wire.

15. REMOVE RADIATOR GRILLE

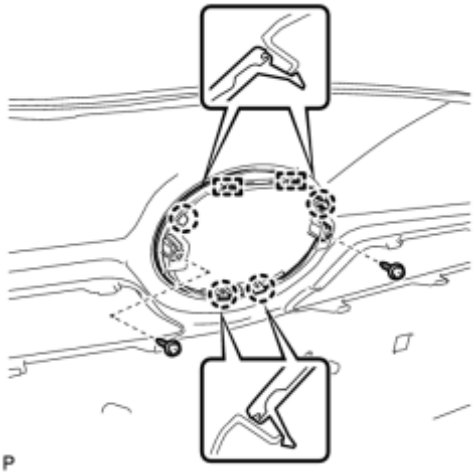
(a) Remove the 4 clips.





(b) Disengage the 12 claws and remove the radiator grille.

16. REMOVE RADIATOR GRILLE EMBLEM ASSEMBLY

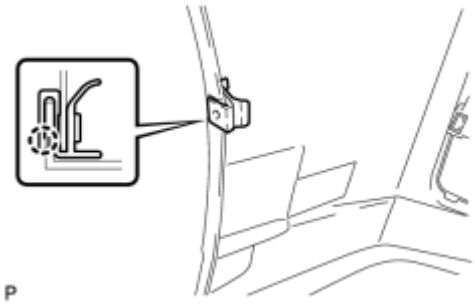


(a) Remove the 2 screws.

(b) Disengage the 4 claws and 2 pins, and remove the radiator grille emblem assembly.

17. REMOVE FRONT FENDER LINER RETAINER

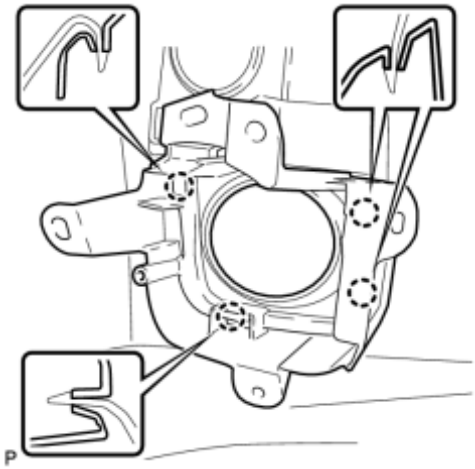
(a) Disengage the claw and remove the front fender liner retainer.




HINT:

Use the same procedure for the RH side and LH side.

18. REMOVE FOG LIGHT COVER LH



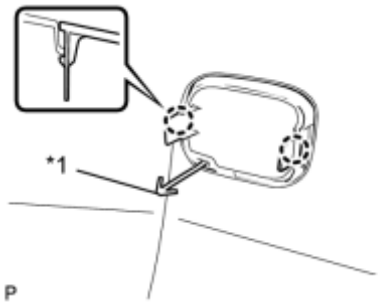

(a) Disengage the 4 claws and remove the fog light cover LH.

19. REMOVE FOG LIGHT COVER RH

HINT:

Use the same procedure for the RH side and LH side.

20. REMOVE FRONT BUMPER HOLE COVER LH




(a) Disengage the 2 claws.

## Text in Illustration

| | |
|---|---|
| *1 | Hook |

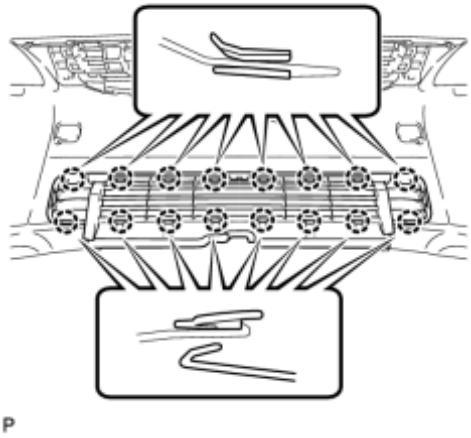
(b) Disengage the hook and remove the front bumper hole cover LH.

21. REMOVE FRONT BUMPER HOLE COVER RH

HINT:

Use the same procedure for the RH side and LH side.

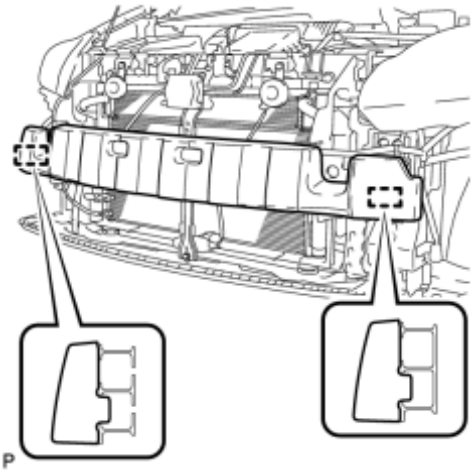
22. REMOVE NO. 1 LOWER RADIATOR GRILLE



P

(a) Disengage the 16 claws and remove the No. 1 lower radiator grille.

23. REMOVE FRONT BUMPER ENERGY ABSORBER

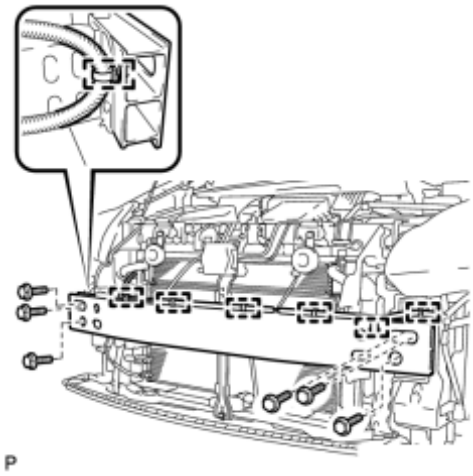


P

(a) Disengage the 2 guides and remove the front bumper energy absorber.

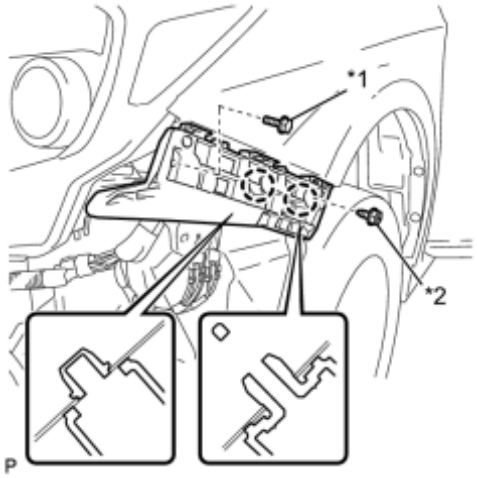
24. REMOVE FRONT BUMPER REINFORCEMENT SUB-ASSEMBLY

(a) Disengage the 7 clamps.



(b) Remove the 6 bolts and front bumper reinforcement sub-assembly.

25. REMOVE FRONT BUMPER SIDE SUPPORT LH




(a) Remove the bolt and screw.

## Text in Illustration

| | |
|---|---|
| *1 | Bolt |
| *2 | Screw |

(b) Disengage the 2 claws and remove the front bumper side support LH.

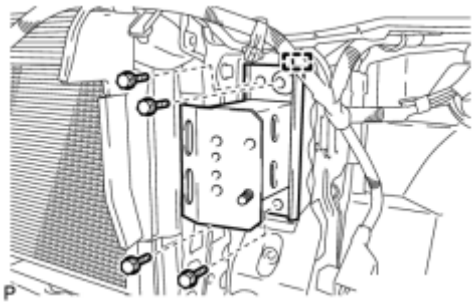
26. REMOVE FRONT BUMPER SIDE SUPPORT RH

HINT:

Use the same procedure for the RH side and LH side.

27. REMOVE FRONT SIDE MEMBER BRACKET SUB-ASSEMBLY LH

(a) Remove the 4 bolts.



(b) Disengage the guide and remove the front side member bracket sub-assembly LH.

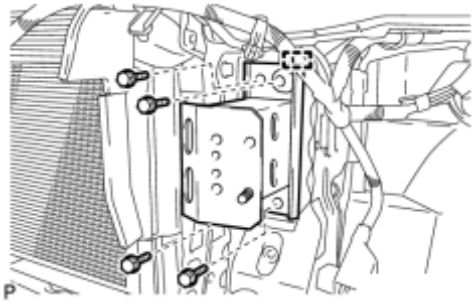
28. REMOVE FRONT SIDE MEMBER BRACKET SUB-ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

# REASSEMBLY

1. INSTALL FRONT SIDE MEMBER BRACKET SUB-ASSEMBLY LH



(a) Engage the guide and install the front side member bracket sub-assembly LH.

(b) Install the 4 bolts.

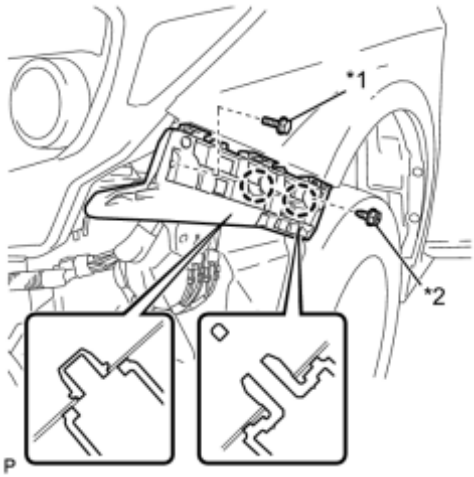
Torque: **50 N·m (510 kgf·cm, 37ft·lbf)**

2. INSTALL FRONT SIDE MEMBER BRACKET SUB-ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

3. INSTALL FRONT BUMPER SIDE SUPPORT LH




(a) Engage the 2 claws and install the front bumper side support LH.

## Text in Illustration

| | |
|---|---|
| *1 | Bolt |
| *2 | Screw |

(b) Install the bolt and screw.

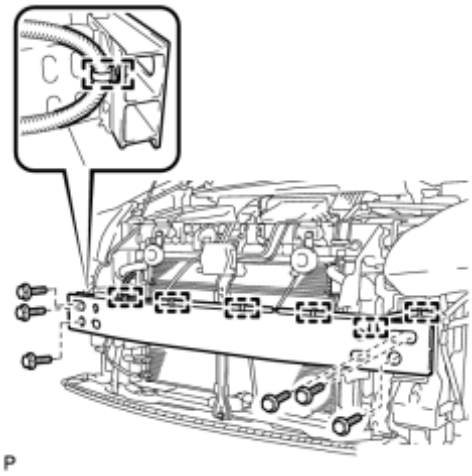
Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

4. INSTALL FRONT BUMPER SIDE SUPPORT RH

HINT:

Use the same procedure for the RH side and LH side.

5. INSTALL FRONT BUMPER REINFORCEMENT SUB-ASSEMBLY

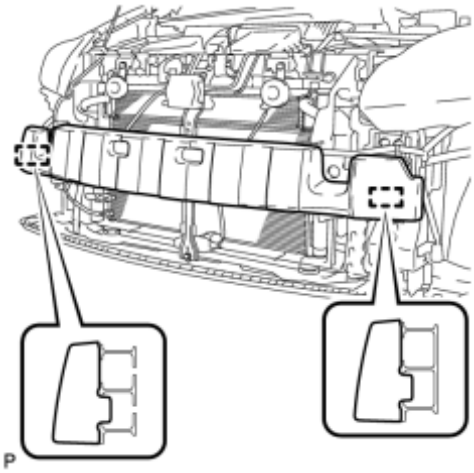


(a) Install the front bumper reinforcement sub-assembly with the 6 bolts.

Torque: **34 N·m (347 kgf·cm, 25ft·lbf)**

(b) Engage the 7 clamps.

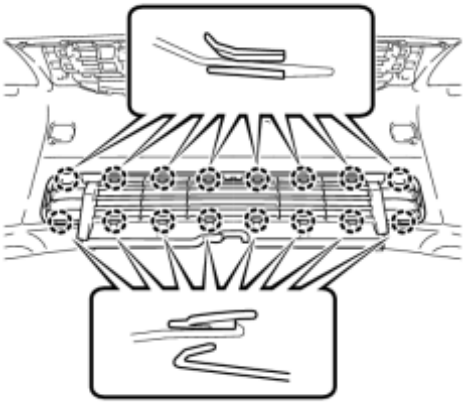
6. INSTALL FRONT BUMPER ENERGY ABSORBER



(a) Engage the 2 guides to install the front bumper energy absorber.

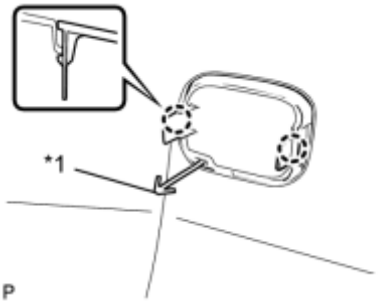
7. INSTALL NO. 1 LOWER RADIATOR GRILLE

(a) Engage the 16 claws to install the No. 1 lower radiator grille.



P

8. INSTALL FRONT BUMPER HOLE COVER LH




P

(a) Engage the hook.

## Text in Illustration

| | |
|---|---|
| *1 | Hook |

(b) Engage the 2 claws and install the front bumper hole cover LH.

9. INSTALL FRONT BUMPER HOLE COVER RH

HINT:

Use the same procedure for the RH side and LH side.

10. INSTALL FRONT TURN SIGNAL LIGHT ASSEMBLY LH INFO

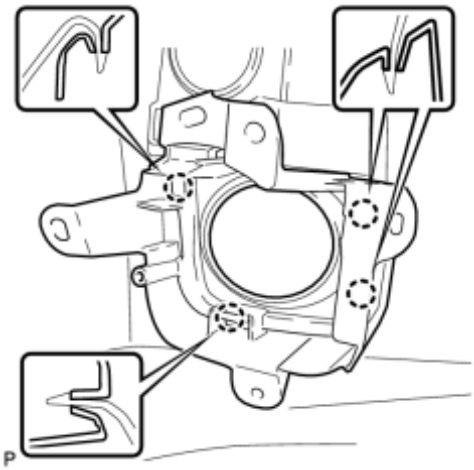
11. INSTALL FRONT TURN SIGNAL LIGHT ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

12. INSTALL FOG LIGHT COVER LH

(a) Engage the 4 claws and install the fog light cover LH.



13. INSTALL FOG LIGHT COVER RH

HINT:

Use the same procedure for the RH side and LH side.

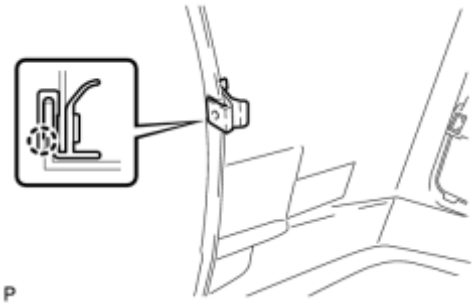
14. INSTALL FOG LIGHT ASSEMBLY LH (w/ Fog Light) INFO

15. INSTALL FOG LIGHT ASSEMBLY RH (w/ Fog Light)

HINT:

Use the same procedure for the RH side and LH side.

16. INSTALL FRONT FENDER LINER RETAINER



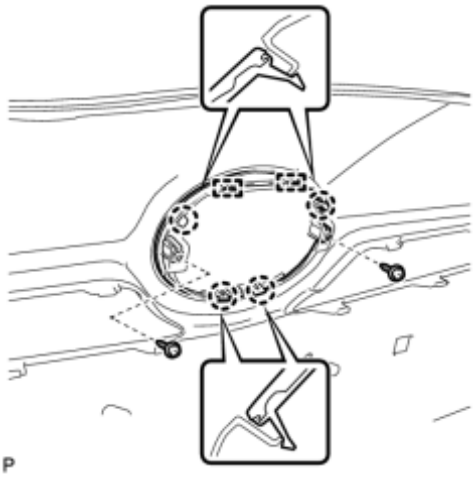
(a) Engage the claw and install the front fender liner retainer.

HINT:

Use the same procedure for the RH side and LH side.

17. INSTALL RADIATOR GRILLE EMBLEM ASSEMBLY

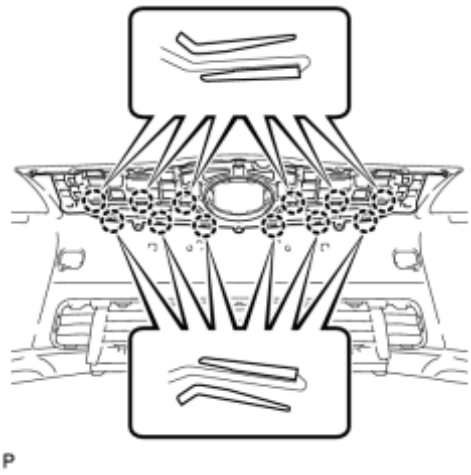
(a) Engage the 2 pins and 4 claws, and install the radiator grille emblem assembly.



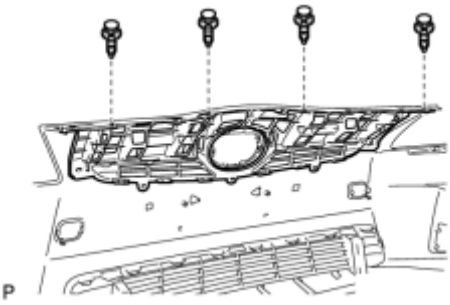
(b) Install the 2 screws.

Torque: **3.0 N·m (31 kgf·cm, 27in·lbf)**

18. INSTALL RADIATOR GRILLE



(a) Engage the 12 claws and install the radiator grille.

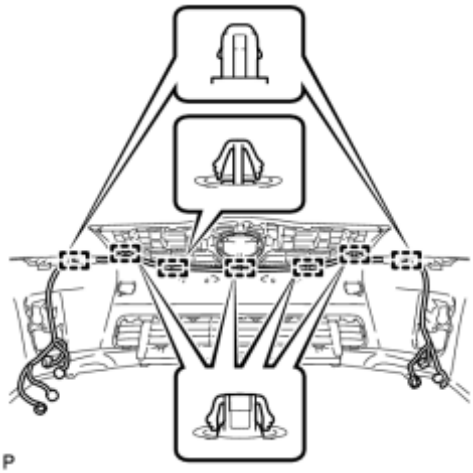


(b) Install the 4 clips.

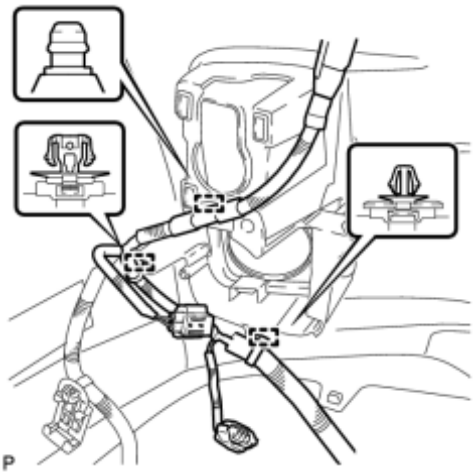
19. INSTALL NO. 1 ULTRASONIC SENSOR RETAINER (w/ Advanced Parking Guidance System) INFO

20. INSTALL NO. 1 ULTRASONIC SENSOR (w/ Advanced Parking Guidance System) INFO

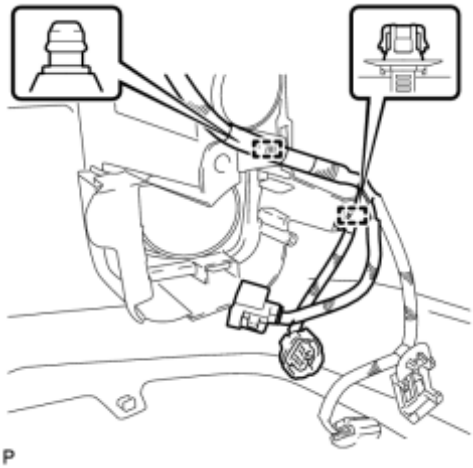
21. INSTALL ENGINE ROOM NO. 3 WIRE



(a) Engage the 7 clamps.

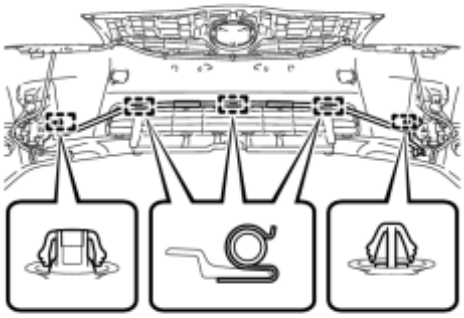


(b) Engage the 3 clamps.



(c) Engage the 2 clamps and install the engine room No. 3 wire.

22. INSTALL HEADLIGHT CLEANER HOSE (w/ Headlight Cleaner System)



(a) Engage the 5 clamps and install the headlight cleaner hose.

P

23. INSTALL HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY LH (w/ Headlight Cleaner System) INFO

24. INSTALL HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY RH (w/ Headlight Cleaner System)

HINT:

Use the same procedure for the RH side and LH side.

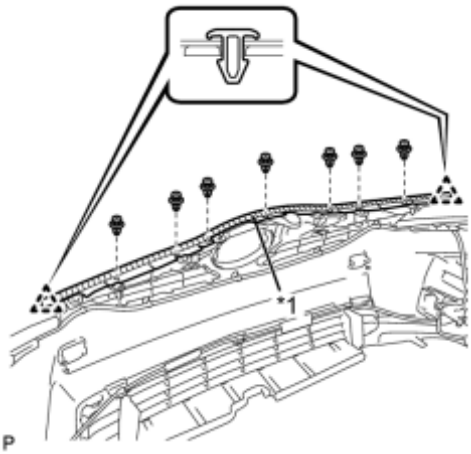
25. INSTALL HEADLIGHT CLEANER WASHER NOZZLE LH (w/ Headlight Cleaner System) INFO

26. INSTALL HEADLIGHT CLEANER WASHER NOZZLE RH (w/ Headlight Cleaner System)

HINT:

Use the same procedure for the RH side and LH side.

27. INSTALL HOOD TO FRONT END PANEL SEAL




(a) Engage the 2 clips and install the new hood to front end panel seal.

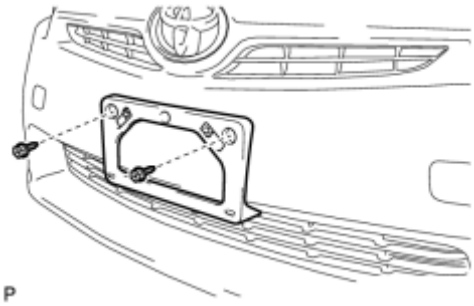
## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape |

P

(b) Install the 7 clips.

28. INSTALL FRONT BUMPER EXTENSION MOUNTING BRACKET



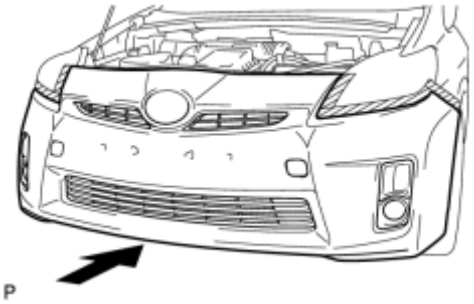

(a) Install the front bumper extension mounting bracket with the 2 screws.

# INSTALLATION

1. INSTALL FRONT BUMPER ASSEMBLY

(a) Connect the headlight cleaner hose. (w/ Headlight Cleaner System)

(b) Connect each connector.



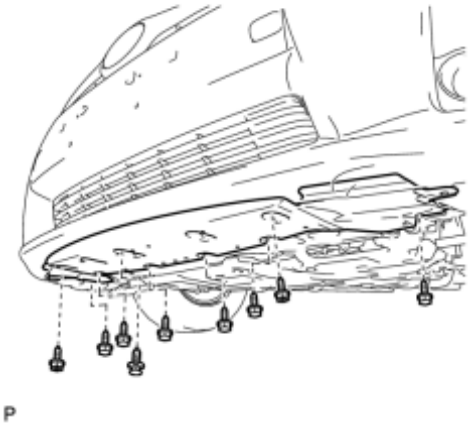

(c) Install the front bumper assembly as shown in the illustration.




(d) Engage the 3 claws to install the front bumper assembly.

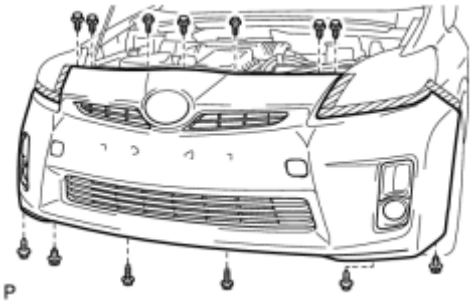
HINT:

Use the same procedure for the RH side and LH side.



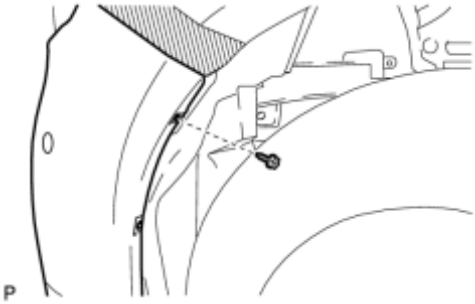

(e) Install the front spoiler cover with the 6 bolts and 2 screws. (w/ Front Spoiler)

(f) Install the clip. (w/ Front Spoiler)



(g) Install the 7 clips.

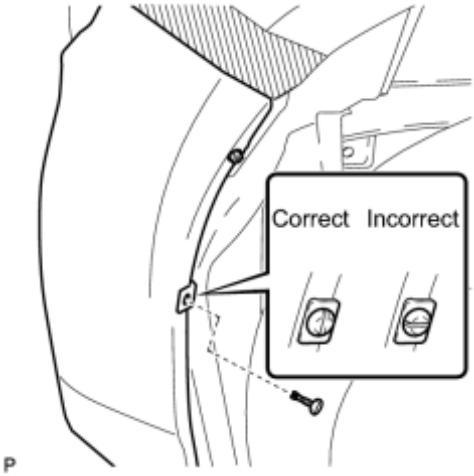
(h) Install the 2 bolts and 4 screws.



(i) Install the screw.

HINT:

Use the same procedure for the RH side and LH side.




(j) Install the pin hold clip.

NOTICE:

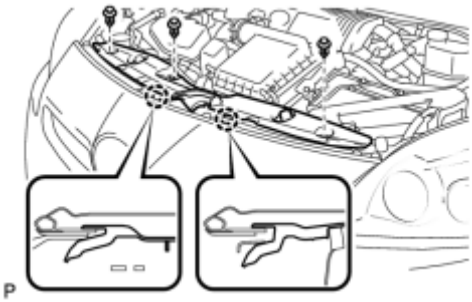
Insert the pin hold clip with the slot aligned vertically. Do not rotate the clip after inserting it. After installation, confirm that the slot is vertical.

HINT:

Use the same procedure for the RH side and LH side.

2. INSTALL RADIATOR SUPPORT OPENING COVER

(a) Engage the 2 claws and install the radiator support opening cover.



(b) Install the 3 clips.

3. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

4. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT (w/ Fog Light) INFO

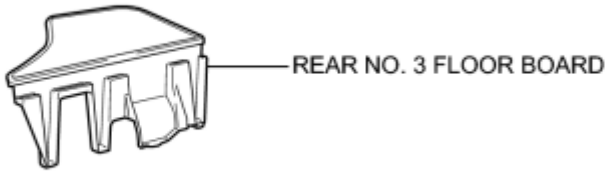
5. PREPARE FOR FOG LIGHT AIMING (w/ Fog Light) INFO

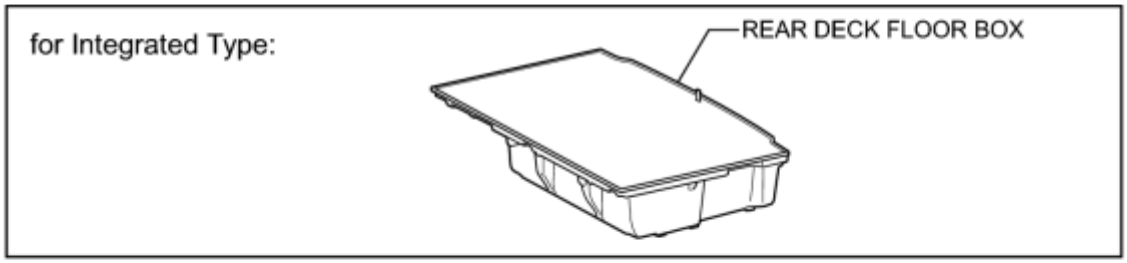
6. INSPECT FOG LIGHT AIMING (w/ Fog Light) INFO

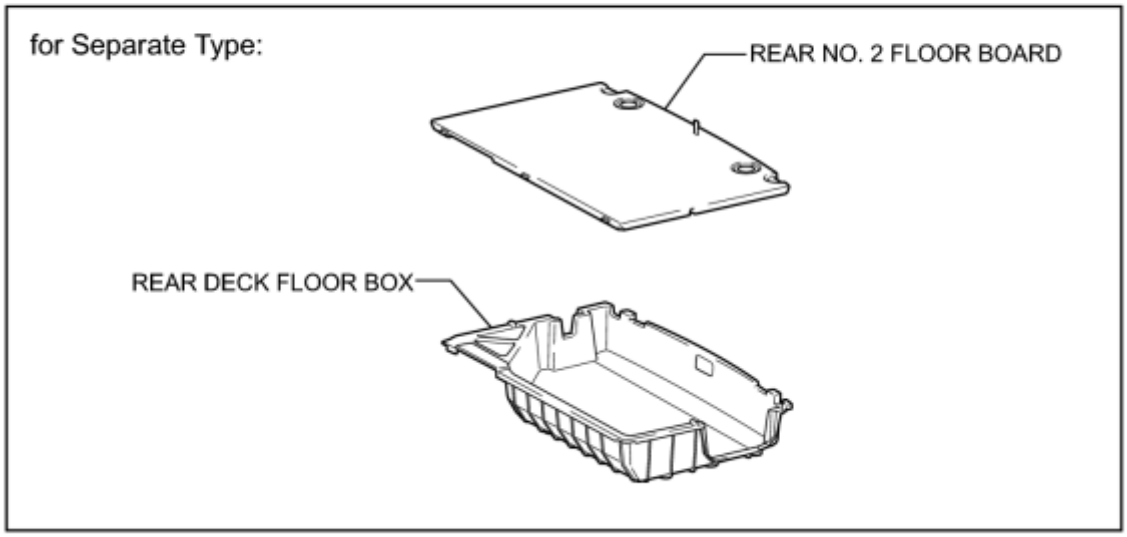
7. ADJUST FOG LIGHT AIMING (w/ Fog Light) INFO

# COMPONENTS

# ILLUSTRATION

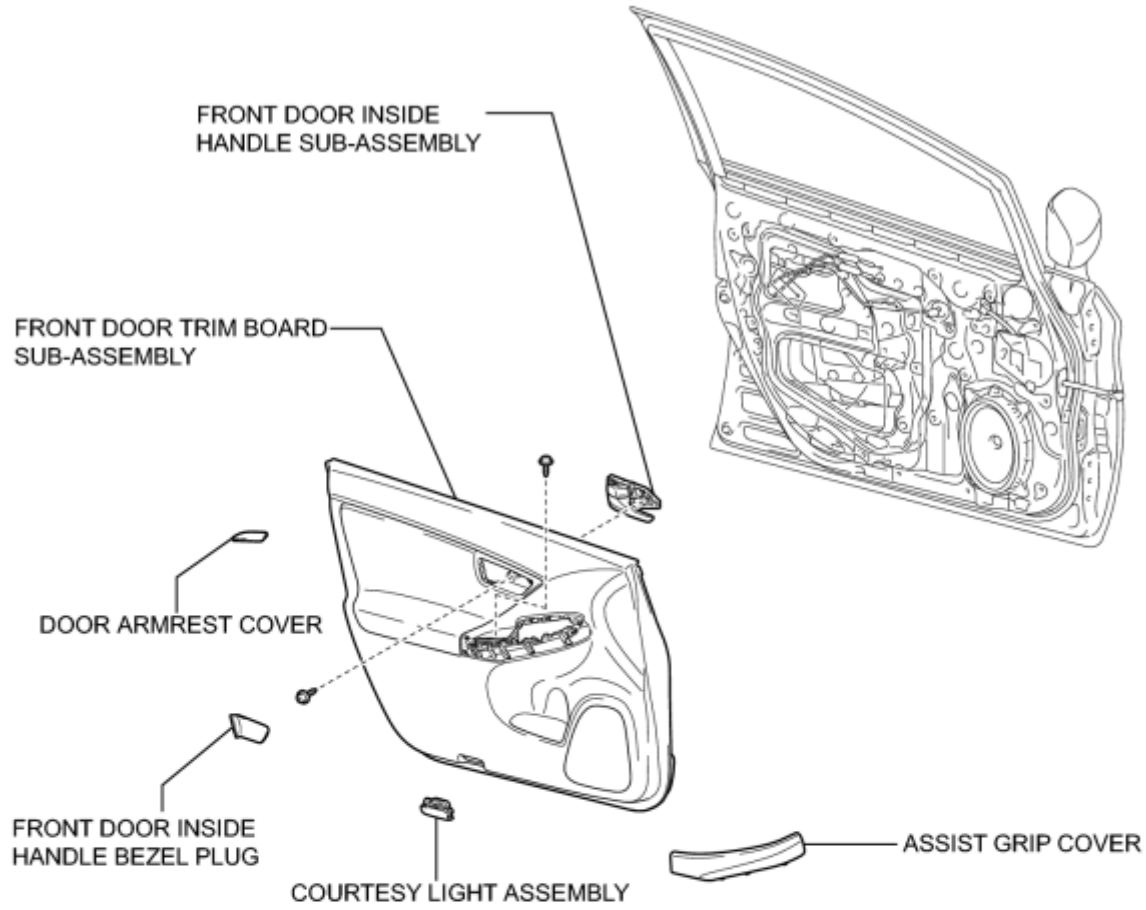


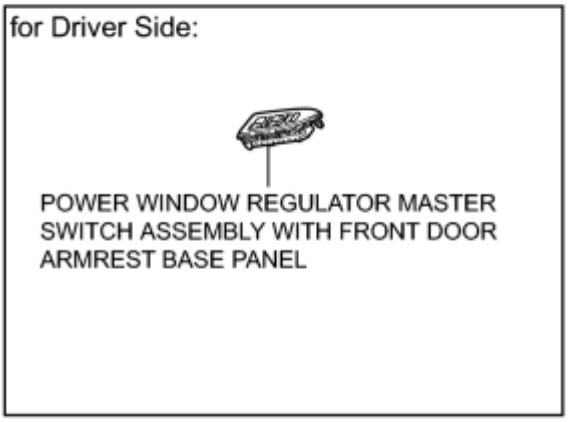



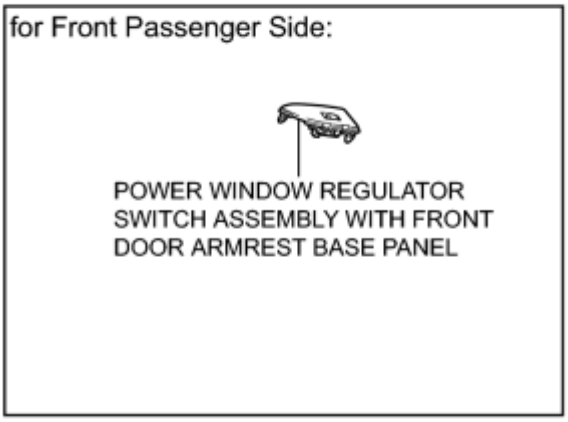




P

# ILLUSTRATION

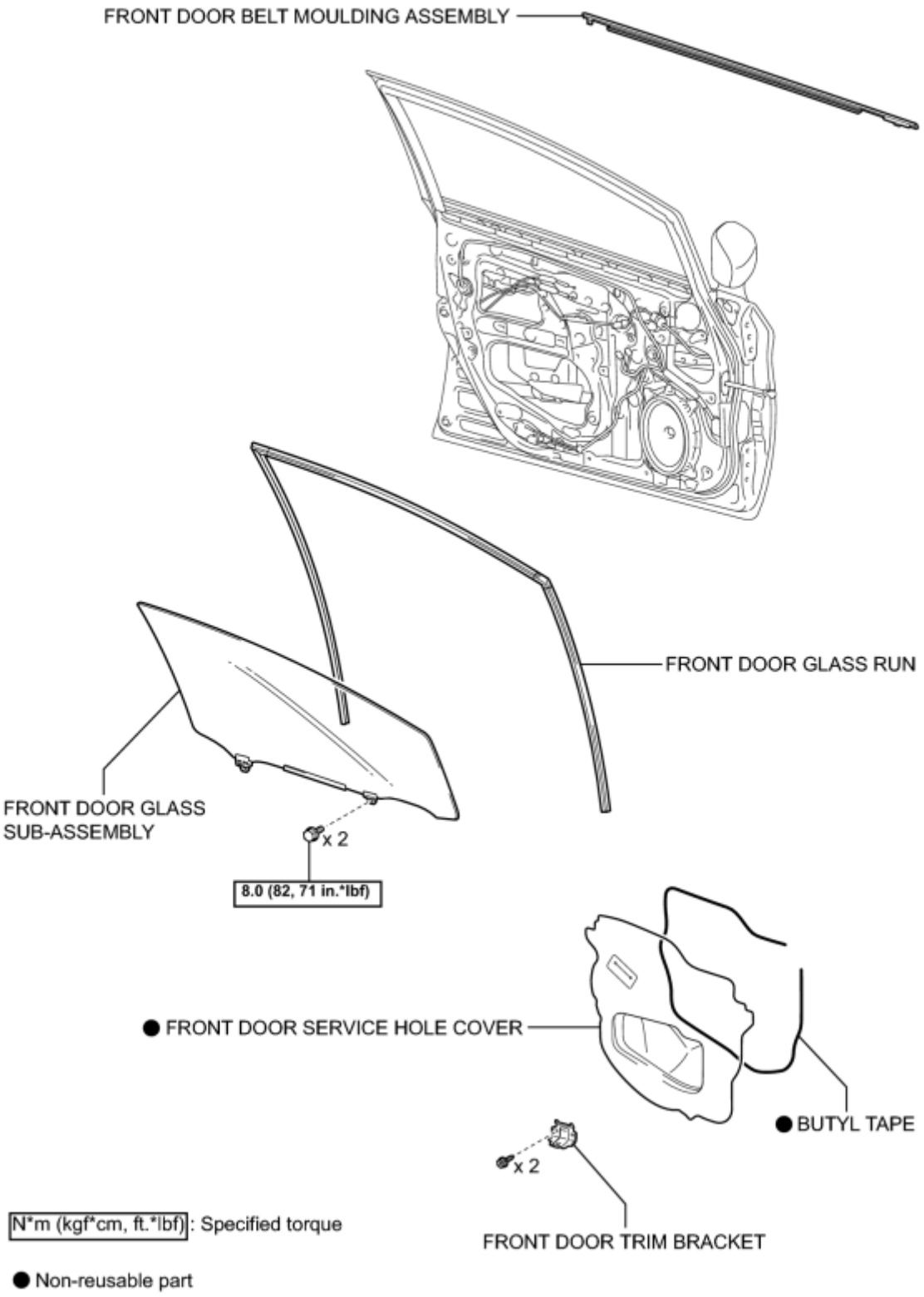



P

# ILLUSTRATION


FRONT DOOR BELT MOULDING ASSEMBLY
FRONT DOOR GLASS RUN
FRONT DOOR GLASS
SUB-ASSEMBLY
x 2
8.0 (82, 71 in.*lbf)
● FRONT DOOR SERVICE HOLE COVER
● BUTYL TAPE
x 2
FRONT DOOR TRIM BRACKET
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE ASSIST GRIP COVER INFO

6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

7. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

8. REMOVE DOOR ARMREST COVER INFO

9. REMOVE COURTESY LIGHT ASSEMBLY INFO

10. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

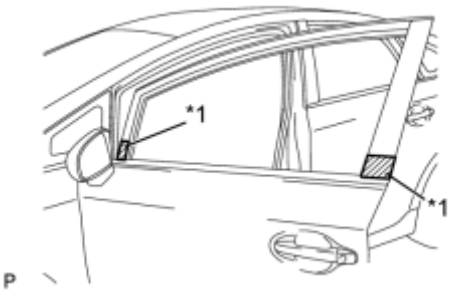
12. REMOVE FRONT DOOR TRIM BRACKET INFO

13. REMOVE FRONT DOOR SERVICE HOLE COVER INFO

14. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY INFO

15. REMOVE FRONT DOOR GLASS RUN INFO

16. REMOVE FRONT DOOR BELT MOULDING ASSEMBLY

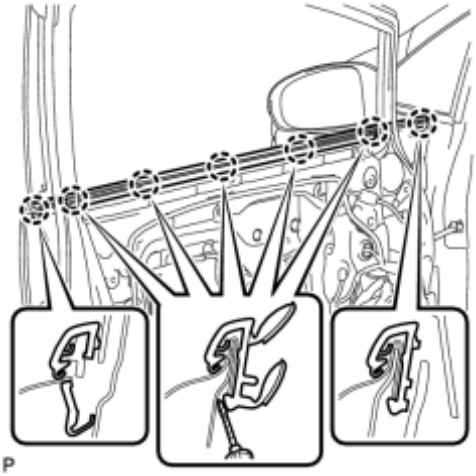



(a) Put protective tape around the front door belt moulding assembly.

## Text in Illustration

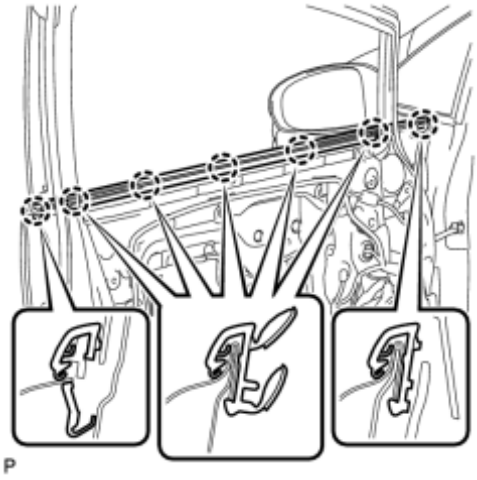
| | |
|---|---|
| *1 | Protective Tape |

(b) Using a screwdriver, disengage the 7 claws and remove the front door belt moulding assembly.


P

# INSTALLATION

1. INSTALL FRONT DOOR BELT MOULDING ASSEMBLY




(a) Engage the 7 claws to install the front door belt moulding assembly.

2. INSTALL FRONT DOOR GLASS RUN INFO

3. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY INFO

4. INSTALL FRONT DOOR SERVICE HOLE COVER INFO

5. INSTALL FRONT DOOR TRIM BRACKET INFO

6. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

7. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

8. INSTALL COURTESY LIGHT ASSEMBLY INFO

9. INSTALL DOOR ARMREST COVER INFO

10. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

11. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

12. INSTALL ASSIST GRIP COVER INFO

13. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

14. INSTALL REAR NO. 3 FLOOR BOARD INFO

15. INSTALL REAR DECK FLOOR BOX INFO

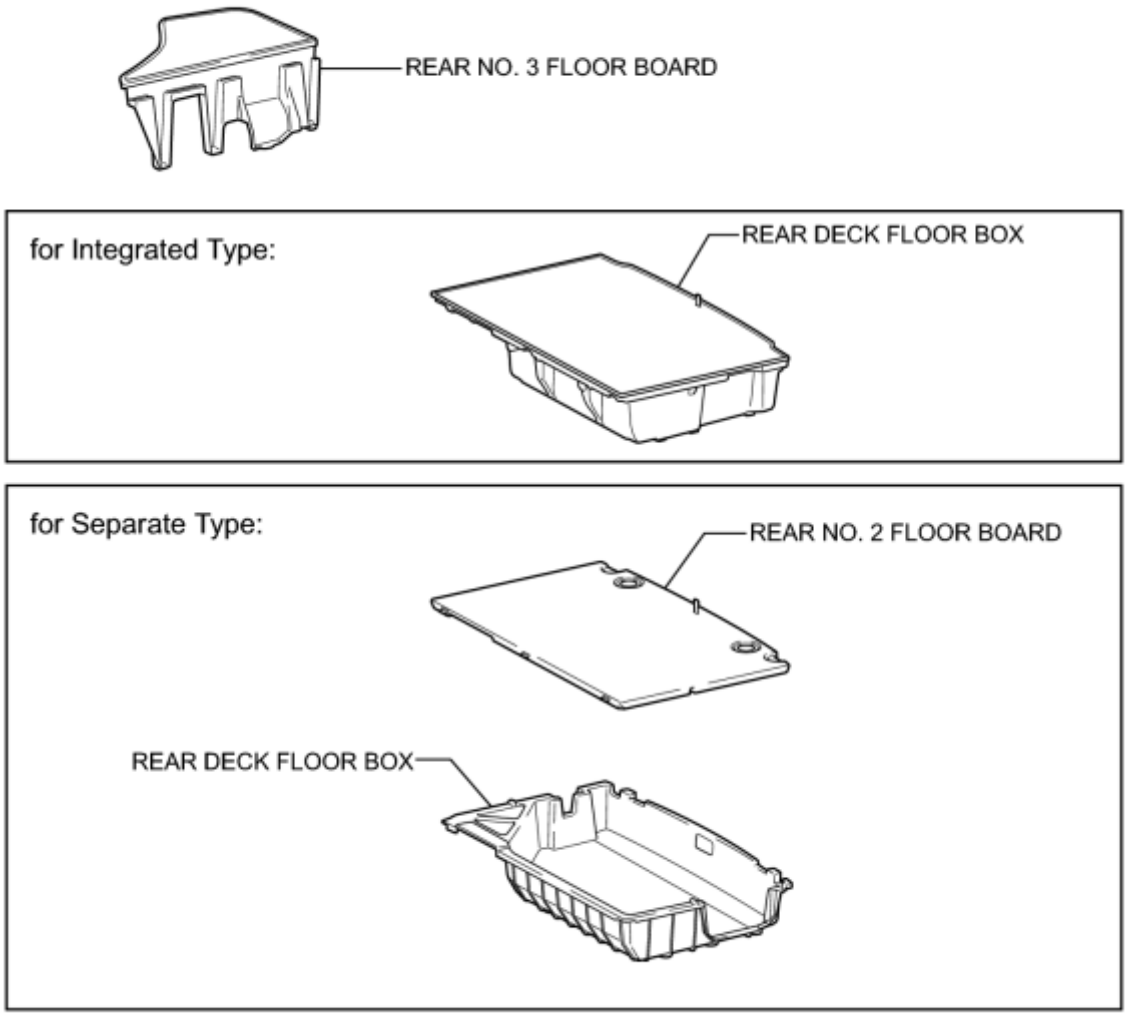
16. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

17. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

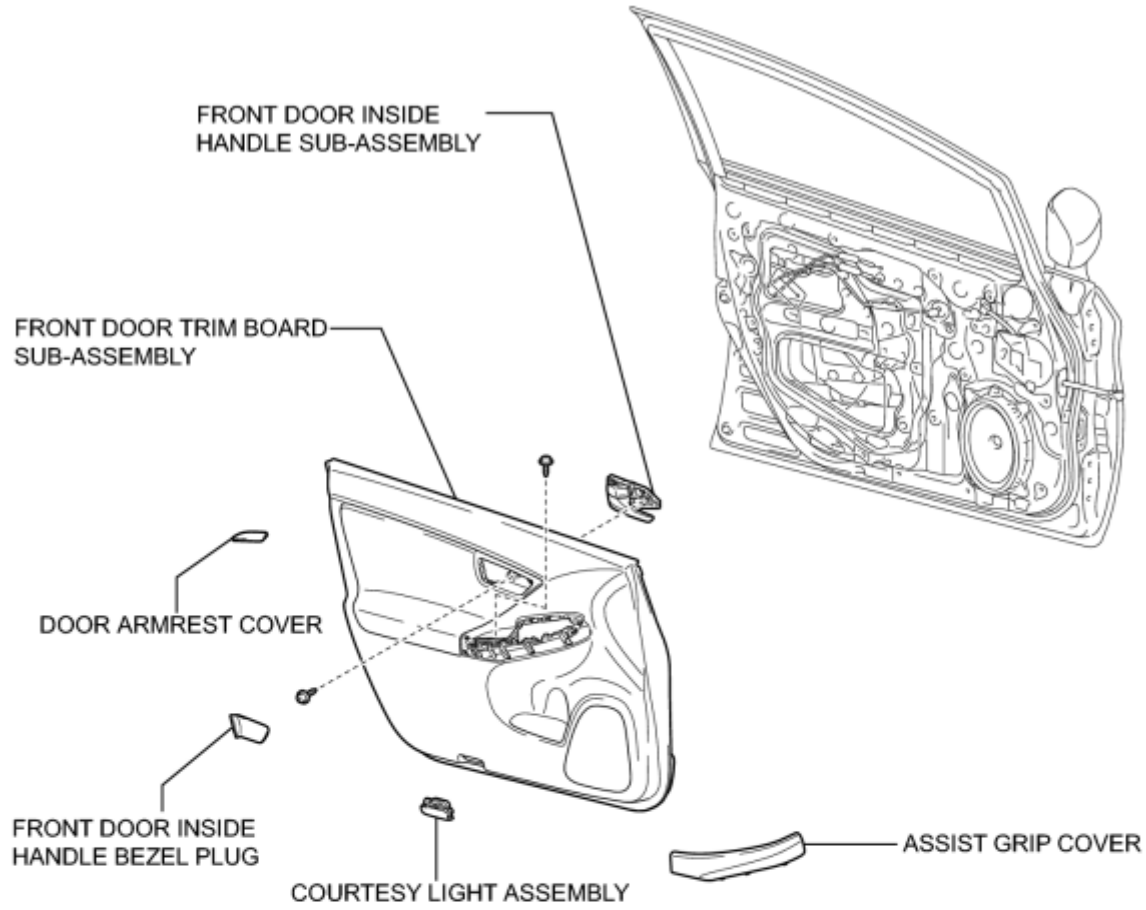
# COMPONENTS

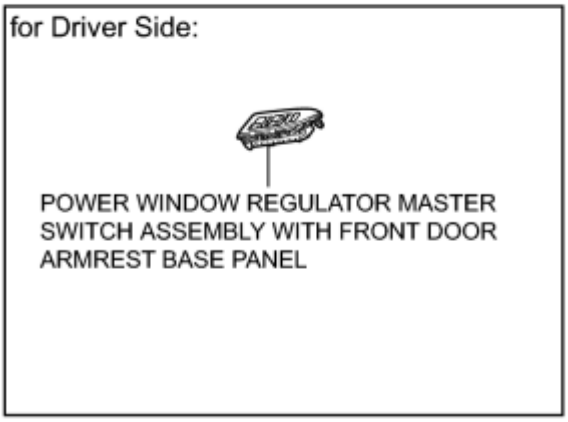
# ILLUSTRATION

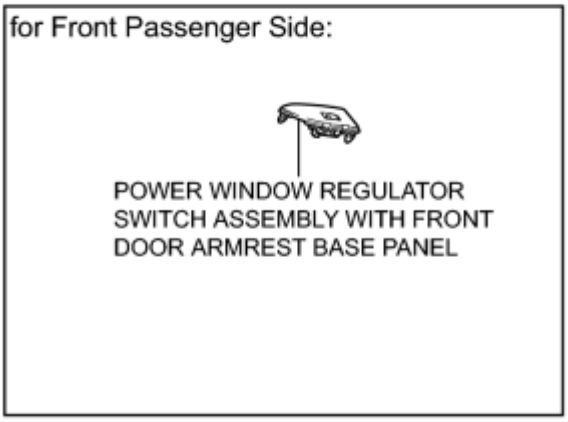



P

# ILLUSTRATION

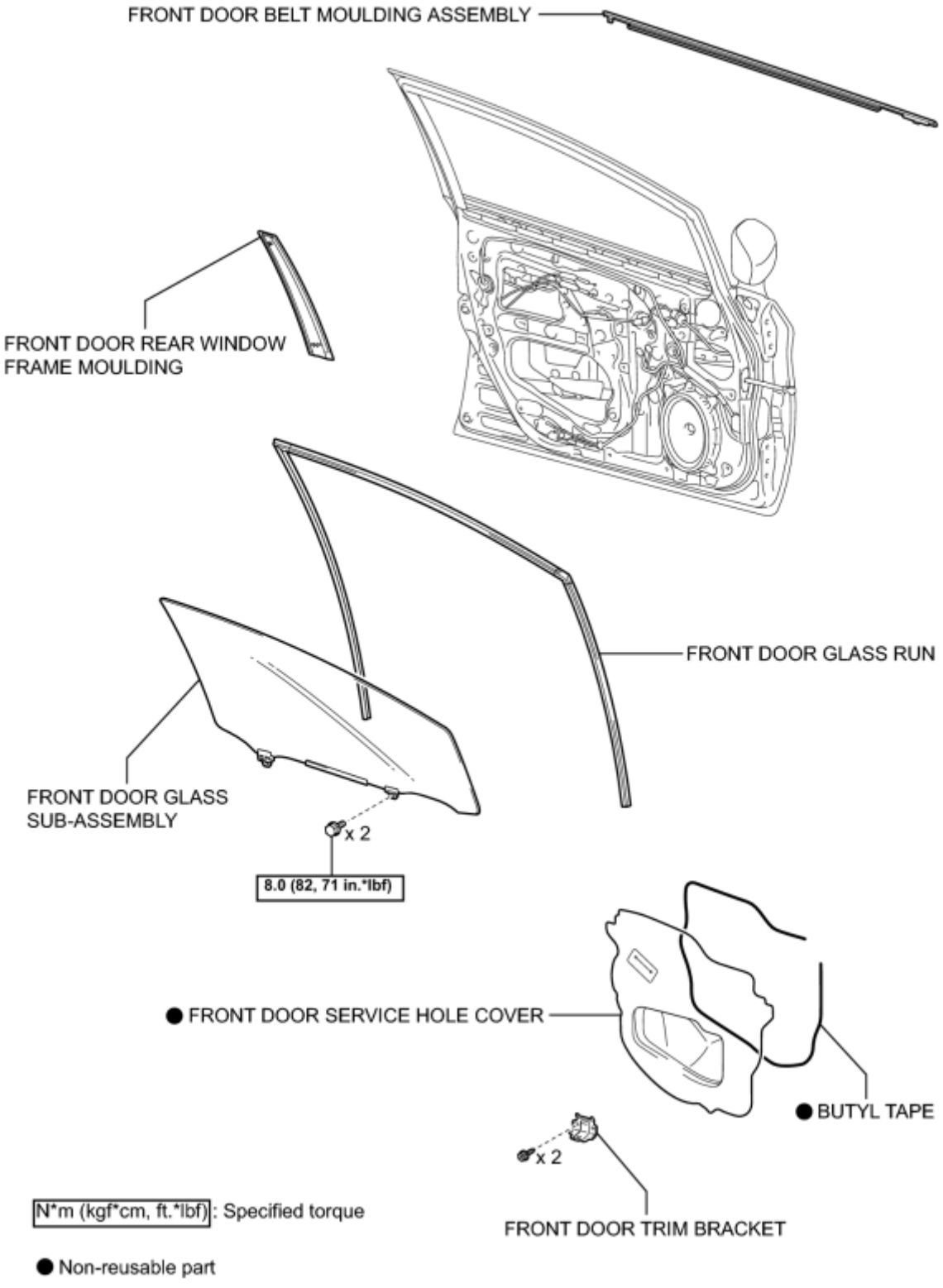



P

# ILLUSTRATION


FRONT DOOR BELT MOULDING ASSEMBLY
FRONT DOOR REAR WINDOW FRAME MOULDING
FRONT DOOR GLASS RUN
FRONT DOOR GLASS SUB-ASSEMBLY
x 2
8.0 (82, 71 in.*lbf)
● FRONT DOOR SERVICE HOLE COVER
● BUTYL TAPE
x 2
FRONT DOOR TRIM BRACKET
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE ASSIST GRIP COVER INFO

6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

7. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

8. REMOVE DOOR ARMREST COVER INFO

9. REMOVE COURTESY LIGHT ASSEMBLY INFO

10. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

12. REMOVE FRONT DOOR TRIM BRACKET INFO

13. REMOVE FRONT DOOR SERVICE HOLE COVER INFO

14. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY INFO

15. REMOVE FRONT DOOR GLASS RUN INFO

16. REMOVE FRONT DOOR BELT MOULDING ASSEMBLY INFO

17. REMOVE FRONT DOOR REAR WINDOW FRAME MOULDING

HINT:

When removing the front door rear window frame moulding, heat the vehicle body and front door rear window frame moulding using a heat light.

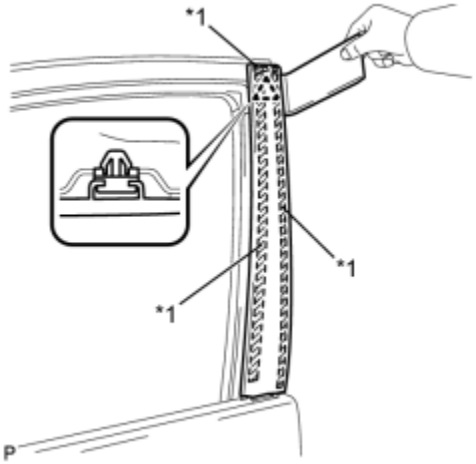
***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |
| Moulding | 20 to 30°C (68 to 86°F) |

NOTICE:

Do not heat the vehicle body or front door rear window frame moulding moulding excessively.

(a) Using a heat light, heat the front door rear window frame moulding.




(b) Using a moulding remover, remove the clip and front door rear window frame moulding.

## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape |

# INSTALLATION

1. INSTALL FRONT DOOR REAR WINDOW FRAME MOULDING

HINT:

When installing the front door rear window frame moulding, heat the vehicle body and front door rear window frame moulding using a heat light.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |
| Moulding | 20 to 30°C (68 to 86°F) |

NOTICE:

Do not heat the vehicle body or front door rear window frame moulding excessively.

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

(2) Remove the double-sided tape from the vehicle body.

(3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the front door rear window frame moulding (if reusing the front door rear window frame moulding).

(1) Using a heat light, heat the front door rear window frame moulding.

(2) Remove the double-sided tape from the front door rear window frame moulding.

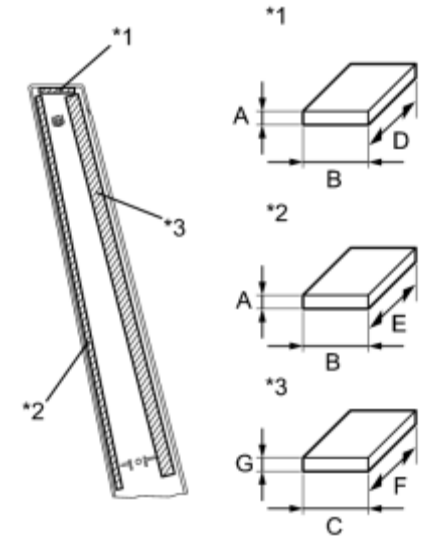
(3) Wipe off any tape adhesive residue with cleaner.

(4) Apply new double-sided tape to the front door rear window frame moulding.

## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape (A) |
| *2 | Double-sided Tape (B) |
| *3 | Double-sided Tape (C) |

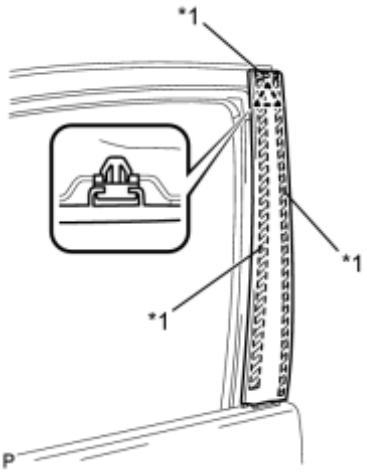
| Item | Dimension |
|---|---|
| A | 0.8 mm (0.0315 in.) |
| B | 5.0 mm (0.197 in.) |
| C | 13.0 mm (0.512 in.) |




P

| | |
|---|---|
| D | 35.0 mm (1.37 in.) |
| E | 420.0 mm (1.38 ft.) |
| F | 410.0 mm (1.35 ft.) |
| G | 1.2 mm (0.0472 in.) |

(c) Install the front door rear window frame moulding.




## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape |

(1) Using a heat light, heat the vehicle body and front door rear window frame moulding.

(2) Remove the release paper from the face of the front door rear window frame moulding.

HINT:

After removing the release paper, keep the exposed adhesive free from foreign matter.

(3) Install the front door rear window frame moulding with the clip.

2. INSTALL FRONT DOOR BELT MOULDING ASSEMBLY INFO

3. INSTALL FRONT DOOR GLASS RUN INFO

4. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY INFO

5. INSTALL FRONT DOOR SERVICE HOLE COVER INFO

6. INSTALL FRONT DOOR TRIM BRACKET INFO

7. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

8. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

9. INSTALL COURTESY LIGHT ASSEMBLY INFO

10. INSTALL DOOR ARMREST COVER INFO

11. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

12. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

13. INSTALL ASSIST GRIP COVER INFO

14. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

15. INSTALL REAR NO. 3 FLOOR BOARD INFO

16. INSTALL REAR DECK FLOOR BOX INFO

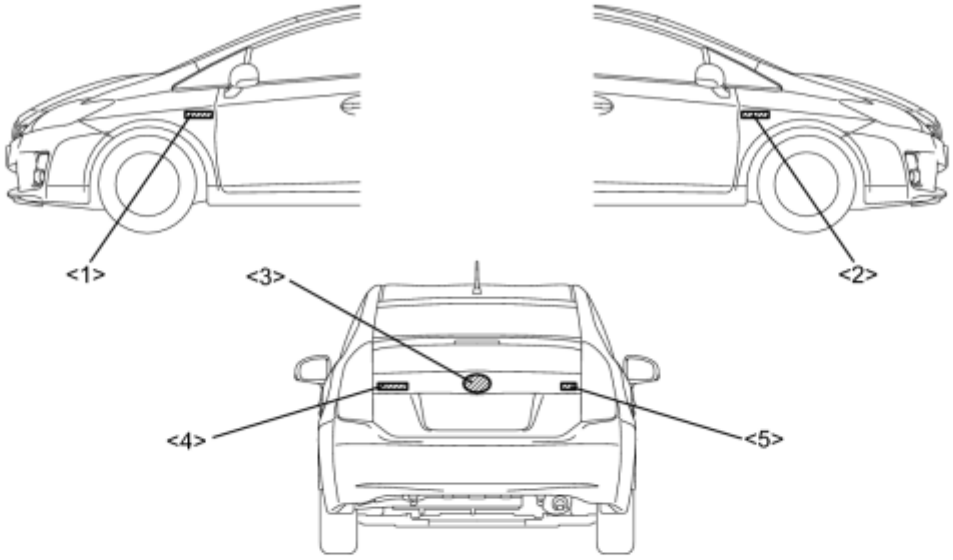
17. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

18. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

# COMPONENTS

# ILLUSTRATION







<1> SIDE PANEL EMBLEM




<2> SIDE PANEL EMBLEM



<3> LUGGAGE COMPARTMENT DOOR EMBLEM




<4> NO. 2 BACK DOOR NAME PLATE




<5> BACK DOOR NAME PLATE

P

# REMOVAL

HINT:

When removing the name plates or emblems, heat the vehicle body and name plates using a heat light.

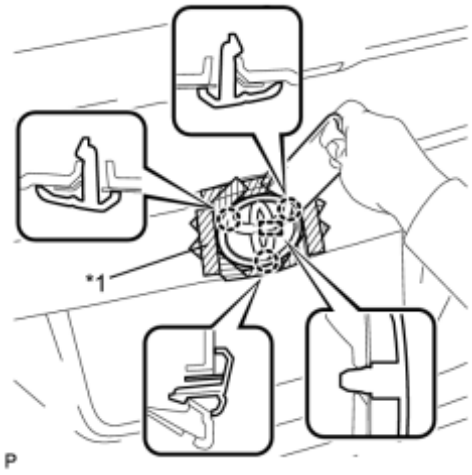
***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |
| Name Plate or emblem | 20 to 30°C (68 to 86°F) |

NOTICE:

Do not heat the vehicle body, name plates or emblems excessively.

1. REMOVE LUGGAGE COMPARTMENT DOOR EMBLEM




(a) Put protective tape around the luggage component door emblem.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

(b) Using a moulding remover, disengage the 3 claws and pin and remove the luggage component door emblem.

NOTICE:

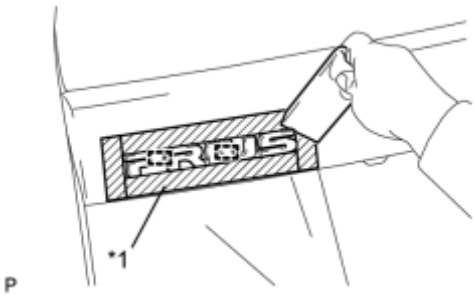
- If reusing the emblem, take care not to damage the luggage component door emblem.
- Be careful not to damage the vehicle body.

2. REMOVE NO. 2 BACK DOOR NAME PLATE

(a) Put protective tape around the No. 2 back door name plate.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

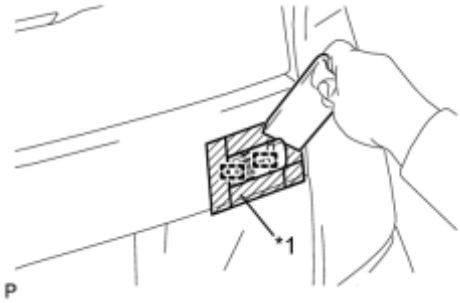



(b) Using a moulding remover, peel off the double-sided tape and disengage the 2 pins to remove the No. 2 back door name plate.

NOTICE:

- If reusing the name plate, take care not to damage the No. 2 back door name plate.
- Be careful not to damage the vehicle body.

3. REMOVE BACK DOOR NAME PLATE




(a) Put protective tape around the back door name plate.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

(b) Using a moulding remover, peel off the double-sided tape and disengage the 2 pins to remove the back door name plate.

NOTICE:

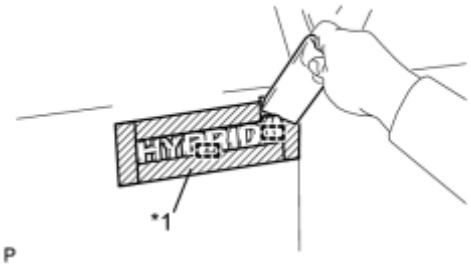
- If reusing the emblems, take care not to damage the back door name plate.
- Be careful not to damage the vehicle body.

4. REMOVE SIDE PANEL EMBLEM

(a) Put protective tape around the side panel emblem.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |




(b) Using a moulding remover, peel off the double-sided tape and disengage the 2 pins to remove the side panel emblem.

NOTICE:

- If reusing the name plate, take care not to damage the side panel emblem.
- Be careful not to damage the vehicle body.

HINT:

Use the same procedure for the RH side and LH side.

# INSTALLATION

HINT:

When installing new name plates or emblems, heat the vehicle body and name plates using a heat light.

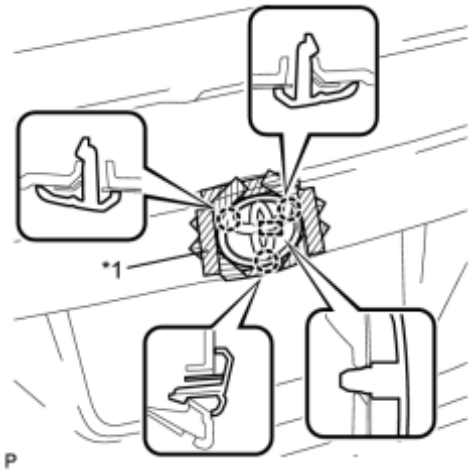
***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |
| Name Plate or emblem | 20 to 30°C (68 to 86°F) |

NOTICE:

Do not heat the vehicle body, name plates or emblems excessively.

1. INSTALL LUGGAGE COMPARTMENT DOOR EMBLEM




(a) Install the luggage compartment door emblem with the pin and 3 claws.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

NOTICE:

Be careful not to damage the vehicle body.

2. INSTALL NO. 2 BACK DOOR NAME PLATE

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

(2) Remove any double-sided tape from the vehicle body.

(3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the No. 2 back door name plate (if reusing the No. 2 back door name plate).

(1) Using a heat light, heat the No. 2 back door name plate.

(2) Remove the double-sided tape from the No. 2 back door name plate.

(3) Wipe off any tape adhesive residue with cleaner.

(4) Apply new double-sided tape to the No. 2 back door name plate.

(c) Install the No. 2 back door name plate.

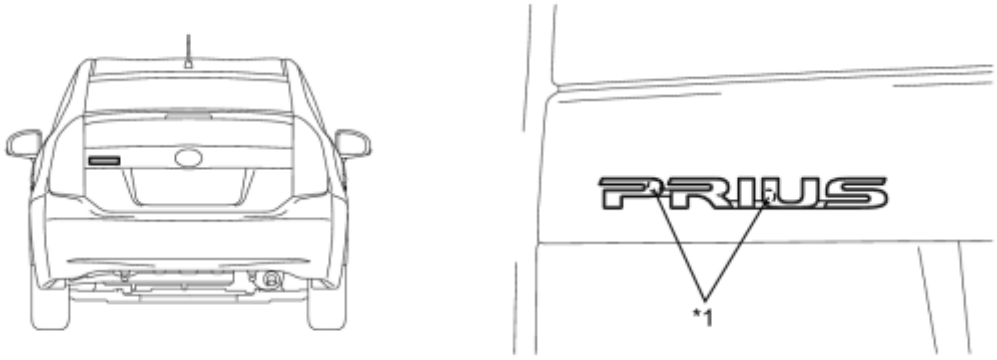
(1) Using a heat light, heat the vehicle body and the No. 2 back door name plate.

(2) Remove the release paper from the No. 2 back door name plate.

HINT:

After removing the release paper, keep the exposed adhesive free from foreign matter.

(3) Install the No. 2 back door name plate as shown in the illustration.




P

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Location Pin | - | - |

3. INSTALL BACK DOOR NAME PLATE

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

(2) Remove any double-sided tape from the vehicle body.

(3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the back door name plate (if reusing the back door name plate).

(1) Using a heat light, heat the back door name plate.

(2) Remove the double-sided tape from the back door name plate.

(3) Wipe off any tape adhesive residue with cleaner.

(4) Apply new double-sided tape to the back door name plate.

(c) Install the back door name plate.

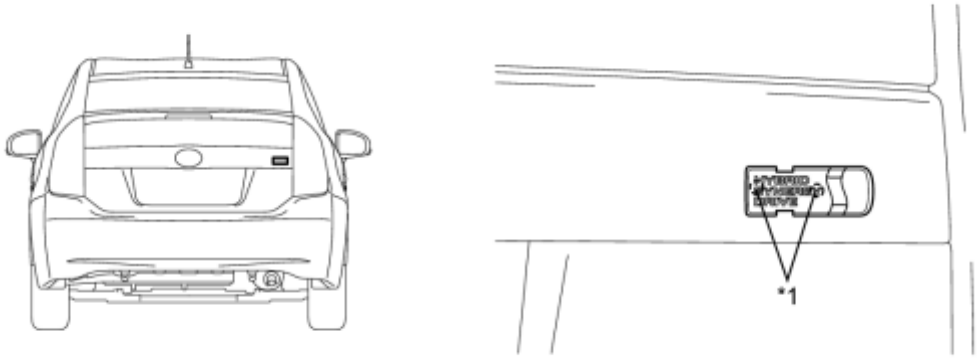
(1) Using a heat light, heat the vehicle body and the back door name plate.

(2) Remove the release paper from the back door name plate.

HINT:

After removing the release paper, keep the exposed adhesive free from foreign matter.

(3) Install the back door name plate as shown in the illustration.




P

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Location Pin | - | - |

4. INSTALL SIDE PANEL EMBLEM

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

(2) Remove any double-sided tape from the vehicle body.

(3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the side panel emblem (if reusing the side panel emblem).

(1) Using a heat light, heat the side panel emblem.

(2) Remove the double-sided tape from the side panel emblem.

(3) Wipe off any tape adhesive residue with cleaner.

(4) Apply new double-sided tape to the side panel emblem.

(c) Install the side panel emblem.

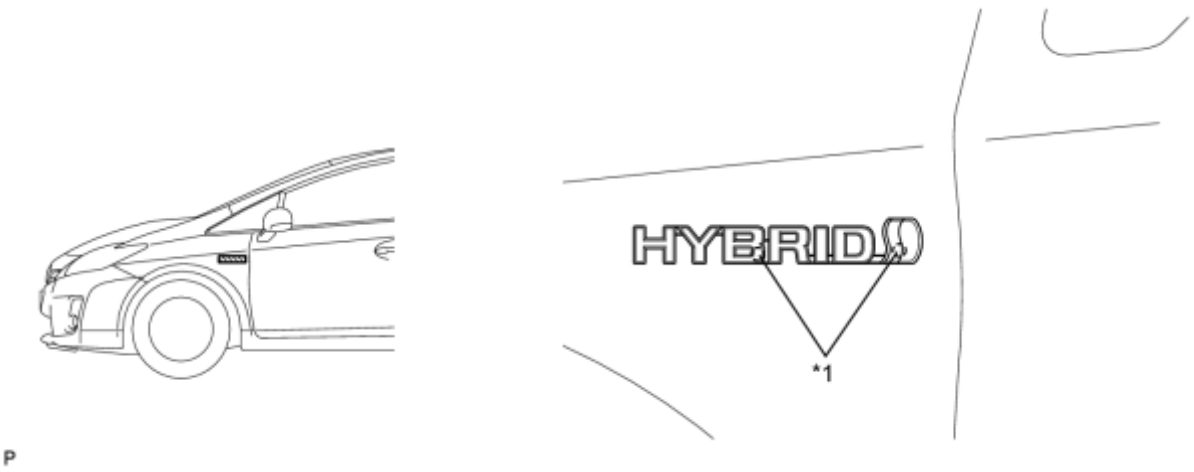
(1) Using a heat light, heat the vehicle body and the side panel emblem.

(2) Remove the release paper from the side panel emblem.

HINT:

After removing the release paper, keep the exposed adhesive free from foreign matter.

(3) Install the side panel emblem as shown in the illustration.




***Text in Illustration***

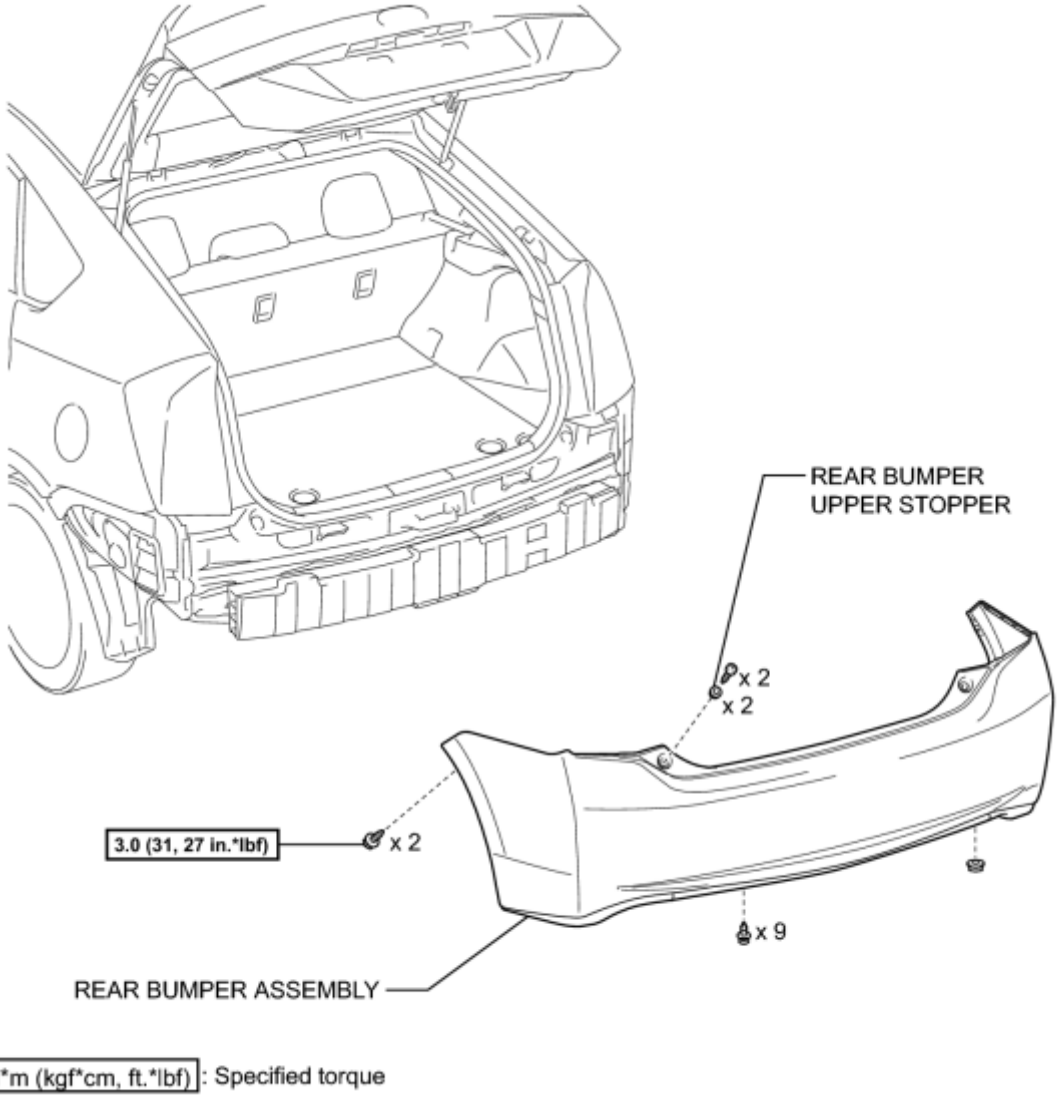
| | | | |
|---|---|---|---|
| *1 | Location Pin | - | - |

HINT:

Use the same procedure for the RH side and LH side.

# COMPONENTS

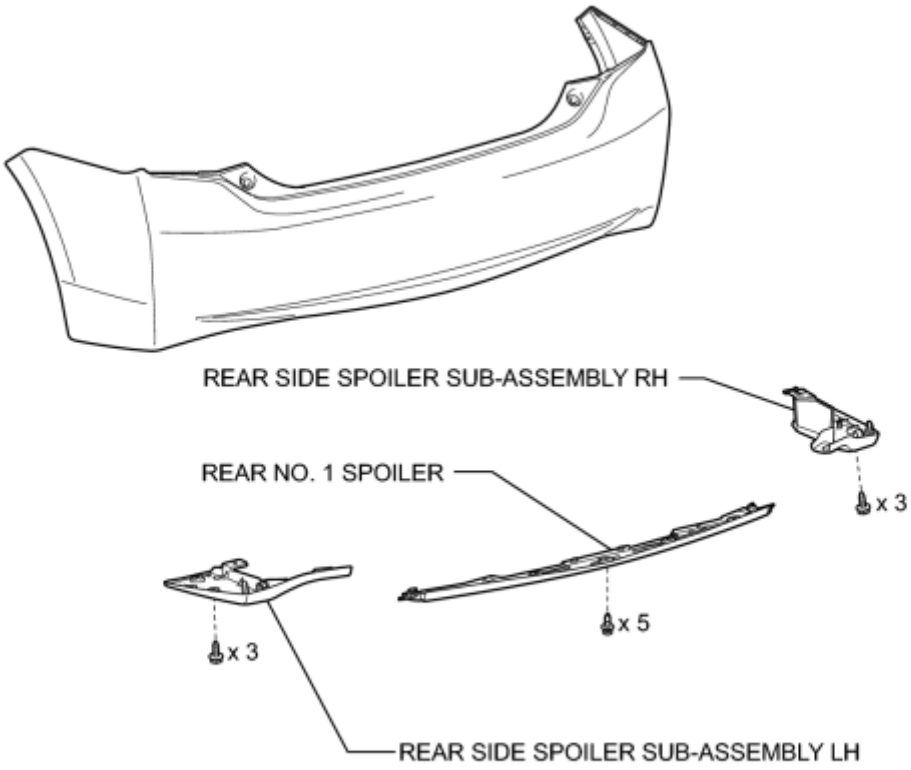
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

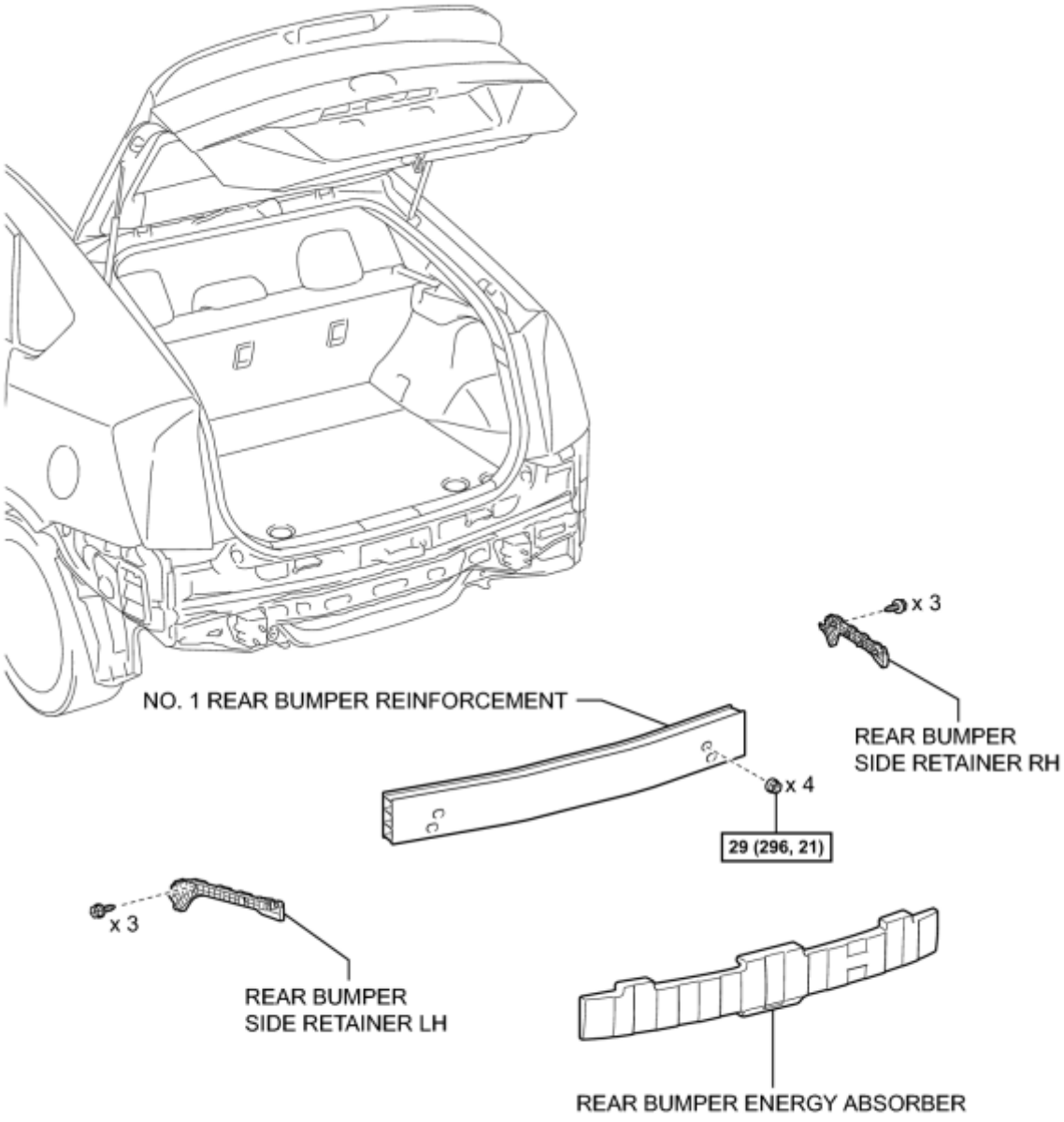
P

# ILLUSTRATION




P

# ILLUSTRATION

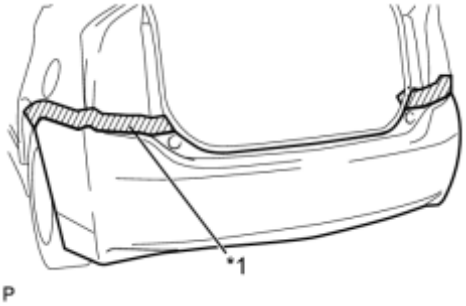



N*m (kgf*cm, ft.*lbf) : Specified torque

P

# REMOVAL

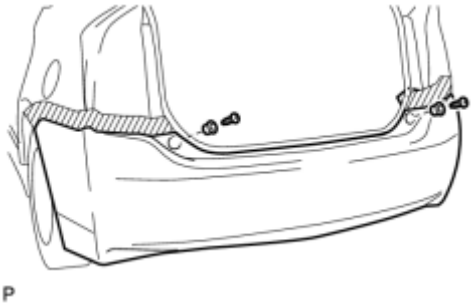
1. REMOVE REAR BUMPER ASSEMBLY



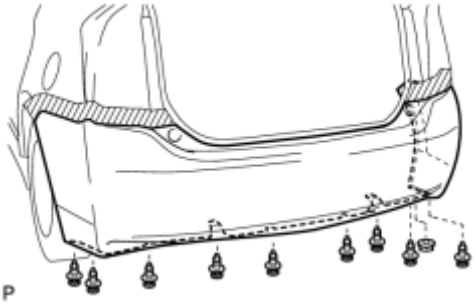

(a) Put protective tape around the rear bumper assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

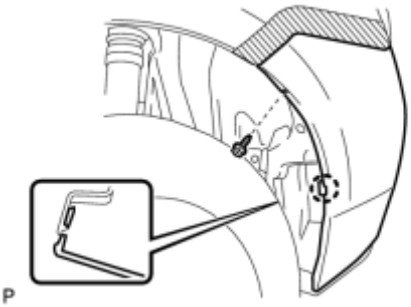



(b) Remove the 2 screws and 2 rear bumper upper stoppers.




(c) Using a clip remover, remove the 9 clips.

(d) Remove the nut.




(e) Remove the screw.

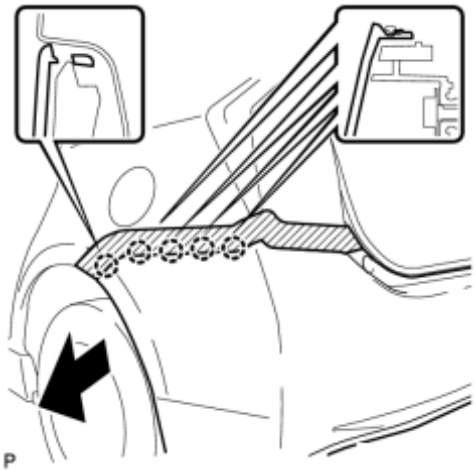
HINT:

Use the same procedure for the RH side and LH side.

(f) Disengage the claw.

HINT:

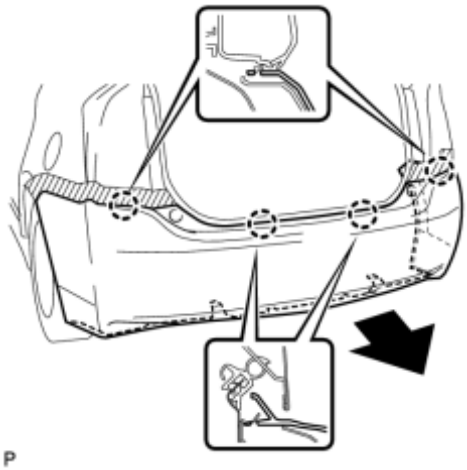
Use the same procedure for the RH side and LH side.



(g) Disengage the 5 claws.

HINT:

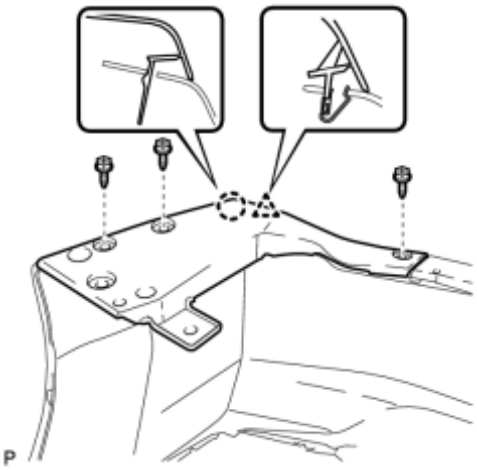
Use the same procedure for the RH side and LH side.



(h) Disengage the 4 claws and remove the rear bumper assembly as shown in the illustration.

# DISASSEMBLY

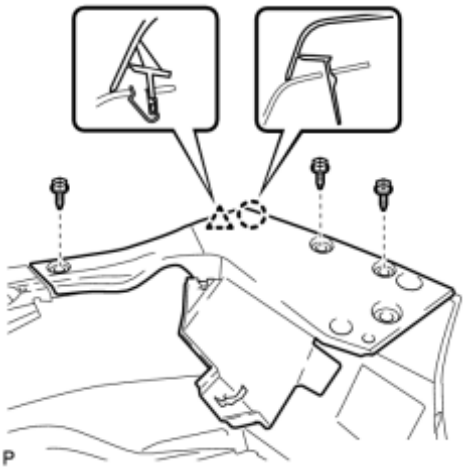
1. REMOVE REAR SIDE SPOILER SUB-ASSEMBLY LH



(a) Remove the 3 screws.

(b) Disengage the claw and clip, and remove the rear side spoiler sub-assembly LH.

2. REMOVE REAR SIDE SPOILER SUB-ASSEMBLY RH

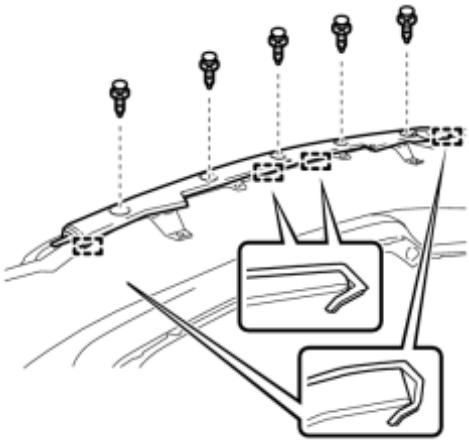


(a) Remove the 3 screws.

(b) Disengage the claw and clip, and remove the rear side spoiler sub-assembly RH.

3. REMOVE REAR NO. 1 SPOILER

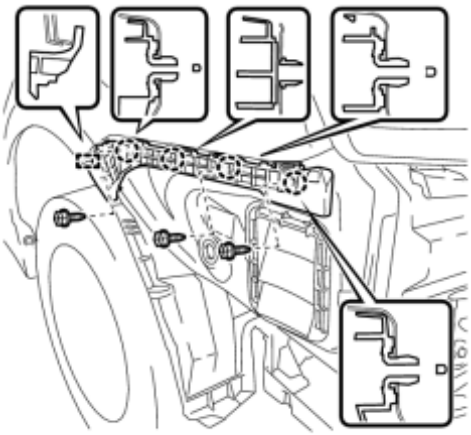
(a) Remove the 5 clips.



P

(b) Disengage the 4 guides and remove the rear No. 1 spoiler.

4. REMOVE REAR BUMPER SIDE RETAINER LH



P

(a) Remove the 3 screws.

(b) Disengage the 4 claws and guide, and remove the rear bumper side retainer LH.

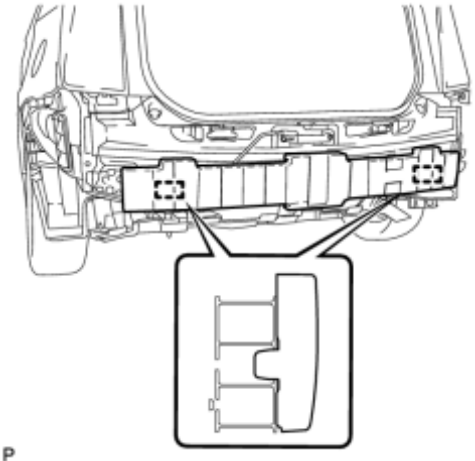
5. REMOVE REAR BUMPER SIDE RETAINER RH

HINT:

Use the same procedure for the RH side and LH side.

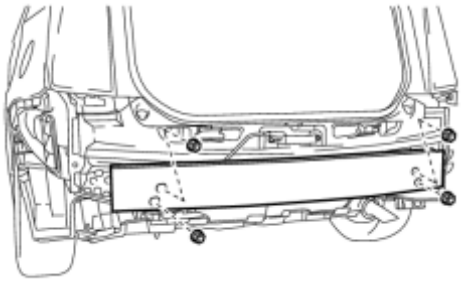
6. REMOVE REAR BUMPER ENERGY ABSORBER

(a) Disengage the 2 guides and remove the rear bumper energy absorber.



P

7. REMOVE NO. 1 REAR BUMPER REINFORCEMENT

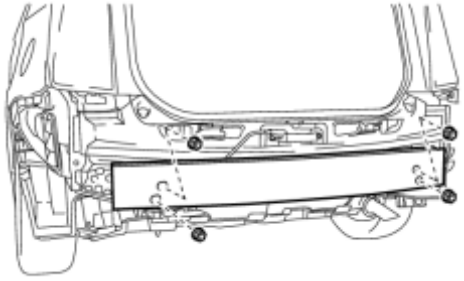


P

(a) Remove the 4 nuts and No. 1 rear bumper reinforcement.

# REASSEMBLY

1. INSTALL NO. 1 REAR BUMPER REINFORCEMENT

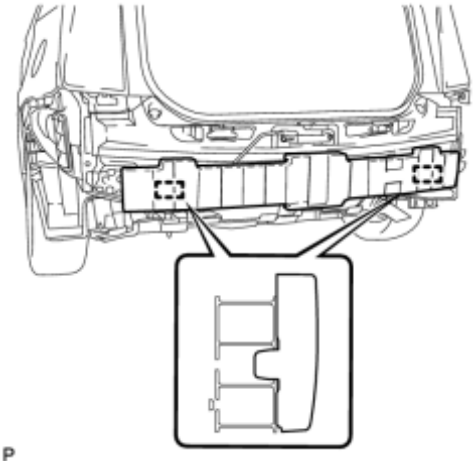


P

(a) Install the No. 1 rear bumper reinforcement with the 4 nuts.

Torque: **29 N·m (296 kgf·cm, 21ft·lbf)**

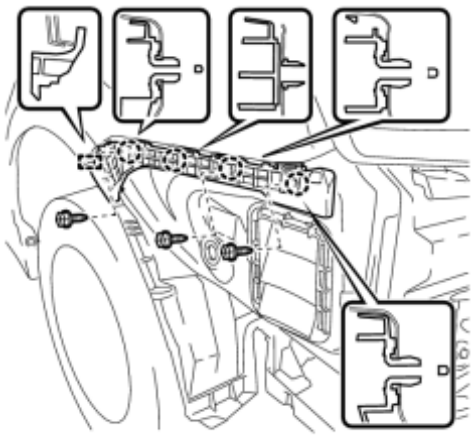
2. INSTALL REAR BUMPER ENERGY ABSORBER



P

(a) Engage the 2 guides to install the rear bumper energy absorber.

3. INSTALL REAR BUMPER SIDE RETAINER LH



P

(a) Engage the guide and 4 claws.

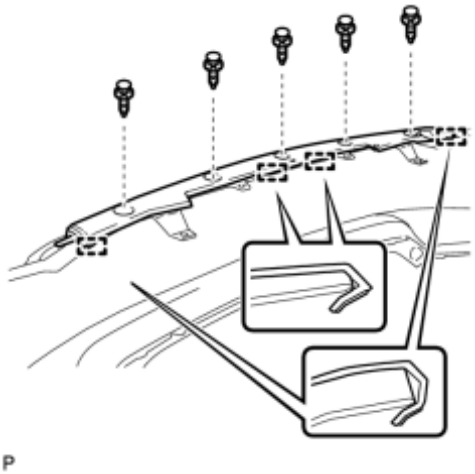
(b) Install the rear bumper side retainer LH with the 3 screws.

4. INSTALL REAR BUMPER SIDE RETAINER RH

HINT:

Use the same procedure for the RH side and LH side.

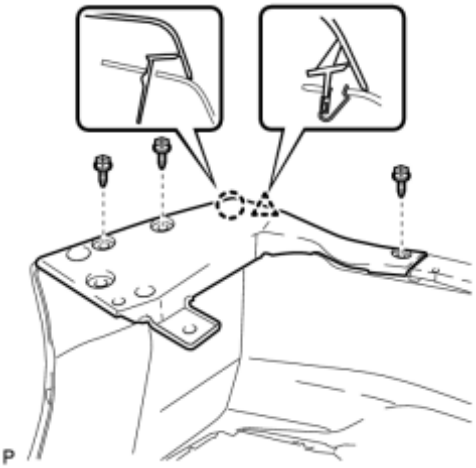
5. INSTALL REAR NO. 1 SPOILER



(a) Engage the 4 guides.

(b) Install the rear No. 1 spoiler with the 5 clips.

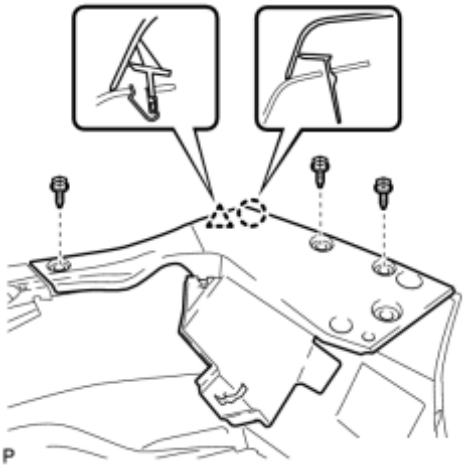
6. INSTALL REAR SIDE SPOILER SUB-ASSEMBLY LH



(a) Engage the claw and clip.

(b) Install the rear side spoiler sub-assembly LH with the 3 screws.

7. INSTALL REAR SIDE SPOILER SUB-ASSEMBLY RH

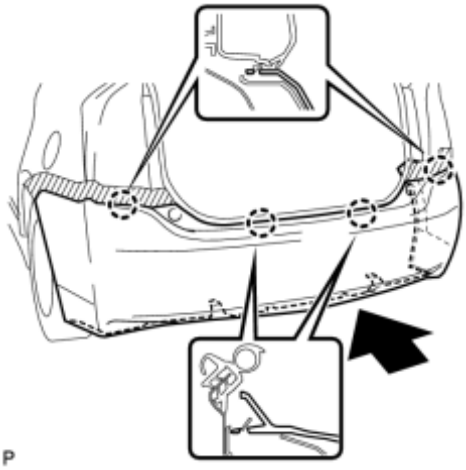


(a) Engage the claw and clip.

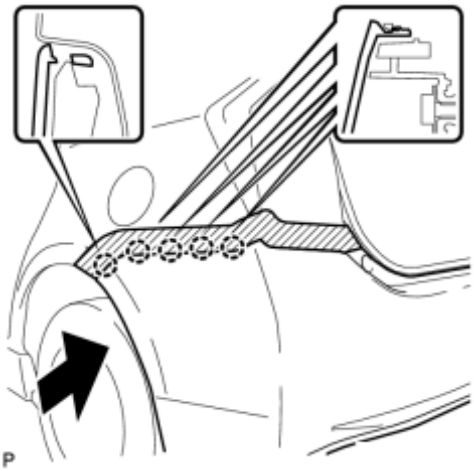
(b) Install the rear side spoiler sub-assembly RH with the 3 screws.

# INSTALLATION

1. INSTALL REAR BUMPER ASSEMBLY



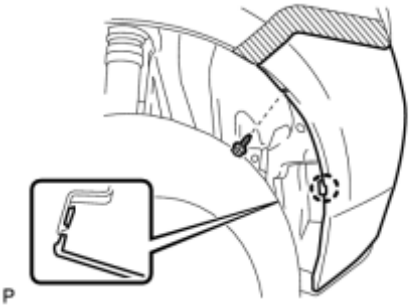
(a) Engage the 4 claws and install the rear bumper assembly as shown in the illustration.



(b) Engage the 5 claws.

HINT:

Use the same procedure for the RH side and LH side.



(c) Install the screw.

Torque: **3.0 N·m (31 kgf·cm, 27in·lbf)**

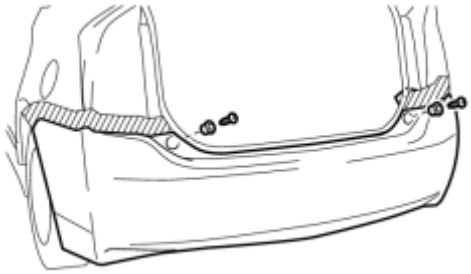
HINT:

Use the same procedure for the RH side and LH side.

(d) Engage the claw.

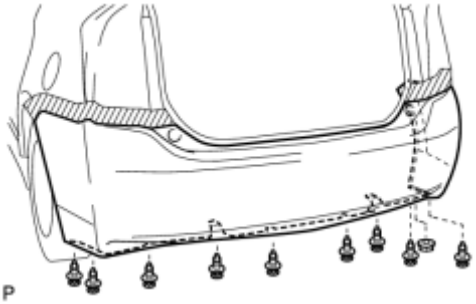
HINT:

Use the same procedure for the RH side and LH side.



P

(e) Engage the 2 rear bumper upper stoppers and install the 2 screws.



P

(f) Install the 9 clips.

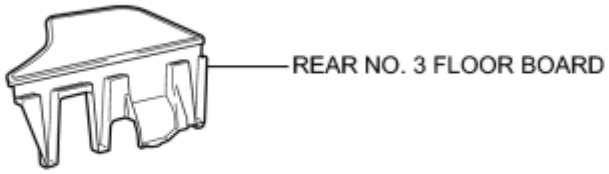
(g) Install the nut.

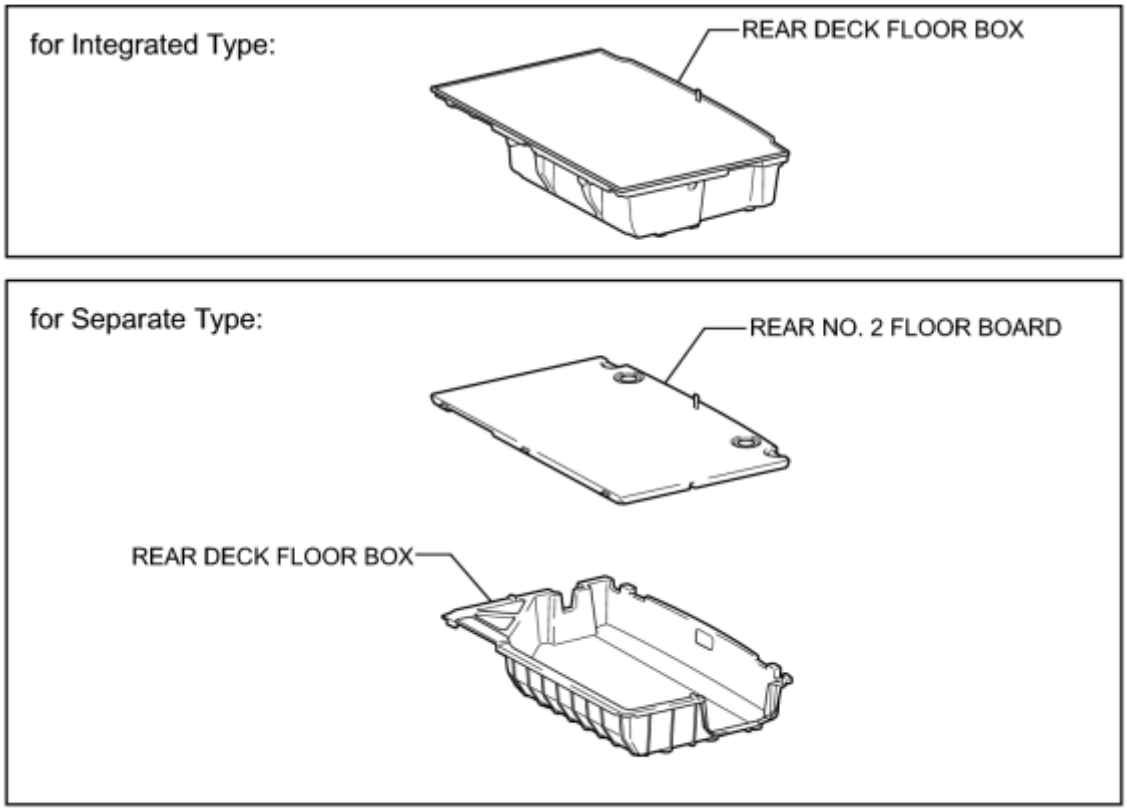
2. BUMPER POSITION SETTING (w/ Advanced Parking Guidance System)

INFO

# COMPONENTS

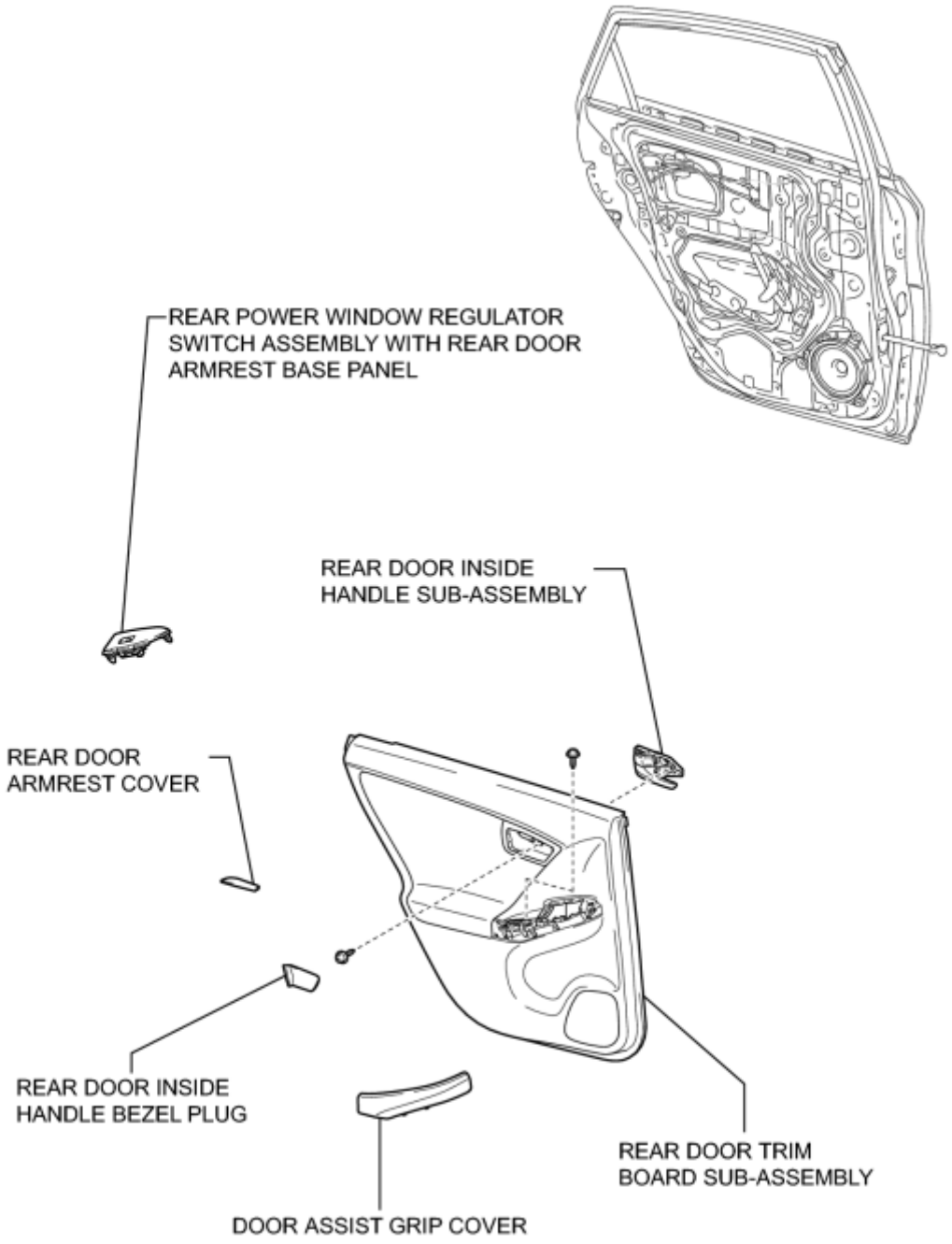
# ILLUSTRATION



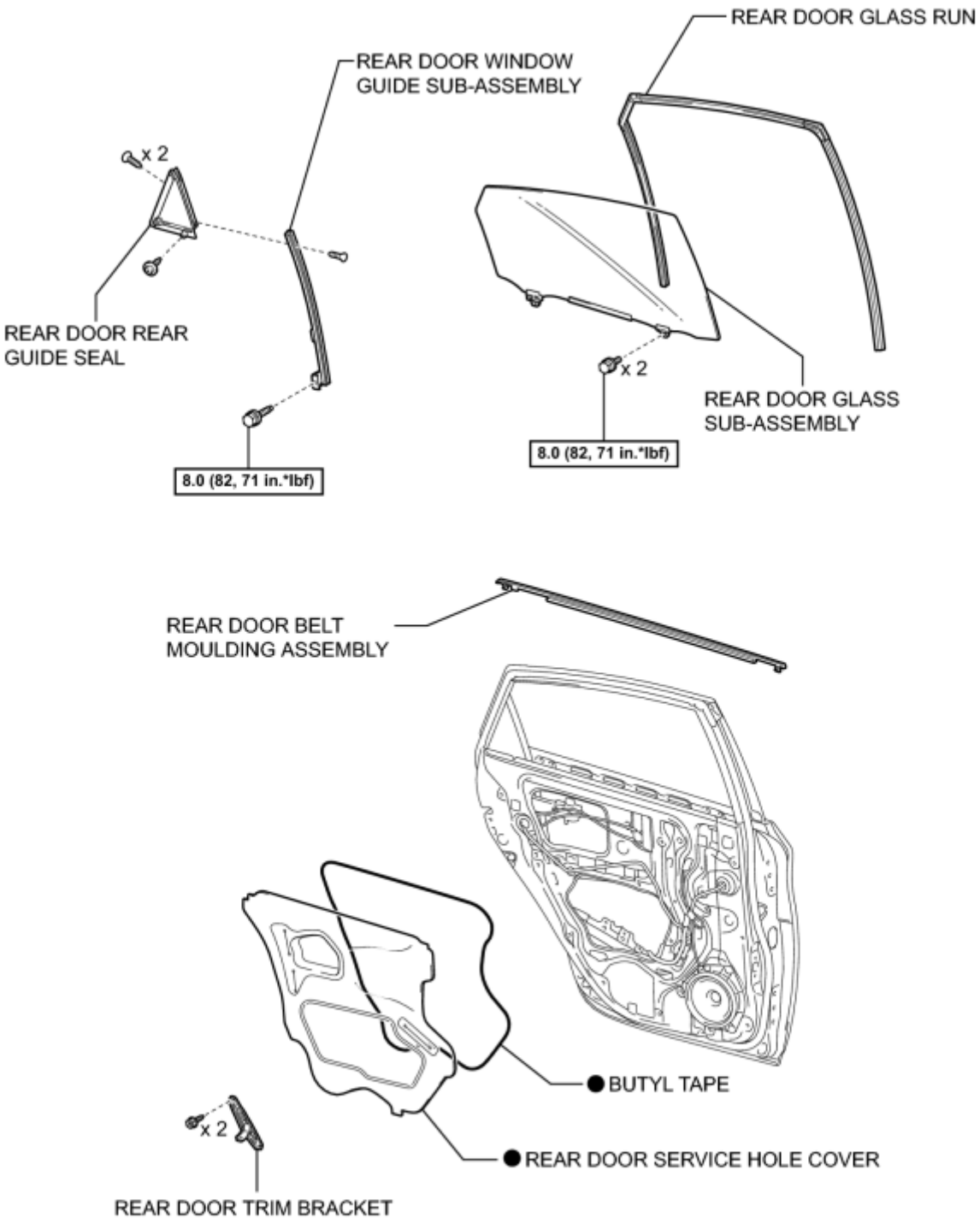

P

# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE DOOR ASSIST GRIP COVER INFO

6. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

7. REMOVE REAR DOOR ARMREST COVER INFO

8. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

9. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. REMOVE REAR DOOR TRIM BRACKET INFO

11. REMOVE REAR DOOR SERVICE HOLE COVER INFO

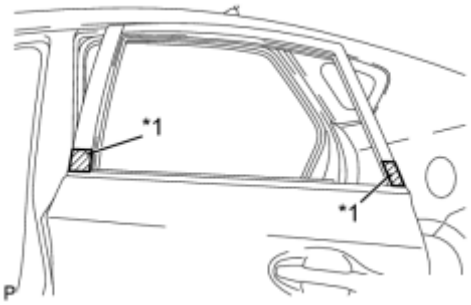
12. REMOVE REAR DOOR GLASS RUN INFO

13. REMOVE REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

14. REMOVE REAR DOOR REAR GUIDE SEAL INFO

15. REMOVE REAR DOOR GLASS SUB-ASSEMBLY INFO

16. REMOVE REAR DOOR BELT MOULDING ASSEMBLY

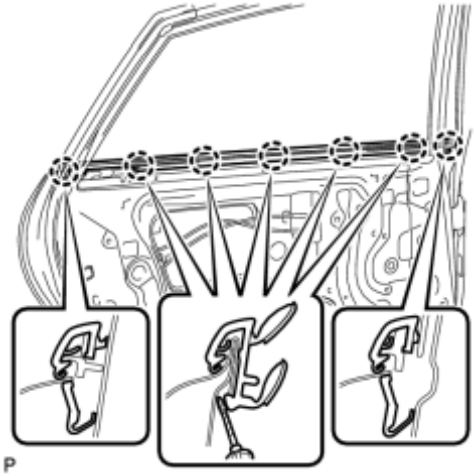



(a) Put protective tape around the rear door belt moulding assembly.

## Text in Illustration

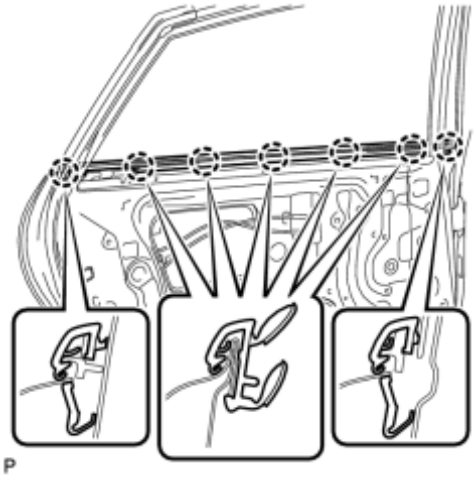
| | |
|---|---|
| *1 | Protective Tape |

(b) Using a screwdriver, disengage the 7 claws and remove the rear door belt moulding assembly.


P

# INSTALLATION

1. INSTALL REAR DOOR BELT MOULDING ASSEMBLY




(a) Engage the 7 claws to install the rear door belt moulding assembly.

2. INSTALL REAR DOOR GLASS SUB-ASSEMBLY INFO

3. INSTALL REAR DOOR REAR GUIDE SEAL INFO

4. INSTALL REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

5. INSTALL REAR DOOR GLASS RUN INFO

6. INSTALL REAR DOOR SERVICE HOLE COVER INFO

7. INSTALL REAR DOOR TRIM BRACKET INFO

8. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

9. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

10. INSTALL REAR DOOR ARMREST COVER INFO

11. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

12. INSTALL DOOR ASSIST GRIP COVER INFO

13. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

14. INSTALL REAR NO. 3 FLOOR BOARD INFO

15. INSTALL REAR DECK FLOOR BOX INFO

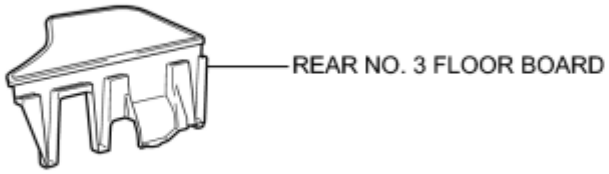
16. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

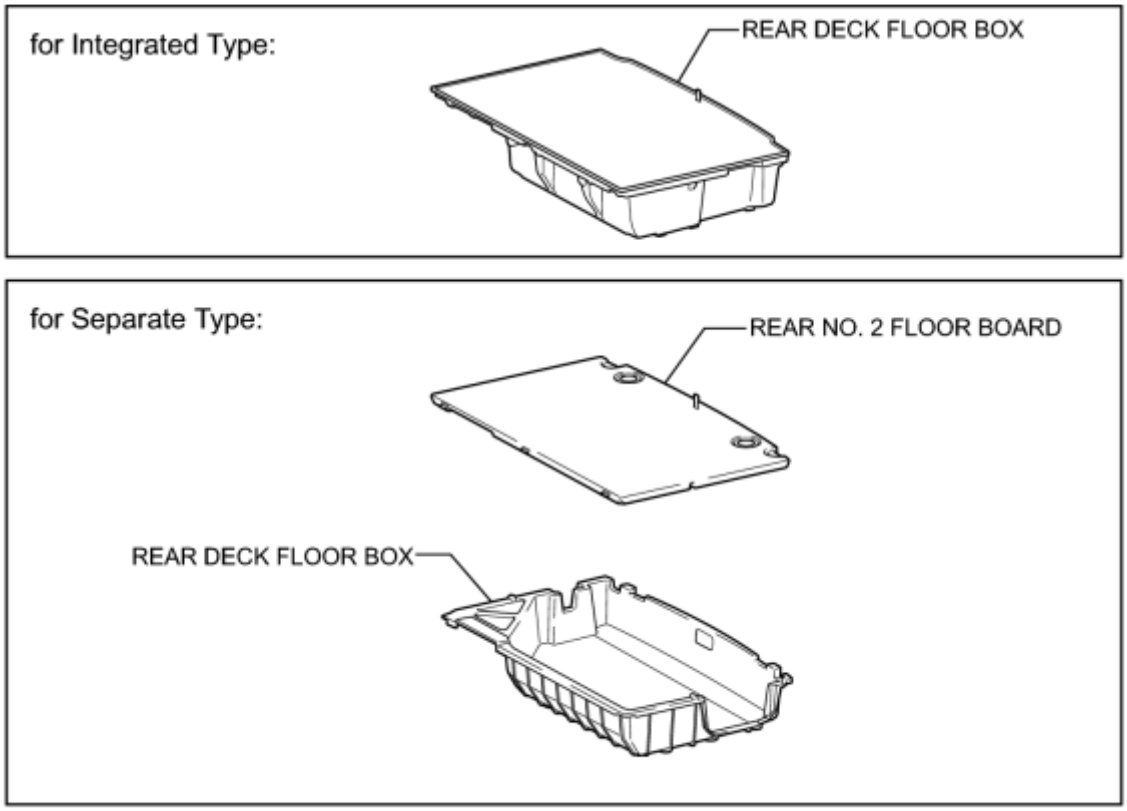
17. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

# COMPONENTS

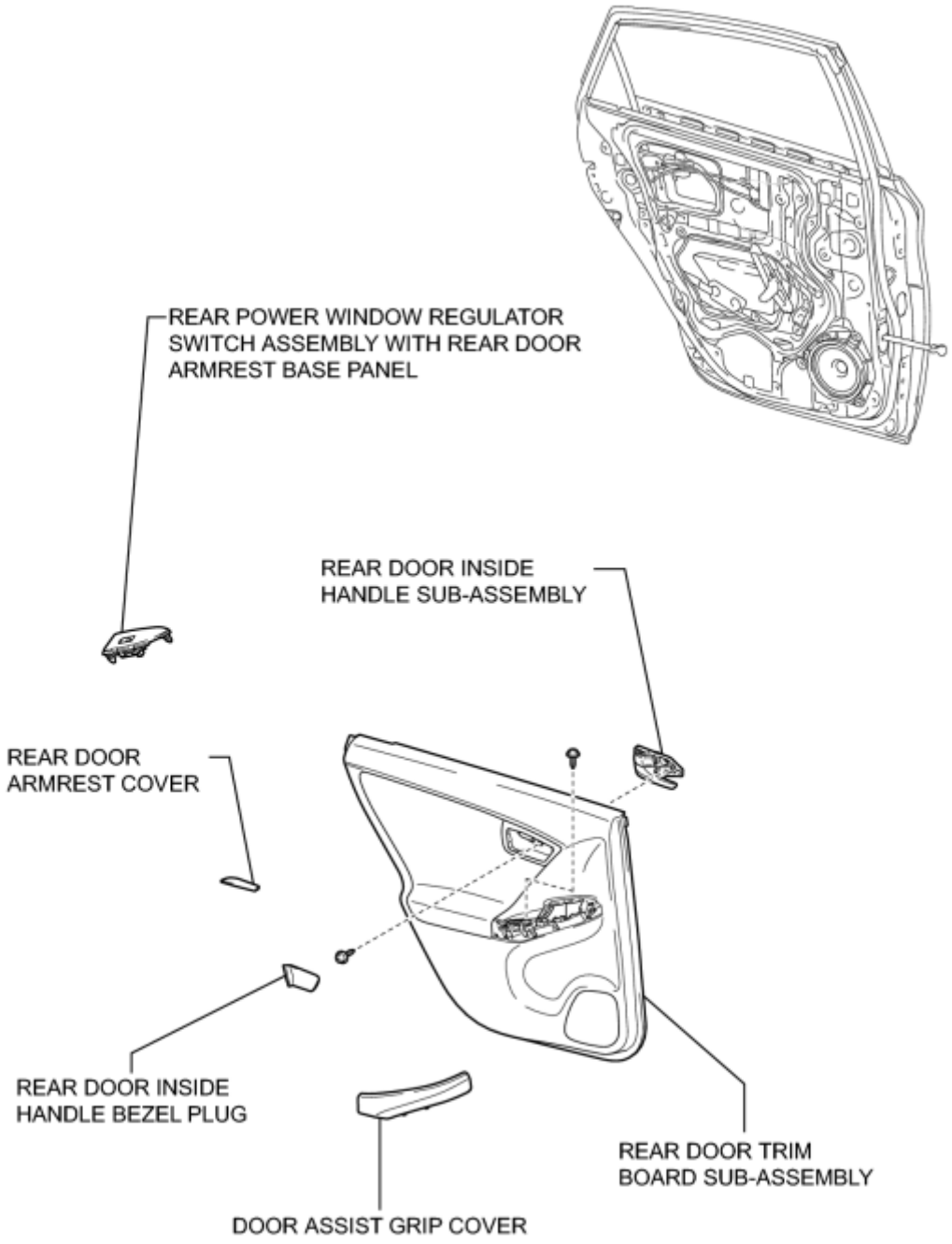
# ILLUSTRATION



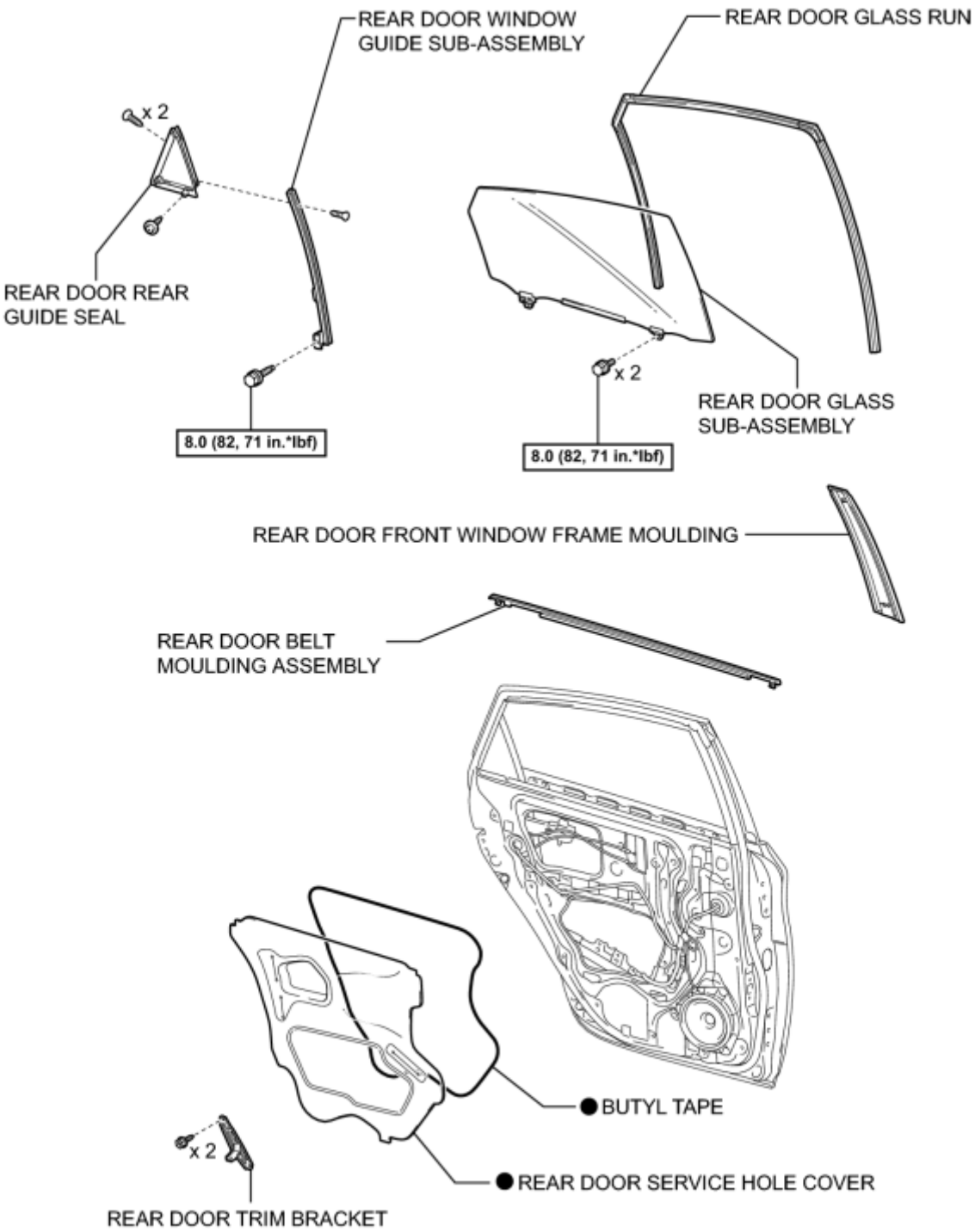

P

# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE DOOR ASSIST GRIP COVER INFO

6. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

7. REMOVE REAR DOOR ARMREST COVER INFO

8. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

9. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. REMOVE REAR DOOR TRIM BRACKET INFO

11. REMOVE REAR DOOR SERVICE HOLE COVER INFO

12. REMOVE REAR DOOR GLASS RUN INFO

13. REMOVE REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

14. REMOVE REAR DOOR REAR GUIDE SEAL INFO

15. REMOVE REAR DOOR GLASS SUB-ASSEMBLY INFO

16. REMOVE REAR DOOR BELT MOULDING ASSEMBLY INFO

17. REMOVE REAR DOOR FRONT WINDOW FRAME MOULDING

HINT:

When removing the rear door front window frame moulding, heat the vehicle body and rear door front window frame moulding using a heat light.

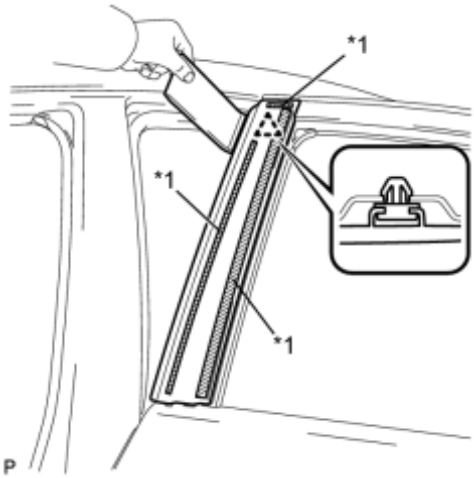
***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |
| Moulding | 20 to 30°C (68 to 86°F) |

NOTICE:

Do not heat the vehicle body or rear door front window frame moulding moulding excessively.

(a) Using a heat light, heat the rear door front window frame moulding.




(b) Using a moulding remover, remove the clip and rear door front window frame moulding.

## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape |

# INSTALLATION

1. INSTALL REAR DOOR FRONT WINDOW FRAME MOULDING

HINT:

When installing the rear door front window frame moulding, heat the vehicle body and rear door front window frame moulding using a heat light.

***Heating Temperature***

| Item | Temperature |
|---|---|
| Vehicle Body | 40 to 60°C (104 to 140°F) |
| Moulding | 20 to 30°C (68 to 86°F) |

NOTICE:

Do not heat the vehicle body or rear door front window frame moulding excessively.

(a) Clean the vehicle body surface.

(1) Using a heat light, heat the vehicle body surface.

(2) Remove the double-sided tape from the vehicle body.

(3) Wipe off any tape adhesive residue with cleaner.

(b) Clean the rear door front window frame moulding (if reusing the rear door front window frame moulding).

(1) Using a heat light, heat the rear door front window frame moulding.

(2) Remove the double-sided tape from the rear door front window frame moulding.

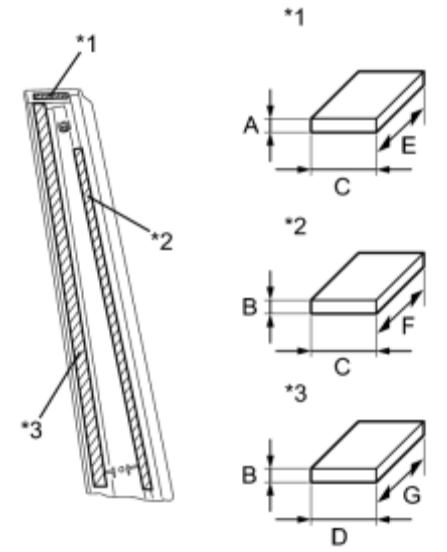
(3) Wipe off any tape adhesive residue with cleaner.

(4) Apply new double-sided tape to the rear door front window frame moulding.

## Text in Illustration

| | |
|---|---|
| *1 | Double-sided Tape (A) |
| *2 | Double-sided Tape (B) |
| *3 | Double-sided Tape (C) |

| Item | Dimension |
|---|---|
| A | 0.8 mm (0.0315 in.) |
| B | 1.2 mm (0.0472 in.) |
| C | 5.0 mm (0.197 in.) |

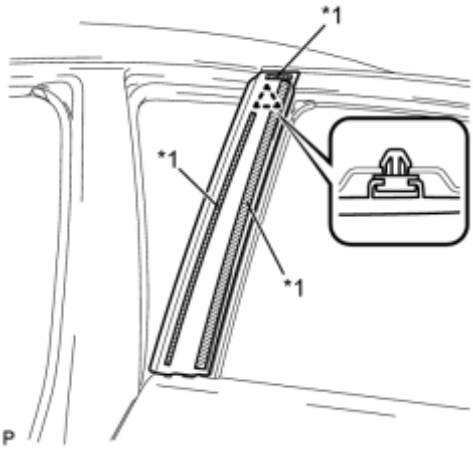



P

| | |
|---|---|
| D | 13.0 mm (0.512 in.) |
| E | 35.0 mm (1.37 in.) |
| F | 365.0 mm (1.20 ft.) |
| G | 410.0 mm (1.35 ft.) |

(c) Install the rear door front window frame moulding.

## Text in Illustration




P

| | |
|---|---|
| *1 | Double-sided Tape |

(1) Using a heat light, heat the vehicle body and rear door front window frame moulding.

(2) Remove the release paper from the face of the rear door front window frame moulding.

HINT:

After removing the release paper, keep the exposed adhesive free from foreign matter.

(3) Install the rear door front window frame moulding with the clip.

2. INSTALL REAR DOOR BELT MOULDING ASSEMBLY INFO

3. INSTALL REAR DOOR GLASS SUB-ASSEMBLY INFO

4. INSTALL REAR DOOR REAR GUIDE SEAL INFO

5. INSTALL REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

6. INSTALL REAR DOOR GLASS RUN INFO

7. INSTALL REAR DOOR SERVICE HOLE COVER INFO

8. INSTALL REAR DOOR TRIM BRACKET INFO

9. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. INSTALL REAR DOOR ARMREST COVER INFO

12. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

13. INSTALL DOOR ASSIST GRIP COVER INFO

14. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

15. INSTALL REAR NO. 3 FLOOR BOARD INFO

16. INSTALL REAR DECK FLOOR BOX INFO

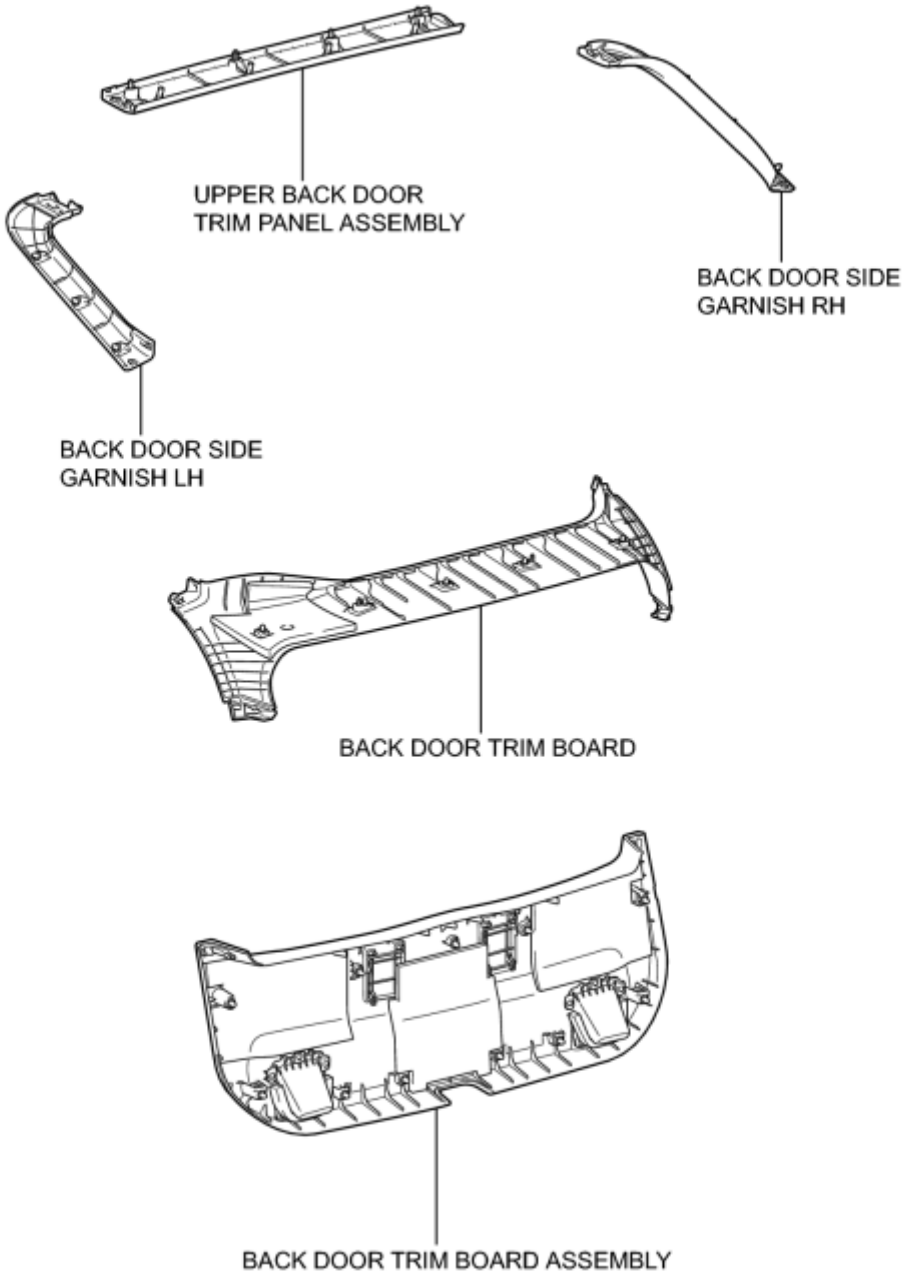
17. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

18. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

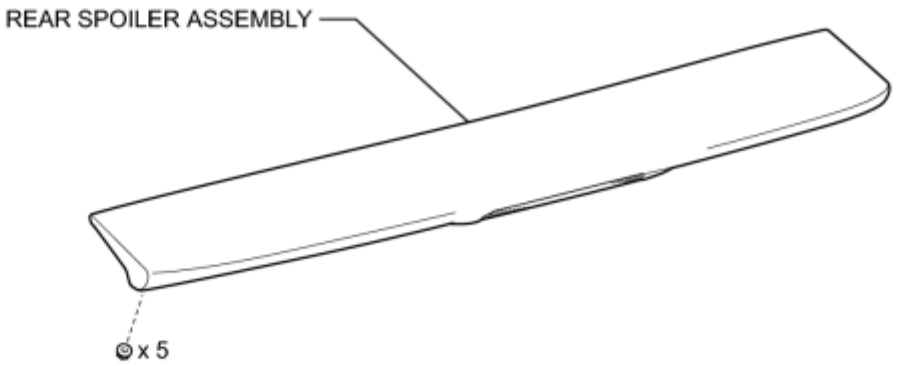
# COMPONENTS

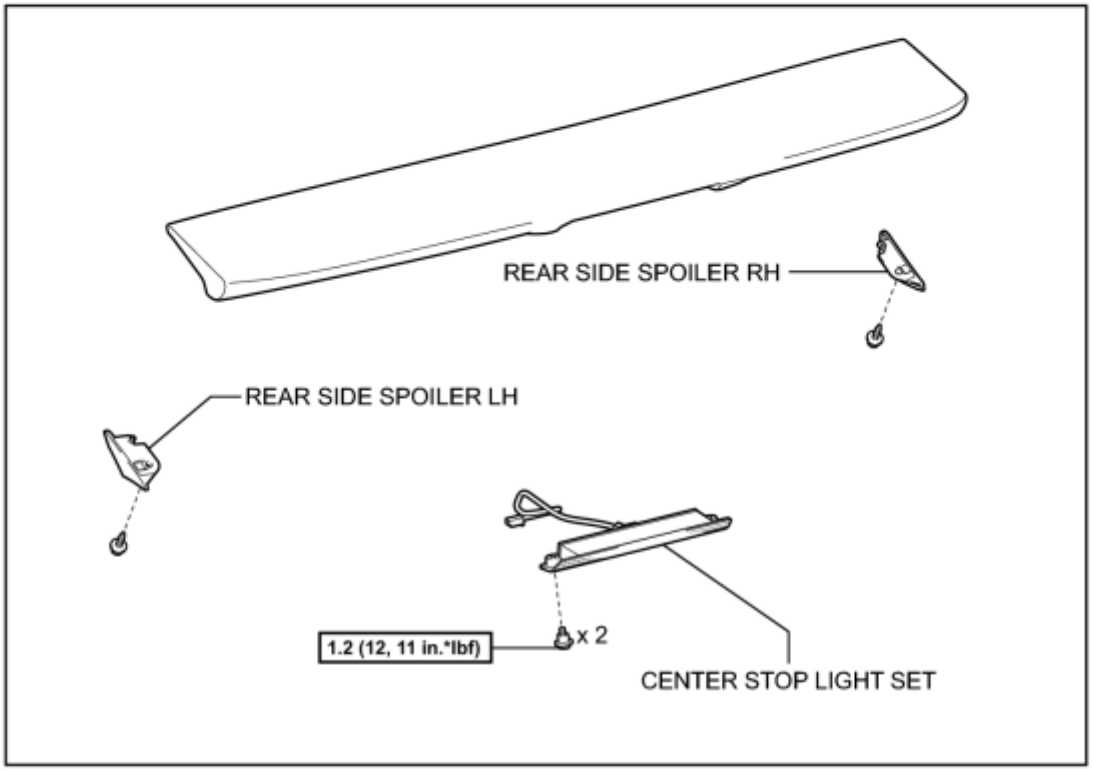
# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

# REMOVAL

1. REMOVE UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

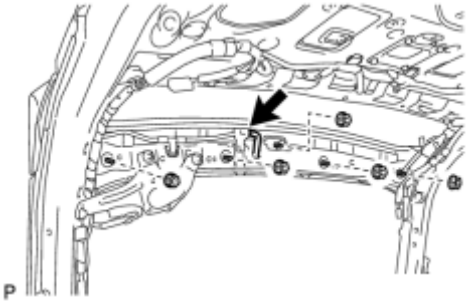
2. REMOVE BACK DOOR SIDE GARNISH RH INFO

3. REMOVE BACK DOOR SIDE GARNISH LH INFO

4. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

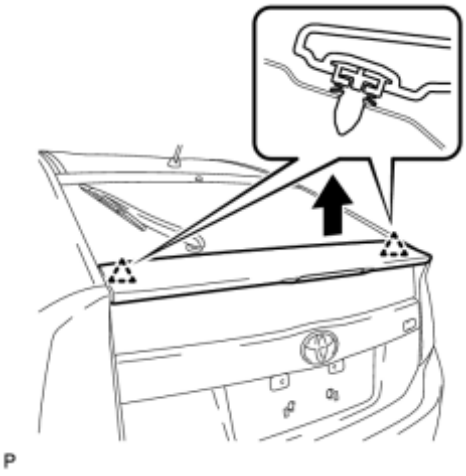
5. REMOVE BACK DOOR TRIM BOARD INFO

6. REMOVE REAR SPOILER ASSEMBLY




(a) Disconnect the connector.

(b) Remove the 5 nuts.




(c) Disengage the 2 clips to remove the rear spoiler assembly.

7. REMOVE CENTER STOP LIGHT SET INFO

8. REMOVE REAR SIDE SPOILER LH

(a) Remove the screw.




(b) Disengage the guide and remove the rear side spoiler LH.

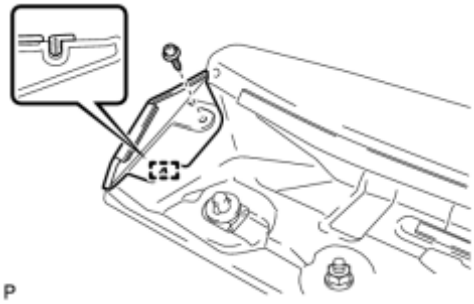
9. REMOVE REAR SIDE SPOILER RH

HINT:

Use the same procedure for the RH side and LH side.

# INSTALLATION

1. INSTALL REAR SIDE SPOILER LH



(a) Engage the guide and install the rear side spoiler LH.

(b) Install the screw.

2. INSTALL REAR SIDE SPOILER RH

HINT:

Use the same procedure for the RH side and LH side.

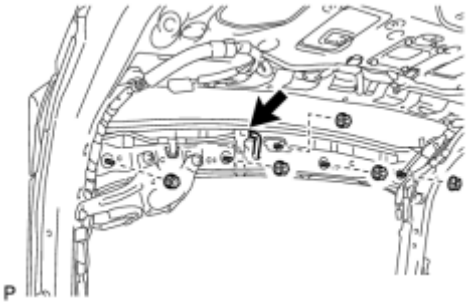
3. INSTALL CENTER STOP LIGHT SET INFO

4. INSTALL REAR SPOILER ASSEMBLY



(a) Engage the 2 clips to install the rear spoiler assembly.

(b) Install the 5 nuts.




(c) Connect the connector.

5. INSTALL BACK DOOR TRIM BOARD INFO

6. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

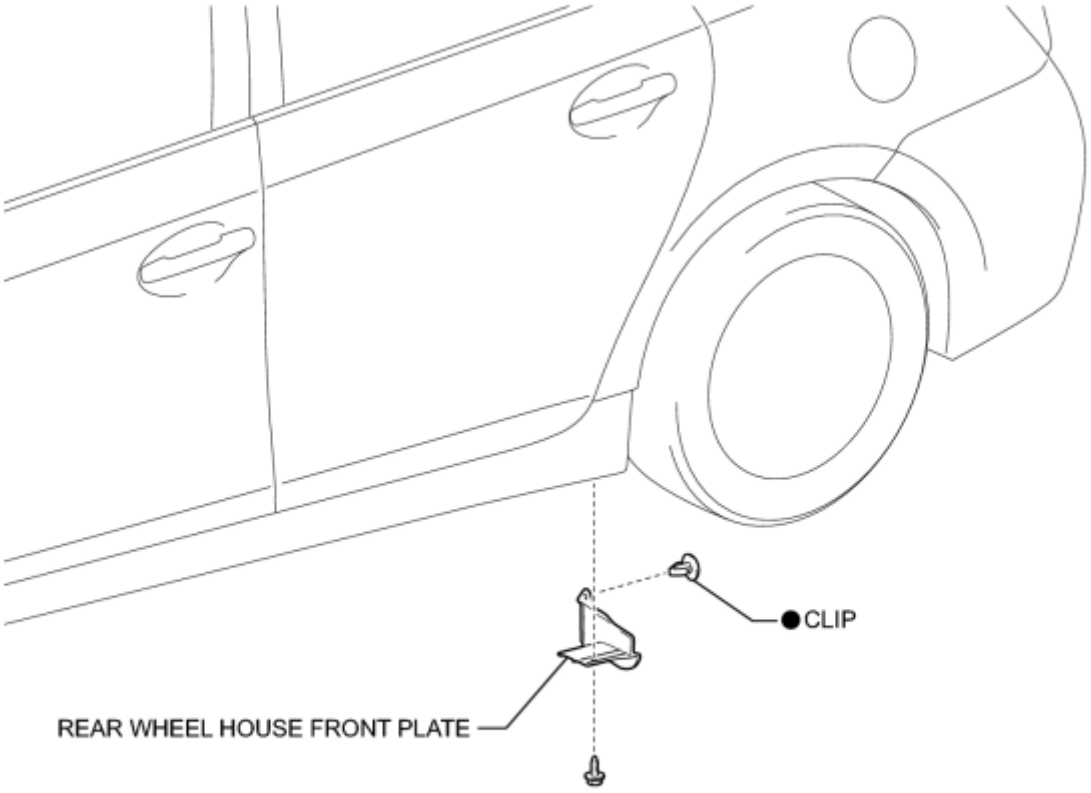
7. INSTALL BACK DOOR SIDE GARNISH LH INFO

8. INSTALL BACK DOOR SIDE GARNISH RH INFO

9. INSTALL UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION

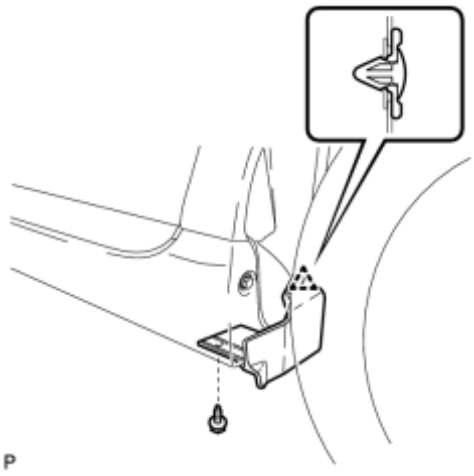



● Non-reusable part

P

# REMOVAL

1. REMOVE REAR WHEEL HOUSE FRONT PLATE

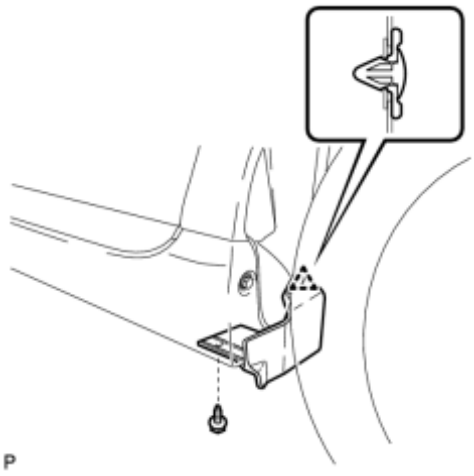



(a) Remove the screw.

(b) Remove the clip and rear wheel house front plate.

# INSTALLATION

1. INSTALL REAR WHEEL HOUSE FRONT PLATE

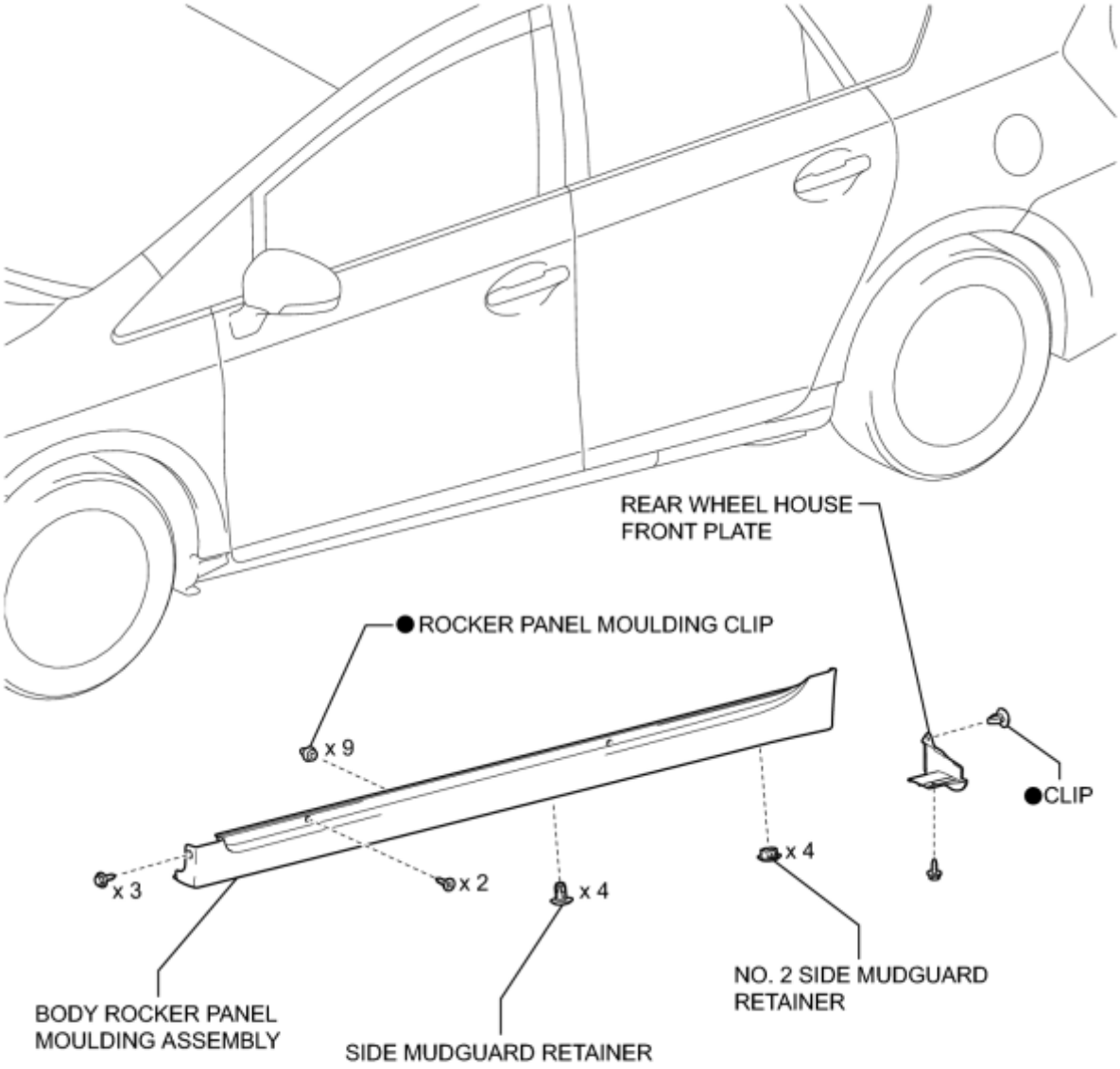



(a) Install the rear wheel house front plate with the new clip.

(b) Install the screw.

# COMPONENTS

# ILLUSTRATION



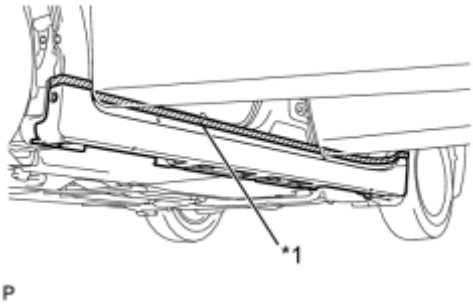

● Non-reusable part

P

# REMOVAL

1. REMOVE REAR WHEEL HOUSE FRONT PLATE INFO

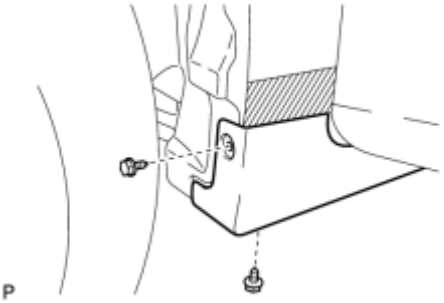
2. REMOVE BODY ROCKER PANEL MOULDING ASSEMBLY



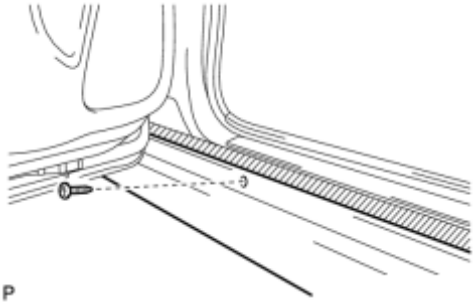

(a) Put protective tape around the body rocker panel moulding assembly.

## Text in Illustration

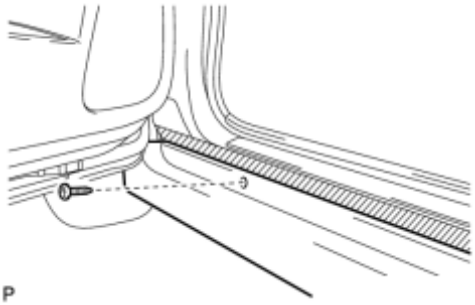
| | |
|---|---|
| *1 | Protective Tape |




(b) Remove the 2 screws.

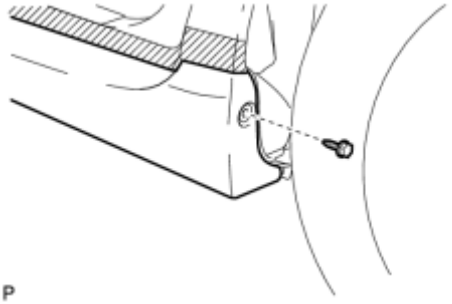



(c) Remove the screw.

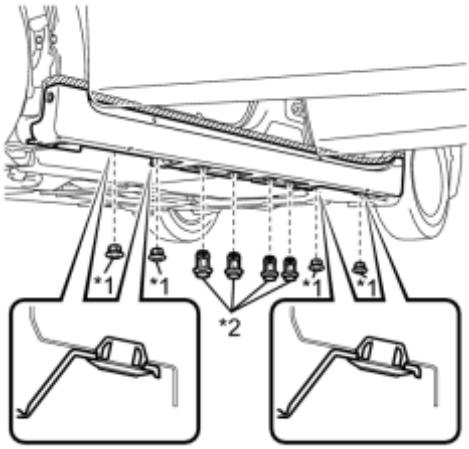



(d) Remove the screw.

(e) Remove the screw.



P

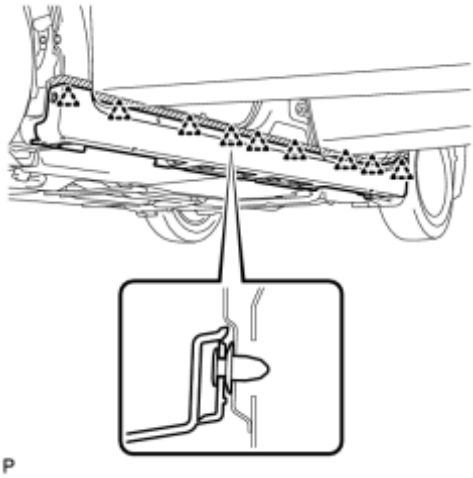



P

(f) Remove the 4 side mudguard retainers and 4 No. 2 side mudguard retainers.

## Text in Illustration

| | |
|---|---|
| *1 | No. 2 Side Mudguard Retainer |
| *2 | Side Mudguard Retainer |



P

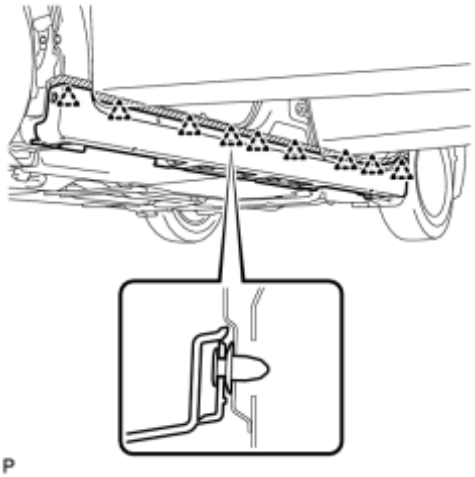
(g) Disengage the 9 clips to remove the body rocker panel moulding assembly.

(h) Remove the 9 clips (rocker panel moulding clip).

# INSTALLATION

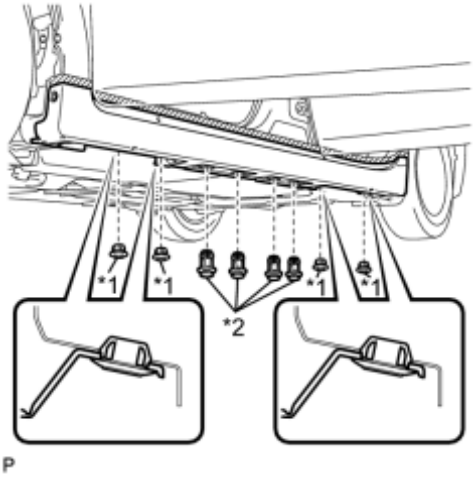
1. INSTALL BODY ROCKER PANEL MOULDING ASSEMBLY

(a) Install 9 new clips (rocker panel moulding clip) to the body rocker panel moulding assembly.



P

(b) Engage the 9 clips to install the body rocker panel moulding assembly.

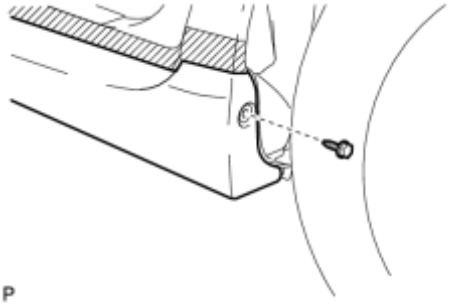



P

(c) Install the 4 No. 2 side mudguard retainers and 4 side mudguard retainers.

## Text in Illustration

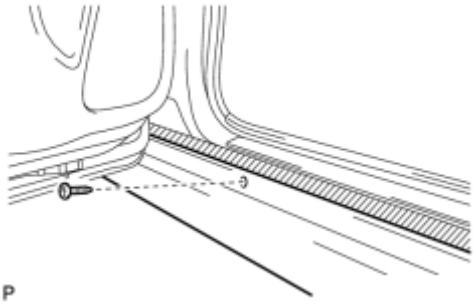
| | |
|---|---|
| *1 | No. 2 Side Mudguard Retainer |
| *2 | Side Mudguard Retainer |

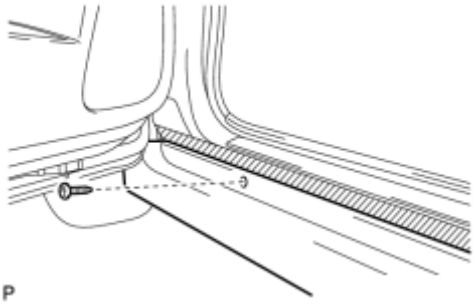


P

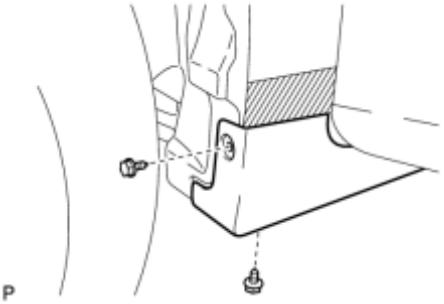
(d) Install the screw.

(e) Install the screw.




(f) Install the screw.

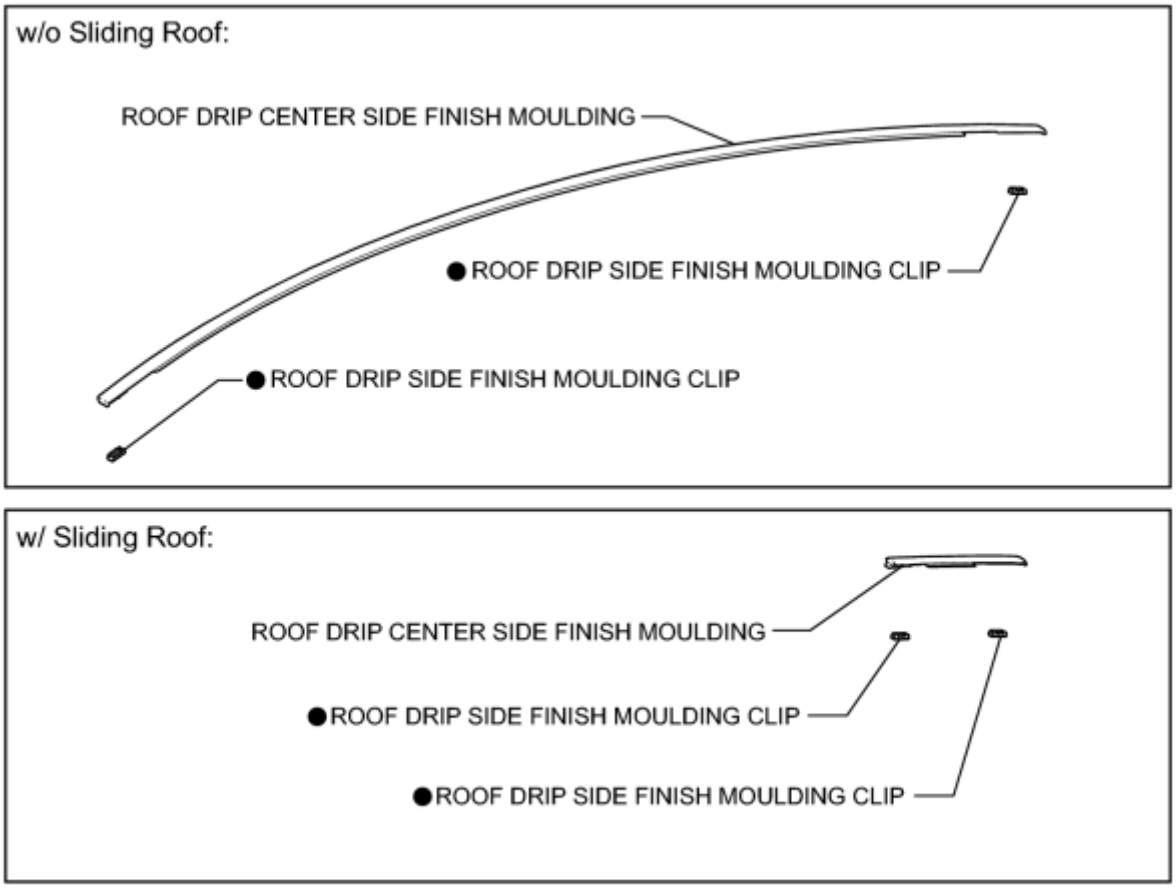



(g) Install the 2 screws.

2. INSTALL REAR WHEEL HOUSE FRONT PLATE INFO

# COMPONENTS

# ILLUSTRATION

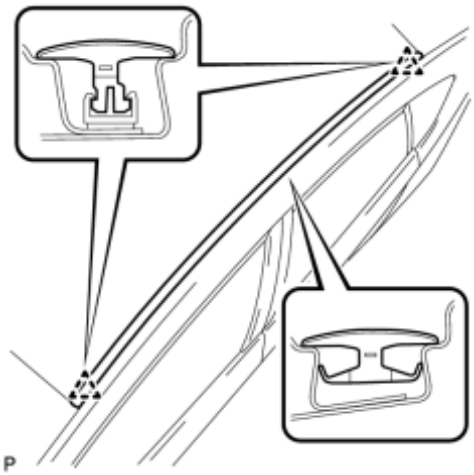



● Non-reusable part

P

# REMOVAL

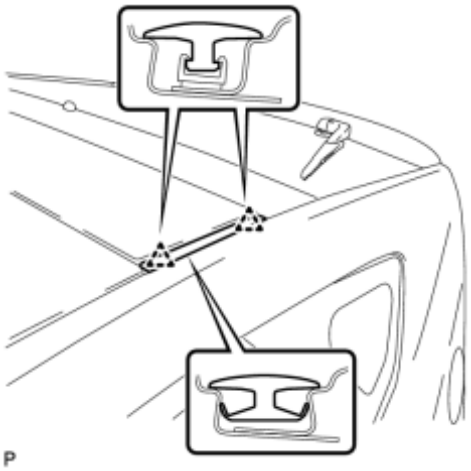
1. REMOVE ROOF DRIP CENTER SIDE FINISH MOULDING (w/o Sliding Roof)



(a) Disengage the 2 clips and remove the roof drip center side finish moulding.

- Do not remove the clips.
- If the clips are damaged or dropped off, replace them with new clips.

2. REMOVE ROOF DRIP CENTER SIDE FINISH MOULDING (w/ Sliding Roof)



(a) Disengage the 2 clips and remove the roof drip center side finish moulding.

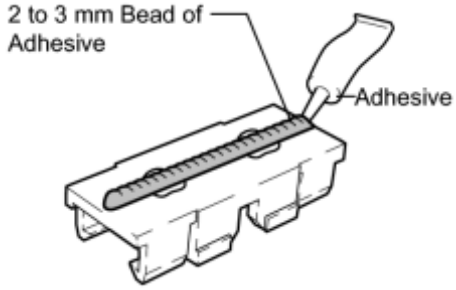
- Do not remove the clips.
- If the clips are damaged or dropped off, replace them with new clips.

# INSTALLATION

1. INSTALL ROOF DRIP SIDE FINISH MOULDING CLIP (w/o Sliding Roof)

NOTICE:

- If reusing the clips, do not remove the double-sided tape remaining on the clips and where the clips will be installed on the body.
- If installing new clips, remove the double-sided tape remaining where the clips will be installed on the body and clean the body with a non-residue solvent.




P

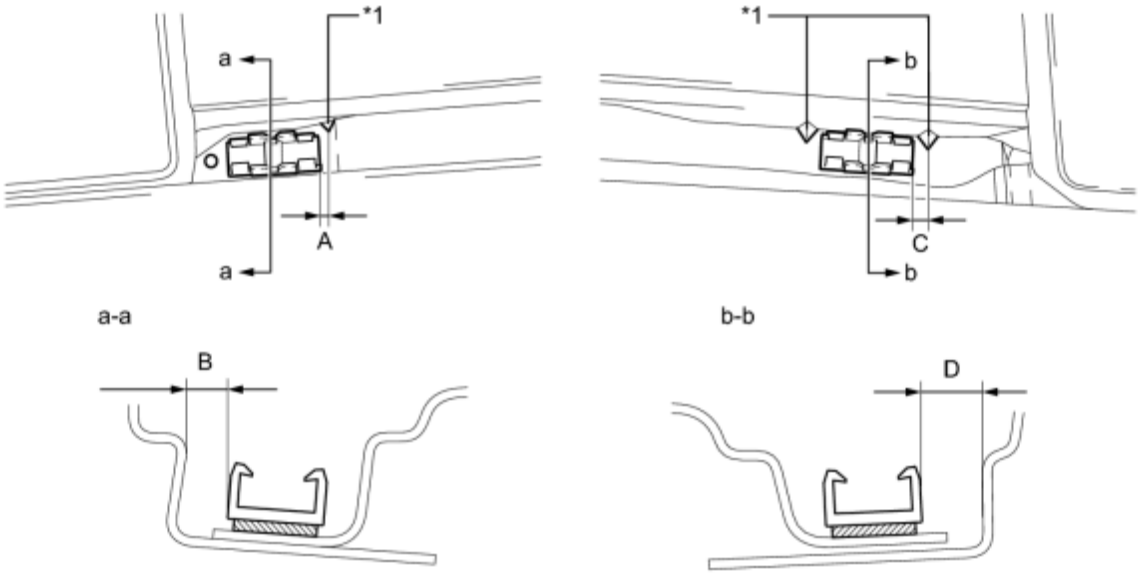
(a) Apply a 2 to 3 mm (0.0787 to 0.118 in.) bead of adhesive (3M DP-105 or equivalent) to new roof drip side finish moulding clips.

HINT:

Adhesive strength (tensile strength): 13.7 MPa (140 kgf/cm$^2$, 1987 psi) or more (when the temperature is 23°C (73°F).)

(b) Press and install the 2 roof drip side finish moulding clips.

(c) Install the clips to the positions on the roof panel shown in the illustration. Determine the locations and firmly press and install the 2 roof drip side finish moulding clips after lightly applying adhesive (3M DP-105 or equivalent).




P

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Protruding Part | - | - |

*Standard Dimension*

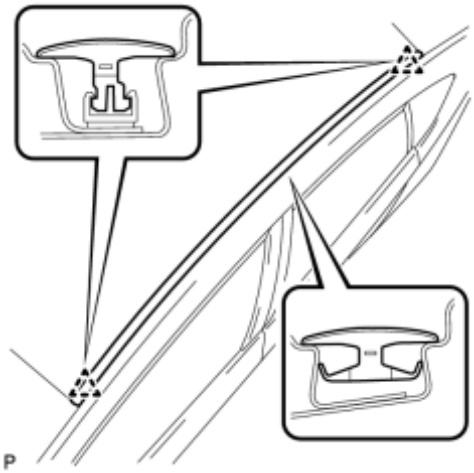
| Installation Area | Dimension | Measurement |
|---|---|---|
| for Front Side | A | 4.0 mm (0.158 in.) |
| | B | 2.7mm (0.106 in.) |
| for Rear Side | C | 4.3 mm (0.169 in.) |
| | D | 3.9 mm (0.154 in.) |

(d) Install the roof drip center side finish moulding when 20 minutes or more have elapsed after pressing and installing the 2 roof drip side finish moulding clips.

HINT:

- Initial hardening time: 20 minutes
- Complete hardening time: 48 hours

2. INSTALL ROOF DRIP CENTER SIDE FINISH MOULDING (w/o Sliding Roof)



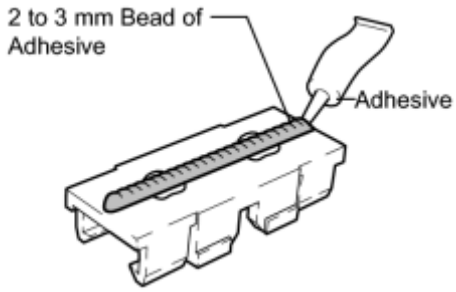
(a) Engage the 2 clips and install the roof drip center side finish moulding as shown in the illustration.

3. INSTALL ROOF DRIP SIDE FINISH MOULDING CLIP (w/ Sliding Roof)

NOTICE:

- If reusing the clips, do not remove the double-sided tape remaining on the clips and where the clips will be installed on the body.
- If installing new clips, remove the double-sided tape remaining where the clips will be installed on the body and clean the body with a non-residue solvent.

(a) Apply a 2 to 3 mm (0.0787 to 0.118 in.) bead of adhesive (3M DP-105 or equivalent) to new roof drip side finish moulding clips.



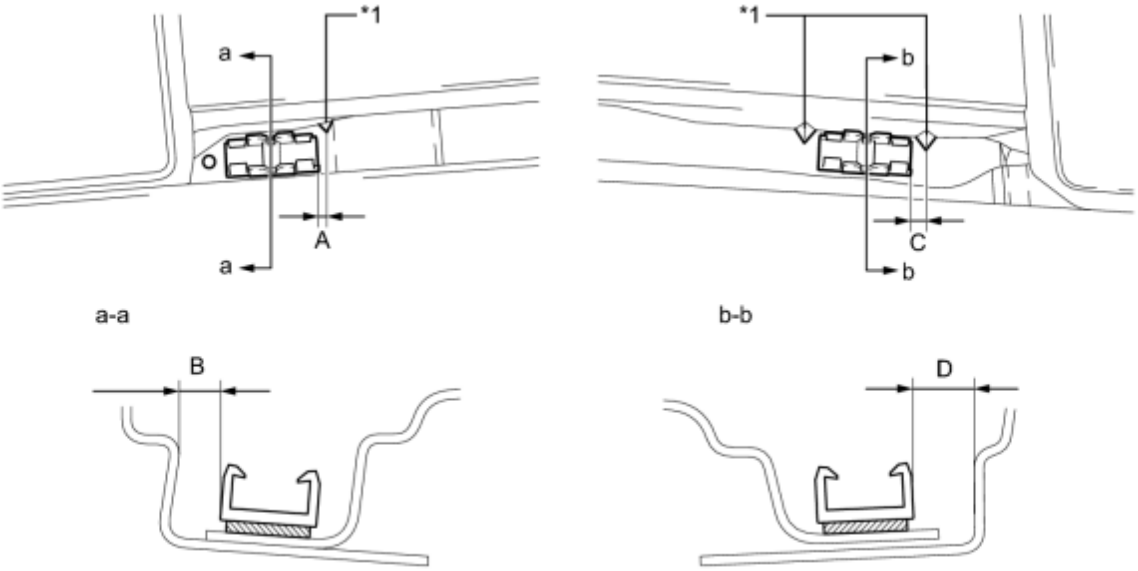

P

HINT:

Adhesive strength (tensile strength): 13.7 MPa (140 kgf/cm$^2$, 1987 psi) or more (when the temperature is 23°C (73°F).)

(b) Press and install the 2 roof drip side finish moulding clips.

(c) Install the clips to the positions on the roof panel shown in the illustration. Determine the locations and firmly press and install the 2 roof drip side finish moulding clips after lightly applying adhesive (3M DP-105 or equivalent).




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Protruding Part | - | - |

### *Standard Dimension*

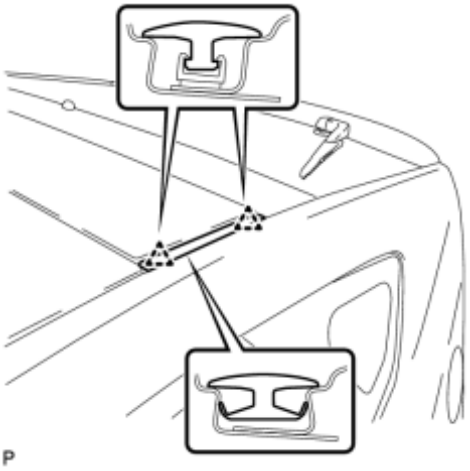
| Installation Area | Dimension | Measurement |
|---|---|---|
| for Front Side | A | 2.8 mm (0.150 in.) |
| | B | 3.7mm (0.146 in.) |
| for Rear Side | C | 4.3 mm (0.169 in.) |
| | D | 3.9 mm (0.154 in.) |

(d) Install the roof drip center side finish moulding when 20 minutes or more have elapsed after pressing and installing the 2 roof drip side finish moulding clips.

HINT:

- Initial hardening time: 20 minutes
- Complete hardening time: 48 hours

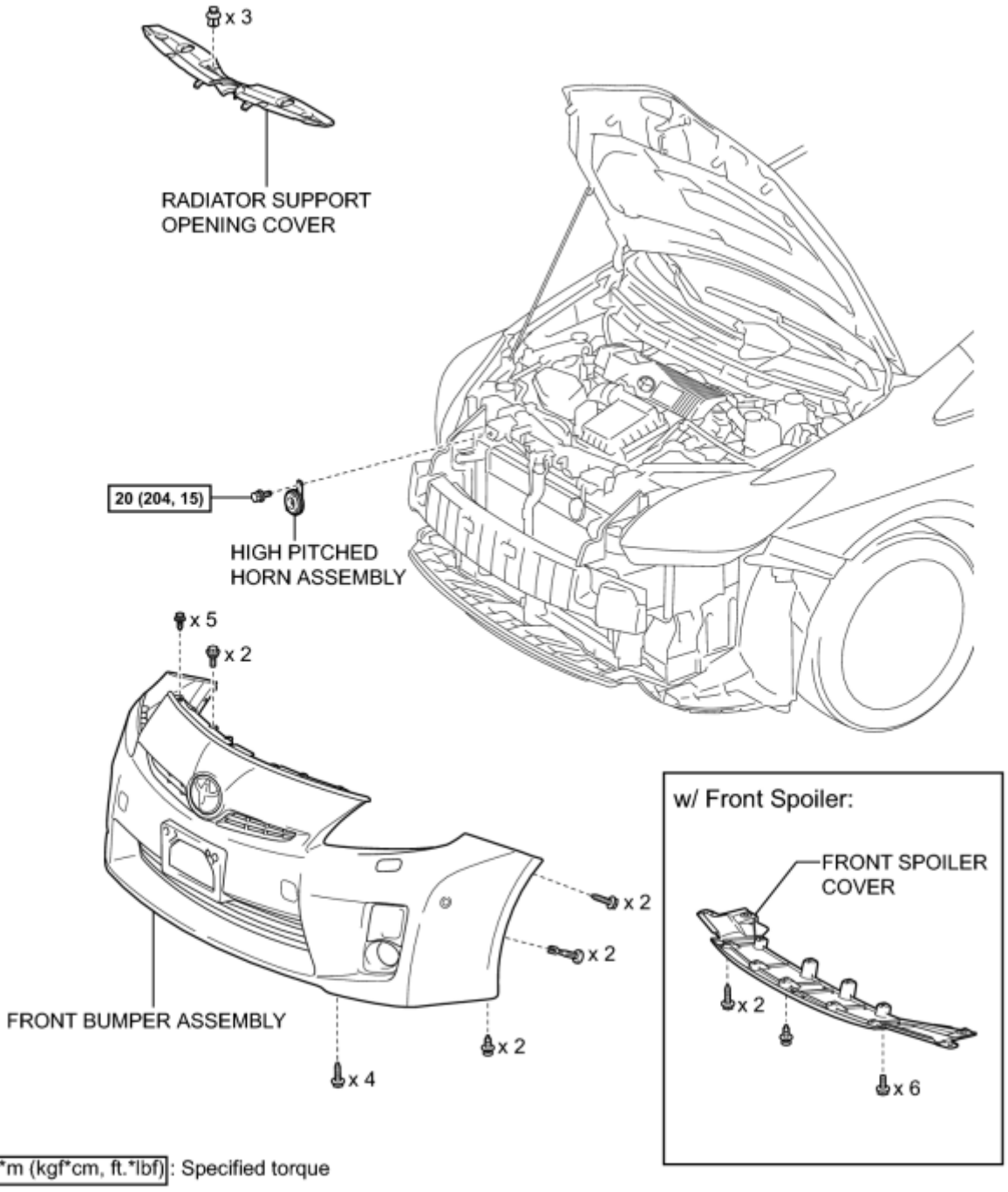
4. INSTALL ROOF DRIP CENTER SIDE FINISH MOULDING (w/ Sliding Roof)




(a) Engage the 2 clips and install the roof drip center side finish moulding as shown in the illustration.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

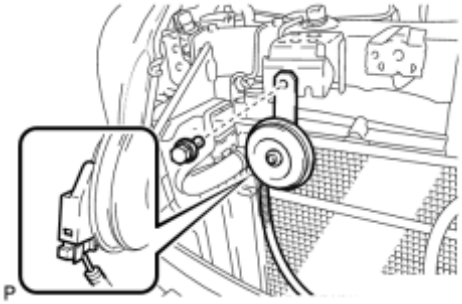
P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE HIGH PITCHED HORN ASSEMBLY

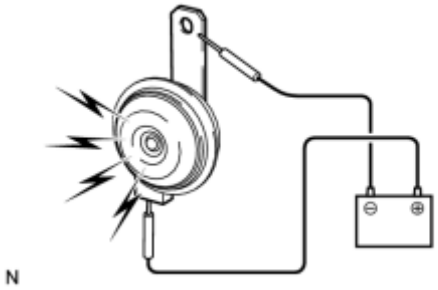


(a) Disconnect the connector.

(b) Remove the bolt and high pitched horn assembly.

# INSPECTION

1. INSPECT HIGH PITCHED HORN ASSEMBLY



N

(a) Apply battery voltage and check the operation of the horn according to the table below.

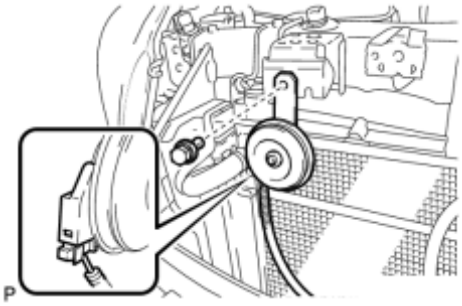
OK:

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → Terminal 1<br><br>Battery negative (-) → Body ground | Horn sounds |

If the result is not as specified, replace the high pitched horn assembly.

# INSTALLATION

1. INSTALL HIGH PITCHED HORN ASSEMBLY



(a) Install the high pitched horn assembly with the bolt.

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

(b) Connect the connector.

2. INSTALL FRONT BUMPER ASSEMBLY INFO

3. INSTALL RADIATOR SUPPORT OPENING COVER INFO

4. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

5. ADJUST FOG LIGHT AIMING (w/ Fog Light)

INFO

# PRECAUTION

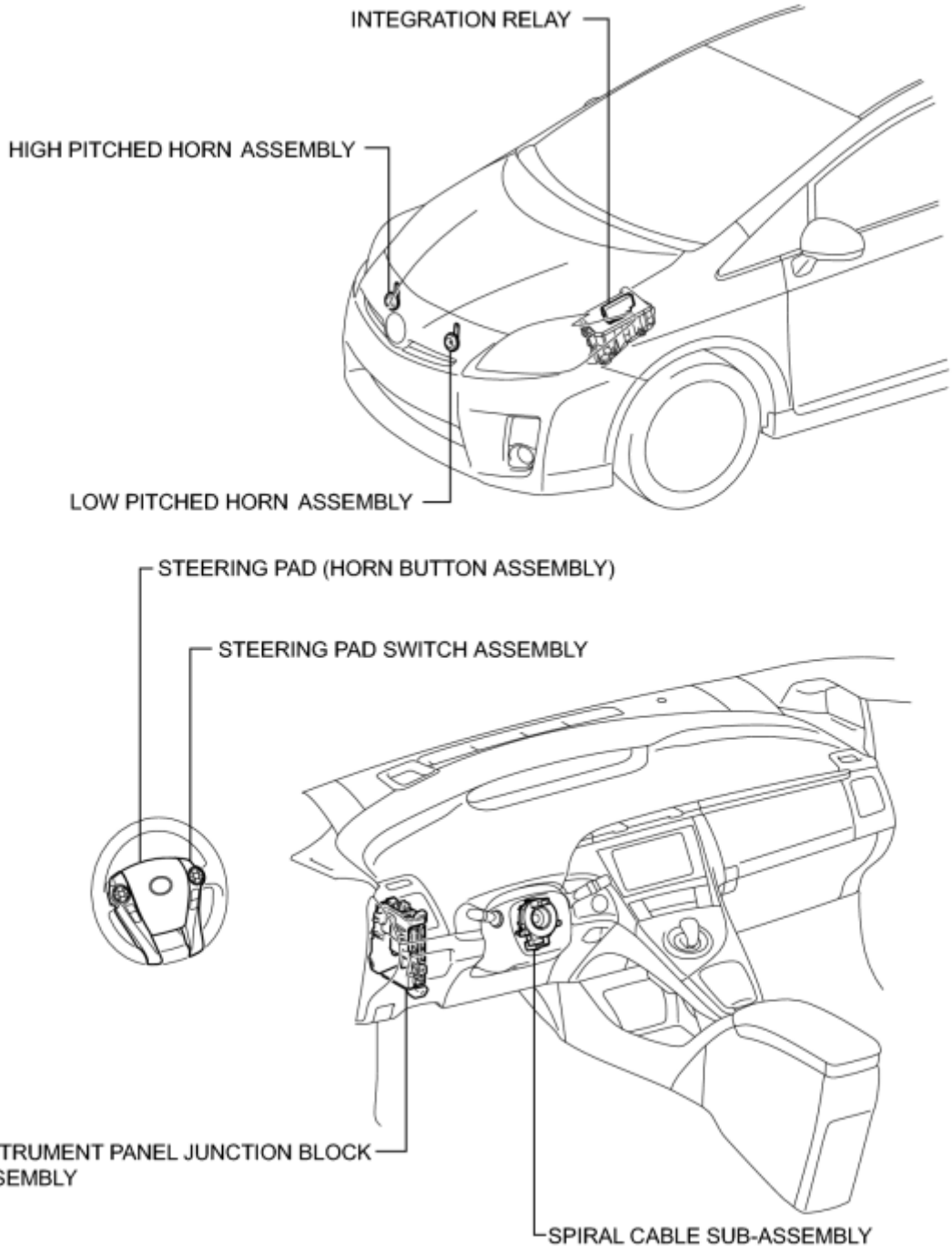
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

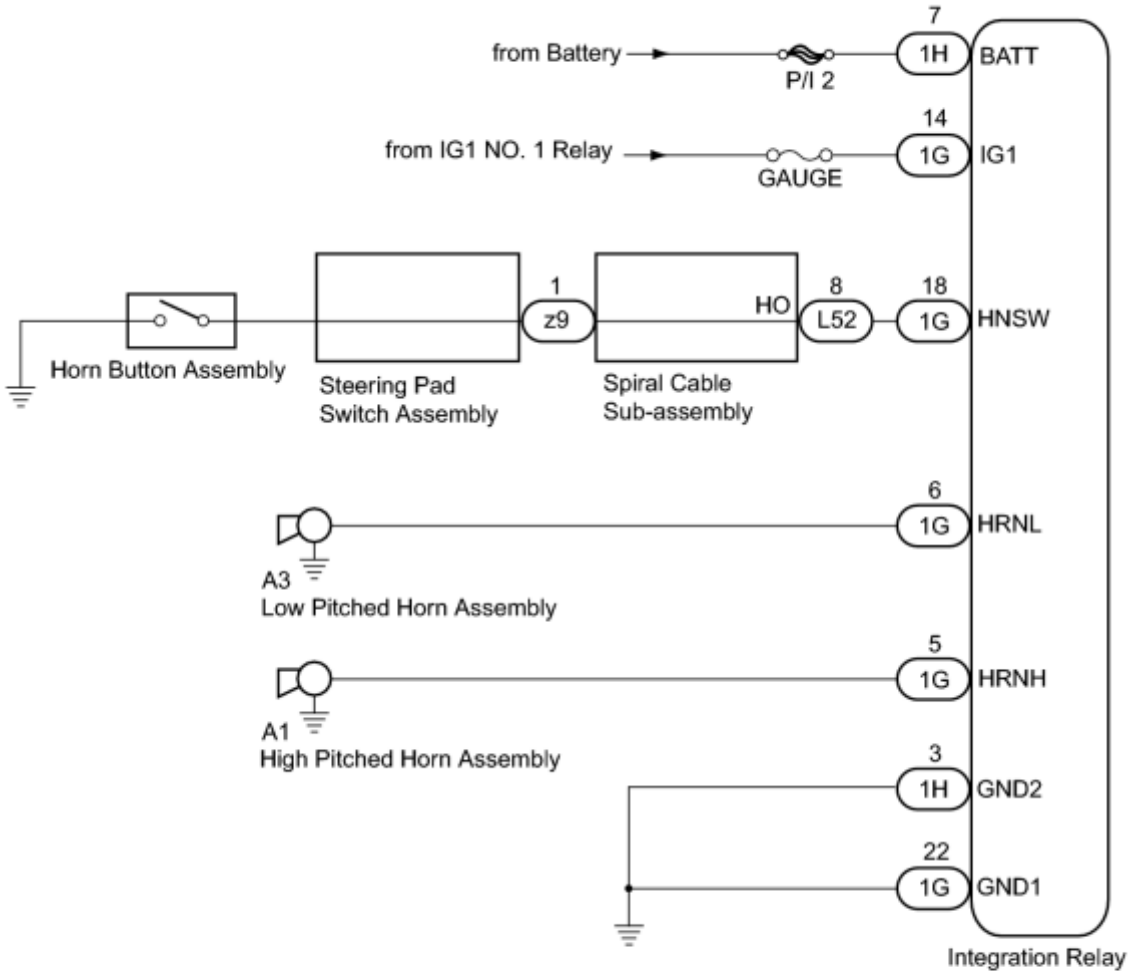
# PARTS LOCATION

# ILLUSTRATION




H

# SYSTEM DIAGRAM



# PROBLEM SYMPTOMS TABLE

HINT:

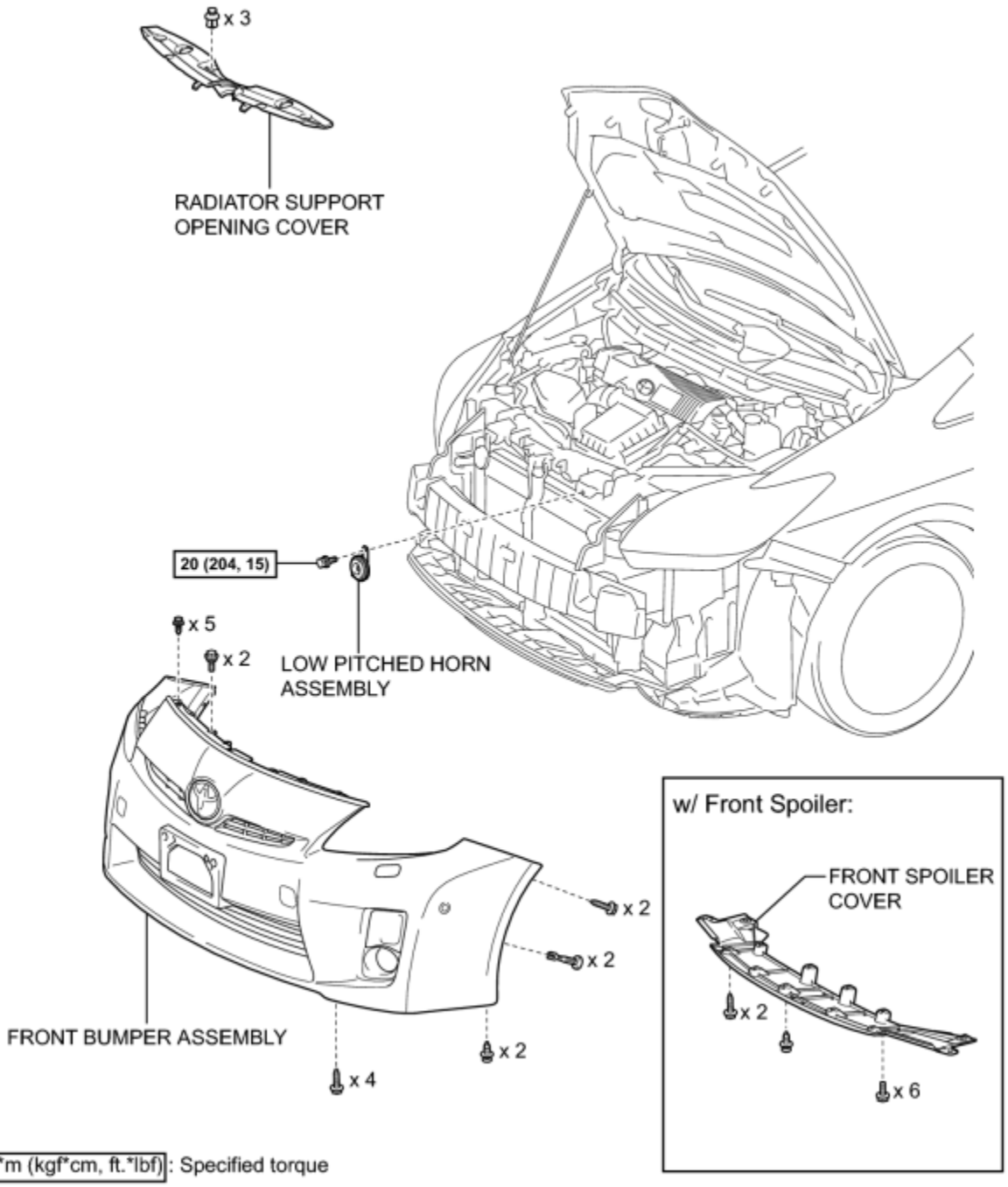
Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Horn System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Horn does not sound | HORN fuse | - |
| | Low pitched horn assembly | INFO |
| | High pitched horn assembly | INFO |
| | Integration relay | INFO |
| | Steering pad (Horn button assembly) | INFO |
| | Steering pad switch assembly | INFO |
| | Spiral cable sub-assembly | INFO |
| | Wire harness | - |
| Horn blows all the time | Integration relay | INFO |
| | Steering pad (Horn button assembly) | INFO |
| | Steering pad switch assembly | INFO |
| | Spiral cable sub-assembly | INFO |
| | Wire harness | - |
| Low pitched horn operates but high pitched horn does not operate | High pitched horn assembly | INFO |
| | Wire harness | - |
| High pitched horn operates but low pitched horn does not operate | Low pitched horn assembly | INFO |
| | Wire harness | - |

# COMPONENTS

# ILLUSTRATION



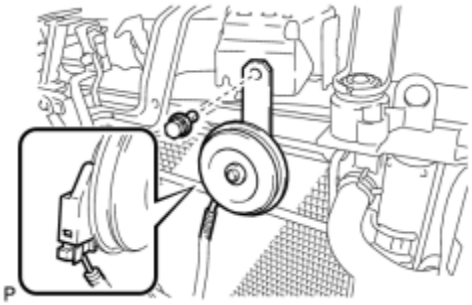

P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE LOW PITCHED HORN ASSEMBLY

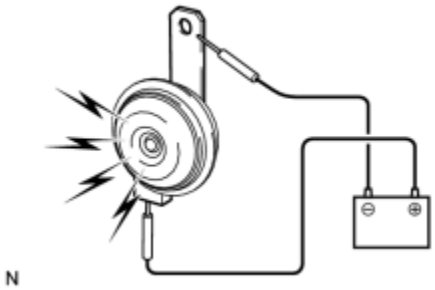


(a) Disconnect the connector.

(b) Remove the bolt and low pitched horn assembly.

# INSPECTION

1. INSPECT LOW PITCHED HORN ASSEMBLY



N

(a) Apply battery voltage and check the operation of the horn according to the table below.

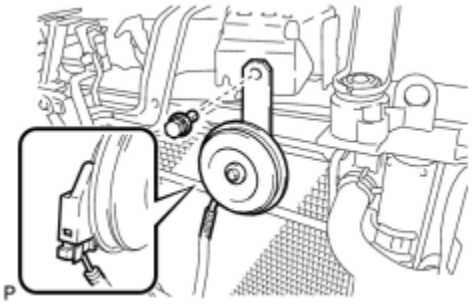
OK:

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → Terminal 1<br><br>Battery negative (-) → Body ground | Horn sounds |

If the result is not as specified, replace the low pitched horn assembly.

# INSTALLATION

1. INSTALL LOW PITCHED HORN ASSEMBLY



(a) Install the low pitched horn assembly with the bolt.

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**

(b) Connect the connector.

2. INSTALL FRONT BUMPER ASSEMBLY INFO

3. INSTALL RADIATOR SUPPORT OPENING COVER INFO

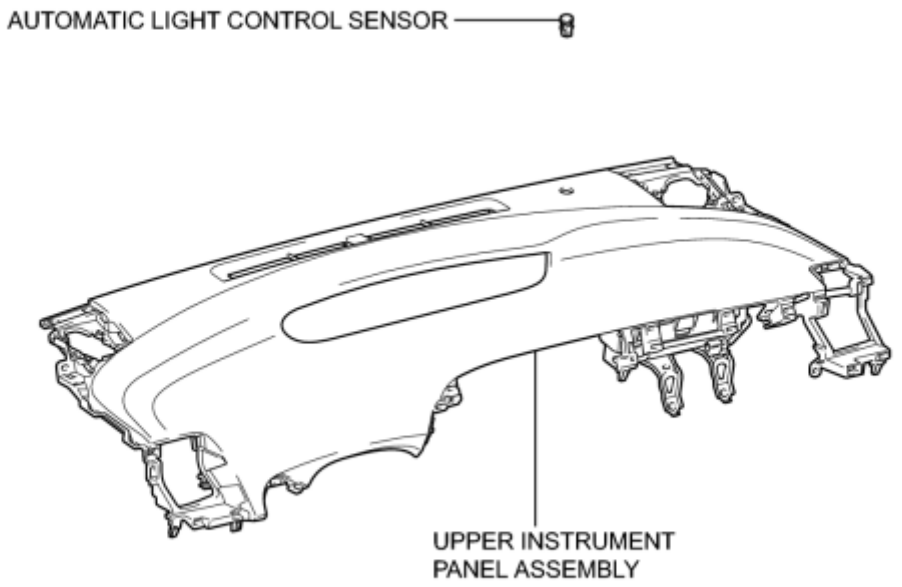
4. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

5. ADJUST FOG LIGHT AIMING (w/ Fog Light)

INFO

# COMPONENTS

# ILLUSTRATION




P

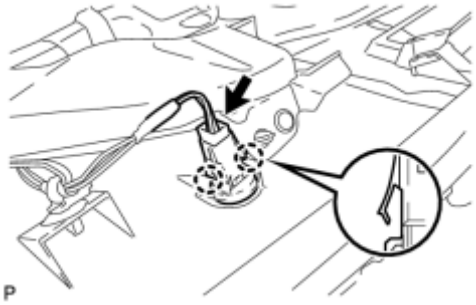
# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure up to Remove Upper Instrument Panel Assembly INFO.

2. REMOVE AUTOMATIC LIGHT CONTROL SENSOR



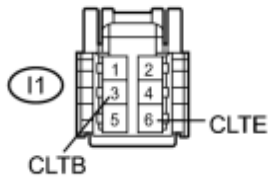

(a) Disconnect the connector.

(b) Disengage the 2 claws and remove the automatic light control sensor.

# INSPECTION

1. INSPECT AUTOMATIC LIGHT CONTROL SENSOR

*1




H

(a) Disconnect the I1 automatic light control sensor connector.

(b) Measure the voltage and resistance according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| I1-3 (CLTB) - I1-6 (CLTE) | Power switch off | Below 1 V |
| | Power switch on (IG) | 10 to 14 V |

Standard Resistance:

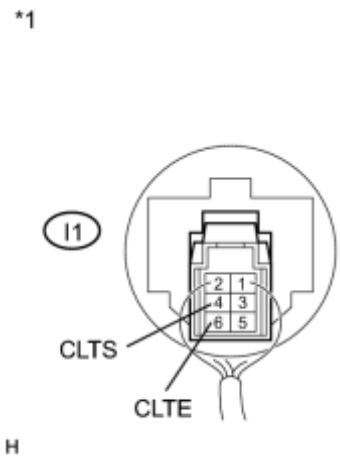
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| I1-6 (CLTE) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Automatic Light Control Sensor) |

If the result is not as specified, there may be a malfunction on the wire harness side.

(c) Reconnect the I1 automatic light control sensor connector.



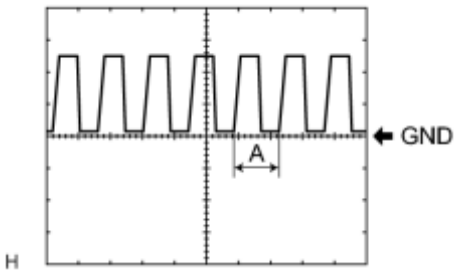

(d) Connect an oscilloscope to the automatic light control sensor connector.

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Automatic Light Control Sensor) |

(e) Check the waveform.

OK:




| Tester Connection | Tool Setting | Condition | Specified Condition |
|---|---|---|---|
| I1-6 (CLTE) - I1-4 (CLTS) | 5 V/DIV., 5 ms./DIV | Power switch on (IG), light control switch in AUTO position | Correct waveform is as shown |

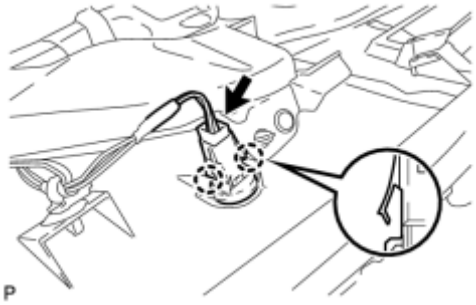
HINT:

If the ambient light becomes brighter, width A becomes narrower.

If the result is not as specified, the automatic light control sensor may have a malfunction.

# INSTALLATION

1. INSTALL AUTOMATIC LIGHT CONTROL SENSOR




(a) Engage the 2 claws and install the automatic light control sensor.

(b) Connect the connector.

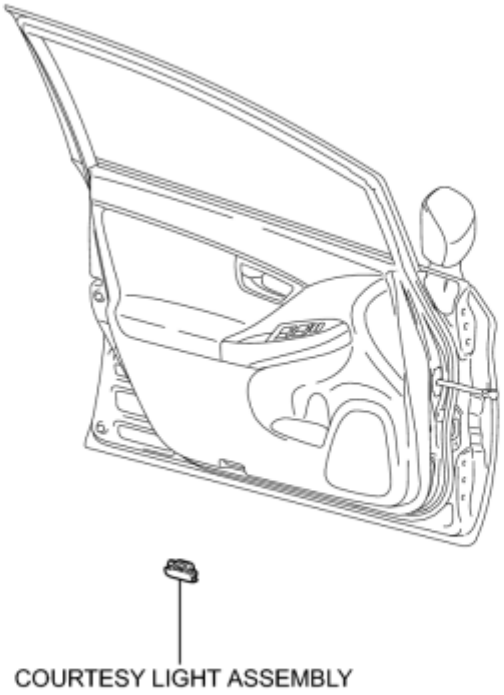
2. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure from Install Upper Instrument Panel Assembly INFO.

# COMPONENTS

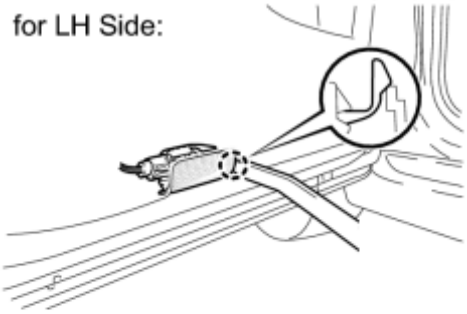
# ILLUSTRATION



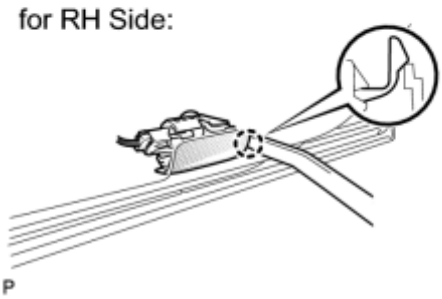

P

# REMOVAL

1. REMOVE COURTESY LIGHT ASSEMBLY




(a) Using a moulding remover, disengage the claw.




(b) Disconnect the connector and remove the courtesy light assembly.

# INSPECTION

1. INSPECT COURTESY LIGHT ASSEMBLY

*1




(a) Connect a positive (+) lead from the battery to terminal 1 and a negative (-) lead to terminal 2.

(b) Check that the courtesy light comes on.

OK:

Courtesy light comes on.

***Text in Illustration***

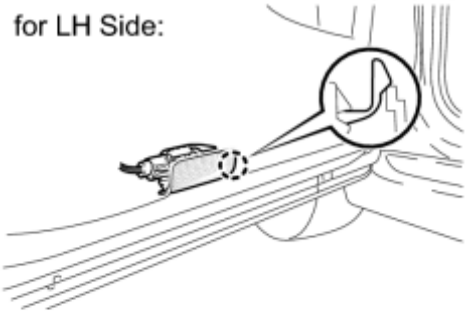
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Courtesy Light Assembly) |

If the result is not as specified, replace the bulb or courtesy light assembly.

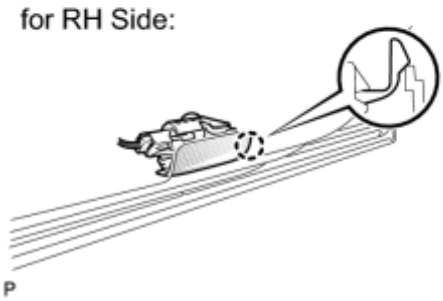
# INSTALLATION

1. INSTALL COURTESY LIGHT ASSEMBLY

(a) Connect the connector.

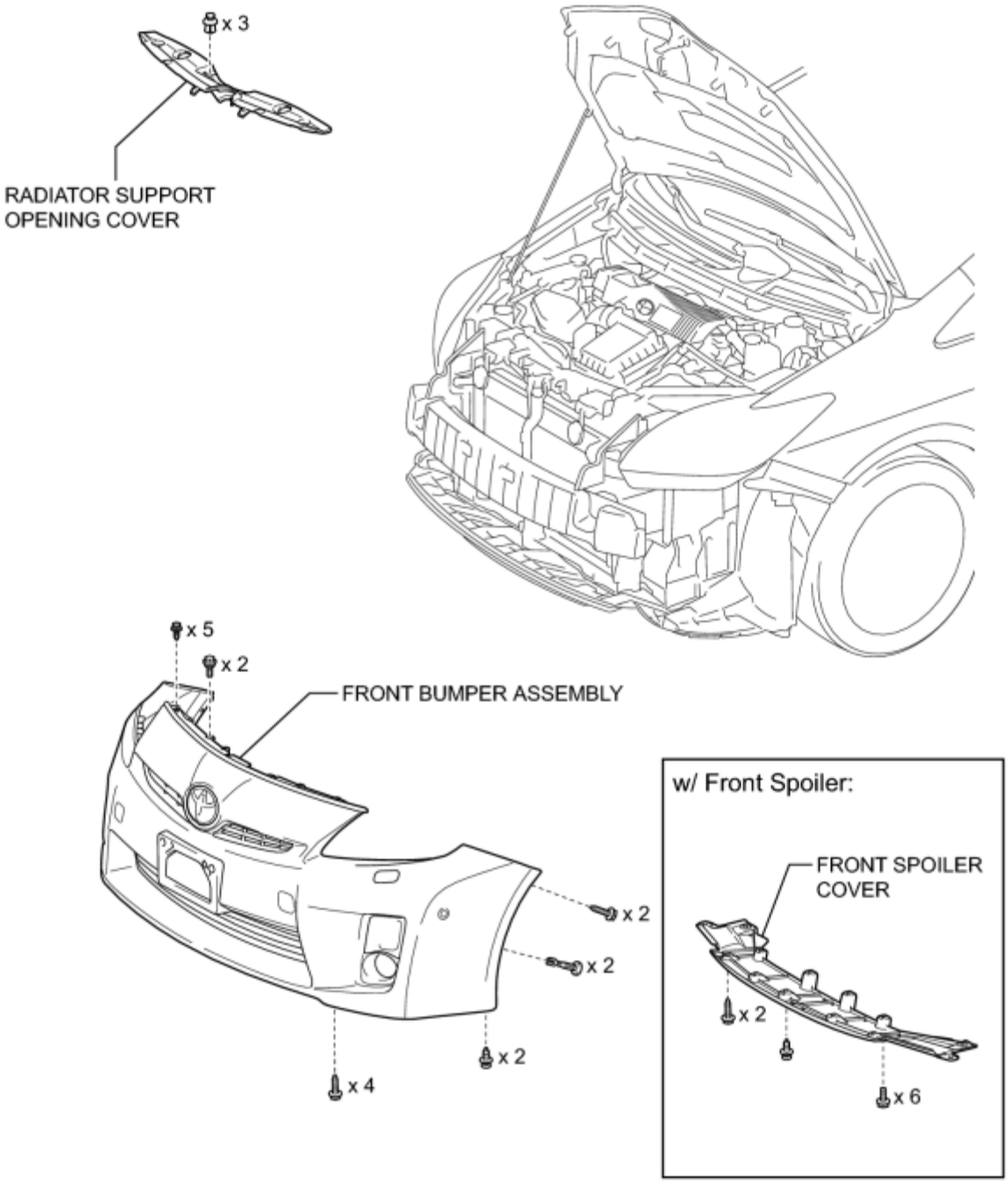



(b) Engage the claw to install the courtesy light assembly.



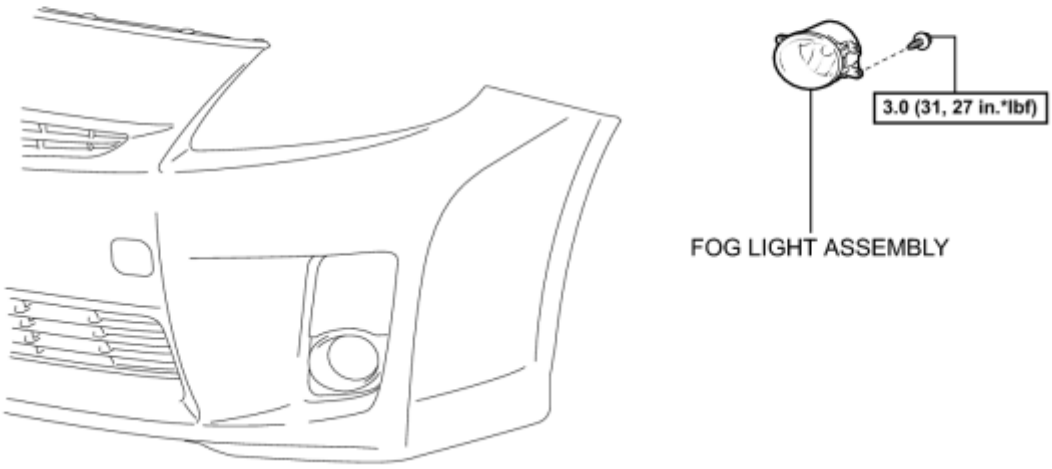
# COMPONENTS

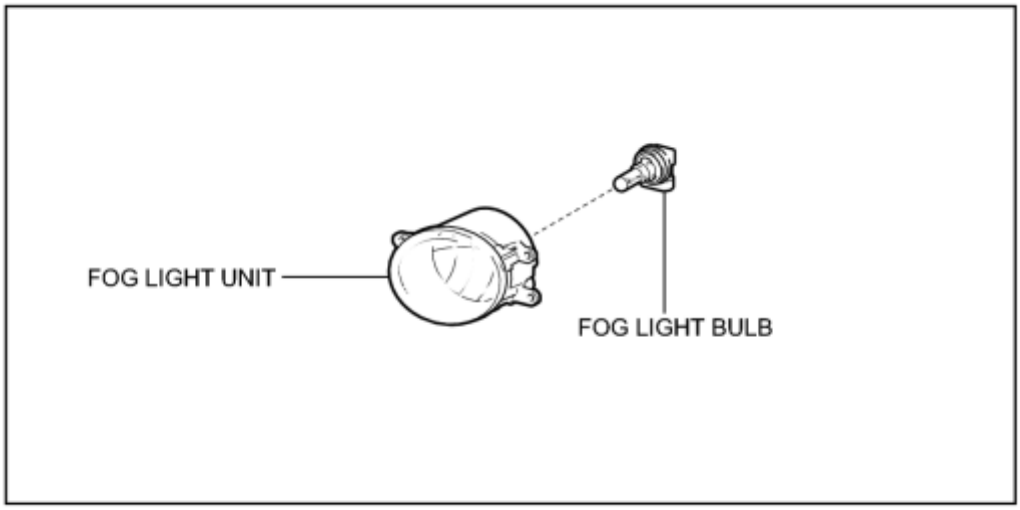
# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

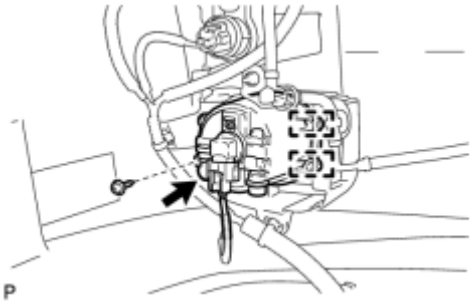
P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE FOG LIGHT ASSEMBLY




(a) Disconnect the connector.

(b) Remove the screw.

(c) Disengage the 2 guides and remove the fog light assembly.

# DISASSEMBLY

1. REMOVE FOG LIGHT BULB



P

(a) Turn the fog light bulb in the direction indicated by the arrow shown in the illustration and remove it.

NOTICE:

Do not touch the bulb glass.

# ADJUSTMENT

HINT:

It is possible that a bulb is incorrectly installed, affecting fog light aim. Bulb installation should be considered prior to performing the adjustment procedure.

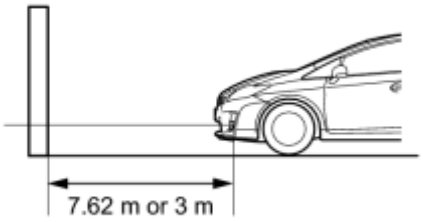
1. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT

(a) Prepare the vehicle:

- Ensure there is no damage or deformation to the body around the fog lights.
- Fill the fuel tank.
- Make sure that the oil is filled to the specified level.
- Make sure that the coolant is filled to the specified level.
- Inflate the tires to the appropriate pressure.
- Unload the trunk and vehicle, ensuring that the spare tire, tools and jack are in their original positions.
- Sit a person of average weight (68 kg, 150 lb) in the driver's seat.

2. PREPARE FOR FOG LIGHT AIMING

(a) Prepare the vehicle:




P

- Place the vehicle in a location that is dark enough to clearly observe the cutoff line. The cutoff line is a distinct line, below which light from the fog lights can be observed and above which it cannot.
- Place the vehicle at a 90° angle to the wall.
- Create a 7.62 m (25 ft.) distance between the vehicle (fog light bulb center) and the wall.
- Make sure that the vehicle is on a level surface.
- Position the front wheels straight ahead.
- Bounce the vehicle up and down to settle the suspension.

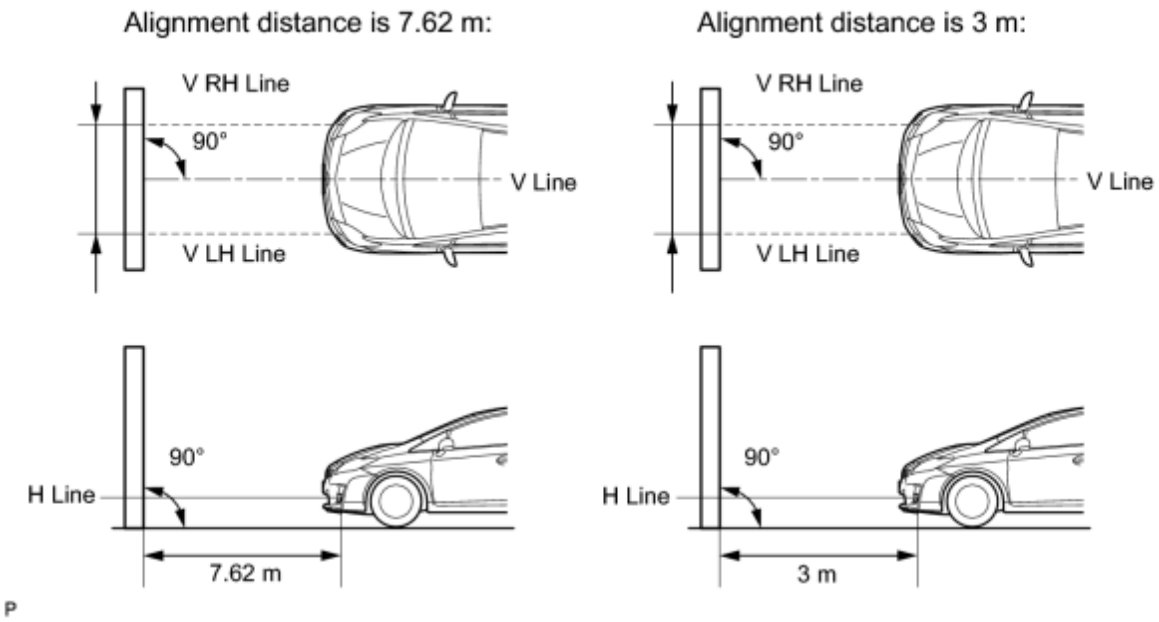
NOTICE:

A distance of 7.62 m (25 ft.) between the vehicle (fog light bulb center) and the wall is necessary for proper aim adjustment. If sufficient space is not available, secure a distance of exactly 3 m (9.84 ft.) to allow for checking and adjustment of fog light aim. (The size of the target zone will change with the distance, so follow the instructions in the illustration.)

(b) Prepare a piece of thick white paper (approximately 2 m (6.6 ft.) (height) x 4 m (13.1 ft.) (width)) to use as a screen.

(c) Draw a vertical line down the center of the screen (V line).

(d) Set the screen as shown in the illustration.




P

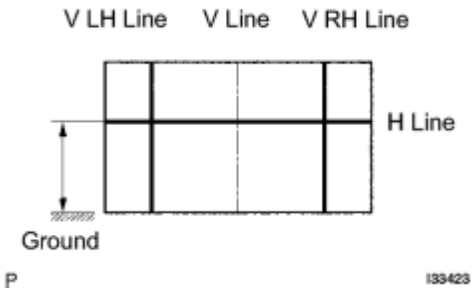
HINT:

- Stand the screen perpendicular to the ground.
- Align the V line on the screen with the center of the vehicle.

(e) Draw base lines (H, V LH, and V RH lines) on the screen as shown in the illustration.

HINT:

Mark the fog light bulb center marks on the screen. If the center mark cannot be observed on the fog light, use the center of the fog light bulb or the manufacturer's name marked on the fog light as the center mark.




P I33423

(1) H Line (Fog light height):

Draw a horizontal line across the screen so that it passes through the center marks. The H line should be at the same height as the fog light bulb center marks of the fog lights.

(2) V LH Line, V RH Line (Center mark position of left-hand (LH) and right-hand (RH) fog lights):

Draw two vertical lines so that they intersect the H line at each center mark (aligned with the center of the fog light bulbs).

3. INSPECT FOG LIGHT AIMING

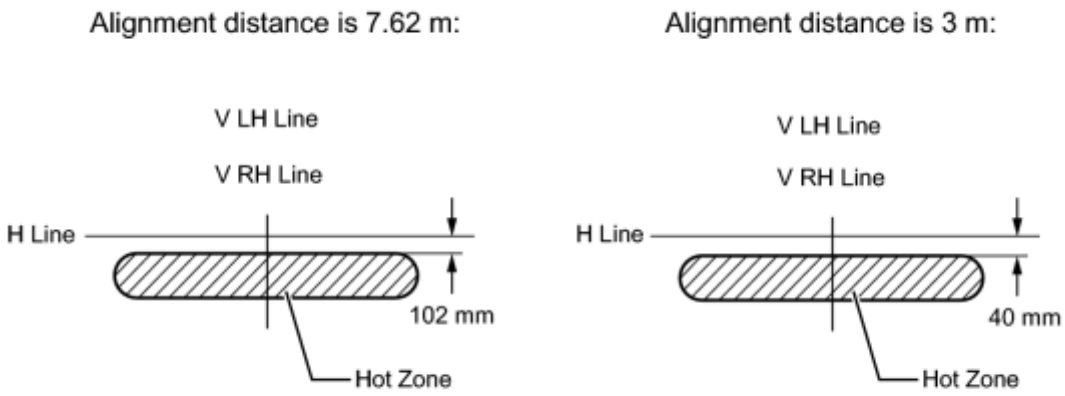
(a) Cover the fog light or disconnect the connector of the fog light on the opposite side to prevent light from the fog light that is not being inspected from affecting the fog light aiming inspection.

NOTICE:

Do not keep the fog light covered for more than 3 minutes. The fog light lens is made of synthetic resin, which may melt or be damaged due to excessive heat.

(b) Start the engine.

(c) Turn on the fog lights and check if the upper edge of the hot zone for each fog light matches the upper edge as shown in the illustration.




P

HINT:

- If the alignment distance is 7.62 m (25 ft.):

  The upper edge of the hot zone for the fog light should be 102 mm (4.02 in.) below the H line.

- If the alignment distance is 3 m (9.84 ft.):

  The upper edge of the hot zone for the fog light should be 40 mm (1.58 in.) below the H line.

4. ADJUST FOG LIGHT AIMING

(a) Adjust the aim vertically:

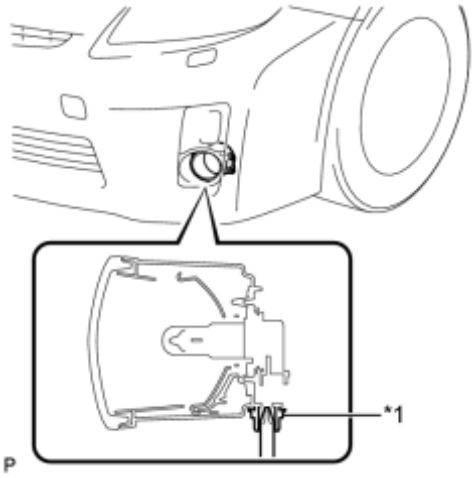
Adjust the aim of each fog light to the specified range by turning each aiming screw with a screwdriver.

# Text in Illustration

| | |
|---|---|
| *1 | Aiming Screw |

NOTICE:

The final turn of the aiming screw should be made in the clockwise




direction. If the screw is tightened excessively, loosen it and then retighten it, so that the final turn of the screw is in the clockwise direction.

HINT:

If it is not possible to correctly adjust fog light aim, check bulb, fog light unit and fog light unit reflector installation.

# REASSEMBLY

1. INSTALL FOG LIGHT BULB



P

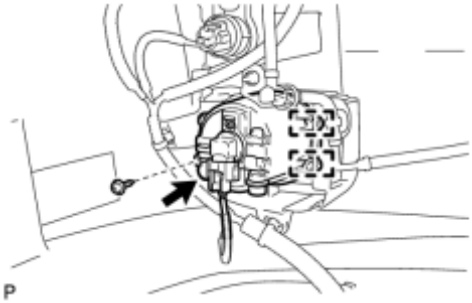
(a) Turn the fog light bulb in the direction indicated by the arrow shown in the illustration to install it.

NOTICE:

Do not touch the bulb glass.

# INSTALLATION

1. INSTALL FOG LIGHT ASSEMBLY




(a) Engage the 2 guides.

(b) Install the fog light assembly with the screw.

Torque: **3.0 N·m (31 kgf·cm, 27in·lbf)**

(c) Connect the connector.

2. INSTALL FRONT BUMPER ASSEMBLY INFO

3. INSTALL RADIATOR SUPPORT OPENING COVER INFO

4. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

5. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT INFO

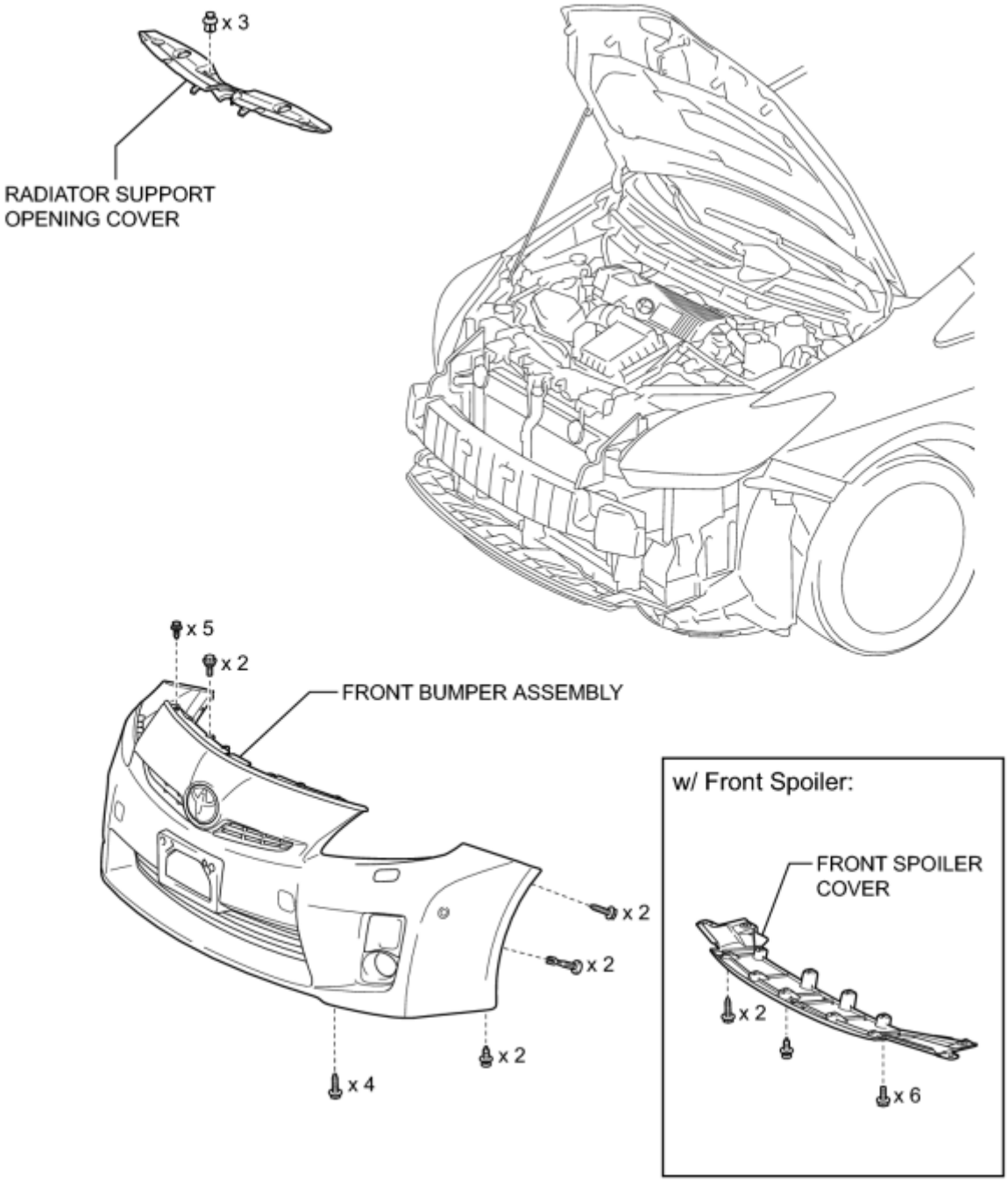
6. PREPARE FOR FOG LIGHT AIMING INFO

7. INSPECT FOG LIGHT AIMING INFO

8. ADJUST FOG LIGHT AIMING INFO

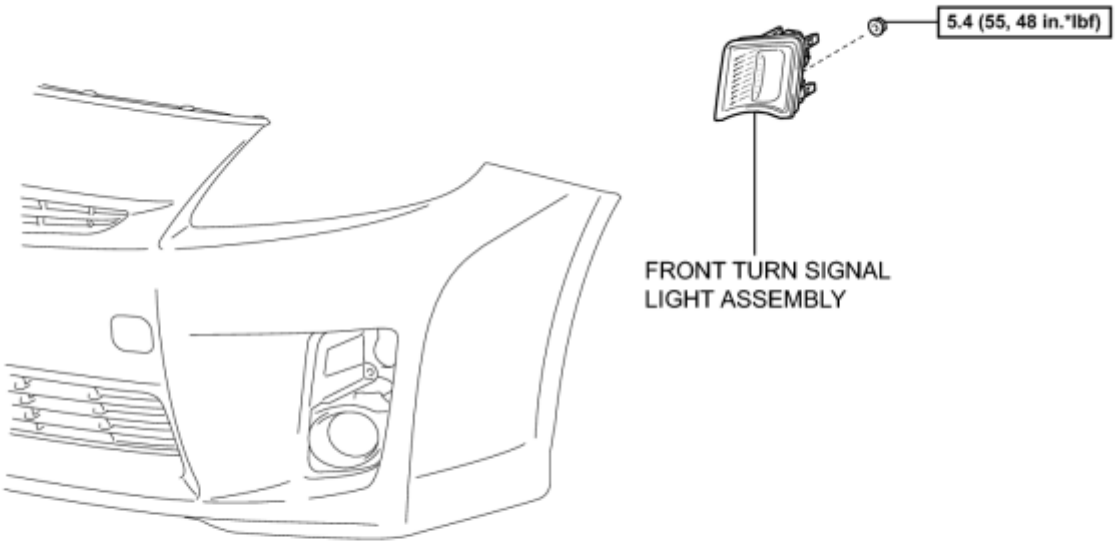
# COMPONENTS

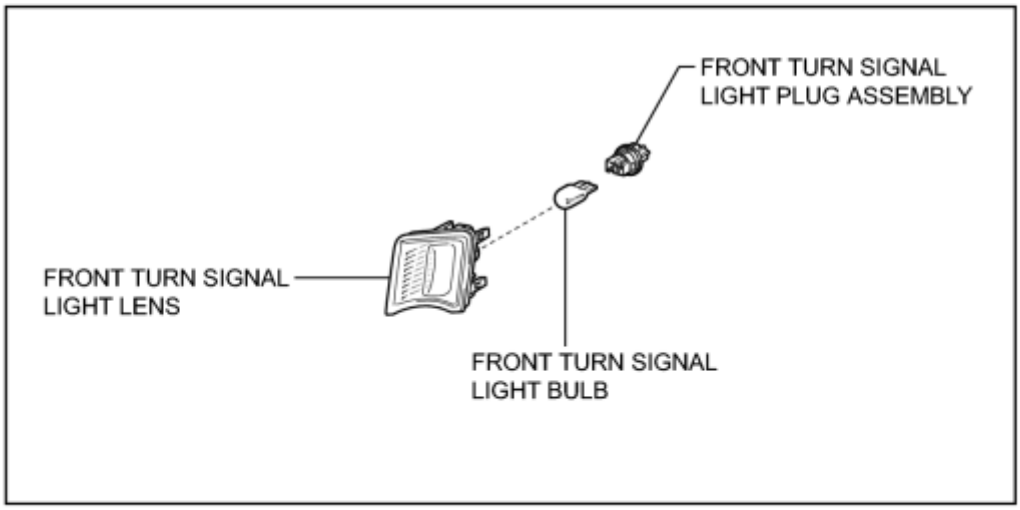
# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

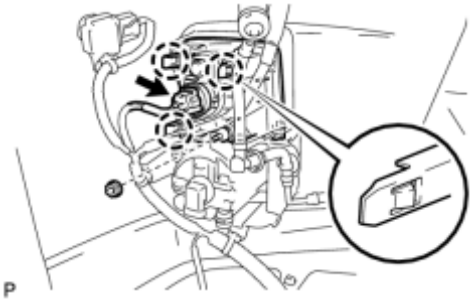
P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE FRONT TURN SIGNAL LIGHT ASSEMBLY

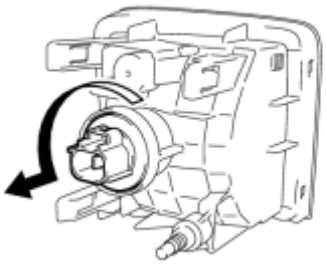


(a) Disconnect the connector.

(b) Remove the nut.

(c) Disengage the 3 claws and remove the front turn signal light assembly.

4. REMOVE FRONT TURN SIGNAL LIGHT BULB



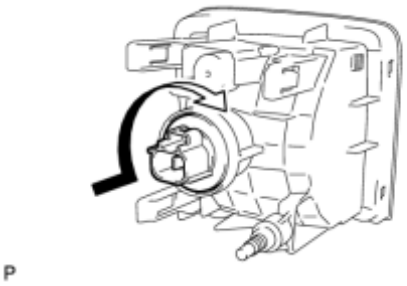
(a) Turn the front turn signal light bulb and front turn signal light plug assembly in the direction indicated by the arrow shown in the illustration, and remove them as a unit.

(b) Remove the front turn signal light bulb from the front turn signal light plug assembly.

# INSTALLATION

1. INSTALL FRONT TURN SIGNAL LIGHT BULB

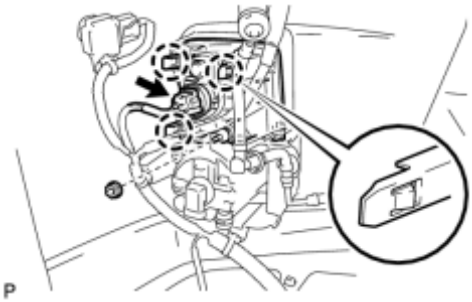
(a) Install the front turn signal light bulb to the front turn signal light plug assembly.



P

(b) Turn the front turn signal light bulb and front turn signal light plug assembly in the direction indicated by the arrow shown in the illustration and install them as a unit.

2. INSTALL FRONT TURN SIGNAL LIGHT ASSEMBLY



P

(a) Engage the 3 claws.

(b) Install the front turn signal light assembly with the nut.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

(c) Connect the connector.

3. INSTALL FRONT BUMPER ASSEMBLY INFO

4. INSTALL RADIATOR SUPPORT OPENING COVER INFO

5. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

6. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT (w/ Fog Light) INFO

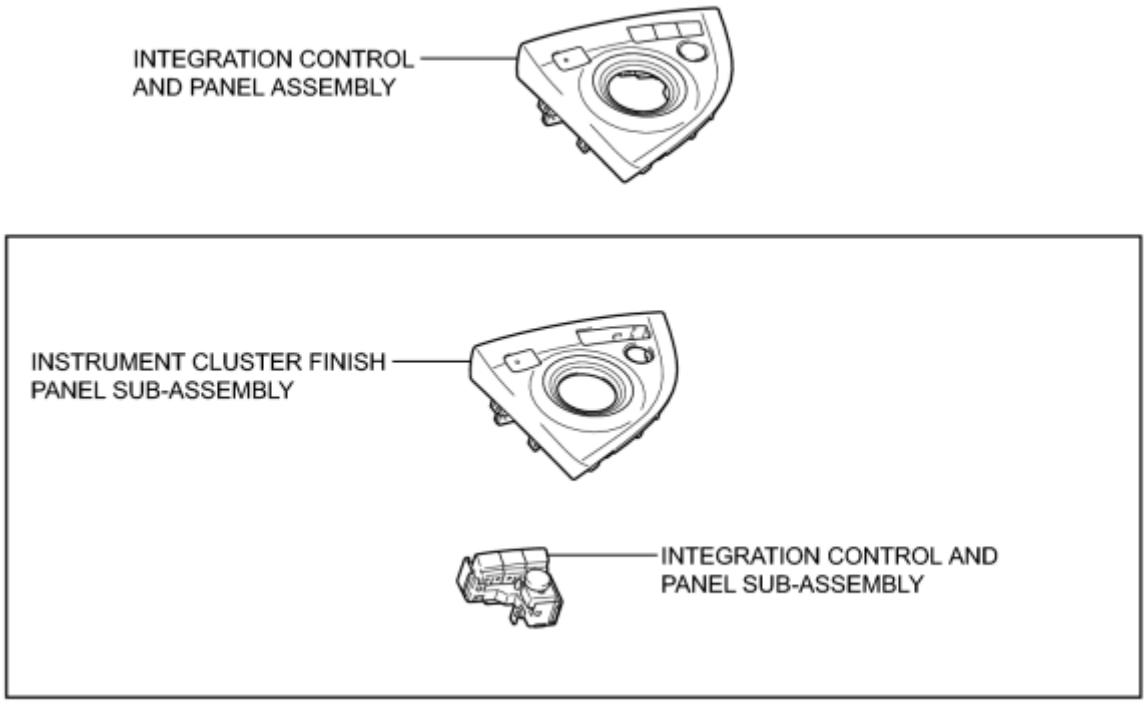
7. PREPARE FOR FOG LIGHT AIMING (w/ Fog Light) INFO

8. INSPECT FOG LIGHT AIMING (w/ Fog Light) INFO

9. ADJUST FOG LIGHT AIMING (w/ Fog Light) INFO

# COMPONENTS

# ILLUSTRATION

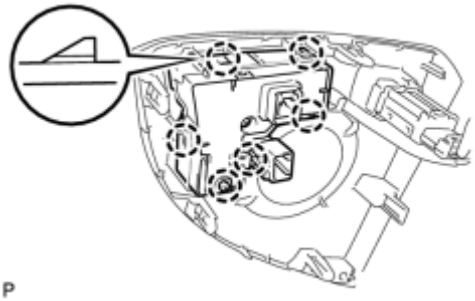



P

# REMOVAL

1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

2. REMOVE INTEGRATION CONTROL AND PANEL SUB-ASSEMBLY



P

(a) Using a screwdriver, disengage the 6 claws and remove the integration control and panel sub-assembly.

# INSPECTION

1. INSPECT INTEGRATION CONTROL AND PANEL SUB-ASSEMBLY

*1




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 8 (F) - 5 (E) | Hazard warning switch off | 10 kΩ or higher |
| | Hazard warning switch on | Below 1 Ω |

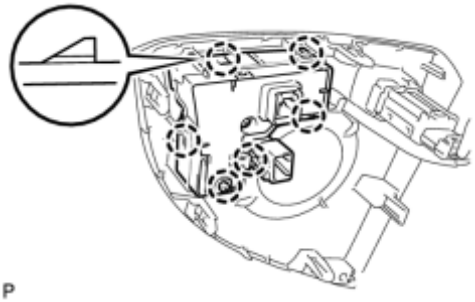
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Integration Control and Panel Sub-assembly) |

If the result is not as specified, replace the integration control and panel sub-assembly.

# INSTALLATION

1. INSTALL INTEGRATION CONTROL AND PANEL SUB-ASSEMBLY



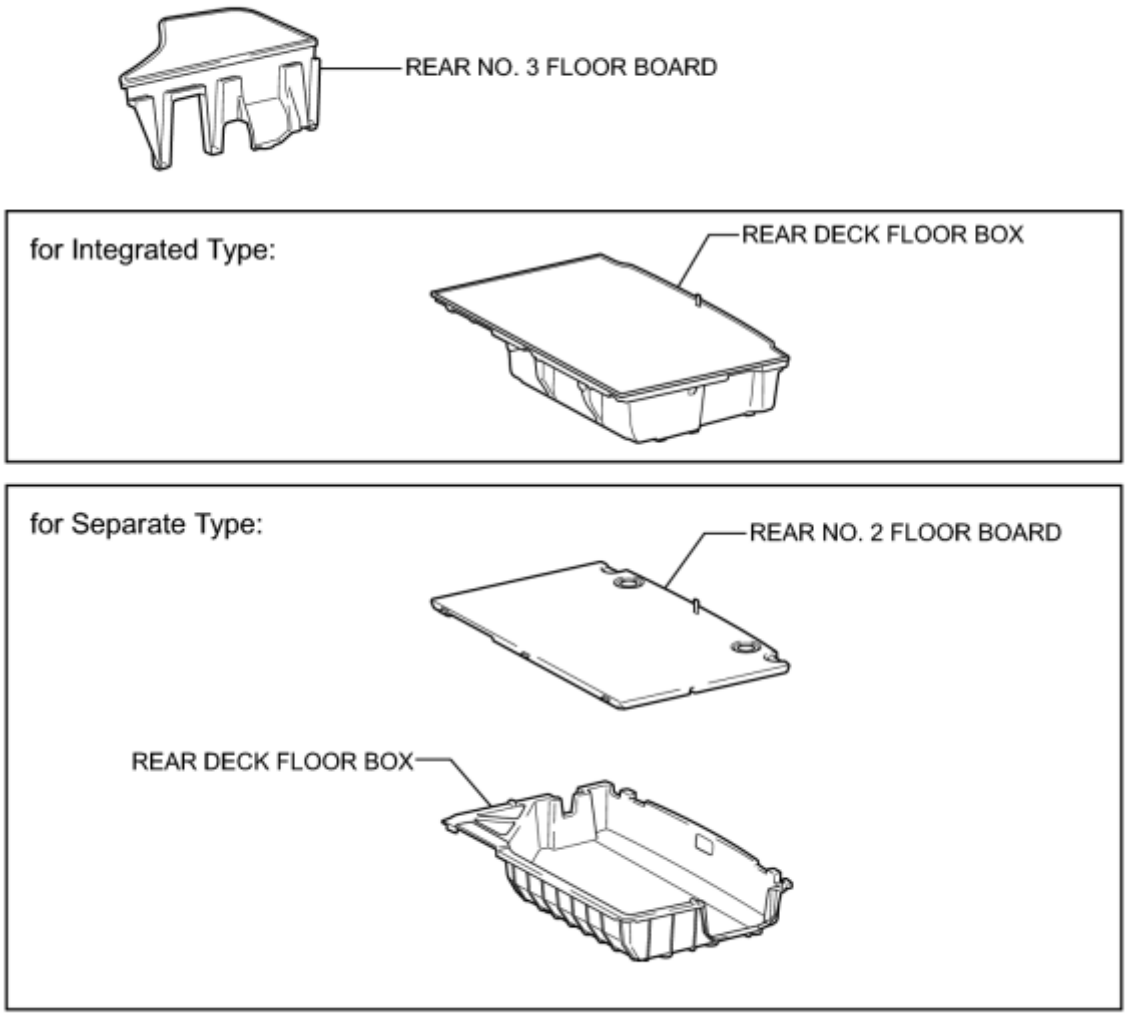
P

(a) Engage the 6 claws and install the integration control and panel sub-assembly.

2. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

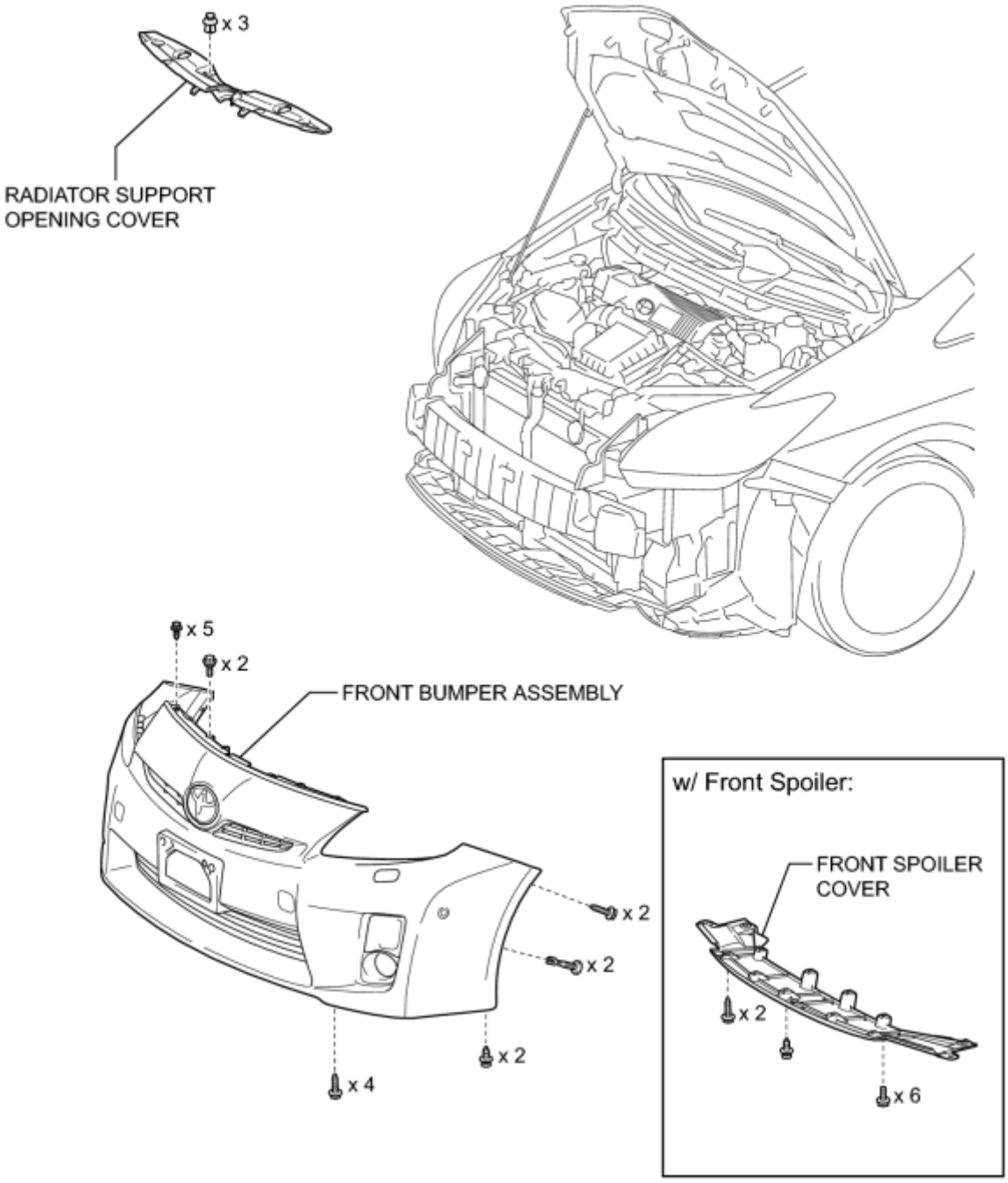
# COMPONENTS

# ILLUSTRATION



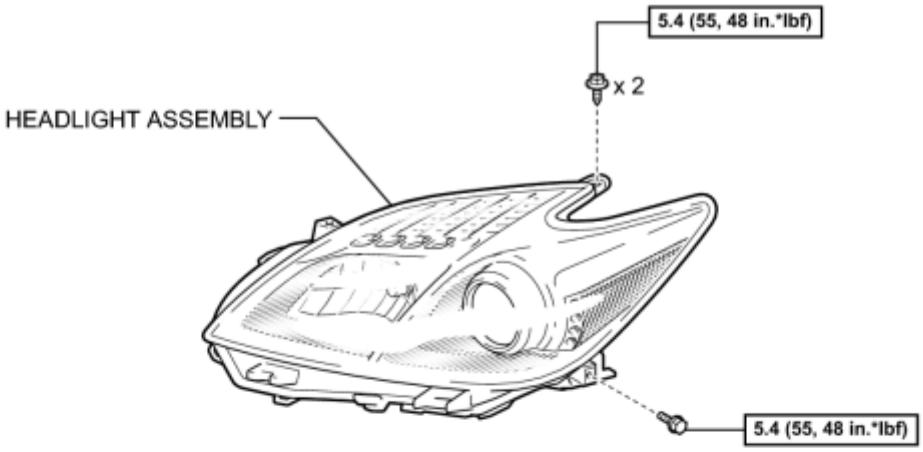

P

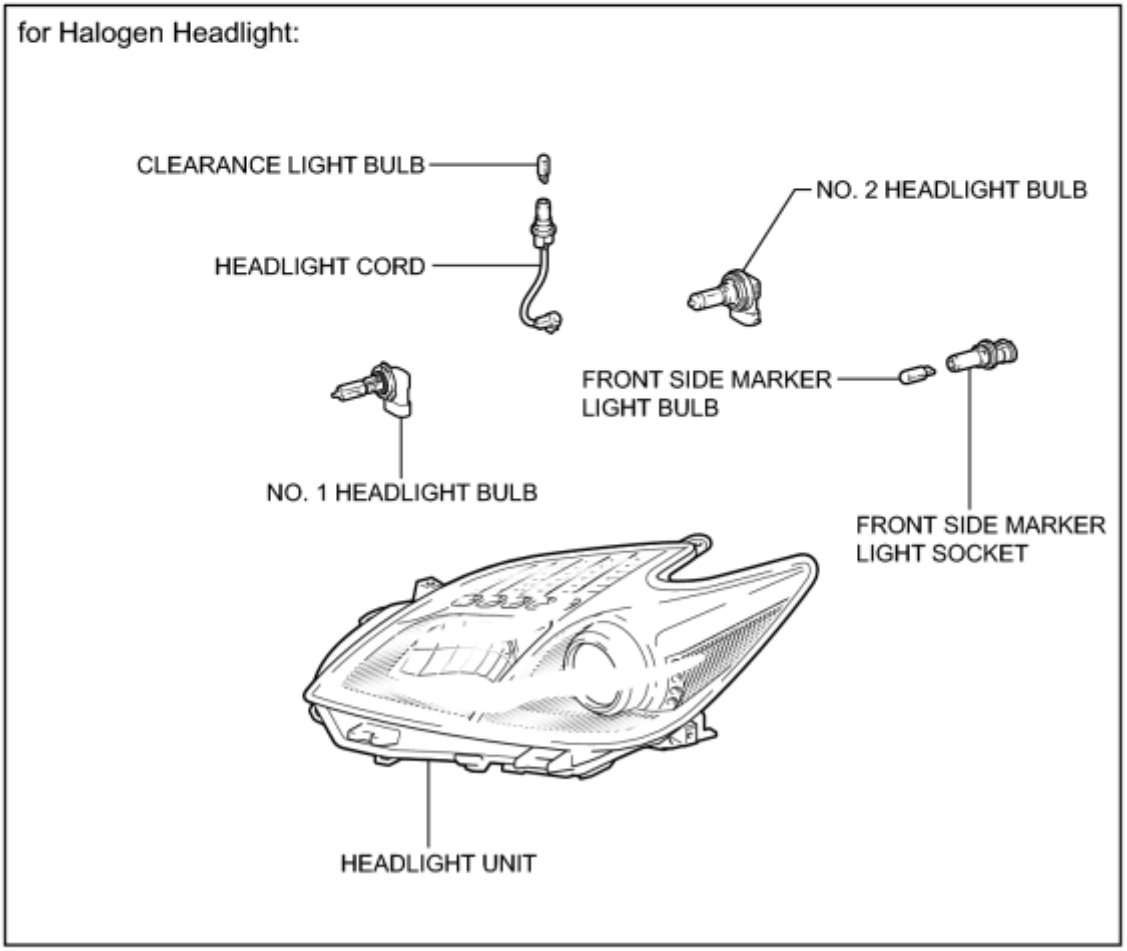
# ILLUSTRATION




P

# ILLUSTRATION



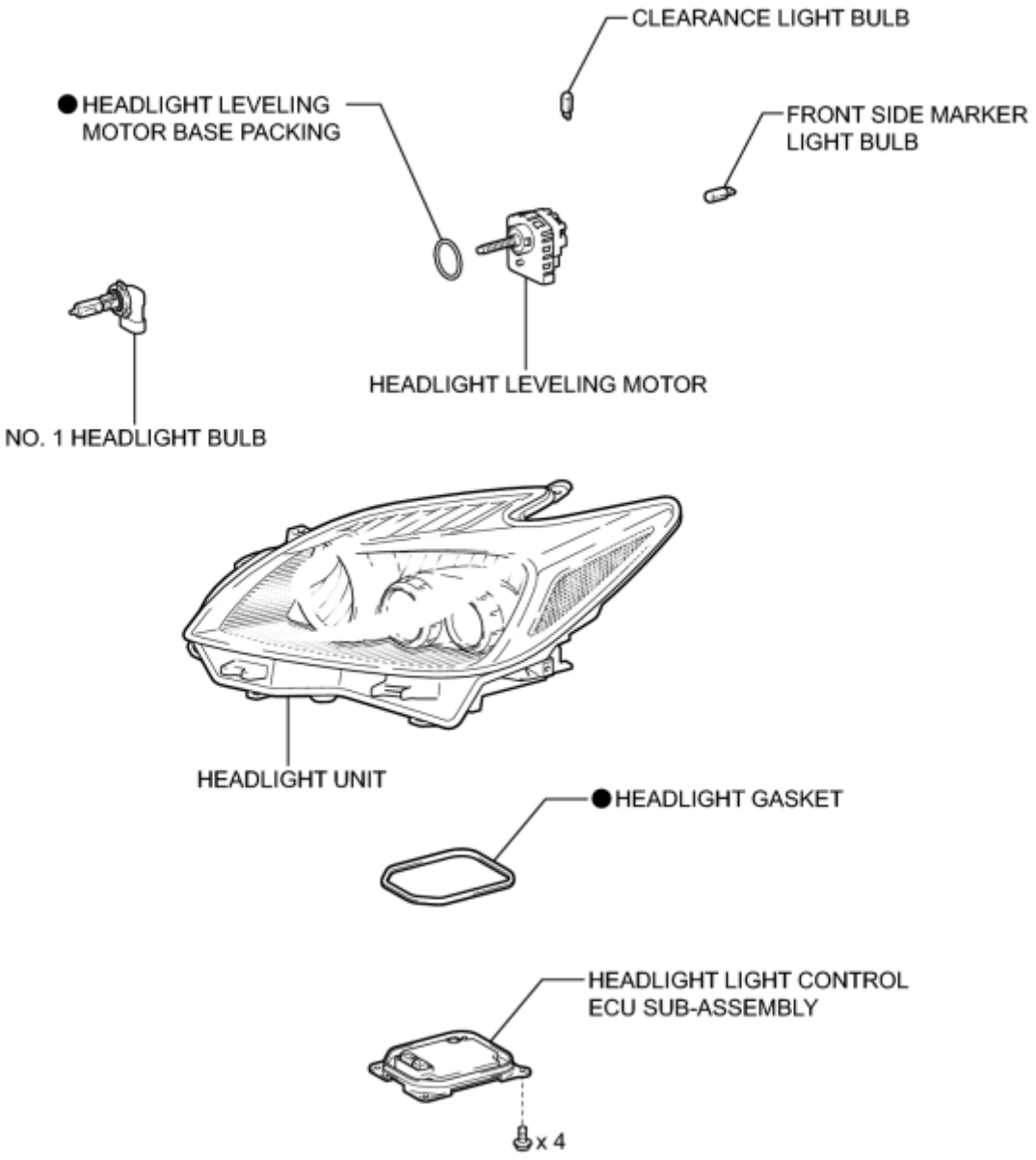




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION

for LED Headlight:

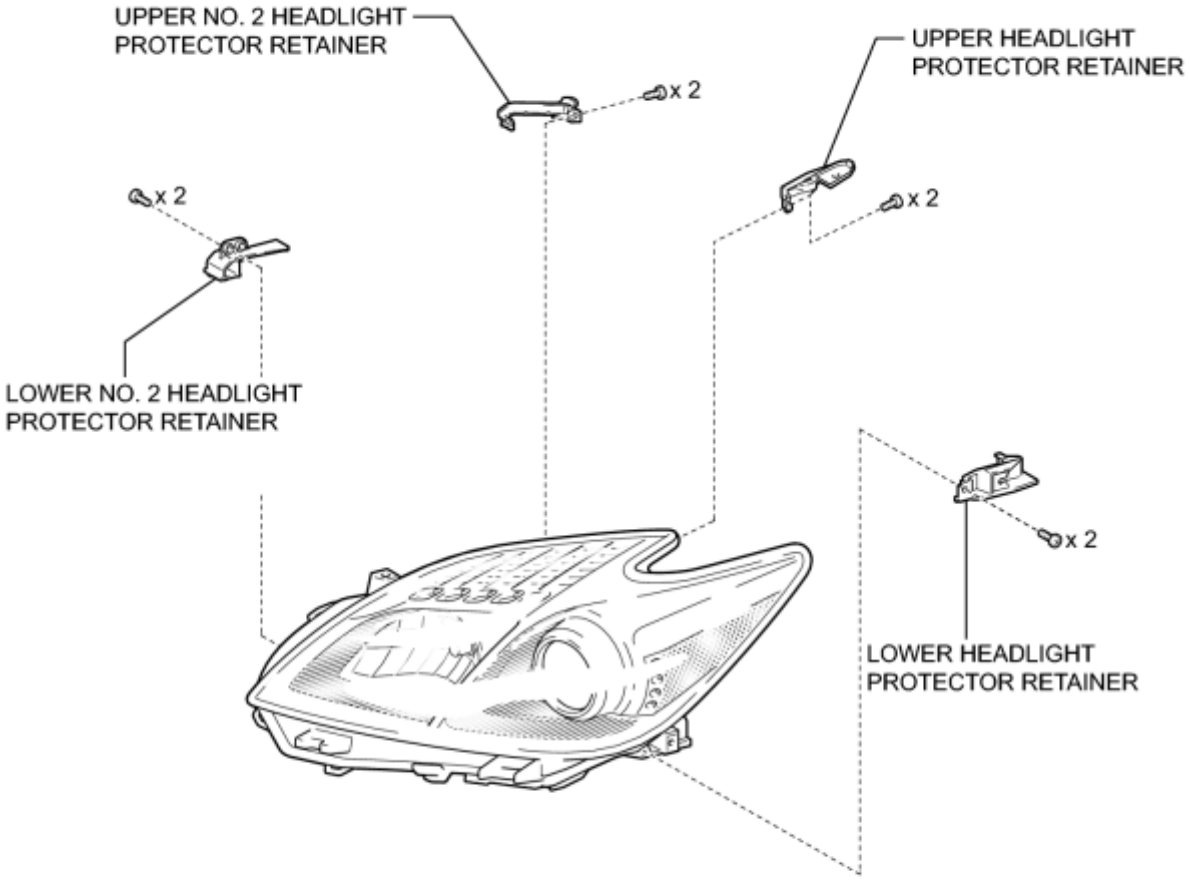



● Non-reusable part

P

# ILLUSTRATION

Bracket for Repair:




P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

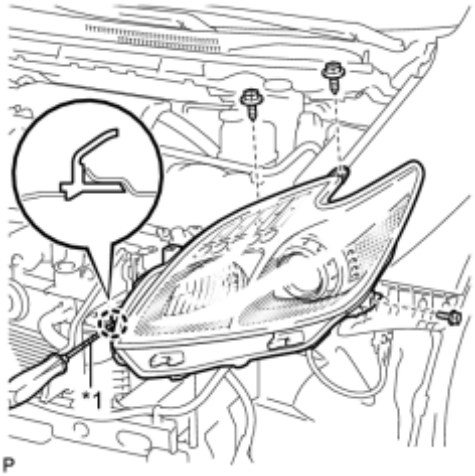
NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE RADIATOR SUPPORT OPENING COVER INFO

6. REMOVE FRONT BUMPER ASSEMBLY INFO

7. REMOVE HEADLIGHT ASSEMBLY



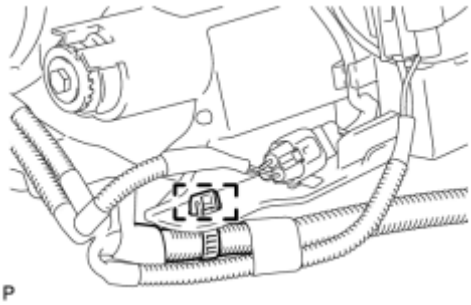

(a) Remove the bolt and 2 screws.

(b) Using a screwdriver wrapped with protective tape, disengage the claw.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

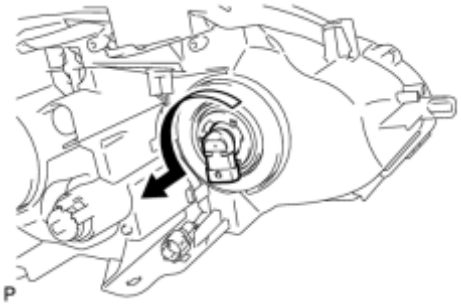
(c) Disengage the clamp.




(d) Disconnect each connector and remove the headlight assembly.

# DISASSEMBLY

1. REMOVE NO. 1 HEADLIGHT BULB

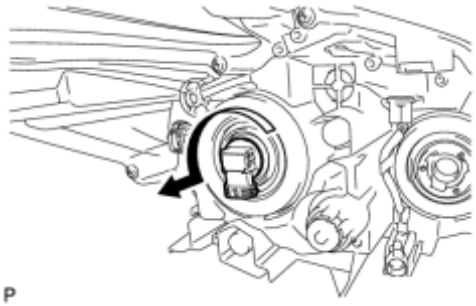


(a) Turn the No. 1 headlight bulb in the direction indicated by the arrow shown in the illustration, and remove it.

NOTICE:

Do not touch the bulb glass.

2. REMOVE NO. 2 HEADLIGHT BULB (for Halogen Headlight)

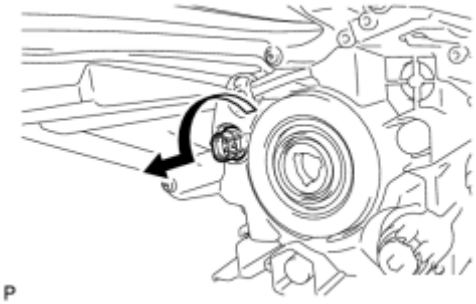


(a) Turn the No. 2 headlight bulb in the direction indicated by the arrow shown in the illustration, and remove it.

NOTICE:

Do not touch the bulb glass.

3. REMOVE FRONT SIDE MARKER LIGHT BULB (for Halogen Headlight)

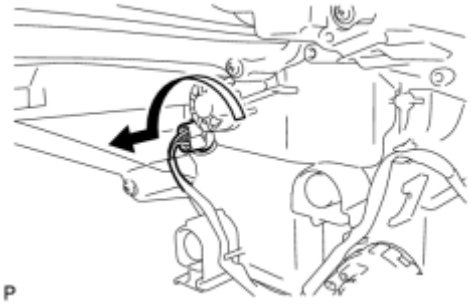


(a) Turn the front side marker light bulb and front side marker light socket in the direction indicated by the arrow shown in the illustration, and remove them as a unit.

(b) Remove the front side marker light bulb from the front side marker light socket.

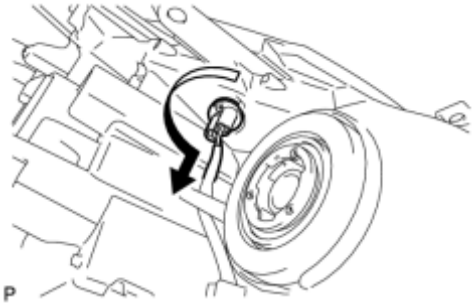
4. REMOVE FRONT SIDE MARKER LIGHT BULB (for LED Headlight)

(a) Turn the front side marker light bulb and headlight cord in the direction indicated by the arrow shown in the illustration, and disconnect them as a unit.



(b) Remove the front side marker light bulb from the front side marker light socket.

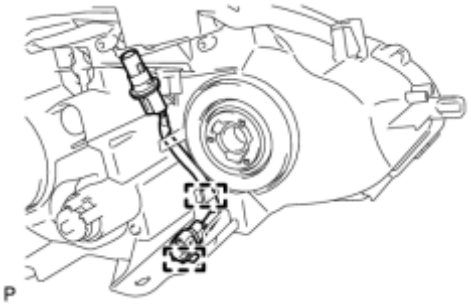
5. REMOVE CLEARANCE LIGHT BULB



(a) Turn the clearance light bulb and headlight cord in the direction indicated by the arrow shown in the illustration, and disconnect them as a unit.

(b) Remove the clearance light bulb from the clearance light socket.

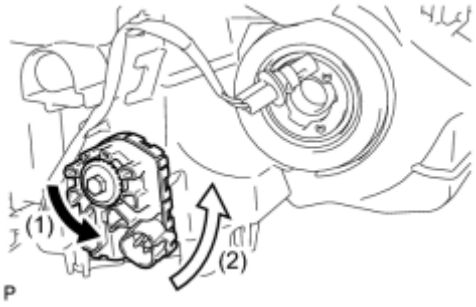
6. REMOVE HEADLIGHT CORD (for Halogen Headlight)



(a) Disengage the 2 clamps and remove the headlight cord.

7. REMOVE HEADLIGHT LEVELING MOTOR (for LED Headlight)

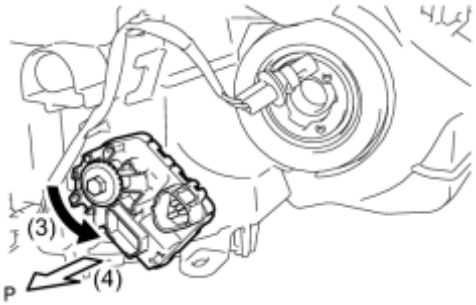
(a) Turn the aiming screw of the headlight leveling motor in the direction indicated by the arrow (1) shown in the illustration.




(b) Turn the headlight leveling motor in the direction indicated by the arrow (2) shown in the illustration to release it.

HINT:

When removing the headlight leveling motor of the headlight assembly RH, turn the headlight leveling motor in the opposite direction indicated by the arrow (2) shown in the illustration.




(c) Turn the aiming screw of the headlight leveling motor in the direction indicated by the arrow (3) shown in the illustration to disengage the shaft.

(d) Pull out the headlight leveling motor in the direction indicated by the arrow (4) shown in the illustration to remove it.

8. REMOVE HEADLIGHT LEVELING MOTOR BASE PACKING (for LED Headlight)

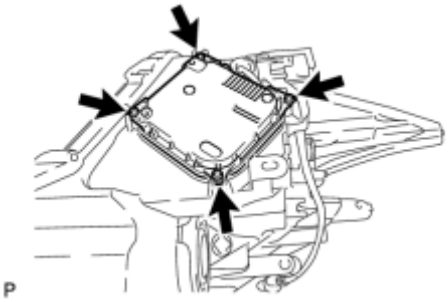
(a) Remove the headlight leveling motor base packing.

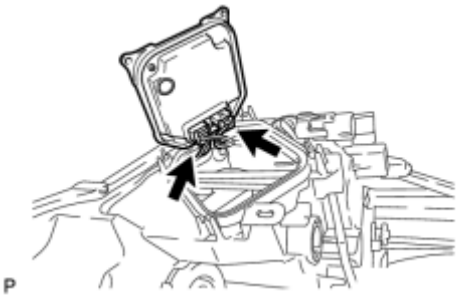
NOTICE:

After the headlight leveling motor base packing is removed, be sure to replace it with a new one. Failure to do this may cause water ingress.

9. REMOVE HEADLIGHT LIGHT CONTROL ECU SUB-ASSEMBLY (for LED Headlight)

(a) Remove the 4 screws and disconnect the headlight light control ECU sub-assembly.





(b) Disconnect the 2 connectors and remove the headlight light control ECU sub-assembly.

10. REMOVE HEADLIGHT GASKET (for LED Headlight)

(a) Remove the headlight gasket.

NOTICE:

After the headlight gasket is removed, be sure to replace it with a new one. Failure to do this may cause water ingress.

# ADJUSTMENT

HINT:

It is possible that a bulb is incorrectly installed, affecting headlight aim. Bulb installation should be considered prior to performing the adjustment procedure.

1. PREPARE VEHICLE FOR HEADLIGHT AIM ADJUSTMENT

(a) Prepare the vehicle:

- Ensure there is no damage or deformation to the body around the headlights.
- Fill the fuel tank.
- Make sure that the oil is filled to the specified level.
- Make sure that the coolant is filled to the specified level.
- Inflate the tires to the appropriate pressure.
- Unload the trunk and vehicle, ensuring that the spare tire, tools and jack are in their original positions.
- Sit a person of average weight (68 kg, 150 lb) in the driver's seat.

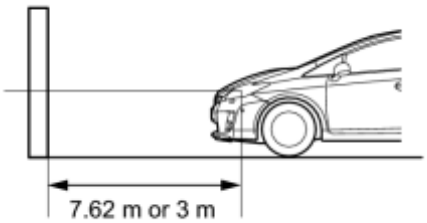
2. PREPARE FOR HEADLIGHT AIMING (Using a headlight aim test machine)

(a) Adjust the headlight aim in accordance with the headlight aim test machine instructions.

3. PREPARE FOR HEADLIGHT AIMING (Using a screen)

(a) Prepare the vehicle:

- Place the vehicle in a location that is dark enough to clearly observe the cutoff line. The cutoff line is a distinct line, below which light from the headlights can be observed and above which it cannot.
- Place the vehicle at a 90° angle to the wall.
- Create a 7.62 m (25 ft.) distance between the vehicle (headlight bulb center) and the wall.
- Make sure that the vehicle is on a level surface.
- Position the front wheels straight ahead.
- Bounce the vehicle up and down to settle the suspension.




P

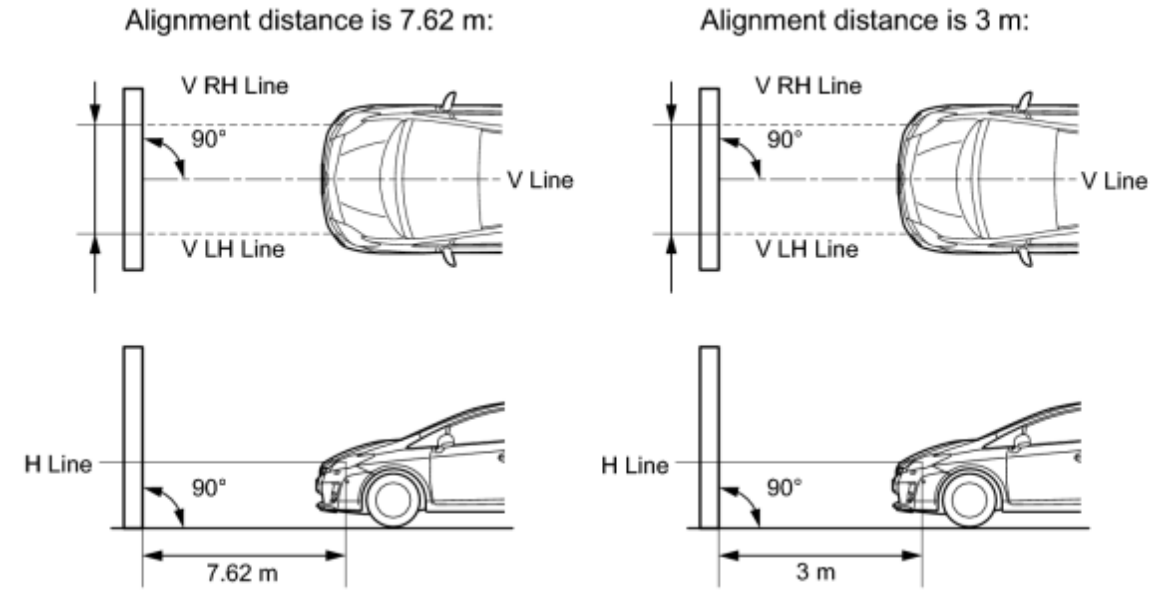
NOTICE:

A distance of 7.62 m (25 ft.) between the vehicle (headlight bulb center) and the wall is necessary for proper aim adjustment. If sufficient space is not available, secure a distance of exactly 3 m (9.84 ft.) to allow for checking and adjustment of headlight aim. (The size of the target zone will change with the distance, so follow the instructions in the illustration.)

(b) Prepare a piece of thick white paper (approximately 2 m (6.6 ft.) (height) x 4 m (13.1 ft.) (width)) to use as a screen.

(c) Draw a vertical line down the center of the screen (V line).

(d) Set the screen as shown in the illustration.



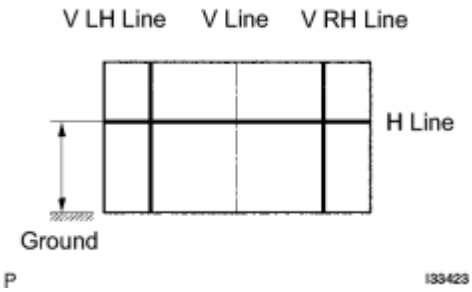

P

HINT:

- Stand the screen perpendicular to the ground.
- Align the V line on the screen with the center of the vehicle.

(e) Draw base lines (H, V LH, and V RH lines) on the screen as shown in the illustration.

- The base lines differ for "low beam inspection" and "high beam inspection".
- Mark the headlight bulb center marks on the screen. If the center mark cannot be observed on the headlight, use the center of the headlight bulb or the manufacturer's name marked on the headlight as the center mark.




P

(1) H Line (Headlight height):

Draw a horizontal line across the screen so that it passes through the center marks. The H line should be at the same height as the headlight bulb center marks of the low beam headlights.

(2) V LH Line, V RH Line (Center mark position of left-hand (LH) and right-hand (RH) headlights):

Draw two vertical lines so that they intersect the H line at each center mark (aligned with the center of the low beam headlight bulbs).

4. INSPECT HEADLIGHT AIMING

(a) Cover the headlight or disconnect the connector of the headlight on the opposite side to prevent light from the headlight that is not being inspected from affecting the headlight aiming inspection.

NOTICE:

Do not keep the headlight covered for more than 3 minutes. The headlight lens is made of synthetic resin, which may melt or be damaged due to excessive heat.

HINT:

When checking the aim of the high beam, cover the low beam or disconnect the connector.

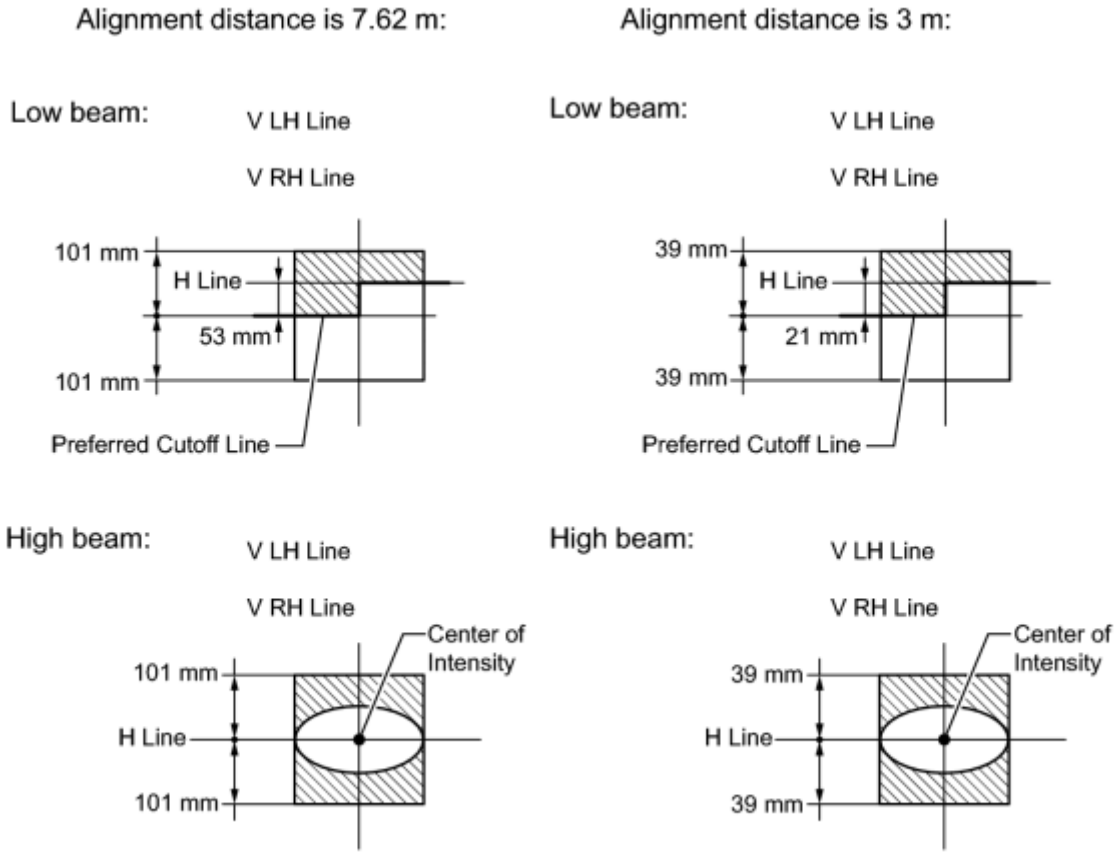
(b) Start the engine.

(c) Turn on the headlights and check the aiming of each beam.

HINT:

Preferred position for the low beam: Matches preferred cutoff line shown in the illustration

Preferred position for the high beam: Matches center of intensity shown in the illustration




P

HINT:

- Since the low beam light and the high beam light are a unit, if the aim on the low beam is correct, the high beam should also be correct. However, check both beams just to make sure.
- If the alignment distance is 7.62 m (25 ft.):

  The left half of the low beam cutoff line should be within 101 mm (3.97 in.) above or below a line drawn 53 mm (2.09 in.) below the H line (SAEJ599).

- If the alignment distance is 3 m (9.84 ft.):

  The left half of the low beam cutoff line should be within 39 mm (1.56 in.) above or below a line drawn 21 mm (0.825 in.) below the H line (SAEJ599).

- If the alignment distance is 7.62 m (25 ft.):

  The high beam center of intensity should be within 101 mm (3.97 in.) above or below the H line (SAE J599).

- If the alignment distance is 3 m (9.84 ft.):

  The high beam center of intensity should be within 39 mm (1.56 in.) above or below the H line (SAE J599).

- If the alignment distance is 7.62 m (25 ft.):

  The left half of the low beam cutoff line should be 53 mm (2.09 in.) below the H line (preferred cutoff line target).

- If the alignment distance is 3 m (9.84 ft.):

  The left half of the low beam cutoff line should be 21 mm (0.825 in.) below the H line (preferred cutoff line target).

- If the alignment distance is 7.62 m (25 ft.):

  The high beam center of intensity should be on the H line (preferred center of intensity).

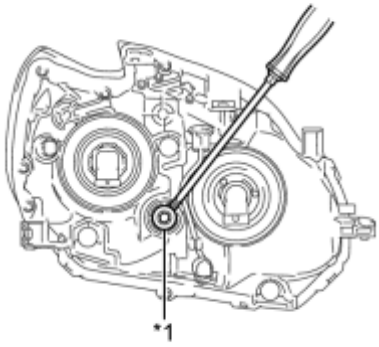
- If the alignment distance is 3 m (9.84 ft.):

  The high beam center of intensity should be on the H line (preferred center of intensity).

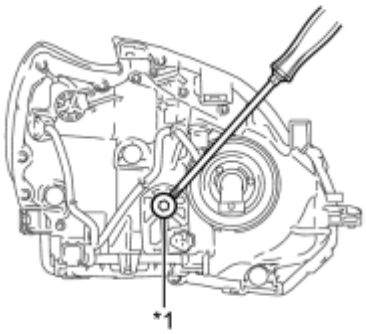
5. ADJUST HEADLIGHT AIMING

(a) Adjust the aim vertically:

for Halogen Headlight:




for LED Headlight:




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Aiming Screw | - | - |

Adjust the aim of each headlight to the specified range by turning each aiming screw with a screwdriver.

NOTICE:

The final turn of the aiming screw should be made in the clockwise direction. If the screw is tightened excessively, loosen it and then retighten it, so that the final turn of the screw is in the clockwise direction.

HINT:

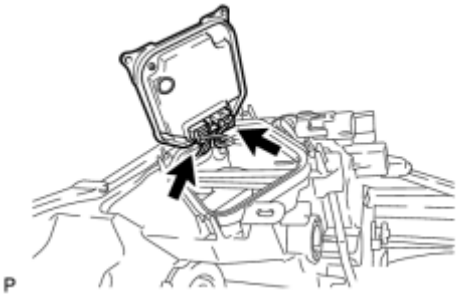
- Since the low beam light and the high beam light are a unit, if the aim on the low beam is correct, the high beam should also be correct. However, check both beams just to make sure.
- If it is not possible to correctly adjust headlight aim, check bulb, headlight unit and headlight unit reflector installation.
- The headlight aim moves down when turning the aiming screw clockwise, and moves up when turning the aiming screw counterclockwise.
- Confirm the direction of rotation of the aiming screw by observing it while it is being adjusted. Due to the position of the screwdriver, the direction of rotation of the adjusting screw can be different than the direction of rotation of the screwdriver being used to adjust it.

# REASSEMBLY

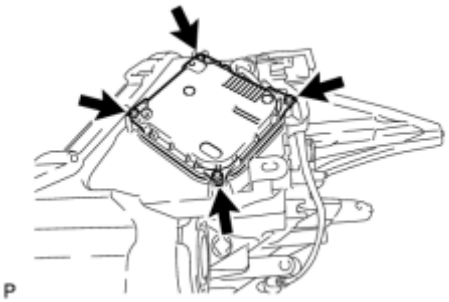
1. INSTALL HEADLIGHT GASKET (for LED Headlight)

(a) Install a new headlight gasket.

2. INSTALL HEADLIGHT LIGHT CONTROL ECU SUB-ASSEMBLY (for LED Headlight)



(a) Connect the 2 connectors.

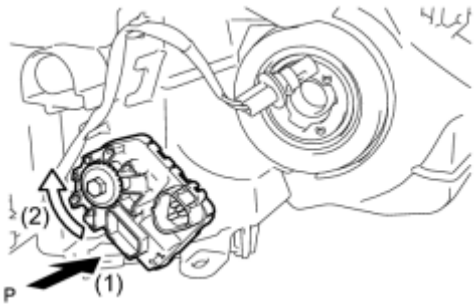


(b) Install the headlight light control ECU sub-assembly with the 4 screws.

3. INSTALL HEADLIGHT LEVELING MOTOR BASE PACKING (for LED Headlight)

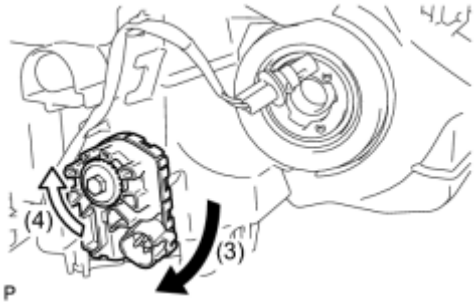
(a) Install a new headlight leveling motor base packing.

4. INSTALL HEADLIGHT LEVELING MOTOR (for LED Headlight)




(a) Insert the headlight leveling motor in the direction indicated by the arrow (1) shown in the illustration.

(b) Turn the aiming screw of the headlight leveling motor in the direction indicated by the arrow (2) shown in the illustration to engage the shaft.



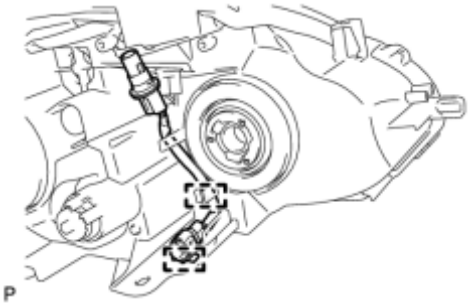

(c) Turn the headlight leveling motor in the direction indicated by the arrow (3) shown in the illustration.

HINT:

When installing the headlight leveling motor of the headlight assembly RH, turn the headlight leveling motor in the opposite direction indicated by the arrow (3) shown in the illustration.

(d) Turn the aiming screw of the headlight leveling motor in the direction indicated by the arrow (4) shown in the illustration to install it.

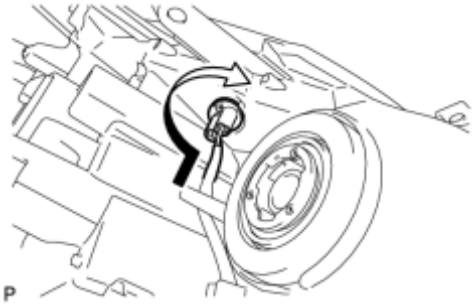
5. INSTALL HEADLIGHT CORD (for Halogen Headlight)




(a) Engage the 2 clamps and install the headlight cord.

6. INSTALL CLEARANCE LIGHT BULB

(a) Install the clearance light bulb to the headlight cord.

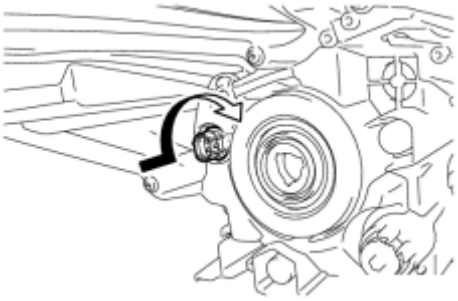



(b) Turn the clearance light bulb and headlight cord in the direction indicated by the arrow shown in the illustration and install them as a unit.

7. INSTALL FRONT SIDE MARKER LIGHT BULB (for Halogen Headlight)

(a) Install the front side marker light bulb to the front side marker light socket.

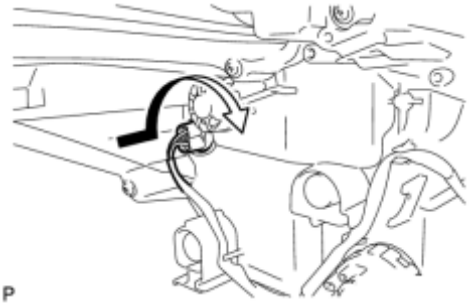
(b) Turn the front side marker light bulb and front side marker light socket in the direction indicated by the arrow shown in the illustration and install them as a unit.



P

8. INSTALL FRONT SIDE MARKER LIGHT BULB (for LED Headlight)

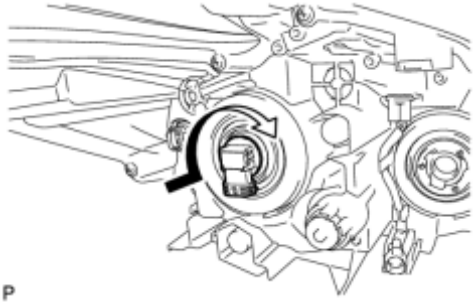
(a) Install the front side marker light bulb to the headlight cord.



P

(b) Turn the front side marker light bulb and headlight cord in the direction indicated by the arrow shown in the illustration and install them as a unit.

9. INSTALL NO. 2 HEADLIGHT BULB (for Halogen Headlight)



P

(a) Turn the No. 2 headlight bulb in the direction indicated by the arrow shown in the illustration to install it.

NOTICE:

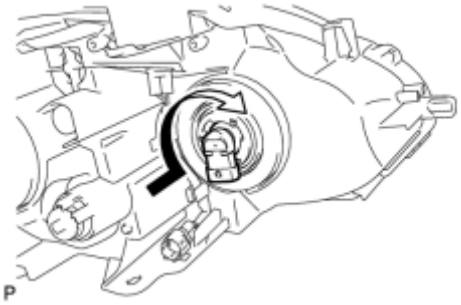
Do not touch the bulb glass.

10. INSTALL NO. 1 HEADLIGHT BULB

(a) Turn the No. 1 headlight bulb in the direction indicated by the arrow shown in the illustration to install it.

NOTICE:

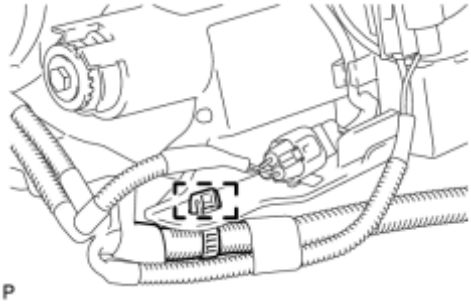
Do not touch the bulb glass.


P

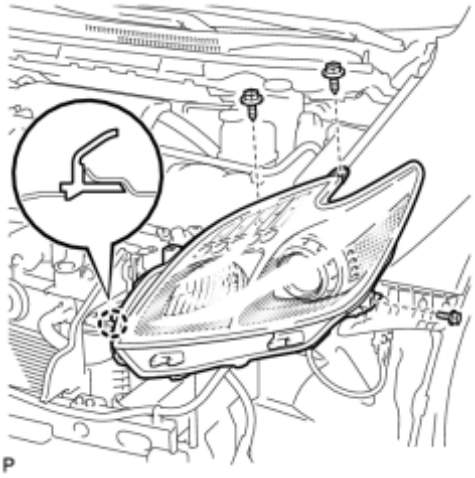
# INSTALLATION

1. INSTALL HEADLIGHT ASSEMBLY

(a) Connect each connector.



(b) Engage the clamp.



(c) Engage the claw.

(d) Install the headlight assembly with the bolt and 2 screws.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

2. INSTALL FRONT BUMPER ASSEMBLY INFO

3. INSTALL RADIATOR SUPPORT OPENING COVER INFO

4. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. INSTALL REAR NO. 3 FLOOR BOARD INFO

7. INSTALL REAR DECK FLOOR BOX INFO

8. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

9. PREPARE VEHICLE FOR HEADLIGHT AIM ADJUSTMENT INFO

10. PREPARE FOR HEADLIGHT AIMING (Using a headlight aim test machine) INFO

11. PREPARE FOR HEADLIGHT AIMING (Using a screen) INFO

12. INSPECT HEADLIGHT AIMING INFO

13. ADJUST HEADLIGHT AIMING INFO

14. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT (w/ Fog Light) INFO

15. PREPARE FOR FOG LIGHT AIMING (w/ Fog Light) INFO

16. INSPECT FOG LIGHT AIMING (w/ Fog Light) INFO

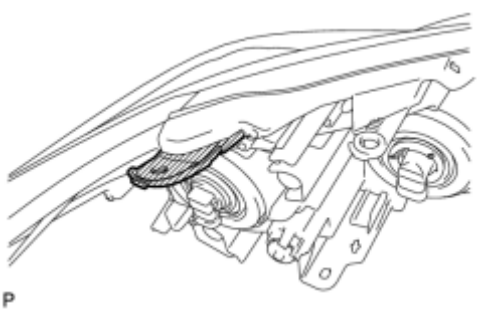
17. ADJUST FOG LIGHT AIMING (w/ Fog Light) INFO

# REPAIR

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.
- If the installation area of the headlight assembly is damaged, use the supply retainer for low-cost repair.
- Ensure that the headlight assembly is not damaged.

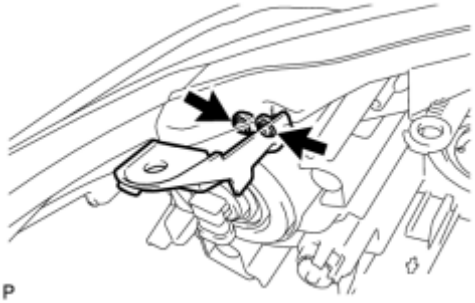
1. INSTALL UPPER HEADLIGHT PROTECTOR RETAINER




(a) Cut off the part shaded in the illustration and sand smooth with sandpaper.

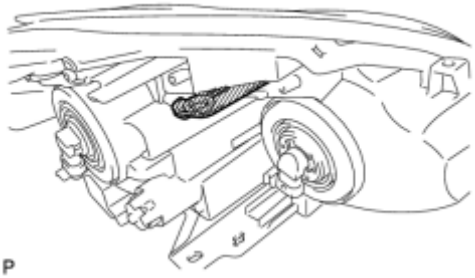
NOTICE:

After cutting off the part, place the upper headlight protector retainer against the bosses and gradually file away the old bracket if it interferes with the installation of the supply retainer.




(b) Install the upper headlight protector retainer with the 2 screws.

2. INSTALL UPPER NO. 2 HEADLIGHT PROTECTOR RETAINER

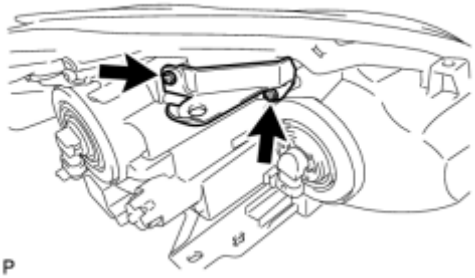



(a) Cut off the part shaded in the illustration and sand smooth with sandpaper.

NOTICE:

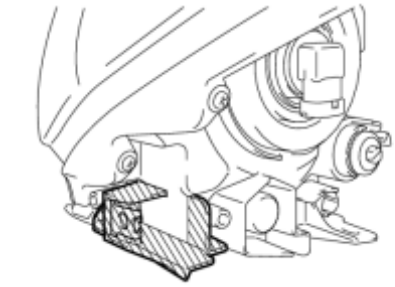
After cutting off the part, place the upper headlight protector retainer against the bosses and gradually file away the old bracket if it interferes with the installation of the supply retainer.

(b) Install the upper No. 2 headlight protector retainer with the 2 screws.



P

3. INSTALL LOWER HEADLIGHT PROTECTOR RETAINER

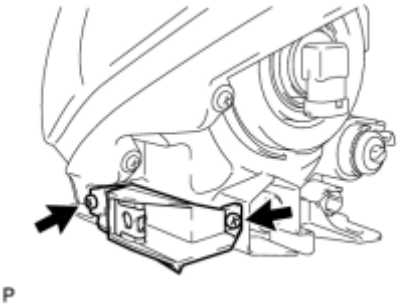


P

(a) Cut off the part shaded in the illustration and sand smooth with sandpaper.

NOTICE:

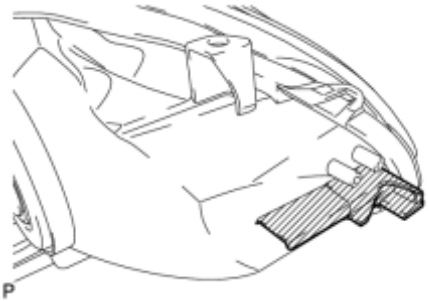
After cutting off the part, place the lower headlight protector retainer against the bosses and gradually file away the old bracket if it interferes with the installation of the supply retainer.



P

(b) Install the lower headlight protector retainer with the 2 screws.

4. INSTALL LOWER NO. 2 HEADLIGHT PROTECTOR RETAINER



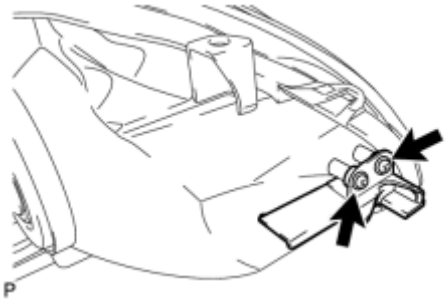
P

(a) Cut off the part shaded in the illustration and sand smooth with sandpaper.

NOTICE:

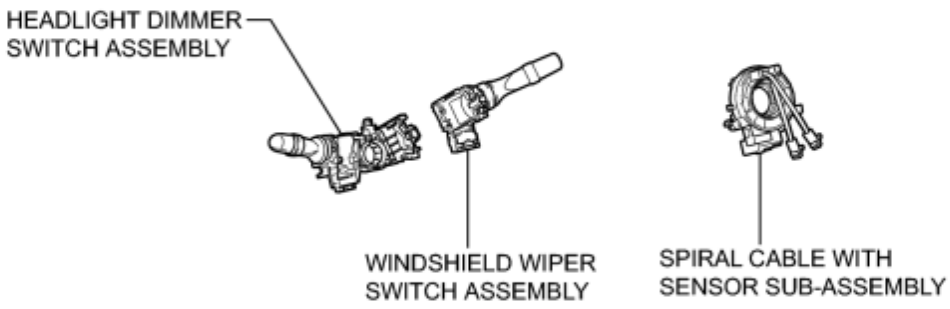
After cutting off the part, place the lower headlight protector retainer against the bosses and gradually file away the old bracket if it interferes with the installation of the supply retainer.

(b) Install the lower No. 2 headlight protector retainer with the 2 screws.


P

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

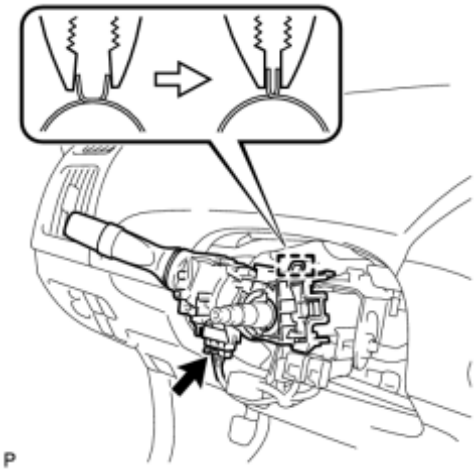
1. REMOVE SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

HINT:

Refer to the procedure up to Remove Spiral Cable with Sensor Sub-assembly INFO.

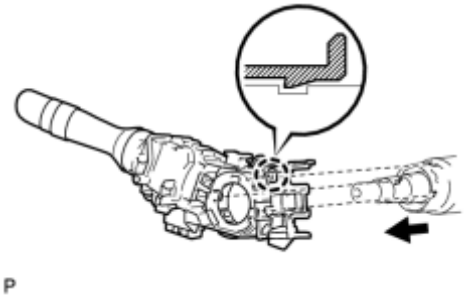
2. REMOVE WINDSHIELD WIPER SWITCH ASSEMBLY INFO

3. REMOVE HEADLIGHT DIMMER SWITCH ASSEMBLY




(a) Disconnect the connector.

(b) Using pliers, expand the clamp as shown in the illustration.




(c) While holding the clamp expanded, disengage the claw and remove the headlight dimmer switch assembly as shown in the illustration.

# INSPECTION

1. INSPECT HEADLIGHT DIMMER SWITCH ASSEMBLY

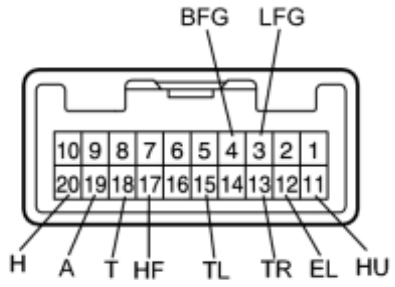
(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

## Light Control Switch

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 12 (EL) - 18 (T) | Light control switch off | 10 kΩ or higher |
| 18 (T) - 19 (A) | Light control switch off | 10 kΩ or higher |
| 19 (A) - 20 (H) | Light control switch off | 10 kΩ or higher |
| 12 (EL) - 18 (T) | Light control switch in tail position | Below 1 Ω |
| 12 (EL) - 18 (T) | Light control switch in head position | Below 1 Ω |
| 18 (T) - 20 (H) | Light control switch in head position | Below 1 Ω |
| 12 (EL) - 19 (A) | Light control switch in AUTO position | Below 1 Ω |

*1




P

## Dimmer Switch

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 11 (HU) - 12 (EL) | Dimmer switch in high position | Below 1 Ω |
| 12 (EL) - 11 (HU) | Dimmer switch in high flasher position | Below 1 Ω |
| 12 (EL) - 17 (HF) | | Below 1 Ω |

## Turn Signal Switch

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 12 (EL) - 13 (TR) | Right turn | Below 1 Ω |
| 12 (EL) - 13 (TR) | Neutral | 10 kΩ or higher |
| 12 (EL) - 15 (TL) | Neutral | 10 kΩ or higher |
| 12 (EL) - 15 (TL) | Left turn | Below 1 Ω |

# Front Fog Light Switch

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 3 (LFG) - 4 (BFG) | Front fog light switch off | 10 kΩ or higher |
| 3 (LFG) - 4 (BFG) | Front fog light switch on | Below 1 Ω |

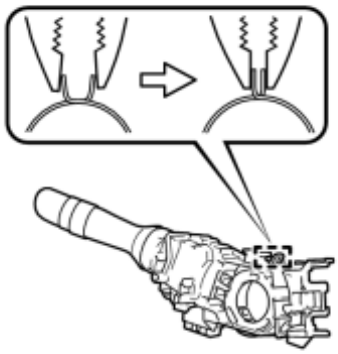
# Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Headlight Dimmer Switch Assembly) |

If the result is not as specified, replace the headlight dimmer switch assembly.

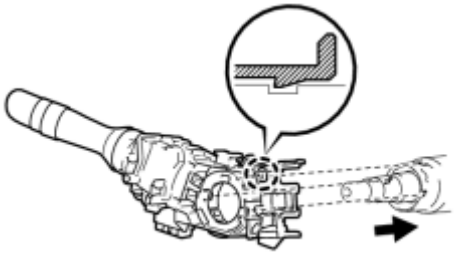
# INSTALLATION

1. INSTALL HEADLIGHT DIMMER SWITCH ASSEMBLY



P

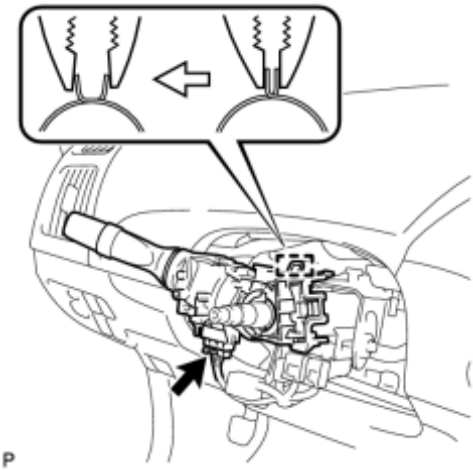
(a) Using pliers, expand the clamp.



P

(b) While holding the clamp expanded, install the headlight dimmer switch assembly as shown in the illustration.

(c) Engage the claw.



P

(d) Install the headlight dimmer switch assembly with the clamp.

(e) Connect the connector.

2. INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY INFO

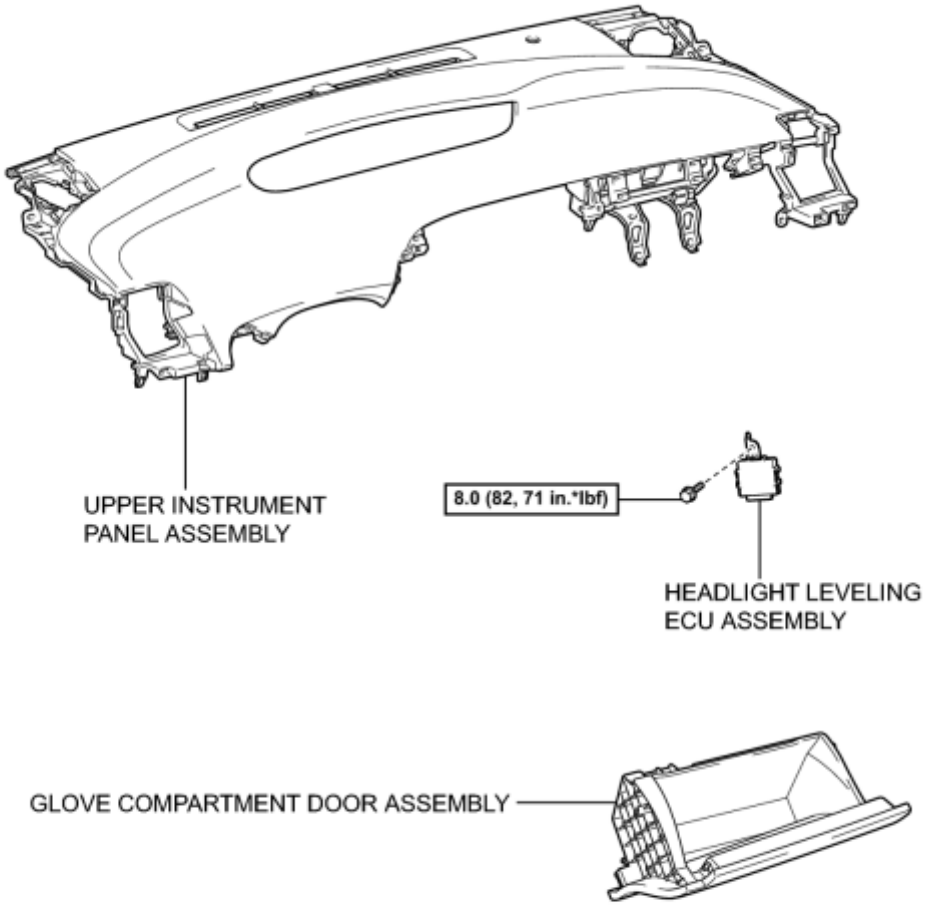
3. INSTALL SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

HINT:

Refer to the procedure from Install Spiral Cable with Sensor Sub-assembly INFO.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

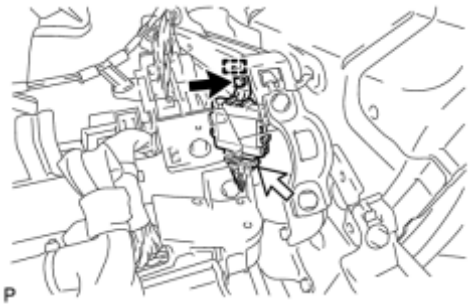
1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure up to Remove Upper Instrument Panel Assembly INFO.

2. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO

3. REMOVE HEADLIGHT LEVELING ECU ASSEMBLY



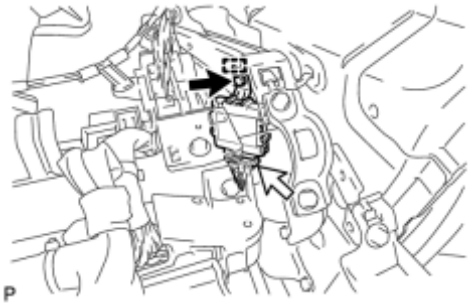

(a) Disconnect the connector.

(b) Remove the bolt.

(c) Disengage the guide and remove the headlight leveling ECU assembly.

# INSTALLATION

1. INSTALL HEADLIGHT LEVELING ECU ASSEMBLY



(a) Engage the guide.

(b) Install the headlight leveling ECU assembly with the bolt.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

(c) Connect the connector.

2. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

3. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure from Install Upper Instrument Panel Assembly INFO.

4. HEIGHT CONTROL SENSOR SIGNAL INITIALIZATION

INFO

5. PREPARE VEHICLE FOR HEADLIGHT AIM ADJUSTMENT INFO

6. PREPARE FOR HEADLIGHT AIMING (Using a headlight aim test machine) INFO

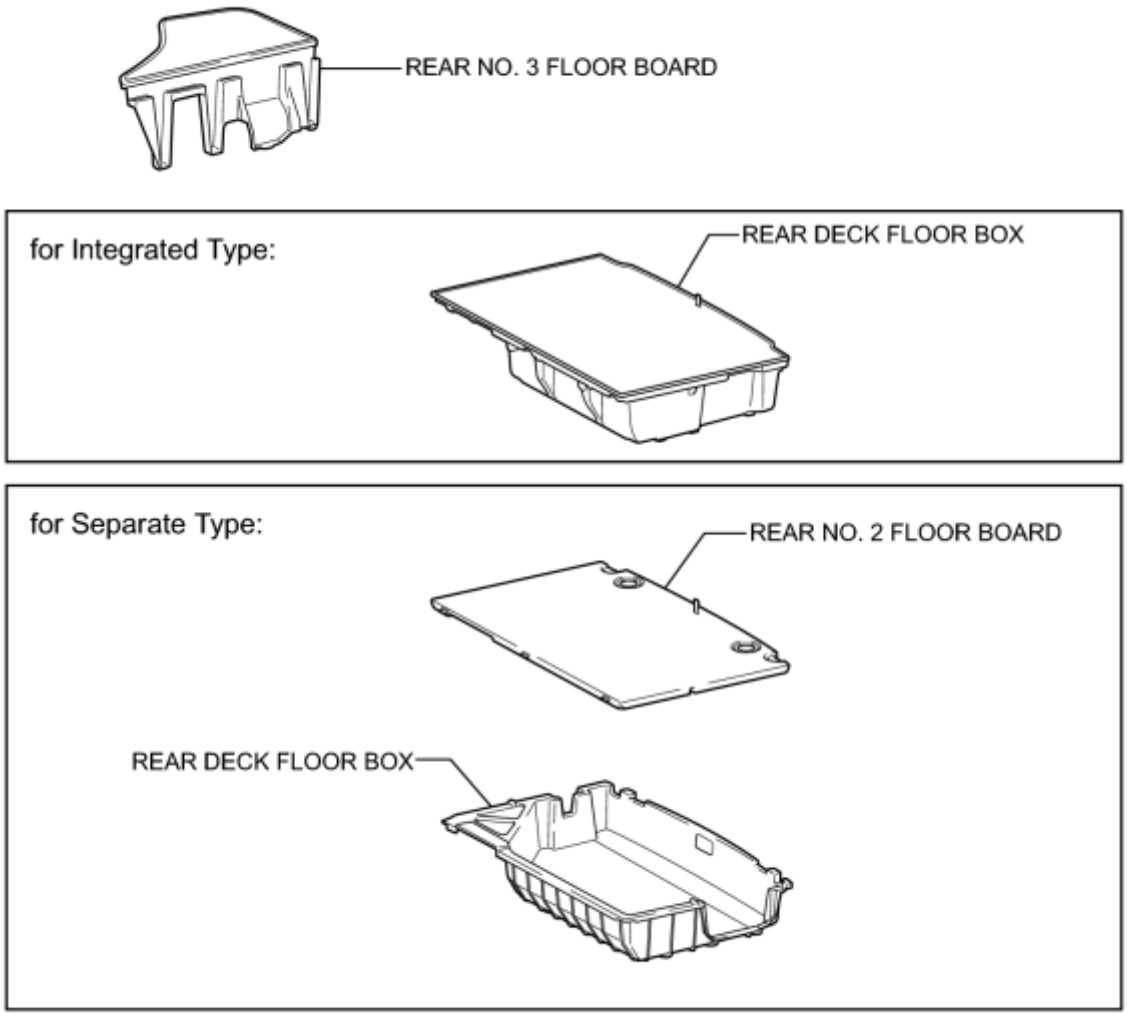
7. PREPARE FOR HEADLIGHT AIMING (Using a screen) INFO

8. INSPECT HEADLIGHT AIMING INFO

9. ADJUST HEADLIGHT AIMING INFO

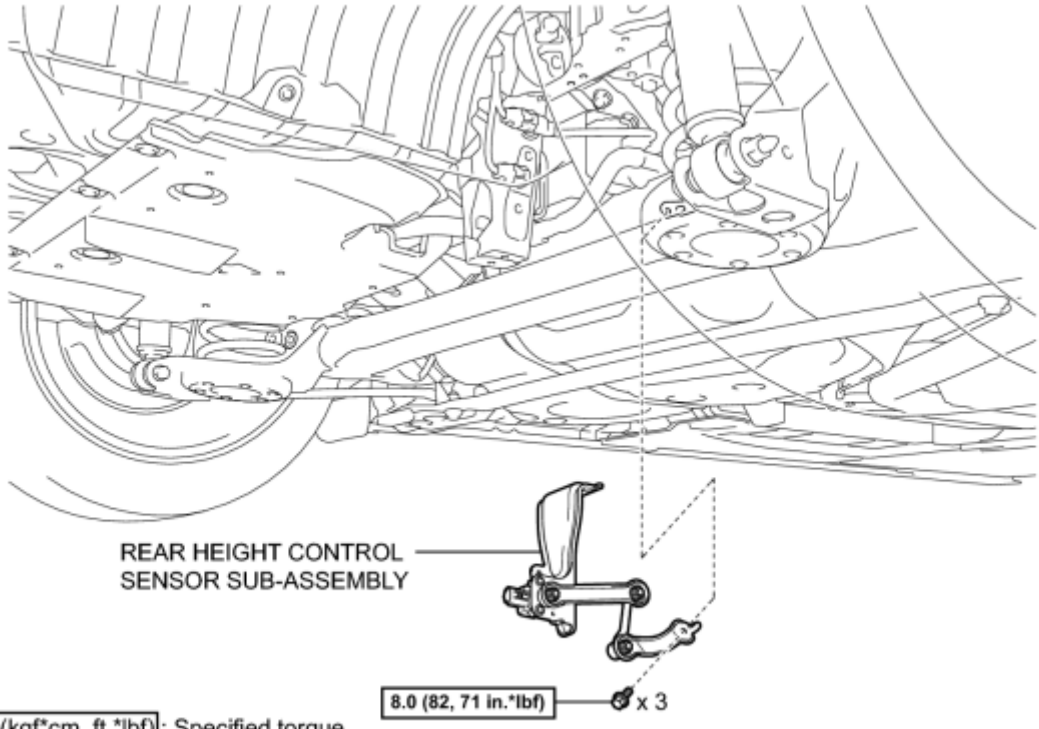
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

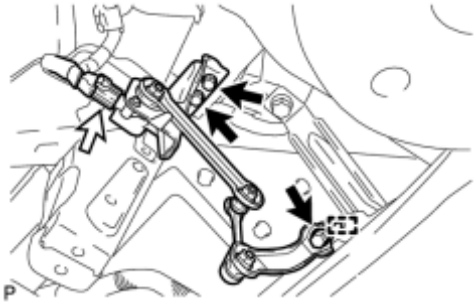
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE REAR WHEEL

6. REMOVE REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY



(a) Disconnect the connector.

(b) Remove the 3 bolts.

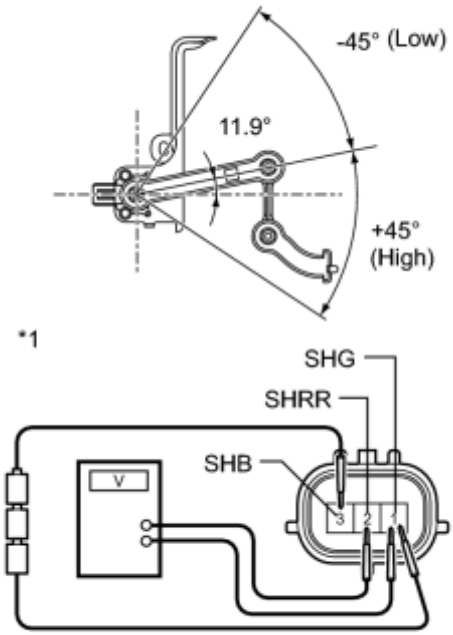
(c) Disengage the guide and remove the rear height control sensor sub-assembly.

NOTICE:

Do not drop the rear height control sensor sub-assembly. If it is dropped, replace it with a new one.

# INSPECTION

1. INSPECT REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY RH




(a) Connect 3 dry cell batteries (1.5 V) in series.

(b) Connect the positive (+) lead from the batteries to terminal 3 (SHB) and the negative (-) lead from the batteries to terminal 1 (SHG).

(c) Measure the voltage between terminals 2 (SHRR) and 1 (SHG) while slowly moving the link up and down.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2 (SHRR) - 1 (SHG) | +45° (High) | 4.05 V |
| 2 (SHRR) - 1 (SHG) | 0°(Normal) | 2.25 V |
| 2 (SHRR) - 1 (SHG) | -45° (Low) | 0.45 V |

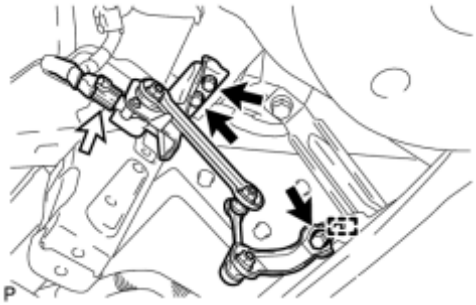
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Rear Height Control Sensor Sub-assembly RH) |

If the result is not as specified, replace the rear height control sensor sub-assembly RH.

# INSTALLATION

1. INSTALL REAR HEIGHT CONTROL SENSOR SUB-ASSEMBLY



(a) Engage the guide and install the rear height control sensor sub-assembly with the 3 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

(b) Connect the connector.

2. INSTALL REAR WHEEL INFO

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

4. INSTALL REAR NO. 3 FLOOR BOARD INFO

5. INSTALL REAR DECK FLOOR BOX INFO

6. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

7. HEIGHT CONTROL SENSOR SIGNAL INITIALIZATION

INFO

8. PREPARE VEHICLE FOR HEADLIGHT AIM ADJUSTMENT INFO

9. PREPARE FOR HEADLIGHT AIMING (Using a headlight aim test machine) INFO

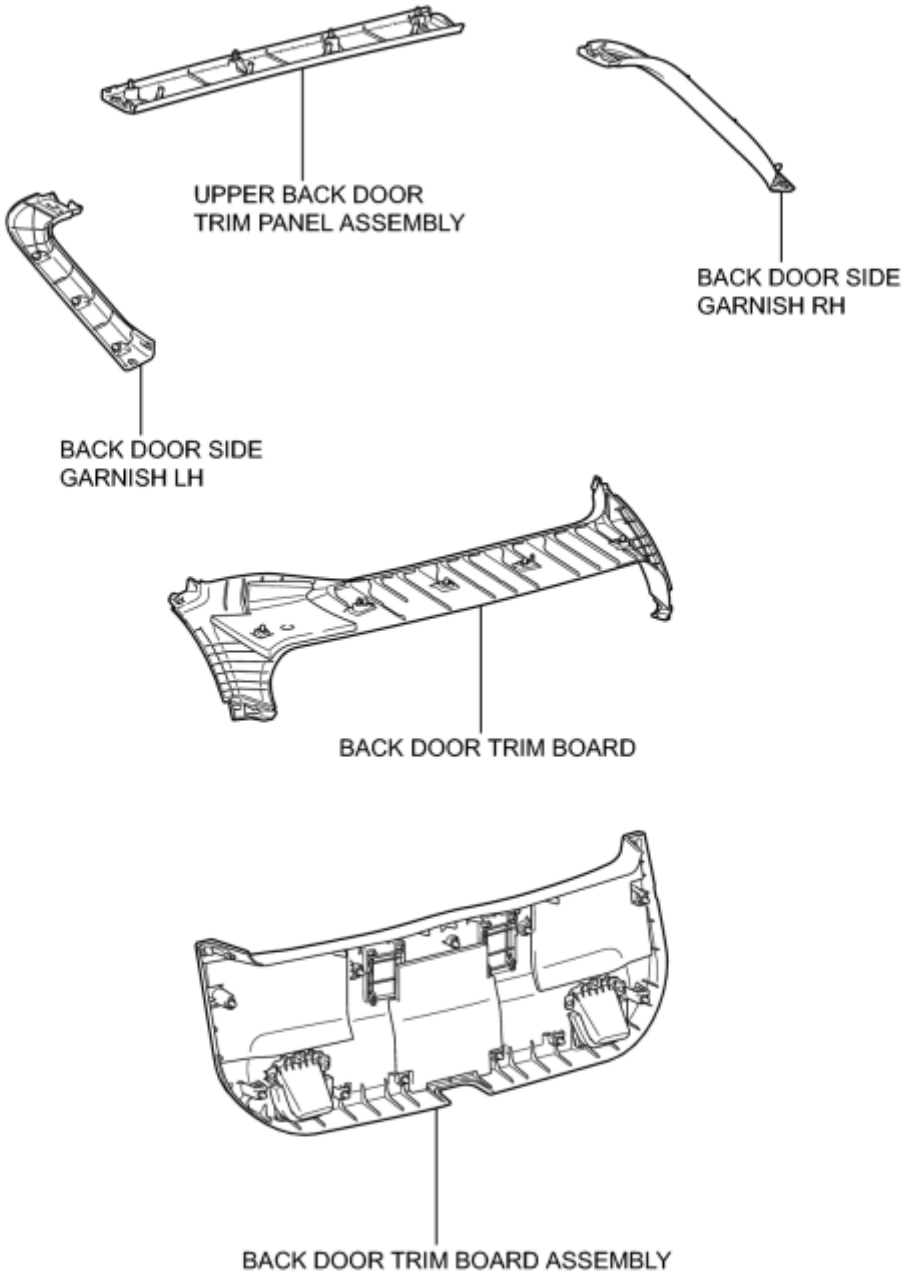
10. PREPARE FOR HEADLIGHT AIMING (Using a screen) INFO

11. INSPECT HEADLIGHT AIMING INFO

12. ADJUST HEADLIGHT AIMING INFO

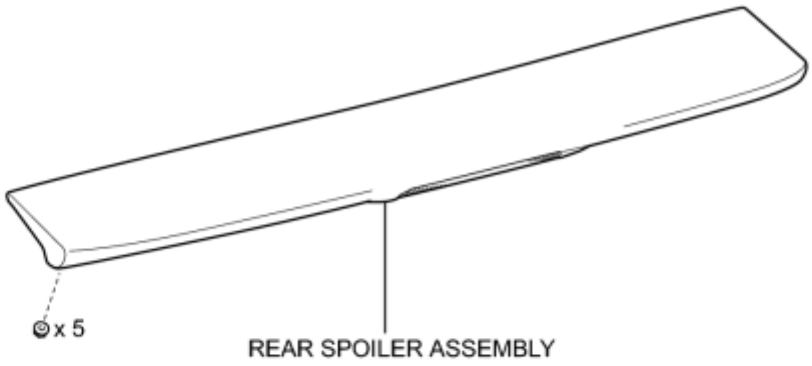
# COMPONENTS

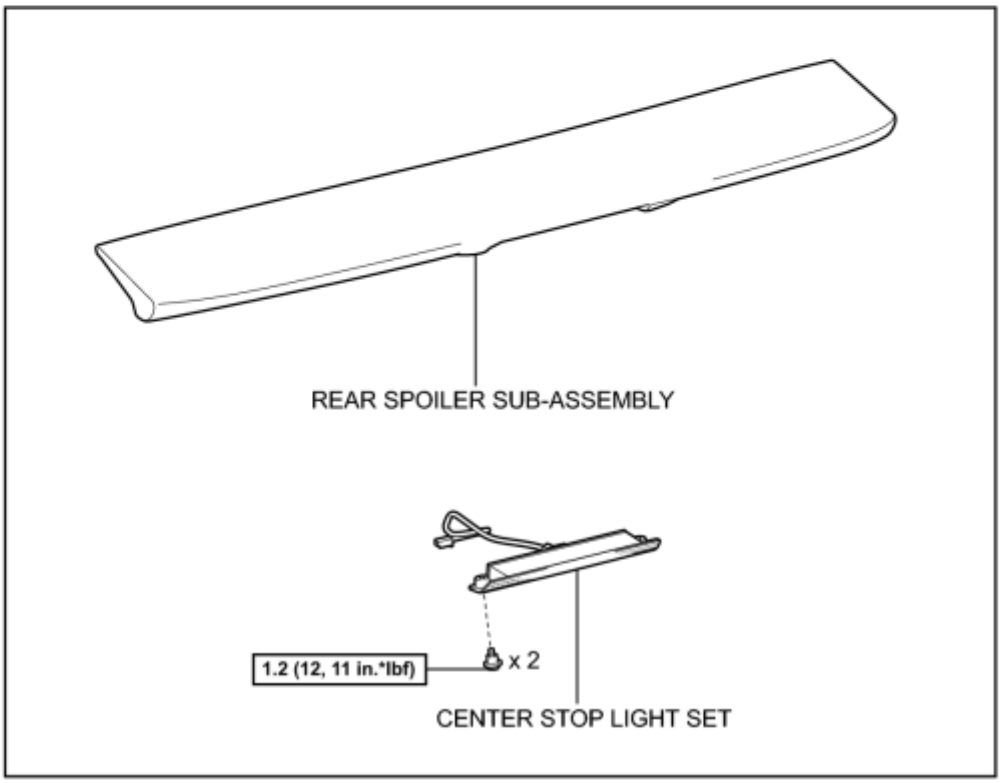
# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

2. REMOVE BACK DOOR SIDE GARNISH RH INFO

3. REMOVE BACK DOOR SIDE GARNISH LH INFO

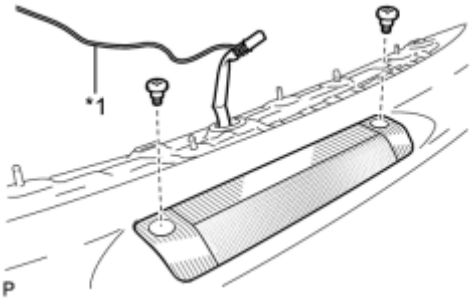
4. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

5. REMOVE BACK DOOR TRIM BOARD INFO

6. REMOVE REAR SPOILER ASSEMBLY INFO

7. REMOVE CENTER STOP LIGHT SET

(a) Secure a wire around the center stop light set wire harness as shown in the illustration.



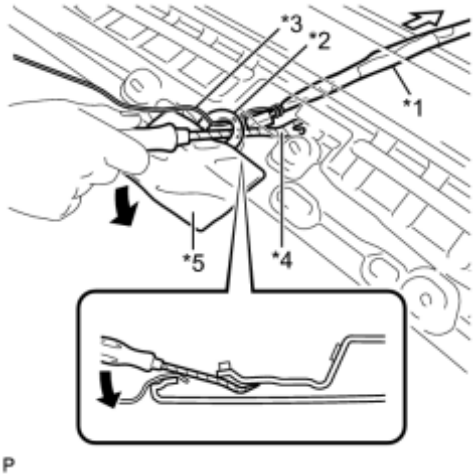

## Text in Illustration

| | |
|---|---|
| *1 | Wire |

NOTICE:

Use a wire long enough so that the center stop light set wire harness can be passed through the rear spoiler assembly during installation.

(b) Remove the 2 screws.




(c) Place a cloth on the rear spoiler assembly as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Wire Harness |
| *2 | Gasket |
| *3 | Wire |
| *4 | Protective Tape |
| *5 | Cloth |

(d) Using a clip remover wrapped with protective tape, widen the space inside the rear spoiler assembly, and pull the center stop light set wire harness to remove it as shown in the illustration.

NOTICE:

- Do not apply excess force to the rear spoiler assembly or it may be damaged.
- Do not damage the gasket of the rear spoiler assembly.
- Do not apply excess force when pulling the wire harness or it may break.

(e) Remove the wire from the old center stop light set wire harness.

# INSPECTION

1. INSPECT CENTER STOP LIGHT SET

*1




(a) Connect a positive (+) lead from the battery to terminal 2 and a negative (-) lead to terminal 1.

(b) Check that the center stop light comes on.

OK:

The light comes on.

***Text in Illustration***

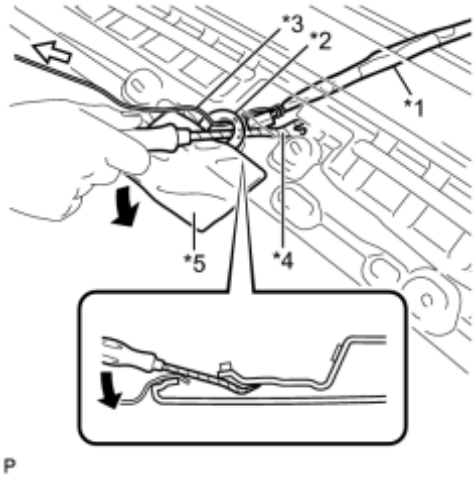
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Center Stop Light Set) |

If the result is not as specified, replace the center stop light set.

# INSTALLATION

1. INSTALL CENTER STOP LIGHT SET

(a) Secure the wire running through the rear spoiler assembly to the center stop light set wire harness.




P

(b) Place a cloth on the rear spoiler assembly as shown in the illustration.

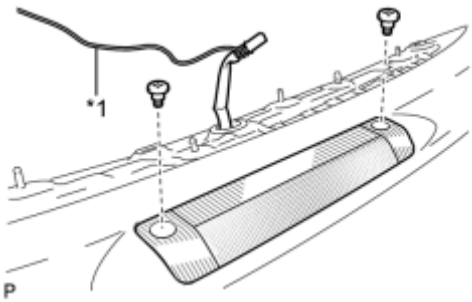
## Text in Illustration

| | |
|---|---|
| *1 | Wire Harness |
| *2 | Gasket |
| *3 | Wire |
| *4 | protective tape |
| *5 | Cloth |

(c) Using a clip remover wrapped with protective tape, widen the space inside the rear spoiler assembly, and pull the wire to pass the center stop light set wire harness through the spoiler.

NOTICE:

- Do not apply excess force to the rear spoiler assembly or it may be damaged.
- Do not damage the gasket of the rear spoiler assembly.
- Do not apply excess force when pulling the wire harness or it may break.




P

(d) Install the center stop light set with the 2 screws to the rear spoiler assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Wire |

Torque: **1.2 N·m (12 kgf·cm, 11in·lbf)**

(e) Remove the wire from the old center stop light set wire harness.

2. INSTALL REAR SPOILER ASSEMBLY INFO

3. INSTALL BACK DOOR TRIM BOARD INFO

4. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

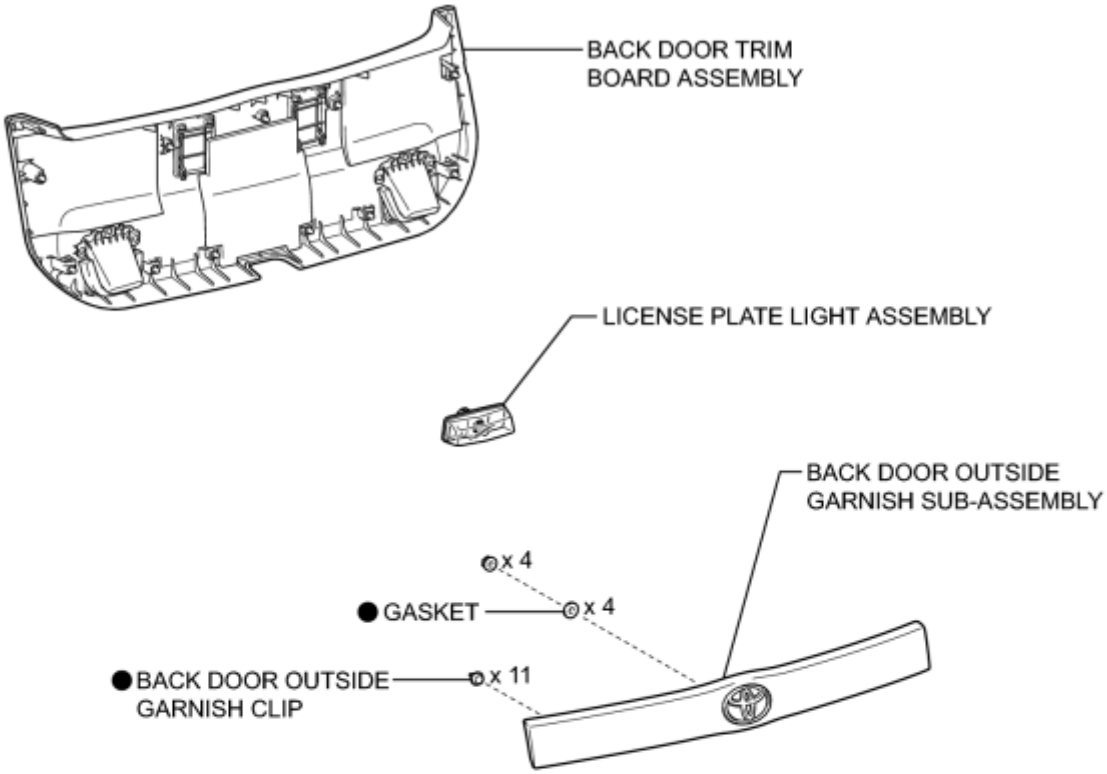
5. INSTALL BACK DOOR SIDE GARNISH LH INFO

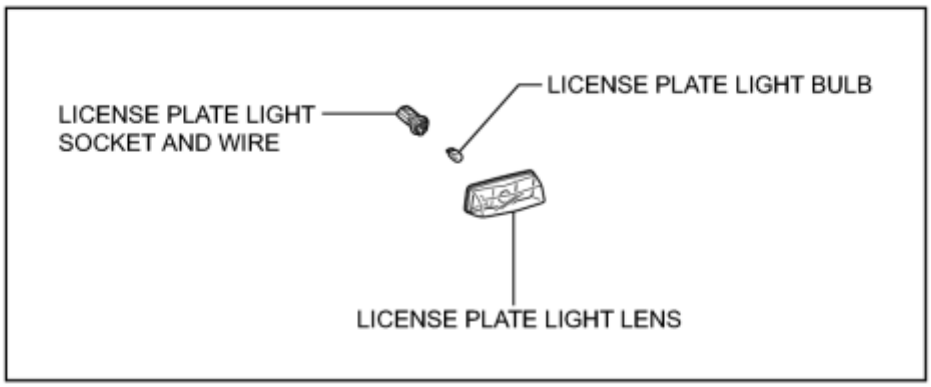
6. INSTALL BACK DOOR SIDE GARNISH RH INFO

7. INSTALL UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION




● Non-reusable part

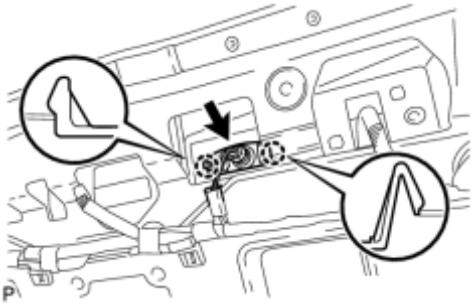
P

# REMOVAL

1. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

2. REMOVE BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

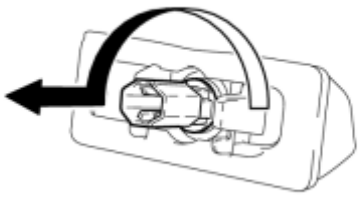
3. REMOVE LICENSE PLATE LIGHT ASSEMBLY



(a) Disconnect the connector.

(b) Disengage the 2 claws and remove the license plate light assembly.

4. REMOVE LICENSE PLATE LIGHT BULB



P

(a) Turn the license plate light bulb and license plate light socket and wire in the direction indicated by the arrow shown in the illustration, and remove them as a unit.

(b) Remove the license plate light bulb from the license plate light socket and wire.

# INSPECTION

1. INSPECT LICENSE PLATE LIGHT ASSEMBLY

*1




(a) Connect a positive (+) lead from the battery to terminal 2 and a negative (-) lead to terminal 1.

(b) Check that the license plate light comes on.

OK:

The light comes on.

***Text in Illustration***

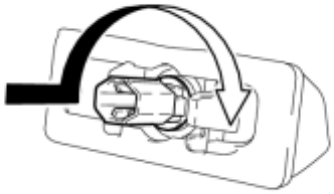
| | |
|---|---|
| *1 | Component without harness connected<br><br>(License Plate Light Assembly) |

If the result is not as specified, replace the bulb or license plate light socket and wire.

# INSTALLATION

1. INSTALL LICENSE PLATE LIGHT BULB

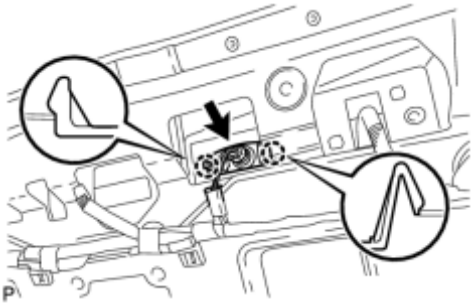
(a) Install the license plate light bulb to the license plate light socket and wire.



(b) Turn the license plate light bulb and license plate light socket and wire in the direction indicated by the arrow shown in the illustration and install them as a unit.

P

2. INSTALL LICENSE PLATE LIGHT ASSEMBLY



(a) Engage the 2 claws to install the license plate light assembly.

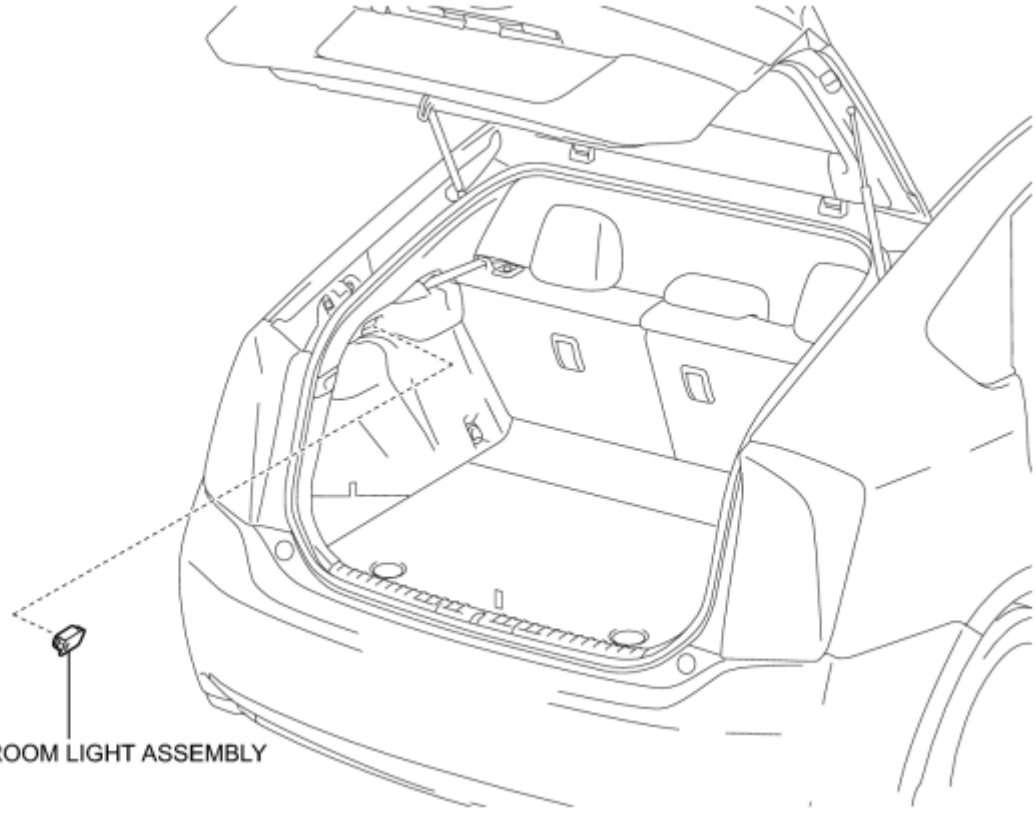
(b) Connect the connector.

3. INSTALL BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY INFO

4. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

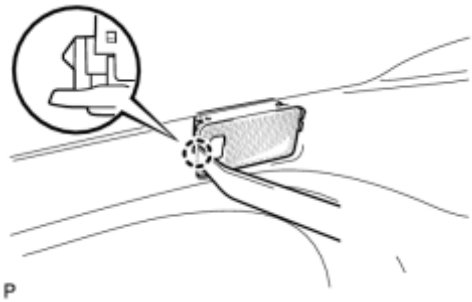
# COMPONENTS

# ILLUSTRATION



# REMOVAL

1. REMOVE NO. 2 ROOM LIGHT ASSEMBLY




(a) Using a moulding remover, disengage the claw.

(b) Disconnect the connector and remove the No. 2 room light assembly.

# INSPECTION

1. INSPECT NO. 2 ROOM LIGHT ASSEMBLY

*1




(a) Connect a positive (+) lead from the battery to terminal 2 and a negative (-) lead to terminal 1.

(b) Turn the No. 2 room light switch on.

(c) Check that the No. 2 room light comes on.

OK:

No. 2 room light comes on.

***Text in Illustration***

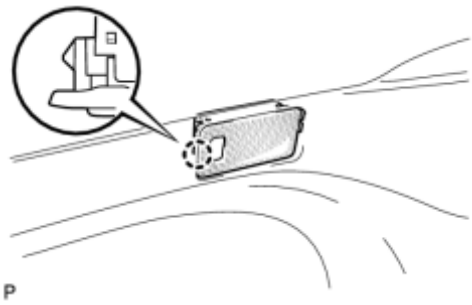
| | |
|---|---|
| *1 | Component without harness connected<br><br>(No. 2 Room Light Assembly) |

If the result is not as specified, replace the bulb or No. 2 room light assembly.

# INSTALLATION

1. INSTALL NO. 2 ROOM LIGHT ASSEMBLY

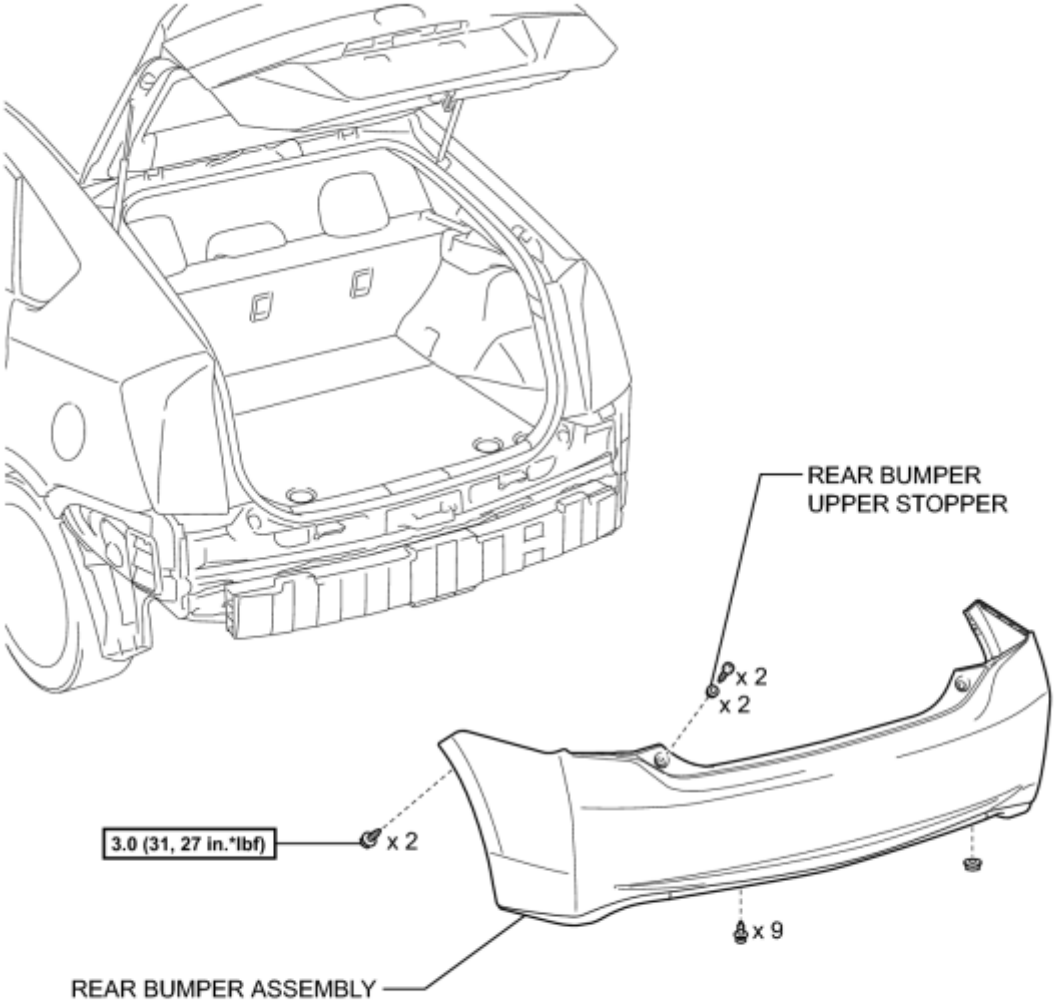
(a) Connect the connector.




(b) Engage the claw to install the No. 2 room light assembly.

# COMPONENTS

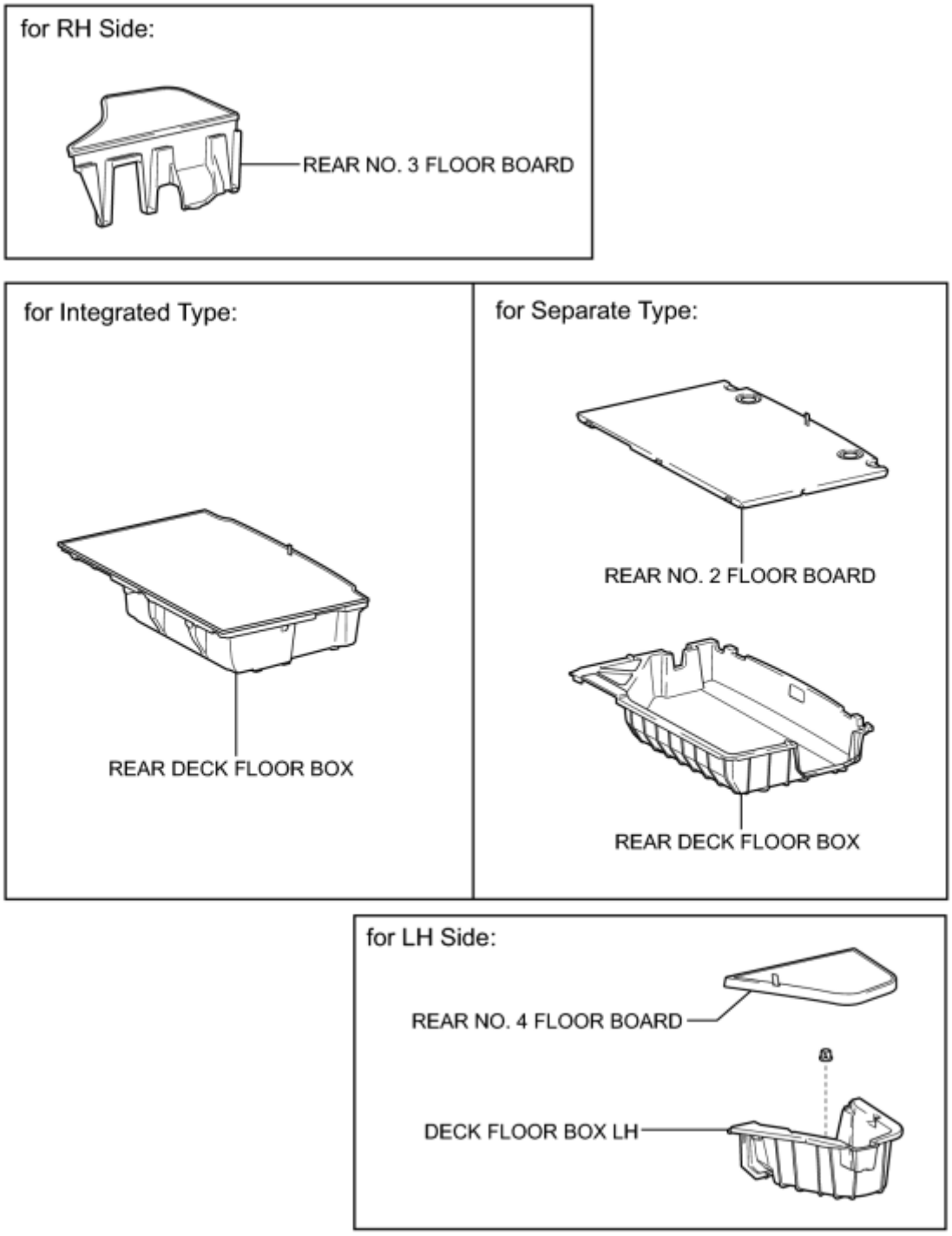
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

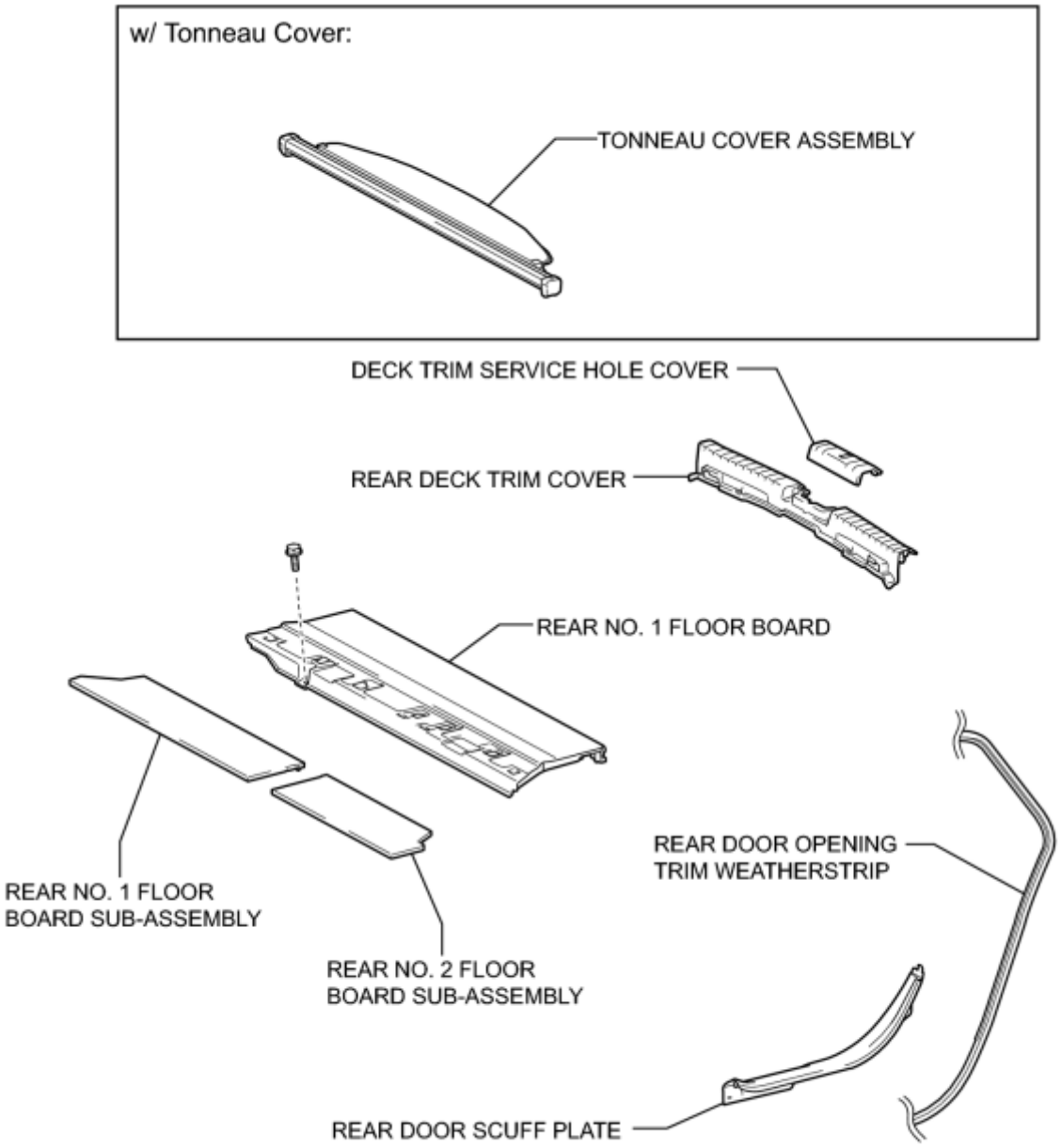
P

# ILLUSTRATION



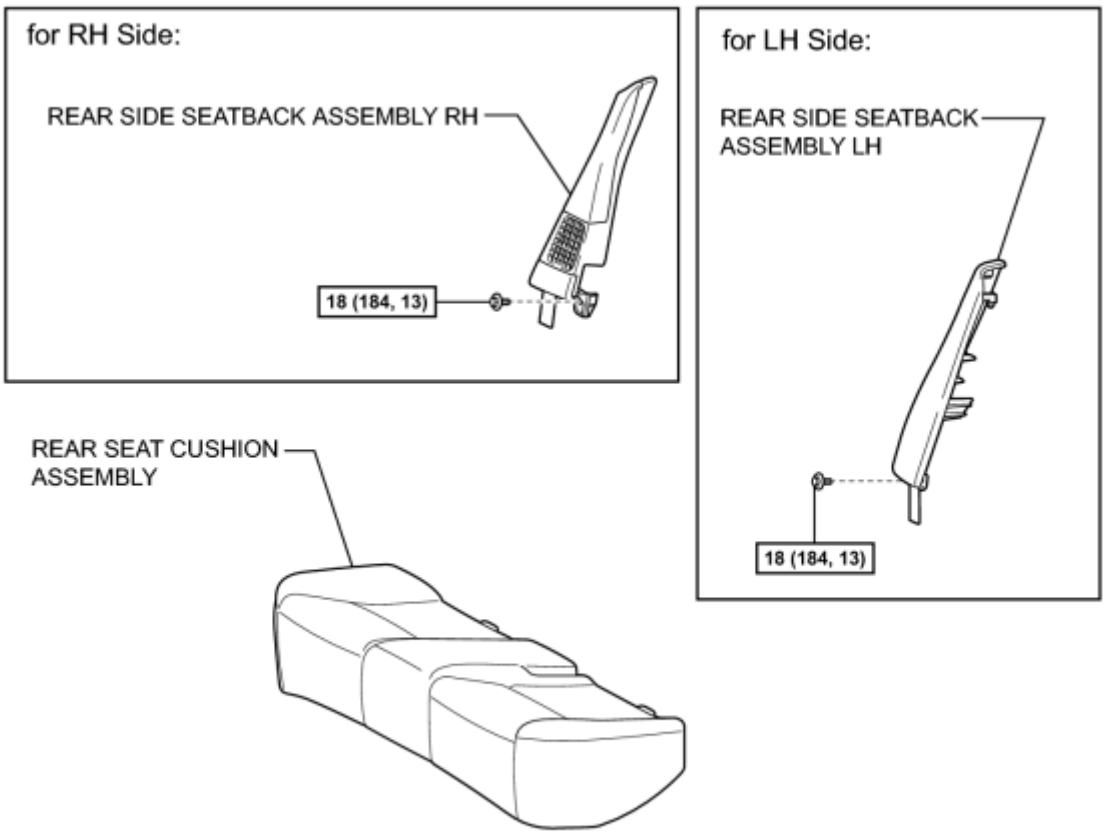

P

# ILLUSTRATION




P

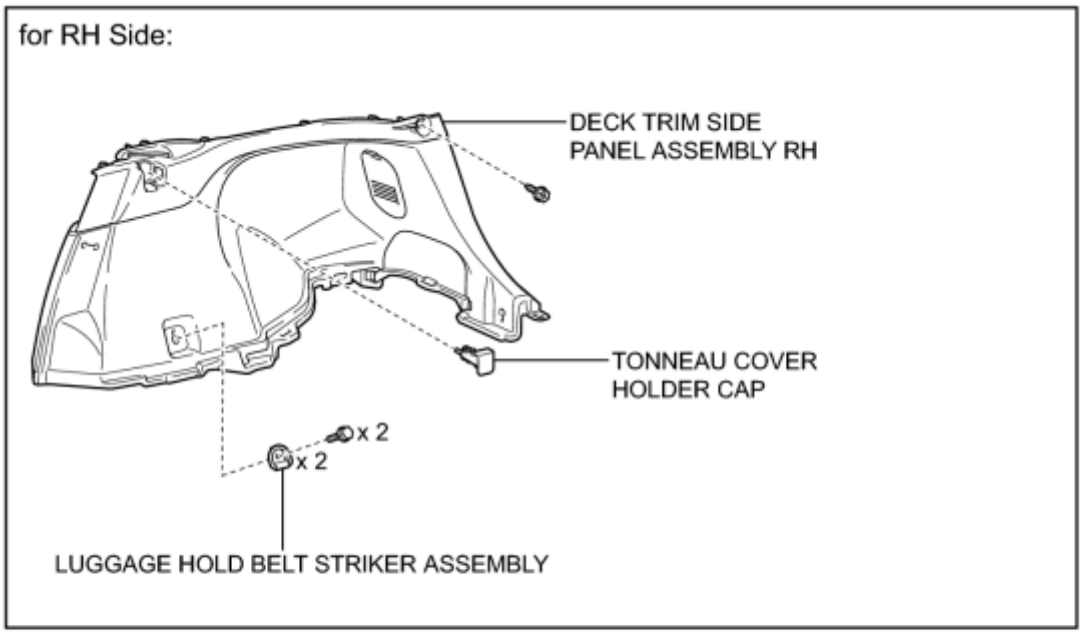
# ILLUSTRATION

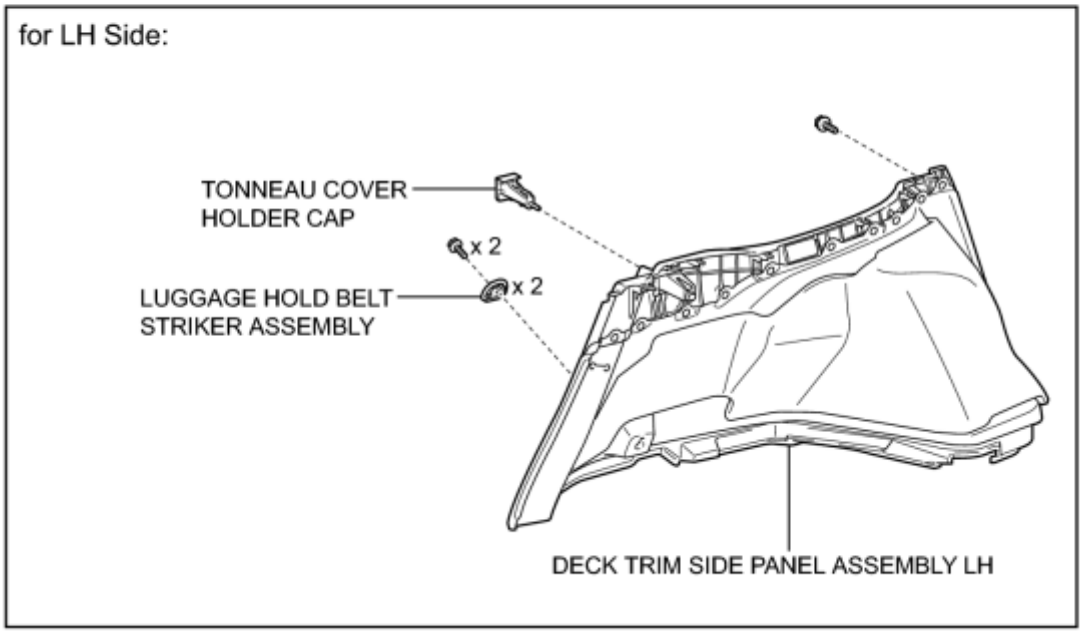



N*m (kgf*cm, ft.*lbf): Specified torque

P

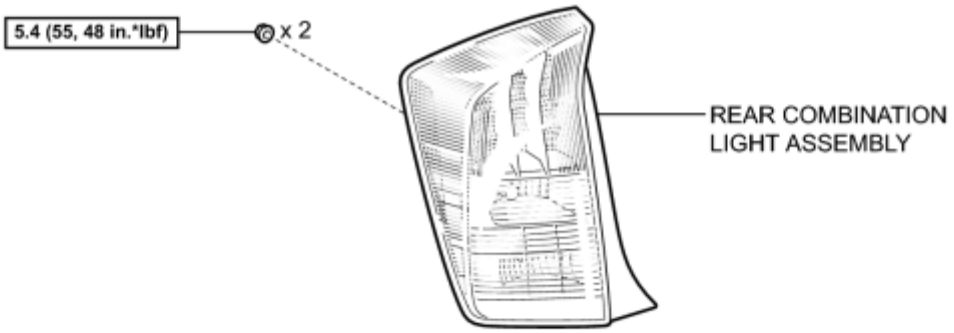
# ILLUSTRATION

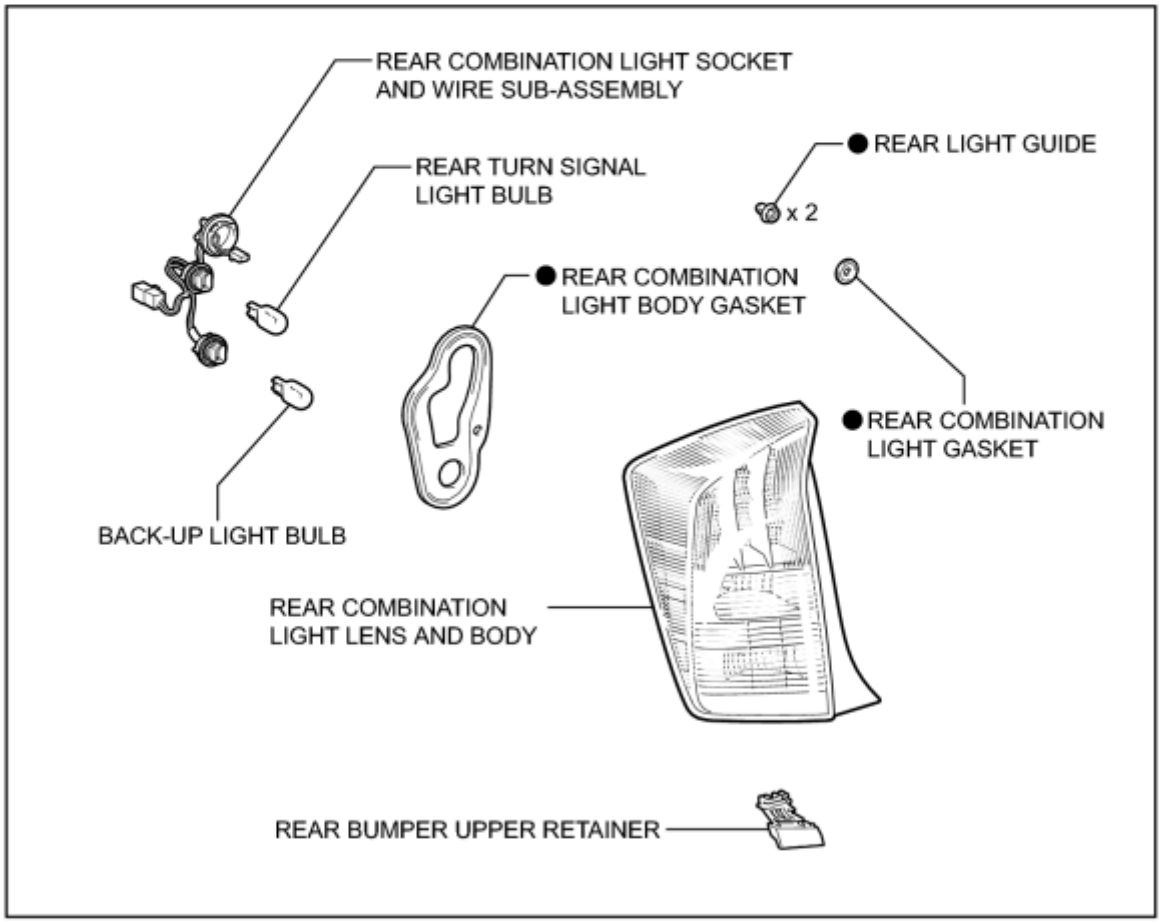



P

# ILLUSTRATION



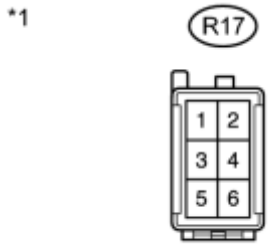

N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# ON-VEHICLE INSPECTION

1. INSPECT REAR COMBINATION LIGHT ASSEMBLY LH




(a) Disconnect the connector from the rear combination light assembly LH.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R17-1 - R17-5 | Light control switch off | Below 1 V |
| | Light control switch in tail position | 11 to 14 V |
| R17-2 - R17-5 | Brake pedal released | Below 1 V |
| | Brake pedal depressed | 11 to 14 V |
| R17-3 - R17-5 | Turn signal switch in neutral position | Below 1 V |
| | Power switch on (IG) and turn signal switch in left turn position | 11 to 14 V (60 to 120 times per minute) |

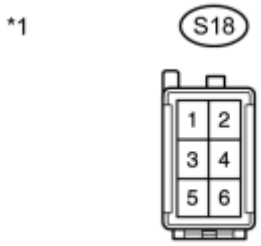
***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Rear Combination Light Assembly LH) |

If the result is not as specified, repair or replace the wire harness or connector.

2. INSPECT REAR COMBINATION LIGHT ASSEMBLY RH

(a) Disconnect the connector from the rear combination light assembly RH.




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S18-1 - S18-5 | Light control switch off | Below 1 V |
| | Light control switch in tail position | 11 to 14 V |
| S18-2 - S18-5 | Brake pedal released | Below 1 V |
| | Brake pedal depressed | 11 to 14 V |
| S18-3 - S18-5 | Turn signal switch in neutral position | Below 1 V |
| | Power switch on (IG) and turn signal switch in right turn position | 11 to 14 V (60 to 120 times per minute) |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Rear Combination Light Assembly RH) |

If the result is not as specified, repair or replace the wire harness or connector.

# REMOVAL

1. REMOVE REAR BUMPER ASSEMBLY INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD (for RH Side) INFO

5. REMOVE REAR NO. 4 FLOOR BOARD (for LH Side) INFO

6. REMOVE DECK FLOOR BOX LH (for LH Side) INFO

7. REMOVE REAR DOOR SCUFF PLATE INFO

8. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP INFO

9. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

10. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

11. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

12. REMOVE REAR NO. 1 FLOOR BOARD INFO

13. REMOVE DECK TRIM SERVICE HOLE COVER INFO

14. REMOVE REAR DECK TRIM COVER INFO

15. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

16. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

17. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (for RH Side)

HINT:

Use the same procedure described for the LH side.

18. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

19. REMOVE TONNEAU COVER HOLDER CAP (for LH Side) INFO

20. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

21. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

HINT:

Use the same procedure described for the LH side.

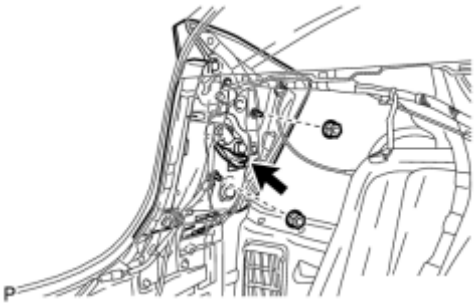
22. REMOVE TONNEAU COVER HOLDER CAP (for RH Side)

HINT:

Use the same procedure described for the LH side.

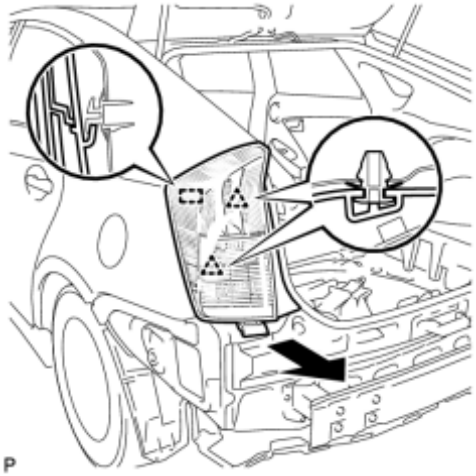
23. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

24. REMOVE REAR COMBINATION LIGHT ASSEMBLY



(a) Disconnect the connector.

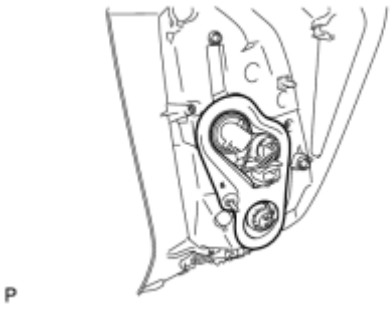
(b) Remove the 2 nuts.



(c) Disengage the 2 clips and guide, and remove the rear combination light assembly as shown in the illustration.

# DISASSEMBLY

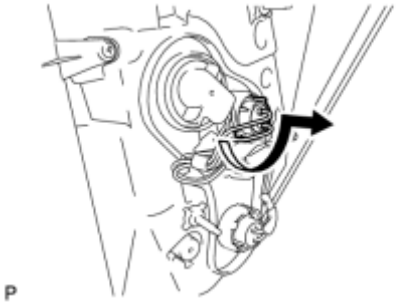
1. REMOVE REAR COMBINATION LIGHT BODY GASKET




(a) Remove the rear combination light body gasket.

- Be sure to remove all the traces of the old gasket from the body.
- Do not reuse the removed gasket. Be sure to install a new rear combination light body gasket to prevent water ingress.

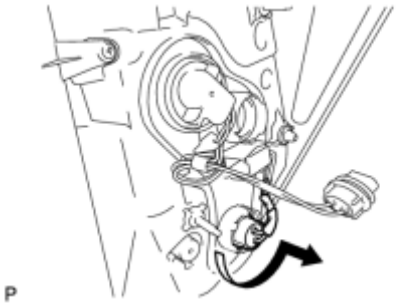
2. REMOVE REAR TURN SIGNAL LIGHT BULB




(a) Turn the rear turn signal light bulb and rear combination light socket and wire sub-assembly in the direction indicated by the arrow shown in the illustration, and remove them as a unit.

(b) Remove the rear turn signal light bulb from the rear combination light socket and wire sub-assembly.

3. REMOVE BACK-UP LIGHT BULB

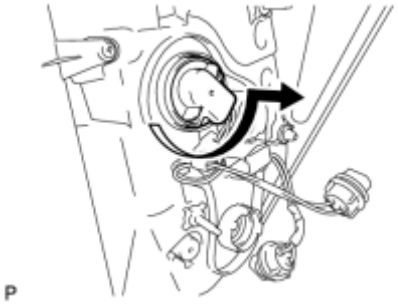


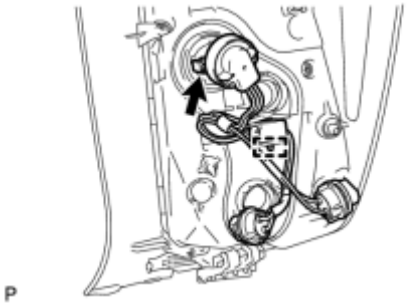

(a) Turn the back-up light bulb and rear combination light socket and wire sub-assembly in the direction indicated by the arrow shown in the illustration, and remove them as a unit.

(b) Remove the back-up light bulb from the rear combination light socket and wire sub-assembly.

4. REMOVE REAR COMBINATION LIGHT SOCKET AND WIRE SUB-ASSEMBLY

(a) Turn the cap in the direction indicated by the arrow shown in the illustration and separate it.





(b) Disconnect the connector.

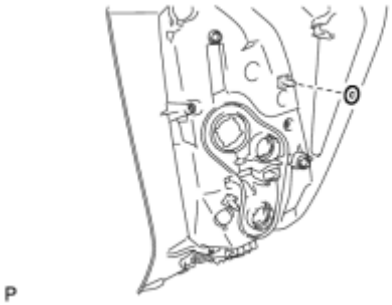
(c) Disengage the clamp and remove the rear combination light socket and wire sub-assembly.

5. REMOVE REAR BUMPER UPPER RETAINER



(a) Using a screwdriver, disengage the claw and remove the rear bumper upper retainer.

6. REMOVE REAR COMBINATION LIGHT GASKET

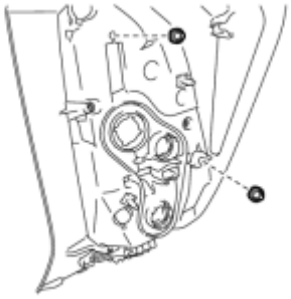


(a) Remove the rear combination light gasket.

- Be sure to remove all the traces of the old gasket from the body.
- Do not reuse the removed gasket. Be sure to install a new rear combination light gasket to prevent water ingress.

7. REMOVE REAR LIGHT GUIDE

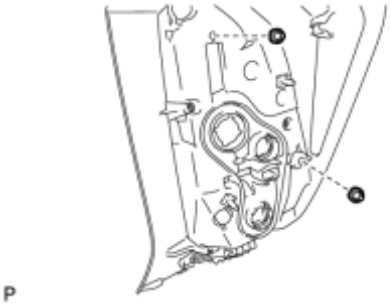
(a) Remove the 2 rear light guides.



P

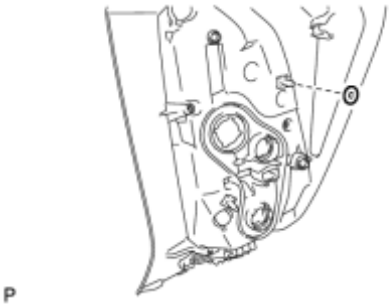
# REASSEMBLY

1. INSTALL REAR LIGHT GUIDE



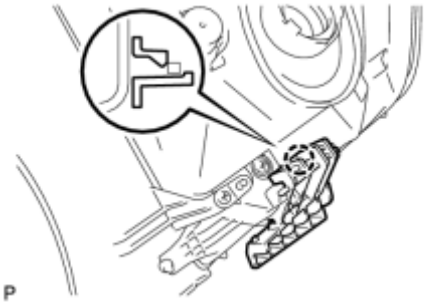
(a) Install 2 new rear light guides.

2. INSTALL REAR COMBINATION LIGHT GASKET



(a) Install a new rear combination light gasket.

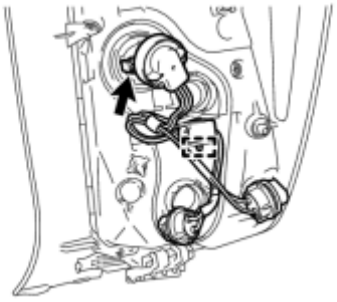
3. INSTALL REAR BUMPER UPPER RETAINER



(a) Engage the claw and install the rear bumper upper retainer.

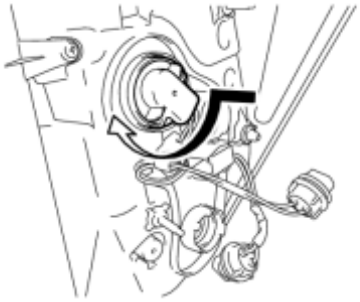
4. INSTALL REAR COMBINATION LIGHT SOCKET AND WIRE SUB-ASSEMBLY

(a) Engage the clamp.



P

(b) Connect the connector.

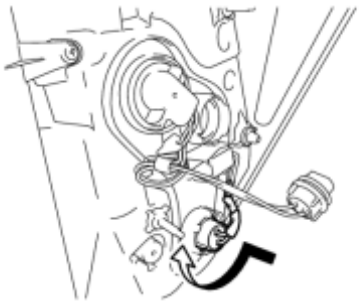


P

(c) Turn the cap in the direction indicated by the arrow shown in the illustration to install the cap of the rear combination light socket and wire sub-assembly.

5. INSTALL BACK-UP LIGHT BULB

(a) Install the back-up light bulb to the rear combination light socket and wire sub-assembly.



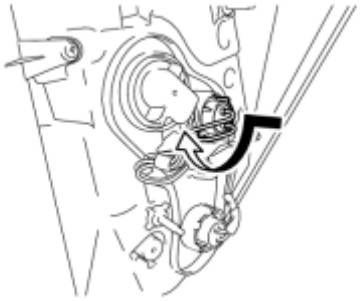
P

(b) Turn the back-up light bulb and rear combination light socket and wire sub-assembly in the direction indicated by the arrow shown in the illustration to install them as a unit.

6. INSTALL REAR TURN SIGNAL LIGHT BULB

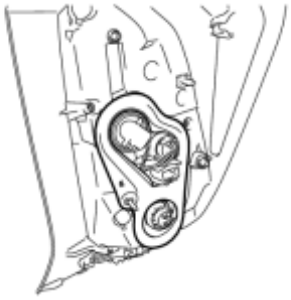
(a) Install the rear turn signal light bulb to the rear combination light socket and wire sub-assembly.

(b) Turn the rear turn signal light bulb and rear combination light socket and wire sub-assembly in the direction indicated by the arrow shown in the illustration to install them as a unit.



P

7. INSTALL REAR COMBINATION LIGHT BODY GASKET

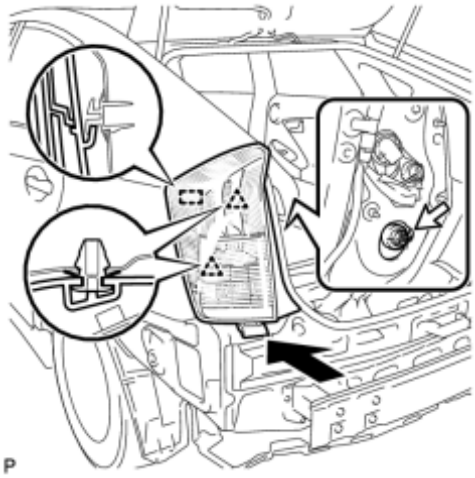


P

(a) Install a new rear combination light body gasket.

# INSTALLATION

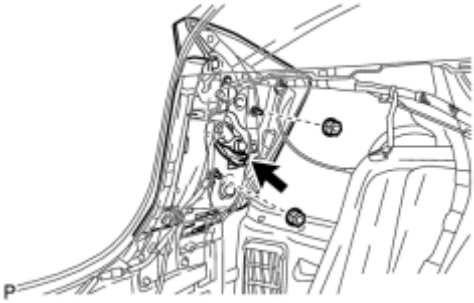
1. INSTALL REAR COMBINATION LIGHT ASSEMBLY



(a) Engage the guide and 2 clips, and install the rear combination light assembly as shown in the illustration.

CAUTION:

When installing the rear combination light assembly, check that the wire harness is not caught between the rear combination light assembly and the body. Failure to do so may cause a short circuit.



(b) Install the 2 nuts.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

(c) Connect the connector.

2. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

3. INSTALL TONNEAU COVER HOLDER CAP (for LH Side) INFO

4. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

5. INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

6. INSTALL TONNEAU COVER HOLDER CAP (for RH Side)

HINT:

Use the same procedure described for the LH side.

7. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

HINT:

Use the same procedure described for the LH side.

8. INSTALL REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

9. INSTALL REAR SIDE SEATBACK ASSEMBLY RH (for RH Side)

HINT:

Use the same procedure described for the LH side.

10. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

11. INSTALL REAR DECK TRIM COVER INFO

12. INSTALL DECK TRIM SERVICE HOLE COVER INFO

13. INSTALL REAR NO. 1 FLOOR BOARD INFO

14. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

15. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

16. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

17. INSTALL DECK FLOOR BOX LH (for LH Side) INFO

18. INSTALL REAR NO. 4 FLOOR BOARD (for LH Side) INFO

19. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP INFO

20. INSTALL REAR DOOR SCUFF PLATE INFO

21. INSTALL REAR NO. 3 FLOOR BOARD (for RH Side) INFO

22. INSTALL REAR DECK FLOOR BOX INFO

23. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

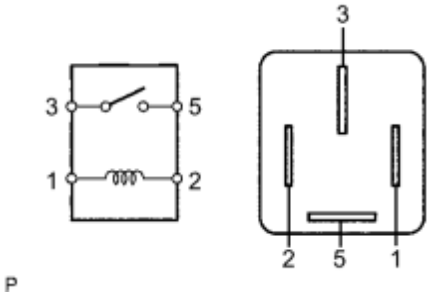
24. INSTALL REAR BUMPER ASSEMBLY INFO

25. BUMPER POSITION SETTING (w/ Advanced Parking Guidance System)

INFO

# ON-VEHICLE INSPECTION

1. INSPECT HEADLIGHT DIMMER RELAY (DIM)




(a) Remove the headlight dimmer relay from the engine room relay block.

(b) Measure the resistance according to the value(s) in the table below.

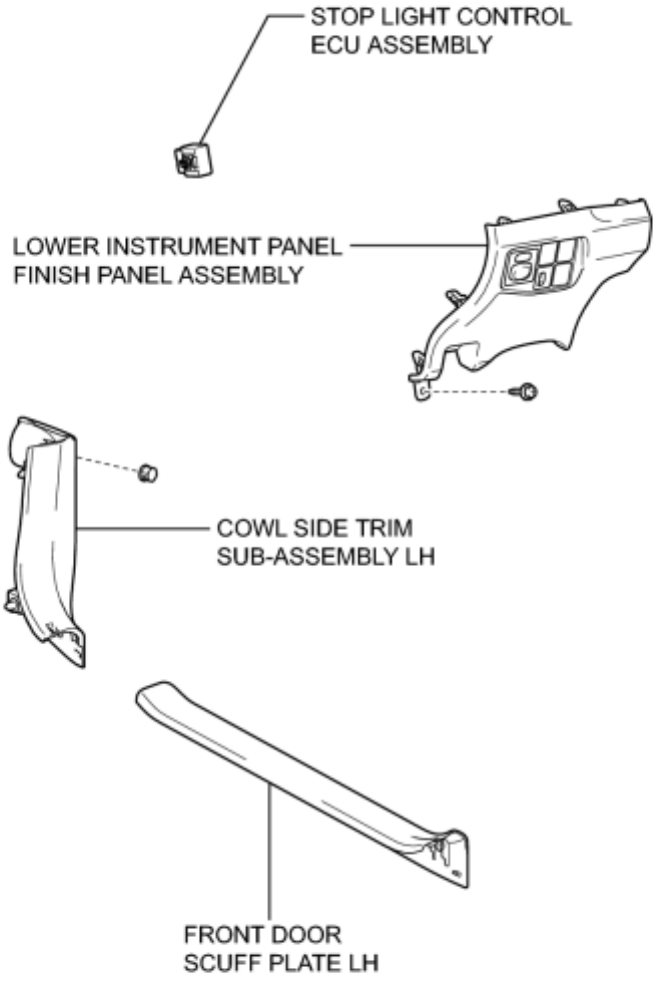
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3 - 5 | Voltage is not applied between terminals 1 and 2 | 10 kΩ or higher |
| 3 - 5 | Voltage is applied between terminals 1 and 2 | Below 1 Ω |

If the result is not as specified, replace the headlight dimmer relay.

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE LH INFO

2. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

3. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

4. REMOVE STOP LIGHT CONTROL ECU ASSEMBLY



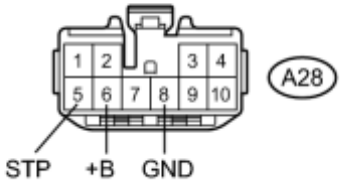
(a) Using a clip remover, disengage the clamp.

(b) Disconnect the connector and remove the stop light control ECU assembly.

# INSPECTION

1. INSPECT STOP LIGHT CONTROL ECU ASSEMBLY

*1




H

(a) Disconnect the A28 stop light control ECU assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A28-5 (STP) - Body ground | Brake pedal released | Below 1 V |
| | Brake pedal depressed | 11 to 14 V |
| A28-6 (+B) - Body ground | Always | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Stop Light Control ECU Assembly) |

If the result is not as specified, repair or replace the wire harness or connector.

(c) Measure the resistance according to the value(s) in the table below.

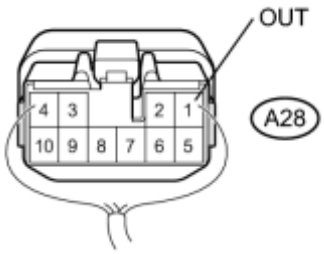
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A28-8 (GND) - Body ground | Always | Below 1 Ω |

If the result is not as specified, repair or replace the wire harness or connector.

(d) Reconnect the A28 stop light control ECU assembly connector.

*1




H

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A28-1 (OUT) - Body ground | Brake pedal released | Below 1 V |
| | Brake pedal depressed | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Stop Light Control ECU Assembly) |

If the result is not as specified, the stop light control ECU assembly may have a malfunction.

# INSTALLATION

1. INSTALL STOP LIGHT CONTROL ECU ASSEMBLY



(a) Connect the connector.

(b) Engage the clamp to install the stop light control ECU assembly.

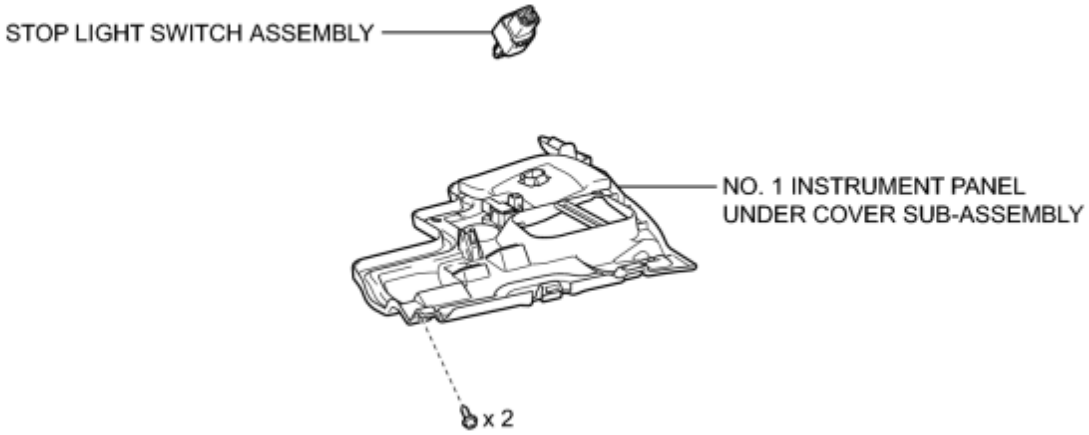
2. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. INSTALL FRONT DOOR SCUFF PLATE LH INFO

# COMPONENTS

# ILLUSTRATION




P

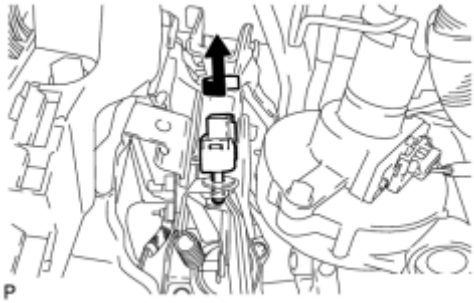
# REMOVAL

1. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

2. REMOVE STOP LIGHT SWITCH ASSEMBLY



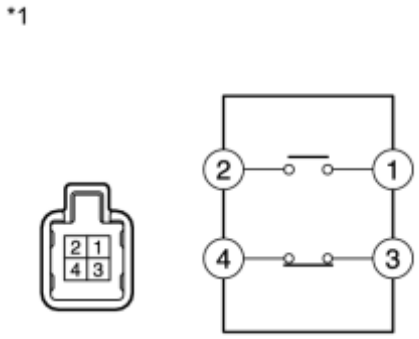

(a) Disconnect the connector.




(b) Turn the stop light switch assembly counterclockwise and remove it.

# INSPECTION

1. INSPECT STOP LIGHT SWITCH ASSEMBLY




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Pushed | 10 kΩ or higher |
| | Not pushed | Below 1 Ω |
| 3 - 4 | Pushed | Below 1 Ω |
| | Not pushed | 10 kΩ or higher |

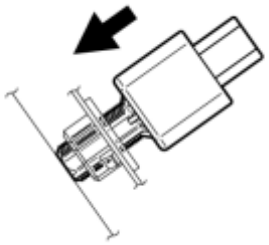
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Stop Light Switch Assembly) |

If the result is not as specified, replace the stop light switch assembly.

# INSTALLATION

1. INSTALL STOP LIGHT SWITCH ASSEMBLY

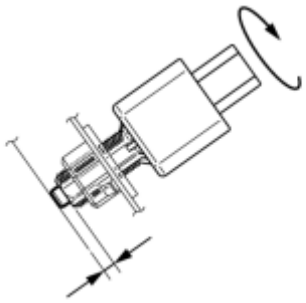


P

(a) Insert the stop light switch assembly until the rod hits the pedal.

NOTICE:

When inserting the stop light switch assembly, support the pedal from behind so that the pedal is not pushed in.



P

(b) Make a quarter turn clockwise to install the stop light switch assembly.

Torque: **1.5 N·m (15 kgf·cm, 13in·lbf)** or less

NOTICE:

When inserting the stop light switch assembly, support the pedal from behind so that the pedal is not pushed in.

(c) Connect the connector.

(d) Check the protrusion of the rod.

Protrusion of the rod:

1.5 to 2.5 mm (0.0591 to 0.0984 in.)

If the protrusion is not as specified, adjust it.

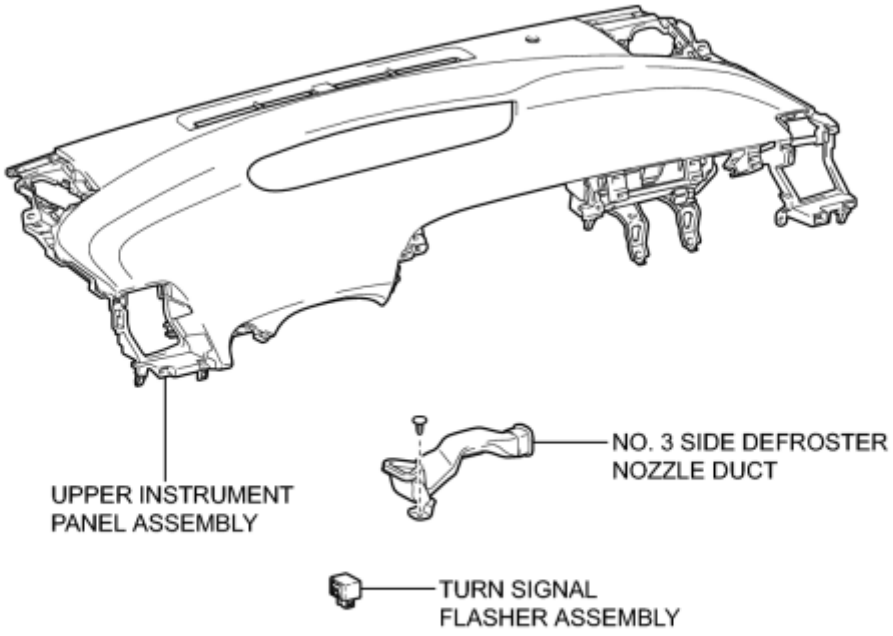
NOTICE:

Do not depress the brake pedal.

2. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure up to Remove Upper Instrument Panel Assembly INFO.

2. REMOVE NO. 3 SIDE DEFROSTER NOZZLE DUCT INFO

3. REMOVE TURN SIGNAL FLASHER ASSEMBLY



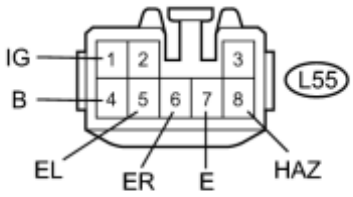
(a) Using a screwdriver, disengage the claw.

(b) Disconnect the connector and remove the turn signal flasher assembly.

# INSPECTION

1. INSPECT TURN SIGNAL FLASHER ASSEMBLY

*1




(a) Disconnect the L55 turn signal flasher assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L55-1 (IG) - Body ground | Power switch off | Below 1 V |
| | Power switch on (IG) | 11 to 14 V |
| L55-4 (B) - Body ground | Always | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Turn Signal Flasher Assembly) |

If the result is not as specified, repair or replace the wire harness or connector.

(c) Measure the resistance according to the value(s) in the table below.

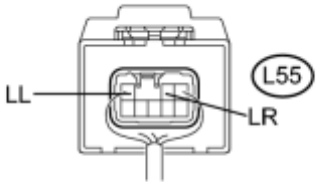
Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L55-5 (EL) - Body ground | Turn signal switch off | 10 kΩ or higher |
| | Turn signal switch in left turn position | Below 1 Ω |
| L55-6 (ER) - Body ground | Turn signal switch in neutral position | 10 kΩ or higher |
| | Turn signal switch in right turn position | Below 1 Ω |
| L55-7 (E) - Body ground | Always | Below 1 Ω |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L55-8 (HAZ) - Body ground | Hazard warning switch off | 10 kΩ or higher |
| | Hazard warning switch on | Below 1 Ω |

If the result is not as specified, repair or replace the wire harness or connector.

*1




(d) Reconnect the L55 turn signal flasher assembly connector.

H

(e) Measure the voltage according to the valve(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L55-2 (LR) - Body ground | Hazard warning switch off | Below 1 V |
| | Hazard warning switch on | 11 to 14 V (60 to 120 times per minute) |
| | Turn signal switch off | Below 1 V |
| | Power switch on (IG) and turn signal switch in RH position | 11 to 14 V (60 to 120 times per minute) |
| L55-3 (LL) - Body ground | Hazard warning switch off | Below 1 V |
| | Hazard warning switch on | 11 to 14 V (60 to 120 times per minute) |
| | Turn signal switch off | Below 1 V |
| | Power switch on (IG) and turn signal switch in LH position | 11 to 14 V (60 to 120 times per minute) |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Turn Signal Flasher Assembly) |

If the result is not as specified, the turn signal flasher assembly may have a malfunction.

# INSTALLATION

1. INSTALL TURN SIGNAL FLASHER ASSEMBLY



(a) Connect the connector.

(b) Engage the claw to install the turn signal flasher assembly.

2. INSTALL NO. 3 SIDE DEFROSTER NOZZLE DUCT INFO

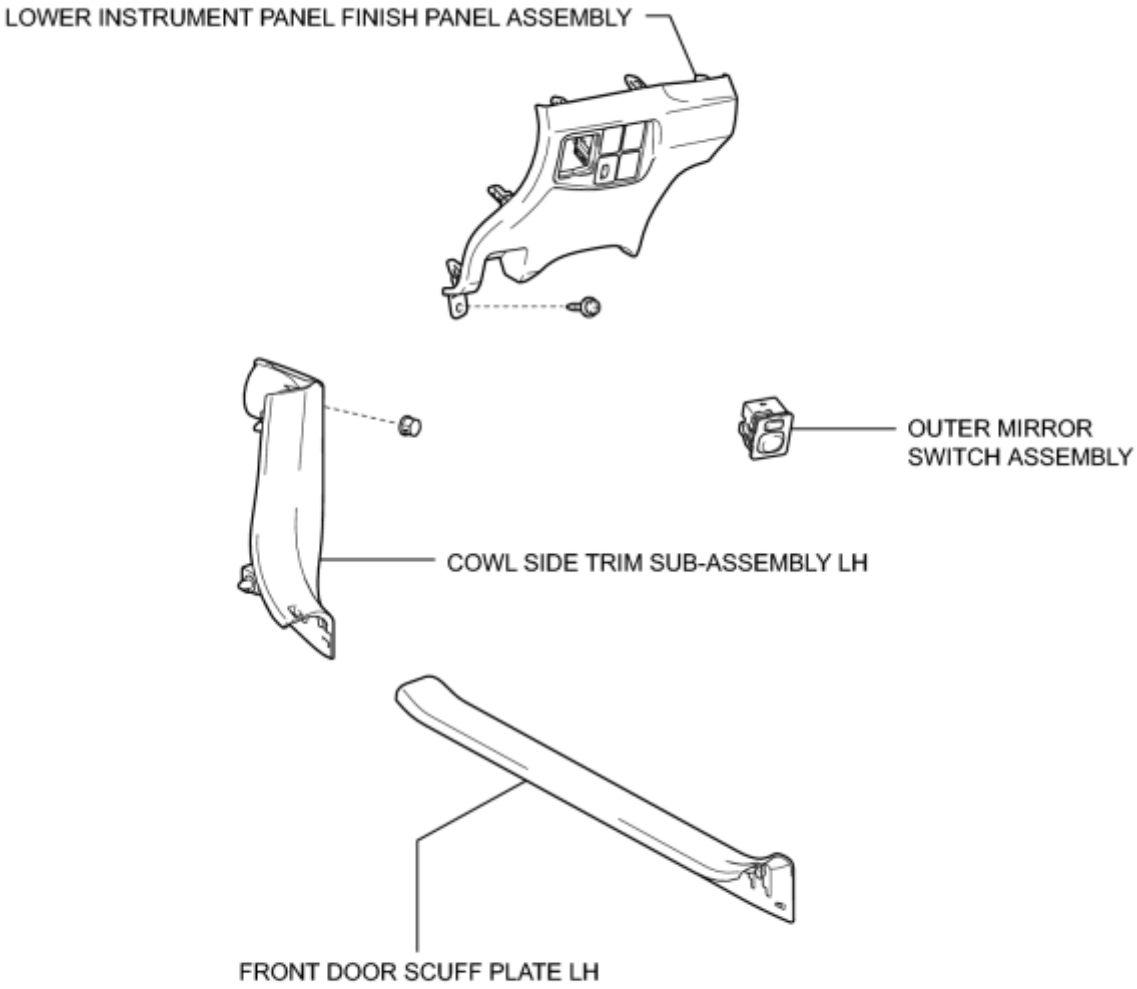
3. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure from Install Upper Instrument Panel Assembly INFO.

# COMPONENTS

# ILLUSTRATION




P

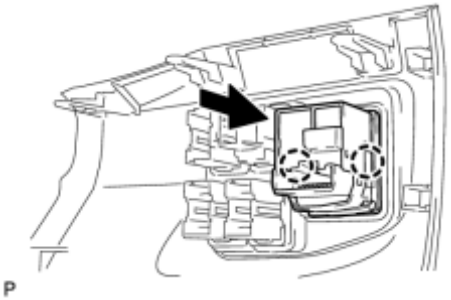
# REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE LH INFO

2. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

3. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

4. REMOVE OUTER MIRROR SWITCH ASSEMBLY




(a) Disengage the 2 claws and remove the outer mirror switch assembly.

# INSPECTION

1. INSPECT OUTER MIRROR SWITCH ASSEMBLY

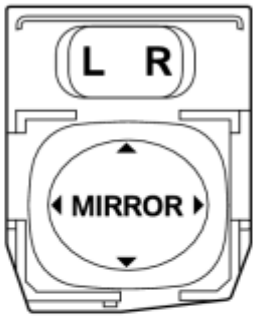
(a) Inspect the outer mirror switch.

(1) Measure the resistance according to the value(s) in the table below when the switch is operated.

HINT:

Select "L" on the left/right adjustment switch.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 4 - 8 | Up | Below 1 Ω |
| 6 - 7 | | |
| 4 - 7 | Down | |
| 6 - 8 | | |
| 5 - 8 | Left | |
| 6 - 7 | | |
| 5 - 7 | Right | |
| 6 - 8 | | |

HINT:



Select "R" on the left/right adjustment switch.

Standard Resistance:

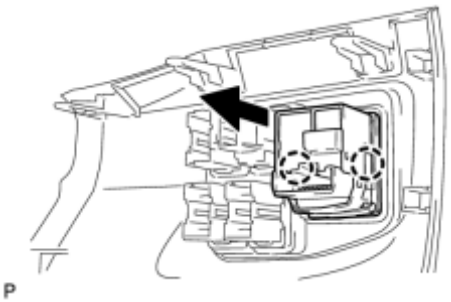
H

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 3 - 8 | Up | Below 1 Ω |
| 6 - 7 | | |
| 3 - 7 | Down | |
| 6 - 8 | | |
| 2 - 8 | Left | |
| 6 - 7 | | |
| 2 - 7 | Right | |
| 6 - 8 | | |

If the result is not as specified, replace the outer mirror switch assembly.

# INSTALLATION

1. INSTALL OUTER MIRROR SWITCH ASSEMBLY




(a) Engage the 2 claws to install the outer mirror switch assembly.

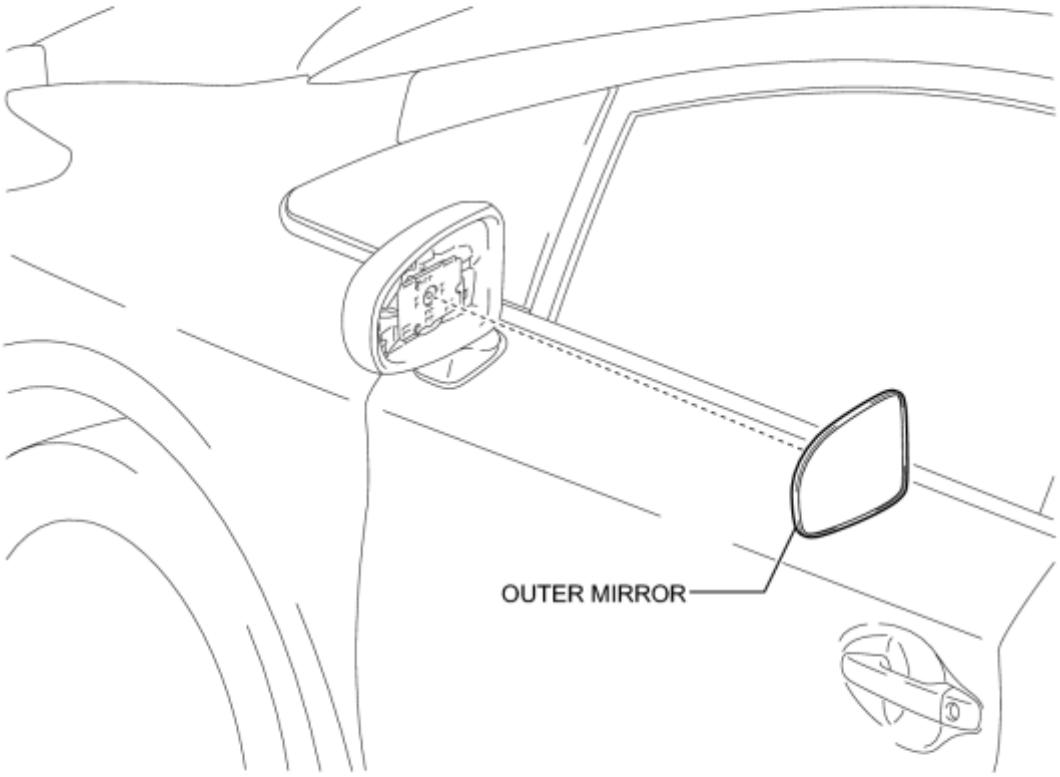
2. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. INSTALL FRONT DOOR SCUFF PLATE LH INFO

# COMPONENTS

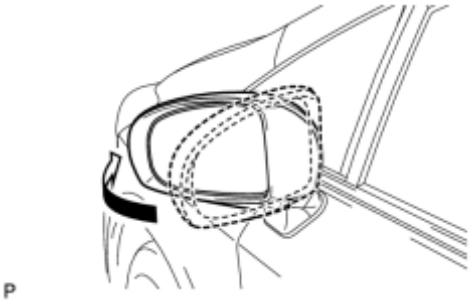
# ILLUSTRATION



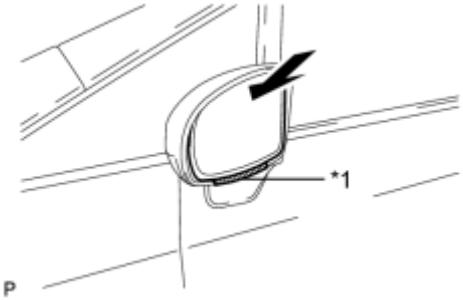

P

# REMOVAL

1. REMOVE OUTER MIRROR



(a) Push the outside part of the outer mirror assembly and tilt it as show in the illustration.

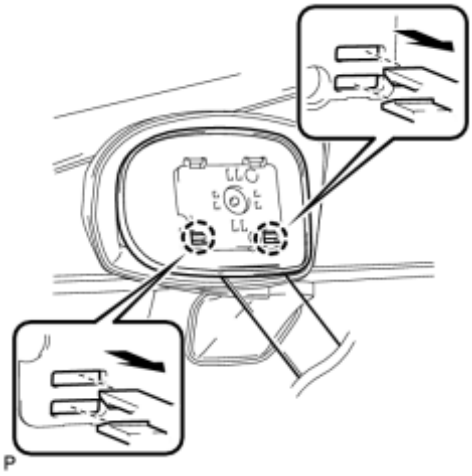



(b) Push the upper part of the mirror surface and tilt it.

(c) Apply protective tape as shown in the illustration.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |



(d) Using a moulding remover, disengage the 2 claws at the lower part of the outer rear view mirror, and separate the outer rear view mirror glass.

(e) w/o Mirror Heater:

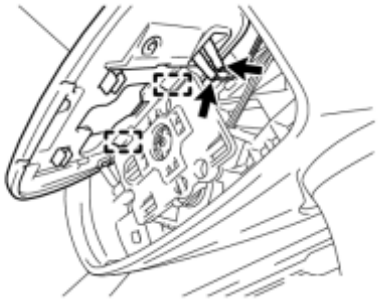
(1) Disengage the 2 guides at the upper part of the outer mirror.



P

(2) Remove the outer mirror.

(f) w/ Mirror Heater:



P

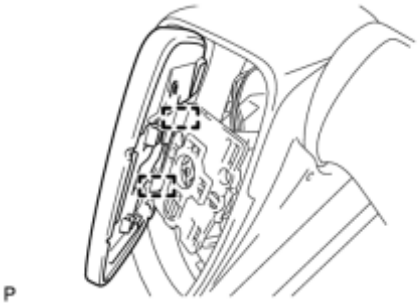
(1) Disengage the 2 guides at the upper part of the outer mirror.

(2) Disconnect the 2 connectors and remove the outer mirror.

# INSTALLATION

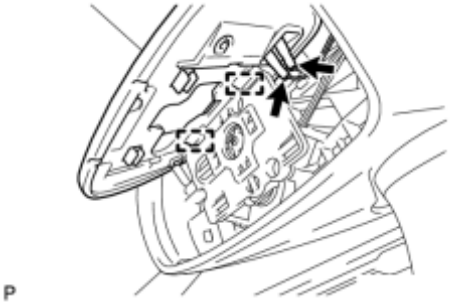
1. INSTALL OUTER MIRROR

(a) w/o Mirror Heater:



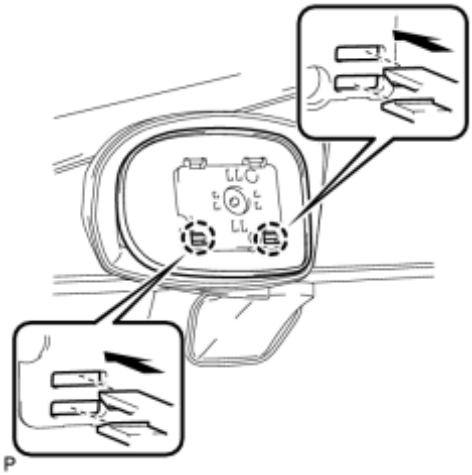
(1) Engage the 2 guides on the upper part of the outer mirror to the outer rear view mirror.

(b) w/ Mirror Heater:



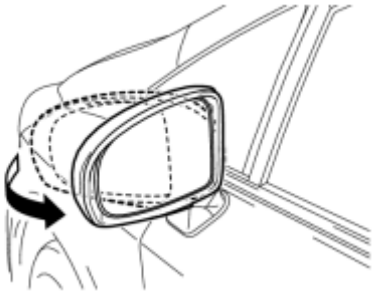
(1) Connect the 2 connectors.

(2) Engage the 2 guides on the upper part of the outer mirror to the outer rear view mirror.



(c) Engage the 2 claws on the lower part of the outer mirror to the outer rear view mirror as shown in the illustration.

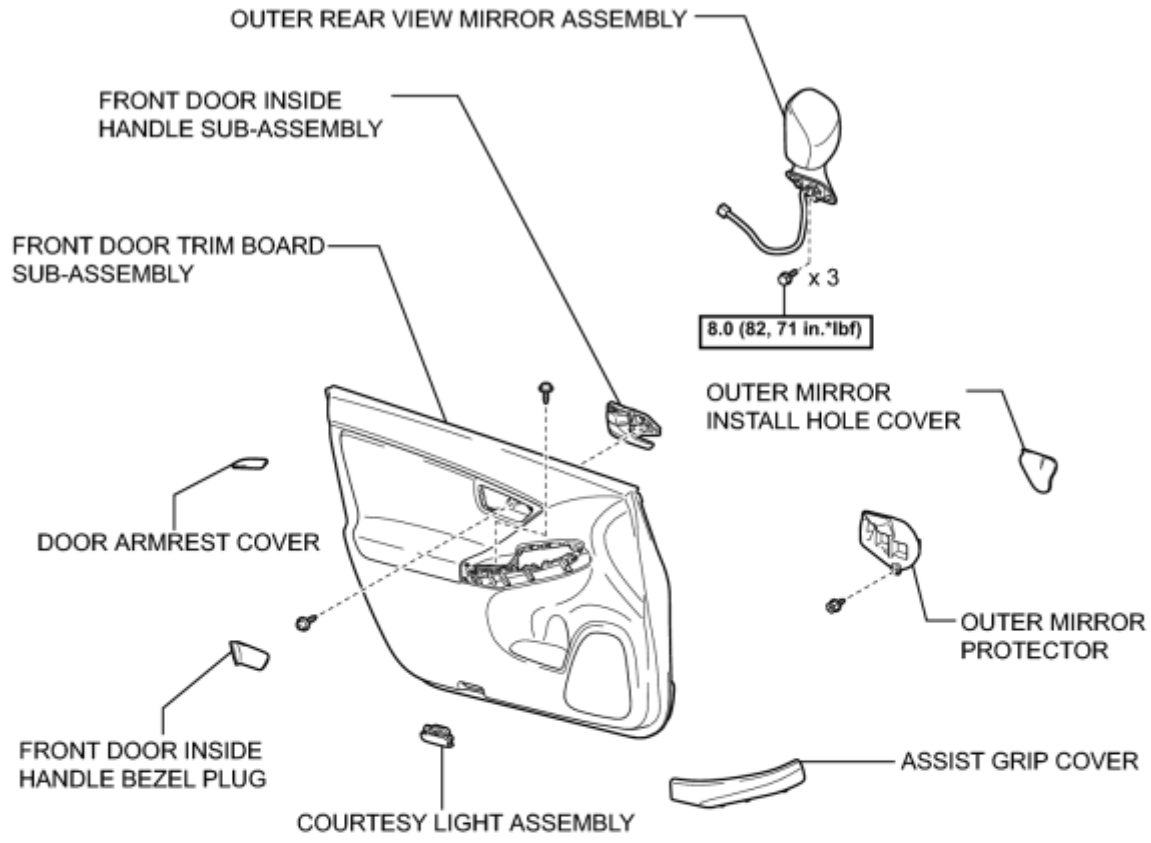
(d) Push the outside part of the outer mirror assembly and tilt it as show in the illustration.

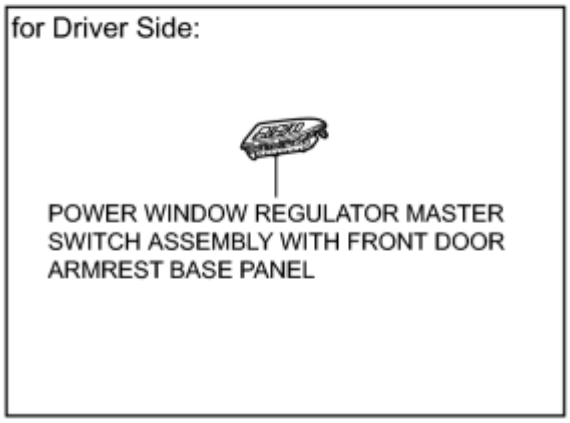


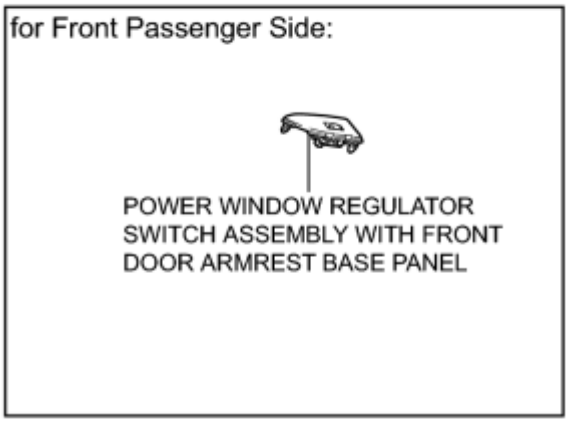
P

# COMPONENTS

# ILLUSTRATION

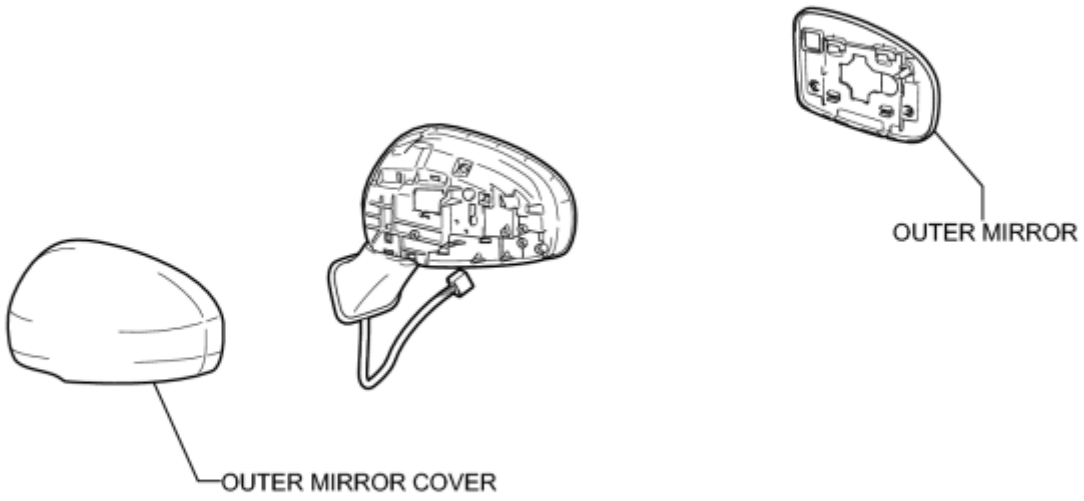



P

# ILLUSTRATION




P

# REMOVAL

1. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

2. REMOVE ASSIST GRIP COVER INFO

3. REMOVE DOOR ARMREST COVER INFO

4. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

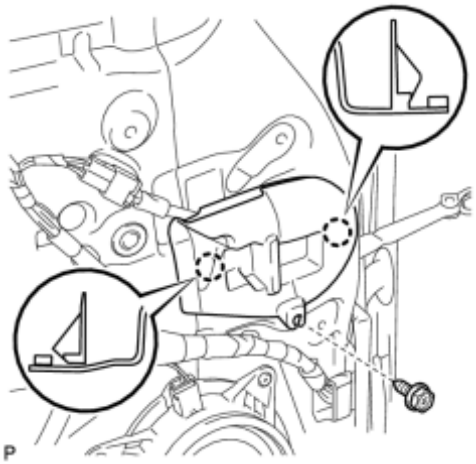
5. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

6. REMOVE COURTESY LIGHT ASSEMBLY INFO

7. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

8. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

9. REMOVE OUTER MIRROR PROTECTOR




(a) Remove the screw.

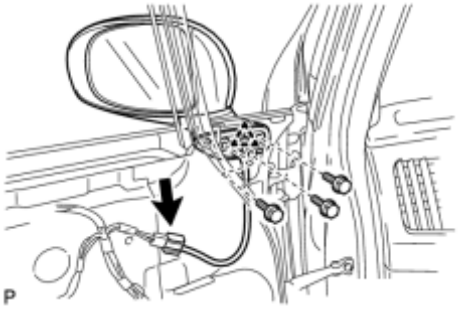
(b) Disengage the 2 claws and remove the outer mirror protector.

10. REMOVE OUTER MIRROR INSTALL HOLE COVER

(a) Disengage the 2 claws and guide, remove the outer mirror install hole cover.



11. REMOVE OUTER REAR VIEW MIRROR ASSEMBLY



(a) Disconnect the connector.

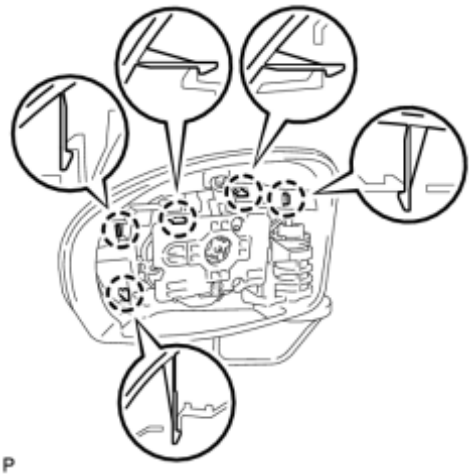
(b) Remove the 3 bolts.

(c) Disengage the clip and remove the outer rear view mirror assembly.

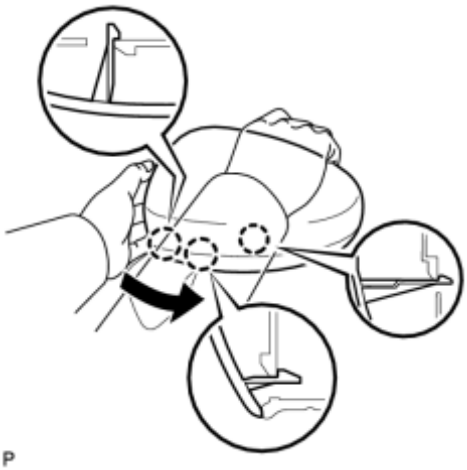
12. REMOVE OUTER MIRROR INFO

13. REMOVE OUTER MIRROR COVER

(a) Disengage the 5 claws.



P



P

(b) Disengage the 3 claws and remove the outer mirror cover as shown in the illustration.

# INSPECTION

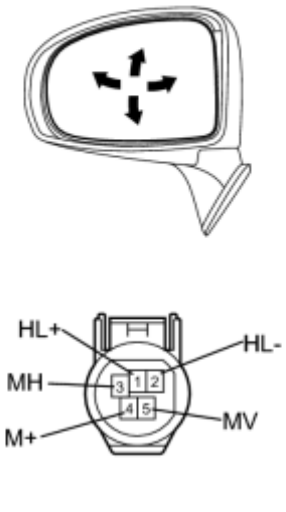
1. INSPECT OUTER REAR VIEW MIRROR ASSEMBLY LH

(a) Inspect outer mirror motor operation.

(1) Apply battery voltage and check the operation of the mirror face, as shown in the table and illustration.

OK:

| Connection | Result |
|---|---|
| Battery positive (+) → Terminal 5 (MV)<br><br>Battery negative (-) → Terminal 4 (M+) | Turns upward |
| Battery positive (+) → Terminal 4 (M+)<br><br>Battery negative (-) → Terminal 5 (MV) | Turns downward |
| Battery positive (+) → Terminal 3 (MH)<br><br>Battery negative (-) → Terminal 4 (M+) | Turns left |
| Battery positive (+) → Terminal 4 (M+)<br><br>Battery negative (-) → Terminal 3 (MH) | Turns right |




H

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Outer Rear View Mirror Assembly LH) |

If the result is not specified, replace the outer rear view mirror assembly.

(b) Check the mirror heater (w/ Mirror heater).

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Terminal 1 (HL+) - Terminal 2 (HL-) | 25°C (77°F) | 7.6 to 11.4 Ω |

If the result is not specified, replace the outer rear view mirror assembly.

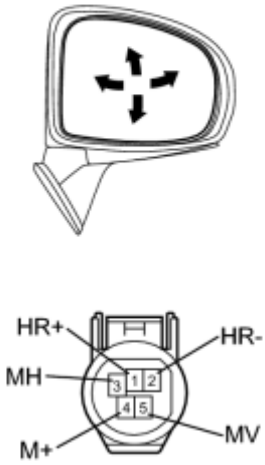
2. INSPECT OUTER REAR VIEW MIRROR ASSEMBLY RH

(a) Inspect outer mirror motor operation.

(1) Apply battery voltage and check the operation of the mirror face, as shown in the table and illustration.

OK:

| Connection | Result |
|---|---|
| Battery positive (+) → Terminal 5 (MV)<br><br>Battery negative (-) → Terminal 4 (M+) | Turns upward |
| Battery positive (+) → Terminal 4 (M+)<br><br>Battery negative (-) → Terminal 5 (MV) | Turns downward |
| Battery positive (+) → Terminal 3 (MH)<br><br>Battery negative (-) → Terminal 4 (M+) | Turns left |
| Battery positive (+) → Terminal 4 (M+)<br><br>Battery negative (-) → Terminal 3 (MH) | Turns right |




H

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Outer Rear View Mirror Assembly RH) |

If the result is not specified, replace the outer rear view mirror assembly.

(b) Check the mirror heater (w/ Mirror heater).

(1) Measure the resistance according to the value(s) in the table below.

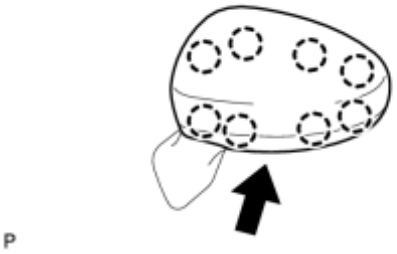
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Terminal 1 (HR+) - Terminal 2 (HR-) | 25°C (77°F) | 7.6 to 11.4 Ω |

If the result is not specified, replace the outer rear view mirror assembly.

# INSTALLATION

1. INSTALL OUTER MIRROR COVER



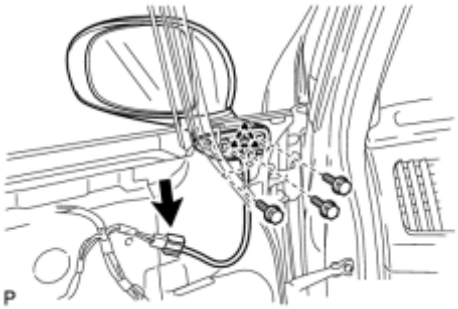
(a) Engage the 8 claws to install the outer mirror cover.

NOTICE:

Securely engage the 8 claws.

2. INSTALL OUTER MIRROR INFO

3. INSTALL OUTER REAR VIEW MIRROR ASSEMBLY



(a) Engage the clip to install the outer rear view mirror assembly.

(b) Install the outer rear view mirror assembly with the 3 bolts.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

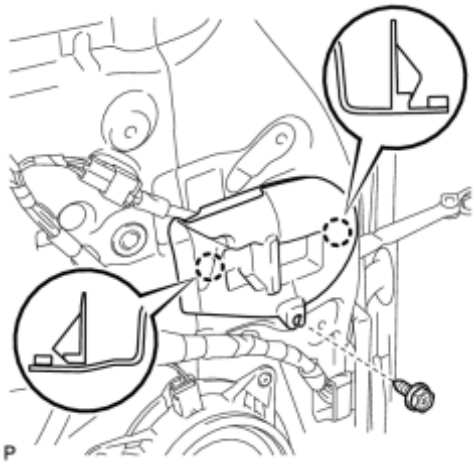
(c) Connect the connector.

4. INSTALL OUTER MIRROR INSTALL HOLE COVER

(a) Engage the guide and 2 claws to install the outer mirror install hole cover.



5. INSTALL OUTER MIRROR PROTECTOR



(a) Engage the 2 claws.

(b) Install the outer mirror protector with the screw.

6. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

7. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

8. INSTALL COURTESY LIGHT ASSEMBLY INFO

9. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

10. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

11. INSTALL DOOR ARMREST COVER INFO

12. INSTALL ASSIST GRIP COVER INFO

13. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

# PRECAUTION

1. NOTICE FOR INITIALIZATION

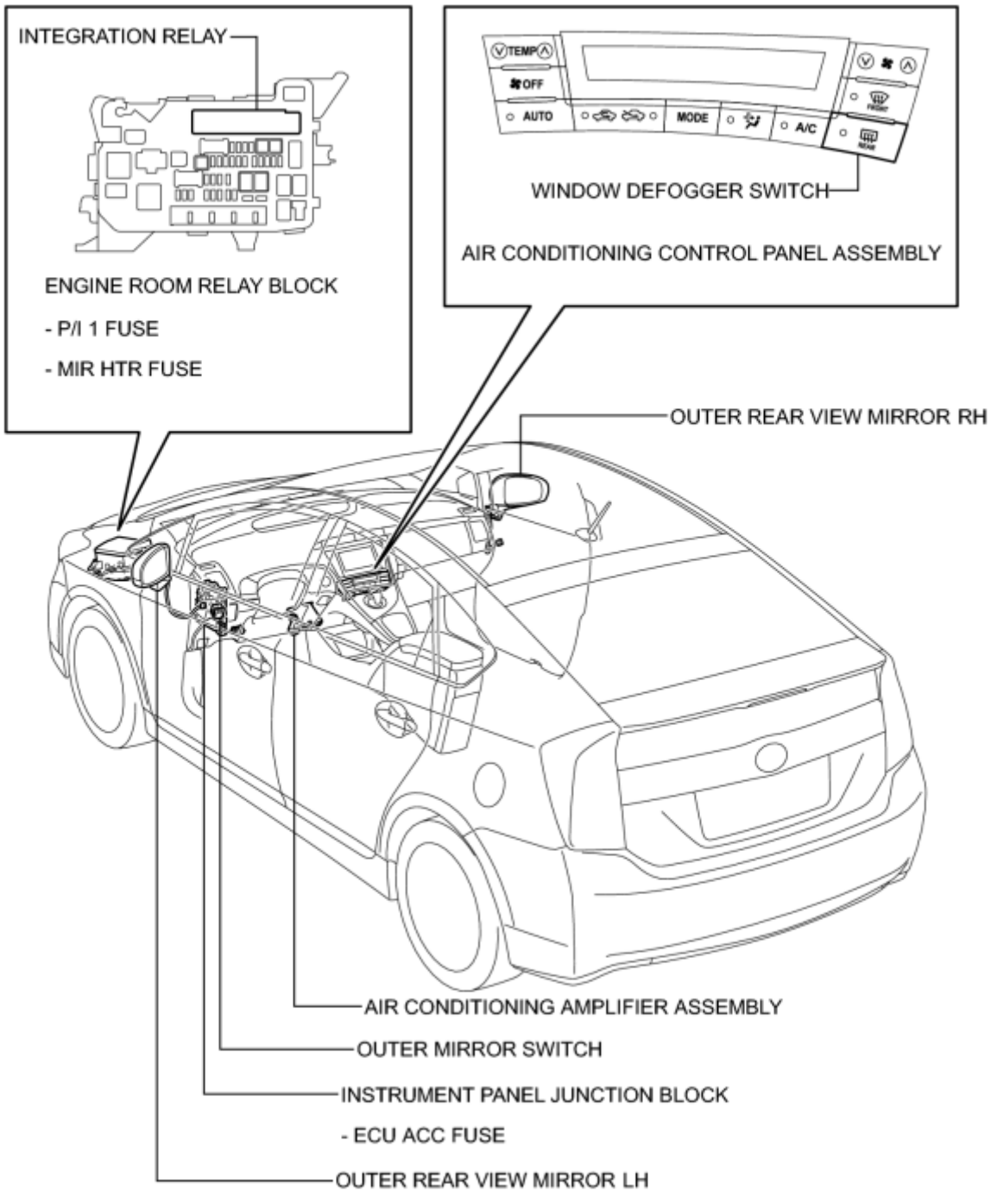
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

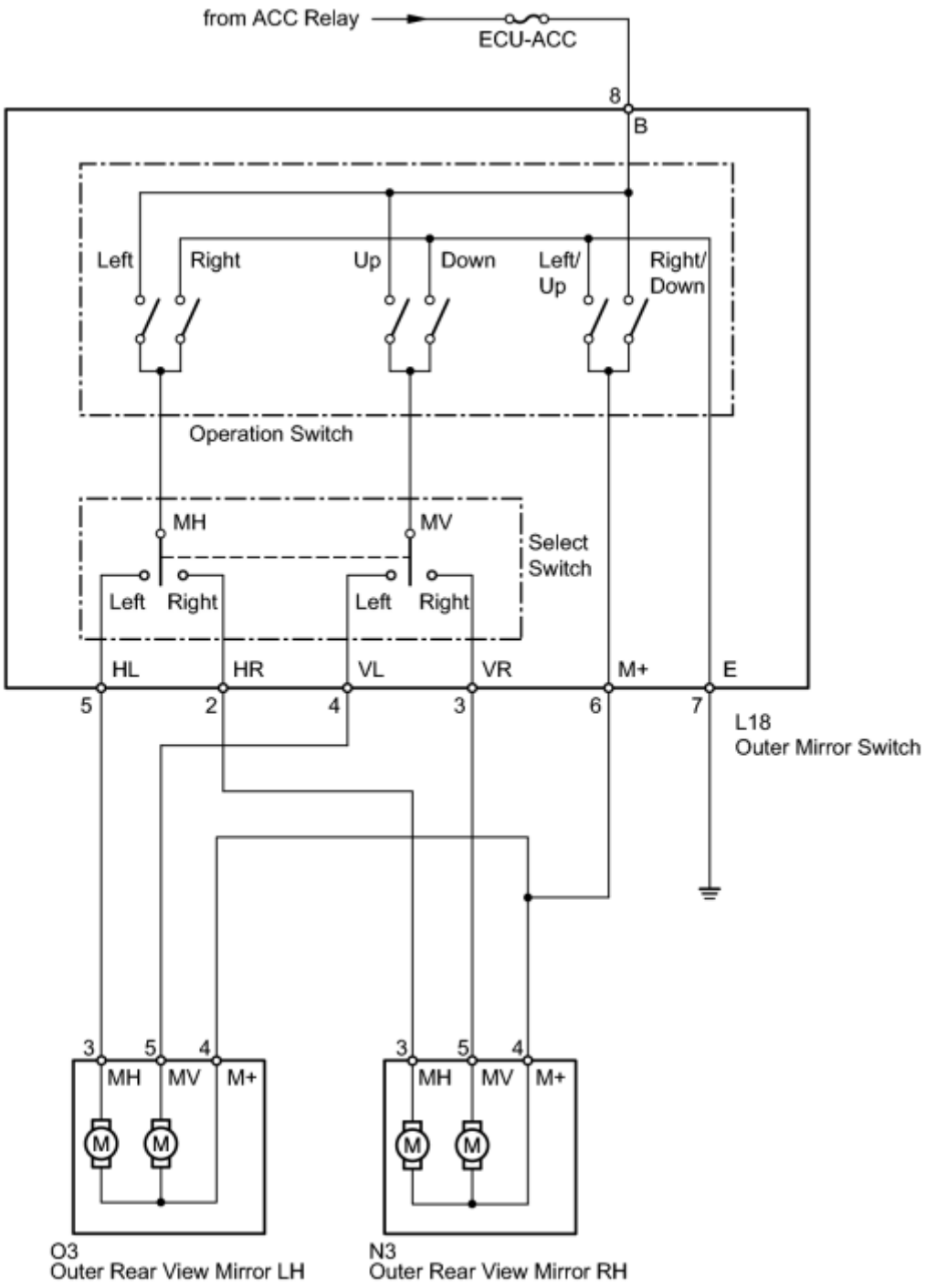
# PARTS LOCATION

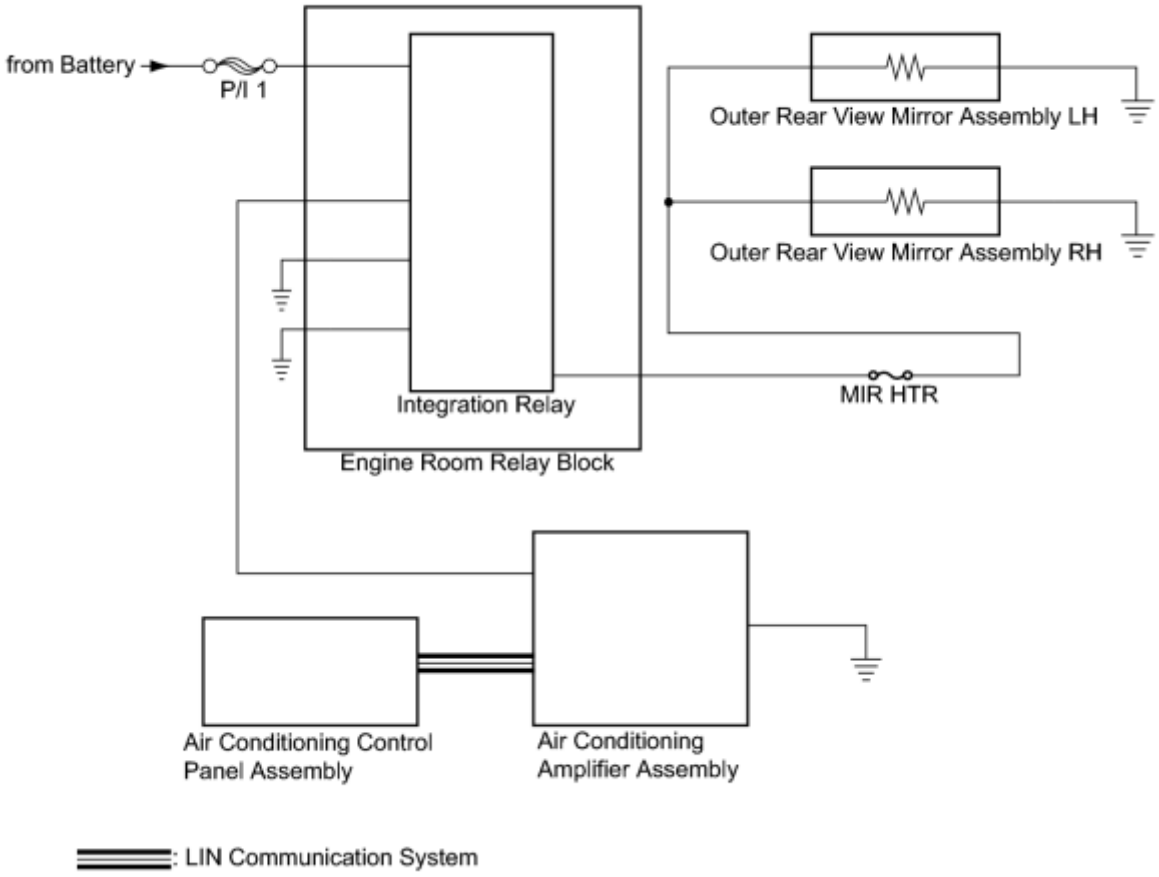
# ILLUSTRATION




H

# SYSTEM DIAGRAM






### *Communication Table*

| Transmitting ECU | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Air Conditioning Control Panel Assembly | Air Conditioning Amplifier Assembly | Outer Mirror Heater Switch Signal | LIN |

# SYSTEM DESCRIPTION

1. FUNCTION OF MAIN COMPONENT

| Component | Function |
|---|---|
| Vertical mirror motor | Receives a signal from the outer mirror switch and adjusts the mirror surface position vertically. |
| Horizontal mirror motor | Receives a signal from the outer mirror switch and adjusts the mirror surface position horizontally. |
| Mirror heater | Receives a signal from the outer mirror switch and operates to warm the mirror. |
| Mirror select switch | Consists of R and L switches. One must be chosen to operate the outer mirror switch assembly. |
| Mirror adjust switch | Mirror R and L signals are sent to each outer mirror control ECU assembly from the mirror select switch.<br><br>After selecting the R or L switch, the right, left, up and down control switches can be operated to change the angle of the mirror. |

2. SYSTEM OPERATION

(a) The remote control mirror has the following features:

| Function | Outline |
|---|---|
| Electrical remote control mirror function | When the outer mirror switch assembly is operated, this function moves the mirror surface vertically or horizontally to enable the driver to attain an optimal mirror angle. Setting the mirror select switch to the R position operates the right mirror, and setting it to the L position operates the left mirror. |
| Mirror heater function | Automatically turns on the mirror heaters when the rear window defogger switch is turned on. The rear window defogger and mirror heaters automatically turn off after 15 min. |

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

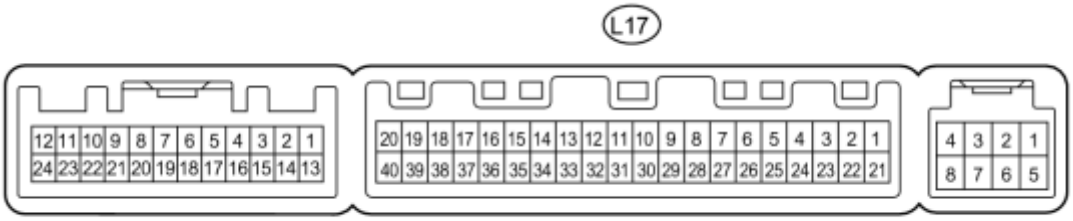
### *Power Mirror Control System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Mirror does not operate | ECU-ACC fuse | INFO |
| | Outer mirror switch | INFO |
| | Outer rear view mirror assembly LH | INFO |
| | Outer rear view mirror assembly RH | INFO |
| | Wire harness | - |
| Mirror heater does not operate* | MIR HTR fuse | INFO |
| | Outer rear view mirror assembly LH | - |
| | Outer rear view mirror assembly RH | - |
| | Wire harness | - |
| | Windshield defogger system | - |

# TERMINALS OF ECU

1. CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY

(a) Disconnect the L17 air conditioning amplifier assembly connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-1 (IG+) - L17-14 (GND) | B - W-B | Power source (IG) | Power switch on (IG) | 11 to 14 V |
| L17-1 (IG+) - L17-14 (GND) | B - W-B | Power source (IG) | Power switch off | Below 1 V |
| L17-21 (B) - L17-14 (GND) | Y - W-B | Battery power supply | Always | 11 to 14 V |
| L17-14 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L17 air conditioning amplifier assembly connector.

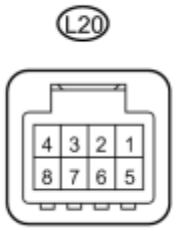
(d) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-20 (RDEF) - L17-14 (GND) | Y - W-B | Rear window defogger signal | Power switch on (IG), rear window defogger switch off | 11 to 14 V |
| L17-20 (RDEF) - L17-14 (GND) | Y - W-B | Rear window defogger signal | Power switch on (IG), rear window defogger switch on | Below 1 V |

If the result is not as specified, the air conditioning amplifier assembly may have a malfunction.

2. CHECK AIR CONDITIONING CONTROL PANEL ASSEMBLY

(a) Disconnect the L20 air conditioning control panel assembly connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L20-5 (IG+) - L20-8 (GND) | B - W-B | Power source (IG) | Power switch on (IG) | 11 to 14 V |
| L20-8 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L20 air conditioning control panel assembly connector.

(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L20-2 (TX+) - L20-8 (GND) | V - W-B | Rear window defogger signal | Power switch on (IG) | Pulse generation |

If the result is not as specified, the air conditioning control panel assembly may have a malfunction.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Data of the system can be read from the Data Link Connector 3 (DLC3) of the vehicle. Therefore, when the system seems to be malfunctioning, use Techstream to check for a malfunction and repair it.

2. CHECK DLC3

(a) Check the DLC3 

.

# DATA LIST / ACTIVE TEST

1. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

***Air Conditioner***

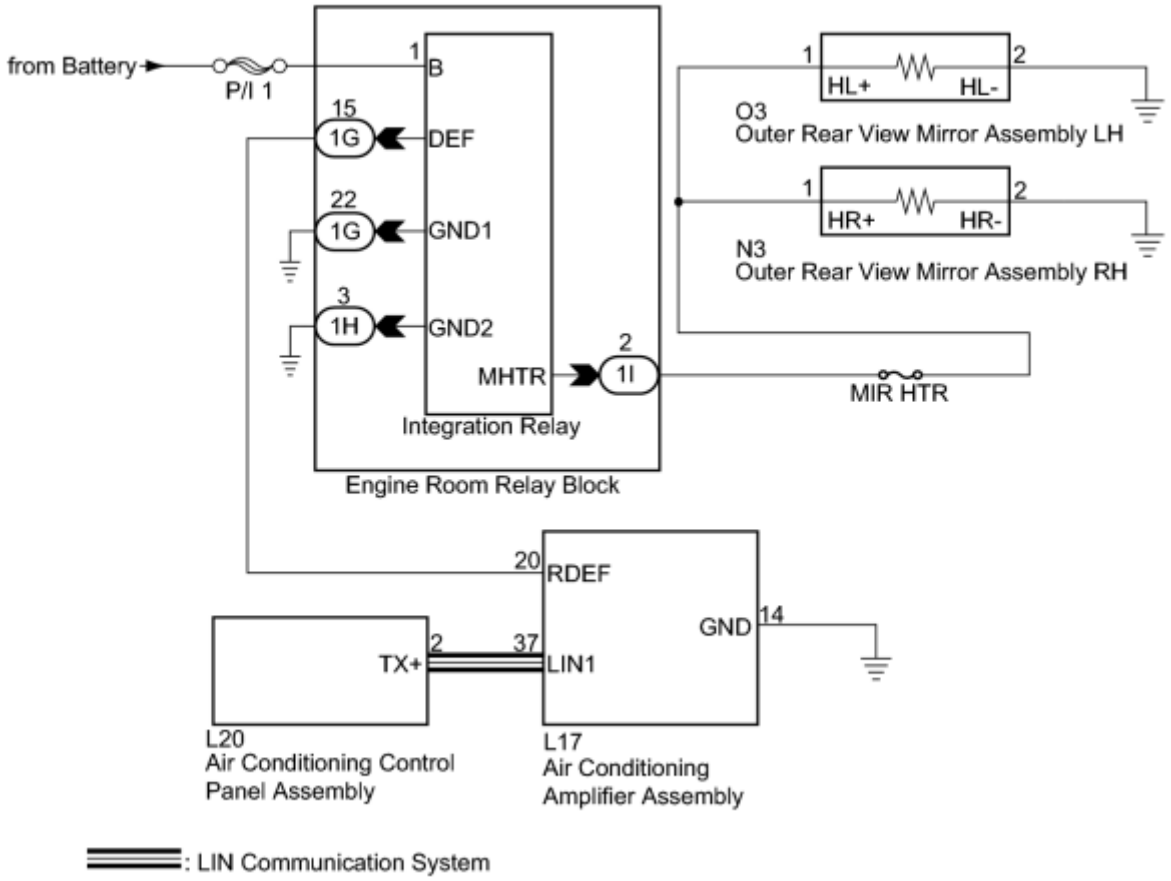
| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Mirror Heater Relay | Mirror Heater | ON/OFF | - |

Mirror Heater does not Operate with Rear Defogger Switch

# DESCRIPTION

When the rear window defogger switch on the air conditioning control panel assembly is pressed, the operation signal is transmitted to the air conditioning amplifier assembly through a LIN communication line. When the air conditioning amplifier assembly receives the signal, it turns on the integration relay to operate the mirror heater.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical /Air Conditioner / Active Test.

(e) Perform an Active Test according to the display on the Techstream.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Mirror Heater Relay | Mirror heater | ON / OFF | - |

Result:

| Result | Proceed to |
|---|---|
| Mirror heater operation on both mirrors is not normal | A |
| Mirror heater operation on RH side mirror is not normal | B |
| Mirror heater operation on LH side mirror is not normal | C |

C CHECK OUTER REAR VIEW MIRROR ASSEMBLY LH

B CHECK OUTER REAR VIEW MIRROR ASSEMBLY RH

A

| | |
|---|---|
| 2. | CHECK DEFOGGER SYSTEM |

(a) Check the rear window defogger operation.

OK:

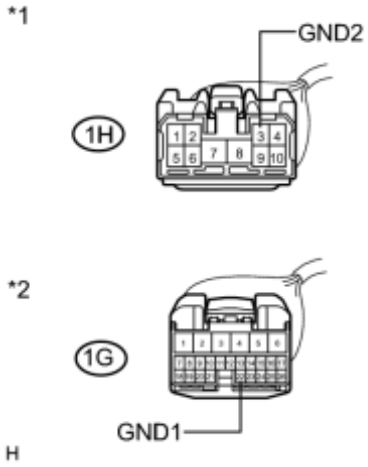
The rear window defogger operated normally.

NG GO TO WINDOW DEFOGGER SYSTEM

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BODY GROUND) |

(a) Disconnect the integration relay connector.




(b) Measure the resistance according to the value(s) in the table below

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1H-3 (GND2) - Body ground | Always | Below 1 Ω |
| 1G-22 (GND1) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

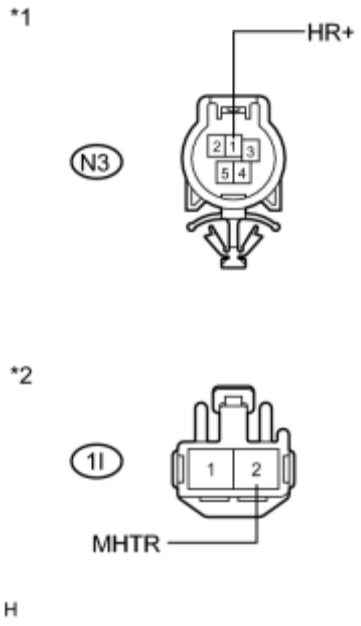
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (OUTER REAR VIEW MIRROR ASSEMBLY RH - INTEGRATION RELAY) |

(a) Disconnect the integration relay connector.




(b) Disconnect the outer rear view mirror assembly RH connector.

(c) Measure the resistance according to the value(s) in the table below

:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1I-2 (MHTR) - N3-1 (HR+) | Always | Below 1 Ω |
| 1I-2 (MHTR) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Outer Rear View Mirror Assembly RH) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

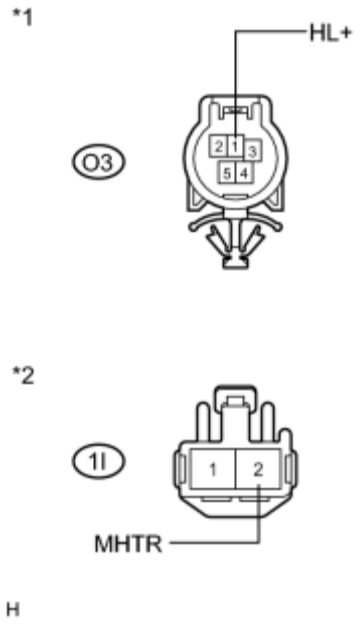
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (OUTER REAR VIEW MIRROR ASSEMBLY LH - INTEGRATION RELAY) |

(a) Disconnect the integration relay connector.




(b) Disconnect the outer rear view mirror assembly LH connector.

(c) Measure the resistance according to the value(s) in the table below

:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1I-2 (MHTR) - O3-1 (HL+) | Always | Below 1 Ω |
| 1I-2 (MHTR) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Outer Rear View Mirror Assembly RH) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | REPLACE INTEGRATION NO.1 RELAY |

(a) Replace the integration relay INFO.

OK

| | |
|---|---|
| 7. | CHECK REAR WINDOW DEFOGGER AND MIRROR HEATER |

(a) Check the mirror heater system.

OK:

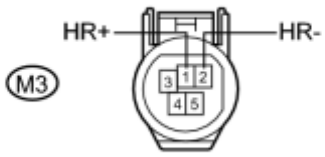
Mirror heater system is normal.

NG ▶ REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY

OK ▶ **END (INTEGRATION RELAY WAS DEFECTIVE)**

| | |
|---|---|
| 8. | CHECK OUTER REAR VIEW MIRROR ASSEMBLY RH |

*1




(a) Remove the outer mirror rear view mirror assembly RH INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| N3-1 (HR+) - N3-2 (HR-) | 25°C (77°F) | 7.6 to 11.4 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Outer Rear View Mirror Assembly RH) |

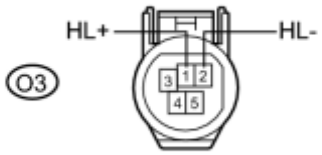
NG ▶ REPLACE OUTER REAR VIEW MIRROR ASSEMBLY RH (FRONT PASSENGER SIDE)

OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY - OUTER REAR VIEW MIRROR ASSEMBLY RH)**

| | |
|---|---|
| 9. | CHECK OUTER REAR VIEW MIRROR ASSEMBLY LH |

(a) Remove the outer mirror rear view mirror assembly LH INFO.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O3-1 (HL+) - O3-2 (HL-) | 25°C (77°F) | 7.6 to 11.4 Ω |

*Text in Illustration*

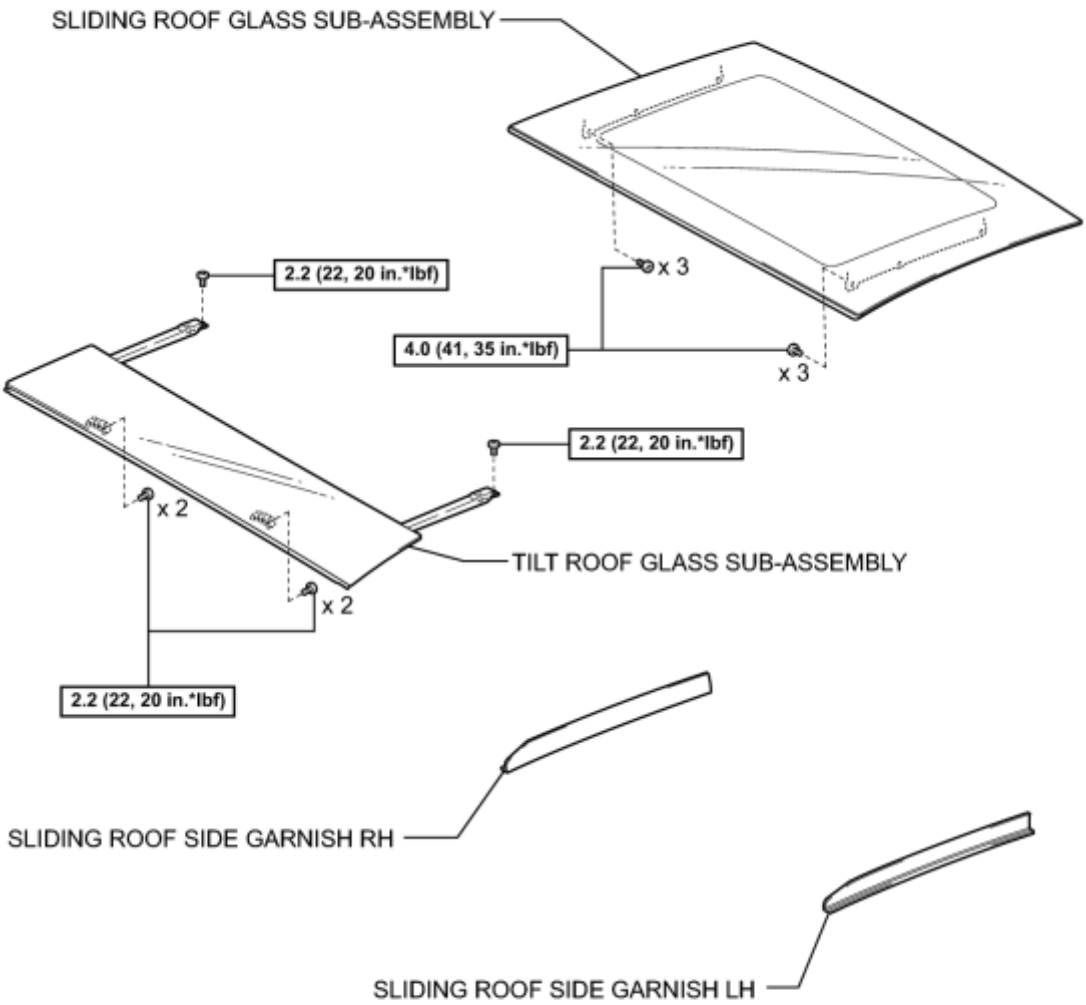
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Outer Rear View Mirror Assembly LH) |

NG ▶ REPLACE OUTER REAR VIEW MIRROR ASSEMBLY LH (DRIVER SIDE)

OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (INTEGRATION RELAY - OUTER REAR VIEW MIRROR ASSEMBLY LH)**

# COMPONENTS

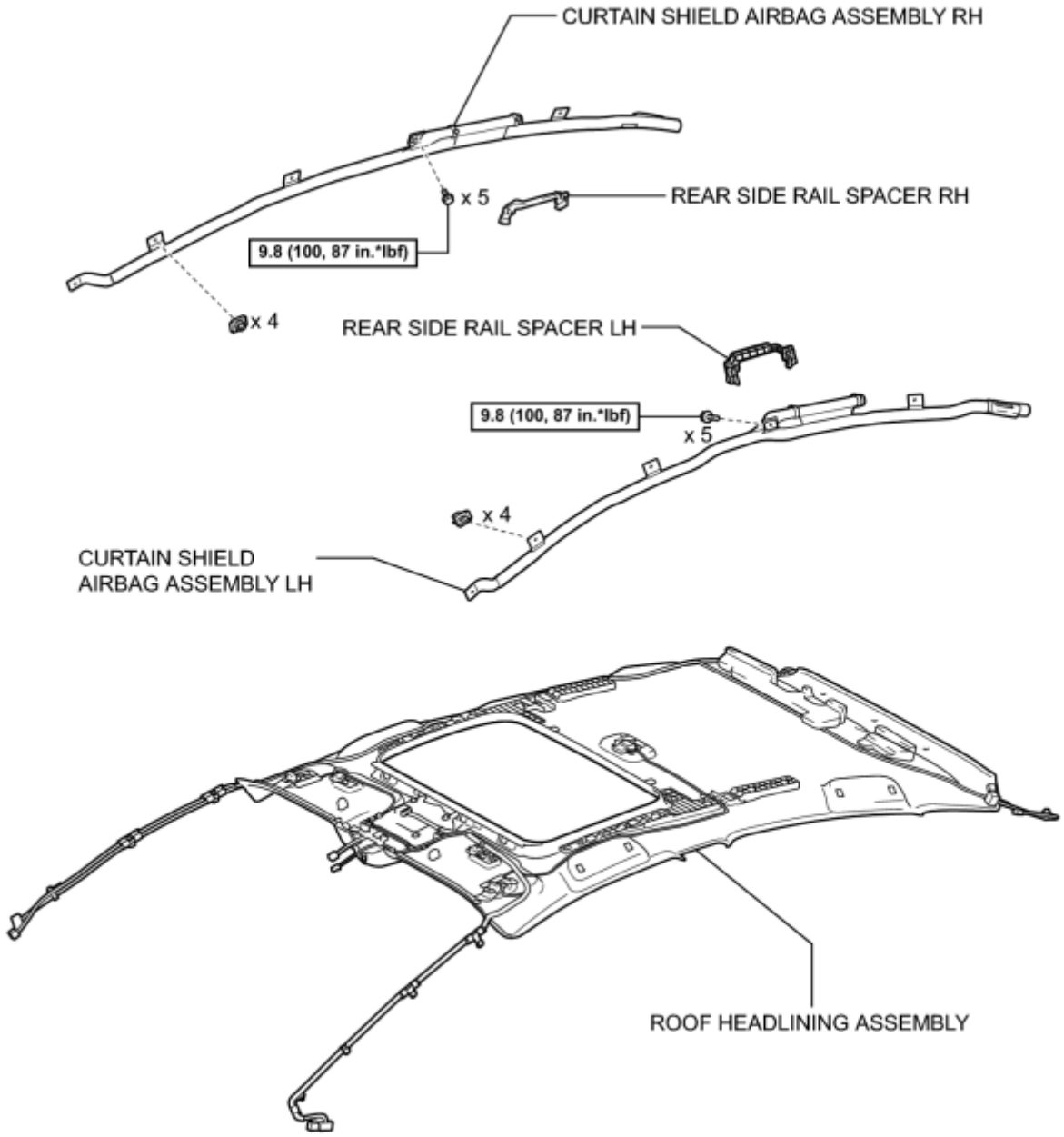
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

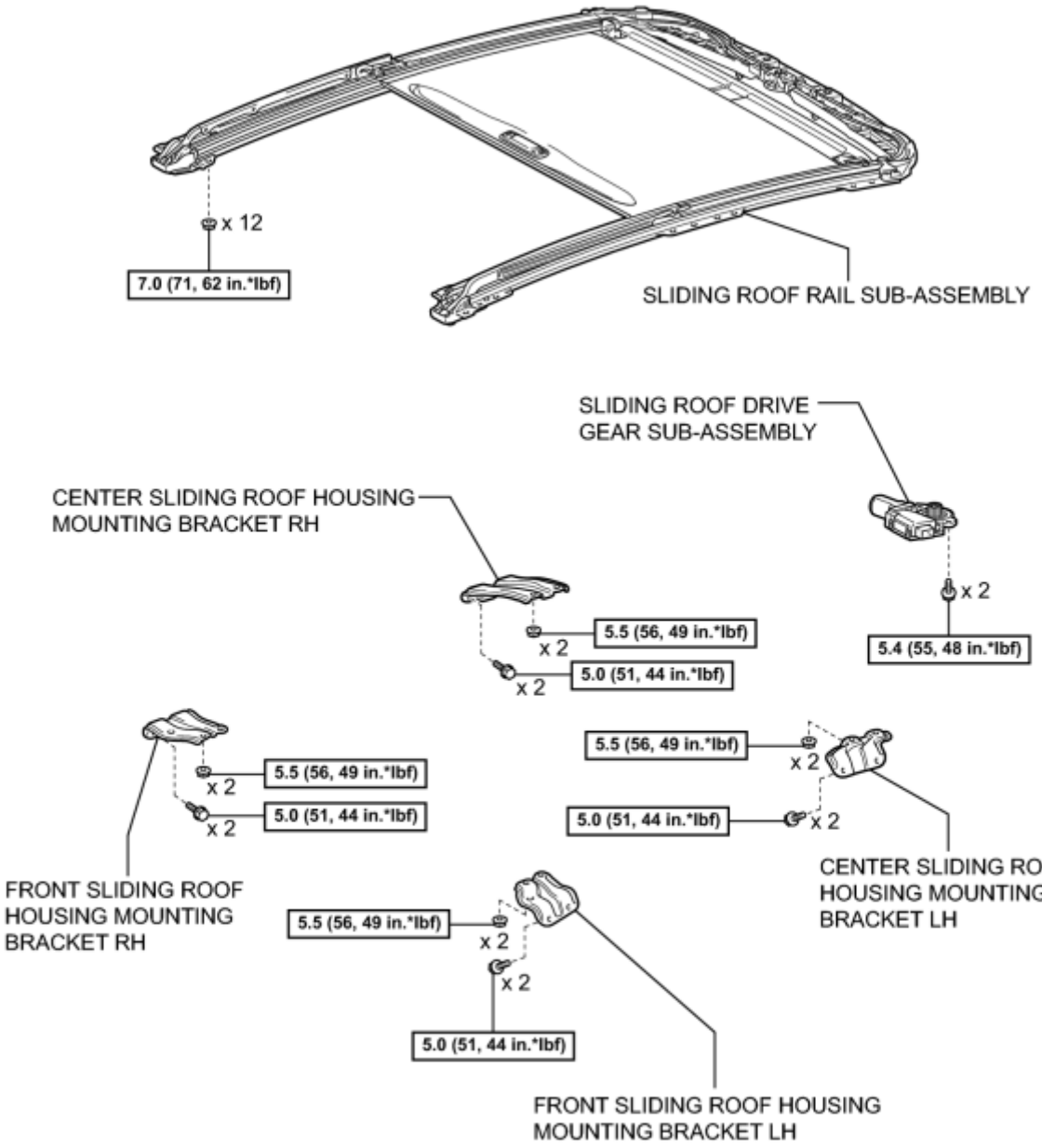
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

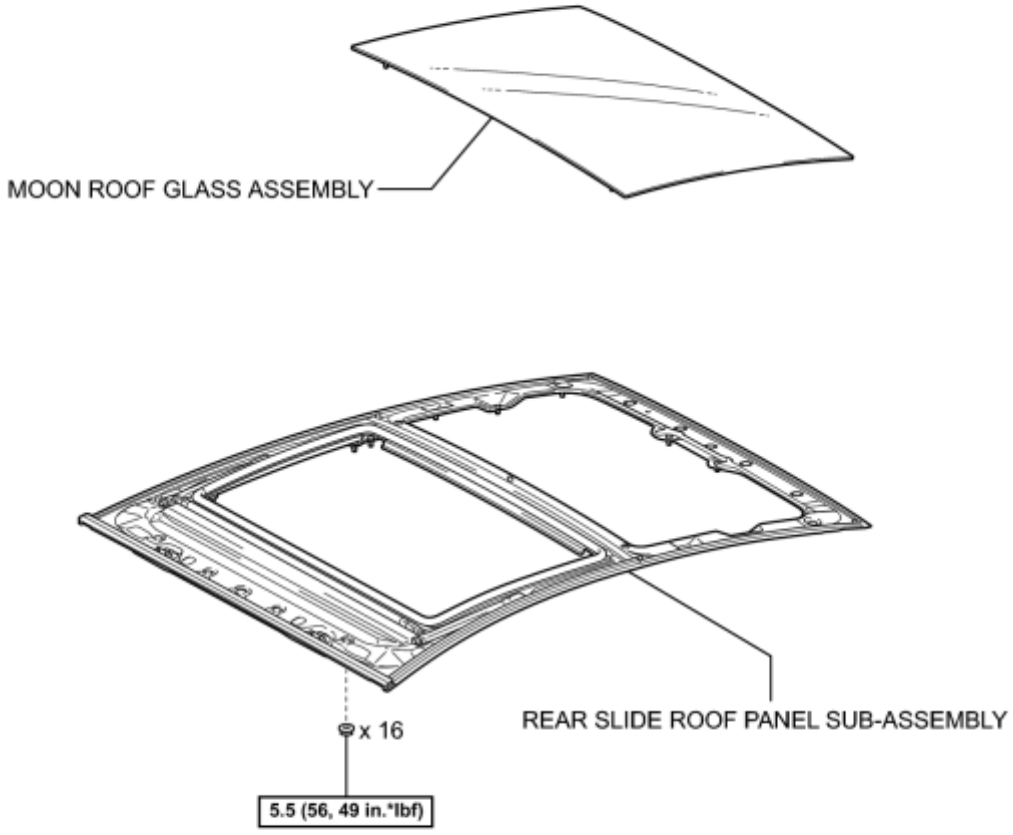
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

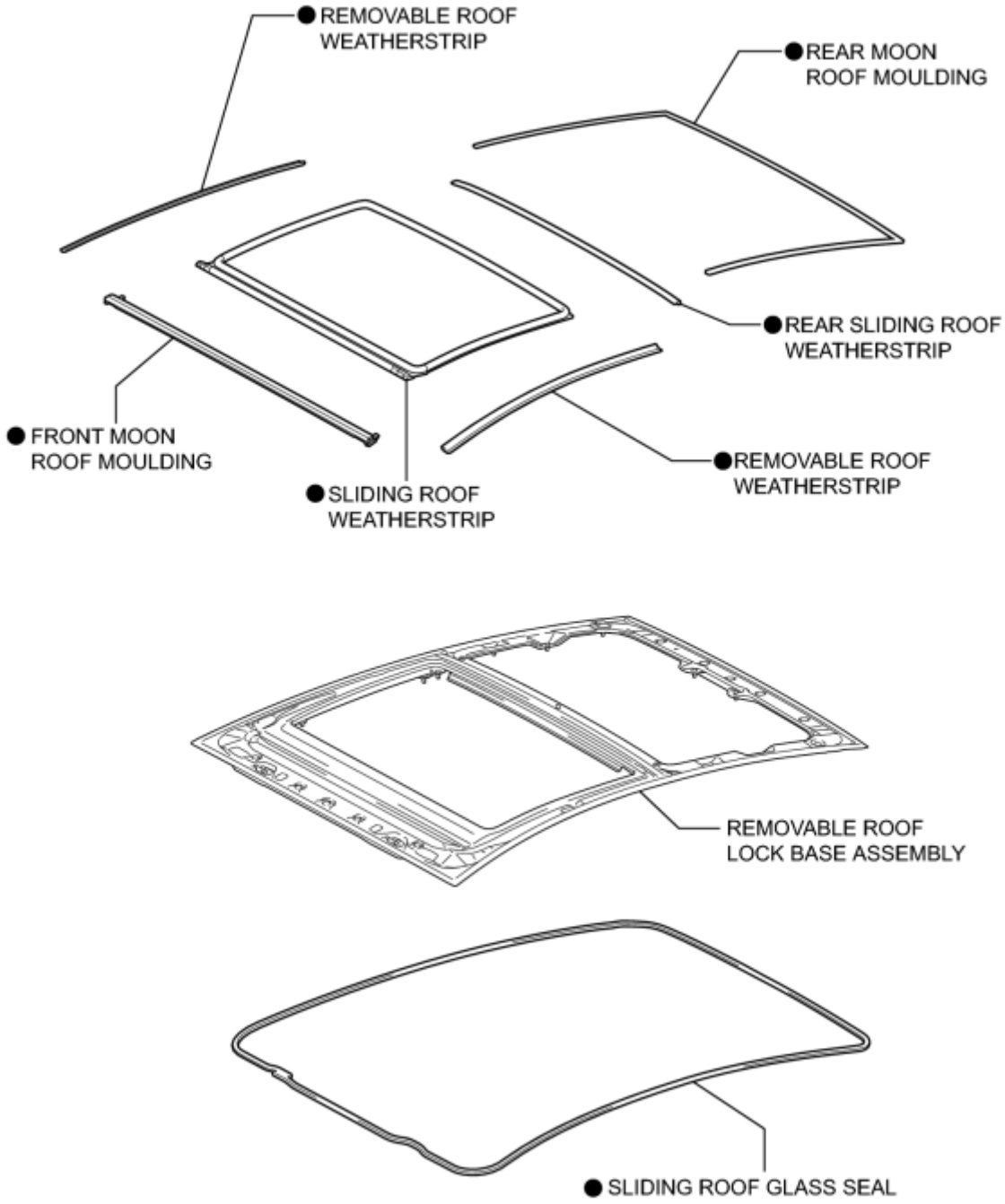
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




● Non-reusable part

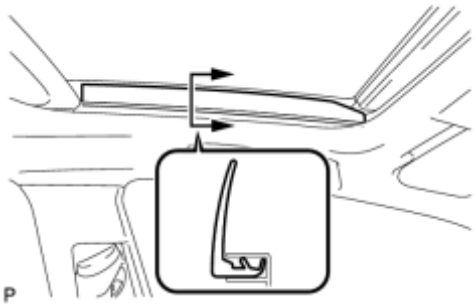
P

# REMOVAL

CAUTION:

OPERATION PRECAUTIONS INFO

1. REMOVE SLIDING ROOF SIDE GARNISH LH



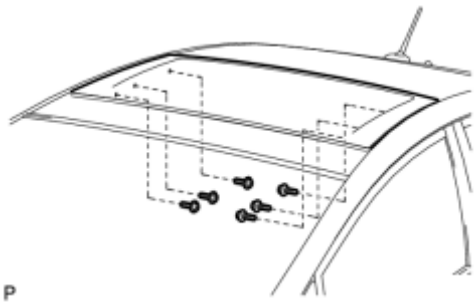

(a) Remove the sliding roof side garnish LH.

2. REMOVE SLIDING ROOF SIDE GARNISH RH

HINT:

Use the same procedure for the RH side and LH side.

3. REMOVE SLIDING ROOF GLASS SUB-ASSEMBLY

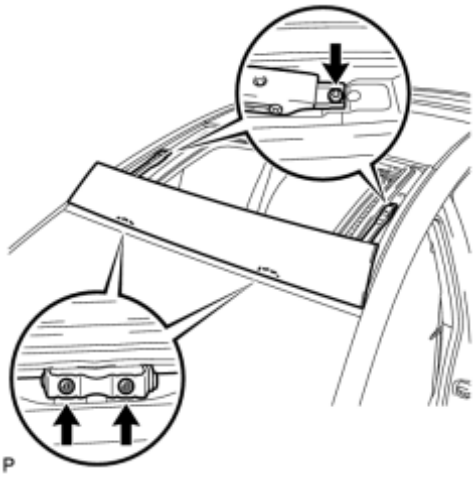



(a) Using a T25 "TORX" driver, remove the 6 screws.

(b) Remove the sliding roof glass sub-assembly.

4. REMOVE TILT ROOF GLASS SUB-ASSEMBLY

(a) Using a T20 "TORX" driver, remove the 6 screws and tilt roof glass sub-assembly.



5. REMOVE ROOF HEADLINING ASSEMBLY

HINT:

Refer to the procedure up to Remove Roof Headlining Assembly INFO.

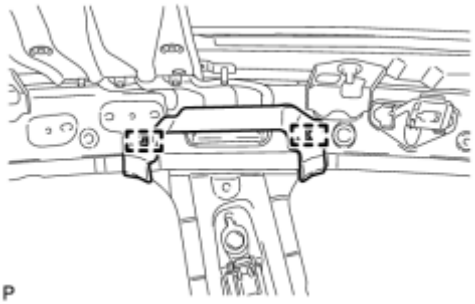
6. REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY LH INFO

7. REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

8. REMOVE REAR SIDE RAIL SPACER LH



(a) Engage the 2 clamps and remove the rear side rail spacer LH.

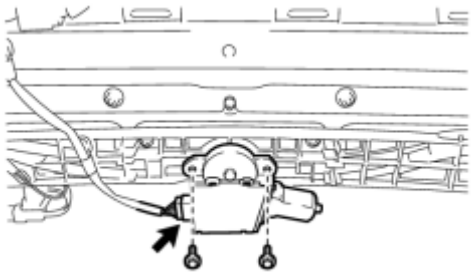
9. REMOVE REAR SIDE RAIL SPACER RH

HINT:

Use the same procedure for the RH side and LH side.

10. REMOVE SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY

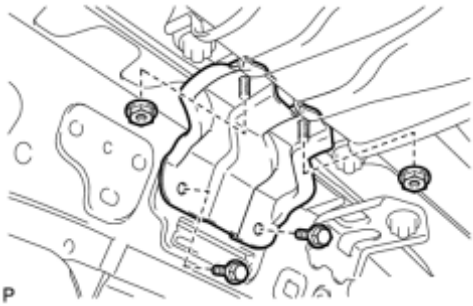
(a) Disconnect the connector.



P

(b) Remove the 2 bolts and sliding roof drive gear sub-assembly.

11. REMOVE FRONT SLIDING ROOF HOUSING MOUNTING BRACKET LH



P

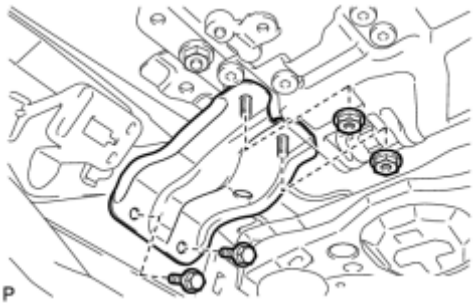
(a) Remove the 2 bolts, 2 nuts and front sliding roof housing mounting bracket LH.

12. REMOVE FRONT SLIDING ROOF HOUSING MOUNTING BRACKET RH

HINT:

Use the same procedure for the RH side and LH side.

13. REMOVE CENTER SLIDING ROOF HOUSING MOUNTING BRACKET LH



P

(a) Remove the 2 bolts, 2 nuts and center sliding roof housing mounting bracket LH.

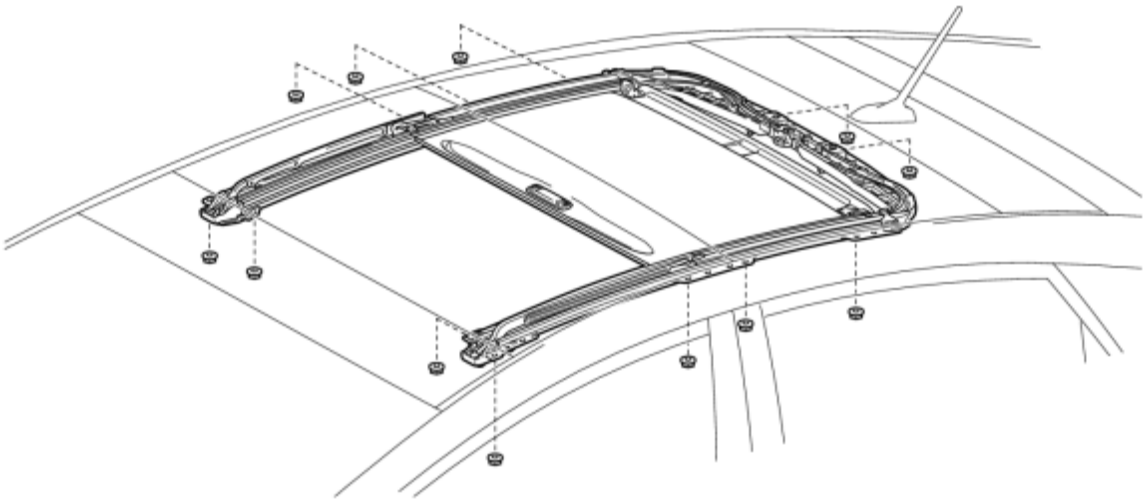
14. REMOVE CENTER SLIDING ROOF HOUSING MOUNTING BRACKET RH

HINT:

Use the same procedure for the RH side and LH side.

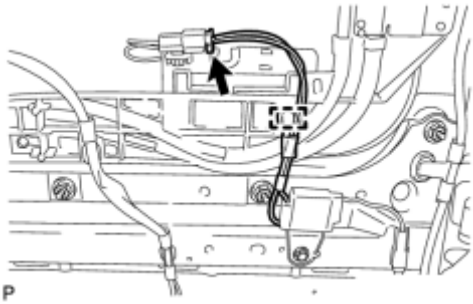
15. REMOVE SLIDING ROOF RAIL SUB-ASSEMBLY

(a) Remove the 12 nuts and sliding roof rail sub-assembly.



P

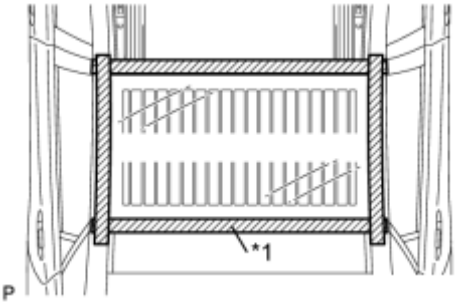
16. REMOVE MOON ROOF GLASS ASSEMBLY



P

(a) Disconnect the connector.

(b) Disengage the clamp.



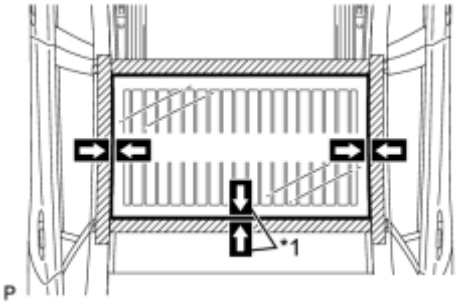

P

(c) Apply protective tape to the outer surface of the vehicle body to prevent scratches.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

(d) Place matchmarks on the moon roof glass assembly and vehicle body on the locations indicated in the illustration.

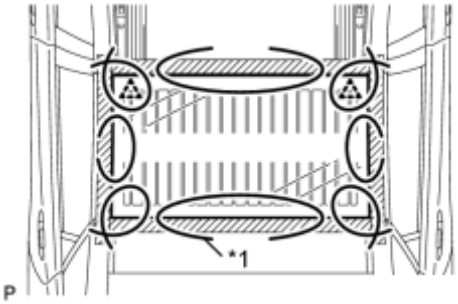



## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

HINT:

Matchmarks are not necessary if the moon roof glass assembly is not going to be reused.



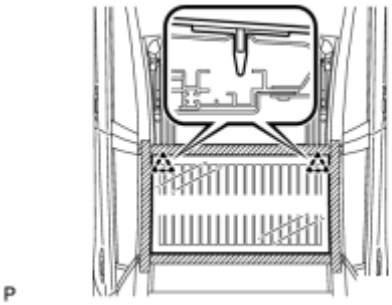

(e) Pass a piano wire between the rear slide roof panel sub-assembly and moon roof glass assembly from the interior, as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Piano Wire |

(f) Tie both wire ends to wooden blocks or similar objects that can serve as handles.

(g) Cut off the adhesive by pulling the piano wire around the moon roof glass assembly.



(h) Using suction cups, disengage the 2 clips and remove the moon roof glass assembly.

17. CLEAN MOON ROOF GLASS ASSEMBLY



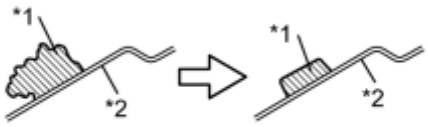
(a) Clean the outer edge of the moon roof glass with a non-residue solvent.

- Do not touch the moon roof glass surface after cleaning it.
- Be careful not to damage the glass.
- Even if using a new moon roof glass, clean the moon roof glass with a non-residue solvent.

18. CLEAN REAR SLIDE ROOF PANEL SUB-ASSEMBLY

(a) Using a scraper, remove the moulding and adhesive from the moon

roof glass.




## Text in Illustration

| | |
|---|---|
| *1 | Adhesive |
| *2 | Rear Slide Roof Panel Sub-assembly |

P

(b) Clean and shape the contact surfaces of the rear slide roof panel sub-assembly.

(1) Using a knife, cut away excess adhesive on the contact surfaces of the rear slide roof panel sub-assembly, as shown in the illustration.

NOTICE:

Be careful not to damage the rear slide roof panel sub-assembly.

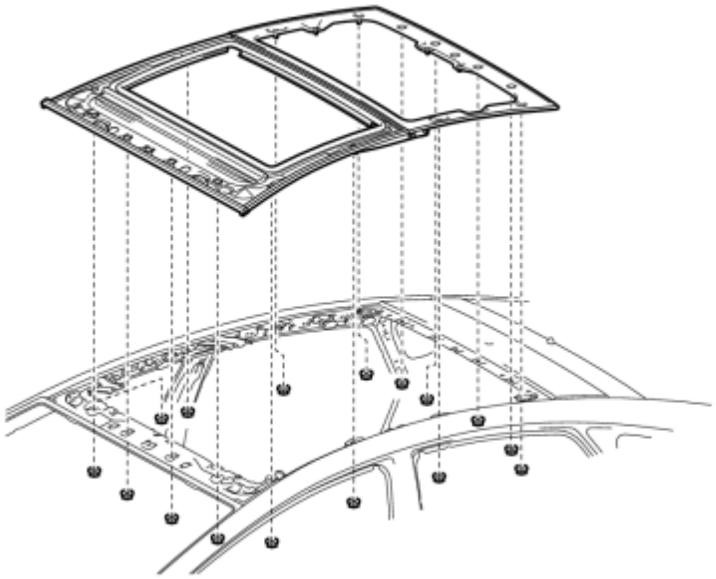
(2) Clean the contact surfaces of the rear slide roof panel sub-assembly with a piece of cloth saturated with cleaner.

HINT:

Even if all the adhesive has been removed, clean the rear slide roof panel sub-assembly.

19. REMOVE REAR SLIDE ROOF PANEL SUB-ASSEMBLY

(a) Remove the 16 nuts and rear slide roof panel sub-assembly.



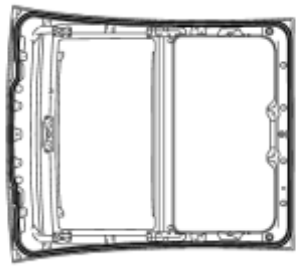
P

NOTICE:

- When removing the roof rail, be careful not to damage the vehicle.
- Perform this step with 2 or more technicians.

# DISASSEMBLY

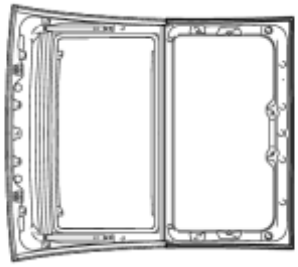
1. REMOVE SLIDING ROOF GLASS SEAL



P

(a) Remove the sliding roof glass seal.

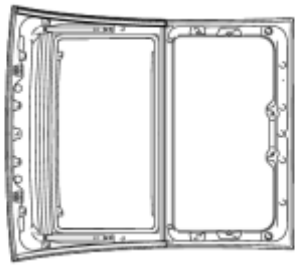
2. REMOVE REAR MOON ROOF MOULDING



P

(a) Remove the rear moon roof moulding.

3. REMOVE REMOVABLE ROOF WEATHERSTRIP



P

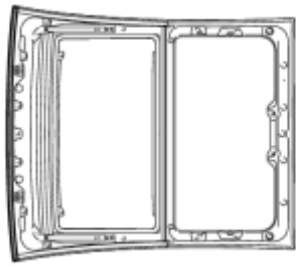
(a) Remove the removable roof weatherstrip.

HINT:

Use the same procedure for the RH side and LH side.

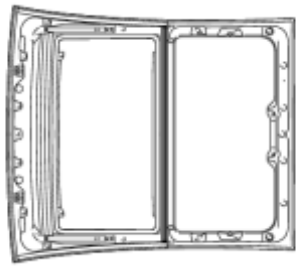
4. REMOVE FRONT MOON ROOF MOULDING

(a) Remove the front moon roof moulding.



P

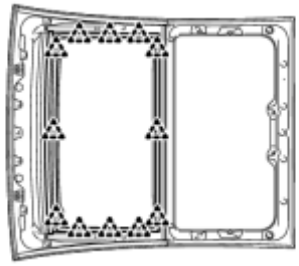
5. REMOVE REAR SLIDING ROOF WEATHERSTRIP



P

(a) Remove the rear sliding roof weatherstrip.

6. REMOVE SLIDING ROOF WEATHERSTRIP

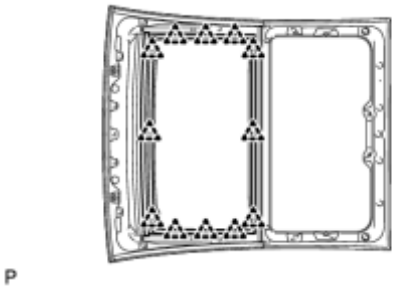


P

(a) Disengage the 12 clips and remove the sliding roof weatherstrip.

# REASSEMBLY

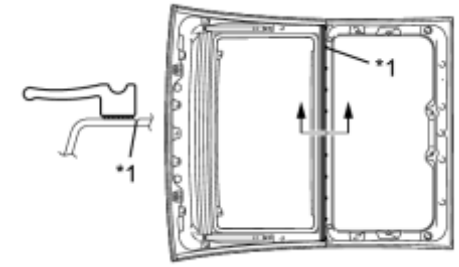
1. INSTALL SLIDING ROOF WEATHERSTRIP



P

(a) Engage the 12 clips and install the new sliding roof weatherstrip.

2. INSTALL REAR SLIDING ROOF WEATHERSTRIP



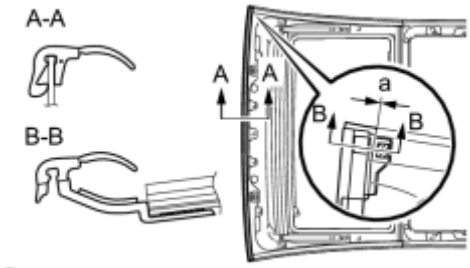

P

(a) Align the matchmarks on the new rear sliding roof weatherstrip and rear sliding roof rail assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

3. INSTALL FRONT MOON ROOF MOULDING




P

(a) Install the new front moon roof moulding as shown in the illustration.

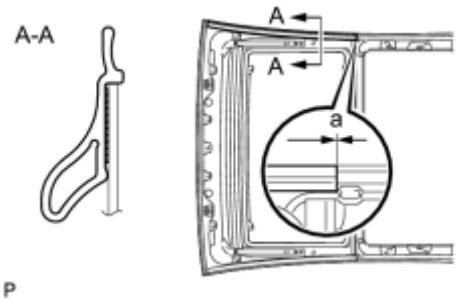
## Standard

| Area | Measurement |
|---|---|
| a | 1.3 mm (0.00512 in.) or less |

4. INSTALL REMOVABLE ROOF WEATHERSTRIP

(a) Install the new removal roof weatherstrip as shown in the illustration.

## Standard



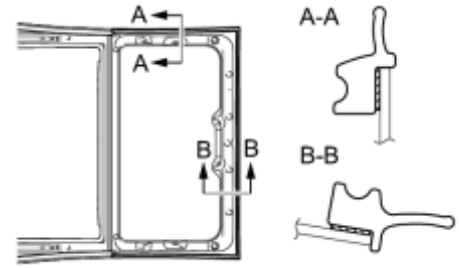

P

| Area | Measurement |
|---|---|
| a | 1.0 mm (0.0394 in.) or less |

HINT:

Use the same procedure for the RH side and LH side.

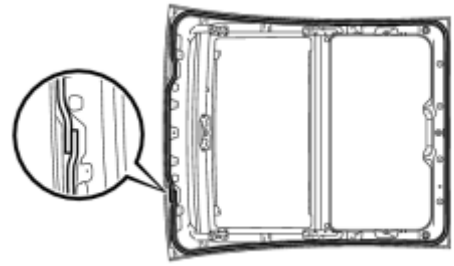
5. INSTALL REAR MOON ROOF MOULDING




P

(a) Install the new rear moon roof moulding as shown in the illustration.

6. INSTALL SLIDING ROOF GLASS SEAL



P

(a) Install the new sliding roof glass seal as shown in the illustration.

# INSTALLATION

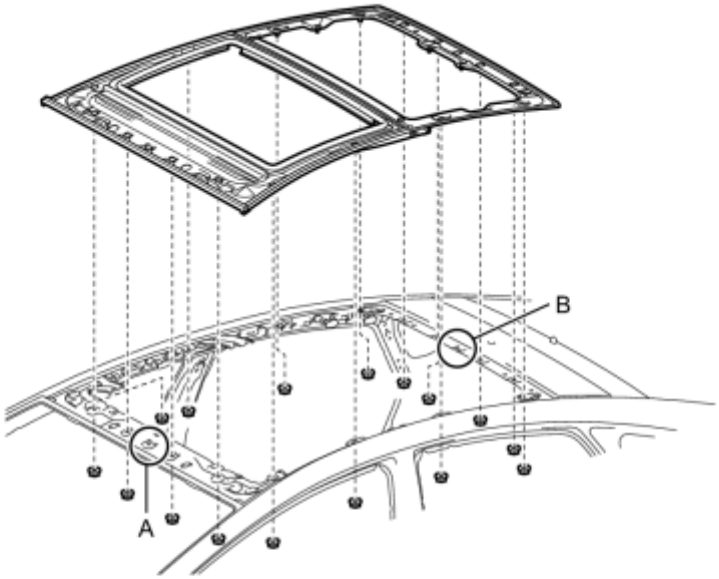
1. TEMPORARILY INSTALL REAR SLIDE ROOF PANEL SUB-ASSEMBLY

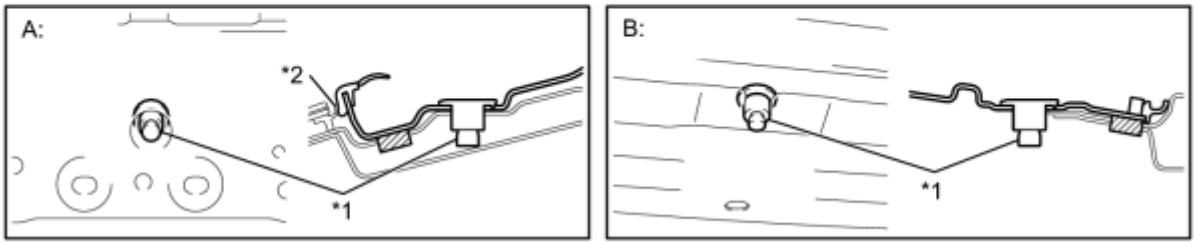
(a) Temporarily install the rear sliding roof rail sub-assembly with the 16 nuts.

NOTICE:

- When installing the roof rail to the vehicle, first install the roof rail center front and center rear alignment bolts to the vehicle front and rear alignment bolt installation points, as shown in the illustration.
- When installing the roof rail, be careful not to damage the vehicle.
- Perform this step with 2 or more technicians.

(b) Check that the alignment bolts are firmly installed.




P

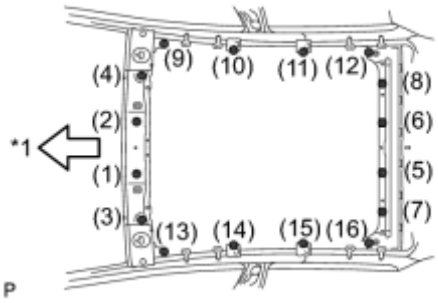
***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Alignment Bolt | *2 | Windshield Glass Moulding |

NOTICE:

- When the bolts are not firmly installed, water leaks and malfunctions will occur.
- Make sure that the lip of the windshield glass moulding is not folded down.

2. FULLY TIGHTEN REAR SLIDE ROOF PANEL SUB-ASSEMBLY




(a) Fully tighten the 16 nuts to install the rear sliding roof rail sub-assembly.

# Text in Illustration

| | |
|---|---|
| *1 | Front Side |

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

HINT:

Tighten the nuts in the order indicated in the illustration.

3. CLEAN MOON ROOF GLASS ASSEMBLY

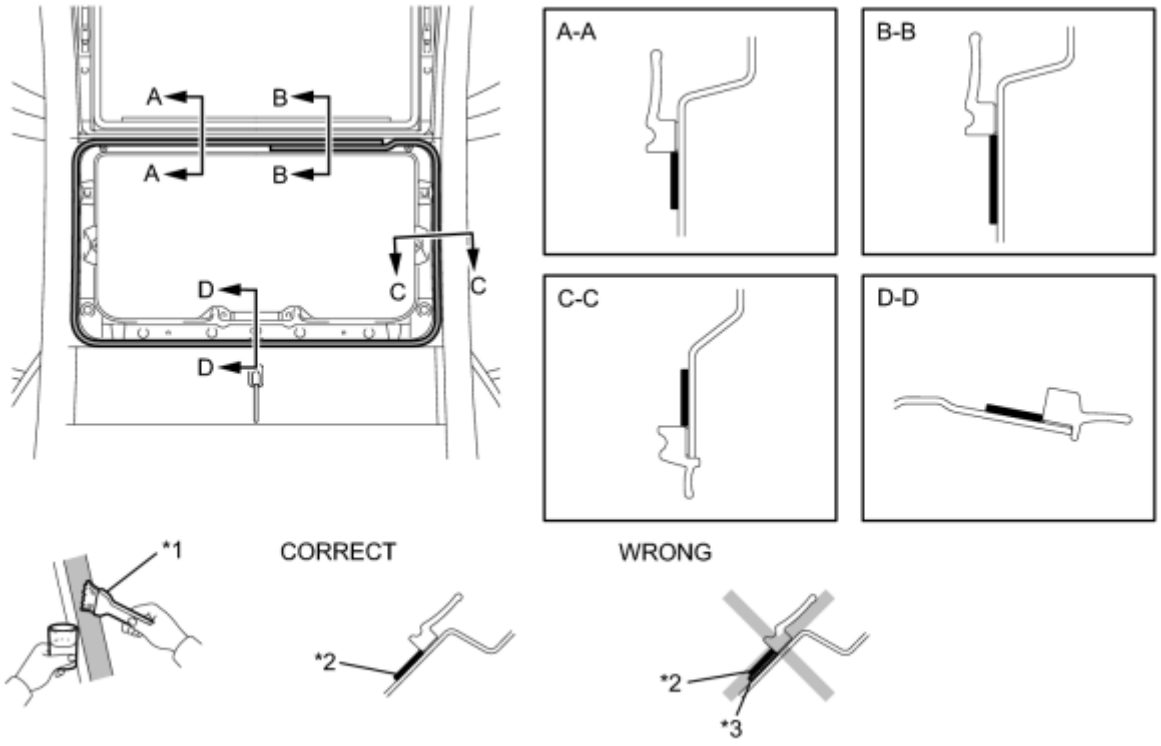


(a) Clean the outer edge of the moon roof glass with a non-residue solvent.

- Do not touch the moon roof glass surface after cleaning it.
- Be careful not to damage the glass.
- Even if using a new moon roof glass, clean the moon roof glass with a non-residue solvent.

4. INSTALL MOON ROOF GLASS ASSEMBLY

(a) Using a brush, coat the installation surface on the rear slide roof panel sub-assembly with Primer M.




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Brush | *2 | Primer M |
| *3 | Adhesive | - | - |

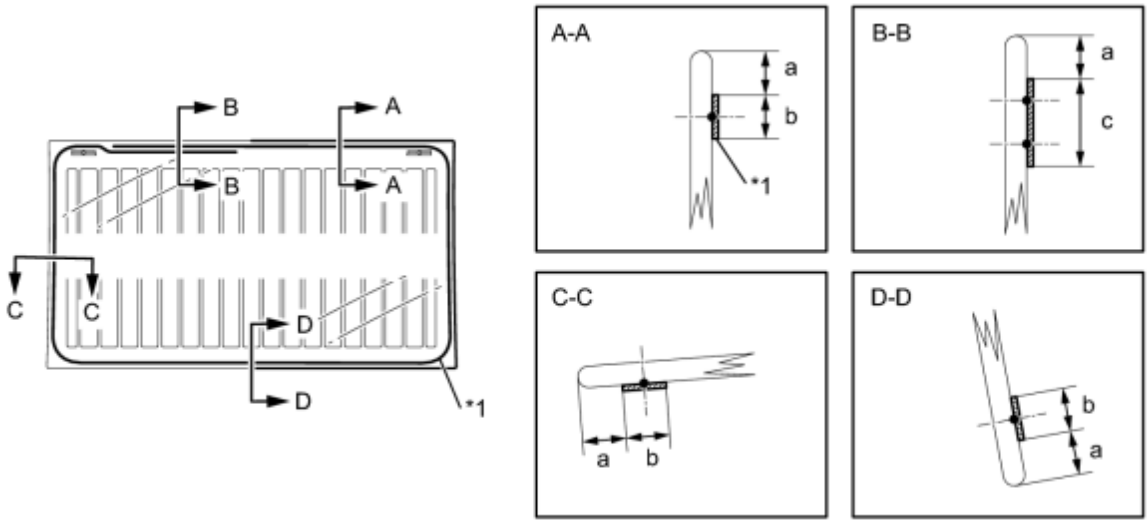
NOTICE:

- Do not coat the adhesive with Primer M.
- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Using a brush or a sponge, coat the application area of the adhesive with Primer G.




P

### *Text in Illustration*

| | |
|---|---|
| *1 | Primer G |

### *Standard*

| Area | Dimension |
|---|---|
| a | 8.0 mm (0.315 in.) |
| b | 12.0 mm (0.472 in.) |
| c | 24.0 mm (0.945 in.) |

NOTICE:

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

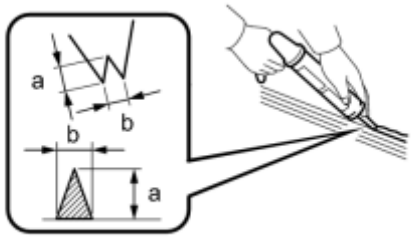
If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(c) Apply adhesive to the rear sliding roof rail sub-assembly.

Adhesive:

Toyota Genuine Windshield Glass Adhesive or equivalent

(1) Cut off the tip of the cartridge nozzle as shown in the illustration.




P

## Standard Dimension

| Area | Dimension |
|---|---|
| a | 12.0 mm (0.472 in.) |
| b | 8.0 mm (0.315 in.) |

HINT:

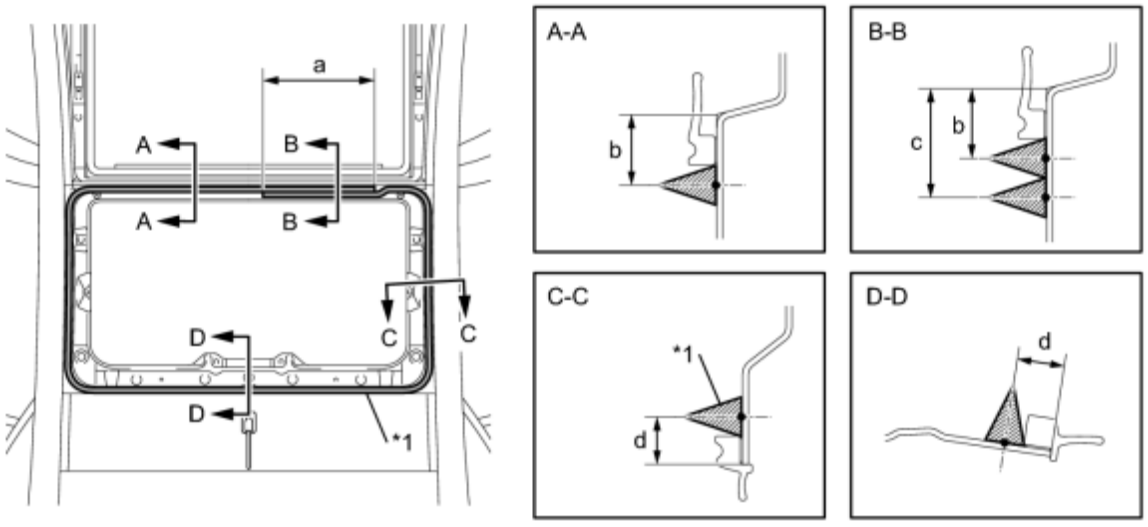
After cutting off the tip, use all the adhesive within the time described in the table below.

## Usage Time Frame

| Temperature | Usage Time Frame |
|---|---|
| 35°C (95°F) | 15 minutes |
| 20°C (68°F) | 1 hour and 40 minutes |
| 5°C (41°F) | 8 hours |

(2) Load the sealer gun with cartridge.

(3) Apply adhesive to the rear sliding roof rail sub-assembly as shown in the illustration.




P

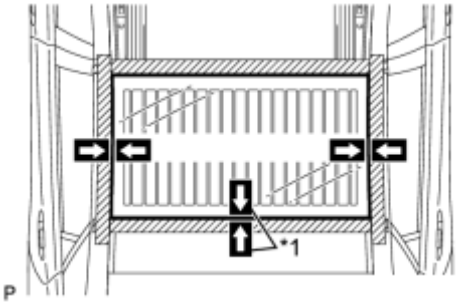
*Text in Illustration*

| | |
|---|---|
| *1 | Adhesive |

*Standard Dimension*

| Area | Dimension |
|---|---|
| a | 300 mm (11.8 in.) |
| b | 14.0 mm (0.551 in.) |
| c | 22.0 mm (0.866 in.) |
| d | 8.0 mm (0.315 in.) |

(d) Install the moon roof glass assembly.




(1) Position the moon roof glass assembly so that the matchmarks are aligned, and press it in gently along the rim (when glass without a clip is used).

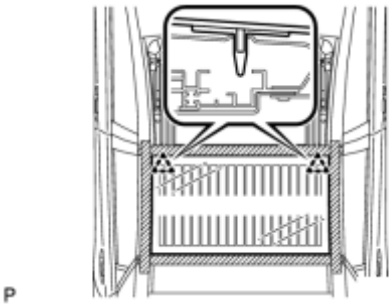
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

(2) Lightly press the moon roof glass assembly to ensure that the moon roof glass assembly is securely fit to the vehicle body (when glass without a clip is used).

HINT:

Press the moon roof glass assembly with a force of 98 N (10 kgf, 22.0 lbf) or more.




(3) Using suction cups, engage the 2 clips to install the moon roof glass assembly.

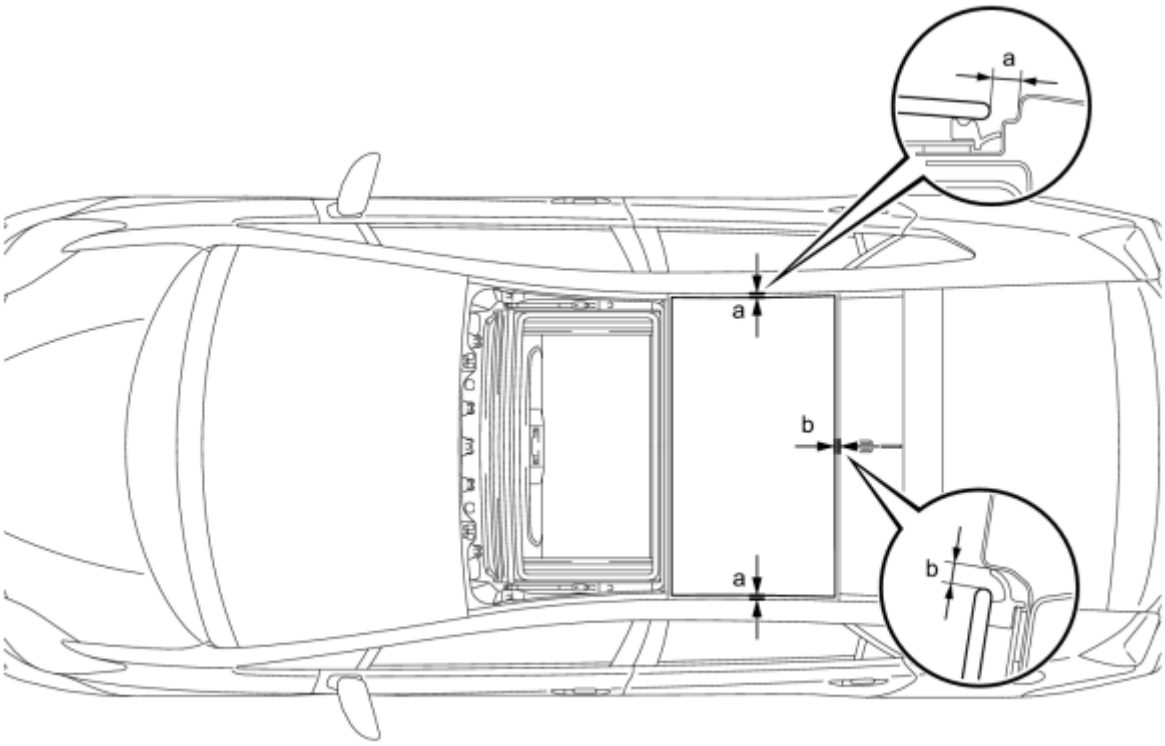
- Check that the clips are attached to the vehicle body correctly.
- Check the clearance between the vehicle body and moon roof glass assembly.

(4) Lightly press the front surface of the moon roof glass assembly to ensure that the moon roof glass assembly is securely fit to the vehicle body.

HINT:

Press the moon roof glass assembly with a force of 98 N (10 kgf, 22.0 lbf) or more.

(5) Inspect the position of the moon roof glass assembly so that the measurements are within the standard values shown in the illustration.




P

*Standard*

| Area | Measurement |
|---|---|
| a | 7.4 mm + 2.0 mm (0.291 in. + 0.0787 in.)<br><br>7.4 mm - 2.0 mm (0.291 in. - 0.0787 in.) |
| b | 5.0 mm + 2.0 mm (0.197 in. + 0.0787 in.)<br><br>5.0 mm - 2.0 mm (0.197 in. - 0.0787 in.) |

HINT:

"+" represents the condition that the glass is above the panel level. "-" represents the condition that the glass is below the panel level.

(6) Hold the moon roof glass assembly using protective tape until applied adhesive becomes hard.

NOTICE:

Do not drive the vehicle within the time described in the table below.

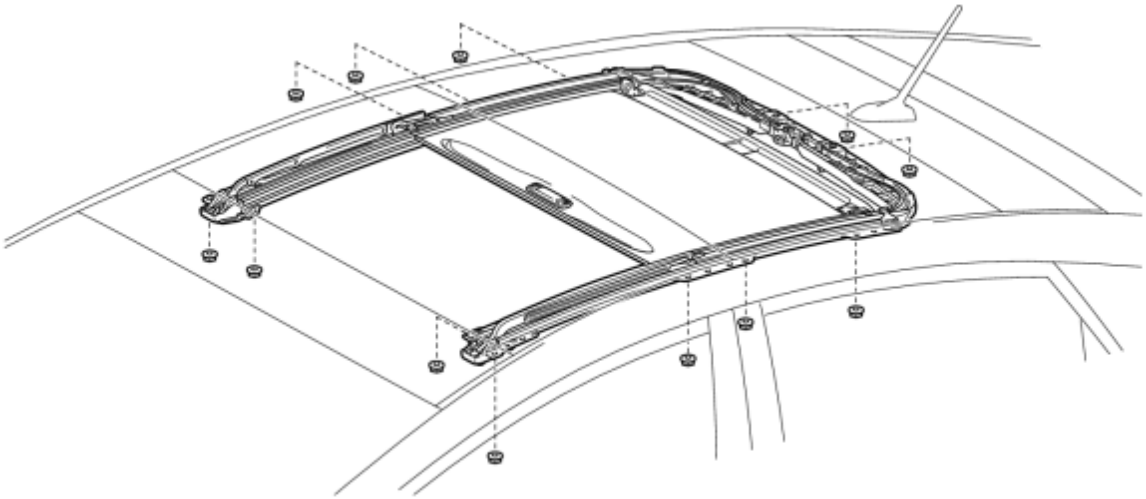
Minimum Time:

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|
| 35°C (95°F) | 1 hour and 30 minutes |

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|
| 20°C (68°F) | 5 hours |
| 5°C (41°F) | 24 hours |

5. INSTALL SLIDING ROOF RAIL SUB-ASSEMBLY

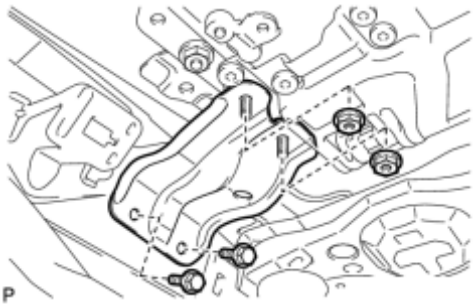
(a) Install the sliding roof rail sub-assembly with the 12 nuts.



P

Torque: **7.0 N·m (71 kgf·cm, 62in·lbf)**

6. INSTALL CENTER SLIDING ROOF HOUSING MOUNTING BRACKET LH



P

(a) Install the center sliding roof housing mounting bracket LH with the 2 bolts and 2 nuts.

Bolt - Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

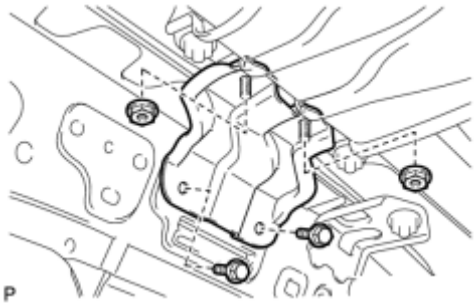
Nut - Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

7. INSTALL CENTER SLIDING ROOF HOUSING MOUNTING BRACKET RH

HINT:

Use the same procedure for the RH side and LH side.

8. INSTALL FRONT SLIDING ROOF HOUSING MOUNTING BRACKET LH



(a) Install the front sliding roof housing mounting bracket LH with the 2 bolts and 2 nuts.

Bolt - Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

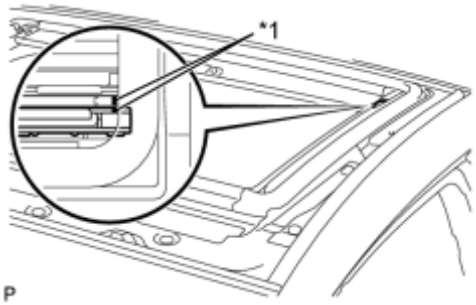
Nut - Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

9. INSTALL FRONT SLIDING ROOF HOUSING MOUNTING BRACKET RH

HINT:

Use the same procedure for the RH side and LH side.

10. ADJUST FULLY CLOSED POSITION




(a) Using a screwdriver, slide the sliding roof drive cable to align the matchmarks.

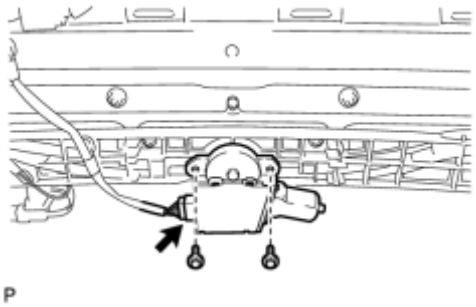
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

HINT:

Tape the screwdriver tip before use.

11. INSTALL SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY

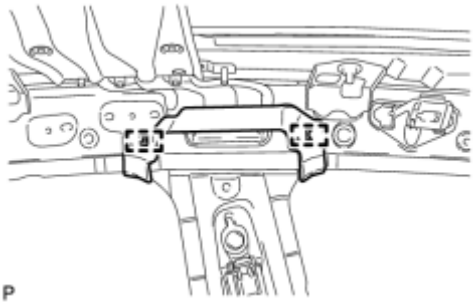


(a) Install the sliding roof drive gear sub-assembly with the 2 bolts.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

12. INSTALL REAR SIDE RAIL SPACER LH

(a) Engage the 2 clamps and install the rear side rail spacer LH



P

13. INSTALL REAR SIDE RAIL SPACER RH

HINT:

Use the same procedure for the RH side and LH side.

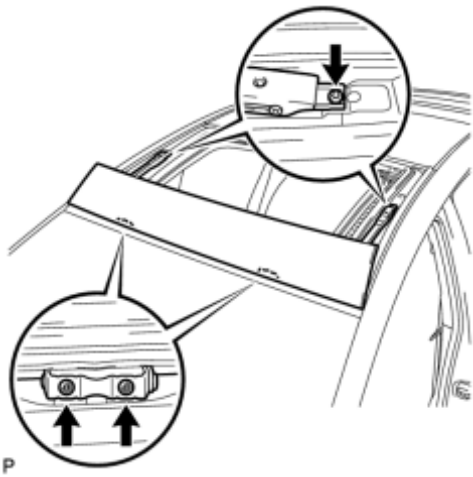
14. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY LH INFO

15. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

16. TEMPORARILY INSTALL TILT ROOF GLASS SUB-ASSEMBLY

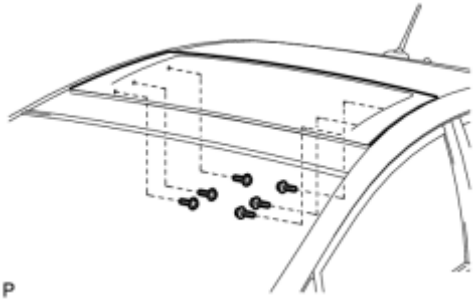


P

(a) Using a T20 "TORX" driver, install the tilt roof glass sub-assembly with the 6 screws.

17. TEMPORARILY INSTALL SLIDING ROOF GLASS SUB-ASSEMBLY

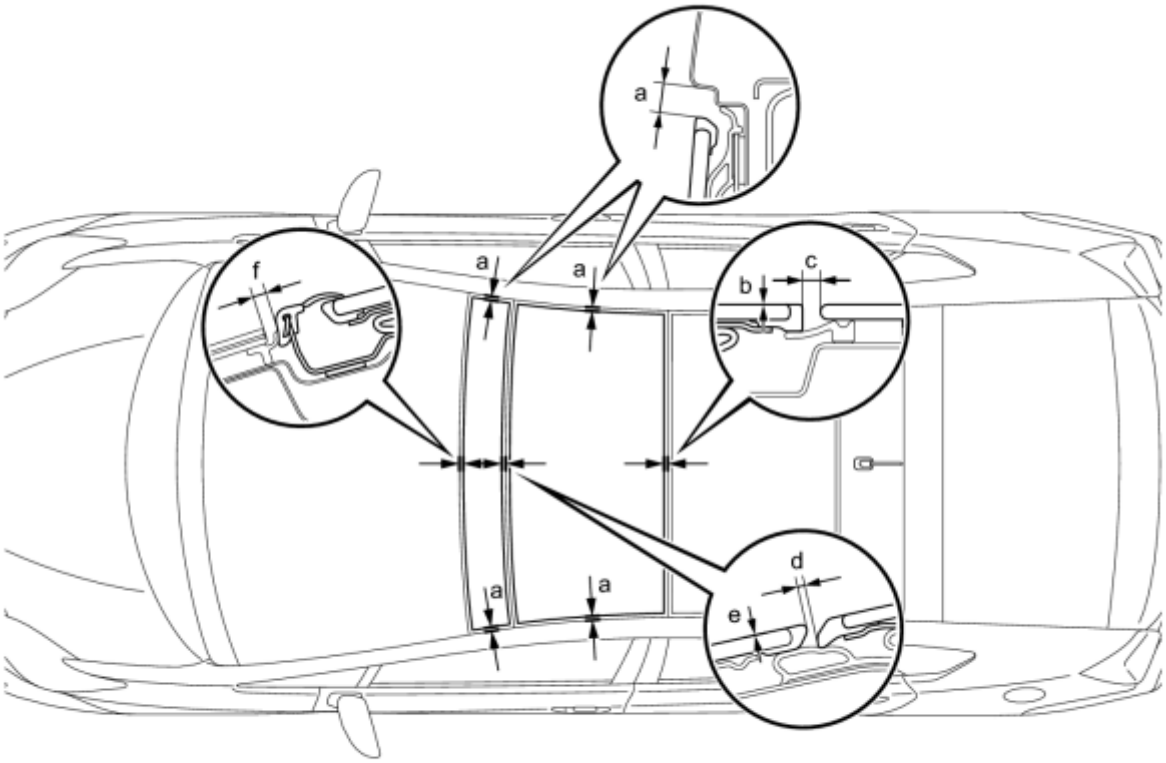
(a) Using a T25 "TORX" driver, install the 6 screws.



P

18. ADJUST SLIDING ROOF GLASS

(a) Adjust the sliding roof glass sub-assembly:




P

(1) Adjust the position of the sliding roof glass sub-assembly so that the measurements are within the standard values shown in the illustration.

***Standard***

| Area | Measurement |
|---|---|

| Area | Measurement |
|---|---|
| a | 7.4 mm + 2.0 mm (0.291 in. + 0.0787 in.)<br><br>7.4 mm - 2.0 mm (0.291 in. - 0.0787 in.) |
| b | 0 + 2.0 mm (0 + 0.0787 in.)<br><br>0 - 1.0 mm (0 - 0.0394 in.) |
| c | 5.0 mm + 2.0 mm (0.197 in. + 0.0787 in.)<br><br>5.0 mm - 2.0 mm (0.197 in. - 0.0787 in.) |
| d | 1.9 mm + 1.0 mm (0.0748 in. + 0.0394 in.)<br><br>1.9 mm - 1.0 mm (0.0748 in. - 0.0394 in.) |

HINT:

"+" represents the condition that the glass is above the panel level. "-" represents the condition that the glass is below the panel level.

(2) After adjusting the sliding roof glass sub-assembly, using a T25 "TORX" driver, fully tighten the 6 screws to install the sliding roof glass sub-assembly.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

(b) Adjust the tilt roof glass sub-assembly:

(1) Adjust the position of the tilt roof glass sub-assembly so that the measurements are within the standard values shown in the illustration.

***Standard***

| Area | Measurement |
|---|---|
| a | 7.4 mm + 2.0 mm (0.291 in. + 0.0787 in.)<br><br>7.4 mm - 2.0 mm (0.291 in. - 0.0787 in.) |
| e | 0 + 2.0 mm (0 + 0.0787 in.)<br><br>0 - 1.0 mm (0 - 0.0394 in.) |
| f | 4.0 mm + 2.0 mm (0.158 in. + 0.0787 in.)<br><br>4.0 mm - 2.0 mm (0.158 in. - 0.0787 in.) |

HINT:

"+" represents the condition that the glass is above the panel level. "-" represents the condition that the glass is below the panel level.

(2) After adjusting the tilt roof glass sub-assembly, using a T20 "TORX" driver, fully tighten the 6 screws to install the tilt roof glass sub-assembly.

Torque: **2.2 N·m (22 kgf·cm, 20in·lbf)**

19. INSPECT FOR WATER LEAKS

(a) After adjusting the roof glass sub-assembly, inspect for water leaks.

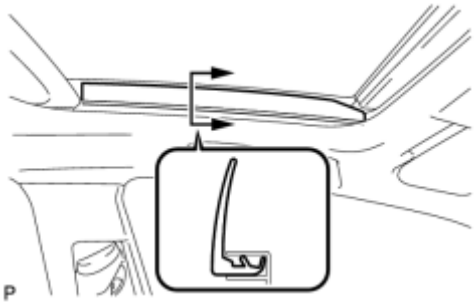
(b) If there are any leaks, readjust the roof glass sub-assembly.

20. INSTALL ROOF HEADLINING ASSEMBLY

HINT:

Refer to the procedure from Install Roof Headlining Assembly INFO.

21. INSTALL SLIDING ROOF SIDE GARNISH LH




(a) Install the sliding roof side garnish LH.

22. INSTALL SLIDING ROOF SIDE GARNISH RH

HINT:

Use the same procedure for the RH side and LH side.

23. RESET SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY

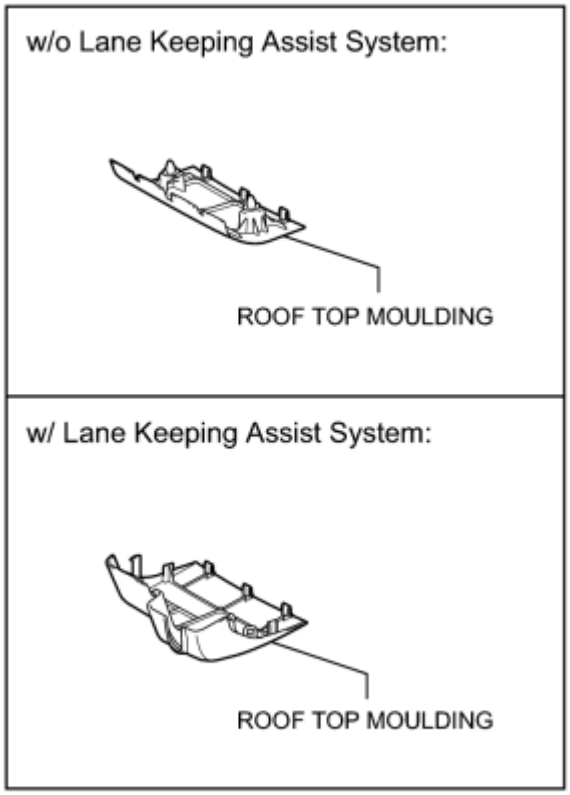
INFO

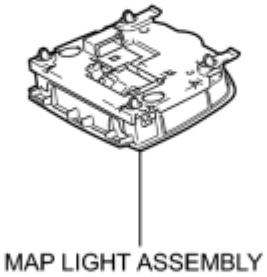
24. INSPECT SLIDING ROOF SYSTEM

INFO

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

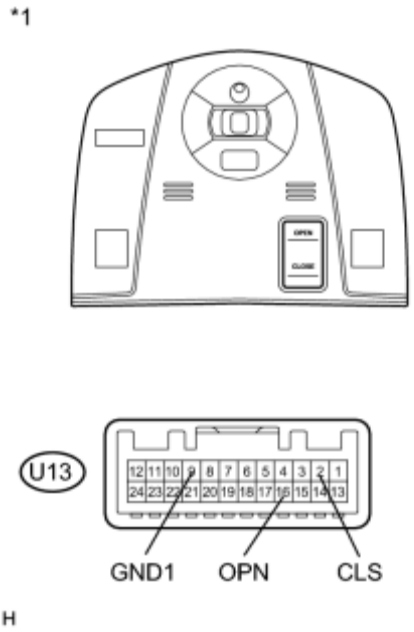
1. REMOVE ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

2. REMOVE ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

3. REMOVE MAP LIGHT ASSEMBLY INFO

# INSPECTION

1. INSPECT SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY)




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| U13-2 (CLS) - U13-9 (GND1) | CLOSE switch is pressed | Below 1 Ω |
| U13-2 (CLS) - U13-9 (GND1) | CLOSE switch is not pressed | 10 kΩ or higher |
| U13-16 (OPN) - U13-9 (GND1) | OPEN switch is pressed | Below 1 Ω |
| U13-16 (OPN) - U13-9 (GND1) | OPEN switch is not pressed | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Sliding Roof Switch (Map Light Assembly)) |

If the result is not as specified, replace the sliding roof switch (map light assembly).

# INSTALLATION

1. INSTALL MAP LIGHT ASSEMBLY INFO

2. INSTALL ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

3. INSTALL ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

# PRECAUTION

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

1. PRECAUTION FOR SOLAR PANEL

(a) Before disconnecting the solar module connector, make sure to cover the entire solar module with a material such as thick fabric which blocks sunlight.

CAUTION:

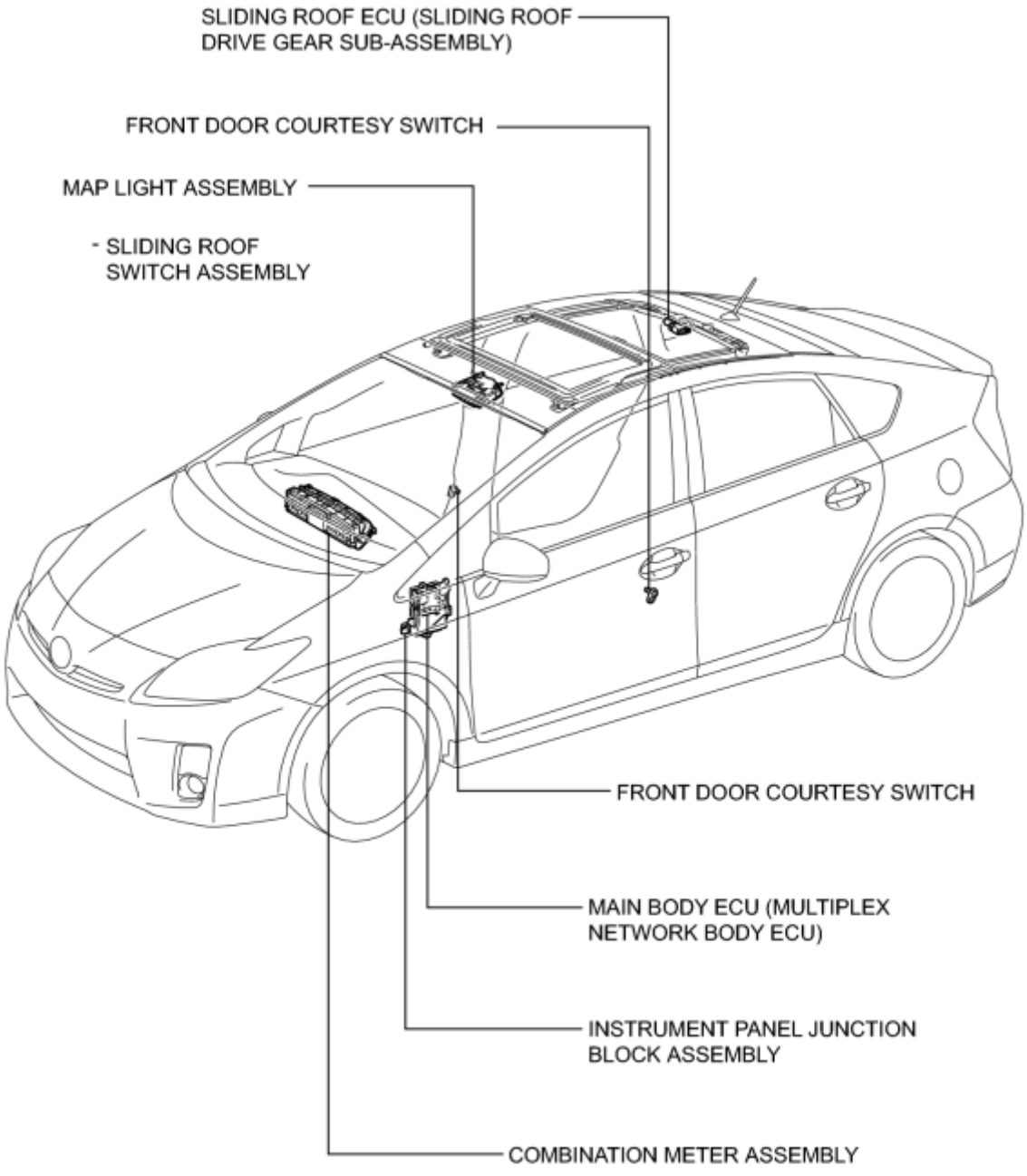
The solar module generates electricity from sunlight and other light sources. If the solar module connector is touched while the solar module is generating electricity, an accidental short circuit or electric shock may occur, causing serious injury.

HINT:

The solar module always generates electricity when exposed to light. When exposed to a light source such as sunlight, approximately 3.6 A and 22 V will be generated.

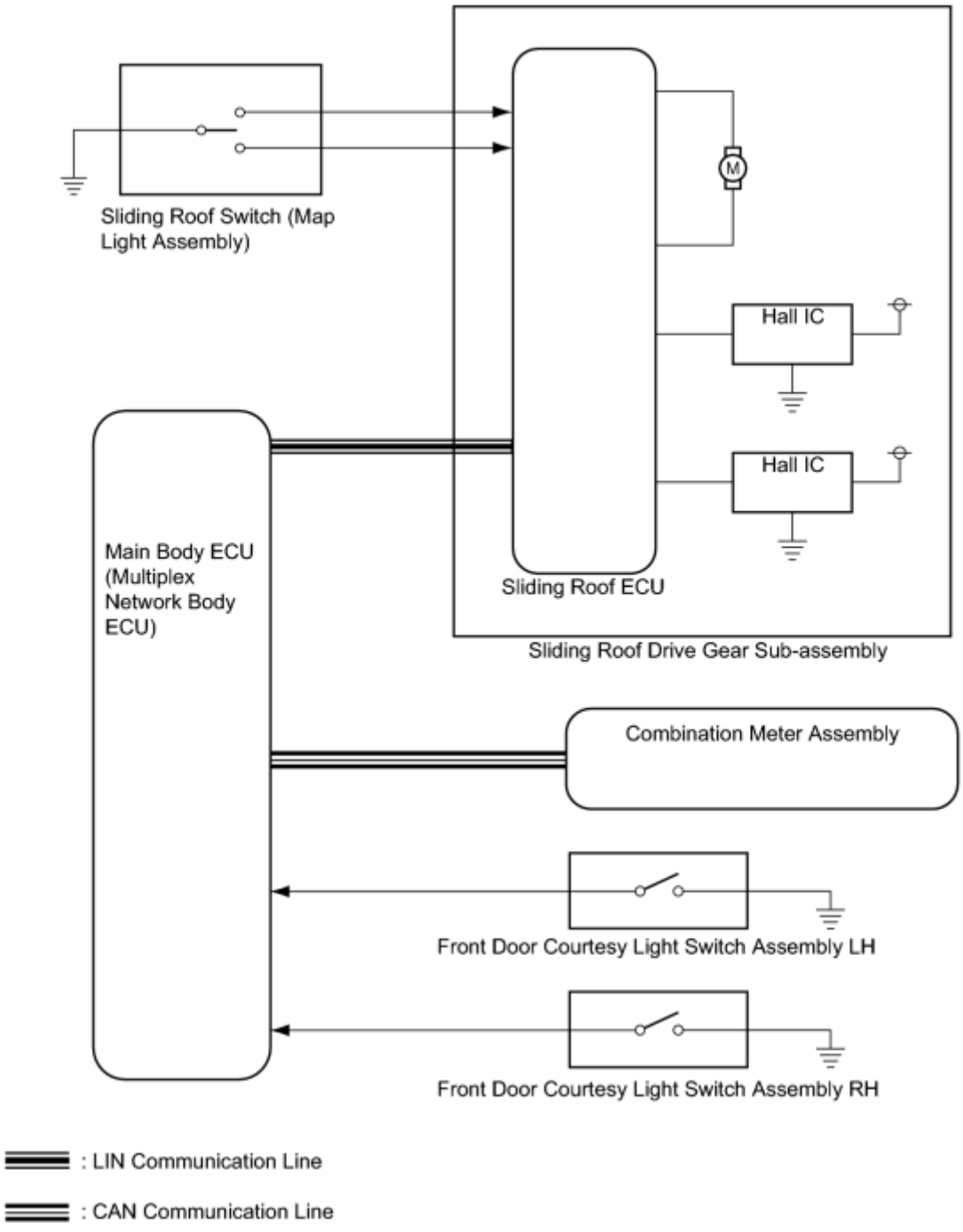
# PARTS LOCATION

# ILLUSTRATION




H

# SYSTEM DIAGRAM




### *Communication Table*

| Sender | Receiver | Signal | Line |
|---|---|---|---|
| Main Body ECU (Multiplex Network Body ECU) | Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly) | • Key-off operation permit signal<br>• Front door courtesy light switch | LIN |

| Sender | Receiver | Signal | Line |
|---|---|---|---|
| | | assembly LH signal<br>• Power switch on (IG) signal | |
| Main Body ECU (Multiplex Network Body ECU) | Combination Meter Assembly | Sliding roof open warning request signal | CAN |

# SYSTEM DESCRIPTION

1. GENERAL

The sliding roof system has the following functions:

manual open and close, auto open, jam protection and key off operation.

2. FUNCTION OF MAIN COMPONENT

| Component | Outline |
|---|---|
| Sliding roof ECU (Sliding roof drive gear sub-assembly) | Sliding roof ECU (sliding roof drive gear sub-assembly) controls the rotational direction of the motor. |
| Sliding roof switch (Map light assembly) | Sliding roof switch (map light assembly) outputs operation signals to sliding roof ECU (sliding roof drive gear sub-assembly). |

3. SYSTEM OPERATION

The sliding roof system has the following features:

| Function | Outline |
|---|---|
| Manual open and close | This function causes sliding roof to open (tilt up and slide open) or close (slide close and tilt down) when OPEN switch or CLOSE switch is pressed for a maximum of 0.3 seconds. Sliding roof stops as soon as switch is released. |
| Auto open | This function causes sliding roof to fully tilts up or fully open when OPEN switch is pressed for a minimum of 0.3 seconds. |
| Jam protection | The jam protection function automatically stops the sliding roof and moves it open half way (or fully tilt up) if a foreign object gets jammed in the sliding roof during close operation. |
| Key-off operation | The key-off operation function makes it possible to operate the sliding roof for approximately 43 seconds after the power switch is turned on (ACC) or off, if the front doors are not opened. |
| Sliding roof open warning | When the power switch is turned from on (IG) to off and the driver door is opened with the sliding roof open, the buzzer in the combination meter assembly sounds once. |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the sliding roof system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.

- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.

- The following 5 items are important points in the problem analysis:

| | |
|---|---|
| What | Vehicle, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

- If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | INSPECT COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM* |

(a) Using the Techstream, check if the LIN Communication System is functioning normally INFO.

***Result***

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B INFO Go to LIN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 5. | INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B INFO Go to CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 6. | CHECK DTC OUTPUT (SLIDING ROOF ECU) |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

***Result***

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B INFO Go to DIAGNOSTIC TROUBLE CODE CHART

A

| | |
|---|---|
| 7. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

***Result***

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B Go to step 9

A

| | |
|---|---|
| 8. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Operation Check INFO

(b) Terminals of ECU INFO

(c) Data List / Active Test INFO

NEXT

| | |
|---|---|
| 9. | REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 10. | CONFIRMATION TEST |

NEXT **END**

# OPERATION CHECK

1. CHECK AUTO OPEN OPERATION

NOTICE:

Make sure that initialization is completed before inspection INFO.

HINT:

When pressing the switch for 0.3 seconds or less, the roof glass moves but auto operation does not operate.

(a) Turn the power switch on (IG).

(b) When the roof glass is fully closed, press the OPEN switch for 0.3 seconds or more. Check that the roof glass automatically tilts up until it is fully tilted upward.

HINT:

When the OPEN switch is pressed for 1.7 seconds or more, the roof glass automatically opens to the comfort stop position without stopping at the fully tilted up position.

(c) When the roof glass is fully tilted upward, press the OPEN switch again for 0.3 seconds or more. Check that the roof glass automatically slides until it is comfort stop position.

(d) When the roof glass is comfort stop position, press the OPEN switch again for 0.3 seconds or more. Check that the roof glass automatically slides until it is fully open.

(e) When the auto operation is operating, check that pressing any sliding roof switch stops the roof glass operation.

2. CHECK SLIDING ROOF OPERATION AFTER POWER SWITCH IS TURNED OFF

(a) Turn the power switch from on (IG) to off, and check that the sliding roof can be operated. Then open the front door once, and check that the sliding roof cannot be operated.

(b) Turn the power switch from on (IG) to off and wait for approximately 45 seconds. Check that the sliding roof cannot be operated.

(c) Operate the auto open operation (tilt up or slide open) with the driver or front passenger side door open. While the roof glass is in motion, turn the power switch off. Check that the roof glass stops immediately.

3. CHECK JAM PROTECTION FUNCTION

CAUTION:

- Do not use a part of your body, for example, your hand, to check the jam protection function.
- Do not allow anything to become caught in the sliding roof by accident while performing this inspection.
- Perform the inspection from the inside of the vehicle.

NOTICE:

- Do not use hard objects, such as a hammer, to avoid damaging the roof.
- Make sure that initialization is completed before inspection INFO.
- If the jam protection function does not operate, reset the sliding roof drive gear (motor).
- The jam protection function does not operate when the roof glass is close to the fully closed position.

(a) When the slide close function is operating and an object is caught between the vehicle body and glass, check that the roof glass opens a distance of 218 mm (8.58 in.) from the point of contact with the object, or opens fully if an opening distance of 218 mm (8.58 in.) is not available.

(b) When the tilt down function is operating, and an object is caught between the vehicle body and the roof glass, check that the sliding roof tilts up fully.

4. CHECK SLIDING ROOF OPEN WARNING

(a) Open the sliding roof by using the sliding roof switch.

(b) When the power switch is turned from on (IG) to off and the driver door is opened with the key is in the vehicle, check that the warning buzzer in the combination meter assembly sounds once.

# INITIALIZATION

1. INITIALIZE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

NOTICE:

- When the sliding roof glass, sliding roof housing or sliding roof ECU (sliding roof drive gear sub-assembly) is replaced or removed and installed, the sliding roof drive gear requires initialization (pulse sensor initial position setting), as the glass position cannot be determined. If initialization is not performed, the auto slide open and tilt up functions, key-off operation and jam protection function may not operate, or the sliding roof may move in reverse or become misaligned.
- During initialization, do not apply a physical shock, such as opening/closing a door or driving the vehicle at 5 km/h (3 mph) or more, to the vehicle and do not perform the electrical operations:

HINT:

When the cable of the negative (-) battery terminal is disconnected and reconnected or the drive gear connector is disconnected and reconnected, sliding roof drive gear (pulse sensor initial position setting) initialization is not necessary.

(a) Perform initialization according to the table below.

| Condition of Sliding Roof | Proceed to |
|---|---|
| Auto slide open and tilt up functions do not operate | Procedure A |
| Sliding roof moves in reverse direction during slide close (tilt down) operation | Procedure B |
| Sliding roof does not stop at the correct fully tilt up or open position during open operation | Procedure C |

HINT:

Before performing initialization, make sure that there is no foreign matter on the guide rails and the guide rails are not deformed.

(1) Procedure A

1. Turn the power switch on (IG).
2. Press and hold the OPEN switch.

   NOTICE:

   Make sure not to release the switch during the initialization. If the switch is released, perform the initialization again.

3. The sliding roof glass starts open operation (tilt up and slide open operation) and stops at the fully open position.
4. After the sliding roof glass stops, check that the sliding roof glass moves slightly forward and stops at the correct fully open position.

   HINT:

The initialization process ends when this operation completes.

(2) Procedure B

1. Turn the power switch on (IG).
2. Press and hold the CLOSE switch until the following movements finish: starts close operation (slide close or tilt down operation) → erroneously reverses → stops operation for 10 seconds → starts close operation (slide close or tilt down operation) → stops at the fully closed position.

   NOTICE:

   - If the switch is released before "stops operation for 10 seconds" finished, perform Procedure B again.
   - If the switch is released after "stops operation for 10 seconds" finished, perform Procedure A.
3. Perform Procedure A.

(3) Procedure C

1. Turn the power switch on (IG).
2. Press and hold the OPEN switch until the following movements finish: starts slide open operation → stops at the incorrect fully open position for 10 seconds → stops at the fully open position.

   NOTICE:

   - If the switch is released before "stops at the incorrect fully open position for 10 seconds" finished, perform Procedure C again.
   - If the switch is released after "stops at the incorrect fully open position for 10 seconds" finished, perform Procedure A.
3. After the sliding roof glass stops, check that the sliding roof glass moves slightly forward and stops at the correct fully open position.

   HINT:

   The initialization process ends when this operation completes.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

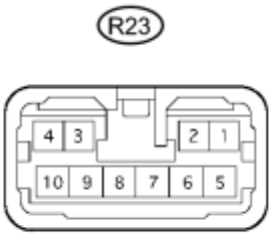
### *Sliding Roof System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Sliding Roof does not Move by Operating Sliding Roof Control Switch | Sliding roof ECU (sliding roof drive gear sub-assembly) | INFO |
| | Wire harness or connector | INFO |
| | Sliding roof switch (map light assembly) | INFO |

# TERMINALS OF ECU

1. CHECK SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

(a) Disconnect the R23 ECU connector.




(b) Measure the resistance and voltage according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| R23-1 (B) - R23-2 (E) | R - W-B | +B Power supply | Power switch off | 11 to 14 V |
| R23-5 (IG) - R23-2 (E) | B - W-B | Power switch power supply | Power switch off | Below 1 V |
| R23-5 (IG) - R23-2 (E) | B - W-B | Power switch power supply | Power switch on (IG) | 11 to 14 V |
| R23-2 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the R23 ECU connector.

(d) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| R23-7 (OPN) - R23-2 (E) | SB - W-B | Sliding roof motor open | Power switch on (IG), OPEN switch on | Below 1 V |
| R23-7 (OPN) - R23-2 (E) | SB - W-B | Sliding roof motor open | Power switch on (IG), OPEN switch off | 11 to 14 V |
| R23-9 (CLS) - R23-2 | BR - W-B | Sliding roof motor | Power switch on (IG), CLOSE | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| (E) | | close | switch on | |
| R23-9 (CLS) - R23-2 (E) | BR - W-B | Sliding roof motor close | Power switch on (IG), CLOSE switch off | 11 to 14 V |

If the result is not as specified, the sliding roof ECU (sliding roof drive gear sub-assembly) may have a malfunction.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Sliding roof system data and Diagnostic Trouble Codes (DTCs) can be read through the vehicle Data Link Connector 3 (DLC3). When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) Check the DLC3 INFO.

3. INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

- If the voltage is below 11 V, recharge or replace the battery.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Sliding Roof / Trouble Codes.

(e) Check the details of the DTC(s) INFO.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Sliding Roof / Trouble Codes.

(e) Clear the DTCs.

# DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the following table, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Sliding Roof / Data List.

(e) Read the Data List according to the display on the Techstream.

***Sliding Roof (Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Open Switch | OPEN switch signal/ON or OFF | ON: OPEN switch pressed<br><br>OFF: OPEN switch not pressed | - |
| Close Switch | CLOSE switch signal/ON or OFF | ON: CLOSE switch pressed<br><br>OFF: CLOSE switch not pressed | - |
| Hall IC1 Pulse | Hall IC1 pulse output/Lo or Hi | Lo and Hi repeat during motor operation | Lo: Hall IC1 output is low<br><br>Hi: Hall IC1 output is high |
| Hall IC1 Status | Status of Hall IC1/Normal or Error | Normal: Hall IC1 is normal<br><br>Error: Hall IC1 is not normal | - |
| Hall IC2 Pulse | Hall IC2 pulse output/Lo or Hi | Lo and Hi repeat during motor operation | Lo: Hall IC2 output is low<br><br>Hi: Hall IC2 output is high |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Hall IC2 Status | Status of Hall IC2/Normal or Error | Normal: Hall IC2 is normal<br><br>Error: Hall IC2 is not normal | - |
| Ignition (Direct Signal) | Power switch signal/ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |
| Ignition (MPX) | Power switch signal (LIN signal)/ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |
| Door Courtesy | Driver side door courtesy light switch signal/ON or OFF | ON: Driver side door open<br><br>OFF: Driver side door closed | - |
| Key Off Permission | Key-off sliding roof operation permit signal/ON or OFF | ON: Front doors are not opened within 45 seconds after power switch turned off<br><br>OFF: Any status except "ON" status | - |
| Open Switch Failure(Past) | Open switch failure signal (Past)/ON or OFF | ON: Sliding roof open signal failure (Past)<br><br>OFF: Sliding roof open signal not fail (Past) | - |
| Close Switch Failure(Past) | Close switch failure signal (Past)/ON or OFF | ON: Sliding roof close signal failure (Past)<br><br>OFF: Sliding roof close signal not fail (Past) | - |
| Open Switch Failure(Current) | Open switch failure signal (Current)/ON or OFF | ON: Sliding roof open signal failure (Current)<br><br>OFF: Sliding roof open signal not fail (Current) | - |
| Close Switch Failure(Current) | Close switch failure signal (Current)/ON or OFF | ON: Sliding roof close signal failure (Current)<br><br>OFF: Sliding roof close signal not fail (Current) | - |

2. PERFORM ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in

troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Sliding Roof / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

### *Sliding Roof (Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Slide Roof | Operate sliding roof | Opn/Dwn / Clos/Up / OFF | - |

# DIAGNOSTIC TROUBLE CODE CHART

*Sliding Roof (Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly))*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B2341 | Sensor (Motor) Failure | 1. Sliding roof ECU (Sliding roof drive gear sub-assembly)<br>2. Sliding roof switch (Map light assembly)<br>3. Wire harness or connector | INFO |
| B2342 | Switch Failure | 1. Sliding roof ECU (Sliding roof drive gear sub-assembly)<br>2. Sliding roof switch (Map light assembly)<br>3. Wire harness or connector | INFO |
| B2343 | Position Initialization Incomplete | 1. Sliding roof ECU (Sliding roof drive gear sub-assembly) | INFO |
| B2344 | Position Failure | 1. Sliding roof ECU (Sliding roof drive gear sub-assembly)<br>2. Sliding roof switch (Map light assembly)<br>3. Wire harness or connector | INFO |

| | | |
|---|---|---|
| DTC | B2341 | Sensor (Motor) Failure |
| DTC | B2344 | Position Failure |

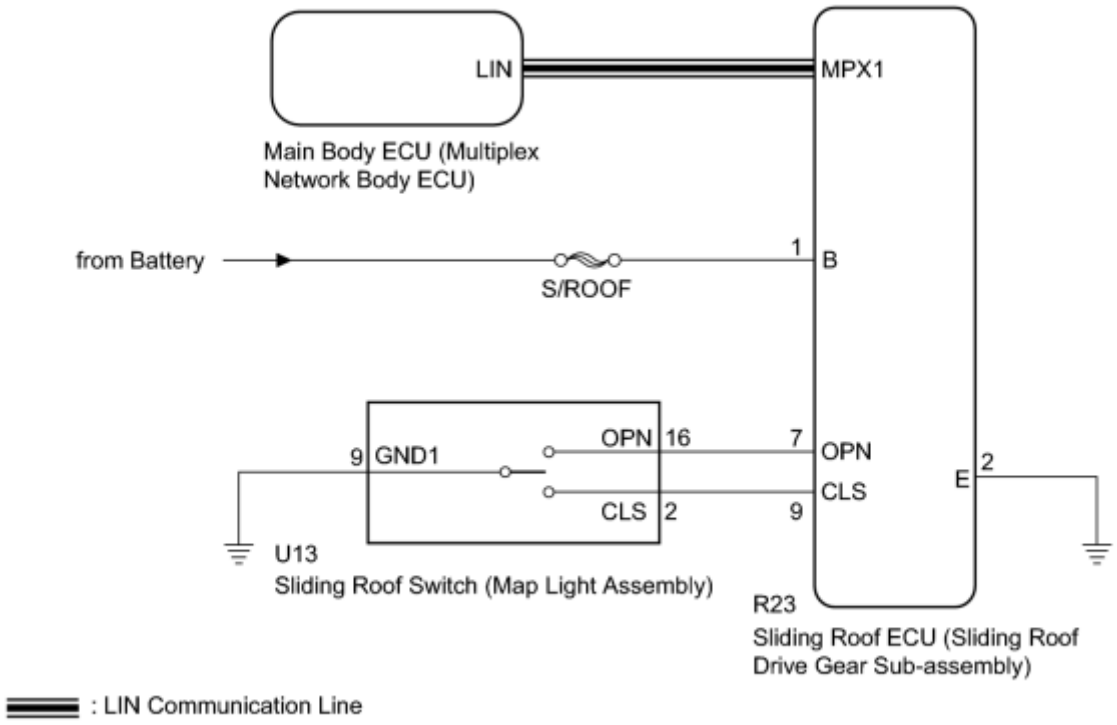
# DESCRIPTION

When the sliding roof ECU (sliding roof drive gear sub-assembly) detects a motor malfunction and the sliding roof operation is stopped, DTC B2341 is output.

When the sliding roof ECU (sliding roof drive gear sub-assembly) detects a gear position malfunction and the sliding roof operation is stopped, DTC B2344 is output.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2341 | Sensor (motor) failure (When the ECU enters fail-safe mode due to a problem with the motor) | • Sliding roof ECU (Sliding roof drive gear sub-assembly)<br>• Sliding roof switch (Map light assembly)<br>• Wire harness or connector |
| B2344 | Position failure (When the ECU enters fail-safe mode due to a problem with the gear position) | • Sliding roof ECU (Sliding roof drive gear sub-assembly)<br>• Sliding roof switch (Map light assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When the sliding roof ECU (sliding roof drive gear sub-assembly) is replaced or removed and reinstalled, it requires initialization INFO.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK SLIDING ROOF OPERATION |

(a) Check the sliding roof auto operation INFO.

OK:

Auto operation operates normally.

NG ▶ INITIALIZE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

OK

▼

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B2341 or B2344 is not output.

NG ▶ REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

OK ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 3. | INITIALIZE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY) |

(a) Check that the sliding roof ECU (sliding roof drive gear sub-assembly) can be initialized INFO.

OK:

Sliding roof ECU (sliding roof drive gear sub-assembly) can be initialized.

NG ▶ CHECK HARNESS AND CONNECTOR (SLIDING ROOF ECU - SLIDING ROOF SWITCH)

OK

▼

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B2341 or B2344 is not output.

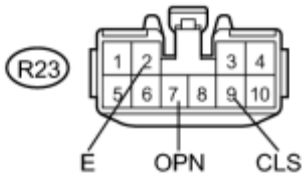
NG ▶ REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

OK ▶ **END**

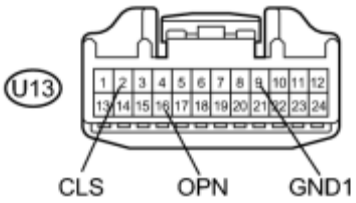
| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (SLIDING ROOF ECU - SLIDING ROOF SWITCH) |

(a) Disconnect the sliding roof switch (map light assembly) connector.

*1




*2




(b) Disconnect the sliding roof ECU (sliding roof drive gear sub-assembly) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R23-9 (CLS) - U13-2 (CLS) | Always | Below 1 Ω |
| R23-9 (CLS) - Body ground | Always | 10 kΩ or higher |
| R23-7 (OPN) - U13-16 (OPN) | Always | Below 1 Ω |
| R23-7 (OPN) - Body ground | Always | 10 kΩ or higher |
| U13-9 (GND1) - Body ground | Always | Below 1 Ω |
| R23-2 (E) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Sliding Roof Switch (Map Light Assembly)) |

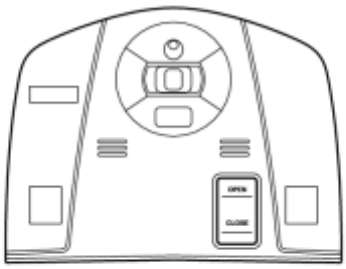
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

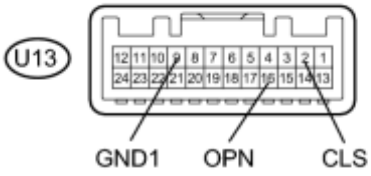
▼

| | |
|---|---|
| 6. | INSPECT SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY) |

*1



(a) Remove the sliding roof switch (map light assembly) INFO.




H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| U13-2 (CLS) - U13-9 (GND1) | CLOSE switch is pressed | Below 1 Ω |
| U13-2 (CLS) - U13-9 (GND1) | CLOSE switch is not pressed | 10 kΩ or higher |
| U13-16 (OPN) - U13-9 (GND1) | OPEN switch is pressed | Below 1 Ω |
| U13-16 (OPN) - U13-9 (GND1) | OPEN switch is not pressed | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Sliding Roof Switch (Map Light Assembly)) |

NG REPLACE SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY)

OK **REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)**

| DTC | B2342 | Switch Failure |
|---|---|---|

# DESCRIPTION

This DTC is output when the sliding roof ECU (sliding roof drive gear sub-assembly) detects that the sliding roof switch is stuck for 30 seconds or more.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2342 | Sliding roof ECU (sliding roof drive gear sub-assembly) detects sliding roof switch is stuck for 30 seconds or more. | • Sliding roof ECU (Sliding roof drive gear sub-assembly)<br>• Sliding roof switch (Map light assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM

Refer to DTC B2341 INFO.

# INSPECTION PROCEDURE

NOTICE:

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When the sliding roof ECU (sliding roof drive gear sub-assembly) is replaced or removed and reinstalled, it requires initialization INFO.

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM (SLIDING ROOF SWITCH) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Sliding Roof / Data List.

(e) Read the Data List according to the display on the Techstream.

***Sliding Roof (Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Open Switch | Open switch failure signal | ON: Sliding roof open signal | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Failure(Past) | (Past)/ON or OFF | failure (Past)<br><br>OFF: Sliding roof open signal not fail (Past) | |
| Close Switch Failure(Past) | Close switch failure signal (Past)/ON or OFF | ON: Sliding roof close signal failure (Past)<br><br>OFF: Sliding roof close signal not fail (Past) | - |
| Open Switch Failure(Current) | Open switch failure signal (Current)/ON or OFF | ON: Sliding roof open signal failure (Current)<br><br>OFF: Sliding roof open signal not fail (Current) | - |
| Close Switch Failure(Current) | Close switch failure signal (Current)/ON or OFF | ON: Sliding roof close signal failure (Current)<br><br>OFF: Sliding roof close signal not fail (Current) | - |

OK:

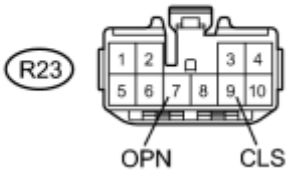
"OFF" appears on the Techstream screen.

NG CHECK HARNESS AND CONNECTOR (SLIDING ROOF ECU - BODY GROUND)

OK **REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (SLIDING ROOF ECU - BODY GROUND) |

*1




(a) Disconnect the sliding roof ECU (sliding roof drive gear sub-assembly) connector.

(b) Disconnect the sliding roof switch (map light assembly) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| R23-7 (OPN) - Body ground | Always | 10 kΩ or higher |
| R23-9 (CLS) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)) |

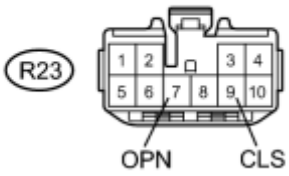
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY)) |

*1




(a) Reconnect the sliding roof switch (map light assembly) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| R23-7 (OPN) - Body ground | OPEN switch off | 10 kΩ or higher |
| R23-9 (CLS) - Body ground | CLOSE switch off | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)) |

NG ▶ REPLACE SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY)

OK ▶ **REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)**

| DTC | B2343 | Position Initialization Incomplete |
|---|---|---|

# DESCRIPTION

This DTC is output when the sliding roof ECU (sliding roof drive gear sub-assembly) has not been initialized.

| DTC Code | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2343 | Sliding roof ECU (sliding roof drive gear sub-assembly) has not been initialized. | Sliding roof ECU (Sliding roof drive gear sub-assembly) |

# WIRING DIAGRAM

Refer to DTC B2341 INFO.

# INSPECTION PROCEDURE

NOTICE:

- When DTC B2342 and B2343 are output simultaneously, perform troubleshooting for DTC B2342 first.
- When the sliding roof ECU (sliding roof drive gear sub-assembly) is replaced or removed and reinstalled, it requires initialization INFO.

# PROCEDURE

| 1. | INITIALIZE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY) |
|---|---|

(a) Check that the sliding roof ECU (sliding roof drive gear sub-assembly) can be initialized INFO.

OK:

Sliding roof ECU (sliding roof drive gear sub-assembly) can be initialized.

NG ▶ REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

OK ▼

| 2. | CHECK SLIDING ROOF OPERATION |
|---|---|

(a) Check the sliding roof auto operation INFO.

OK:

Auto operation operates normally.

NG ▶ REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)

OK

| | |
|---|---|
| 3. | CHECK DTC OUTPUT |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B2343 is not output.

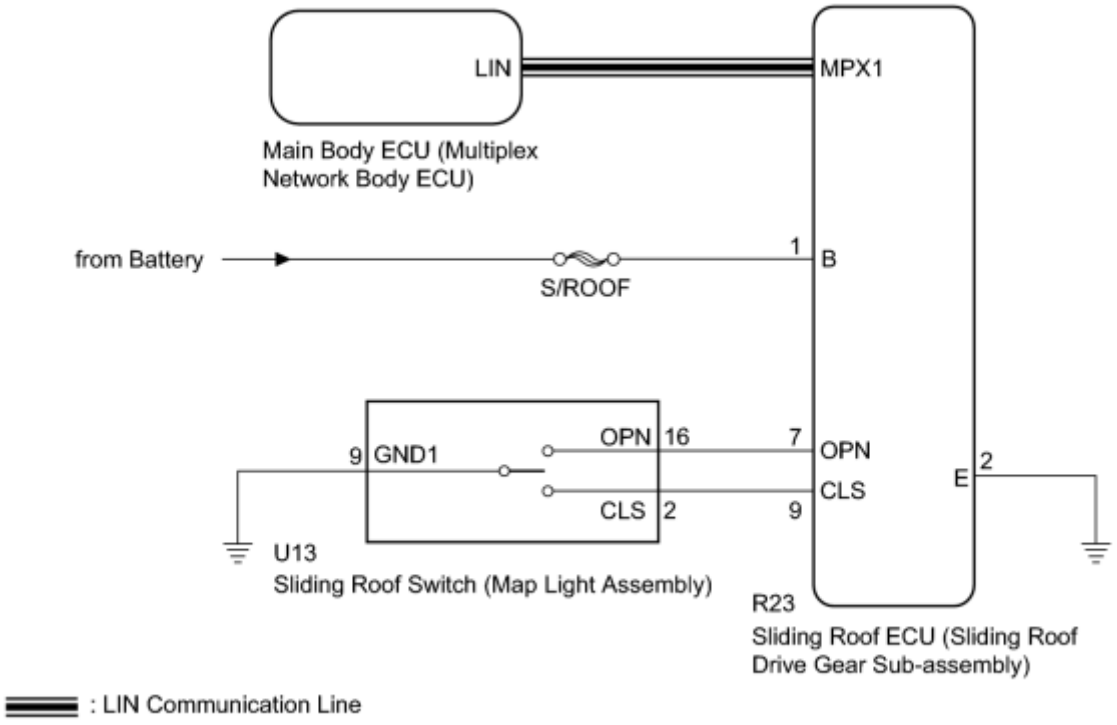
NG → REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)
OK → **END**

| Sliding Roof does not Move by Operating Sliding Roof Control Switch |
|---|

# DESCRIPTION

The sliding roof ECU (sliding roof drive gear sub-assembly) receives slide and tilt switch signals and drives its built-in motor.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.
- When the sliding roof ECU (sliding roof drive gear sub-assembly) is reinstalled or replaced, the sliding roof ECU (sliding roof drive gear sub-assembly) must be initialized INFO.
- Since the sliding roof system has functions that use LIN communication, first confirm that there is no malfunction in the LIN communication system with the How to Proceed with Troubleshooting procedure INFO.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Sliding Roof / Data List.

(e) Read the Data List according to the display on the Techstream.

***Sliding Roof (Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Open Switch | OPEN switch signal/ON or OFF | ON: OPEN switch pressed<br>OFF: OPEN switch not pressed | - |
| Close Switch | CLOSE switch signal/ON or OFF | ON: CLOSE switch pressed<br>OFF: CLOSE switch not pressed | - |

OK:

The Techstream display changes according to switch operation as shown in the table.

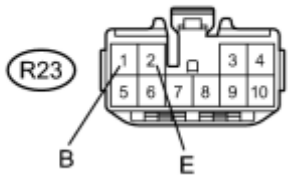
NG ▶ INSPECT SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY)

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (SLIDING ROOF ECU - BATTERY, BODY GROUND) |

*1




(a) Disconnect the sliding roof ECU (sliding roof drive gear sub-assembly) connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R23-1 (B) - Body ground | Power switch off | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R23-2 (E) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

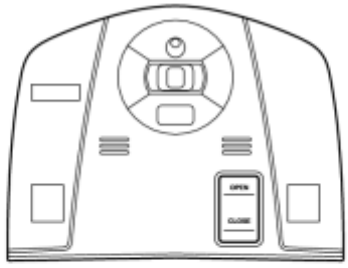
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

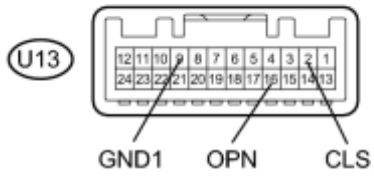
OK **REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)**

| | |
|---|---|
| 3. | INSPECT SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY) |

*1



(a) Remove the sliding roof switch (map light assembly) INFO.




H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| U13-2 (CLS) - U13-9 (GND1) | CLOSE switch is pressed | Below 1 Ω |
| U13-2 (CLS) - U13-9 (GND1) | CLOSE switch is not pressed | 10 kΩ or higher |
| U13-16 (OPN) - U13-9 (GND1) | OPEN switch is pressed | Below 1 Ω |
| U13-16 (OPN) - U13-9 (GND1) | OPEN switch is not pressed | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Sliding Roof Switch (Map Light Assembly)) |

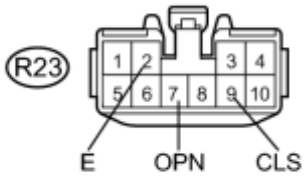
NG ▶ REPLACE SLIDING ROOF SWITCH (MAP LIGHT ASSEMBLY)

OK

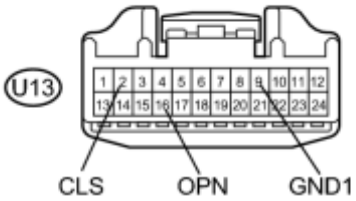
▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (SLIDING ROOF ECU - SLIDING ROOF SWITCH) |

*1




*2




(a) Disconnect the sliding roof ECU (sliding roof drive gear sub-assembly) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R23-9 (CLS) - U13-2 (CLS) | Always | Below 1 Ω |
| R23-9 (CLS) - Body ground | Always | 10 kΩ or higher |
| R23-7 (OPN) - U13-16 (OPN) | Always | Below 1 Ω |
| R23-7 (OPN) - Body ground | Always | 10 kΩ or higher |
| U13-9 (GND1) - Body ground | Always | Below 1 Ω |
| R23-2 (E) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Sliding Roof ECU (Sliding Roof Drive Gear Sub-assembly)) |

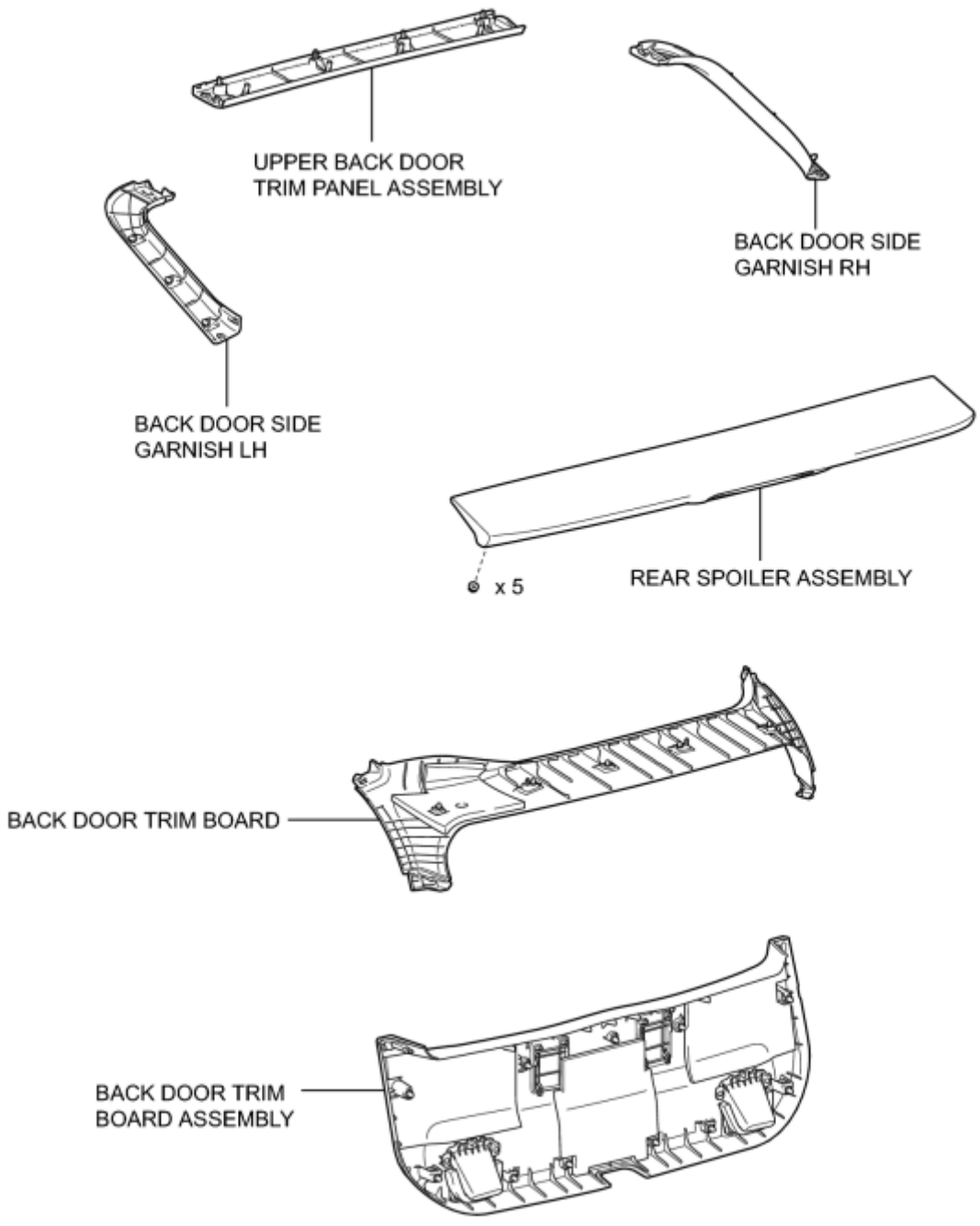
| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Sliding Roof Switch (Map Light Assembly)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE SLIDING ROOF ECU (SLIDING ROOF DRIVE GEAR SUB-ASSEMBLY)**

# COMPONENTS

# ILLUSTRATION

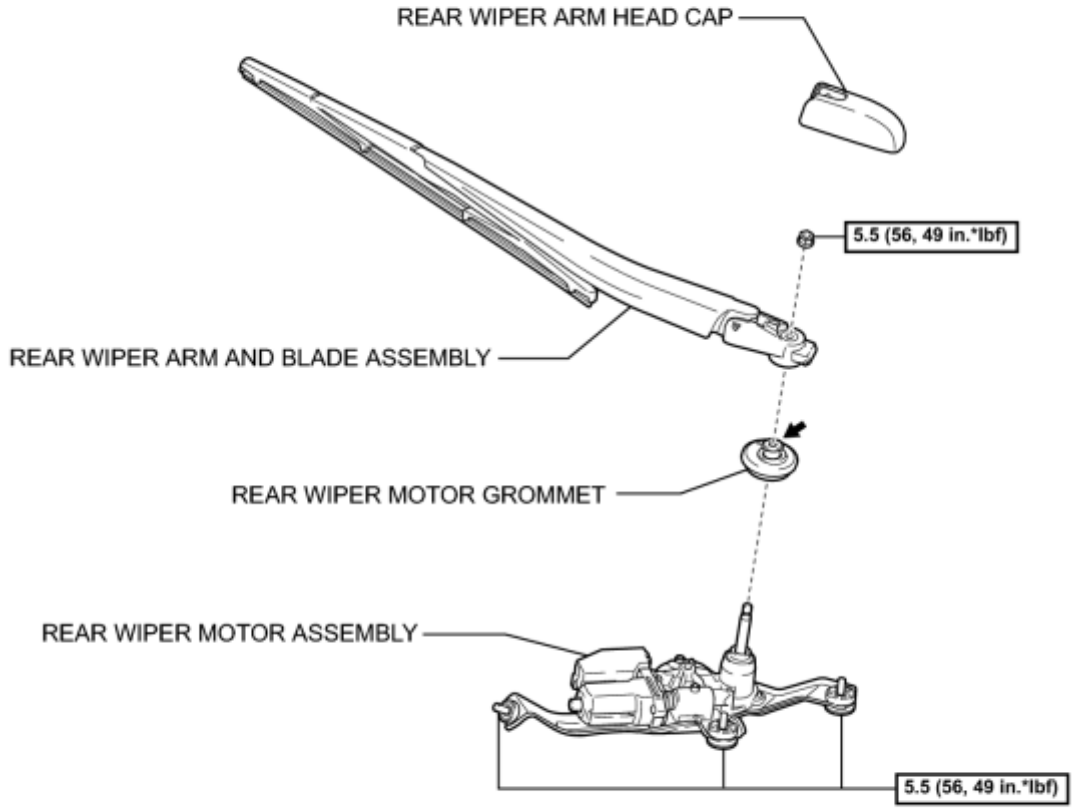



P

# ILLUSTRATION

w/ Rear Wiper:

for Back Door Glass:



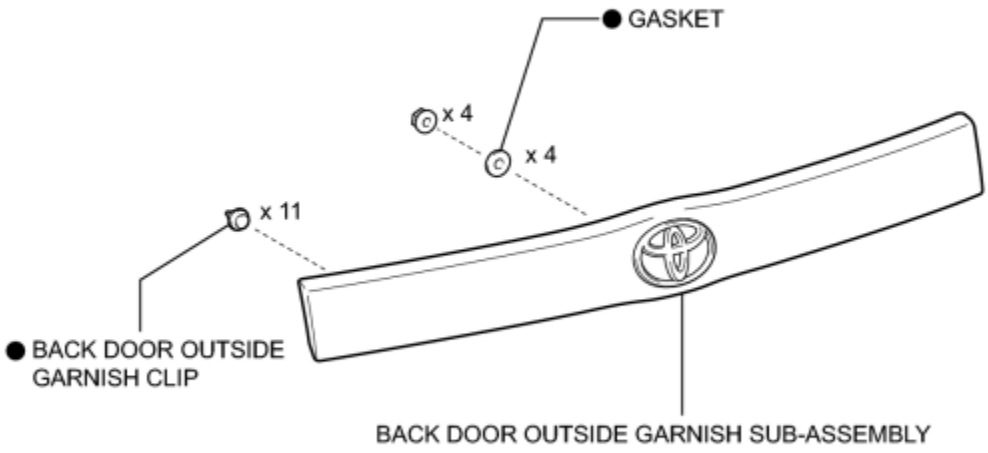

N*m (kgf*cm, ft.*lbf) : Specified torque

MP grease

P

# ILLUSTRATION

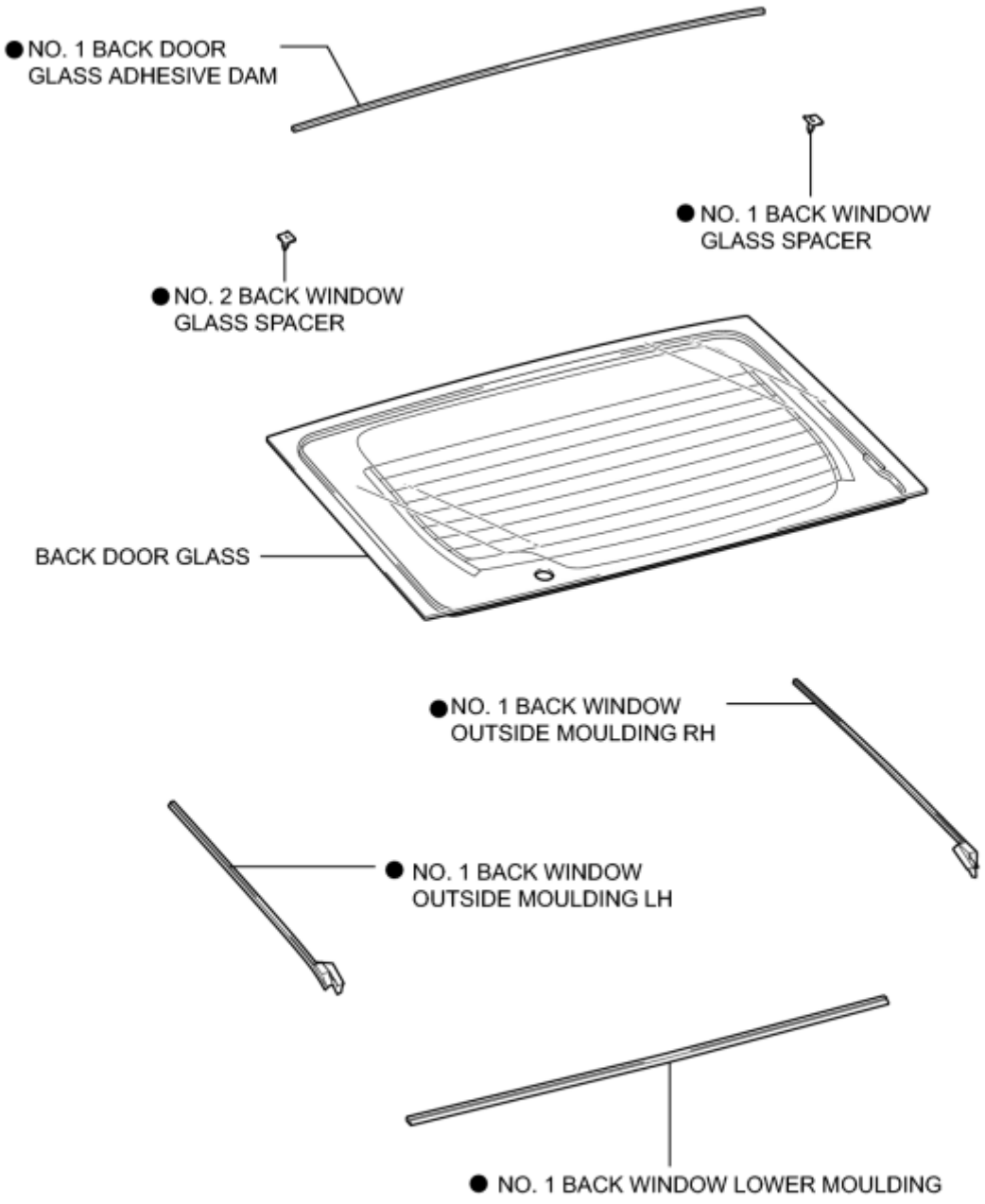
for Back Window Fix Glass:




● Non-reusable part

P

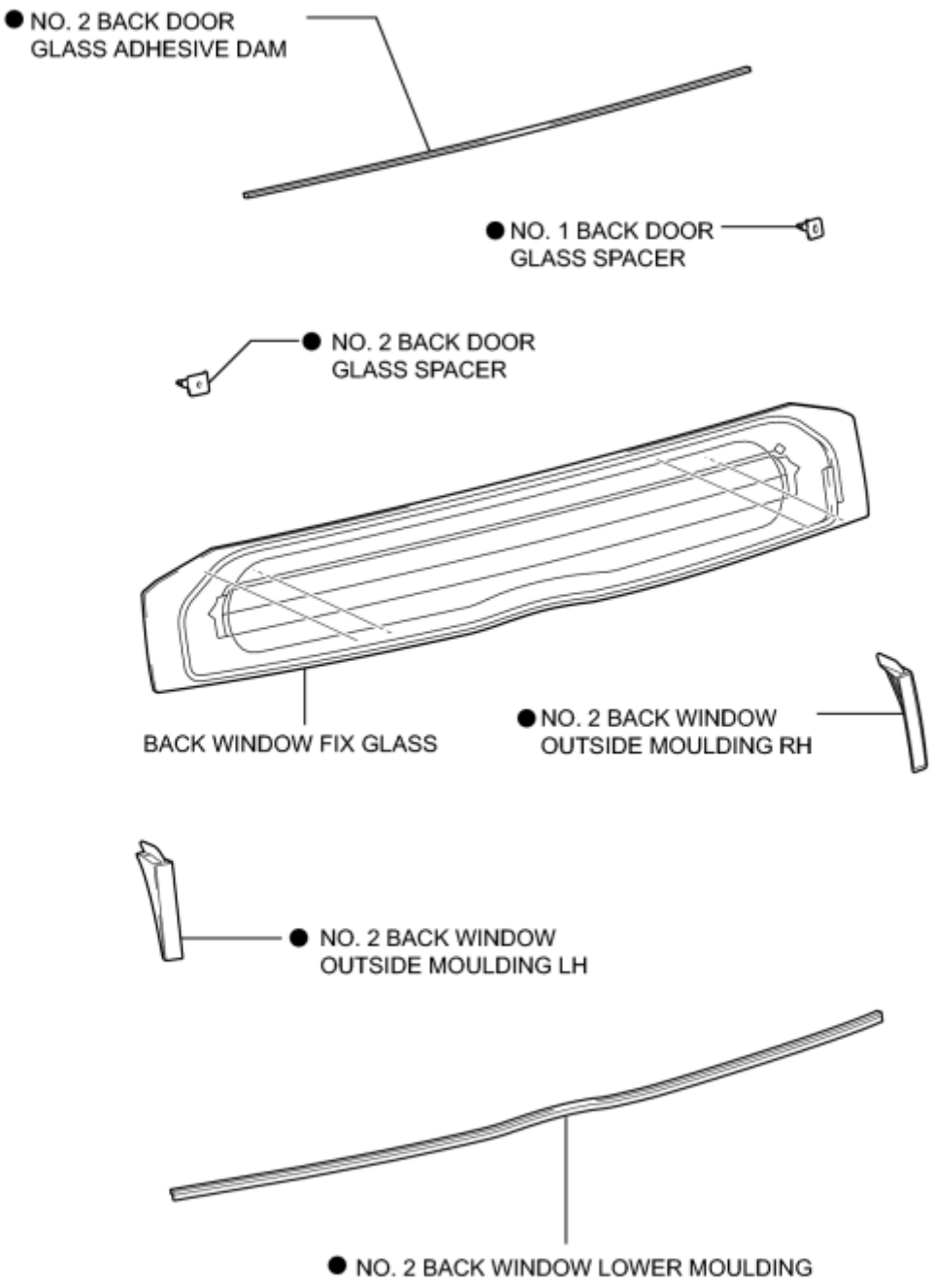
# ILLUSTRATION




● Non-reusable part

P

# ILLUSTRATION




● Non-reusable part

P

# REMOVAL

1. REMOVE UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

2. REMOVE BACK DOOR SIDE GARNISH RH INFO

3. REMOVE BACK DOOR SIDE GARNISH LH INFO

4. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

5. REMOVE BACK DOOR TRIM BOARD INFO

6. REMOVE REAR SPOILER ASSEMBLY INFO

7. REMOVE REAR WIPER ARM HEAD CAP (w/ Rear Wiper)

(a) for Back Door Glass:

(1) Remove the rear wiper arm head cap INFO.

8. REMOVE REAR WIPER ARM AND BLADE ASSEMBLY (w/ Rear Wiper)

(a) for Back Door Glass:

(1) Remove the rear wiper arm and blade assembly INFO.

9. REMOVE REAR WIPER MOTOR GROMMET (w/ Rear Wiper)

(a) for Back Door Glass:

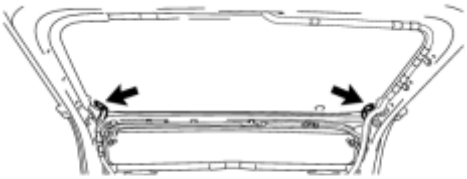
(1) Remove the rear wiper motor grommet INFO.

10. REMOVE REAR WIPER MOTOR ASSEMBLY (w/ Rear Wiper)

(a) for Back Door Glass:

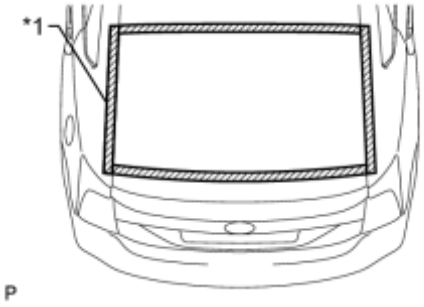
(1) Remove the rear wiper motor assembly INFO.

11. REMOVE BACK DOOR GLASS



(a) Disconnect the 2 connectors.

(b) Apply protective tape to the outer surface of the vehicle body to prevent scratches.



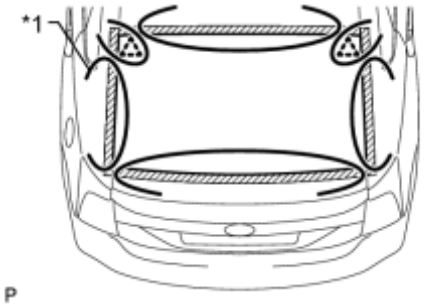

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

NOTICE:

When separating the back door glass from the vehicle, be careful not to damage the paint or interior and exterior ornaments.

(c) Pass a piano wire between the vehicle body and back door glass from the interior, as shown in the illustration.




HINT:

Do not allow the piano wire to interfere with the clips.

## Text in Illustration

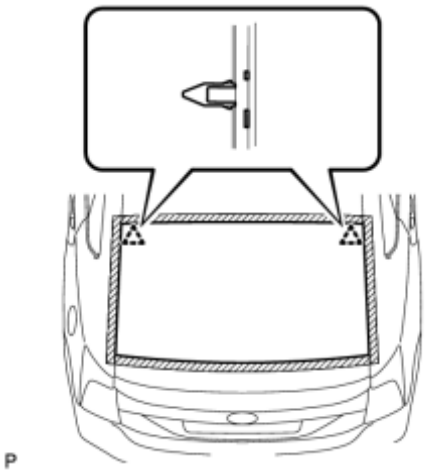
| | |
|---|---|
| *1 | Piano Wire |

(d) Tie both wire ends to wooden blocks or similar objects that can serve as handles.

(e) Cut off the adhesive by pulling the piano wire around the back door glass.

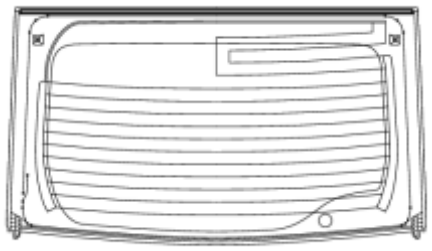
NOTICE:

Leave as much adhesive on the vehicle body as possible when removing the back door glass.




(f) Using suction cups, disengage the 2 clips and remove the back door glass.

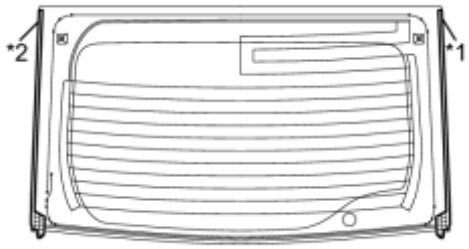
12. REMOVE NO. 1 BACK DOOR GLASS ADHESIVE DAM



P

(a) Remove the No. 1 back door glass adhesive dam.

13. REMOVE NO. 1 BACK WINDOW OUTSIDE MOULDING LH




P

(a) Remove the No. 1 back window outside moulding LH.

## Text in Illustration

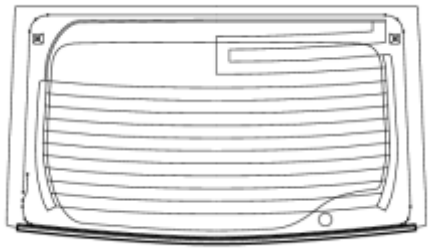
| | |
|---|---|
| *1 | LH Side |
| *2 | RH Side |

14. REMOVE NO. 1 BACK WINDOW OUTSIDE MOULDING RH

HINT:

Use the same procedure for the RH side and LH side.

15. REMOVE NO. 1 BACK WINDOW LOWER MOULDING



P

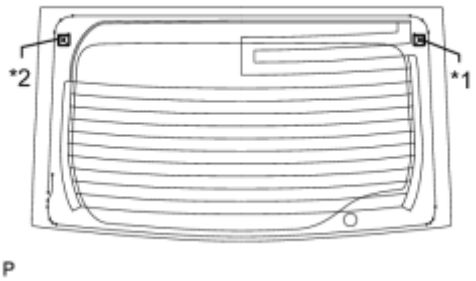
(a) Remove the No. 1 back window lower moulding.

16. REMOVE NO. 2 BACK WINDOW GLASS SPACER

(a) Using a scraper, remove the No. 2 back window glass spacer.

## Text in Illustration

| | |
|---|---|
| *1 | No. 2 Back Window Glass Spacer |




P

| | |
|---|---|
| *2 | No. 1 Back Window Glass Spacer |

- Be careful not to damage the back door glass.
- Be sure to replace the No. 1 back window glass spacer with a new one.

17. REMOVE NO. 1 BACK WINDOW GLASS SPACER

HINT:

Use the same procedure for the No. 1 spacer and No. 2 spacer.

18. CLEAN BACK DOOR GLASS



(a) Clean the outer edge of the back door glass with a non-residue solvent.

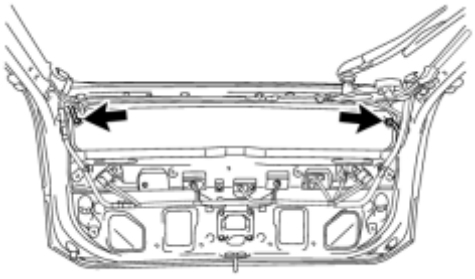
- Do not touch the back door glass surface after cleaning it.
- Be careful not to damage the glass.
- Even if using a new back door glass, clean the back door glass with a non-residue solvent.

19. REMOVE BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY

(a) for Back Door Window Fix Glass:

(1) Remove the back door outside garnish sub-assembly INFO.

20. REMOVE BACK WINDOW FIX GLASS

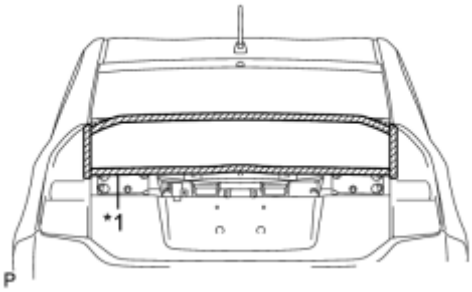


P

(a) Disconnect the 2 connectors.

(b) Apply protective tape to the outer surface of the vehicle body to prevent scratches.

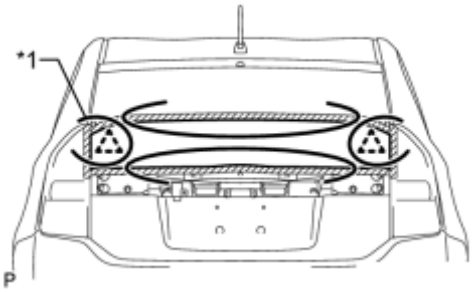
# Text in Illustration




| | |
|---|---|
| *1 | Protective Tape |

NOTICE:

When separating the back door glass vehicle, be careful not to damage the interior and exterior ornaments.




(c) Pass a piano wire between the vehicle body and back window fix glass from the interior, as shown in the illustration.

## Text in Illustration

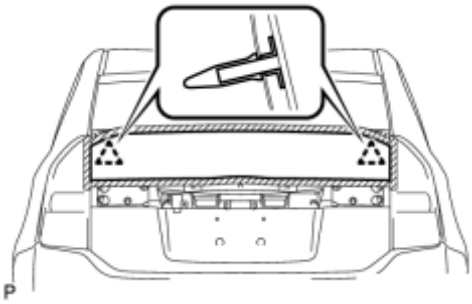
| | |
|---|---|
| *1 | Piano Wire |

(d) Tie both wire ends to wooden blocks or similar objects that can serve as handles.

(e) Cut off the adhesive by pulling the piano wire around the back door glass.

NOTICE:

Leave as much adhesive on the vehicle body as possible when removing the back door glass.




(f) Using suction cups, disengage the 2 clips and remove the back door glass.

21. REMOVE NO. 2 BACK DOOR GLASS ADHESIVE DAM




(a) Using a scraper, remove the back door glass adhesive dam.

- Be careful not to damage the back window fix glass.
- Be sure to replace the back door glass adhesive dam with a new one.

22. REMOVE NO. 2 BACK WINDOW OUTSIDE MOULDING LH

(a) Using a scraper, remove the NO. 2 back window outside moulding LH.

## Text in Illustration




P

| | |
|---|---|
| *1 | LH Side |
| *2 | RH Side |

- Be careful not to damage the back window fix glass.
- Be sure to replace the back window outside moulding with a new one.

23. REMOVE NO. 2 BACK WINDOW OUTSIDE MOULDING RH

HINT:

Use the same procedure for the RH side and LH side.

24. REMOVE NO. 2 BACK WINDOW LOWER MOULDING

(a) Using a scraper, remove the back window lower moulding.



P

- Be careful not to damage the back window fix glass.
- Be sure to replace the back window lower moulding with a new one.

25. REMOVE NO. 2 BACK DOOR GLASS SPACER

(a) Using a scraper, remove the No. 2 back door glass spacer.

## Text in Illustration




P

| | |
|---|---|
| *1 | No. 2 Back Window Glass Spacer |
| *2 | No. 1 Back Window Glass Spacer |

- Be careful not to damage the back window fix glass.
- Be sure to replace the No. 2 back window glass spacer with a new one.

26. REMOVE NO. 1 BACK DOOR GLASS SPACER

HINT:

Use the same procedure for the No. 1 spacer and No. 2 spacer.

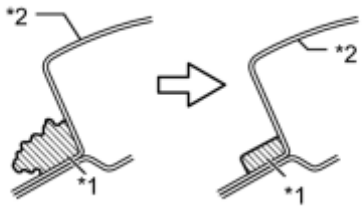
27. CLEAN BACK WINDOW FIX GLASS



(a) Clean the outer edge of the back window fix glass with a non-residue solvent.

- Do not touch the back window fix glass surface after cleaning it.
- Be careful not to damage the glass.
- Even if using a new back window fix glass, clean the back window fix glass with a non-residue solvent.

28. CLEAN VEHICLE BODY




P

(a) Using a scraper, remove the moulding and adhesive from the back window fix glass.

## Text in Illustration

| | |
|---|---|
| *1 | Adhesive |
| *2 | Vehicle Body |

(b) Clean and shape the contact surfaces of the vehicle body.

(1) Using a knife, cut away excess adhesive on the contact surfaces of the vehicle body, as shown in the illustration.

NOTICE:

Be careful not to damage the vehicle body.

HINT:

Leave as much adhesive on the vehicle body as possible.

(2) Clean the contact surfaces of the vehicle body with a piece of cloth saturated with cleaner.

HINT:

Even if all the adhesive has been removed, clean the vehicle body.

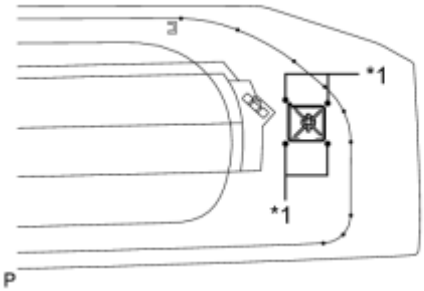
# INSTALLATION

1. INSTALL NO. 2 BACK DOOR GLASS SPACER

(a) Apply Primer G to the installation part of a new No. 2 back door glass spacer.

HINT:

If primer is applied to an area that is not specified, wipe off the primer with a non-residue solvent before it dries.




(b) Install the new No. 2 back door glass spacer onto the back window fix glass, as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Marking for Spacer Pasting |

- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

2. INSTALL NO. 1 BACK DOOR GLASS SPACER

HINT:

Use the same procedure for the No. 1 spacer and No. 2 spacer.

3. INSTALL NO. 2 BACK WINDOW LOWER MOULDING

(a) Apply Primer G to the installation part of a new No . 2 back window lower moulding.

HINT:

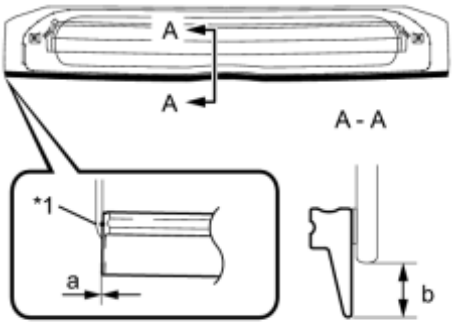
If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.

(b) Install the new back window lower moulding onto the back window fix glass, as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Edge of Curved Surface |

Standard Dimension:




P

| Item | Dimension |
|---|---|
| a | -1.5 to 1.5 mm (-0.0591 to 0.0591 in.) |
| b | 5.7 to 8.3 mm (0.224 to 0.326 in.) |

- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

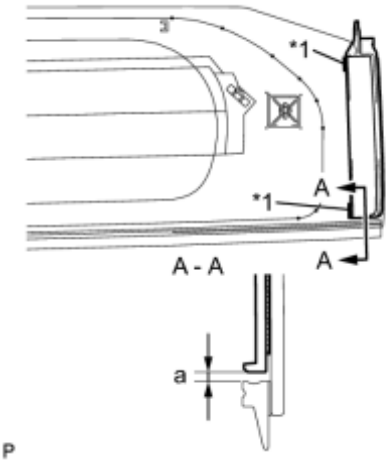
4. INSTALL NO. 2 BACK WINDOW OUTSIDE MOULDING LH

(a) Apply Primer G to the installation part of a new NO. 2 back window outside moulding LH.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.

(b) Install the new NO. 2 back window outside moulding LH onto the back window fix glass, as shown in the illustration.




P

# Text in Illustration

| | |
|---|---|
| *1 | Marking for Moulding Pasting |

Standard Dimension:

| Item | Dimension |
|---|---|
| a | 2.0 mm (0.0787 in.) |

- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

5. INSTALL NO. 2 BACK WINDOW OUTSIDE MOULDING RH

HINT:

Use the same procedure for the LH side and RH side.

6. INSTALL NO. 2 BACK DOOR GLASS ADHESIVE DAM

(a) Apply Primer G to the installation part of a new NO. 2 back door glass adhesive dam.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.




P

(b) Install the new NO . 2 back door glass adhesive dam onto the back window fix glass, as shown in the illustration.

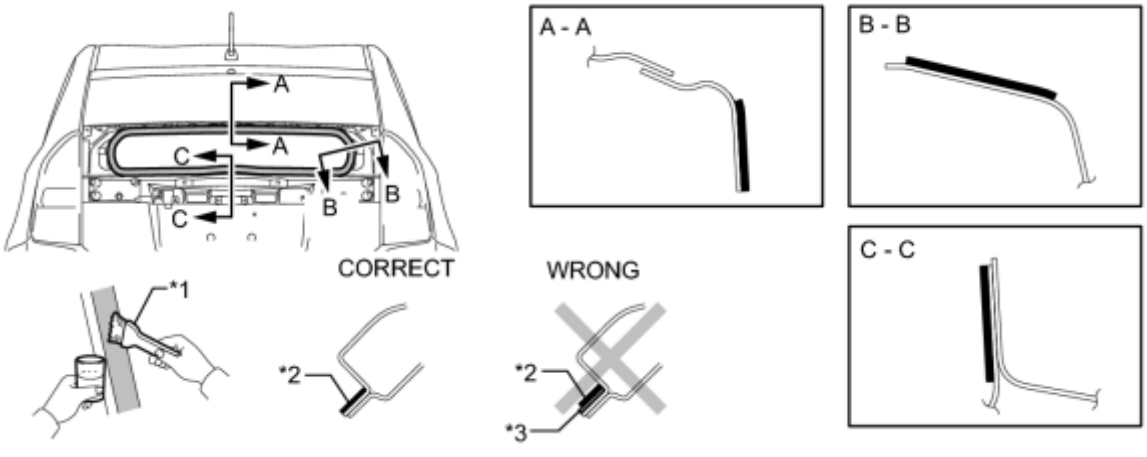
## Text in Illustration

| | |
|---|---|
| *1 | Marking for Dam Pasting |

- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

7. INSTALL BACK WINDOW FIX GLASS

(a) Using a brush, coat the installation surface on the vehicle body with Primer M.




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Brush | *2 | Primer M |
| *3 | Adhesive | - | - |

NOTICE:

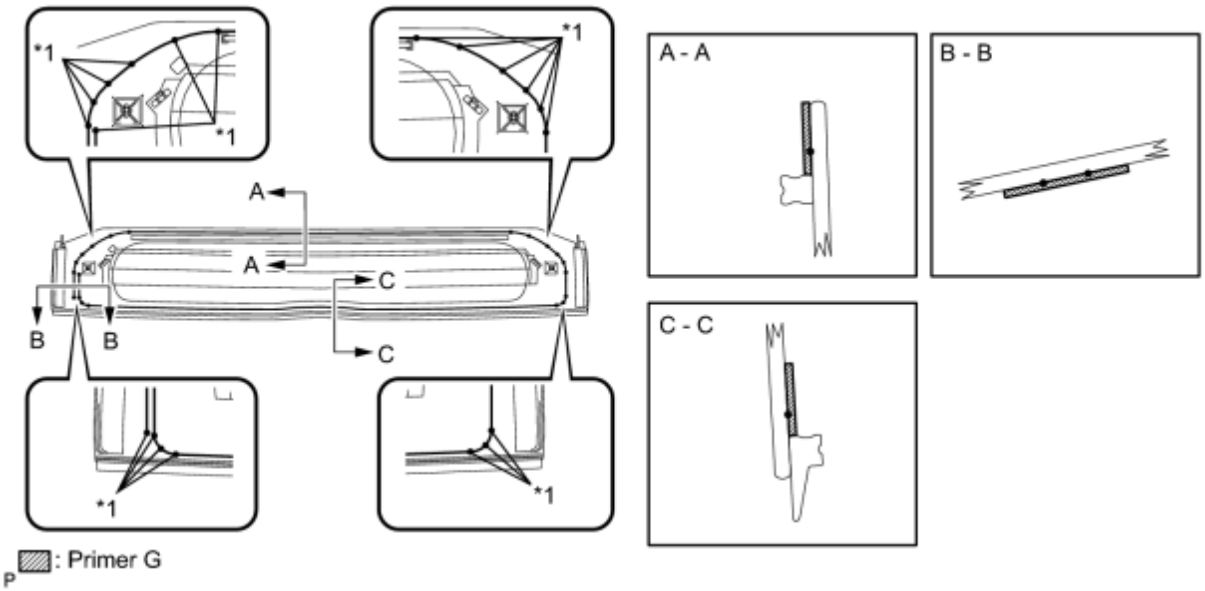
- Do not coat the adhesive with Primer M.

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Using a brush or a sponge, coat the application area of the adhesive with Primer G.




NOTICE:

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

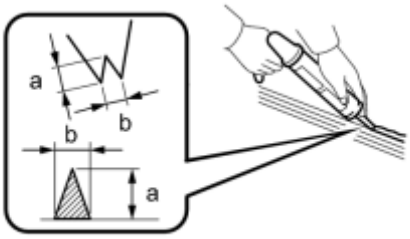
- Apply Primer G onto the ceramic notches.
- If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(c) Apply adhesive to the back window fix glass.

Adhesive:

Toyota Genuine Windshield Glass Adhesive or equivalent

(1) Cut off the tip of the cartridge nozzle as shown in the illustration.




P

Standard Dimension:

| Item | Dimension |
|---|---|
| a | 12.0 mm (0.472 in.) |
| b | 8.0 mm (0.315 in.) |

HINT:

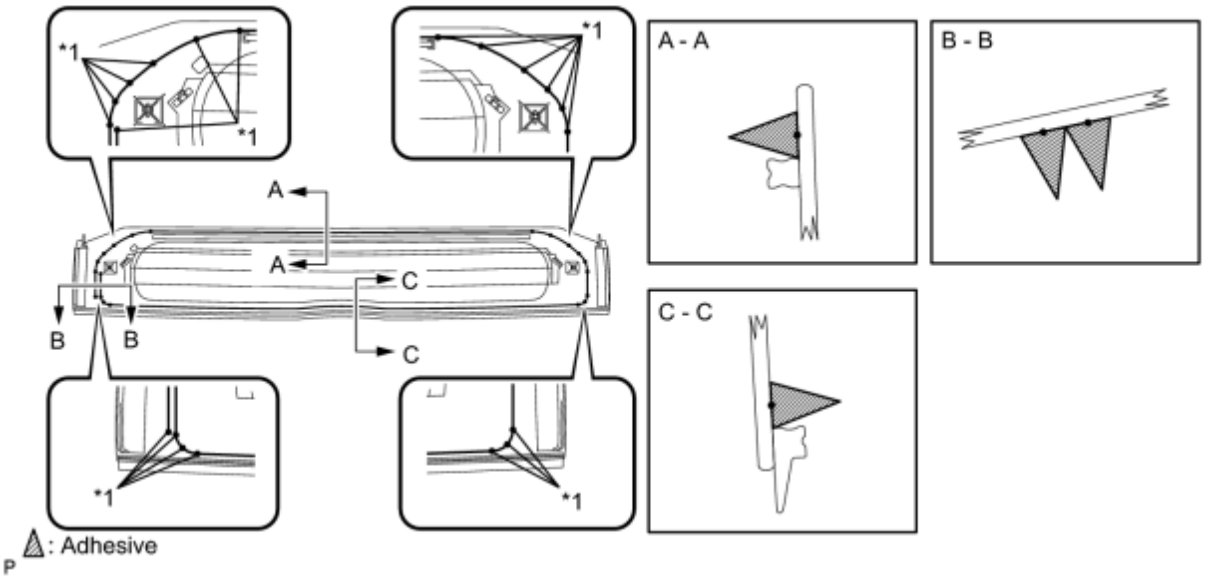
After cutting off the tip, use all the adhesive within the time described in the table below.

Usage Time Frame:

| Temperature | Usage Time Frame |
|---|---|
| 35°C (95°F) | 15 minutes |
| 20°C (68°F) | 1 hour and 40 minutes |
| 5°C (41°F) | 8 hours |

(2) Load the sealer gun with the cartridge.

(3) Apply adhesive to the back window fix glass as shown in the illustration.




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Ceramic Notch | - | - |

(d) Install the back window fix glass.

(1) Using suction cups, engage the 2 clips to install the back window fix glass.

NOTICE:

- Check that the clips are attached to the vehicle body correctly.
- Check the clearance between the vehicle body and back window fix glass.

(2) Lightly press the front surface of the back window fix glass to ensure that the back window fix glass is securely fit to the vehicle body.

HINT:

Press the back window fix glass with a force of 98 N (10 kgf, 22 lbf) or more.

(3) Using a scraper, remove any excess or protruding adhesive.

HINT:

Apply adhesive onto the glass rim.

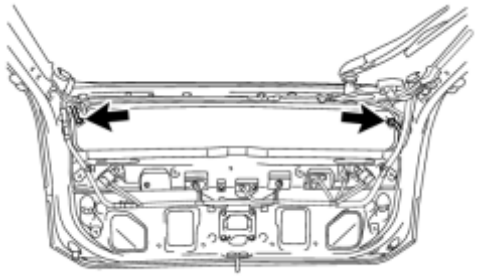
(4) Hold the back window fix glass using protective tape until applied adhesive becomes hard.

NOTICE:

Do not drive the vehicle within the time described in the table below.

Minimum Time:

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|
| 35°C (95°F) | 1 hour and 30 minutes |
| 20°C (68°F) | 5 hours |
| 5°C (41°F) | 24 hours |



P

(e) Connect the 2 connectors.

8. INSTALL BACK DOOR OUTSIDE GARNISH SUB-ASSEMBLY

(a) for Back Window Fix Glass:

(1) Install the back door outside garnish sub-assembly INFO.

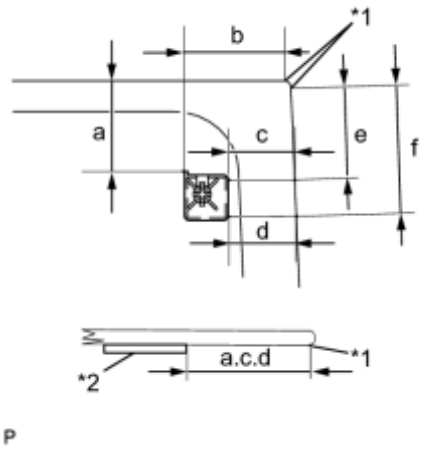
9. INSTALL NO. 2 BACK WINDOW GLASS SPACER

(a) Apply Primer G to the installation part of a new No. 2 back window glass spacer.

HINT:

If primer is applied to an area that is not specified, wipe off the primer with a non-residue solvent before it dries.

(b) Install the new No. 2 back window glass spacer onto the back door glass, as shown in the illustration.




P

## Text in Illustration

| | |
|---|---|
| *1 | Edge of Curved Surface |
| *2 | Back Window Glass Spacer |

Standard Dimension:

| Item | Dimension |
|---|---|
| a | 69.0 mm (2.716 in.) |
| b | 66.1 mm (2.602 in.) |
| c | 48.7 mm (1.917 in.) |
| d | 49.7 mm (1.956 in.) |
| e | 69.9 mm (2.752 in.) |
| f | 89.9 mm (3.539 in.) |

- RH and LH spacers are different parts.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

10. INSTALL NO. 1 BACK WINDOW GLASS SPACER

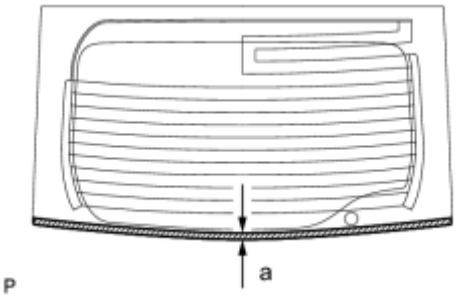
HINT:

Use the same procedure for the No. 1 spacer and No. 2 spacer.

11. INSTALL NO .1 BACK WINDOW LOWER MOULDING

(a) Apply Primer G to the installation part of a new NO. 1 back window lower moulding.

Standard Dimension:

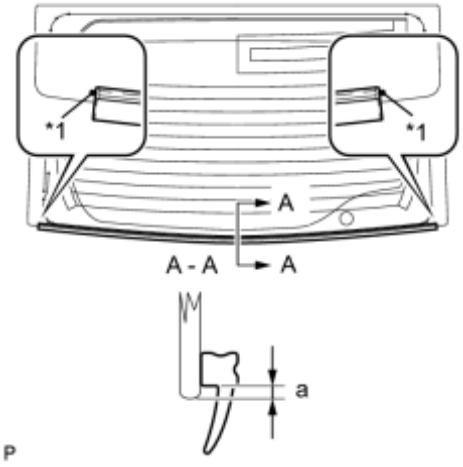



| Item | Dimension |
|---|---|
| a | 3.0 to 7.0 mm (0.118 to 0.275 in.) |

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.

(b) Install the new NO. 1 back window lower moulding onto the back door glass, as shown in the illustration.




# Text in Illustration

| | |
|---|---|
| *1 | Marking for Moulding Installation |

Standard Dimension:

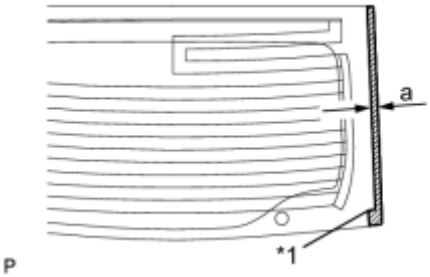
| Item | Dimension |
|---|---|
| a | 0.3 to 3.3 mm (0.0118 to 0.129 in.) |

- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

12. INSTALL NO. 1 BACK WINDOW OUTSIDE MOULDING LH

(a) Apply Primer G to the installation part of a new NO. 1 back window outside moulding LH.

# Text in Illustration




| | |
|---|---|
| *1 | Print Mark |

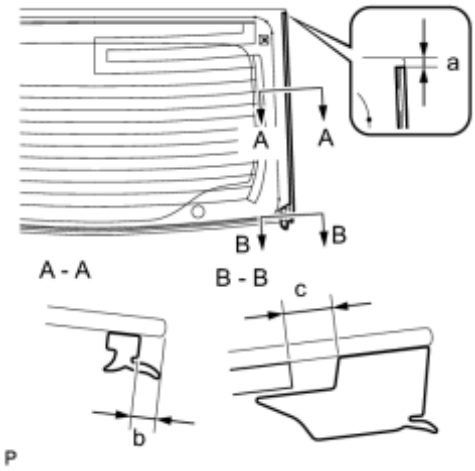
Standard Dimension:

| Item | Dimension |
|---|---|
| a | 8.0 to 12.0 mm (0.315 to 0.472 in.) |

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.

(b) Install the new NO. 1 back window outside moulding LH onto the




back door glass, as shown in the illustration.

Standard Dimension:

| Item | Dimension |
|---|---|
| a | 8.5 to 11.5 mm (0.334 to 0.452 in.) |
| b | 4.0 mm (0.157 in.) |
| c | 8.0 to 14.0 mm (0.315 to 0.551 in.) |

- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

13. INSTALL NO. 1 BACK WINDOW OUTSIDE MOULDING RH

HINT:

Use the same procedure for the LH side and RH side.

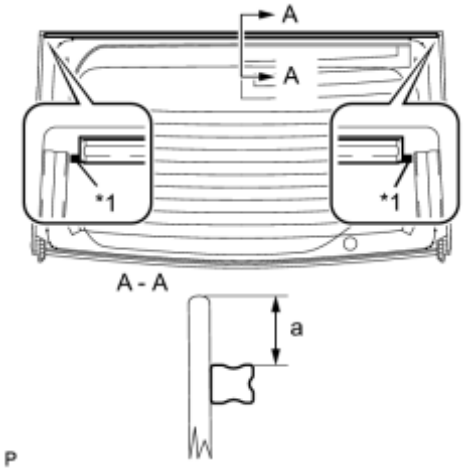
14. INSTALL NO. 1 BACK DOOR GLASS ADHESIVE DAM

(a) Apply Primer G to the installation part of a new NO. 1 back door glass adhesive dam.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.

(b) Install the new NO. 1 back door glass adhesive dam onto the back door glass, as shown in the illustration.




# Text in Illustration

| | |
|---|---|
| *1 | Marking for Dam Installation |

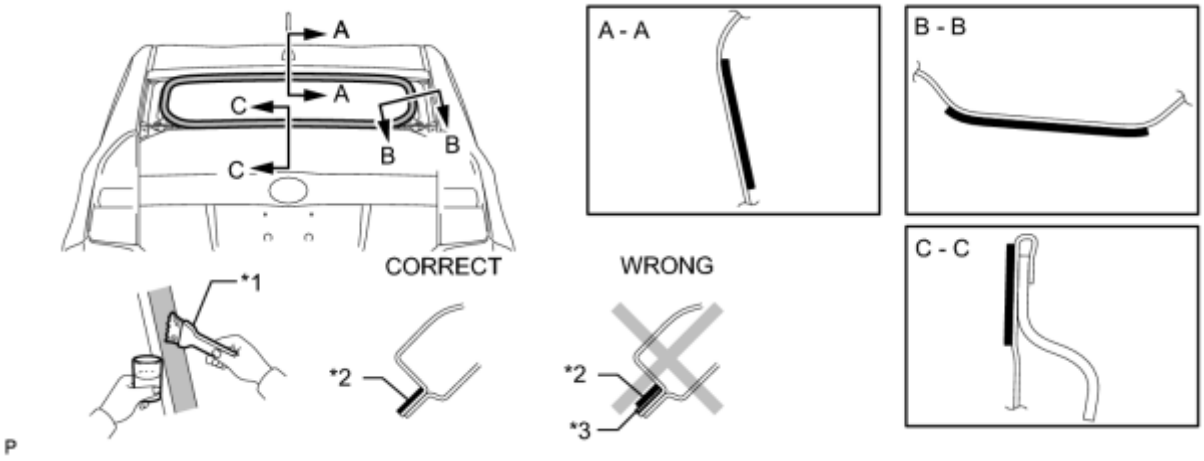
Standard Dimension:

| Item | Dimension |
|---|---|
| a | 10.2 mm (0.401 in.) |

- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

15. INSTALL BACK DOOR GLASS

(a) Using a brush, coat the installation surface on the vehicle body with Primer M.




### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Brush | *2 | Primer M |
| *3 | Adhesive | - | - |

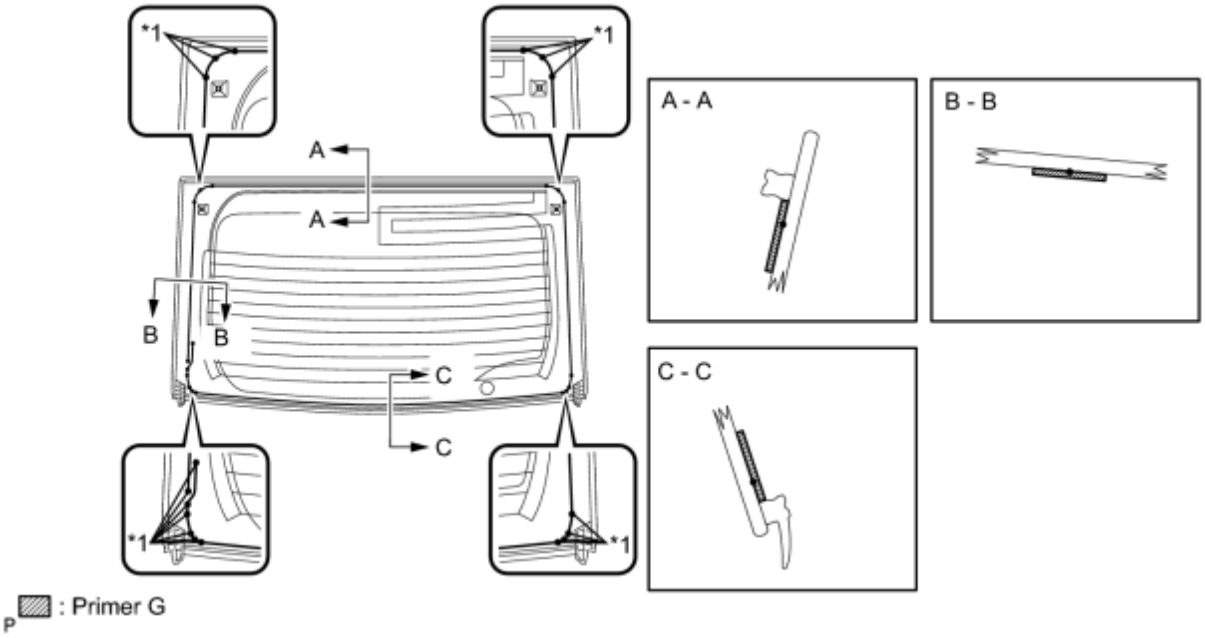
NOTICE:

- Do not coat the adhesive with Primer M.
- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Using a brush or a sponge, coat the application area of the adhesive with Primer G.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Ceramic Notch | - | - |

Standard Dimension:

| Item | Dimension |
|---|---|
| a | 14.0 mm (0.551 in.) |

NOTICE:

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

- Apply Primer G onto the ceramic notches.
- If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

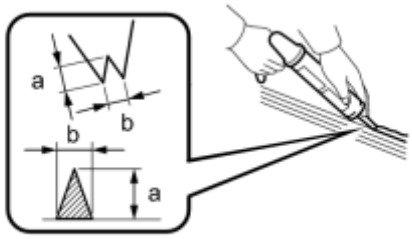
(c) Apply adhesive to the back door glass.

Adhesive:

Toyota Genuine Windshield Glass Adhesive or equivalent

(1) Cut off the tip of the cartridge nozzle as shown in the illustration.

Standard Dimension:




P

| Item | Dimension |
|---|---|
| a | 12.0 mm (0.472 in.) |
| b | 8.0 mm (0.315 in.) |

HINT:

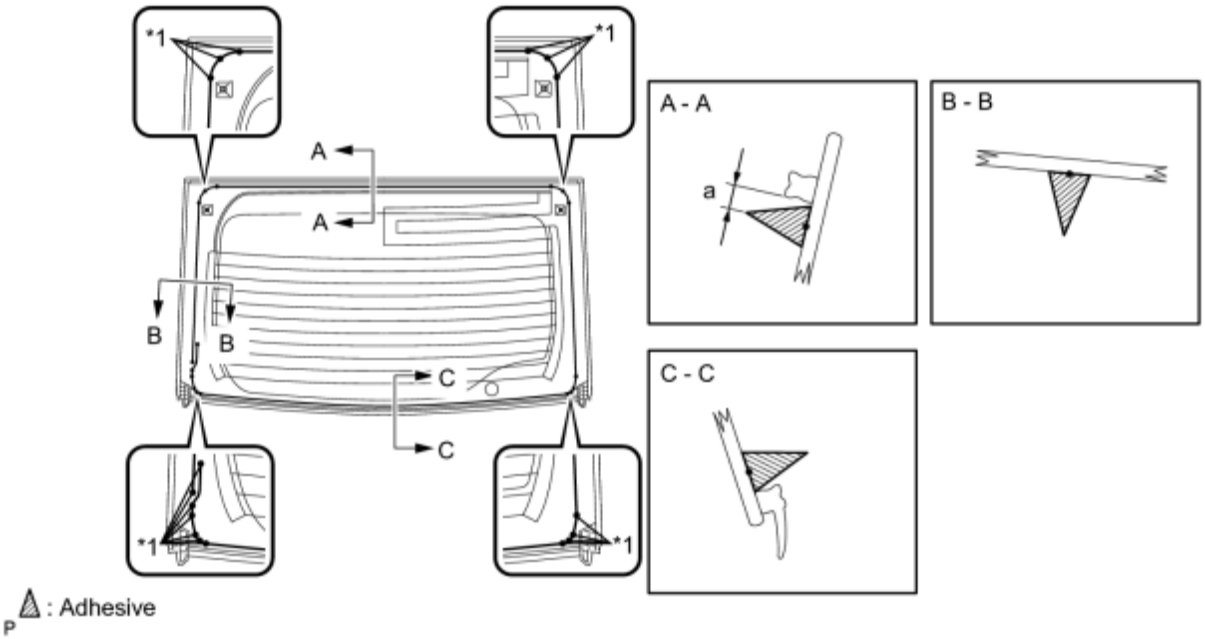
After cutting off the tip, use all the adhesive within the time described in the table below.

Usage Time Frame:

| Temperature | Usage Time Frame |
|---|---|
| 35°C (95°F) | 15 minutes |
| 20°C (68°F) | 1 hour and 40 minutes |
| 5°C (41°F) | 8 hours |

(2) Load the sealer gun with the cartridge.

(3) Apply adhesive to the back door glass as shown in the illustration.




P

### *Text in Illustration*

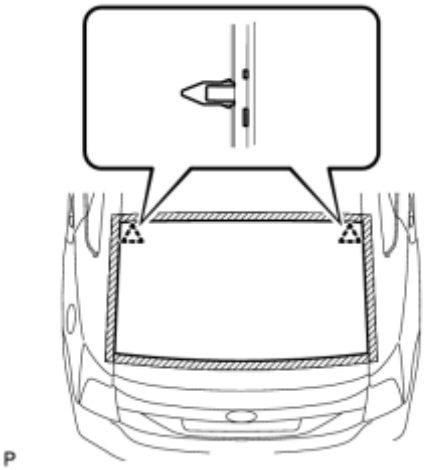
| | | | |
|---|---|---|---|
| *1 | Ceramic Notch | - | - |

Standard Dimension:

| Item | Dimension |
|---|---|

| Item | Dimension |
|---|---|
| a | 4.8 mm (0.189 in.) |

(d) Install the back door glass.



P

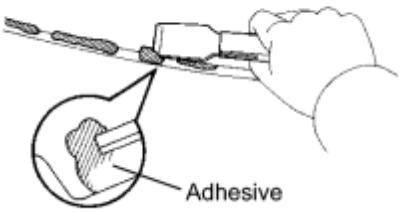
(1) Using suction cups, engage the 2 clips to install the back door glass.

- Check that the clips are attached to the vehicle body correctly.
- Check the clearance between the vehicle body and back door glass.

(2) Lightly press the front surface of the back door glass to ensure that the back door glass is securely fit to the vehicle body.

HINT:

Press the back door glass with a force of 98 N (10 kgf, 22 lbf) or more.




(3) Using a scraper, remove any excess or protruding adhesive.

HINT:

Apply adhesive onto the glass rim.

(4) Hold the back door glass using protective tape until applied adhesive becomes hard.

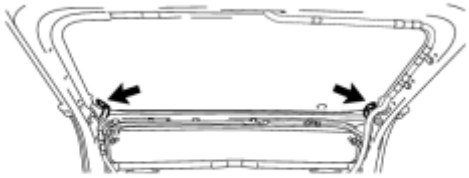
NOTICE:

Do not drive the vehicle within the time described in the table below.

Minimum Time:

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|
| 35°C (95°F) | 1 hour and 30 minutes |
| 20°C (68°F) | 5 hours |
| 5°C (41°F) | 24 hours |



(e) Connect the 2 connectors.

P

16. INSPECT FOR LEAK AND REPAIR

(a) After the adhesive has hardened, apply water from the outside of the vehicle. Check that no water leaks into the cabin.

(b) If water leaks into the cabin, allow the water to dry and add adhesive.

(c) Remove the protective tape.

17. INSTALL REAR WIPER MOTOR ASSEMBLY (w/ Rear Wiper)

(a) for Back Door Glass:

(1) Install the rear wiper motor assembly INFO.

18. INSTALL REAR WIPER MOTOR GROMMET (w/ Rear Wiper)

(a) for Back Door Glass:

(1) Install the rear wiper motor grommet INFO.

19. INSTALL REAR WIPER ARM AND BLADE ASSEMBLY (w/ Rear Wiper)

(a) for Back Door Glass:

(1) Install the rear wiper arm and blade assembly INFO.

20. INSTALL REAR WIPER ARM HEAD CAP (w/ Rear Wiper)

(a) for Back Door Glass:

(1) Install the rear wiper arm head cap INFO.

21. INSTALL REAR SPOILER ASSEMBLY INFO

22. INSTALL BACK DOOR TRIM BOARD INFO

23. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

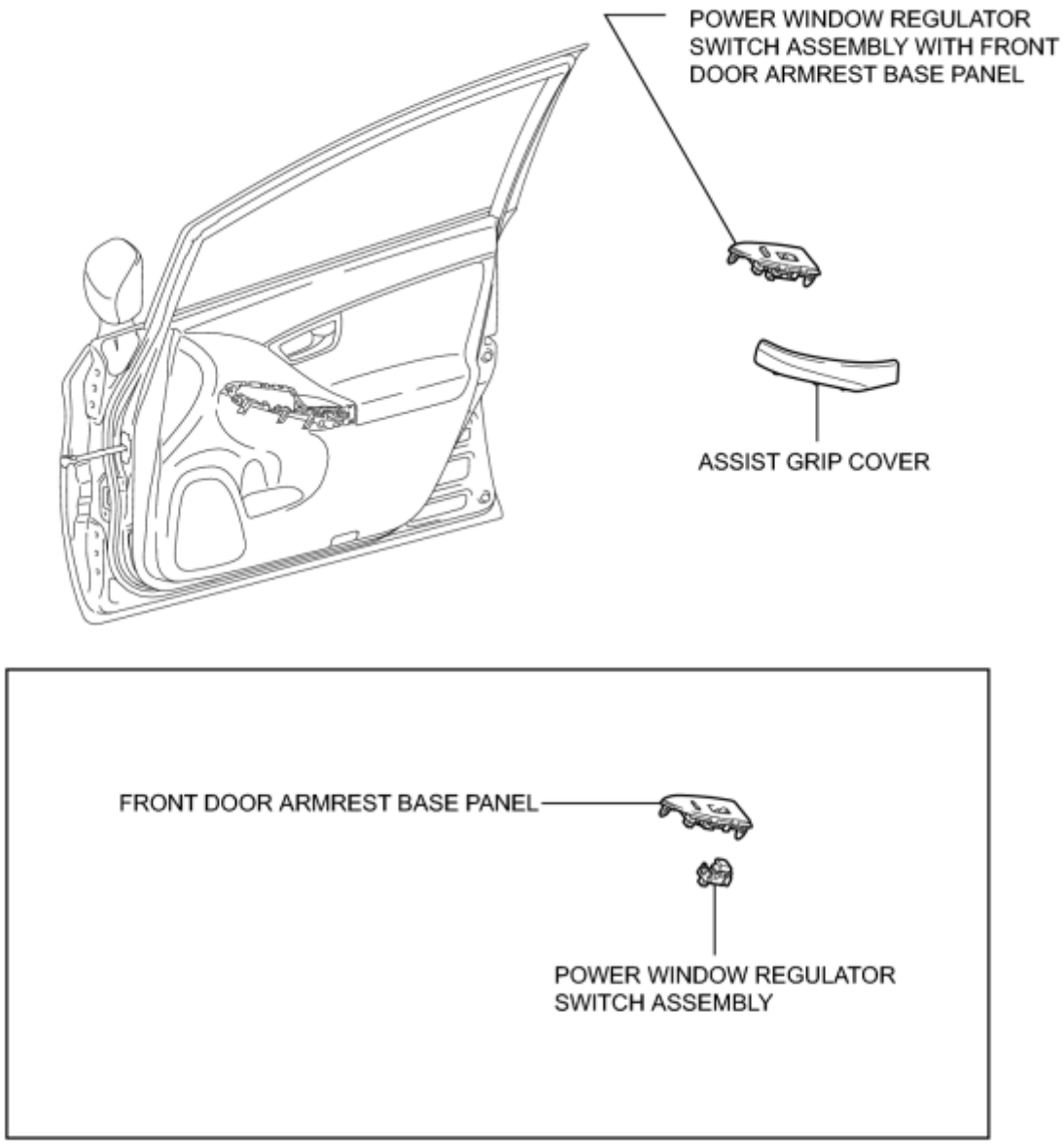
24. INSTALL BACK DOOR SIDE GARNISH LH INFO

25. INSTALL BACK DOOR SIDE GARNISH RH INFO

26. INSTALL UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION




P

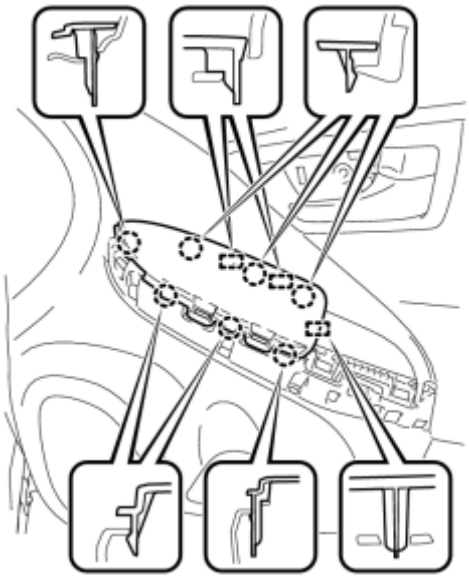
# REMOVAL

1. REMOVE ASSIST GRIP COVER

HINT:

Use the same procedure for the RH side and LH side INFO.

2. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL

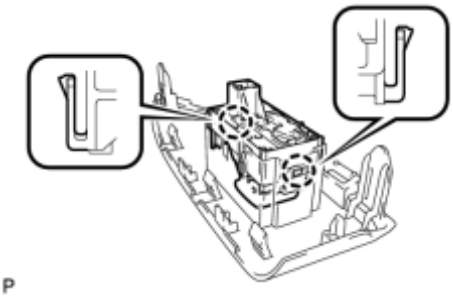


P

(a) Disengage the 7 claws and 3 guides.

(b) Disconnect each connector and remove the power window regulator switch assembly with front door armrest base panel.

3. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY



P

(a) Disengage the 2 claws and remove the power window regulator switch assembly.

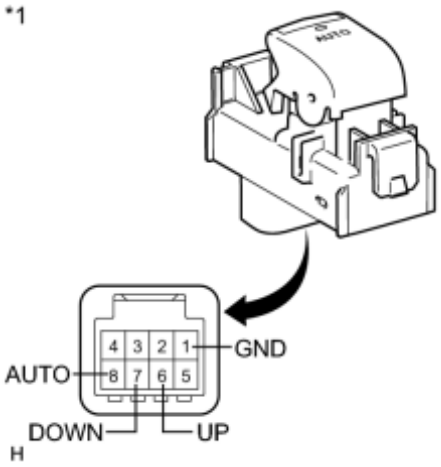
# INSPECTION

1. INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY

(a) Check the switch function.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



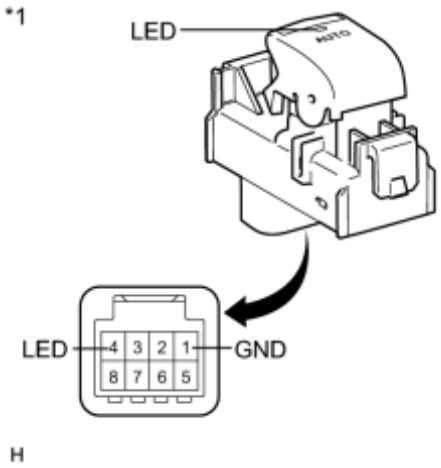

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |
| 6 (UP) - 1 (GND) | Free | 10 kΩ or higher |
| 7 (DOWN) - 1 (GND) | Free | 10 kΩ or higher |
| 8 (AUTO) - 1 (GND) | Free | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Power Window Regulator Switch Assembly (for Front Passenger Side)) |

If the result is not as specified, replace the power window regulator switch assembly (for front passenger side).

(b) Check that the LED illuminates.




(1) Apply battery voltage to the power window regulator switch assembly and check that the LED illuminates.

OK:

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → 4 (LED)<br><br>Battery negative (-) → 1 (GND) | LED illuminates |

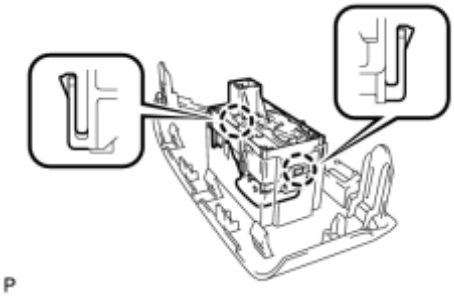
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Power Window Regulator Switch Assembly (for Front Passenger Side)) |

If the result is not as specified, replace the power window regulator switch assembly (for front passenger side).

# INSTALLATION

1. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY

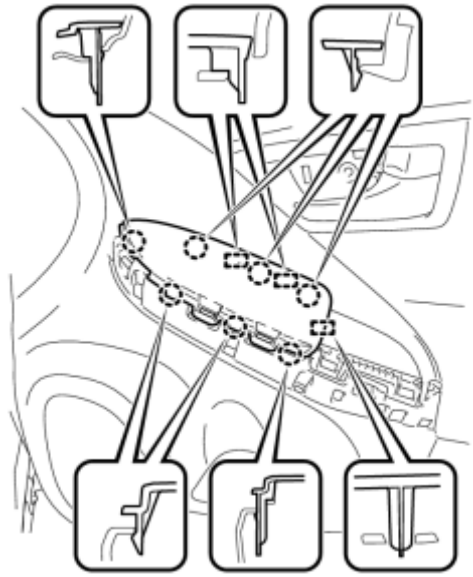


P

(a) Engage the 2 claws to install the power window regulator switch assembly.

2. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL

(a) Connect each connector.



P

(b) Engage the 7 claws and 3 guides, and install the power window regulator switch assembly with front door armrest base panel.

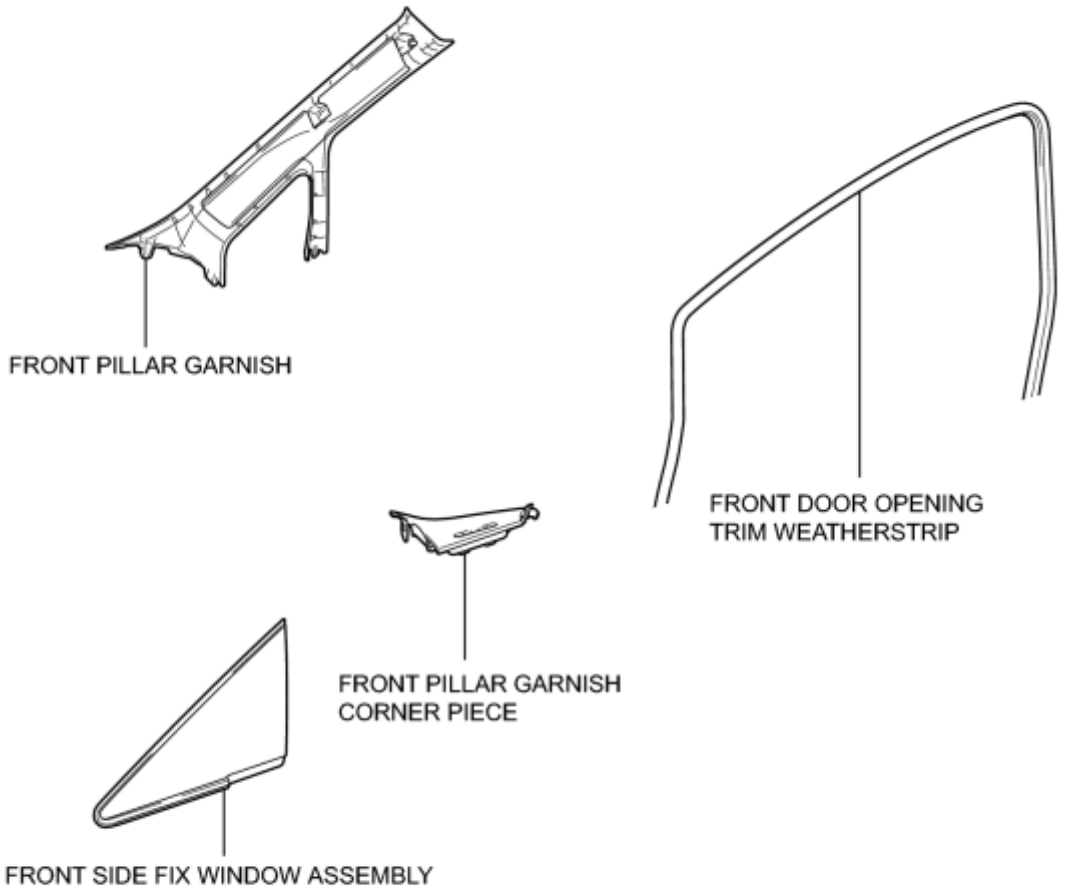
3. INSTALL ASSIST GRIP COVER

HINT:

Use the same procedure for the LH side and RH side INFO.

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

HINT:

- The front side fix window assembly can be reused. When installing the window, if any of the clips on the front side fix window assembly are broken, butyl tape can be used to support the glass until the applied adhesive hardens.
- When using butyl tape to temporarily secure the window, make sure that the butyl tape is not applied exactly at the original clip location. If the butyl tape is applied exactly at the clip location, it will cause the window to protrude.
- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

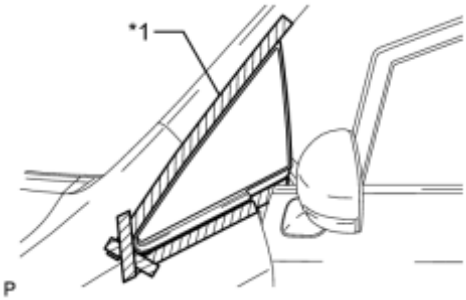
1. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP

(a) Remove the front part of the front door opening trim weatherstrip to the extent that allows removal of the front pillar garnish.

2. REMOVE FRONT PILLAR GARNISH INFO

3. REMOVE FRONT PILLAR GARNISH CORNER PIECE INFO

4. REMOVE FRONT SIDE FIX WINDOW ASSEMBLY

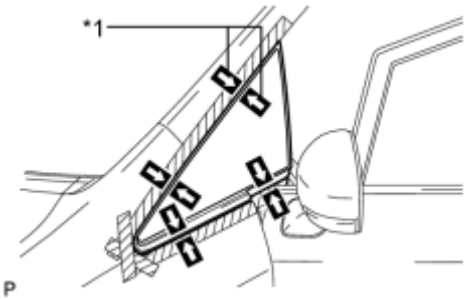



(a) Apply protective tape to the installation position of the front side fix window assembly on the vehicle body.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

(b) Place matchmarks on the front side fix window assembly and vehicle body on the locations indicated in the illustration.



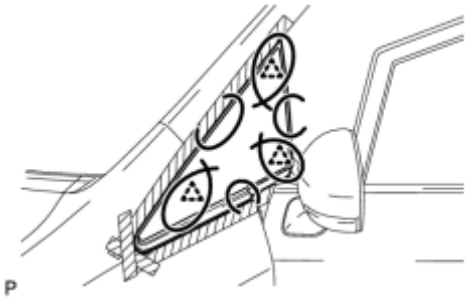

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

HINT:

Matchmarks are not necessary if the front side fix window assembly is not going to be reused.

(c) Pass a piano wire between the interior vehicle body and glass from the interior as shown in the illustration.



HINT:

Do not allow the piano wire to interfere with the clips.

(d) Tie both wire ends to wooden blocks or similar objects that can serve as handles.

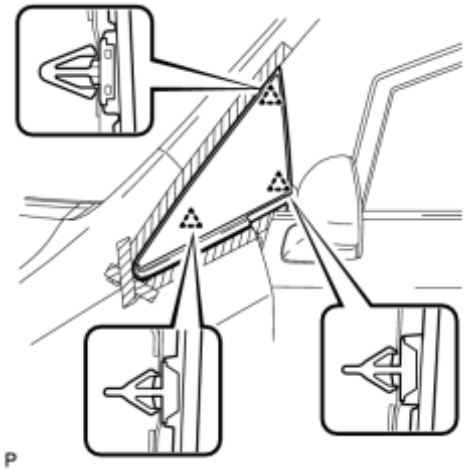
NOTICE:

When separating the front side fix window assembly from the vehicle, be careful not to damage the paint or interior and exterior ornaments.

(e) Cut off the adhesive by pulling the piano wire around the front side fix window assembly.

NOTICE:

Leave as much adhesive on the vehicle body as possible when cutting through the adhesive.



(f) Disengage the 3 clips.

(g) Using suction cups, remove the glass.

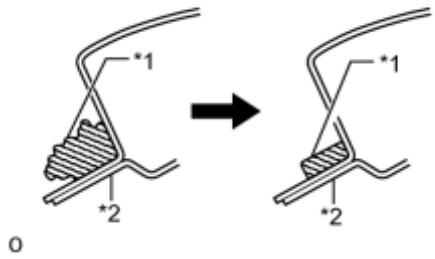
NOTICE:

Be careful not to drop the glass.

5. CLEAN VEHICLE BODY

(a) Clean and shape the contact surfaces of the vehicle body.

# Text in Illustration




| | |
|---|---|
| *1 | Adhesive |
| *2 | Vehicle Body |

(1) Using a knife, cut away excess adhesive on the contact surfaces of the vehicle body as shown in the illustration.

NOTICE:

Be careful not to damage the vehicle body.

HINT:

Leave as much adhesive on the vehicle body as possible.

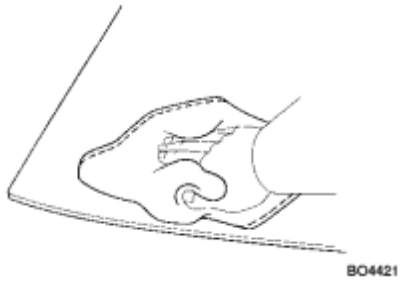
(b) Clean the contact surfaces of the vehicle body with a piece of cloth saturated with cleaner.

HINT:

Even if all the adhesive has been removed, clean the vehicle body.

# INSTALLATION

1. CLEAN FRONT SIDE FIX WINDOW ASSEMBLY

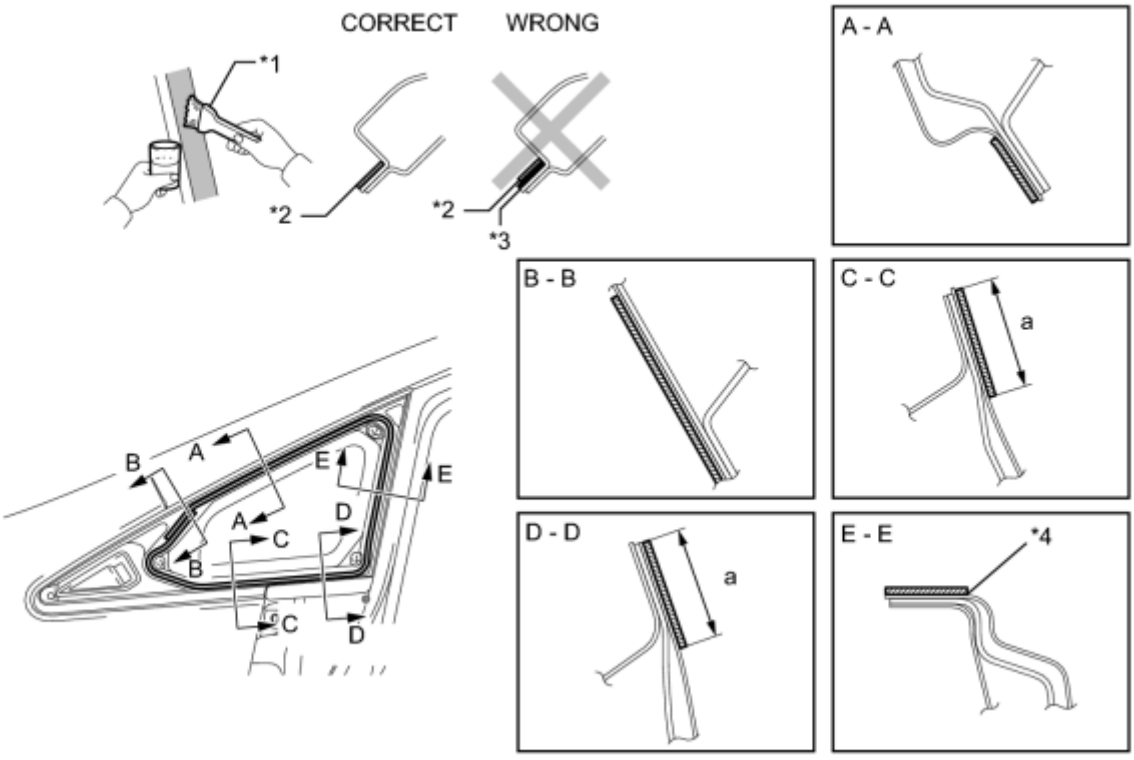



(a) Clean the outer edges of the front side fix window assembly with a non-residue solvent.

- Do not touch the glass surface after cleaning it.
- Be careful not to damage the glass or clips.

2. INSTALL FRONT SIDE FIX WINDOW ASSEMBLY

(a) Using a brush or a sponge, apply Primer M to the exposed part of the vehicle body.




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Brush | *2 | Primer M |
| *3 | Adhesive | *4 | Edge of Curved Surface |

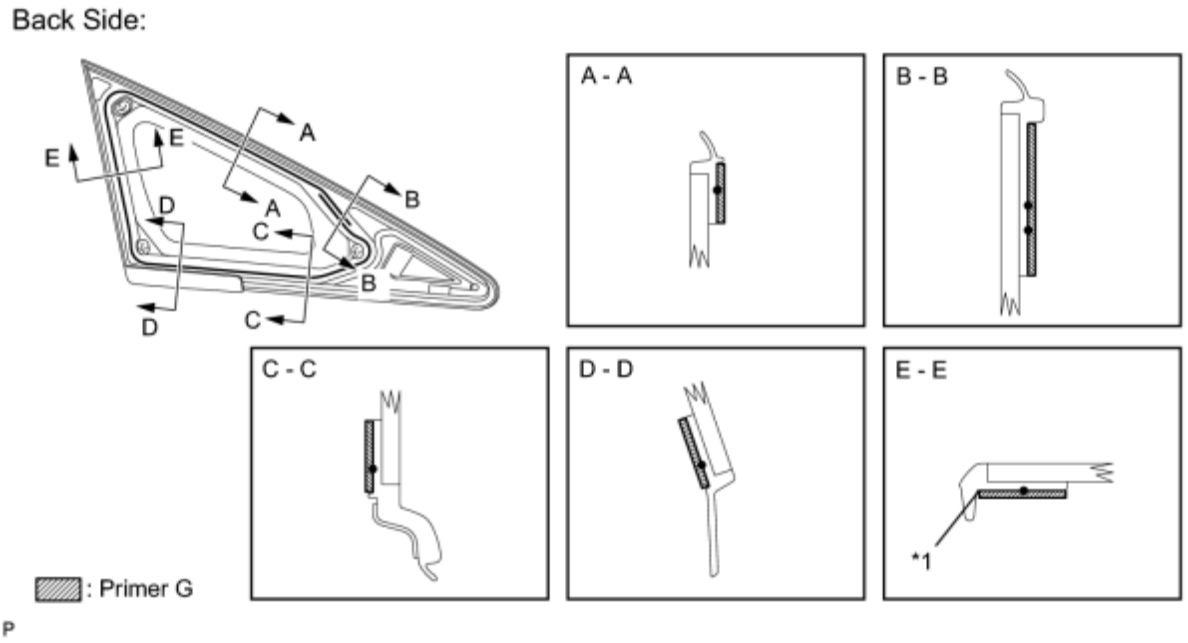
Standard Dimension:

| Item | Dimension |
|---|---|
| a | 25 mm (0.984 in.) or more |

NOTICE:

- Do not coat the adhesive with Primer M.
- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

(b) Using a brush or a sponge, apply Primer G to the contact surface of the front side fix window assembly.




P

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Edge of Curved Surface | - | - |

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.

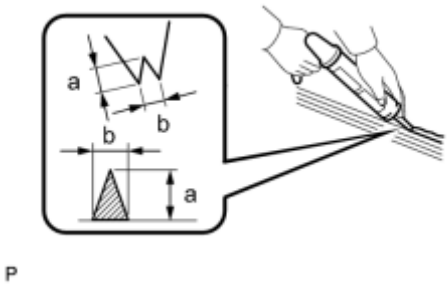
NOTICE:

- To prevent the glass from breaking at low temperatures, ensure that no primer adheres to the contact surface between the moulding and glass during application.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

(c) Apply adhesive to the front side fix window assembly.

Adhesive:

Toyota Genuine Windshield Glass Adhesive or equivalent




P

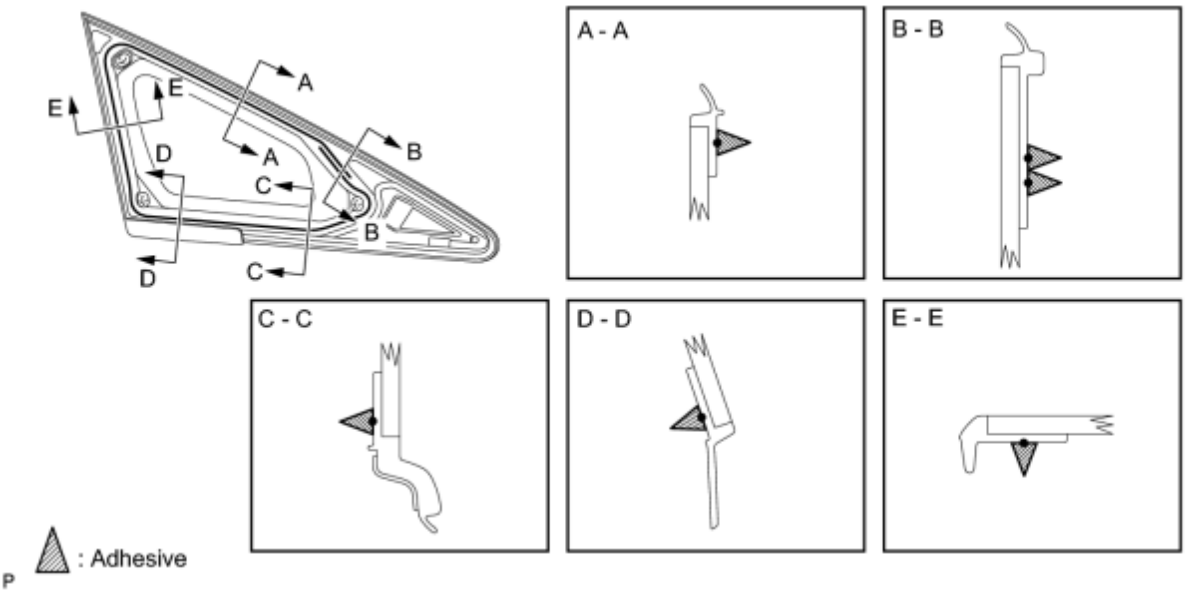
(1) Cut off the tip of the cartridge nozzle as shown in the illustration.

Standard Dimension:

| Item | Dimension |
|---|---|
| a | 6.0 mm (0.236 in.) |
| d | 8.0 mm (0.315 in.) |

(2) Load the sealer gun with the cartridge.

(3) Apply adhesive to the front side fix window assembly as shown in the illustration.



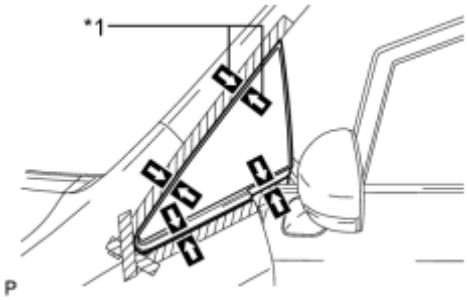

P

(d) Install the front side fix window assembly to the vehicle body.

(1) Position the front side fix window assembly so that the matchmarks are aligned, and press it in gently along the rim (when a window with missing clips is used).

# Text in Illustration

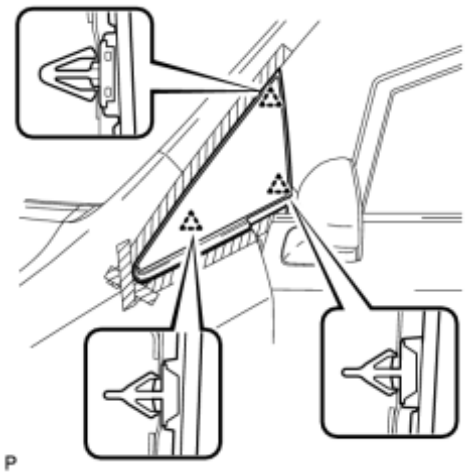
| | |
|---|---|
| *1 | Matchmark |




(2) Lightly press the front side fix window assembly to ensure that the front side fix window assembly is securely fit to the vehicle body (when a window with missing clips is used).

HINT:

Press the glass with a force of 98 N (10 kgf, 22 lbf) or more.




(3) Engage the 3 clips to install the front side fix window assembly (when a window without missing clips is used).

(4) Hold the front side fix window assembly in place securely with protective tape or equivalent until the adhesive hardens.

NOTICE:

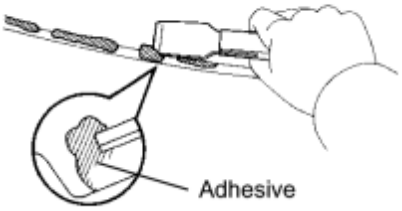
- Allow the primer to dry for 3 minutes or more.
- Check that the clips are attached to the body correctly.
- Check the clearance between the body and glass.

(5) Lightly press the outer surface of the glass to ensure that the glass is securely fit to the vehicle body.

(6) Using a scraper, remove any excess or protruding adhesive.

HINT:

Apply adhesive onto the glass rim.




NOTICE:

Do not drive the vehicle within the time described in the table below.

Minimum Time:

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|
| 35°C (95°F) | 1 hour and 30 minutes |
| 20°C (68°F) | 5 hours |
| 5°C (41°F) | 24 hours |

3. INSPECT FOR LEAK AND REPAIR

(a) After the adhesive has hardened, apply water from the outside of the vehicle. Check that no water leaks into the cabin.

(b) If water leaks into the cabin, allow the water to dry and add adhesive.

(c) Remove the protective tape.

4. INSTALL FRONT PILLAR GARNISH CORNER PIECE INFO

5. INSTALL FRONT PILLAR GARNISH INFO

6. CONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP INFO

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected:

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. POWER WINDOW CONTROL SYSTEM PRECAUTIONS

CAUTION:

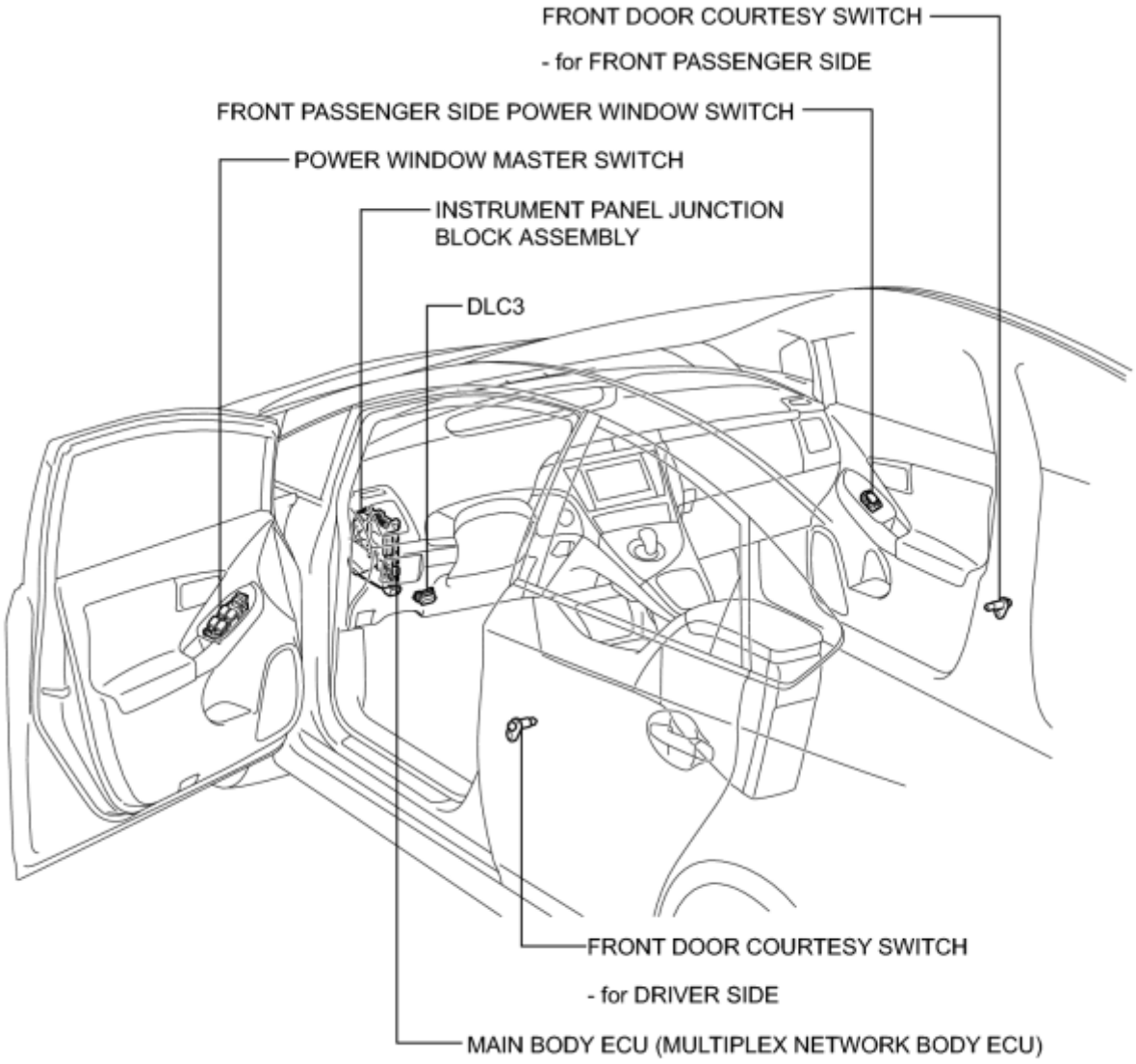
- The power window control system prohibits the auto up and down function when the jam protection function malfunctions. Therefore, troubleshoot the power window control system after confirming that no trouble codes are output.
- When a power window regulator or a power window regulator motor assembly is replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operation at least 5 times:
    a. Close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly and holding it at the auto up position.
    b. Open the power window by fully pushing down the multiplex network master switch assembly or power window regulator switch assembly.
- The jam protection function may operate unexpectedly even when the power window control system is normal due to detection of a value different from the operation learned value when the door glass moving speed changes sharply under any of the following conditions:
    a. A power window is being opened or closed while the vehicle is driven on a rough road.
    b. A power window is being opened or closed while the door is being opened or closed.
    c. The voltage changes abruptly.

NOTICE:

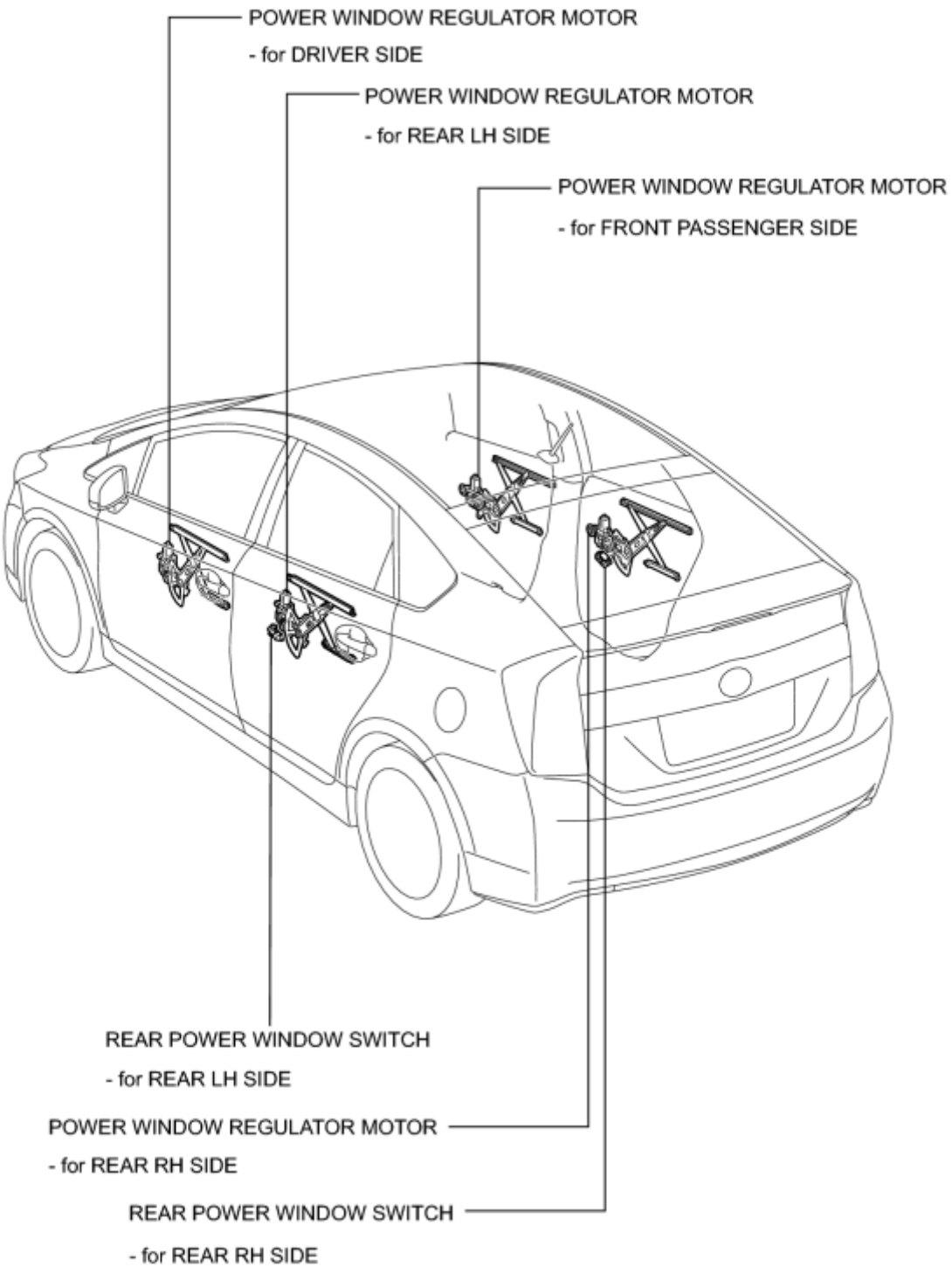
Do not disconnect the battery while the power switch is on (IG). Otherwise, DTC B2311 will be output.

# PARTS LOCATION

# ILLUSTRATION

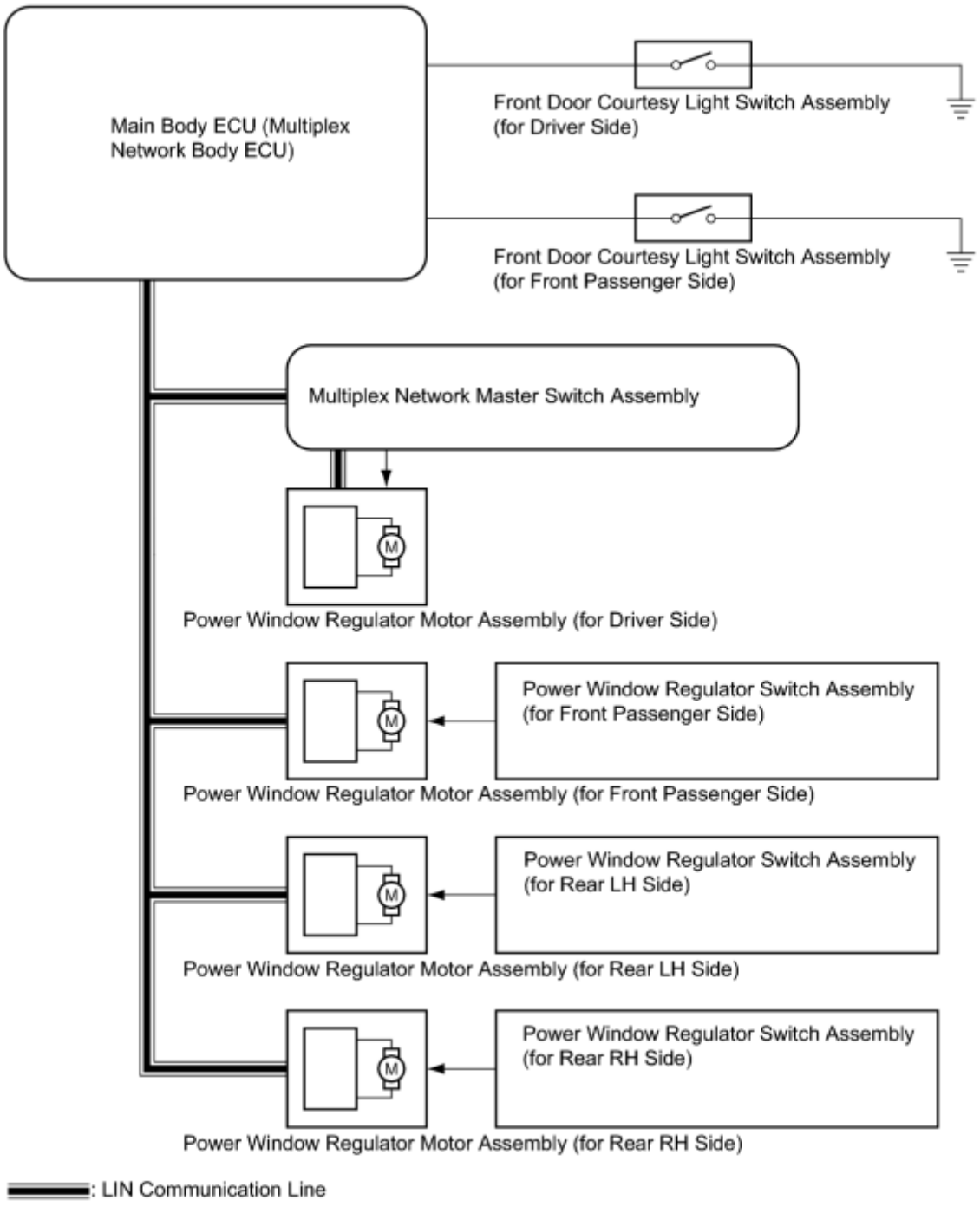



# ILLUSTRATION


POWER WINDOW REGULATOR MOTOR
- for DRIVER SIDE
POWER WINDOW REGULATOR MOTOR
- for REAR LH SIDE
POWER WINDOW REGULATOR MOTOR
- for FRONT PASSENGER SIDE
REAR POWER WINDOW SWITCH
- for REAR LH SIDE
POWER WINDOW REGULATOR MOTOR
- for REAR RH SIDE
REAR POWER WINDOW SWITCH
- for REAR RH SIDE

H

# SYSTEM DIAGRAM




### *Communication Table*

| Transmitting ECU | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Multiplex network master | Power window regulator motor | Power window auto up | LIN |

| Transmitting ECU | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| switch assembly | assembly (for driver side) | and down signal | |
| | • Power window regulator motor assembly (for front passenger side)<br>• Power window regulator motor assembly (for rear LH side)<br>• Power window regulator motor assembly (for rear RH side) | Power window remote up and down signal | LIN |
| Main body ECU (multiplex network body ECU) | • Power window regulator motor assembly (for driver side)<br>• Power window regulator motor assembly (for front passenger side)<br>• Power window regulator motor assembly (for rear LH side)<br>• Power window regulator motor assembly (for rear RH side) | Power window operation permission signal | LIN |

# SYSTEM DESCRIPTION

1. POWER WINDOW CONTROL SYSTEM DESCRIPTION

(a) The power window control system controls the power window operation using the power window regulator motors. The main controls of this system are the multiplex network master switch assembly, which is mounted on the driver side door, and the power window regulator switch assembly (for front passenger side), which are mounted on the front passenger door, and the power window regulator switches, which are mounted on the rear doors. Operating a window switch results in electrical power being transmitted to the corresponding power window regulator motor.

2. FUNCTION OF MAIN COMPONENTS

The power window control system consists of the following components:

| Component | Outline |
|---|---|
| Multiplex Network Master Switch Assembly | • Controls power window operation for all seats.<br>• When the lock switch is set to the lock position, window operation will be possible only for the driver door power window. |
| Power Window Regulator Switch Assembly<br>• Front Passenger Side | • Located on the front passenger door.<br>• Controls front passenger window operation. |
| Power Window Regulator Switch Assembly<br>• Rear LH Side<br>• Rear RH Side | • Located on the rear doors.<br>• Each switch controls window operation for its respective window. |
| Power Window Regulator Motor Assembly | • Receives switch signals and changes signals into motor activation. As a result, the window position changes.<br>• Uses the Hall-ICs in the regulator motor with the ECU to detect the window position and jamming. |

3. SYSTEM FUNCTION

The power window control system has the following functions:

| Function | Outline |
|---|---|
| Manual up-and-down function | Function that causes the window to go up while the power window switch is being pulled halfway up and to go down while pushed halfway down. The window stops as soon as the switch is released. |
| All door auto up-and-down | Function that enables the windows of all doors to be fully opened or closed by one full pull or push of the multiplex network master switch assembly or power window regulator switch |

| Function | Outline |
|---|---|
| function | assembly. |
| Window lock function | • Function that disables the power window regulator switch assembly operation when the window lock switch is pressed.<br>• The power window regulator switch assemblies can be operated when the window lock switch is pressed again. |
| Jam protection function | Function that automatically stops the power window and moves it downward if a foreign object gets jammed in the door window during auto up and manual up operation. |
| Remote control function | Function that allows the multiplex network master switch assembly to control manual and auto up-and-down operations of the front passenger door window and rear door windows. |
| Key-off operation function | • Function that makes it possible to operate all power windows for approximately 45 sec. after the power switch is turned off when the driver door or front passenger door has not been opened.<br>• When 45 sec. have elapsed, or the driver door or front passenger door is opened after the power switch is turned off, the key-off operation function will be disabled.<br><br>HINT:<br><br>• If the window lock switch is off, the windows can be operated using any of the power window regulator switch assemblies. If the window lock switch is on, only the multiplex network master switch assembly can be used to operate the windows (remote operation remains possible).<br>• If the driver door or front passenger door is opened during automatic window operation while the key-off operation function is on, the window will stop operating. |
| Diagnosis | Function that allows diagnosis of the power window control system if any of the power window ECUs (built into each power window regulator motor assembly) detect a malfunction in the system. If a malfunction is detected, the power window ECU will illuminate the LEDs on the multiplex network master switch assembly and the respective power window regulator switch assemblies to inform the driver and passenger of the malfunction. |
| Fail-safe | A fail-safe function to disable a part of power window functions if the pulse sensor in the power window motor has a malfunction.<br><br>Auto up-and-down function and remote control function are disabled. |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the power window control system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | PRE-CHECK |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

(b) Check the fuses and relays.

(c) Check the connector connections and terminals to make sure that there are no abnormalities such as loose connections, deformation, etc.

NEXT

| | |
|---|---|
| 4. | INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| ECU connected, communication line is functioning normally | A |
| ECU connected, communication line is malfunctioning | B |

B ▶ INFO GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 5. | INSPECT COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the LIN communication system is functioning normally INFO.

Result:

| Result | Proceed to |
|---|---|
| No DTCs output | A |
| DTCs output | B |

B ▶ INFO GO TO LIN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 6. | CHECK FOR DTC* |

(a) Check for DTCs and note any codes that are output INFO.

(b) Clear the DTCs.

(c) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| No DTCs output | A |
| DTCs output | B |

B ▶ INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

A ▼

| | |
|---|---|
| 7. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in problem symptoms table | A |
| Fault is listed in problem symptoms table | B |

B Go to step 9

A

| | |
|---|---|
| 8. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Operation Check INFO

(b) Data List / Active Test INFO

(c) Terminals of ECU INFO

NEXT

| | |
|---|---|
| 9. | ADJUST, REPAIR OR REPLACE |

(a) Check if any of the door window regulators or power window regulator motor assemblies have been removed and reinstalled.

Result:

| Result | Proceed to |
|---|---|
| Any of the door window regulators or power window regulator motor assemblies have been removed and reinstalled. | A |
| None of the door window regulators or power window regulator motor assemblies has been removed and reinstalled. | B |

B Go to step 11

A

| | |
|---|---|
| 10. | INITIALIZE POWER WINDOW REGULATOR MOTOR |

(a) If any of the door window regulators or power window regulator motor assemblies have been removed and reinstalled, perform "Initialize Power Window Control System" (initialization of the pulse sensor) for the applicable door glass INFO.

HINT:

If "Initialize Power Window Control System" (initialization of the pulse sensor) has not been performed, the auto operation function, jam protection function and key-off operation function will not operate or will operate incorrectly.

NEXT

| | |
|---|---|
| 11. | CONFIRMATION TEST |

NEXT **END**

# OPERATION CHECK



1. CHECK WINDOW LOCK SWITCH

HINT:

Before performing the window lock switch operation check, make sure that the window lock switch is off (the switch is not pushed in).

(a) Check that the front passenger and rear windows cannot be operated from each power window regulator switch assembly (front passenger side, rear LH side or rear RH side) when the window lock switch of the multiplex network master switch assembly is pushed in.

OK:

Front passenger and rear windows are disabled.

HINT:

Even when the window lock switch of the multiplex network master switch assembly is pushed in, remote manual up and down and auto up and down functions can be operated.

(b) Check that the front passenger and rear windows can be operated from each power window regulator switch assembly (front passenger side, rear LH side or rear RH side) when the window lock switch of the multiplex network master switch assembly is pushed in again to release it.

OK:

Front passenger and rear windows operate normally.

2. CHECK MANUAL UP / DOWN FUNCTION

(a) Check that the driver door power window operates as follows:

***OK***

| Condition | Master Switch | Switch Operation | Power Window |
|---|---|---|---|
| Power switch on (IG) | Driver side | Pulled halfway up | UP (Closes) |
| | | Pushed halfway down | DOWN (Opens) |

(b) Check that the front passenger side window and rear power windows operate as follows:

***OK***

| Condition | Regulator Switch | Switch Operation | Power Window |
|---|---|---|---|
| • Power switch on (IG) | Front passenger side | Pulled halfway up | UP (Closes) |

| Condition | Regulator Switch | Switch Operation | Power Window |
|---|---|---|---|
| • Window lock switch off | | Pushed halfway down | DOWN (Opens) |
| | Rear LH side | Pulled halfway up | UP (Closes) |
| | | Pushed halfway down | DOWN (Opens) |
| | Rear RH side | Pulled halfway up | UP (Closes) |
| | | Pushed halfway down | DOWN (Opens) |

3. CHECK AUTO UP / DOWN FUNCTION

(a) Check that the driver door power window operates as follows:

***OK***

| Condition | Master Switch | Switch Operation | Power Window |
|---|---|---|---|
| Power switch on (IG) | Driver side | Pulled up (One touch operation) | AUTO UP (Closes) |
| | | Pushed down (One touch operation) | AUTO DOWN (Opens) |

(b) Check that the front passenger side window and rear power windows operate as follows:

***OK***

| Condition | Regulator Switch | Switch Operation | Power Window |
|---|---|---|---|
| • Power switch on (IG)<br>• Window lock switch off | Front passenger side | Pulled up (One touch operation) | AUTO UP (Closes) |
| | | Pushed down (One touch operation) | AUTO DOWN (Opens) |
| | Rear LH side | Pulled up (One touch operation) | AUTO UP (Closes) |
| | | Pushed down (One touch operation) | AUTO DOWN (Opens) |
| | Rear RH side | Pulled up (One touch operation) | AUTO UP (Closes) |
| | | Pushed down (One touch operation) | AUTO DOWN (Opens) |

4. CHECK REMOTE MANUAL UP / DOWN FUNCTION

(a) Check that the front passenger side window and rear power windows operate as follows:

***OK***

| Condition | Master Switch | Switch Operation | Power Window |
|---|---|---|---|
| Power switch on (IG) | Front passenger side | Pulled halfway up | UP (Closes) |
| | | Pushed halfway down | DOWN (Opens) |
| | Rear LH side | Pulled halfway up | UP (Closes) |
| | | Pushed halfway down | DOWN (Opens) |
| | Rear RH side | Pulled halfway up | UP (Closes) |
| | | Pushed halfway down | DOWN (Opens) |

5. CHECK REMOTE AUTO UP / DOWN FUNCTION

(a) Check that the front passenger side window and rear power windows operate as follows:

***OK***

| Condition | Master Switch | Switch Operation | Power Window |
|---|---|---|---|
| Power switch on (IG) | Front passenger side | Pulled up (One touch operation) | AUTO UP (Closes) |
| | | Pushed down (One touch operation) | AUTO DOWN (Opens) |
| | Rear LH side | Pulled up (One touch operation) | AUTO UP (Closes) |
| | | Pushed down (One touch operation) | AUTO DOWN (Opens) |
| | Rear RH side | Pulled up (One touch operation) | AUTO UP (Closes) |
| | | Pushed down (One touch operation) | AUTO DOWN (Opens) |

6. CHECK POWER WINDOW OPERATION FUNCTION AFTER POWER SWITCH IS TURNED OFF

(a) Check that all the power windows can be operated with the multiplex network master switch assembly and power window regulator switch assemblies (for front passenger, rear LH and RH sides) after the power switch is turned off.

HINT:

If the window lock switch is on, the windows cannot be operated using the power window regulator switch assemblies (for front passenger, rear LH and RH sides). Therefore, turn the window lock switch off before checking the window operation.

(b) Check that the key-off operation function does not operate after the driver door or front passenger door is opened.

HINT:

If the driver door or front passenger door is opened during automatic window operation while the key-off operation function is on, the window will stop operating.

(c) Check that all the power windows cannot be operated after more than approximately 45 seconds have elapsed since the power switch was turned off.

7. CHECK JAM PROTECTION FUNCTION

(a) Check the basic function.

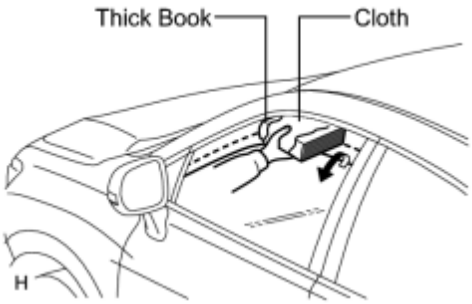
CAUTION:

Do not put your fingers between the door frame and door glass to check the jam protection function. Also, prevent any part of your body from being caught during inspection.

HINT:

The jam protection function is operative during both the auto up and manual up operations.

(1) Fully open the window.




(2) Set a thick book wrapped with a piece of cloth near the window fully closed position.

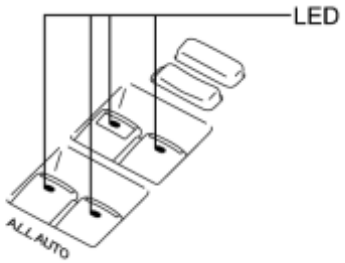
(3) Operate the auto up or manual up function to check that the power window goes down after the book is caught between the window and door frame, and stops when the opening reaches approximately 200 mm (7.87 in.).

HINT:

The power window moves down approximately 125 mm (4.93 in.). However, when the opening does not reach 200 mm (7.87 in.), the power window continues to go down until the opening reaches 200 mm (7.87 in.) or until approximately 5 seconds elapse.

(4) While the power window is moving down, check that the door glass cannot be raised when the power window switch is used.

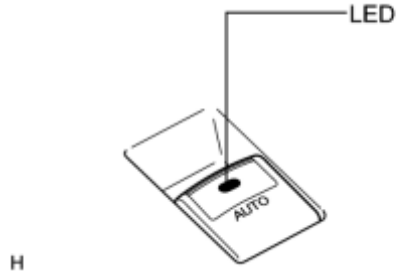
8. CHECK POWER WINDOW SWITCH LED ILLUMINATION




(a) Check the LED illumination (multiplex network master switch assembly).

(1) Check that the LEDs located on the multiplex network master switch assembly illuminate when the power switch is turned on (IG).

(b) Check the LED illumination (power window regulator switch assembly).




(1) Check that the LEDs located on the power window regulator switch assembly illuminate when the power switch is turned on (IG).

HINT:

If the window lock switch is on, the LEDs located on the power window regulator switch assemblies (for front passenger, rear LH and RH sides) do not illuminate. Therefore, turn the window lock switch off before

checking the LED illumination.

# INITIALIZATION

1. INITIALIZE POWER WINDOW CONTROL SYSTEM (POWER WINDOW REGULATOR MOTOR ASSEMBLY (ALL DOORS))

CAUTION:

When the power window regulator motor assembly is reinstalled or replaced, the power window control system must be initialized. Functions such as the auto up and down, jam protection, remote control and key-off operation do not operate if the initialization is not performed.

HINT:

When the battery is replaced, it is not necessary to initialize the power window regulator motor assembly.

NOTICE:

- When the power window regulator motor assembly is replaced, DTC B2313 is output. Clear the DTC after the initialization.
- When performing initialization, do not perform any other procedures.
- When performing initialization, use the power window switch of each door to initialize each door window.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used, due to detection of a value different from the operation learned value of the door glass movement speed. In such cases, the auto up function can be reinitialized by repeating the following operation at least 5 times:
    a. Open the power window by fully pushing down the multiplex network master switch assembly or power window regulator switch assembly.
    b. Close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly and holding it at the auto up position.
- If the initialization is not completed properly, the LIN communication system may have a malfunction INFO.

(a) Initialization procedure when replacing the power window regulator motor assembly with a new one:

(1) Connect the battery and turn the power switch on (IG) (at this time, the LED on the multiplex network master switch assembly or power window regulator switch assembly blinks to indicate that it is ready for initialization).

(2) Fully open the window by fully pushing down the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 1 second or more after the window is fully opened.

(3) Fully close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 1 second or more after the window is fully closed to reset the glass position. The LED on the multiplex network master switch assembly or power window regulator switch assembly stops blinking and illuminates to indicate that the initialization is complete.

(b) Initialization procedure when removing/installing the power window regulator motor assembly:

(1) Connect the battery and turn the power switch on (IG).

(2) Fully close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 6 seconds or more after the window is fully closed (if the power window does not move or stops halfway even when the switch is fully pulled, release the switch and fully pull it again).

(3) Fully open the window by pushing down the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 1 second or more after the window is fully opened.

(4) Release the multiplex network master switch assembly or power window regulator switch assembly. Then fully push down and hold the switch for 4 seconds or more.

(5) Fully close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 1 second or more after the window is fully closed to reset the glass position and complete the initialization.

(c) Initialization procedure when the power window does not fully open:

(1) Connect the battery and turn the power switch on (IG).

(2) Fully close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 6 seconds or more after the window is fully closed (if the power window does not move or stops halfway even when the switch is fully pulled, release the switch and fully pull it again).

(3) Fully open the window by pushing down the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 1 second or more after the window is fully opened.

(4) Release the multiplex network master switch assembly or power window regulator switch assembly. Then fully push down and hold the switch for 4 seconds or more.

(5) Fully close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly, and hold the switch for 1 second or more after the window is fully closed to reset the glass position and complete the initialization.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Power Window Control System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Remote Up / Down Function does not Operate | LIN communication system | INFO |
| | Multiplex network master switch assembly | - |
| | Power window regulator motor assembly (for front passenger side) | - |
| | Power window regulator motor assembly (for rear LH side) | - |
| | Power window regulator motor assembly (for rear RH side) | - |
| Driver Side Power Window does not Operate with Power Window Master Switch | LIN communication system | INFO |
| | Power window regulator motor assembly (for driver side) | - |
| | Multiplex network master switch assembly | - |
| | Main body ECU (multiplex network body ECU) | - |
| | Wire harness or connector | - |
| Front Passenger Side Power Window does not Operate with Front Passenger Side Power Window Switch | LIN communication system | INFO |
| | Power window regulator motor assembly (for front passenger side) | - |
| | Power window regulator switch assembly (for front passenger side) | - |
| | Main body ECU (multiplex network body ECU) | - |
| | Wire harness or connector | - |
| Rear Power Window LH does not Operate with Rear Power Window Switch LH | LIN communication system | INFO |
| | Power window regulator motor assembly (for rear LH side) | - |
| | Power window regulator switch assembly (for rear LH side) | - |
| | Main body ECU (multiplex network | - |

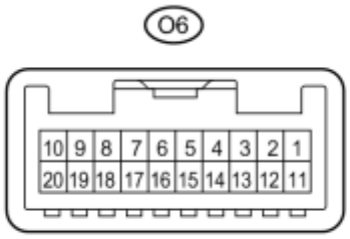
| Symptom | Suspected Area | See page |
|---|---|---|
| | body ECU) | |
| | Wire harness or connector | - |
| Rear Power Window RH does not Operate with Rear Power Window Switch RH | LIN communication system | INFO |
| | Power window regulator motor assembly (for rear RH side) | - |
| | Power window regulator switch assembly (for rear RH side) | - |
| | Main body ECU (multiplex network body ECU) | - |
| | Wire harness or connector | - |
| Driver Side Power Window Auto Up / Down Function does not Operate with Power Window Master Switch | Power window regulator motor assembly (for driver side) | INFO |
| | Multiplex network master switch assembly | - |
| | Glass position initialization | - |
| | Wire harness or connector | - |
| Front Passenger Side Power Window Auto Up / Down Function does not Operate with Front Passenger Side Power Window Switch | Power window regulator motor assembly (for front passenger side) | INFO |
| | Power window regulator switch assembly (for front passenger side) | - |
| | Glass position initialization | - |
| | Wire harness or connector | - |
| Rear Power Window LH Auto Up / Down Function does not Operate with Rear Power Window Switch LH | Power window regulator motor assembly (for rear LH side) | INFO |
| | Power window regulator switch assembly (for rear LH side) | - |
| | Glass position initialization | - |
| | Wire harness or connector | - |
| Rear Power Window RH Auto Up / Down Function does not Operate with Rear Power Window Switch RH | Power window regulator motor assembly (for rear RH side) | INFO |
| | Power window regulator switch assembly (for rear RH side) | - |
| | Glass position initialization | - |
| | Wire harness or connector | - |
| Key-off Operation Function Operates even if Operating Conditions are not Satisfied | LIN communication system | INFO |
| | Lighting system | - |
| | Power window regulator motor assembly (for driver side) | - |
| | Power window regulator motor assembly (for front passenger side) | - |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Power window regulator motor assembly (for rear LH side) | - |
| | Power window regulator motor assembly (for rear RH side) | - |
| | Main body ECU (multiplex network body ECU) | - |
| Auto Up Operation does not Fully Close Power Window (Jam Protection Function is Activated) | Glass position initialization (applicable location) | INFO |
| | Improper installation (applicable location) | - |
| | Power window regulator motor assembly (for driver side) | - |
| | Power window regulator motor assembly (for front passenger side) | - |
| | Power window regulator motor assembly (for rear LH side) | - |
| | Power window regulator motor assembly (for rear RH side) | - |
| Jam Protection Function does not Operate | Glass position initialization (applicable location) | INFO |
| | Power window regulator motor assembly (for driver side) | - |
| | Power window regulator motor assembly (for front passenger side) | - |
| | Power window regulator motor assembly (for rear LH side) | - |
| | Power window regulator motor assembly (for rear RH side) | - |

# TERMINALS OF ECU

1. MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY

(a) Disconnect the O6 multiplex network master switch assembly connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O6-11 (B) - O6-12 (GND) | L - W-B | Power supply | Power switch off | 11 to 14 V |
| O6-12 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the O6 multiplex network master switch assembly connector.

(d) Measure the voltage according to the value(s) in the table below.

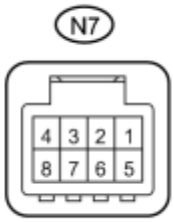
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O6-15 (DOWN) - O6-12 (GND) | Y - W-B | Power window motor DOWN output | Power switch on (IG), driver door power window regulator switch OFF | 11 to 14 V |
| O6-15 (DOWN) - O6-12 (GND) | Y - W-B | Power window motor DOWN output | Power switch on (IG), driver door power window switch DOWN (Manual operation) | Below 1 V |
| O6-18 (LED) - O6-12 (GND) | B - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| O6-18 (LED) - O6-12 (GND) | B - W-B | LED illumination signal | Approximately 45 seconds after power switch turned off | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O6-20 (UP) - O6-12 (GND) | V - W-B | Power window motor UP output | Power switch on (IG), driver door power window switch OFF | 11 to 14 V |
| O6-20 (UP) - O6-12 (GND) | V - W-B | Power window motor UP output | Power switch on (IG), driver door power window switch UP (Manual operation) | Below 1 V |

If the result is not as specified, the multiplex network master switch assembly may have a malfunction.

2. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side)

(a) Disconnect the N7 power window regulator switch assembly (for front passenger side) connector.




(b) Measure the resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N7-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the N7 power window regulator switch assembly (for front passenger side) connector.

(d) Measure the voltage according to the value(s) in the table below.

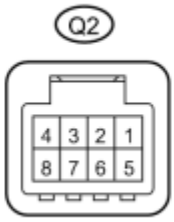
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N7-6 (UP) - N7-1 (GND) | B - W-B | Power window motor UP output | Power switch on (IG), power window regulator switch assembly (for front passenger side) OFF | 11 to 14 V |
| N7-6 (UP) - N7-1 (GND) | B - W-B | Power window motor UP output | Power switch on (IG), power window regulator switch assembly (for front passenger side) UP (Manual operation) | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N7-6 (UP) - N7-1 (GND) | B - W-B | Power window motor UP output | Power switch on (IG), front passenger side power window fully open | 11 to 14 V |
| N7-6 (UP) - N7-1 (GND) | B - W-B | Power window motor UP output | Power switch on (IG), front passenger side power window fully UP (AUTO UP position) | Below 1 V |
| N7-6 (UP) - N7-1 (GND) | B - W-B | Power window motor UP output | Power switch on (IG), front passenger side power window fully stopped (UP) | 11 to 14 V |
| N7-8 (AUTO) - N7-1 (GND) | L - W-B | Power window motor AUTO UP output | Power switch on (IG), front passenger side power window fully open | 11 to 14 V |
| N7-8 (AUTO) - N7-1 (GND) | L - W-B | Power window motor AUTO UP output | Power switch on (IG), front passenger side power window fully UP (AUTO UP position) | Below 1 V |
| N7-8 (AUTO) - N7-1 (GND) | L - W-B | Power window motor AUTO UP output | Power switch on (IG), front passenger side power window fully stopped (UP) | 11 to 14 V |
| N7-8 (AUTO) - N7-1 (GND) | L - W-B | Power window motor AUTO DOWN output | Power switch on (IG), front passenger side power window fully closed | 11 to 14 V |
| N7-8 (AUTO) - N7-1 (GND) | L - W-B | Power window motor AUTO DOWN output | Power switch on (IG), front passenger side power window fully DOWN (AUTO DOWN position) | Below 1 V |
| N7-8 (AUTO) - N7-1 (GND) | L - W-B | Power window motor AUTO DOWN output | Power switch on (IG), front passenger side power window fully stopped (DOWN) | 11 to 14 V |
| N7-4 (LED) - N7-1 (GND) | Y - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| N7-4 (LED) - N7-1 (GND) | Y - W-B | LED illumination signal | Approximately 45 seconds after the power switch is turned off | Below 1 V |
| N7-7 (DOWN) - N7-1 (GND) | G - W-B | Power window motor DOWN output | Power switch on (IG), power window regulator switch assembly (for front passenger side) OFF | 11 to 14 V |
| N7-7 (DOWN) - N7-1 (GND) | G - W-B | Power window motor DOWN output | Power switch on (IG), power window regulator switch assembly (for front passenger side) DOWN (Manual operation) | Below 1 V |
| N7-7 (DOWN) - N7-1 (GND) | G - W-B | Power window motor DOWN output | Power switch on (IG), front passenger side power window fully closed | 11 to 14 V |
| N7-7 (DOWN) - N7-1 (GND) | G - W-B | Power window motor DOWN output | Power switch on (IG), front passenger side power window fully DOWN (AUTO DOWN position) | Below 1 V |
| N7-7 (DOWN) - N7-1 (GND) | G - W-B | Power window motor DOWN output | Power switch on (IG), front passenger side power window fully stopped (DOWN) | 11 to 14 V |

If the result is not as specified, the power window regulator switch assembly (for front passenger side) may have a malfunction.

3. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side)

(a) Disconnect the Q2 power window regulator switch assembly (for rear LH side) connector.




(b) Measure the resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q2-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the Q2 power window regulator switch assembly (for rear LH side) connector.

(d) Measure the voltage according to the value(s) in the table below.

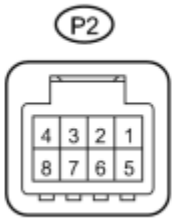
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q2-6 (UP) - Q2-1 (GND) | L - W-B | Power window motor UP output | Power switch on (IG), power window regulator switch assembly (for rear LH side) OFF | 11 to 14 V |
| Q2-6 (UP) - Q2-1 (GND) | L - W-B | Power window motor UP output | Power switch on (IG), power window regulator switch assembly (for rear LH side) UP (Manual operation) | Below 1 V |
| Q2-6 (UP) - Q2-1 (GND) | L - W-B | Power window motor UP output | Power switch on (IG), rear LH side power window fully open | 11 to 14 V |
| Q2-6 (UP) - Q2-1 (GND) | L - W-B | Power window motor UP output | Power switch on (IG), rear LH side power window fully UP (AUTO UP position) | Below 1 V |
| Q2-6 (UP) - Q2-1 (GND) | L - W-B | Power window motor UP output | Power switch on (IG), rear LH side power window fully stopped (UP) | 11 to 14 V |
| Q2-8 (AUTO) - Q2-1 (GND) | V - W-B | Power window motor AUTO UP output | Power switch on (IG), rear LH side power window fully open | 11 to 14 V |
| Q2-8 (AUTO) - Q2-1 (GND) | V - W-B | Power window motor AUTO UP output | Power switch on (IG), rear LH side power window fully UP (AUTO UP position) | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q2-8 (AUTO) - Q2-1 (GND) | V - W-B | Power window motor AUTO UP output | Power switch on (IG), rear LH side power window fully stopped (UP) | 11 to 14 V |
| Q2-8 (AUTO) - Q2-1 (GND) | V - W-B | Power window motor AUTO DOWN output | Power switch on (IG), rear LH side power window fully closed | 11 to 14 V |
| Q2-8 (AUTO) - Q2-1 (GND) | V - W-B | Power window motor AUTO DOWN output | Power switch on (IG), rear LH side power window fully DOWN (AUTO DOWN position) | Below 1 V |
| Q2-8 (AUTO) - Q2-1 (GND) | V - W-B | Power window motor AUTO DOWN output | Power switch on (IG), rear LH side power window fully stopped (DOWN) | 11 to 14 V |
| Q2-4 (LED) - Q2-1 (GND) | Y - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| Q2-4 (LED) - Q2-1 (GND) | Y - W-B | LED illumination signal | Approximately 45 seconds after the power switch is turned off | Below 1 V |
| Q2-7 (DOWN) - Q2-1 (GND) | GR - W-B | Power window motor DOWN output | Power switch on (IG), power window regulator switch assembly (for rear LH side) OFF | 11 to 14 V |
| Q2-7 (DOWN) - Q2-1 (GND) | GR - W-B | Power window motor DOWN output | Power switch on (IG), power window regulator switch assembly (for rear LH side) DOWN (Manual operation) | Below 1 V |
| Q2-7 (DOWN) - Q2-1 (GND) | GR - W-B | Power window motor DOWN output | Power switch on (IG), rear LH side power window fully closed | 11 to 14 V |
| Q2-7 (DOWN) - Q2-1 (GND) | GR - W-B | Power window motor DOWN output | Power switch on (IG), rear LH side power window fully DOWN (AUTO DOWN position) | Below 1 V |
| Q2-7 (DOWN) - Q2-1 (GND) | GR - W-B | Power window motor DOWN output | Power switch on (IG), rear LH side power window fully stopped (DOWN) | 11 to 14 V |

If the result is not as specified, the power window regulator switch assembly (for rear LH side) may have a malfunction.

4. CHECK POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side)

(a) Disconnect the P2 power window regulator switch assembly (for rear RH side) connector.



(b) Measure the resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| P2-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the P2 power window regulator switch assembly (for rear RH side) connector.

(d) Measure the voltage according to the value(s) in the table below.

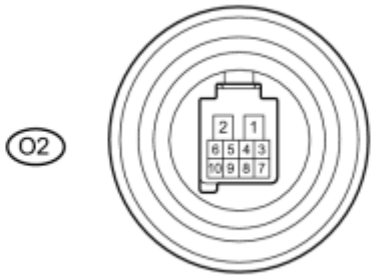
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| P2-6 (UP) - P2-1 (GND) | V - W-B | Power window motor UP output | Power switch on (IG), power window regulator switch assembly (for rear RH side) OFF | 11 to 14 V |
| P2-6 (UP) - P2-1 (GND) | V - W-B | Power window motor UP output | Power switch on (IG), power window regulator switch assembly (for rear RH side) UP (Manual operation) | Below 1 V |
| P2-6 (UP) - P2-1 (GND) | V - W-B | Power window motor UP output | Power switch on (IG), rear RH side power window fully open | 11 to 14 V |
| P2-6 (UP) - P2-1 (GND) | V - W-B | Power window motor UP output | Power switch on (IG), rear RH side power window fully UP (AUTO UP position) | Below 1 V |
| P2-6 (UP) - P2-1 (GND) | V - W-B | Power window motor UP output | Power switch on (IG), rear RH side power window fully stopped (UP) | 11 to 14 V |
| P2-8 (AUTO) - P2-1 (GND) | L - W-B | Power window motor AUTO UP output | Power switch on (IG), rear RH side power window fully open | 11 to 14 V |
| P2-8 (AUTO) - P2-1 (GND) | L - W-B | Power window motor AUTO UP output | Power switch on (IG), rear RH side power window fully UP (AUTO UP position) | Below 1 V |
| P2-8 (AUTO) - P2-1 (GND) | L - W-B | Power window motor AUTO UP output | Power switch on (IG), rear RH side power window fully stopped (UP) | 11 to 14 V |
| P2-8 (AUTO) - P2-1 (GND) | L - W-B | Power window motor AUTO DOWN output | Power switch on (IG), rear RH side power window fully closed | 11 to 14 V |
| P2-8 (AUTO) - P2-1 (GND) | L - W-B | Power window motor AUTO DOWN output | Power switch on (IG), rear RH side power window fully DOWN (AUTO DOWN position) | Below 1 V |
| P2-8 (AUTO) - P2-1 (GND) | L - W-B | Power window motor AUTO DOWN output | Power switch on (IG), rear RH side power window fully stopped (DOWN) | 11 to 14 V |
| P2-4 (LED) - P2-1 (GND) | GR - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| P2-4 (LED) - P2- | GR - W- | LED illumination | Approximately 45 seconds after the power | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 1 (GND) | B | signal | switch is turned off | |
| P2-7 (DOWN) - P2-1 (GND) | Y - W-B | Power window motor DOWN output | Power switch on (IG), power window regulator switch assembly (for rear RH side) OFF | 11 to 14 V |
| P2-7 (DOWN) - P2-1 (GND) | Y - W-B | Power window motor DOWN output | Power switch on (IG), power window regulator switch assembly (for rear RH side) DOWN (Manual operation) | Below 1 V |
| P2-7 (DOWN) - P2-1 (GND) | Y - W-B | Power window motor DOWN output | Power switch on (IG), rear RH side power window fully closed | 11 to 14 V |
| P2-7 (DOWN) - P2-1 (GND) | Y - W-B | Power window motor DOWN output | Power switch on (IG), rear RH side power window fully DOWN (AUTO DOWN position) | Below 1 V |
| P2-7 (DOWN) - P2-1 (GND) | Y - W-B | Power window motor DOWN output | Power switch on (IG), rear RH side power window fully stopped (DOWN) | 11 to 14 V |

If the result is not as specified, the power window regulator switch assembly (for rear RH side) may have a malfunction.

5. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

(a) Disconnect the O2 power window regulator motor assembly (for driver side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O2-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| O2-2 (B) - Body ground | L - Body ground | Power supply | Power switch off | 11 to 14 V |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the O2 power window regulator motor assembly (for driver side) connector.

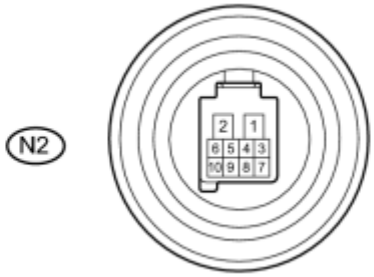
(d) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| O2-5 (LED) - O2-1 (GND) | B - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| O2-5 (LED) - O2-1 (GND) | B - W-B | LED illumination signal | Approximately 45 seconds after power switch turned off | Below 1 V |
| O2-7 (DOWN) - O2-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), driver door power window regulator switch OFF | 11 to 14 V |
| O2-7 (DOWN) - O2-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), driver door power window switch DOWN (Manual operation) | Below 1 V |
| O2-7 (DOWN) - O2-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), driver door power window fully closed | 11 to 14 V |
| O2-7 (DOWN) - O2-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), driver door power window switch fully DOWN (AUTO DOWN position) | Below 1 V |
| O2-7 (DOWN) - O2-1 (GND) | Y - W-B | Power window motor AUTO DOWN input | Power switch on (IG), driver door power window fully open (DOWN) | 11 to 14 V |
| O2-10 (UP) - O2-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), driver door power window switch OFF | 11 to 14 V |
| O2-10 (UP) - O2-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), driver door power window switch UP (Manual operation) | Below 1 V |
| O2-10 (UP) - O2-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), driver door power window fully open | 11 to 14 V |
| O2-10 (UP) - O2-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), driver door power window switch fully UP (AUTO UP position) | Below 1 V |
| O2-10 (UP) - O2-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), driver door power window fully closed (UP) | 11 to 14 V |

If the result is not as specified, the power window regulator motor assembly (for driver side) may have a malfunction.

6. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

(a) Disconnect the N2 power window regulator motor assembly (for front passenger side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N2-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| N2-2 (B) - Body ground | R - Body ground | Power supply | Power switch off | 11 to 14 V |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the N2 power window regulator motor assembly (for front passenger side) connector.

(d) Measure the voltage according to the value(s) in the table below.

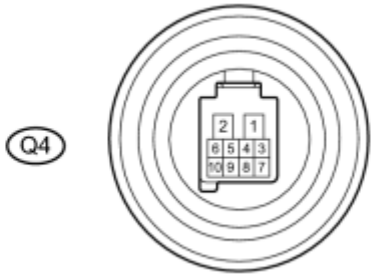
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N2-4 (AUTO) - N2-1 (GND) | L - W-B | Power window motor AUTO UP input | Power switch on (IG), front passenger side power window fully open | 11 to 14 V |
| N2-4 (AUTO) - N2-1 (GND) | L - W-B | Power window motor AUTO UP input | Power switch on (IG), front passenger side power window switch fully UP (AUTO UP position) | Below 1 V |
| N2-4 (AUTO) - N2-1 (GND) | L - W-B | Power window motor AUTO UP input | Power switch on (IG), front passenger side power window fully closed (UP) | 11 to 14 V |
| N2-4 (AUTO) - N2-1 (GND) | L - W-B | Power window motor AUTO DOWN input | Power switch on (IG), front passenger side power window fully closed | 11 to 14 V |
| N2-4 (AUTO) - N2-1 (GND) | L - W-B | Power window motor AUTO DOWN input | Power switch on (IG), front passenger side power window switch fully DOWN (AUTO DOWN position) | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| N2-4 (AUTO) - N2-1 (GND) | L - W-B | Power window motor AUTO DOWN input | Power switch on (IG), front passenger side power window fully open (DOWN) | 11 to 14 V |
| N2-5 (LED) - N2-1 (GND) | Y - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| N2-5 (LED) - N2-1 (GND) | Y - W-B | LED illumination signal | Approximately 45 seconds after power switch turned off | Below 1 V |
| N2-7 (DOWN) - N2-1 (GND) | G - W-B | Power window motor DOWN input | Power switch on (IG), power window regulator switch assembly (for front passenger side) OFF | 11 to 14 V |
| N2-7 (DOWN) - N2-1 (GND) | G - W-B | Power window motor DOWN input | Power switch on (IG), power window regulator switch assembly (for front passenger side) DOWN (Manual operation) | Below 1 V |
| N2-7 (DOWN) - N2-1 (GND) | G - W-B | Power window motor DOWN input | Power switch on (IG), front passenger side power window fully closed | 11 to 14 V |
| N2-7 (DOWN) - N2-1 (GND) | G - W-B | Power window motor DOWN input | Power switch on (IG), front passenger side power window switch fully DOWN (AUTO DOWN position) | Below 1 V |
| N2-7 (DOWN) - N2-1 (GND) | G - W-B | Power window motor DOWN input | Power switch on (IG), front passenger side power window fully open (DOWN) | 11 to 14 V |
| N2-10 (UP) - N2-1 (GND) | B - W-B | Power window motor UP input | Power switch on (IG), power window regulator switch assembly (for front passenger side) OFF | 11 to 14 V |
| N2-10 (UP) - N2-1 (GND) | B - W-B | Power window motor UP input | Power switch on (IG), power window regulator switch assembly (for front passenger side) UP (Manual operation) | Below 1 V |
| N2-10 (UP) - N2-1 (GND) | B - W-B | Power window motor UP input | Power switch on (IG), front passenger side power window fully open | 11 to 14 V |
| N2-10 (UP) - N2-1 (GND) | B - W-B | Power window motor UP input | Power switch on (IG), front passenger side power window switch fully UP (AUTO UP position) | Below 1 V |
| N2-10 (UP) - N2-1 (GND) | B - W-B | Power window motor UP input | Power switch on (IG), front passenger side power window fully closed (UP) | 11 to 14 V |

If the result is not as specified, the power window regulator motor assembly (for front passenger side) may have a malfunction.

7. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)

(a) Disconnect the Q4 power window regulator motor assembly (for rear LH side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q4-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| Q4-2 (B) - Body ground | R - Body ground | Power supply | Power switch off | 11 to 14 V |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the Q4 power window regulator motor assembly (for rear LH side) connector.

(d) Measure the voltage according to the value(s) in the table below.

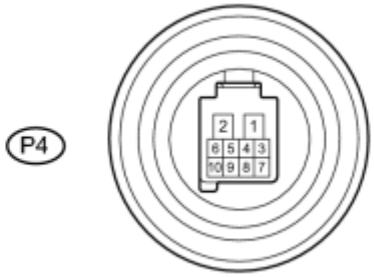
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q4-4 (AUTO) - Q4-1 (GND) | V - W-B | Power window motor AUTO UP input | Power switch on (IG), rear LH side power window fully open | 11 to 14 V |
| Q4-4 (AUTO) - Q4-1 (GND) | V - W-B | Power window motor AUTO UP input | Power switch on (IG), rear LH side power window switch fully UP (AUTO UP position) | Below 1 V |
| Q4-4 (AUTO) - Q4-1 (GND) | V - W-B | Power window motor AUTO UP input | Power switch on (IG), rear LH side power window fully closed (UP) | 11 to 14 V |
| Q4-4 (AUTO) - Q4-1 (GND) | V - W-B | Power window motor AUTO DOWN input | Power switch on (IG), rear LH side power window fully closed | 11 to 14 V |
| Q4-4 (AUTO) - Q4-1 (GND) | V - W-B | Power window motor AUTO DOWN input | Power switch on (IG), rear LH side power window switch fully DOWN (AUTO DOWN position) | Below 1 V |
| Q4-4 (AUTO) - Q4-1 (GND) | V - W-B | Power window motor AUTO DOWN input | Power switch on (IG), rear LH side power window fully open (DOWN) | 11 to 14 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Q4-5 (LED) - Q4-1 (GND) | Y - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| Q4-5 (LED) - Q4-1 (GND) | Y - W-B | LED illumination signal | Approximately 45 seconds after power switch turned off | Below 1 V |
| Q4-7 (DOWN) - Q4-1 (GND) | GR - W-B | Power window motor DOWN input | Power switch on (IG), power window regulator switch assembly (for rear LH side) OFF | 11 to 14 V |
| Q4-7 (DOWN) - Q4-1 (GND) | GR - W-B | Power window motor DOWN input | Power switch on (IG), power window regulator switch assembly (for rear LH side) DOWN (Manual operation) | Below 1 V |
| Q4-7 (DOWN) - Q4-1 (GND) | GR - W-B | Power window motor DOWN input | Power switch on (IG), rear LH side power window fully closed | 11 to 14 V |
| Q4-7 (DOWN) - Q4-1 (GND) | GR - W-B | Power window motor DOWN input | Power switch on (IG), rear LH side power window switch fully DOWN (AUTO DOWN position) | Below 1 V |
| Q4-7 (DOWN) - Q4-1 (GND) | GR - W-B | Power window motor DOWN input | Power switch on (IG), rear LH side power window fully open (DOWN) | 11 to 14 V |
| Q4-10 (UP) - Q4-1 (GND) | L - W-B | Power window motor UP input | Power switch on (IG), power window regulator switch assembly (for rear LH side) OFF | 11 to 14 V |
| Q4-10 (UP) - Q4-1 (GND) | L - W-B | Power window motor UP input | Power switch on (IG), power window regulator switch assembly (for rear LH side) UP (Manual operation) | Below 1 V |
| Q4-10 (UP) - Q4-1 (GND) | L - W-B | Power window motor UP input | Power switch on (IG), rear LH side power window fully open | 11 to 14 V |
| Q4-10 (UP) - Q4-1 (GND) | L - W-B | Power window motor UP input | Power switch on (IG), rear LH side power window switch fully UP (AUTO UP position) | Below 1 V |
| Q4-10 (UP) - Q4-1 (GND) | L - W-B | Power window motor UP input | Power switch on (IG), rear LH side power window fully closed (UP) | 11 to 14 V |

If the result is not as specified, the power window regulator motor assembly (for rear LH side) may have a malfunction.

8. CHECK POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)

(a) Disconnect the P4 power window regulator motor assembly (for rear RH side) connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| P4-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| P4-2 (B) - Body ground | R - Body ground | Power supply | Power switch off | 11 to 14 V |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the P4 power window regulator motor assembly (for rear RH side) connector.

(d) Measure the voltage according to the value(s) in the table below.

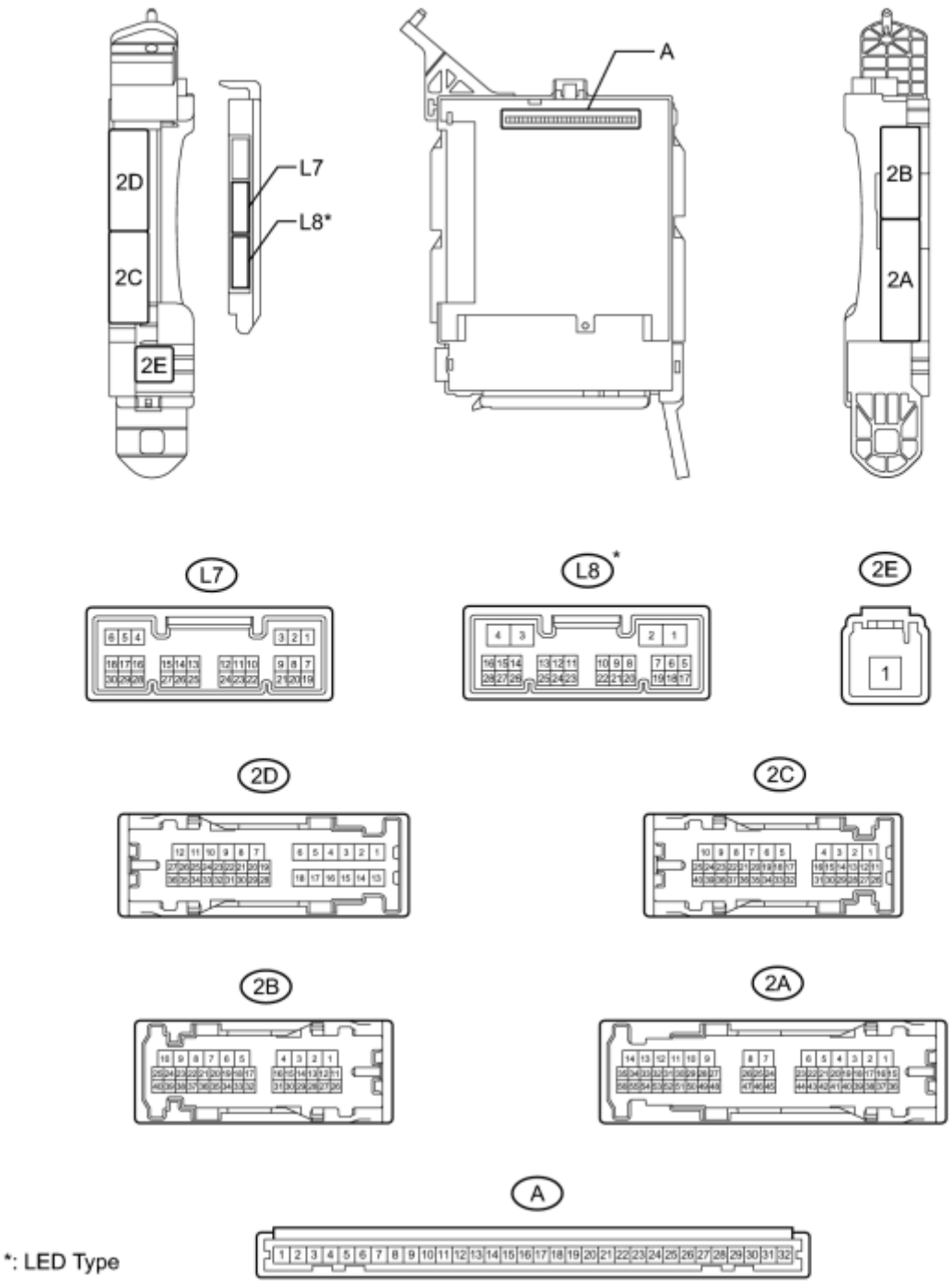
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| P4-4 (AUTO) - P4-1 (GND) | L - W-B | Power window motor AUTO UP input | Power switch on (IG), rear RH side power window fully open | 11 to 14 V |
| P4-4 (AUTO) - P4-1 (GND) | L - W-B | Power window motor AUTO UP input | Power switch on (IG), rear RH side power window switch fully open (AUTO UP position) | Below 1 V |
| P4-4 (AUTO) - P4-1 (GND) | L - W-B | Power window motor AUTO UP input | Power switch on (IG), rear RH side power window fully closed (UP) | 11 to 14 V |
| P4-4 (AUTO) - P4-1 (GND) | L - W-B | Power window motor AUTO DOWN input | Power switch on (IG), rear RH side power window fully closed | 11 to 14 V |
| P4-4 (AUTO) - P4-1 (GND) | L - W-B | Power window motor AUTO DOWN input | Power switch on (IG), rear RH side power window switch fully DOWN (AUTO DOWN position) | Below 1 V |
| P4-4 (AUTO) - P4-1 (GND) | L - W-B | Power window motor AUTO DOWN input | Power switch on (IG), rear RH side power window fully open (DOWN) | 11 to 14 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| P4-5 (LED) - P4-1 (GND) | GR - W-B | LED illumination signal | Power switch on (IG) | 11 to 14 V |
| P4-5 (LED) - P4-1 (GND) | GR - W-B | LED illumination signal | Approximately 45 seconds after power switch turned off | Below 1 V |
| P4-7 (DOWN) - P4-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), power window regulator switch assembly (for rear RH side) OFF | 11 to 14 V |
| P4-7 (DOWN) - P4-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), power window regulator switch assembly (for rear RH side) DOWN (Manual operation) | Below 1 V |
| P4-7 (DOWN) - P4-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), rear RH side power window fully closed | 11 to 14 V |
| P4-7 (DOWN) - P4-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), rear RH side power window switch fully DOWN (AUTO DOWN position) | Below 1 V |
| P4-7 (DOWN) - P4-1 (GND) | Y - W-B | Power window motor DOWN input | Power switch on (IG), rear RH side power window switch fully open (DOWN) | 11 to 14 V |
| P4-10 (UP) - P4-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), power window regulator switch assembly (for rear RH side) OFF | 11 to 14 V |
| P4-10 (UP) - P4-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), power window regulator switch assembly (for rear RH side) UP (Manual operation) | Below 1 V |
| P4-10 (UP) - P4-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), rear RH side power window fully open | 11 to 14 V |
| P4-10 (UP) - P4-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), rear RH side power window switch fully UP (AUTO UP position) | Below 1 V |
| P4-10 (UP) - P4-1 (GND) | V - W-B | Power window motor UP input | Power switch on (IG), rear RH side power window fully closed (UP) | 11 to 14 V |

If the result is not as specified, the power window regulator motor assembly (for rear RH side) may have a malfunction.

9. CHECK INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY, MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

(a) Disconnect the 2B and 2C junction block connectors.




(b) Disconnect the A main body ECU (multiplex network body ECU) connector.

(c) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2B-6 (GND1) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| 2C-18 (BECU) - Body ground | Y - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| A-31 (ALTB) - Body ground | - | Battery power supply | Power switch off | 11 to 14 V |
| A-32 (IG) - Body ground | - | IG power supply | Power switch off | Below 1 V |
| A-32 (IG) - Body ground | - | IG power supply | Power switch on (IG) | 11 to 14 V |

If the result is not as specified, there may be a malfunction in the wire harness or instrument panel junction block assembly.

(d) Reconnect the 2B and 2C junction block connectors.

(e) Reconnect the A main body ECU (multiplex network body ECU) connector.

(f) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2D-35 (FLCY) - Body ground | V - Body ground | Front door courtesy switch LH input | Front door LH open | Below 1 V |
| 2D-35 (FLCY) - Body ground | V - Body ground | Front door courtesy switch LH input | Front door LH closed | 11 to 14 V |
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front door courtesy switch RH input | Front door RH open | Below 1 V |
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front door courtesy switch RH input | Front door RH closed | 11 to 14 V |

If the result is not as specified, the main body ECU (multiplex network body ECU) or instrument panel junction block assembly may have a malfunction.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The power window control system data can be read from the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) Check the DLC3 INFO.

3. INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / (desired system) / Trouble Codes.

(e) Check the details of the DTC(s) INFO.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / (desired system) / Trouble Codes.

(e) Clear the DTCs.

# FAIL-SAFE CHART

1. POWER WINDOW OPERATION IN FAIL-SAFE MODE

HINT:

If the pulse sensor built into the power window regulator motor malfunctions, the power window control system enters fail-safe mode.

(a) The power window control system prohibits the following power window operations when the pulse sensor for the jam protection function has problems and the window position or the learned value is abnormal.

***Multiplex Network Master Switch Assembly***

| Power Window Operation | Condition | | |
|---|---|---|---|
| | Power switch on (IG) | Power switch off (Key-off operation permitted) | Power switch off (Key-off operation prohibited) |
| Manual up (Driver side door window) | X | X | - |
| Manual down (Driver side door window) | ○ | X | - |
| Auto up (Driver side door window) (hold switch at auto up position) | ○* | X | - |
| Auto up (Driver side door window) | X | X | - |
| Auto down (Driver side door window) | X | X | - |
| Manual up (Remote switch operation) | X | X | - |
| Manual down (Remote switch operation) | X | X | - |
| Auto up (Remote switch operation) (hold switch at auto up position) | X | X | - |
| Auto up (Remote switch operation) | X | X | - |
| Auto down (Remote switch operation) | X | X | - |

HINT:

- ○: Operates

- X: Operation prohibited
- *: Operates in manual mode without jam protection

### *Power Window Regulator Switch Assembly (for Front Passenger, Rear LH and Rear RH Sides)*

| Power Window Operation | Condition | | |
|---|---|---|---|
| | Power switch on (IG) | Power switch off (Key-off operation permitted) | Power switch off (Key-off operation prohibited) |
| Manual up | X | X | - |
| Manual down | ○ | X | - |
| Auto up (hold switch at auto up position) | ○* | X | - |
| Auto up | X | X | - |
| Auto down | X | X | - |

HINT:

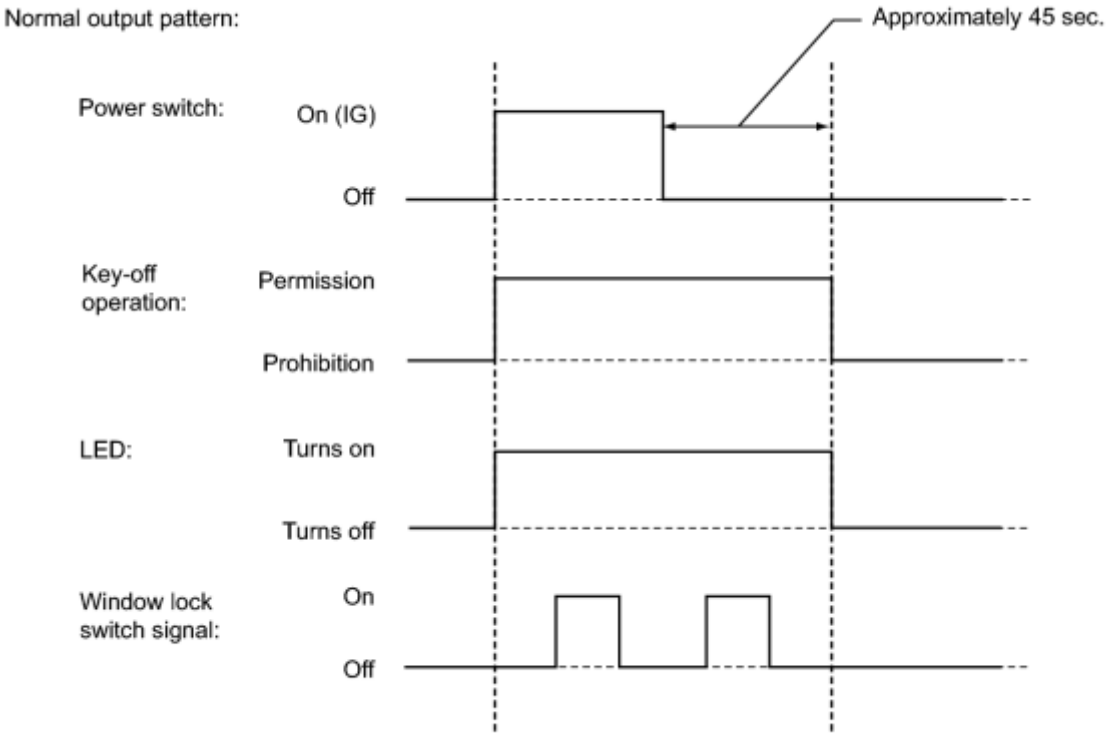
- ○: Operates
- X: Operation prohibited
- *: Operates in manual mode without jam protection

(1) Power window switch LED control

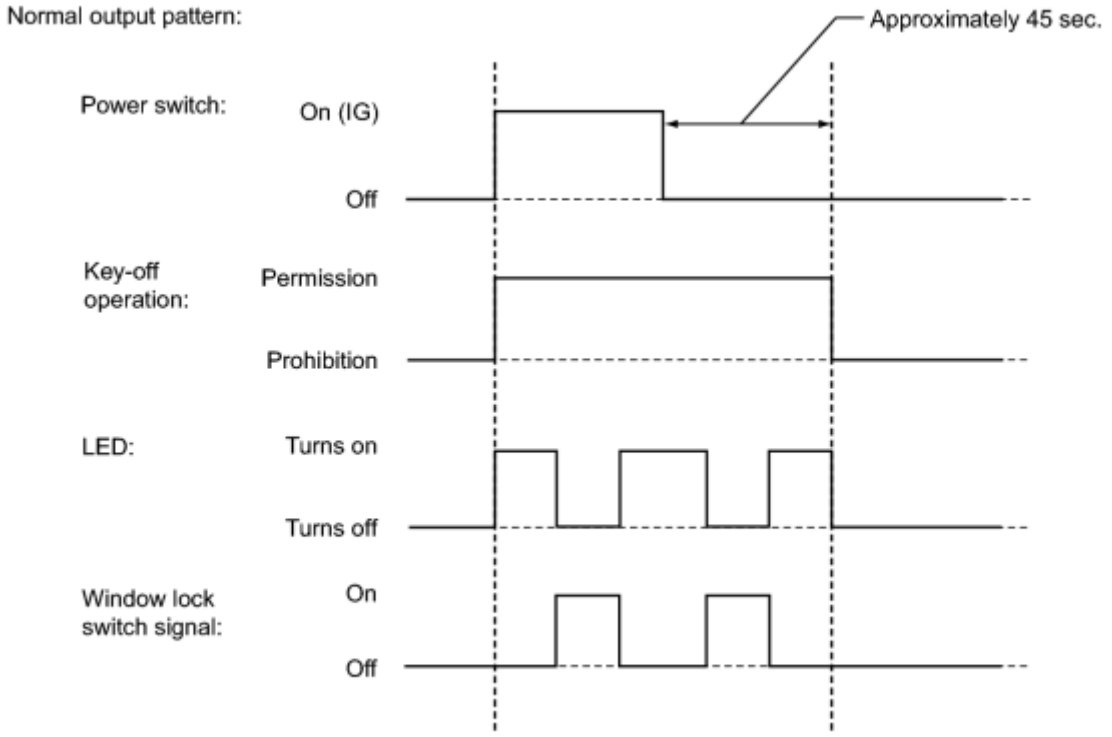
HINT:

During normal operation (fail-safe is not operating), or during fail-safe mode when there is a pulse sensor malfunction or the window position or learned value is abnormal, the LED illuminates as shown in the illustration.

1. For driver side:




2. For front passenger, rear LH and rear RH sides:




(2) Fail-safe deactivation condition

- When the pulse sensor is normal, to deactivate fail-safe mode, pull up the power window switch to the auto up position and hold it for at least 1 second to fully close the window from the fully open position. As a result, the auto up and down function will return.

(b) Initialization failure

HINT:

During initialization of the power window regulator motor ECU, when the window position or initialization complete status cannot be properly read from the EEPROM, the power window control system prohibits the operations as follows:

***Multiplex Network Master Switch Assembly***

| Power Window Operation | Condition | | |
|---|---|---|---|
| | Power switch on (IG) | Power switch off (Key-off operation permitted) | Power switch off (Key-off operation prohibited) |
| Manual up (Driver side door window) | X | X | - |
| Manual down (Driver side door window) | ○ | X | - |
| Auto up (Driver side door window) (hold switch at auto up position) | ○* | X | - |
| Auto up (Driver side door window) | X | X | - |
| Auto down (Driver side door window) | X | X | - |
| Manual up (Remote switch operation) | X | X | - |
| Manual down (Remote switch operation) | X | X | - |
| Auto up (Remote switch operation) (hold switch at auto up position) | X | X | - |
| Auto up (Remote switch operation) | X | X | - |
| Auto down (Remote switch operation) | X | X | - |

HINT:

- ○: Operates

- X: Operation prohibited
- *: Operates in manual mode without jam protection

### *Power Window Regulator Switch Assembly (for Front Passenger, Rear LH and Rear RH Sides)*

| Power Window Operation | Condition | | |
|---|---|---|---|
| | Power switch on (IG) | Power switch off (Key-off operation permitted) | Power switch off (Key-off operation prohibited) |
| Manual up | X | X | - |
| Manual down | ○ | X | - |
| Auto up (hold switch at auto up position) | ○* | X | - |
| Auto up | X | X | - |
| Auto down | X | X | - |

HINT:

- ○: Operates
- X: Operation prohibited
- *: Operates in manual mode without jam protection

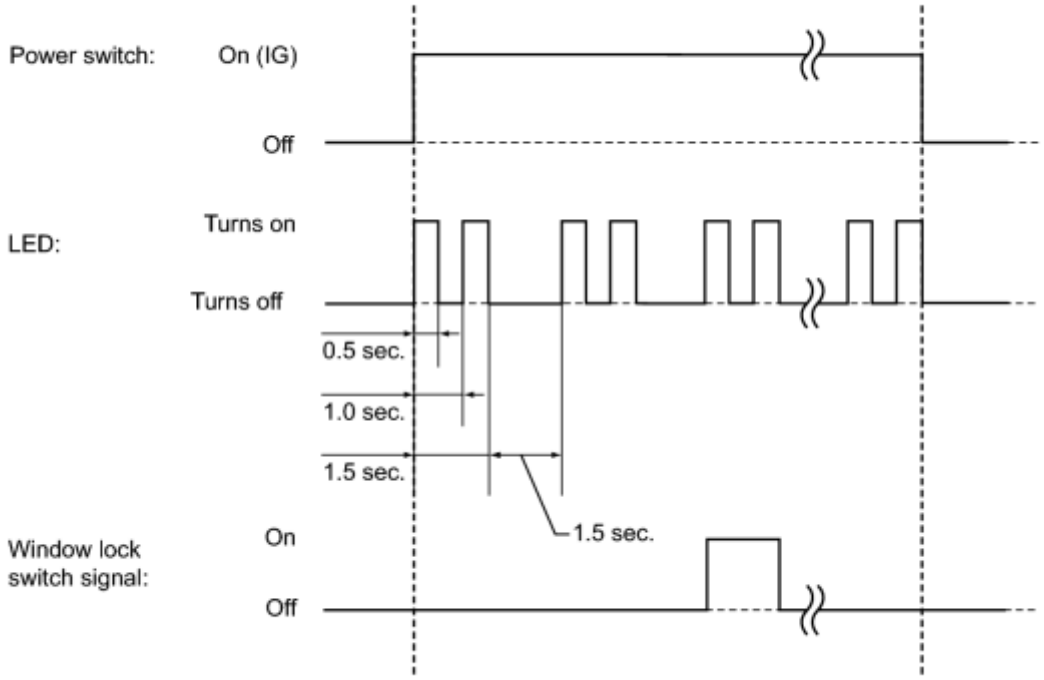
(1) Power window switch LED control

HINT:

During initialization of the power window regulator motor ECU, when the window position or initialization complete status cannot be properly read from the EEPROM during fail-safe mode, the LED illuminates as shown in the illustration.

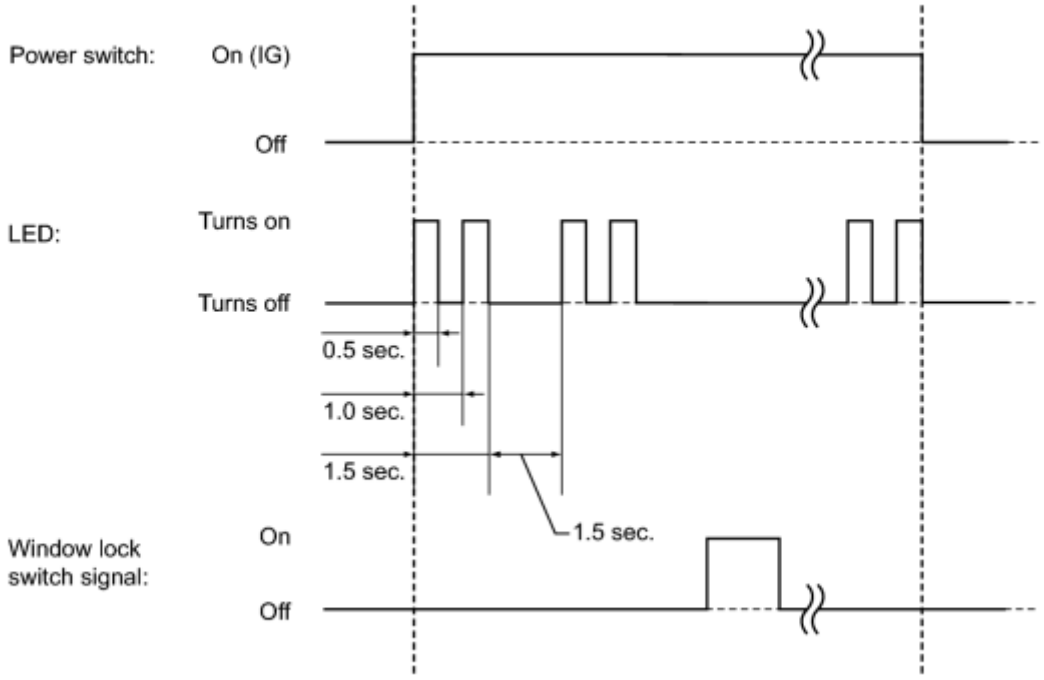
1. For driver side:

Initialization failure output pattern:




2. For front passenger, rear LH and rear RH sides:

Initialization failure output pattern:




(c) LIN communication failure

HINT:

If the LIN communication line malfunctions (communication stop), the power window control system prohibits the operations as follows:

*Multiplex Network Master Switch Assembly*

| Power Window Operation | Condition |
|---|---|
| | Power switch on (IG) |
| Manual up | ○* |
| Manual down | ○ |
| Auto up (hold switch at auto up position) | X |
| Auto up | X |
| Auto down | X |

HINT:

- ○: Operates
- X: Operation prohibited
- *: Jam protection can operate.
- Remote up and down function does not operate.

*Power Window Regulator Switch Assembly (for Front Passenger, Rear LH and Rear RH Sides)*

| Power Window Operation | Condition |
|---|---|
| | Power switch on (IG) |
| Manual up | ○* |
| Manual down | ○ |
| Auto up (hold switch at auto up position) | ○* |
| Auto up | ○* |
| Auto down | ○ |

HINT:

- ○: Operates
- X: Operation prohibited
- *: Jam protection can operate.

(d) LIN communication failure and pulse sensor failure

HINT:

If the LIN communication line malfunctions (communication stop) and the pulse sensor for the jam protection function has problems, the power window control system prohibits the operations as follows:

*Multiplex Network Master Switch Assembly*

| Power Window Operation | Condition |
|---|---|
| | Always |
| Manual up | X |

| Power Window Operation | Condition |
|---|---|
| | Always |
| Manual down | X |
| Auto up (hold switch at auto up position) | X |
| Auto up | X |
| Auto down | X |

HINT:

- ○: Operates
- X: Operation prohibited
- Driver door window: When the jam protection function does not operate due to a LIN communication failure, the manual up and auto up functions will not operate.
- Remote switch operation: Not operative during a LIN communication failure

### *Power Window Regulator Switch Assembly (for Front Passenger, Rear LH and Rear RH Sides)*

| Power Window Operation | Condition |
|---|---|
| | Always |
| Manual up | X |
| Manual down | X |
| Auto up (hold switch at auto up position) | X |
| Auto up | X |
| Auto down | X |

HINT:

- ○: Operates
- X: Operation prohibited

(e) LIN communication failure and abnormal window position learned value or initialization failure

HINT:

If the LIN communication line malfunctions (communication stop) and the window position or the learned value is abnormal, the power window control system prohibits the operations as follows:

### *Multiplex Network Master Switch Assembly*

| Power Window Operation | Condition |
|---|---|
| | Always |
| Manual up | ○* |
| Manual down | ○ |
| Auto up (hold switch at auto up position) | - |
| Auto up | - |
| Auto down | - |

HINT:

- ○: Operates
- *: Jam protection can operate and window reverses upon reaching the fully closed position.
- Remote switch operation: Operation is not possible during a LIN communication failure.

### *Power Window Regulator Switch Assembly (for Front Passenger, Rear LH and Rear RH Sides)*

| Power Window Operation | Condition |
|---|---|
| | Always |
| Manual up | ○* |
| Manual down | ○ |
| Auto up (hold switch at auto up position) | ○* |
| Auto up | X |
| Auto down | X |

HINT:

- ○: Operates
- X: Operation prohibited
- *: Jam protection can operate and window reverses upon reaching the fully closed position.

# DATA LIST / ACTIVE TEST

1. READ DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / (desired system) / Data List.

(e) Read the Data List according to the display on the Techstream.

***Master Switch (Multiplex Network Master Switch Assembly)***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D Door P/W Auto SW | Driver door power window auto switch signal / ON or OFF | ON: Driver door power window auto switch operated<br><br>OFF: Driver door power window auto switch not operated | - |
| P Door P/W Auto SW | Front passenger side power window auto up and down switch signal / ON or OFF | ON: Front passenger door power window auto switch operated<br><br>OFF: Front passenger door power window auto switch not operated | - |
| RR Door P/W Auto SW | Rear RH side power window auto up and down switch signal / ON or OFF | ON: Rear RH power window auto switch operated<br><br>OFF: Rear RH power window auto switch not operated | - |
| RL Door P/W Auto SW | Rear LH side power window auto up and down switch signal / ON or OFF | ON: Rear LH power window auto switch operated<br><br>OFF: Rear LH power window auto | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | switch not operated | |
| P Door P/W Up SW | Front passenger side power window manual up switch signal / ON or OFF | ON: Front passenger door power window manual up switch operated<br><br>OFF: Front passenger door power window manual up switch not operated | - |
| RR Door P/W up Switch | Rear RH side power window manual up switch signal / ON or OFF | ON: Rear RH power window manual up switch operated<br><br>OFF: Rear RH power window manual up switch not operated | - |
| RL Door P/W up Switch | Rear LH side power window manual up switch signal / ON or OFF | ON: Rear LH power window manual up switch operated<br><br>OFF: Rear LH power window manual up switch not operated | - |
| P Door P/W Down SW | Front passenger side power window manual down switch signal / ON or OFF | ON: Front passenger door power window manual down switch operated<br><br>OFF: Front passenger door power window manual down switch not operated | - |
| RR Door P/W Down SW | Rear RH side power window manual down switch signal / ON or OFF | ON: Rear RH power window manual down switch operated<br><br>OFF: Rear RH power window manual down switch not operated | - |
| RL Door P/W Down SW | Rear LH side power window manual down switch signal / ON or OFF | ON: Rear LH power window manual down switch operated<br><br>OFF: Rear LH power window manual down switch not operated | - |
| Window Lock Switch Status | Window lock switch signal / ON or OFF | ON: Window lock switch LOCK position<br><br>OFF: Window lock switch UNLOCK position | - |
| Number of Trouble Codes | Number of trouble codes / Min.: 0 or Max.: 255 | Number of DTCs will be displayed | - |

### *D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D Door P/W Auto SW | Driver door power window auto switch signal / ON or OFF | ON: Driver door power window auto switch operated<br><br>OFF: Driver door power window auto switch not operated | - |
| D Door P/W Up SW | Driver door power window manual up switch signal / ON or OFF | ON: Driver door power window manual up switch operated<br><br>OFF: Driver door power window manual up switch not operated | - |
| D Door P/W Down SW | Driver door power window manual down switch signal / ON or OFF | ON: Driver door power window manual down switch operated<br><br>OFF: Driver door power window manual down switch not operated | - |
| Glass Position (Close - 1/4) | Margin for jam protection triggering force of window glass within range of fully closed to 1/4 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (1/4 - 2/4) | Margin for jam protection triggering force of window glass within range of 1/4 to 1/2 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (2/4 - 3/4) | Margin for jam protection triggering force of window glass within range of 1/2 to 3/4 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (3/4 - Open) | Margin for jam protection triggering force of window glass within range of 3/4 to fully open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Number of | Number of trouble codes / Min.: 0 or | Number of DTCs will | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Trouble Codes | Max.: 255 | be displayed | |

*P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| P Door P/W Auto SW | Front passenger side power window auto switch signal / ON or OFF | ON: Front passenger door power window auto switch operated<br><br>OFF: Front passenger door power window auto switch not operated | - |
| P Door P/W Up SW | Front passenger side power window manual up switch signal / ON or OFF | ON: Front passenger door power window manual up switch operated<br><br>OFF: Front passenger door power window manual up switch not operated | - |
| P Door P/W Down SW | Front passenger side power window manual down switch signal / ON or OFF | ON: Front passenger door power window manual down switch operated<br><br>OFF: Front passenger door power window manual down switch not operated | - |
| Glass Position (Close - 1/4) | Margin for jam protection triggering force of window glass within range of fully closed to 1/4 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (1/4 - 2/4) | Margin for jam protection triggering force of window glass within range of 1/4 to 1/2 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (2/4 - 3/4) | Margin for jam protection triggering force of window glass within range of 1/2 to 3/4 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | in the specified range | |
| Glass Position (3/4 - Open) | Margin for jam protection triggering force of window glass within range of 3/4 to fully open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Number of Trouble Codes | Number of trouble codes / Min.: 0 or Max.: 255 | Number of DTCs will be displayed | - |

*RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RL Door P/W Auto SW | Rear LH side power window auto switch signal / ON or OFF | ON: Rear LH door power window auto switch operated<br><br>OFF: Rear LH door power window auto switch not operated | - |
| RL Door P/W Up SW | Rear LH side power window manual up switch signal / ON or OFF | ON: Rear LH door power window manual up switch operated<br><br>OFF: Rear LH door power window manual up switch not operated | - |
| RL Door P/W Down SW | Rear LH side power window manual down switch signal / ON or OFF | ON: Rear LH door power window manual down switch operated<br><br>OFF: Rear LH door power window manual down switch not operated | - |
| Glass Position (Close - 1/4) | Margin for jam protection triggering force of window glass within range of fully closed to 1/4 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (1/4 - 2/4) | Margin for jam protection triggering force of window glass within range of 1/4 to 1/2 open window glass position / | OK: Normal manual up operation | Caution is displayed only while the power window ECU built into the power window regulator |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | OK or Caution | Caution: Jam detected in the specified range | motor assembly detects a jam. |
| Glass Position (2/4 - 3/4) | Margin for jam protection triggering force of window glass within range of 1/2 to 3/4 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (3/4 - Open) | Margin for jam protection triggering force of window glass within range of 3/4 to fully open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Number of Trouble Codes | Number of trouble codes / Min.: 0 or Max.: 255 | Number of DTCs will be displayed | - |

***RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RR Door P/W Auto SW | Rear RH side power window auto switch signal / ON or OFF | ON: Rear RH door power window auto switch operated<br><br>OFF: Rear RH door power window auto switch not operated | - |
| RR Door P/W Up SW | Rear RH side power window manual up switch signal / ON or OFF | ON: Rear RH door power window manual up switch operated<br><br>OFF: Rear RH door power window manual up switch not operated | - |
| RR Door P/W Down SW | Rear RH side power window manual down switch signal / ON or OFF | ON: Rear RH door power window manual down switch operated<br><br>OFF: Rear RH door power window manual down switch not operated | - |
| Glass Position | Margin for jam protection triggering force of window glass within range of | OK: Normal manual | Caution is displayed only while the power window ECU built into |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| (Close - 1/4) | fully closed to 1/4 open window glass position / OK or Caution | up operation<br><br>Caution: Jam detected in the specified range | the power window regulator motor assembly detects a jam. |
| Glass Position (1/4 - 2/4) | Margin for jam protection triggering force of window glass within range of 1/4 to 1/2 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (2/4 - 3/4) | Margin for jam protection triggering force of window glass within range of 1/2 to 3/4 open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Glass Position (3/4 - Open) | Margin for jam protection triggering force of window glass within range of 3/4 to fully open window glass position / OK or Caution | OK: Normal manual up operation<br><br>Caution: Jam detected in the specified range | Caution is displayed only while the power window ECU built into the power window regulator motor assembly detects a jam. |
| Number of Trouble Codes | Number of trouble codes / Min.: 0 or Max.: 255 | Number of DTCs will be displayed | - |

### *Main Body (Main Body ECU (Multiplex Network Body ECU))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Door Courtesy SW | Front door courtesy switch RH signal / ON or OFF | ON: Front door RH open<br><br>OFF: Front door RH closed | - |
| FL Door Courtesy SW | Front door courtesy switch LH signal / ON or OFF | ON: Front door LH open<br><br>OFF: Front door LH closed | - |
| Communication D-Door Motor | Connection status between power window regulator motor (for driver side) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |
| Communication P-Door Motor | Connection status between power window regulator motor (for front passenger side) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | STOP: Communication stopped | |
| Communication RR-Door Motor | Connection status between power window regulator motor (for rear RH) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |
| Communication RL-Door Motor | Connection status between power window regulator motor (for rear LH) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |
| Communication Master SW | Connection status between multiplex network master switch assembly and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / (desired system) / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

CAUTION:

Be careful to avoid injuries as this test causes vehicle parts to move. During the Active Test, the jam protection function will not operate.

*D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

*P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

*RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

*RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

# DIAGNOSTIC TROUBLE CODE CHART

*Power Window Control System*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B2311 | Power Window Motor Malfunction | 1. Battery disconnected when power switch on (IG)<br><br>2. Power window regulator motor assembly (for driver side)<br><br>3. Power window regulator motor assembly (for front passenger side)<br><br>4. Power window regulator motor assembly (for rear LH side)<br><br>5. Power window regulator motor assembly (for rear RH side)<br><br>6. Incorrect installation of power window components<br><br>7. Overheated power window regulator motor assembly | INFO |
| B2312 | Power Window Switch Malfunction | 1. Multiplex network master switch assembly<br><br>2. Power window regulator switch assembly (for front passenger side)<br><br>3. Power window regulator switch assembly (for rear LH side)<br><br>4. Power window regulator switch assembly (for rear RH side)<br><br>5. Power window regulator motor assembly (for driver side)<br><br>6. Power window regulator motor assembly (for front passenger side)<br><br>7. Power window regulator motor assembly (for rear LH side)<br><br>8. Power window regulator motor assembly (for rear RH side)<br><br>9. Wire harness or connector | INFO |
| B2313 | Glass Position Initialization Incomplete | 1. Power window regulator motor assembly (for driver side) not initialized<br><br>2. Power window regulator motor assembly (for front | |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | passenger side) not initialized<br><br>3. Power window regulator motor assembly (for rear LH side) not initialized<br><br>4. Power window regulator motor assembly (for rear RH side) not initialized<br><br>5. Power window regulator motor assembly (for driver side)<br><br>6. Power window regulator motor assembly (for front passenger side)<br><br>7. Power window regulator motor assembly (for rear LH side)<br><br>8. Power window regulator motor assembly (for rear RH side) | |

| DTC | B2311 | Power Window Motor Malfunction |
|---|---|---|

# DESCRIPTION

The power window regulator motor is operated by the multiplex network master switch assembly or power window regulator switch assembly. The power window regulator motor assembly has motor, regulator and ECU functions.

This DTC is output when the power window regulator motor assembly has a malfunction, or the ECU built into the regulator motor assembly determines that the fully closed window position has deviated approximately 20 mm (0.787 in.) or more from the normal position.

HINT:

DTC B2311 can be stored in each power window regulator motor assembly (power window ECU).

### *D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2311 | • Either condition is met:<br>a. Power window regulator motor assembly malfunctions<br>b. When ECU in power window regulator motor assembly determines that fully closed window position has deviated approx. 20 mm (0.787 in.) or more from normal position | • Battery disconnected when power switch on (IG)<br>• Power window regulator motor assembly (for driver side)<br>• Incorrect installation of power window components<br>• Overheated power window regulator motor assembly |

### *P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2311 | • Either condition is met:<br>a. Power window regulator motor assembly malfunctions<br>b. When ECU in power window regulator motor assembly determines that fully closed window position has deviated approx. 20 mm (0.787 in.) or more from normal position | • Battery disconnected when power switch on (IG)<br>• Power window regulator motor assembly (for front passenger side)<br>• Incorrect installation of power window components<br>• Overheated power window regulator motor assembly |

### *RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2311 | • Either condition is met:<br>a. Power window regulator motor assembly malfunctions<br>b. When ECU in power window regulator motor assembly determines that fully closed window position has deviated approx. 20 mm (0.787 in.) or more from normal position | • Battery disconnected when power switch on (IG)<br>• Power window regulator motor assembly (for rear LH side)<br>• Incorrect installation of power window components<br>• Overheated power window regulator motor assembly |

*RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2311 | • Either condition is met:<br>a. Power window regulator motor assembly malfunctions<br>b. When ECU in power window regulator motor assembly determines that fully closed window position has deviated approx. 20 mm (0.787 in.) or more from normal position | • Battery disconnected when power switch on (IG)<br>• Power window regulator motor assembly (for rear RH side)<br>• Incorrect installation of power window components<br>• Overheated power window regulator motor assembly |

# INSPECTION PROCEDURE

NOTICE:

- When the power window regulator motor assembly is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
  a. Close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly and holding it in the auto up position.
  b. Open the power window by fully pushing down the switch.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (APPLICABLE LOCATION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / (desired system) / Active Test.

HINT:

Perform the Active Test for the power window regulator motor assembly that has DTC B2311 stored in its ECU.

(e) Perform the Active Test according to the display on the Techstream.

CAUTION:

Be careful to avoid injuries as this test causes vehicle parts to move. During the Active Test, the jam protection function will not operate.

***D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

***P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

***RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

***RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

OK:

Each power window motor operates.

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (Driver door power window) | B |
| NG (Front passenger side power window) | C |
| NG (Rear LH side power window) | D |
| NG (Rear RH side power window) | E |

E REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)

D REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)

C REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

B REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

A

| | |
|---|---|
| 2. | PERFORM INITIALIZATION (APPLICABLE LOCATION) |

(a) Initialize the power window regulator motor assembly INFO.

HINT:

Initialize the power window regulator motor assembly that has DTC B2311 stored in its ECU.

NEXT

| | |
|---|---|
| 3. | CHECK POWER WINDOW CONTROL SYSTEM (APPLICABLE LOCATION) |

(a) Check that the power window operates normally by opening and closing the window INFO.

HINT:

Check the power window operation of the window where DTC B2311 has been stored.

OK:

Each power window operates normally.

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (Driver door power window) | B |
| NG (Front passenger side power window) | C |
| NG (Rear LH side power window) | D |
| NG (Rear RH side power window) | E |

E REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)

D REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)

C REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

B REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

A

| | |
|---|---|
| 4. | CHECK WHETHER PARTS HAVE BEEN INSTALLED CORRECTLY |

(a) Check that the power window components are installed correctly.

OK:

Power window components are installed correctly.

HINT:

When the power window components are installed correctly, the problem has occurred because the battery is disconnected while the power switch is on (IG), the power window components are installed improperly or the motor is overheated.

NG → INSTALL PARTS CORRECTLY

OK → **END**

| DTC | B2312 | Power Window Switch Malfunction |
|---|---|---|

# DESCRIPTION

The power window regulator motor assembly is operated by the multiplex network master switch assembly or power window regulator switch assembly. The power window regulator motor assembly has motor, regulator and ECU functions.

This DTC is output when the ECU built into the regulator motor and master switch determines that the multiplex network master switch assembly or power window regulator switch assembly is stuck.

HINT:

DTC B2312 can be stored in the multiplex network master switch assembly and in each power window regulator motor assembly (power window ECU).

### *Master Switch (Multiplex Network Master Switch Assembly)*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2312 | • Multiplex network master switch assembly stuck<br>• Multiplex network master switch assembly held in same position for more than 20 seconds | Multiplex network master switch assembly |

### *D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2312 | • Multiplex network master switch assembly stuck<br>• Multiplex network master switch assembly held in same position for more than 20 seconds | • Multiplex network master switch assembly<br>• Power window regulator motor assembly (for driver side)<br>• Wire harness or connector |

### *P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2312 | • Power window regulator switch assembly (for front passenger side) stuck<br>• Power window regulator switch assembly (for front passenger side) held in same position for more than 20 seconds | • Power window regulator switch assembly (for front passenger side)<br>• Power window regulator motor assembly (for front passenger side)<br>• Wire harness or connector |

### *RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))*

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|

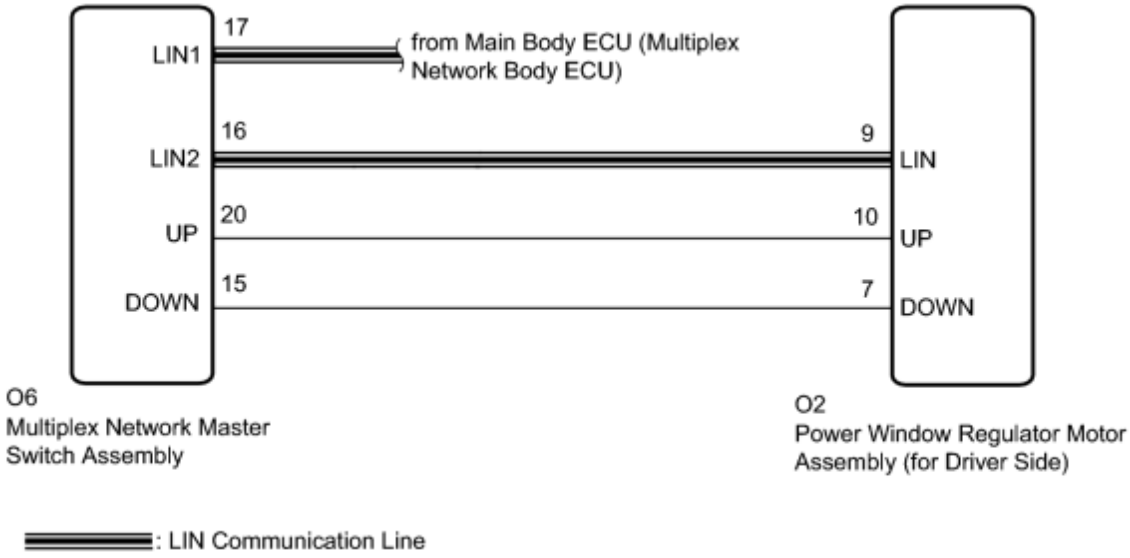
| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2312 | • Power window regulator switch assembly (for rear LH side) stuck<br>• Power window regulator switch assembly (for rear LH side) held in same position for more than 20 seconds | • Power window regulator switch assembly (for rear LH side)<br>• Power window regulator motor assembly (for rear LH side)<br>• Wire harness or connector |

*RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))*

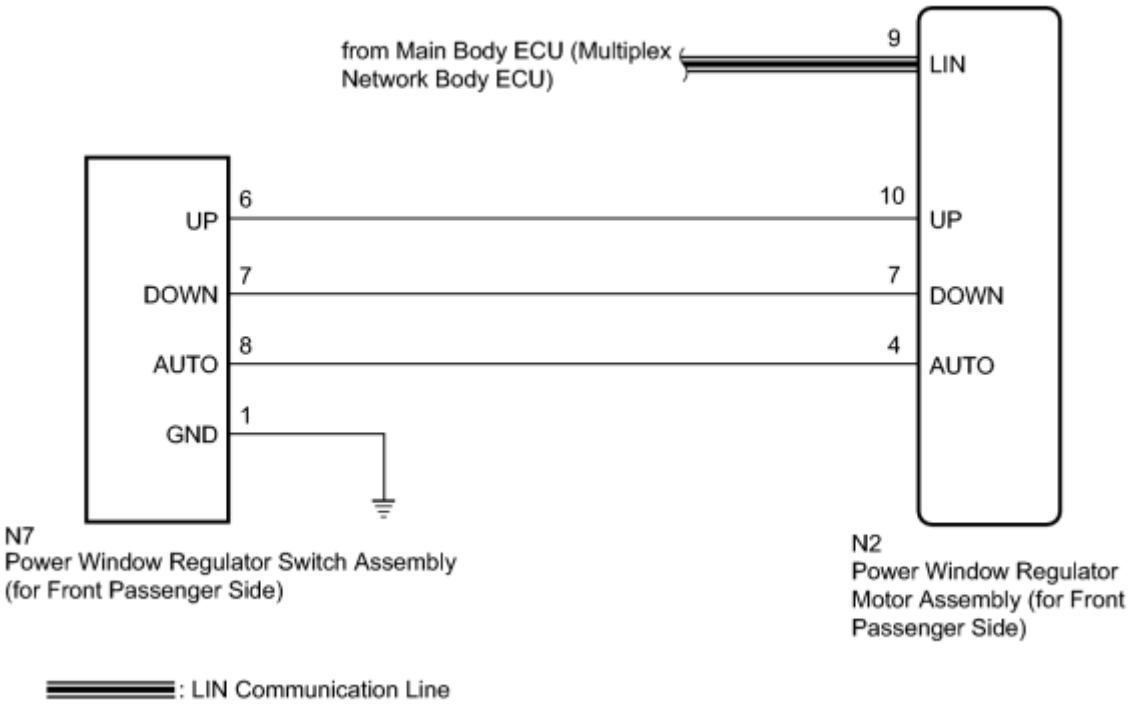
| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2312 | • Power window regulator switch assembly (for rear RH side) stuck<br>• Power window regulator switch assembly (for rear RH side) held in same position for more than 20 seconds | • Power window regulator switch assembly (for rear RH side)<br>• Power window regulator motor assembly (for rear RH side)<br>• Wire harness or connector |

# WIRING DIAGRAM

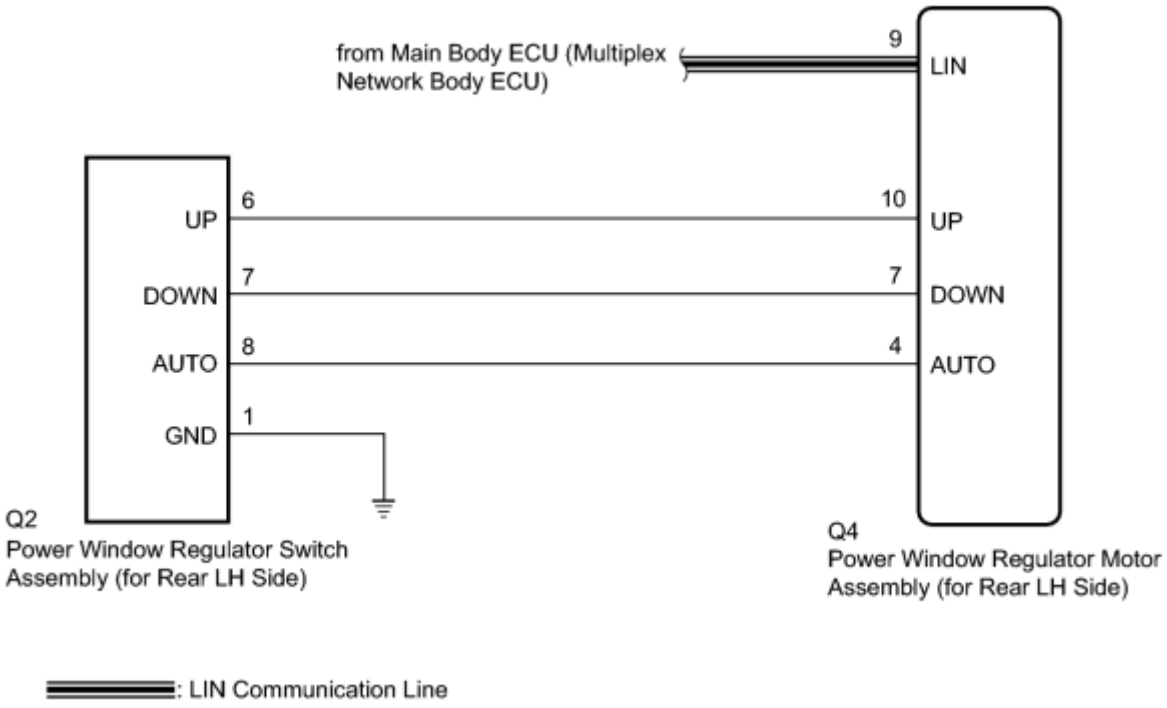
1. for Driver Side



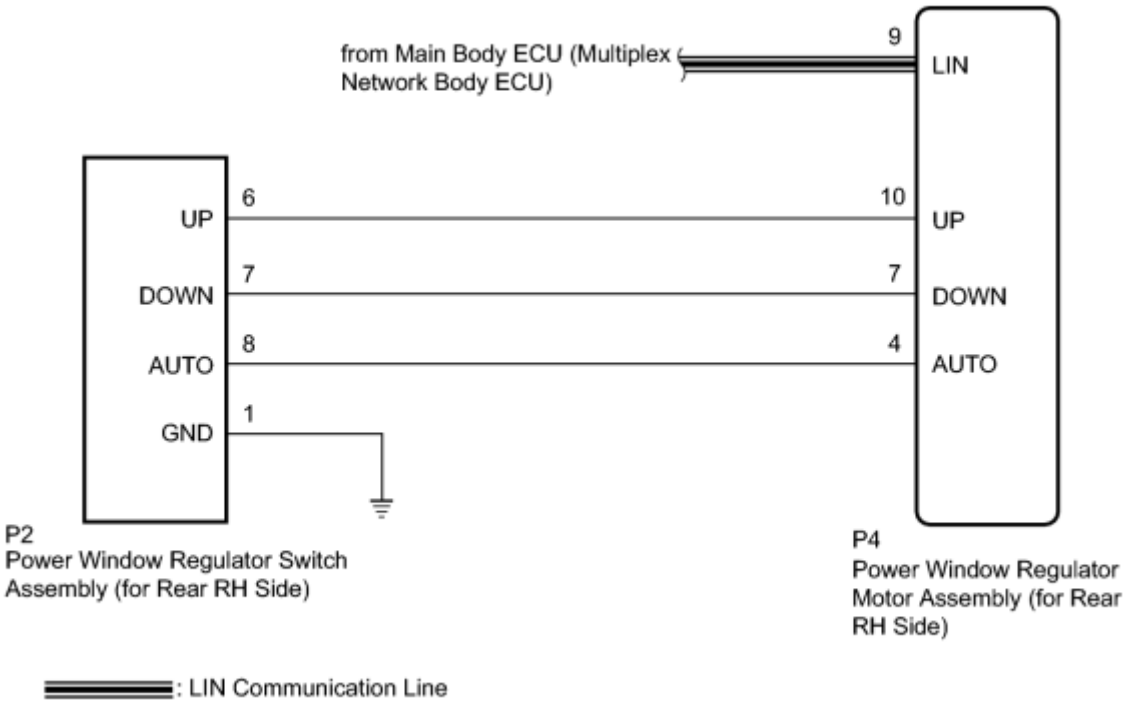

2. for Front Passenger Side




3. for Rear LH Side




4. for Rear RH Side




# INSPECTION PROCEDURE

NOTICE:

- If DTC B2312 is not output again after the DTC has been cleared, the DTC was output due to the switch being held.
- When the power window regulator motor assembly is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly and holding it at the auto up position.
    b. Open the power window by fully pushing down the switch.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Clear the DTC INFO.

(b) Check for DTCs INFO.

OK:

DTC B2312 is not output.

NG CHECK DTC OUTPUT

OK **END (DUE TO SWITCH BEING OPERATED FOR 20 SECONDS OR MORE)**

| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Check the parts which the DTCs have been output from.

Result:

| Result | Proceed to |
|---|---|
| DTC output from multiplex network master switch assembly | A |
| DTC output from power window regulator motor assembly (for driver side) | B |
| DTC output from power window regulator motor assembly (for front passenger side) | C |
| DTC output from power window regulator motor assembly (for rear LH side) | D |
| DTC output from power window regulator motor assembly (for rear RH side) | E |

E READ VALUE USING TECHSTREAM (RR-Door Motor)

D READ VALUE USING TECHSTREAM (RL-Door Motor)

C READ VALUE USING TECHSTREAM (P-Door Motor)

B READ VALUE USING TECHSTREAM (D-Door Motor)

A **REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY**

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (D-Door Motor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / D-Door Motor / Data List.

(e) Read the Data List according to the display on the Techstream.

***D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D Door P/W Up SW | Driver door power window manual up switch signal / ON or OFF | ON: Driver door power window manual up switch operated<br><br>OFF: Driver door power window manual up switch not operated | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D Door P/W Down SW | Driver door power window manual down switch signal / ON or OFF | ON: Driver door power window manual down switch operated<br><br>OFF: Driver door power window manual down switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

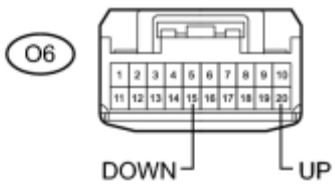
NG CHECK HARNESS AND CONNECTOR (MASTER SWITCH - DRIVER SIDE MOTOR)

OK **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)**

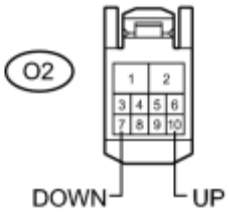
| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (MASTER SWITCH - DRIVER SIDE MOTOR) |

(a) Disconnect the multiplex network master switch assembly connector.

*1




*2




(b) Disconnect the power window regulator motor assembly (for driver side) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O6-20 (UP) - Body ground | Always | 10 kΩ or higher |
| O6-15 (DOWN) - Body ground | Always | 10 kΩ or higher |
| O2-10 (UP) - Body ground | Always | 10 kΩ or higher |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Multiplex Network Master Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)**

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (P-Door Motor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / P-Door Motor / Data List.

(e) Read the Data List according to the display on the Techstream.

*P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| P Door P/W Auto SW | Front passenger side power window auto up and down switch signal / ON or OFF | ON: Front passenger side door power window auto switch operated<br><br>OFF: Front passenger side door power window auto switch not operated | - |
| P Door P/W Up SW | Front passenger side power window manual up switch signal / ON or OFF | ON: Front passenger side door power window manual up switch operated<br><br>OFF: Front passenger side door power window manual up switch not operated | - |
| P Door P/W Down SW | Front passenger side power window manual down switch signal / ON or OFF | ON: Front passenger side door power window manual down switch operated<br><br>OFF: Front passenger side door power window manual down switch not operated | - |

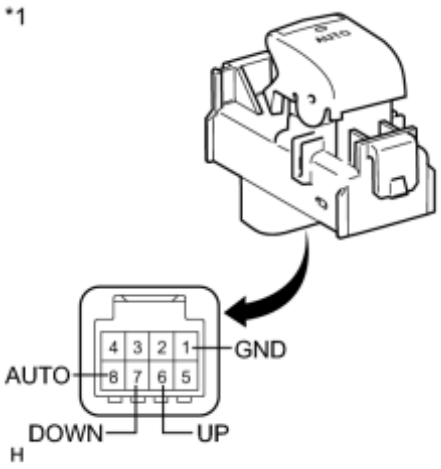
OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side)

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)**

| | |
|---|---|
| 6. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side) |




(a) Remove the power window regulator switch assembly (for front passenger side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |
| 6 (UP) - 1 (GND) | Free | 10 kΩ or higher |
| 7 (DOWN) - 1 (GND) | Free | 10 kΩ or higher |
| 8 (AUTO) - 1 (GND) | Free | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Front Passenger Side)) |

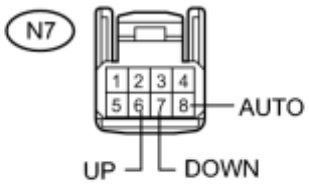
NG ▶ REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side)

OK

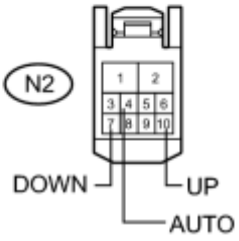
▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (FRONT PASSENGER SIDE SWITCH - FRONT PASSENGER SIDE MOTOR) |

*1




*2




(a) Disconnect the power window regulator motor assembly (for front passenger side) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| N7-6 (UP) - Body ground | Always | 10 kΩ or higher |
| N7-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| N7-8 (AUTO) - Body ground | Always | 10 kΩ or higher |
| N2-10 (UP) - Body ground | Always | 10 kΩ or higher |
| N2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| N2-4 (AUTO) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Front Passenger Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)**

| | |
|---|---|
| 8. | READ VALUE USING TECHSTREAM (RL-Door Motor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / RL-Door Motor / Data List.

(e) Read the Data List according to the display on the Techstream.

***RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RL Door P/W Auto SW | Rear LH side power window auto up and down switch signal / ON or OFF | ON: Rear LH door power window auto switch operated<br><br>OFF: Rear LH door power window auto switch not operated | - |
| RL Door P/W Up SW | Rear LH side power window manual up switch signal / ON or OFF | ON: Rear LH door power window manual up switch operated<br><br>OFF: Rear LH door power window manual up switch not operated | - |
| RL Door P/W Down SW | Rear LH side power window manual down switch signal / ON or OFF | ON: Rear LH door power window manual down switch operated<br><br>OFF: Rear LH door power window manual down switch not operated | - |

OK:

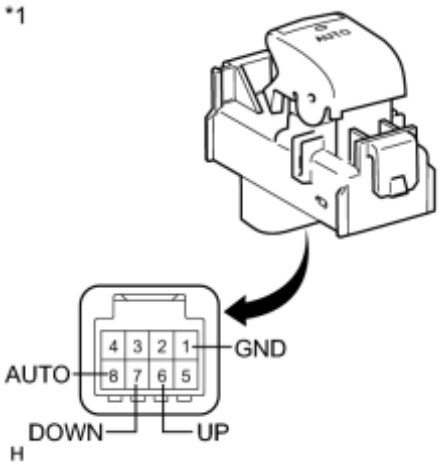
On the Techstream screen, ON or OFF is displayed accordingly.

NG INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side)

OK **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH side)**

| | |
|---|---|
| 9. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side) |

(a) Remove the power window regulator switch assembly (for rear LH side) INFO.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |
| 6 (UP) - 1 (GND) | Free | 10 kΩ or higher |
| 7 (DOWN) - 1 (GND) | Free | 10 kΩ or higher |
| 8 (AUTO) - 1 (GND) | Free | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Rear LH Side)) |

NG ▶ REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH side)

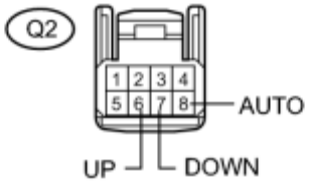
OK

▼

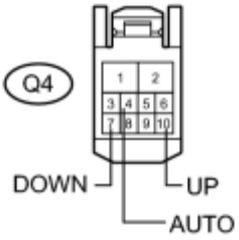
| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (REAR LH SWITCH - REAR LH MOTOR) |

(a) Disconnect the power window regulator motor assembly (for rear LH side) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Q2-6 (UP) - Body ground | Always | 10 kΩ or higher |
| Q2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| Q2-8 (AUTO) - Body ground | Always | 10 kΩ or higher |
| Q4-10 (UP) - Body ground | Always | 10 kΩ or higher |
| Q4-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| Q4-4 (AUTO) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Rear LH Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear LH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH side)**

| | |
|---|---|
| 11. | READ VALUE USING TECHSTREAM (RR-Door Motor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / RR-Door Motor / Data List.

(e) Read the Data List according to the display on the Techstream.

***RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RR Door P/W Auto SW | Rear RH side power window auto up and down switch signal / ON or OFF | ON: Rear RH door power window auto switch operated<br><br>OFF: Rear RH door power window auto switch not operated | - |
| RR Door P/W Up SW | Rear RH side power window manual up switch signal / ON or OFF | ON: Rear RH door power window manual up switch operated<br><br>OFF: Rear RH door power window manual up switch not operated | - |
| RR Door P/W Down SW | Rear RH side power window manual down switch signal / ON or OFF | ON: Rear RH door power window manual down switch operated<br><br>OFF: Rear RH door power window manual down switch not operated | - |

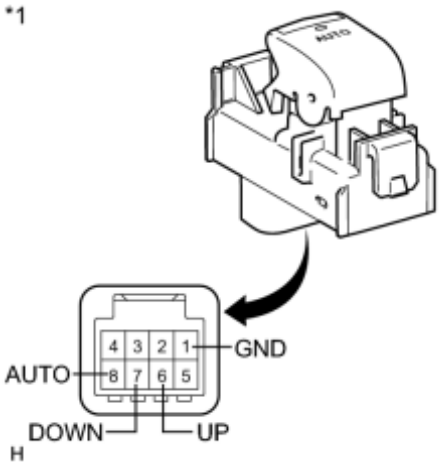
OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side)

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH side)**

| | |
|---|---|
| 12. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side) |




(a) Remove the power window regulator switch assembly (for rear RH side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |
| 6 (UP) - 1 (GND) | Free | 10 kΩ or higher |
| 7 (DOWN) - 1 (GND) | Free | 10 kΩ or higher |
| 8 (AUTO) - 1 (GND) | Free | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Rear RH Side)) |

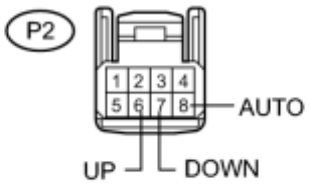
NG ▶ REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH side)

OK

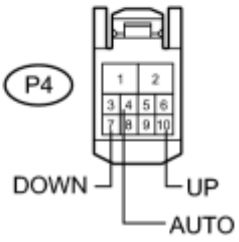
▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (REAR RH SWITCH - REAR RH MOTOR) |

*1




*2




(a) Disconnect the power window regulator motor assembly (for rear RH side) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| P2-6 (UP) - Body ground | Always | 10 kΩ or higher |
| P2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| P2-8 (AUTO) - Body ground | Always | 10 kΩ or higher |
| P4-10 (UP) - Body ground | Always | 10 kΩ or higher |
| P4-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| P4-4 (AUTO) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Rear RH Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear RH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH side)**

| DTC | B2313 | Glass Position Initialization Incomplete |
|---|---|---|

# DESCRIPTION

The power window regulator motor assembly is operated by the multiplex network master switch or power window regulator switch assembly. The power window regulator motor assembly has motor, regulator and ECU functions.

When the ECU determines that the power window regulator motor assembly has not been initialized, DTC B2313 is set.

HINT:

DTC B2313 can be stored in each power window regulator motor assembly (power window ECU).

***D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))***

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2313 | • Power window regulator motor assembly not initialized<br>• Power window regulator motor assembly malfunctions | • Power window regulator motor assembly (for driver side) not initialized<br>• Power window regulator motor assembly (for driver side) |

***P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))***

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2313 | • Power window regulator motor assembly not initialized<br>• Power window regulator motor assembly malfunctions | • Power window regulator motor assembly (for front passenger side) not initialized<br>• Power window regulator motor assembly (for front passenger side) |

***RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))***

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2313 | • Power window regulator motor assembly not initialized<br>• Power window regulator motor assembly malfunctions | • Power window regulator motor assembly (for rear LH side) not initialized<br>• Power window regulator motor assembly (for rear LH side) |

***RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))***

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2313 | • Power window regulator motor assembly not initialized | • Power window regulator motor assembly (for rear RH side) not initialized |

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| | • Power window regulator motor assembly malfunctions | • Power window regulator motor assembly (for rear RH side) |

# INSPECTION PROCEDURE

NOTICE:

- When the power window regulator motor assembly is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
  a. Close the power window by fully pulling up the multiplex network master switch or power window regulator switch assembly and holding it at the auto up position.
  b. Open the power window by fully pushing down the switch.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM INITIALIZATION (APPLICABLE LOCATION) |

(a) Turn the power switch on (IG).

(b) Initialize the power window regulator motor assembly INFO.

HINT:

Initialize the power window regulator motor assembly that has DTC B2313 stored in its ECU.

NEXT



| | |
|---|---|
| 2. | CHECK DTC OUTPUT |

(a) Turn the power switch off.

(b) Wait for at least 10 seconds, and then turn the power switch on (IG).

(c) Check for DTCs INFO.

HINT:

Check for DTCs for the power window regulator motor assembly that has DTC B2313 stored in its ECU.

OK:

DTC B2313 is not output.

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (Driver door power window) | B |
| NG (Front passenger side power window) | C |
| NG (Rear LH side power window) | D |
| NG (Rear RH side power window) | E |

E REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)

D REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)

C REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

B REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

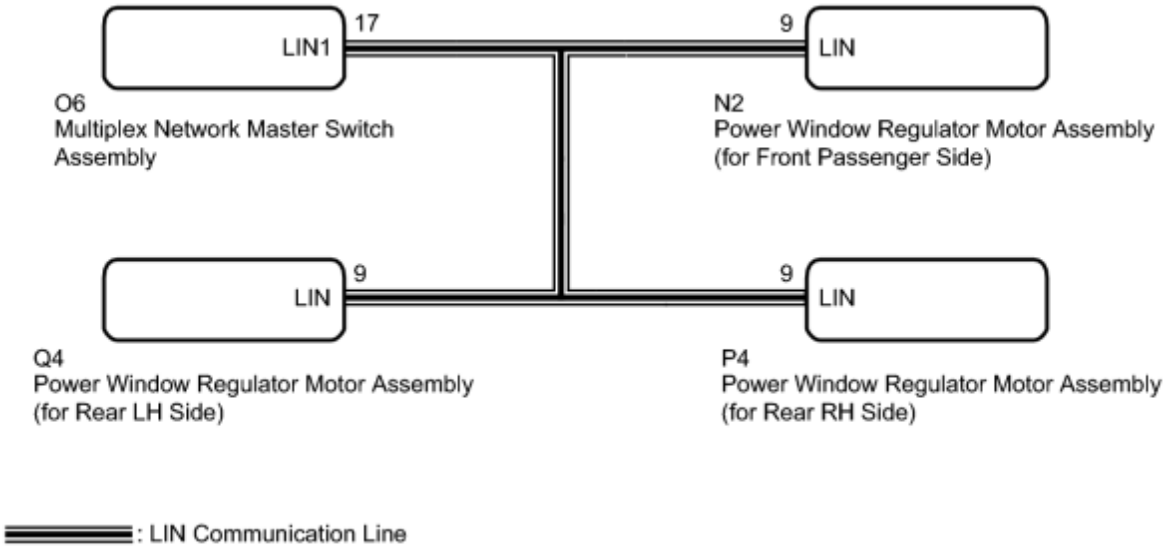
A **END (POWER WINDOW CONTROL SYSTEM HAS NOT BEEN INITIALIZED)**

| Remote Up / Down Function does not Operate |
|---|

# DESCRIPTION

When the power switch is on (IG), the multiplex network master switch assembly sends remote up and down signals to each power window regulator motor assembly via the LIN communication line.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM (Main Body) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Communication P-Door Motor | Connection status between power window regulator motor (for front passenger side) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |
| Communication RL-Door Motor | Connection status between power window regulator motor (for rear LH) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |
| Communication RR-Door Motor | Connection status between power window regulator motor (for rear RH) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |
| Communication Master SW | Connection status between multiplex network master switch assembly and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |

OK:

On the Techstream screen, OK is displayed.

NG ▶ GO TO LIN COMMUNICATION SYSTEM (Proceed to How to Proceed with Troubleshooting)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (Master Switch) |

(a) Enter the following menus: Body Electrical / Master Switch / Data List.

(b) Read the Data List according to the display on the Techstream.

*Master Switch (Multiplex Network Master Switch Assembly)*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| P Door P/W Auto SW | Front passenger side power window auto up and down switch signal / ON or OFF | ON: Front passenger door power window auto switch operated<br><br>OFF: Front passenger door power window auto switch not operated | - |
| RL Door P/W Auto SW | Rear LH side power window auto up and down switch signal / ON or OFF | ON: Rear LH power window auto switch operated<br><br>OFF: Rear LH power window auto switch not operated | - |
| RR Door P/W Auto SW | Rear RH side power window auto up and down switch signal / ON or OFF | ON: Rear RH power window auto switch operated<br><br>OFF: Rear RH power window auto switch not operated | - |
| P Door P/W Up SW | Front passenger side power window manual up switch signal / ON or OFF | ON: Front passenger door power window manual up switch operated<br><br>OFF: Front passenger door power window manual up switch not operated | - |
| RL Door P/W up Switch | Rear LH side power window manual up switch signal / ON or OFF | ON: Rear LH power window manual up switch operated<br><br>OFF: Rear LH power window manual up switch not operated | - |
| RR Door P/W up Switch | Rear RH side power window manual up switch signal / ON or OFF | ON: Rear RH power window manual up switch operated<br><br>OFF: Rear RH power window manual up switch not operated | - |
| P Door P/W Down SW | Front passenger side power window manual down switch signal / ON or OFF | ON: Front passenger door power window manual down switch operated<br><br>OFF: Front passenger door power window manual down switch not operated | - |
| RL Door P/W Down SW | Rear LH side power window manual down switch signal / ON or OFF | ON: Rear LH power window manual down switch operated<br><br>OFF: Rear LH power window manual down switch not operated | - |
| RR Door P/W | Rear RH side power window manual | ON: Rear RH power window manual | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Down SW | down switch signal / ON or OFF | down switch operated<br><br>OFF: Rear RH power window manual down switch not operated | |
| Window Lock Switch Status | Window lock switch signal / ON or OFF | ON: Window lock switch LOCK position<br><br>OFF: Window lock switch UNLOCK position | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (Front passenger side power window remote up and down function does not operate) | B |
| OK (Rear LH side power window remote up and down function does not operate) | C |
| OK (Rear RH side power window remote up and down function does not operate) | D |

D ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)

C ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)

B ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

A ▶ **REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY**

Driver Side Power Window does not Operate with Power Window Master Switch

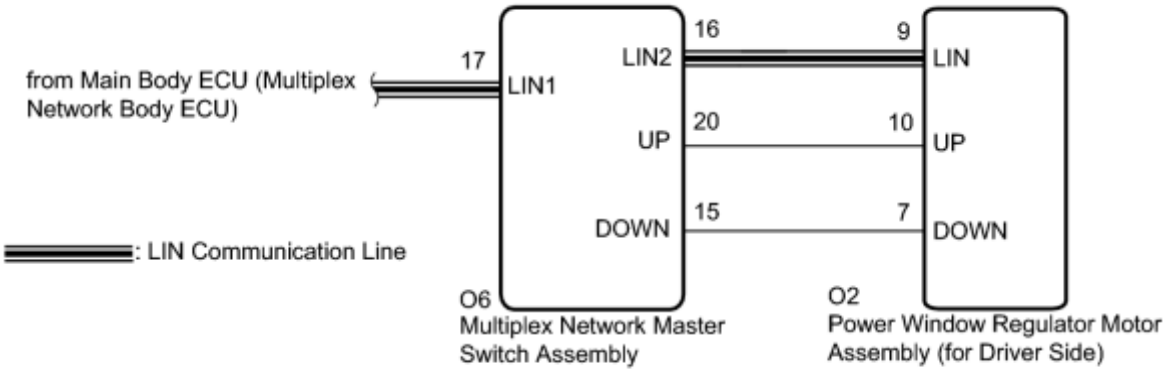
# DESCRIPTION

When the hybrid vehicle control system is running or the power switch is on (IG), the power window regulator motor assembly (for driver side) is operated by the multiplex network master switch assembly. The power window regulator motor assembly (for driver side) has motor, regulator and ECU functions.

HINT:

If the pulse sensor built into the power window regulator motor assembly (for driver side) malfunctions, the power window control system enters fail-safe mode. The remote up and down and auto up and down functions cannot be operated during fail-safe mode. However, the power window can be closed by holding the multiplex network master switch assembly at the auto up position, and opened manually by pushing down the multiplex network master switch assembly.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for driver side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the multiplex network master switch assembly and holding it at the auto up position.
    b. Open the power window by fully pushing down the multiplex network master switch assembly.

- When the ECU determines that the power window regulator motor assembly (for driver side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (Main Body) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Communication D-Door Motor | Connection status between power window regulator motor (for driver side) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |

OK:

On the Techstream screen, OK is displayed.

NG ▶ GO TO LIN COMMUNICATION SYSTEM (Proceed to How to Proceed with Troubleshooting)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (D-Door Motor) |

(a) Enter the following menus: Body Electrical / D-Door Motor / Data List.

(b) Read the Data List according to the display on the Techstream.

***D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D Door P/W Up SW | Driver door power window manual up switch signal / ON or OFF | ON: Driver door power window | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | manual up switch operated<br><br>OFF: Driver door power window manual up switch not operated | |
| D Door P/W Down SW | Driver door power window manual down switch signal / ON or OFF | ON: Driver door power window manual down switch operated<br><br>OFF: Driver door power window manual down switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ CHECK HARNESS AND CONNECTOR (MASTER SWITCH - DRIVER SIDE MOTOR)

OK

▼

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (D-Door Motor) |

(a) Enter the following menus: Body Electrical / D-Door Motor / Active Test.

(b) Perform the Active Test according to the display on the Techstream.

*D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

OK:

Driver door power window operates normally.

CAUTION:

Be careful to avoid injuries as this test causes vehicle parts to move. During the Active Test, the jam protection function will not operate.

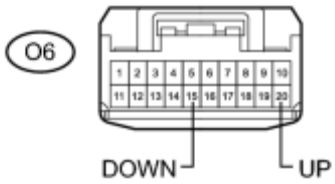
NG ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

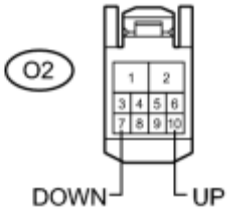
| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (MASTER SWITCH - DRIVER SIDE MOTOR) |

(a) Disconnect the multiplex network master switch assembly connector.

*1




*2




(b) Disconnect the power window regulator motor assembly (for driver side) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O6-20 (UP) - O2-10 (UP) | Always | Below 1 Ω |
| O6-15 (DOWN) - O2-7 (DOWN) | Always | Below 1 Ω |
| O6-20 (UP) - Body ground | Always | 10 kΩ or higher |
| O6-15 (DOWN) - Body ground | Always | 10 kΩ or higher |
| O2-10 (UP) - Body ground | Always | 10 kΩ or higher |
| O2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Multiplex Network Master Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY |

(a) Replace the multiplex network master switch assembly INFO.

NEXT

▼

| | |
|---|---|
| 6. | CHECK MANUAL UP / DOWN FUNCTION (for Driver Side) |

(a) Check that the driver side door power window moves when the manual up and down function of the multiplex network master switch assembly is operated INFO.

OK:

Driver side manual up and down function is normal.

NG ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

OK **END (MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY WAS DEFECTIVE)**

Front Passenger Side Power Window does not Operate with Front Passenger Side Power Window Switch

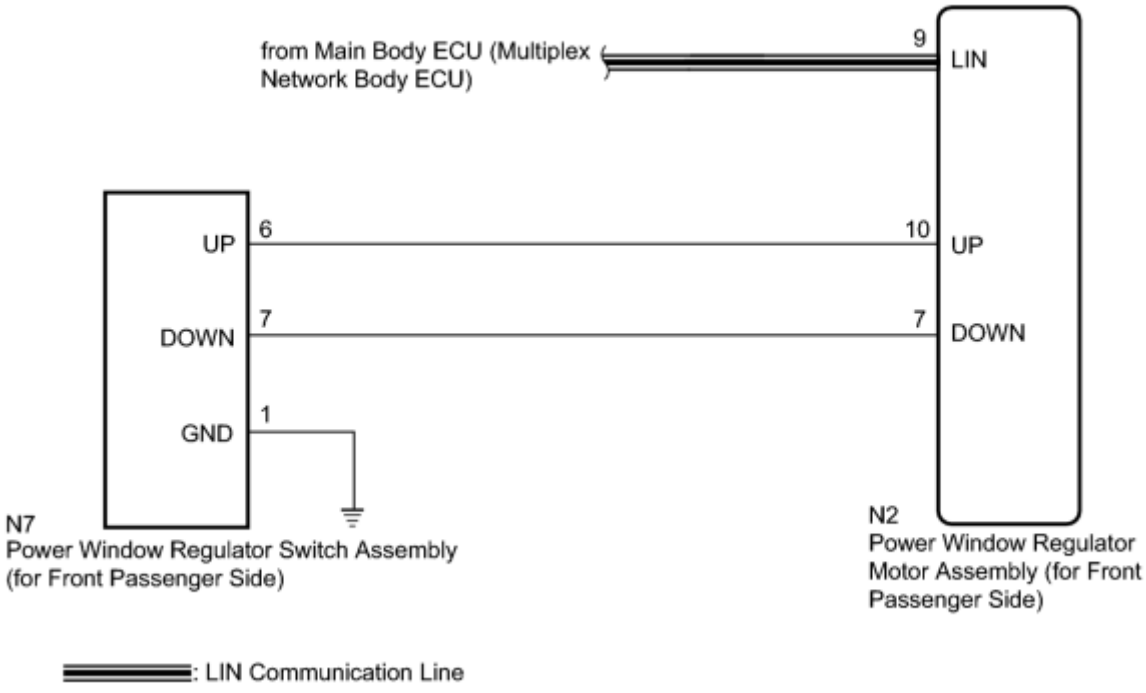
# DESCRIPTION

When the hybrid vehicle control system is running or the power switch is on (IG), the power window regulator motor assembly (for front passenger side) is operated by the power window regulator switch assembly (for front passenger side). The power window regulator motor assembly (for front passenger side) has motor, regulator, and ECU functions.

HINT:

If the pulse sensor built into the power window regulator motor assembly (for front passenger side) malfunctions, the power window control system enters fail-safe mode. The remote up and down and auto up and down functions cannot be operated during fail-safe mode. However, the power window can be closed by holding the power window regulator switch assembly (for front passenger side) at the auto up position, and opened manually by pushing down the power window regulator switch assembly (for front passenger side).

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for front passenger side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the power window regulator switch assembly (for front passenger side) and holding it at the auto up position.
    b. Open the power window by fully pushing down the power window regulator switch assembly (for front passenger side).
- When the ECU determines that the power window regulator motor assembly (for front passenger side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (Main Body) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Communication P-Door Motor | Connection status between power window regulator motor (for front passenger side) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |

OK:

On the Techstream screen, OK is displayed.

NG ▶ GO TO LIN COMMUNICATION SYSTEM (Proceed to How to Proceed with Troubleshooting)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (P-Door Motor) |

(a) Enter the following menus: Body Electrical / P-Door Motor / Data List.

(b) Read the Data List according to the display on the Techstream.

***P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| P Door P/W Up SW | Front passenger side power window manual up switch signal / ON or OFF | ON: Front passenger door power window manual up switch operated<br><br>OFF: Front passenger power window manual up switch not operated | - |
| P Door P/W Down SW | Front passenger side power window manual down switch signal / ON or OFF | ON: Front passenger door power window manual down switch operated<br><br>OFF: Front passenger power window manual down switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side)

OK

▼

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (P-Door Motor) |

(a) Enter the following menus: Body Electrical / P-Door Motor / Active Test.

(b) Perform the Active Test according to the display on the Techstream.

***P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

OK:

Front passenger side power window operates normally.

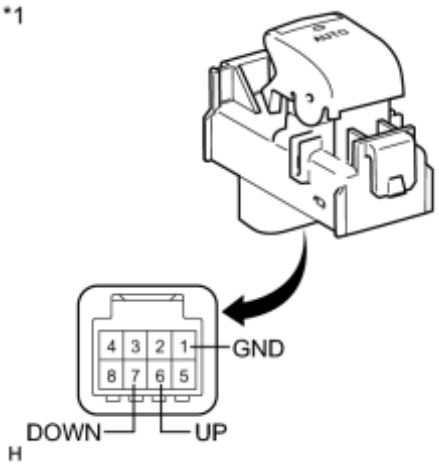
CAUTION:

Be careful to avoid injuries as this test causes vehicle parts to move. During the Active Test, the jam protection function will not operate.

NG ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| | |
|---|---|
| 4. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side) |




(a) Remove the power window regulator switch assembly (for front passenger side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Front Passenger Side)) |

NG ▶ REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side)

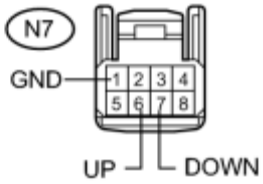
OK

▼

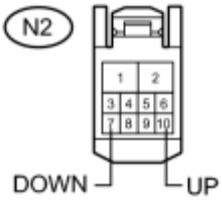
| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (FRONT PASSENGER SIDE SWITCH - MOTOR AND BODY GROUND) |

(a) Disconnect the power window regulator motor assembly (for front passenger side) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| N7-1 (GND) - Body ground | Always | Below 1 Ω |
| N7-6 (UP) - N2-10 (UP) | Always | Below 1 Ω |
| N7-7 (DOWN) - N2-7 (DOWN) | Always | Below 1 Ω |
| N7-6 (UP) - Body ground | Always | 10 kΩ or higher |
| N7-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| N2-10 (UP) - Body ground | Always | 10 kΩ or higher |
| N2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Front Passenger Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)**

Rear Power Window LH does not Operate with Rear Power Window Switch LH

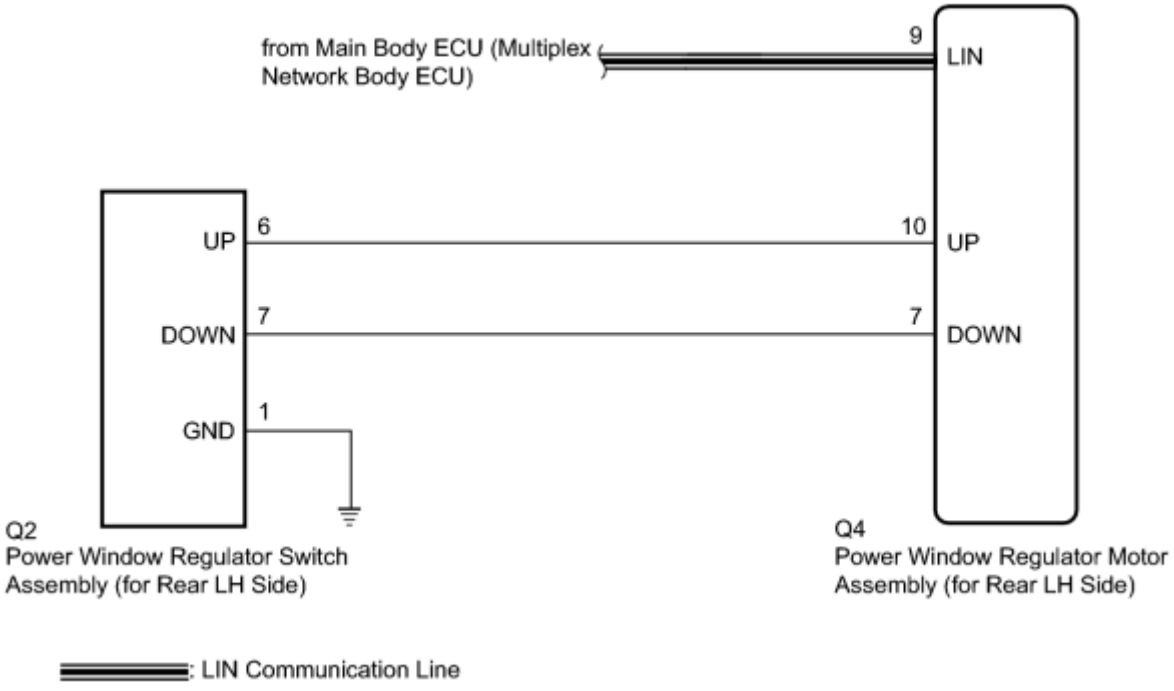
# DESCRIPTION

When the hybrid vehicle control system is running or the power switch is on (IG), the power window regulator motor assembly (for rear LH side) is operated by the power window regulator switch assembly (for rear LH side). The power window regulator motor has motor, regulator, and ECU functions.

HINT:

If the pulse sensor built into the power window regulator motor assembly (for rear LH side) malfunctions, the power window control system enters fail-safe mode. The remote up and down and auto up and down functions cannot be operated during fail-safe mode. However, the power window can be closed by holding the power window regulator switch assembly (for rear LH side) at the auto up position, and opened manually by pushing down the power window regulator switch assembly (for rear LH side).

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for rear LH side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the power window regulator switch assembly (for rear LH side) and holding it at the auto up position.
    b. Open the power window by fully pushing down the power window regulator switch assembly (for rear LH side).
- When the ECU determines that the power window regulator motor assembly (for rear LH side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (Main Body) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Communication RL-Door Motor | Connection status between power window regulator motor (for rear LH) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |

OK:

On the Techstream screen, OK is displayed.

NG ▶ GO TO LIN COMMUNICATION SYSTEM (Proceed to How to Proceed with Troubleshooting)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (RL-Door Motor) |

(a) Enter the following menus: Body Electrical / RL-Door Motor / Data List.

(b) Read the Data List according to the display on the Techstream.

***RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RL Door P/W Up SW | Rear LH side power window manual up switch signal / ON or OFF | ON: Rear LH door power window manual up switch operated<br><br>OFF: Rear LH door power window manual up switch not operated | - |
| RL Door P/W Down SW | Rear LH side power window manual down switch signal / ON or OFF | ON: Rear LH door power window manual down switch operated<br><br>OFF: Rear LH door power window manual down switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side)

OK

▼

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (RL-Door Motor) |

(a) Enter the following menus: Body Electrical / RL-Door Motor / Active Test.

(b) Perform the Active Test according to the display on the Techstream.

***RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

OK:

Rear LH power window operates normally.

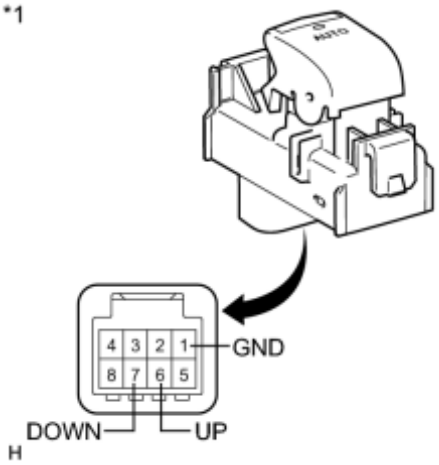
CAUTION:

Be careful to avoid injuries as this test causes vehicle parts to move. During the Active Test, the jam protection function will not operate.

NG REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH side)

OK **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| | |
|---|---|
| 4. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side) |




(a) Remove the power window regulator switch assembly (for rear LH side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Rear LH Side)) |

NG REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH side)

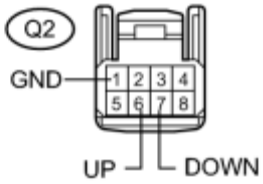
OK

▼

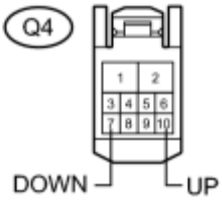
| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (REAR LH SIDE SWITCH - REAR LH SIDE MOTOR AND BODY GROUND) |

(a) Disconnect the power window regulator motor assembly (for rear LH side) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Q2-1 (GND) - Body ground | Always | Below 1 Ω |
| Q2-6 (UP) - Q4-10 (UP) | Always | Below 1 Ω |
| Q2-7 (DOWN) - Q4-7 (DOWN) | Always | Below 1 Ω |
| Q2-6 (UP) - Body ground | Always | 10 kΩ or higher |
| Q2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| Q4-10 (UP) - Body ground | Always | 10 kΩ or higher |
| Q4-7 (DOWN) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Rear LH Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear LH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH side)**

Rear Power Window RH does not Operate with Rear Power Window Switch RH

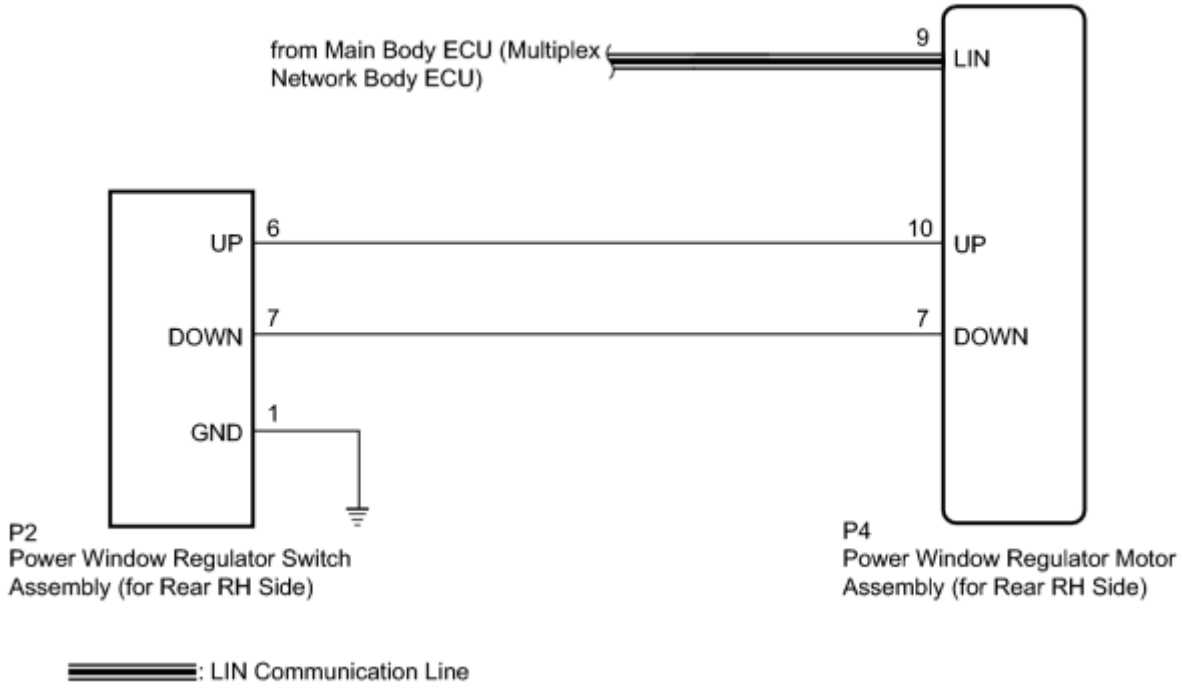
# DESCRIPTION

When the hybrid vehicle control system is running or the power switch is on (IG), the power window regulator motor assembly (for rear RH side) is operated by the power window regulator switch assembly (for rear RH side). The power window regulator motor assembly (for rear RH side) has motor, regulator, and ECU functions.

HINT:

If the pulse sensor built into the power window regulator motor (for rear RH side) malfunctions, the power window control system enters fail-safe mode. The remote up and down and auto up and down functions cannot be operated during fail-safe mode. However, the power window can be closed by holding the power window regulator switch assembly (for rear RH side) at the auto up position, and opened manually by pushing down the power window regulator switch assembly (for rear RH side).

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for rear RH side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the power window regulator switch assembly (for rear RH side) and holding it at the auto up position.
    b. Open the power window by fully pushing down the power window regulator switch assembly (for rear RH side).
- When the ECU determines that the power window regulator motor assembly (for rear RH side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (Main Body) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Communication RR-Door Motor | Connection status between power window regulator motor (for rear RH) and main body ECU (multiplex network body ECU) / OK or STOP | OK: Normal communication<br><br>STOP: Communication stopped | - |

OK:

On the Techstream screen, OK is displayed.

NG ▶ GO TO LIN COMMUNICATION SYSTEM (Proceed to How to Proceed with Troubleshooting)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (RR-Door Motor) |

(a) Enter the following menus: Body Electrical / RR-Door Motor / Data List.

(b) Read the Data List according to the display on the Techstream.

***RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RR Door P/W Up SW | Rear RH side power window manual up switch signal / ON or OFF | ON: Rear RH door power window manual up switch operated<br><br>OFF: Rear RH door power window manual up switch not operated | - |
| RR Door P/W Down SW | Rear RH side power window manual down switch signal / ON or OFF | ON: Rear RH door power window manual down switch operated<br><br>OFF: Rear RH door power window manual down switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side)

OK

▼

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (RR-Door Motor) |

(a) Enter the following menus: Body Electrical / RR-Door Motor / Active Test.

(b) Perform the Active Test according to the display on the Techstream.

***RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power Window | Power window | OFF / UP / DOWN | - |

OK:

Rear RH power window operates normally.

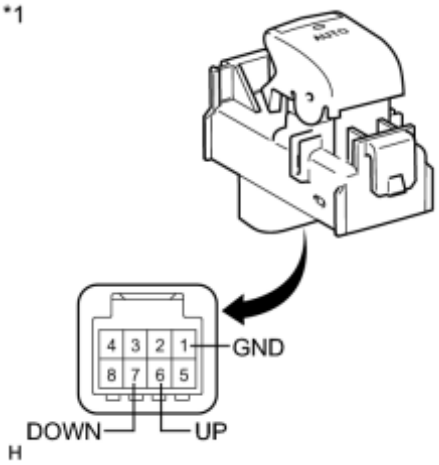
CAUTION:

Be careful to avoid injuries as this test causes vehicle parts to move. During the Active Test, the jam protection function will not operate.

NG REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH side)

OK **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| | |
|---|---|
| 4. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side) |




(a) Remove the power window regulator switch assembly (for rear RH side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Rear RH Side)) |

NG REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH side)

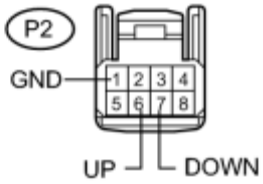
OK

▼

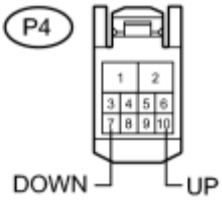
| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (REAR RH SIDE SWITCH - REAR RH SIDE MOTOR AND BODY GROUND) |

(a) Disconnect the power window regulator motor assembly (for rear RH side) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| P2-1 (GND) - Body ground | Always | Below 1 Ω |
| P2-6 (UP) - P4-10 (UP) | Always | Below 1 Ω |
| P2-7 (DOWN) - P4-7 (DOWN) | Always | Below 1 Ω |
| P2-6 (UP) - Body ground | Always | 10 kΩ or higher |
| P2-7 (DOWN) - Body ground | Always | 10 kΩ or higher |
| P4-10 (UP) - Body ground | Always | 10 kΩ or higher |
| P4-7 (DOWN) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Rear RH Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear RH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH side)**

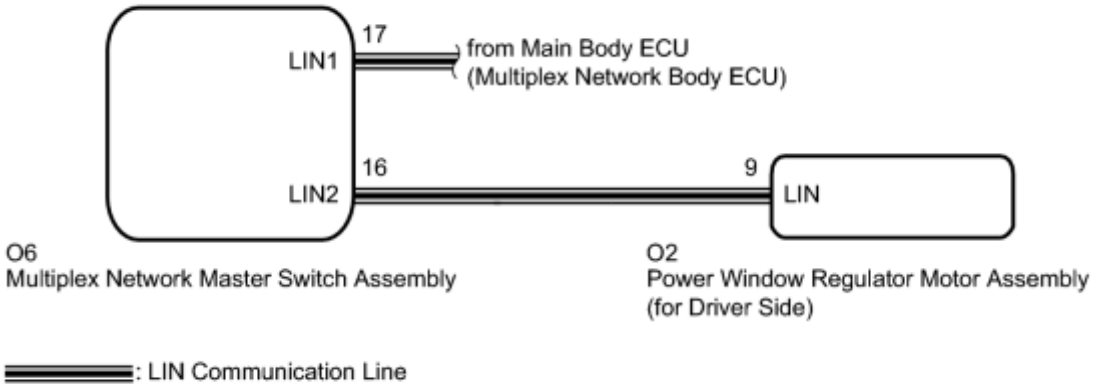
Driver Side Power Window Auto Up / Down Function does not Operate with Power Window Master Switch

# DESCRIPTION

If the manual up and down function can be performed but the auto up and down function cannot, then the fail-safe mode may be functioning.

If the power window initialization INFO has not been performed, the auto up and down function will not operate.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for driver side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the multiplex network master switch assembly and holding it at the auto up position.
    b. Open the power window by fully pushing down the multiplex network master switch assembly.
- When the ECU determines that the power window regulator motor assembly (for driver side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (Master Switch) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Master switch / Data List.

(e) Read the Data List according to the display on the Techstream.

***Master Switch (Multiplex Network Master Switch Assembly)***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D Door P/W Auto SW | Driver door power window auto up and down switch signal / ON or OFF | ON: Driver door power window auto switch operated<br><br>OFF: Driver door power window auto switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (D-Door Motor) |

(a) Enter the following menus: Body Electrical / D-Door Motor / Data List.

(b) Read the Data List according to the display on the Techstream.

***D-Door Motor (Power Window Regulator Motor Assembly (for Driver Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D Door P/W Auto SW | Driver door power window auto up and down switch signal / ON or OFF | ON: Driver door power window auto switch operated<br><br>OFF: Driver door power window auto switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 3. | PERFORM INITIALIZATION (for Driver Side) |

(a) Initialize the power window regulator motor assembly (for driver side) INFO.

NEXT

▼

| | |
|---|---|
| 4. | CHECK POWER WINDOW CONTROL SYSTEM (AUTO UP/DOWN FUNCTION) |

(a) Check that the driver side door power window moves when the auto up and down function of the multiplex network master switch assembly is operated INFO.

OK:

Driver side auto up and down function is normal.

NG ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

OK ▶ **END (PROBLEM DUE TO INITIALIZATION FAILURE)**

| | |
|---|---|
| 5. | REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY |

(a) Replace the multiplex network master switch assembly INFO.

NEXT

▼

| | |
|---|---|
| 6. | CHECK POWER WINDOW CONTROL SYSTEM (AUTO UP/DOWN FUNCTION) |

(a) Check that the driver side door power window moves when the auto up and down function of the multiplex network master switch assembly is operated INFO.

OK:

Driver side auto up and down function is normal.

NG ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)

OK ▶ **END (MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY WAS DEFECTIVE)**

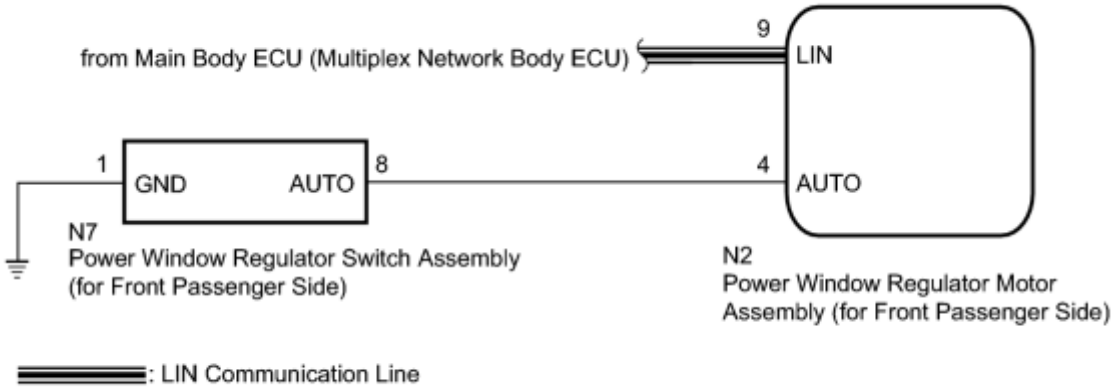
| Front Passenger Side Power Window Auto Up / Down Function does not Operate with Front Passenger Side Power Window Switch |
|---|

# DESCRIPTION

If the manual up and down function can be performed but the auto up and down function cannot, the fail-safe mode may be functioning.

If the power window initialization INFO has not been performed, the auto up and down function will not operate.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for front passenger side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the power window regulator switch assembly (for front passenger side) and holding it at the auto up position.
    b. Open the power window by fully pushing down the power window regulator switch assembly (for front passenger side).
- When the ECU determines that the power window regulator motor assembly (for front passenger side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (P-Door Motor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / P-Door Motor / Data List.

(e) Read the Data List according to the display on the Techstream.

***P-Door Motor (Power Window Regulator Motor Assembly (for Front Passenger Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| P Door P/W Auto SW | Front passenger side power window auto switch signal / ON or OFF | ON: Front passenger door power window auto switch operated<br><br>OFF: Front passenger door power window auto switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side)

OK

▼

| | |
|---|---|
| 2. | PERFORM INITIALIZATION (for Front Passenger Side) |

(a) Initialize the power window regulator motor assembly (for front passenger side) INFO.

NEXT

▼

| | |
|---|---|
| 3. | CHECK POWER WINDOW CONTROL SYSTEM (AUTO UP/DOWN FUNCTION) |

(a) Check that the front passenger side door power window moves when the auto up and down function of the power window regulator switch assembly (for front passenger side) is operated INFO.

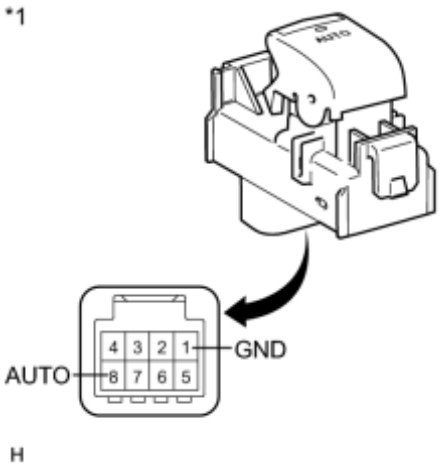
OK:

Front passenger side auto up and down function is normal.

NG ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)

OK ▶ **END (PROBLEM DUE TO INITIALIZATION FAILURE)**

| | |
|---|---|
| 4. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side) |




(a) Remove the power window regulator switch assembly (for front passenger side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Front Passenger Side)) |

NG ▶ REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Front Passenger Side)

OK

▼

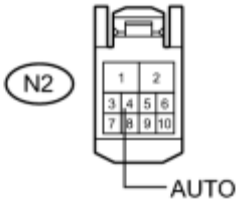
| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (POWER WINDOW SWITCH - REGULATOR MOTOR) |

(a) Disconnect the power window regulator motor assembly (for front passenger side) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| N7-8 (AUTO) - N2-4 (AUTO) | Always | Below 1 Ω |
| N7-8 (AUTO) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Front Passenger Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)**

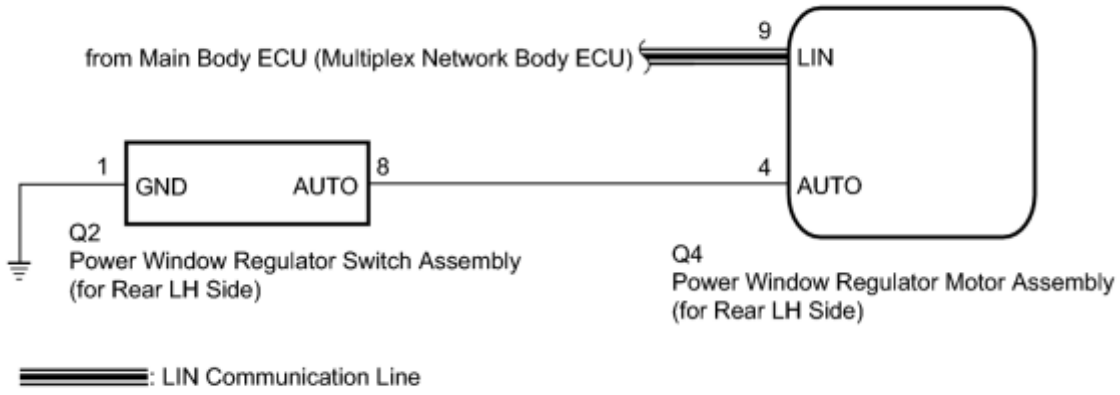
Rear Power Window LH Auto Up / Down Function does not Operate with Rear Power Window Switch LH

# DESCRIPTION

If the manual up and down function can be performed but the auto up and down function cannot, the fail-safe mode may be functioning.

If the power window initialization INFO has not been performed, the auto up and down function will not operate.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for rear LH side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the power window regulator switch assembly (for rear LH side) and holding it at the auto up position.
    b. Open the power window by fully pushing down the power window regulator switch assembly (for rear LH side).
- When the ECU determines that the power window regulator motor assembly (for rear LH side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (RL-Door Motor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / RL-Door Motor / Data List.

(e) Read the Data List according to the display on the Techstream.

***RL-Door Motor (Power Window Regulator Motor Assembly (for Rear LH Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RL Door P/W Auto SW | Rear LH side power window auto switch signal / ON or OFF | ON: Rear LH power window auto switch operated<br><br>OFF: Rear LH power window auto switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side)

OK

▼

| | |
|---|---|
| 2. | PERFORM INITIALIZATION (for Rear LH Side) |

(a) Initialize the power window regulator motor assembly (for rear LH side) INFO.

NEXT

▼

| | |
|---|---|
| 3. | CHECK POWER WINDOW CONTROL SYSTEM (AUTO UP/DOWN FUNCTION) |

(a) Check that the rear LH side door power window moves when the auto up and down function of the power window regulator switch assembly (for rear LH side) is operated INFO.

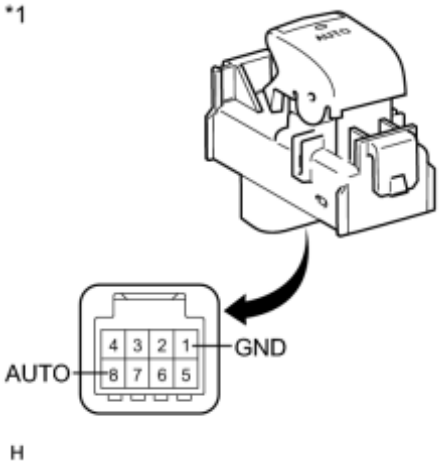
OK:

Rear LH side auto up and down function is normal.

NG REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)

OK **END (PROBLEM DUE TO INITIALIZATION FAILURE)**

| | |
|---|---|
| 4. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side) |




(a) Remove the power window regulator switch assembly (for rear LH side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Rear LH Side)) |

NG REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear LH Side)

OK

▼

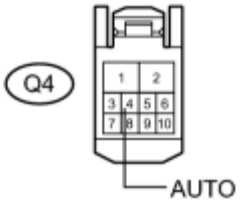
| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (REAR LH SIDE SWITCH - REAR LH SIDE MOTOR) |

(a) Disconnect the power window regulator motor assembly (for rear LH side) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| Q2-8 (AUTO) - Q4-4 (AUTO) | Always | Below 1 Ω |
| Q2-8 (AUTO) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Rear LH Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear LH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)**

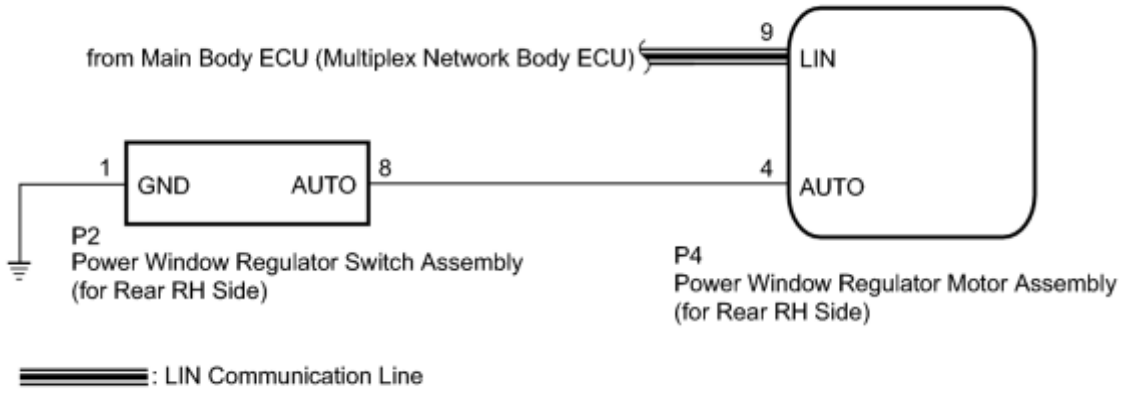
Rear Power Window RH Auto Up / Down Function does not Operate with Rear Power Window Switch RH

# DESCRIPTION

If the manual up and down function can be performed but the auto up and down function cannot, the fail-safe mode may be functioning.

If the power window initialization INFO has not been performed, the auto up and down function will not operate.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly (for rear RH side) is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the power window regulator switch assembly (for rear RH side) and holding it at the auto up position.
    b. Open the power window by fully pushing down the power window regulator switch assembly (for rear RH side).
- When the ECU determines that the power window regulator motor assembly (for rear RH side) has a malfunction, DTC B2311 is set.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (RR-Door Motor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / RR-Door Motor / Data List.

(e) Read the Data List according to the display on the Techstream.

***RR-Door Motor (Power Window Regulator Motor Assembly (for Rear RH Side))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RR Door P/W Auto SW | Rear RH side power window auto switch signal / ON or OFF | ON: Rear RH power window auto switch operated<br><br>OFF: Rear RH power window auto switch not operated | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side)

OK

▼

| | |
|---|---|
| 2. | PERFORM INITIALIZATION (for Rear RH Side) |

(a) Initialize the power window regulator motor assembly (for rear RH side) INFO.

NEXT

▼

| | |
|---|---|
| 3. | CHECK POWER WINDOW CONTROL SYSTEM (AUTO UP/DOWN FUNCTION) |

(a) Check that the rear RH side door power window moves when the auto up and down function of the power window regulator switch assembly (for rear RH side) is operated INFO.

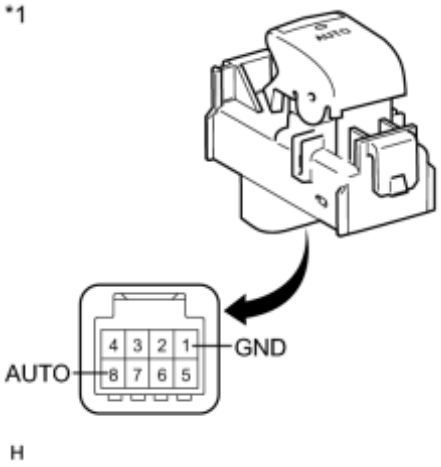
OK:

Rear RH side auto up and down function is normal.

NG REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)

OK **END (PROBLEM DUE TO INITIALIZATION FAILURE)**

| | |
|---|---|
| 4. | INSPECT POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side) |




(a) Remove the power window regulator switch assembly (for rear RH side) INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Window Regulator Switch Assembly (for Rear RH Side)) |

NG REPLACE POWER WINDOW REGULATOR SWITCH ASSEMBLY (for Rear RH Side)

OK

▼

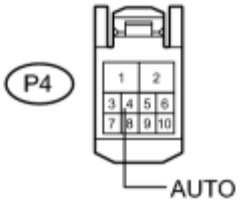
| | |
|---|---|
| 5. | CHECK HARNESS OR CONNECTOR (REAR RH SIDE SWITCH - REAR RH SIDE MOTOR) |

(a) Disconnect the power window regulator motor assembly (for rear RH side) connector.

*1




*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| P2-8 (AUTO) - P4-4 (AUTO) | Always | Below 1 Ω |
| P2-8 (AUTO) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Window Regulator Switch Assembly (for Rear RH Side)) |
| *2 | Front view of wire harness connector<br><br>(to Power Window Regulator Motor Assembly (for Rear RH Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)**

| Key-off Operation Function Operates even if Operating Conditions are not Satisfied |
|---|

# DESCRIPTION

- When the front doors are closed, each power window regulator motor assembly can control its power window operation for approximately 45 seconds after the power switch is turned from on (IG) to off by receiving operation permission signals from the main body ECU (multiplex network body ECU).
- However, when approximately 45 seconds have elapsed, or the driver side door or front passenger side door is opened within approximately 45 seconds of the power switch being turned off, the power window regulator motor assembly stops operating.
- During an auto operation, when 45 seconds have passed and key-off operation is prohibited, the window operation stops immediately.

# INSPECTION PROCEDURE

NOTICE:

The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.

# PROCEDURE

| 1. | CHECK MANUAL UP / DOWN FUNCTION |
|---|---|

(a) Check that the manual up and down function using the multiplex network master switch assembly and power window regulator switch assemblies can operate all the power windows INFO.

OK:

Manual up and down function is normal.

NG ▶ GO TO OTHER PROBLEM (Proceed to Problem Symptoms Table)

OK

▼

| 2. | CHECK REMOTE UP / DOWN FUNCTION |
|---|---|

(a) Check that the remote up and down function using the multiplex network master switch assembly operates the power windows INFO.

OK:

Remote up and down function is normal.

NG GO TO OTHER PROBLEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 3. | CHECK OPERATION FUNCTION AFTER POWER SWITCH IS TURNED OFF |

(a) Check the power window operation function after the power switch is turned off.

Result:

| Result | Proceed to |
|---|---|
| When power window can still be operated even after opening driver side door or front passenger side door within approximately 45 seconds of power switch being turned off | A |
| When power window can still be operated even after approximately 45 seconds have elapsed after power switch is turned off (for All Doors) | B |
| When power window can still be operated even after approximately 45 seconds have elapsed after power switch is turned off (for Driver Side, Front Passenger Side, Rear LH Side or Rear RH Side)) | C* |

HINT:

*: Replace the power window regulator motor assembly INFO for Front Door, INFO for Rear Door) for the window that still operates when more than 45 seconds have elapsed after the power switch was turned off.

C REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (APPLICABLE LOCATION)

B REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

A

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (Main Body) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

*Main Body (Main Body ECU (Multiplex Network Body ECU))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Door Courtesy SW | Front door courtesy switch RH signal / ON or OFF | ON: Front door RH open<br><br>OFF: Front door RH closed | - |
| FL Door Courtesy SW | Front door courtesy switch LH signal / ON or OFF | ON: Front door LH open<br><br>OFF: Front door LH closed | - |

OK:

On the Techstream screen, ON or OFF is displayed accordingly.

NG ▶ GO TO LIGHTING SYSTEM (Proceed to Door Courtesy Light Switch Circuit)

OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| Auto Up Operation does not Fully Close Power Window (Jam Protection Function is Activated) |
|---|

# DESCRIPTION

If a door glass or a power window regulator motor assembly does not operate smoothly, the jam protection function may be triggered automatically, resulting in the auto up function being unable to fully close the window.

HINT:

This symptom may occur for any of the windows.

# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly and holding it at the auto up position.
    b. Open the power window by fully pushing down the multiplex network master switch assembly or power window regulator switch assembly.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM INITIALIZATION (APPLICABLE LOCATION) |

(a) Initialize the power window regulator motor assembly (applicable location) INFO.

NEXT

| | |
|---|---|
| 2. | CHECK POWER WINDOW CONTROL SYSTEM (AUTO UP/DOWN FUNCTION (APPLICABLE LOCATION)) |

(a) Check that all the power windows move when the auto up and down function of the multiplex network master switch assembly and power window regulator switch assemblies are operated INFO.

OK:

Auto up and down function is normal (applicable location).

NG ▶ CHECK WINDOW GLASS SLIDING MOVEMENT (APPLICABLE LOCATION)
OK ▶ **END (PROBLEM DUE TO INITIALIZATION FAILURE)**

| | |
|---|---|
| 3. | CHECK WINDOW GLASS SLIDING MOVEMENT (APPLICABLE LOCATION) |

(a) Remove the window regulator.

(b) Install the window glass onto the door glass run.

(c) Check if the door window regulator operates smoothly.

(d) Check that the window glass slides smoothly when sliding it up by hand.

OK:

Door window glass slides smoothly.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (Driver door power window) | B |
| OK (Front passenger side power window) | C |
| OK (Rear LH side power window) | D |
| OK (Rear RH side power window) | E |

HINT:

Ensure the following:

- The window glass fits with the glass run without improper contact or deformation.
- Foreign objects are not caught in the glass run.

CAUTION:

Perform initialization again.

E ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)
D ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)
C ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)
B ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)
A ▶ **FIT WINDOW GLASS CORRECTLY (REMOVE FOREIGN OBJECTS CAUSING IMPROPER FIT OR REPLACE PARTS)**

| Jam Protection Function does not Operate |
|---|

# DESCRIPTION

This symptom may occur for any of the windows.

The jam protection function operates within a specified range during the manual up or auto up operation.

# INSPECTION PROCEDURE

NOTICE:

- The power window control system uses a multiplex communication system (LIN communication system). Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the power window control system after confirming that the communication system is functioning properly.
- When the power window regulator motor assembly is reinstalled or replaced, the power window control system must be initialized.
- After a door glass or a door glass run has been replaced, the jam protection function may operate unexpectedly when the auto up function is used. In such cases, the auto up function can be reinitialized by repeating the following operations at least 5 times:
    a. Close the power window by fully pulling up the multiplex network master switch assembly or power window regulator switch assembly and holding it at the auto up position.
    b. Open the power window by fully pushing down the multiplex network master switch assembly or power window regulator switch assembly.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM INITIALIZATION (APPLICABLE LOCATION) |

(a) Initialize the power window regulator motor assembly (applicable location) INFO.

NEXT

| | |
|---|---|
| 2. | CHECK POWER WINDOW CONTROL SYSTEM (AUTO UP/DOWN FUNCTION) |

(a) Check if the power window auto up and down function operates normally INFO.

OK:

Auto up and down function is normal.

NG ▶ GO TO OTHER PROBLEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 3. | CHECK JAM PROTECTION FUNCTION OPERATING RANGE |

(a) Check if the jam protection function operates normally for the applicable power window.

HINT:

The jam protection function will not operate within 4 mm (0.157 in.) of the fully closed position.

OK:

Jam protection function operates normally.

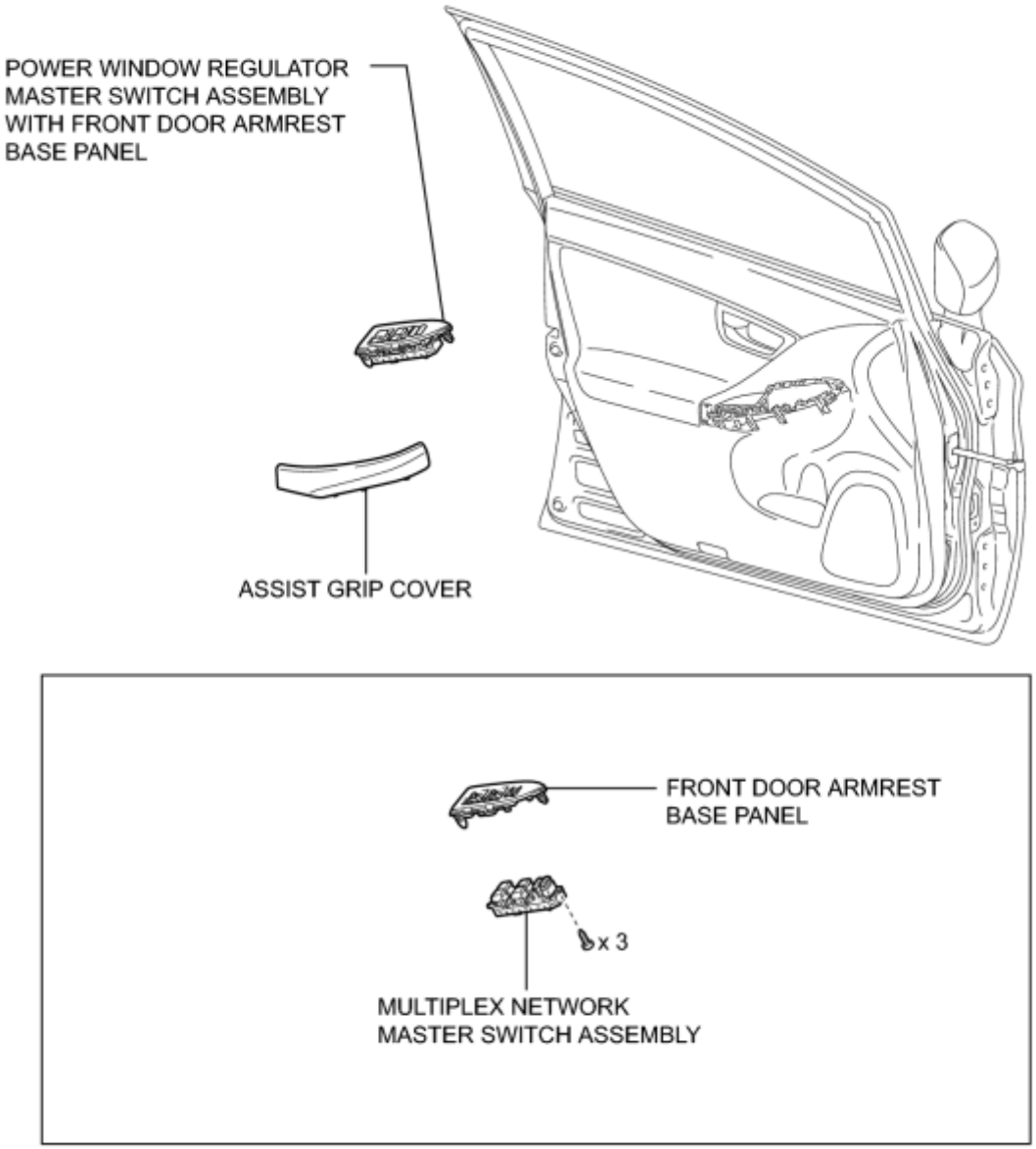
Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (Driver door power window) | B |
| NG (Front passenger side power window) | C |
| NG (Rear LH side power window) | D |
| NG (Rear RH side power window) | E |

E ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear RH Side)
D ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Rear LH Side)
C ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Front Passenger Side)
B ▶ REPLACE POWER WINDOW REGULATOR MOTOR ASSEMBLY (for Driver Side)
A ▶ **END (PROBLEM DUE TO INITIALIZATION FAILURE)**

# COMPONENTS

# ILLUSTRATION



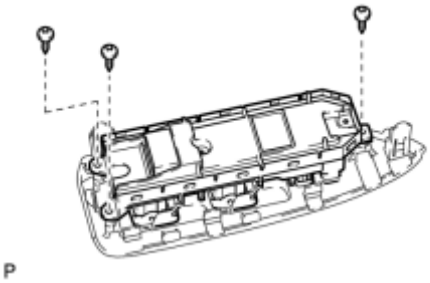

P

# REMOVAL

1. REMOVE ASSIST GRIP COVER INFO

2. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL INFO

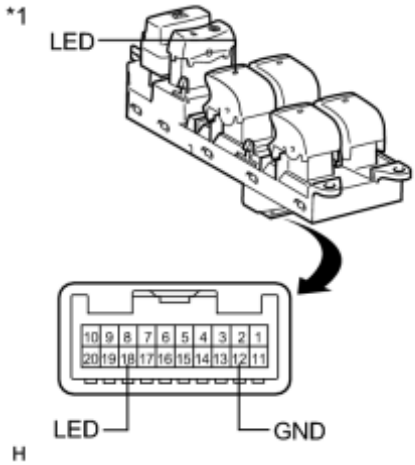
3. REMOVE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY




(a) Remove the 3 screws and the multiplex network master switch assembly.

# INSPECTION

1. INSPECT MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY




(a) Check that the LED illuminates.

(1) Apply battery voltage to the multiplex network master switch assembly and check that the LED illuminates.

OK:

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → 18 (LED)<br><br>Battery negative (-) → 12 (GND) | LED illuminates |

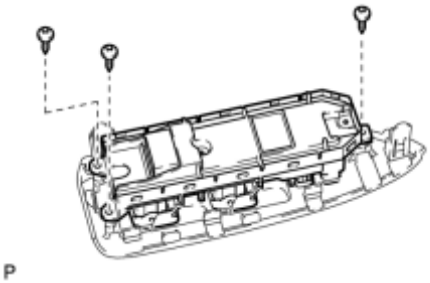
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Multiplex Network Master Switch Assembly) |

If the result is not as specified, replace the multiplex network master switch assembly.

# INSTALLATION

1. INSTALL MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY



P

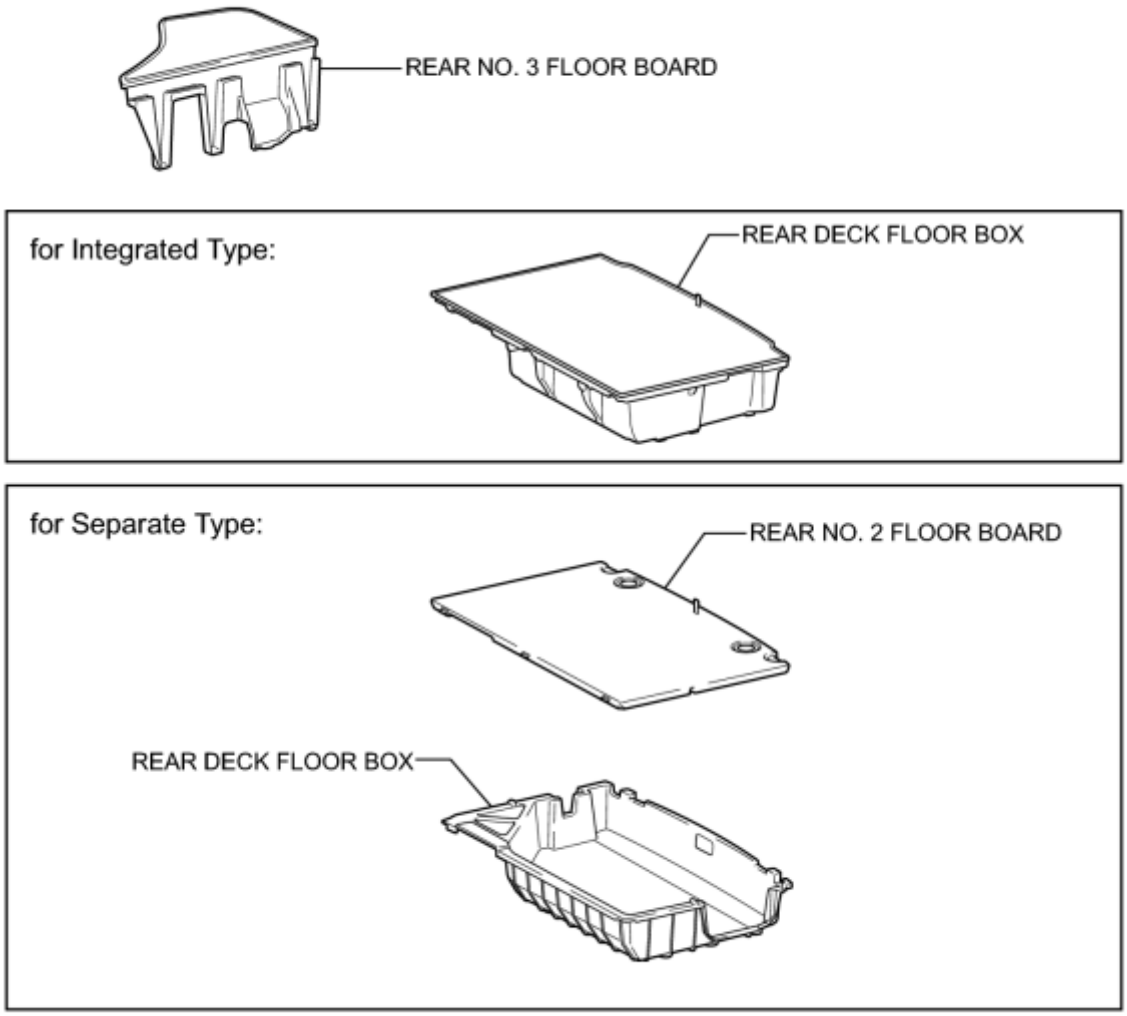
(a) Install the multiplex network master switch assembly with the 3 screws.

2. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL INFO

3. INSTALL ASSIST GRIP COVER INFO

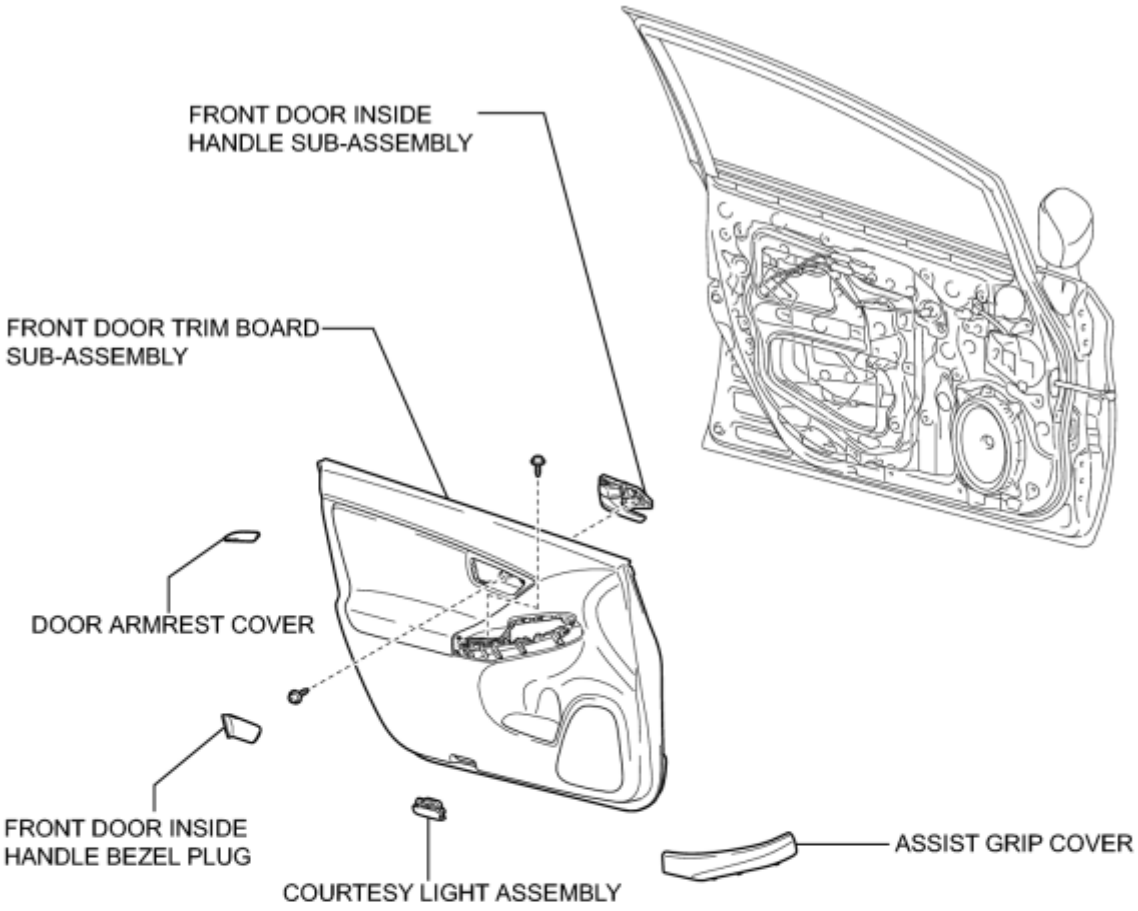
# COMPONENTS

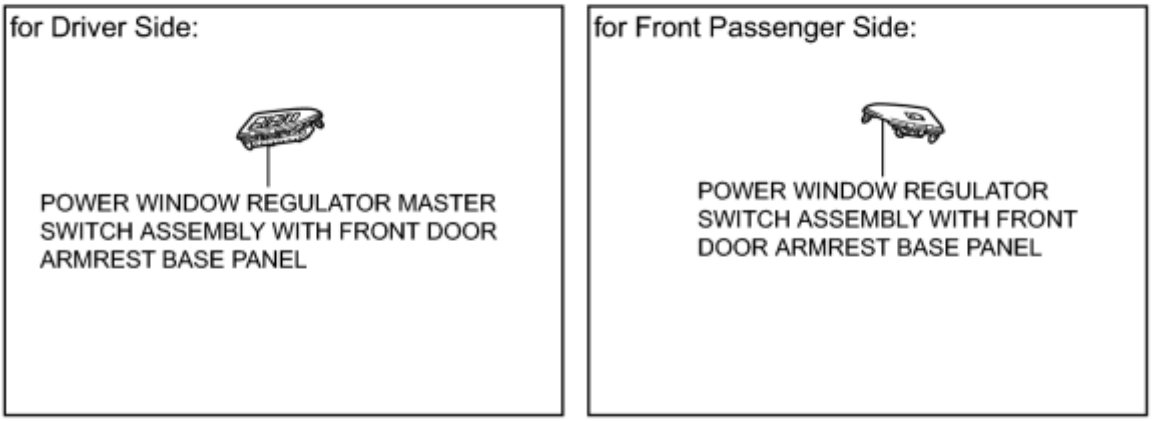
# ILLUSTRATION




P

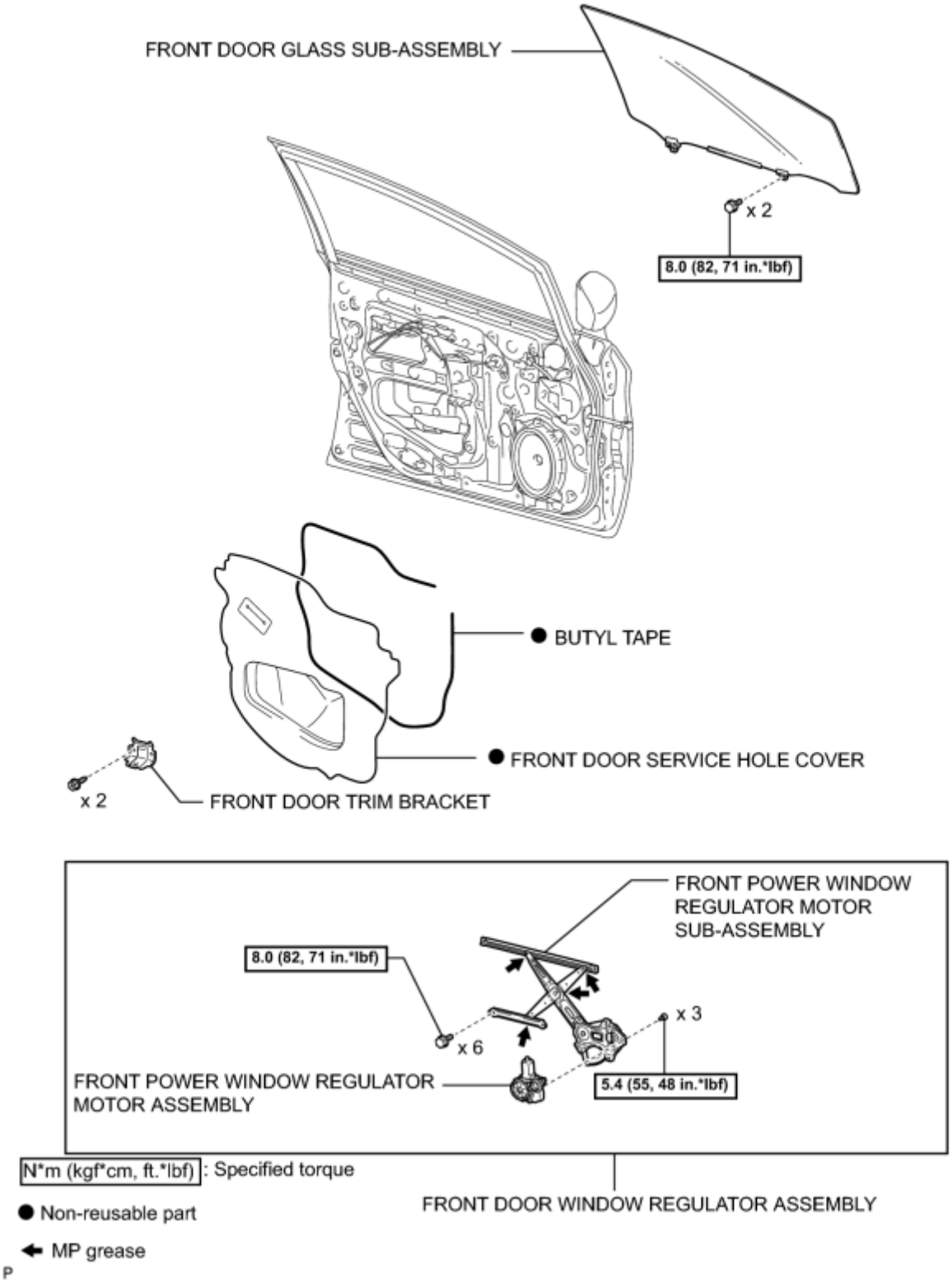
# ILLUSTRATION




P

# ILLUSTRATION


FRONT DOOR GLASS SUB-ASSEMBLY
x 2
8.0 (82, 71 in.*lbf)
BUTYL TAPE
FRONT DOOR SERVICE HOLE COVER
x 2
FRONT DOOR TRIM BRACKET
FRONT POWER WINDOW REGULATOR MOTOR SUB-ASSEMBLY
8.0 (82, 71 in.*lbf)
x 3
x 6
FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY
5.4 (55, 48 in.*lbf)
N*m (kgf*cm, ft.*lbf) : Specified torque
Non-reusable part
MP grease
FRONT DOOR WINDOW REGULATOR ASSEMBLY
P

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE ASSIST GRIP COVER INFO

6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

7. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

8. REMOVE DOOR ARMREST COVER INFO

9. REMOVE COURTESY LIGHT ASSEMBLY INFO

10. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

12. REMOVE FRONT DOOR TRIM BRACKET INFO

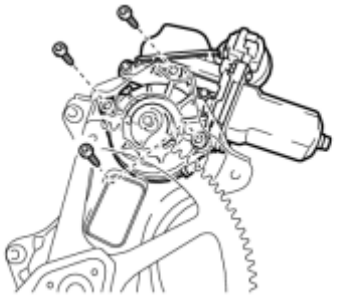
13. REMOVE FRONT DOOR SERVICE HOLE COVER INFO

14. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY INFO

15. REMOVE FRONT DOOR WINDOW REGULATOR ASSEMBLY INFO

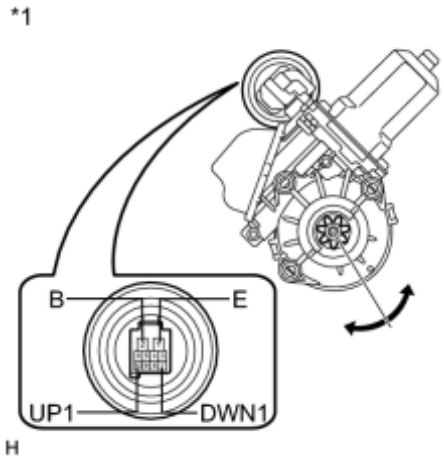
16. REMOVE FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY

(a) Using a T25 "TORX" driver, remove the 3 screws and the front power window regulator motor assembly.


P

# INSPECTION

1. INSPECT FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY LH




(a) Apply positive (+) battery voltage to connector terminal 2 (B).

NOTICE:

Do not apply positive (+) battery voltage to any terminals other than terminal 2 (B) to avoid damaging the pulse sensor inside the motor.

(b) Connect a ground lead to connector terminals 1 (E) and 7 (DWN1) or 10 (UP1).

(c) Check that the motor gear rotates smoothly as follows:

OK:

| Measurement Condition | Specified Condition |
|---|---|
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect a negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 10 (UP1).<br>3. Disconnect and reconnect the negative (-) battery lead to terminal 10 (UP1) within 1 second. | Motor gear rotates clockwise |
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect a negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 7 (DWN1).<br>3. Disconnect and reconnect the negative (-) battery lead to terminal 7 (DWN1) within 1 second. | Motor gear rotates counterclockwise |

***Text in Illustration***

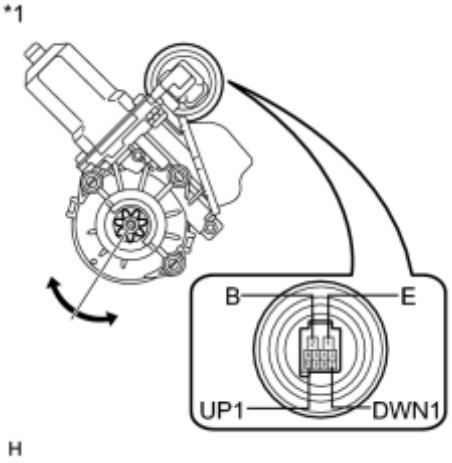
| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Front Power Window Regulator Motor Assembly LH) |

- If the result is not as specified, replace the front power window regulator motor assembly LH.

CAUTION:

Reset the power window regulator motor (initialize the pulse sensor) after installing the power window regulator motor and regulator assembly onto the door.

2. INSPECT FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY RH




(a) Apply positive (+) battery voltage to connector terminal 2 (B).

NOTICE:

Do not apply positive (+) battery voltage to any terminals other than terminal 2 (B) to avoid damaging the pulse sensor inside the motor.

(b) Connect a ground lead to connector terminals 1 (E) and 7 (DWN1) or 10 (UP1).

(c) Check that the motor gear rotates smoothly as follows:

OK:

| Measurement Condition | Specified Condition |
|---|---|
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect a negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 10 (UP1).<br>3. Disconnect and reconnect the negative (-) battery lead to terminal 10 (UP1) within 1 second. | Motor gear rotates counterclockwise |
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect a negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 7 (DWN1).<br>3. Disconnect and reconnect the negative (-) battery lead to terminal 7 (DWN1) within 1 second. | Motor gear rotates clockwise |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Front Power Window Regulator Motor Assembly RH) |

- If the result is not as specified, replace the front power window regulator motor assembly RH.

CAUTION:

Reset the power window regulator motor (initialize the pulse sensor) after installing the power window regulator motor and regulator assembly onto the door.

# INSTALLATION

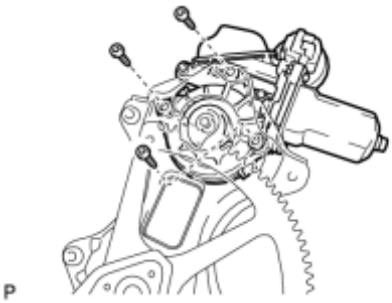
HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. INSTALL FRONT POWER WINDOW REGULATOR MOTOR ASSEMBLY

NOTICE:

The regulator arm must be below the intermediate position when installing the front power window regulator motor assembly.



P

(a) Using a T25 "TORX" driver, install the front power window regulator motor assembly with the 3 screws.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

HINT:

A new front window regulator uses self-tapping screws to thread new installation holes when the self-tapping screws are inserted.

2. INSTALL FRONT DOOR WINDOW REGULATOR ASSEMBLY INFO

3. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY INFO

4. INSTALL FRONT DOOR SERVICE HOLE COVER INFO

5. INSTALL FRONT DOOR TRIM BRACKET INFO

6. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

7. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

8. INSTALL COURTESY LIGHT ASSEMBLY INFO

9. INSTALL DOOR ARMREST COVER INFO

10. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

11. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

12. INSTALL ASSIST GRIP COVER INFO

13. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

14. INSTALL REAR NO. 3 FLOOR BOARD INFO

15. INSTALL REAR DECK FLOOR BOX INFO

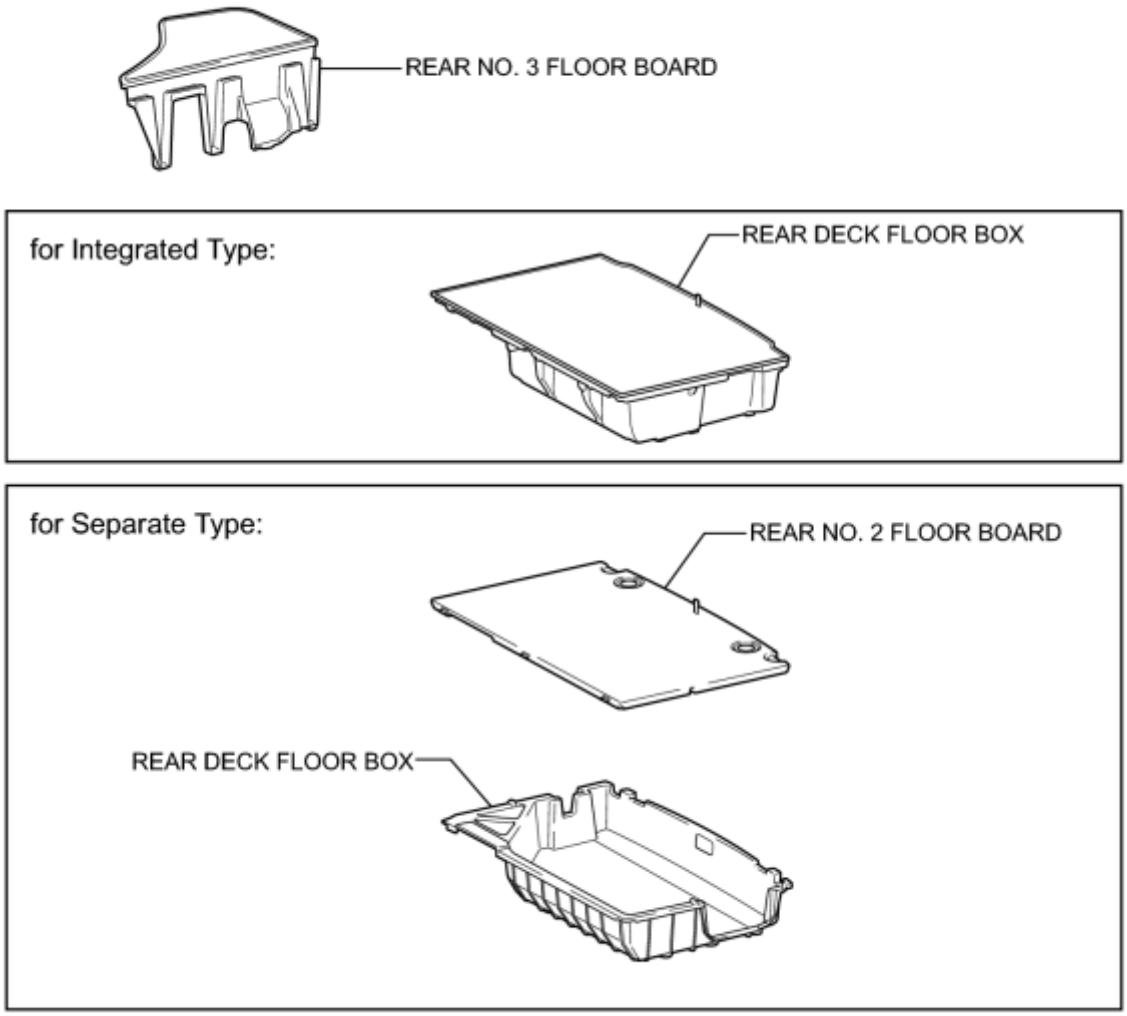
16. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

17. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

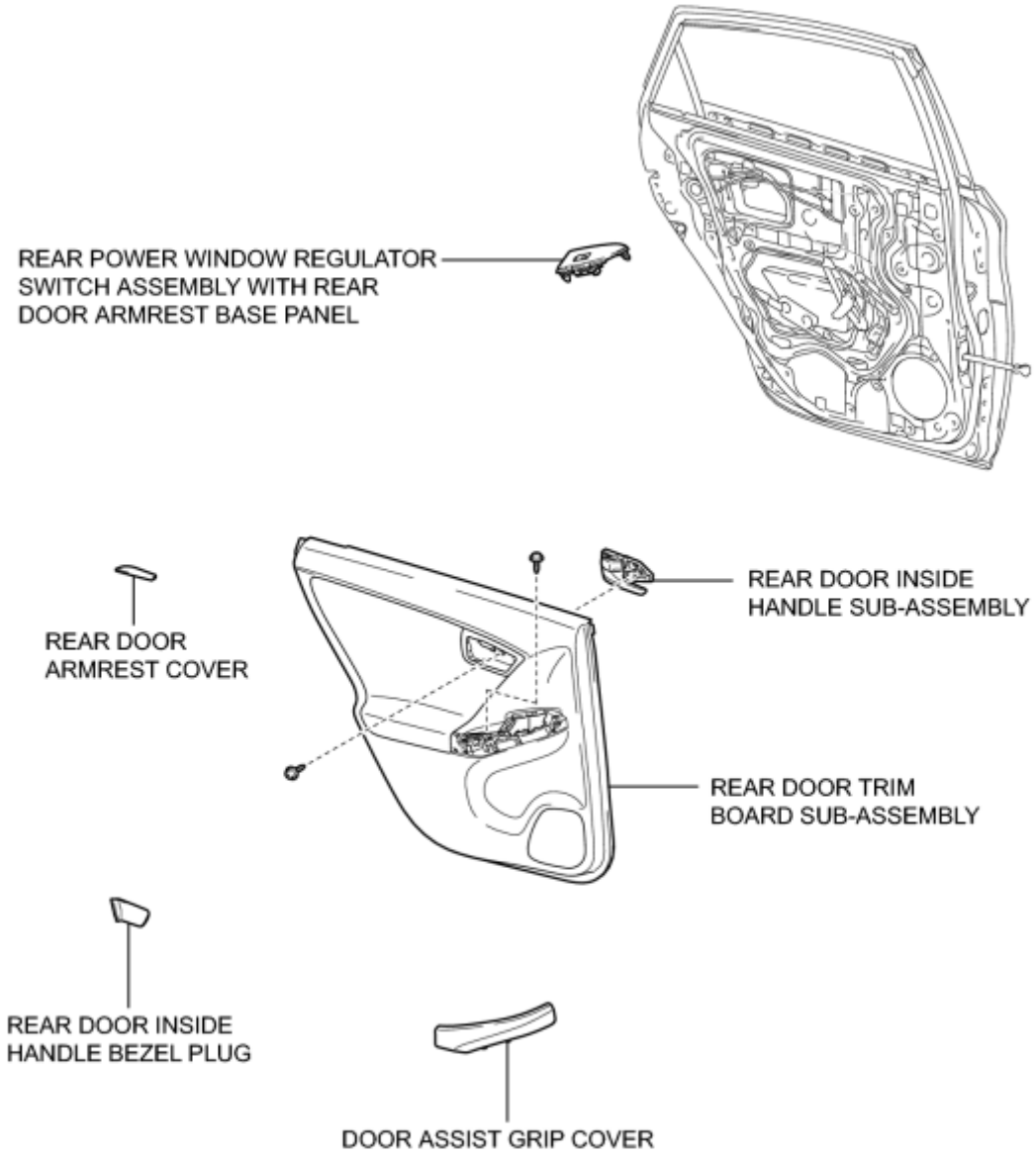
# COMPONENTS

# ILLUSTRATION



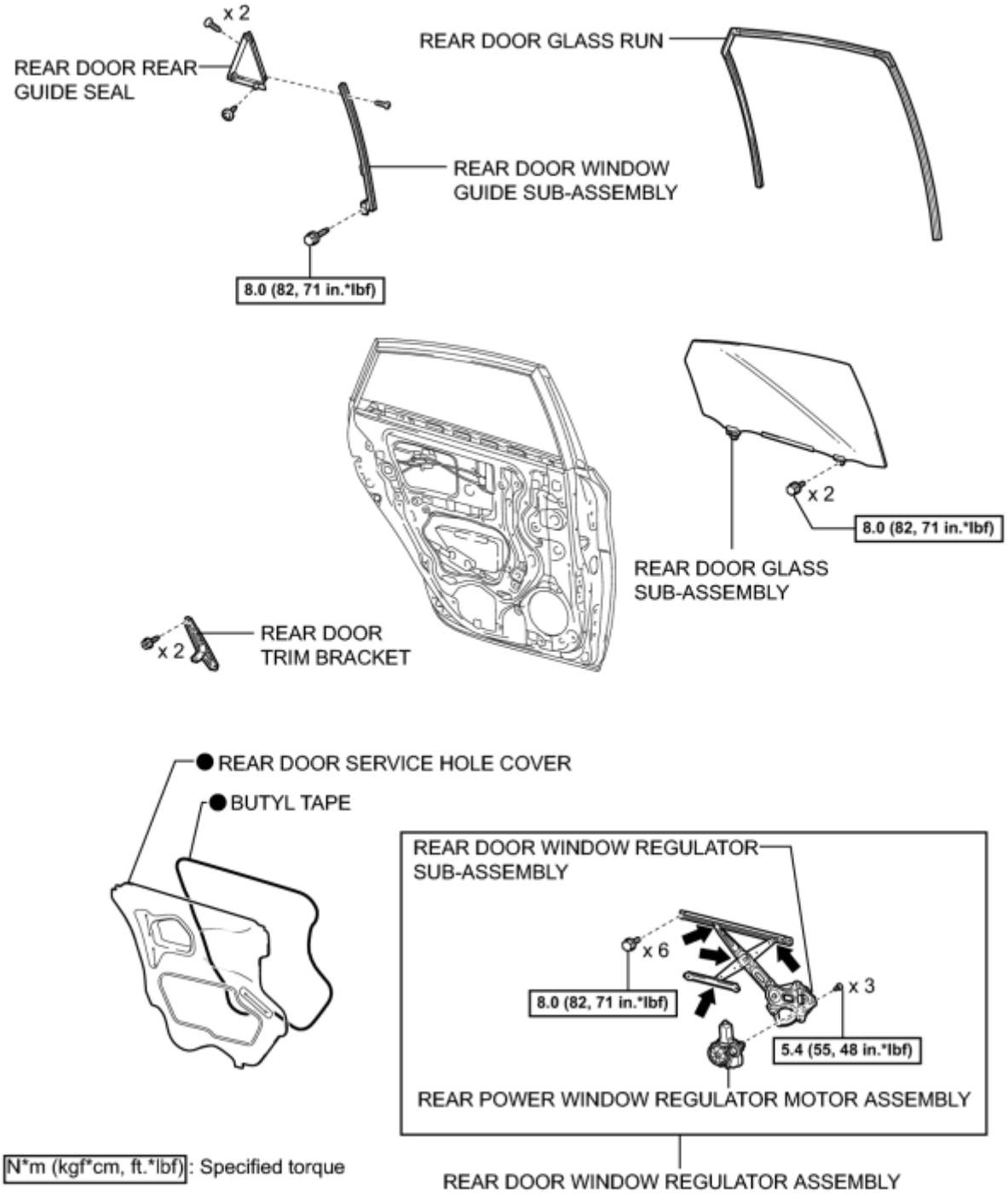

P

# ILLUSTRATION




P

# ILLUSTRATION


x 2
REAR DOOR REAR GUIDE SEAL
REAR DOOR GLASS RUN
REAR DOOR WINDOW GUIDE SUB-ASSEMBLY
8.0 (82, 71 in.*lbf)
x 2
8.0 (82, 71 in.*lbf)
REAR DOOR GLASS SUB-ASSEMBLY
x 2
REAR DOOR TRIM BRACKET
REAR DOOR SERVICE HOLE COVER
BUTYL TAPE
REAR DOOR WINDOW REGULATOR SUB-ASSEMBLY
x 6
8.0 (82, 71 in.*lbf)
x 3
5.4 (55, 48 in.*lbf)
REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY
REAR DOOR WINDOW REGULATOR ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
MP grease
P

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE DOOR ASSIST GRIP COVER INFO

6. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

7. REMOVE REAR DOOR ARMREST COVER INFO

8. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

9. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. REMOVE REAR DOOR TRIM BRACKET INFO

11. REMOVE REAR DOOR SERVICE HOLE COVER INFO

12. REMOVE REAR DOOR GLASS RUN INFO

13. REMOVE REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

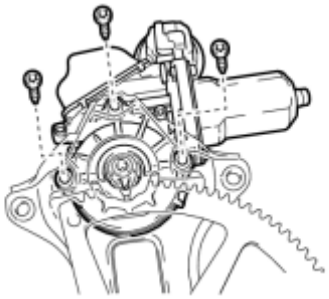
14. REMOVE REAR DOOR REAR GUIDE SEAL INFO

15. REMOVE REAR DOOR GLASS SUB-ASSEMBLY INFO

16. REMOVE REAR DOOR WINDOW REGULATOR ASSEMBLY INFO

17. REMOVE REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY

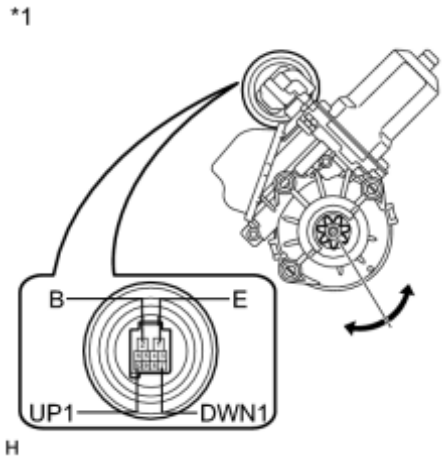
(a) Using a T25 "TORX" driver, remove the 3 screws and the rear power window regulator motor assembly.



P

# INSPECTION

1. INSPECT REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY LH




(a) Apply positive (+) battery voltage to connector terminal 2 (B).

NOTICE:

Do not apply positive (+) battery voltage to any terminals other than terminal 2 (B) to avoid damaging the pulse sensor inside the motor.

(b) Connect a ground lead to connector terminals 1 (E) and 7 (DWN1) or 10 (UP1).

(c) Check that the motor gear rotates smoothly as follows:

OK:

| Measurement Condition | Specified Condition |
|---|---|
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect a negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 10 (UP1).<br>3. Disconnect and reconnect the negative (-) battery lead to terminal 10 (UP1) within 1 second. | Motor gear rotates clockwise |
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect a negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 7 (DWN1).<br>3. Disconnect and reconnect the negative (-) battery lead to terminal 7 (DWN1) within 1 second. | Motor gear rotates counterclockwise |

***Text in Illustration***

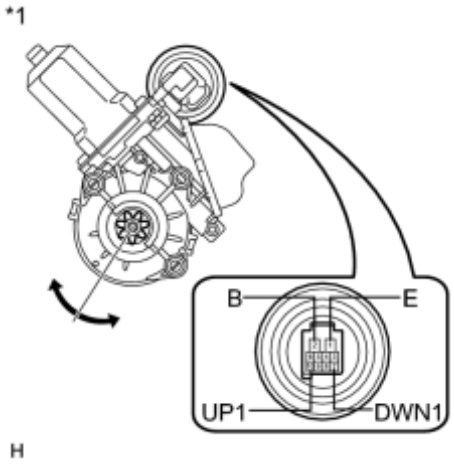
| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Rear Power Window Regulator Motor Assembly LH) |

- If the result is not as specified, replace the rear power window regulator motor assembly LH.

CAUTION:

Reset the power window regulator motor (initialize the pulse sensor) after installing the power window regulator motor and regulator assembly onto the door.

2. INSPECT REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY RH




(a) Apply positive (+) battery voltage to connector terminal 2 (B).

NOTICE:

Do not apply positive (+) battery voltage to any terminals other than terminal 2 (B) to avoid damaging the pulse sensor inside the motor.

(b) Connect a ground lead to connector terminals 1 (E) and 7 (DWN1) or 10 (UP1).

(c) Check that the motor gear rotates smoothly as follows:

OK:

| Measurement Condition | Specified Condition |
|---|---|
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect a negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 10 (UP1).<br>3. Disconnect and reconnect the negative (-) battery lead to terminal 10 (UP1) within 1 second. | Motor gear rotates counterclockwise |
| 1. Connect a positive (+) battery lead to terminal 2 (B), connect the negative (-) battery lead to terminal 1 (E), and keep them connected for 3 seconds or more.<br>2. With terminals 2 (B) and 1 (E) connected, connect a negative (-) battery lead to terminal 7 (DWN1).<br>3. Disconnect and reconnect a negative (-) battery lead to terminal 7 (DWN1) within 1 second. | Motor gear rotates clockwise |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Rear Power Window Regulator Motor Assembly RH) |

- If the result is not as specified, replace the rear power window regulator motor assembly RH.

CAUTION:

Reset the power window regulator motor (initialize the pulse sensor) after installing the power window regulator motor and regulator assembly onto the door.

# INSTALLATION

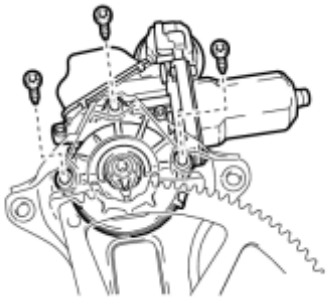
HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. INSTALL REAR POWER WINDOW REGULATOR MOTOR ASSEMBLY

NOTICE:

The regulator arm must be below the intermediate position when installing the rear power window regulator motor assembly.



P

(a) Using a T25 "TORX" driver, install the rear power window regulator motor assembly with the 3 screws.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

HINT:

A new rear window regulator uses self-tapping screws to thread new installation holes when the self-tapping screws are inserted.

2. INSTALL REAR DOOR WINDOW REGULATOR ASSEMBLY INFO

3. INSTALL REAR DOOR GLASS SUB-ASSEMBLY INFO

4. INSTALL REAR DOOR REAR GUIDE SEAL INFO

5. INSTALL REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

6. INSTALL REAR DOOR GLASS RUN INFO

7. INSTALL REAR DOOR SERVICE HOLE COVER INFO

8. INSTALL REAR DOOR TRIM BRACKET INFO

9. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. INSTALL REAR DOOR ARMREST COVER INFO

12. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

13. INSTALL DOOR ASSIST GRIP COVER INFO

14. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

15. INSTALL REAR NO. 3 FLOOR BOARD INFO

16. INSTALL REAR DECK FLOOR BOX INFO

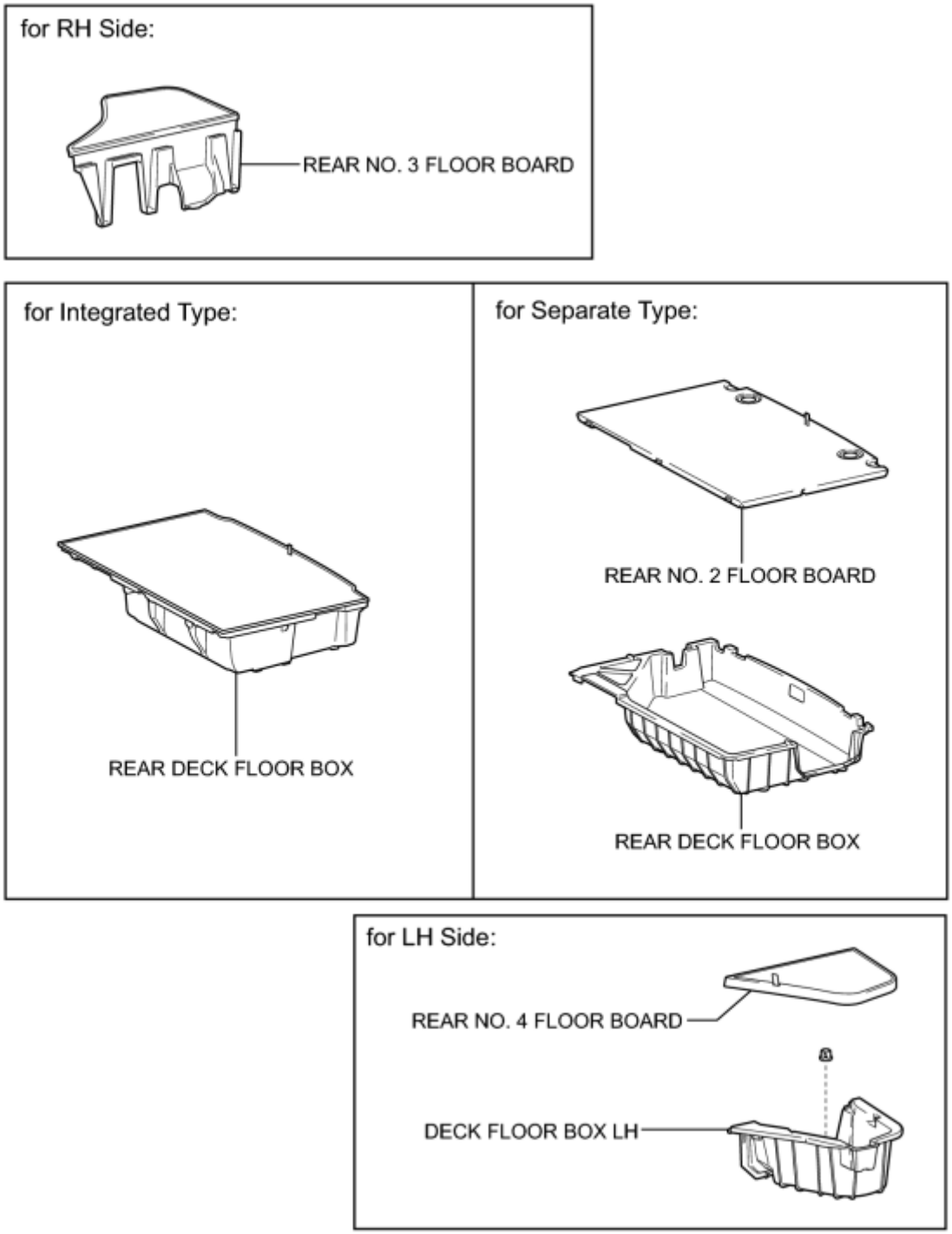
17. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

18. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

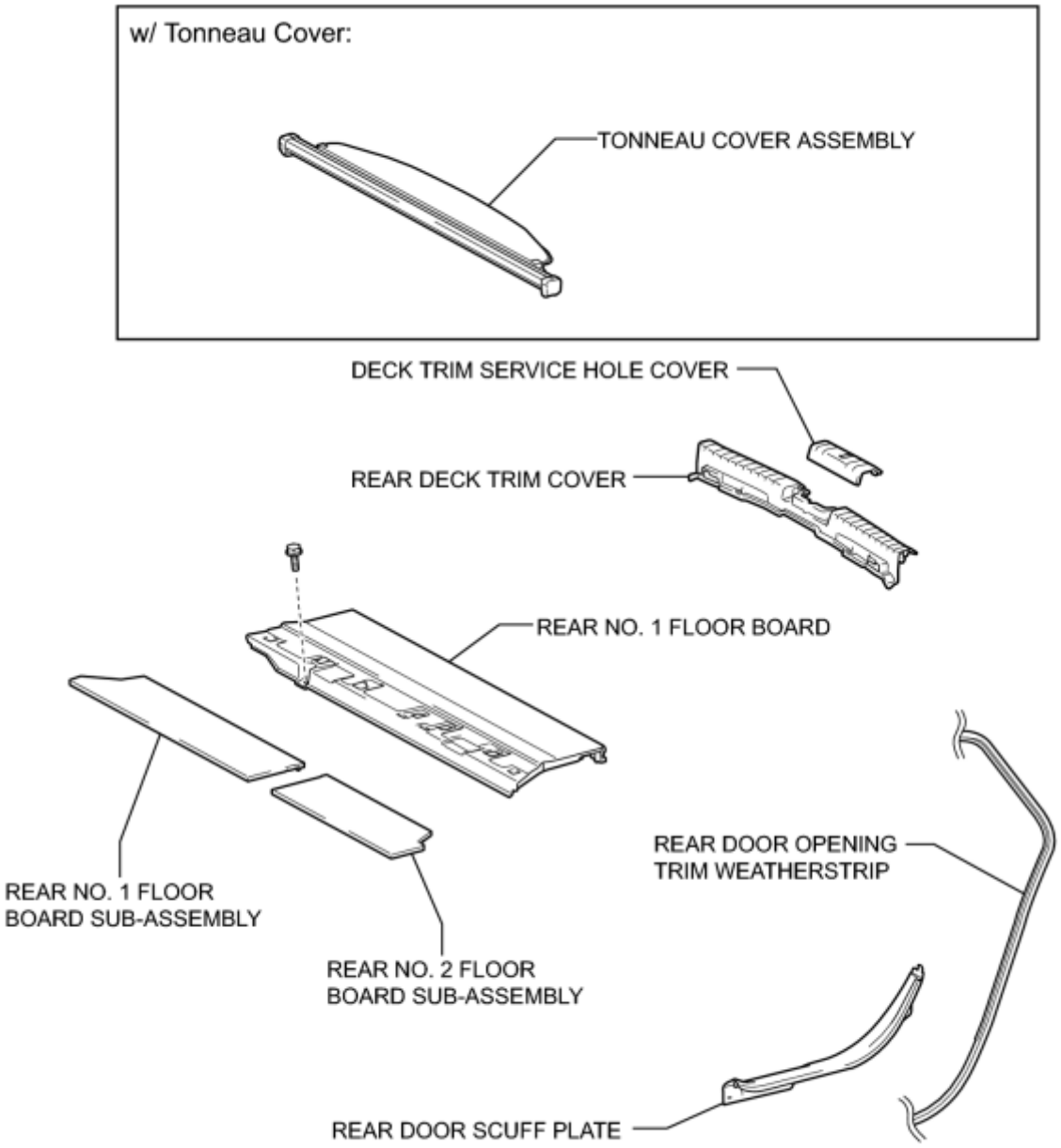
# COMPONENTS

# ILLUSTRATION



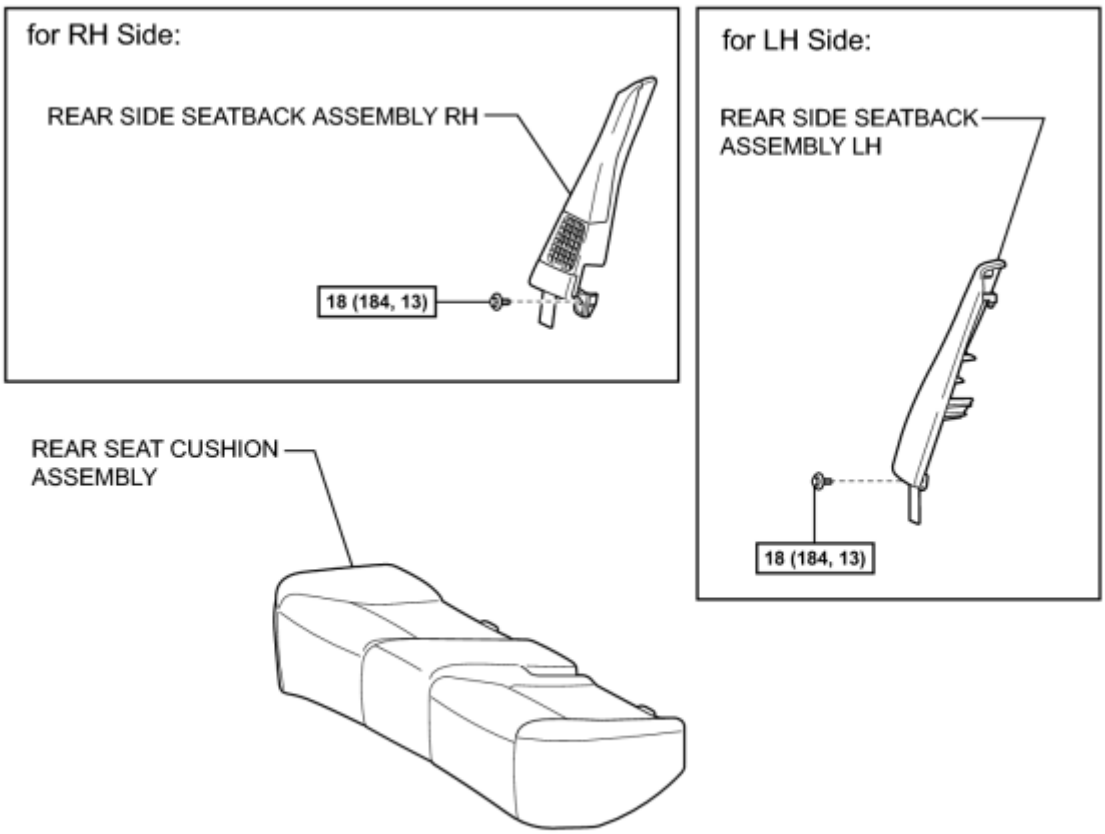

P

# ILLUSTRATION




P

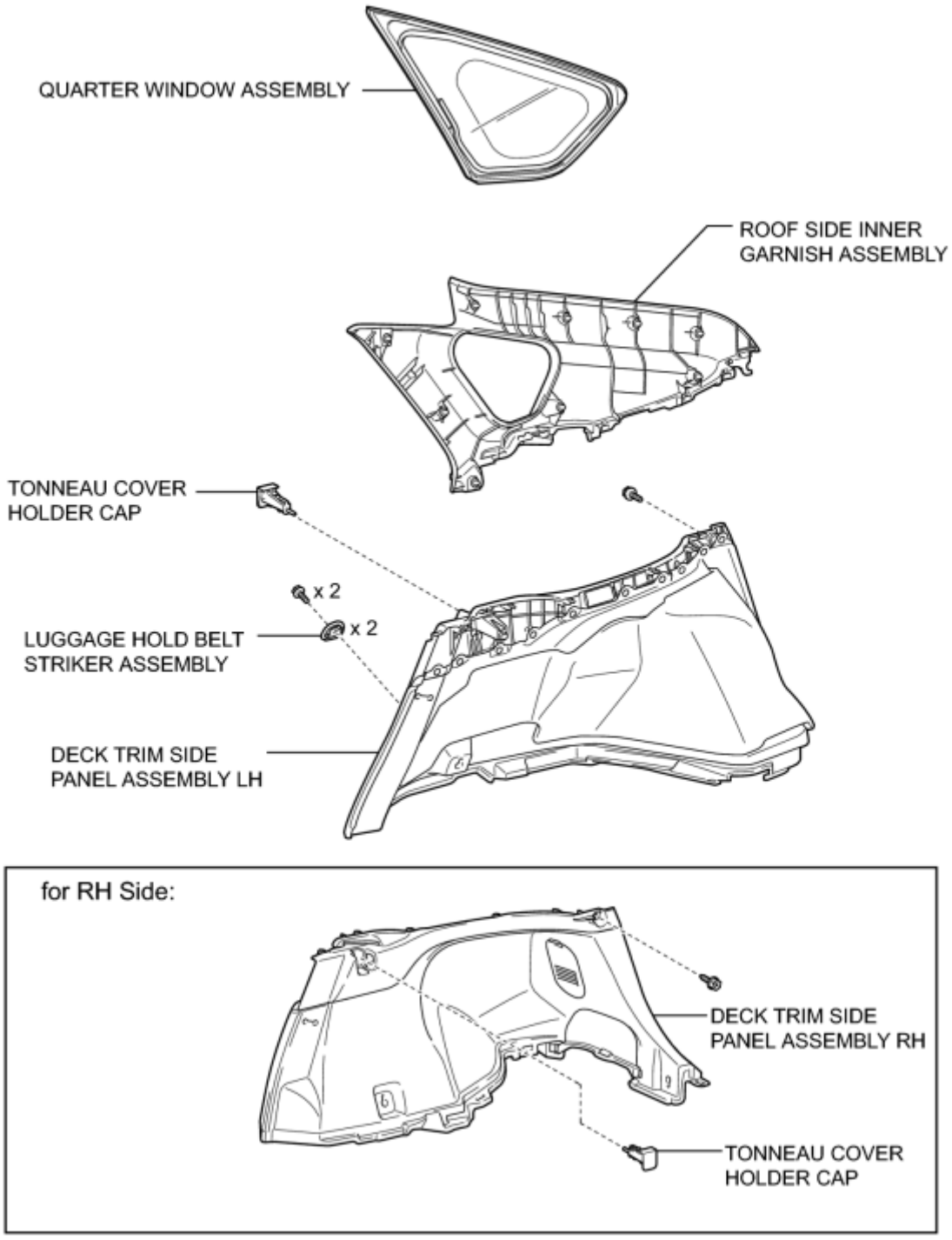
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION


QUARTER WINDOW ASSEMBLY
ROOF SIDE INNER GARNISH ASSEMBLY
TONNEAU COVER HOLDER CAP
x 2
x 2
LUGGAGE HOLD BELT STRIKER ASSEMBLY
DECK TRIM SIDE PANEL ASSEMBLY LH
for RH Side:
DECK TRIM SIDE PANEL ASSEMBLY RH
TONNEAU COVER HOLDER CAP

P

# REMOVAL

HINT:

- The front side fix window assembly can be reused. When installing the window, if any of the clips on the quarter window glass are broken, butyl tape can be used to support the glass until the applied adhesive hardens.
- When using butyl tape to temporarily secure the window, make sure that the butyl tape is not applied exactly at the original clip location. If the butyl tape is applied exactly at the clip location, it will cause the window to protrude
- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD (for RH Side) INFO

4. REMOVE REAR DOOR SCUFF PLATE INFO

5. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP

6. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

7. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

8. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (for RH Side) INFO

9. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

10. REMOVE REAR NO. 4 FLOOR BOARD INFO

11. REMOVE DECK FLOOR BOX LH (for LH Side) INFO

12. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

13. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

14. REMOVE REAR NO. 1 FLOOR BOARD INFO

15. REMOVE DECK TRIM SERVICE HOLE COVER INFO

16. REMOVE REAR DECK TRIM COVER INFO

17. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

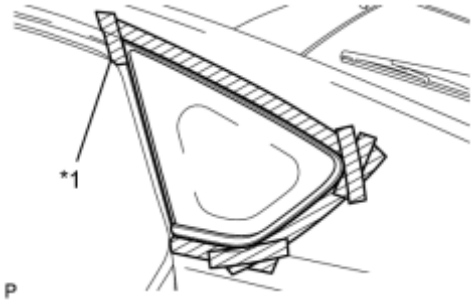
18. REMOVE TONNEAU COVER HOLDER CAP (for LH Side) INFO

19. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

20. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

21. REMOVE ROOF SIDE INNER GARNISH ASSEMBLY INFO

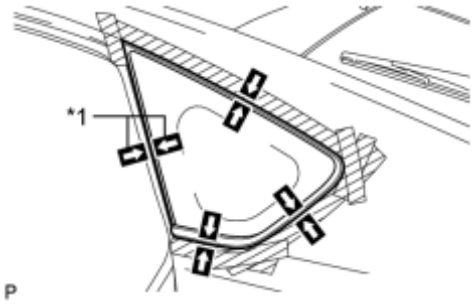
22. REMOVE QUARTER WINDOW ASSEMBLY




(a) Apply protective tape to the outer surface of the vehicle body to prevent scratches.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |




(b) Place matchmarks on the quarter window assembly and vehicle body on the locations indicated in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

HINT:

Do not allow the piano wire to interfere with the clips.

(c) Pass a piano wire between the vehicle body and glass from the interior as shown in the illustration.




HINT:

Ensure not to interfere with the clips when passing the piano wire.

## Text in Illustration

| | |
|---|---|
| *1 | Piano Wire |

(d) Tie both wire ends to wooden blocks or similar objects that can serve as handles.

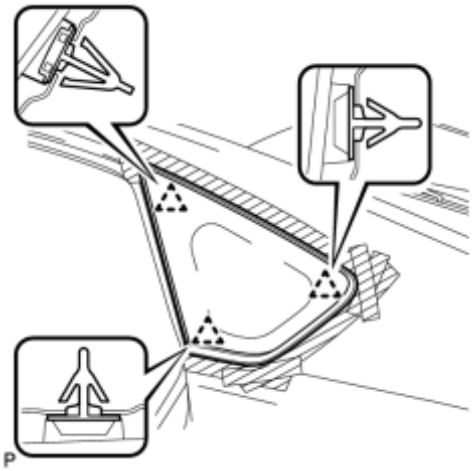
NOTICE:

When separating the quarter window assembly from the vehicle, be careful not to damage the paint or interior and exterior ornaments.

(e) Cut off the adhesive by pulling the piano wire around the quarter window assembly.

NOTICE:

Leave as much adhesive on the vehicle body as possible when cutting through the adhesive.



(f) Disengage the 3 clips.

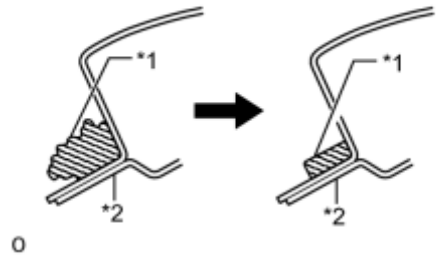
(g) Using suction cups, remove the glass.

NOTICE:

Be careful not to drop the glass.

23. CLEAN VEHICLE BODY

(a) Clean and shape the contact surfaces of the vehicle body.




## Text in Illustration

| | |
|---|---|
| *1 | Adhesive |
| *2 | Vehicle Body |

(1) Using a knife, cut away excess adhesive on the contact surfaces of the vehicle body as shown in the illustration.

NOTICE:

Be careful not to damage the vehicle body.

HINT:

Leave as much adhesive on the vehicle body as possible.

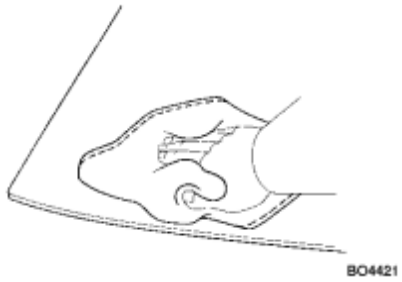
(b) Clean the contact surfaces of the vehicle body with a piece of cloth saturated with cleaner.

HINT:

Even if all the adhesive has been removed, clean the vehicle body.

# INSTALLATION

1. CLEAN QUARTER WINDOW ASSEMBLY

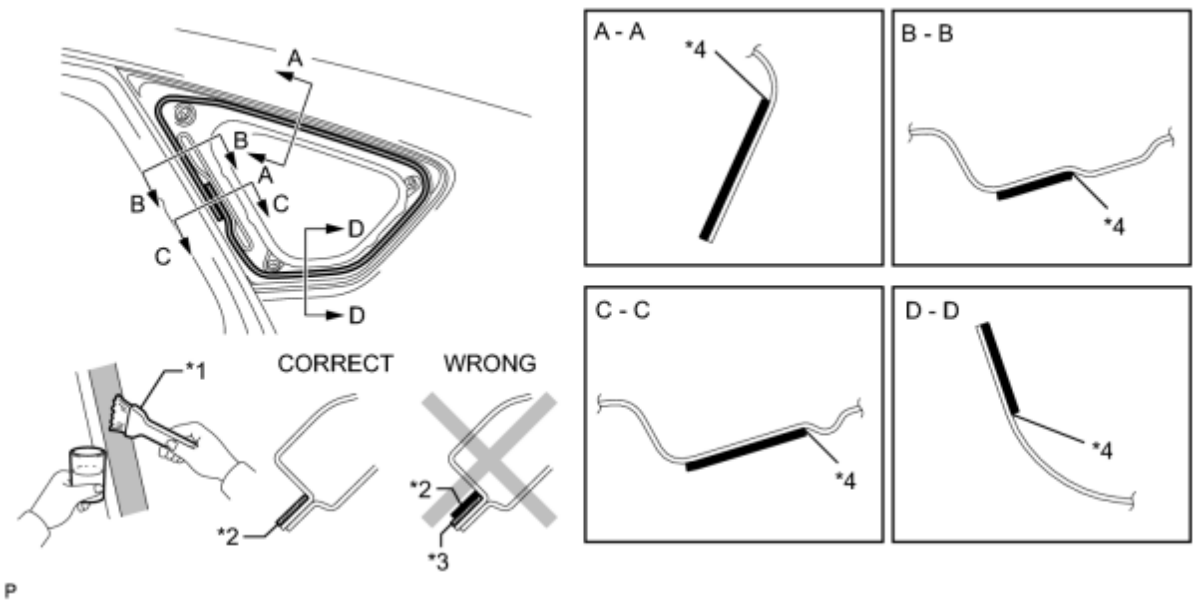



(a) Clean the outer edges of the quarter window assembly with a non-residue solvent.

- Do not touch the glass surface after cleaning it.
- Be careful not to damage the glass or clips.

2. INSTALL QUARTER WINDOW ASSEMBLY

(a) Using a brush or a sponge, apply Primer M to the exposed part of the vehicle body.



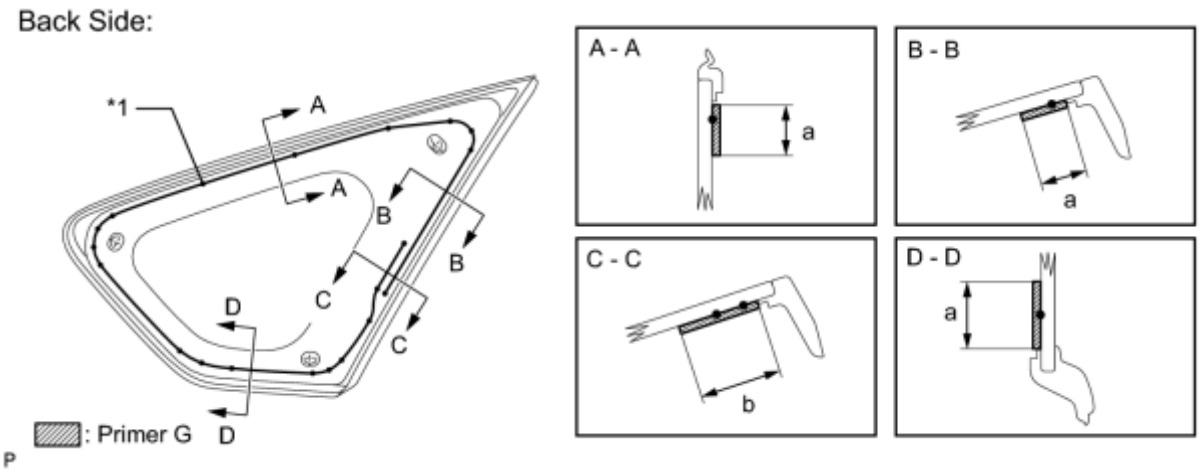

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Brush | *2 | Primer M |
| *3 | Adhesive | *4 | Edge of Curved Surface |

NOTICE:

- Do not coat the adhesive with Primer M.
- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

(b) Using a brush or a sponge, apply Primer G to the contact surface of the quarter window glass.




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Ceramic Notch x 20 | - | - |

| Item | Dimension |
|---|---|
| a | 11.0 mm (0.433 in.) |
| b | 19.0 mm (0.748 in.) |

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a non-residue solvent before it dries.

NOTICE:

- To prevent the glass from breaking at low temperatures, ensure that no primer adheres to the contact surface between the moulding and glass during application.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.
- Do not apply too much primer.

(c) Apply adhesive to the quarter window assembly.

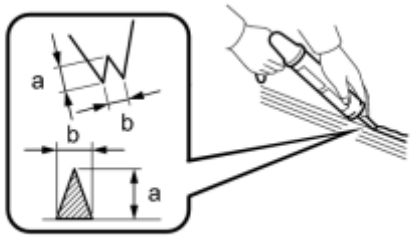
Adhesive:

Toyota Genuine Windshield Glass Adhesive or equivalent

(1) Cut off the tip of the cartridge nozzle as shown in the illustration.

Standard Dimension:

| Item | Dimension |
|---|---|

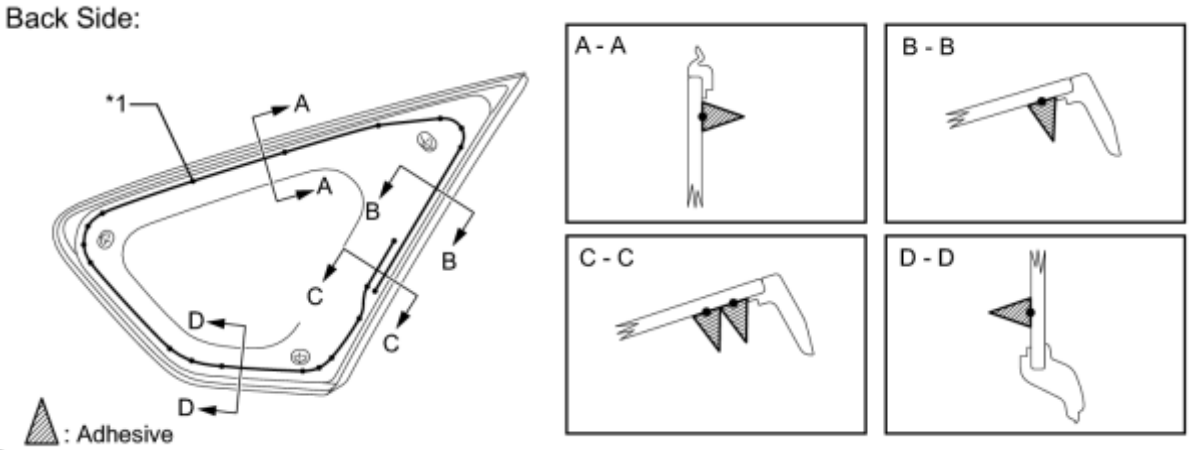



P

| | |
|---|---|
| a | 12.0 mm (0.472 in.) |
| b | 8.0 mm (0.315 in.) |

(2) Load the sealer gun with cartridge.

(3) Apply adhesive to the quarter window glass as shown in the illustration.

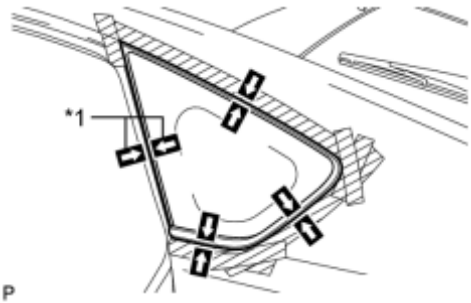



P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Ceramic Notch x 20 | - | - |

(d) Install the quarter window glass to the vehicle body.




P

(1) Position the quarter window glass so that the matchmarks are aligned, and press it in gently along the rim (when a window with missing clips is used).

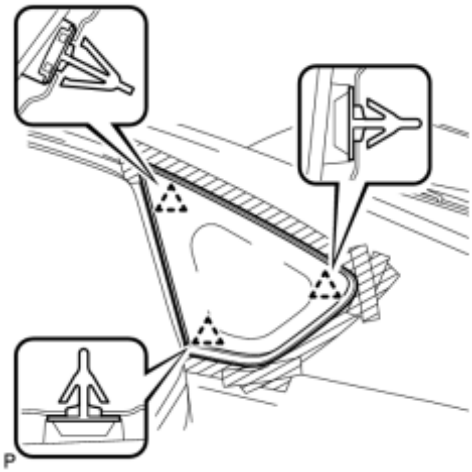
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

(2) Lightly press the front surface of the windshield glass to ensure that the windshield glass is securely fit to the vehicle body (when a window with missing clips is used).

HINT:

Press the glass with a force of 98 N (10 kgf, 22 lbf) or more.



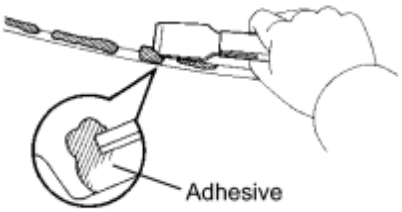
(3) Engage the 3 clips to install the quarter window glass (when a window without missing clips is used used).

(4) Hold the quarter window assembly in place securely with protective tape or equivalent until the adhesive hardens.

NOTICE:

- Allow the primer to dry for 3 minutes or more.
- Check that the clips are attached to the body correctly.
- Check the clearance between the body and glass.

(5) Lightly press the outer surface of the glass to ensure that the glass is securely fit to the vehicle body.




(6) Using a scraper, remove any excess or protruding adhesive.

HINT:

Apply adhesive onto the glass rim.

NOTICE:

Do not drive the vehicle within the time described in the table below.

Minimum Time:

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|
| 35°C (95°F) | 1 hour and 30 minutes |
| 20°C (68°F) | 5 hours |
| 5°C (41°F) | 24 hours |

3. INSPECT FOR LEAK AND REPAIR

(a) After the adhesive has hardened, apply water from the outside of the vehicle. Check that no water leaks into the cabin.

(b) If water leaks into the cabin, allow the water to dry and add adhesive.

(c) Remove the protective tape.

4. INSTALL ROOF SIDE INNER GARNISH ASSEMBLY INFO

5. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

6. INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

7. INSTALL TONNEAU COVER HOLDER CAP INFO

8. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

9. INSTALL REAR DECK TRIM COVER INFO

10. INSTALL DECK TRIM SERVICE HOLE COVER INFO

11. INSTALL REAR NO. 1 FLOOR BOARD INFO

12. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

13. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

14. INSTALL DECK FLOOR BOX LH (for LH Side) INFO

15. INSTALL REAR NO. 4 FLOOR BOARD (for LH Side) INFO

16. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

17. INSTALL REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

18. INSTALL REAR SIDE SEATBACK ASSEMBLY RH (for RH Side) INFO

19. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

20. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP INFO

21. INSTALL REAR DOOR SCUFF PLATE INFO

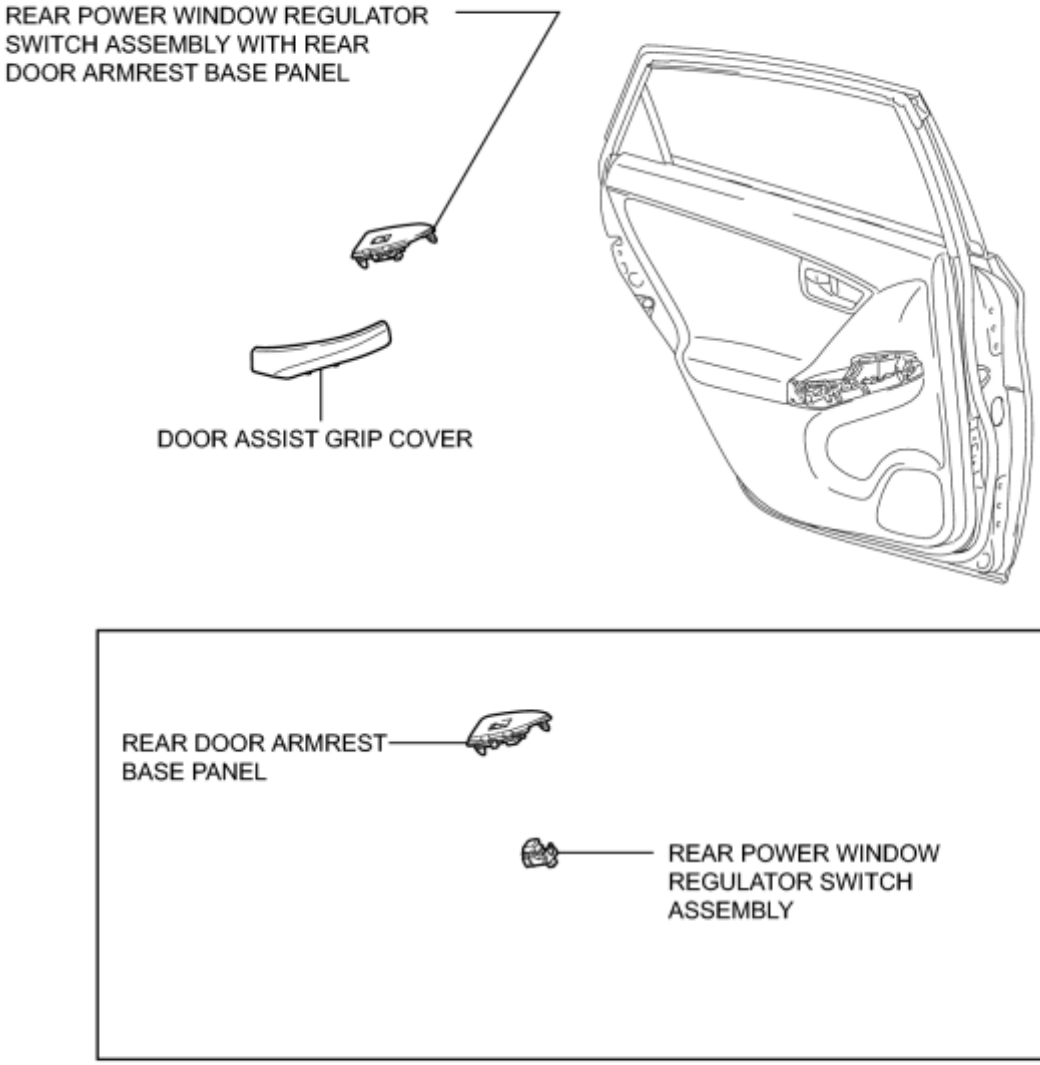
22. INSTALL REAR NO. 3 FLOOR BOARD (for RH Side) INFO

23. INSTALL REAR DECK FLOOR BOX INFO

24. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

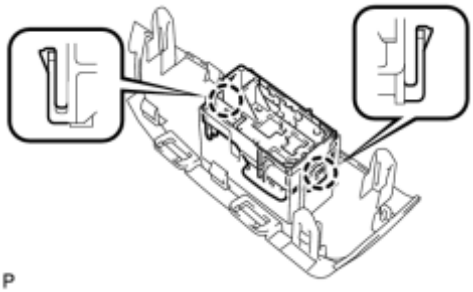
HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. REMOVE DOOR ASSIST GRIP COVER INFO

2. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

3. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY



P

(a) Disengage the 2 claws and remove the rear power window regulator switch assembly.

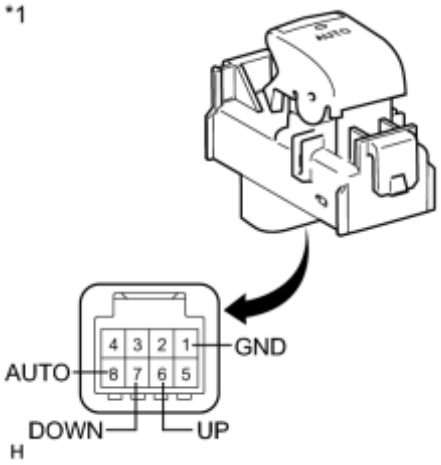
# INSPECTION

1. INSPECT REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY (for LH Side)

(a) Check the switch function.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:



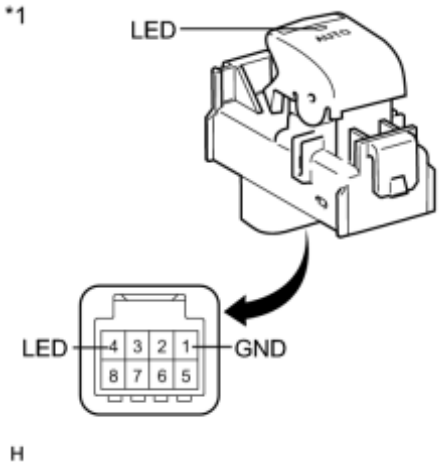

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |
| 6 (UP) - 1 (GND) | Free | 10 kΩ or higher |
| 7 (DOWN) - 1 (GND) | Free | 10 kΩ or higher |
| 8 (AUTO) - 1 (GND) | Free | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Power Window Regulator Switch Assembly (for Rear LH Side)) |

If the result is not as specified, replace the power window regulator switch assembly (for rear LH side).

(b) Check that the LED illuminates.




(1) Apply battery voltage to the power window regulator switch assembly and check that the LED illuminates.

OK:

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → 4 (LED)<br><br>Battery negative (-) → 1 (GND) | LED illuminates |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Power Window Regulator Switch Assembly (for Rear LH Side)) |

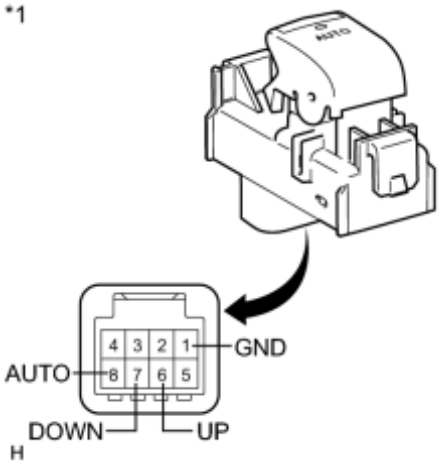
If the result is not as specified, replace the power window regulator switch assembly (for rear LH side).

2. INSPECT REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY (for RH Side)

(a) Check the switch function.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 6 (UP) - 1 (GND) | Auto up or up position | Below 1 Ω |
| 7 (DOWN) - 1 (GND) | Auto down or down position | Below 1 Ω |
| 8 (AUTO) - 1 (GND) | Auto up or auto down position | Below 1 Ω |
| 6 (UP) - 1 (GND) | Free | 10 kΩ or higher |
| 7 (DOWN) - 1 (GND) | Free | 10 kΩ or higher |
| 8 (AUTO) - 1 (GND) | Free | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Power Window Regulator Switch Assembly (for Rear RH Side)) |

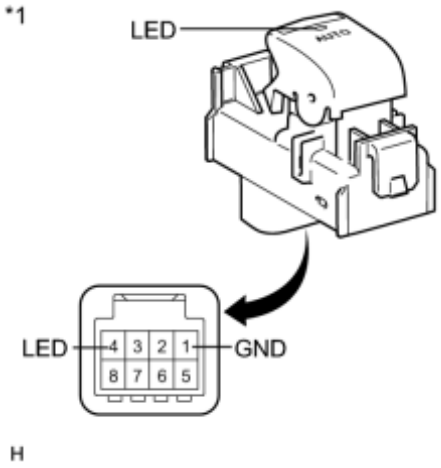
If the result is not as specified, replace the power window regulator switch assembly (for rear RH side).

(b) Check that the LED illuminates.

(1) Apply battery voltage to the power window regulator switch assembly and check that the LED illuminates.

OK:

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → 4 (LED) | LED illuminates |




| | |
|---|---|
| Battery negative (-) → 1 (GND) | |

# Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(to Power Window Regulator Switch Assembly (for Rear RH Side)) |

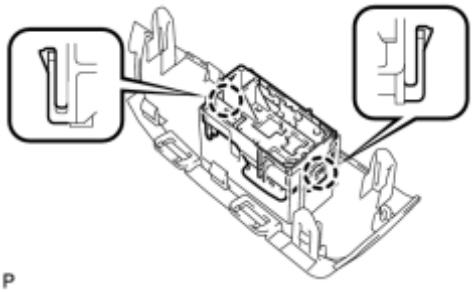
If the result is not as specified, replace the power window regulator switch assembly (for rear RH side).

# INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY



P

(a) Engage the 2 claws to install the rear power window regulator switch assembly.

2. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

3. INSTALL DOOR ASSIST GRIP COVER INFO

# PRECAUTION

1. NOTICE FOR INITIALIZATION

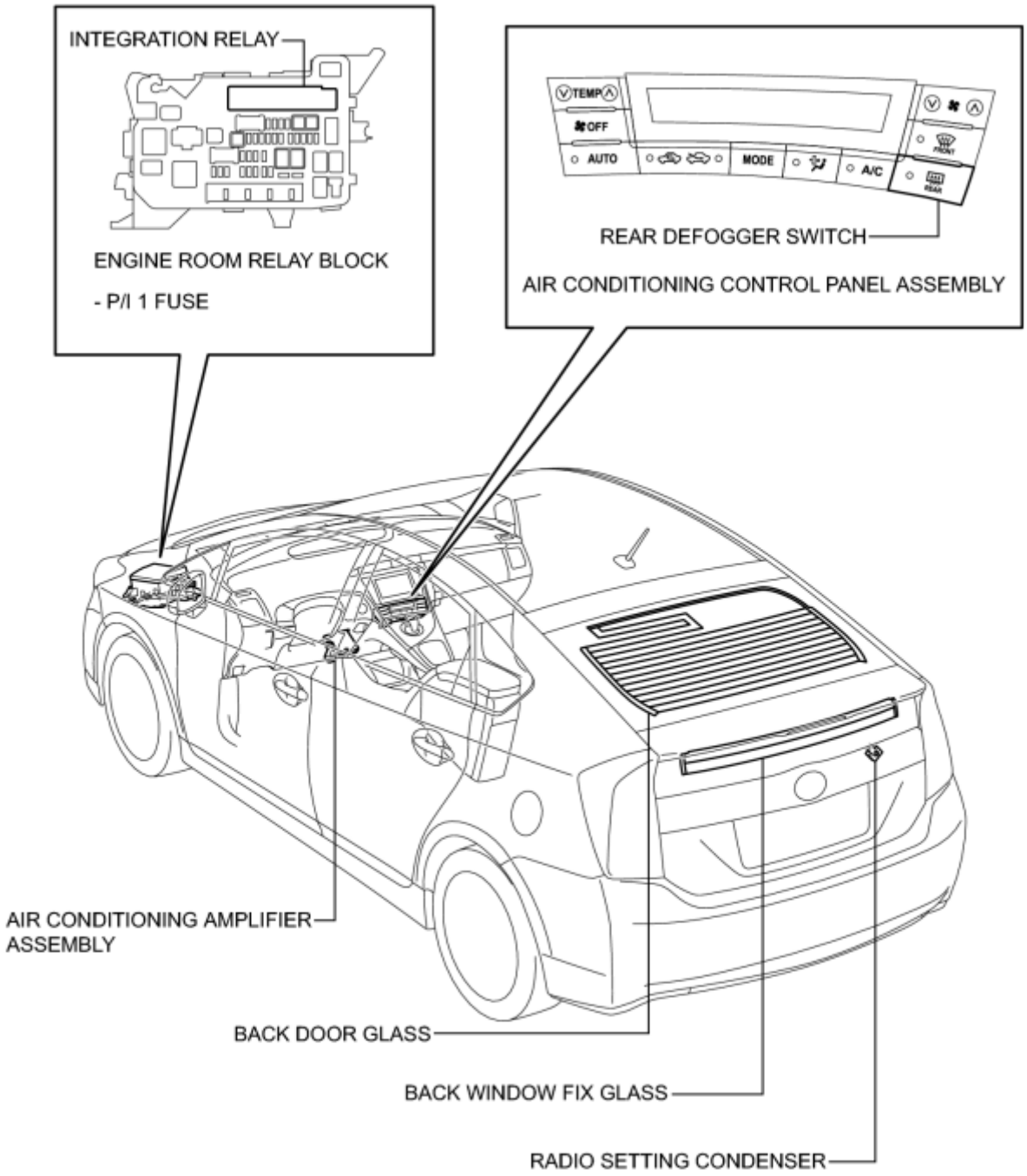
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

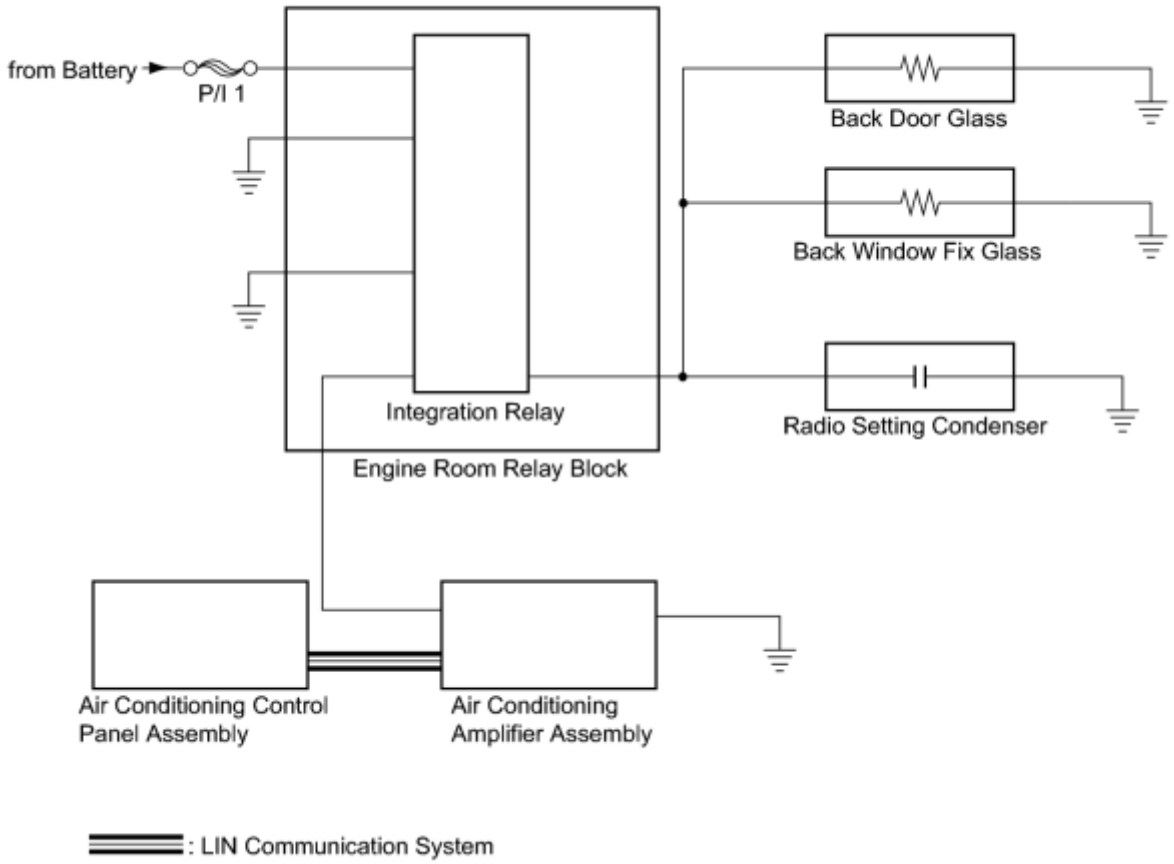
| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

# PARTS LOCATION

# ILLUSTRATION



# SYSTEM DIAGRAM




### *Communication Table*

| Transmitting ECU | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Air Conditioning Control Panel Assembly | Air Conditioning Amplifier Assembly | Rear window defogger switch signal | LIN |

# SYSTEM DESCRIPTION

1. GENERAL

The rear window defogger wires are attached to the inside of the rear window and defog the window surface quickly by pressing the rear window defogger switch on the air conditioning control assembly. The indicator light illuminates while the system is operating. The system automatically turns off after approximately 15 minutes.

HINT:

If both of the following conditions are met after approximately 15 minutes from the rear window defogger was activated, the rear window defogger continues to operate up to approximately 45 minutes. If the following conditions are not met, the rear window defogger stops operating immediately.

- The outside temperature is -3°C (27°F) or below.
- The vehicle speed is 45 km/h (28 mph) or more.

HINT:

The rear window defogger is linked with the mirror defogger.

NOTICE:

If the battery voltage becomes low, window defogger operation is canceled to prioritize supplying power to the power steering system.

2. FUNCTION OF MAIN COMPONENT

| Component | Outline |
|---|---|
| Integration Relay | Receives rear window defogger activation request signal from the air conditioning amplifier assembly and supplies power to the rear window defogger. |
| Rear Window Defogger | Receives power from the integration relay and heats the window using the rear window defogger wires. |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the window defogger system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | CHECK COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM* |

(a) Check the LIN communication function to ensure there are no malfunctions in the communication system INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output. | A |
| DTC is output. | B |

B ▶ INFO GO TO LIN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 5. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table. | A |
| Fault is listed in Problem Symptoms Table. | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| 6. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO

(b) Data List / Active Test INFO

(c) On-vehicle Inspection INFO

NEXT ▼

| | |
|---|---|
| 7. | REPAIR OR REPLACE |

NEXT ▼

| | |
|---|---|
| 8. | CONFIRMATION TEST |

NEXT ▶ **END**

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses related to this system before inspecting the suspected areas below.

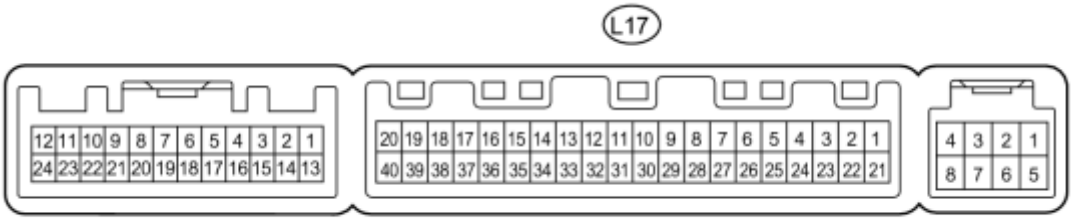
### *Window Defogger System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Rear Window Defogger System does not Operate. | Back door glass | INFO |
| | Back window fix glass | - |
| | Air conditioning system | - |
| | Integration relay | - |
| | Wire harness or connector | - |
| | Air conditioning amplifier assembly | - |
| | Radio setting condenser | - |

# TERMINALS OF ECU

1. CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY

(a) Disconnect the L17 air conditioning amplifier assembly connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-1 (IG+) - L17-14 (GND) | B - W-B | Power source (IG) | Power switch on (IG) | 11 to 14 V |
| L17-1 (IG+) - L17-14 (GND) | B - W-B | Power source (IG) | Power switch off | Below 1 V |
| L17-21 (B) - L17-14 (GND) | Y - W-B | Battery power supply | Always | 11 to 14 V |
| L17-14 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L17 air conditioning amplifier assembly connector.

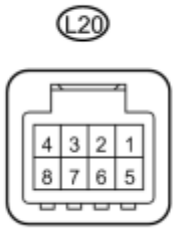
(d) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-20 (RDEF) - L17-14 (GND) | Y - W-B | Rear window defogger signal | Power switch on (IG), rear window defogger switch off | 11 to 14 V |
| L17-20 (RDEF) - L17-14 (GND) | Y - W-B | Rear window defogger signal | Power switch on (IG), rear window defogger switch on | Below 1 V |

If the result is not as specified, the air conditioning amplifier assembly may have a malfunction.

2. CHECK AIR CONDITIONING CONTROL PANEL ASSEMBLY

(a) Disconnect the L20 air conditioning control panel assembly connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L20-5 (IG+) - L20-8 (GND) | B - W-B | Power supply | Power switch on (IG) | 11 to 14 V |
| L20-8 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L20 air conditioning control panel assembly connector.

(d) Check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L20-2 (TX+) - L20-8 (GND) | V - W-B | Rear window defogger signal | Power switch on (IG) | Pulse generation |

If the result is not as specified, the air conditioning control panel assembly may have a malfunction.

# DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) Check the DLC3 INFO.

2. INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Chassis / EMPS / Data List.

(f) Read the Data List according to the display on the Techstream.

***EMPS***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Battery Voltage Lo Record | Battery voltage reduction history/ Min.: 0 times, Max.: 65535 times | 0 to 65535 | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

### *Air Conditioner*

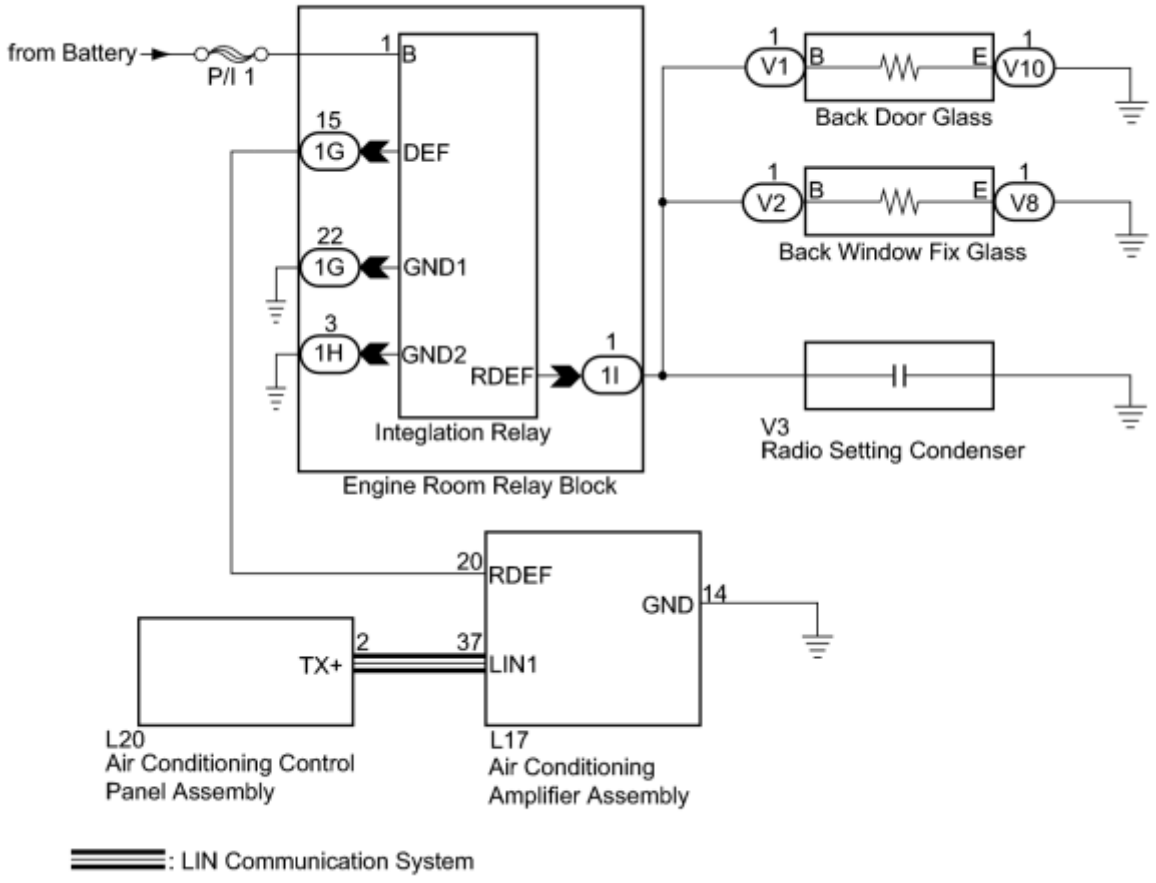
| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Defogger Relay (Rear) | Rear window defogger | OFF/ON | - |

Rear Window Defogger System does not Operate

# DESCRIPTION

When the rear window defogger switch on the air conditioning control panel assembly is pressed, the operation signal is transmitted to the air conditioning amplifier assembly through a LIN communication line. When the air conditioning amplifier assembly receives the signal, it turns on the integration relay to operate the rear window defogger.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK REAR WINDOW DEFOGGER SYSTEM |

(a) Active the rear defogger system and check the symptoms.

Result:

| Result | Proceed to |
|---|---|
| Both back window defoggers do not warm up. | A |
| The back door glass defogger does not warm up. | B |
| The back window fix glass defogger does not warm up. | C |

C CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BACK WINDOW FIX GLASS)

B CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BACK DOOR GLASS)

A

| | |
|---|---|
| 2. | CHECK POWER STEERING SYSTEM (Battery Voltage Lo Record) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Chassis / EMPS / Data List.

(e) Read the Data List according to the display on the Techstream.

***EMPS***

| Tester Display | Measurement item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Battery Voltage Lo Record | Battery voltage reduction history/ Min.: 0 times, Max.: 65535 times | 0 to 65535 | - |

Result:

| Result | Proceed to |
|---|---|
| No control history is stored. | A |
| Control history is stored. | B |

B GO TO CHARGING SYSTEM

A

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (DEFOGGER RELAY) |

(a) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(b) Perform the Active Test according to the display on the Techstream.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Defogger Relay (Rear) | Rear window defogger | ON/OFF | - |

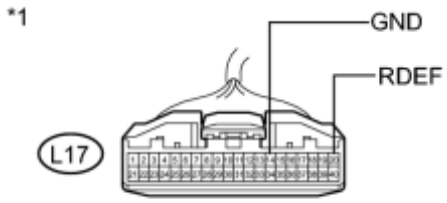
OK:

The window defogger system operates normally.

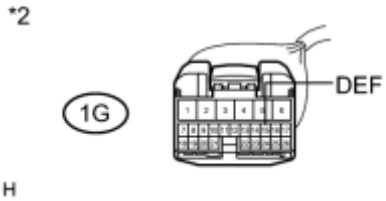
NG ▶ CHECK HARNESS AND CONNECTOR (AIR CONDITIONING AMPLIFIER ASSEMBLY - INTEGRATION RELAY)

OK ▶ **GO TO AIR CONDITIONING SYSTEM**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (AIR CONDITIONING AMPLIFIER ASSEMBLY - INTEGRATION RELAY) |




(a) Disconnect the 1G integration relay connector.




(b) Disconnect the L17 air conditioning amplifier assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-20 (RDEF) - 1G-15 (DEF) | Always | Below 1 Ω |
| 1G-15 (DEF) - Body ground | Always | 10 kΩ or higher |
| L17-14 (GND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

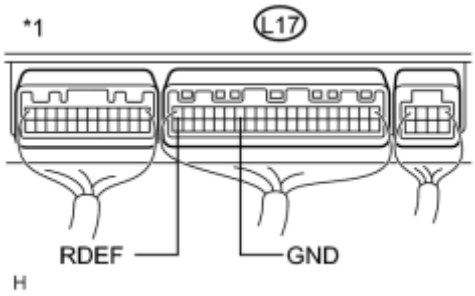
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Air Conditioning Amplifier Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Integration Relay) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | CHECK AIR CONDITIONING AMPLIFIER ASSEMBLY |




(a) Turn the power switch on (READY).

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-20 (RDEF) - L17-14 (GND) | Rear defogger switch off | 11 to 14 V |
| L17-20 (RDEF) - L17-14 (GND) | Rear defogger switch on | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Rear view of wire harness connector<br><br>(to Air Conditioning Amplifier Assembly) |

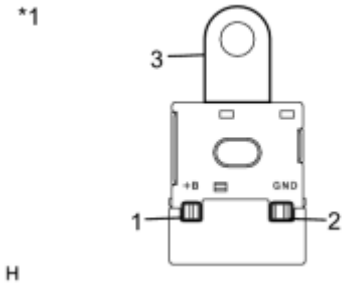
NG ▶ REPLACE AIR CONDITIONING AMPLIFIER ASSEMBLY

OK

▼

| | |
|---|---|
| 6. | INSPECT RADIO SETTING CONDENSER |

(a) Remove the radio setting condenser.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Always | 10 k Ω or higher |
| 2 - 3 | Always | Below 1 Ω |

***Text in Illustration***

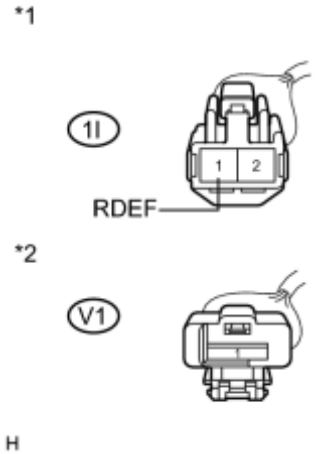
| | |
|---|---|
| *1 | Radio Setting Condenser |

NG ▶ REPLACE RADIO SETTING CONDENSER

OK

▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BODY GROUND) |




(a) Disconnect the V1 back door glass battery side connector.

(b) Disconnect the V2 back window fix glass battery side connector.

(c) Disconnect the 1I integration relay connector.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1I-1 (RDEF) - Body ground | Always | 10 k Ω or higher |
| 1I-1 (RDEF) - V1-1 | Always | Below 1 Ω |

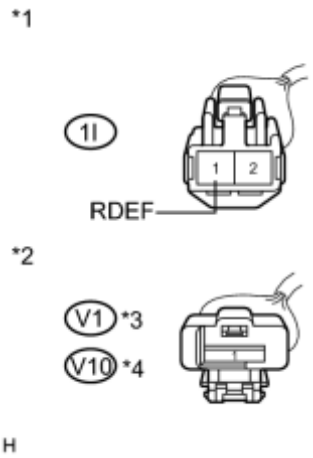
*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |
| *2 | Front view of wire harness connector<br><br>(to Back Door Glass) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE INTEGRATION NO.1 RELAY**

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BACK DOOR GLASS) |




(a) Disconnect the V1 back door glass battery side connector.

(b) Disconnect the V10 back door glass body ground side connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1I-1 (RDEF) - V1-1 | Always | Below 1 Ω |
| V10-1 - Body ground | Always | Below 1 Ω |
| 1I-1 (RDEF) - Body ground | Always | 10 k Ω or higher |
| V1-1 - Body ground | Always | 10 k Ω or higher |

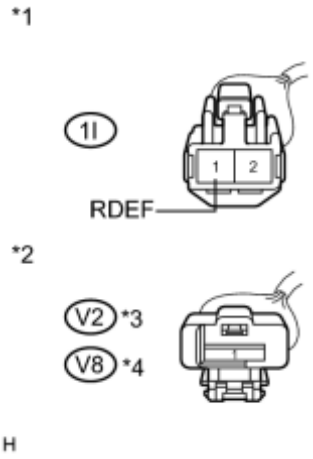
*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |
| *2 | Front view of wire harness connector<br><br>(to Back Door Glass) |
| *3 | Back Door Glass Battery Side |
| *4 | Back Door Glass Body Ground Side |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE BACK DOOR GLASS**

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - BACK WINDOW FIX GLASS) |




(a) Disconnect the V2 back window fix glass battery side connector.

(b) Disconnect the V8 back window fix glass body ground side connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1I-1 (RDEF) - V2-1 | Always | Below 1 Ω |
| V8-1 - Body ground | Always | Below 1 Ω |
| 1I-1 (RDEF) - Body ground | Always | 10 k Ω or higher |
| V2-1 - Body ground | Always | 10 k Ω or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Relay) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Back Door Glass) |
| *3 | Back Window Fix Glass Battery Side |
| *4 | Back Window Fix Glass Body Ground Side |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE BACK WINDOW FIX GLASS**

# ON-VEHICLE INSPECTION

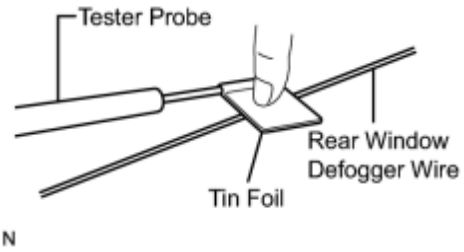
1. CHECK REAR WINDOW DEFOGGER OPERATION

(a) When the power switch is on (IG) and the rear window defogger switch is pressed, check that the rear window defogger operates.

2. INSPECT REAR WINDOW DEFOGGER WIRE (BACK DOOR GLASS)

NOTICE:

- When cleaning the glass, wipe the glass along the wire using a soft and dry cloth. Take care not to damage the wires.
- Do not use detergents or glass cleaners that have abrasive ingredients.
- When measuring voltage, wrap a piece of tin foil around the tip of the negative tester probe and press the foil against the wire with your finger, as shown in the illustration.

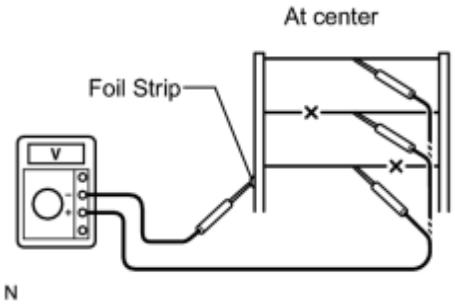



(a) Turn the power switch on (IG).

(b) Turn the rear window defogger switch on.

(c) Measure the voltage at the center of each rear window defogger wire to check the wire, as shown in the illustration.

Result:

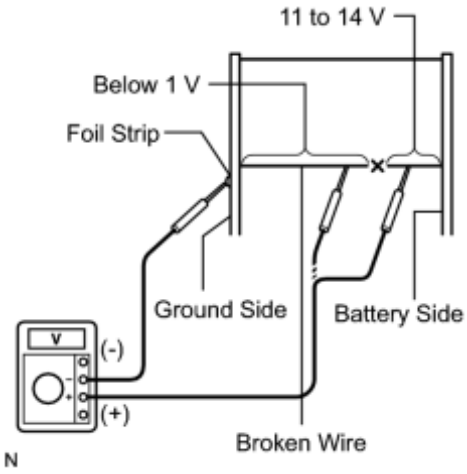



| Voltage | Criteria |
|---|---|
| 4 to 6 V | Wire is not broken |
| 11 to 14 V | Wire is broken between the center and battery side end |
| Below 1 V | Wire is broken between the center and ground side end |

HINT:

If the voltage is 11 to 14 V, the wire may be faulty between the center of the wire and the wire end on the battery side. If the voltage is below 1 V, the wire may be faulty between the center of the wire and the wire end on the ground side.

(d) Place the positive (+) lead of the voltmeter against the rear window defogger wire on the battery side.




(e) Place the negative (-) lead of the voltmeter with the foil strip against the wire on the ground side.

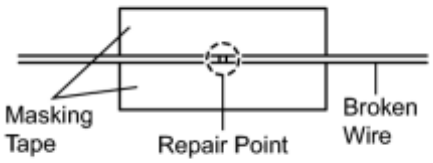
(f) Slide the positive (+) lead from the battery side to the ground side. The point where the voltage drops to below 1 V from 11 to 14 V is the place where the rear window defogger wire is broken.

HINT:

If the rear window defogger wire is not broken, the voltmeter should indicate 11 to 14 V at the battery side. When the positive (+) lead slides to the ground side, the voltage gradually decreases to below 1 V.

# REPAIR

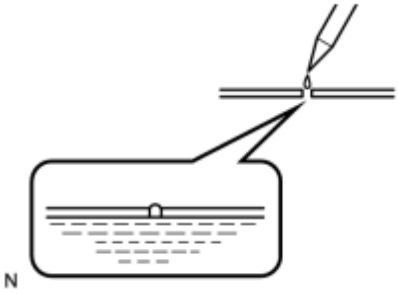
1. REPAIR REAR WINDOW DEFOGGER WIRE (BACK DOOR GLASS)




N

(a) Clean the broken wire tips with a grease, wax and silicone remover.

(b) Place masking tape along both sides of the wire.



N

(c) Thoroughly mix the repair agent (Dupont paste No. 4817 or equivalent).

(d) Using a fine tip brush, apply a small amount of the agent to the wire.

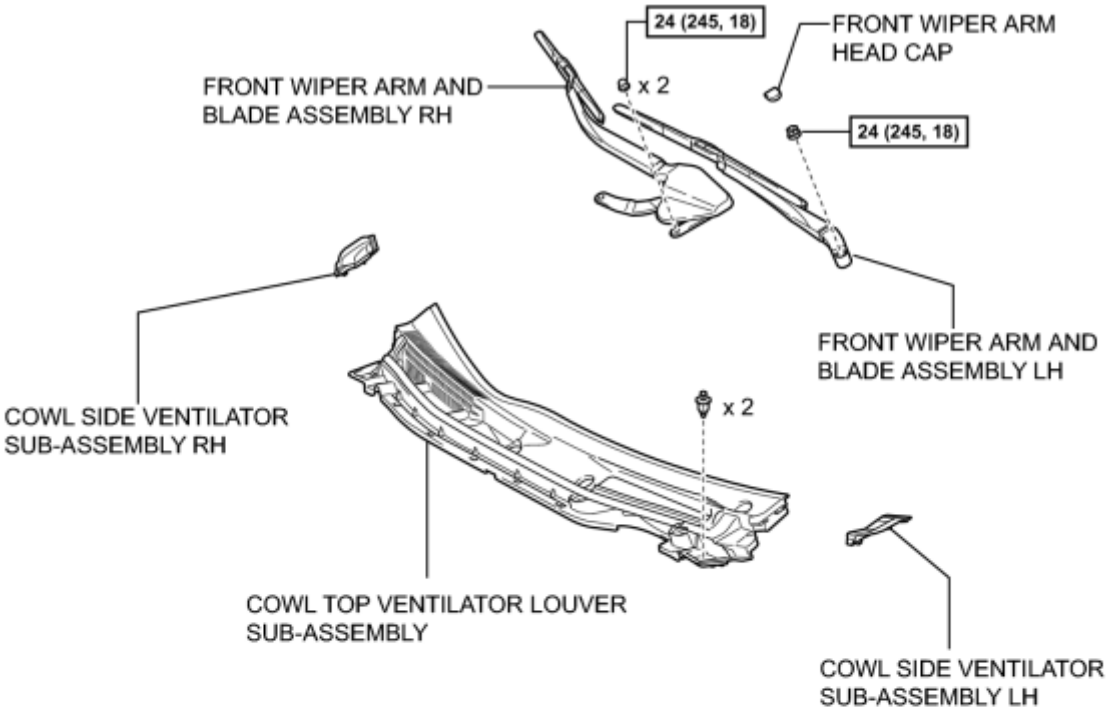
(e) After a few minutes, remove the masking tape.

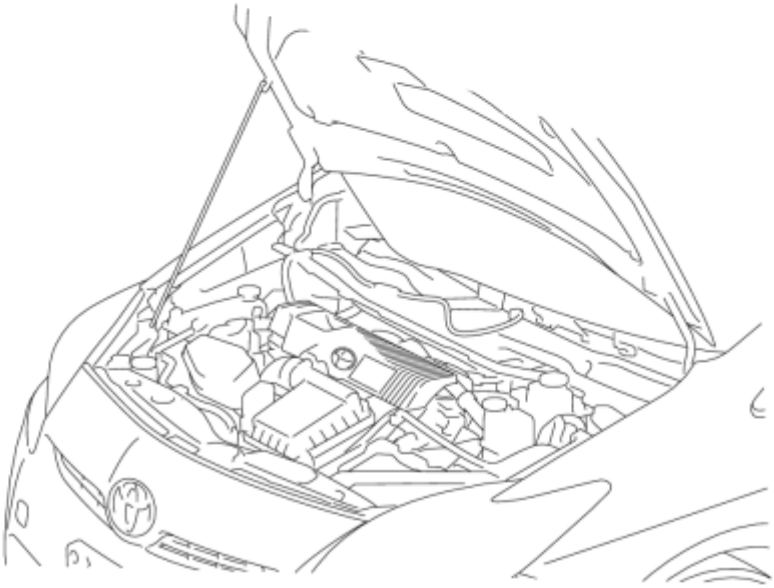
NOTICE:

Do not use the rear window defogger for at least 24 hours after performing the repair.

# COMPONENTS

# ILLUSTRATION

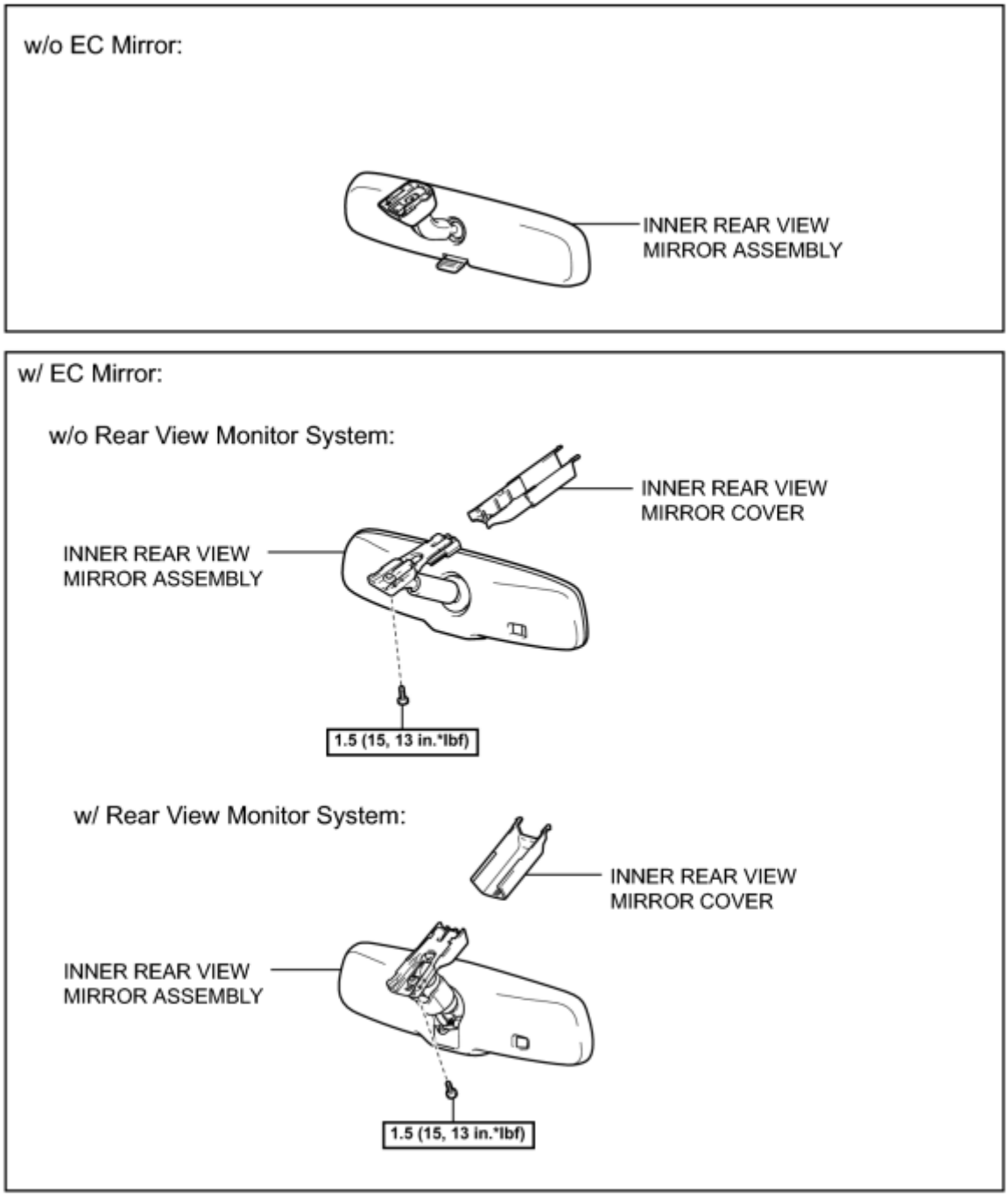


N*m (kgf*cm, ft.*lbf): Specified torque

P

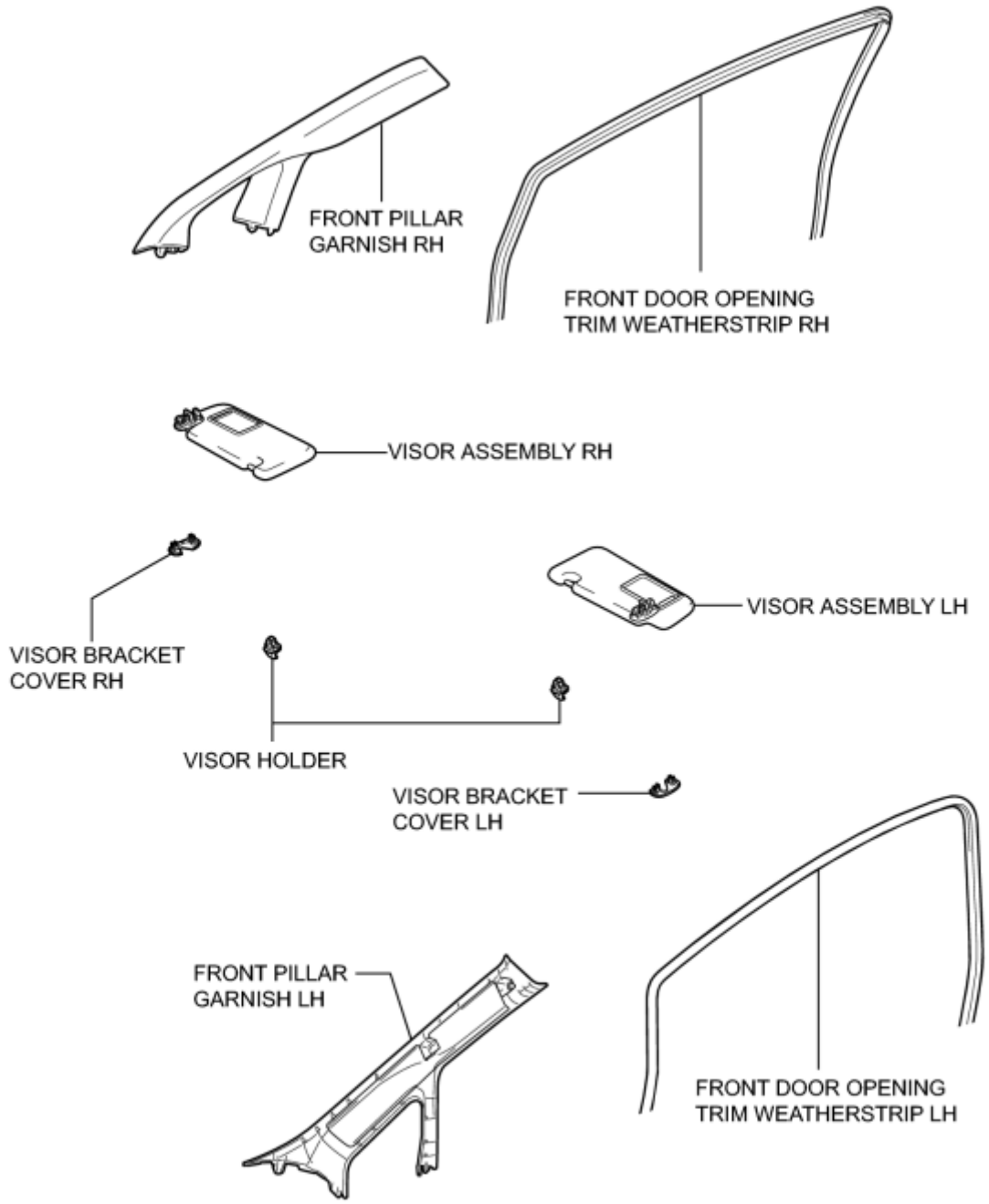
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

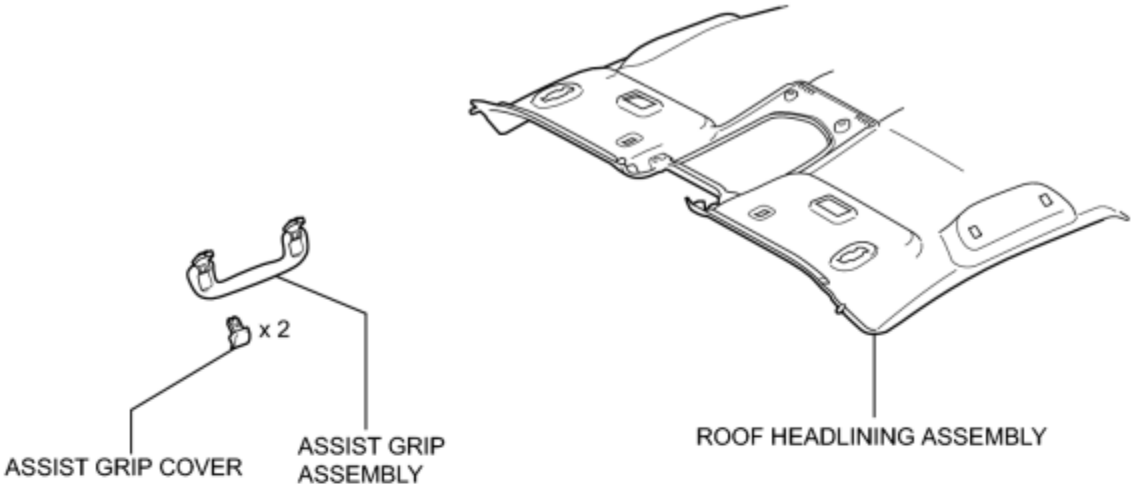
P

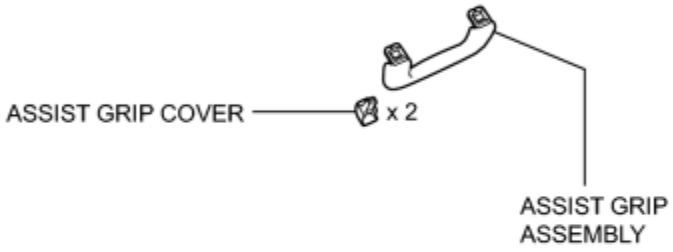
# ILLUSTRATION

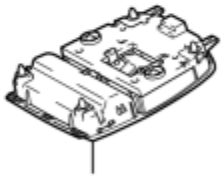
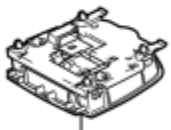



P

# ILLUSTRATION



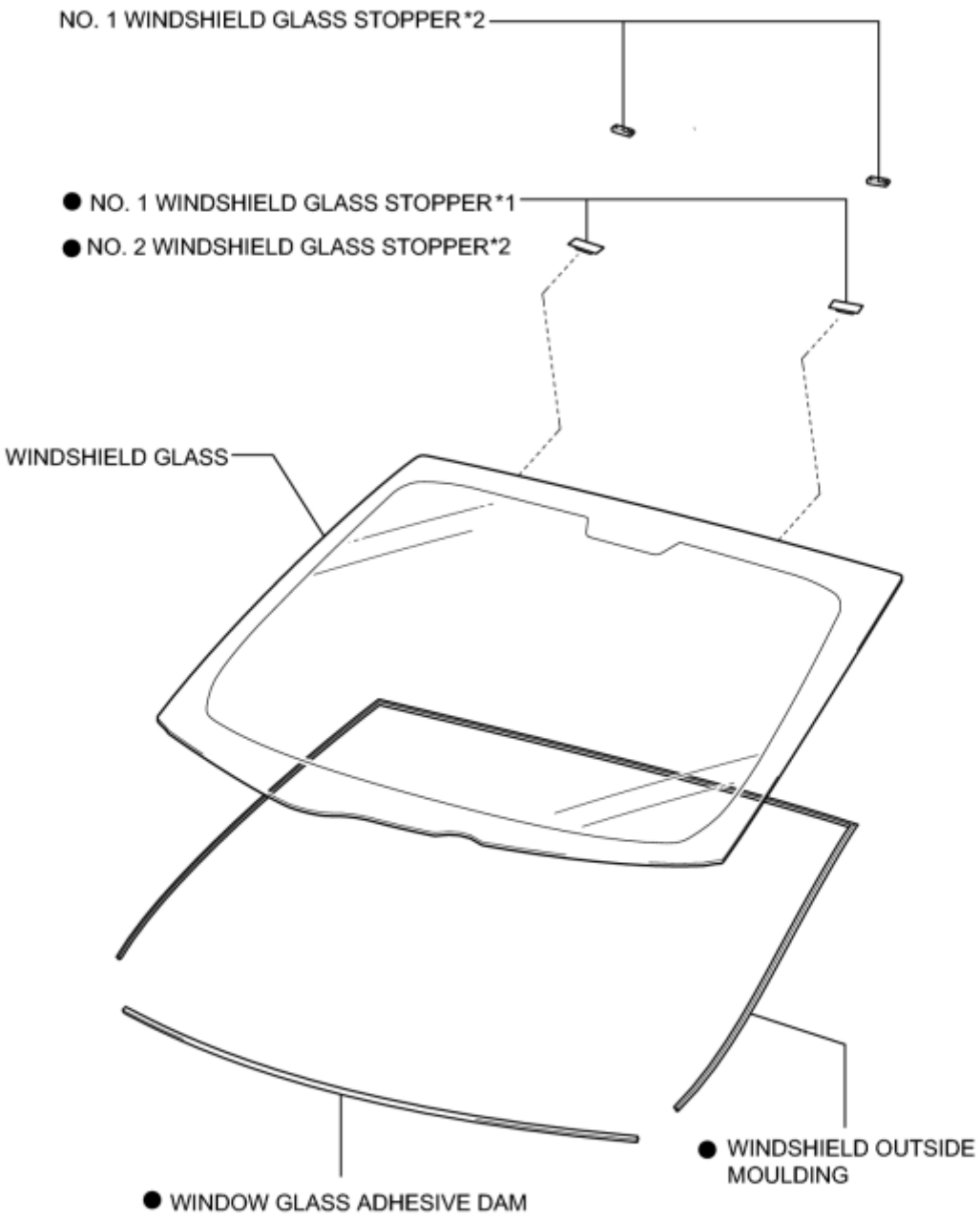




| | |
|---|---|
| w/o Sliding Roof:<br>  <br>MAP LIGHT ASSEMBLY | w/ Sliding Roof:<br>  <br>MAP LIGHT ASSEMBLY |

| | |
|---|---|
| w/o Lane Keeping Assist System:<br>  <br>ROOF TOP MOULDING | w/ Lane Keeping Assist System:<br>  <br>ROOF TOP MOULDING |

P

# ILLUSTRATION




*1: 1-piece type

*2: 2-piece type

● Non-reusable part

P

# REMOVAL

1. REMOVE FRONT WIPER ARM HEAD CAP INFO

2. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO

3. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO

4. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY LH INFO

5. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY RH INFO

6. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY INFO

7. REMOVE INNER REAR VIEW MIRROR COVER (w/ EC Mirror) INFO

8. REMOVE INNER REAR VIEW MIRROR ASSEMBLY (w/o EC Mirror) INFO

9. REMOVE INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror) INFO

10. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP LH

11. REMOVE FRONT PILLAR GARNISH LH INFO

12. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP RH

13. REMOVE FRONT PILLAR GARNISH RH INFO

14. REMOVE ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

15. REMOVE ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

16. REMOVE MAP LIGHT ASSEMBLY (w/o Sliding Roof) INFO

17. REMOVE MAP LIGHT ASSEMBLY (w/ Sliding Roof) INFO

18. REMOVE ASSIST GRIP ASSEMBLY INFO

19. REMOVE VISOR BRACKET COVER LH INFO

20. REMOVE VISOR ASSEMBLY LH INFO

21. REMOVE VISOR BRACKET COVER RH

HINT:

Use the same procedure for the RH side and LH side.

22. REMOVE VISOR ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

23. REMOVE VISOR HOLDER INFO

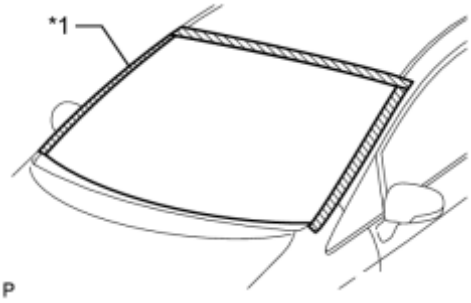
24. REMOVE ROOF HEADLINING ASSEMBLY

(a) Slightly lower the front section of the roof headlining assembly so that the windshield glass can be removed.

HINT:

It is not necessary to completely remove the roof headlining assembly.

25. REMOVE WINDSHIELD GLASS SUB-ASSEMBLY




P

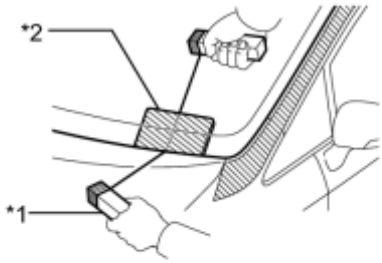
(a) Apply protective tape to the installation position of the windshield glass sub-assembly on the vehicle body.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

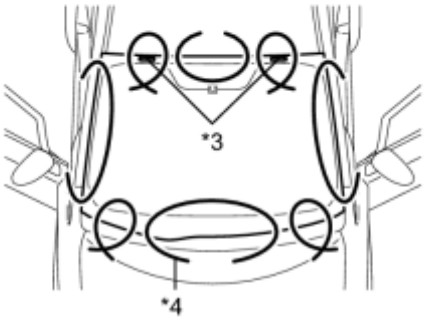
HINT:

Apply protective tape to the installation surface to prevent it from being scratched.




(b) Pass a piano wire between the vehicle body and glass from the interior, as shown in the illustration.

## Text in Illustration




P

| | |
|---|---|
| *1 | Wooden Block |
| *2 | Plastic Sheet |
| *3 | Stopper |
| *4 | Piano Wire |

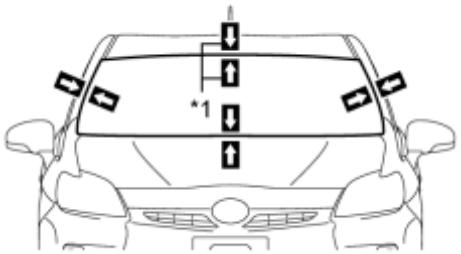
(c) Tie both wire ends to wooden blocks or similar objects that can serve as handles.

(d) Cut off the adhesive by pulling the piano wire around the windshield glass sub-assembly.

NOTICE:

- When separating the windshield glass sub-assembly, be careful not to damage the paint or interior and exterior ornaments.
- To prevent the safety pad from being scratched when removing the windshield glass sub-assembly, place a plastic sheet between the piano wire and safety pad.

(e) Place matchmarks on the windshield glass sub-assembly and vehicle body on the locations indicated in the illustration.




P

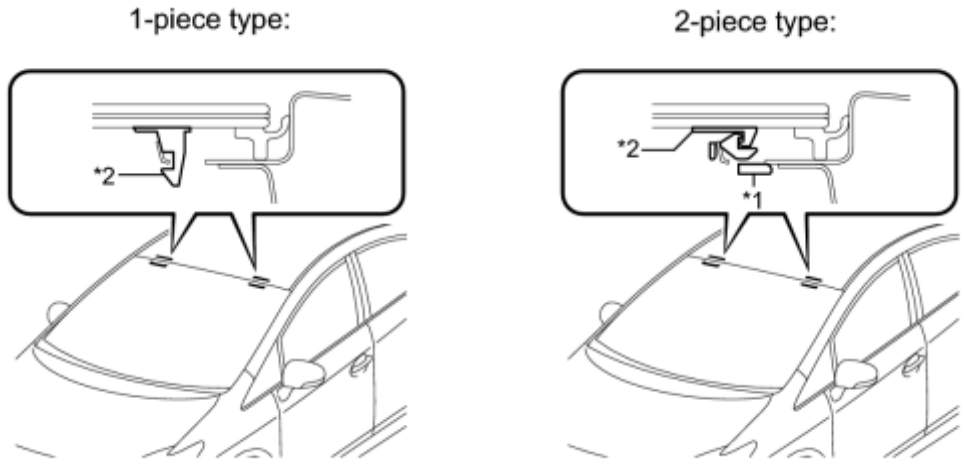
## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

HINT:

Matchmarks are not necessary if the windshield glass assembly is not going to be reused.

(f) Disconnect the windshield glass stoppers.




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | No. 1 Stopper | *2 | No. 2 Stopper |

NOTICE:

- There are No. 1 and No. 2 stoppers on the windshield glass sub-assembly as shown in the illustration. Be careful not to damage the windshield glass sub-assembly when cutting off the adhesive.
- To prevent the windshield glass sub-assembly from dropping when performing this operation, be sure to hold the windshield glass using suction cups.

HINT:

Depending on vehicles, 1-piece or 2-piece type stoppers are used.

(g) Using suction cups, remove the windshield glass sub-assembly .

NOTICE:

- Be careful not to drop the windshield glass sub-assembly.
- Leave as much adhesive on the vehicle body as possible when removing the windshield glass sub-assembly.

26. REMOVE WINDOW GLASS ADHESIVE DAM

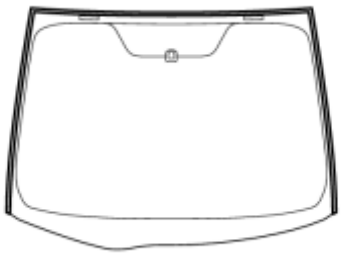


P

(a) Using a scraper, remove the windshield glass adhesive dam.

- Be careful not to damage the windshield glass.
- Be sure to replace the window glass adhesive dam with a new one.

27. REMOVE WINDSHIELD OUTSIDE MOULDING



P

(a) Using a scraper, remove the windshield outside moulding.

- Be careful not to damage the windshield glass.
- Be sure to replace the windshield outside moulding with a new one.

28. REMOVE NO. 2 WINDSHIELD GLASS STOPPER

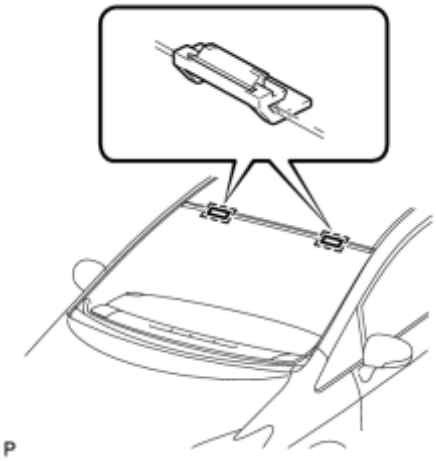


P

(a) Using a scraper, remove the 2 No. 2 windshield glass stoppers.

- Be careful not to damage the windshield glass.
- Be sure to replace the No. 2 windshield glass stoppers with new ones.

29. REMOVE NO. 1 WINDSHIELD GLASS STOPPER (for 2-piece Type)

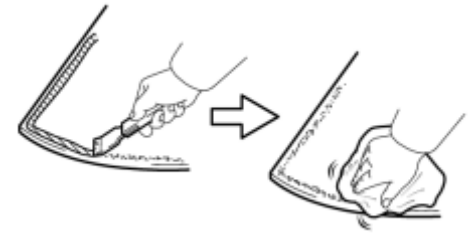


(a) Remove the 2 No. 1 windshield glass stoppers.

NOTICE:

Be sure to replace the No. 1 windshield glass stoppers with new ones.

30. CLEAN WINDSHIELD GLASS



(a) Using a scraper, remove the adhesive tape and adhesive sticking to the windshield glass.

NOTICE:

Be careful not to damage the windshield glass.

(b) Clean the outer circumference of the windshield glass with a non-residue solvent.

NOTICE:

- Do not touch the windshield glass surface after cleaning it.
- Even if using a new windshield glass, clean the windshield glass with a non-residue solvent.

31. CLEAN VEHICLE BODY

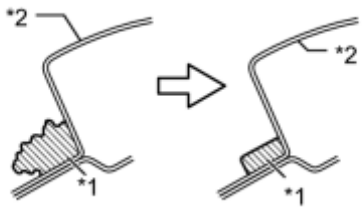
(a) Clean and shape the contact surfaces of the vehicle body.

# Text in Illustration

| | |
|---|---|
| *1 | Adhesive |
| *2 | Body |

(1) Using a knife, cut away excess adhesive on the contact surfaces of the

vehicle body, as shown in the illustration.




NOTICE:

Be careful not to damage the vehicle body.

HINT:

Leave as much adhesive on the vehicle body as possible.

(2) Clean the contact surfaces of the vehicle body with a piece of cloth saturated with cleaner.

HINT:

Even if all the adhesive has been removed, clean the vehicle body.

# INSTALLATION

1. INSTALL NO. 2 WINDSHIELD GLASS STOPPER

(a) Using a brush or a sponge, coat the application area of the No. 2 windshield glass stoppers with Primer G.

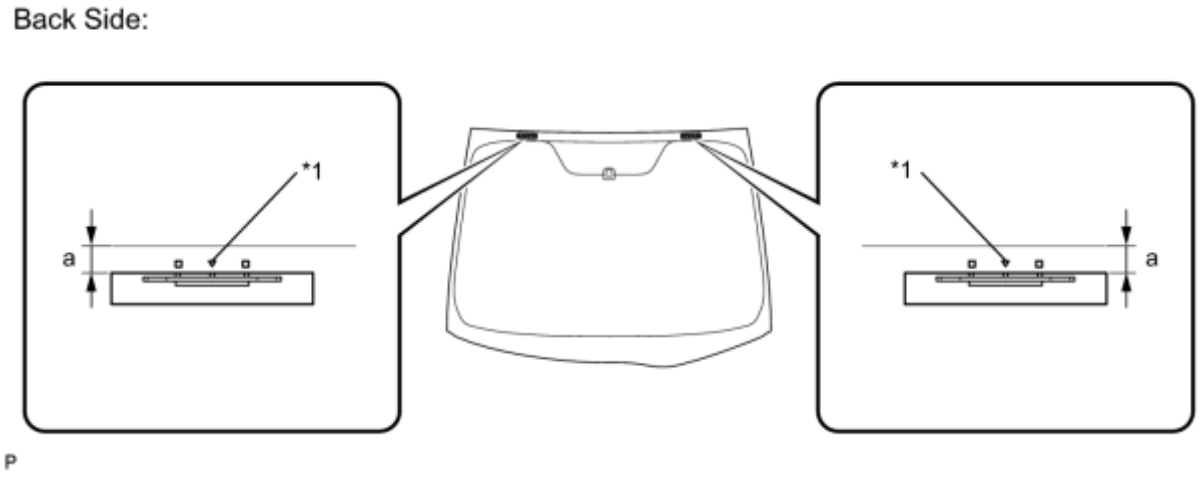
NOTICE:

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(b) Install 2 new No. 2 windshield glass stoppers onto the windshield glass, as shown in the illustration.




***Text in Illustration***

| | |
|---|---|
| *1 | Ceramic Notch |

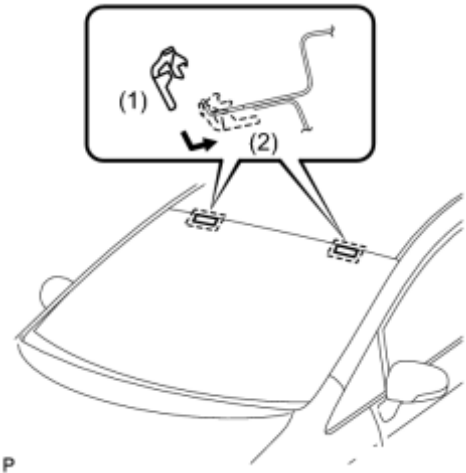
Standard Dimension:

| Area | Dimension |
|---|---|
| a | 13.7 to 14.7 mm (0.539 to 0.578 in.) |

NOTICE:

Only the 2-piece type No. 2 windshield glass stoppers are supplied. Use the 2-piece type stoppers even if the 1-piece type stoppers were used.

2. INSTALL NO. 1 WINDSHIELD GLASS STOPPER




P

(a) Install 2 new No. 1 windshield glass stoppers to the vehicle body, as shown in the illustration.

NOTICE:

Only the 2-piece type No. 1 windshield glass stoppers are supplied. Use the 2-piece type stoppers even if the 1-piece type stoppers were used.

3. INSTALL WINDSHIELD OUTSIDE MOULDING

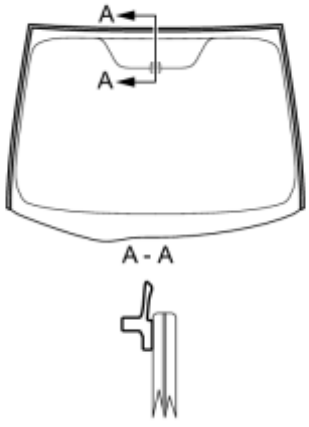
(a) Using a brush or a sponge, coat the application area of a new windshield outside moulding with Primer G.

NOTICE:

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.




P

(b) Install the windshield outside moulding onto the windshield glass, as shown in the illustration.

4. INSTALL WINDOW GLASS ADHESIVE DAM

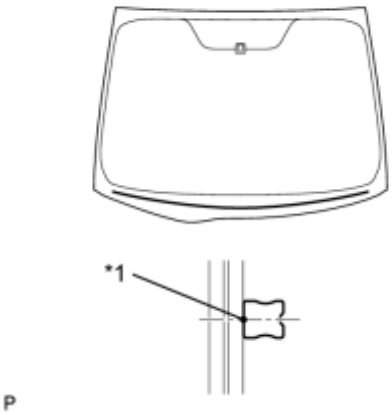
(a) Using a brush or a sponge, coat the application area of a new window glass adhesive dam with Primer G.

NOTICE:

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.




(b) Install the window glass adhesive dam onto the windshield glass, as shown in the illustration.

## Text in Illustration

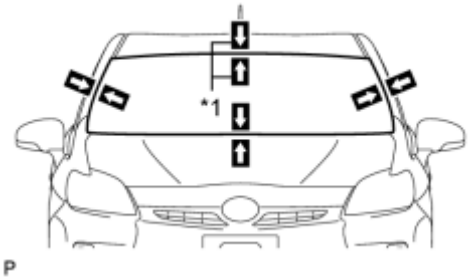
| | |
|---|---|
| *1 | Dam Center Line |

5. INSTALL WINDSHIELD GLASS SUB-ASSEMBLY

(a) Position the windshield glass sub-assembly.

## Text in Illustration

| | |
|---|---|
| *1 | Matchmark |




(1) Using suction cups, place the windshield glass in the correct position.

(2) Check that the whole contact surface of the windshield glass rim is perfectly even.

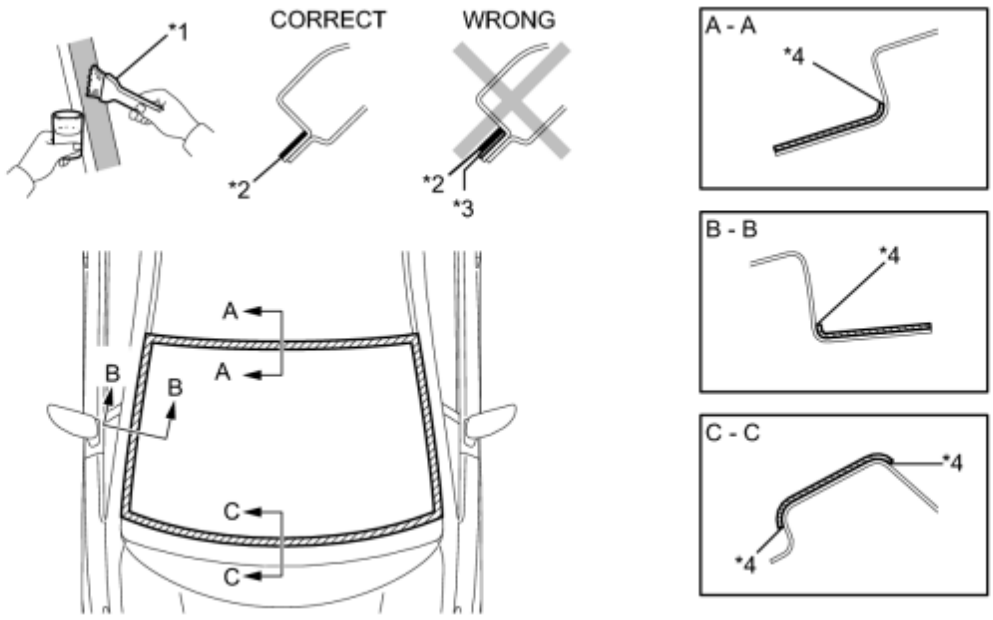
(3) Align the matchmarks on the windshield glass sub-assembly and vehicle body.

NOTICE:

Check that the windshield glass stoppers are attached to the vehicle body correctly.

(4) Remove the windshield glass sub-assembly.

(b) Using a brush, coat the installation surface on the vehicle body with Primer M.




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Brush | *2 | Primer M |
| *3 | Adhesive | *4 | Edge of Curved Surface |

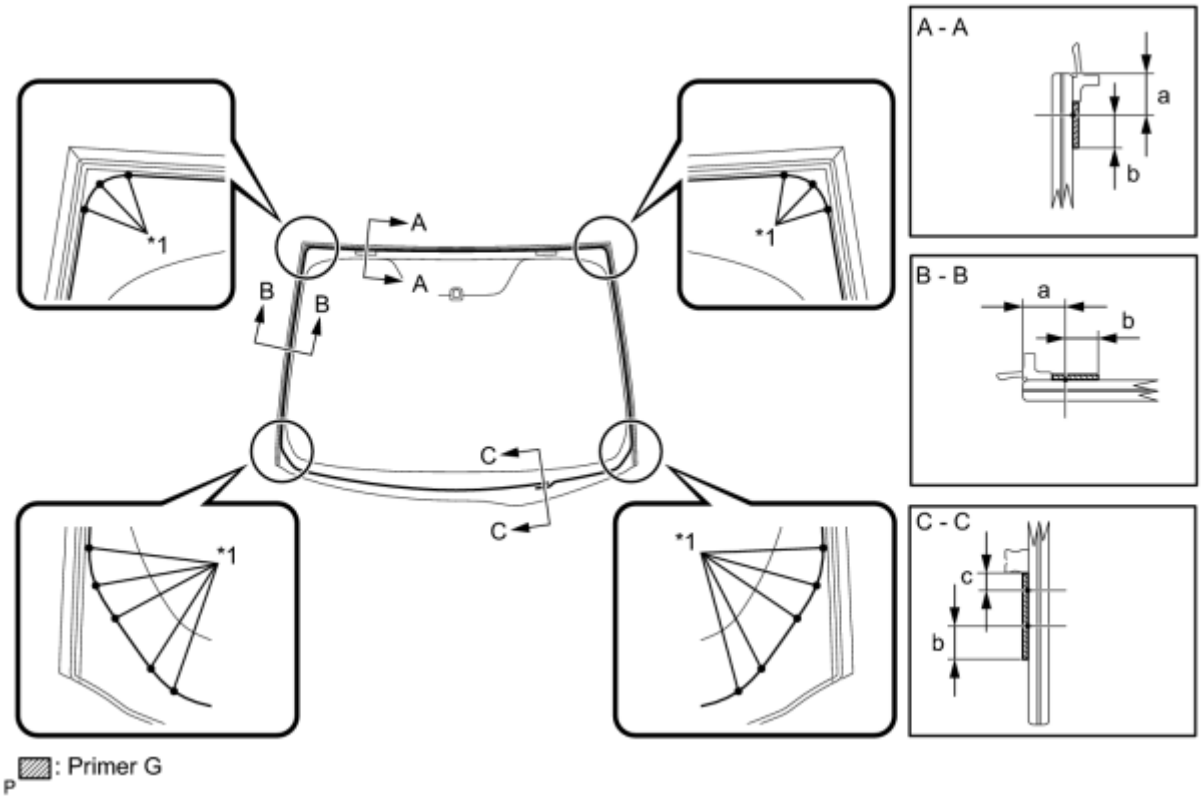
NOTICE:

- Do not coat the adhesive with Primer M.
- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

HINT:

If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(c) Using a brush or a sponge, coat the application area of adhesive with Primer G.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Ceramic Notch | - | - |

Standard Dimension:

| Area | Dimension |
|---|---|
| a | 9.5 mm (0.374 in.) |
| b | 7.0 mm (0.275 in.) |
| c | 4.0 mm (0.157 in.) |

NOTICE:

- Do not apply too much primer.
- Allow the primer to dry for 3 minutes or more.
- Throw away any leftover primer.

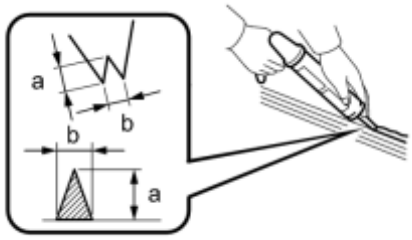
HINT:

- Apply Primer G onto the ceramic notches.
- If an area other than that specified is coated by accident, wipe off the primer with a clean piece of cloth before it dries.

(d) Apply adhesive to the glass.

Adhesive:

Toyota Genuine Windshield Glass Adhesive or equivalent




P

(1) Cut off the tip of the cartridge nozzle as shown in the illustration.

Standard Dimension:

| Area | Dimension |
|---|---|
| a | 12.0 mm (0.472 in.) |
| b | 8.0 mm (0.315 in.) |

HINT:

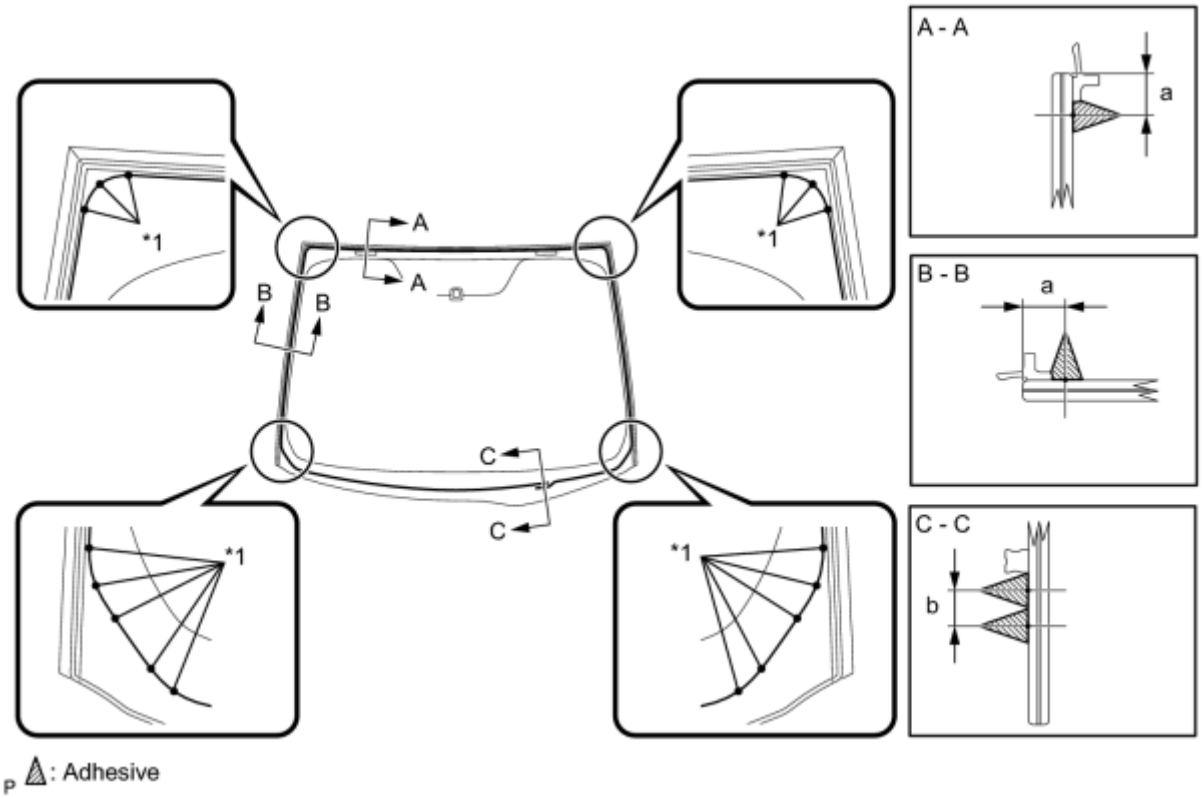
After cutting off the tip, use all adhesive within the time described in the table below.

Usage Time Frame:

| Temperature | Usage Time Frame |
|---|---|
| 35°C (95°F) | 15 minutes |
| 20°C (68°F) | 1 hour and 40 minutes |
| 5°C (41°F) | 8 hours |

(2) Load the sealer gun with cartridge.

(3) Apply adhesive to the windshield glass as shown in the illustration.




*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Ceramic Notch | - | - |

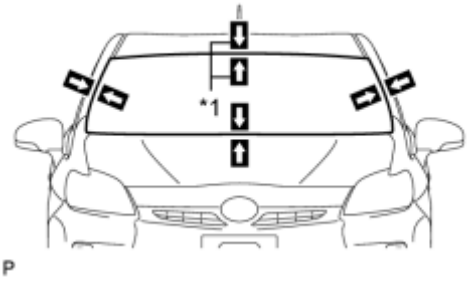
Standard Dimension:

| Area | Dimension |
|---|---|
| a | 9.5 mm (0.374 in.) |
| b | 8.0 mm (0.315 in.) |

HINT:

Apply adhesive onto the ceramic notches.

(e) Install the windshield glass sub-assembly.




P

*Text in Illustration*

| | |
|---|---|
| *1 | Matchmark |

(1) Using suction cups, position the windshield glass sub-assembly so that the matchmarks are aligned, and press it in gently along the rim.

NOTICE:

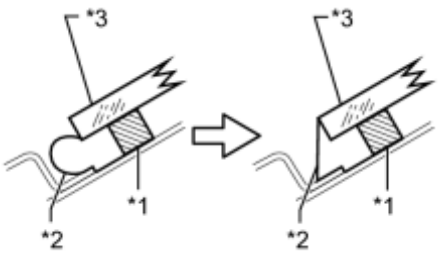
- Check that the windshield glass stoppers are attached to the vehicle body correctly.
- Check the clearance between the vehicle body and windshield glass.

(2) Lightly press the front surface of the windshield glass sub-assembly to ensure that the windshield glass sub-assembly is securely fit to the vehicle body.

HINT:

Press the glass with a force of 98 N (10 kgf, 22 lbf) or more.

(3) Using a scraper, remove any excess or protruding adhesive.




P

# Text in Illustration

| | |
|---|---|
| *1 | Dam |
| *2 | Adhesive |
| *3 | Windshield |

HINT:

Apply adhesive onto the windshield glass rim.

(4) Hold the windshield glass using protective tape until applied adhesive becomes hard.

NOTICE:

Do not drive the vehicle for the time described in the table below.

Minimum Time:

| Temperature | Minimum Time prior to Driving Vehicle |
|---|---|
| 35°C (95°F) | 1 hour and 30 minutes |
| 20°C (68°F) | 5 hours |
| 5°C (41°F) | 24 hours |

6. INSPECT FOR LEAK AND REPAIR

(a) After the adhesive has hardened, apply water from the outside of the vehicle. Check that no water leaks into the cabin.

(b) If water leaks into the cabin, allow the water to dry and add adhesive.

(c) Remove the protective tape.

7. INSTALL ROOF HEADLINING ASSEMBLY

(a) Return the front section of the roof headlining assembly to the original position.

8. INSTALL VISOR HOLDER INFO

9. INSTALL VISOR ASSEMBLY LH INFO

10. INSTALL VISOR BRACKET COVER LH INFO

11. INSTALL VISOR ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

12. INSTALL VISOR BRACKET COVER RH

HINT:

Use the same procedure for the RH side and LH side.

13. INSTALL ASSIST GRIP ASSEMBLY INFO

14. INSTALL MAP LIGHT ASSEMBLY (w/o Sliding Roof) INFO

15. INSTALL MAP LIGHT ASSEMBLY (w/ Sliding Roof) INFO

16. INSTALL ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

17. INSTALL ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

18. INSTALL FRONT PILLAR GARNISH LH INFO

19. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH INFO

20. INSTALL FRONT PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and LH side.

21. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH INFO

22. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (w/o EC Mirror) INFO

23. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror) INFO

24. INSTALL INNER REAR VIEW MIRROR COVER (w/ EC Mirror) INFO

25. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY INFO

26. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY LH INFO

27. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY RH INFO

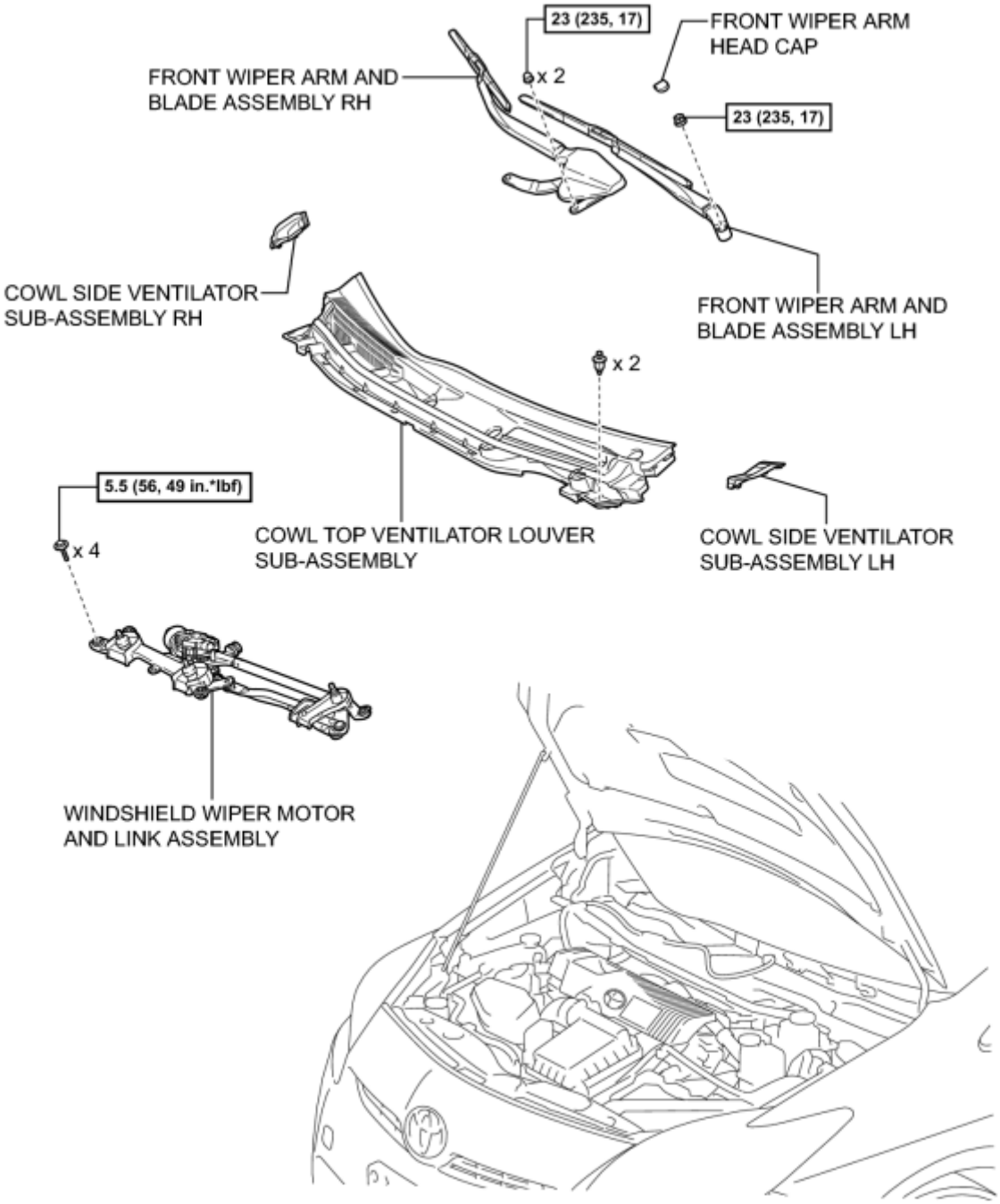
28. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO

29. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO

30. INSTALL FRONT WIPER ARM HEAD CAP INFO

# COMPONENTS

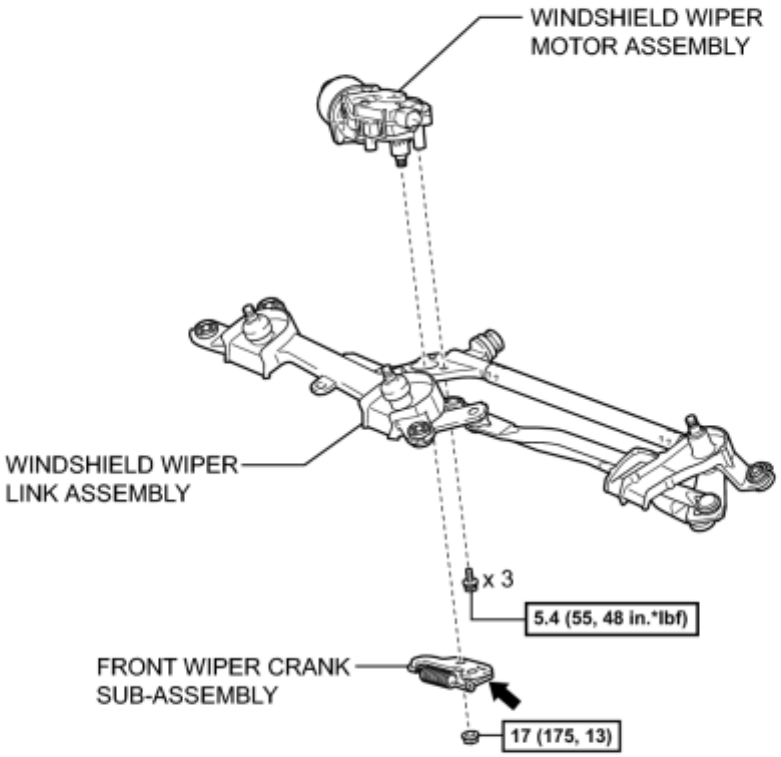
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

MP grease

P

# ON-VEHICLE INSPECTION

1. INSPECT WINDSHIELD WIPER MOTOR ASSEMBLY

(a) for LH Side




(1) Operate the windshield wiper motor assembly.

(2) Stop the windshield wiper motor assembly operation.

(3) Check the automatic stop (park) position.

OK:

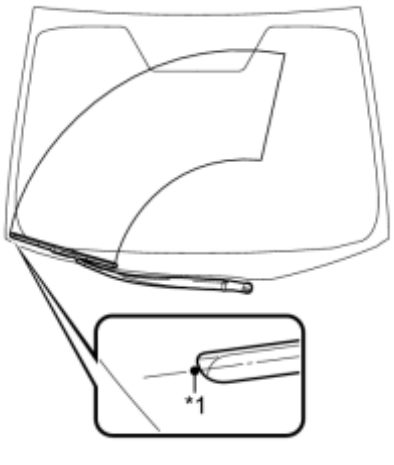
The front wiper stops at the position shown in the illustration.

***Text in Illustration***

| | |
|---|---|
| *1 | Ceramic Dot |

(b) for RH Side

(1) Operate the windshield wiper motor assembly.




(2) Stop the windshield wiper motor assembly operation.

(3) Check the automatic stop (park) position.

OK:

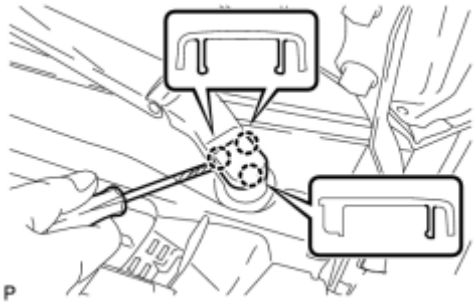
The front wiper stops at the position shown in the illustration.

***Text in Illustration***

| | |
|---|---|
| *1 | Ceramic Dot |

# REMOVAL

1. REMOVE FRONT WIPER ARM HEAD CAP



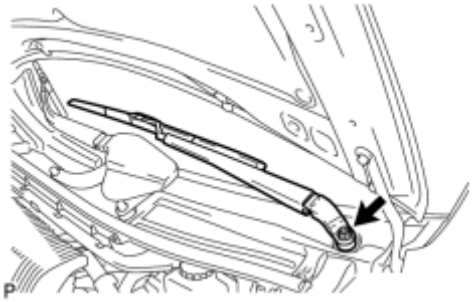
(a) Using a screwdriver, disengage the 3 claws and remove the front wiper arm head cap.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

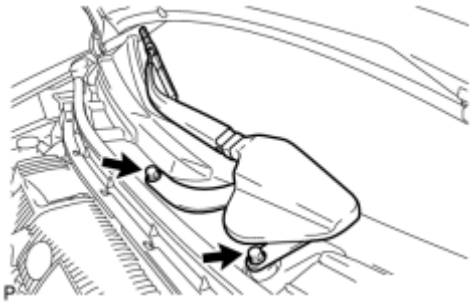
- Tape the screwdriver tip before use.
- Use the same procedure for the RH side and LH side.

2. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH



(a) Remove the nut and the front wiper arm and blade assembly LH.

3. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH

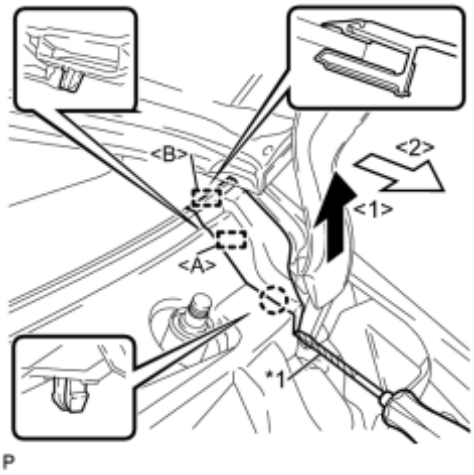


(a) Remove the 2 nuts and the front wiper arm and blade assembly RH.

4. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY LH

(a) Using a screwdriver, disengage the claw and guide <A> as shown in the illustration.

## Text in Illustration




| | |
|---|---|
| *1 | Protective Tape |

HINT:

Tape the screwdriver tip before use.

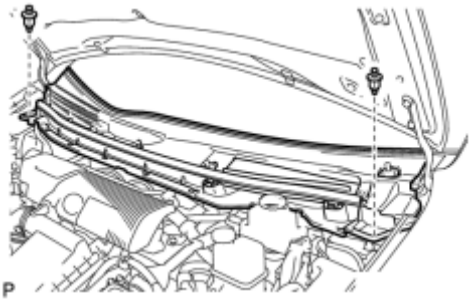
(b) Disengage the guide <B> and remove the cowl side ventilator sub-assembly LH as shown in the illustration.

5. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY RH

HINT:

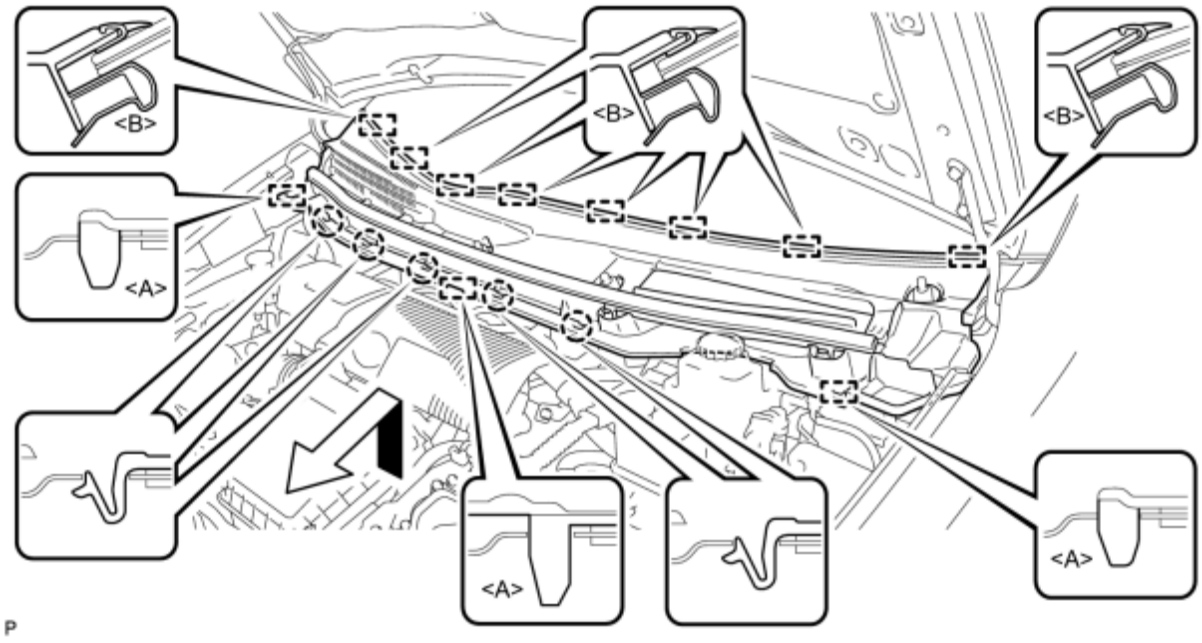
Use the same procedure for the RH side and LH side.

6. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY




(a) Remove the 2 clips.

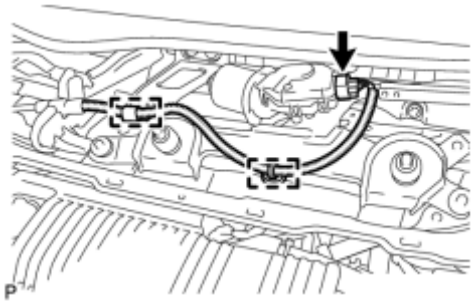
(b) Disengage the 5 claws and 3 guides <A>.




(c) Disengage the 8 guides <B> and pull out the cowl top ventilator louver sub-assembly as shown in the illustration.

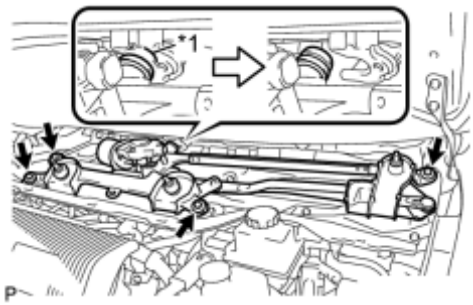
7. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY

(a) Operate the wiper and stop the windshield wiper motor at the automatic stop position.



(b) Disconnect the connector.

(c) Disengage the 2 clamps.




(d) Remove the 4 bolts.

# Text in Illustration

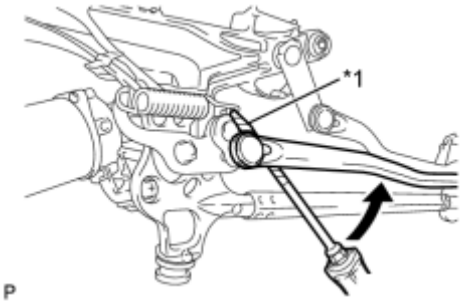
| | |
|---|---|
| *1 | Grommet |

(e) Disengage the grommet and remove the windshield wiper motor and link assembly as shown in the illustration.

NOTICE:

Be careful not to damage the windshield when removing the windshield wiper motor and link assembly.

8. REMOVE FRONT WIPER CRANK SUB-ASSEMBLY




(a) Using a screwdriver, separate the windshield wiper link rod from the crank arm pivot of the front wiper crank sub-assembly as shown in the illustration.

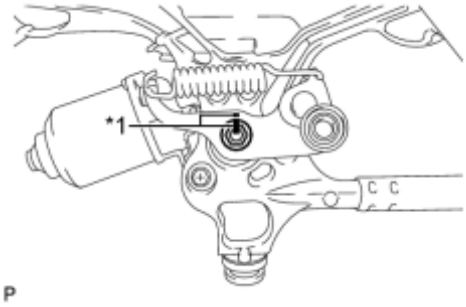
## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

HINT:

Tape the screwdriver tip before use.

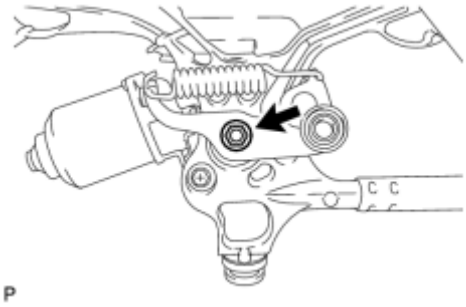
(b) When reusing the windshield wiper motor assembly and front wiper crank sub-assembly:




(1) Place matchmarks on the windshield wiper link assembly and front wiper crank sub-assembly as shown in the illustration.

## Text in Illustration

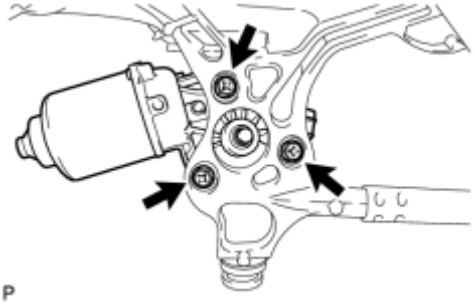
| | |
|---|---|
| *1 | Matchmark |




(c) Remove the nut and the front wiper crank sub-assembly.

9. REMOVE WINDSHIELD WIPER MOTOR ASSEMBLY

(a) Remove the 3 bolts and remove the windshield wiper motor assembly.



P

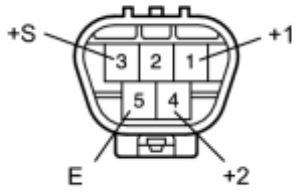
# INSPECTION

NOTICE:

Ensure that fingers or articles of clothing do not get caught in moving parts when performing this test.

1. INSPECT WINDSHIELD WIPER MOTOR ASSEMBLY

*1




P

(a) Check the low speed operation.

(1) Connect a battery positive (+) lead to terminal 1 (+1) and a negative (-) lead to terminal 5 (E), and check that the motor operates at low speed.

OK:

Motor operates at low speed.

(b) Check the high speed operation.

(1) Connect a battery positive (+) lead to terminal 4 (+2) and a negative (-) lead to terminal 5 (E), and check that the motor operates at high speed.

OK:

Motor operates at high speed.

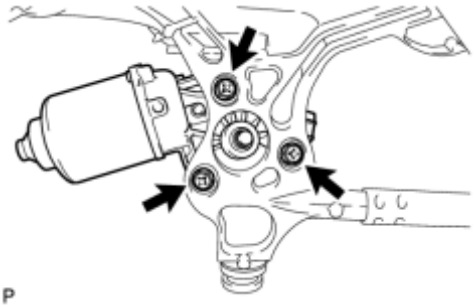
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Windshield Wiper Motor Assembly) |

If the result is not as specified, replace the windshield wiper motor assembly.

# INSTALLATION

1. INSTALL WINDSHIELD WIPER MOTOR ASSEMBLY



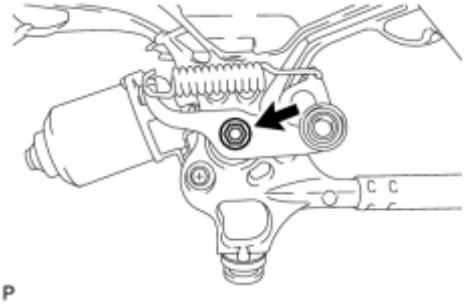
P

(a) Install the windshield wiper motor assembly with the 3 bolts.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

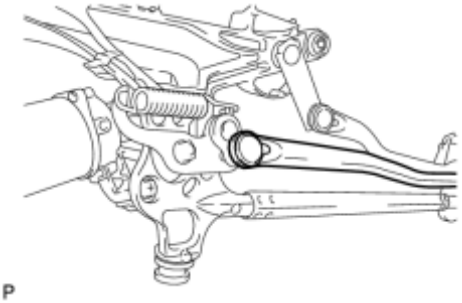
2. INSTALL FRONT WIPER CRANK SUB-ASSEMBLY

(a) When replacing the windshield wiper motor assembly and front wiper crank sub-assembly with a new one:



P

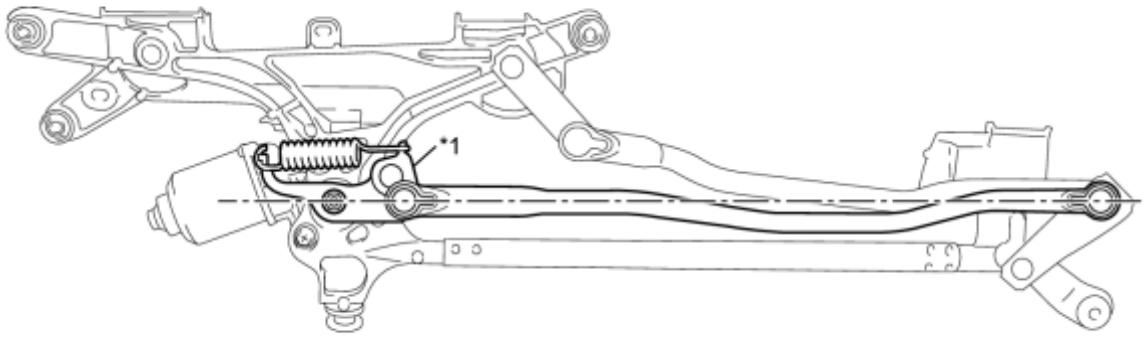
(1) Temporarily install a front wiper crank sub-assembly on the new windshield wiper motor assembly with the nut.



P

(2) Temporarily install the windshield wiper motor and link on the crank arm pivot of the front wiper crank sub-assembly.

(3) Align the front wiper crank sub-assembly with the windshield wiper motor and link as shown in the illustration.




P

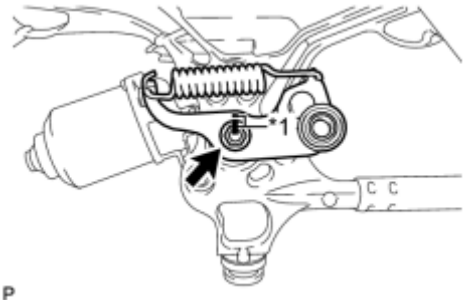
*Text in Illustration*

| | |
|---|---|
| *1 | Front Wiper Crank Sub-assembly |

(4) Tighten install the front wiper crank sub-assembly with the nut.

Torque: **17 N·m (175 kgf·cm, 13ft·lbf)**

(b) When reusing the windshield wiper motor assembly and front wiper crank sub-assembly:



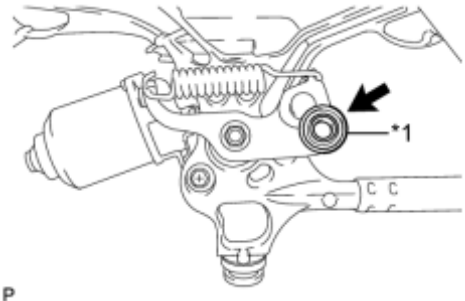

P

(1) Align the matchmarks to install the front wiper crank sub-assembly with the nut.

# Text in Illustration

| | |
|---|---|
| *1 | Matchmark |

Torque: **17 N·m (175 kgf·cm, 13ft·lbf)**



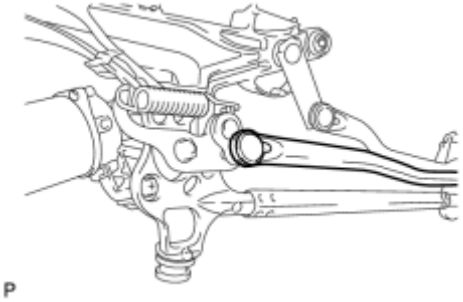

P

(c) Apply MP grease to the crank arm pivot of the front wiper crank sub-assembly.

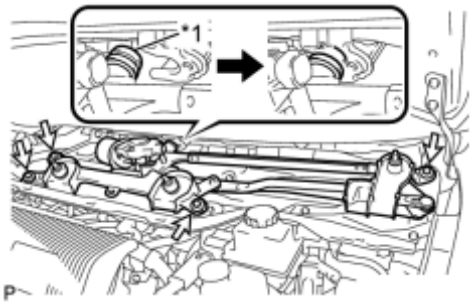
# Text in Illustration

| | |
|---|---|
| *1 | Crank arm Pivot |

(d) Connect the rod of the windshield wiper link assembly to the crank arm pivot of the front wiper crank sub-assembly.



3. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY




(a) Engage the grommet as shown in the illustration.

## Text in Illustration

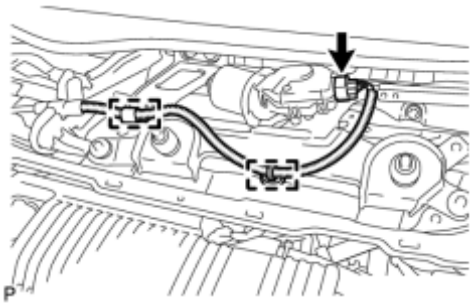
| | |
|---|---|
| *1 | Grommet |

(b) Install the windshield wiper motor and link assembly with the 4 bolts.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

NOTICE:

Be careful not to damage the windshield when installing the windshield wiper motor and link assembly.

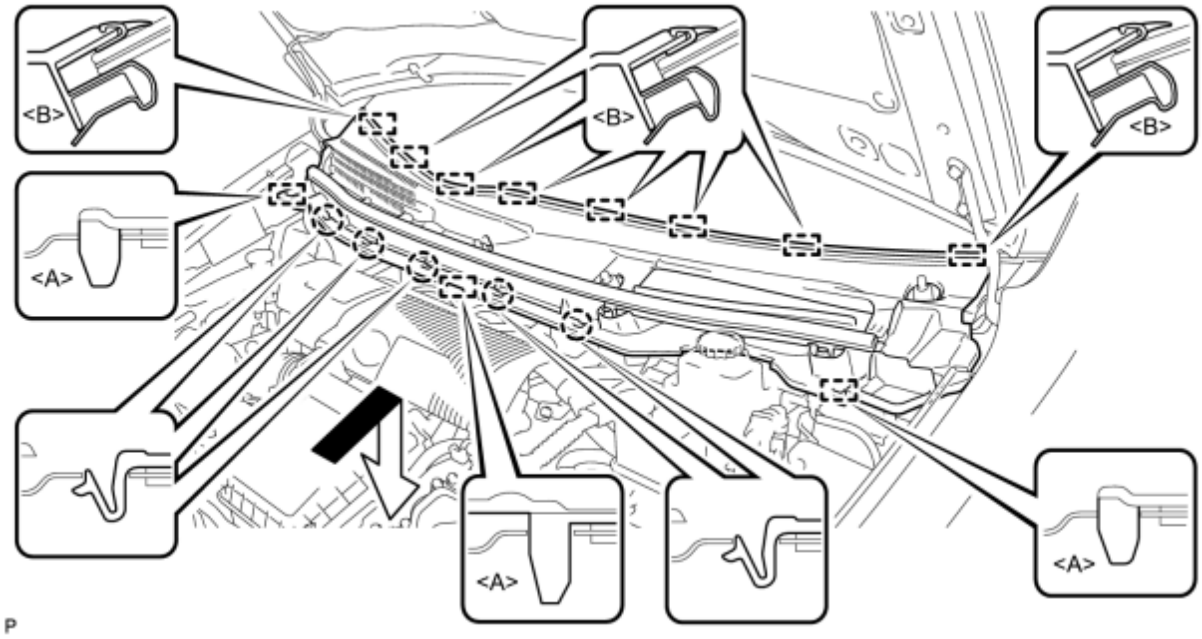


(c) Engage the 2 clamps.

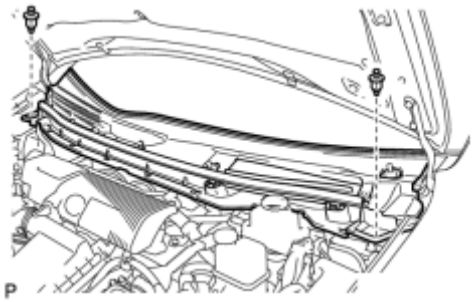
(d) Connect the connector.

4. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY

(a) Engage the 8 guides <B>.



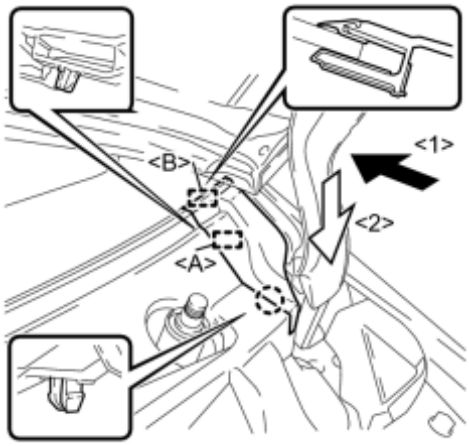

(b) Engage the 5 claws and 3 guides <A> to install the cowl top ventilator louver sub-assembly as shown in the illustration.




(c) Install the 2 clips.

5. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY LH

(a) Engage the guide <B> as shown in the illustration.




P

(b) Engage the claw and guide <A> to install the cowl side ventilator sub-assembly LH as shown in the illustration.

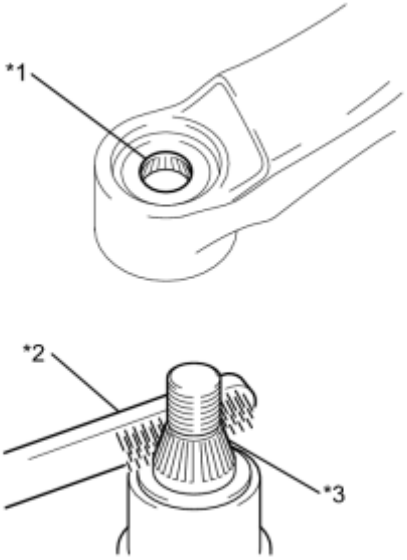
6. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side.

7. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH

(a) Operate the wiper and stop the windshield wiper motor at the automatic stop position.




P

(b) When reusing the front wiper arm and blade assembly RH:

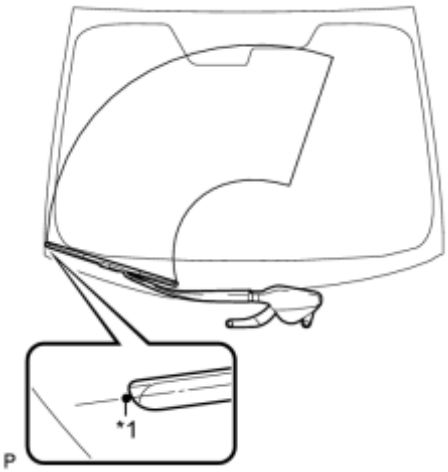
(1) Clean the wiper arm serrations.

## Text in Illustration

| | |
|---|---|
| *1 | Wiper Arm Serration |
| *2 | Wire Brush |
| *3 | Wiper Pivot Serration |

(c) When reusing the windshield wiper link assembly:

(1) Clean the wiper pivot serrations with a wire brush.




(d) Install the front wiper arm and blade assembly RH with the 2 nuts to the position shown in the illustration.

Torque: **23 N·m (235 kgf·cm, 17ft·lbf)**

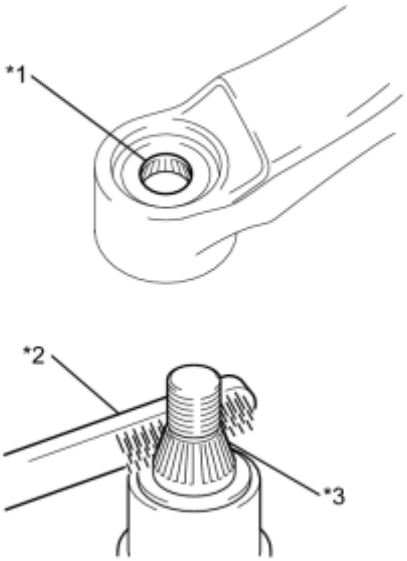
## Text in Illustration

| | |
|---|---|
| *1 | Ceramic Dot |

HINT:

Hold the wiper arm by hand while tightening the nut.

8. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH




(a) When reusing the front wiper arm and blade assembly LH:

(1) Clean the wiper arm serrations.

## Text in Illustration

| | |
|---|---|
| *1 | Wiper Arm Serration |
| *2 | Wire Brush |
| *3 | Wiper Pivot Serration |

(b) When reusing the windshield wiper link assembly:

(1) Clean the wiper pivot serrations with a wire brush.

(c) Install the front wiper arm and blade assembly LH with the nut to the position shown in the illustration.

Torque: **23 N·m (235 kgf·cm, 17ft·lbf)**




## Text in Illustration

| | |
|---|---|
| *1 | Ceramic Dot |

HINT:

Hold the wiper arm by hand while tightening the nut.

(d) Operate the front wipers while spraying washer fluid on the windshield glass. Make sure that the front wipers function properly and there is no interference with the vehicle body.

9. INSTALL FRONT WIPER ARM HEAD CAP



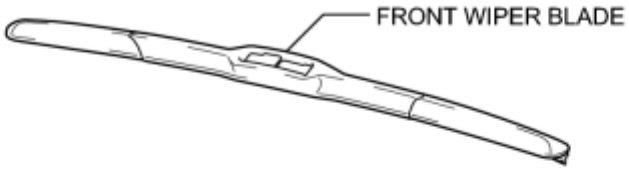

(a) Engage the 3 claws to install the front wiper arm head cap.

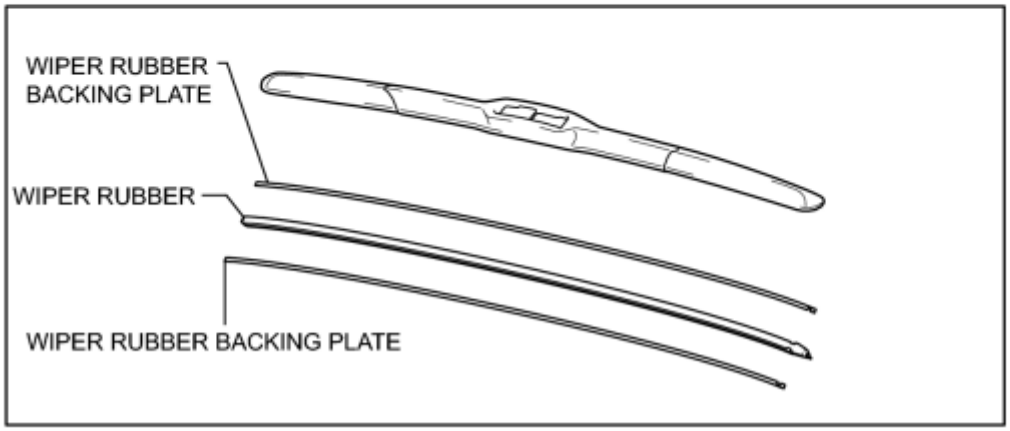
HINT:

Use the same procedure for the RH side and LH side.

# COMPONENTS

# ILLUSTRATION

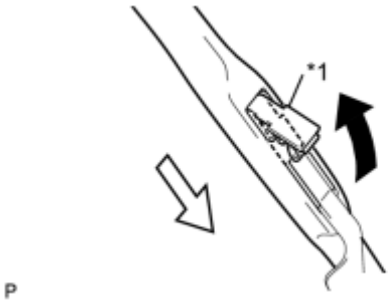



P

# REPLACEMENT

1. REMOVE FRONT WIPER BLADE




P

(a) Remove the holder of the front wiper blade as shown in the illustration.

## Text in Illustration

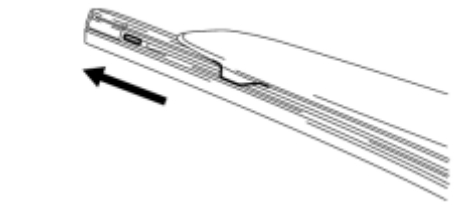
| | |
|---|---|
| *1 | Holder |

(b) Remove the front wiper blade from the front wiper arm as shown in the illustration.

NOTICE:

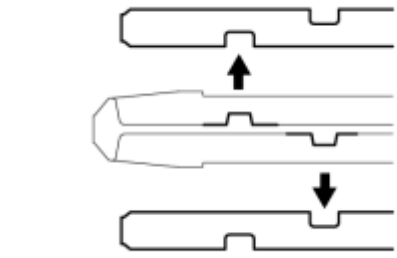
Do not lower the front wiper arm with the front wiper blade removed. The arm tip may damage the windshield surface.

2. REMOVE WIPER RUBBER



P

(a) Remove the wiper rubber with the wiper rubber backing plates from the front wiper blade.



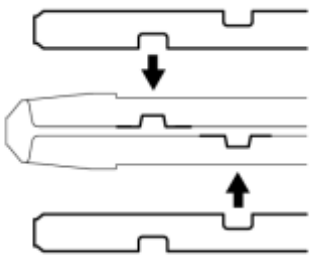
P

(b) Remove the 2 wiper rubber backing plates from the wiper rubber.

3. INSTALL WIPER RUBBER

(a) Install the 2 wiper rubber backing plates to the wiper rubber.

## Text in Illustration



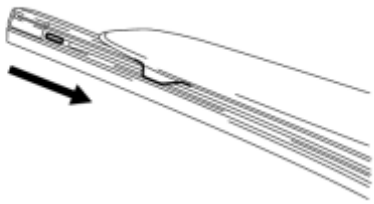
| | |
|---|---|
| *1 | Wiper rubber Backing plate |

- Align the protrusions on the wiper rubber and the notches of the backing plates.
- Align the curved lines of the backing plates and the glass.




P

(b) Install the wiper rubber to the front wiper blade with the top of the rubber (curved end) facing the axis of the wiper arm.

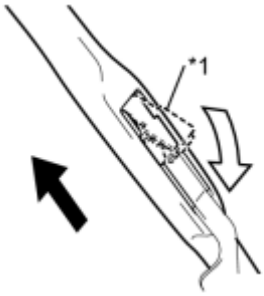


NOTICE:

Push the wiper rubber into the wiper blade strongly to engage them securely.

P

4. INSTALL FRONT WIPER BLADE




(a) Install the front wiper blade as shown in the illustration.

## Text in Illustration

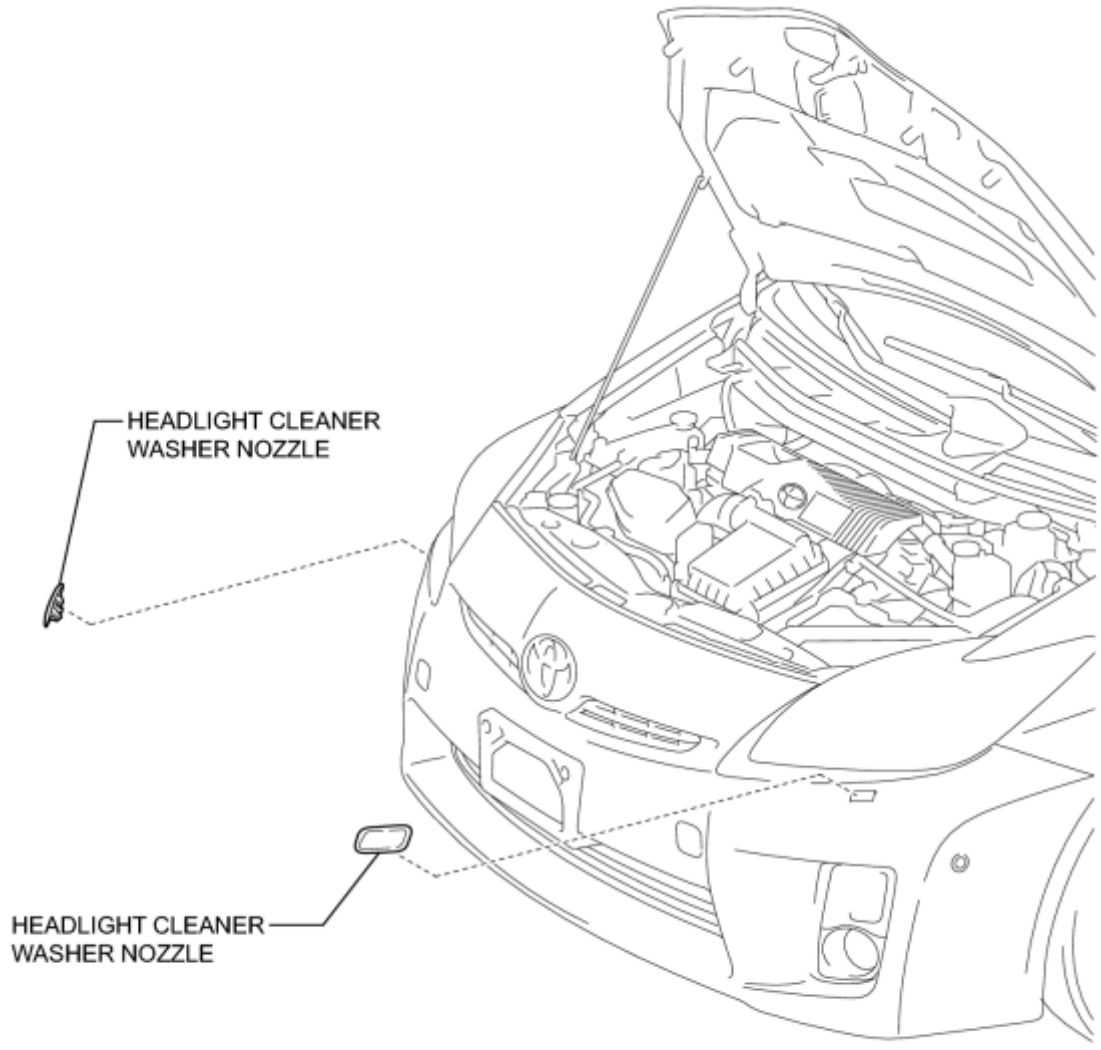
| | |
|---|---|
| *1 | Holder |

P

(b) Install the holder of the front wiper blade as shown in the illustration.

# COMPONENTS

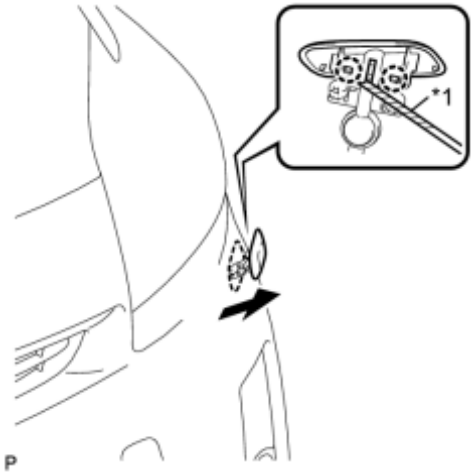
# ILLUSTRATION




P

# REMOVAL

1. REMOVE HEADLIGHT CLEANER WASHER NOZZLE




(a) Extend the headlight cleaner washer nozzle.

(b) Using a screwdriver, disengage the 2 claws and remove the headlight cleaner washer nozzle.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

HINT:

- Tape the screwdriver tip before use.
- Use the same procedure for the RH side and LH side.

# INSTALLATION

1. INSTALL HEADLIGHT CLEANER WASHER NOZZLE



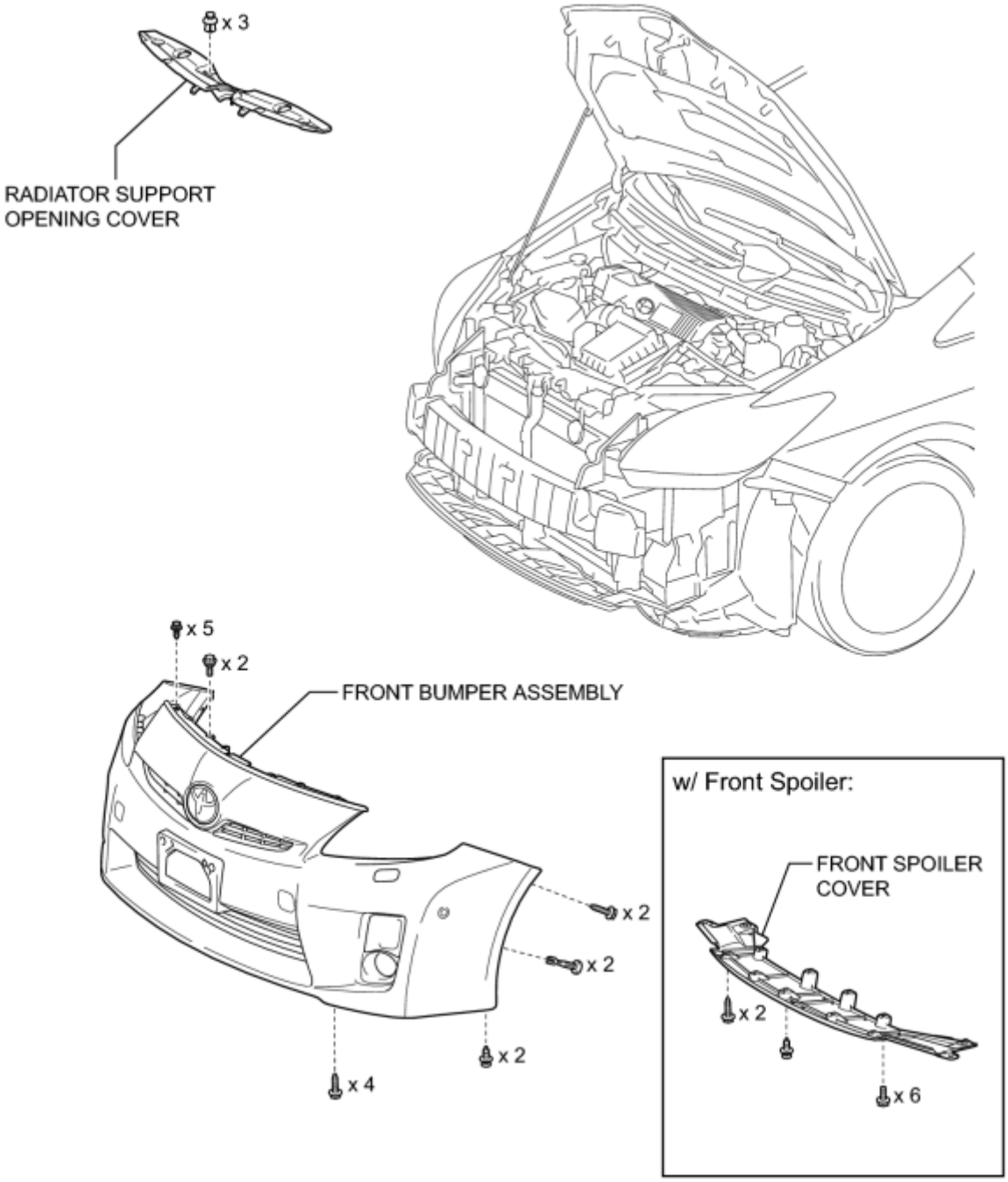

(a) Engage the 2 claws to install the headlight cleaner washer nozzle.

HINT:

Use the same procedure for the RH side and LH side.

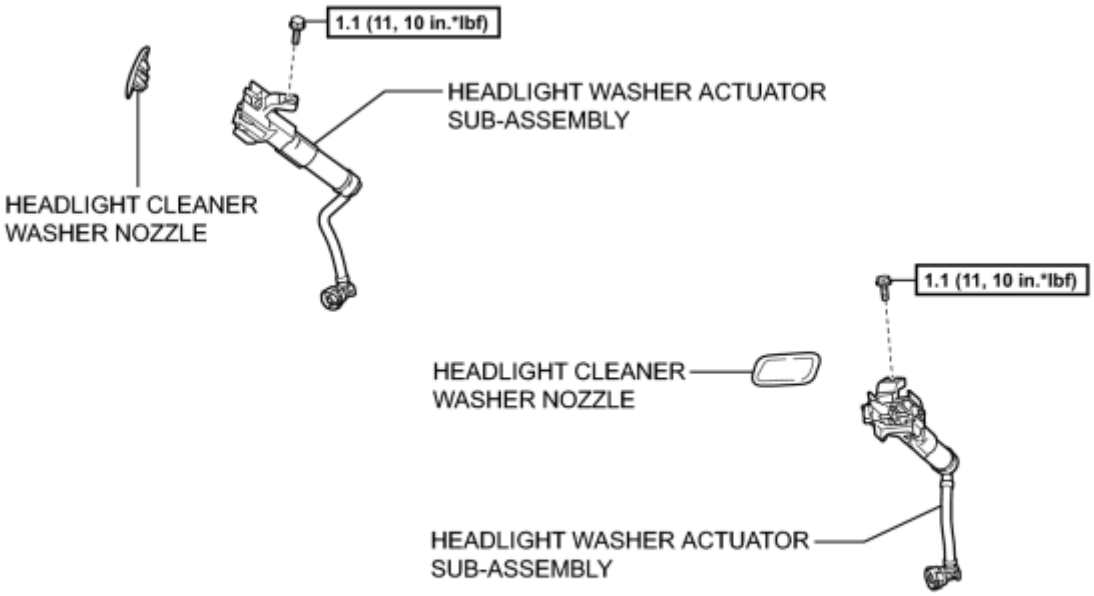
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

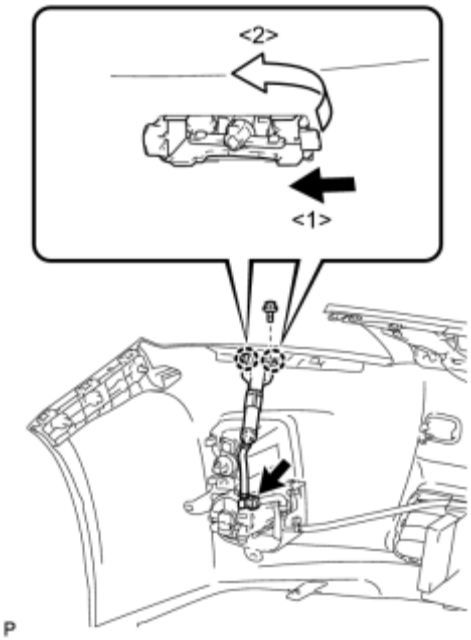
# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE HEADLIGHT CLEANER WASHER NOZZLE INFO

4. REMOVE HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY




(a) Disconnect the headlight washer hose.

(b) Remove the bolt.

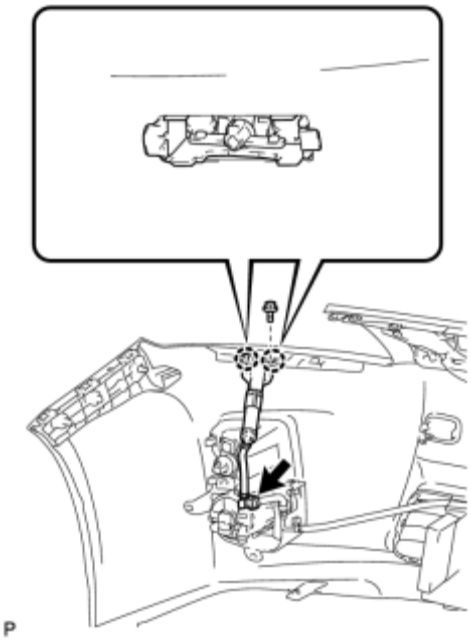
(c) Disengage the 2 claws and remove the headlight washer actuator sub-assembly as shown in the illustration.

HINT:

Use the same procedure for the RH side and LH side.

# INSTALLATION

1. INSTALL HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY




(a) Engage the 2 claws to install the headlight washer actuator sub-assembly.

(b) Install the bolt.

Torque: **1.1 N·m (11 kgf·cm, 10in·lbf)**

(c) Connect the headlight washer hose.

HINT:

Use the same procedure for the RH side and LH side.

2. INSTALL HEADLIGHT CLEANER WASHER NOZZLE INFO

3. INSTALL FRONT BUMPER ASSEMBLY INFO

4. INSTALL RADIATOR SUPPORT OPENING COVER INFO

5. ADD WASHER FLUID INFO

6. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT (w/ Fog Light) INFO

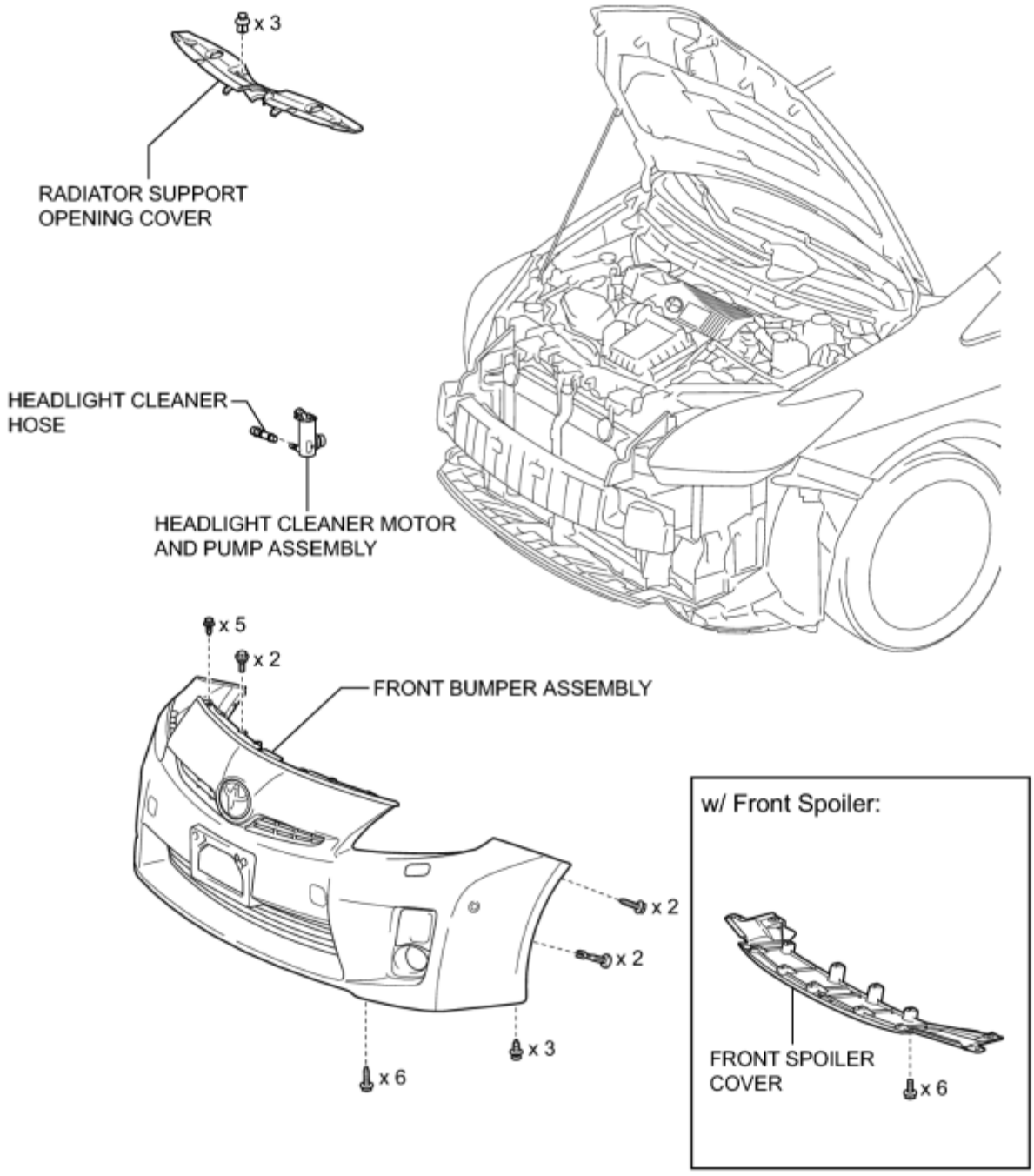
7. PREPARE FOR FOG LIGHT AIMING (w/ Fog Light) INFO

8. INSPECT FOG LIGHT AIMING (w/ Fog Light) INFO

9. ADJUST FOG LIGHT AIMING (w/ Fog Light) INFO

# COMPONENTS

# ILLUSTRATION



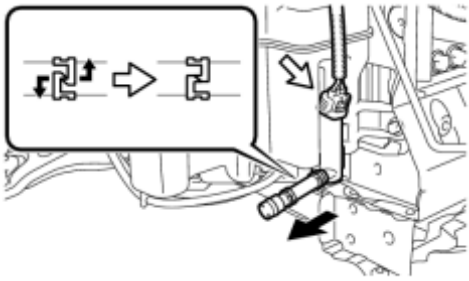

P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE HEADLIGHT CLEANER MOTOR AND PUMP ASSEMBLY



P

(a) Loosen the clip and disconnect the headlight cleaner hose from the headlight cleaner motor and pump assembly as shown in the illustration.

(b) Disconnect the connector and remove the headlight cleaner motor and pump assembly.

# INSPECTION

1. INSPECT HEADLIGHT CLEANER MOTOR AND PUMP ASSEMBLY

HINT:

The following check should be performed with the headlight cleaner motor and pump assembly installed to the washer jar.

(a) Fill the washer jar with washer fluid.

*1




(b) Connect a battery positive (+) lead to terminal 2 of the headlight cleaner motor and pump, and a battery negative (-) lead to terminal 1.

(c) Check that washer fluid flows from the washer jar.

OK:

Washer fluid is pumped from the washer jar.

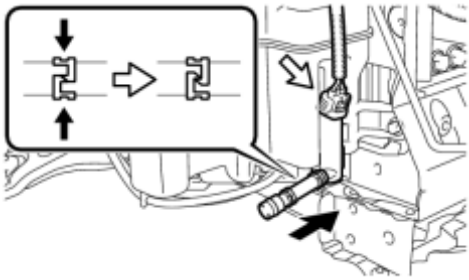
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Headlight Cleaner Motor and Pump Assembly) |

If the result is not as specified, replace the headlight cleaner motor and pump assembly.

# INSTALLATION

1. INSTALL HEADLIGHT CLEANER MOTOR AND PUMP ASSEMBLY



P

(a) Install the headlight cleaner motor and pump assembly.

(b) Connect the headlight cleaner hose to the headlight cleaner motor and pump assembly with the clip as shown in the illustration.

(c) Connect the connector.

2. INSTALL FRONT BUMPER ASSEMBLY INFO

3. INSTALL RADIATOR SUPPORT OPENING COVER INFO

4. ADD WINDSHIELD WASHER FLUID INFO

5. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT (w/ Fog Light) INFO

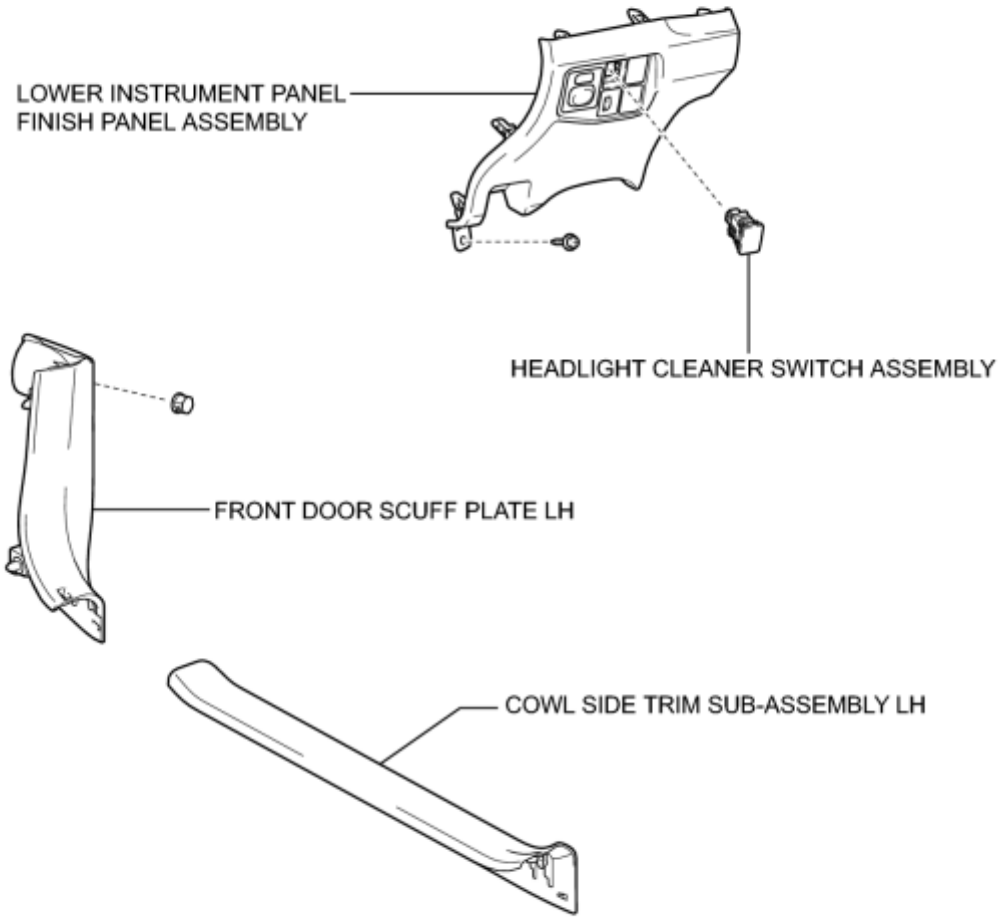
6. PREPARE FOR FOG LIGHT AIMING (w/ Fog Light) INFO

7. INSPECT FOG LIGHT AIMING (w/ Fog Light) INFO

8. ADJUST FOG LIGHT AIMING (w/ Fog Light) INFO

# COMPONENTS

# ILLUSTRATION




P

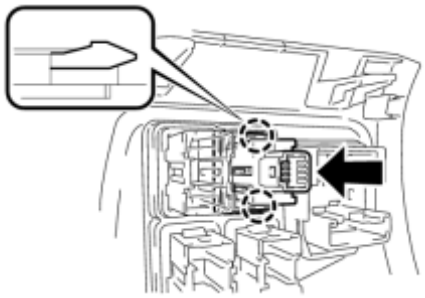
# REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE LH INFO

2. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

3. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

4. REMOVE HEADLIGHT CLEANER SWITCH ASSEMBLY



P

(a) Disengage the 2 claws and remove the headlight cleaner switch assembly as shown in the illustration.

# INSPECTION

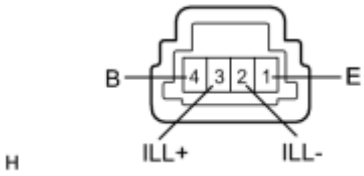
1. INSPECT HEADLIGHT CLEANER SWITCH ASSEMBLY

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (E) - 4 (B) | Headlight cleaner switch on | Below 1 Ω |
| | Headlight cleaner switch off | 10 kΩ or higher |

*1




(b) Connect a positive (+) lead from the battery to terminal 3 (ILL+) and a negative (-) lead to terminal 2 (ILL-).

(c) Check that the headlight cleaner switch assembly illumination comes on.

OK:

The headlight cleaner switch assembly illumination comes on.

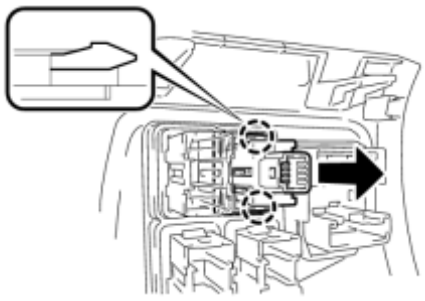
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Headlight Cleaner Switch Assembly) |

If the result is not as specified, replace the headlight cleaner switch assembly.

# INSTALLATION

1. INSTALL HEADLIGHT CLEANER SWITCH ASSEMBLY



P

(a) Engage the 2 claws to install the headlight cleaner switch assembly as shown in the illustration.

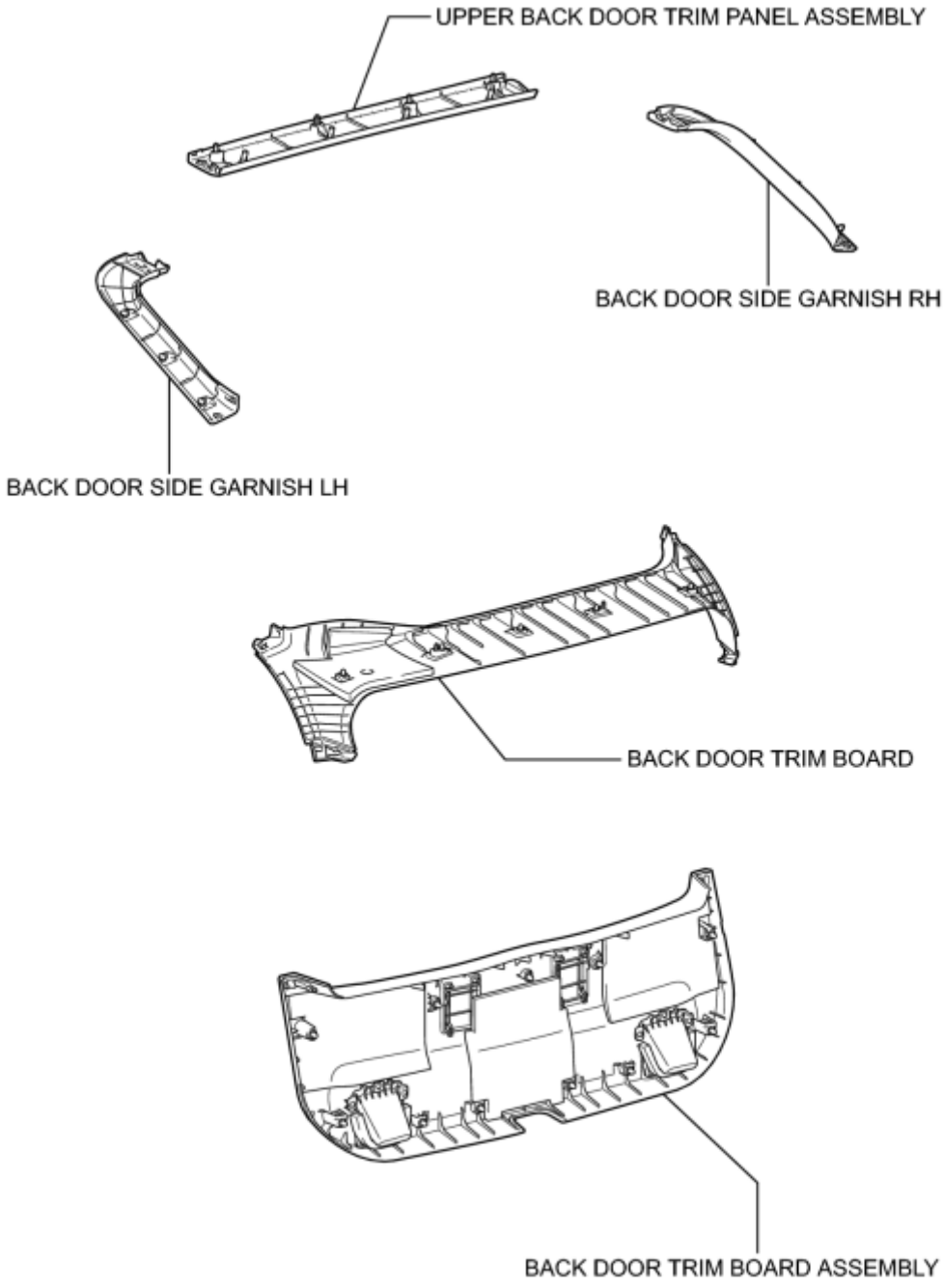
2. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. INSTALL FRONT DOOR SCUFF PLATE LH INFO

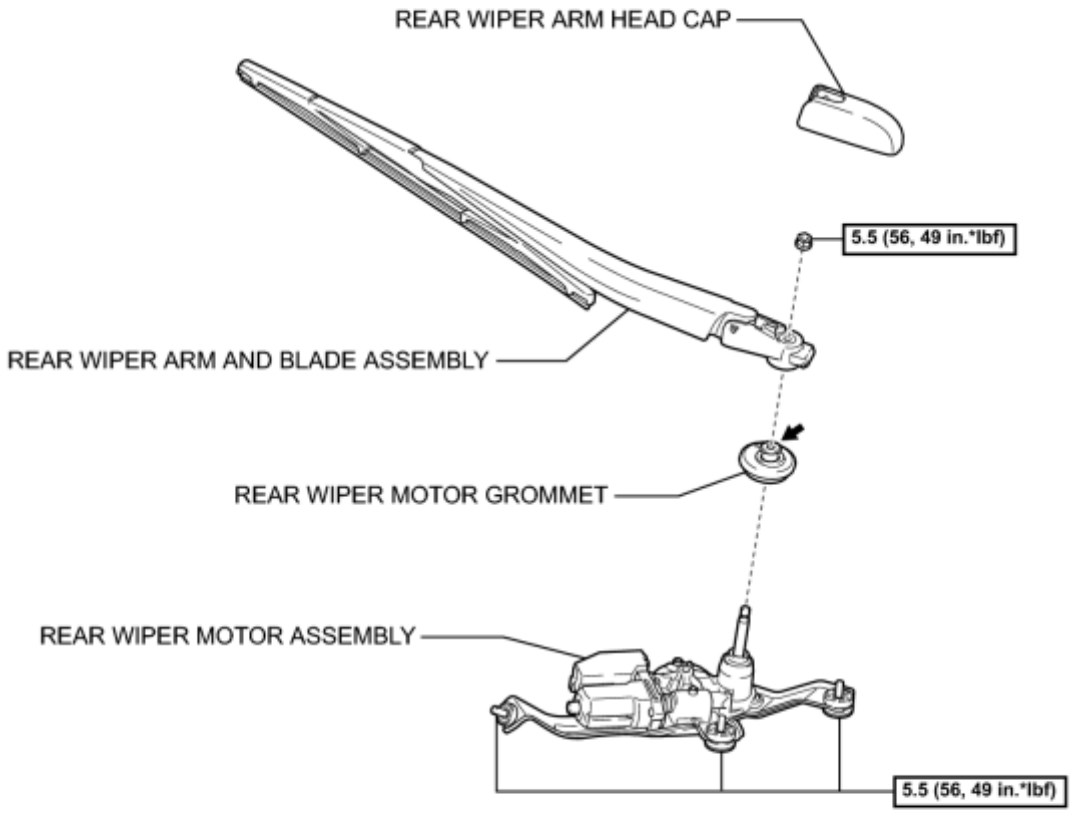
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION



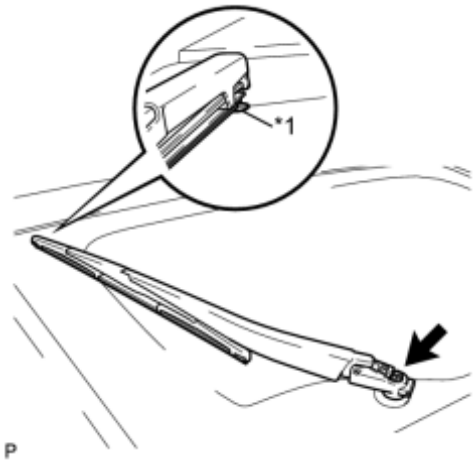

N*m (kgf*cm, ft.*lbf) : Specified torque

MP grease

P

# ON-VEHICLE INSPECTION

1. INSPECT REAR WIPER MOTOR ASSEMBLY




(a) Operate the rear wiper motor assembly.

(b) Stop the rear wiper motor assembly operation.

(c) Check the automatic stop position.

Standard Clearance:

| Area | Measurement |
|---|---|
| A | 30 mm (1.18 in.) |

***Text in Illustration***

| | |
|---|---|
| *1 | Ceramic Line |

# REMOVAL

1. REMOVE UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

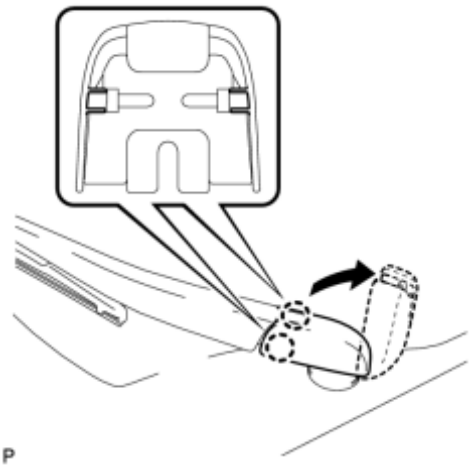
2. REMOVE BACK DOOR SIDE GARNISH RH INFO

3. REMOVE BACK DOOR SIDE GARNISH LH INFO

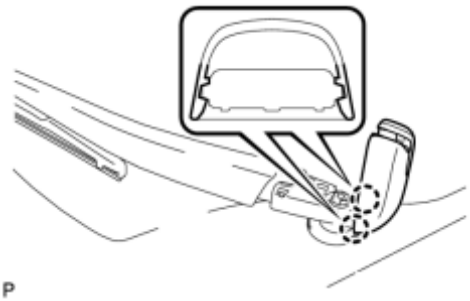
4. REMOVE BACK DOOR TRIM BOARD ASSEMBLY INFO

5. REMOVE BACK DOOR TRIM BOARD INFO

6. REMOVE REAR WIPER ARM HEAD CAP



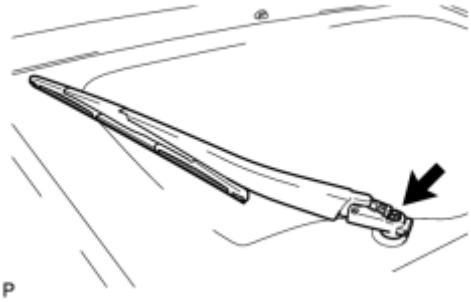

(a) Disengage the 2 claws and open the rear wiper arm head cap as shown in the illustration.



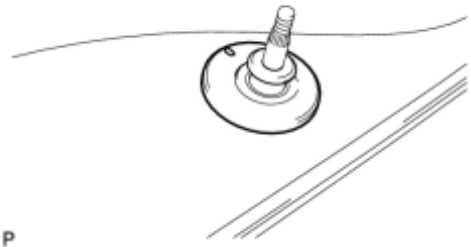

(b) Disengage the 2 claws and remove the rear wiper arm head cap.

7. REMOVE REAR WIPER ARM AND BLADE ASSEMBLY

(a) Remove the nut, and the rear wiper arm and blade assembly.

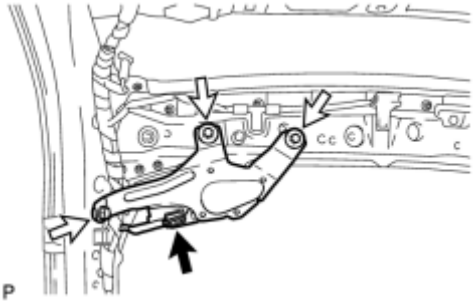


8. REMOVE REAR WIPER MOTOR GROMMET



(a) Remove the rear wiper motor grommet.

9. REMOVE REAR WIPER MOTOR ASSEMBLY



(a) Disconnect the connector.

(b) Remove the 3 bolts and the rear wiper motor assembly.

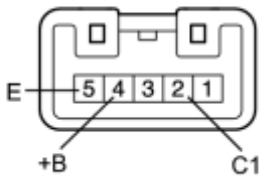
# INSPECTION

1. INSPECT REAR WIPER MOTOR ASSEMBLY

(a) Check the wiper intermittent operation.

(1) Connect a battery positive (+) lead to terminal 4 (+B), and a negative (-) lead to terminal 2 (C1) and terminal 5 (E), and check that the motor operates.

*1




OK:

Motor operates.

## Text in Illustration

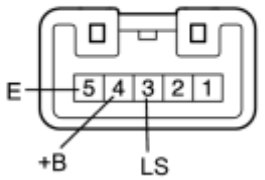
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Rear Wiper Motor and Bracket Assembly) |

If the result is not as specified, replace the motor assembly.

(b) Check the wiper continuous operation.

(1) Connect a battery positive (+) lead to terminal 4 (+B), and a negative (-) lead to terminal 3 (LS) and terminal 5 (E), and check that the motor operates.

*1




OK:

Motor operates.

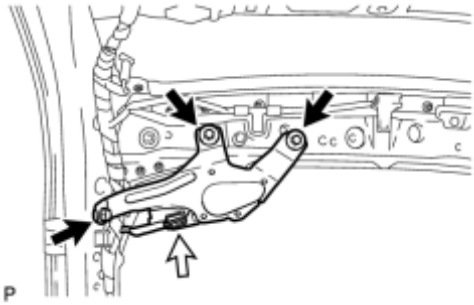
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Rear Wiper Motor and Bracket Assembly) |

If the result is not as specified, replace the motor assembly.

# INSTALLATION

1. INSTALL REAR WIPER MOTOR ASSEMBLY



(a) Install the rear wiper motor assembly with the 3 bolts.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

(b) Connect the connector.

2. INSTALL BACK DOOR TRIM BOARD INFO

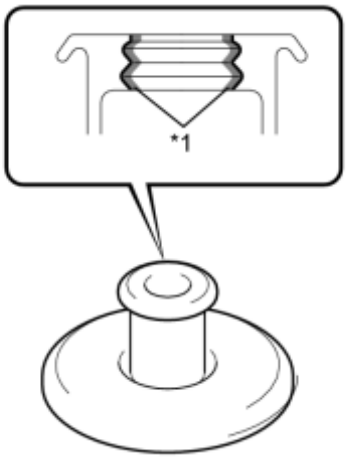
3. INSTALL BACK DOOR TRIM BOARD ASSEMBLY INFO

4. INSTALL BACK DOOR SIDE GARNISH LH INFO

5. INSTALL BACK DOOR SIDE GARNISH RH INFO

6. INSTALL UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

7. INSTALL REAR WIPER MOTOR GROMMET




(a) Apply MP grease to the entire surface of the rear wiper motor grommet lip.

## Text in Illustration

| | |
|---|---|
| *1 | MP grease |

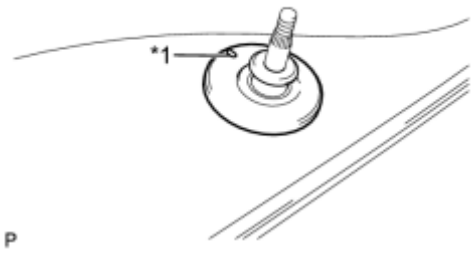
HINT:

Make sure that the hole does not get clogged with grease and the grooves on the lip are filled with grease.

(b) Install the rear wiper motor grommet.

HINT:

Install the grommet with its alignment mark facing up.



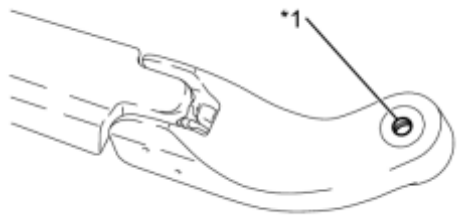

## Text in Illustration

| | |
|---|---|
| *1 | Alignment Mark |

8. INSTALL REAR WIPER ARM AND BLADE ASSEMBLY

(a) Operate the wiper and stop the windshield wiper motor at the automatic stop position.

(b) When reusing the rear wiper arm and blade assembly:

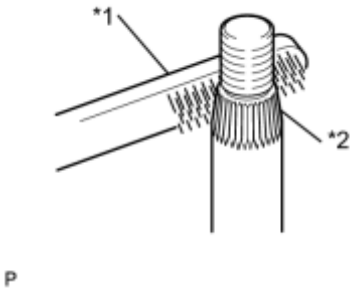



(1) Clean the wiper arm serrations.

## Text in Illustration

| | |
|---|---|
| *1 | Wiper Arm Serration |

(c) When reusing the rear wiper motor assembly:




(1) Clean the wiper pivot serrations with a wire brush.

## Text in Illustration

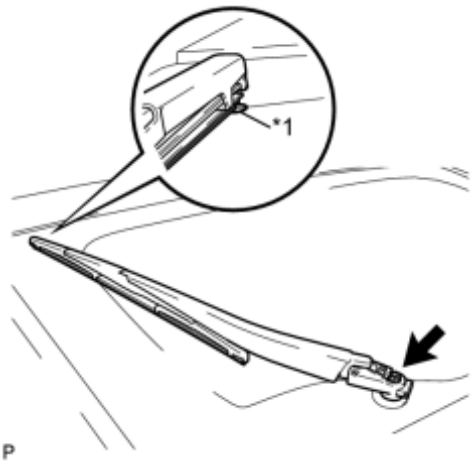
| | |
|---|---|
| *1 | Wire Brush |
| *2 | Wiper Pivot Serration |

(d) Install the rear wiper arm and blade assembly with the nut to the position shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Ceramic Dot |

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

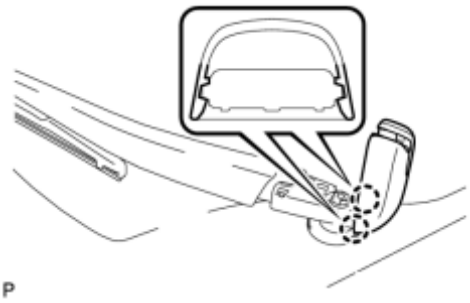



HINT:

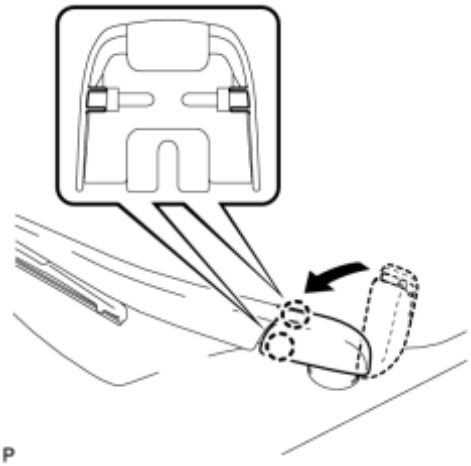
Hold the wiper arm by hand while tightening the nut.

(e) Operate the rear wiper while spraying washer fluid onto the back door glass. Make sure that the rear wiper functions properly and the wiper does not come into contact with the vehicle body.

9. INSTALL REAR WIPER ARM HEAD CAP



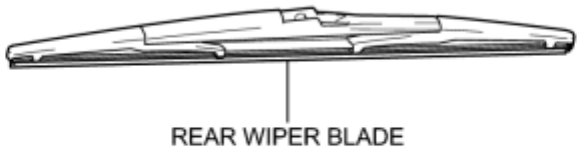

(a) Engage the 2 claws to install the rear wiper arm head cap.

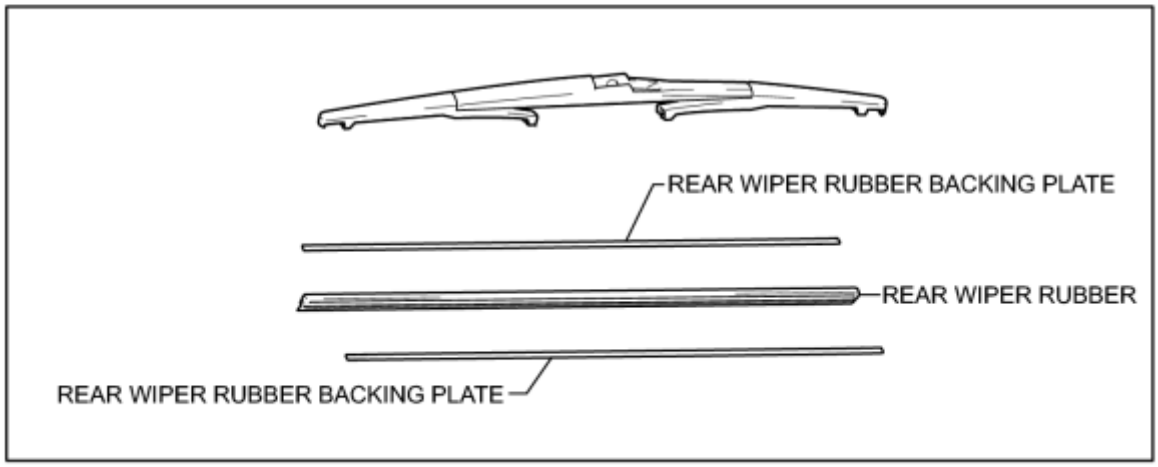



(b) Engage the 2 claws to close the rear wiper arm head cap as shown in the illustration.

# COMPONENTS

# ILLUSTRATION

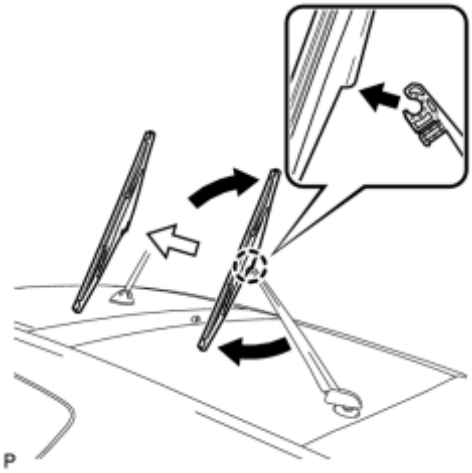



P

# REPLACEMENT

1. REMOVE REAR WIPER BLADE



(a) Raise the wiper blade to the position where the claw detaches with a click sound as shown in the illustration.

NOTICE:

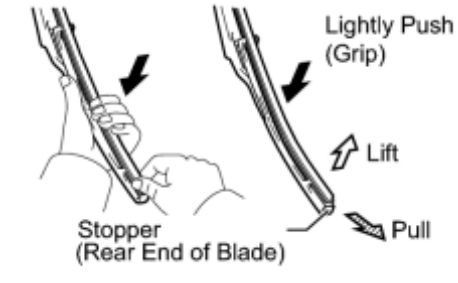
Be careful not to damage the claw.

(b) Pull the wiper blade straight toward to remove it from the wiper arm.

NOTICE:

Do not lower the wiper arm with the wiper blade removed. The arm tip may damage the back door glass surface.

2. REMOVE REAR WIPER RUBBER




(a) Lift and pull the end of the wiper rubber protrusion from the blade stopper as shown in the illustration.

NOTICE:

Do not forcibly pull out the wiper rubber. The backing plates will be deformed or the blade claws will be damaged.

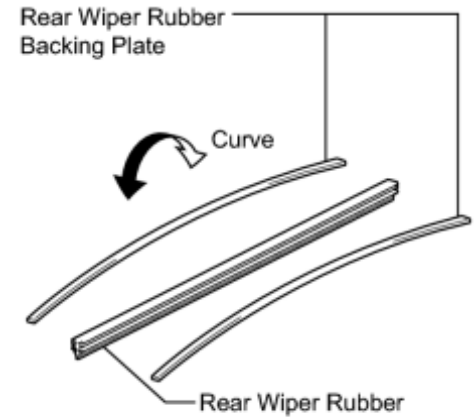
HINT:

Lightly pushing the rubber in the middle will allow it to be removed more easily.

(b) Remove the rear wiper rubber backing plates.

3. INSTALL REAR WIPER RUBBER

(a) Install the rear wiper rubber backing plates as shown in the illustration.

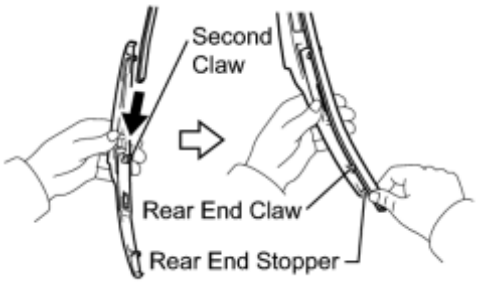



P

NOTICE:

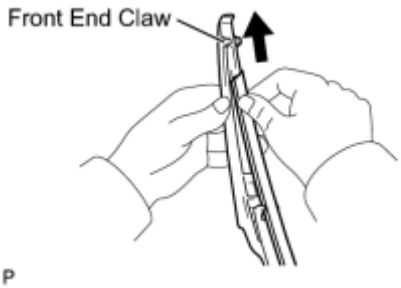
Install the backing plates facing the correct direction.

(b) Insert the wiper rubber from the front end of the wiper blade to the rear end through the second claw.




P

(c) After pushing the wiper rubber through the rear end claw, allow it to stick out from the rear end stopper.

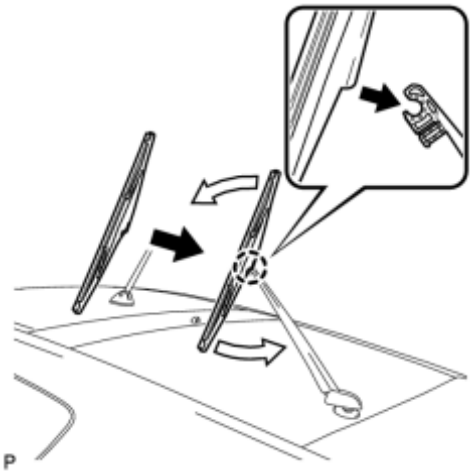



P

(d) Slide the wiper rubber through the front end claw.

4. INSTALL REAR WIPER BLADE

(a) Push the wiper blade straight toward to install it to the wiper arm.



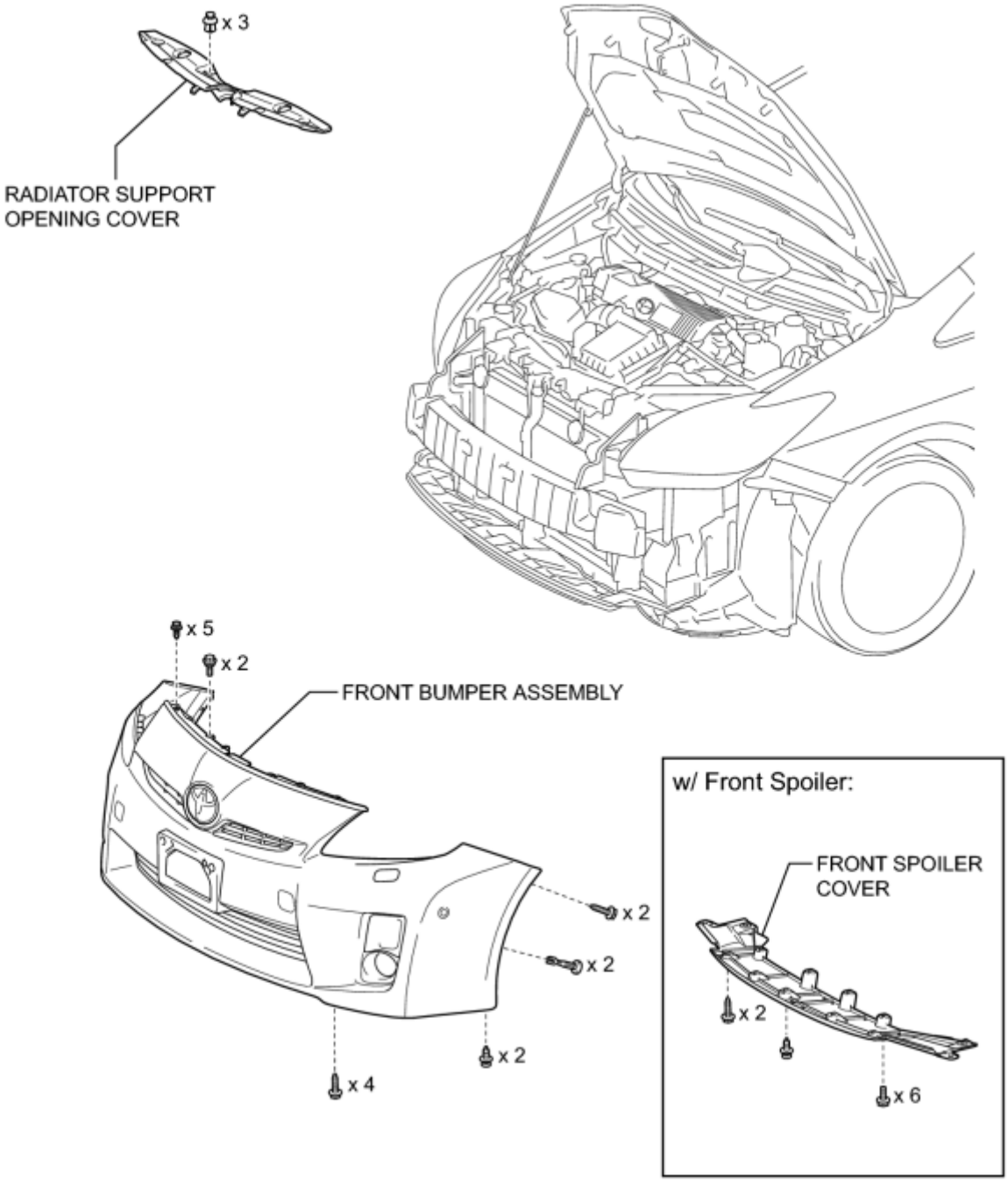
(b) Engage the claw to install the rear wiper blade as shown in the illustration.

NOTICE:

Be careful not to damage the claw.

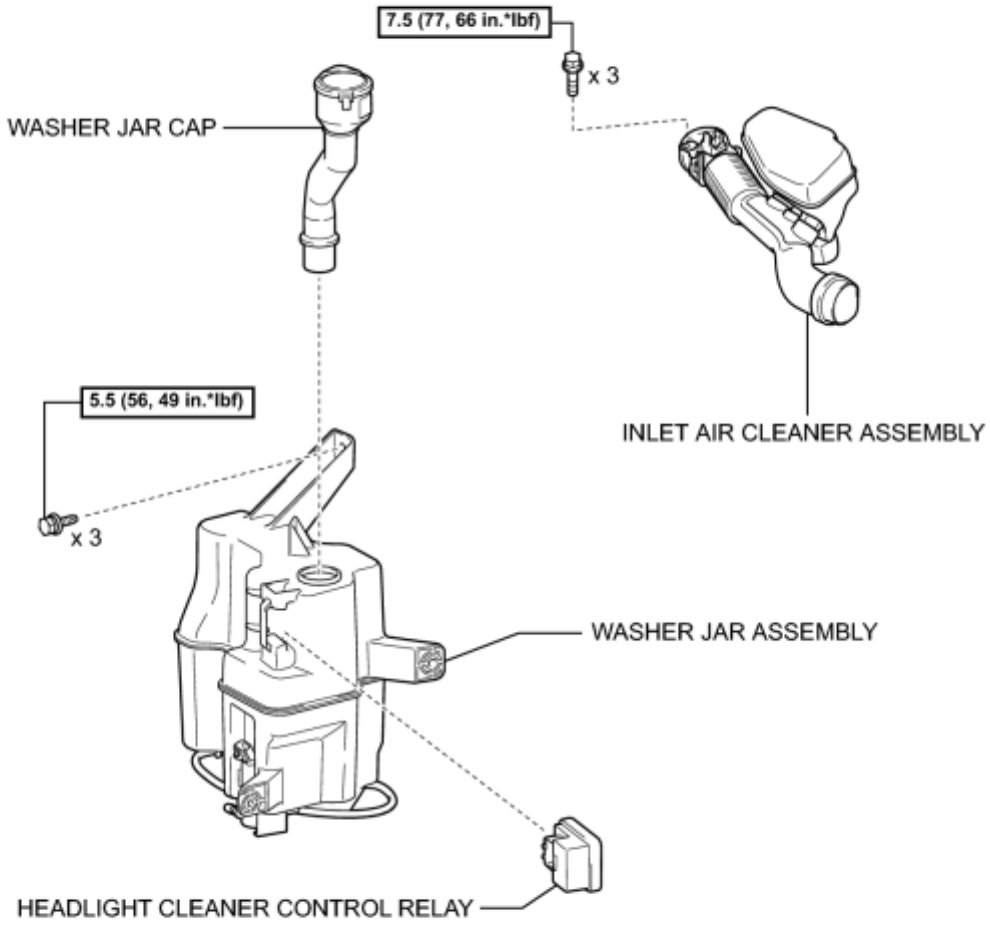
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION



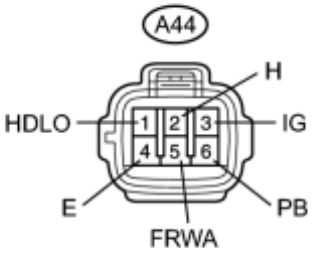

N*m (kgf*cm, ft.*lbf) : Specified torque

P

# ON-VEHICLE INSPECTION

1. INSPECT HEADLIGHT CLEANER CONTROL RELAY

*1




N

(a) Disconnect the A44 headlight cleaner control relay connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A44-3 (IG) - Body ground | Power switch off | Below 1 V |
| | Power switch on (IG) | 11 to 14 V |
| A44-6 (PB) - Body ground | Always | 11 to 14 V |
| A44-1 (HDLO) - Body ground | Light control switch in head position | Below 1 V |
| | Light control switch off | 11 to 14 V |
| A44-2 (H) - Body ground | Headlight cleaner switch off | 11 to 14 V |
| | Headlight cleaner switch on | Below 1 V |
| A44-5 (FRWA) - Body ground | Front washer switch off | 11 to 14 V |
| | Front washer switch on | Below 1 V |

If the result is not as specified, there is a malfunction in the wire harness.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A44-4 (E) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Headlight Cleaner Control Relay) |

If the result is not as specified, there is a malfunction in the wire harness.

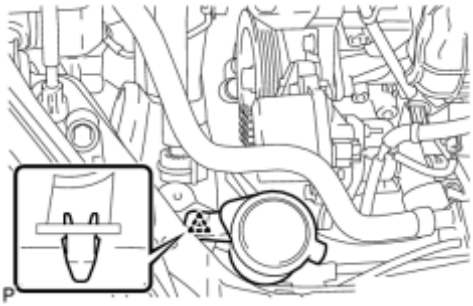
# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

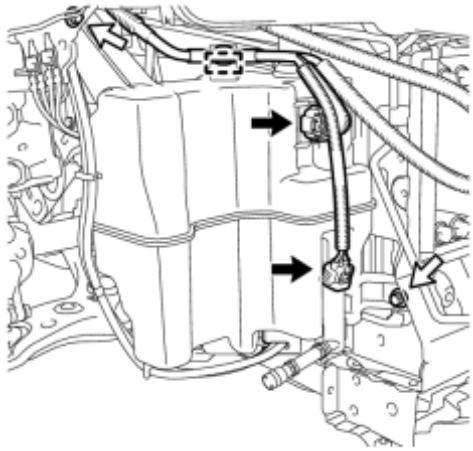
2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE INLET AIR CLEANER ASSEMBLY INFO

4. REMOVE HEADLIGHT CLEANER CONTROL RELAY



(a) Disengage the clip and separate the washer jar cap of the washer jar assembly.

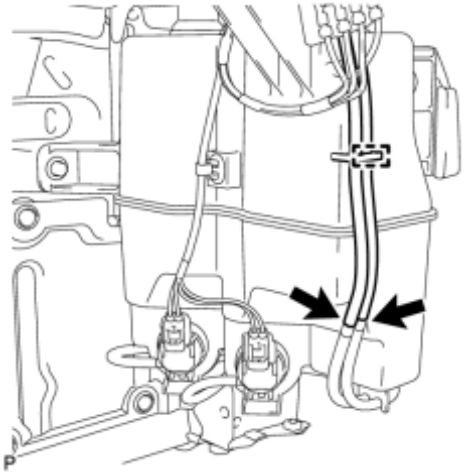


(b) Disconnect the 2 connectors.

(c) Disengage the clamp.

(d) Remove the 2 bolts.

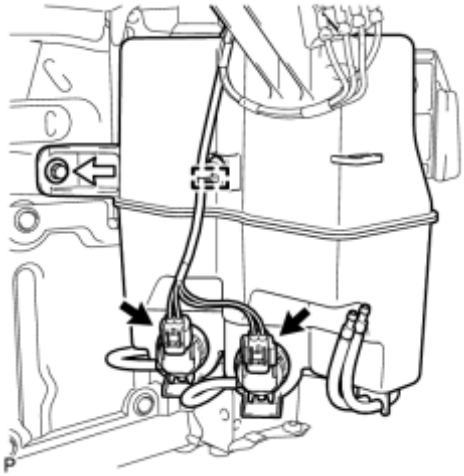
(e) Disengage the hose clamp.



(f) Disconnect the 2 washer hoses, and drain the washer fluid.

HINT:

Use a container to collect the washer fluid.

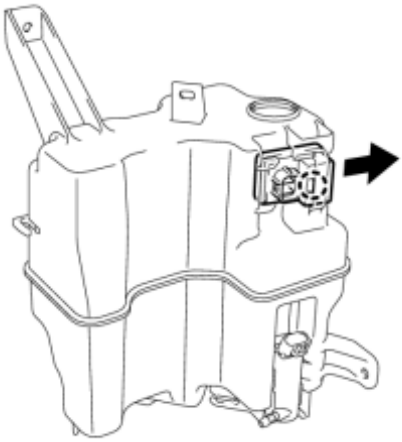


(g) Disconnect the 2 connectors.

(h) Disengage the clamp.

(i) Remove the bolt and the washer jar assembly.

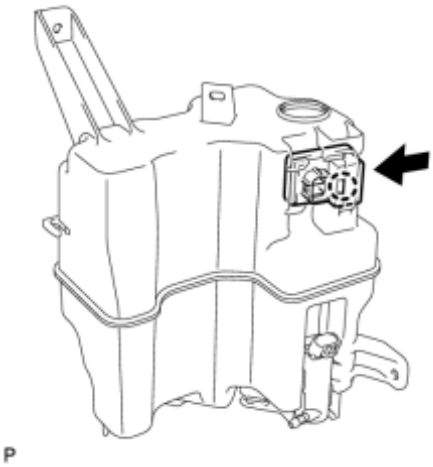
(j) Disengage the claw and remove the headlight cleaner control relay as shown in the illustration.



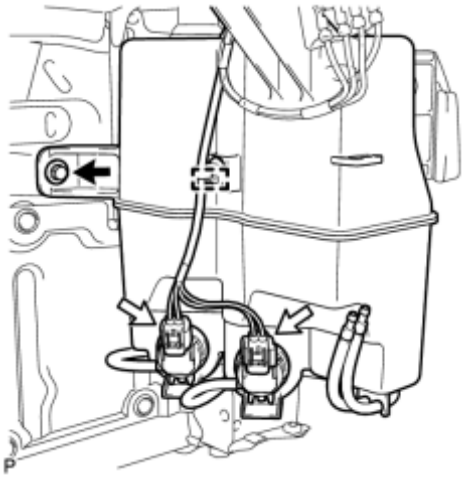
P

# INSTALLATION

1. INSTALL HEADLIGHT CLEANER CONTROL RELAY




(a) Engage the claw to install the headlight cleaner control relay as shown in the illustration.



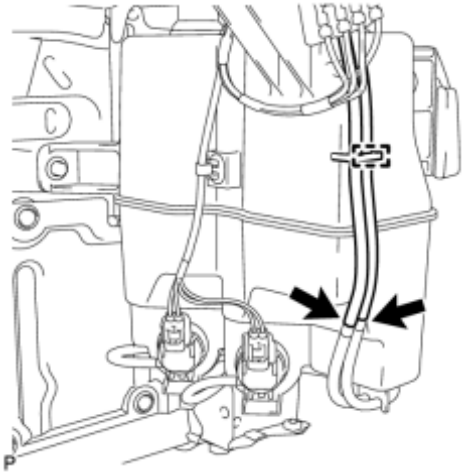

(b) Install the washer jar assembly with the bolt.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

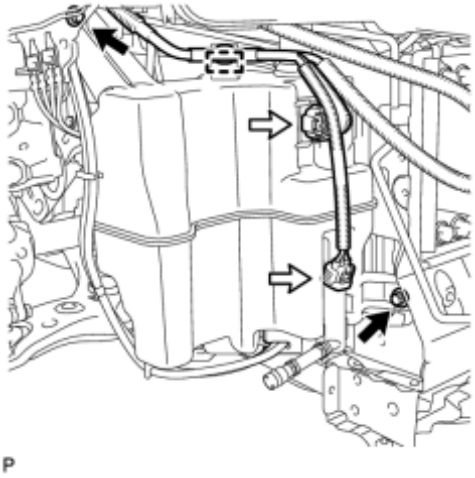
(c) Engage the clamp.

(d) Connect the 2 connectors.

(e) Connect the 2 washer hoses.



(f) Engage the hose clamp.

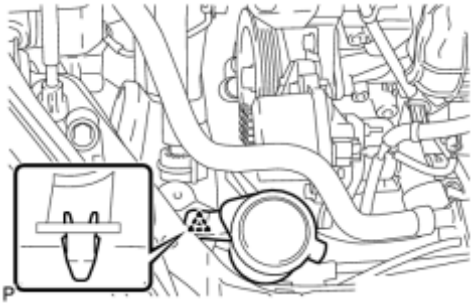


(g) Install the 2 bolts.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

(h) Engage the clamp.

(i) Connect the 2 connectors.



(j) Connect the washer jar cap to the washer jar assembly.

(k) Engage the clip.

2. INSTALL INLET AIR CLEANER ASSEMBLY INFO

3. INSTALL FRONT BUMPER ASSEMBLY INFO

4. INSTALL RADIATOR SUPPORT OPENING COVER INFO

5. ADD WASHER FLUID INFO

6. PREPARE VEHICLE FOR FOG LIGHT AIM ADJUSTMENT (w/ Fog Light) INFO

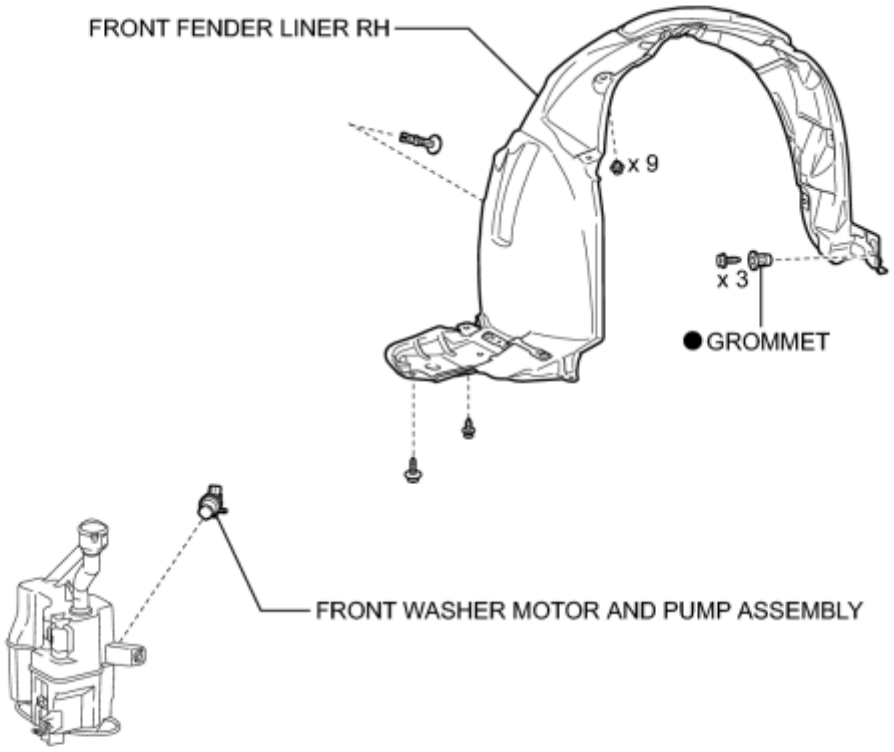
7. PREPARE FOR FOG LIGHT AIMING (w/ Fog Light) INFO

8. INSPECT FOG LIGHT AIMING (w/ Fog Light) INFO

9. ADJUST FOG LIGHT AIMING (w/ Fog Light) INFO

# COMPONENTS

# ILLUSTRATION



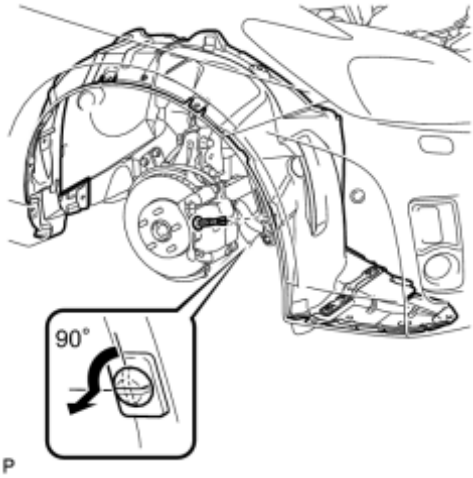

● Non-reusable part

P

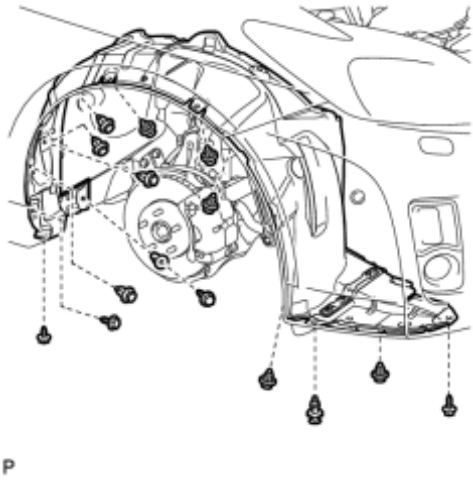
# REMOVAL

1. REMOVE FRONT WHEEL RH

2. REMOVE FRONT FENDER LINER RH




(a) Using a screwdriver, turn the pin 90 degrees and remove the pin hold clip.




(b) Remove the 10 clips and 4 screws.

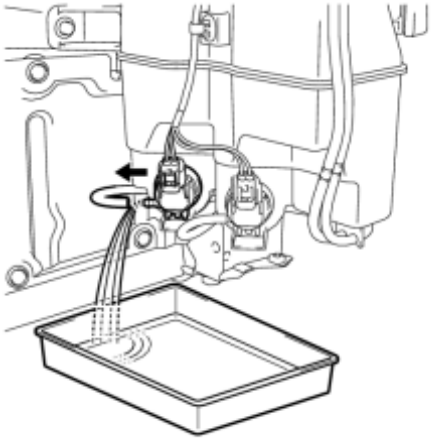
(c) Using a clip remover, remove the grommet and the front fender liner RH.

HINT:

The grommet needs to be replaced with new one because it will break when it is removed.

3. DRAIN WASHER FLUID

(a) Disconnect the washer hose from the windshield washer motor and pump assembly, and drain the washer fluid.

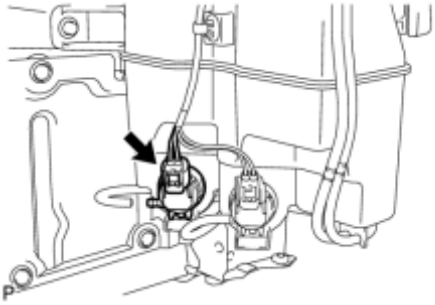


P

HINT:

Use a container to collect the washer fluid.

4. REMOVE FRONT WASHER MOTOR AND PUMP ASSEMBLY



P

(a) Disconnect the connector.

(b) Remove the windshield washer motor and pump assembly.

# INSPECTION

1. INSPECT WINDSHIELD WASHER MOTOR AND PUMP ASSEMBLY

(a) Remove the washer jar.

(b) Disconnect the windshield washer motor and pump connector.

HINT:

The check should be performed with the windshield washer motor and pump installed on the washer jar.

(c) Fill the washer jar with washer fluid.

*1




(d) Connect a battery positive (+) lead to terminal 1 of the windshield washer motor and pump, and a negative (-) lead to terminal 2.

(e) Check that washer fluid flows from the washer jar.

OK:

Washer fluid flows from the washer jar.

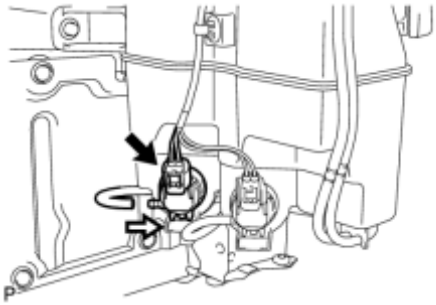
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Windshield Washer Motor and Pump Assembly) |

If the result is not as specified, replace the windshield washer motor and pump assembly.

# INSTALLATION

1. INSTALL FRONT WASHER MOTOR AND PUMP ASSEMBLY



(a) Install the windshield washer motor and pump assembly.

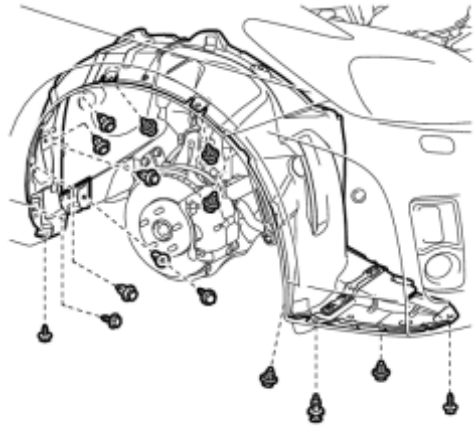
(b) Connect the connector.

(c) Connect the washer hose.

2. ADD WASHER FLUID

(a) Add washer fluid to the washer jar.

3. INSTALL FRONT FENDER LINER RH



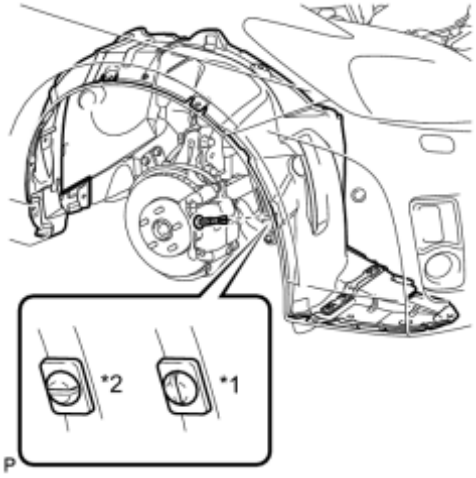
(a) Install a new grommet and the 4 screws.

(b) Install the 10 clips.

(c) Install the pin hold clip as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Correct |




| | |
|---|---|
| *2 | Incorrect |

NOTICE:

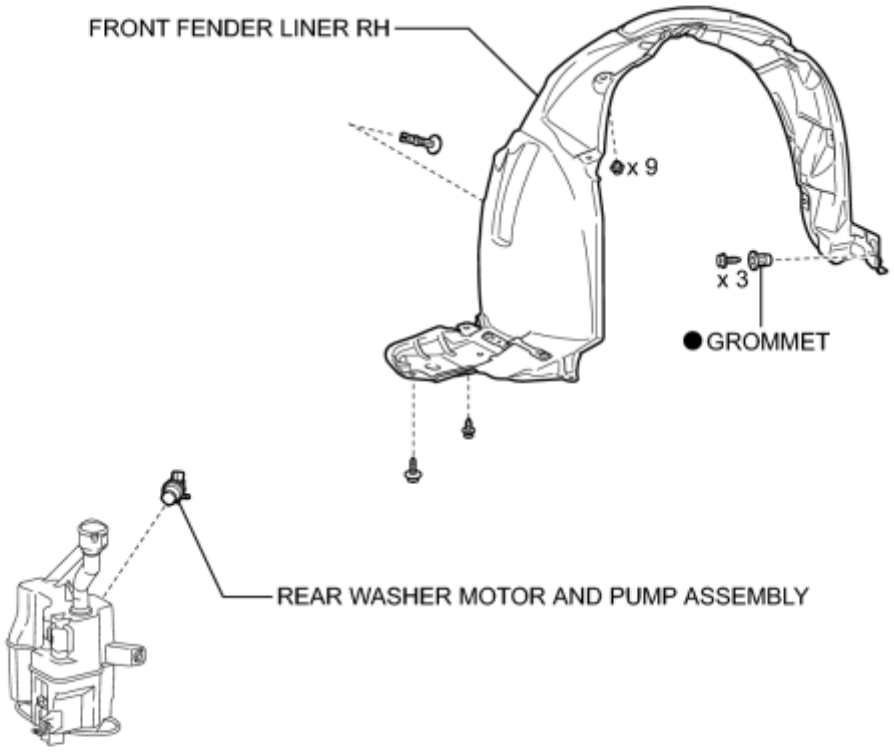
Insert the pin hold clip with the slot aligned vertically. Do not rotate the clip after inserting it. After installation, confirm that the slot is vertical.

4. INSTALL FRONT WHEEL RH

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# COMPONENTS

# ILLUSTRATION




● Non-reusable part

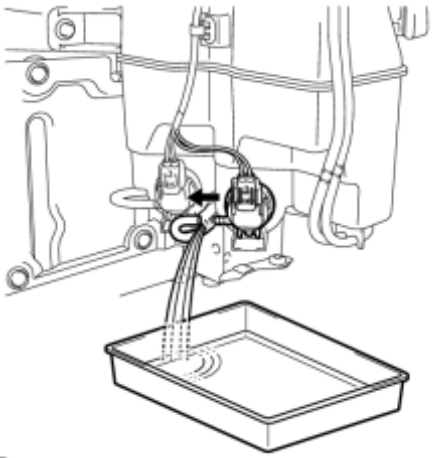
P

# REMOVAL

1. REMOVE FRONT WHEEL RH

2. REMOVE FRONT FENDER LINER RH INFO

3. DRAIN WASHER FLUID

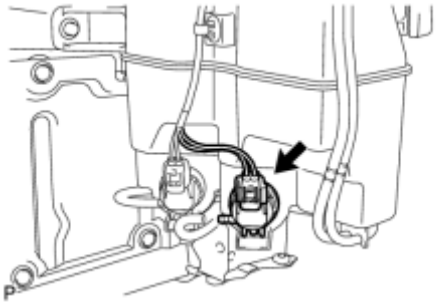



(a) Disconnect the washer hose from the rear washer motor and pump assembly, and drain the washer fluid.

HINT:

Use a container to collect the washer fluid.

4. REMOVE REAR WASHER MOTOR AND PUMP ASSEMBLY




(a) Disconnect the connector.

(b) Remove the rear washer motor and pump assembly.

# INSPECTION

1. INSPECT REAR WASHER MOTOR AND PUMP ASSEMBLY

(a) Remove the washer jar.

(b) Disconnect the rear washer motor and pump connector.

HINT:

The check should be performed with the rear washer motor and pump installed on the washer jar.

(c) Fill the washer jar with washer fluid.

*1




(d) Connect a battery positive (+) lead to terminal 1 of the rear washer motor and pump, and a negative (-) lead to terminal 2.

(e) Check that washer fluid flows from the washer jar.

OK:

Washer fluid flows from the washer jar.

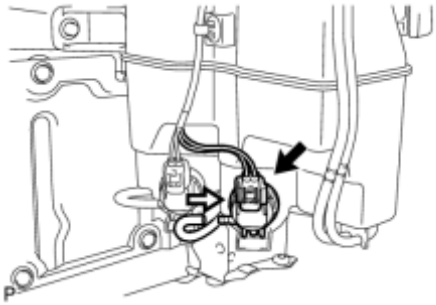
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Rear Washer Motor and Pump Assembly) |

If the result is not as specified, replace the rear washer motor and pump assembly.

# INSTALLATION

1. INSTALL REAR WASHER MOTOR AND PUMP ASSEMBLY



(a) Install the rear washer motor and pump assembly.

(b) Connect the connector.

(c) Connect the washer hose.

2. ADD WASHER FLUID INFO

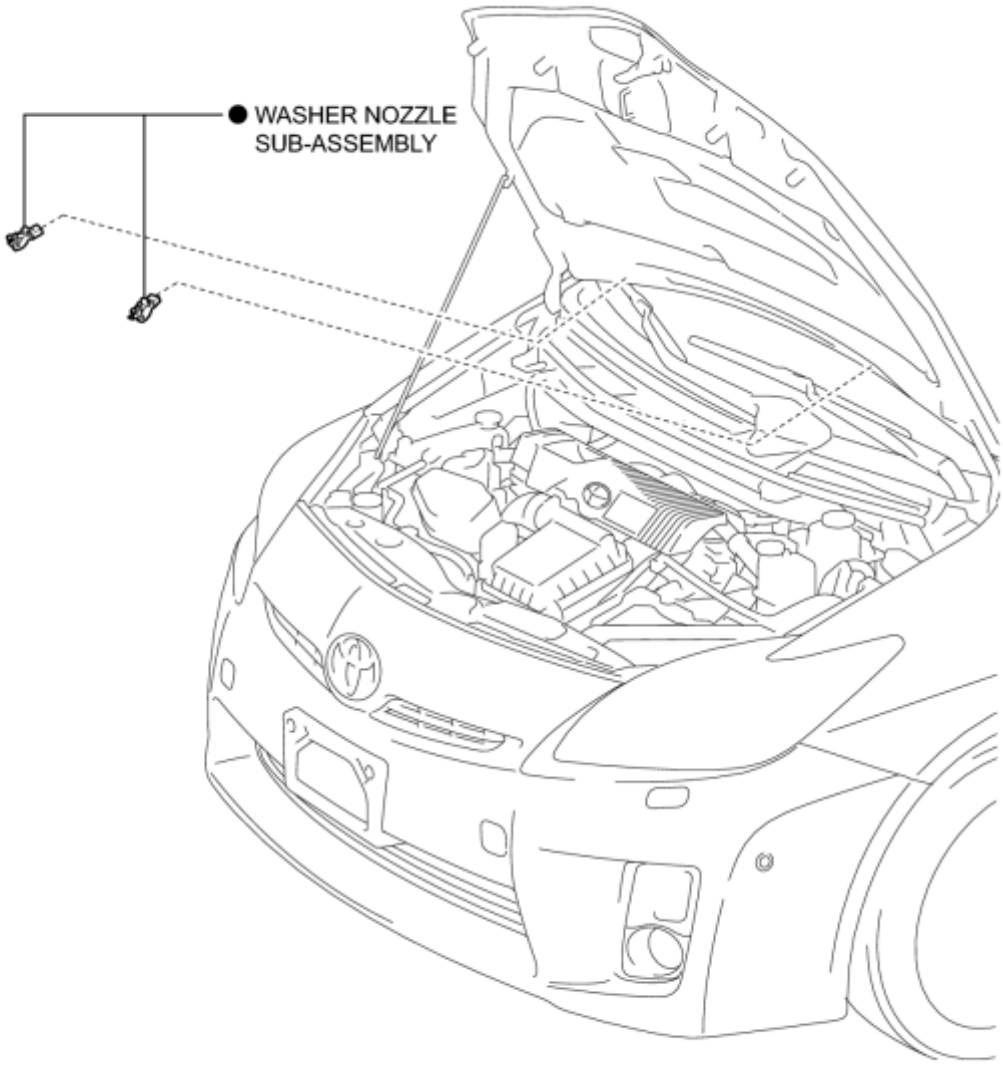
3. INSTALL FRONT FENDER LINER RH INFO

4. INSTALL FRONT WHEEL RH

Torque: **103 N·m (1050 kgf·cm, 76ft·lbf)**

# COMPONENTS

# ILLUSTRATION




● Non-reusable part

P

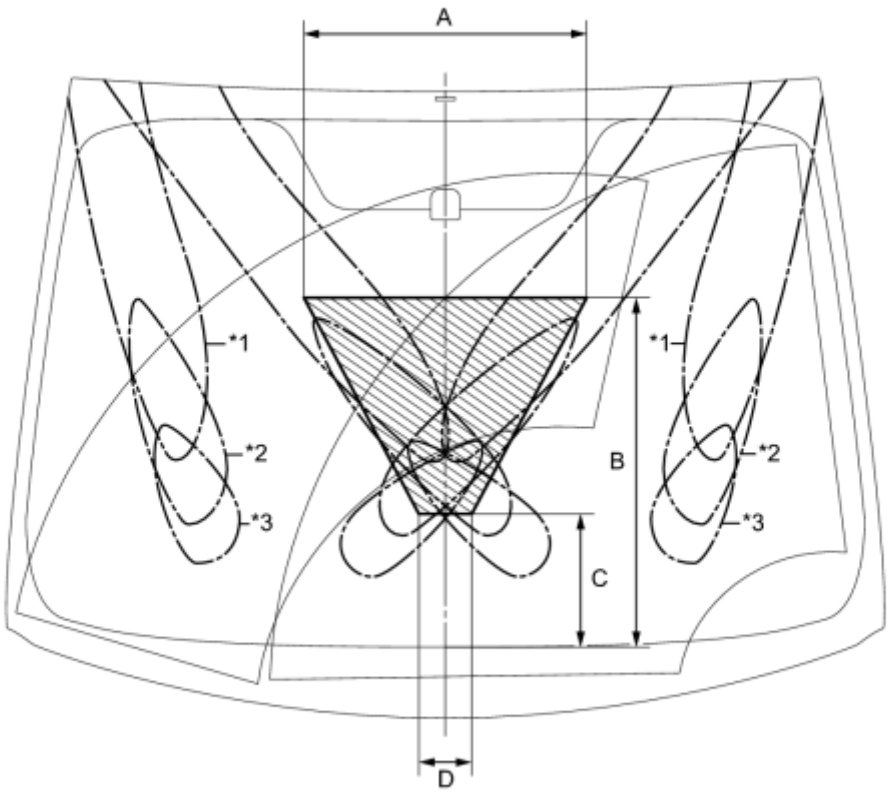
# ON-VEHICLE INSPECTION

1. INSPECT WASHER NOZZLE SUB-ASSEMBLY

(a) With the engine running, check the position that the washer fluid hits the windshield.

Standard:

Washer fluid hits the windshield in the areas shown in the illustration.




P

### *Standard Clearance*

| Area | Measurement |
|---|---|
| A | 443.7 mm (17.5 in.) |
| B | 546.6 mm (21.5 in.) |
| C | 208.2 mm (8.20 in.) |
| D | 82.1 mm (3.23 in.) |

*Text in Illustration*

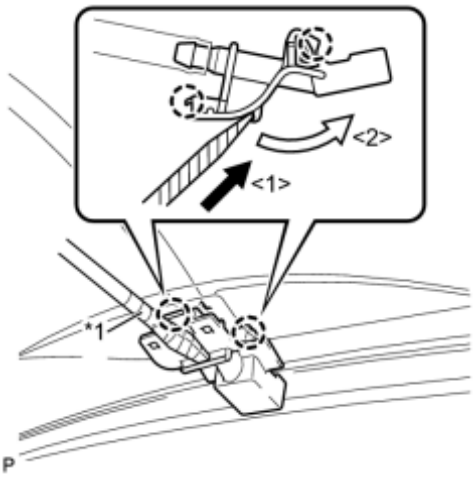
| | | | |
|---|---|---|---|
| *1 | Upper Limit | *2 | Standard |
| *3 | Lower Limit | - | - |

HINT:

If the result is not as specified, replace the malfunctioning washer nozzle sub-assembly.

# REMOVAL

1. REMOVE WASHER NOZZLE SUB-ASSEMBLY




(a) Using a screwdriver, disengage the 2 claws and separate the washer nozzle sub-assembly as shown in the illustration.

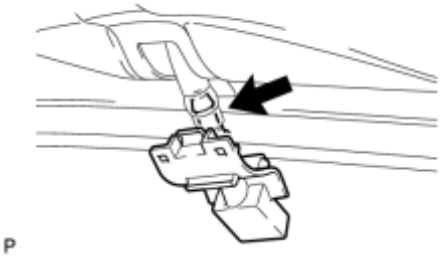
## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

- Be careful not to damage the windshield.
- Washer nozzles cannot be reused.

HINT:

Tape the screwdriver tip before use.




(b) Remove the washer nozzle sub-assembly from the washer hose.

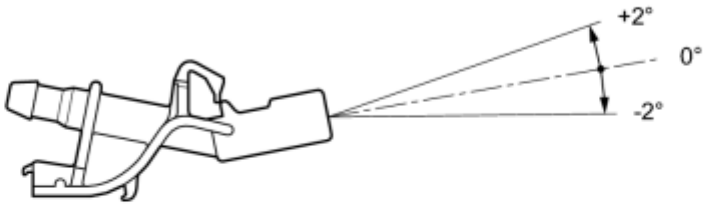
# ADJUSTMENT

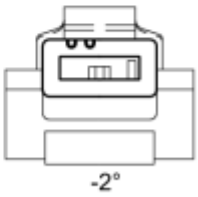
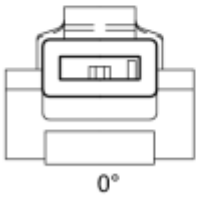
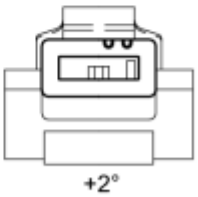
1. REMOVE WASHER NOZZLE SUB-ASSEMBLY INFO

2. ADJUST WASHER NOZZLE SUB-ASSEMBLY

(a) Select a washer nozzle so that the contact area is within the standard. Replace the washer nozzle with the selected one.

Available Washer Nozzles:



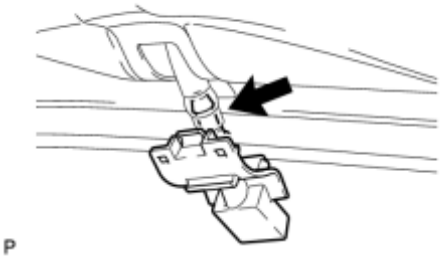

| Washer Fluid Spray Angle |  -2° |  0° |  +2° |
|---|---|---|---|
| Part Number | 85381-12340 | 85381-12330 | 85381-12350 |

P

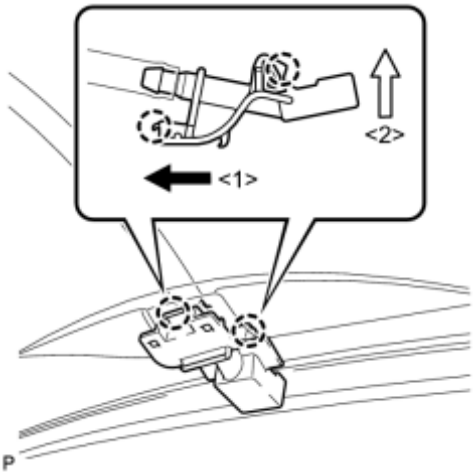
3. INSTALL WASHER NOZZLE SUB-ASSEMBLY INFO

# INSTALLATION

1. INSTALL WASHER NOZZLE SUB-ASSEMBLY




(a) Connect a new washer nozzle sub-assembly to the washer hose.



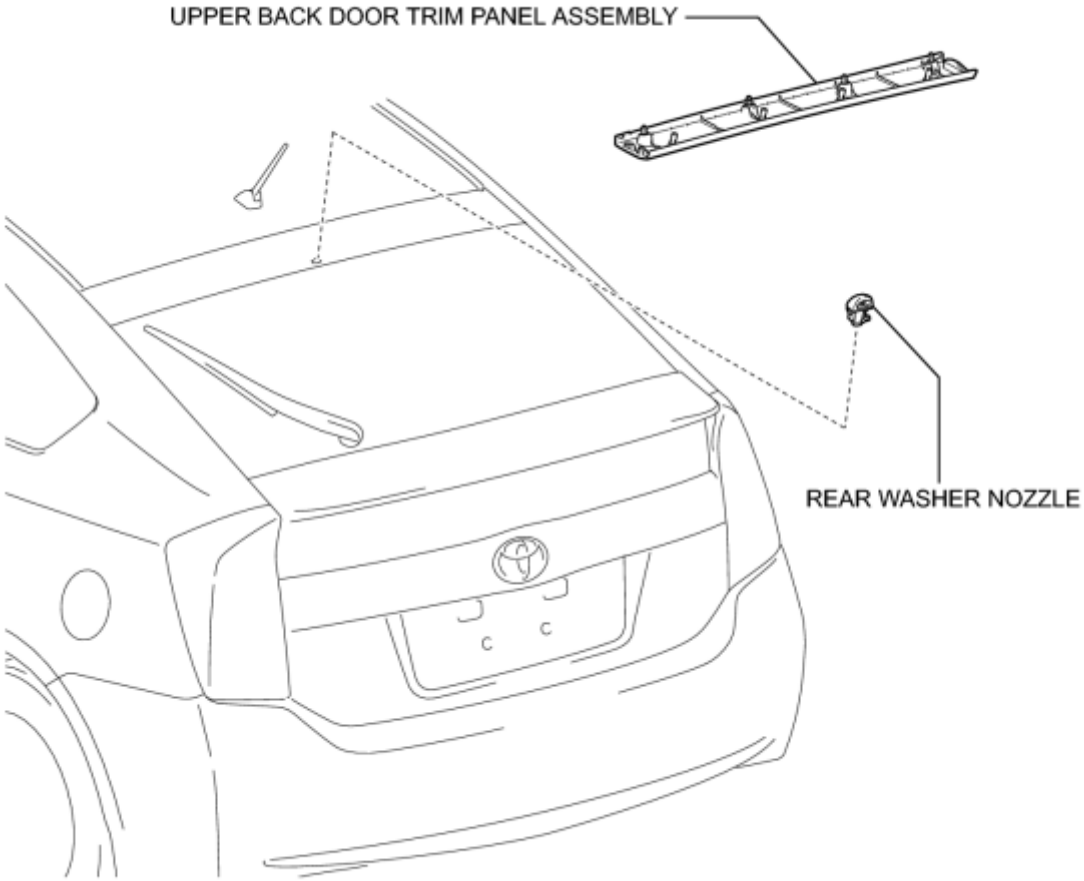

(b) Engage the 2 claws and install the washer nozzle sub-assembly as shown in the illustration.

2. INSPECT WASHER NOZZLE SUB-ASSEMBLY INFO

3. ADJUST WASHER NOZZLE SUB-ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION




P

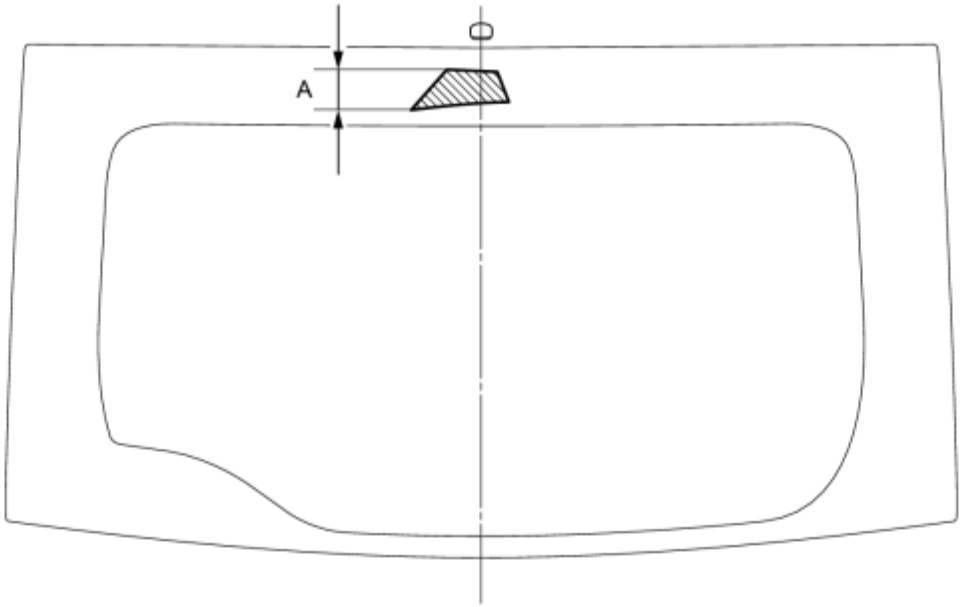
# ON-VEHICLE INSPECTION

1. INSPECT REAR WASHER NOZZLE

(a) With the engine running, check that the center stream of washer fluid sprays on the windshield within the hatched area shown in the illustration.

Standard:

Washer fluid hits the windshield in the area shown in the illustration.




P

***Standard Clearance***

| Area | Measurement |
|---|---|
| A | 48.7 mm (1.92 in.) |

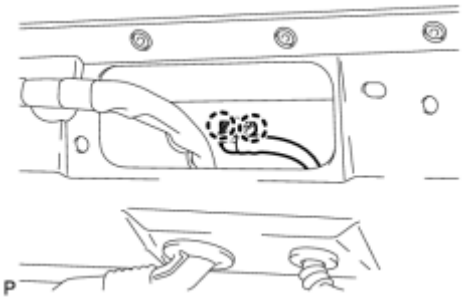
HINT:

If the result is not as specified, replace the malfunctioning rear washer nozzle.

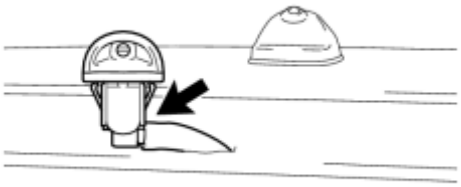
# REMOVAL

1. REMOVE UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

2. REMOVE REAR WASHER NOZZLE



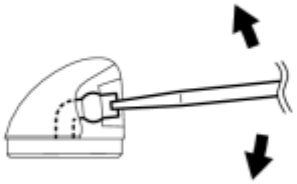

(a) Disengage the 2 claws.




(b) Disconnect the washer hose and remove the rear washer nozzle.

# ADJUSTMENT

1. ADJUST REAR WASHER NOZZLE



P

(a) Using a screwdriver, adjust the direction of the rear washer nozzle.

NOTICE:

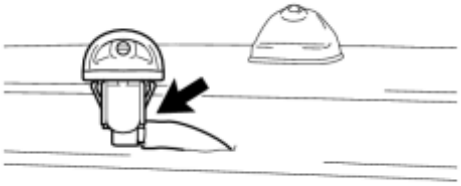
Do not use a safety pin or other pointed tools. Doing so may damage the inside of the washer nozzle.

HINT:

Use a thin-bladed screwdriver with an approximately 1 mm (0.0394 in.) thick tip.

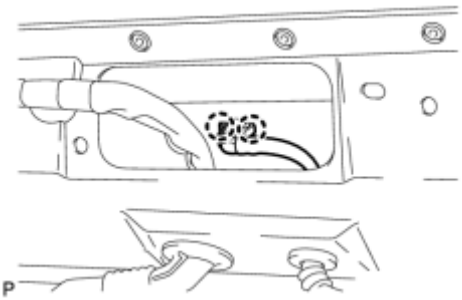
# INSTALLATION

1. INSTALL REAR WASHER NOZZLE



(a) Connect the washer hose.

P



P

(b) Engage the 2 claws to install the rear washer nozzle.

2. INSTALL UPPER BACK DOOR TRIM PANEL ASSEMBLY INFO

3. INSPECT REAR WASHER NOZZLE INFO

4. ADJUST REAR WASHER NOZZLE INFO

# PRECAUTION

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

1. PRECAUTION OF WASHER NOZZLE ADJUSTMENT

(a) Do not clean or adjust the washer nozzle with a safety pin, etc. because:

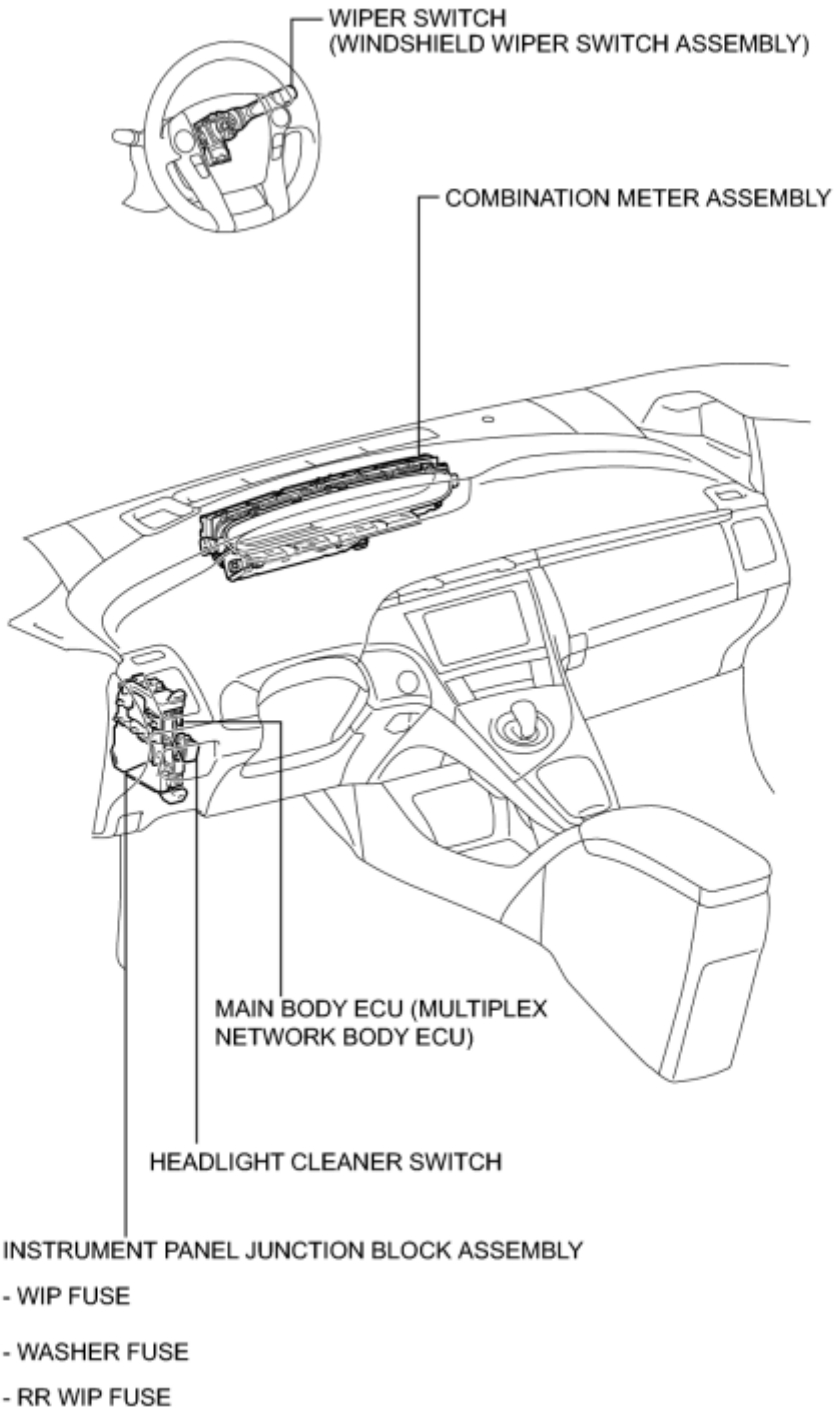
(1) the washer nozzle tip is made of resin and could be damaged.

(2) adjustment is not necessary for this spray type washer nozzle. If it is necessary to change the nozzle angle, replace the washer nozzle with one that has a different nozzle angle.

(b) If the washer nozzle is clogged with wax, etc., remove it and clean the nozzle hole with a soft resin brush or other cleaning tool.

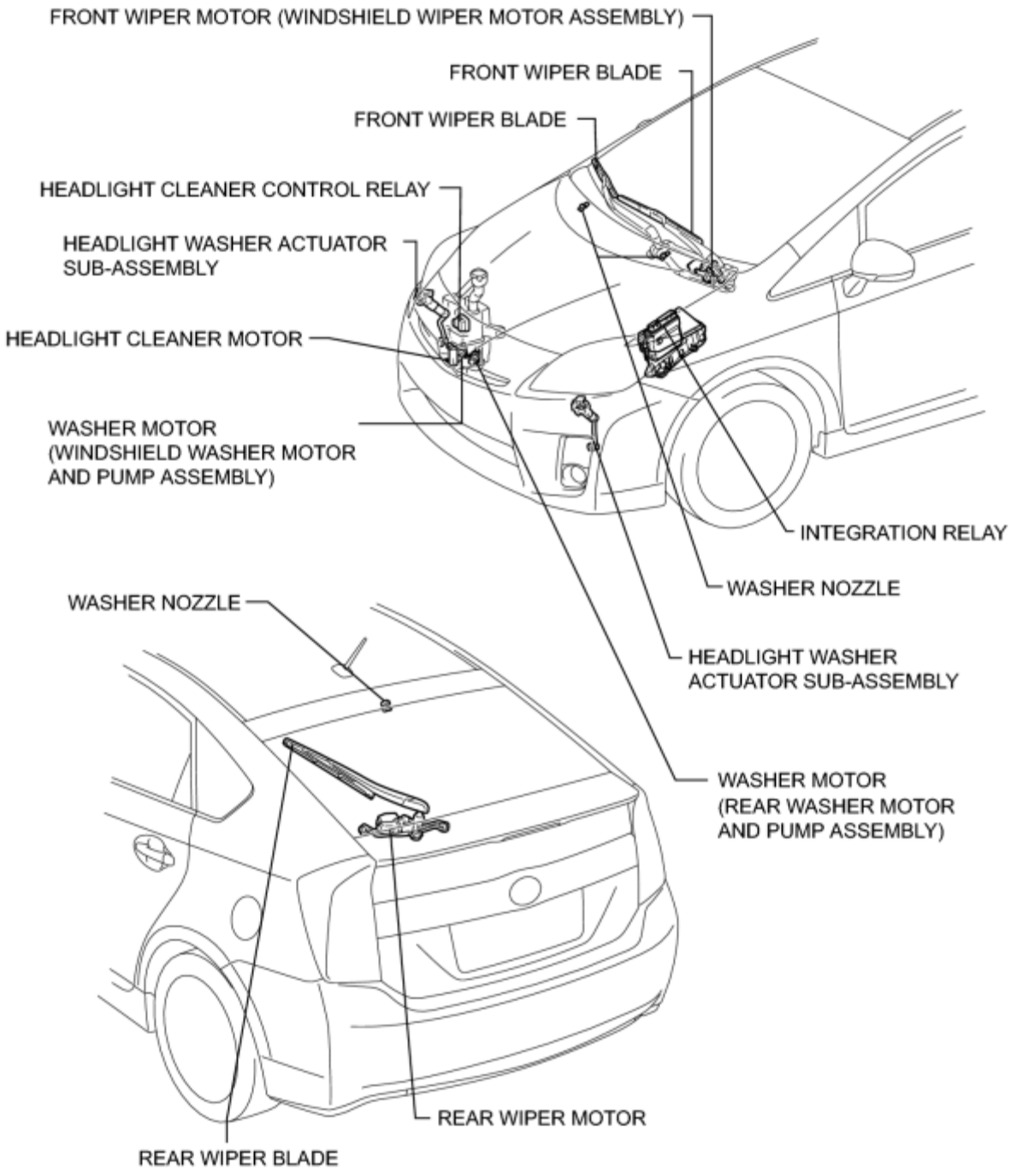
# PARTS LOCATION

# ILLUSTRATION




H

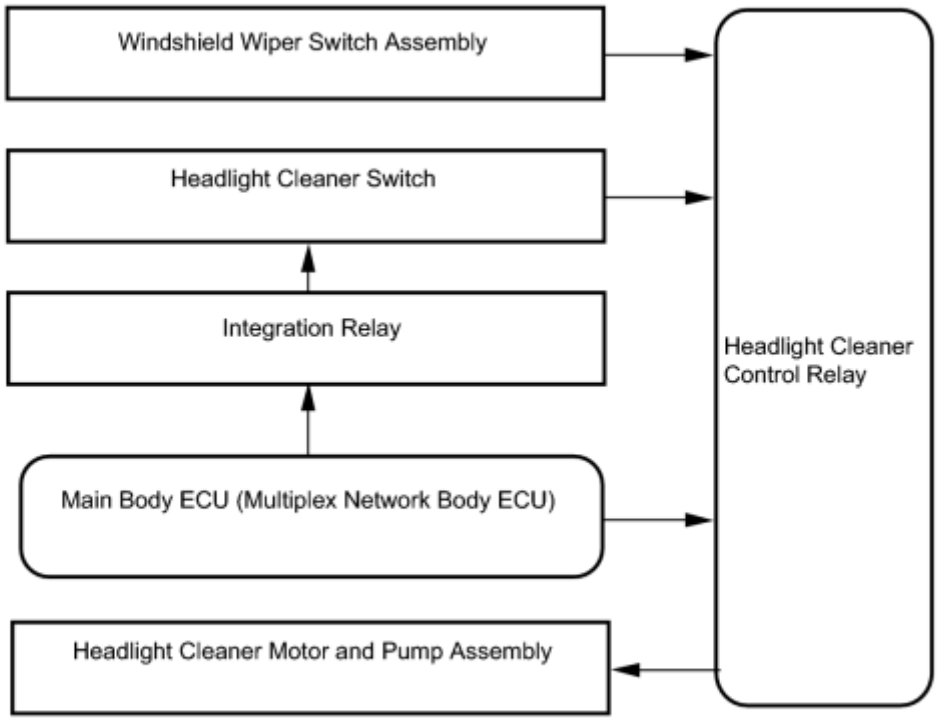
# ILLUSTRATION


FRONT WIPER MOTOR (WINDSHIELD WIPER MOTOR ASSEMBLY)
FRONT WIPER BLADE
FRONT WIPER BLADE
HEADLIGHT CLEANER CONTROL RELAY
HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY
HEADLIGHT CLEANER MOTOR
WASHER MOTOR (WINDSHIELD WASHER MOTOR AND PUMP ASSEMBLY)
INTEGRATION RELAY
WASHER NOZZLE
HEADLIGHT WASHER ACTUATOR SUB-ASSEMBLY
WASHER NOZZLE
WASHER MOTOR (REAR WASHER MOTOR AND PUMP ASSEMBLY)
REAR WIPER MOTOR
REAR WIPER BLADE

H

# SYSTEM DIAGRAM

1. HEADLIGHT CLEANER SYSTEM



# SYSTEM DESCRIPTION

1. HEADLIGHT CLEANER SYSTEM

General

- The headlight cleaner system operates when the headlight cleaner switch is pushed ON.
- The headlight cleaner system also operates when the front washer switch is first operated with the headlights on.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

Use the following procedure to troubleshoot the wiper and washer system.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT



| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS AND SYMPTOM CHECK |

NEXT



| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT



| | |
|---|---|
| 4. | PROBLEM SYMPTOMS TABLE |

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in problem symptoms table | A |
| Fault is listed in problem symptoms table | B |

B  Go to step 6

A



| | |
|---|---|
| 5. | OVERALL ANALYSIS AND TROUBLESHOOTING |

(a) Terminals of ECU INFO

(b) Inspection

(c) On-vehicle inspection

NEXT



| | |
|---|---|
| 6. | ADJUST, REPAIR OR REPLACE |

NEXT



| | |
|---|---|
| 7. | CONFIRMATION TEST |

NEXT  **END**

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Front Wiper and Washer*

| Symptom | Suspected Area | See page |
|---|---|---|
| Front wipers do not operate at all | WIP fuse | - |
| | Windshield wiper motor assembly | INFO |
| | Windshield wiper switch assembly | INFO |
| | Harness or connector | - |
| Front wipers do not operate in INT | Windshield wiper motor assembly | INFO |
| | Windshield wiper switch assembly | INFO |
| | Harness or connector | - |
| Front wipers do not operate in LO | Windshield wiper switch assembly | INFO |
| | Windshield wiper motor assembly | INFO |
| | Harness or connector | - |
| Front wipers do not operate in HI | Windshield wiper switch assembly | INFO |
| | Windshield wiper motor assembly | INFO |
| | Harness or connector | - |
| Front washer motor does not operate | Windshield washer motor and pump assembly | INFO |
| | Windshield wiper switch assembly | INFO |
| | Harness or connector | - |
| Washer fluid does not flow | Washer hose and nozzle | - |
| Front wipers do not operate when front washer switch is on | Windshield wiper switch assembly | INFO |
| | Windshield wiper motor assembly | INFO |
| | Harness or connector | - |
| When the front wiper switch is off, the wiper blades do not park or park in the wrong position | Front wiper arm installation position | INFO |
| | Windshield wiper motor assembly | INFO |

### *Rear Wiper and Washer*

| Symptom | Suspected Area | See page |
|---|---|---|
| Rear wiper does not operate at all | RR WIP fuse | - |
| | Rear wiper motor assembly | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Windshield wiper switch assembly | INFO |
| | Harness or connector | - |
| Rear wiper does not operate in LO or HI | Rear wiper motor assembly | INFO |
| | Windshield wiper switch assembly | INFO |
| | Harness or connector | - |
| Rear washer motor does not operate | RR WIP fuse | - |
| | Rear washer motor assembly | INFO |
| | Windshield wiper switch assembly | INFO |
| | Harness or connector | - |
| Washer fluid does not flow | Washer hose and nozzle | - |
| When the rear wiper switch is off, the wiper blade does not park or park in the wrong position | Rear wiper arm installation position | INFO |
| | Rear wiper motor assembly | INFO |

### *Headlight Cleaner System*

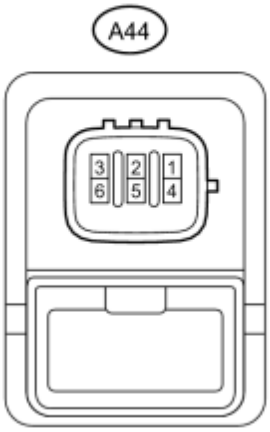
| Symptom | Suspected Area | See page |
|---|---|---|
| Headlight cleaner system does not operate when the headlight cleaner switch is operated | IG power source circuit | INFO |
| | Headlight cleaner switch circuit | INFO |
| | Headlight cleaner motor and relay circuit | INFO |
| | Headlight cleaner control relay | INFO |
| Headlight cleaner system does not operate when the front washer switch is operated | IG power source circuit | INFO |
| | Headlight signal circuit | INFO |
| | Washer signal circuit | INFO |
| | Headlight cleaner motor and relay circuit | INFO |
| | Headlight cleaner control relay | INFO |

# TERMINALS OF ECU

1. CHECK HEADLIGHT CLEANER CONTROL RELAY

(a) Disconnect the A44 headlight cleaner control relay connector.

(b) Measure the voltage and resistance according to the value(s) in the table below.




H

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A44-1 (HDLO) - A44-4 (E) | L - W-B | Low beam headlight signal | Light control switch in head position | Below 1 V |
| | | | Light control switch off | 11 to 14 V |
| A44-2 (H) - A44-4 (E) | LG - W-B | Headlight cleaner switch operation signal | Headlight cleaner switch off | 11 to 14 V |
| | | | Headlight cleaner switch on | Below 1 V |
| A44-3 (IG) - A44-4 (E) | B - W-B | Power switch on (IG) signal (Power source circuit) | Power switch off | Below 1 V |
| | | | Power switch on (IG) | 11 to 14 V |
| A44-4 (E) - Body ground | W-B - Body ground | Body ground | Always | Below 1 Ω |
| A44-5 (FRWA) - A44-4 (E) | R - W-B | Front washer switch signal | Front washer switch off | 11 to 14 V |
| | | | Front washer switch on | Below 1 V |

If the result is not as specified, there may be a malfunction in the wire harness.

| Washer Signal Circuit |
|---|

# DESCRIPTION

The headlight cleaner control relay receives the windshield washer operation signal.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK OPERATION |
|---|---|

(a) Check the operation of the front wiper and washer system.

OK:

Front wiper and washer system operates normally.

NG ▶ GO TO PROBLEM SYMPTOMS TABLE

OK

▼

| 2. | CHECK HARNESS AND CONNECTOR (WINDSHIELD WIPER SWITCH ASSEMBLY - RELAY) |
|---|---|

(a) Disconnect the A44 headlight cleaner control relay connector.

*1




N

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A44-5 (FRWA) - Body ground | Front washer switch off | 11 to 14 V |
| | Front washer switch on | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Headlight Cleaner Control Relay) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# DESCRIPTION

The headlight cleaner control relay detects the low beam headlights status.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

First check that the low beam headlights operate normally.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (INTEGRATION RELAY - HEADLIGHT CLEANER CONTROL RELAY) |

(a) Disconnect the A44 headlight cleaner control relay connector.

*1




N

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A44-1 (HDLO) - Body ground | Light control switch in head position | Below 1 V |
| | Light control switch off | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Headlight Cleaner Control Relay) |

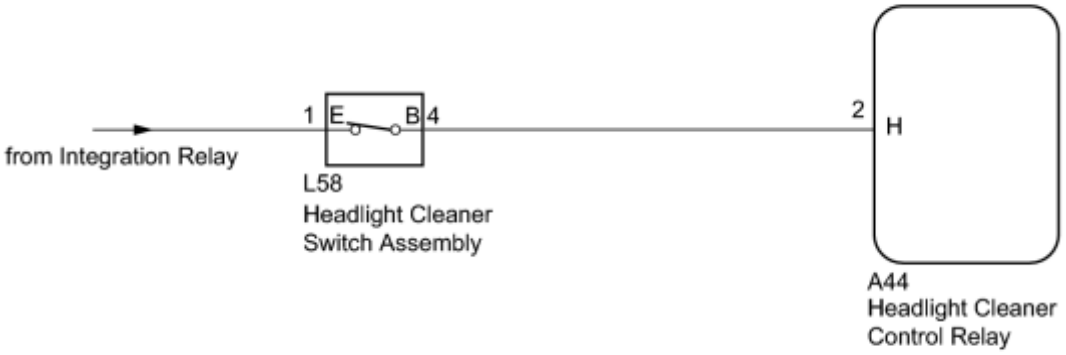
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# DESCRIPTION

This circuit detects the conditions (on or off) of the headlight cleaner switch assembly.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT HEADLIGHT CLEANER CONTROL RELAY (H SIGNAL) |

*1




(a) Disconnect the A44 headlight cleaner control relay connector.

N

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A44-2 (H) - Body ground | Light control switch in head and headlight cleaner switch on | 11 to 14 V |
| A44-2 (H) - Body ground | Headlight cleaner switch off | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Headlight Cleaner Control Relay) |

NG ▶ INSPECT HEADLIGHT CLEANER SWITCH ASSEMBLY

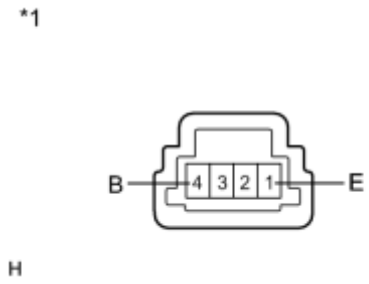
OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | INSPECT HEADLIGHT CLEANER SWITCH ASSEMBLY |

(a) Remove the headlight cleaner switch assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (E) - 4 (B) | Headlight cleaner switch off | 10 kΩ or higher |
| 1 (E) - 4 (B) | Headlight cleaner switch on | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Headlight Cleaner Switch Assembly) |

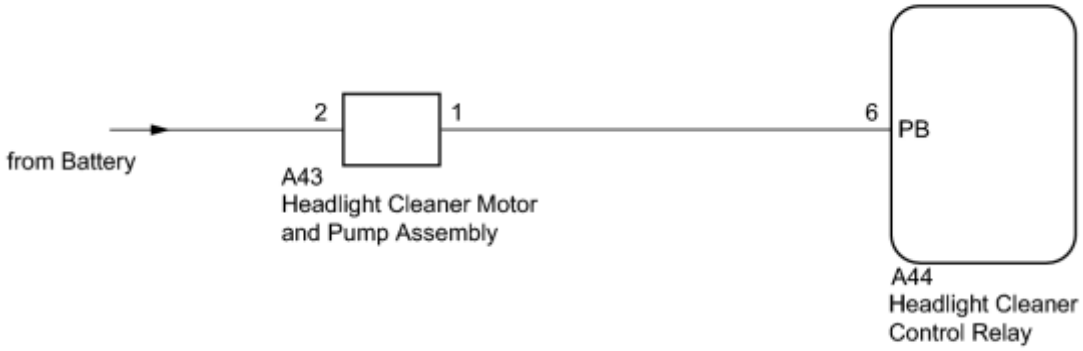
NG ▶ REPLACE HEADLIGHT CLEANER SWITCH ASSEMBLY

OK ▶ **REPAIR OR REPLACE HARNESS OR CONNECTOR (MAIN BODY ECU - HEADLIGHT CLEANER CONTROL RELAY)**

# DESCRIPTION

The headlight cleaner control relay controls the headlight cleaner motor and pump assembly.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT HEADLIGHT CLEANER MOTOR AND PUMP ASSEMBLY |

HINT:

The following check should be performed with the headlight cleaner motor and pump assembly installed to the washer jar.

(a) Fill the washer jar with washer fluid.

*1




(b) Connect a battery positive (+) lead to terminal 2 of the headlight cleaner motor and pump assembly, and a battery negative (-) lead to terminal 1.

(c) Check that washer fluid flows from the washer jar.

OK:

Washer fluid is pumped from the washer jar.

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Headlight Cleaner Motor and Pump Assembly) |

NG ▶ REPLACE HEADLIGHT CLEANER MOTOR AND PUMP ASSEMBLY

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (HEADLIGHT CLEANER MOTOR CIRCUIT) |

(a) Connect the headlight cleaner motor and pump assembly connector.

*1




(b) Disconnect the A44 headlight cleaner control relay connector.

N

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A44-6 (PB) - Body ground | Always | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Headlight Cleaner Control Relay) |

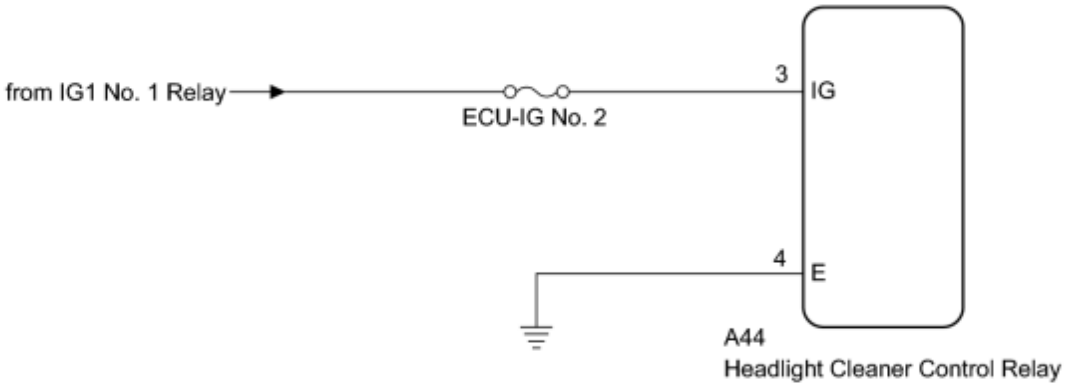
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (HEADLIGHT CLEANER CONTROL RELAY - BATTERY)

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# DESCRIPTION

This circuit provides power to the headlight cleaner control relay.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (HEADLIGHT CLEANER CONTROL RELAY - BATTERY AND BODY GROUND) |

(a) Disconnect the A44 headlight cleaner control relay connector.

*1




N

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A44-3 (IG) - Body ground | Power switch off | Below 1 V |
| | Power switch on (IG) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A44-4 (E) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

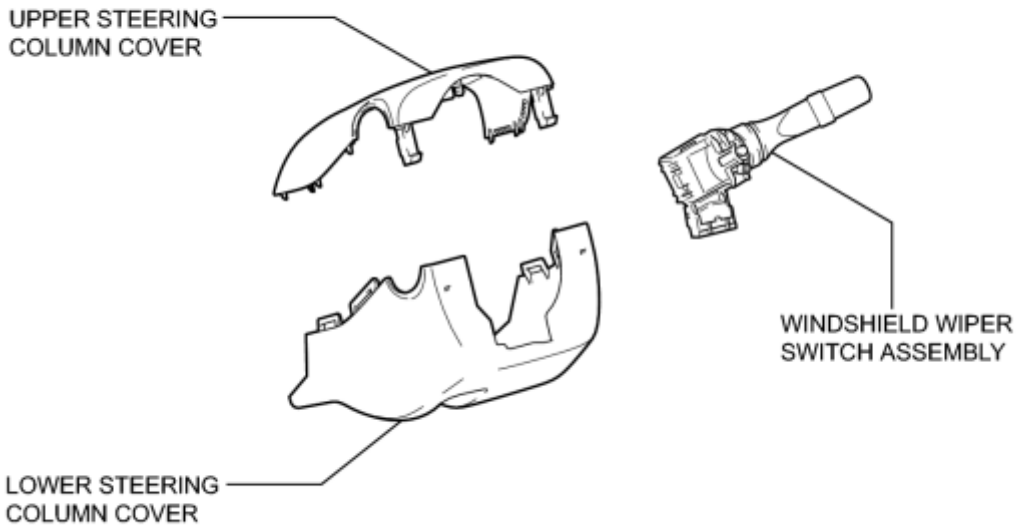
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Headlight Cleaner Control Relay) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

1. REMOVE LOWER STEERING COLUMN COVER

NOTICE:

Removing the lower steering column cover in the incorrect order will cause the lower steering column cover to break.

(a) Release the tilt and telescopic lever, and fully extend and lower the steering column assembly.

(b) Lock the tilt and telescopic lever.



P

(c) Push the right and left sides of the lower steering column cover to disengage the 4 claws.



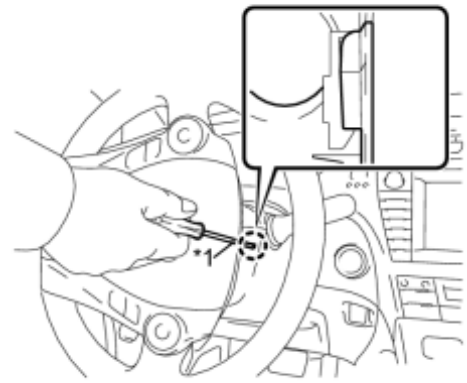
P

(d) Insert fingers into the opening of the tilt lever of the lower steering column cover to disengage the claw.

HINT:

Spread the claw to disengage it.

(e) Turn the steering wheel assembly to the right.




P

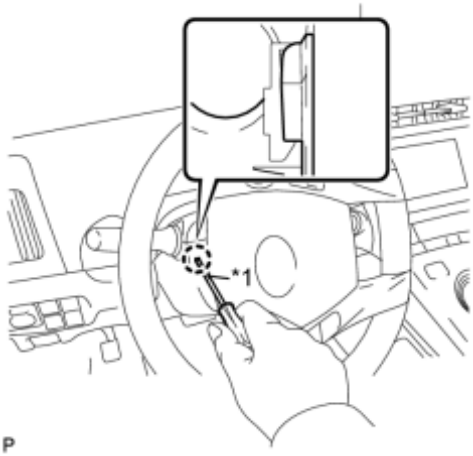
(f) Using a screwdriver, disengage the claw as shown in the illustration.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

HINT:

Tape the screwdriver tip before use.




P

(g) Turn the steering wheel assembly to the left.

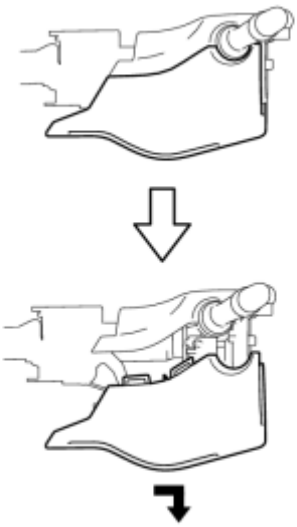
(h) Using a screwdriver, disengage the claw as shown in the illustration.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

HINT:

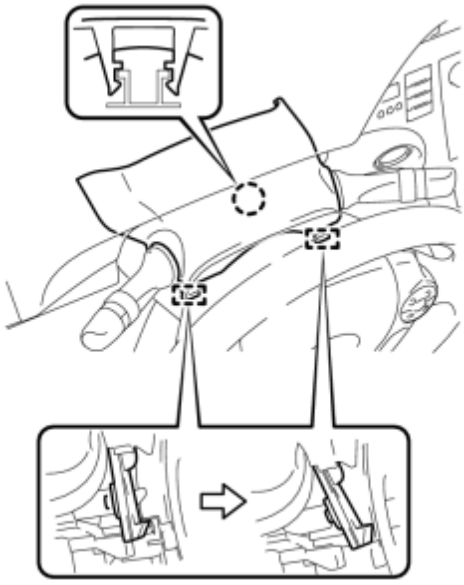
Tape the screwdriver tip before use.



C

(i) Remove the lower steering column cover as shown in the illustration.

2. REMOVE UPPER STEERING COLUMN COVER

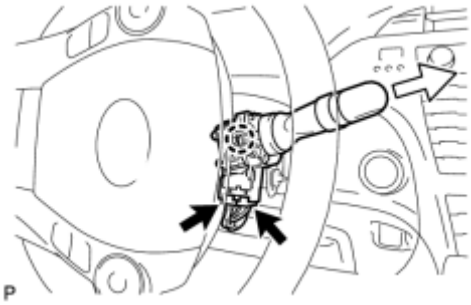


P

(a) Disengage the claw and 2 pins, and remove the upper steering column cover.

3. REMOVE WINDSHIELD WIPER SWITCH ASSEMBLY

(a) Turn the steering wheel assembly to the right.




(b) Disconnect the 2 connectors.

(c) Disengage the claw and remove the windshield wiper switch assembly as shown in the illustration.

NOTICE:

If the claw is pushed with excessive force, it may break.

# INSPECTION

1. INSPECT WINDSHIELD WIPER SWITCH ASSEMBLY

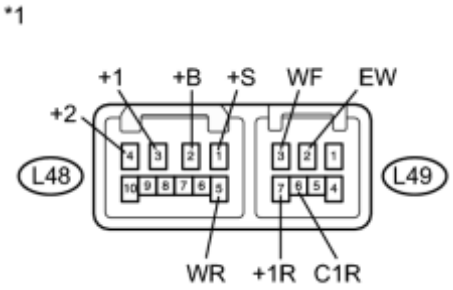
(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

Front Washer Switch

Rear Wiper Switch

Rear Washer Switch




## Front Wiper Switch

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L48-1 (+S) - L48-3 (+1) | OFF | Below 1 Ω |
| | INT | |
| L48-2 (+B) - L48-3 (+1) | MIST | |
| | LO | |
| L48-2 (+B) - L48-4 (+2) | HI | |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L49-2 (EW) - L49-3 (WF) | ON | Below 1 Ω |
| | OFF | 10 kΩ or higher |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L49-6 (C1R) - L49-2 (EW) | OFF | 10 kΩ or higher |
| L49-7 (+1R) - L49-2 (EW) | | |
| L49-6 (C1R) - L49-2 (EW) | INT | Below 1 Ω |
| L49-7 (+1R) - L49-2 (EW) | HI | Below 1 Ω |

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L48-5 (WR) - L49-2 (EW) | OFF | 10 kΩ or higher |
| L49-7 (+1R) - L49-2 (EW) | | |
| L48-5 (WR) - L49-2 (EW) | WASH | Below 1 Ω |
| L48-5 (WR) - L49-2 (EW) | ON + WASH | Below 1 Ω |
| L49-7 (+1R) - L49-2 (EW) | | |

If the result is not as specified, replace the windshield wiper switch assembly.

## Text in Illustration

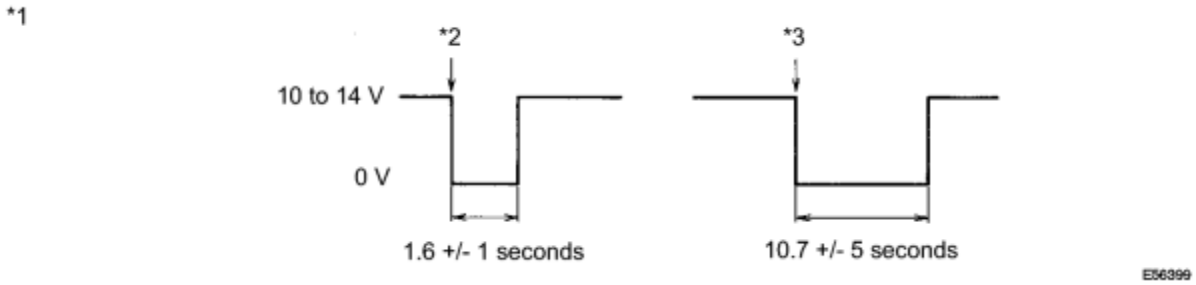
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Windshield Wiper Switch Assembly) |

(b) Check the intermittent operation.

1. Connect a voltmeter positive (+) lead to terminal L48-3 (+1) and a negative (-) lead to terminal L49-2 (EW).
2. Connect a battery positive (+) lead to terminal L48-2 (+B) and a negative (-) lead to terminal L49-2 (EW) and L48-1 (+S).
3. Turn the wiper switch to the INT position.
4. Connect a battery positive (+) lead to terminal L48-1 (+S) for 5 seconds.
5. Connect a battery negative (-) lead to terminal L48-1 (+S). Operate the intermittent wiper relay and check the voltage between terminals L48-3 (+1) and L49-2 (EW).

   OK:

   Voltage changes as shown in the illustration.



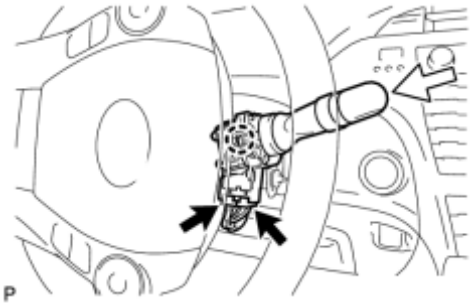

   If the result is not as specified, replace the windshield wiper switch assembly.

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Voltage between terminals L48-3 (+1) and L49-2 (EW) | *2 | FAST: Connect battery negative lead to terminal L48-1 (+S) |
| *3 | SLOW: Connect battery negative lead to terminal L48-1 (+S) | - | - |

# INSTALLATION

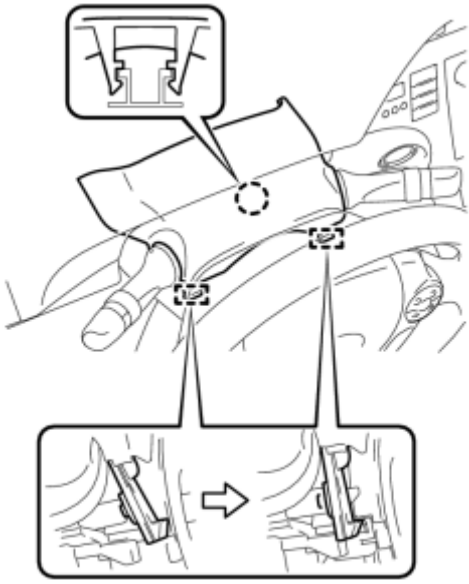
1. INSTALL WINDSHIELD WIPER SWITCH ASSEMBLY



(a) Engage the claw and install the windshield wiper switch assembly as shown in the illustration.

(b) Connect the 2 connectors.

2. INSTALL UPPER STEERING COLUMN COVER



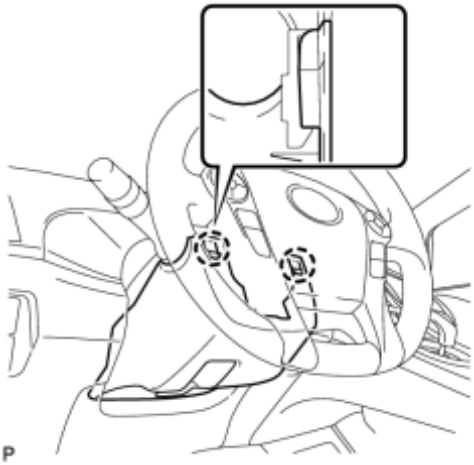
(a) Engage the claw and 2 pins to install the upper steering column cover.

3. INSTALL LOWER STEERING COLUMN COVER

NOTICE:

If the lower steering column cover is installed in the incorrect order, it will not be possible to assemble the lower steering column cover.

(a) Engage the 2 claws to install the lower steering column cover.



P



P

(b) Engage the 4 claws.



P

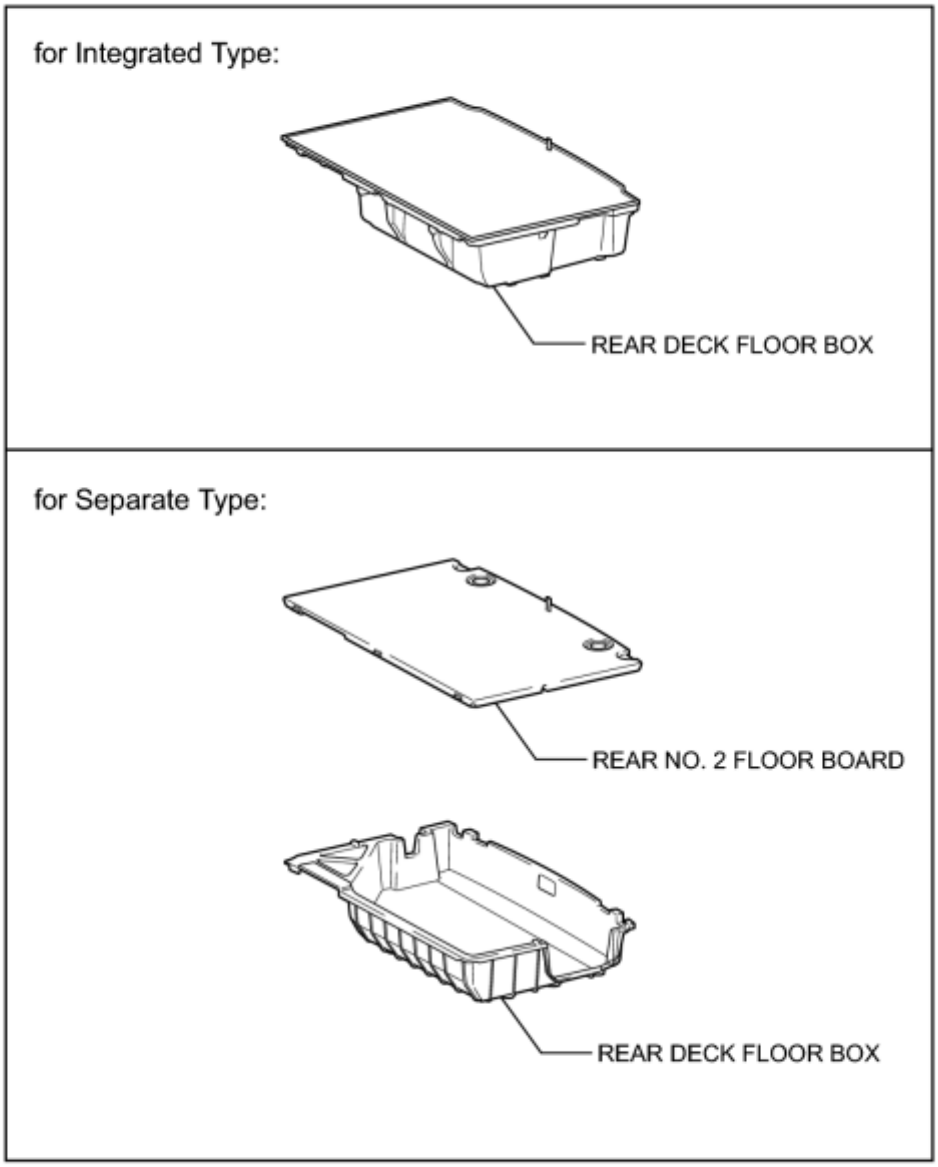
(c) Engage the claw.

HINT:

Press the area around the claw to engage it.

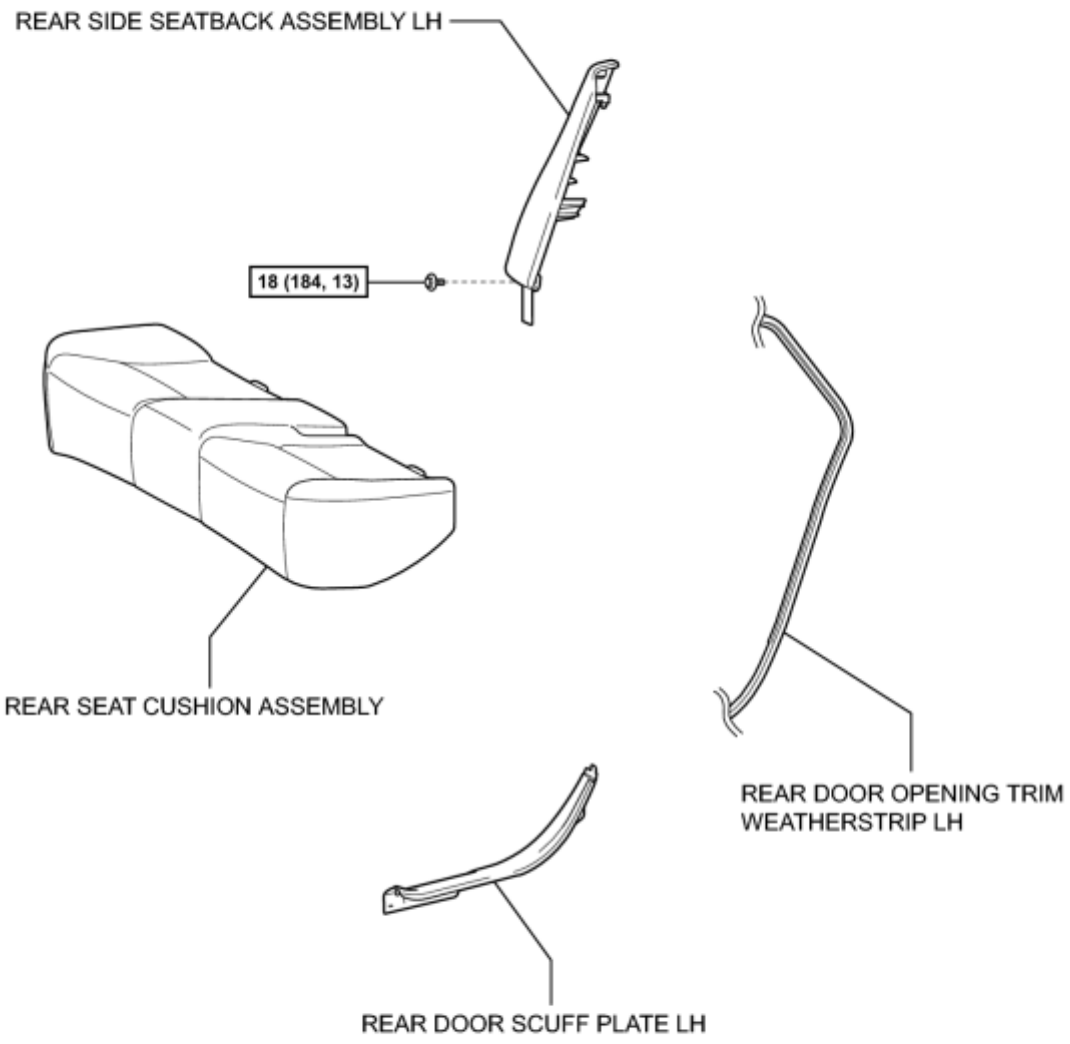
# COMPONENTS

# ILLUSTRATION




P

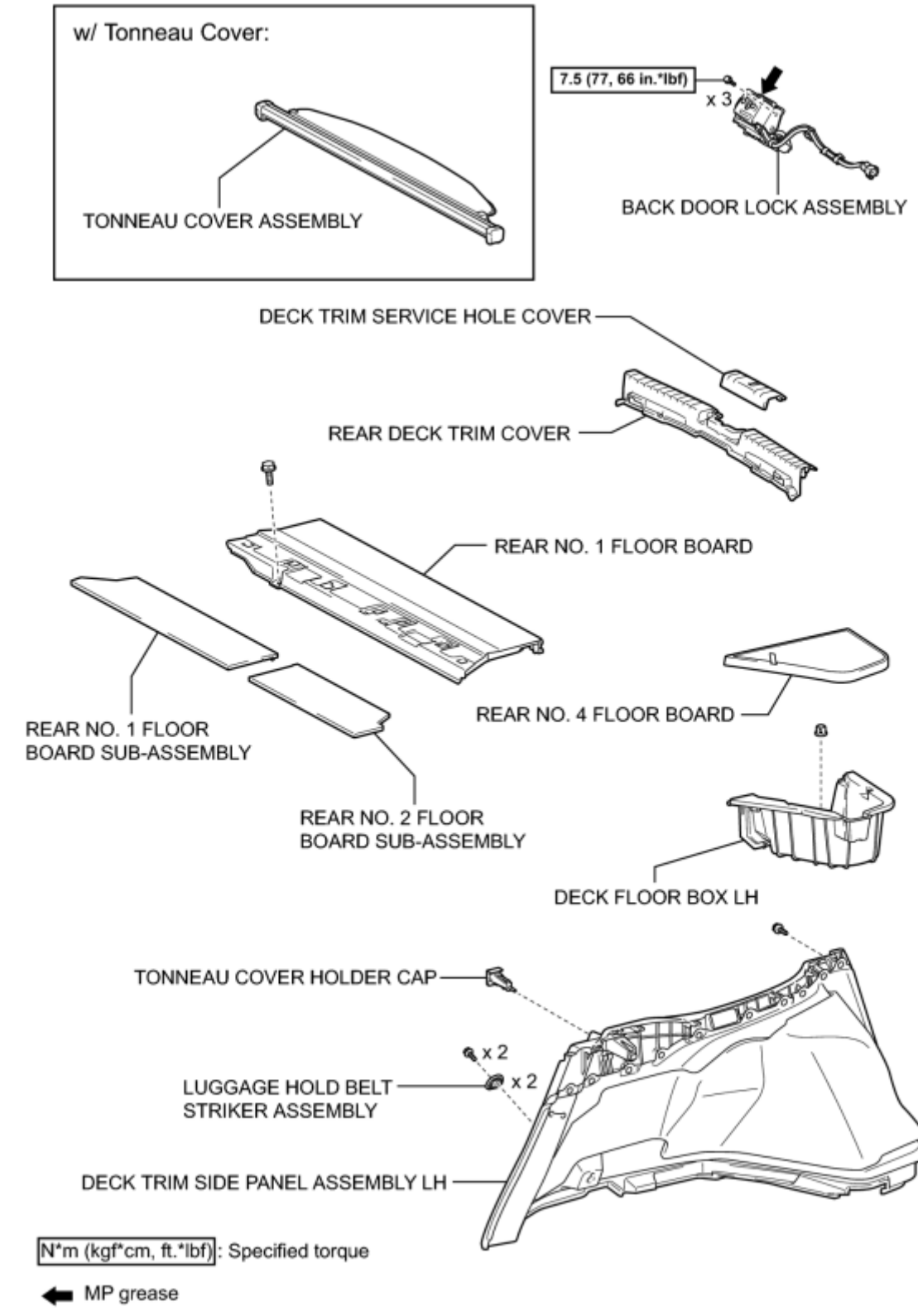
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION


w/ Tonneau Cover:
TONNEAU COVER ASSEMBLY
7.5 (77, 66 in.*lbf)
x 3
BACK DOOR LOCK ASSEMBLY
DECK TRIM SERVICE HOLE COVER
REAR DECK TRIM COVER
REAR NO. 1 FLOOR BOARD
REAR NO. 1 FLOOR
BOARD SUB-ASSEMBLY
REAR NO. 4 FLOOR BOARD
REAR NO. 2 FLOOR
BOARD SUB-ASSEMBLY
DECK FLOOR BOX LH
TONNEAU COVER HOLDER CAP
x 2
LUGGAGE HOLD BELT
STRIKER ASSEMBLY
x 2
DECK TRIM SIDE PANEL ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
MP grease

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR DOOR SCUFF PLATE LH INFO

4. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH

5. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

6. REMOVE REAR SIDE SEATBACK ASSEMBLY LH INFO

7. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

8. REMOVE REAR NO. 4 FLOOR BOARD INFO

9. REMOVE DECK FLOOR BOX LH INFO

10. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

11. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

12. REMOVE REAR NO. 1 FLOOR BOARD INFO

13. REMOVE DECK TRIM SERVICE HOLE COVER INFO

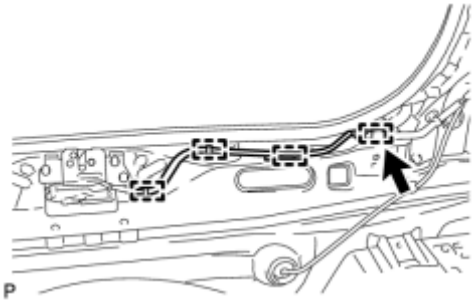
14. REMOVE REAR DECK TRIM COVER INFO

15. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

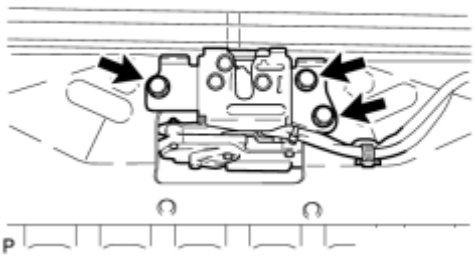
16. REMOVE TONNEAU COVER HOLDER CAP INFO

17. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH INFO

18. REMOVE BACK DOOR LOCK ASSEMBLY



(a) Disconnect the connector and disengage the 4 clamps.

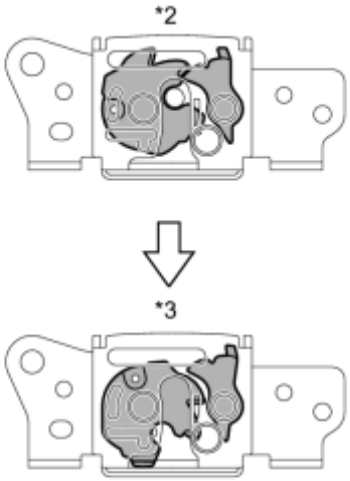


(b) Remove the 3 bolts and back door lock assembly.

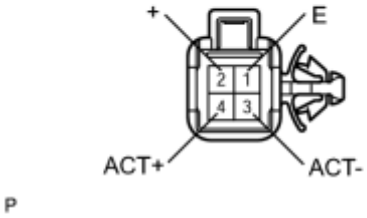
# INSPECTION

1. INSPECT BACK DOOR LOCK ASSEMBLY

(a) Check the operation of the door lock motor.




(1) Move the door lock to the lock position.




(2) Apply battery voltage to the door lock motor and check the operation of the door lock motor.

OK:

| Connection | Result |
|---|---|
| Battery positive (+) → 4 (ACT+)<br><br>Battery negative (-) → 3 (ACT-) | Unlocks |

If the result is not as specified, replace the back door lock assembly.

(b) Check the operation of the door courtesy switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (E) - 2 (+) | Locked | 10 kΩ or higher |
| 1 (E) - 2 (+) | Unlocked | Below 1 Ω |

*Text in Illustration*

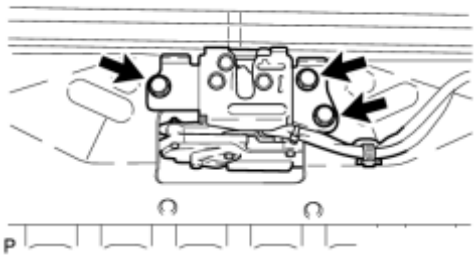
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Back Door Lock Assembly) |
| *2 | Lock |
| *3 | Unlock |

If the result is not as specified, replace the back door lock assembly.

# INSTALLATION

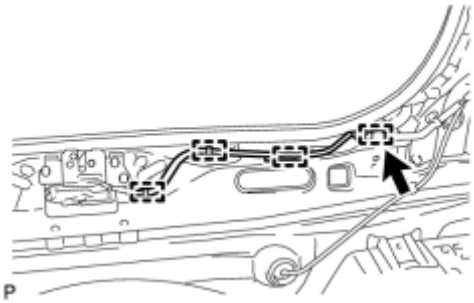
1. INSTALL BACK DOOR LOCK ASSEMBLY

(a) Apply MP grease to the sliding parts of the back door lock assembly.



(b) Install the back door lock assembly with the 3 bolts.

Torque: **7.5 N·m (77 kgf·cm, 66in·lbf)**



(c) Engage the 4 clamps and connect the connector.

2. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH INFO

3. INSTALL TONNEAU COVER HOLDER CAP INFO

4. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

5. INSTALL REAR DECK TRIM COVER INFO

6. INSTALL DECK TRIM SERVICE HOLE COVER INFO

7. INSTALL REAR NO. 1 FLOOR BOARD INFO

8. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

9. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

10. INSTALL DECK FLOOR BOX LH INFO

11. INSTALL REAR NO. 4 FLOOR BOARD INFO

12. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

13. INSTALL REAR SIDE SEATBACK ASSEMBLY LH INFO

14. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

15. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH INFO

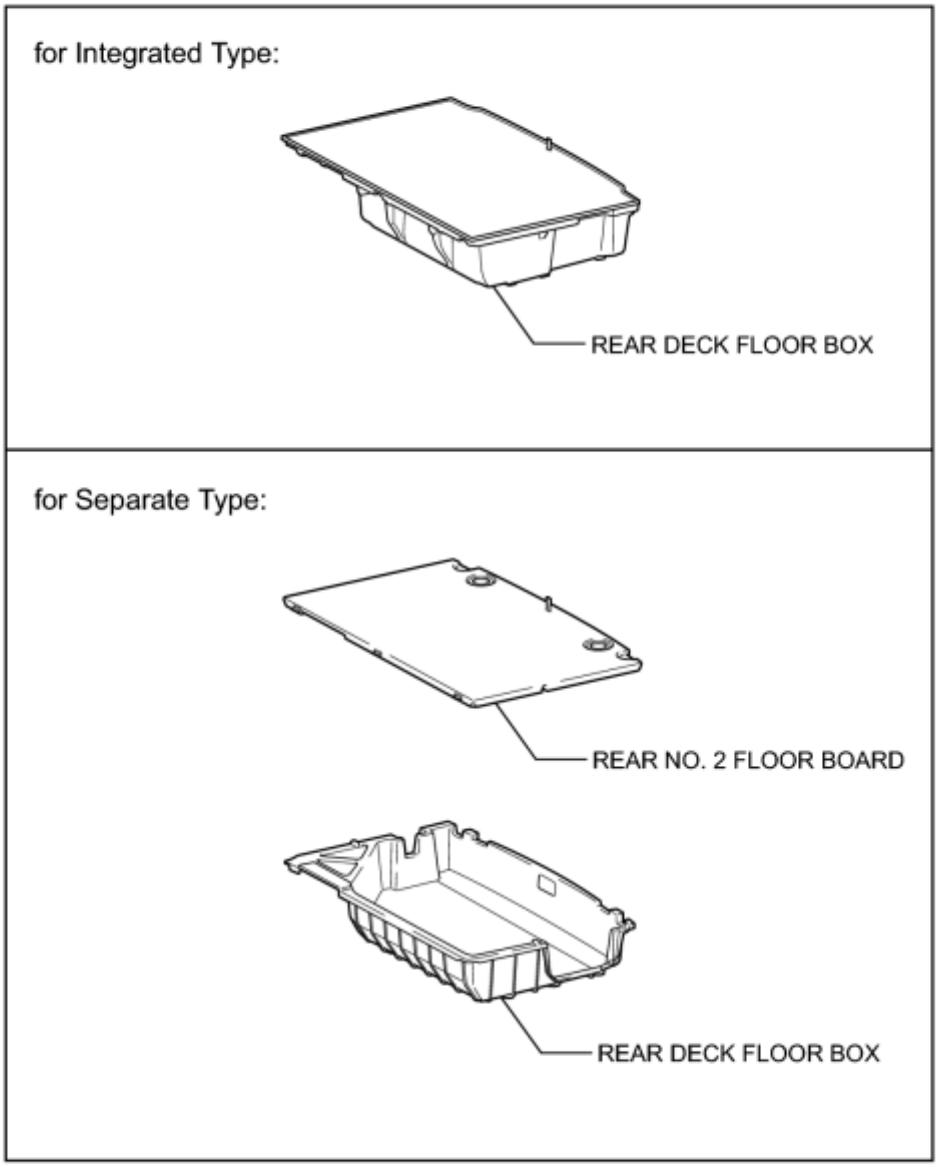
16. INSTALL REAR DOOR SCUFF PLATE LH INFO

17. INSTALL REAR DECK FLOOR BOX INFO

18. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

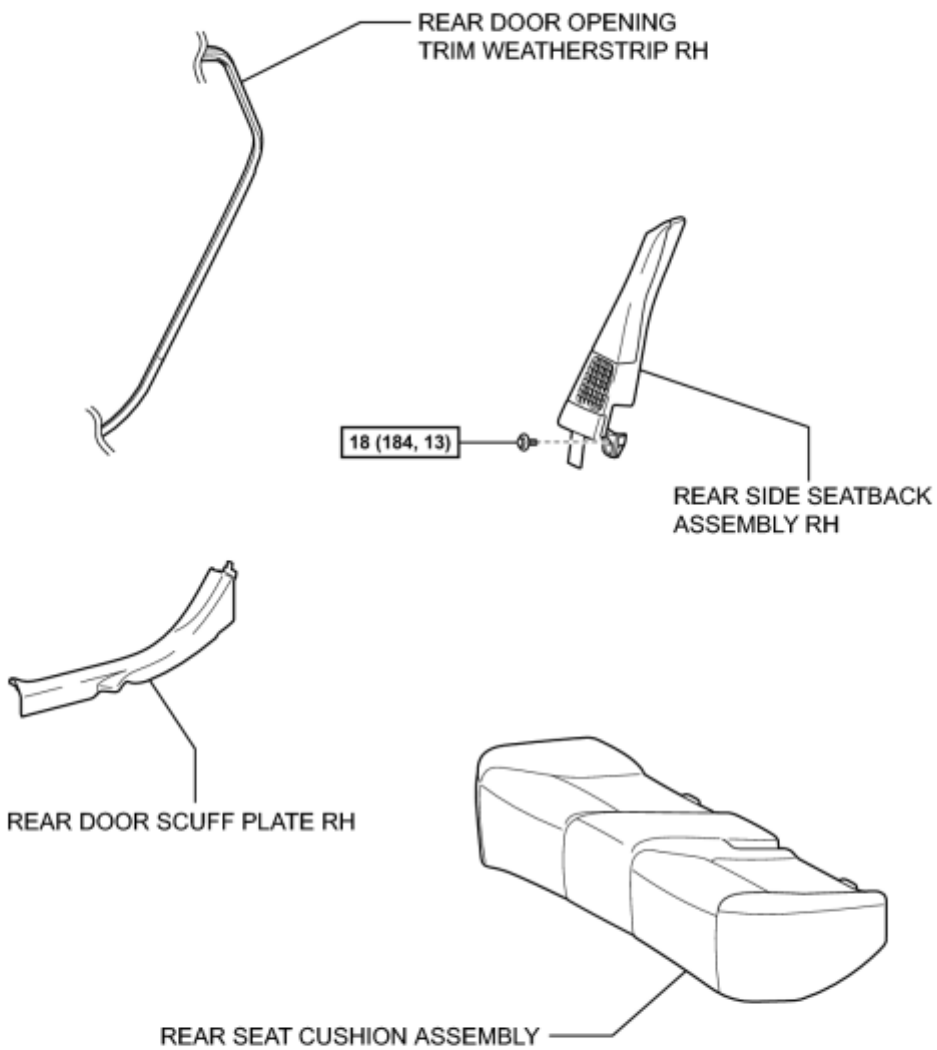
# COMPONENTS

# ILLUSTRATION




P

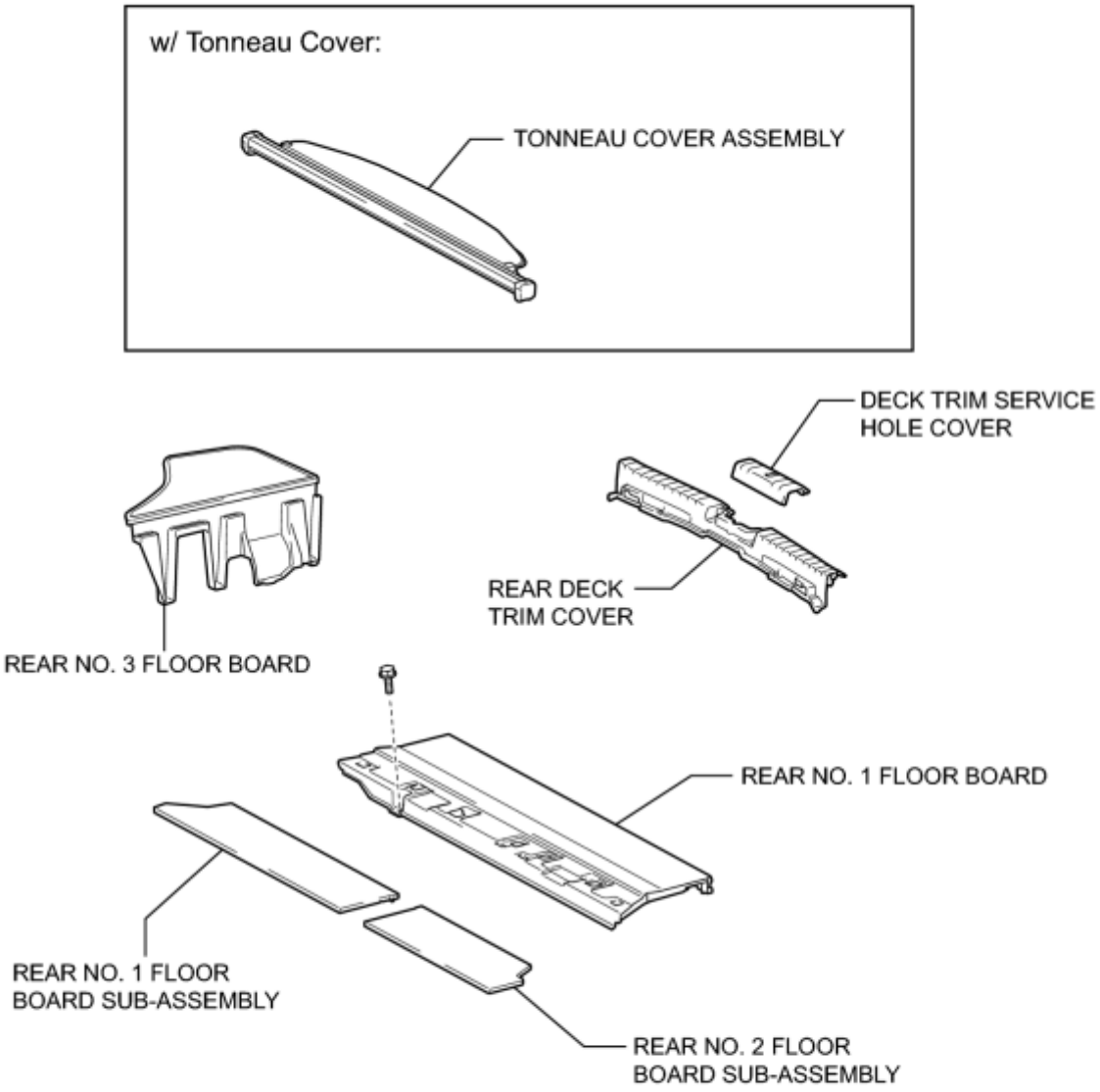
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

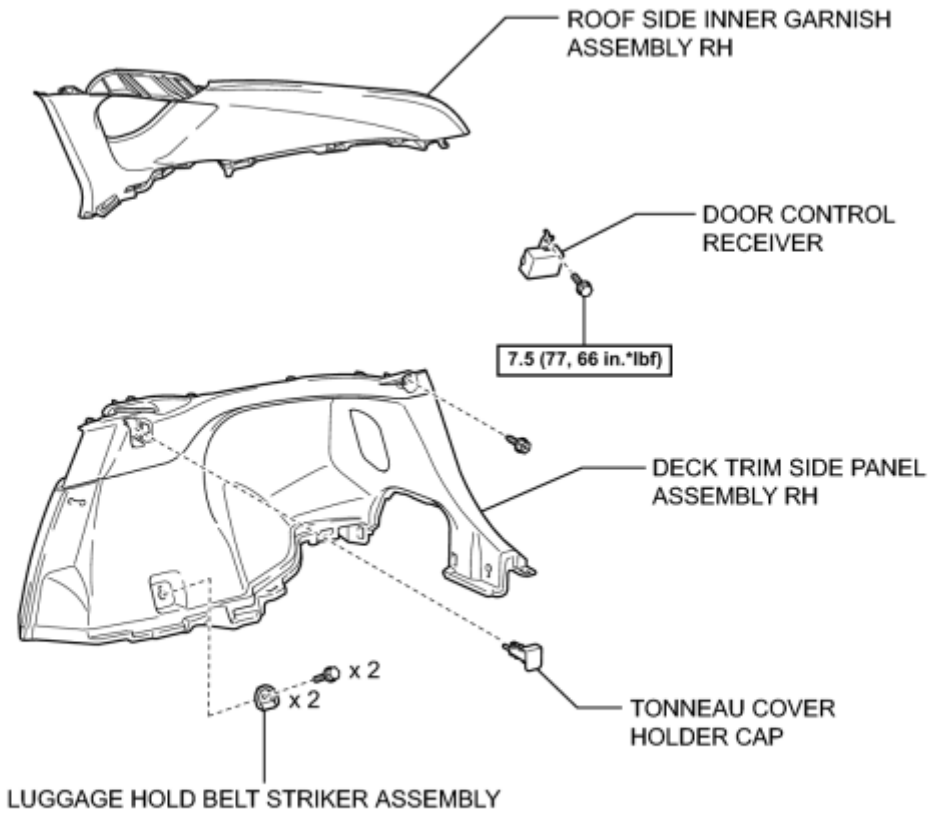
P

# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR DOOR SCUFF PLATE RH

HINT:

Use the same procedure for the RH side and LH side INFO.

4. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP RH

5. REMOVE REAR SIDE SEATBACK ASSEMBLY RH INFO

6. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

7. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

8. REMOVE REAR NO. 3 FLOOR BOARD INFO

9. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

10. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

11. REMOVE REAR NO. 1 FLOOR BOARD INFO

12. REMOVE DECK TRIM SERVICE HOLE COVER INFO

13. REMOVE REAR DECK TRIM COVER INFO

14. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY

HINT:

Use the same procedure for the RH side and LH side INFO.

15. REMOVE TONNEAU COVER HOLDER CAP

HINT:

Use the same procedure for the RH side and LH side INFO.

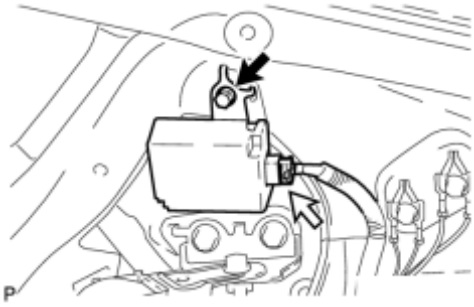
16. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH INFO

17. REMOVE ROOF SIDE INNER GARNISH ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side INFO.

18. REMOVE DOOR CONTROL RECEIVER

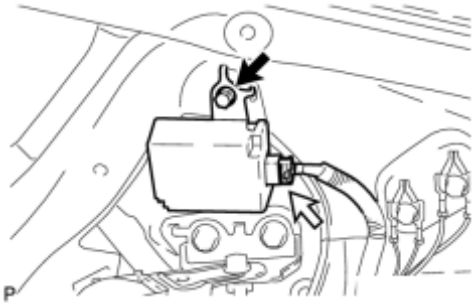


(a) Disconnect the connector.

(b) Remove the bolt and door control receiver.

# INSTALLATION

1. INSTALL DOOR CONTROL RECEIVER



(a) Install the door control receiver with the bolt.

Torque: **7.5 N·m (77 kgf·cm, 66in·lbf)**

(b) Connect the connector.

2. INSTALL ROOF SIDE INNER GARNISH ASSEMBLY RH

HINT:

Use the same procedure for the RH side and LH side INFO.

3. INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH INFO

4. INSTALL TONNEAU COVER HOLDER CAP

HINT:

Use the same procedure for the RH side and LH side INFO.

5. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY

HINT:

Use the same procedure for the RH side and LH side INFO.

6. INSTALL REAR DECK TRIM COVER INFO

7. INSTALL DECK TRIM SERVICE HOLE COVER INFO

8. INSTALL REAR NO. 1 FLOOR BOARD INFO

9. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

10. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

11. INSTALL REAR NO. 3 FLOOR BOARD INFO

12. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

13. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

14. INSTALL REAR SIDE SEATBACK ASSEMBLY RH INFO

15. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH INFO

16. INSTALL REAR DOOR SCUFF PLATE RH

HINT:

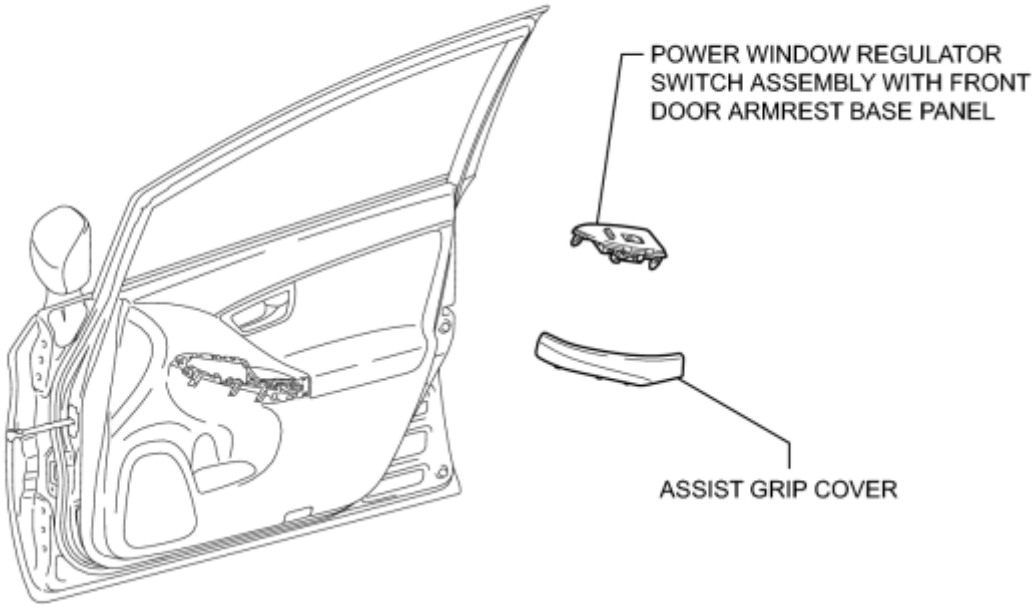
Use the same procedure for the RH side and LH side INFO.

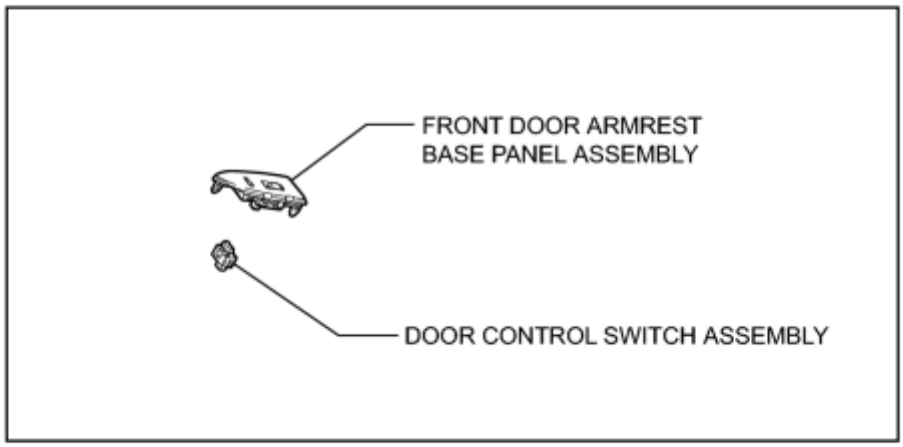
17. INSTALL REAR DECK FLOOR BOX INFO

18. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

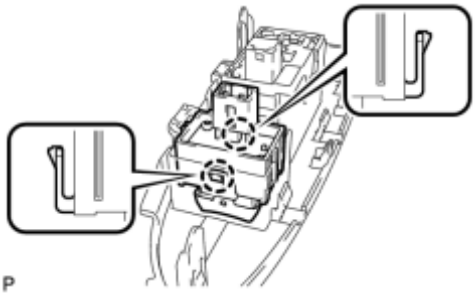
1. REMOVE ASSIST GRIP COVER

HINT:

Use the same procedure for the RH side and LH side INFO.

2. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL INFO

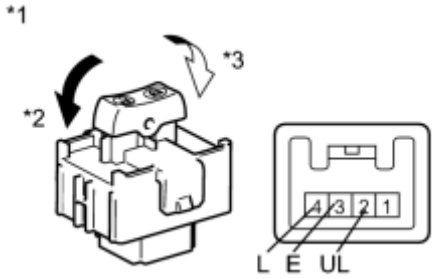
3. REMOVE DOOR CONTROL SWITCH ASSEMBLY




(a) Disengage the 2 claws and remove the door control switch assembly.

# INSPECTION

1. INSPECT DOOR CONTROL SWITCH ASSEMBLY




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 4 (L) - 3 (E) | Locked | Below 1 Ω |
| 4 (L) - 3 (E) | off | 10 kΩ or higher |
| 2 (UL) - 3 (E) | Unlocked | Below 1 Ω |
| 2 (UL) - 3 (E) | off | 10 kΩ or higher |

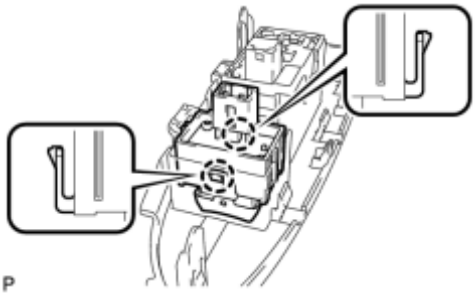
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Door Control Switch Assembly) |
| *2 | Unlock |
| *3 | Lock |

If the result is not as specified, replace the door control switch assembly.

# INSTALLATION

1. INSTALL DOOR CONTROL SWITCH ASSEMBLY




(a) Engage the 2 claws to install the door control switch assembly.

2. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL INFO

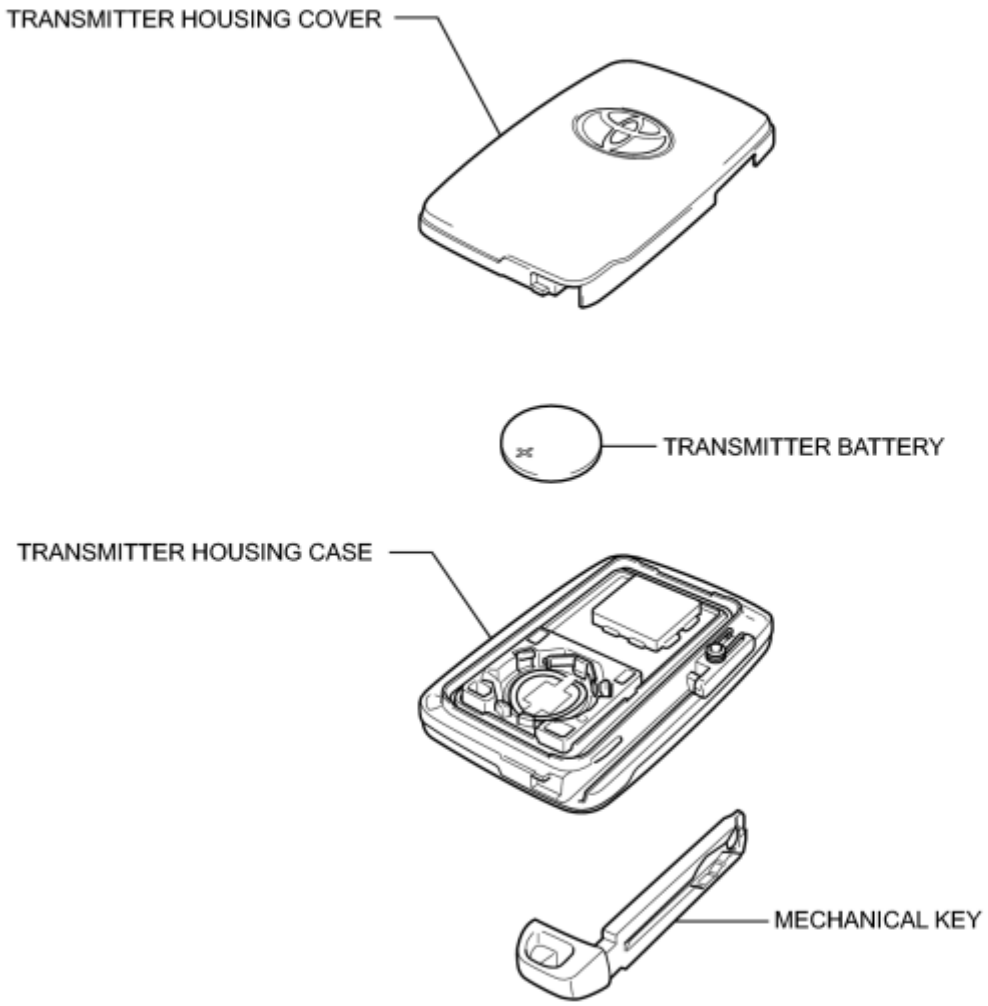
3. INSTALL ASSIST GRIP COVER

HINT:

Use the same procedure for the RH side and LH side INFO.

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

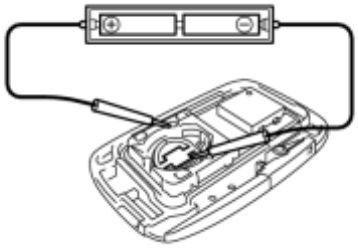
1. REMOVE TRANSMITTER BATTERY INFO

# INSPECTION

1. INSPECT ELECTRICAL KEY TRANSMITTER

(a) Inspect operation of the transmitter.

(1) Remove the battery (lithium battery) from the transmitter INFO.



H

(2) Install a new or normal battery (lithium battery).

HINT:

If a new or normal battery is not available, first connect 2 new 1.5 V batteries in series. Then connect leads to the batteries and apply 3 V to the transmitter, as shown in the illustration.

(3) From outside the vehicle, approximately 1 m (3.28 ft.) away from the driver side outside door handle, test the transmitter by pointing its key plate at the vehicle and pressing a transmitter switch.

OK:

The door lock can be operated via the transmitter.

The LED comes on more than once.

- The operational area differs depending on the user, the way the transmitter is held, and the location.
- The transmitter's faint electric waves may be affected if the area has strong electric waves or noise. The transmitter's operation area may be shortened or the transmitter may not function.

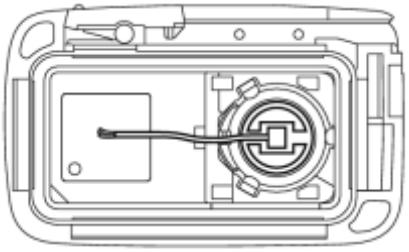
(b) Inspect the battery capacity.

(1) Remove the battery INFO from the electrical key transmitter that does not operate. Attach a lead wire (0.6 mm (0.0236 in.) in diameter or less including wire sheath) with tape or equivalent to the negative terminal.

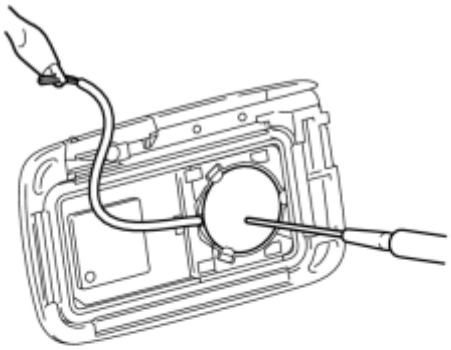
NOTICE:

Do not wrap the lead wire around a terminal, wedge it between the terminals, or solder it. A terminal may be deformed or damaged, and the battery will not be able to be installed correctly.

(2) Carefully pull the lead wire out from the position shown in the illustration and install the previously removed transmitter battery.



H

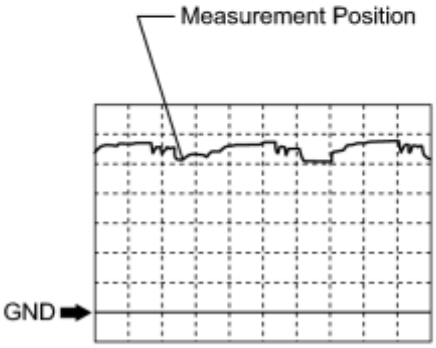


(3) Using an oscilloscope, check the transmitter battery voltage waveform.

HINT:

When measuring the battery voltage, while operating the lock sensor of a door handle, bring the electrical key transmitter within the entry operating range to perform the measurement. For the entry operating range, refer to SYSTEM DESCRIPTION INFO.

Standard voltage:




H

| Item | Content |
|---|---|
| Tester Connection | Battery positive (+) - Battery negative (-) |
| Tool Setting | 0.5 V/DIV., 100 ms/DIV. |
| Condition | Power switch OFF, all doors closed and lock sensor touched |
| Specified Condition | 2.2 to 3.2 V (Refer to the waveform) |

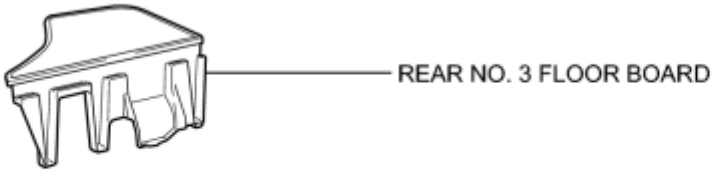
If the result is not as specified, replace the transmitter battery.

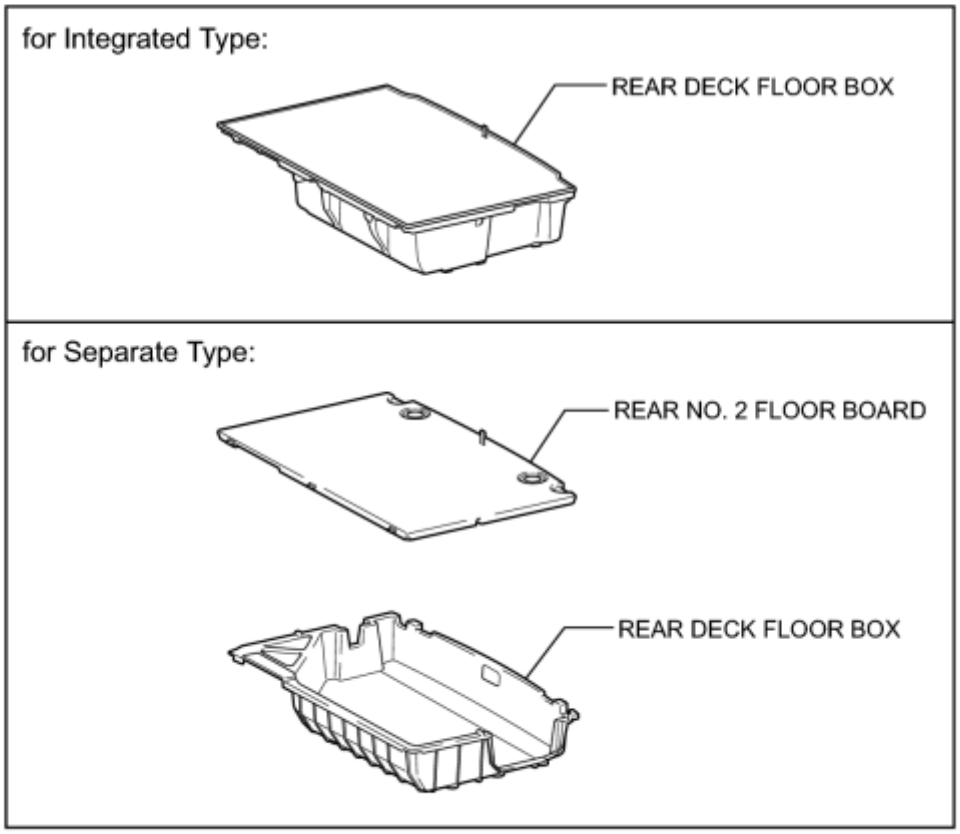
# INSTALLATION

1. INSTALL TRANSMITTER BATTERY INFO

# COMPONENTS

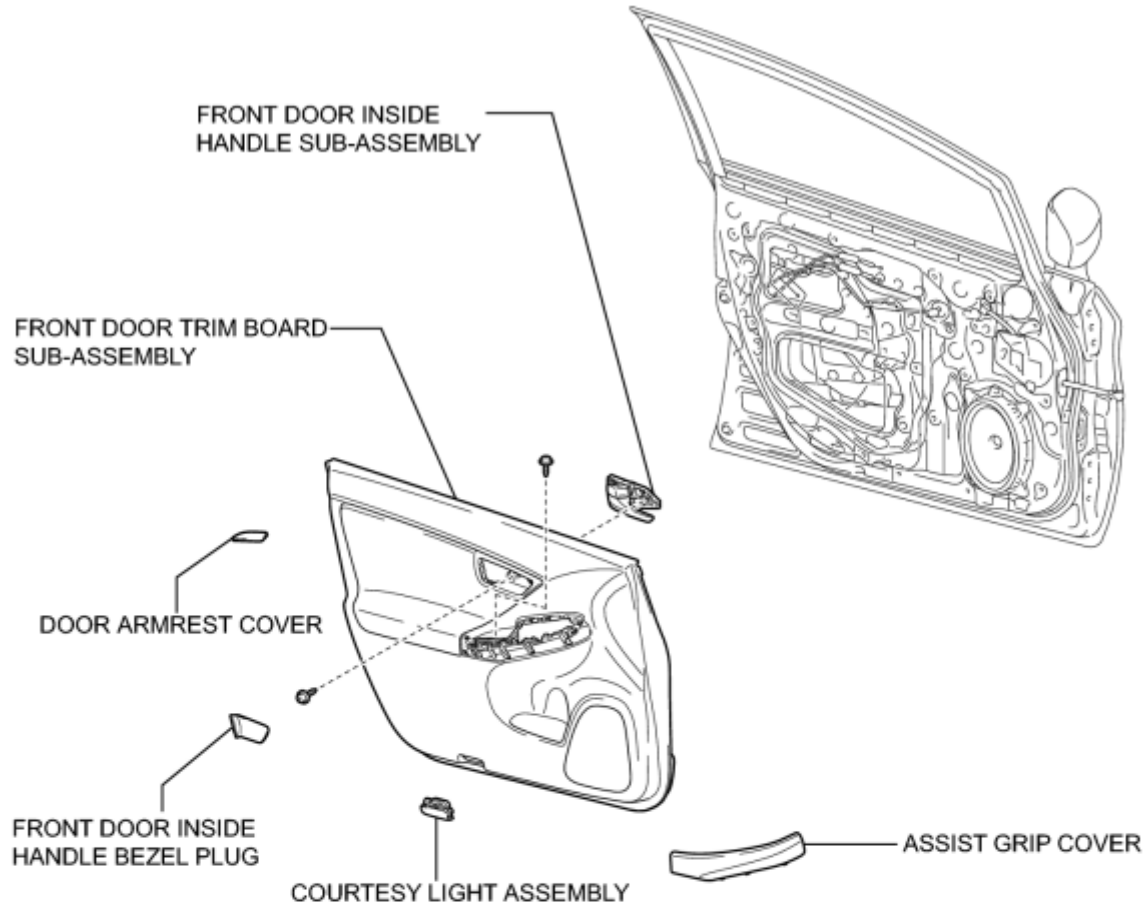
# ILLUSTRATION

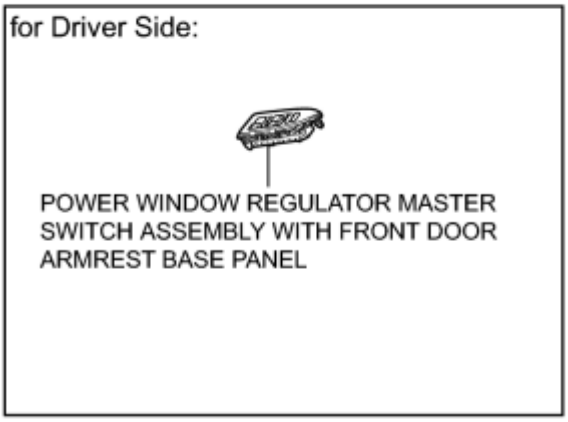


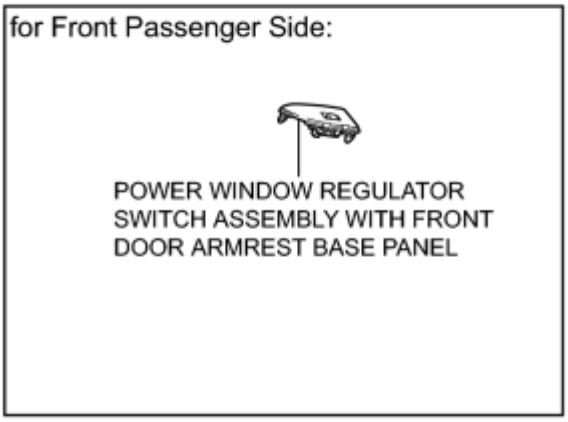




P

# ILLUSTRATION

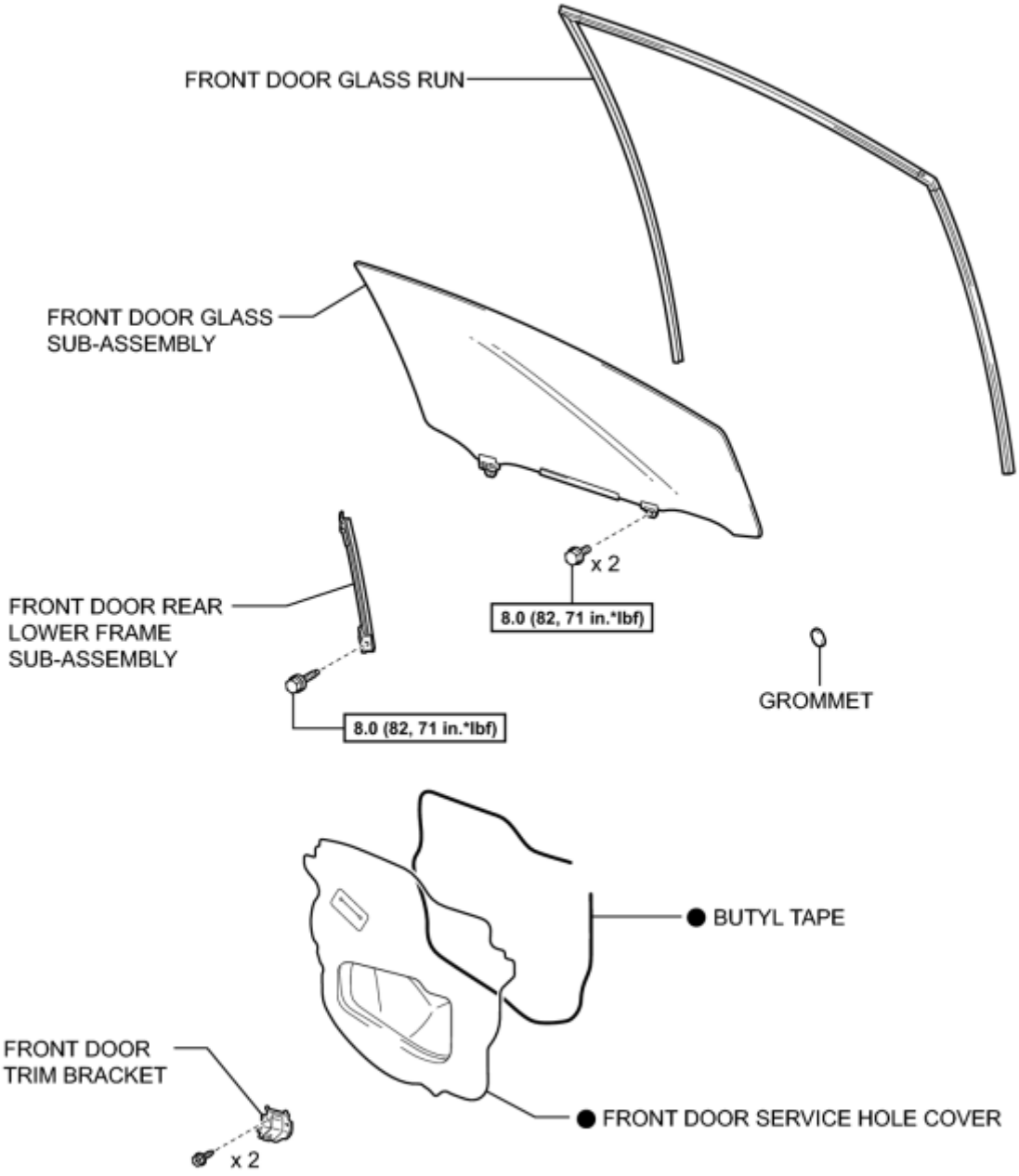



P

# ILLUSTRATION

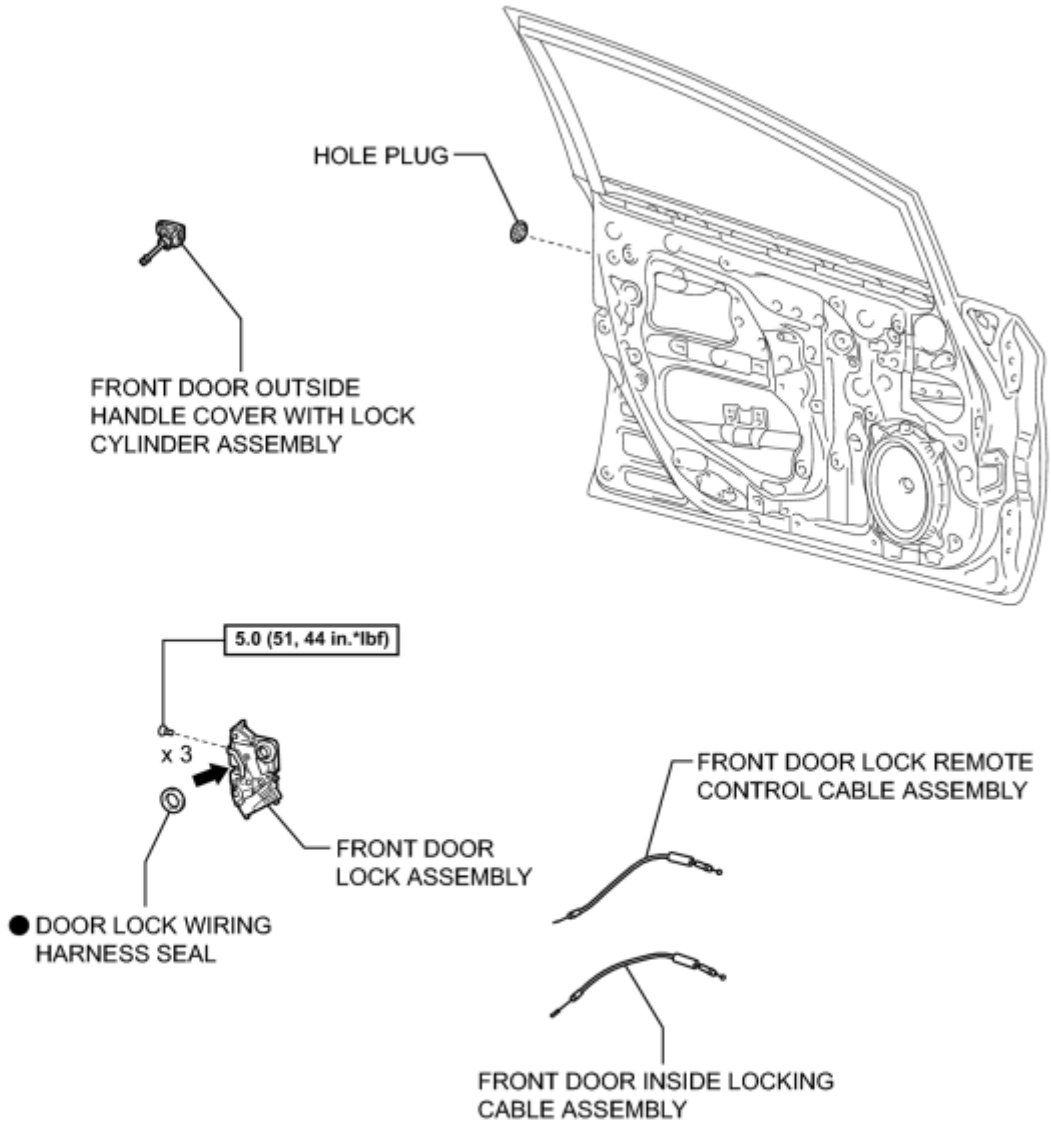



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

⬅ Grease

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE ASSIST GRIP COVER INFO

6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

7. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

8. REMOVE DOOR ARMREST COVER INFO

9. REMOVE COURTESY LIGHT ASSEMBLY INFO

10. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

12. REMOVE FRONT DOOR TRIM BRACKET INFO

13. REMOVE FRONT DOOR SERVICE HOLE COVER INFO

14. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY INFO

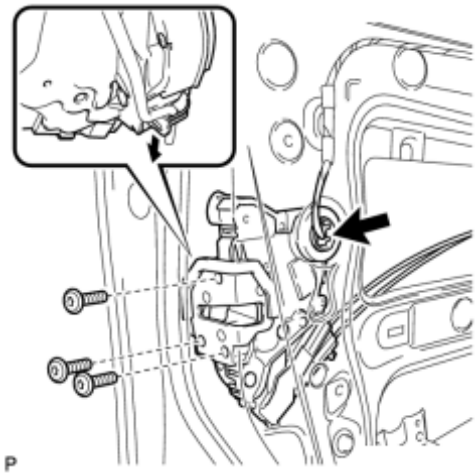
15. REMOVE FRONT DOOR GLASS RUN INFO

16. REMOVE FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY INFO

17. REMOVE FRONT DOOR OUTSIDE HANDLE COVER WITH LOCK CYLINDER ASSEMBLY (for Driver Side) INFO

18. REMOVE FRONT DOOR LOCK ASSEMBLY

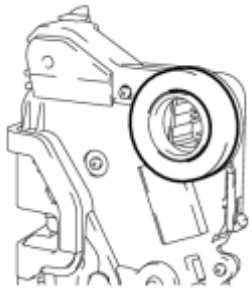
(a) Disconnect the connector.



P

(b) Using a T30 "TORX" socket wrench, remove the 3 screws.

(c) Slide the front door lock assembly downward, and remove the front door lock assembly and cables as a unit.



P

(d) Remove the door lock wiring harness seal from the front door lock assembly.

19. REMOVE FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY INFO

20. REMOVE FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY INFO

# INSPECTION

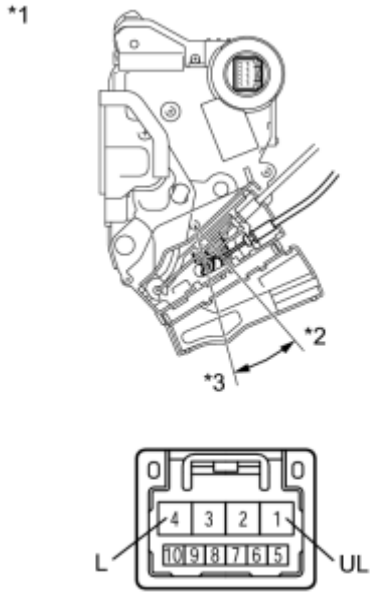
1. INSPECT FRONT DOOR LOCK ASSEMBLY LH

(a) Check the operation of the door lock motor.

(1) Apply battery voltage and check the operation of the door lock motor.

OK:

| Connection | Result |
|---|---|
| Battery positive (+) → Terminal 4 (L)<br><br>Battery negative (-) → Terminal 1 (UL) | Locks |
| Battery positive (+) → Terminal 1 (UL)<br><br>Battery negative (-) → Terminal 4 (L) | Unlocks |




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Front Door Lock Assembly LH) |
| *2 | Unlock |
| *3 | Lock |

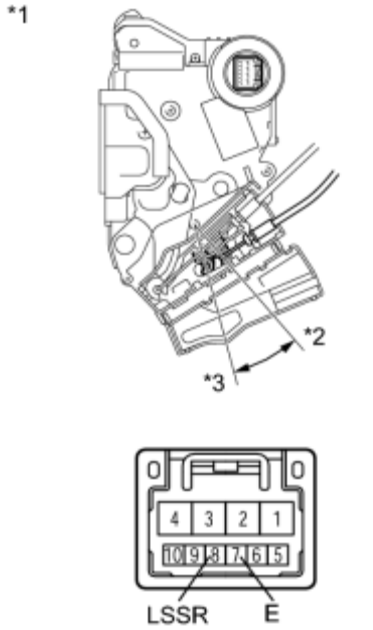
If the result is not as specified, replace the front door lock assembly LH.

(b) Check the operation of the door unlock detection switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 7 (E) - 8 (LSSR) | Locked | 10 kΩ or higher |
| 7 (E) - 8 (LSSR) | Unlocked | Below 1 Ω |



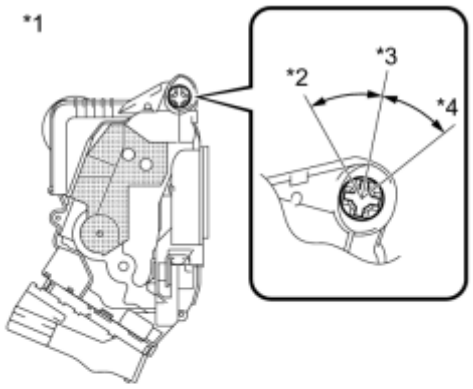

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Front Door Lock Assembly LH) |
| *2 | Unlock |
| *3 | Lock |

If the result is not as specified, replace the front door lock assembly LH.

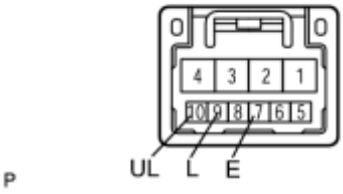
(c) Check the operation of the door key lock and unlock switch.

(1) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 7 (E) - 9 (L) | Locked | Below 1 Ω |
| 7 (E) - 9 (L) | off | 10 kΩ or higher |
| 7 (E) - 10 (UL) | Unlocked | Below 1 Ω |
| 7 (E) - 10 (UL) | off | 10 kΩ or higher |

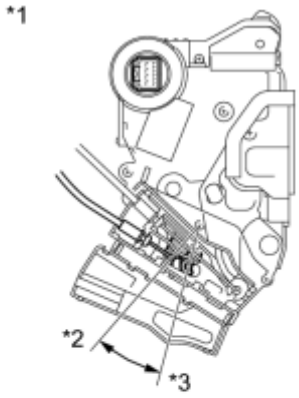



## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Front Door Lock Assembly LH) |
| *2 | Lock |
| *3 | off |
| *4 | Unlock |

If the result is not as specified, replace the front door lock assembly LH.

2. INSPECT FRONT DOOR LOCK ASSEMBLY RH

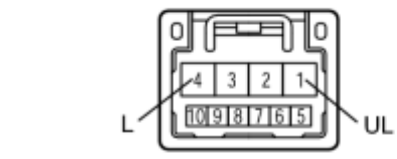



(a) Check the operation of the door lock motor.

(1) Apply battery voltage and check the operation of the door lock motor.

OK:

| Connection | Result |
|---|---|
| Battery positive (+) → Terminal 4 (L)<br><br>Battery negative (-) → Terminal 1 (UL) | Locks |
| Battery positive (+) → Terminal 1 (UL)<br><br>Battery negative (-) → Terminal 4 (L) | Unlocks |




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Front Door Lock Assembly RH) |
| *2 | Unlock |
| *3 | Lock |

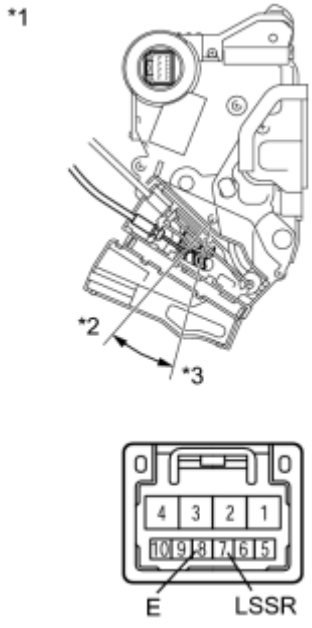
If the result is not as specified, replace the front door lock assembly RH.

(b) Check the operation of the door unlock detection switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 7 (LSSR) - 8 (E) | Locked | 10 kΩ or higher |
| 7 (LSSR) - 8 (E) | Unlocked | Below 1 Ω |




# Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Front Door Lock Assembly RH) |
| *2 | Unlock |
| *3 | Lock |

If the result is not as specified, replace the front door lock assembly RH.

# INSTALLATION

1. INSTALL FRONT DOOR INSIDE LOCKING CABLE ASSEMBLY INFO

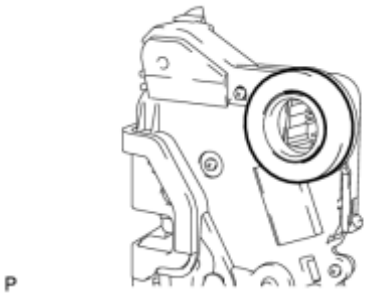
2. INSTALL FRONT DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY INFO

3. INSTALL FRONT DOOR LOCK ASSEMBLY

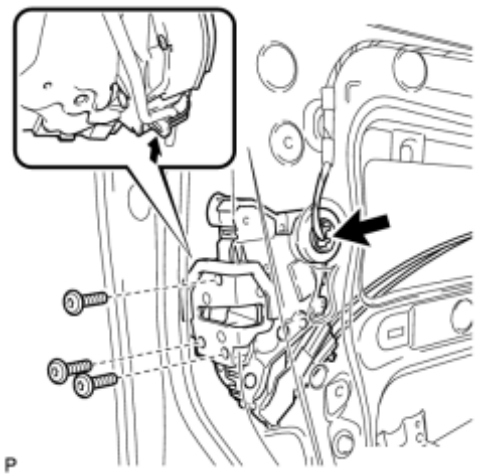
NOTICE:

- When reusing the removed front door lock assembly, replace the door lock wiring harness seal on the connector with a new one.
- Do not allow grease or dust to adhere to the door lock wiring harness seal surface of the connector.
- Reusing the door lock wiring harness seal or using a damaged door lock wiring harness seal may cause water intrusion. This may result in a malfunction of the front door lock assembly.

(a) Apply MP grease to the sliding parts of the front door lock assembly.




(b) Install a new door lock wiring harness seal to the front door lock assembly.




(c) Insert the front door lock open rod to the front door lock assembly.

(d) Make sure that the front door lock open rod is securely connected to the front door lock assembly.

(e) Using a T30 "TORX" socket wrench, install the front door lock assembly with the 3 screws.

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

4. INSTALL FRONT DOOR OUTSIDE HANDLE COVER WITH LOCK CYLINDER ASSEMBLY (for Driver Side) INFO

5. INSTALL FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY INFO

6. INSTALL FRONT DOOR GLASS RUN INFO

7. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY INFO

8. INSTALL FRONT DOOR SERVICE HOLE COVER INFO

9. INSTALL FRONT DOOR TRIM BRACKET INFO

10. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

11. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

12. INSTALL COURTESY LIGHT ASSEMBLY INFO

13. INSTALL DOOR ARMREST COVER INFO

14. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

15. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

16. INSTALL ASSIST GRIP COVER INFO

17. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

18. INSTALL REAR NO. 3 FLOOR BOARD INFO

19. INSTALL REAR DECK FLOOR BOX INFO

20. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

21. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

22. CHECK POWER WINDOW CONTROL SYSTEM

INFO

# PRECAUTION

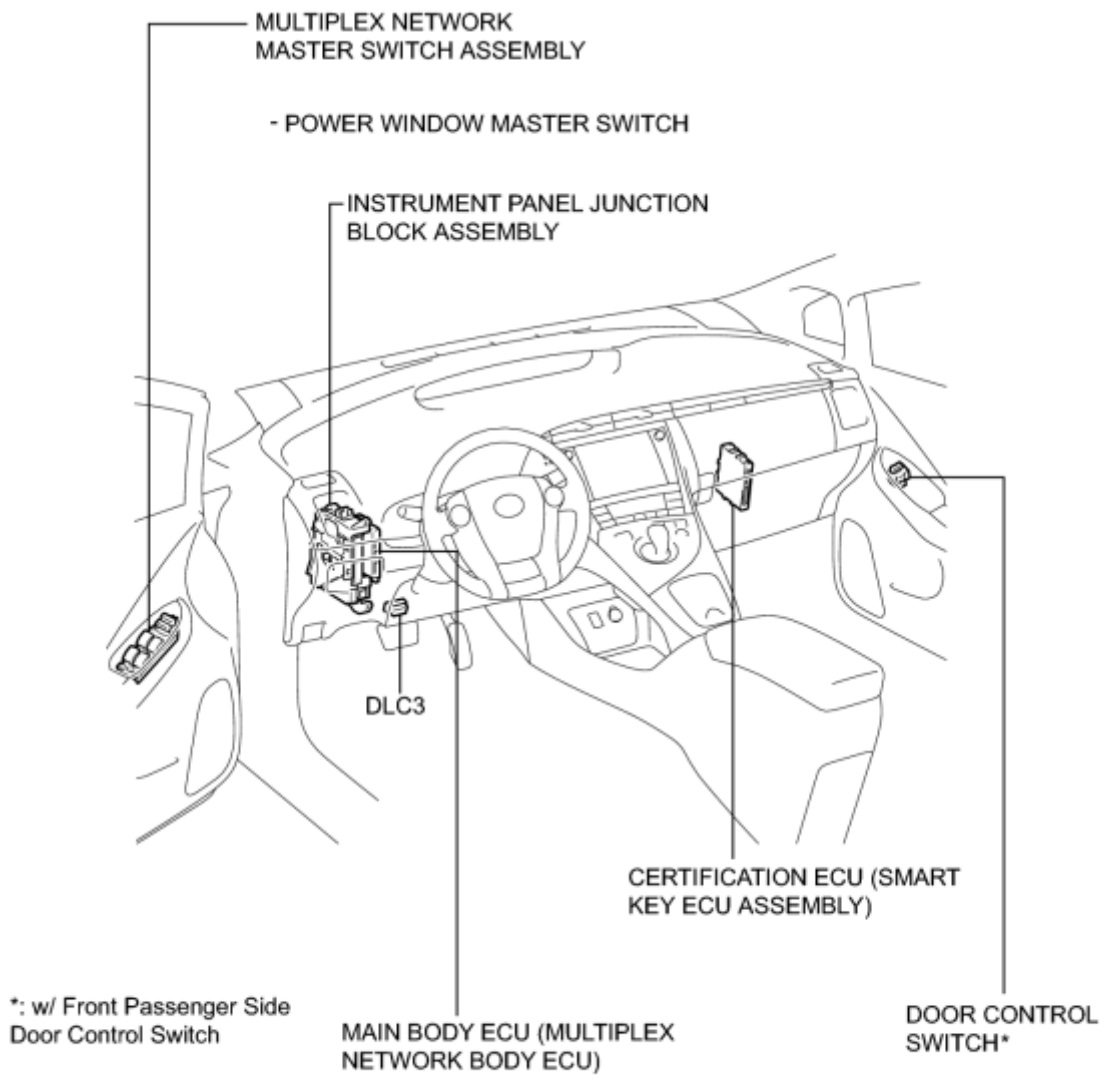
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

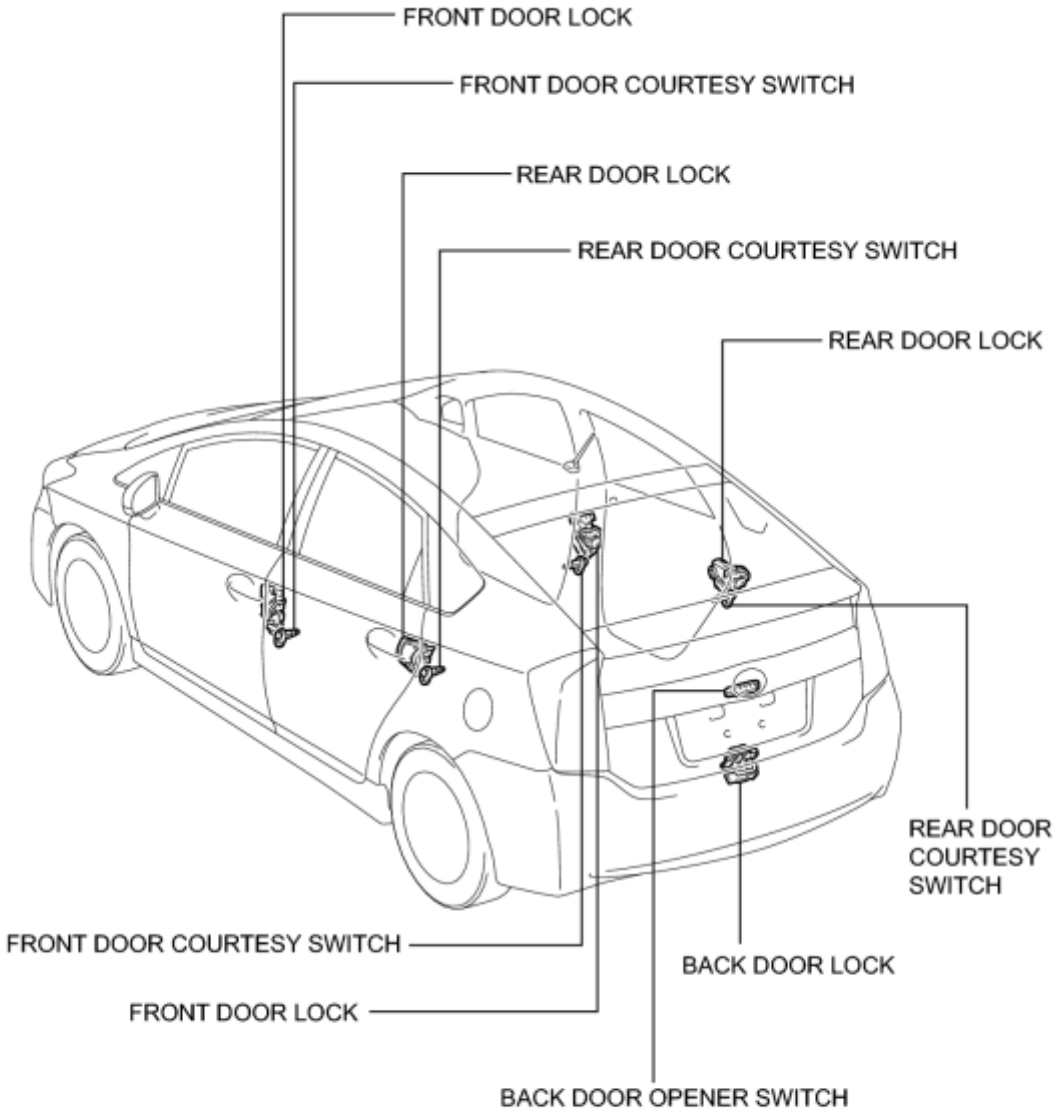
# PARTS LOCATION

# ILLUSTRATION



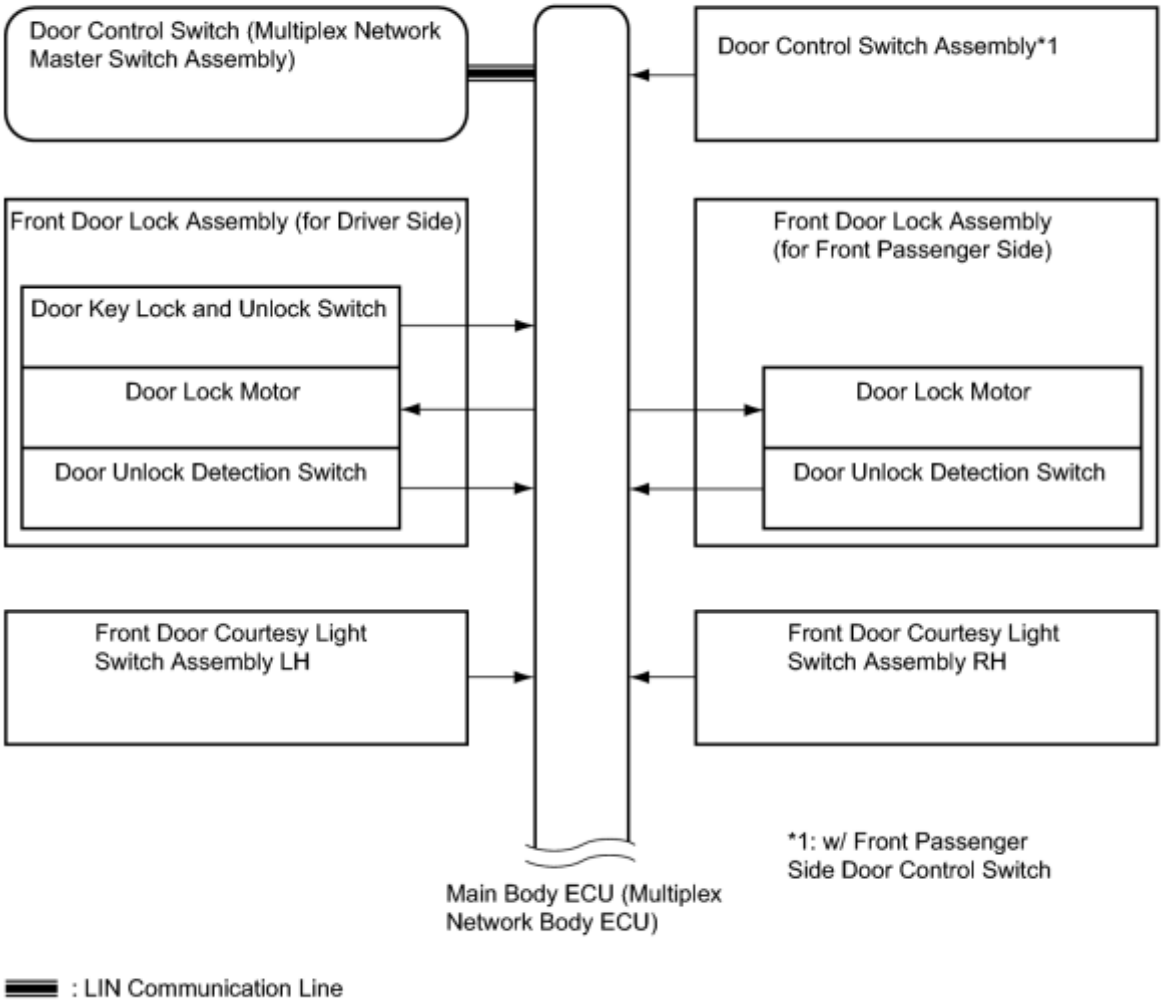

P

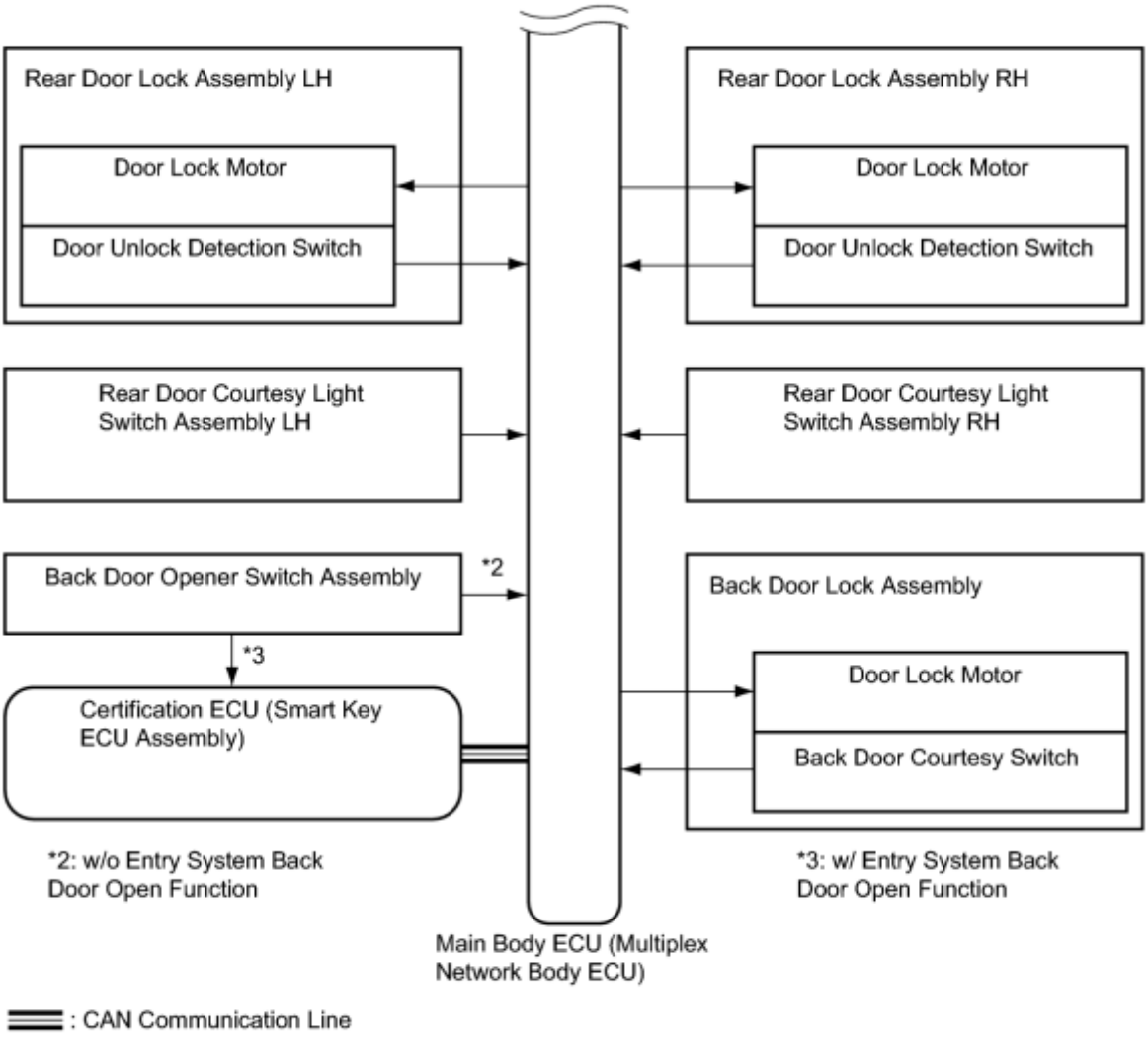
# ILLUSTRATION


FRONT DOOR LOCK
FRONT DOOR COURTESY SWITCH
REAR DOOR LOCK
REAR DOOR COURTESY SWITCH
REAR DOOR LOCK
REAR DOOR COURTESY SWITCH
BACK DOOR LOCK
FRONT DOOR COURTESY SWITCH
FRONT DOOR LOCK
BACK DOOR OPENER SWITCH

P

# SYSTEM DIAGRAM






### *Communication Table*

| Sender | Receiver | Signal | Communication Method |
|---|---|---|---|
| Multiplex Network Master Switch Assembly | Main Body ECU (Multiplex Network Body ECU) | Driver door control switch signal | LIN |
| Certification ECU (Smart Key ECU Assembly)*3 | Main Body ECU (Multiplex Network Body ECU) | Back door opener switch signal | CAN |

- *3: w/ Entry System Back Door Open Function

# SYSTEM DESCRIPTION

1. POWER DOOR LOCK CONTROL SYSTEM DESCRIPTION

(a) The power door lock system locks/unlocks all doors.

The driver and front passenger door control switches send lock/unlock request signals to the main body ECU (multiplex network body ECU). Then, the main body ECU (multiplex network body ECU) sends these request signals to the door lock motors in each door to lock/unlock all doors at once in response to the inputs.

Operating the driver door lock using a mechanical key sends request signals to lock or unlock the doors to the main body ECU (multiplex network body ECU).

2. FUNCTION OF MAIN COMPONENTS

| Component | Function |
|---|---|
| Multiplex network master switch assembly | Driver door control switch on multiplex network master switch assembly locks or unlocks all doors. |
| Door control switch assembly*1 | Front passenger door control switch assembly locks or unlocks all doors. |
| Door courtesy light switch assembly | • Placed on each door.<br>• Detects door status (open or closed) and outputs data to main body ECU (multiplex network body ECU).<br>• Turns on when door is opened and turns off when door is closed. |
| Front door lock assembly (for driver side) | • Built-in motor locks or unlocks door.<br>• Built-in door control switch (key-linked) detects door key operation status (locked or unlocked) and outputs a signal to main body ECU (multiplex network body ECU).<br>• Built-in position switch detects door status (locked or unlocked) and outputs a signal to main body ECU (multiplex network body ECU). This switch turns off when door is locked and turns on when door is unlocked. |
| Front door lock assembly (for front passenger side)<br><br>Rear door lock assembly LH/RH | • Built-in motor locks or unlocks door.<br>• Built-in position switch detects door status (locked or unlocked) and outputs a signal to main body ECU (multiplex network body ECU). This switch turns off when door is locked and turns on when door is unlocked. |
| Back door lock assembly | • Built-in motor opens door latch.<br>• Performs back door open operation according to locked/unlocked state determination of main body ECU (multiplex network body ECU). |

- *1: w/ Front Passenger Side Door Control Switch

3. SYSTEM FUNCTION

(a) This system is controlled by the main body ECU (multiplex network body ECU). The main body ECU (multiplex network body ECU) outputs signals to each door lock motor. The power door lock control system has the following functions:

| Function | Outline |
|---|---|
| Manual lock and unlock function | This function can lock or unlock all doors by the door control switch operation. |
| Key-linked lock and unlock function | This function, which is linked with the mechanical key cylinder, can lock or unlock all doors when a lock or unlock operation is effected. |
| Manual unlock prohibition function | When the condition below is met, unlocking the vehicle using the door control switch will be prohibited.<br>• The doors are locked using a mechanical key, door control transmitter or entry lock operation with all doors closed. |
| Key lock-in prevention function | When the key is in the vehicle, performing the door lock operation will not lock the door. |
| Key-linked 2-step unlock function | Unlocks only the driver door by turning the key cylinder once and unlocks the other doors by turning it twice. |
| Shift-linked automatic door lock function*2 | When the conditions listed below are met consecutively, this function causes all doors to be automatically locked:<br>• All doors are closed.<br>• The hybrid vehicle control system is started.<br>• The shift lever is moved to any position. |
| Shift-linked automatic door unlock function | When the conditions listed below are met consecutively, this function causes all doors to be automatically unlocked:<br>• The power switch is on (IG).<br>• Push the P position switch. |
| Speed-sensitive automatic door lock function*3 | When the conditions listed below are met consecutively, this function causes all doors to be automatically locked:<br>• All doors are closed.<br>• Any of the doors is unlocked.<br>• Vehicle speed is higher than approximately 20 km/h (12 mph). |
| Opening driver door-linked automatic door unlock*4 | All doors are unlocked automatically when the driver door is opened within 10 seconds after the power switch is turned from on (IG) to off. |

- *2: Default setting for Korea is OFF.
- *3: Default setting for except Korea is OFF.
- *4: Default setting is OFF.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the power door lock control system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS CHECK |

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.

- The following 5 items are important points for problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Running conditions, driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | SYSTEM CHECK |

(a) Check the vehicle specification.

Result:

| Result | Proceed to |
|---|---|
| w/ Entry System Back Door Open Function | A |
| w/o Entry System Back Door Open Function | B |

B ▶ Go to step 6

A ▼

| | |
|---|---|
| 5. | INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INFO GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 6. | INSPECT COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the LIN communication system is functioning normally INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INFO GO TO LIN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 7. | CHECK FOR DTC (MASTER SWITCH)* |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC B2312 is not output | A |
| DTC B2312 is output | B |

B ▶ INFO GO TO POWER WINDOW CONTROL SYSTEM

A

| | |
|---|---|
| 8. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B Go to step 10

A

| | |
|---|---|
| 9. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO

(b) Data List / Active Test INFO

(c) Operation Check INFO

NEXT

| | |
|---|---|
| 10. | REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 11. | CONFIRMATION TEST |

NEXT **END**

# OPERATION CHECK

1. CHECK POWER DOOR LOCK OPERATION

NOTICE:

The operation check below is based on the non-customized initial condition of the vehicle.

(a) Check basic functions.

(1) Check that all doors lock when the lock side of the door control switch (for manual operation) is pressed, and all doors unlock when the unlock side is pressed.

(2) Check that all doors lock when the driver door lock key cylinder is turned to lock using the key.

(3) Check that the driver door unlock when the driver door lock key cylinder is turned to unlock using the key.

(b) Check the key lock-in prevention function.

NOTICE:

In order to prevent the key from being locked in, the following inspection should be performed with the driver door window open.

(1) Turn the power switch on (IG) or (ACC).

(2) With the driver door open, check that all doors unlock immediately after the door lock knob for the driver door is locked.

(3) With the driver door open, check that all doors unlock immediately after the lock side of the door control switch (for manual operation) is pressed.

(4) With the driver door open, lock the driver door lock knob and hold it for 2 seconds or more, then close the driver door and check that all doors unlock.

(c) Check the security function of the door lock control system.

(1) Close all doors and leave the driver door window open so that the door control switch can be operated from outside the vehicle. (Step 1)

(2) Open the driver door and remove the key from the vehicle. With the door still open, lock the door using the lock knob. Hold the outside handle of the driver door open, and close the door while holding the handle open (confirm that the lock knob remained in the lock position). Then, check that the doors do not unlock when the unlock side of the door control switch (for manual operation) is pressed from outside the vehicle.

(3) Starting from Step 1, with the key outside the vehicle, close and lock the driver door using the mechanical key. Then, check that the doors do not unlock when the unlock side of the door control switch (for manual operation) is pressed from outside the vehicle.

(4) Starting from Step 1, with the key outside the vehicle, close and lock the driver door using wireless door lock or entry lock operation. Then, check that the doors do not unlock when the unlock side of the door control switch (for manual operation) is pressed from outside the vehicle.

HINT:

Check that the security function of the door lock control system is canceled under the following conditions:

- The power switch is turned on (IG).
- The driver door is unlocked using the key.
- The unlock side of the door control switch (for manual operation) is pressed after the door lock knob is unlocked manually.
- The doors are unlocked by wireless operation.

(d) Check the illumination function.

(1) Set the map light switch to the door position.

(2) When the driver door is unlocked by the key linked or wireless operation with the power switch off and all doors closed and locked, check that the roof light comes on.

(3) Check that the interior light turns off in approximately 15 seconds* if the doors have not been opened.

HINT:

*: This function can be customized INFO.

(e) Check the key-linked 2-step unlock function.

(1) Lock all doors.

(2) Check that only the driver door unlocks when the driver door lock cylinder is turned to unlock once using the key and other doors unlock when turned to unlock consecutively once again.

(f) Check the driver door-linked automatic door unlock function.

HINT:

The default setting is OFF. If necessary, the function must be set to ON through the customize function.

(1) When the driver door is closed, turning the power switch from on (IG) to off and opening the driver door within 10 seconds will automatically unlock all doors.

(g) Check the shift linked automatic door lock function.

HINT:

The default setting for Korea is OFF. If necessary, the function must be set to ON through the customize function.

(1) When the power switch is on (IG) and the shift lever is moved to any position, check that all doors lock automatically.

(h) Check the shift linked automatic door unlock function.

(1) When the power switch is on (IG) and push the P position switch, check that all doors unlock automatically.

(i) Check the speed-sensitive automatic door lock function.

HINT:

The default setting for except Korea is OFF. If necessary, the function must be set to ON through the customize function.

(1) Confirm that all doors lock when the vehicle speed reaches 20 km/h (12mph) if the vehicle starts off with any of the doors unlocked.

HINT:

If the vehicle is being driven after the speed-sensitive automatic door lock function has locked the doors, the speed-sensitive automatic door lock function does not attempt to relock the doors, even if any of the doors is unlocked. The vehicle must be stopped first before the speed-sensitive automatic door lock function will relock the doors.

# CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH TECHSTREAM

HINT:

The following items can be customized.

NOTICE:

- When the customer requests a change in a function, first make sure that the function can be customized.
- Be sure to make a note of the current settings before customizing.
- When troubleshooting a function, first make sure that the function is set to the default setting.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Customize Setting.

(e) Select the setting by referring to the table below.

***Door Lock***

| Display | Default | Content | Setting |
|---|---|---|---|
| Unlock Key Twice | ON | Function that unlocks only the driver door when the driver door key cylinder is turned to unlock once, and unlock all doors when it is turned to unlock twice. For the OFF setting, turning it once unlocks all doors. | ON or OFF |
| Auto Lock | OFF<br>ON* | Function that locks all doors when the vehicle speed reaches a certain level. | ON or OFF |
| Auto Lock/Shift | ON<br>OFF* | Function that locks all doors when the shift lever is moved from P to any position other than P while the engine is running and all doors are closed. | ON or OFF |
| Auto Unlock/Shift | ON | Function that unlocks all doors when the shift lever is moved to P from any position other than P while the power switch is on (IG). | ON or OFF |
| All Unlock/Open-Close | OFF | Function that unlocks the other doors when the driver door is opened within 10 seconds after the power switch is turned off. | ON or OFF |

- *: for Korea

***Illuminated Entry***

| Display | Default | Content | Setting |
|---|---|---|---|
| Lighting Time | 15 s | Function that changes the lighting time after closing all doors. (It will quickly fade out in case of turning the power switch from off to on (ACC) or (IG).) | 7.5 s, 15 s or 30 s |

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Power Door Lock Control System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Only Driver Door LOCK/UNLOCK Functions do not Operate | Front door lock assembly (for Driver side) | INFO |
| | Wire harness or connector | - |
| | Main body ECU (Multiplex network body ECU) | - |
| Only Front Passenger Door LOCK/UNLOCK Functions do not Operate | Front door lock assembly (for Front passenger side) | INFO |
| | Wire harness or connector | - |
| | Main body ECU (Multiplex network body ECU) | - |
| Only Rear Door LH LOCK/UNLOCK Functions do not Operate | Rear door lock assembly LH | INFO |
| | Wire harness or connector | - |
| | Main body ECU (Multiplex network body ECU) | - |
| Only Rear Door RH LOCK/UNLOCK Functions do not Operate | Rear door lock assembly RH | INFO |
| | Wire harness or connector | - |
| | Main body ECU (Multiplex network body ECU) | - |
| All Doors LOCK/UNLOCK Functions do not Operate Via Master Switch, Driver Side Door Key Cylinder | LIN communication system | INFO |
| | Multiplex network master switch assembly | - |
| | Front door lock assembly (for Driver side) | - |
| | Wire harness or connector | - |
| | Main body ECU (Multiplex network body ECU) | - |
| All Doors LOCK/UNLOCK Functions do not Operate Via Door Control Switch*1 | Door control switch assembly | INFO |
| | Wire harness or connector | - |
| | Main body ECU (Multiplex network body ECU) | - |

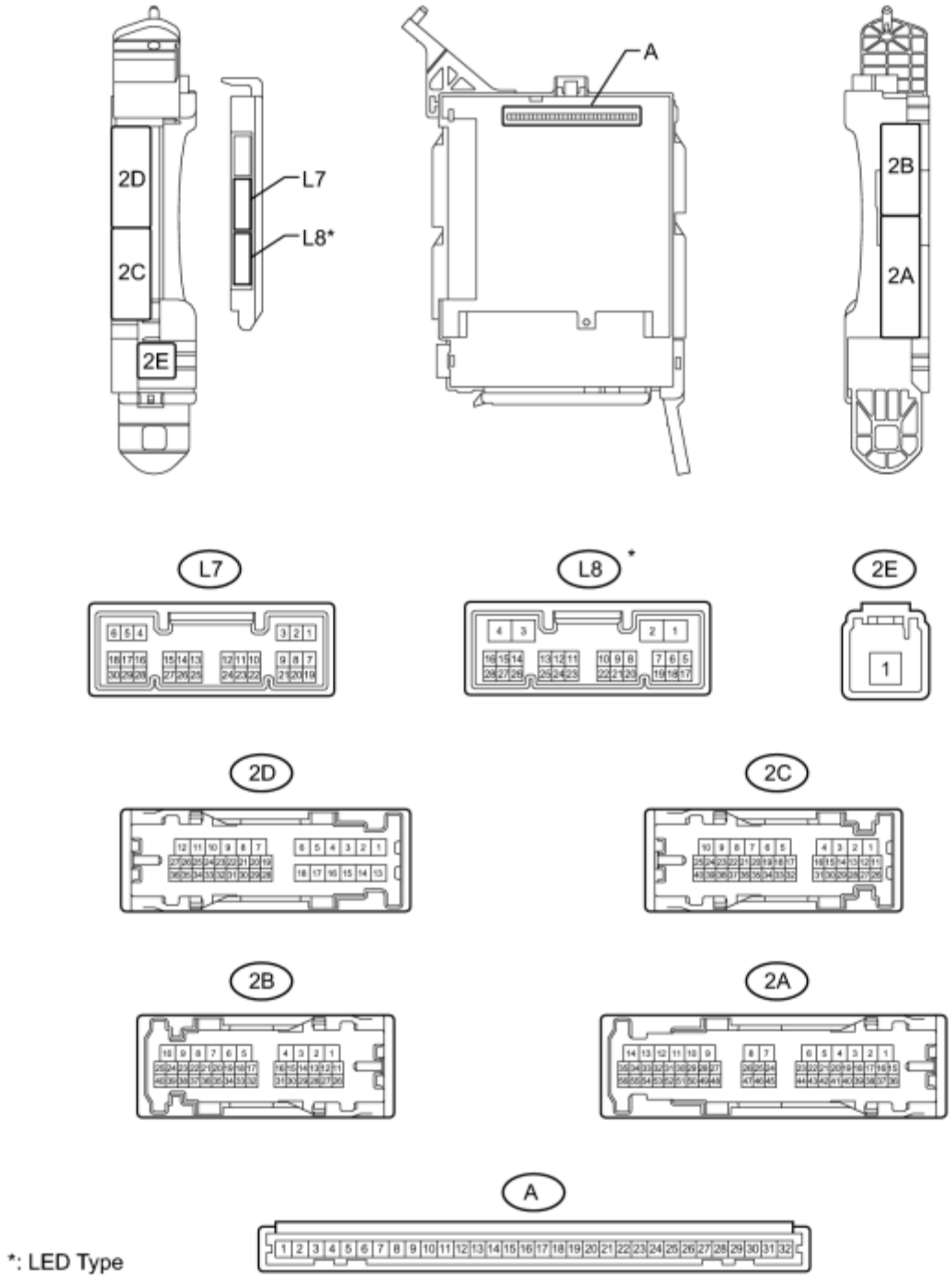
| Symptom | Suspected Area | See page |
|---|---|---|
| Only Back Door cannot be Opened*2 | Back door lock assembly | INFO |
| | Back door opener switch assembly | - |
| | Main body ECU (Multiplex network body ECU) | - |
| | Wire harness or connector | - |
| Only Back Door cannot be Opened*3 | Smart key system (for Entry function) | INFO |

- *1: w/ Front Passenger Side Door Control Switch
- *2: w/o Entry System Back Door Open Function
- *3: w/ Entry System Back Door Open Function

# TERMINALS OF ECU

1. CHECK INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY AND MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

(a) Disconnect the 2B and 2C junction block connectors.



(b) Disconnect the A main body ECU connector.

(c) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2B-6 (GND1) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| 2C-18 (BECU) - Body ground | Y - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| A-29 (ACC) - Body ground | - | ACC power supply | Power switch on (ACC) | 11 to 14 V |
| A-29 (ACC) - Body ground | - | ACC power supply | Power switch off | Below 1 V |
| A-31 (ALTB) - Body ground | - | Battery power supply | Power switch off | 11 to 14 V |
| A-32 (IG) - Body ground | - | Power switch power supply | Power switch on (IG) | 11 to 14 V |
| A-32 (IG) - Body ground | - | Power switch power supply | Power switch off | Below 1 V |

If the result is not as specified, there may be a malfunction in the wire harness.

(d) Reconnect the 2B and 2C junction block connectors.

(e) Reconnect the A main body ECU connector.

(f) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2B-1 (ACT-) - Body ground | B - Body ground | Door lock motor unlock drive output (except driver side) | Driver or front passenger side door control switch off | Below 1 V |
| 2B-1 (ACT-) - Body ground | B - Body ground | Door lock motor unlock drive output (except driver side) | Driver or front passenger side door control switch unlocked | 11 to 14 V |
| 2B-8 (ACT+) - Body ground | L - Body ground | Door lock motor lock drive output (all doors) | Driver or front passenger side door control switch off | Below 1 V |
| 2B-8 (ACT+) - Body ground | L - Body ground | Door lock motor lock drive output (all doors) | Driver or front passenger side door control switch locked | 11 to 14 V |
| 2B-5 (ACTD) - | B - Body | Driver side door lock motor | Driver or front passenger side | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Body ground | ground | unlock drive output | door control switch off | |
| 2B-5 (ACTD) - Body ground | B - Body ground | Driver side door lock motor unlock drive output | Driver or front passenger side door control switch unlocked | 11 to 14 V |
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front passenger side door courtesy switch input | Front passenger side door open | Below 1 V |
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front passenger side door courtesy switch input | Front passenger side door closed | 11 to 14 V |
| 2D-35 (FLCY) - Body ground | V - Body ground | Driver side door courtesy switch input | Driver door open | Below 1 V |
| 2D-35 (FLCY) - Body ground | V - Body ground | Driver side door courtesy switch input | Driver door closed | 11 to 14 V |
| 2D-25 (LSR) - Body ground | GR - Body ground | Rear door LH lock position switch input | Rear door LH unlocked | Below 1 V |
| 2D-25 (LSR) - Body ground | GR - Body ground | Rear door LH lock position switch input | Power switch off, all doors closed and rear door LH locked | 11 to 14 V |
| 2B-29 (LSR) - Body ground | GR - Body ground | Rear door RH lock position switch input | Rear door RH unlocked | Below 1 V |
| 2B-29 (LSR) - Body ground | GR - Body ground | Rear door RH lock position switch input | Power switch off, all doors closed and rear door RH locked | 11 to 14 V |
| L7-6 (LRCY) - Body ground | G - Body ground | Rear door courtesy light switch input | Rear door open | Below 1 V |
| L7-6 (LRCY) - Body ground | G - Body ground | Rear door courtesy light switch input | Rear door closed | 11 to 14 V |
| L7-7 (LSFL) - Body ground | GR - Body ground | Driver door lock position switch input | Driver door unlocked | Below 1 V |
| L7-7 (LSFL) - Body ground | GR - Body ground | Driver door lock position switch input | Power switch off, all doors closed and driver door locked | 11 to 14 V |
| L7-9 (L1) - Body ground*1 | LG - Body ground | Front passenger side door control switch input | Front passenger side door control switch locked | Below 1 V |
| L7-9 (L1) - Body ground*1 | LG - Body ground | Front passenger side door control switch input | Front passenger side door control switch off | 11 to 14 V |
| L7-10 (UL1) - Body ground*1 | BR - Body ground | Front passenger side door control switch input | Front passenger side door control switch unlocked | Below 1 V |
| L7-10 (UL1) - Body ground*1 | BR - Body ground | Front passenger side door control switch input | Front passenger side door control switch off | 11 to 14 V |
| L7-11 (L2) - Body ground | G - Body ground | Driver door key-linked lock input | Driver door key cylinder turned to lock | Below 1 V |
| L7-11 (L2) - Body ground | G - Body ground | Driver door key-linked lock input | Driver door key cylinder off | 11 to 14 V |
| L7-18 (LSFR) - Body ground | LG - Body ground | Front passenger side door lock position switch input | Front passenger side door unlocked | Below 1 V |
| L7-18 (LSFR) - | LG - Body | Front passenger side door | Power switch off, all doors | 11 to 14 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Body ground | ground | lock position switch input | closed and front passenger side door locked | |
| L7-19 (BCTY) - Body ground | L - Body ground | Back door courtesy light switch input | Back door open | Below 1 V |
| L7-19 (BCTY) - Body ground | L - Body ground | Back door courtesy light switch input | Back door closed | 11 to 14 V |
| L7-23 (BDSU) - Body ground*2 | GR - Body ground | Back door opener switch input | Back door opener switch pushed | Below 1 V |
| L7-23 (BDSU) - Body ground*2 | GR - Body ground | Back door opener switch input | Back door opener switch not pushed | 11 to 14 V |
| L7-24 (UL3) - Body ground | V - Body ground | Driver door key-linked unlock input | Driver door key cylinder turned to unlock | Below 1 V |
| L7-24 (UL3) - Body ground | V - Body ground | Driver door key-linked unlock input | Driver door key cylinder off | 11 to 14 V |

- *1: w/ Front Passenger Side Door Control Switch
- *2: w/o Entry System Back Door Open Function

If the result is not as specified, the main body ECU (multiplex network body ECU) may have a malfunction.

2. CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (w/ Entry System Back Door Open Function)




(a) Disconnect the L62 certification ECU (smart key ECU assembly) connector.

(b) Measure the resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-22 (TSW5) - Body | GR - Body | Back door opener switch | Back door opener | Below 1 Ω |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| ground | ground | signal | switch on | |
| L62-22 (TSW5) - Body ground | GR - Body ground | Back door opener switch signal | Back door opener switch off | 10 kΩ or higher |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L62 certification ECU (smart key ECU assembly) connector.

(d) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-22 (TSW5) - Body ground | GR - Body ground | Back door opener switch signal | Back door opener switch off | 11 to 14 V |
| L62-22 (TSW5) - Body ground | GR - Body ground | Back door opener switch signal | Back door opener switch on | Below 1 V |

If the result is not as specified, the certification ECU (smart key ECU assembly) may have a malfunction.

# DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) Check the DLC3 INFO.

2. INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body or Master Switch / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| RR Door Courtesy SW | Rear door courtesy light switch signal/ON or OFF | ON: Rear left side or rear right side door open<br><br>OFF: Rear left side and rear right side door closed | - |
| RL Door Courtesy SW | Rear door courtesy light switch signal/ON or OFF | ON: Rear left side or rear right side door open<br><br>OFF: Rear left side and rear right side door closed | - |
| Back Door Courtesy SW | Back door courtesy switch signal/ON or OFF | ON: Back door open<br><br>OFF: Back door closed | - |
| Back Door Open | Back door lock/Permit or Prohibt | Permit: Back door unlocked<br><br>Prohibt: Back door locked | - |
| Door Lock SW-Lock*1 | Front passenger side door control switch lock signal/ON or OFF | ON: Lock side of front passenger side door control switch pushed | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | OFF: Lock side of front passenger side door control switch not pushed | |
| Door Lock SW-Unlock*1 | Front passenger side door control switch unlock signal/ON or OFF | ON: Unlock side of front passenger side door control switch pushed<br><br>OFF: Unlock side of front passenger side door control switch not pushed | - |
| Door Key SW-Lock | Driver door key-linked lock/unlock switch lock signal/ON or OFF | ON: Driver door key cylinder turned to lock position<br><br>OFF: Driver door key cylinder not turned to lock position | - |
| D Door Key SW-UL | Driver door key-linked lock/unlock switch unlock signal/ON or OFF | ON: Driver door key cylinder turned to unlock position<br><br>OFF: Driver door key cylinder not turned to unlock position | - |
| FR Door Lock Pos | Front passenger side door lock position switch signal/LOCK or UNLOCK | LOCK: Front passenger side door locked<br><br>UNLOCK: Front passenger side door unlocked | - |
| FR Door Courtesy | Front passenger side door courtesy light switch signal/ON or OFF | ON: Front passenger side door open<br><br>OFF: Front passenger side door closed | - |
| FL Door Lock Pos | Driver door lock position switch signal/LOCK or UNLOCK | LOCK: Driver door locked<br><br>UNLOCK: Driver door unlocked | - |
| FL Door Courtesy | Driver door courtesy light switch signal/ON or OFF | ON: Driver door open<br><br>OFF: Driver door closed | - |
| Back Door Open Handle SW*2 | Back door opener switch signal/ON or OFF | ON: Back door opener switch pushed<br><br>OFF: Back door opener switch not pushed | - |
| RR-Door Lock Pos SW | Rear door lock position switch signal/ON or OFF | ON: Rear left side or rear right side door unlocked<br><br>OFF: Rear left side and rear right side door locked | - |
| RL-Door Lock Pos SW | Rear door lock position switch signal/ON or OFF | ON: Rear left side or rear right side | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | door unlocked<br><br>OFF: Rear left side and rear right side door locked | |
| Unlock Key Twice | Key-linked 2-step unlock function/ ON or OFF | Customized value displayed | - |
| Auto Lock | Speed-sensitive automatic door lock function/ON or OFF | Customized value displayed | - |
| Auto Lock/Shift | Shift-linked automatic door lock function/ON or OFF | Customized value displayed | - |
| Auto Unlock/Shift | Shift-linked automatic door unlock function/ON or OFF | Customized value displayed | - |
| All Unlock/Open-Close | Driver door-linked automatic door unlock function/ON or OFF | Customized value displayed | - |

- *1: w/ Front Passenger Side Door Control Switch
- *2: w/o Entry System Back Door Open Function

***Master Switch (Multiplex Network Master Switch Assembly)***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Door Lock Switch Status | Driver door control switch lock signal/ON or OFF | ON: Lock side of driver door control switch pushed<br><br>OFF: Lock side of driver door control switch not pushed | - |
| Door Unlock Switch Status | Driver door control switch unlock signal/ON or OFF | ON: Unlock side of driver door control switch pushed<br><br>OFF: Unlock side of driver door control switch not pushed | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

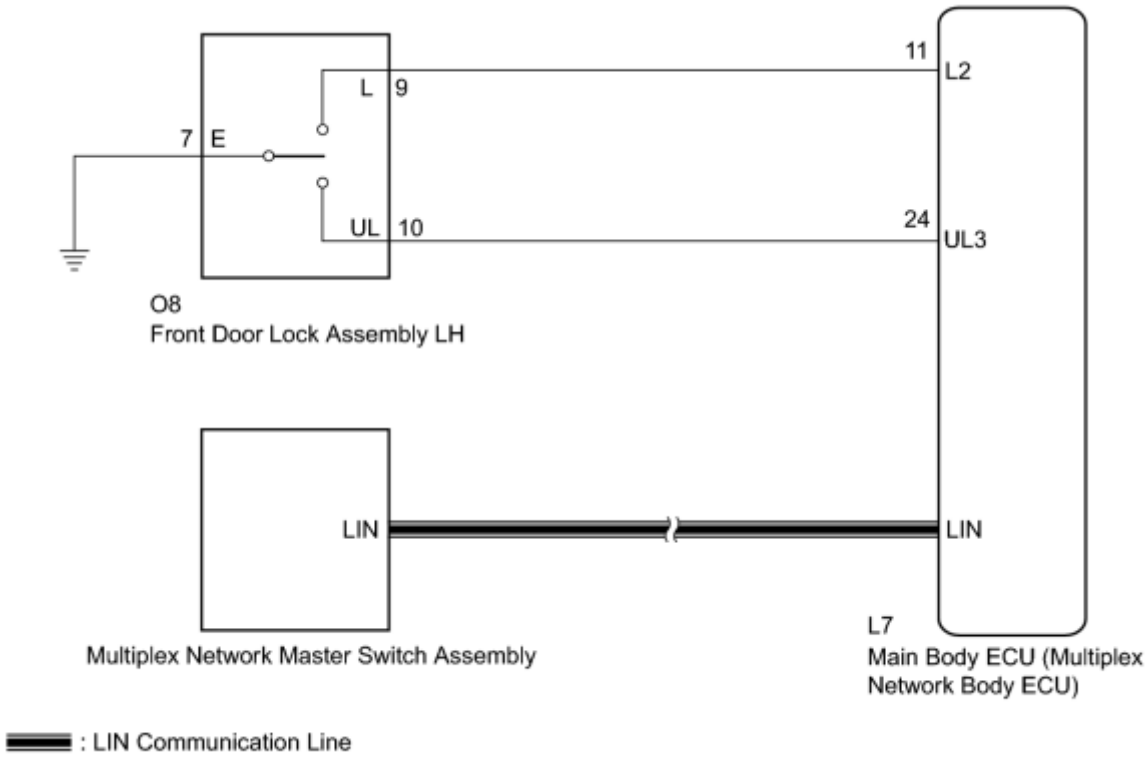
| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Door Lock | Operate door lock motor | Unlock/Lock/OFF | - |
| D-Door Unlock | Operate driver side door lock motor | ON/OFF | - |
| Trunk and Back-Door Open | Operate back door lock motor | ON/OFF | - |

| All Doors LOCK/UNLOCK Functions do not Operate Via Master Switch, Driver Side Door Key Cylinder |
|---|

# DESCRIPTION

The main body ECU (multiplex network body ECU) receives switch signals from the multiplex network master switch assembly, and driver side door key cylinder switch signals from the front door lock assembly LH. The main body ECU (multiplex network body ECU) activates the door lock motor on each door according to these signals.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK DOOR LOCK OPERATION |
|---|---|

(a) Check door lock operation INFO.

Result:

| Result | Proceed to |
|---|---|

| Result | Proceed to |
|---|---|
| All doors cannot be locked through multiplex network master switch | A |
| All doors cannot be locked through driver door key cylinder | B |

B READ VALUE USING TECHSTREAM (DOOR KEY LINKED LOCK AND UNLOCK SWITCH)

A

| | |
|---|---|
| 2. | CHECK DTC OUTPUT (LIN COMMUNICATION SYSTEM) |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B1206 is not output.

NG GO TO LIN COMMUNICATION SYSTEM (DTC B1206)

OK

| | |
|---|---|
| 3. | REPLACE MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY |

(a) Replace the multiplex network master switch assembly INFO.

NEXT

| | |
|---|---|
| 4. | CHECK DOOR LOCK OPERATION |

(a) Check that all doors can be locked and unlocked by using the multiplex network master switch INFO.

OK:

All doors can be locked and unlocked with the multiplex network master switch.

NG REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK **END (MULTIPLEX NETWORK MASTER SWITCH ASSEMBLY WAS DEFECTIVE)**

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (DOOR KEY LINKED LOCK AND UNLOCK SWITCH) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Door Key SW-Lock | Driver door key-linked lock/unlock switch lock signal/ON or OFF | ON: Driver door key cylinder turned to lock position<br><br>OFF: Driver door key cylinder not turned to lock position | - |
| D Door Key SW-UL | Driver door key-linked lock/unlock switch unlock signal/ON or OFF | ON: Driver door key cylinder turned to unlock position<br><br>OFF: Driver door key cylinder not turned to unlock position | - |

OK:

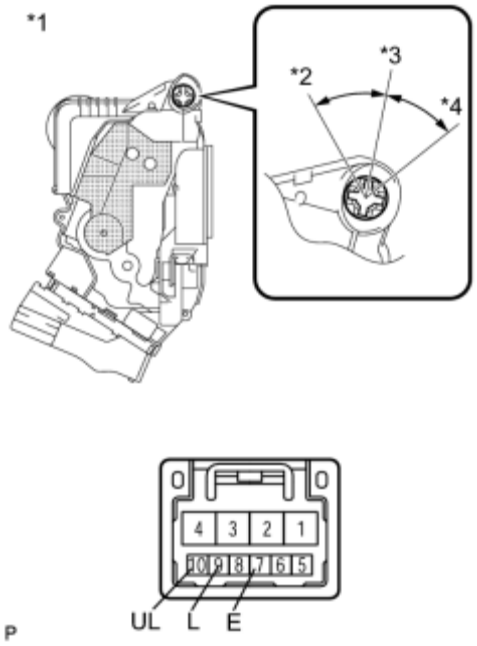
The Techstream indicates ON or OFF according to the key cylinder operation shown in the table.

NG ▶ INSPECT FRONT DOOR LOCK ASSEMBLY LH (DOOR KEY LINKED LOCK AND UNLOCK SWITCH)

OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| | |
|---|---|
| 6. | INSPECT FRONT DOOR LOCK ASSEMBLY LH (DOOR KEY LINKED LOCK AND UNLOCK SWITCH) |

(a) Remove the front door lock assembly LH INFO.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 9 (L) - 7 (E) | Locked | Below 1 Ω |
| 9 (L) - 7 (E) | off | 10 kΩ or higher |
| 10 (UL) - 7 (E) | Unlocked | Below 1 Ω |
| 10 (UL) - 7 (E) | off | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Front Door Lock Assembly LH) |
| *2 | Lock |
| *3 | off |
| *4 | Unlock |

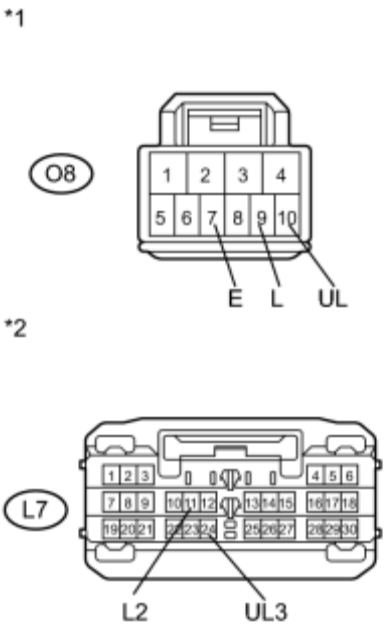
NG ▶ REPLACE FRONT DOOR LOCK ASSEMBLY LH

OK

▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (FRONT DOOR LOCK - MAIN BODY ECU) |

(a) Disconnect the main body ECU (multiplex network body ECU) connector.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| O8-9 (L) - L7-11 (L2) | Always | Below 1 Ω |
| O8-10 (UL) - L7-24 (UL3) | Always | Below 1 Ω |
| O8-7 (E) - Body ground | Always | Below 1 Ω |
| L7-11 (L2) - Body ground | Always | 10 kΩ or higher |
| L7-24 (UL3) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Door Lock Assembly LH) |
| *2 | Front view of wire harness connector<br><br>(to Main Body ECU (Multiplex Network Body ECU)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

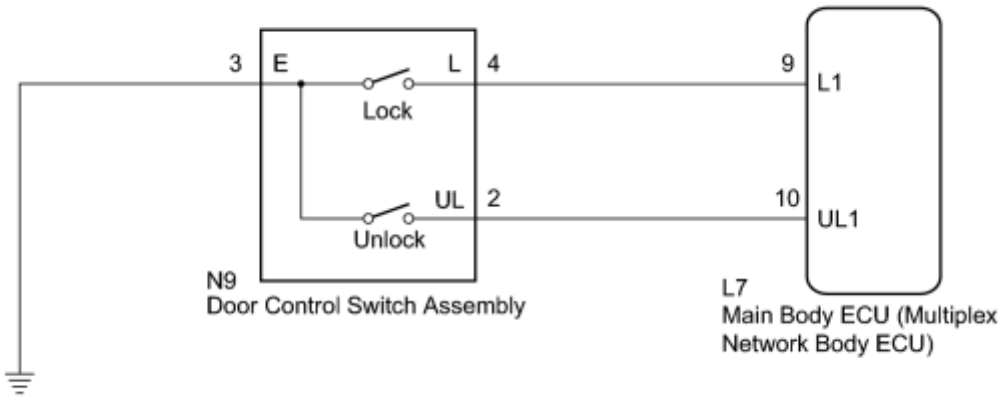
OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| All Doors LOCK/UNLOCK Functions do not Operate Via Door Control Switch |
|---|

# DESCRIPTION

The main body ECU (multiplex network body ECU) receives switch signals from the door control switch assembly and activates the door lock motor on each door according to these signals.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM (DOOR CONTROL SWITCH) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Door Lock SW-Lock | Front passenger side door control switch lock signal/ON or OFF | ON: Lock side of front passenger side door control switch pushed | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | OFF: Lock side of front passenger side door control switch not pushed | |
| Door Lock SW-Unlock | Front passenger side door control switch unlock signal/ON or OFF | ON: Unlock side of front passenger side door control switch pushed<br><br>OFF: Unlock side of front passenger side door control switch not pushed | - |

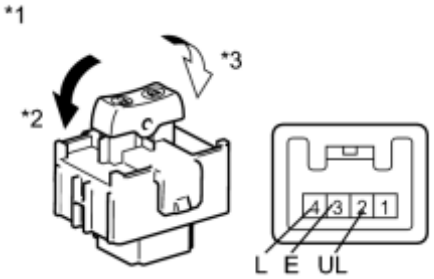
OK:

The Techstream indicates ON or OFF according to the switch operation shown in the table.

NG INSPECT DOOR CONTROL SWITCH ASSEMBLY

OK **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| | |
|---|---|
| 2. | INSPECT DOOR CONTROL SWITCH ASSEMBLY |




(a) Remove the door control switch assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 4 (L) - 3 (E) | Locked | Below 1 Ω |
| 4 (L) - 3 (E) | off | 10 kΩ or higher |
| 2 (UL) - 3 (E) | Unlocked | Below 1 Ω |
| 2 (UL) - 3 (E) | off | 10 kΩ or higher |

***Text in Illustration***

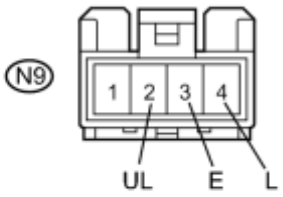
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Door Control Switch Assembly) |
| *2 | Unlock |
| *3 | Lock |

NG REPLACE DOOR CONTROL SWITCH ASSEMBLY

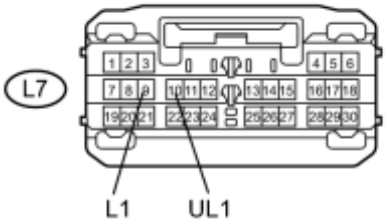
OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (DOOR CONTROL SWITCH - MAIN BODY ECU AND BODY GROUND) |

*1




*2




(a) Disconnect the main body ECU (multiplex network body ECU) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| N9-2 (UL) - L7-10 (UL1) | Always | Below 1 Ω |
| N9-4 (L) - L7-9 (L1) | Always | Below 1 Ω |
| N9-3 (E) - Body ground | Always | Below 1 Ω |
| N9-2 (UL) - Body ground | Always | 10 kΩ or higher |
| N9-4 (L) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Door Control Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Main Body ECU (Multiplex Network Body ECU)) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

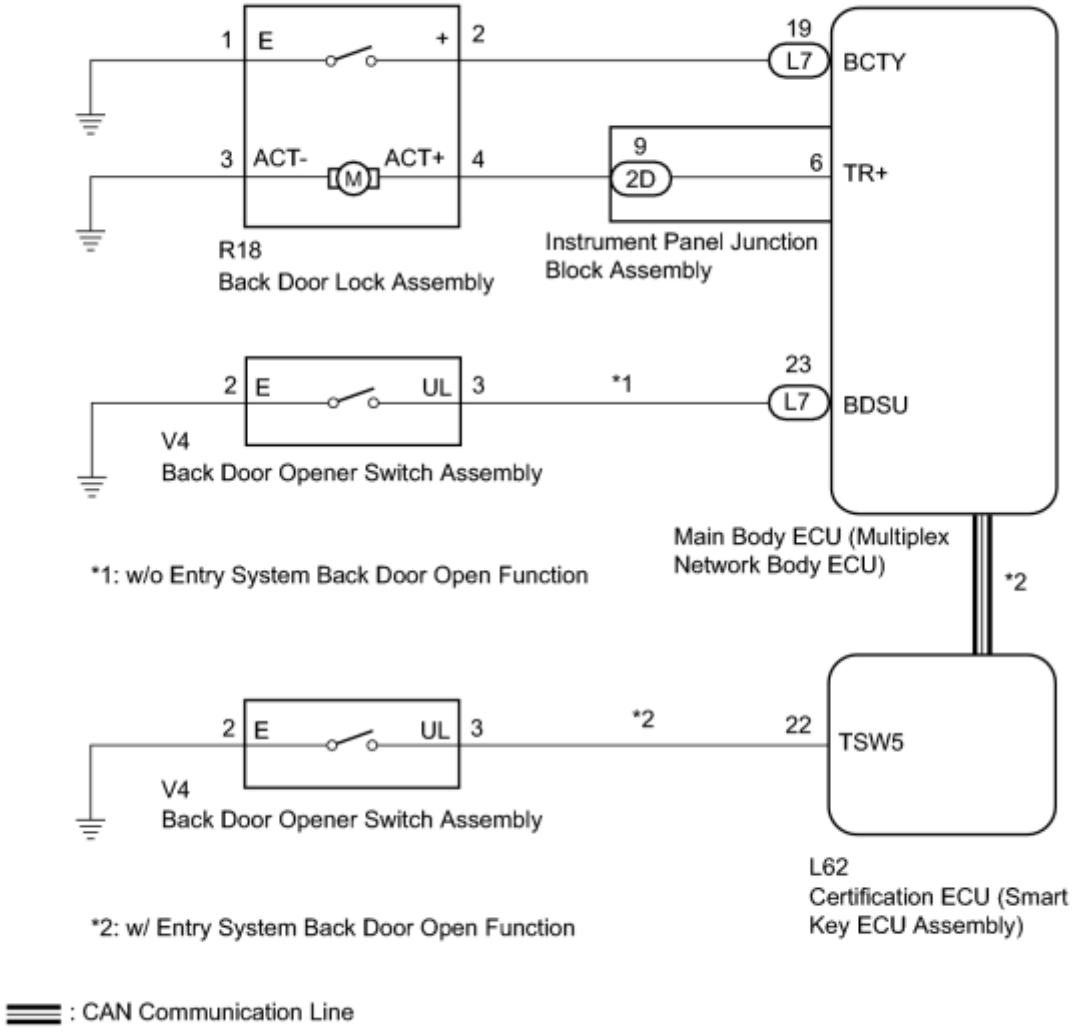
OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

Only Back Door cannot be Opened

# DESCRIPTION

The main body ECU (multiplex network body ECU) receives signals from the back door opener switch assembly. Then, the main body ECU (multiplex network body ECU) activates the back door lock motor.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | SYSTEM CHECK |

(a) Check the vehicle specification.

Result:

| Result | Proceed to |
|---|---|
| w/o Entry System Back Door Open Function | A |
| w/ Entry System Back Door Open Function | B |

B ▶ INSPECT BACK DOOR LOCK ASSEMBLY

A

▼

| | |
|---|---|
| 2. | CHECK POWER DOOR LOCK OPERATION (BASIC FUNCTION) |

(a) Check the power door lock basic function INFO.

OK:

The power door lock basic functions operate normally.

NG ▶ GO TO PROBLEM SYMPTOMS TABLE

OK

▼

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (DOOR LOCK STATUS) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Back Door Open | Back door lock/Permit or Prohibt | Permit: Back door unlocked<br><br>Prohibt: Back door locked | - |

OK:

The Techstream indicates Permit or Prohibit according to the door lock operation shown in the table.

NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK

▼

| | |
|---|---|
| 4. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Trunk and Back-Door Open | Operate back door lock motor | ON or OFF | - |

OK:

The back door lock assembly unlatches when ON is selected.

NG ▶ INSPECT BACK DOOR LOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Back Door Open Handle SW | Back door opener switch signal/ON or OFF | ON: Back door opener switch pushed<br><br>OFF: Back door opener switch not pushed | - |

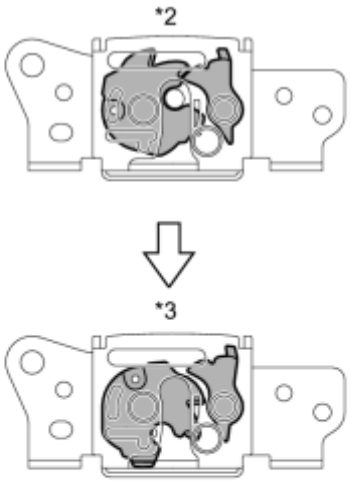
OK:

The Techstream indicates ON or OFF according to the switch operation shown in the table.

NG ▶ INSPECT BACK DOOR OPENER SWITCH ASSEMBLY

OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| | |
|---|---|
| 6. | INSPECT BACK DOOR LOCK ASSEMBLY |




(a) Remove the back door lock assembly INFO.

(b) Check the operation of the door lock motor.

(1) Move the door lock to the lock position.

(2) Apply battery voltage to the door lock motor and check the operation of the door lock motor.

OK:

| Connection | Result |
|---|---|
| Battery positive (+) → Terminal 4 (ACT+)<br><br>Battery negative (-) → Terminal 3 (ACT-) | Unlocks |

(c) Check the operation of the door courtesy switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (E) - 2 (+) | Locked | 10 kΩ or higher |
| 1 (E) - 2 (+) | Unlocked | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Back Door Lock Assembly) |
| *2 | Lock |
| *3 | Unlock |

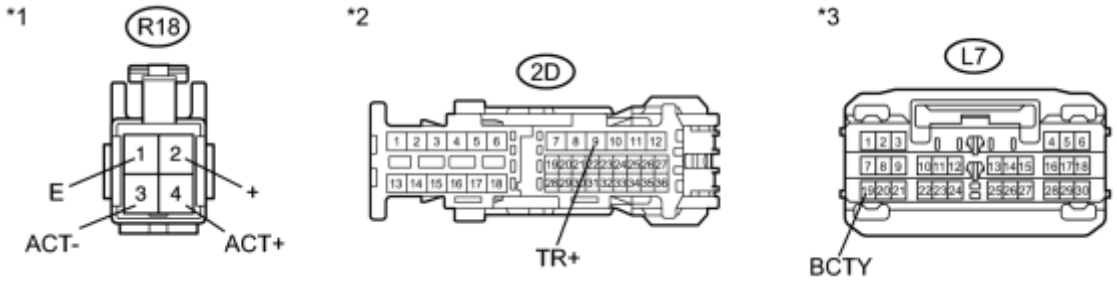
NG ▶ REPLACE BACK DOOR LOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (BACK DOOR LOCK ASSEMBLY - MAIN BODY ECU) |

(a) Disconnect the main body ECU (multiplex network body ECU) connector.




(b) Disconnect the instrument panel junction block assembly connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R18-4 (ACT+) - 2D-9 (TR+) | Always | Below 1 Ω |
| R18-4 (ACT+) - Body ground | Always | 10 kΩ or higher |
| R18-2 (+) - L7-19 (BCTY) | Always | Below 1 Ω |
| R18-2 (+) - Body ground | Always | 10 kΩ or higher |
| R18-3 (ACT-) - Body ground | Always | Below 1 Ω |
| R18-1 (E) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front view of wire harness connector<br><br>(to Back Door Lock Assembly) | *2 | Front view of wire harness connector<br><br>(to Instrument Panel Junction Block Assembly) |
| *3 | Front view of wire harness connector<br><br>(to Main Body ECU (Multiplex Network Body ECU)) | - | - |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 8. | REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

(a) Replace the instrument panel junction block assembly INFO.

NEXT

▼

| | |
|---|---|
| 9. | CHECK BACK DOOR OPEN OPERATION |

(a) Check that the back door can be opened.

OK:

The back door can be opened normally.

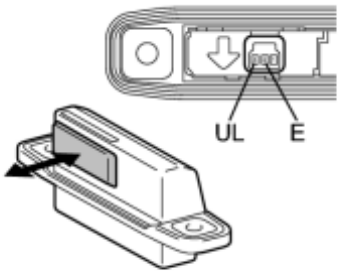
NG ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK ▶ **END (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY WAS DEFECTIVE)**

| | |
|---|---|
| 10. | INSPECT BACK DOOR OPENER SWITCH ASSEMBLY |

(a) Remove the back door opener switch assembly INFO.

*1




(b) Check the operation of the opener switch.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 2 (E) - 3 (UL) | Back door opener switch not pushed | 10 kΩ or higher |
| 2 (E) - 3 (UL) | Back door opener switch pushed | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Back Door Opener Switch Assembly) |

NG ▶ REPLACE BACK DOOR OPENER SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (BACK DOOR OPENER SWITCH ASSEMBLY - MAIN BODY ECU) |

(a) Disconnect the main body ECU (multiplex network body ECU) connector.

(b) Measure the resistance according to the value(s) in the table below.

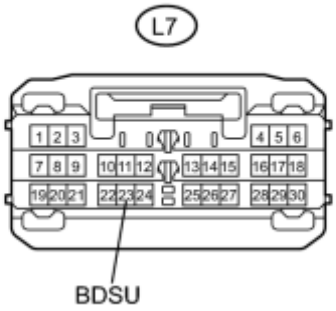
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| V4-3 (UL) - L7-23 (BDSU) | Always | Below 1 Ω |
| V4-3 (UL) - Body ground | Always | 10 kΩ or higher |
| V4-2 (E) - Body ground | Always | Below 1 Ω |

*1




*2




*Text in Illustration*

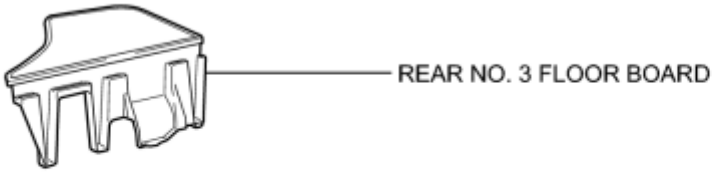
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Back Door Opener Switch Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Main Body ECU (Multiplex Network Body ECU)) |

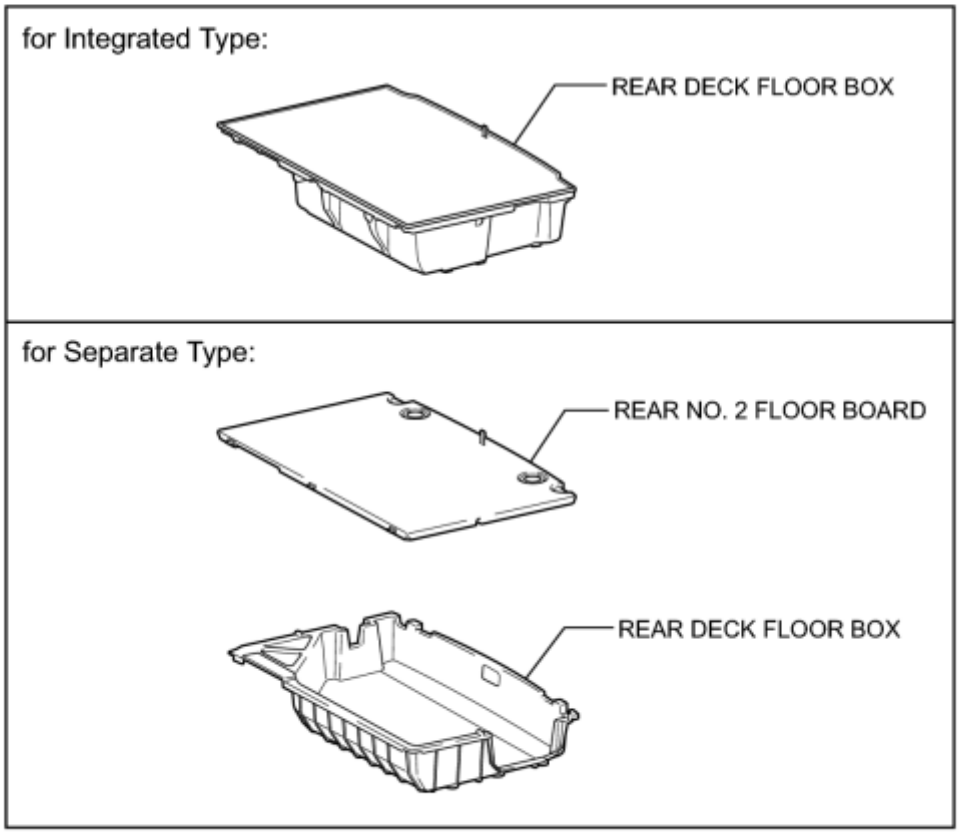
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

# COMPONENTS

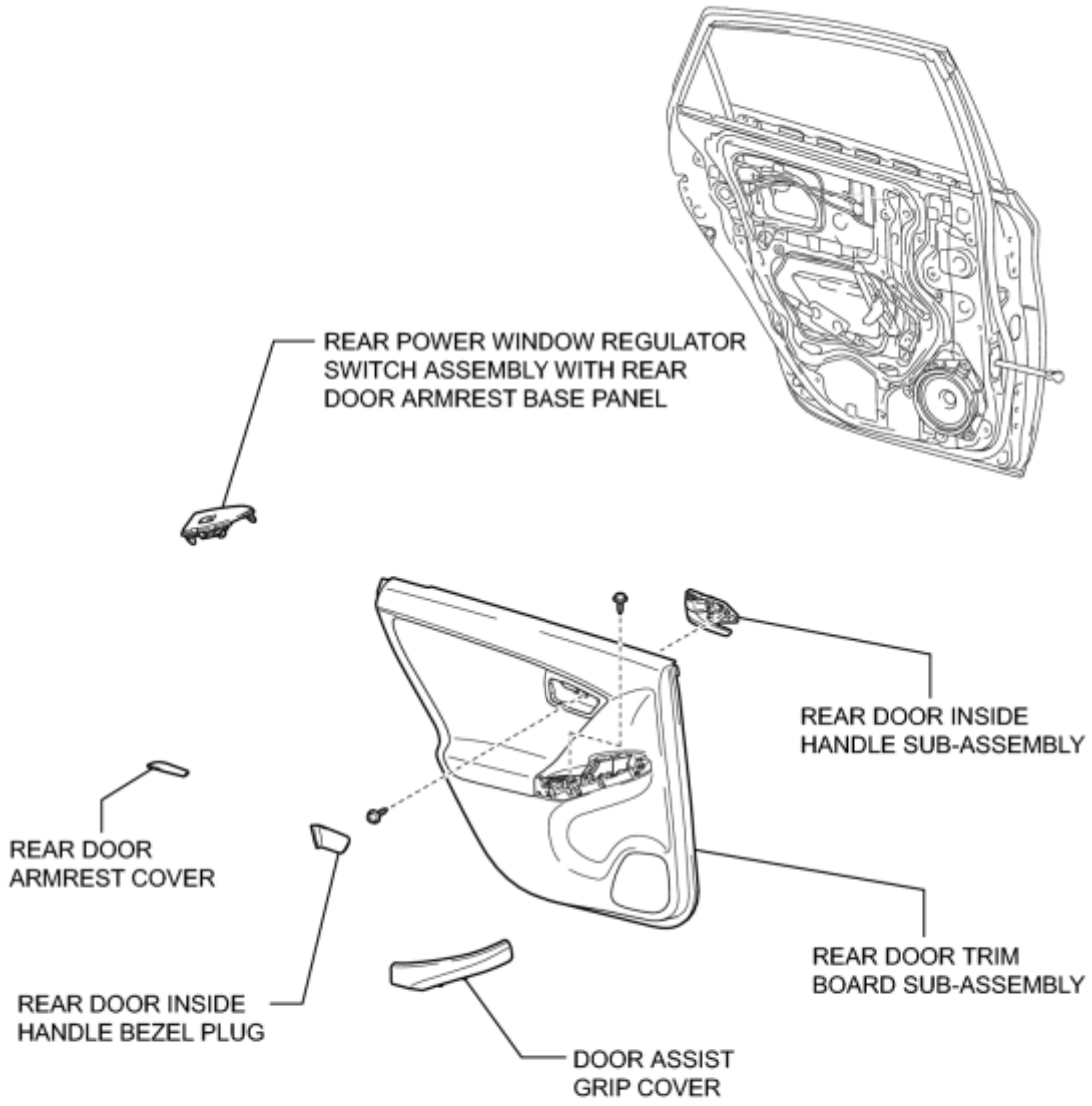
# ILLUSTRATION



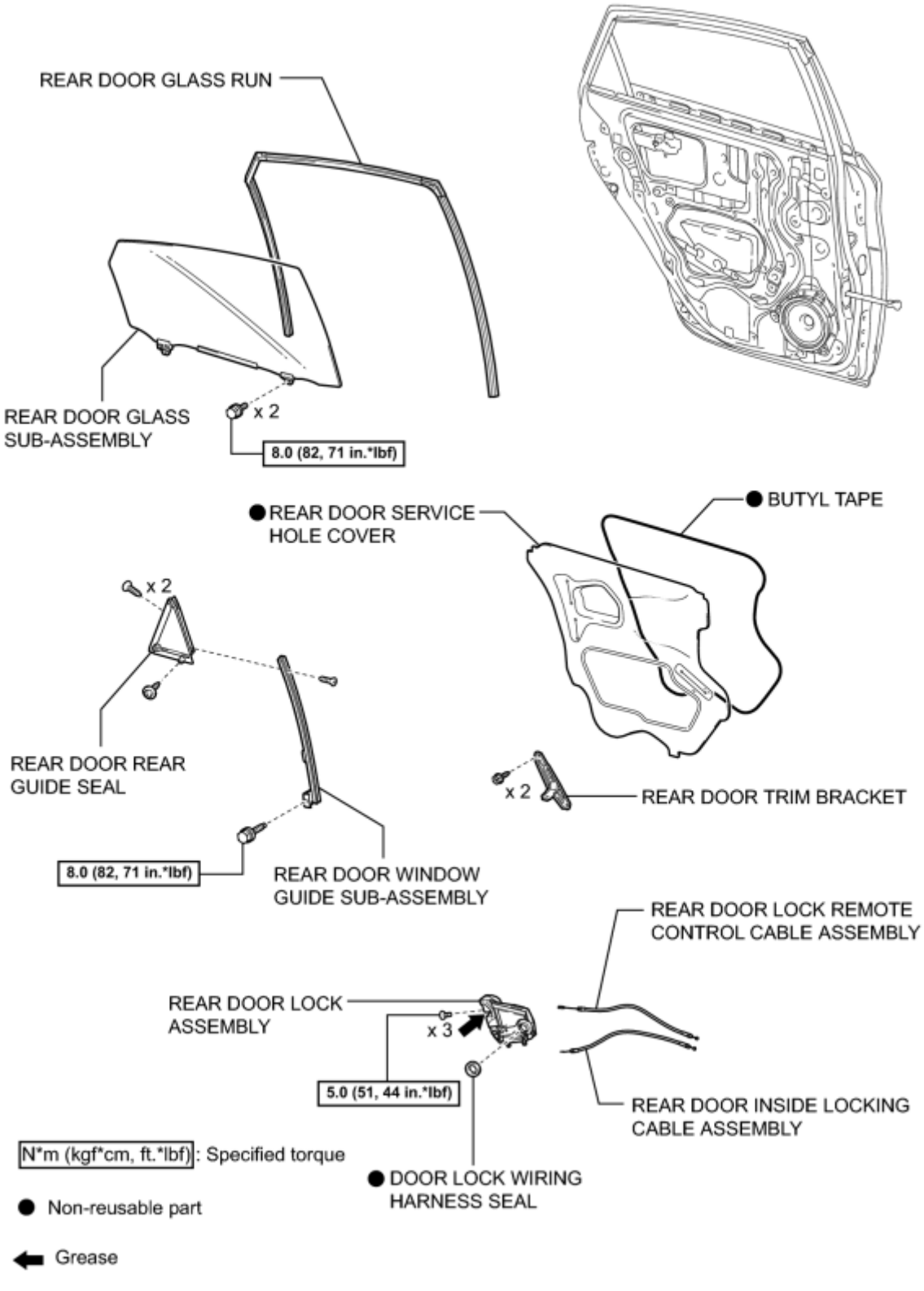

P

# ILLUSTRATION




P

# ILLUSTRATION


REAR DOOR GLASS RUN
REAR DOOR GLASS SUB-ASSEMBLY
x 2
8.0 (82, 71 in.*lbf)
● REAR DOOR SERVICE HOLE COVER
● BUTYL TAPE
x 2
REAR DOOR REAR GUIDE SEAL
x 2
REAR DOOR TRIM BRACKET
8.0 (82, 71 in.*lbf)
REAR DOOR WINDOW GUIDE SUB-ASSEMBLY
REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY
REAR DOOR LOCK ASSEMBLY
x 3
5.0 (51, 44 in.*lbf)
REAR DOOR INSIDE LOCKING CABLE ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
● DOOR LOCK WIRING HARNESS SEAL
● Non-reusable part
Grease

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE DOOR ASSIST GRIP COVER INFO

6. REMOVE REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

7. REMOVE REAR DOOR ARMREST COVER INFO

8. REMOVE REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

9. REMOVE REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. REMOVE REAR DOOR TRIM BRACKET INFO

11. REMOVE REAR DOOR SERVICE HOLE COVER INFO

12. REMOVE REAR DOOR GLASS RUN INFO

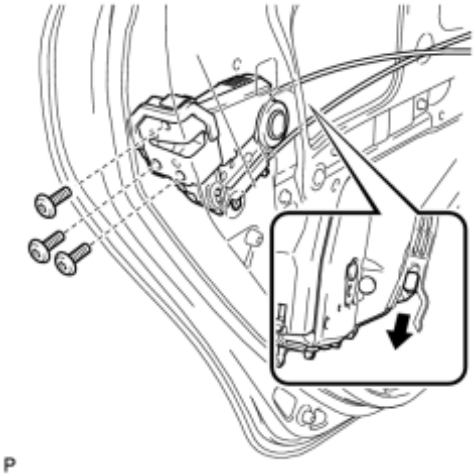
13. REMOVE REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

14. REMOVE REAR DOOR REAR GUIDE SEAL INFO

15. REMOVE REAR DOOR GLASS SUB-ASSEMBLY INFO

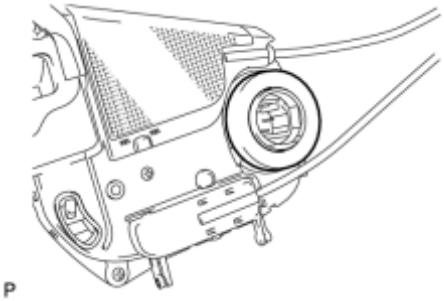
16. REMOVE REAR DOOR LOCK ASSEMBLY

(a) Using a T30 "TORX" socket wrench, remove the 3 screws.



P

(b) Move the rear door lock assembly downward and pull the release plate out of the rear door outside handle frame.



P

(c) Remove the door lock wiring harness seal from the rear door lock assembly.

17. REMOVE REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY INFO

18. REMOVE REAR DOOR INSIDE LOCKING CABLE ASSEMBLY INFO

# INSPECTION

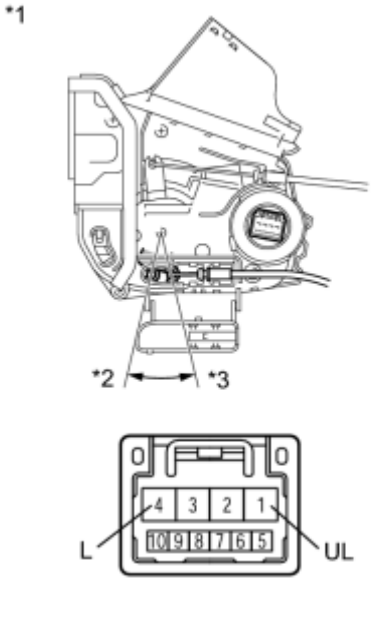
1. INSPECT REAR DOOR LOCK ASSEMBLY LH

(a) Check the operation of the door lock motor.

(1) Apply battery voltage and check the operation of the door lock motor.

OK:

| Connection | Result |
|---|---|
| Battery positive (+) → Terminal 4 (L)<br>Battery negative (-) → Terminal 1 (UL) | Locks |
| Battery positive (+) → Terminal 1 (UL)<br>Battery negative (-) → Terminal 4 (L) | Unlocks |




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear Door Lock Assembly LH) |
| *2 | Lock |
| *3 | Unlock |

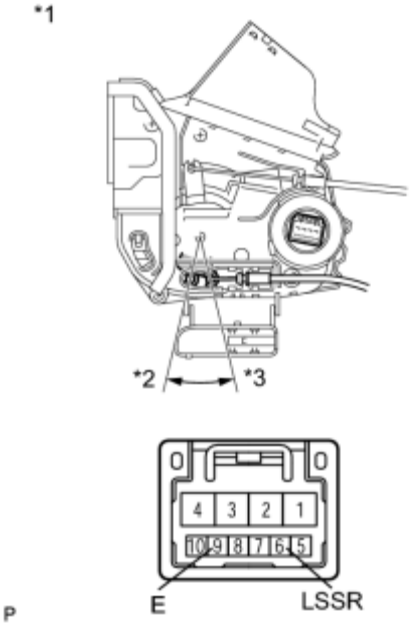
If the result is not as specified, replace the rear door lock assembly LH.

(b) Check the operation of the unlock detection switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 6 (LSSR) - 9 (E) | Locked | 10 kΩ or higher |
| 6 (LSSR) - 9 (E) | Unlocked | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear Door Lock Assembly LH) |
| *2 | Lock |
| *3 | Unlock |

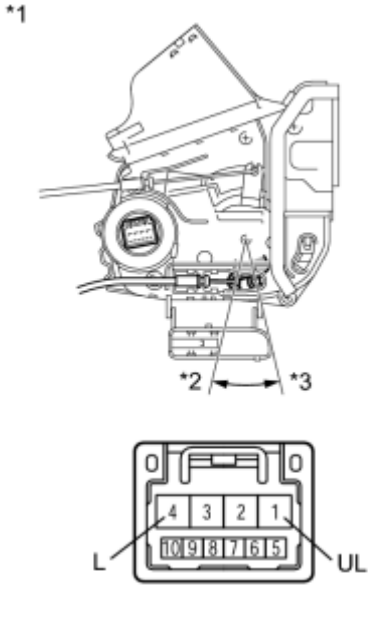
If the result is not as specified, replace the rear door lock assembly LH.

2. INSPECT REAR DOOR LOCK ASSEMBLY RH

(a) Check the operation of the door lock motor.

(1) Apply battery voltage and check the operation of the door lock motor.

OK:




| Connection | Result |
|---|---|
| Battery positive (+) → Terminal 4 (L)<br>Battery negative (-) → Terminal 1 (UL) | Locks |
| Battery positive (+) → Terminal 1 (UL)<br>Battery negative (-) → Terminal 4 (L) | Unlocks |

## Text in Illustration

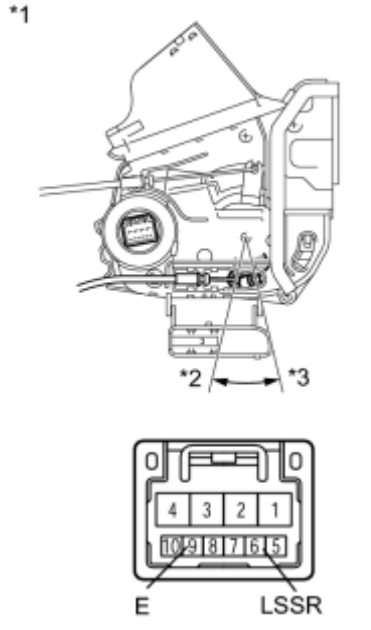
| | |
|---|---|
| *1 | Component without harness connected<br>(Rear Door Lock Assembly RH) |
| *2 | Unlock |
| *3 | Lock |

If the result is not as specified, replace the rear door lock assembly RH.

(b) Check the operation of the unlock detection switch.

(1) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 6 (LSSR) - 9 (E) | Locked | 10 kΩ or higher |
| 6 (LSSR) - 9 (E) | Unlocked | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br>(Rear Door Lock Assembly RH) |
| *2 | Unlock |

| | |
|---|---|
| *3 | Lock |

If the result is not as specified, replace the rear door lock assembly RH.

# INSTALLATION

1. INSTALL REAR DOOR INSIDE LOCKING CABLE ASSEMBLY INFO

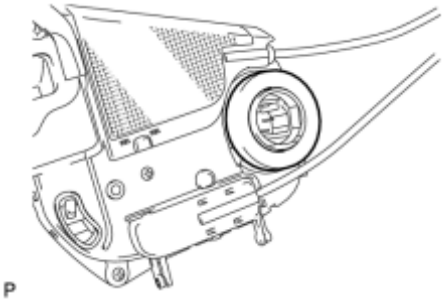
2. INSTALL REAR DOOR LOCK REMOTE CONTROL CABLE ASSEMBLY INFO

3. INSTALL REAR DOOR LOCK ASSEMBLY

NOTICE:

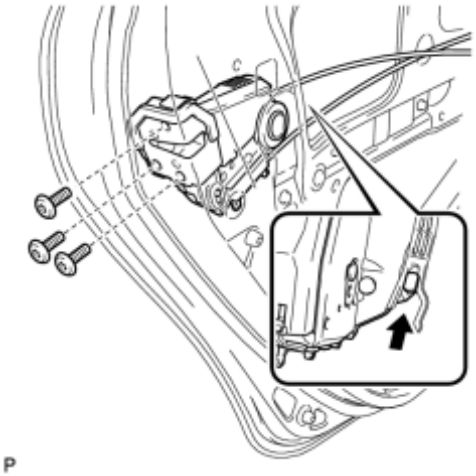
- When reusing the removed rear door lock assembly, replace the door lock wiring harness seal on the connector with a new one.
- Do not allow grease or dust to adhere to the door lock wiring harness seal surface of the connector.
- Reusing the door lock wiring harness seal or using a damaged door lock wiring harness seal may cause water intrusion. This may result in a malfunction of the rear door lock assembly.

(a) Apply MP grease to the sliding parts of the rear door lock assembly.



P

(b) Install a new door lock wiring harness seal to the rear door lock assembly.



P

(c) Insert the rear door lock assembly to the rear door outside handle release plate, and set it to the rear door panel.

(d) Make sure that the rear door outside handle frame release plate is securely connected to the rear door lock assembly.

(e) Using a T30 "TORX" socket wrench, install the rear door lock assembly with the 3 screws.

Torque: **5.0 N·m (51 kgf·cm, 44in·lbf)**

4. INSTALL REAR DOOR GLASS SUB-ASSEMBLY INFO

5. INSTALL REAR DOOR REAR GUIDE SEAL INFO

6. INSTALL REAR DOOR WINDOW GUIDE SUB-ASSEMBLY INFO

7. INSTALL REAR DOOR GLASS RUN INFO

8. INSTALL REAR DOOR SERVICE HOLE COVER INFO

9. INSTALL REAR DOOR TRIM BRACKET INFO

10. INSTALL REAR DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

11. INSTALL REAR DOOR TRIM BOARD SUB-ASSEMBLY INFO

12. INSTALL REAR DOOR ARMREST COVER INFO

13. INSTALL REAR POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH REAR DOOR ARMREST BASE PANEL INFO

14. INSTALL DOOR ASSIST GRIP COVER INFO

15. INSTALL REAR DOOR INSIDE HANDLE BEZEL PLUG INFO

16. INSTALL REAR NO. 3 FLOOR BOARD INFO

17. INSTALL REAR DECK FLOOR BOX INFO

18. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

19. INITIALIZE POWER WINDOW CONTROL SYSTEM

INFO

20. CHECK POWER WINDOW CONTROL SYSTEM

INFO

# REPLACEMENT

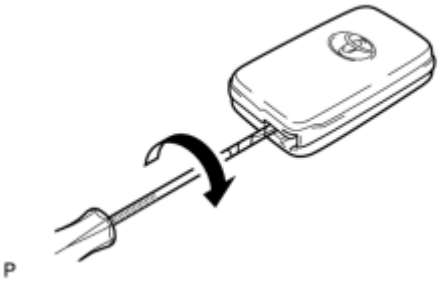
1. REMOVE TRANSMITTER BATTERY

NOTICE:

Take extra care when handling these precision electronic components.




(a) Push the release hook knob and extract the mechanical key.

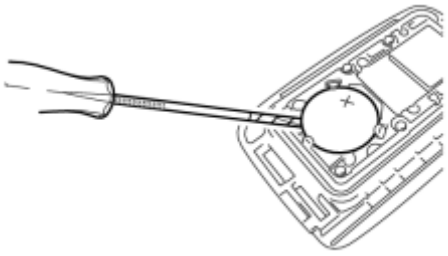



(b) Insert a precision screwdriver into the gap, and turn the screwdriver to detach the transmitter housing cover.

HINT:

Tape the screwdriver tip before use.

(c) Insert a precision screwdriver into the gap and gently remove the battery (lithium battery: CR1632).



- Do not push the terminals with your finger.
- Do not forcibly pry up the battery. The terminals may be damaged.
- Do not touch the battery with wet hands. Water may cause rust.
- Do not touch or move any components inside the transmitter. It may interfere with proper operation.

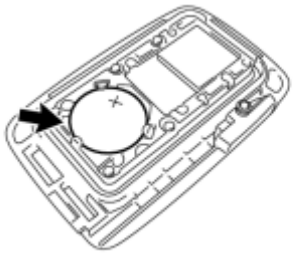
HINT:

Tape the screwdriver tip before use.

2. INSTALL TRANSMITTER BATTERY

(a) Install a new battery (lithium battery: CR1632) with the positive (+) side facing upward, as shown in the illustration.

- Do not bend the transmitter battery electrode during insertion.
- Keep the transmitter cover interior free of dust and oil.



O



Y

(b) Install the transmitter housing cover by pressing down on it as shown in the illustration.



Y

(c) Insert the mechanical key into the transmitter.

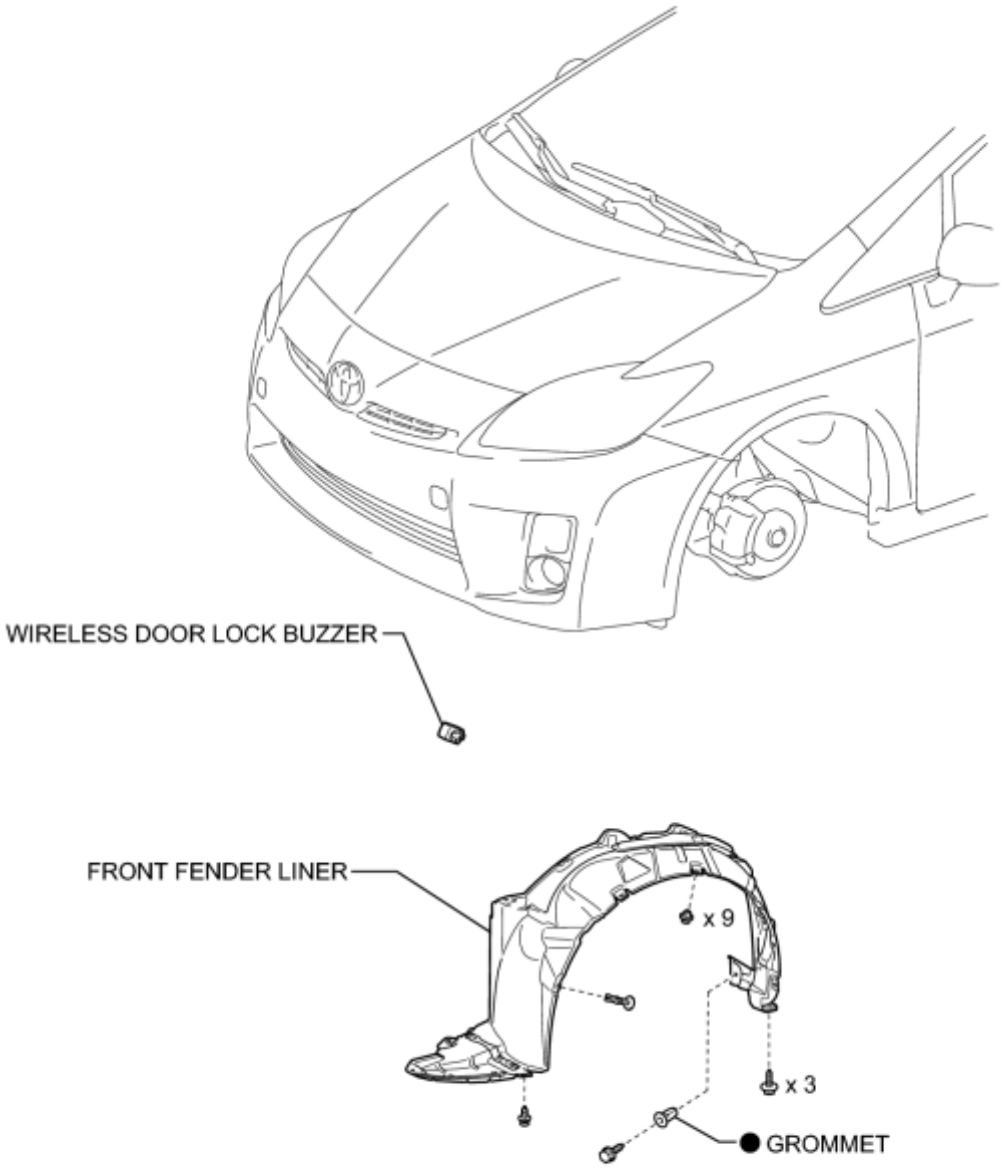
(d) Press one of the transmitter switches and check that the LED illuminates.

OK:

Transmitter LED illuminates when switch is pressed.

# COMPONENTS

# ILLUSTRATION




● Non-reusable part

P

# REMOVAL

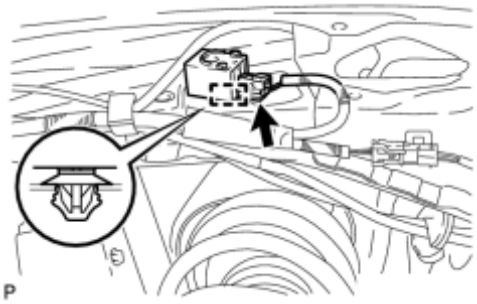
1. REMOVE FRONT WHEEL

2. REMOVE FRONT FENDER LINER

HINT:

Use the same procedure for the RH side and LH side INFO.

3. REMOVE WIRELESS DOOR LOCK BUZZER

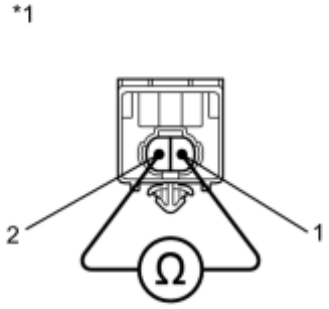


(a) Disconnect the connector.

(b) Disengage the clamp and remove the wireless door lock buzzer.

# INSPECTION

1. INSPECT WIRELESS DOOR LOCK BUZZER




N

(a) Measure the resistance according to the value(s) in the table below.

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connector<br><br>(Wireless Door Lock Buzzer) |

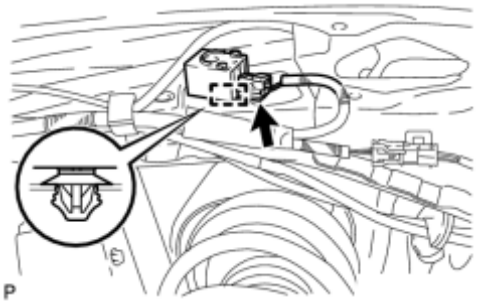
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Always | 950 to 1050 Ω |

If the result is not as specified, replace the wireless door lock buzzer.

# INSTALLATION

1. INSTALL WIRELESS DOOR LOCK BUZZER



(a) Engage the clamp and install the wireless door lock buzzer.

(b) Connect the connector.

2. INSTALL FRONT FENDER LINER

HINT:

Use the same procedure for the RH side and LH side INFO.

3. INSTALL FRONT WHEEL INFO

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE AUXILIARY BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) auxiliary battery terminal, initialize the following systems after the terminal is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

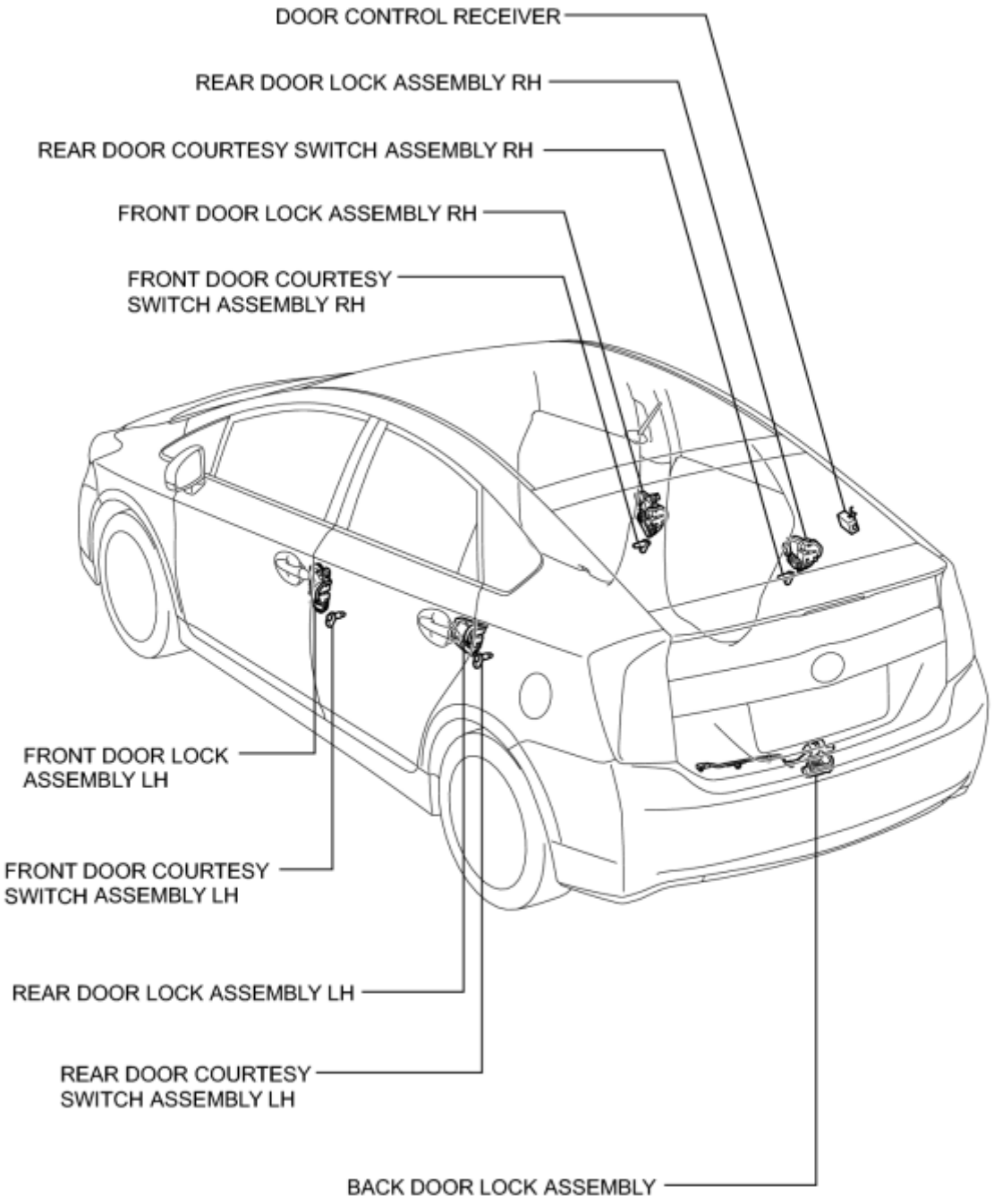
2. PRECAUTION WHEN USING TECHSTREAM

(a) When using the Techstream to troubleshoot the wireless door lock control system:

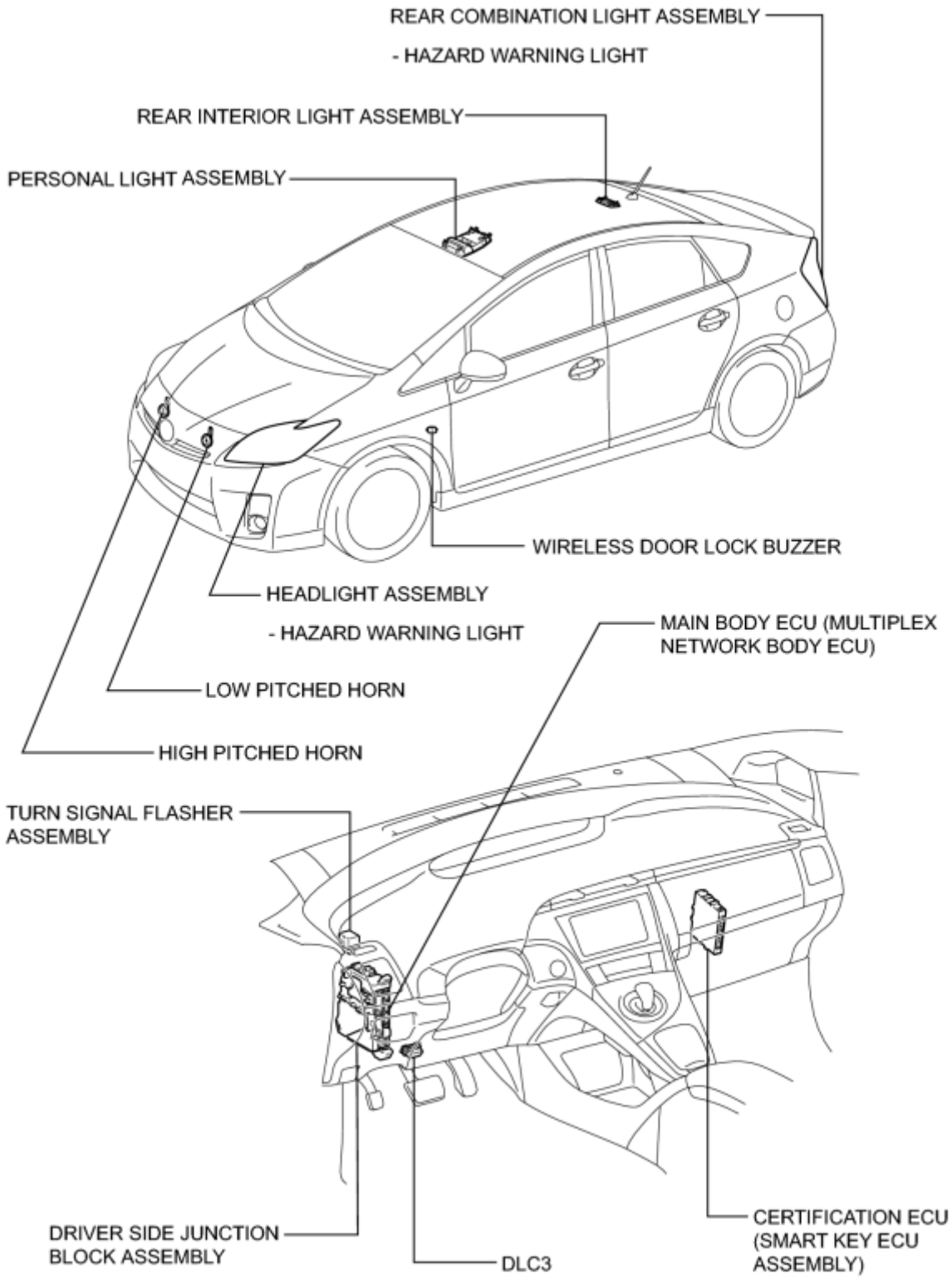
Connect the Techstream to the DLC3 while the power switch is off, and turn a door courtesy light switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PARTS LOCATION

# ILLUSTRATION



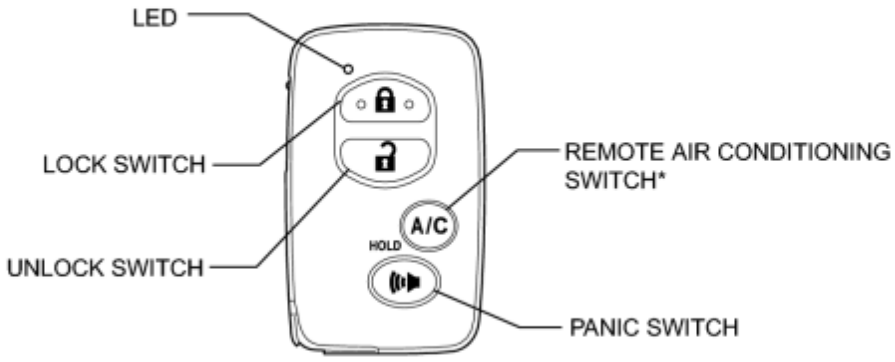

# ILLUSTRATION




H

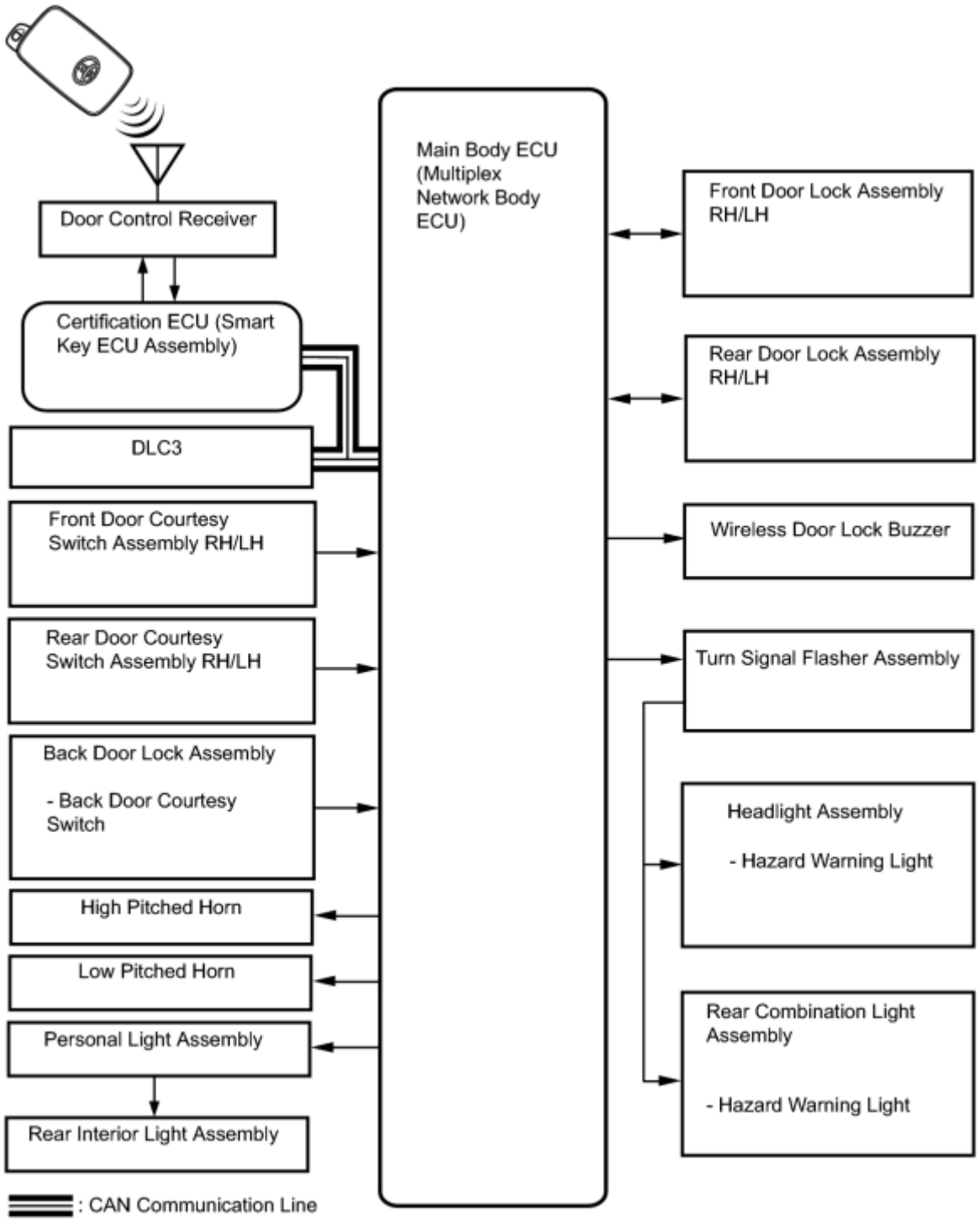
# ILLUSTRATION

DOOR CONTROL TRANSMITTER




*: w/ Remote Air Conditioning System

# SYSTEM DIAGRAM




### *Communication Table*

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Line |
|---|---|---|---|
| Certification ECU | Main body ECU | Wireless door lock signal | CAN |

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Line |
|---|---|---|---|
| (Smart key ECU assembly) | (Multiplex network body ECU) | | |

# SYSTEM DESCRIPTION

1. WIRELESS DOOR LOCK CONTROL SYSTEM

The wireless door lock control system can be used to lock and unlock all doors from a distance. The system is controlled by a door control transmitter which sends radio waves to the door control receiver. The certification ECU (smart key ECU assembly) performs an ID code identification process and engages the door lock control.

2. FUNCTION OF MAIN COMPONENTS

| Component | Function |
|---|---|
| Door control transmitter | • Has lock, unlock, remote air conditioning* and panic switches.<br>• Transmits weak radio waves (recognition codes and function codes) to the door control receiver.<br>• Illuminates indicator light (LED) during transmission. |
| Door control receiver | Receives weak radio waves from the door control transmitter and sends them to the certification ECU (smart key ECU assembly). |
| • Front door courtesy switch assembly LH/RH<br>• Rear door courtesy switch assembly LH/RH<br>• Back door courtesy switch | • Turns on when a door is opened and turns off when it is closed.<br>• Outputs door status signals (open or closed) to the main body ECU (multiplex network body ECU). |
| • Front door lock assembly LH/RH<br>• Rear door lock assembly LH/RH<br>• Back door lock assembly | Transmits the door lock position of each door to the main body ECU (multiplex network body ECU). |
| Certification ECU (Smart key ECU assembly) | Sends wireless door lock control signals in response to the code data from the door control receiver and signals from each ECU. |
| Main body ECU (Multiplex network body ECU) | Receives wireless door lock signals from the certification ECU (smart key ECU assembly) and controls each door lock assembly |

3. SYSTEM FUNCTION

The door control transmitter has the lock, unlock, and panic switches. Operating these switches activates each function.

The wireless door lock control system has the following functions:

HINT:

The default settings of the following functions are on. Part of these functions can be customized INFO.

| Function | Operation |
|---|---|

| Function | Operation |
|---|---|
| All door lock | Pressing the lock switch locks all doors. |
| All door unlock<br><br>(Unlock 2 operation) | Pressing the unlock switch twice within 3 seconds unlocks all doors after the driver door is unlocked. |
| Automatic lock | If none of the doors is opened within 60*1 or 30*2 seconds after they are unlocked by the wireless door lock control, all doors will lock again automatically. |
| Answer back | • When the doors are locked by wireless operation, the hazard warning lights flash once and wireless door lock buzzer sounds once.<br>• When the doors are unlocked by wireless operation, the hazard warning lights flash twice and wireless door lock buzzer sounds twice. |
| Panic alarm | Pressing the panic switch of the transmitter for longer than about 0.8 seconds causes the following alarms to activate:<br><br>• Sounds the horn.<br>• Flashes the headlights*1, taillights*1 and hazard warning lights.<br>• Illuminates the interior lights (when the switch is in the door position).*1<br><br>While the panic alarm is operating, pressing any switch of the transmitter cancels the alarm operation. |
| Remote air conditioning system*3 | Holding air conditioning switch will cause air conditioning system and all doors lock. |
| Door ajar warning | The buzzer sounds for 10 seconds continuously when the lock switch is pressed when any of the doors are ajar. The buzzer stops when all doors are closed or the unlock switch is pressed. |
| Illuminated entry | When all doors are locked, pressing the unlock switch causes the interior lights to come on simultaneously with the unlock operation. |

- *1: except for Korea
- *2: for Korea
- *3: w/ Remote Air Conditioning System

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- The wireless door lock control system troubleshooting procedure is based on the premise that the power door lock control system is operating normally. Check the power door lock control system first before troubleshooting the wireless door lock control system. Use this procedure to troubleshoot the wireless door lock control system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT



| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Running conditions, driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT



| | |
|---|---|
| 3. | INSPECT AUXILIARY BATTERY VOLTAGE |

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the auxiliary battery before proceeding to the next step.

NEXT



| | |
|---|---|
| 4. | CHECK FOR DTC* |

(a) Check for DTCs and note any codes that are output INFO.

(b) Clear the DTCs.

(c) Recheck for DTCs. Based on the DTCs output above, try to force output of the same CAN communication system DTC or wireless door lock control system DTC by simulating the symptoms indicated by the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output. | A |
| CAN communication system DTC is output. | B |
| Wireless door lock control system DTC is output. | C |

B INFO GO TO CAN COMMUNICATION SYSTEM

C INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

A

| | |
|---|---|
| 5. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table. | A |
| Fault is listed in Problem Symptoms Table. | B |

B Go to step 7

A

| | |
|---|---|
| 6. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

**(a) Operation Check** INFO

**(b) Terminals of ECU** INFO

**(c) Data List / Active Test** INFO

NEXT

| | |
|---|---|
| 7. | REPAIR OR REPLACE |

NEXT



| | |
|---|---|
| 8. | CONFIRMATION TEST |

NEXT **END**

# OPERATION CHECK

1. NOTICE WHEN CHECKING FOLLOWING

(a) Wireless door lock/unlock function:

This wireless door lock control function operates only when the following 3 conditions are met:

(1) The power switch is off.

(2) All doors are closed.

(3) The power door lock system is operating normally.

HINT:

The unlock function operates even when a door is open.

(b) The size of the wireless door lock control operational area differs depending on the situation.

(1) The size of the operation area differs depending on the user and the way the transmitter is held.

(2) In certain areas, the remote control function will only operate partially for the operational area, which will be reduced due to the vehicle body shape and the influence of the surrounding environment.

(3) Since the transmitter uses weak radio waves, strong radio waves or electrical noise in the frequency used by the transmitter may reduce the size of the operational area and the remote control may not function.

(4) When the transmitter battery is weak, the size of the operational area is reduced and the remote control may not function.

HINT:

If the door control transmitter has been left in a place that is exposed to direct sunlight, such as on the instrument panel, it may cause the battery to be weakened or cause other related problems.

2. CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS

HINT:

- The switches described in this text are the switches for transmitting signals. The switches are built into the door control transmitter.
- All the functions listed below must be checked in comparison with the remote control operational area.

(a) Make sure that the vehicle is in an area that allows the wireless control function to operate.

(b) Check basic functions.

(1) Check whether the LED of the transmitter comes on 3 times when each switch is pressed 3 times.

HINT:

If the LED does not come on when the switch has been pressed 3 times or more, it may have a weak battery.

(2) Check that all doors lock when the lock switch is pressed.

(3) Check that the driver side door unlock when the unlock switch is pressed once, and unlocks all doors when pressed twice within 3 seconds.

(c) Check the chattering prevention function.

(1) Check that the corresponding operation occurs only once and is not repeated continuously while the switch is held. However, when the switch is operated repeatedly at 1-second intervals, check that the corresponding operation is carried out.

(d) Check the automatic locking function.

(1) Check that the doors relock automatically as long as none of the doors have been opened or all doors have not been locked within approximately 60*1 or 30*2 seconds after all doors are unlocked by pressing the unlock switch.

(2) Check that the automatic locking function does not operate when any door has been opened within approximately 60*1 or 30*2 seconds of unlocking the doors by pressing the unlock switch.

(3) Check that the automatic locking function does not operate when all doors have been locked manually (such as using key linked operation, or by pressing the lock switch) within approximately 60*1 or 30*2 seconds of unlocking the doors by pressing the unlock switch.

- *1: except for Korea
- *2: for Korea

(e) Check the switch operation fail-safe function.

(1) Check that the doors cannot be locked or unlocked by operating a switch on the unregistered transmitter, and that the doors are locked and unlocked by operating a switch on the registered transmitter.

(f) Check the door ajar warning function.

(1) Check that the wireless door lock buzzer sounds for approximately 10 seconds when the lock switch is pressed with any of the doors ajar or open.

(g) Check the repeat function.

(1) Check that all doors attempt to automatically lock once again 1 second after the lock switch has been pressed while the driver door control knob is being held in the unlock position.

(h) Check the answer-back function.

(1) When the lock switch is pressed, check that the hazard warning lights flash once and the buzzer sounds once simultaneously with the locking operation.

(2) When the unlock switch is pressed once, check that the hazard warning lights flash twice and the buzzer sounds twice simultaneously with the unlocking operation of the driver door.

(3) Check remote air conditioning answer back function* INFO.

- *: w/ Remote Air Conditioning System

(i) Check the remote panic function.

(1) Check that the horn sounds, the headlights*1, taillights*1, hazard lights flash and the interior lights*1 remain on (when the light switch is turned to the door position) for 60*1 or 30*2 seconds by the theft alarm function, when the panic switch is held down for 0.8 seconds or more. Also, check that the horn stops sounding and the lights stop flashing when any switch of the transmitter is pressed.

- *1: except for Korea
- *2: for Korea

(j) Check the interior light on function INFO.

(k) Check the remote air conditioning function INFO.

# CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH TECHSTREAM

HINT:

The following items can be customized.

NOTICE:

- When the customer requests a change in a function, first make sure that the function can be customized.
- Be sure to make a note of the current settings before customizing.
- When troubleshooting a function, first make sure that the function is set to the default setting.

2. CUSTOMIZE

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body or Illuminated Entry / Utility / Customize.

(e) Select the setting by referring to the table below.

***Wireless Door Lock Control System***

| Display (item) | Default | Function | Setting |
|---|---|---|---|
| Wireless Control | ON | Function that turns wireless door lock function on or off | ON or OFF |
| Hazard Answer Back | ON | When the doors are locked by wireless operation, the hazard warning lights flash once.<br><br>When the doors are unlocked by wireless operation, the hazard warning lights flash twice. | ON or OFF |
| Open Door Warning | ON | The buzzer sounds when lock is pressed when any of the doors are ajar. | ON or OFF |
| Unlock 2 Operation | ON | Function that unlocks driver door when unlock switch on transmitter is pressed once, and unlocks all doors when pressed twice. If setting is OFF, pressing unlock switch once makes all doors unlock. | ON or OFF |
| Panic Function | ON | Function to operate theft deterrent system by continuously pressing panic switch on transmitter for 0.8 seconds | ON or OFF |
| Auto Lock Time | 60 s*1 or 30 s*2 | Function that regulates the interval between unlocking and automatic relocking of doors | 30 s, 60 s or 120 s |
| Wireless Auto Lock | ON | This function turns the wireless auto lock function on or off. | ON or OFF |

| Display (item) | Default | Function | Setting |
|---|---|---|---|
| Wireless Buzzer Resp | ON | Wireless door lock buzzer response | ON or OFF |
| Wireless Buzzer Vol | Level7 | Wireless door lock buzzer volume | Level7, Level6, Level5, Level4, Level3, Level2, Level1 or Level0 |

- *1: except for Korea
- *2: for Korea

### *Illuminated Entry*

| Display | Default | Content | Setting |
|---|---|---|---|
| Lighting Time | 15 s | Changes the lighting time after closing all doors. (It will quickly fade out in case of turning the power switch from off to on (ACC or IG).) | 7.5 s, 15 s or 30 s |

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

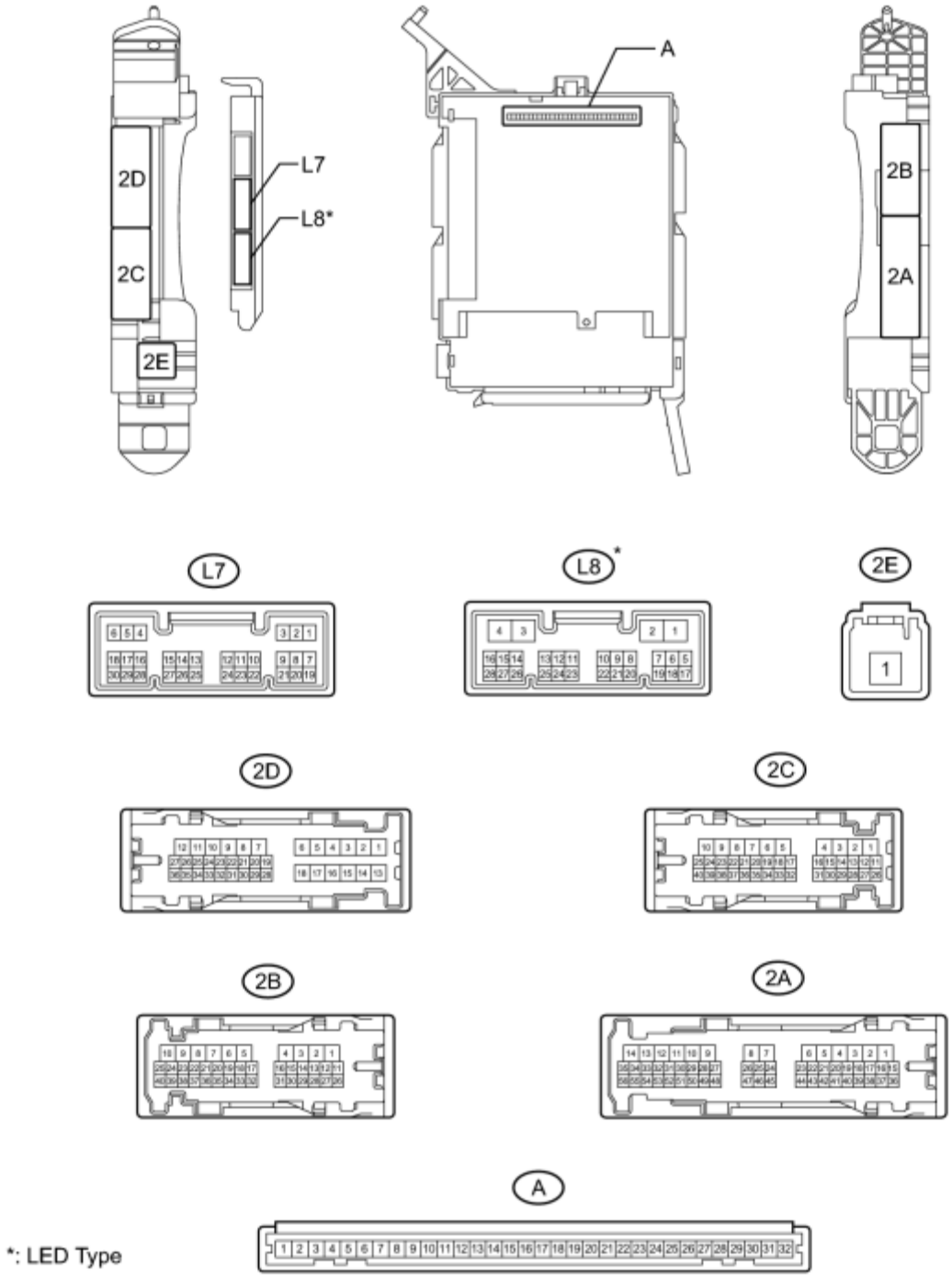
### *Wireless Door Lock Control System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Wireless control function and entry function do not operate | Proceed to "All Door Entry Lock / Unlock Functions and Wireless Functions do not Operate" | INFO |
| Wireless control function does not operate but entry function operates | Electrical key transmitter | - |
| Only answer-back function does not operate normally | Proceed to "No-answer back" | INFO |
| Only automatic lock function does not operate normally | Perform operation check | INFO |
| | Lighting system (door courtesy light switch circuit) | INFO |
| | Main body ECU (multiplex network body ECU) | - |
| Only illuminated entry function does not operate | Perform operation check | INFO |
| | Lighting system (door courtesy light switch circuit) | INFO |
| | Main body ECU (multiplex network body ECU) | - |
| Only door ajar warning function does not operate | Perform operation check | INFO |
| | Lighting system (door courtesy light switch circuit) | INFO |
| | Main body ECU (multiplex network body ECU) | - |
| Panic alarm function does not operate | Perform operation check | INFO |
| | Lighting system (int) (interior lights) | INFO |
| | Lighting system (ext) (headlights, taillights, hazard warning lights) | INFO |
| | Theft deterrent system (vehicle horns, security horn) | - |
| | Main body ECU (multiplex network body ECU) | - |
| Remote air conditioning system does not operate | Proceed to "Air Conditioning System" | INFO |

# TERMINALS OF ECU

1. CHECK MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU) AND DRIVER SIDE JUNCTION BLOCK ASSEMBLY

(a) Disconnect the L8 main body ECU (multiplex network body ECU) connectors.



(b) Disconnect the A, 2B and 2C driver side junction block assembly connectors.

(c) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2C-18 (BECU) - Body ground | Y - Body ground | Auxiliary battery power supply | Power switch off | 11 to 14 V |
| A-31 (ALTB) - Body ground | - | Auxiliary battery power supply | Power switch off | 11 to 14 V |
| A-32 (IG) - Body ground | - | Power switch power supply | Power switch on (IG) | 11 to 14 V |
| A-32 (IG) - Body ground | - | Power switch power supply | Power switch off | Below 1 V |
| A-29 (ACC) - Body ground | - | ACC power supply | Power switch on (ACC) | 11 to 14 V |
| A-29 (ACC) - Body ground | - | ACC power supply | Power switch off | Below 1 V |
| L8-3 (GND2) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| 2B-6 (GND1) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(d) Reconnect the L8 main body ECU (multiplex network body ECU) connectors.

(e) Reconnect the A, 2B and 2C driver side junction block assembly connectors.

(f) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2D-35 (FLCY) - Body ground | V - Body ground | Driver side door courtesy switch input | Driver side door open | Below 1 V |
| 2D-35 (FLCY) - Body ground | V - Body ground | Driver side door courtesy switch input | Driver side door closed | 11 to 14 V |
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front passenger side door courtesy switch input | Front passenger side door open | Below 1 V |
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front passenger side door courtesy switch input | Front passenger side door closed | 11 to 14 V |
| L7-6 (LRCY) - | G - Body | Rear door LH and RH | Rear door LH or RH open | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Body ground | ground | courtesy light switch input | | |
| L7-6 (LRCY) - Body ground | G - Body ground | Rear door LH and RH courtesy light switch input | Rear door LH or RH closed | 11 to 14 V |
| L7-19 (BCTY) - Body ground | GR - Body ground | Back door courtesy light switch input | Back door open | Below 1 V |
| L7-19 (BCTY) - Body ground | GR - Body ground | Back door courtesy light switch input | Back door closed | 11 to 14 V |
| L7-11 (L2) - Body ground | G - Body ground | Driver side door key-linked lock input | Driver side door key cylinder turned to lock | Below 1 V |
| L7-11 (L2) - Body ground | G - Body ground | Driver side door key-linked lock input | Driver side door key cylinder off | 11 to 14 V |
| L7-24 (UL3) - Body ground | U - Body ground | Driver side door key-linked unlock input | Driver side door key cylinder turned to unlock | Below 1 V |
| L7-24 (UL3) - Body ground | U - Body ground | Driver side door key-linked unlock input | Driver side door key cylinder off | 11 to 14 V |
| L7-9 (L1) - Body ground | LG - Body ground | Front passenger side door control switch input | Front passenger side door control switch locked | Below 1 V |
| L7-9 (L1) - Body ground | LG - Body ground | Front passenger side door control switch input | Front passenger side door control switch off | 11 to 14 V |
| L7-10 (UL1) - Body ground | BR - Body ground | Front passenger side door control switch input | Front passenger side door control switch unlocked | Below 1 V |
| L7-10 (UL1) - Body ground | BR - Body ground | Front passenger side door control switch input | Front passenger side door control switch off | 11 to 14 V |
| 2B-3 (ACT+) - Body ground | LG - Body ground | Door lock motor lock drive output (all doors) | Multiplex network master switch (door control switch) or driver side door key cylinder off | Below 1 V |
| 2B-3 (ACT+) - Body ground | LG - Body ground | Door lock motor lock drive output (all doors) | Multiplex network master switch (door control switch) or driver side door key cylinder locked | 11 to 14 V |
| 2B-5 (ACTD) - Body ground | B - Body ground | Driver side door lock motor unlock drive output | Multiplex network master switch (door control switch) or driver side door key cylinder off | Below 1 V |
| 2B-5 (ACTD) - Body ground | B - Body ground | Driver side door lock motor unlock drive output | Multiplex network master switch (door control switch) or driver side door key cylinder unlocked | 11 to 14 V |
| 2B-1 (ACT-) - Body ground | B - Body ground | Door lock motor unlock drive output (except driver side) | Multiplex network master switch (door control switch) or driver side door key cylinder off | Below 1 V |
| 2B-1 (ACT-) - Body ground | B - Body ground | Door lock motor unlock drive output (except driver side) | Multiplex network master switch (door control switch) or driver side door key cylinder unlocked | 11 to 14 V |
| L7-18 (LSFR) - Body ground | LG - Body ground | Front passenger side door lock position switch input | Front passenger side door unlocked | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L7-18 (LSFR) - Body ground | LG - Body ground | Front passenger side door lock position switch input | Power switch off, all doors closed and front passenger side door locked | 11 to 14 V |
| 2D-25 (LSR) - Body ground | GR - Body ground | Rear door LH lock position switch input | Rear door LH unlocked | Below 1 V |
| 2D-25 (LSR) - Body ground | GR - Body ground | Rear door LH lock position switch input | Power switch off, all doors closed and rear door LH locked | 11 to 14 V |
| 2B-29 (LSR) - Body ground | GR - Body ground | Rear door RH lock position switch input | Rear door RH unlocked | Below 1 V |
| 2B-29 (LSR) - Body ground | GR - Body ground | Rear door RH lock position switch input | Power switch off, all doors closed and rear door RH locked | 11 to 14 V |
| L7-7 (LSFL) - Body ground | GR - Body ground | Driver door lock position switch input | Driver door unlocked | Below 1 V |
| L7-7 (LSFL) - Body ground | GR - Body ground | Driver door lock position switch input | Power switch off, all doors closed and driver door locked | 11 to 14 V |
| 2C-23 (BZR) - Body ground | R - Body ground | Wireless door lock buzzer signal | Wireless door lock buzzer off | Below 1 V |
| 2C-23 (BZR) - Body ground | R - Body ground | Wireless door lock buzzer signal | Wireless door lock buzzer on | Pulse generation |
| L7-3 (HAZ) - Body ground | Y - Body ground | Turn signal flasher relay signal | Any transmitter switch not pressed | 11 to 14 V |
| L7-3 (HAZ) - Body ground | Y - Body ground | Turn signal flasher relay signal | Any transmitter switch pressed | Below 1 V |

If the result is not as specified, the main body ECU (multiplex network body ECU) or driver side junction block assembly may have a malfunction.

2. CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)




(a) Disconnect the L62 and L63 certification ECU (smart key ECU assembly) connectors.

(b) Measure the resistance and voltage according to the value(s) in the table below.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-15 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| L62-1 (+B) - L62-15 (E) | B - W-B | Auxiliary battery power supply | Always | 11 to 14 V |
| L62-16 (IG) - L62-15 (E) | BE - W-B | IG power supply | Power switch on (IG) | 11 to 14 V |
| | | | Power switch off | Below 1 V |

- If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L62 and L63 certification ECU (smart key ECU assembly) connectors.

(d) Measure the voltage according to the value(s) in the table below.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L63-16 (RSSI) - L62-15 (E) | V - W-B | Door control receiver output signal | Power switch off, all doors closed and transmitter switch not pressed | 11 to 14 V |
| | | | Power switch off, all doors closed and transmitter switch pressed | Below 2 V |
| L63-15 (RDA) - L62-15 (E) | Y - W-B | Door control receiver output signal | Power switch off | Pulse between 11 to 14 V occurs regularly |
| L63-5 (RC0) - L62-15 (E) | R - W-B | Supply battery to door control receiver | Power switch off, all doors closed and transmitter switch pressed | 4.5 to 5.5 V |

- If the result is not as specified, the certification ECU (smart key ECU assembly) may have a malfunction.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

The ECU stores trouble codes when malfunctions occur.

The diagnostic system allows for reading of the trouble codes from the DLC3.

Use the Techstream to help diagnose and repair the problem.

2. CHECK DLC3

(a) Check the DLC3 INFO.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Read the DTC by following the prompts on the Techstream screen.

HINT:

Refer to the Techstream operator's manual for further details.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Clear the DTC by following the directions on the Techstream screen.

HINT:

Refer to the Techstream operator's manual for further details.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wireless Control | Wireless door lock control function/ON or OFF | ON: Operating<br><br>OFF: Not operating | - |
| Hazard Answer Back | Hazard answer-back of wireless/ON or OFF | ON: Operating<br><br>OFF: Not operating | - |
| Wireless Auto Lock | Automatic lock function/ON or OFF | ON: Operating<br><br>OFF: Not operating | - |
| Open Door Warning | Open door warning/ON or OFF | ON: Operating<br><br>OFF: Not operating | - |
| Unlock 2 Operation | 2 times operation of wireless unlock/ON or OFF | ON: All doors unlock when unlock switch pressed twice<br><br>OFF: All doors unlock when unlock switch pressed once | - |
| Panic Function | Panic function/ON or OFF | ON: Operating | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | OFF: Not operating | |
| Auto Lock Time | Automatic lock time/120 s, 60 s or 30 s | 120 s: 120 seconds<br>60 s: 60 seconds<br>30 s: 30 seconds | - |
| Keyless Entry Buzzer | Buzzer answer-back of wireless/ON or OFF | ON: Operating<br>OFF: Not operating | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing the Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Hazard | Turn signal flasher relay | ON/OFF | Observe headlights and rear combination lights for correct operation |
| Illuminated Entry System | Interior lights and power switch light (Interior light switch is in the door position and all doors are closed) | ON/OFF | - |
| Wireless Buzzer | Wireless door lock buzzer | ON/OFF | - |
| Vehicle Horn | Vehicle horns | ON/OFF | - |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is output during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to "See page" in the DTC chart.

### *Wireless Door Lock Control System*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B1242 | Wireless Door Lock Tuner Circuit Malfunction | 1. Wire harness or connector<br>2. Door control receiver<br>3. Certification ECU (Smart key ECU assembly) | INFO |

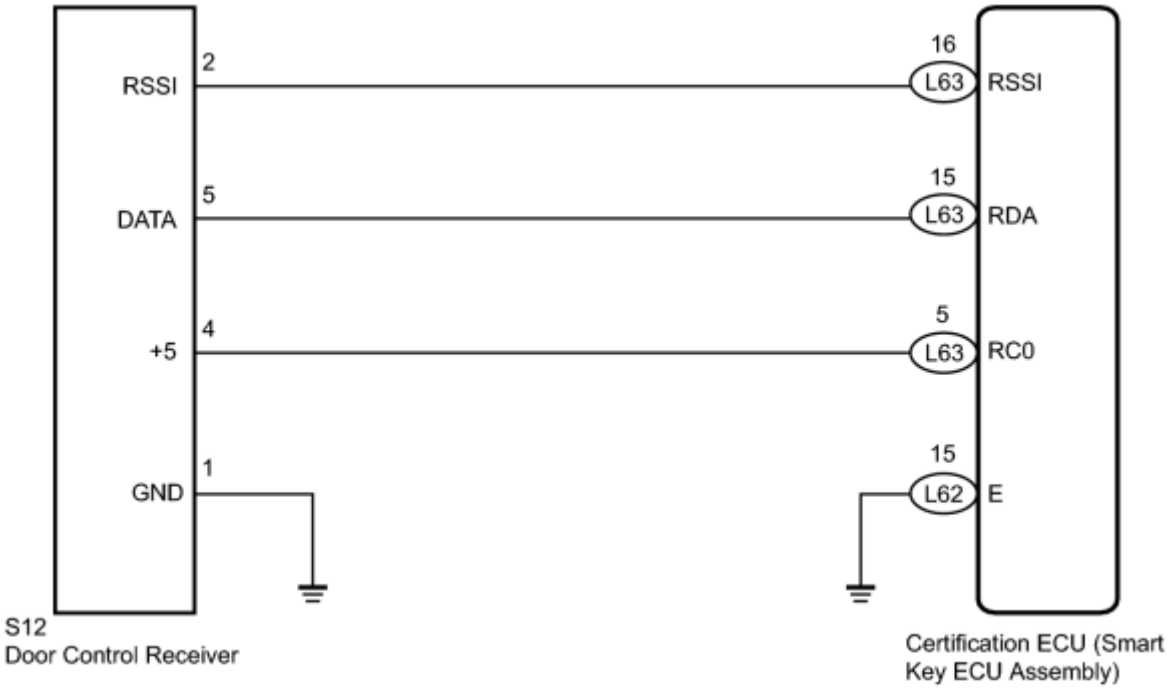
| DTC | B1242 | Wireless Door Lock Tuner Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The door control receiver is used to receive electrical waves relating to the entry functions of the smart key system. The certification ECU (smart key ECU assembly) decodes the requested smart key system operation by identifying a key code based on the electric waves received via the door control receiver. The door control receiver receives a signal from the door control transmitter and sends signals to the main body ECU (multiplex network body ECU) through the certification ECU (smart key ECU assembly). The certification ECU (smart key ECU assembly) then sends a command, according to the requested operation, to each ECU (ex. if door lock operation is requested, the certification ECU (smart key ECU assembly) sends a door lock command to the main body ECU (multiplex network body ECU)).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1242 | • Short in RDA or RSSI to ground between the certification ECU (smart key ECU assembly) and the door control receiver.<br>• Short in RDA or RSSI to ground when RC0 (5 V) output from the ECU is off. | • Wire harness or connector<br>• Door control receiver<br>• Certification ECU (Smart key ECU assembly) |

# WIRING DIAGRAM



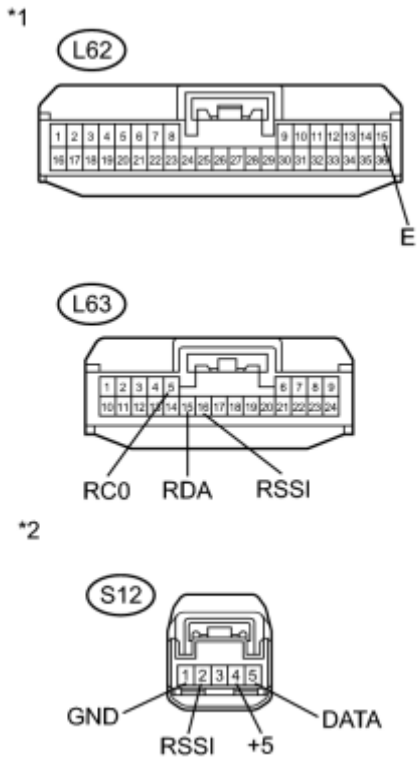
# INSPECTION PROCEDURE

NOTICE:

- When replacing or inspecting the door control receiver and wire harness, do not change the position or length of the wire harness. If the wire harness is too close to the door control receiver, entry and wireless function performance may be affected.
- Before performing the inspection, check that there are no problems related to the CAN communication system and LIN communication system.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (DOOR CONTROL RECEIVER - CERTIFICATION ECU AND BODY GROUND) |




(a) Disconnect the L62 and L63 certification ECU (smart key ECU assembly) connectors.

(b) Disconnect the S12 door control receiver connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L63-16 (RSSI) - S12-2 (RSSI) | Always | Below 1 Ω |
| L63-15 (RDA) - S12-5 (DATA) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L63-5 (RC0) - S12-4 (+5) | Always | Below 1 Ω |
| L62-15 (E) - Body ground | Always | Below 1 Ω |
| S12-1 (GND) - Body ground | Always | Below 1 Ω |
| L63-16 (RSSI) or S12-2 (RSSI) - Body ground | Always | 10 kΩ or higher |
| L63-15 (RDA) or S12-5 (DATA) - Body ground | Always | 10 kΩ or higher |
| L63-5 (RC0) or S12-4 (+5) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

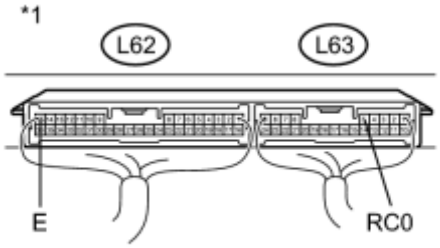
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Door Control Receiver) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 2. | CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) |




(a) Reconnect the L62 and L63 certification ECU (smart key ECU assembly) connectors and the S12 door control receiver connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L63-5 (RC0) - L62-15 (E) | Power switch off, all doors closed and transmitter switch pressed | 4.5 to 5.5 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

▼

| | |
|---|---|
| 3. | REPLACE DOOR CONTROL RECEIVER |

(a) Temporarily replace the door control receiver with a new one INFO.

NEXT

▼

| | |
|---|---|
| 4. | CHECK FOR DTC |

(a) Clear the DTC INFO.

(b) Recheck for DTCs.

OK:

DTC B1242 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

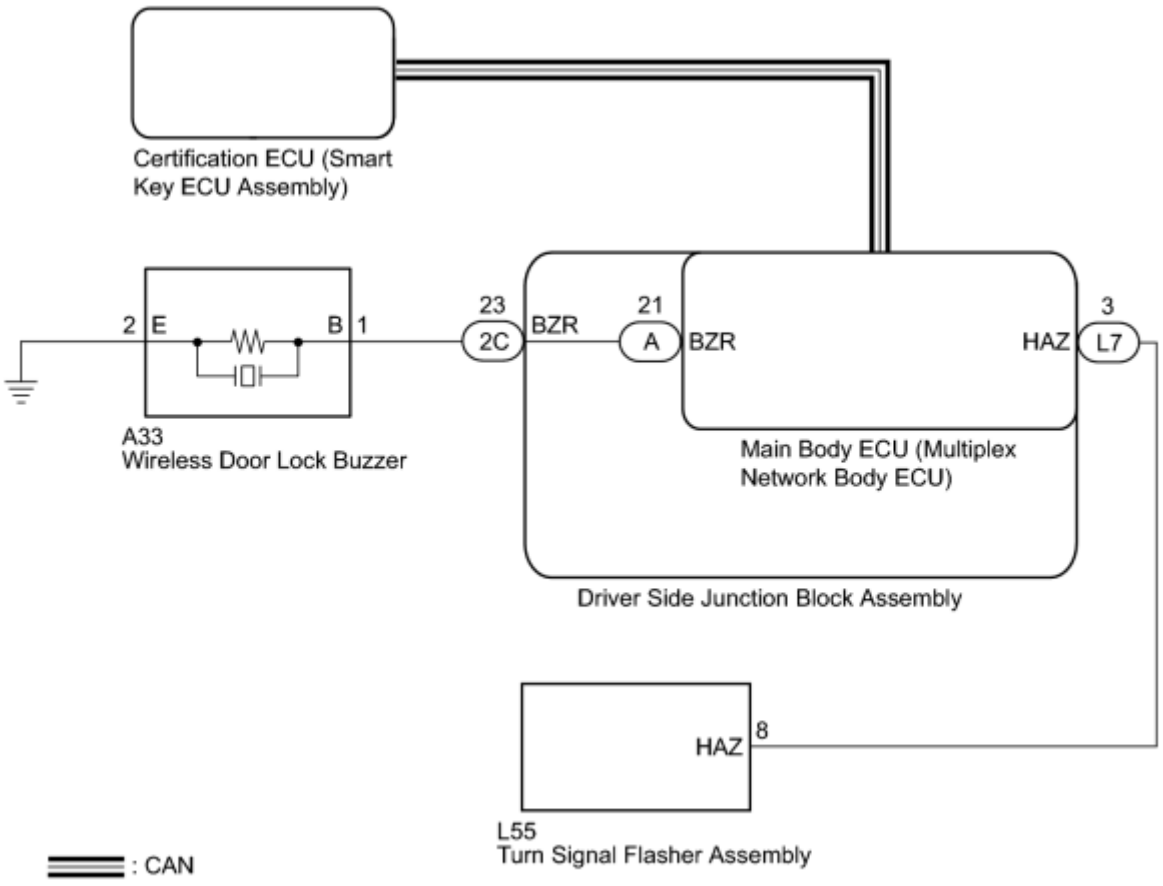
OK ▶ **END (DOOR CONTROL RECEIVER WAS DEFECTIVE)**

| |
|---|
| No Answer-Back |

# DESCRIPTION

In some cases, wireless door lock control functions are normal but the hazard warning light and/or wireless door lock buzzer answer-back function(s) does not operate. In such cases, the hazard warning light and wireless door lock buzzer signals output from the main body ECU (multiplex network body ECU) may be malfunctioning.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Troubleshooting should be started after confirming that the customize status of the answer-back function has been switched on.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (ANSWER-BACK OPERATION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Utility / Customize.

(e) Select the setting by referring to the table below.

***Wireless Door Lock Control System***

| Display (item) | Default | Function | Setting |
|---|---|---|---|
| Hazard Answer Back | ON | When the doors are locked by wireless operation, the hazard warning lights flash once.<br><br>When the doors are unlocked by wireless operation, the hazard warning lights flash twice. | ON or OFF |
| Wireless Buzzer Resp | ON | Wireless door lock buzzer response on or off | ON or OFF |

Result:

| Result | Proceed to |
|---|---|
| Both items are on. | A |
| Either item is off. | B |

B ▶ PERFORM CUSTOMIZE FUNCTION (ANSWER-BACK FUNCTION)

A

▼

| | |
|---|---|
| 2. | CHECK WIRELESS DOOR LOCK CONTROL FUNCTIONS |

(a) Check the wireless door lock control function by the electrical key transmitter.

Result:

| Result | Proceed to |
|---|---|
| Wireless door lock/unlock operates normally. | A |
| Wireless door lock/unlock does not operate normally. | B |

B ▶ GO TO SMART KEY SYSTEM

A

| | |
|---|---|
| 3. | CHECK WIRELESS ANSWER-BACK OPERATION |

(a) Check the wireless answer-back operation by wireless door lock control function.

Result:

| Result | Proceed to |
|---|---|
| Only hazard warning light answer-back does not occur. | A |
| Only wireless door lock buzzer answer-back does not occur. | B |

B PERFORM ACTIVE TEST USING TECHSTREAM (WIRELESS DOOR LOCK BUZZER)

A

| | |
|---|---|
| 4. | CHECK HAZARD WARNING LIGHT OPERATION |

(a) Check that the hazard warning lights flash continuously when the hazard warning signal switch is pressed.

OK:

Hazard warning lights flash continuously.

NG GO TO LIGHTING SYSTEM

OK

| | |
|---|---|
| 5. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Hazard | Turn signal flasher relay | ON/OFF | Observe headlights and rear combination lights for correct operation |

Result:

| Result | Proceed to |
|---|---|
| Turn signal flasher relay does not turn on/off. | A |
| Turn signal flasher relay turns on/off. | B |

B REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

A

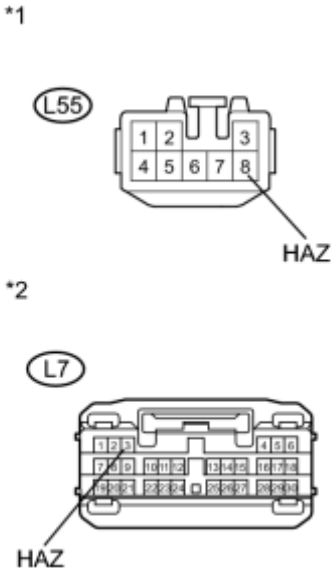
| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (TURN SIGNAL FLASHER ASSEMBLY - MAIN BODY ECU) |

(a) Disconnect the L55 turn signal flasher assembly and L7 main body ECU (multiplex network body ECU) connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L55-8 (HAZ) - L7-3 (HAZ) | Always | Below 1 Ω |
| L55-8 (HAZ) - Body ground | Always | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Turn Signal Flasher Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Main Body ECU (Multiplex Network Body ECU)) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK **REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)**

| | |
|---|---|
| 7. | PERFORM ACTIVE TEST USING TECHSTREAM (WIRELESS DOOR LOCK BUZZER) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

*Main Body (Main Body ECU (Multiplex Network Body ECU))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Wireless Buzzer | Turns the wireless door lock buzzer | ON/OFF | - |

Result:

| Result | Proceed to |
|---|---|
| Wireless door lock buzzer does not turn on/off. | A |
| Wireless door lock buzzer turns on/off. | B |

B ▶ REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

A

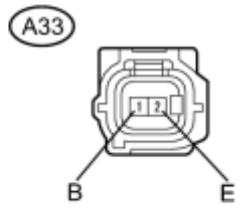
▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (WIRELESS DOOR LOCK BUZZER - DRIVER SIDE JUNCTION BLOCK) |

(a) Disconnect the A33 wireless door lock buzzer and 2C driver side junction block assembly connectors.

(b) Measure the resistance according to the value(s) in the table below.

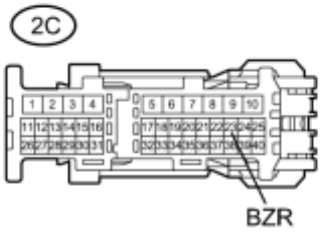
*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A33-1 (B) - 2C-23 (BZR) | Always | Below 1 Ω |
| A33-2 (E) - Body ground | Always | Below 1 Ω |
| A33-1 (B) - Body ground | Always | 10 kΩ or higher |

*2




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Wireless Door Lock Buzzer) |
| *2 | Front view of wire harness connector<br><br>(to Driver Side Junction Block Assembly) |

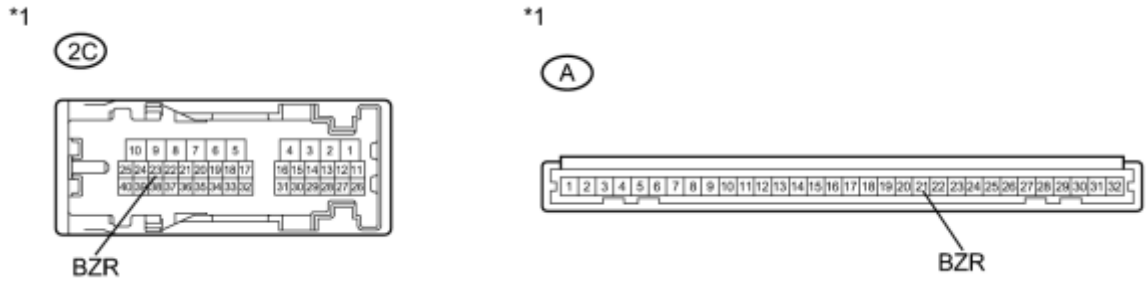
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 9. | CHECK DRIVER SIDE JUNCTION BLOCK ASSEMBLY |

(a) Remove the driver side junction block assembly INFO.




*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Driver Side Junction Block Assembly) |

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2C-23 (BZR) - A-21 (BZR) | Always | Below 1 Ω |

NG ▶ REPLACE DRIVER SIDE JUNCTION BLOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 10. | REPLACE WIRELESS DOOR LOCK BUZZER |

(a) Temporarily replace the wireless door lock buzzer with a new one INFO.

NEXT

▼

| | |
|---|---|
| 11. | CHECK WIRELESS DOOR LOCK BUZZER OPERATION |

(a) Check the operation of the wireless answer-back function.

OK:

Wireless answer-back function operates normally.

NG REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

OK **END (WIRELESS DOOR LOCK BUZZER WAS DEFECTIVE)**

| | |
|---|---|
| 12. | REPLACE MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU) |

(a) Temporarily replace the main body ECU (multiplex network body ECU) with a new one INFO.

NEXT

| | |
|---|---|
| 13. | CHECK WIRELESS DOOR LOCK BUZZER OPERATION |

(a) Check the operation of the wireless function.

OK:

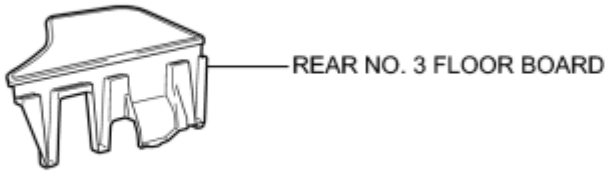
Wireless function operates normally.

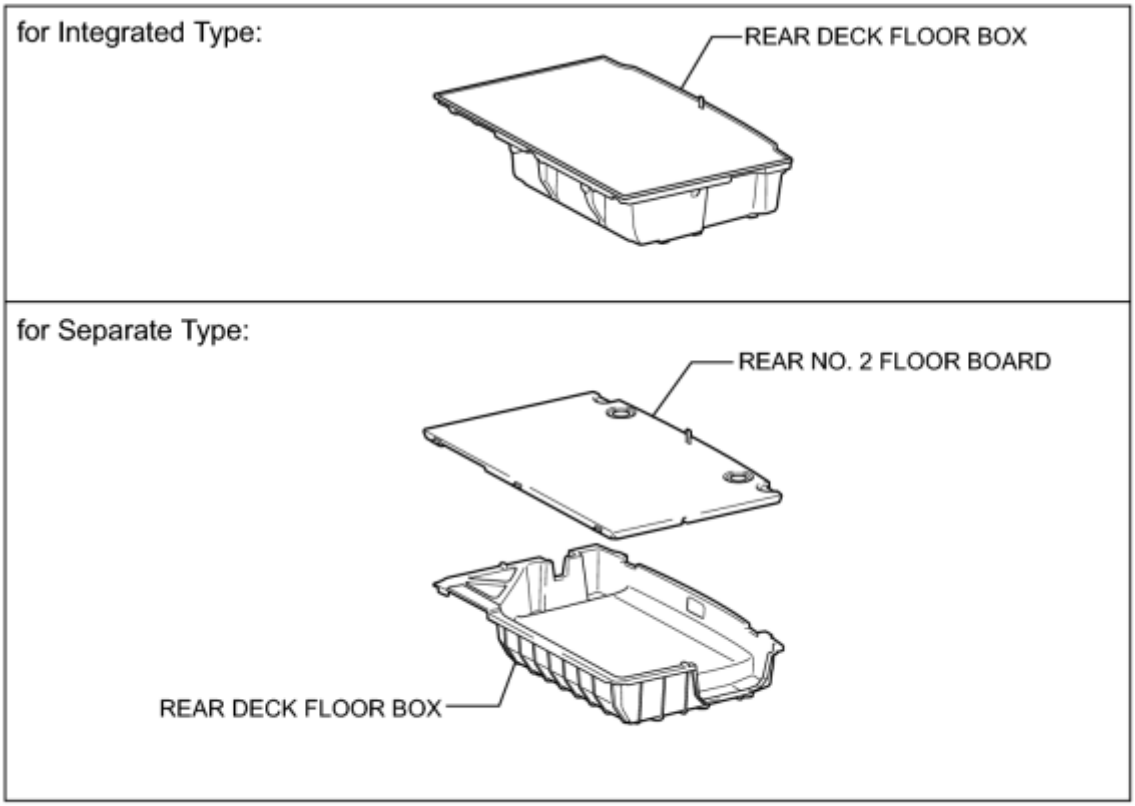
NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK **END (MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU) WAS DEFECTIVE)**

# COMPONENTS

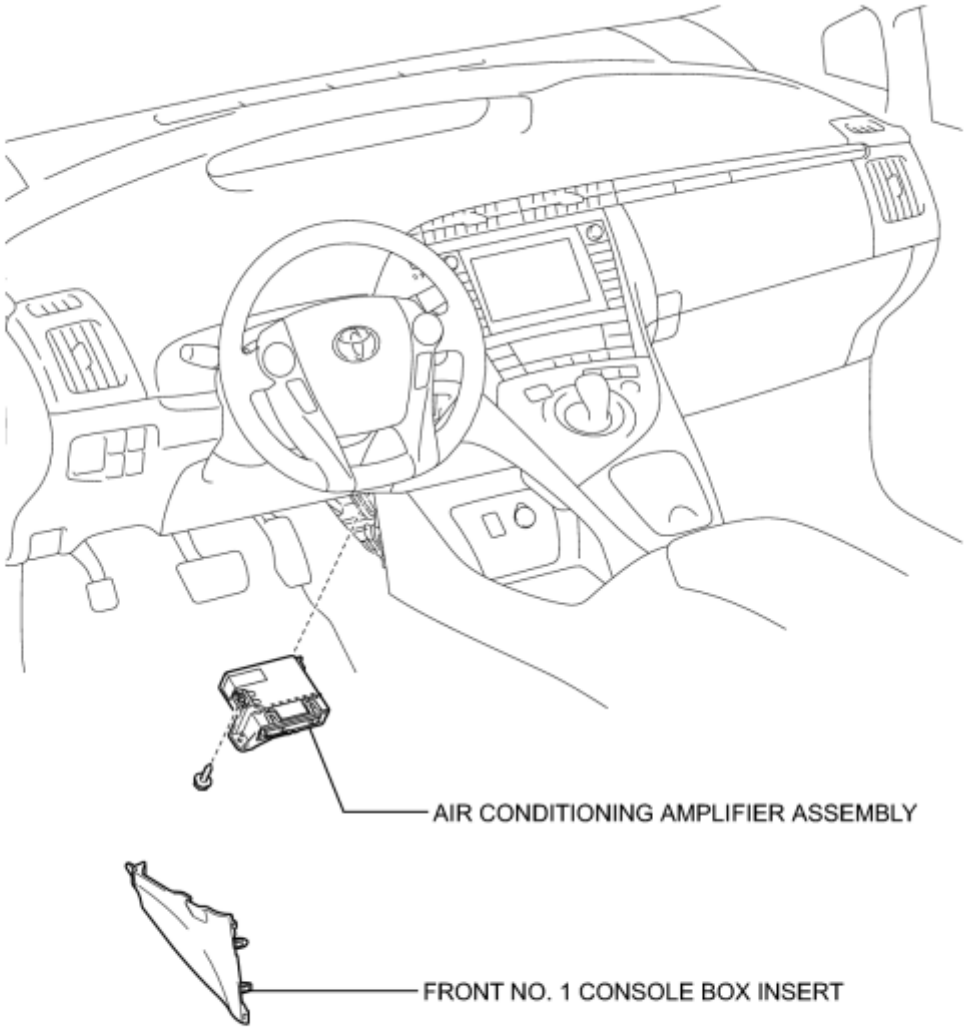
# ILLUSTRATION




P

# ILLUSTRATION


AIR CONDITIONING AMPLIFIER ASSEMBLY
FRONT NO. 1 CONSOLE BOX INSERT

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

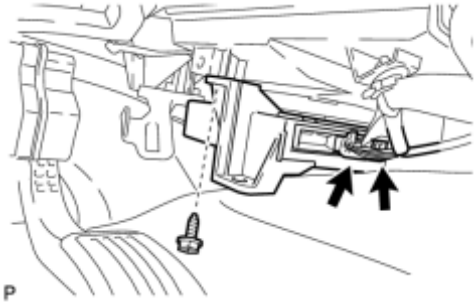
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

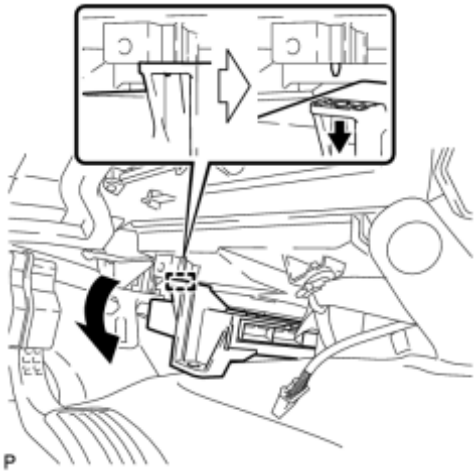
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT NO. 1 CONSOLE BOX INSERT INFO

6. REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY

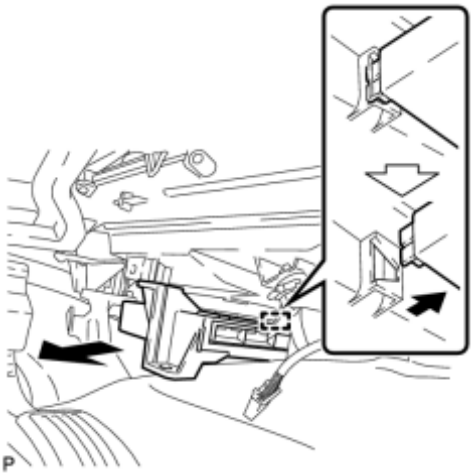



(a) Disconnect each connector and remove the screw.



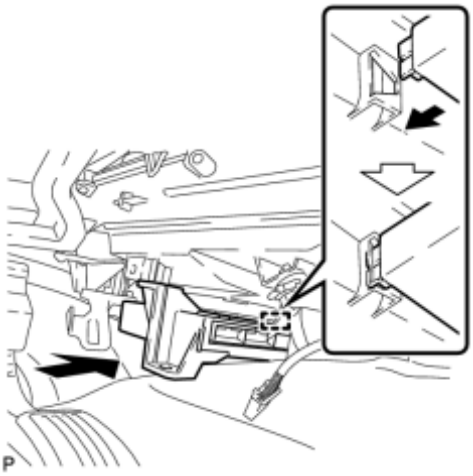

(b) Disengage the guide as shown in the illustration.

(c) Disengage the guide and remove the air conditioning amplifier assembly as shown in the illustration.

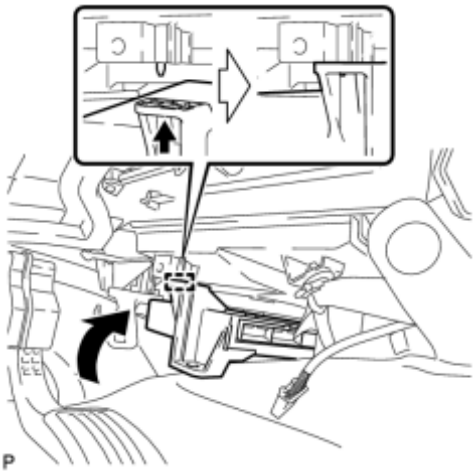


# INSTALLATION

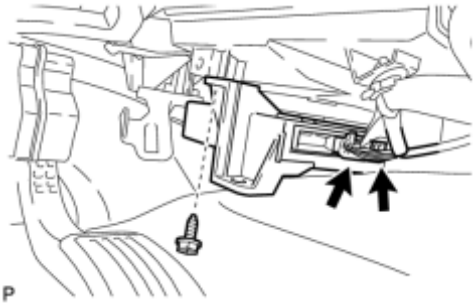
1. INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY



(a) Engage the guide as shown in the illustration.



(b) Engage the guide and install the air conditioning amplifier assembly as shown in the illustration.



(c) Install the screw and connect each connector.

2. INSTALL FRONT NO. 1 CONSOLE BOX INSERT INFO

3. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

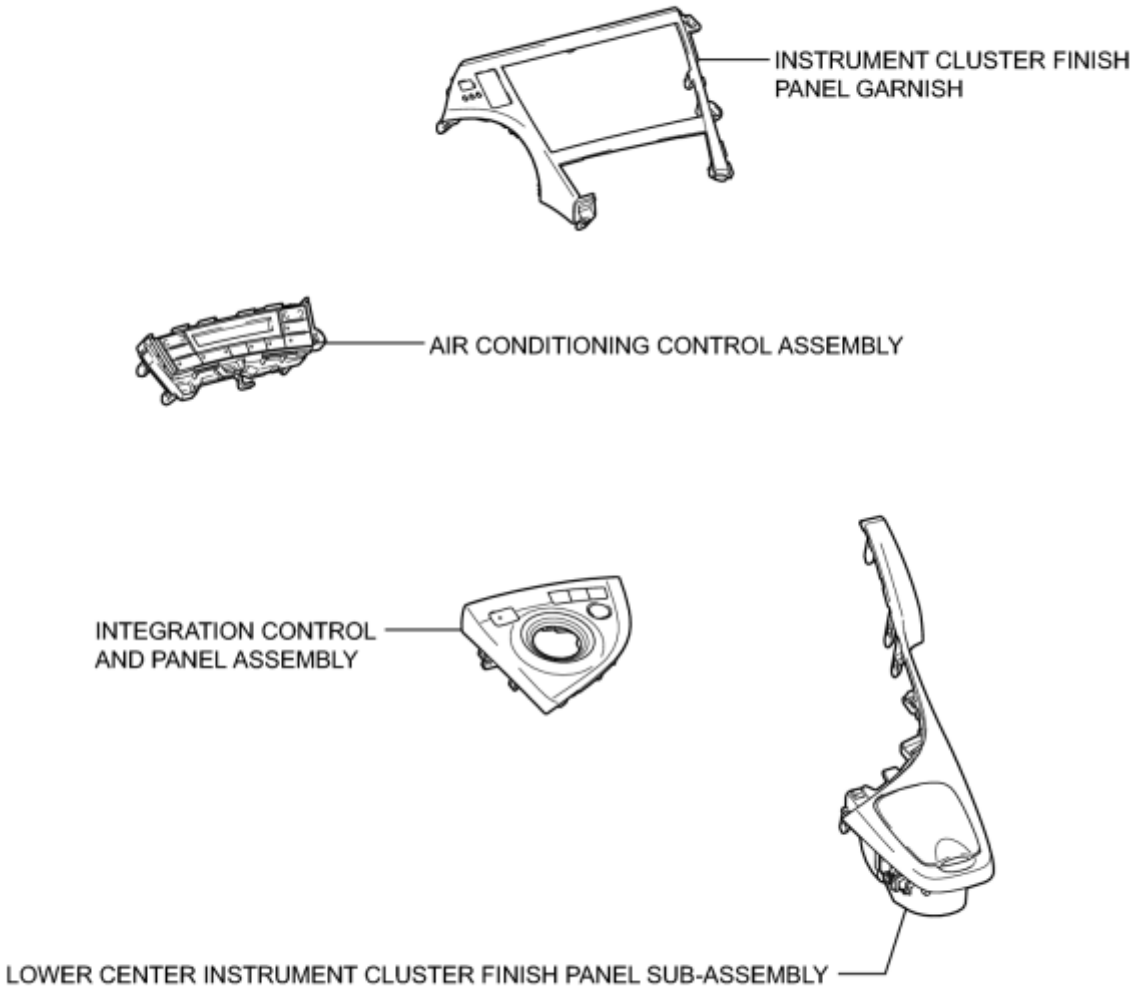
4. INSTALL REAR NO. 3 FLOOR BOARD INFO

5. INSTALL REAR DECK FLOOR BOX INFO

6. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION




P

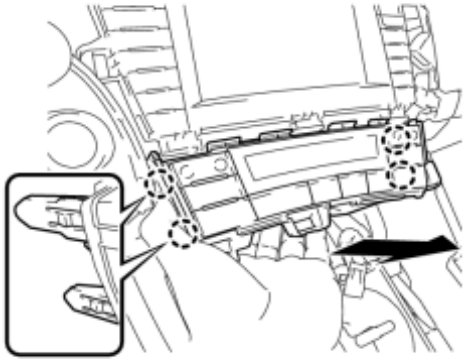
# REMOVAL

1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

2. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

3. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

4. REMOVE AIR CONDITIONING CONTROL ASSEMBLY



P

(a) Disengage the 4 claws and remove the air conditioning control assembly as shown in the illustration.

(b) Disconnect the connector.

NOTICE:

Since the connectors for the air conditioning control assembly and the integration control and panel sub-assembly are the same shape, mark them so that they will not be reconnected incorrectly.

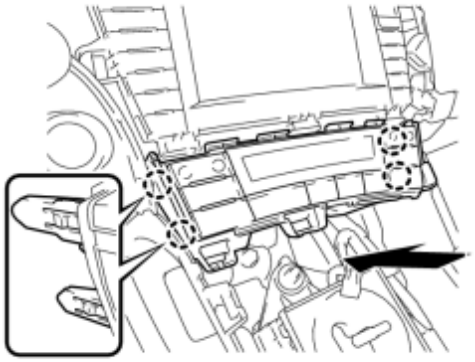
# INSTALLATION

1. INSTALL AIR CONDITIONING CONTROL ASSEMBLY

(a) Connect the connector.

NOTICE:

Since the connectors for the air conditioning control assembly and the integration control and panel sub-assembly are the same shape, take care to connect each connector to the correct component.



(b) Engage the 4 claws to install the air conditioning control assembly.

P

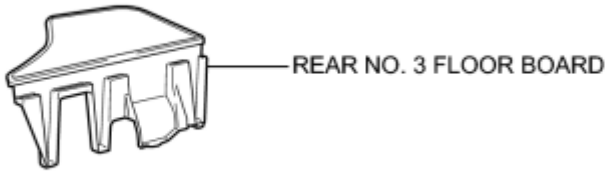
2. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

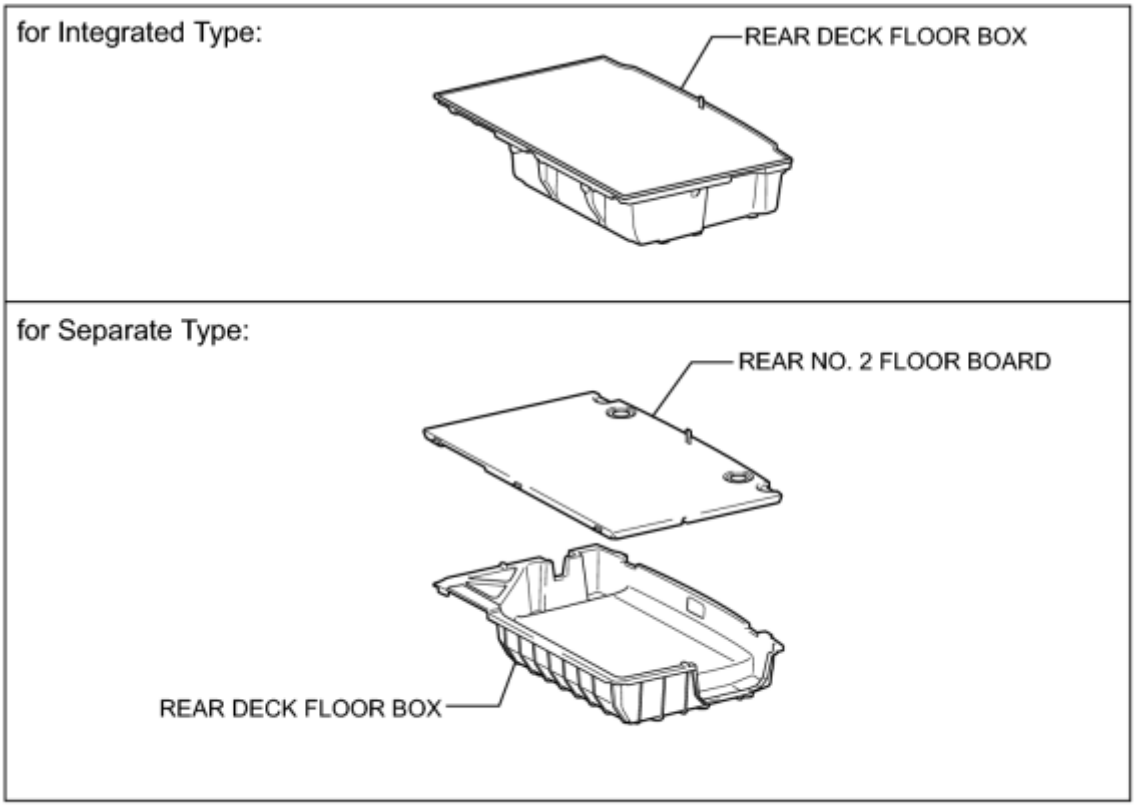
3. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

4. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

# COMPONENTS

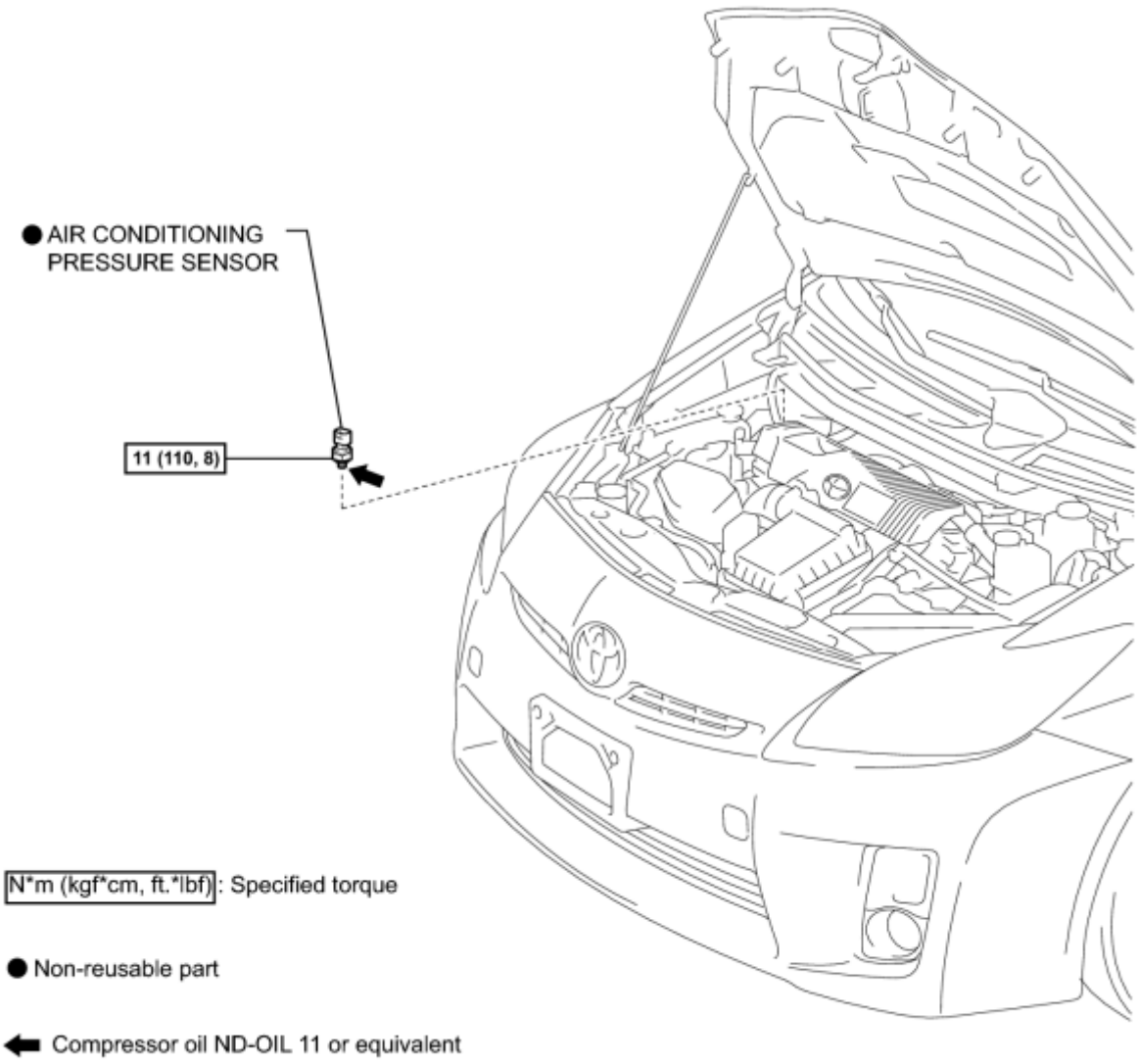
# ILLUSTRATION




P

# ILLUSTRATION


● AIR CONDITIONING PRESSURE SENSOR
11 (110, 8)
N*m (kgf*cm, ft.*lbf): Specified torque
● Non-reusable part
Compressor oil ND-OIL 11 or equivalent

P

# REMOVAL

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE AIR CONDITIONING PRESSURE SENSOR



(a) Disconnect the connector.

(b) Remove the air conditioning pressure sensor.

NOTICE:

Do not deform the piping.

# INSTALLATION

1. INSTALL AIR CONDITIONING PRESSURE SENSOR



(a) Sufficiently apply compressor oil to a new air conditioning pressure sensor.

Compressor oil:

ND-OIL 11 or equivalent

- Keep the O-ring and O-ring fitting surfaces clean from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.

(b) Install the new air conditioning pressure sensor.

Torque: **11 N·m (110 kgf·cm, 8ft·lbf)**

NOTICE:

- Do not deform the piping.
- Make sure to confirm that the piping does not disengage from the plastic clamp.

(c) Connect the connector.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

3. INSTALL REAR NO. 3 FLOOR BOARD INFO

4. INSTALL REAR DECK FLOOR BOX INFO

5. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

6. CHARGE WITH REFRIGERANT INFO

7. WARM UP COMPRESSOR INFO

8. INSPECT FOR REFRIGERANT LEAK INFO

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the terminal is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. GENERAL PRECAUTION

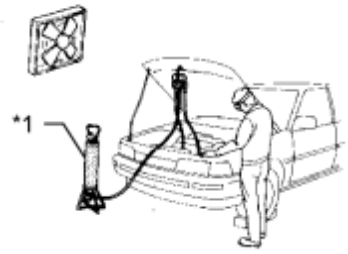
(a) While using the battery during inspection, do not bring the positive (+) and negative (-) tester probes too close to each other as a short circuit may occur.

3. PRECAUTIONS WHEN USING TECHSTREAM

(a) When using the Techstream with the power switch off to troubleshoot:

Connect the Techstream to the vehicle, and turn a courtesy light switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

(b) After all DTCs are cleared, check if the trouble occurs again 6 seconds after the power switch is turned on (IG).




4. DO NOT HANDLE REFRIGERANT IN ENCLOSED AREA OR NEAR OPEN FLAME

## Text in Illustration

| | |
|---|---|
| *1 | Charging Cylinder |

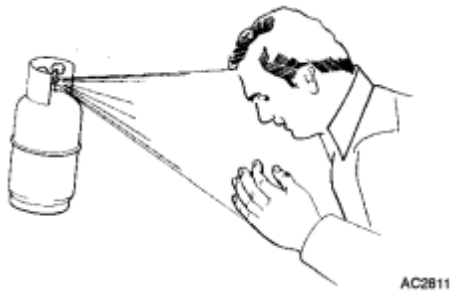
5. ALWAYS WEAR EYE PROTECTION

6. BE CAREFUL NOT TO GET LIQUID REFRIGERANT IN YOUR EYES OR ON YOUR SKIN

If liquid refrigerant gets in your eyes or on your skin:

(a) Wash the area with lots of cold water.

CAUTION:



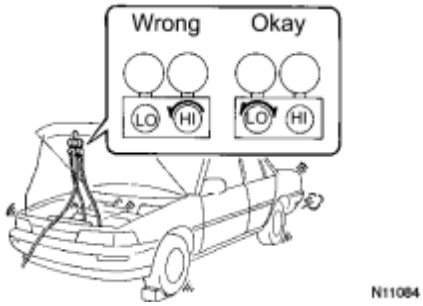

Do not rub your eyes or skin.

(b) Apply clean petroleum jelly to the skin.

(c) Go immediately to a hospital or see a physician for professional treatment.

7. NEVER HEAT CONTAINER OR EXPOSE THE CONTAINER TO AN OPEN FLAME

8. BE CAREFUL NOT TO DROP CONTAINER OR APPLY PHYSICAL SHOCKS TO IT




9. DO NOT OPERATE COMPRESSOR WITHOUT ENOUGH REFRIGERANT IN AIR CONDITIONING SYSTEM

If there is not enough refrigerant in the A/C system, oil lubrication will be insufficient and the compressor may be damaged.

Necessary care should be taken to avoid this.

10. DO NOT OPEN HIGH PRESSURE MANIFOLD VALVE WHILE COMPRESSOR IS OPERATING

(a) Open and close only the low pressure valve.

If the high pressure valve is opened, refrigerant flows in the reverse direction causing the charging cylinder to rupture.

11. BE CAREFUL NOT TO OVERCHARGE SYSTEM WITH REFRIGERANT

If refrigerant is overcharged, it causes problems such as insufficient cooling, poor fuel economy, engine overheating, etc.

12. DO NOT OPERATE COMPRESSOR WITHOUT REFRIGERANT

CAUTION:

Doing so may damage inside the compressor because the compressor parts always move regardless of whether the A/C system is turned on or off.

13. PRECAUTIONS TO BE OBSERVED WHILE SERVICING

CAUTION:

Always use electric insulating gloves and remove the service plug grip before beginning inspection, as inspection of the A/C system requires disconnecting high voltage connectors.

NOTICE:

- Only use ND-OIL11 for the electric inverter compressor of the air conditioning system. Using other compressor oils may be dangerous, as they may conduct electricity.
- Electrical insulation performance may decrease significantly if even a small amount of oil other than ND-OIL11 is used (or enters) in the refrigeration cycle, causing a DTC to be output.
- If other oil is accidentally used and a DTC is output, collect the compressor oil in the compressor and replace it with ND-OIL11 to increase the ND-OIL11 ratio amount.
- Replace the main components (evaporator, condenser, and compressor) if a large amount of oil other than ND-OIL11 enters the system. Failing to do so may cause electrical insulation performance to remain low, causing a DTC to be output.

14. SUPPLEMENTAL RESTRAINT SYSTEM (SRS)

(a) This vehicle is equipped with an Supplemental Restraint System (SRS) such as the driver, front passenger, side and curtain shield airbags. Failure to carry out service operations in the correct sequence could cause the SRS to unexpectedly deploy during servicing, possibly leading to a serious accident. Before servicing (including removal or installation of parts, inspection or replacement), be sure to read the precautionary notices INFO.

15. PRECAUTIONS WHEN WORKING (w/ Remote Air Conditioning System and Solar Ventilation System)

(a) Vehicles with the remote air conditioning system have the following risks that it is necessary to be aware of when performing repairs. Therefore, make sure to take care of the key (electrical transmitter) carefully so that the remote air conditioning system is not operated unexpectedly.

***Risks***

| |
|---|
| The electrical fan and other items in the engine compartment may operate resulting in various hazards. |
| The wipers may operate if the wiper switch is in the on position when the remote air conditioning system is activated. If this occurs, there is the potential for damage to the glass, wipers or injury. |
| When the light control switch is in the tail, head or AUTO position, the headlights may turn on. |
| Short circuits may occur if electrical inspections are being performed when the remote air conditioning system is turned on, because the IG circuit is powered at this time. |

CAUTION:

Failure to take proper care with the key (electrical transmitter) may cause the system to be accidentally operated. This can lead to an accident and damage to parts or a serious injury.

HINT:

Make sure to store the key (electrical transmitter) in a box with the switch side facing up, and place the box where it can be monitored so that no one cannot operate the remote A/C switch.

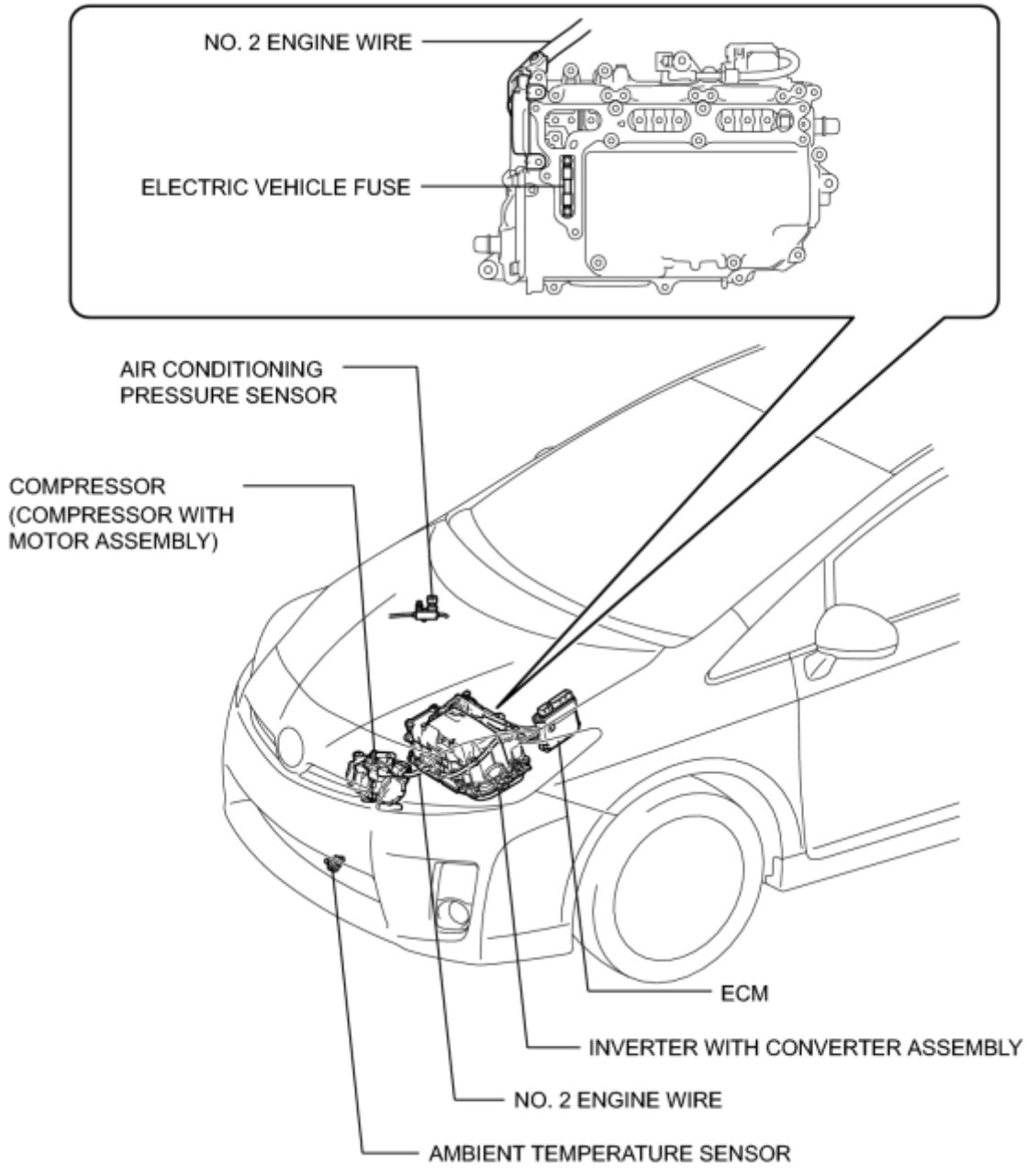
(b) When performing repairs on vehicles with the solar ventilation system, turn the solar ventilation switch off.

CAUTION:

Depending on the environment around the vehicle, performing repairs with the solar ventilation switch on may cause the blower motor to operate unexpectedly, resulting in various hazards. This can lead to damage to parts or a serious injury.

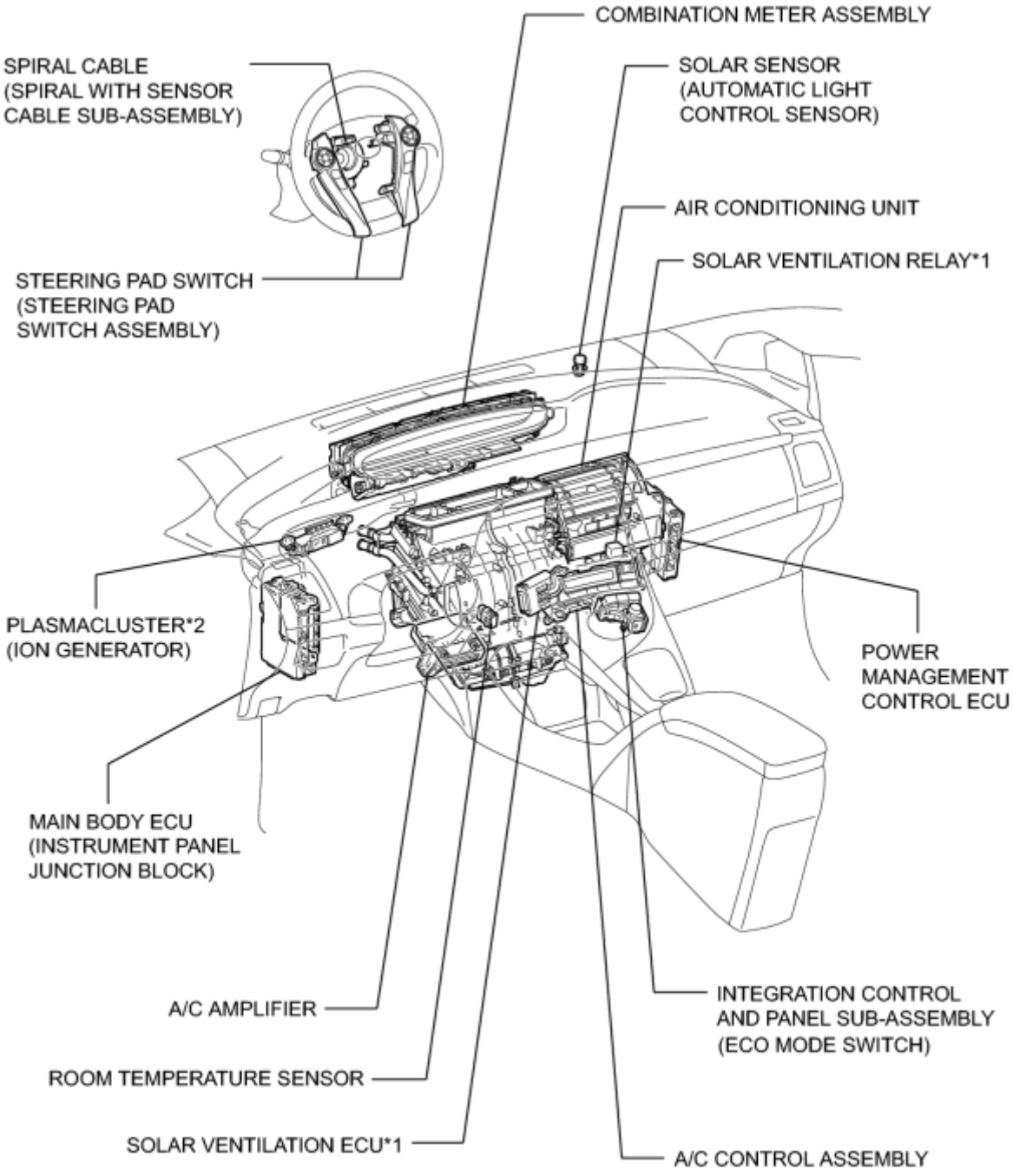
# PARTS LOCATION

# ILLUSTRATION




H

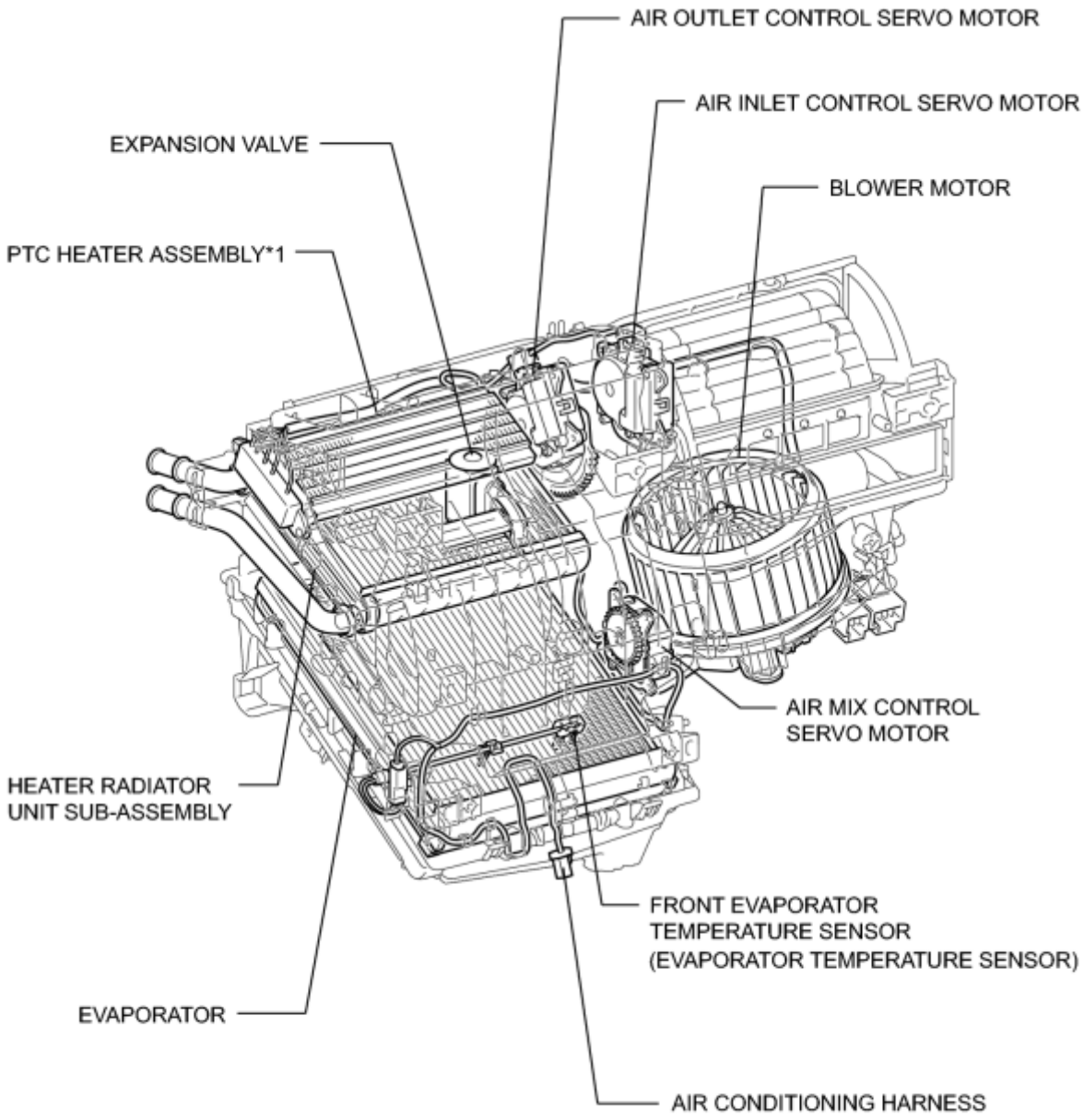
# ILLUSTRATION




*1: w/ Solar Ventilation System *2: w/ Plasmacluster (Ion Generator)

H

# ILLUSTRATION

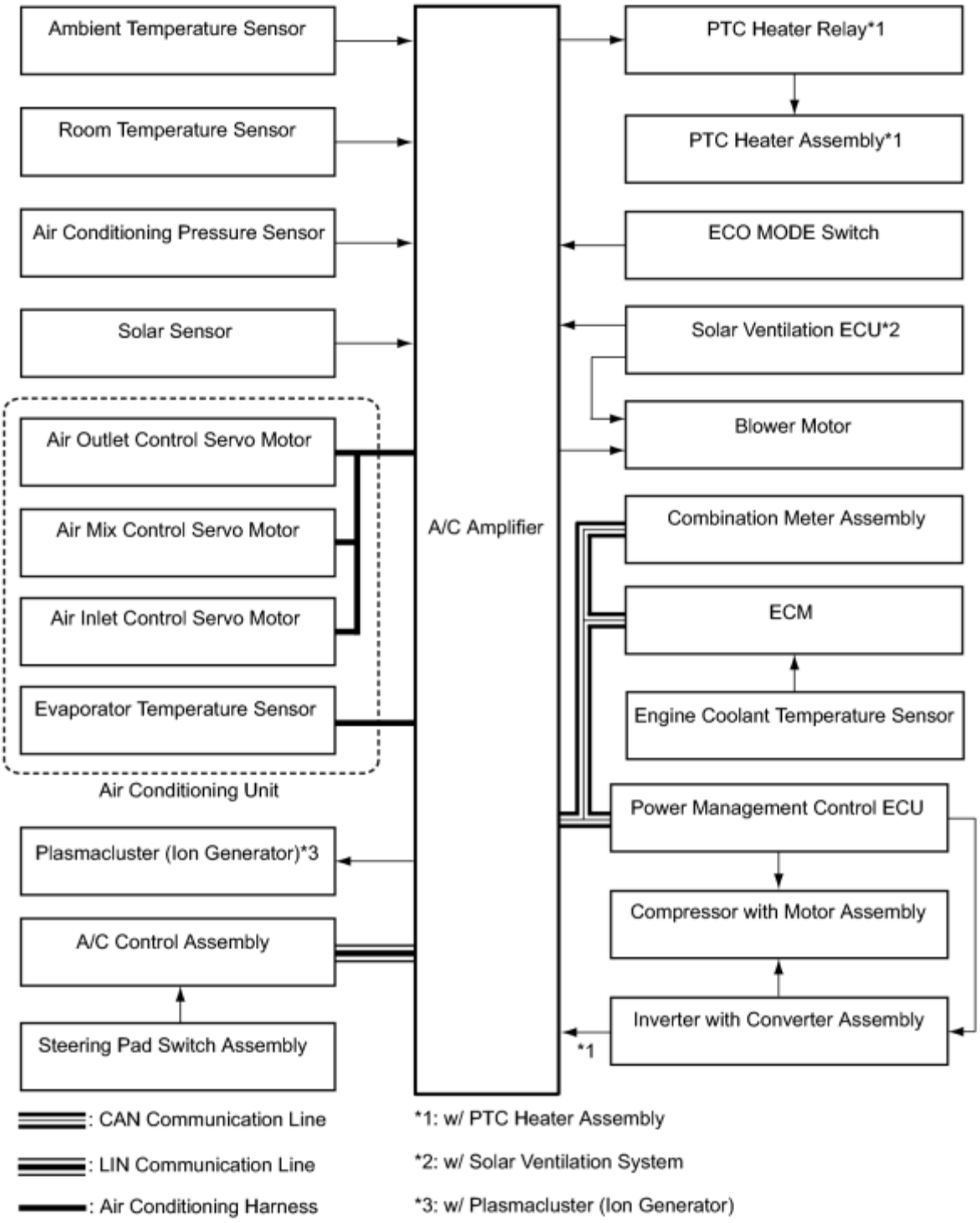



*1: w/ PTC Heater Assembly

H

# SYSTEM DIAGRAM

1. Air Conditioning System

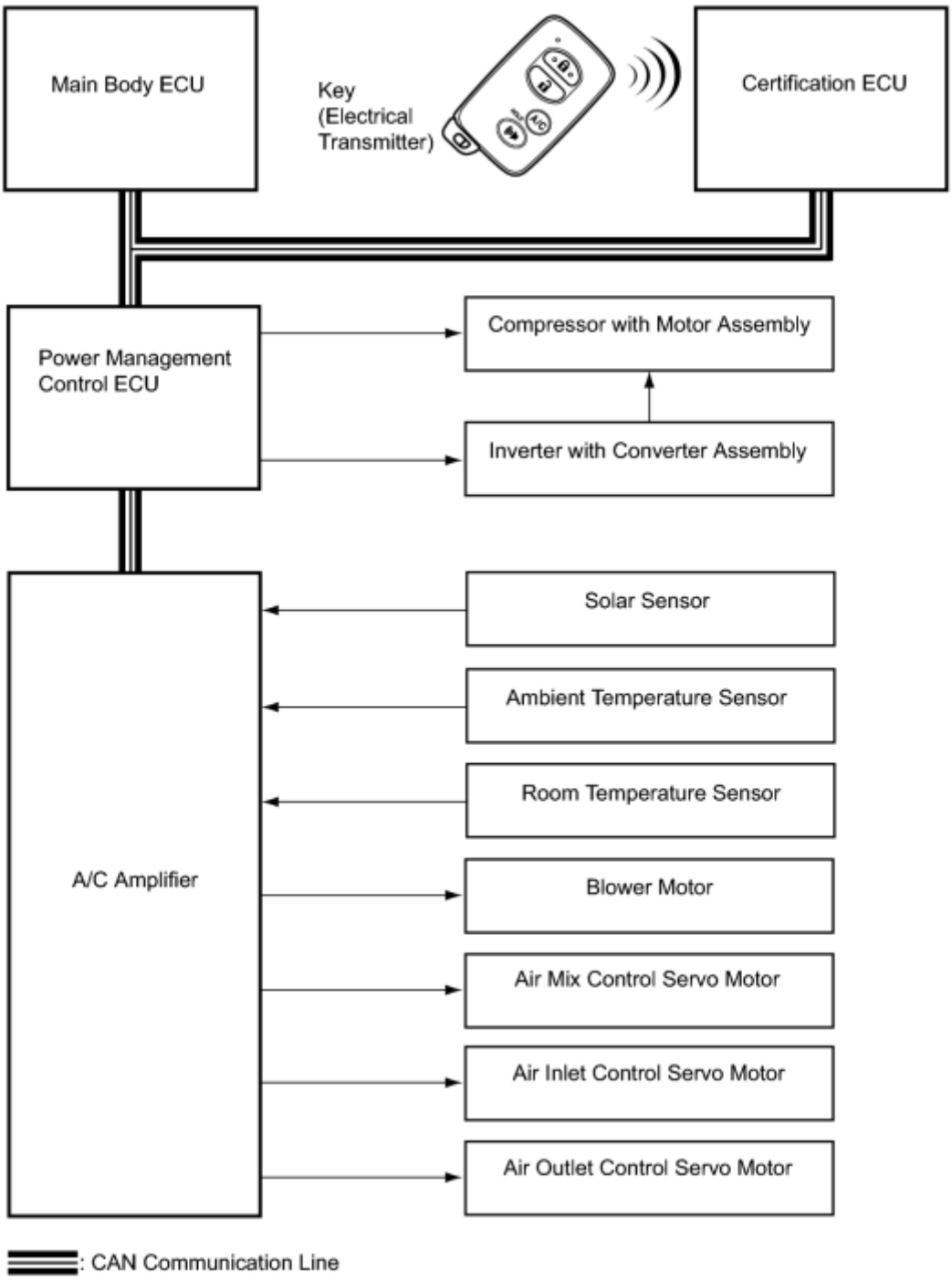


*Communication Table*

| Sender | Receiver | Signal | Communication Line |
|---|---|---|---|
| A/C amplifier | ECM | Heater idle up request signal | CAN |
| | | ECO switch information signal | |
| | | Prior A/C control request signal | |
| | | Cooling fan motor driving request signal | |
| | | Refrigerant gas pressure sensor signal | |
| | | Ambient temperature signal | |
| A/C amplifier | Power management control ECU | Heater idle up request signal | CAN |
| | | ECO switch information signal | |
| | | Prior A/C control request signal | |
| | | Water pump ON/OFF request signal | |
| | | Inverter STB ON/OFF request signal | |
| | | Electrical compressor start signal | |
| | | Electrical compressor target revolutions signal | |
| | | A/C control state signal | |
| A/C amplifier | A/C control assembly | Ambient temperature indicator signal | LIN |
| | | MODE indication signal | |
| | | Blower level indication signal | |
| | | Set temperature indication signal | |
| Combination meter assembly | A/C amplifier | Vehicle speed signal | CAN |
| ECM | A/C amplifier | Engine revolution speed signal | CAN |
| | | Engine coolant temperature signal | |
| Power management control ECU | A/C amplifier | A/C inverter main power supply voltage signal | CAN |
| | | A/C inverter output signal | |
| | | A/C inverter internal power source malfunction | |
| | | STB wire short | |
| | | State of STB | |
| | | A/C inverter temperature information | |
| | | Compressor start flag | |

| Sender | Receiver | Signal | Communication Line |
|---|---|---|---|
| | | Compressor humidity control start flag | |
| | | A/C motor revolution signal | |
| | | A/C motor current request signal | |
| A/C control assembly | A/C amplifier | AUTO switch signal | LIN |
| | | A/C switch signal | |
| | | Fr DEF switch signal | |
| | | Rr DEF switch signal | |
| | | MODE switch signal | |
| | | REC/FRS switch signal | |
| | | Micro dust and pollen filter mode switch signal | |
| | | Blower switch signal (FAN+, FAN-, OFF) | |
| | | Set temperature switch signal (UP, DOWN) | |

2. Remote Air Conditioning System




### *Communication Table*

| Sender | Receiver | Signal | Communication Line |
|---|---|---|---|
| Key (Electrical Transmitter) | Certification ECU | Remote air conditioning system activation request signal | Radio waves |
| | | Remote air conditioning system stop | |

| Sender | Receiver | Signal | Communication Line |
|---|---|---|---|
| | | request signal | |
| Certification ECU | Main Body ECU | Remote air conditioning system activation request signal | CAN |
| | | Remote air conditioning system stop request signal | |
| Main Body ECU | Power Management Control ECU<br><br>(Power Control Section) | Remote air conditioning system power ON/OFF request signal | CAN |
| | | Remote air conditioning system mode notification signal | |
| | Power Management Control ECU<br><br>(HV System Control Section) | HV system ON/OFF request signal | |
| | | Remote air conditioning system mode notification signal | |
| | A/C amplifier | Remote air conditioning system mode notification signal | |
| | Certification ECU | Remote air conditioning system mode notification signal | |
| Power Management Control ECU<br><br>(Power Control Section) | Main Body ECU | Power mode status signal | CAN |
| Power Management Control ECU<br><br>(HV System Control Section) | Main Body ECU | Remote air conditioning system activation permission signal | CAN |
| | | Remote air conditioning system activation prohibition signal | |
| | A/C Amplifier | Remote air conditioning system activation permission signal | |
| | | Remote air conditioning system activation prohibition signal | |
| A/C Amplifier | Main Body ECU | Remote air conditioning system OFF request signal | CAN |

HINT:

For details of the remote air conditioning system, refer to System Description INFO.

# SYSTEM DESCRIPTION

1. GENERAL

(a) The air conditioning system uses the following types of control.

| Control | | Outline |
|---|---|---|
| Neural Network Control | | This control is capable of effecting complex control by artificially simulating the information processing method of the nervous system of living organisms in order to establish a complex input or output relationship that is similar to a human brain. |
| Outlet Air Temperature Control | | In compliance with the temperature set at the temperature control switch, the neural network control calculates the outlet temperature based on the input signals from various sensors. In addition, corrections in accordance with the signals from the evaporative temperature sensor and water temperature sensor are added to control the outlet air temperature. |
| Blower Control | | Controls the blower motor in accordance with the airflow volume that has been calculated by the neural network control based on the input signals from various sensors. |
| Air Outlet Control | | Automatically switches the outlets in accordance with the outlet mode ratio that has been calculated by the neural network control based on the input signals from various sensors. |
| Micro Dust and Pollen Filter Mode Control | | • Activated by the micro dust and pollen filter mode switch operation.<br>• Switches the air vent to the FACE mode.<br>• Sends air which has passed through the clean air filter to the area around the upper part of the bodies of the driver and front passenger. This air is filtered by the clean air filter in order to remove pollen. |
| Air Inlet Control | | Automatically controls the air inlet control damper in accordance with the outlet temperature that has been calculated by the neural network control. |
| Electric Inverter Compressor Control | Compressor Speed Control | The A/C amplifier calculates the target speed of the compressor based on the target evaporator temperature (which is calculated by the temperature control switch, room temperature sensor, ambient temperature sensor, and solar sensor) and the actual evaporator temperature that is detected by the evaporator temperature sensor in order to control the compressor speed. |
| | | The A/C amplifier calculates the target evaporator temperature, which includes corrections based on the temperature control switch, room temperature sensor, ambient temperature sensor, solar sensor, and evaporator temperature sensor. Accordingly, the A/C amplifier controls the compressor speed to an extent that would not inhibit the proper cooling performance or defogging performance. |
| PTC Heater Control*1 | | When the hybrid control system is operating (READY), and the blower motor is turned on, the A/C amplifier turns on the PTC heater assembly if the conditions listed below are met:<br>• Engine coolant temperature is below specified temperature.<br>• Outside temperature is below specified temperature<br>• Tentative air mix damper opening angle is above the specified value (MAX |

| Control | Outline |
| --- | --- |
| | HOT). |
| Plasmacluster (Ion Generator) Control*2 | The Plasmacluster generator is controlled by the air conditioning amplifier assembly and operates in conjunction with the blower with fan motor sub-assembly. |
| ECO Mode Control | When the ECO MODE switch is turned on, the A/C amplifier limits the air conditioning system performance. |
| Remote Air Conditioning System Control*3 | When the remote A/C switch on the key (electrical transmitter) is pressed, the air conditioning system is automatically controlled and operated for a maximum of 3 minutes using power from the HV battery. |

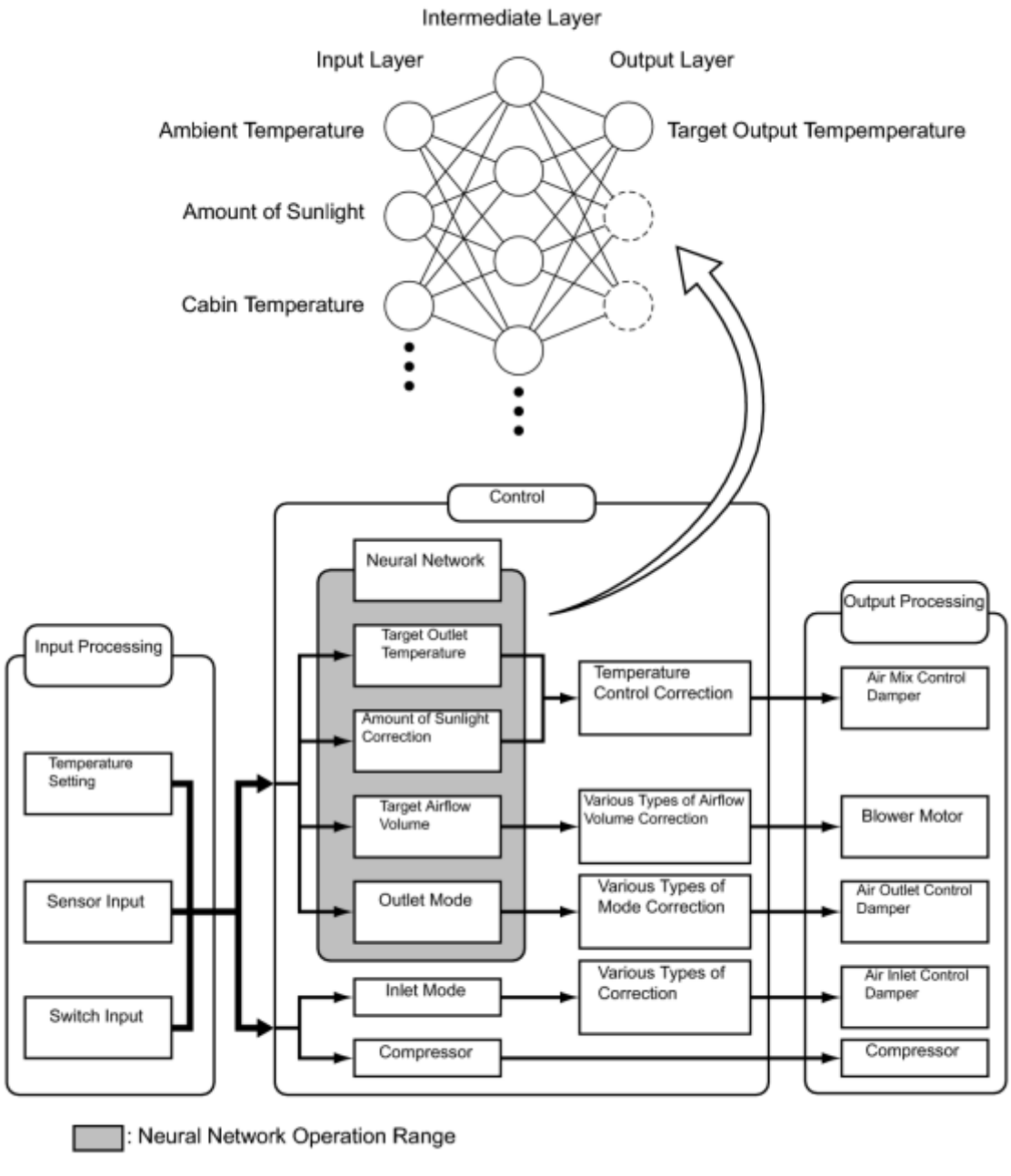
- *1: w/ PTC heater assembly
- *2: w/ Plasmacluster (ion generator)
- *3: w/ Remote air conditioning system

## 2. NEURAL NETWORK CONTROL

- In the previous automatic air conditioning systems, the A/C amplifier determined the required outlet air temperature and blower air volume in accordance with the calculation formula that has been obtained based on information received from the sensors.

  However, because the senses of a person are rather complex, a given temperature is sensed differently, depending on the environment in which the person is situated. For example, a given amount of sunlight can feel comfortably warm in a cold climate, or extremely uncomfortable in a hot climate. Therefore, as a technique for effecting a higher level of control, a neural network has been adopted in the automatic air conditioning system. With this technique, the data that has been collected under varying environmental conditions is stored in the A/C amplifier. The A/C amplifier can then effect control to provide enhanced air conditioning comfort.

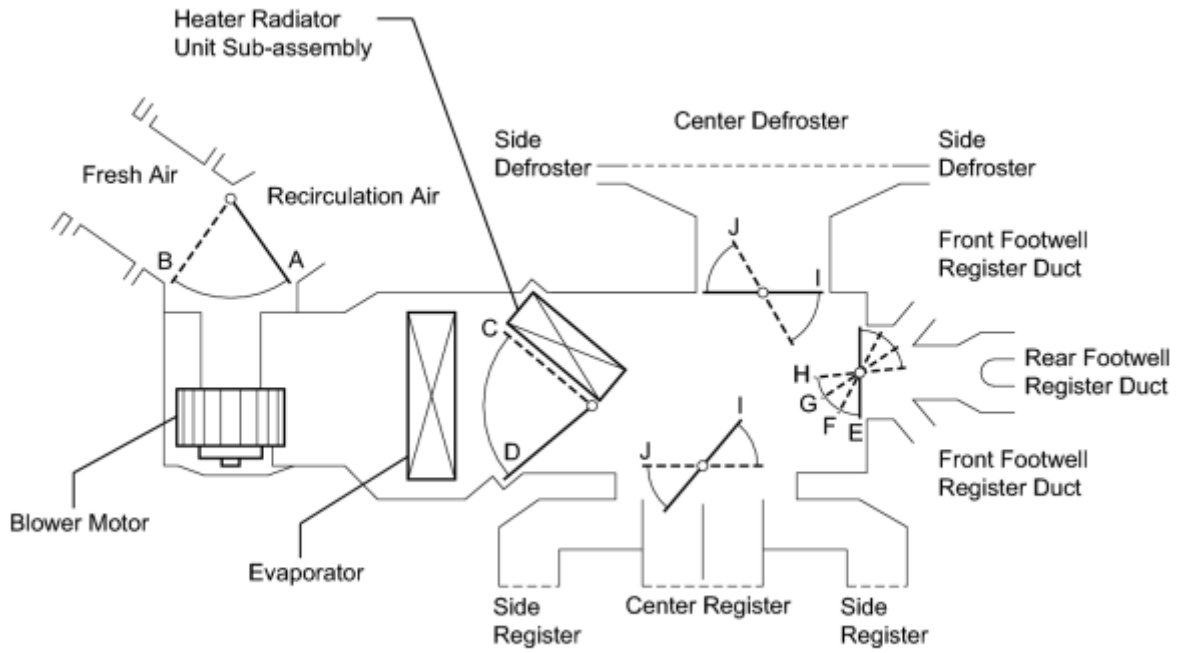
- The neural network control consists of neurons in the input layer, intermediate layer and output layer. The input layer neurons process the input data of the outside temperature, the amount of sunlight and the room temperature based on the outputs of the switches and sensors, and output them to the intermediate layer neurons. Based on this data, the intermediate layer neurons adjust the strength of the links among the neurons. The sum of these is then calculated by the output layer neurons in the form of the required outlet temperature, solar correction, target airflow volume and outlet mode control volume. Accordingly, the A/C amplifier controls the servo motors and blower motor in accordance with the control volumes that have been calculated by the neural network control.




H

3. MODE POSITION AND DAMPER OPERATION

(a) Mode Position and Damper Operation




H

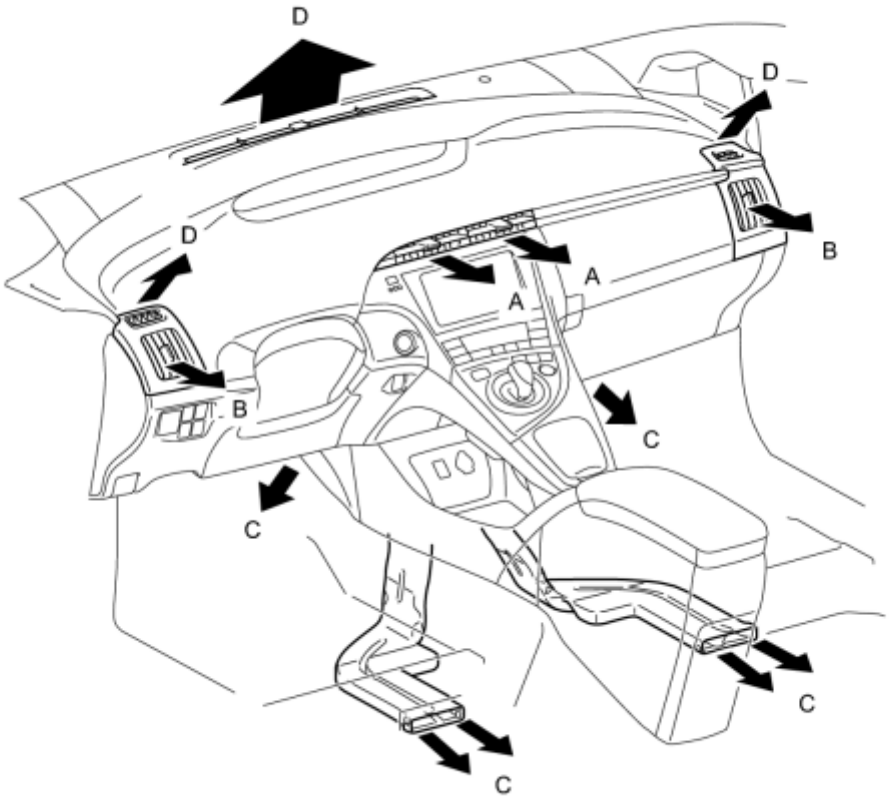
### *Functions of Main Dampers*

| Control Damper | Operation Position | Damper Position | Operation |
|---|---|---|---|
| Air Inlet Control Damper | FRESH | A | Allows fresh air to enter. |
| | RECIRCULATION | B | Causes internal air to recirculate. |
| Air Mix Control Damper | MAX COLD to MAX HOT Temperature Setting | C - D | Varies the mixture ratio of warm air and cool air in order to regulate the temperature continuously between hot and cold. |
| Air Outlet Control Damper | DEF | J, E | Defrosts the windshield through the center defroster, side defroster and side registers. |
| | FOOT/DEF | J, F | Defrosts the windshield through the center defroster, side defrosters, side registers while air is also blown out from the front and rear footwell register ducts. |
| | FOOT | J, H | Air blows out of the front and rear footwell register ducts, and side registers. In addition, air blows out slightly from the center defroster and side defrosters. |

| Control Damper | Operation Position | Damper Position | Operation |
|---|---|---|---|
| | BI-LEVEL  | I, G | Air blows out of the front and rear center register, side register and front and rear footwell register ducts. |
| | FACE  | I, E | Air blows out of the front center register and side register ducts. |

4. AIR OUTLETS AND AIRFLOW VOLUME

(a) Air Outlets and Airflow Volume




H

| Indication | Mode | FACE | | FOOT | DEF |
|---|---|---|---|---|---|
| | | CTR | SIDE | C | D |
| | | A | B | | |

| Indication | Mode | FACE | | FOOT | DEF |
|---|---|---|---|---|---|
| | | CTR | SIDE | C | D |
| | | A | B | | |
|  | FACE | ○ | ○ | — | — |
|  | B/L | ○ | ○ | ○ | — |
|  | FOOT | — | ○ | ○ | ○ |
|  | F/D | — | ○ | ○ | ○ |
|  | DEF | — | ○ | — | ○ |

The size of each circle ○ indicates the ratio of airflow volume.

5. OUTLINE OF REMOTE AIR CONDITIONING SYSTEM

(a) Outline

(1) When the remote A/C switch on the key (electrical transmitter) is pressed, the air conditioning system is automatically controlled and operated for a maximum of 3 minutes using power from the HV battery.

HINT:

The remote air conditioning system starts operating when all of the following operating conditions are met:

***Operating Condition***

| Item | Condition |
|---|---|
| Power switch | • Off<br>• Power switch is not pressed |
| Door Lock | • All doors are closed and locked.<br>• Hood is closed. |
| Brake Pedal | Not operated (not depressed) |
| Security | Not in alarm sounding state |
| Shift Selection | Park (P) is selected. |
| HV Battery | HV battery state of charge is sufficient.<br><br>(Reference value: level 3 or higher) |

| Item | Condition |
|---|---|
| Cabin Temperature | • Higher than air conditioning temperature set by user<br>• Air conditioning (cooling) is necessary |

(b) Function of Main Components

(1) Each component of the remote air conditioning system has the functions described in the table:

***Function of Main Components***

| Component | Outline |
|---|---|
| Key (electrical transmitter) | Sends remote air conditioning system on/off signals to the certification ECU. |
| Certification ECU | Receives a signal from the key (electrical transmitter) and sends a signal to the main body ECU. |
| Main body ECU | • Locks all of the doors.<br>• Checks that all of the doors are closed and locked.<br>• Checks that the hood is closed.<br>• When the remote air conditioning system starts, the main body ECU operates the wireless door lock system. |
| Power management control ECU | • Turns the vehicle power (12 V) on/off.<br>• Checks the state of charge of the HV battery.<br>• Starts/stops the HV system.<br>• Controls the inverter with converter assembly.<br>• Checks the power switch condition.<br>• Checks if park (P) is selected.<br>• Checks the brake pedal condition.<br>• Permits/prohibits remote air conditioning system operation. |
| A/C amplifier | • Judges whether the cooling function is operating during remote air conditioning system operation.<br>• Checks the operation of the air conditioning system based on signals from various sensors.<br>• Controls the air conditioning system.<br>• Judges when to stop the remote air conditioning system. |
| Inverter with converter assembly | Supplies DC power from the HV battery to the inverter of the compressor with motor assembly. |
| Compressor with motor assembly | Compresses refrigerant using power from the HV battery. |

6. EJECTOR CYCLE SYSTEM

(a) In the conventional refrigerant cycle, liquid refrigerant gas is sent into the evaporator using the expansion valve, generating cold air. However, a rapid decrease in the refrigerant pressure forms swirls, causing energy loss. In this ejector cycle, the energy loss caused by the cooler expansion valve is utilized by the operation of the ejector that injects and expands a high-pressure refrigerant, thus improving energy consumption efficiency.

(b) The ejector includes nozzle, mixing and diffuser portions.

(c) A high temperature and pressure liquid refrigerant flowing from the condenser is introduced into the mixing section through the nozzle at high speeds as the nozzle is inwardly tapered. This decreases the refrigerant pressure in the vicinity of the nozzle, introducing low temperature and pressure gaseous refrigerant into the nozzle from the evaporator. Thus, both refrigerants are mixed in the mixing section and are introduced into the diffuser section.

(d) As the diffuser section is outwardly flared, the refrigerant flow rate in the diffuser decreases and the refrigerant pressure rises.

(e) Through these operations, the refrigerant pressure in the evaporator on the downwind side can be constantly kept lower than that on the upwind side, creating the lower temperature conditions. Therefore, air cooled by the evaporator on the upwind side can be further cooled by that on the downwind side, thus improving the efficiency of the evaporator.

7. MICRO DUST AND POLLEN FILTER MODE CONTROL

(a) When the micro dust and pollen filter mode switch is pressed, the micro dust and pollen filter mode control is activated.

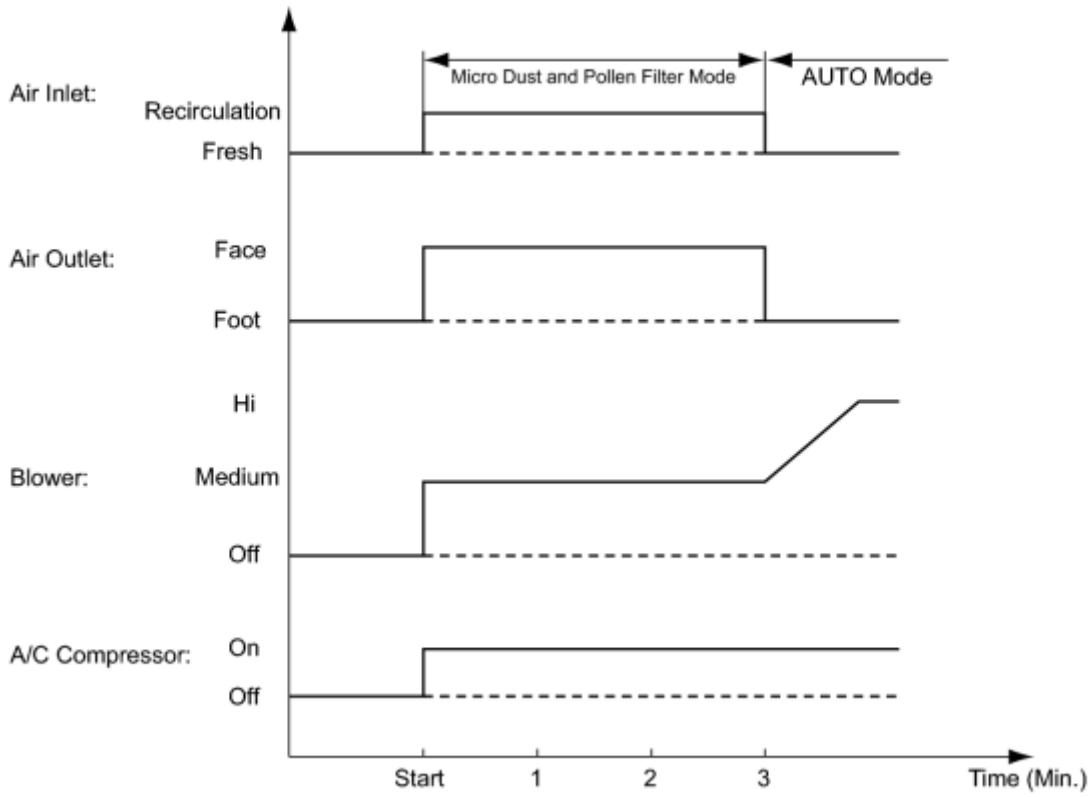
(b) Then, the air vent is switched to the FACE mode and recirculated pollen-free air flows in the area around the upper part of the bodies of the driver and front passenger.

(c) When the micro dust and pollen filter mode switch signal is input to the A/C amplifier, the A/C amplifier controls the compressor with motor assembly, air inlet control servo motor, air outlet control servo motor and blower motor as shown in the timing chart below.

(d) This control usually operates for approximately 3 minutes. However, when the outside temperature is low (5°C (41°F) maximum), it will operate for approximately 1 minute.

(e) After this control stops operating, the A/C amplifier controls the air conditioning system using AUTO mode.

Timing Chart:
(Sample)




H

8. PLASMACLUSTER (ION GENERATOR) CONTROL (w/ Plasmacluster (Ion Generator))

(a) General:

(1) A Plasmacluster (ion generator) is provided inside the air duct of the side register on the driver seat side to improve the air quality and comfort in the cabin.

(2) This generator is controlled by the A/C amplifier and operates in conjunction with the blower motor.

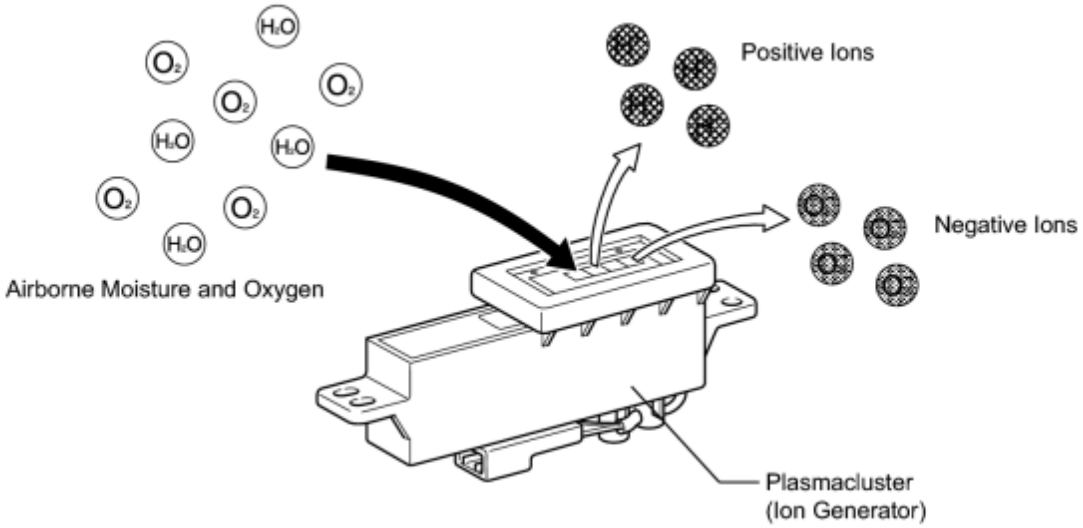
NOTICE:

- The Plasmacluster (ion generator) uses a high voltage, which is hazardous. Therefore, if the Plasmacluster (ion generator) requires repairs, be sure to have them done at a TOYOTA dealer.
- Do not apply any type of spray (such as a cleaning solvent or hair spray) or stick any foreign matter into the Plasmacluster ion outlet, as this could cause improper operation or a malfunction.
- After use, dust may accumulate around the side register on the driver seat side. If this occurs, press the OFF switch on the A/C control assembly to stop the blower motor before cleaning the area.
- It is normal for the Plasmacluster (ion generator) to emit a slight sound during operation. This sound is created when electrons collide with the electrode while Plasmacluster ions are being generated.

HINT:

Plasmacluster™, plasmacluster, and plasmacluster ions are a trademark of the SHARP Corporation.

(b) Operation:




H

(1) The Plasmacluster (ion generator) produces positive and negative ions from the water molecules ($H_2O$) and oxygen molecules ($O_2$) in the air, and emits them into the air. These ions reduce airborne germs.

9. ECO MODE CONTROL

(a) Under the control of eco mode, the A/C amplifier restricts the air conditioning system performance under specified conditions, thus improving fuel economy.

(b) Eco mode control is activated when the ECO MODE switch provided inside the integration control and panel sub-assembly is pressed, and then restricts the air conditioning system performance as described below.

| Control | Outline |
|---|---|
| Inside/outside Air Switch Control | Automatically switches the air inlet port to internal air circulation mode when the outside air temperature is equal to or higher than a predetermined temperature and reduces the power consumption. |
| Blower Level Control | Sets the blower level in AUTO mode lower than normal, and suppresses the power consumption. |
| PTC Heater Control | Stops the operation of PTC heater assembly and suppresses the power consumption. |
| Heating Restriction Control | Changes the air outlet temperature by turning the ECO MODE switch on and off during heating and increases the amount of engine-off time when the ECO MODE switch is in the on state, thus improving fuel economy. |
| Compressor Speed Restriction Control | Restricts the maximum speed during cooling and reduces the power consumption. |

10. COMPRESSOR WITH MOTOR ASSEMBLY

(a) Compressor Control

HINT:

In order to ensure the proper insulation of the internal high-voltage portion of the compressor and the compressor housing, this vehicle has adopted compressor oil (ND11) with a high level of insulation performance. Therefore, never use compressor oil other than the ND11 type compressor oil or its equivalent.

(1) The A/C amplifier calculates the target compressor speed based on the target evaporator temperature (calculated from the temperature control switch, room temperature sensor, ambient temperature sensor, and solar sensor) and the actual evaporator temperature detected by the evaporator temperature sensor. Then, the A/C amplifier transmits the target speed to the power management control ECU. The power management control ECU controls the A/C inverter based on the target speed data in order to control the compressor with motor assembly to a speed that suits the operating condition of the air conditioning system.

(2) The A/C amplifier calculates the target evaporator temperature, which includes corrections based on the temperature control switch, room temperature sensor, ambient temperature sensor, automatic light control sensor, and evaporator temperature sensor. Accordingly, the A/C amplifier controls the compressor speed to an extent that does not inhibit the proper cooling performance or defogging performance.

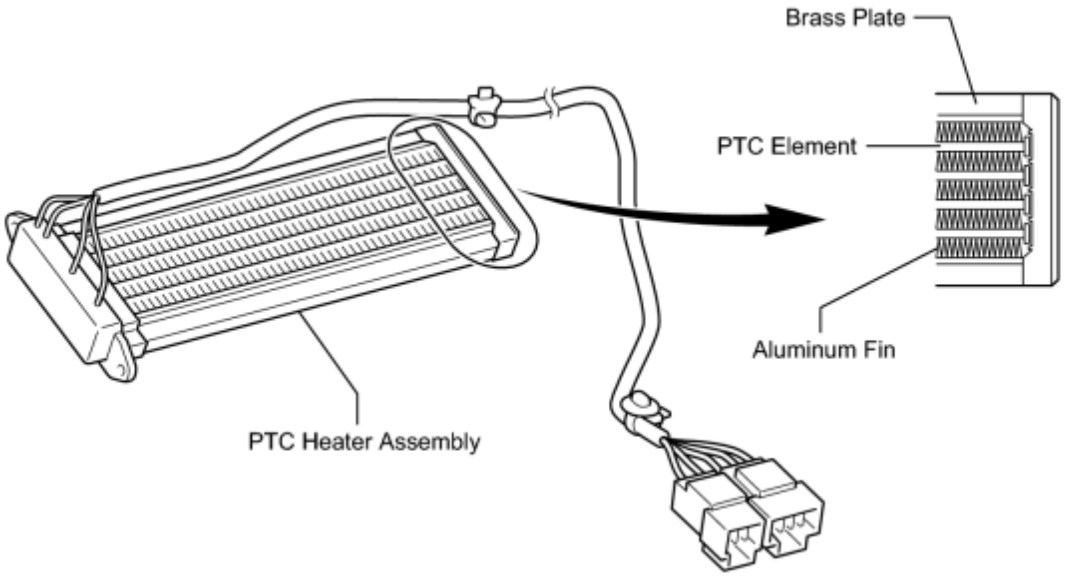
(3) The compressor with motor assembly uses high-voltage alternating current. If a short or open circuit occurs in the compressor with motor assembly wiring harness, the power management control ECU will cut off the A/C inverter circuit in order to stop the power supply to the compressor motor.

11. PTC HEATER (w/ PTC Heater Assembly)

(a) General

(1) The PTC heater assembly is located above the heater core in the air conditioning unit.

(2) The PTC heater assembly consists of a PTC element, aluminum fin, and brass plate. When current is applied to the PTC element, it generates heat to warm the air that passes through the unit.




(b) PTC Heater Assembly Operating Conditions

(1) The PTC heater assembly is turned on and off by the A/C amplifier in accordance with the engine coolant temperature, ambient temperature, engine speed, temperature setting, and electrical load (generator power ratio).

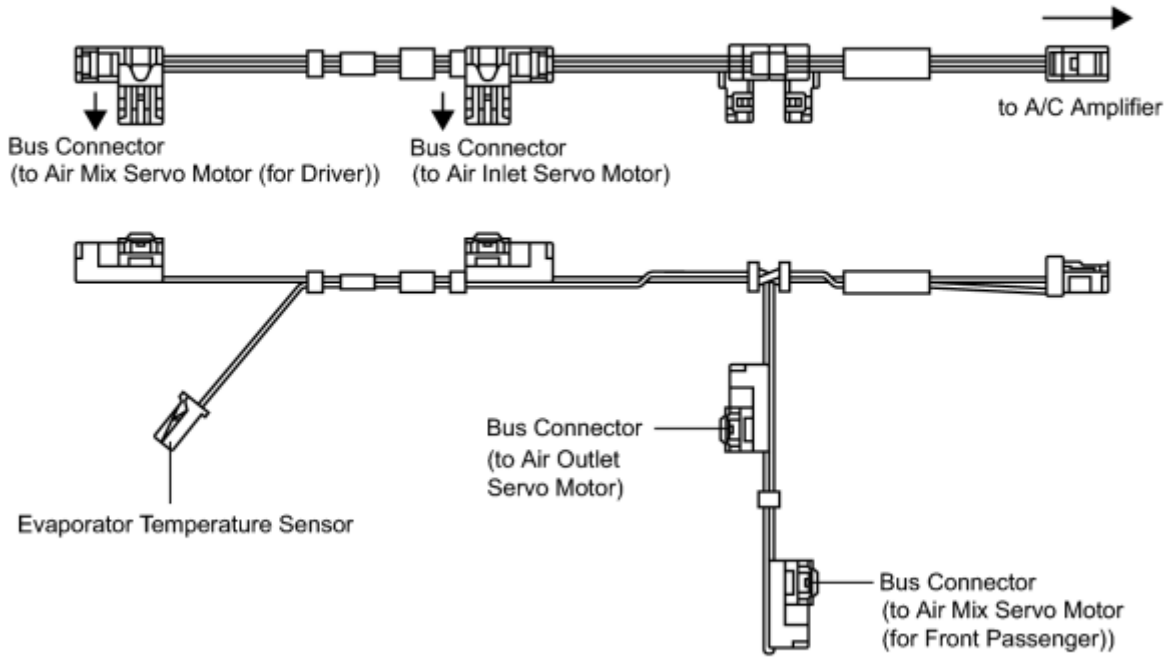
12. BLOWER MOTOR

The blower motor has a built-in blower controller, and is controlled using duty control performed by the A/C amplifier.

13. BUS CONNECTOR (AIR CONDITIONING HARNESS)

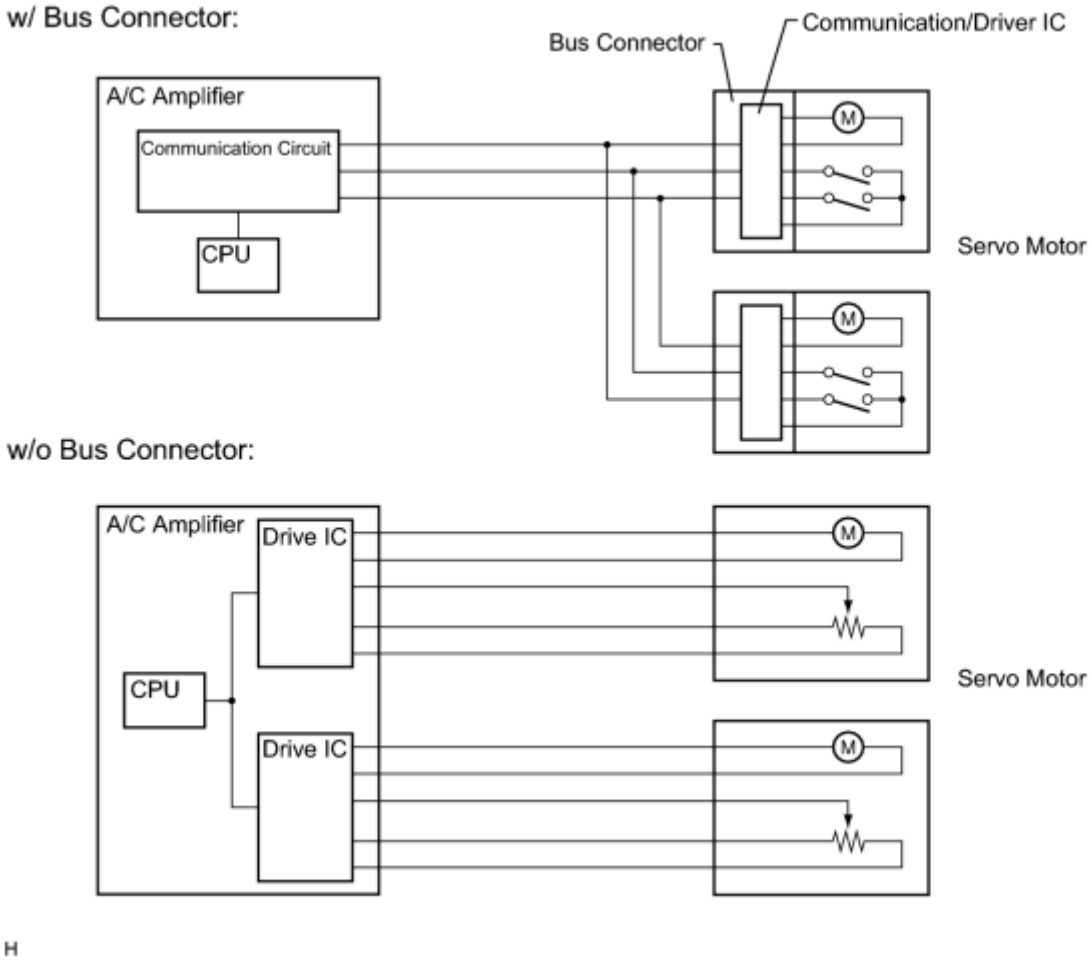
(a) A Bus connector is used in the wire harness connection that connects the servo motor from the A/C amplifier.

Example:




H

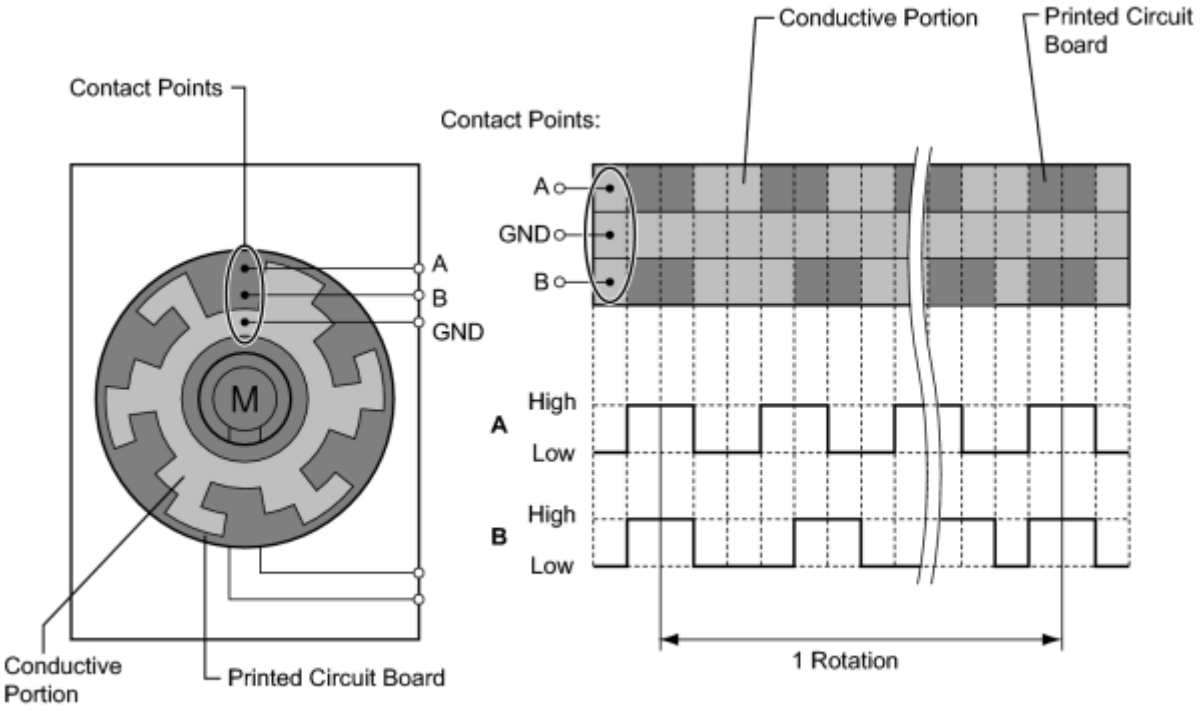
(b) Each Bus connector has a built-in communication/driver IC which communicates with each servo motor connector, actuates the servo motor, and has a position detection function. This enables bus communication for the servo motor wire harness, for a more lightweight construction and a reduced number of wires.




H

14. SERVO MOTOR

The pulse pattern type servo motor consists of a printed circuit board and a servo motor. The printed circuit board has three contact points, and can transmit two ON-OFF signals to the A/C amplifier based on the difference of the pulse phases. The BUS connector can detect the damper position and movement direction with these signals.




H

15. EVAPORATOR TEMPERATURE SENSOR

The evaporator temperature sensor detects the temperature of the cool air immediately through the evaporator in the form of resistance changes, and outputs it to the A/C amplifier.

16. ROOM TEMPERATURE SENSOR

The room temperature sensor detects the cabin temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C amplifier.

17. AMBIENT TEMPERATURE SENSOR

The ambient temperature sensor detects the outside temperature based on changes in the resistance of its built-in thermistor and sends a signal to the A/C amplifier.

18. SOLAR SENSOR (AUTOMATIC LIGHT CONTROL SENSOR)

The solar sensor (automatic light control sensor) detects the changes in the amount of sunlight and outputs it to the A/C amplifier in the form of voltage changes.

19. A/C PRESSURE SENSOR

The A/C pressure sensor detects the refrigerant pressure and outputs it to the A/C amplifier in the form of voltage changes.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the air conditioning system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

(a) Inspect the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 3. | CHECK COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the LIN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| LIN DTC is not output | A |
| LIN DTC is output | B<br>INFO |

B GO TO LIN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 4. | CHECK COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |

| Result | Proceed to |
|---|---|
| CAN DTC is output | B<br>INFO |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 5. | CHECK FOR DTC* |

(a) Check for DTCs and note any code that is output.

(b) Clear the DTCs.

(c) Recheck for DTCs. Based on the DTCs output above, try to force the A/C system to output DTCs by simulating the conditions indicated by the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC is output | A |
| DTC is not output | B |

B ▶ Go to step 7

A ▼

| | |
|---|---|
| 6. | DIAGNOSTIC TROUBLE CODE CHART |

(a) Find the output code in the diagnostic trouble code chart INFO.

NEXT ▶ Go to step 9

| | |
|---|---|
| 7. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B ▶ Go to step 9

A ▼

| | |
|---|---|
| 8. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Panel diagnosis (indicator check, sensor check) INFO

(b) Data List / Active Test INFO

(c) Terminals of ECU INFO

(d) Operation Check INFO (w/ Remote Air Conditioning System))

(e) On-vehicle Inspection

(f) Inspection

NEXT

| | |
|---|---|
| 9. | ADJUST, REPAIR OR REPLACE |

NEXT **END**

# OPERATION CHECK

1. OPERATION CHECK OF REMOTE AIR CONDITIONING SYSTEM

HINT:

The remote air conditioning system does not operate unless the required operating conditions are met. Therefore, confirm that the operating conditions are met before performing the inspection INFO.

(a) Activation Control Check

(1) Press and hold the remote A/C switch on the key (electrical transmitter) once for 1 seconds or more to start the air conditioning system.

HINT:

The wireless door lock system locks all doors before the remote air conditioning system is activated.

(b) Operation Check

(1) Check that the remote air conditioning system operates for a maximum of 3 minutes.

HINT:

The operating time differs depending on the HV battery state of charge.

(c) Stop Control Check

(1) Press the remote A/C switch on the key (electrical transmitter) twice briefly within 3 seconds to stop the remote air conditioning system.

HINT:

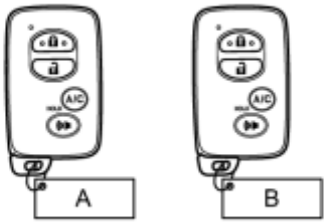
- When any of the operating conditions are not met during remote air conditioning system operation, the remote air conditioning system will stop.
- When 3 minutes have elapsed after the remote air conditioning system was started, the remote air conditioning system will stop. Some operating conditions may result in the remote air conditioning system being stopped before 3 minutes elapses.

(d) Operation Check of the Remote A/C Switch on the Key (Electrical Transmitter)

NOTICE:

- Use 2 keys (electrical transmitters).
- Confirm that the wireless door lock functions operate normally.

(1) Prepare 2 registered keys (electrical transmitters), and label one of them key (electrical transmitter) A, and the other key (electrical transmitter) B.




(2) Operate the remote A/C switch on key (electrical transmitter) A and check that the remote air conditioning system can be operated.

(3) Operate the remote A/C switch on key (electrical transmitter) B and check that the remote air conditioning system can be operated.

HINT:

- If the remote air conditioning system is not operated for both keys (electrical transmitters) A and B, the remote air conditioning system may have a malfunction INFO.
- If the remote air conditioning system is not operated for one of the keys (electrical transmitter) A or B, the key (electrical transmitter) needs to be replaced because a malfunction of the remote A/C switch on the key (electrical transmitter) is suspected.

# CUSTOMIZE PARAMETERS

HINT:

The following items can be customized.

NOTICE:

- When the customer requests a change in a function, first make sure that the function can be customized.
- Be sure to make a note of the current settings before customizing.
- When troubleshooting a function, first make sure that the function is set to the default setting.

### *Air Conditioner*

| Display (Item) | Default | Content | Setting |
|---|---|---|---|
| Set Temperature Shift | Normal | Function to control with the shifted temperature against the displayed temperature. | +2 C, +1 C, Normal, -1 C or -2 C |
| Compressor Mode | Automatic | Function to automatically turn the A/C on by pressing the AUTO button when blower is on and the A/C is off. | Manual or Automatic |
| Air Inlet Mode | Automatic | Function to shift from INLET mode to RECIRCULATION mode when the A/C is turned on. | Manual or Automatic |
| Foot/DEF Auto Mode | ON | Function to automatically turn the airflow from FOOT/DEF on when AUTO mode is on. | OFF or ON |
| Foot/DEF Automatic Blow Up Function | ON | Function to automatically increase the blower level when the defroster is on. | OFF or ON |
| Ambient Temperature Shift | Normal | Function to control the shifted ambient temperature in relation to the displayed ambient temperature. | +3 C, +2 C, +1 C, Normal, -1 C, -2 C or -3 C |
| ECO MODE Cancel | OFF | Function to cancel the ECO mode drive when item is on. | OFF or ON |
| Noise and Vibration Reduction | OFF | Function to change speed of the compressor when item is on. | OFF or ON |
| Start Pre A/C*1 | Long1 | Function to set the activation operation method for the remote air conditioning system using the key (electrical transmitter). | 1 tim ON, 2 tim ON, Long1 or Long2 |
| Stop Pre A/C*1 | 2 tim ON | Function to set the stop operation method for the remote air conditioning system using the key (electrical transmitter). | 1 tim ON, 2 tim ON, Long1 or Long2 |

- *1: w/ Remote Air Conditioning System

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Air Conditioning System*

| Symptom | Suspected Area | See page |
|---|---|---|
| All functions of the A/C system do not operate | IG power source circuit | INFO |
| | Back-up power source circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| Air flow control: No blower operation | Blower motor circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| Air flow control: No blower control | Blower motor circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| Air flow control: Insufficient air flow | Blower motor circuit | INFO |
| | A/C amplifier | INFO |
| The blower motor operates by itself or the motor speed changes arbitrarily (Speed does not change in accordance with automatic or manual control settings)*1 | IG signal circuit | INFO |
| | Solar ventilation ECU | INFO |
| Temperature control: No cool air comes out | Refrigerant volume | INFO |
| | Refrigerant pressure | INFO |
| | Air conditioning pressure sensor circuit | INFO |
| | Air mix damper control servo motor circuit | INFO |
| | Evaporator temperature sensor circuit | INFO |
| | Room temperature sensor circuit | INFO |
| | Ambient temperature sensor circuit | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Air conditioning control panel circuit | INFO |
| | Expansion valve | INFO |
| | CAN communication system | INFO |
| | A/C amplifier | INFO |
| | No. 2 engine wire | INFO |
| | Compressor with motor assembly | INFO |
| | Power management control ECU | INFO |
| Temperature control: No warm air comes out | Air mix damper control servo motor circuit | INFO |
| | Engine coolant temperature sensor circuit | INFO |
| | Evaporator temperature sensor circuit | INFO |
| | Room temperature sensor circuit | INFO |
| | Ambient temperature sensor circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | PTC heater circuit*2 | INFO |
| | CAN communication system | INFO |
| | Radiator unit sub-assembly | INFO |
| | A/C amplifier | INFO |
| | ECM | INFO |
| Temperature control: Output air is warmer or cooler than the set temperature or response is slow | Refrigerant volume | INFO |
| | Refrigerant pressure | INFO |
| | Solar sensor circuit | INFO |
| | Room temperature sensor circuit | INFO |
| | Ambient temperature sensor circuit | INFO |
| | Evaporator temperature sensor circuit | INFO |
| | Air mix damper control servo motor circuit | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Air inlet damper control servo motor circuit | INFO |
| | PTC heater circuit*2 | INFO |
| | Air conditioning control panel circuit | INFO |
| | Radiator unit sub-assembly | INFO |
| | Expansion valve | INFO |
| | CAN communication system | INFO |
| | A/C amplifier | INFO |
| | No. 2 engine wire | INFO |
| | Compressor with motor assembly | INFO |
| | ECM | INFO |
| | Power management control ECU | INFO |
| Temperature control: No temperature control (only Max. cool or Max. warm) | Air mix damper control servo motor circuit | INFO |
| | Room temperature sensor circuit | INFO |
| | Ambient temperature sensor circuit | INFO |
| | Evaporator temperature sensor circuit | INFO |
| | Solar sensor circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| No air inlet control | Air inlet damper control servo motor circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| No air flow mode control | Air outlet damper control servo motor circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| Heater performance is low (engine is stopped)*2 | PTC heater circuit | INFO |
| | A/C amplifier | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| Plasmacluster does not operate*3 | Blower motor circuit | INFO |
| | Plasmacluster circuit | INFO |
| | A/C amplifier | INFO |
| ECO MODE switch indicator does not come on (ECO MODE switch does not operate) | ECO switch circuit | INFO |
| | A/C amplifier | INFO |
| Micro dust and pollen filter mode does not operate (A/C system is operating normally) | Air inlet damper control servo motor circuit | INFO |
| | Air outlet damper control servo motor circuit | INFO |
| | Blower motor circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| Unable to control A/C with the steering pad switch | Steering pad switch circuit | INFO |
| | Air conditioning control panel circuit | INFO |
| | A/C amplifier | INFO |
| Diagnostic trouble codes (DTCs) are not recorded. Set mode is cleared when power switch is off. | Back-up power source circuit | INFO |
| | A/C amplifier | INFO |

### *Remote Air Conditioning System*4*

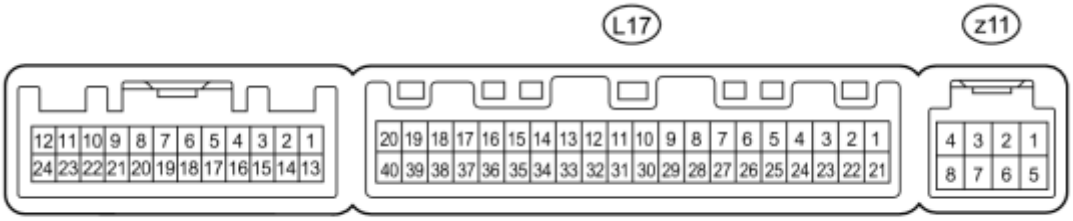
| Symptom | Suspected Area | See page |
|---|---|---|
| The remote air conditioning system does not operate when the remote A/C switch on the key (electrical transmitter) is pressed. (air conditioning system is normal) | Wireless door lock control system | INFO |
| | Data List (FL Door Courtesy, FR Door Courtesy, RL Door Courtesy SW, RR Door Courtesy SW, Back Door Courtesy SW) | INFO |
| | Data List (Hood Courtesy SW) | INFO |
| | Data List (Start Switch1, Start Switch2) | INFO |
| | Data List (IG SW, ACC SW) | INFO |
| | Data List (FL Door Lock Pos, FR Door Lock Pos, RL-Door Lock Pos SW, RR-Door Lock Pos SW) | INFO |
| | Operation check (key (electrical transmitter)) | INFO |
| | Use simulation method to check | INFO |
| The remote air conditioning system does not operate even though a wireless door lock is performed when the remote A/C switch on the key (electrical transmitter) is pressed. (air | Data List (FL Door Courtesy, FR Door Courtesy, RL Door Courtesy SW, RR Door Courtesy SW, Back Door Courtesy | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| conditioning system is normal) | SW) | |
| | Data List (Hood Courtesy SW) | INFO |
| | Data List (Start Switch1, Start Switch2) | INFO |
| | Data List (IG SW, ACC SW) | INFO |
| | Data List (Stop Light Switch) | INFO |
| | Data List (Shift Position) | INFO |
| | Use simulation method to check | INFO |
| The remote air conditioning system stops operating shortly after the system starts. | Operation check | INFO |
| | Use simulation method to check | INFO |
| The remote air conditioning system starts operating by itself. | Use simulation method to check | INFO |
| | Operation check (activation control, stop control, key (electrical transmitter)) | INFO |
| | Certification ECU | INFO |
| | A/C amplifier | INFO |
| | Power management control ECU | INFO |
| The remote air conditioning system cannot be stopped using the remote A/C switch on the key (electrical transmitter). | Customize (Stop Pre A/C) | INFO |
| | Operation check (stop control, key (electrical transmitter)) | INFO |
| | A/C amplifier | INFO |
| | Power management control ECU | INFO |
| | Certification ECU | INFO |

- *1: w/ Solar Ventilation System
- *2: w/ PTC Heater Assembly
- *3: w/ Plasmacluster (Ion Generator)
- *4: w/ Remote Air Conditioning System

# TERMINALS OF ECU

1. A/C AMPLIFIER




H

HINT:

Check from the rear of the connector while it is connected to the A/C amplifier.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-1 (IG+) - L17-14 (GND) | B - W-B | Power source (IG) | Power switch on (IG) | 11 to 14 V |
| L17-1 (IG+) - L17-14 (GND) | B - W-B | Power source (IG) | Power switch off | Below 1 V |
| L17-5 (TAM) - L17-13 (SG-2) | BE - G | Ambient temperature sensor signal | Power switch on (IG)<br><br>Ambient temperature: 25°C (77°F) | 1.35 to 1.75 V |
| L17-5 (TAM) - L17-13 (SG-2) | BE - G | Ambient temperature sensor signal | Power switch on (IG)<br><br>Ambient temperature: 40°C (104°F) | 0.9 to 1.2 V |
| L17-9 (PRE) - L17-13 (SG-2) | L - G | A/C pressure sensor signal | Engine started, A/C system operating, Refrigerant pressure: Abnormal pressure (more than 3140 kPa (32.0 kgf/cm$^2$, 455 psi)) | 4.84 V or higher |
| L17-9 (PRE) - L17-13 (SG-2) | L - G | A/C pressure sensor signal | Engine started, A/C system operating, Refrigerant pressure: Abnormal pressure (less than 196 kPa (2.0 kgf/cm$^2$, 28 psi)) | Below 0.73 V |
| L17-9 (PRE) - L17-13 (SG-2) | L - G | A/C pressure sensor signal | Engine started, A/C system operating, Refrigerant pressure: Normal pressure (less than 3140 kPa (32.0 kgf/cm$^2$, 455 psi) and more than 196 kPa (2.0 kgf/cm$^2$, 28 psi)) | 0.73 to 4.84 V |
| L17-10 (S5-3) - L17-13 (SG-2) | B - G | Power supply for A/C pressure sensor | Power switch on (IG)<br><br>A/C switch on | 4.75 to 5.25 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-10 (S5-3) - L17-13 (SG-2) | B - G | Power supply for A/C pressure sensor | Power switch on (IG)<br><br>A/C switch off | Below 1 V |
| L17-11 (CANH) | Y | CAN communication system | - | - |
| L17-12 (CANL) | BR | CAN communication system | - | - |
| L17-13 (SG-2) - Body ground | G - Body ground | Ground for A/C pressure sensor, A/C ambient temperature sensor | Always | Below 1 V |
| L17-14 (GND) - Body ground | W-B - Body ground | Ground for main power supply | Always | Below 1 V |
| L17-15 (ECOS) - L17-14 (GND) | G - W-B | ECO MODE switch signal | Power switch on (IG)<br><br>ECO MODE switch off | 11 to 14 V |
| L17-15 (ECOS) - L17-14 (GND) | G - W-B | ECO MODE switch signal | Power switch on (IG)<br><br>ECO MODE switch on | Below 1 V |
| L17-16 (PTC3) - L17-14 (GND)*1 | BR - W-B | PTC heater operation signal | Engine is running (1250 rpm or higher)<br><br>Temperature setting: MAX. HOT<br><br>Ambient temperature: 10°C (50°F) or lower<br><br>Engine coolant temperature: 65°C (149°F) or lower<br><br>Light control switch off<br><br>Blower switch on | 11 to 14 V |
| L17-17 (PCD1) - L17-14 (GND)*3 | LG - W-B | Plasmacluster operation signal | Power switch on (IG)<br><br>Blower switch off<br><br>(plasmacluster not operating) | 11 to 14 V |
| L17-17 (PCD1) - L17-14 (GND)*3 | LG - W-B | Plasmacluster operation signal | Power switch on (IG)<br><br>Blower switch on<br><br>(plasmacluster operating) | Below 1 V |
| L17-18 (PTC1) - L17-14 (GND)*1 | W - W-B | PTC heater operation signal | Engine is running (1250 rpm or higher) | 11 to 14 V |

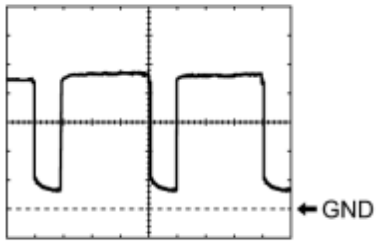
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | Temperature setting: MAX. HOT<br><br>Ambient temperature: 10°C (50°F) or lower<br><br>Engine coolant temperature: 75°C (167°F) or lower<br><br>Light control switch off<br><br>Blower switch on | |
| L17-21 (B) - L17-14 (GND) | Y - W-B | Power source (Back-up) | Power switch off | 11 to 14 V |
| L17-23 (BLW) - L17-14 (GND) | W - W-B | Blower motor speed control signal | Power switch on (IG)<br><br>Blower switch LO | Pulse generation<br><br>(See waveform 1) |
| L17-25 (PVSW) - L17-14 (GND)*2 | P - W-B | Solar ventilation switch signal | Solar ventilation switch off | 4.5 to 5.5 V |
| L17-25 (PVSW) - L17-14 (GND)*2 | P - W-B | Solar ventilation switch signal | Solar ventilation switch on | Below 1 V |
| L17-26 (SSLR) - L17-14 (GND)*2 | L - W-B | Solar ventilation ECU status signal | Power switch on (IG)<br><br>SBI terminal: 7 V or higher<br><br>Solar ventilation system: off | Pulse generation<br><br>(See waveform 2) |
| L17-27 (IDH) - L17-14 (GND)*1 | L - W-B | Inverter with converter assembly current over signal | Power switch on (IG) | Pulse generation |
| L17-29 (TR) - L17-34 (SG-1) | B - W | Room temperature sensor signal | Power switch on (IG)<br><br>Cabin temperature: 25°C (77°F) | 1.8 to 2.2 V |
| L17-29 (TR) - L17-34 (SG-1) | B - W | Room temperature sensor signal | Power switch on (IG)<br><br>Cabin temperature: 40°C (104°F) | 1.2 to 1.6 V |
| L17-33 (TS) - L17-14 (GND) | BR - W-B | Solar sensor signal | Power switch on (IG)<br><br>Solar sensor subjected to electric light | 0.8 to 4.3 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L17-33 (TS) - L17-14 (GND) | BR - W-B | Solar sensor signal | Power switch on (IG)<br>Solar sensor covered with a cloth | Below 0.8 V |
| L17-34 (SG-1) - Body ground | W - Body ground | Ground for room temperature sensor | Always | Below 1 V |
| L17-36 (PCSW) - L17-14 (GND)*3 | P - W-B | Plasmacluster switch signal | Power switch on (IG)<br>Blower switch off<br>(plasmacluster not operating) | 11 to 14 V |
| L17-36 (PCSW) - L17-14 (GND)*3 | P - W-B | Plasmacluster switch signal | Power switch on (IG)<br>Blower switch on<br>(plasmacluster operating) | Below 1 V |
| L17-37 (LIN1) - L17-14 (GND) | V - W-B | LIN communication signal | Power switch on (IG) | Pulse generation |
| L17-38 (PTC2) - L17-14 (GND)*1 | B - W-B | PTC heater operation signal | Engine is running (1250 rpm or higher)<br>Temperature setting: MAX. HOT<br>Ambient temperature: 10°C (50°F) or lower<br>Engine coolant temperature: 65°C (149°F) to 70°C (158°F)<br>Light control switch off<br>Blower switch on | 11 to 14 V |
| z11-2 (BUS G) - Body ground | - | Ground for BUS IC | Always | Below 1 V |
| z11-3 (BUS) - z11-2 (BUS G) | - | BUS IC control signal | Power switch on (IG) | Pulse generation |
| z11-4 (B BUS) - z11-2 (BUS G) | - | Power supply for BUS IC | Power switch off | Below 1 V |
| z11-4 (B BUS) - z11-2 (BUS G) | - | Power supply for BUS IC | Power switch on (IG) | 11 to 14 V |
| z11-5 (SGA) - Body ground | - | Ground for evaporator temperature sensor | Always | Below 1 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| z11-6 (TEA) - z11-5 (SGA) | - | A/C evaporator temperature sensor signal | Power switch on (IG)<br>Evaporator temperature: 0°C (32°F) | 1.7 to 2.1 V |
| z11-6 (TEA) - z11-5 (SGA) | - | A/C evaporator temperature sensor signal | Power switch on (IG)<br>Evaporator temperature: 15°C (59°F) | 0.9 to 1.3 V |

- *1: w/ PTC Heater Assembly
- *2: w/ Solar Ventilation System
- *3: w/ Plasmacluster (Ion Generator)

(a) Waveform 1:



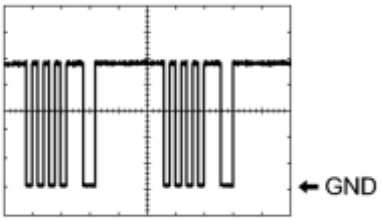

H

| Item | Content |
|---|---|
| Terminal No. | L17-23 (BLW) - L17-14 (GND) |
| Tool Setting | 1 V/DIV., 500 μs/DIV. |
| Vehicle Condition | Power switch on (IG)<br>Blower switch LO |

HINT:

The waveform varies with the blower speed.

(b) Waveform 2:



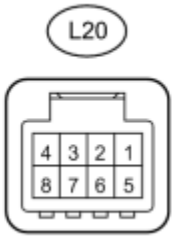

H

| Item | Content |
|---|---|
| Terminal No. | L17-26 (SSLR) - L17-14 (GND) |
| Tool Setting | 1 V/DIV., 100 ms/DIV. |
| Vehicle Condition | Power switch on (IG)<br>SBI terminal: 7 V or higher<br>Solar ventilation system: off |

HINT:

The waveform varies with the communication content.

2. A/C CONTROL ASSEMBLY




HINT:

Check from the rear of the connector while it is connected to the A/C control assembly.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L20-2 (TX+) - L20-8 (GND) | V - W-B | LIN communication signal | Power switch on (IG) | Pulse generation |
| L20-3 (SWO) - L20-8 (GND) | L - W-B | Steering pad switch assembly signal | No switch pushed<br>→ R/F switch pushed<br>→ TEMP+ switch pushed<br>→ TEMP- switch pushed | 4.44 to 5.43 V<br>→ 1.19 to 1.49 V<br>→ 2.09 to 2.54 V<br>→ 3.2 to 3.88 V |
| L20-5 (IG+) - L20-8 (GND) | B - W-B | Power source (IG) | Power switch off | Below 1 V |
| L20-5 (IG+) - L20-8 (GND) | B - W-B | Power source (IG) | Power switch on (IG) | 11 to 14 V |
| L20-6 (ILL+) - L20-7 (ILL-) | G - W-B | Light control switch signal | Light control switch off | Below 1 V |
| L20-6 (ILL+) - L20-7 (ILL-) | G - W-B | Light control switch signal | Light control switch tail or head | 11 to 14 V |
| L20-8 (GND) - Body ground | W-B - Body ground | Ground for front A/C control assembly | Always | Below 1 V |

# DIAGNOSIS SYSTEM

1. DESCRIPTION

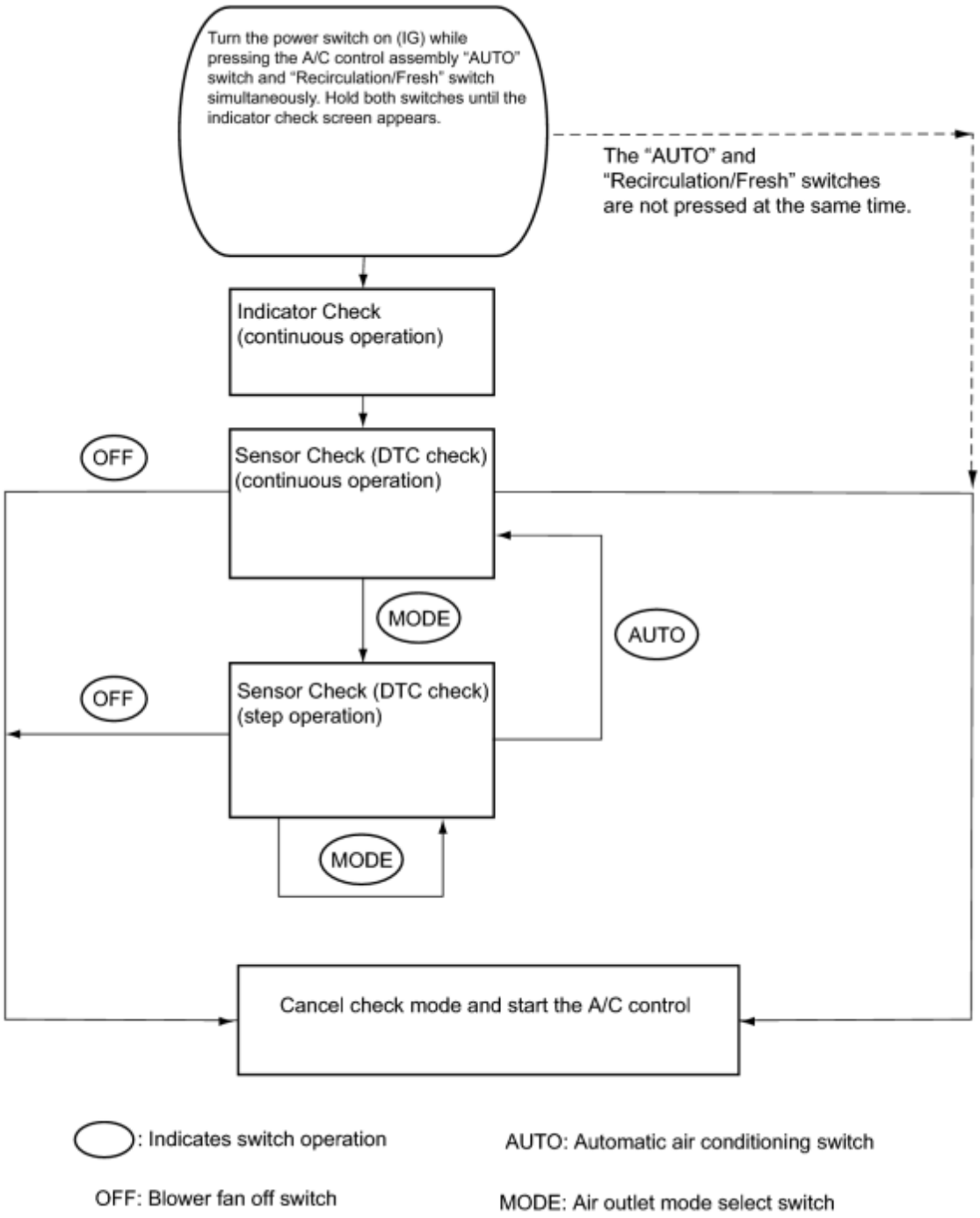
(a) Air conditioning system data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform troubleshooting.

2. CHECK DLC3

(a) Check the DLC3 INFO.

3. LIST OF OPERATION METHODS

(a) By operating each of the air conditioning control switches as shown in the diagram below, it is possible to enter diagnostic check mode.




4. INDICATOR CHECK

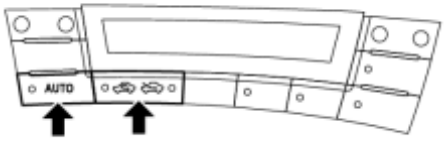
(a) Turn the power switch off.

(b) Turn the power switch on (ACC) and wait for at least 5 seconds.

(c) Turn the power switch on (IG) while pressing the A/C control

*1

assembly "AUTO" switch and "Recirculation/Fresh" switch simultaneously. Hold both switches until the indicator check screen appears.

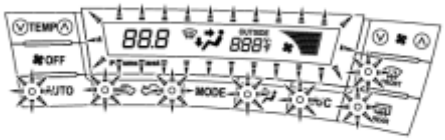



## Text in Illustration

| | |
|---|---|
| *1 | A/C Control Assembly |

H

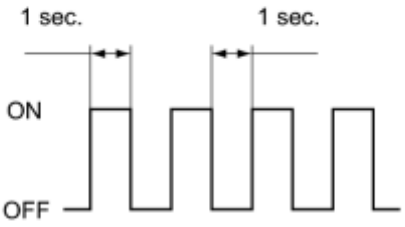
*1




(d) The indicator check is automatically performed when panel diagnosis is activated. Check that the indicators light up and go off 4 times at 1-second intervals continuously.

- The sensor check automatically starts when the indicator check is completed.
- Press the "OFF" switch to cancel the check mode.

Indicator Blinking Pattern:




## Text in Illustration

| | |
|---|---|
| *1 | A/C Control Assembly |

H

5. SENSOR CHECK (DTC CHECK)

(a) Start the engine and warm it up.

(b) Perform the indicator check.

HINT:

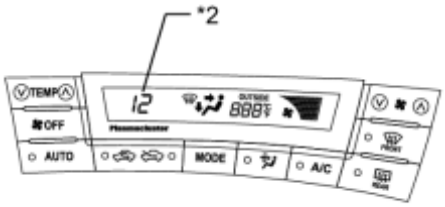
After the indicator check is completed, the system enters DTC check mode automatically.

(c) Read the DTC displayed on the A/C control assembly.

NOTICE:

In sensor check mode, which is automatically entered after indicator check mode, troubleshooting may be partially performed. Be sure to perform the sensor check again.

*1




H

HINT:

Refer to Diagnostic Trouble Code Chart for details of the codes INFO.

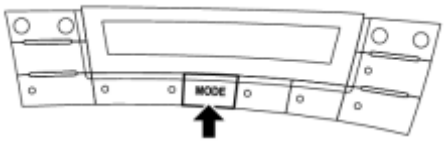
- When there are no problems, DTC 00 is output.
- As an example, the illustration shows that display DTC 12 is output.

## Text in Illustration

| | |
|---|---|
| *1 | A/C Control Assembly |
| *2 | Diagnostic Trouble Code (DTC) |

*1

(d) If the steps are difficult to read because they change automatically, press the "MODE" switch to display the steps one at a time so that they can be read easily. The items are displayed step by step each time the "MODE" switch is pressed.




H

HINT:

Press the "OFF" switch to finish panel diagnosis.

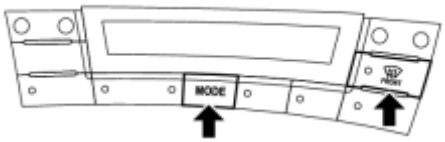
## Text in Illustration

| | |
|---|---|
| *1 | A/C Control Assembly |

(e) Clear the DTC

*1

(1) During the sensor check, press the "FRONT DEF" switch and "MODE" switch simultaneously.




## Text in Illustration

| | |
|---|---|
| *1 | A/C Control Assembly |

H

# DTC CHECK / CLEAR

1. DTC CHECK USING TECHSTREAM

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Trouble Codes.

(e) Check for DTCs.

2. DTC CLEAR USING TECHSTREAM

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Trouble Codes.

(e) Clear the DTCs by pressing the YES button on the Techstream display.

# DATA LIST / ACTIVE TEST

1. DATA LIST

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Room Temperature Sensor | Room temperature sensor / Min.: -6.5°C (20.3°F) Max.: 57.25°C (135.05°F) | Actual cabin temperature displayed | - |
| Ambient Temp Sensor | Ambient temperature sensor / Min.: -23.3°C (-9.94°F) Max.: 65.95°C (150.71°F) | Actual ambient temperature displayed | - |
| Adjusted Ambient Temp | Adjusted ambient temperature / Min.: -30.8°C (-23.44°F) Max.: 50.8°C (123.44°F) | - | - |
| Evaporator Fin Thermistor | Evaporator temperature sensor / Min.: -29.7°C (-21.46°F) Max.: 59.55°C (139.19°F) | Actual evaporator temperature displayed | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Evaporator Target Temp | Evaporator target temperature /<br>Min.: -327.68°C (-557.82°F)<br>Max.: 327.67°C (621.81°F) | Evaporator target temperature displayed | - |
| Solar Sensor (D side) | Solar sensor /<br>Min.: 0<br>Max.: 255 | Solar sensor value increases as brightness increases | - |
| Engine Coolant Temp | Engine coolant temperature sensor /<br>Min.: 1.3°C (34.34°F)<br>Max.: 90.55°C (194.99°F) | Actual engine coolant temperature displayed | - |
| Set Temperature (D side) | Set temperature /<br>Min.: 65°F (18°C)<br>Max.: 85°F (32°C) | Actual set temperature displayed | - |
| Blower Motor Speed Level | Blower motor speed level /<br>Min.: 0<br>Max.: 31 | Displayed speed level increases in range between 0 and 31 as blower motor speed increases | - |
| Regulator Pressure Sensor | Air conditioning pressure sensor /<br>Min.: -0.45668 MPaG<br>Max.: 3.29437 MPaG | Actual regulator pressure displayed | - |
| Air Mix Servo Targ Pulse (D) | Air mix servo motor target pulse /<br>Min.: 0<br>Max.: 255 | MAX. COLD: 6 (pulse)<br>MAX. HOT: 93 (pulse) | - |
| Air Mix Servo Actual Pulse (D) | Air mix servo motor actual pulse /<br>Min.: 0<br>Max.: 255 | MAX. COLD: 6 (pulse)<br>MAX. HOT: 93 (pulse) | - |
| Air Outlet Servo Pulse (D) | Air outlet servo motor target | FACE: 47 (pulse) | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | pulse /<br>Min.: 0<br>Max.: 255 | B/L: 37 (pulse)<br>FOOT: 17(pulse)<br>FOOT/DEF: 9 (pulse)<br>DEF: 5 (pulse) | |
| Air Outlet Servo Actu Pulse (D) | Air outlet servo motor actual pulse /<br>Min.: 0<br>Max.: 255 | FACE: 47 (pulse)<br>B/L: 37 (pulse)<br>FOOT: 17 (pulse)<br>FOOT/DEF: 9 (pulse)<br>DEF: 5 (pulse) | - |
| Air Inlet Damper Targ Pulse | Air inlet servo motor target pulse /<br>Min.: 0<br>Max.: 255 | RECIRCULATION: 19 (pulse)<br>FRESH: 7 (pulse) | - |
| Air Inlet Damper Actual Pulse | Air inlet servo motor actual pulse /<br>Min.: 0<br>Max.: 255 | RECIRCULATION: 19 (pulse)<br>FRESH: 7 (pulse) | - |
| Compressor Speed | Compressor speed /<br>Min.: 0 rpm<br>Max.: 65535 rpm | Displays actual rotation speed in the range between 0 rpm and 10000 rpm | - |
| Compressor Target Speed | Compressor target speed /<br>Min.: 0 rpm<br>Max.: 65535 rpm | Displays actual rotation speed in the range between 0 rpm and 10000 rpm | - |
| Electric Heater Active Level*1 | Heater active level /<br>Min.: 0<br>Max.: 3 | Actual electric heater active level displayed | - |
| ECO Switch | ECO MODE switch /<br>OFF or ON | OFF: ECO MODE switch off<br>ON: ECO MODE switch on | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Solar Ventilation Switch*2 | Solar ventilation switch (Switch recognition value at A/C amplifier side) /<br><br>OFF or ON | OFF: solar ventilation switch off<br><br>ON: solar ventilation switch on | - |
| Number of Trouble Codes | Number of trouble codes /<br><br>Min.: 0<br><br>Max.: 255 | Number of DTCs displayed | - |

- *1: w/ PTC Heater Assembly
- *2: w/ Solar Ventilation System

(f) Connect the Techstream to the DLC3.

(g) Turn the power switch on (IG).

(h) Turn the Techstream on.

(i) Enter the following menus: Body Electrical / Main Body / Data List.

(j) Check the value(s) by referring to the table below.

***Main Body***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Hood Courtesy SW*3 | Engine hood courtesy signal /<br><br>OFF or ON | ON: Engine hood open<br><br>OFF: Engine hood closed | - |

- *3: w/ Remote Air Conditioning System

2. ACTIVE TEST

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

### *Air Conditioner*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Blower Motor | Blower motor | Min.: 0, Max.: 31 | - |
| Compressor Target Speed | Compressor with motor assembly | Min.: 0, Max.: 10000 | - |
| Water Pump | Water pump relay | OFF or ON | - |
| Electrical Fan | Electrical fan | OFF or ON | - |
| Heater Active Level*1 | Heater active level | Min.: 0, Max.: 3 | - |
| Defogger Relay (Rear) | Defogger relay (Rear) | OFF or ON | - |
| Mirror Heater Relay (Front) | Mirror heater relay (Front) | OFF or ON | - |
| Air Mix Servo Targ Pulse (D) | Air mix servo motor pulse | Min.: 0, Max.: 255 | - |
| Air Outlet Servo Pulse (D) | Air outlet servo motor pulse | Min.: 0, Max.: 255 | - |
| Air Inlet Damper Targ Pulse | Air inlet damper target pulse | Min.: 0, Max.: 255 | - |
| Air Purifier Mode*2 | Plasmacluster (ion generator) | Stop, Ion, Clean | - |

- *1: w/ PTC Heater Assembly
- *2: w/ Plasmacluster (Ion Generator)

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

When the air conditioning system functions properly, DTC 00 is output.

### *Air Conditioning System*

| DTC Code | Detection Item | Trouble Area | Memory*4 | See page |
|---|---|---|---|---|
| B1411/11*1 | Room Temperature Sensor Circuit | 1. Room temperature sensor<br>2. Harness or connector between room temperature sensor and A/C amplifier<br>3. A/C amplifier | Memorized<br>(4 sec. or more) | INFO |
| B1412/12*2 | Ambient Temperature Sensor Circuit | 1. Ambient temperature sensor<br>2. Harness or connector between ambient temperature sensor and A/C amplifier<br>3. A/C amplifier | Memorized<br>(4 sec. or more) | INFO |
| B1413/13 | Evaporator Temperature Sensor Circuit | 1. Evaporator temperature sensor<br>2. Air conditioning harness<br>3. A/C amplifier | Memorized<br>(4 sec. or more) | INFO |
| B1423/23 | Pressure Sensor Circuit | 1. A/C pressure sensor<br>2. Harness or connector between A/C pressure sensor and A/C amplifier<br>3. A/C amplifier<br>4. Expansion valve (blocked, stuck)<br>5. Condenser (blocked, deterioration of cooling capacity due to dirt)<br>6. Cooler dryer (moisture in the refrigerant cycle cannot be absorbed)<br>7. Cooling fan system (condenser cannot be cooled down)<br>8. A/C system (leaks, blocked) | - | INFO |
| B1441/41 | Air Mix Damper Control Servo Motor Circuit (Passenger Side) | 1. Air mix control servo motor | Memorized<br>(30 sec. or | INFO |

| DTC Code | Detection Item | Trouble Area | Memory*4 | See page |
|---|---|---|---|---|
| | | 2. Air conditioning harness<br><br>3. A/C amplifier | more) | |
| B1442/42 | Air Inlet Damper Control Servo Motor Circuit | 1. Air inlet control servo motor<br><br>2. Air conditioning harness<br><br>3. A/C amplifier | Memorized<br><br>(30 sec. or more) | INFO |
| B1443/43 | Air Outlet Damper Control Servo Motor Circuit | 1. Air outlet control servo motor<br><br>2. Air conditioning harness<br><br>3. A/C amplifier | Memorized<br><br>(30 sec. or more) | INFO |
| B1471/71 | A/C Inverter High Voltage Power Resource System Malfunction | 1. Electric vehicle fuse<br><br>2. No. 2 engine wire (harness or connector between compressor with motor assembly and inverter with converter assembly)<br><br>3. Compressor with motor assembly<br><br>4. Hybrid control system<br><br>5. CAN communication system | Memorized | INFO |
| B1472/72 | A/C Inverter High Voltage Output System Malfunction | 1. Compressor with motor assembly<br><br>2. CAN communication system | Memorized | INFO |
| B1473/73 | A/C Inverter Start-up Signal System Malfunction | 1. Harness or connector between power management control ECU and compressor with motor assembly<br><br>2. Compressor with motor assembly<br><br>3. Power management control ECU<br><br>4. Hybrid control system<br><br>5. CAN communication system | - | INFO |
| B1474/74 | A/C Inverter Malfunction | 1. Compressor with motor assembly<br><br>2. CAN communication system | Memorized | INFO |
| B1475/75 | A/C Inverter Cooling / Heating System Malfunction | 1. Cooling fan system<br><br>2. Refrigerant volume | Memorized | INFO |

| DTC Code | Detection Item | Trouble Area | Memory*4 | See page |
|---|---|---|---|---|
| | | 3. Compressor with motor assembly<br><br>4. CAN communication system | | |
| B1476/76 | A/C Inverter Load System Malfunction | 1. Refrigerant volume<br><br>2. Compressor with motor assembly<br><br>3. Cooling fan system<br><br>4. CAN communication system | Memorized | INFO |
| B1477/77 | A/C Inverter Low Voltage Power Resource System Malfunction | 1. Compressor with motor assembly<br><br>2. CAN communication system | Memorized | INFO |
| B1497/97 | BUS IC Communication Malfunction | 1. Air conditioning harness<br><br>2. A/C amplifier | Memorized<br><br>(10 sec. or more) | INFO |
| B1498/98 | Communication Malfunction (A/C Inverter Local) | 1. Harness or connector between power management control ECU, compressor with motor assembly and body ground<br><br>2. Power management control ECU<br><br>3. Compressor with motor assembly<br><br>4. No. 2 engine wire (harness or connector between compressor with motor assembly and inverter with converter assembly)<br><br>5. Electric vehicle fuse<br><br>6. CAN communication system<br><br>7. Hybrid control system | Memorized | INFO |
| B14A1*3 | Air Purifier Open Circuit | 1. Plasmacluster (ion generator)<br><br>2. Harness or connector between plasmacluster (ion generator) and A/C amplifier<br><br>3. Harness or connector between plasmacluster (ion generator) and battery<br><br>4. Harness or connector between plasmacluster (ion generator) and body ground | Memorized<br><br>(4 sec. or more) | INFO |

| DTC Code | Detection Item | Trouble Area | Memory*4 | See page |
|---|---|---|---|---|
| | | 5. A/C amplifier | | |
| B14A2 | Driver Side Solar Sensor Short Circuit | 1. Solar sensor (automatic light control sensor)<br><br>2. Harness or connector between solar sensor (automatic light control sensor) and A/C amplifier<br><br>3. Harness or connector between solar sensor (automatic light control sensor) and main body ECU<br><br>4. Main body ECU<br><br>5. A/C amplifier | Memorized<br><br>(4 sec. or more) | INFO |
| U0100 | Lost Communication with ECM | 1. CAN communication system<br><br>2. ECM | - | INFO |
| U0101 | Lost Communication with TCM | 1. CAN communication system<br><br>2. TCM | - | INFO |
| U0131 | Lost Communication with Electric Power Steering ECU | 1. CAN communication system<br><br>2. Electric power steering ECU | - | INFO |
| U0142 | Lost Communication with Main Body ECU | 1. CAN communication system<br><br>2. Main body ECU | - | INFO |
| U0155 | Lost Communication with Combination Meter | 1. CAN communication system<br><br>2. Combination meter | - | INFO |
| U0293 | Lost Communication with HV ECU | 1. CAN communication system<br><br>2. Power management control ECU | - | INFO |

### *Hybrid Control System*

| DTC Code | Detection Item | Trouble Area | Memory | See page |
|---|---|---|---|---|
| P0AA6-611 | Hybrid Battery Voltage System Isolation Fault | 1. Compressor oil<br><br>2. Refrigerant pipe line<br><br>3. Compressor with motor assembly<br><br>4. CAN communication system | - | INFO |

- *1: If the cabin temperature is approximately -18.6°C (-1.48°F) or lower, DTC B1411/11 may be output even though the system is normal.
- *2: If the ambient temperature is approximately -52.9°C (-63.22°F) or lower, DTC B1412/12 may be output even though the system is normal.
- *3: w/ Plasmacluster (Ion Generator)
- *4: The A/C amplifier stores the DTC of the respective malfunction if it has occurred for the period of time indicated in the brackets.

| DTC | B1411/11 | Room Temperature Sensor Circuit |
|---|---|---|

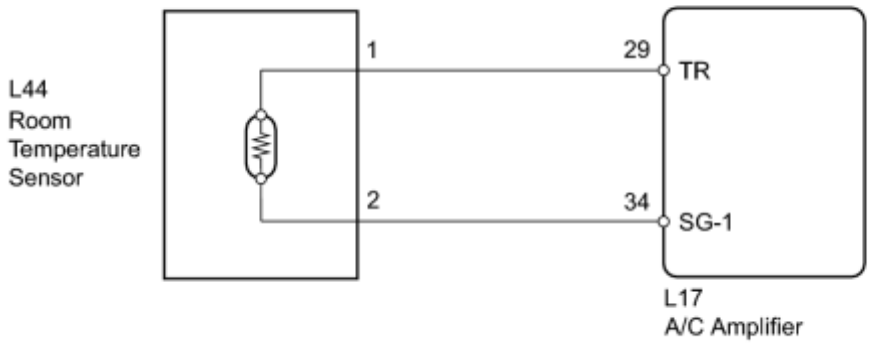
# DESCRIPTION

The room temperature sensor is installed in the instrument panel. It detects the cabin temperature to control the air conditioning AUTO mode. The resistance of the room temperature sensor changes in accordance with the cabin temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The A/C amplifier applies voltage (5 V) to the room temperature sensor and reads voltage changes as the resistance of the room temperature sensor changes. This sensor also sends appropriate signals to the A/C amplifier. The room temperature sensor is integrated with the room humidity sensor.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1411/11 | Open or short in room temperature sensor circuit | • Room temperature sensor<br>• Harness or connector between room temperature sensor and A/C amplifier<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Room Temperature Sensor | Room temperature sensor / Min.: -6.5°C (20.3°F) Max.: 57.25°C (135.05°F) | Actual cabin temperature displayed | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

C REPLACE A/C AMPLIFIER

B PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

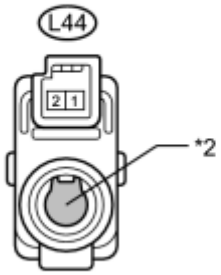
A

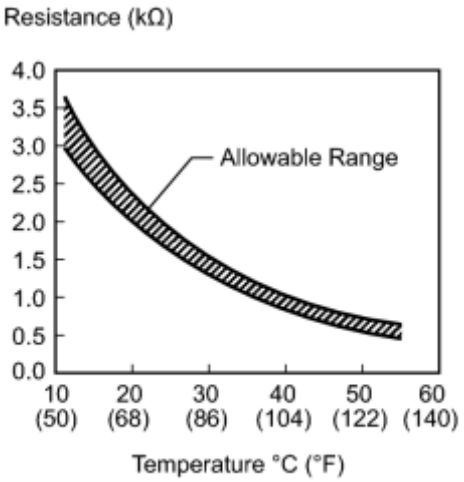
| | |
|---|---|
| 2. | INSPECT ROOM TEMPERATURE SENSOR |

(a) Remove the room temperature sensor.

(b) Disconnect the room temperature sensor connector.

*1




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L44-1 - L44-2 | 10°C (50°F) | 3.00 to 3.73 kΩ |
| L44-1 - L44-2 | 15°C (59°F) | 2.45 to 2.88 kΩ |
| L44-1 - L44-2 | 20°C (68°F) | 1.95 to 2.30 kΩ |
| L44-1 - L44-2 | 25°C (77°F) | 1.60 to 1.80 kΩ |
| L44-1 - L44-2 | 30°C (86°F) | 1.28 to 1.47 kΩ |
| L44-1 - L44-2 | 35°C (95°F) | 1.00 to 1.22 kΩ |
| L44-1 - L44-2 | 40°C (104°F) | 0.80 to 1.00 kΩ |
| L44-1 - L44-2 | 45°C (113°F) | 0.65 to 0.85 kΩ |
| L44-1 - L44-2 | 50°C (122°F) | 0.50 to 0.70 kΩ |
| L44-1 - L44-2 | 55°C (131°F) | 0.44 to 0.60 kΩ |
| L44-1 - L44-2 | 60°C (140°F) | 0.36 to 0.50 kΩ |

NOTICE:

- Hold the sensor only by its connector. Touching the sensor may change the resistance value.
- When measuring, the sensor temperature must be the same as the ambient temperature.

HINT:

As the temperature increases, the resistance decreases (see the graph).

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Room Temperature Sensor) |
| *2 | Sensing Portion |

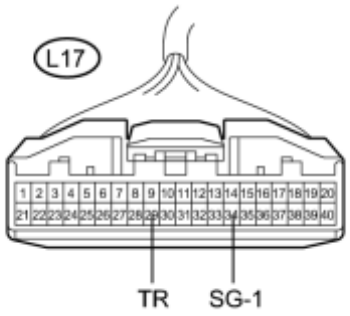
NG ▶ REPLACE ROOM TEMPERATURE SENSOR

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (ROOM TEMPERATURE SENSOR - A/C AMPLIFIER) |

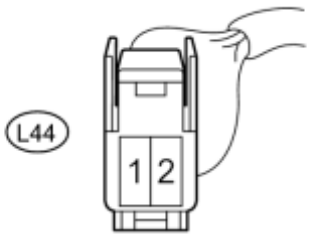
*1




H

(a) Disconnect the A/C amplifier connector.

*2




H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-29 (TR) - L44-1 | Always | Below 1 Ω |
| L17-34 (SG-1) - L44-2 | Always | Below 1 Ω |
| L17-29 (TR) - Body ground | Always | 10 kΩ or higher |
| L17-34 (SG-1) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to Room Temperature Sensor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE A/C AMPLIFIER**

| DTC | B1412/12 | Ambient Temperature Sensor Circuit |
|---|---|---|

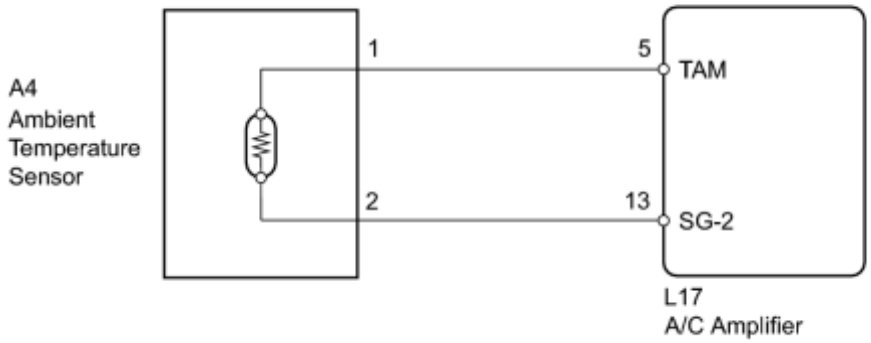
# DESCRIPTION

The ambient temperature sensor is installed in front of the condenser. It detects the ambient temperature to control air conditioning AUTO mode. This sensor is connected to the A/C amplifier and detects fluctuations in the ambient temperature. This data is used for controlling the cabin temperature. The sensor sends a signal to the A/C amplifier. The resistance of the ambient temperature sensor changes in accordance with the ambient temperature. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The A/C amplifier applies voltage (5 V) to the ambient temperature sensor and reads voltage changes as the resistance of the ambient temperature sensor changes.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1412/12 | Open or short in ambient temperature sensor circuit | • Ambient temperature sensor<br>• Harness or connector between ambient temperature sensor and A/C amplifier<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Ambient Temp Sensor | Ambient temperature sensor / Min: -23.3°C (-9.94°F) Max: 65.95°C (150.71°F) | Actual ambient temperature displayed | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

C ▶ REPLACE A/C AMPLIFIER

B ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A

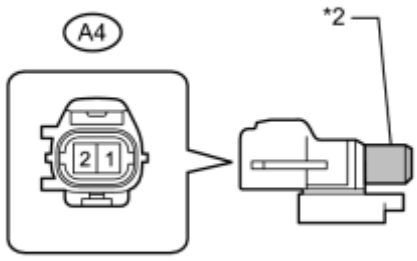
▼

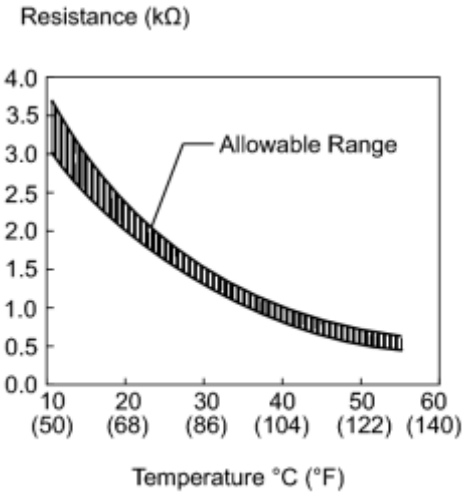
| | |
|---|---|
| 2. | INSPECT AMBIENT TEMPERATURE SENSOR |

(a) Remove the ambient temperature sensor.

(b) Disconnect the ambient temperature sensor connector.

*1




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A4-1 - A4-2 | 10°C (50°F) | 3.00 to 3.73 kΩ |
| A4-1 - A4-2 | 15°C (59°F) | 2.45 to 2.88 kΩ |
| A4-1 - A4-2 | 20°C (68°F) | 1.95 to 2.30 kΩ |
| A4-1 - A4-2 | 25°C (77°F) | 1.60 to 1.80 kΩ |
| A4-1 - A4-2 | 30°C (86°F) | 1.28 to 1.47 kΩ |
| A4-1 - A4-2 | 35°C (95°F) | 1.00 to 1.22 kΩ |
| A4-1 - A4-2 | 40°C (104°F) | 0.80 to 1.00 kΩ |
| A4-1 - A4-2 | 45°C (113°F) | 0.65 to 0.85 kΩ |
| A4-1 - A4-2 | 50°C (122°F) | 0.50 to 0.70 kΩ |
| A4-1 - A4-2 | 55°C (131°F) | 0.44 to 0.60 kΩ |
| A4-1 - A4-2 | 60°C (140°F) | 0.36 to 0.50 kΩ |

NOTICE:

- Hold the sensor only by its connector. Touching the sensor may change the resistance value.
- When measuring, the sensor temperature must be the same as the ambient temperature.

HINT:

As the temperature increases, the resistance decreases (see the graph).

***Text in Illustration***

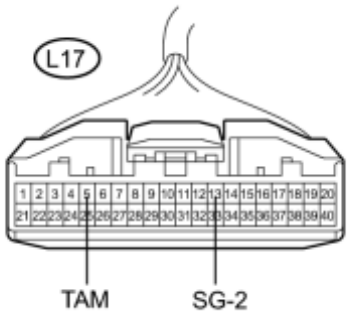
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Ambient Temperature Sensor) |
| *2 | Sensing Portion |

NG REPLACE AMBIENT TEMPERATURE SENSOR

OK

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (AMBIENT TEMPERATURE SENSOR - A/C AMPLIFIER) |

*1




H

(a) Disconnect the A/C amplifier connector.

*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-5 (TAM) - A4-1 | Always | Below 1 Ω |
| L17-13 (SG-2) - A4-2 | Always | Below 1 Ω |
| L17-5 (TAM) - Body ground | Always | 10 kΩ or higher |
| L17-13 (SG-2) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to Ambient Temperature Sensor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE A/C AMPLIFIER**

| DTC | B1413/13 | Evaporator Temperature Sensor Circuit |
|---|---|---|

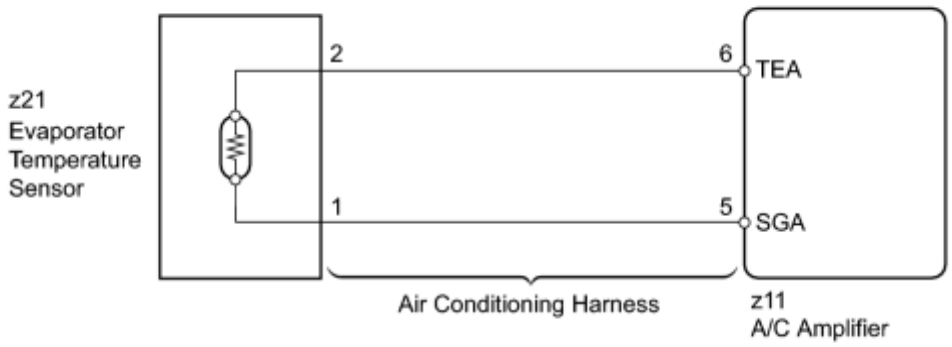
# DESCRIPTION

The evaporator temperature sensor is installed on the evaporator in the air conditioning unit to detect the cooled air temperature that has passed through the evaporator and to control the air conditioning. It sends appropriate signals to the A/C amplifier. The resistance of the evaporator temperature sensor changes in accordance with the cooled air temperature that has passed through the evaporator. As the temperature decreases, the resistance increases. As the temperature increases, the resistance decreases.

The A/C amplifier applies voltage (5 V) to the evaporator temperature sensor and reads voltage changes as the resistance of the evaporator temperature sensor changes. This sensor is used for frost prevention.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1413/13 | Open or short in evaporator temperature sensor circuit | • Evaporator temperature sensor<br>• Air conditioning harness<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Evaporator Fin Thermistor | Evaporator temperature sensor /<br><br>Min.: -29.7°C (-21.46°F)<br><br>Max.: 59.55°C (139.19°F) | Actual evaporator temperature displayed | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

C REPLACE A/C AMPLIFIER

B PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

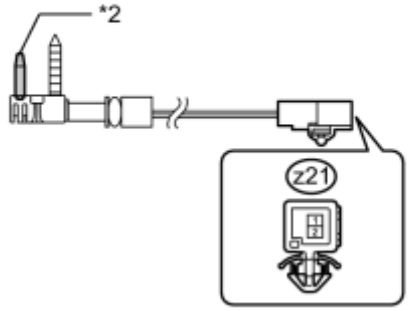
A

| | |
|---|---|
| 2. | INSPECT EVAPORATOR TEMPERATURE SENSOR |

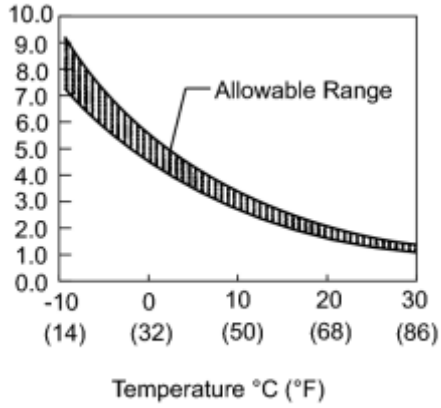
(a) Remove the evaporator temperature sensor.

(b) Disconnect the evaporator temperature sensor connector.

*1




Resistance (kΩ)




H

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z21-1 - z21-2 | -10°C (14°F) | 7.30 to 9.10 kΩ |
| z21-1 - z21-2 | -5°C (23°F) | 5.65 to 6.95 kΩ |
| z21-1 - z21-2 | 0°C (32°F) | 4.40 to 5.35 kΩ |
| z21-1 - z21-2 | 5°C (41°F) | 3.40 to 4.15 kΩ |
| z21-1 - z21-2 | 10°C (50°F) | 2.70 to 3.25 kΩ |
| z21-1 - z21-2 | 15°C (59°F) | 2.14 to 2.58 kΩ |
| z21-1 - z21-2 | 20°C (68°F) | 1.71 to 2.05 kΩ |
| z21-1 - z21-2 | 25°C (77°F) | 1.38 to 1.64 kΩ |
| z21-1 - z21-2 | 30°C (86°F) | 1.11 to 1.32 kΩ |

NOTICE:

- Hold the sensor only by its connector. Touching the sensor may change the resistance value.
- When measuring, the sensor temperature must be the same as the ambient temperature.

HINT:

As the temperature increases, the resistance decreases (see the graph).

***Text in Illustration***

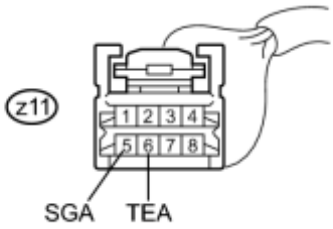
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Evaporator Temperature Sensor) |
| *2 | Sensing Portion |

NG REPLACE EVAPORATOR TEMPERATURE SENSOR

OK

| | |
|---|---|
| 3. | INSPECT AIR CONDITIONING HARNESS (A/C AMPLIFIER - EVAPORATOR TEMPERATURE SENSOR) |

*1

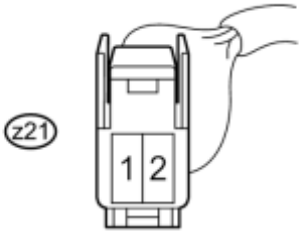



(a) Remove the air conditioning harness.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z11-6 (TEA) - z21-2 | Always | Below 1 Ω |
| z11-5 (SGA) - z21-1 | Always | Below 1 Ω |
| z11-6 (TEA) - Body ground | Always | 10 kΩ or higher |
| z11-5 (SGA) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

H

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Evaporator Temperature Sensor) |

NG ▶ REPLACE AIR CONDITIONING HARNESS

OK ▶ **REPLACE A/C AMPLIFIER**

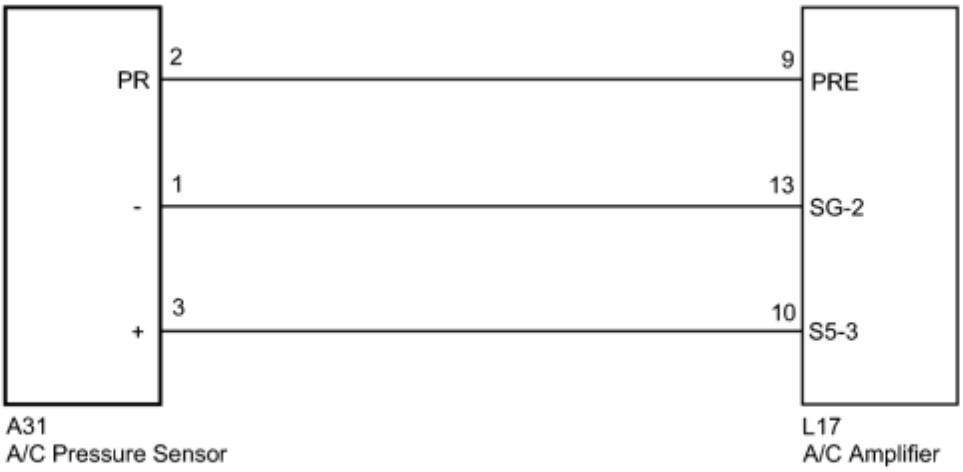
| DTC | B1423/23 | Pressure Sensor Circuit |
|---|---|---|

# DESCRIPTION

This DTC is stored when refrigerant pressure on the high pressure side is extremely low (0.19 MPa (2.0 kgf/cm$^2$, 28 psi) or less) or extremely high (3.14 MPa (32.0 kgf/cm$^2$, 455 psi) or more). The A/C pressure sensor is installed on the high pressure line. It detects refrigerant pressure to output a refrigerant pressure signal to the A/C amplifier. The A/C amplifier converts this signal to a pressure value according to the sensor characteristics to control the compressor.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1423/23 | • Open or short in pressure sensor circuit<br>• Refrigerant pressure on the high pressure line is extremely low (0.19 MPa (2.0 kgf/cm$^2$, 28 psi) or less) or extremely high (3.14 MPa (32.0 kgf/cm$^2$, 455 psi) or more). | • A/C pressure sensor<br>• Harness or connector between A/C pressure sensor and A/C amplifier<br>• A/C amplifier<br>• Expansion valve (blocked, stuck)<br>• Condenser (blocked, deterioration of cooling capacity due to dirt)<br>• Cooler dryer (moisture in the refrigerant cycle cannot be absorbed)<br>• Cooling fan system (condenser cannot be cooled down)<br>• A/C system (leaks, blocked) |

# WIRING DIAGRAM

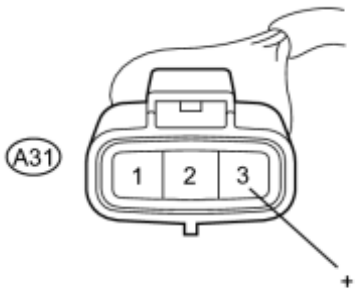



# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT) |

*1




(a) Disconnect the A/C pressure sensor connector.

H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| A31-3 (+) - Body ground | Power switch on (IG) | 4.75 to 5.25 V |

*Text in Illustration*

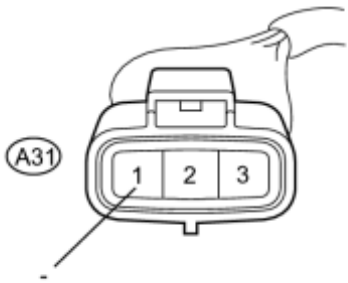
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Pressure Sensor) |

NG CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C PRESSURE SENSOR)

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (GROUND CIRCUIT) |

*1




H

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A31-1 (-) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Pressure Sensor) |

NG CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C PRESSURE SENSOR)

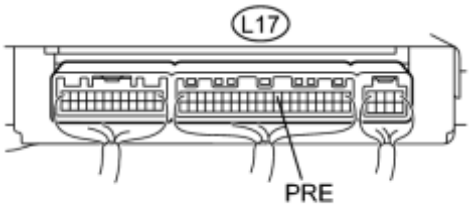
OK

| | |
|---|---|
| 3. | INSPECT A/C PRESSURE SENSOR (SENSOR SIGNAL CIRCUIT) |

(a) Reconnect the A/C pressure sensor connector.

(b) Remove the A/C amplifier with the connectors still connected.

*1




H

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-9 (PRE) - Body ground | Power switch on (IG)<br><br>(A/C: off) | 0.73 to 4.84 V |

HINT:

If the voltage is not as specified, there may be a malfunction in the A/C amplifier, A/C pressure sensor or wire harness. It is also possible that the amount of refrigerant may not be appropriate.

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

NG CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C PRESSURE SENSOR)

OK

| | |
|---|---|
| 4. | INSPECT A/C PRESSURE SENSOR (SENSOR SIGNAL CIRCUIT) |

(a) Measure the voltage when the following conditions are satisfied.

| Item | Condition |
|---|---|
| Vehicle Doors | Fully open |
| Temperature Setting | MAX COLD |
| Blower Speed | HI |
| A/C Switch | on |

| Item | Condition |
|---|---|
| R/F Switch | RECIRCULATION |
| Interior Temperature | 25 to 35°C (77 to 95°F) |

NOTICE:

- If refrigerant pressure on the high pressure line becomes extremely high during the inspection (if the voltage exceeds 4.84 V), the fail-safe function stops compressor operation. Therefore, measure the voltage before the fail-safe function operates.
- It is necessary to measure the voltage over a period of time (approximately 10 minutes) because the problem symptom may recur after a while.

HINT:

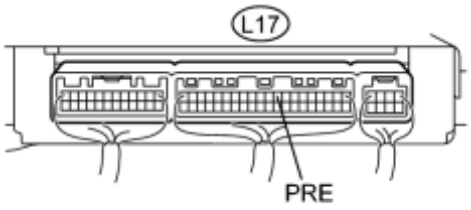
When the outside air temperature is low (below -1.5°C (29.3°F)), the compressor stops due to signals from the ambient temperature sensor and evaporator temperature sensor to prevent the evaporator from freezing. In this case, perform the inspection in a warm indoor environment.

(1) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-9 (PRE) - Body ground | Power switch on (IG)<br><br>(A/C: on) | 0.73 to 4.84 V |

*1




H

Result:

| Result | Proceed to |
|---|---|
| OK (When troubleshooting according to the DTC) | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| NG | C |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

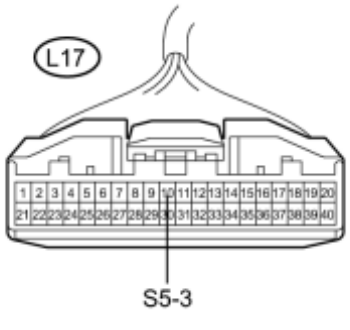
C ▶ INSPECT COOLING FAN SYSTEM

B ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A ▶ **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C PRESSURE SENSOR) |

*1



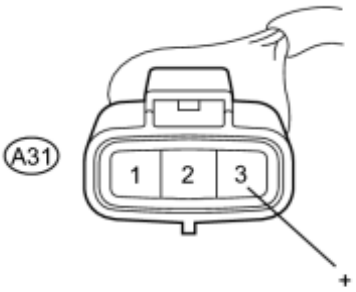

H

(a) Disconnect the A/C amplifier connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A31-3 (+) - L17-10 (S5-3) | Always | Below 1 Ω |
| L17-10 (S5-3) - Body ground | Always | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to A/C Pressure Sensor) |

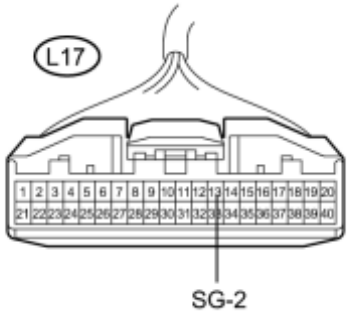
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C PRESSURE SENSOR) |

(a) Disconnect the A/C amplifier connector.

*1

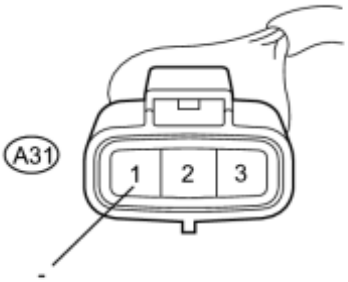



H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A31-1 (-) - L17-13 (SG-2) | Always | Below 1 Ω |
| L17-13 (SG-2) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to A/C Pressure Sensor) |

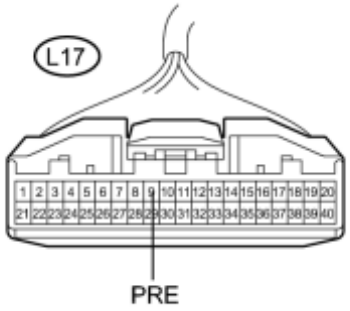
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C PRESSURE SENSOR) |

(a) Disconnect the A/C amplifier connector.

*1

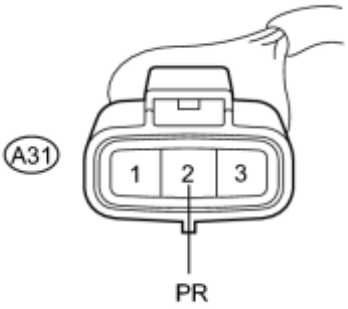



H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A31-2 (PR) - L17-9 (PRE) | Always | Below 1 Ω |
| L17-9 (PRE) - Body ground | Always | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to A/C Pressure Sensor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 8. | CHECK FOR A/C SYSTEM LEAK |

(a) Install the manifold gauge set.

(b) Recover the refrigerant from the A/C system using a refrigerant recovery unit.

(c) Evacuate the A/C system and check that vacuum can be maintained.

OK:

Vacuum can be maintained in the A/C system.

HINT:

If vacuum cannot be maintained in the A/C system, there may be a refrigerant leak. In this case, it is necessary to repair or replace the leaking part of the A/C system.

NG REPAIR A/C SYSTEM LEAK

OK

| | |
|---|---|
| 9. | CHARGE REFRIGERANT |

(a) Add an appropriate amount of refrigerant INFO.

NEXT

| | |
|---|---|
| 10. | RECHECK FOR DTC |

(a) Recheck for the DTC when the following conditions are satisfied.

| Item | Condition |
|---|---|
| Vehicle Doors | Fully open |
| Temperature Setting | MAX COLD |
| Blower Speed | HI |
| A/C Switch | on |
| R/F Switch | RECIRCULATION |
| Interior Temperature | 25 to 35°C (77 to 95°F) |

NOTICE:

If refrigerant pressure on the high pressure line is excessive, this DTC will be set. Therefore, it is necessary to measure the voltage over a period of time (approximately 10 minutes) because this DTC may be set after the A/C has been operating for a while.

HINT:

When the outside air temperature is low (below -1.5°C (29.3°F)), the compressor stops due to signals from the ambient temperature sensor and the evaporator temperature sensor to prevent the evaporator from freezing. In this case, perform the inspection in a warm indoor environment.

Result:

| Result | Proceed to |
|---|---|
| DTC B1423/23 is output | A |

| Result | Proceed to |
|---|---|
| DTC B1423/23 is not output | B |

NOTICE:

If the DTC was set due to an insufficient or excessive amount of refrigerant, the problem may have been solved after performing the previous step. However, the root cause of insufficient refrigerant may be refrigerant leaks. The root cause of excessive refrigerant may be adding refrigerant when the level was insufficient. Therefore, identify and repair any refrigerant leaks as necessary.

B ▶ END

A

▼

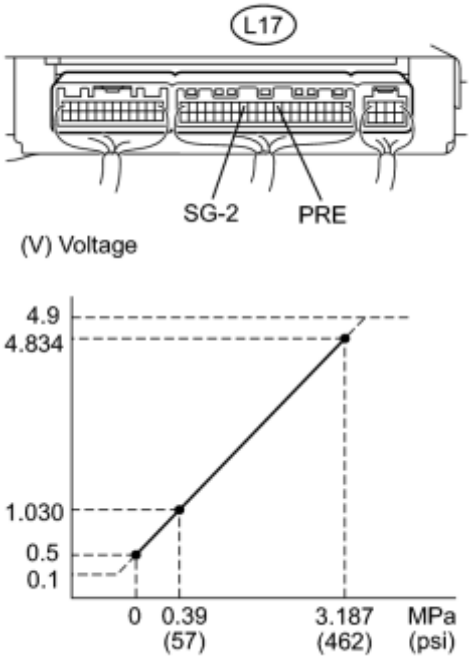
| 11. | INSPECT A/C PRESSURE SENSOR |
|---|---|

(a) Install the manifold gauge set.

(b) Reconnect the A/C pressure sensor connector.

(c) Turn the power switch on (IG).

*1




(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-9 (PRE) - L17-13 (SG-2) | Refrigerant pressure:<br><br>Normal pressure (less than 3.187 MPa [462 psi] and more than 0.39 MPa [57 psi]) | 1.0 to 4.912 V |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

NG ▶ REPLACE A/C PRESSURE SENSOR

OK ▶ **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 12. | REPAIR A/C SYSTEM LEAK |

(a) Identify the area where refrigerant leaks from INFO.

(b) Repair the identified area of the A/C system.

(c) Evacuate the A/C system.

NEXT ▶ **CHARGE REFRIGERANT**

| | |
|---|---|
| 13. | INSPECT COOLING FAN SYSTEM |

(a) Check that the cooling fan(s) operates normally.

HINT:

Refer to Cooling Fan Circuit INFO.

NG ▶ REPAIR COOLING FAN SYSTEM

OK

▼

| | |
|---|---|
| 14. | CHARGE REFRIGERANT |

(a) Use a refrigerant recovery unit to recover refrigerant.

(b) Evacuate the A/C system.

(c) Add an appropriate amount of refrigerant INFO.

HINT:

If refrigerant is added and the system has not been properly evacuated (insufficient vacuum time), moisture in the air remaining in the system will freeze in the expansion valve, blocking the flow on the high pressure side. Therefore, recover the refrigerant and properly evacuate the system. Add an appropriate amount of refrigerant, and check for DTCs.

NEXT

▼

| | |
|---|---|
| 15. | RECHECK FOR DTC |

(a) Recheck for the DTC when the following conditions are satisfied.

| Item | Condition |
|---|---|
| Vehicle Doors | Fully open |
| Temperature Setting | MAX COLD |
| Blower Speed | HI |
| A/C Switch | on |
| R/F Switch | RECIRCULATION |
| Interior Temperature | 25 to 35°C (77 to 95°F) |

NOTICE:

If refrigerant pressure on the high pressure line is excessive, this DTC will be set. Therefore, it is necessary to measure the voltage over a period of time (approximately 10 minutes) because DTC may be set after the A/C has been operating for a while.

HINT:

- When the outside air temperature is low (below -1.5°C (29.3°F)), the compressor stops due to signals from the ambient temperature sensor and the evaporator temperature sensor to prevent the evaporator from freezing. In this case, perform the inspection in a warm indoor environment.
- If refrigerant is added and the system has not been properly evacuated (insufficient vacuum time), moisture in the air remaining in the system will freeze in the expansion valve, blocking the flow on the high pressure side. Therefore, recover the refrigerant and properly evacuate the system. Add an appropriate amount of refrigerant, and check for the DTC. If the DTC is not output, it indicates that the cooler dryer in the condenser is not able to absorb moisture in the refrigerant. In this case, to complete the repair, it is necessary to replace the cooler dryer.

Result:

| Result | Proceed to |
|---|---|
| DTC B1423/23 is output | A |
| DTC B1423/23 is not output | B |

B ▶ REPLACE COOLER DRYER

A

▼

| | |
|---|---|
| 16. | REPLACE EXPANSION VALVE |

(a) Replace the expansion valve with a new or a known good one INFO.

HINT:

Replace the expansion valve with a new or a known good one because the expansion valve is either stuck or clogged.

NEXT

| | |
|---|---|
| 17. | CHARGE REFRIGERANT |

(a) Add an appropriate amount of refrigerant INFO.

NEXT

| | |
|---|---|
| 18. | RECHECK FOR DTC |

(a) Recheck for the DTC when the following conditions are satisfied.

| Item | Condition |
|---|---|
| Vehicle Doors | Fully open |
| Temperature Setting | MAX COLD |
| Blower Speed | HI |
| A/C Switch | on |
| R/F Switch | RECIRCULATION |
| Interior Temperature | 25 to 35°C (77 to 95°F) |

NOTICE:

If refrigerant pressure on the high pressure line is excessive, this DTC will be set. Therefore, it is necessary to measure the voltage over a period of time (approximately 10 minutes) because this DTC may be set after the A/C has been operating for a while.

HINT:

- When the outside air temperature is low (below -1.5°C (29.3°F)), the compressor stops due to signals from the ambient temperature sensor and evaporator temperature sensor to prevent the evaporator from freezing. In this case, perform the inspection in a warm indoor environment.
- If refrigerant pressure is not normal after replacing the expansion valve with a new or a known good one, the condenser or pipes may be clogged with dirt, dust or other contaminants. In this case, clean or replace the condenser or pipes.

Result:

| Result | Proceed to |
|---|---|
| DTC B1423/23 is not output | A |
| DTC B1423/23 is output | B |

B REPLACE CONDENSER

A **END**

| | |
|---|---|
| 19. | REPLACE A/C PRESSURE SENSOR |

(a) Replace the A/C pressure sensor INFO.

HINT:

Since the A/C pressure sensor cannot be inspected while it is removed from the vehicle, replace the A/C pressure sensor with a new or a known good one and check that the condition returns to normal.

NEXT

| | |
|---|---|
| 20. | RECHECK FOR DTC |

(a) Recheck for the DTC when the following conditions are satisfied.

| Item | Condition |
|---|---|
| Vehicle Doors | Fully open |
| Temperature Setting | MAX COLD |
| Blower Speed | HI |
| A/C Switch | on |
| R/F Switch | RECIRCULATION |
| Interior Temperature | 25 to 35°C (77 to 95°F) |

NOTICE:

If refrigerant pressure on the high pressure line is excessive, this DTC will be set. Therefore, it is necessary to measure the voltage over a period of time (approximately 10 minutes) because this DTC may be set after the A/C has been operating for a while.

HINT:

When the outside air temperature is low (below -1.5°C (29.3°F)), the compressor stops due to signals from the ambient temperature sensor and evaporator temperature sensor to prevent the evaporator from freezing. In this case, perform the inspection in a warm indoor environment.

Result:

| Result | Proceed to |
|---|---|
| DTC B1423/23 is not output | A |
| DTC B1423/23 is output | B |

B REPLACE A/C AMPLIFIER

A **END**

| DTC | B1441/41 | Air Mix Damper Control Servo Motor Circuit (Passenger Side) |
|---|---|---|

# DESCRIPTION

The air mix control servo motor sends pulse signals to indicate the damper position to the A/C amplifier. The A/C amplifier activates the motor (normal or reverse) based on these signals to move the air mix damper to any position. As a result, the amount of air passing through the heater core after passing through the evaporator is adjusted, and the temperature of the air blowing toward the passenger side is controlled.

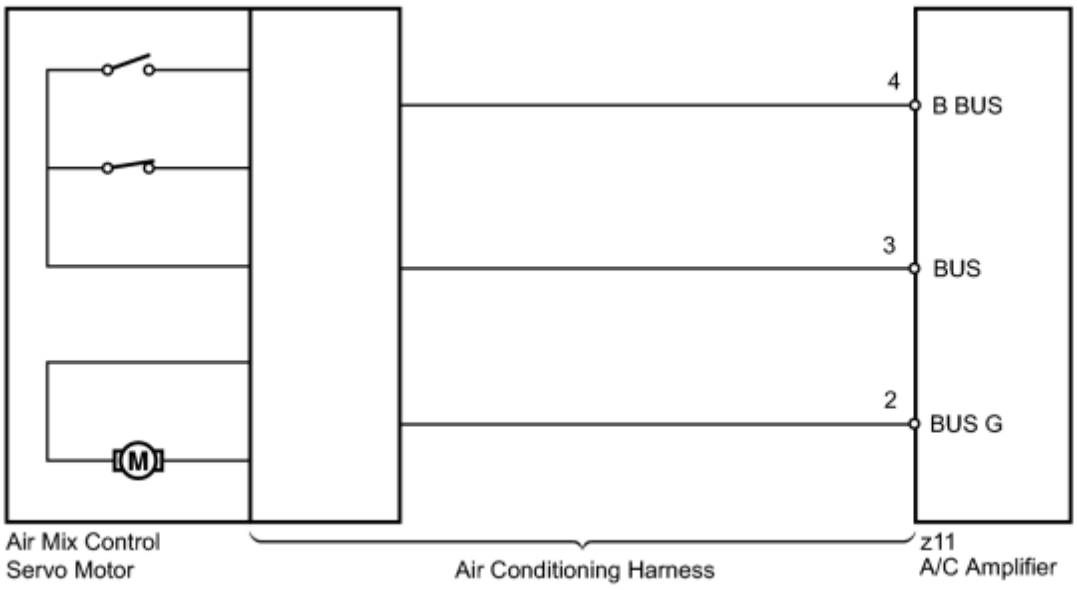
The A/C amplifier communicates with the servo through a communication/driver IC and wiring assembly called the air conditioning harness.

HINT:

Confirm that no mechanical problem is present because this DTC can be stored when either a damper link or the damper is mechanically locked.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1441/41 | Air mix damper position sensor value does not change even if A/C amplifier operates air mix control servo motor | • Air mix control servo motor<br>• Air conditioning harness<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Operate the temperature adjustment switch.

(e) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(f) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Air Mix Servo Targ Pulse (D) | Air mix servo motor target pulse / Min.: 0, Max.: 255 | MAX. COLD: 6 (pulse)<br><br>MAX. HOT: 93 (pulse) | - |
| Air Mix Servo Actual Pulse (D) | Air mix servo motor actual pulse / Min.: 0, Max.: 255 | MAX. COLD: 6 (pulse)<br><br>MAX. HOT: 93 (pulse) | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

C ▶ REPLACE A/C AMPLIFIER

B ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A

▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Air Mix Servo Targ Pulse (D) | Air mix servo motor pulse | Min.: 0, Max.: 255 | - |

OK:

Air temperature changes in accordance with each control range.

NG INSPECT AIR MIX CONTROL SERVO MOTOR

OK **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 3. | INSPECT AIR MIX CONTROL SERVO MOTOR |

(a) Replace the air mix control servo motor INFO.

HINT:

Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC B1441/41 is output | A |
| DTC B1441/41 is not output | B |

B END (AIR MIX CONTROL SERVO MOTOR WAS DEFECTIVE)

A

| | |
|---|---|
| 4. | INSPECT AIR CONDITIONING HARNESS |

(a) Replace the air conditioning harness INFO.

HINT:

Since the air conditioning harness cannot be inspected while it is removed from the vehicle, replace the air conditioning harness with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC B1441/41 is output | A |
| DTC B1441/41 is not output | B |

B ▶ END (AIR CONDITIONING HARNESS WAS DEFECTIVE)

A ▶ **REPLACE A/C AMPLIFIER**

| DTC | B1442/42 | Air Inlet Damper Control Servo Motor Circuit |
|---|---|---|

# DESCRIPTION

The air inlet control servo motor sends pulse signals to indicate the damper position to the A/C amplifier. The A/C amplifier activates the motor (normal or reverse) based on these signals to move the air inlet mode selection air inlet control damper to any position, which controls the intake air settings (FRESH, FRESH/RECIRCULATION and RECIRCULATION).

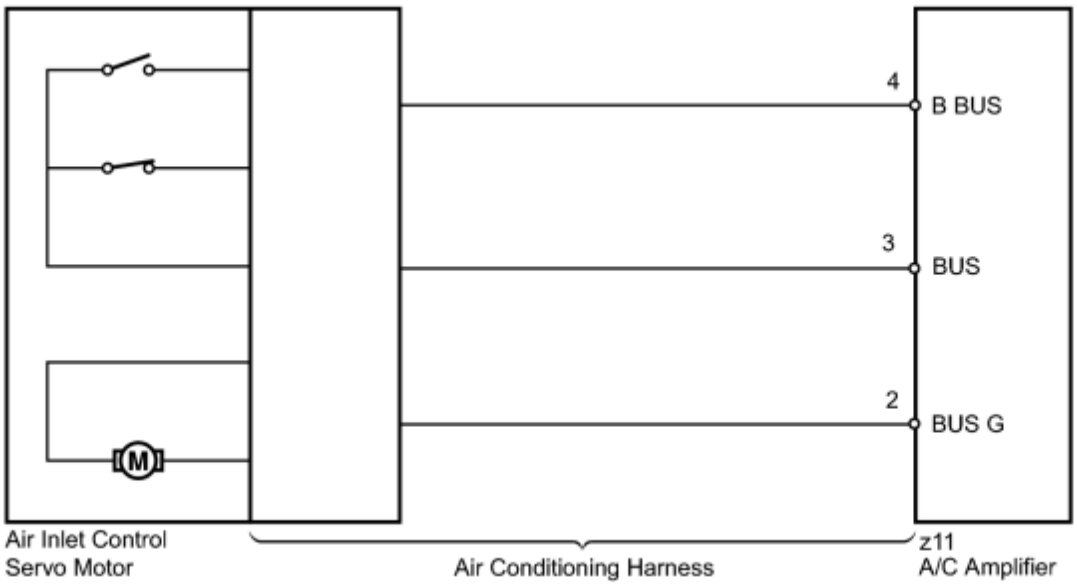
The A/C amplifier communicates with the servo through a communication/driver IC and wiring assembly called the air conditioning harness.

HINT:

Confirm that no mechanical problem is present because this DTC can be stored when either a damper link or the damper is mechanically locked.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1442/42 | Air inlet damper position sensor value does not change even if A/C amplifier operates air inlet control servo motor | • Air inlet control servo motor<br>• Air conditioning harness<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Operate the R/F (Recirculation/Fresh) switch.

(e) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(f) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Air Inlet Damper Targ Pulse | Air inlet servo motor target pulse / Min.: 0, Max.: 255 | RECIRCULATION: 19 (pulse)<br><br>FRESH: 7 (pulse) | - |
| Air Inlet Damper Actual Pulse | Air inlet servo motor actual pulse / Min.: 0, Max.: 255 | RECIRCULATION: 19 (pulse)<br><br>FRESH: 7 (pulse) | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

C ▶ REPLACE A/C AMPLIFIER

B ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A

▼

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Air Inlet Damper Targ Pulse | Air inlet damper target pulse | Min.: 0, Max.: 255 | - |

OK:

Recirculation damper position changes in accordance with each control range.

NG INSPECT AIR INLET CONTROL SERVO MOTOR

OK **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 3. | INSPECT AIR INLET CONTROL SERVO MOTOR |

(a) Replace the air inlet control servo motor INFO.

HINT:

Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC B1442/42 is output | A |
| DTC B1442/42 is not output | B |

B END (AIR INLET CONTROL SERVO MOTOR WAS DEFECTIVE)

A

| | |
|---|---|
| 4. | INSPECT AIR CONDITIONING HARNESS |

(a) Replace the air conditioning harness INFO.

HINT:

Since the air conditioning harness cannot be inspected while it is removed from the vehicle, replace the air conditioning harness with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC B1442/42 is output | A |
| DTC B1442/42 is not output | B |

B END (AIR CONDITIONING HARNESS WAS DEFECTIVE)

A **REPLACE A/C AMPLIFIER**

| DTC | B1443/43 | Air Outlet Damper Control Servo Motor Circuit |
|---|---|---|

# DESCRIPTION

The air outlet control servo motor sends pulse signals to indicate the damper position to the A/C amplifier. The A/C amplifier activates the motor (normal or reverse) based on these signals to move the mode damper to any position, which controls the air outlet switching.

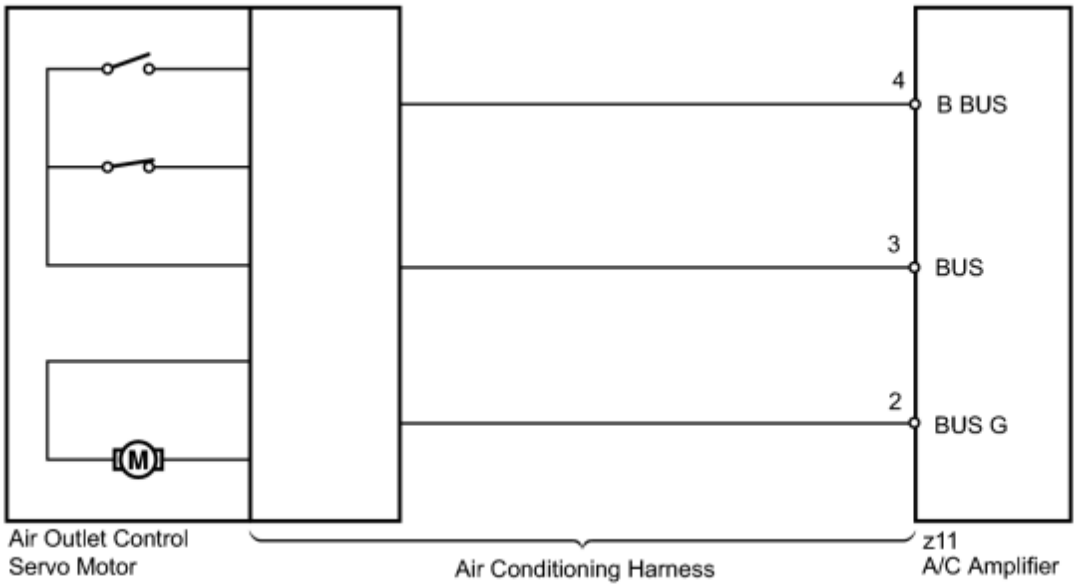
The A/C amplifier communicates with the servo through a communication/driver IC and wiring assembly called the air conditioning harness.

HINT:

Confirm that no mechanical problem is present because this DTC can be stored when either a damper link or the damper is mechanically locked.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1443/43 | Air outlet damper position sensor value does not change even if A/C amplifier operates air outlet control servo motor | • Air outlet control servo motor<br>• Air conditioning harness<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Operate the MODE switch.

(e) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(f) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Air Outlet Servo Pulse (D) | Air outlet servo motor target pulse / Min.: 0, Max.: 255 | FACE: 47 (pulse)<br>B/L: 37 (pulse)<br>FOOT: 17 (pulse)<br>FOOT/DEF: 9 (pulse)<br>DEF: 5 (pulse) | - |
| Air Outlet Servo Actu Pulse (D) | Air outlet servo motor actual pulse / Min.: 0, Max.: 255 | FACE: 47 (pulse)<br>B/L: 37 (pulse)<br>FOOT: 17 (pulse)<br>FOOT/DEF: 9 (pulse)<br>DEF: 5 (pulse) | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |

| Result | Proceed to |
|---|---|
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

C REPLACE A/C AMPLIFIER

B PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

| Tester Display | Test Part | Control Rage | Diagnostic Note |
|---|---|---|---|
| Air Outlet Servo Pulse (D) | Air outlet servo motor pulse | Min.: 0, Max.: 255 | - |

OK:

Air flow position changes in accordance with each control range.

NG INSPECT AIR OUTLET CONTROL SERVO MOTOR

OK **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 3. | INSPECT AIR OUTLET CONTROL SERVO MOTOR |

(a) Replace the air outlet control servo motor INFO.

HINT:

Since the servo motor cannot be inspected while it is removed from the vehicle, replace the servo motor with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC B1443/43 is output | A |
| DTC B1443/43 is not output | B |

B ▶ END (AIR OUTLET CONTROL SERVO MOTOR WAS DEFECTIVE)

A

▼

| | |
|---|---|
| 4. | INSPECT AIR CONDITIONING HARNESS |

(a) Replace the air conditioning harness INFO.

HINT:

Since the air conditioning harness cannot be inspected while it is removed from the vehicle, replace the air conditioning harness with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC B1443/43 is output | A |
| DTC B1443/43 is not output | B |

B ▶ END (AIR CONDITIONING HARNESS WAS DEFECTIVE)

A ▶ **REPLACE A/C AMPLIFIER**

| DTC | B1471/71 | A/C Inverter High Voltage Power Resource System Malfunction |
|---|---|---|

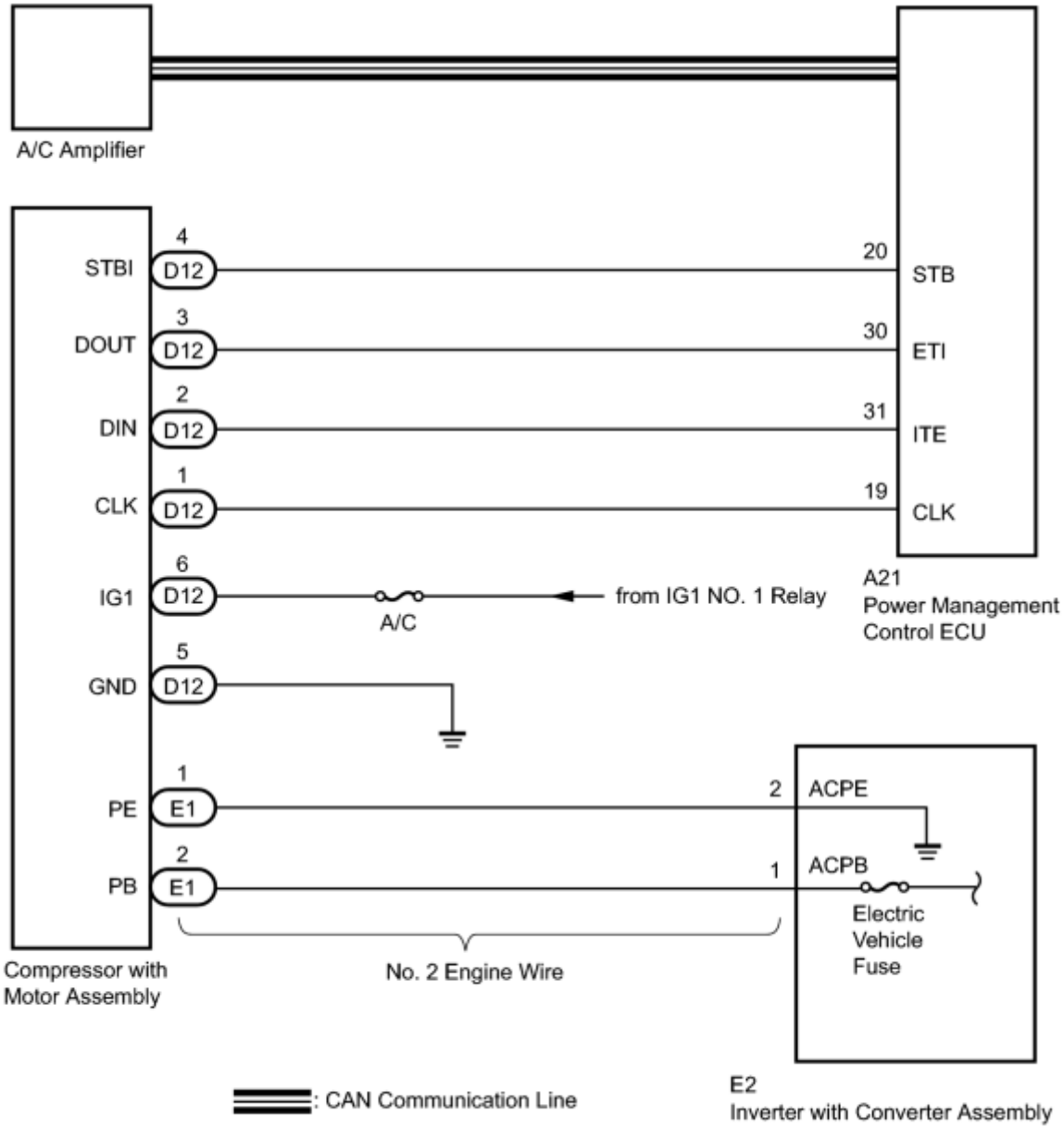
# DESCRIPTION

The A/C inverter assembly monitors power voltage from the main battery in the circuit. It stops compressor control and stores the DTC when the monitored voltage is outside the specified range.

The output DTC is memorized as previous trouble. Compressor control may not resume unless the power switch is turned off.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1471/71 | • Open or short in A/C inverter high voltage power resource system.<br>• The boost pressure system is broken or malfunctioning. | • Electric vehicle fuse<br>• No. 2 engine wire (harness or connector between compressor with motor assembly and inverter with converter assembly)<br>• Compressor with motor assembly<br>• Hybrid control system<br>• CAN communication system |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A

▼

| | |
|---|---|
| 2. | CHECK DIAGNOSTIC TROUBLE CODE (HYBRID CONTROL SYSTEM) |

(a) Check if DTCs for the hybrid control system are output using the Techstream.

OK:

Hybrid control system DTCs are not output.

NG ▶ GO TO HYBRID CONTROL SYSTEM

OK

▼

| | |
|---|---|
| 3. | INSPECT ELECTRIC VEHICLE FUSE |

CAUTION:

Be sure to wear insulated gloves.

(a) Turn the power switch off.

(b) Remove the service plug grip.

CAUTION:

Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

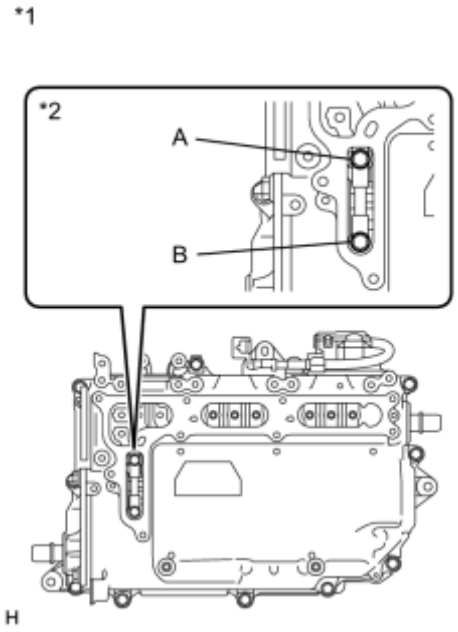
NOTICE:

Do not start the engine with the service plug grip removed because it may cause a malfunction.

(c) Remove the inverter terminal cover.

NOTICE:

Be sure to prevent foreign objects or water from entering the inverter with converter assembly.




(d) Check that bolts A and B are tightened securely.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Item<br><br>(Tester Connection) | Condition | Specified Condition |
|---|---|---|
| ELECTRIC VEHICLE fuse<br><br>(A - B) | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Inverter with Converter Assembly |
| *2 | Electric Vehicle Fuse |

NG ▶ REPLACE ELECTRIC VEHICLE FUSE

OK

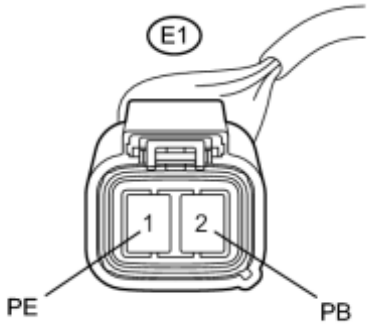
▼

| | |
|---|---|
| 4. | INSPECT NO. 2 ENGINE WIRE |

CAUTION:

Be sure to wear insulated gloves.

*1

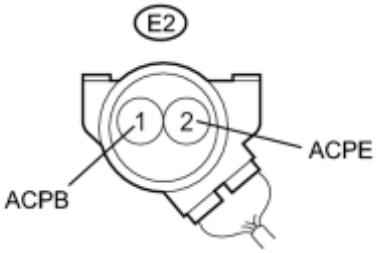



(a) Disconnect the No. 2 engine wire connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| E1-1 (PE) - E2-2 (ACPE) | Always | Below 1 Ω |
| E1-2 (PB) - E2-1 (ACPB) | Always | Below 1 Ω |
| E1-1 (PE) - Body ground | Always | 10 kΩ or higher |
| E1-2 (PB) - Body ground | Always | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Compressor with Motor Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

H

NG ▶ REPLACE NO. 2 ENGINE WIRE

OK ▶ **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

| | | |
|---|---|---|
| DTC | B1472/72 | A/C Inverter High Voltage Output System Malfunction |

# DESCRIPTION

The inverter in the compressor with motor assembly outputs high-voltage to operate the motor. If there is an open or short in the output circuit, the ECU will stop compressor operation and output the DTC. The output DTC will be memorized as a history DTC. The compressor operation remains stopped until both the history and current DTCs are cleared.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1472/72 | Open or short in A/C inverter high voltage output system. | • Compressor with motor assembly<br>• CAN communication system |

# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▶ **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

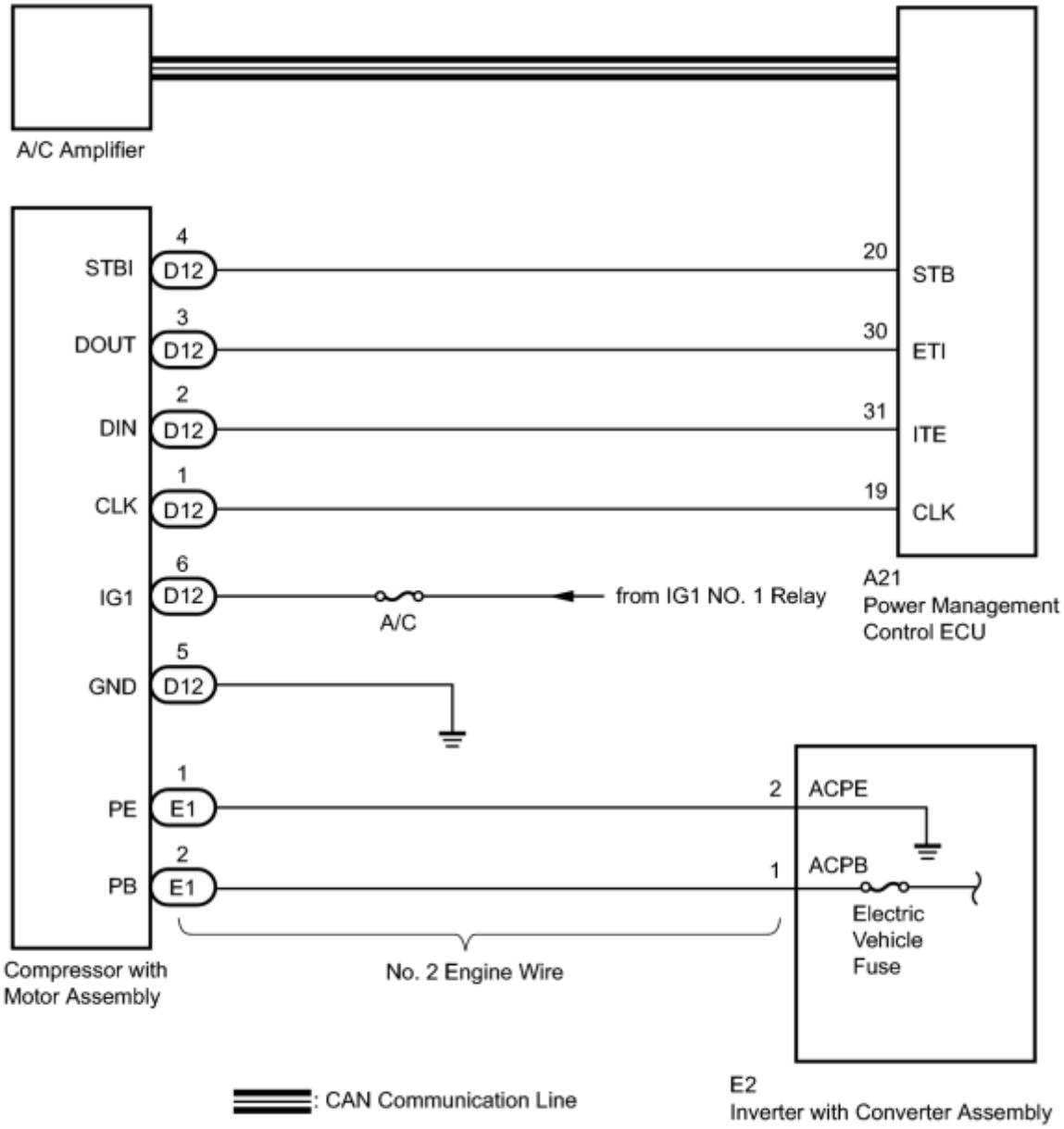
| DTC | B1473/73 | A/C Inverter Start-up Signal System Malfunction |
|---|---|---|

# DESCRIPTION

The inverter activation signal is sent to the compressor with motor assembly from the power management control ECU. Compressor control is stopped and the DTC is stored if there is an open or short in the signal circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1473/73 | Open or short in A/C inverter start-up signal system. | • Harness or connector between power management control ECU and compressor with motor assembly<br>• Compressor with motor assembly<br>• Power management control ECU<br>• Hybrid control system<br>• CAN communication system |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | CHECK DIAGNOSTIC TROUBLE CODE |

(a) Check if DTCs for the air conditioning system and the hybrid control system are output using the Techstream.

Result:

| Result | Proceed to |
|---|---|
| Only DTC B1473 is output | A |
| DTCs B1473 and P3108 are output simultaneously (B1498 is not output) | |
| DTCs B1473 and B1498 are output simultaneously (P3108 is not output) | B |
| DTCs B1473, B1498 and P3108 are output simultaneously | |
| DTCs other than P3108 are output for hybrid control system | C |

C GO TO HYBRID CONTROL SYSTEM

B GO TO DTC B1498/98

A

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - COMPRESSOR WITH MOTOR) |

CAUTION:

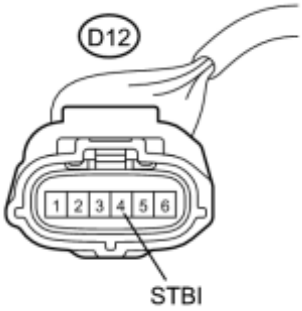
Do not disconnect the connector on the high-voltage side.

*1




(a) Disconnect the connector from the power management control ECU.

*2




H

(b) Disconnect the connector from the compressor with motor assembly.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A21-20 (STB) - D12-4 (STBI) | Always | Below 1 Ω |
| A21-20 (STB) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Compressor with Motor Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 4. | INSPECT COMPRESSOR WITH MOTOR ASSEMBLY |

(a) Reconnect the connector to the compressor with motor assembly.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A21-20 (STB) - Body ground | Power switch on (IG) | 11 to 14 V |
| A21-20 (STB) - Body ground | Power switch off | Below 1 V |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |

NG REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| DTC | B1474/74 | A/C Inverter Malfunction |
|---|---|---|

# DESCRIPTION

| DTC No. | DTC Detecting Condition | Trouble Area |
|---|---|---|
| B1474/74 | A/C inverter malfunction | • Compressor with motor assembly<br>• CAN communication system |

# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

# PROCEDURE

| 1. | CHECK CAN COMMUNICATION SYSTEM |
|---|---|

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▶ **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

| DTC | B1475/75 | A/C Inverter Cooling / Heating System Malfunction |
|---|---|---|

# DESCRIPTION

The temperature sensor of the compressor with motor assembly detects inverter temperature.

If the temperature exceeds the maximum, the compressor with motor assembly stops compressor operation, and this DTC will be stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1475/75 | Cooling water temperature in the inverter is outside the specified range (temperature is too high), or there is an open or short to ground in the temperature sensor circuit. | • Cooling fan system<br>• Refrigerant volume<br>• Compressor with motor assembly<br>• CAN communication system |

# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

# PROCEDURE

| 1. | CHECK CAN COMMUNICATION SYSTEM |
|---|---|

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Electrical Fan | Electrical fan | OFF or ON | - |

OK:

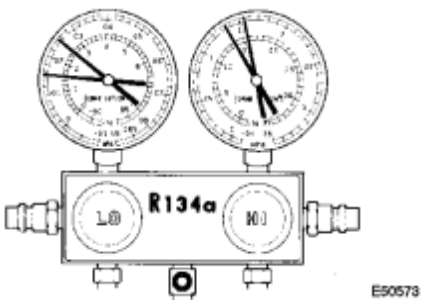
Electrical fan operates smoothly.

NG GO TO COOLING FAN SYSTEM

OK

| | |
|---|---|
| 3. | CHECK REFRIGERANT PRESSURE |

(a) Install the manifold gauge set INFO.




(b) Read the manifold gauge pressure when the following conditions are established.

(1) Prepare the vehicle according to the chart below.

| Item | Condition |
|---|---|
| Vehicle Doors | All fully open |
| Temperature Setting | MAX COLD |
| Blower Speed | HI |
| A/C switch | ON |
| R/F Switch | RECIRCULATION<br><br>(30 to 35°C (86 to 95°F)) |

Standard Pressure:

Low pressure side

0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm$^2$, 21.3 to 35.6 psi)

High pressure side

1.37 to 1.57 MPa (14 to 16 kgf/cm$^2$, 199 to 228 psi)

NG ▶ CHARGE REFRIGERANT

OK

▼

| | |
|---|---|
| 4. | READ OUTPUT DTC (DTC B1475/75) |

(a) Clear the DTCs INFO.

(b) Prepare the vehicle according to the table below.

| Item | Condition |
|---|---|
| Engine speed | Engine idling |
| Blower speed | HI |
| A/C switch | ON |
| Temperature setting | MAX. COLD |

(c) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC B1475/75 is not output (normal) | A |
| DTC B1475/75 is output | B |

NOTICE:

If the engine keeps idling when ambient temperature is high, the compressor may automatically stop to protect the inverter circuit, and DTC B1475/75 may be stored.

B ▶ REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

A ▶ **SYSTEM IS OK**

| DTC | B1476/76 | A/C Inverter Load System Malfunction |
|---|---|---|

# DESCRIPTION

The compressor with motor assembly stops compressor control and outputs this DTC if the rotation load is too large or too small while controlling motor rotation in the compressor with motor assembly.

Possible causes are refrigerant gas leakage, overcharged refrigerant gas, insufficient cooling because of a condenser fan circuit malfunction, or compressor lock.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1476/76 | Motor rotation load while the compressor is operating is too large or too small. | • Refrigerant volume<br>• Compressor with motor assembly<br>• Cooling fan system<br>• CAN communication system |

# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

# PROCEDURE

| 1. | CHECK CAN COMMUNICATION SYSTEM |
|---|---|

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

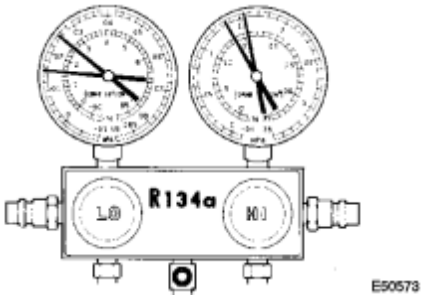
| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Electrical Fan | Electrical fan | OFF or ON | - |

NG GO TO COOLING FAN SYSTEM

OK

| | |
|---|---|
| 3. | CHECK REFRIGERANT PRESSURE |

(a) Install the manifold gauge set INFO.




(b) Read the manifold gauge pressure when the following conditions are established.

(1) Prepare the vehicle according to the chart below.

| Item | Condition |
|---|---|
| Vehicle Doors | All fully open |
| Temperature Setting | MAX COLD |
| Blower Speed | HI |
| A/C switch | ON |
| R/F Switch | RECIRCULATION<br><br>(30 to 35°C (86 to 95°F)) |

Standard Pressure:

Low pressure side

0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm$^2$, 21.3 to 35.6 psi)

High pressure side

1.37 to 1.57 MPa (14 to 16 kgf/cm$^2$, 199 to 228 psi)

NG ▶ CHARGE REFRIGERANT

OK ▶ **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

| DTC | B1477/77 | A/C Inverter Low Voltage Power Resource System Malfunction |
|---|---|---|

# DESCRIPTION

The compressor with motor assembly monitors the controlling power voltage in the circuit. It stops the compressor circuit and stores the DTC when the monitored voltage is outside the specified range.

The output DTC is memorized as previous trouble. The compressor control may not resume unless the power switch is turned off.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1477/77 | An open or short to ground in the inverter controlling power voltage circuit. | • Compressor with motor assembly<br>• CAN communication system |

# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

# PROCEDURE

| 1. | CHECK CAN COMMUNICATION SYSTEM |
|---|---|

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▶ **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

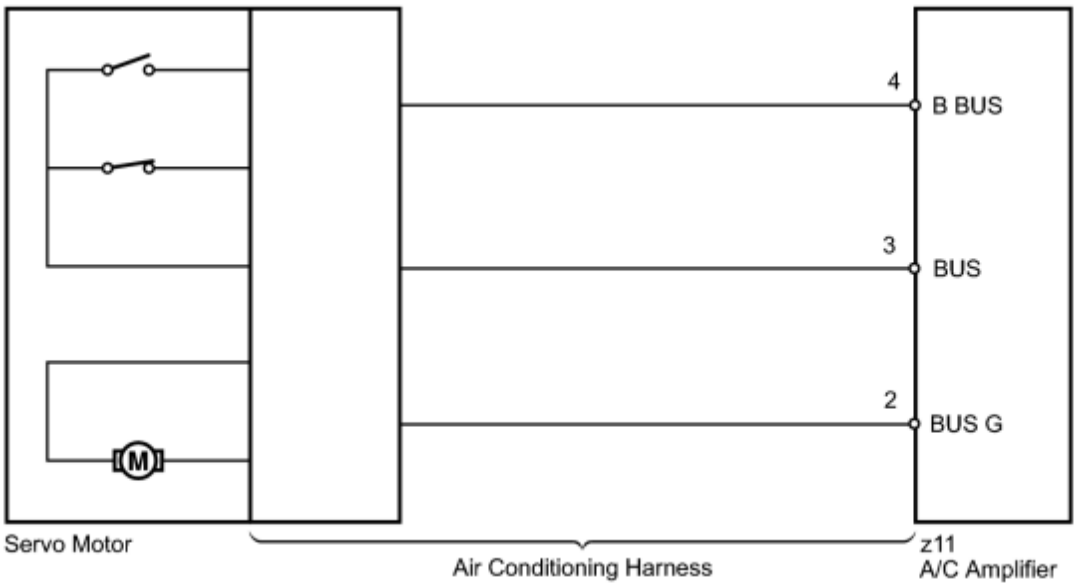
| DTC | B1497/97 | BUS IC Communication Malfunction |
|---|---|---|

# DESCRIPTION

The air conditioning harness connects the A/C amplifier and each servo. The A/C amplifier supplies power and sends operation instructions to each servo through the air conditioning harness. Each servo sends the damper position information to the A/C amplifier.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1497/97 | Communication line error or open | • Air conditioning harness<br>• A/C amplifier |

# WIRING DIAGRAM



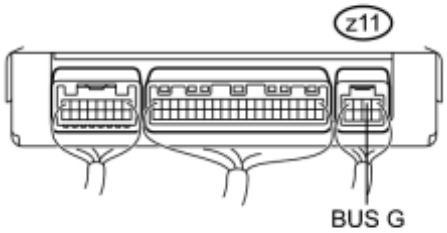

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | INSPECT A/C AMPLIFIER |
|---|---|

(a) Remove the A/C amplifier with the connectors still connected.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z11-2 (BUS G) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

NG ▶ REPLACE A/C AMPLIFIER

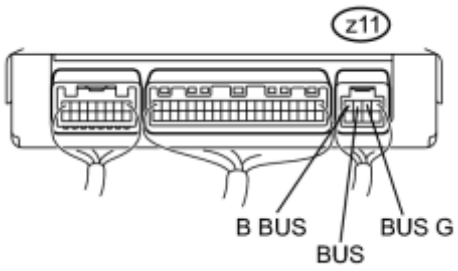
OK

▼

| | |
|---|---|
| 2. | INSPECT A/C AMPLIFIER |

(a) Measure the voltage according to the value(s) in the table below.

*1




Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z11-4 (B BUS) - z11-2 (BUS G) | Power switch off | Below 1 V |
| z11-4 (B BUS) - z11-2 (BUS G) | Power switch on (IG) | 11 to 14 V |
| z11-3 (BUS) - z11-2 (BUS G) | Power switch on (IG) | Pulse generation |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

NG ▶ REPLACE A/C AMPLIFIER

OK ▶ **REPLACE AIR CONDITIONING HARNESS**

| DTC | B1498/98 | Communication Malfunction (A/C Inverter Local) |
|---|---|---|

# DESCRIPTION

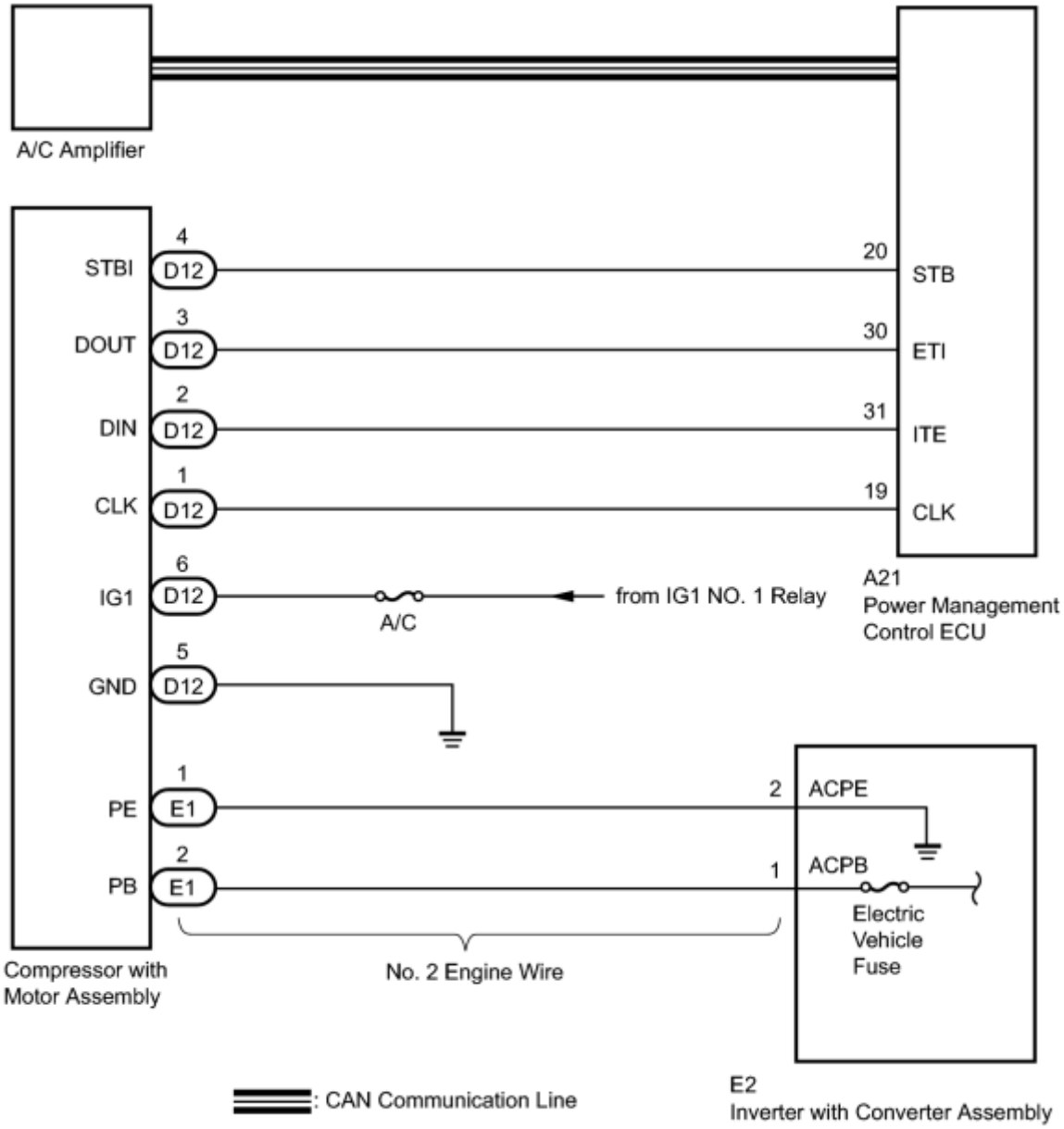
The power management control ECU and compressor with motor assembly transmit information to one another via a communication line. Compressor control is stopped and the DTC is stored if communication information is cut off or abnormal information occurs.

The DTC is also detected if high-voltage power supplied from the inverter with converter assembly to the compressor control circuit is shut off.

The output DTC is memorized as previous trouble.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1498/98 | • Communication line error or open between the power management control ECU and compressor with motor assembly.<br>• High-voltage power source is shut off. | • Harness or connector between power management control ECU, compressor with motor assembly and body ground<br>• Power management control ECU<br>• Compressor with motor assembly<br>• No. 2 engine wire (harness or connector between compressor with motor assembly and inverter with converter assembly)<br>• Electric vehicle fuse<br>• CAN communication system<br>• Hybrid control system |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Wear electrically insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors. Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

- The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.
- Depending on the timing of the power supply to the 12 V power supply circuit and high-voltage circuit when the power switch is turned on (READY), an abnormal information signal may be output, causing this DTC to be stored. If the output DTC is a code that was memorized in the past, check the fuses and wire harnesses. If there is no malfunction, clear the DTC.
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | CHECK DIAGNOSTIC TROUBLE CODE |

(a) Check if DTCs for the hybrid control system are output using the Techstream.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| Only DTC P3108 is output | A |
| DTCs other than P3108 are output | B |

B GO TO HYBRID CONTROL SYSTEM

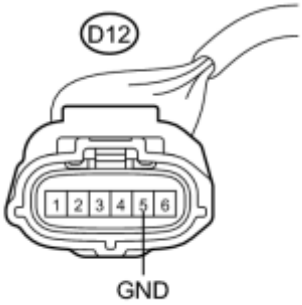
A

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (COMPRESSOR WITH MOTOR ASSEMBLY - BODY GROUND) |

CAUTION:

Do not disconnect the connector on the high-voltage side.

*1




H

(a) Disconnect the connector from the compressor with motor assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D12-5 (GND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Compressor with Motor Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

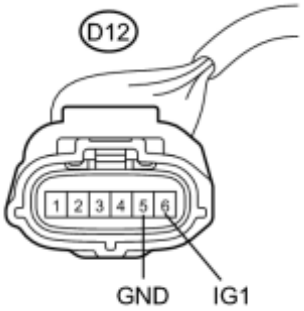
OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (COMPRESSOR WITH MOTOR ASSEMBLY - BATTERY, GROUND) |

(a) Turn the power switch on (IG).

*1




H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D12-6 (IG1) - D12-5 (GND) | Power switch on (IG) | 11 to 14 V |
| D12-6 (IG1) - D12-5 (GND) | Power switch off | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Compressor with Motor Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

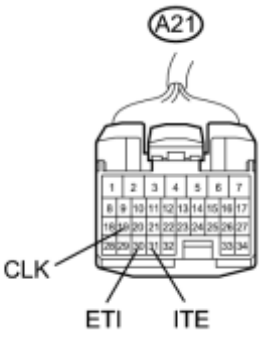
OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - COMPRESSOR WITH MOTOR) |

(a) Disconnect the connector from the power management control ECU.

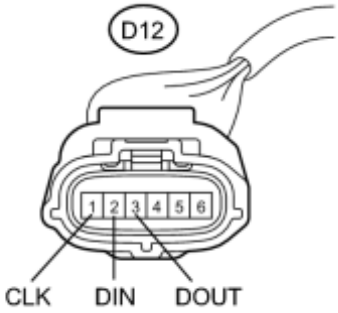
*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| D12-1 (CLK) - A21-19 (CLK) | Always | Below 1 Ω |
| D12-2 (DIN) - A21-31 (ITE) | Always | Below 1 Ω |
| D12-3 (DOUT) - A21-30 (ETI) | Always | Below 1 Ω |
| D12-1 (CLK) - Body ground | Always | 10 kΩ or higher |
| D12-2 (DIN) - Body ground | Always | 10 kΩ or higher |
| D12-3 (DOUT) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Power Management Control ECU) |
| *2 | Front view of wire harness connector<br><br>(to Compressor with Motor Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | INSPECT ELECTRIC VEHICLE FUSE |

CAUTION:

Be sure to wear insulated gloves.

(a) Turn the power switch off.

(b) Remove the service plug grip.

CAUTION:

Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

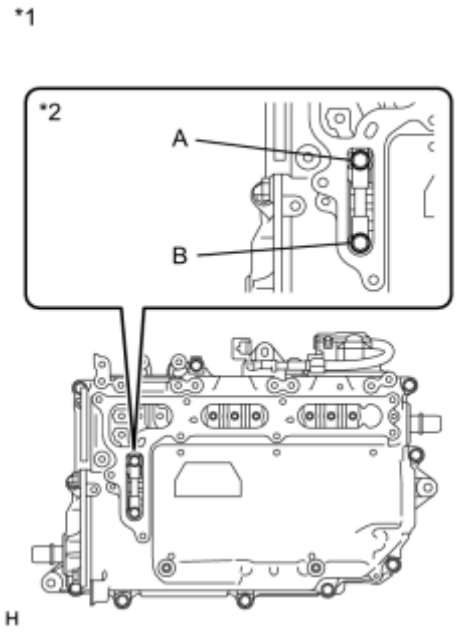
NOTICE:

Do not start the engine with the service plug grip removed because it may cause a malfunction.

(c) Remove the inverter terminal cover.

NOTICE:

Be sure to prevent foreign objects or water from entering the inverter with converter assembly.




(d) Check that bolts A and B are tightened securely.

(e) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Item<br><br>(Tester Connection) | Condition | Specified Condition |
|---|---|---|
| ELECTRIC VEHICLE fuse<br><br>(A - B) | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Inverter with Converter Assembly |

| | |
|---|---|
| *2 | Electric Vehicle Fuse |

NG REPLACE ELECTRIC VEHICLE FUSE

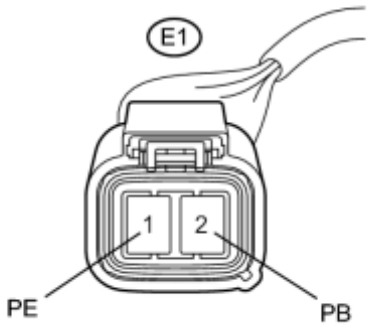
OK

| | |
|---|---|
| 7. | INSPECT NO. 2 ENGINE WIRE |

CAUTION:

Be sure to wear insulated gloves.

*1

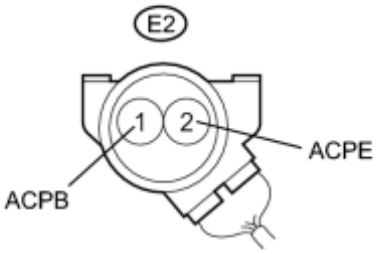



(a) Disconnect the No. 2 engine wire connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| E1-1 (PE) - E2-2 (ACPE) | Always | Below 1 Ω |
| E1-2 (PB) - E2-1 (ACPB) | Always | Below 1 Ω |
| E1-1 (PE) - Body ground | Always | 10 kΩ or higher |
| E1-2 (PB) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Compressor with Motor Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Inverter with Converter Assembly) |

H

NG REPLACE NO. 2 ENGINE WIRE

OK

| | |
|---|---|
| 8. | REPLACE COMPRESSOR WITH MOTOR ASSEMBLY |

(a) Replace the compressor with motor assembly INFO.

HINT:

Since the compressor with motor assembly cannot be inspected while it is removed from the vehicle, replace the compressor with motor assembly with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| DTC B1498/98 is not output | A |
| DTC B1498/98 is output | B |

B REPLACE POWER MANAGEMENT CONTROL ECU

A **END (COMPRESSOR WITH MOTOR ASSEMBLY WAS DEFECTIVE)**

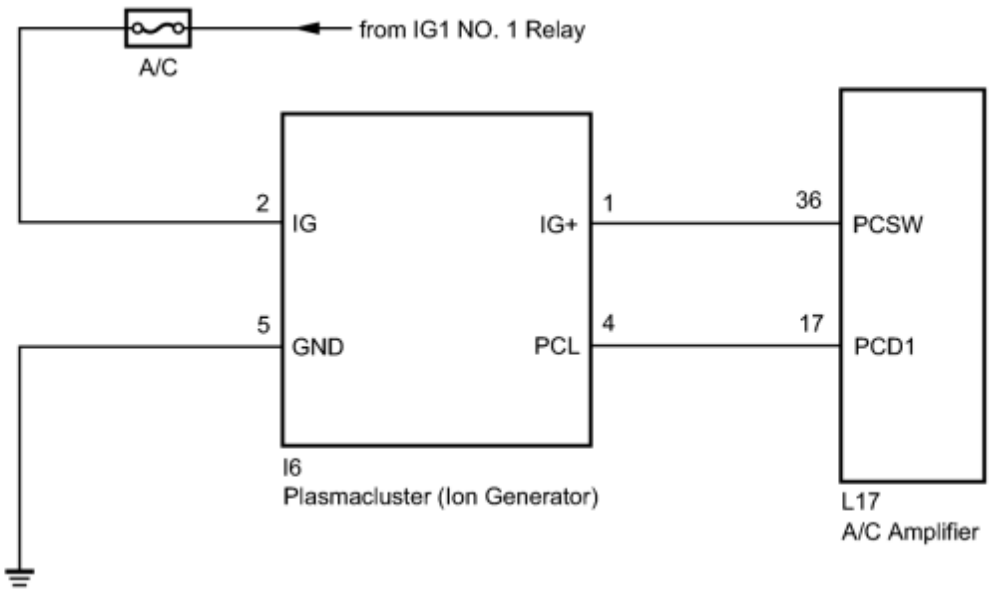
| DTC | B14A1 | Air Purifier Open Circuit |
|---|---|---|

# DESCRIPTION

The plasmacluster (ion generator) operates in conjunction with blower switch operation.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B14A1 | Open in plasmacluster (ion generator) circuit | • Plasmacluster (ion generator)<br>• Harness or connector between plasmacluster (ion generator) and A/C amplifier<br>• Harness or connector between plasmacluster (ion generator) and battery<br>• Harness or connector between plasmacluster (ion generator) and body ground<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |
|---|---|

(a) Connector the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Air Purifier Mode | Plasmacluster (ion generator) | Stop, Ion, Clean | - |

OK:

Plasmacluster (ion generator) operates and mode changes.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

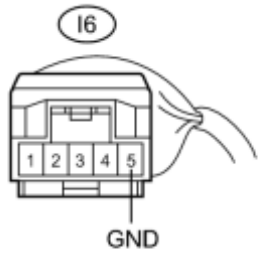
C REPLACE A/C AMPLIFIER

B PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (PLASMACLUSTER (ION GENERATOR) - BODY GROUND) |

*1




(a) Disconnect the plasmacluster (ion generator) connector.

H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| I6-5 (GND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Plasmacluster (Ion Generator)) |

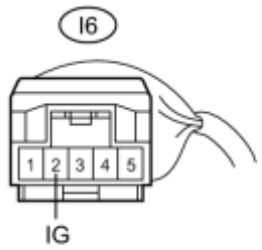
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (PLASMACLUSTER (ION GENERATOR) - BATTERY) |

*1




H

(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| I6-2 (IG) - Body ground | Power switch off | Below 1 V |
| I6-2 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Plasmacluster (Ion Generator)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

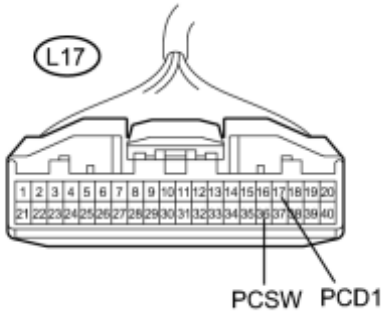
OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (PLASMACLUSTER (ION GENERATOR) - A/C AMPLIFIER) |

(a) Disconnect the A/C amplifier connector.

*1

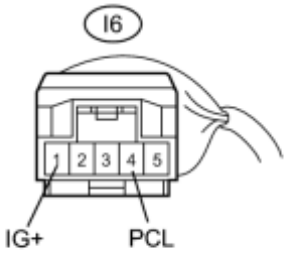



H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-17 (PCD1) - I6-4 (PCL) | Always | Below 1 Ω |
| L17-36 (PCSW) - I6-1 (IG+) | Always | Below 1 Ω |
| L17-17 (PCD1) - Body ground | Always | 10 kΩ or higher |
| L17-36 (PCSW) - Body ground | Always | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to Plasmacluster (Ion Generator)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | INSPECT PLASMACLUSTER (ION GENERATOR) |

(a) Replace the plasmacluster (ion generator) INFO.

HINT:

Since the plasmacluster (ion generator) cannot be inspected while it is removed from the vehicle, replace the plasmacluster (ion generator) with a new or a known good one and check that the condition returns to normal.

(b) Check for the DTC.

Result:

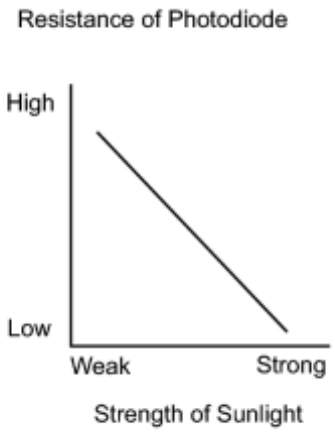
| Result | Proceed to |
| --- | --- |
| DTC B14A1 is output | A |
| DTC B14A1 is not output | B |

B REPLACE PLASMACLUSTER (ION GENERATOR)

A **REPLACE A/C AMPLIFIER**

| DTC | B14A2 | Driver Side Solar Sensor Short Circuit |
|---|---|---|

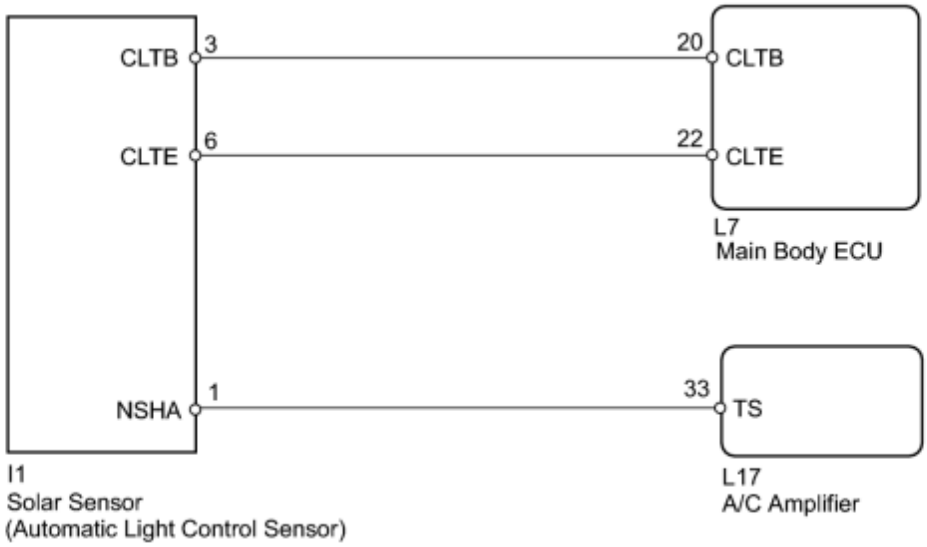
# DESCRIPTION




The solar sensor (automatic light control sensor) is installed on the upper side of the instrument panel. It detects sunlight to control air conditioning AUTO mode. The output voltage from the solar sensor (automatic light control sensor) varies in accordance with the amount of sunlight. When the amount of sunlight increases, the output voltage increases. As the sunlight decreases, the output voltage decreases. The A/C amplifier detects changes in the output voltage from the solar sensor (automatic light control sensor).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B14A2 | Short in driver side solar sensor circuit | • Solar sensor (automatic light control sensor)<br>• Harness or connector between solar sensor (automatic light control sensor) and A/C amplifier<br>• Harness or connector between solar sensor (automatic light control sensor) and main body ECU<br>• Main body ECU<br>• A/C amplifier |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

If DTC B1244 is output together with other DTCs, troubleshoot DTC B1244 first INFO.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Solar Sensor (D side) | Solar sensor /<br>Min.: 0<br>Max.: 255 | Solar sensor value increases as brightness increases | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK (When troubleshooting according to Problem Symptoms Table) | B |
| OK (When troubleshooting according to the DTC) | C |

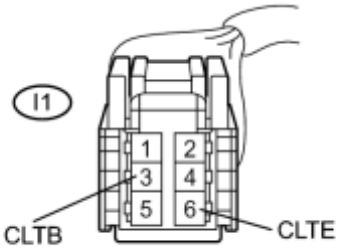
C REPLACE A/C AMPLIFIER

B PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER SOURCE CIRCUIT) |

*1




(a) Disconnect the solar sensor (automatic light control sensor) connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| I1-3 (CLTB) - I1-6 (CLTE) | Power switch off | Below 1 V |
| I1-3 (CLTB) - I1-6 (CLTE) | Power switch on (IG) | 11 to 14 V |

***Text in Illustration***

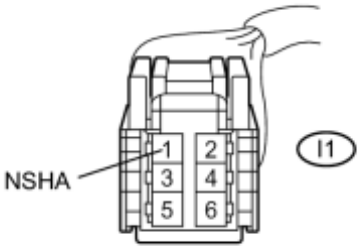
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Sensor (Automatic Light Control Sensor)) |

NG CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - SOLAR SENSOR)

OK

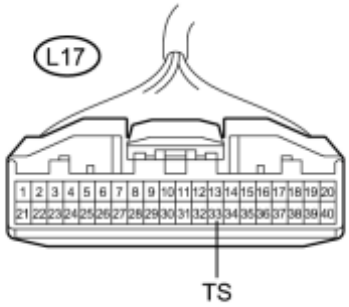
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SOLAR SENSOR - A/C AMPLIFIER) |

*1




(a) Disconnect the solar sensor (automatic light control sensor) connector.

*2




H

(b) Disconnect the A/C amplifier connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-33 (TS) - I1-1 (NSHA) | Always | Below 1 Ω |
| L17-33 (TS) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| | (to Solar Sensor (Automatic Light Control Sensor)) |
| *2 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

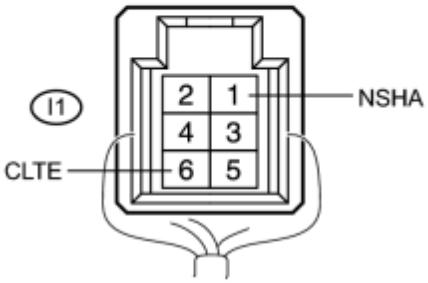
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | INSPECT SOLAR SENSOR (AUTOMATIC LIGHT CONTROL SENSOR) |

*1




(a) Remove the solar sensor (automatic light control sensor).

(b) Reconnect the solar sensor (automatic light control sensor) connector.

(c) Turn the power switch on (IG).

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| I1-1 (NSHA) - I1-6 (CLTE) | Sensor is exposed to electric light | 0.8 to 4.3 V |
| I1-1 (NSHA) - I1-6 (CLTE) | Sensor is covered with a cloth | Below 0.8 V |

NOTICE:

- The connection procedure for using a digital tester such as a TOYOTA electrical tester is shown above. When using an analog tester, connect the negative (-) lead to terminal 3 and the positive (+) lead to terminal 6 of the solar sensor (automatic light control sensor).
- While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

HINT:

- Use an incandescent light for inspection. Bring it within about 30 cm (11.8 in.) of the solar sensor (automatic light control sensor).
- As the inspection light is moved away from the sensor, the voltage decreases.

***Text in Illustration***

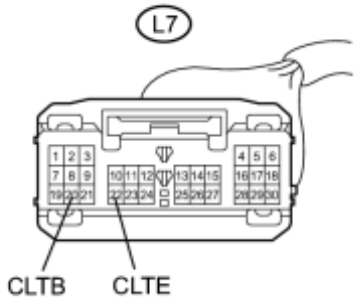
| | |
|---|---|
| *1 | Component with harness connected<br><br>(Solar Sensor (Automatic Light Control Sensor)) |

NG ▶ REPLACE SOLAR SENSOR (AUTOMATIC LIGHT CONTROL SENSOR)

OK ▶ **REPLACE A/C AMPLIFIER**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (MAIN BODY ECU - SOLAR SENSOR) |

*1

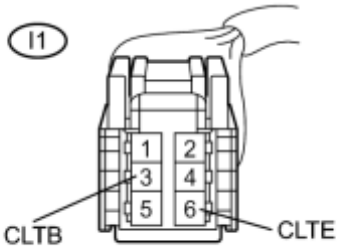



(a) Disconnect the main body ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L7-20 (CLTB) - I1-3 (CLTB) | Always | Below 1 Ω |
| L7-22 (CLTE) - I1-6 (CLTE) | Always | Below 1 Ω |
| L7-20 (CLTB) - Body ground | Always | 10 kΩ or higher |
| L7-22 (CLTE) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Main Body ECU) |
| *2 | Front view of wire harness connector<br><br>(to Solar Sensor (Automatic Light Control Sensor)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE MAIN BODY ECU**

| | | |
|---|---|---|
| DTC | P0AA6-611 | Hybrid Battery Voltage System Isolation Fault |

# DESCRIPTION

The DTC is stored if there is insulation trouble with the high-voltage circuits in the air conditioning system. Possible causes are poor insulation in the compressor with motor assembly, or mixing of any oil other than ND-OIL 11 in the refrigerant cycle.

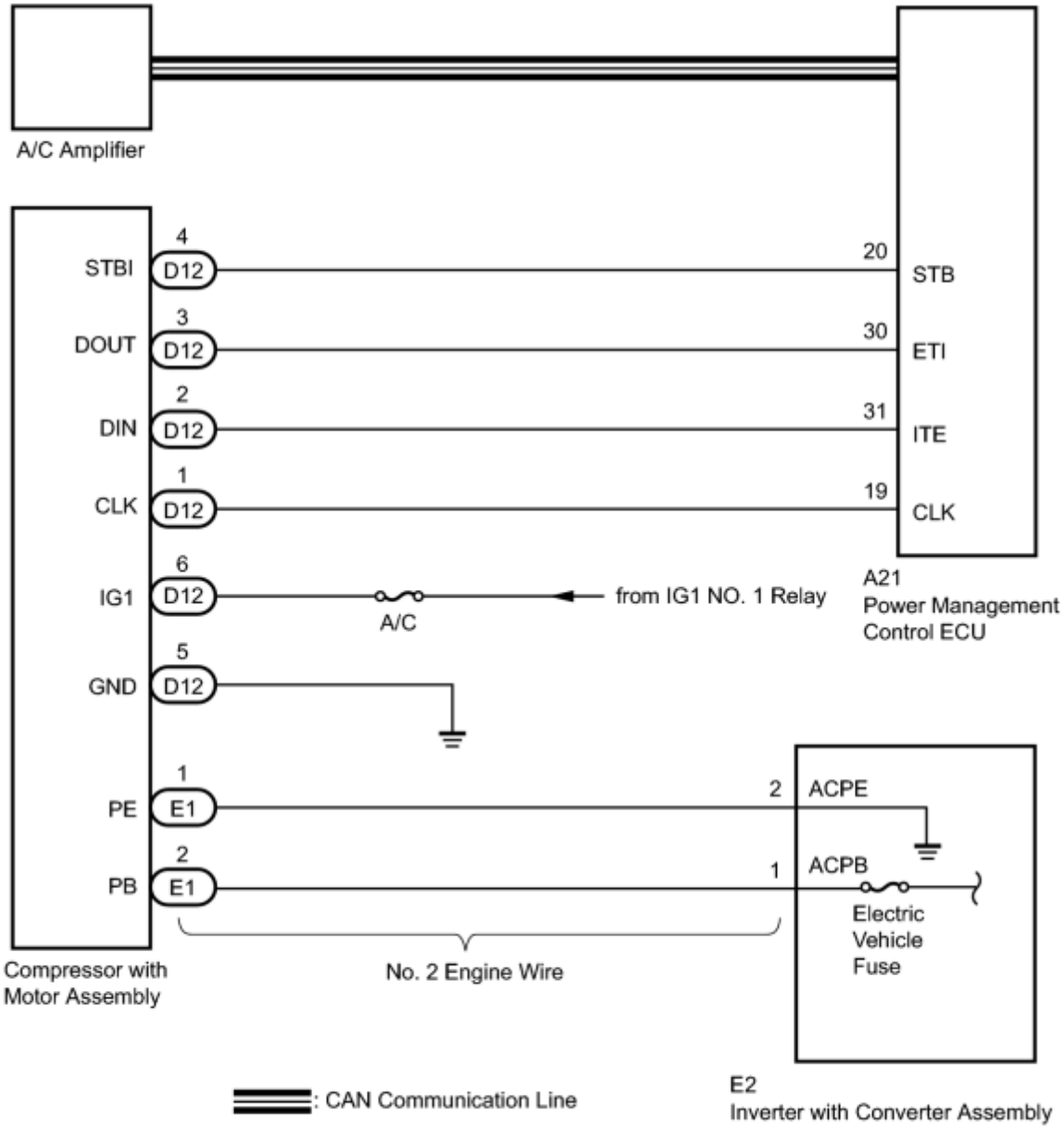
The motor driven with high-voltage is built into the electrical compressor and is cooled directly with refrigerant. Compressor oil (ND-OIL 11) with high insulation performance is used because a leakage of electrical power may occur if regular compressor oil (ND-OIL 8) is used.

CAUTION:

- Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors.
- Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| P0AA6-611 | High voltage system insulation malfunction | • Compressor oil<br>• Refrigerant pipe line<br>• Compressor with motor assembly<br>• CAN communication system |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

CAUTION:

- Wear insulated gloves and pull out the service plug grip before inspection as procedures may require disconnecting high-voltage connectors.
- Be sure to carry the removed service plug grip because other workers may install it by mistake.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

- Electrical insulation performance may decrease significantly if even a small amount of oil other than ND-OIL 11 is used (or enters) in the refrigerant cycle, causing the DTC to be output.
- If other oil is accidentally used and a DTC is output, collect the oil in the refrigerant cycle into the compressor and replace it with ND-OIL 11 to increase the ND-OIL 11 ratio amount.
- Replace the main components (evaporator, condenser, and compressor) if a large amount of oil other than ND-OIL 11 enters the system. Failing to do so may cause electrical insulation performance to remain low, causing the DTC to be output.
- The hybrid control system and air conditioning system output DTCs separately. Inspect DTCs following the flow chart for the hybrid control system first if any DTCs from those systems are output simultaneously.

HINT:

If it can be confirmed that any compressor oil other than ND-OIL 11 has been used in the vehicle, replace the air conditioning cycle.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Using the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| CAN DTC is not output | A |
| CAN DTC is output | B |

B GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | INSPECT COMPRESSOR WITH MOTOR ASSEMBLY |

CAUTION:

Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug grip to cut off the high-voltage circuit before inspection.

(a) Clear the DTCs INFO.

(b) Turn the power switch on (IG).

(c) Prepare the vehicle according to the table below for 3 minutes.

| Item | Condition |
|---|---|
| Blower speed | HI |
| Temperature setting | MAX COLD |

| Item | Condition |
|---|---|
| A/C | ON |

(d) Turn the power switch off.

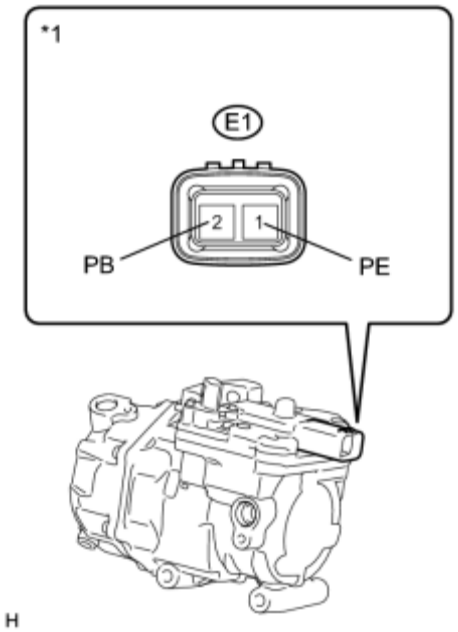
(e) Remove the service plug grip.

CAUTION:

Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

Do not start the engine with the service plug grip removed because it may cause a malfunction.




(f) Disconnect the connector from the compressor with motor assembly.

(g) Using a megohmmeter, measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| E1-1 (PE) - Body ground | Always | 2 MΩ or higher |
| E1-2 (PB) - Body ground | Always | 2 MΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Compressor with Motor Assembly) |

NG REPLACE COMPRESSOR WITH MOTOR ASSEMBLY

OK

| | |
|---|---|
| 3. | INSPECT AIR CONDITIONING CYCLE |

CAUTION:

Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug grip to cut off the high-voltage circuit before inspection.

(a) Reconnect the connector to the compressor with motor assembly.

(b) Install the service plug grip.

(c) Turn the power switch on (IG).

(d) Set the A/C setting temperature to 25°C (77°F) and the blower switch LO and then operate the compressor for 10 minutes to circulate the refrigerant cycle with refrigerant and collect as much compressor oil as possible.

(e) Turn the power switch off.

(f) Using a spot cooler or other tools, cool down the compressor with motor assembly for 30 minutes, or leave the vehicle overnight before inspection.

NOTICE:

Do not operate the compressor before inspection.

(g) Remove the service plug grip.

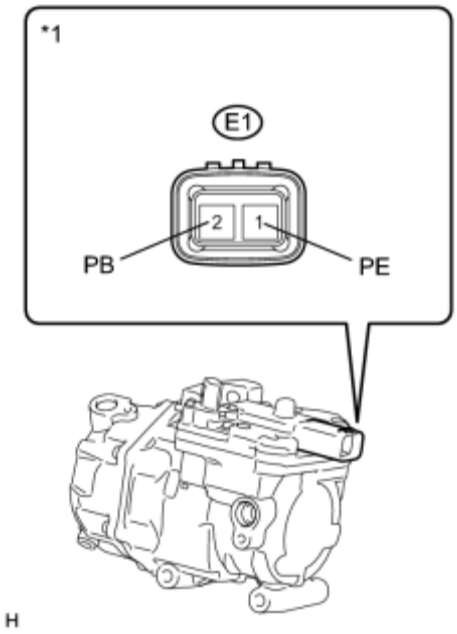
CAUTION:

Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

Do not start the engine with the service plug grip removed because it may cause a malfunction.

(h) Disconnect the connector from the compressor with motor assembly.




(i) Using a megohmmeter, measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| E1-1 (PE) - Body ground | Always | 3 MΩ or higher |
| E1-2 (PB) - Body ground | Always | 3 MΩ or higher |

NOTICE:

If the results are out of the specified range, replace the compressor without operating.

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Compressor with Motor Assembly) |

NG ▶ REPLACE AIR CONDITIONING CYCLE

OK ▶ **REPLACE COMPRESSOR WITH MOTOR ASSEMBLY**

| | | |
|---|---|---|
| DTC | U0100 | Lost Communication with ECM |
| DTC | U0101 | Lost Communication with TCM |
| DTC | U0131 | Lost Communication with Electric Power Steering ECU |
| DTC | U0142 | Lost Communication with Main Body ECU |
| DTC | U0155 | Lost Communication with Combination Meter |
| DTC | U0293 | Lost Communication with HV ECU |

# DESCRIPTION

| DTC No. | DTC Detecting Condition | Trouble Area |
|---|---|---|
| U0100 | No communication with ECM | • CAN communication system<br>• ECM |
| U0101 | No communication with TCM | • CAN communication system<br>• TCM |
| U0131 | No communication with electric power steering ECU | • CAN communication system<br>• Electric power steering ECU |
| U0142 | No communication with main body ECU | • CAN communication system<br>• Main body ECU |
| U0155 | No communication with combination meter | • CAN communication system<br>• Combination meter |
| U0293 | No communication with HV ECU | • CAN communication system<br>• Power management control ECU |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | GO TO CAN COMMUNICATION SYSTEM |

HINT:

Refer to CAN Communication System INFO.

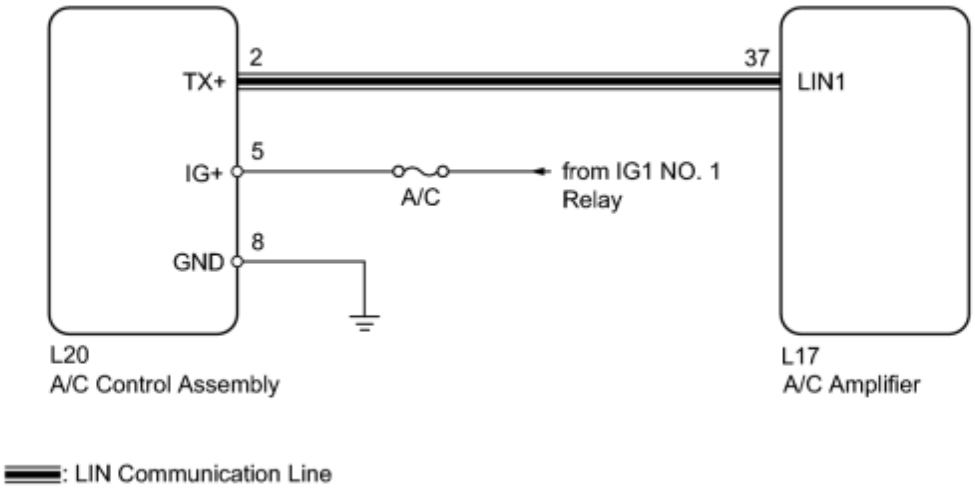
NEXT **END**

# DESCRIPTION

This circuit consists of the A/C control assembly and A/C amplifier. When the A/C control assembly is operated, signals are transmitted to the A/C amplifier through the LIN communication system.

If the LIN communication system malfunctions, the A/C amplifier does not operate even if the A/C control assembly is operated.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - BODY GROUND) |

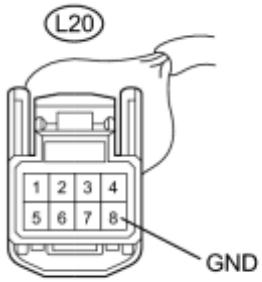
(a) Disconnect the A/C control assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L20-8 (GND) - Body ground | Always | Below 1 Ω |




*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Control Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

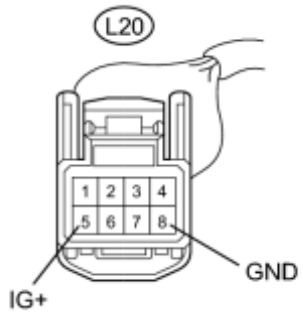
▼

| 2. | CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - BATTERY) |
|---|---|

(a) Measure the voltage according to the value(s) in the table below.

*1

Standard Voltage:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L20-5 (IG+) - L20-8 (GND) | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Control Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

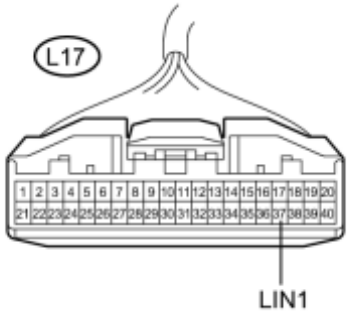
OK

▼

| 3. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - A/C CONTROL ASSEMBLY) |
|---|---|

(a) Disconnect the A/C amplifier connector.

*1



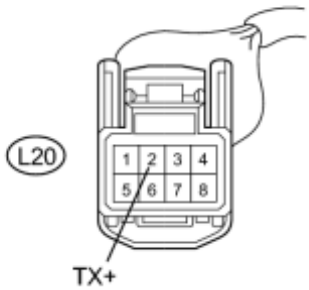

H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-37 (LIN1) - L20-2 (TX+) | Always | Below 1 Ω |
| L17-37 (LIN1) - Body ground | Always | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to A/C Control Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | REPLACE A/C CONTROL ASSEMBLY |

(a) Replace the A/C control assembly with a known good one and check if the same problem occurs again INFO .

OK:

Same problem does not occur.

NG ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

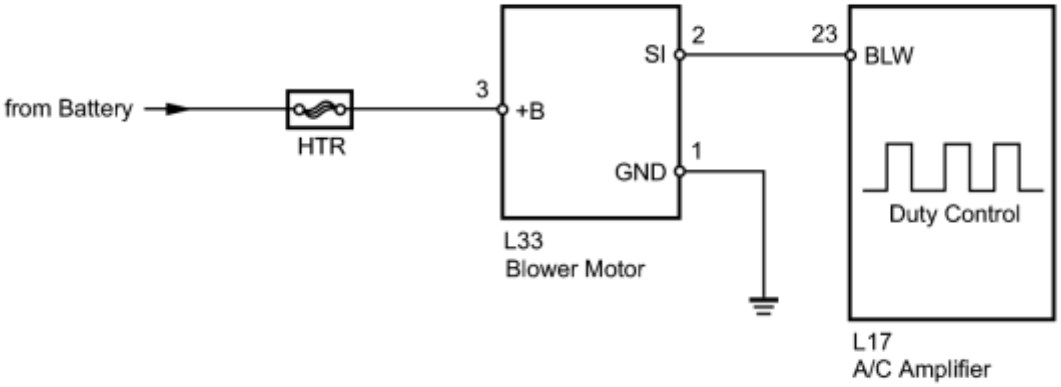
OK **END (A/C CONTROL ASSEMBLY WAS DEFECTIVE)**

# DESCRIPTION

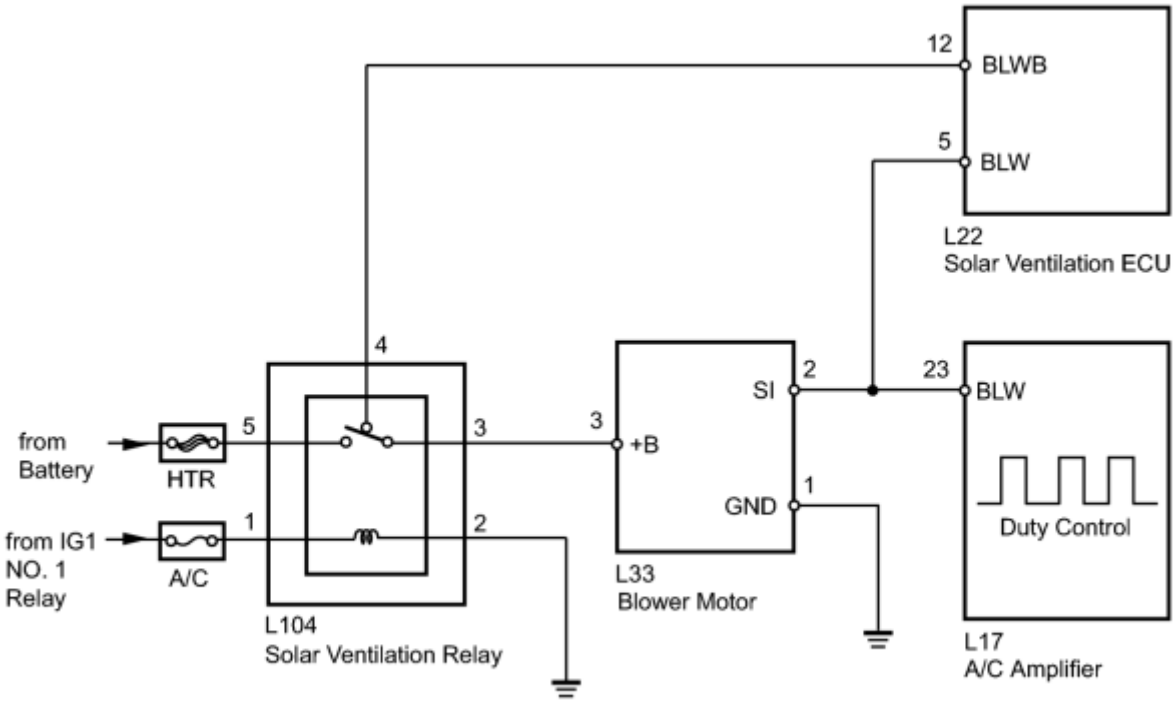
The blower motor is operated by signals from the A/C amplifier. Blower motor speed signals are transmitted in accordance with changes in the duty ratio.

# WIRING DIAGRAM

1. w/o Solar Ventilation System




2. w/ Solar Ventilation System




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Blower Motor | Blower motor | Min.: 0, Max.: 31 | - |

OK:

Blower motor operates and blower motor speed level changes.

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (Blower motor does not operate)<br><br>(w/o Solar ventilation system) | B |
| NG (Blower motor does not operate)<br><br>(w/ Solar ventilation system) | C |
| NG (Blower motor operates but does not change speed)<br><br>(w/o Solar ventilation system) | D |
| NG (Blower motor operates but does not change speed)<br><br>(w/ Solar ventilation system) | E |

E ▶ CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - A/C AMPLIFIER, SOLAR VENTILATION ECU)

D ▶ INSPECT A/C AMPLIFIER

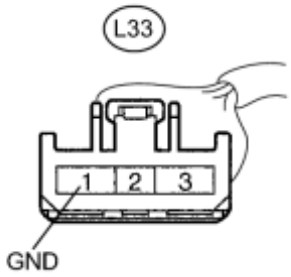
C ▶ INSPECT SOLAR VENTILATION RELAY

B ▶ CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BODY GROUND)

A ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BODY GROUND) |

*1




(a) Disconnect the blower motor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L33-1 (GND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Blower Motor) |

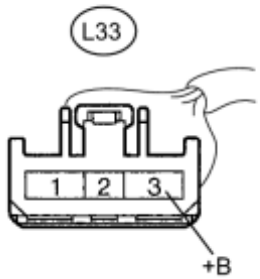
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BATTERY) |

*1




(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L33-3 (+B) - Body ground | Power switch off | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Blower Motor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

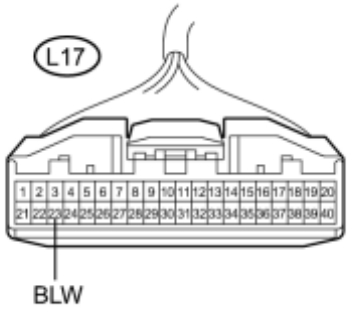
OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - A/C AMPLIFIER) |

(a) Disconnect the A/C amplifier connector.

*1



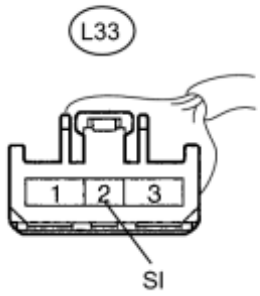

H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*3

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-23 (BLW) - L33-2 (SI) | Always | Below 1 Ω |
| L17-23 (BLW) - Body ground | Always | 10 kΩ or higher |




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to Blower Motor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | INSPECT BLOWER MOTOR |

(a) Reconnect the blower motor connector.

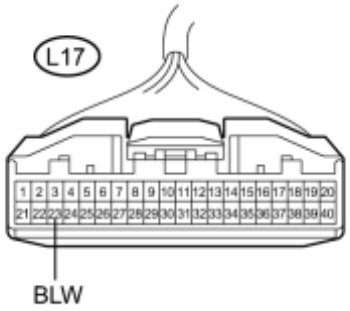
(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-23 (BLW) - Body ground | Power switch off | 4.5 to 5.5 V |

*1

## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

H

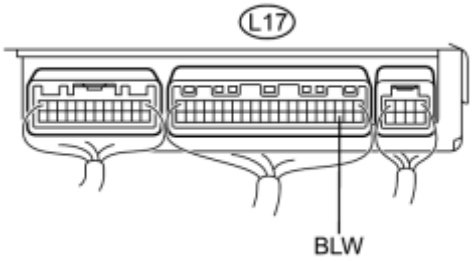
NG ▶ REPLACE BLOWER MOTOR

OK

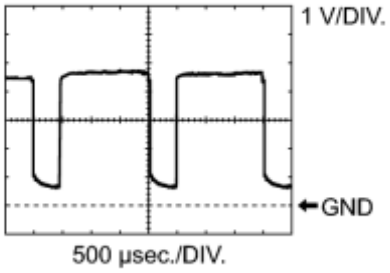
▼

| | |
|---|---|
| 6. | INSPECT A/C AMPLIFIER |

*1




(a) Remove the A/C amplifier.




(b) Reconnect the A/C amplifier connector.

(c) Turn the power switch on (IG).

(d) Set the blower speed to LO.

(e) Measure the waveform between terminal L17-23 (BLW) of the A/C amplifier and body ground.

| Item | Content |
|---|---|
| Tool setting | 1 V/DIV., 500 μs/DIV. |
| Vehicle condition | Power switch on (IG)<br><br>Blower set to LO |

OK:

Waveform is as shown in the illustration.

HINT:

The waveform varies with the blower speed.

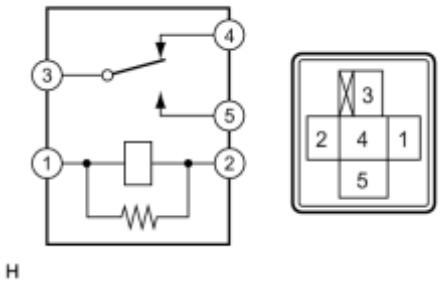
***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

NG ▶ REPLACE A/C AMPLIFIER

OK ▶ **REPLACE BLOWER MOTOR**

| | |
|---|---|
| 7. | INSPECT SOLAR VENTILATION RELAY |




(a) Remove the solar ventilation relay from the relay block No. 2-1.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Specified Condition |
|---|---|
| 3 - 5 | 10 kΩ or higher |
| 3 - 4 | Below 1 Ω |
| 3 - 5 | Below 1 Ω<br><br>(when battery voltage is applied to terminals 1 and 2) |

| Tester Connection | Specified Condition |
|---|---|
| 3 - 4 | 10 kΩ or higher<br><br>(when battery voltage is applied to terminals 1 and 2) |

NG REPLACE SOLAR VENTILATION RELAY

OK

| 8. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION RELAY - BATTERY) |
|---|---|

*1




(a) Disconnect the solar ventilation relay connector.

H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L104-1 - Body ground | Power switch off | Below 1 V |
| L104-1 - Body ground | Power switch on (IG) | 11 to 14 V |
| L104-5 - Body ground | Always | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation Relay) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| 9. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION RELAY - BODY GROUND) |
|---|---|

*1

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L104-2 - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation Relay) |

H

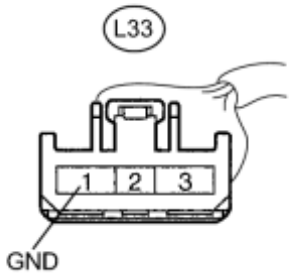
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BODY GROUND) |

*1




(a) Disconnect the blower motor connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L33-1 (GND) - Body ground | Always | Below 1 Ω |

### *Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Blower Motor) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - BATTERY) |

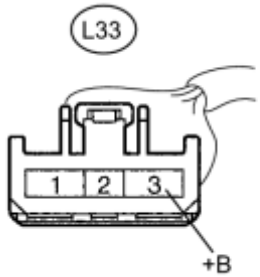
(a) Reinstall the solar ventilation relay.

(b) Reconnect the solar ventilation relay connector.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L33-3 (+B) - Body ground | Power switch off<br><br>Solar ventilation switch off | Below 1 V |
| L33-3 (+B) - Body ground | Power switch on (IG) | 11 to 14 V |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Blower Motor) |

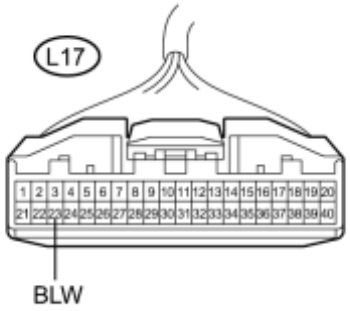
NG REPAIR OR REPLACE HARNESS OR CONNECTOR (BLOWER MOTOR - RELAY BLOCK NO. 2-1)

OK

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (BLOWER MOTOR - A/C AMPLIFIER, SOLAR VENTILATION ECU) |

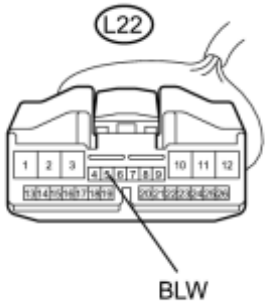
(a) Disconnect the A/C amplifier connector.

*1




H

*2



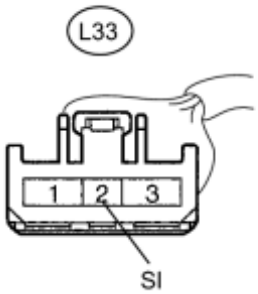

H

(b) Disconnect the solar ventilation ECU connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*3




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-23 (BLW) - L33-2 (SI) | Always | Below 1 Ω |
| L22-5 (BLW) - L33-2 (SI) | Always | Below 1 Ω |
| L17-23 (BLW) - Body ground | Always | 10 kΩ or higher |
| L22-5 (BLW) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |

| | |
|---|---|
| *3 | Front view of wire harness connector<br><br>(to Blower Motor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 13. | INSPECT BLOWER MOTOR |

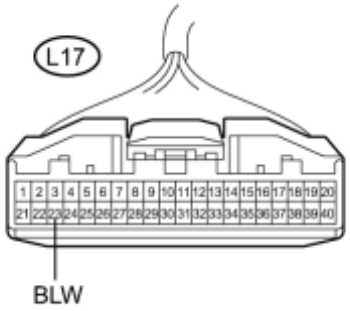
(a) Reconnect the blower motor connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-23 (BLW) - Body ground | Power switch off<br><br>Solar ventilation switch off | Below 1 V |
| L17-23 (BLW) - Body ground | Power switch on (IG) | 4.5 to 5.5 V |

*1




H

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

NG ▶ REPLACE BLOWER MOTOR

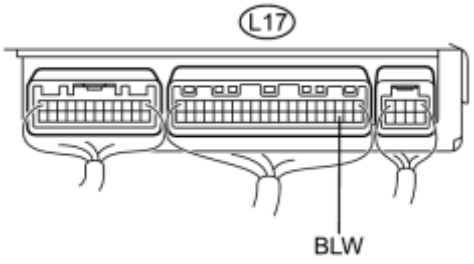
OK

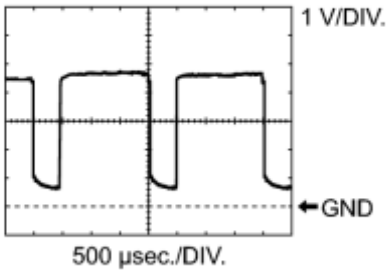
▼

| | |
|---|---|
| 14. | INSPECT A/C AMPLIFIER |

(a) Remove the A/C amplifier.

*1




(b) Reconnect the A/C amplifier connector.

(c) Turn the power switch on (IG).

(d) Set the blower speed to LO.

(e) Measure the waveform between terminal L17-23 (BLW) of the A/C amplifier and body ground.

| Item | Content |
|---|---|
| Tool setting | 1 V/DIV., 500 µs/DIV. |
| Vehicle condition | Power switch on (IG)<br><br>Blower set to LO |

OK:

Waveform is as shown in the illustration.

HINT:

The waveform varies with the blower speed.

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected |

| | |
|---|---|
| | (A/C Amplifier) |

NG → REPLACE A/C AMPLIFIER

OK → **REPLACE BLOWER MOTOR**

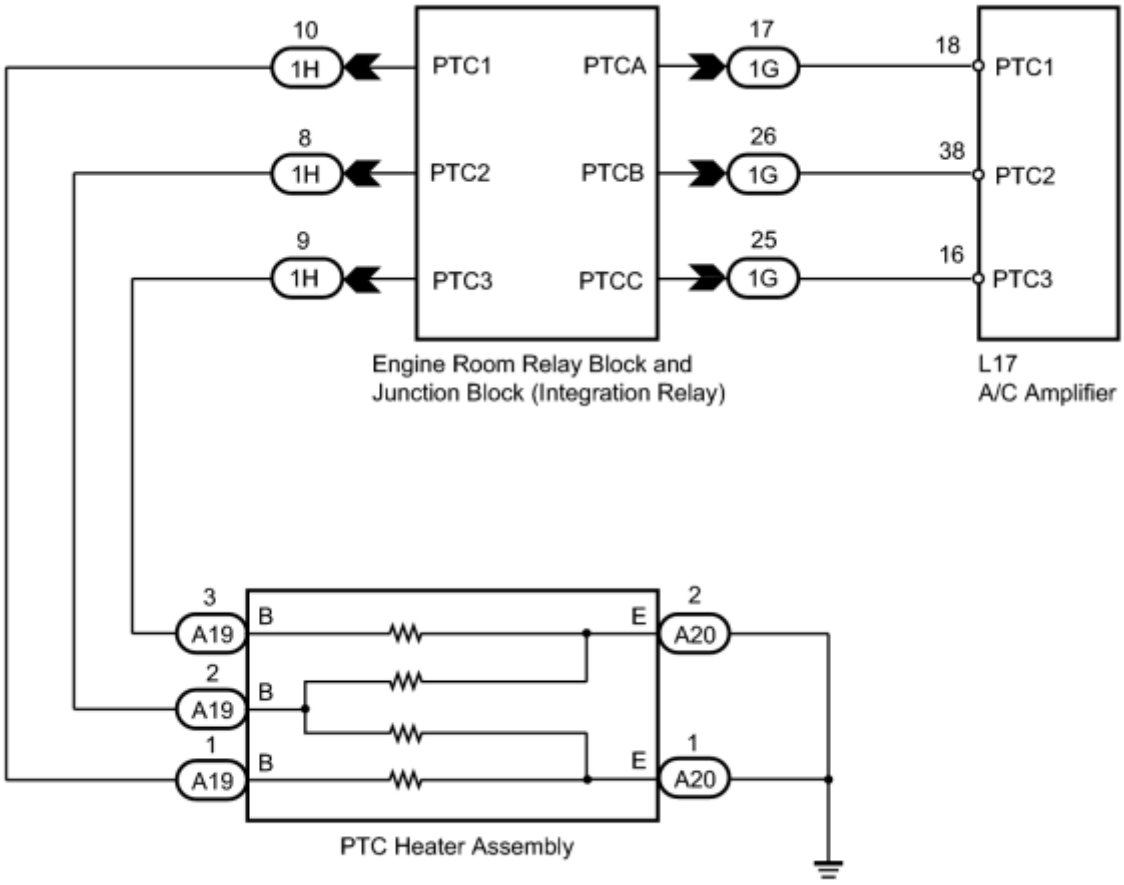
# DESCRIPTION

The PTC heater assembly is installed in the radiator in the heater unit and operates when engine coolant temperature is low and normal heater effectiveness is insufficient.

The A/C control assembly switches the circuit in the PTC relay and operates the PTC heater assembly when the operating conditions (cooling water temperature is below 65°C (149°F), setting temperature is MAX. HOT, ambient temperature is below 10°C (50°F) and blower switch is not OFF) are met.

The PTC heater assembly controls PTC heater lines by electric load or the amount of inverter with converter assembly (PCU) output. Therefore, troubleshooting should be performed with other electric components off.

# WIRING DIAGRAM

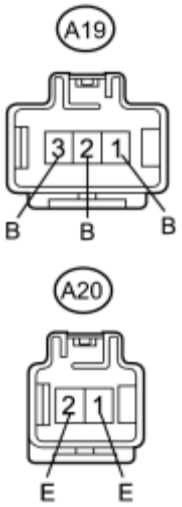



# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT PTC HEATER ASSEMBLY |

*1




(a) Remove the PTC heater assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A19-1 (B) - A20-1 (E) | Always | Below 1 Ω |
| A19-2 (B) - A20-2 (E) | Always | Below 1 Ω |
| A19-2 (B) - A20-1 (E) | Always | Below 1 Ω |
| A19-3 (B) - A20-2 (E) | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(PTC Heater Assembly) |

NG ▶ REPLACE PTC HEATER ASSEMBLY

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (PTC HEATER ASSEMBLY - BODY GROUND) |

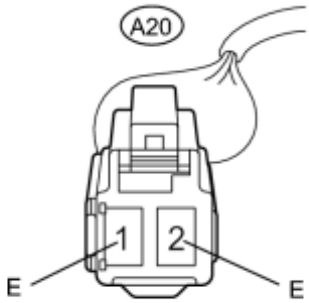
(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

*1

| | | |
|---|---|---|
| A20-1 (E) - Body ground | Always | Below 1 Ω |
| A20-2 (E) - Body ground | Always | Below 1 Ω |




H

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to PTC Heater Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (PTC HEATER ASSEMBLY - INTEGRATION RELAY) |

*1

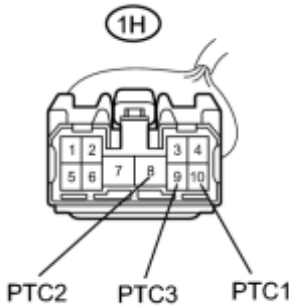



H

(a) Disconnect the PTC heater assembly connector.

(b) Disconnect the engine room relay block and junction block (integration relay) connector.

*2




H

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A19-1 (B) - 1H-10 (PTC1) | Always | Below 1 Ω |
| A19-2 (B) - 1H-8 (PTC2) | Always | Below 1 Ω |
| A19-3 (B) - 1H-9 (PTC3) | Always | Below 1 Ω |
| A19-1 (B) - Body ground | Always | 10 kΩ or higher |
| A19-2 (B) - Body ground | Always | 10 kΩ or higher |
| A19-3 (B) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to PTC Heater Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Engine Room Relay Block and Junction Block (Integration Relay)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

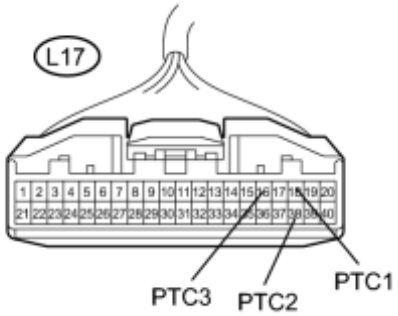
OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - INTEGRATION RELAY) |

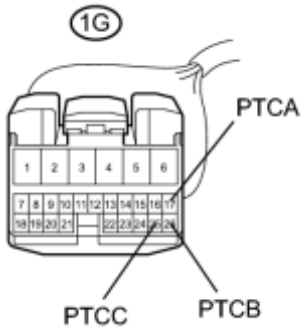
(a) Disconnect the A/C amplifier connector.

*1




H

*2




H

(b) Disconnect the engine room relay block and junction block (integration relay) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-18 (PTC1) - 1G-17 (PTCA) | Always | Below 1 Ω |
| L17-38 (PTC2) - 1G-26 (PTCB) | Always | Below 1 Ω |
| L17-16 (PTC3) - 1G-25 (PTCC) | Always | Below 1 Ω |
| L17-18 (PTC1) - Body ground | Always | 10 kΩ or higher |
| L17-38 (PTC2) - Body ground | Always | 10 kΩ or higher |
| L17-16 (PTC3) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector |

| | |
|---|---|
| | (to Engine Room Relay Block and Junction Block (Integration Relay)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | REPLACE INTEGRATION NO.1 RELAY |

(a) Replace the integration relay INFO.

HINT:

Since the integration relay cannot be inspected while it is removed from the vehicle, replace the integration relay with a new or a known good one and check that the condition returns to normal.

(b) Check if the same problem occurs again.

OK:

Same problem does not occur.

NG ▶ PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

OK ▶ **END (INTEGRATION RELAY WAS DEFECTIVE)**

# DESCRIPTION

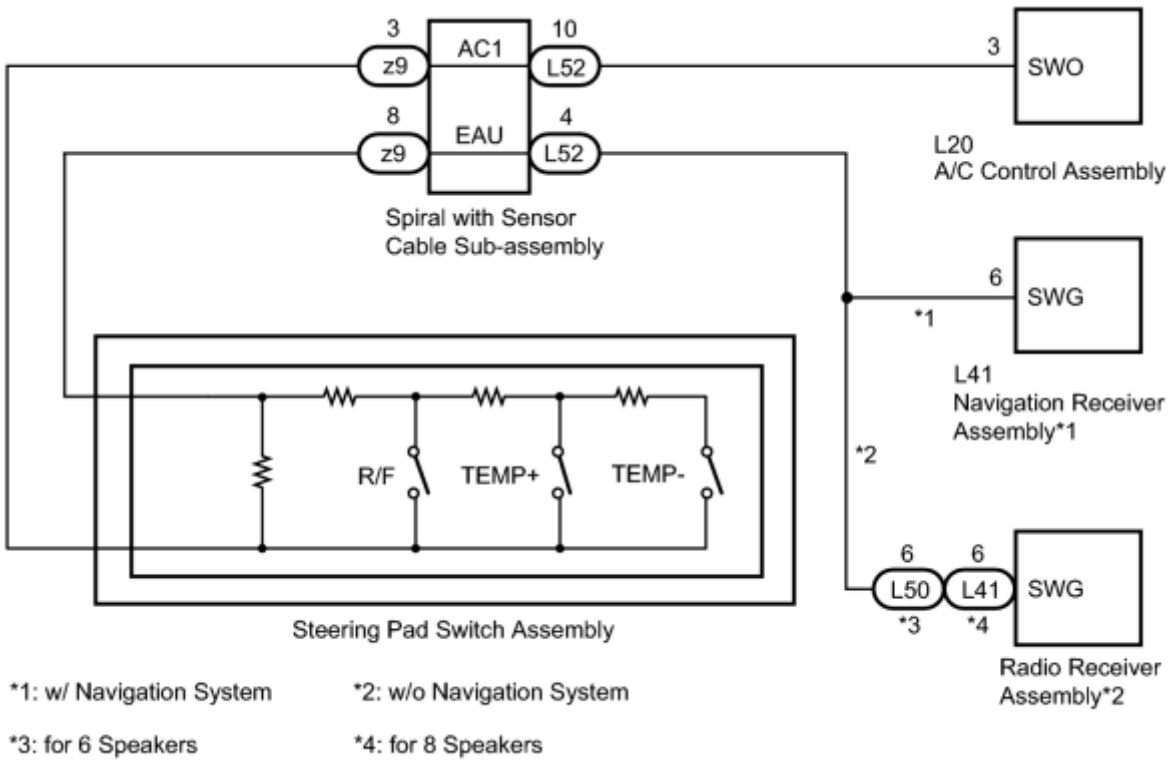
The R/F, TEMP UP (+), and TEMP DOWN (-) switches are located on the steering pad switch assembly. The resistance of the steering pad switch assembly changes in accordance with switch operation. The A/C control assembly outputs voltage to the steering pad switch assembly and reads voltage changes due to the resistance changes that result from switch operation.

HINT:

If there is an open in the circuit, the A/C system cannot be operated by the steering pad switch assembly.

If there is a short in the circuit, the resulting condition is the same as if the switch were continuously depressed. Therefore, the A/C control assembly cannot be operated by the steering pad switch assembly, and the A/C control assembly will not be able to function correctly.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The vehicle is equipped with an SRS (Supplemental Restraint System). Before servicing (including removal or installation of parts), be sure to read the precaution for Supplemental Restraint System INFO.

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT A/C CONTROL ASSEMBLY |

*1




H

(a) Disconnect the connector from the spiral with sensor cable sub-assembly.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-10 (AC1) - Body ground | Power switch off | Below 1 V |
| L52-10 (AC1) - Body ground | Power switch on (IG) | 4.5 to 5.5 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |

NG ▶ CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY)

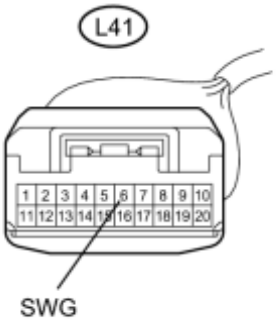
OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR |

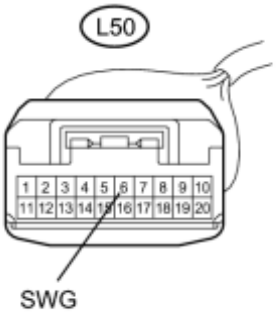
(a) Disconnect the connector from the navigation receiver assembly*4 or radio receiver assembly*5.

*1




H

*2




H

(b) Disconnect the connector from the radio receiver assembly*6.

(c) Measure the resistance according value(s) in the table below.

Standard Resistance:

*3




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L41-6 (SWG) - L52-4 (EAU)*4, *5 | Always | Below 1 Ω |
| L50-6 (SWG) - L52-4 (EAU)*6 | Always | Below 1 Ω |
| L41-6 (SWG) - Body ground*4, *5 | Always | 10 kΩ or higher |
| L50-6 (SWG) - Body ground*6 | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Navigation Receiver Assembly*4, Radio Receiver Assembly*5) |
| *2 | Front view of wire harness connector<br><br>(to Radio Receiver Assembly*6) |

| | |
|---|---|
| *3 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |

*4: w/ Navigation System

*5: w/o Navigation System (for 8 Speakers)

*6: w/o Navigation System (for 6 Speakers)

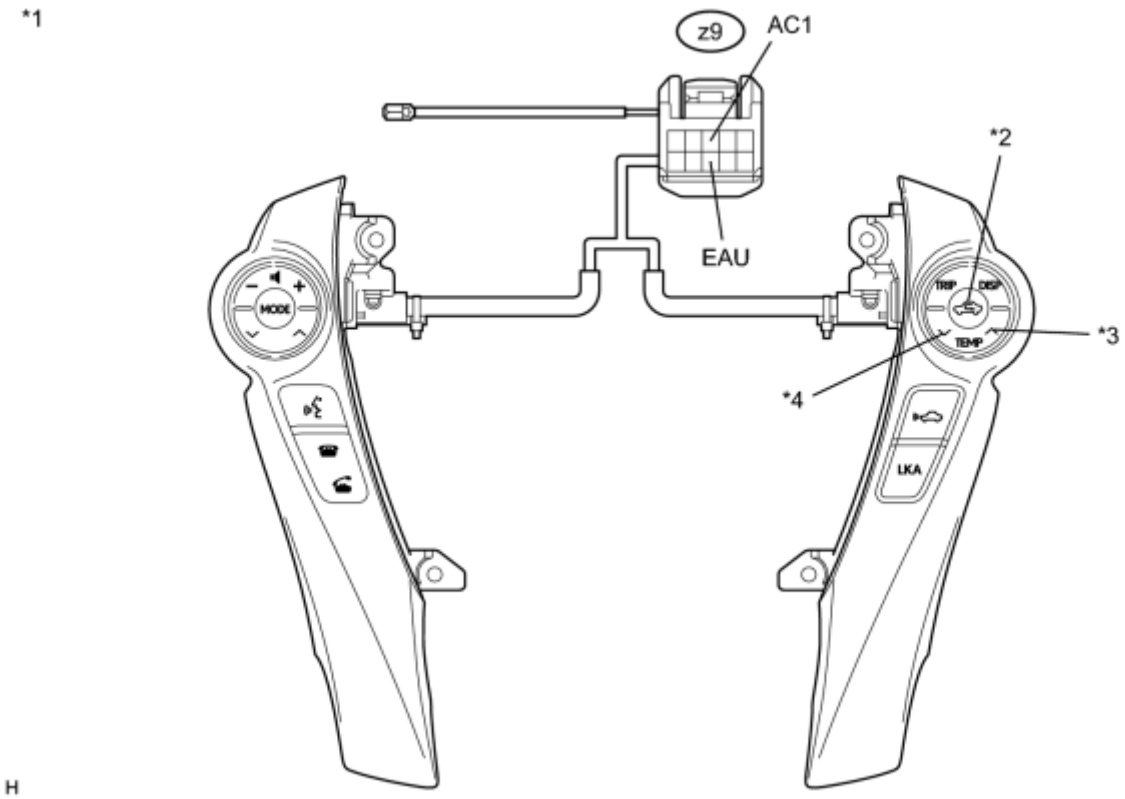
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | INSPECT STEERING PAD SWITCH ASSEMBLY |

(a) Disconnect the connector from the steering pad switch assembly.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z9-3 (AC1) - z9-8 (EAU) | No switch pushed | 95 to 105 kΩ |
| z9-3 (AC1) - z9-8 (EAU) | R/F switch pushed | 323 to 335 Ω |
| z9-3 (AC1) - z9-8 (EAU) | TEMP+ switch pushed | 980 to 1020 Ω |
| z9-3 (AC1) - z9-8 (EAU) | TEMP- switch pushed | 3048 to 3172 Ω |

*Text in Illustration*

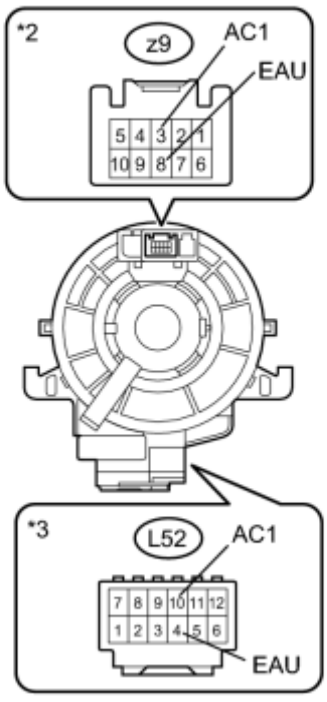
| | | | |
|---|---|---|---|
| *1 | Component without harness connected<br><br>(Steering Pad Switch Assembly) | *2 | R/F Switch |
| *3 | TEMP+ Switch | *4 | TEMP- Switch |

NG REPLACE STEERING PAD SWITCH ASSEMBLY

OK

| | |
|---|---|
| 4. | INSPECT SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY |

*1




H

(a) Disconnect the connector from the spiral with sensor cable sub-assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L52-10 (AC1) - z9-3 (AC1) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| L52-4 (EAU) - z9-8 (EAU) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |

NOTICE:

The spiral with sensor cable sub-assembly is an important part of the SRS airbag system. Incorrect removal or installation of the spiral with sensor cable sub-assembly may prevent the airbag from deploying. Refer to the pages shown in the brackets.

HINT:

- Removal INFO
- Installation INFO
- The spiral cable makes a maximum of approximately 5 rotations.

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Spiral with Sensor Cable Sub-assembly) |
| *2 | Steering Pad Switch Side |
| *3 | Vehicle Side |

NG ▶ REPLACE SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY

OK

▼

| | |
|---|---|
| 5. | CONFIRM MODEL |

Result:

| Result | Proceed to |
|---|---|
| w/ Navigation System | A |
| w/o Navigation System | B |

B ▶ REPLACE RADIO RECEIVER ASSEMBLY

A

▼

| | |
|---|---|
| 6. | REPLACE NAVIGATION RECEIVER ASSEMBLY |

(a) Re INFO the navigation receiver assembly with a known good one and check if the same problem occurs again .

OK:

Same problem does not occur.

NG PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

OK **END (NAVIGATION RECEIVER ASSEMBLY WAS DEFECTIVE)**

| | |
|---|---|
| 7. | REPLACE RADIO RECEIVER ASSEMBLY |

(a) Replace the radio receiver assembly with a known good one and check if the same problem occurs again INFO.

OK:

Same problem does not occur.

NG PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

OK **END (RADIO RECEIVER ASSEMBLY WAS DEFECTIVE)**

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (A/C CONTROL ASSEMBLY - SPIRAL WITH SENSOR CABLE SUB-ASSEMBLY) |

*1




(a) Disconnect the connector from the A/C control assembly.

(b) Measure the resistance according value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L20-3 (SWO) - L52-10 (AC1) | Always | Below 1 Ω |
| L20-3 (SWO) - Body ground | Always | 10 kΩ or higher |

*2

## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Control Assembly) |
| *2 | Front view of wire harness connector<br><br>(to Spiral with Sensor Cable Sub-assembly) |

H

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE A/C CONTROL ASSEMBLY**

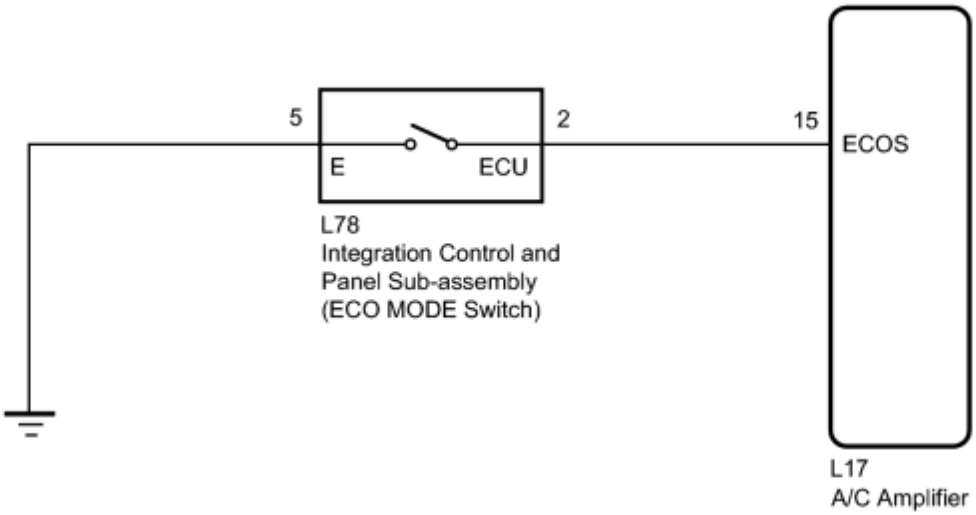
# DESCRIPTION

The integration control and panel sub-assembly (ECO MODE switch) is installed on the instrument panel on the driver side. When the integration control and panel sub-assembly (ECO MODE switch) is turned on, the A/C amplifier receives an integration control and panel sub-assembly (ECO MODE switch) ON signal and controls the air conditioning to enhance fuel efficiency.

When the heater is on, the engine ON request coolant temperature will be set to a lower level. Thus, the length of time that the engine operates to generate the heat necessary to operate the heater will be limited. When the engine coolant temperature drops, the amount of air flow of the blower motor will also decrease. If FOOT/DEF or DEF is selected, or if the temperature is set to MAX HOT, the fuel efficiency control due to the integration control and panel sub-assembly (ECO MODE switch) operation will be canceled.

When the air conditioning is used to cool the vehicle, the power consumption of the compressor will be limited. Initially, the air conditioning will operate normally until the cabin temperature stabilizes. After the cabin temperature stabilizes, the power consumption of the compressor will be limited while stabilizing the cabin temperature. If the temperature is set to MAX COOL, the fuel efficiency control due to the integration control and panel sub-assembly (ECO MODE switch) operation will be canceled.

# WIRING DIAGRAM

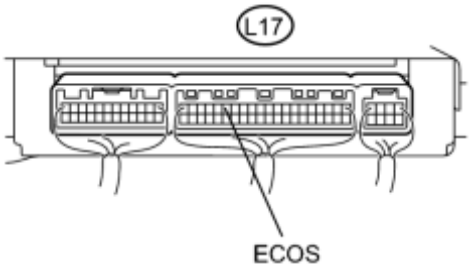



# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT AIR CONDITIONING AMPLIFIER |

*1




(a) Remove the A/C amplifier with the connectors still connected.

H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-15 (ECOS) - Body ground | Power switch on (IG)<br><br>ECO MODE switch off (when switch is not pressed) | 11 to 14 V |
| L17-15 (ECOS) - Body ground | Power switch on (IG)<br><br>ECO MODE switch on (when switch is pressed) | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

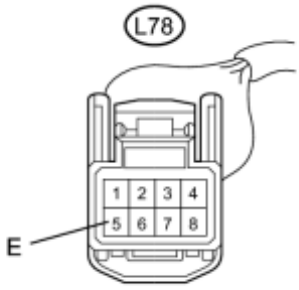
NG CHECK HARNESS AND CONNECTOR (ECO MODE SWITCH - BODY GROUND)

OK **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (ECO MODE SWITCH - BODY GROUND) |

(a) Disconnect the connector from the integration control and panel sub-assembly (ECO MODE switch).

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L78-5 (E) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Integration Control and Panel Sub-assembly (ECO MODE Switch)) |

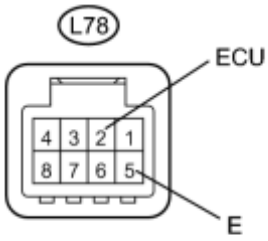
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | INSPECT INTEGRATION CONTROL AND PANEL SUB-ASSEMBLY (ECO MODE SWITCH) |

*1




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L78-2 (ECU) - L78-5 (E) | ECO MODE switch off<br><br>(when switch is not pressed) | 10 kΩ or higher |
| L78-2 (ECU) - L78-5 (E) | ECO MODE switch on<br><br>(when switch is pressed) | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Integration Control and Panel Sub-assembly (ECO MODE Switch)) |

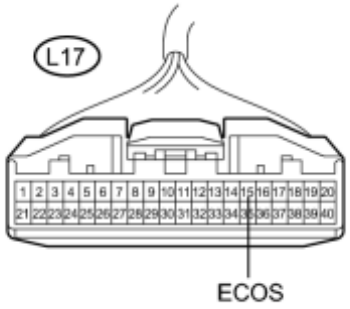
NG ▶ REPLACE INTEGRATION CONTROL AND PANEL SUB-ASSEMBLY (ECO MODE SWITCH)

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - ECO MODE SWITCH) |

*1




H

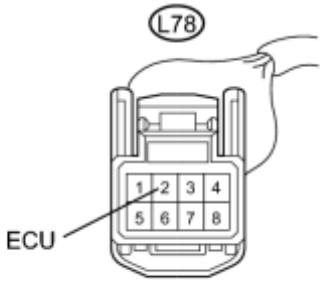
(a) Disconnect the connector from the A/C amplifier.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-15 (ECOS) - L78-2 (ECU) | Always | Below 1 Ω |
| L17-15 (ECOS) - Body ground | Always | 10 kΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |
| *2 | Front view of wire harness connector<br><br>(to Integration Control and Panel Sub-assembly (ECO MODE Switch)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

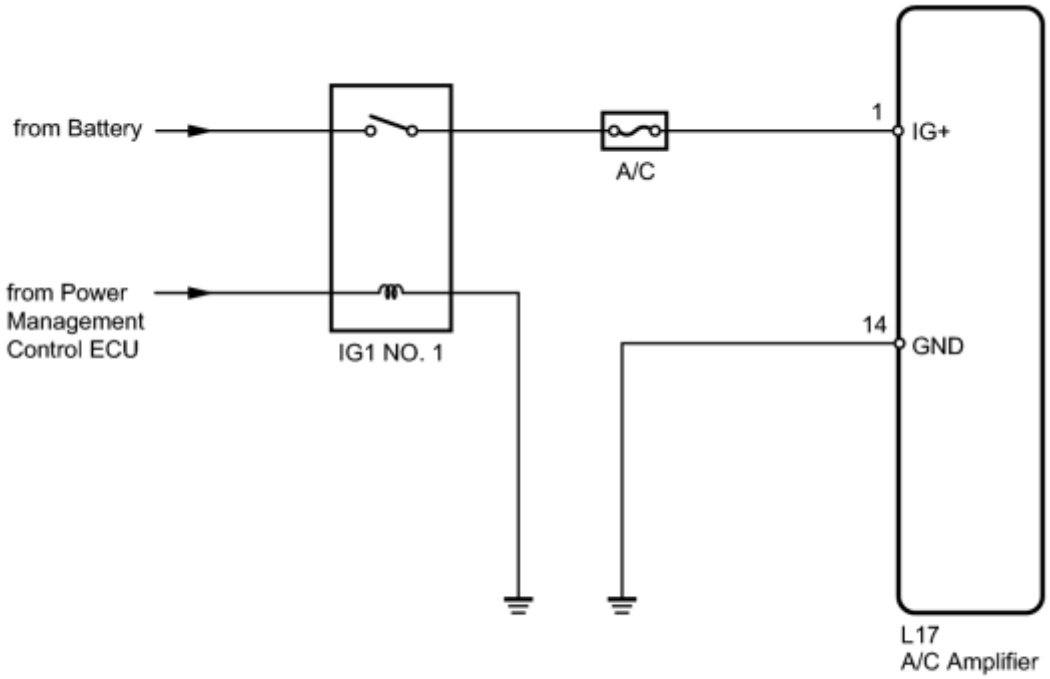
**REPLACE A/C AMPLIFIER**

# DESCRIPTION

The main power source is supplied to the A/C amplifier when the power switch is on (IG).

The power source is used for operating the A/C amplifier and servo motor, etc.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

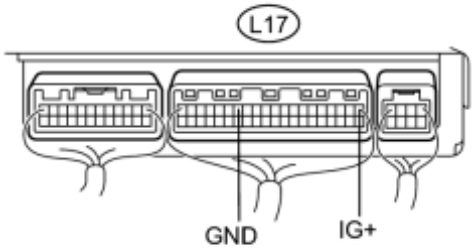
HINT:

Turn the power switch on (IG) before inspection. Check the IG1 NO. 1 relay or auxiliary battery if the power source does not change to on (IG).

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT A/C AMPLIFIER |

*1




(a) Remove the A/C amplifier with its connectors still connected.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-1 (IG+) - L17-14 (GND) | Power switch off | Below 1 V |
| L17-1 (IG+) - L17-14 (GND) | Power switch on (IG) | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(A/C Amplifier) |

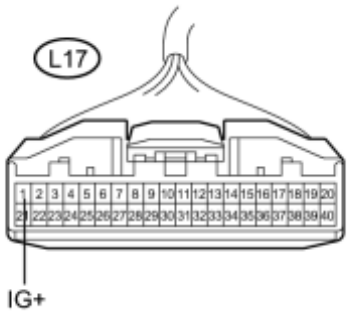
NG CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BATTERY)

OK **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BATTERY) |

(a) Disconnect the A/C amplifier connector.

*1




(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-1 (IG+) - Body ground | Power switch off | Below 1 V |
| L17-1 (IG+) - Body ground | Power switch on (IG) | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

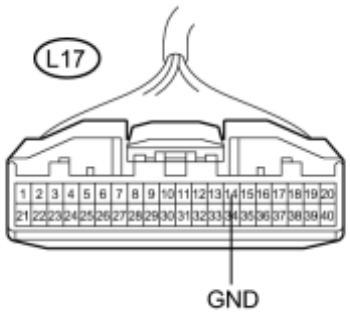
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BODY GROUND) |

*1




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-14 (GND) - Body ground | Always | Below 1 Ω |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

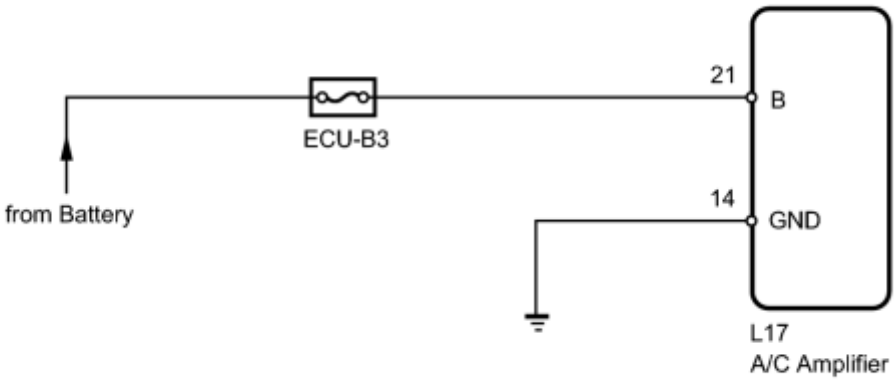
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE A/C AMPLIFIER**

# DESCRIPTION

The back-up power source circuit for the A/C amplifier is shown below. Power is supplied even when the power switch is turned off. The power is used for diagnostic trouble code memory etc.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

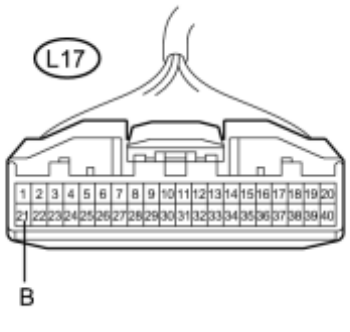
Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BATTERY) |

(a) Disconnect the A/C amplifier connector.

*1




H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-21 (B) - Body ground | Power switch off | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

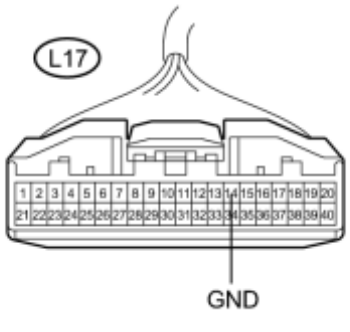
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (A/C AMPLIFIER - BODY GROUND) |

*1




H

(a) Disconnect the A/C amplifier connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-14 (GND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

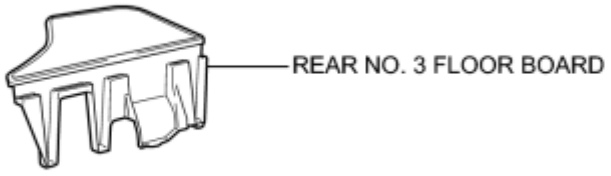
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

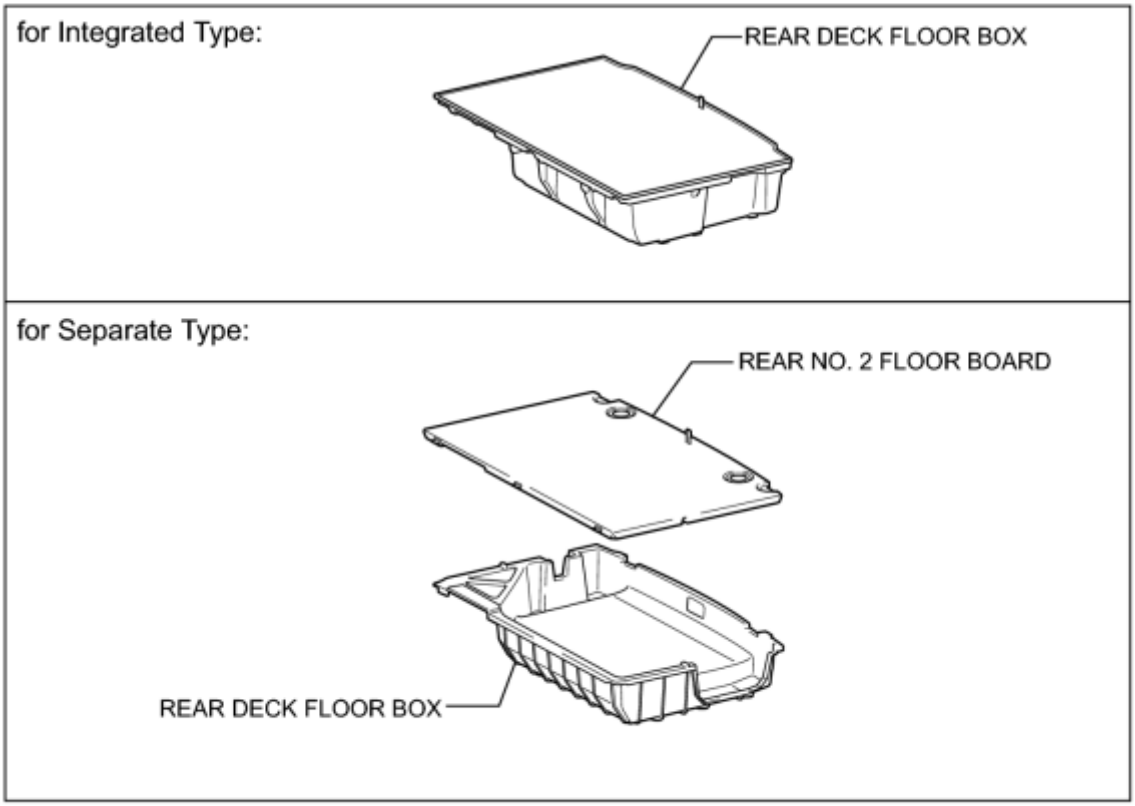
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

# COMPONENTS

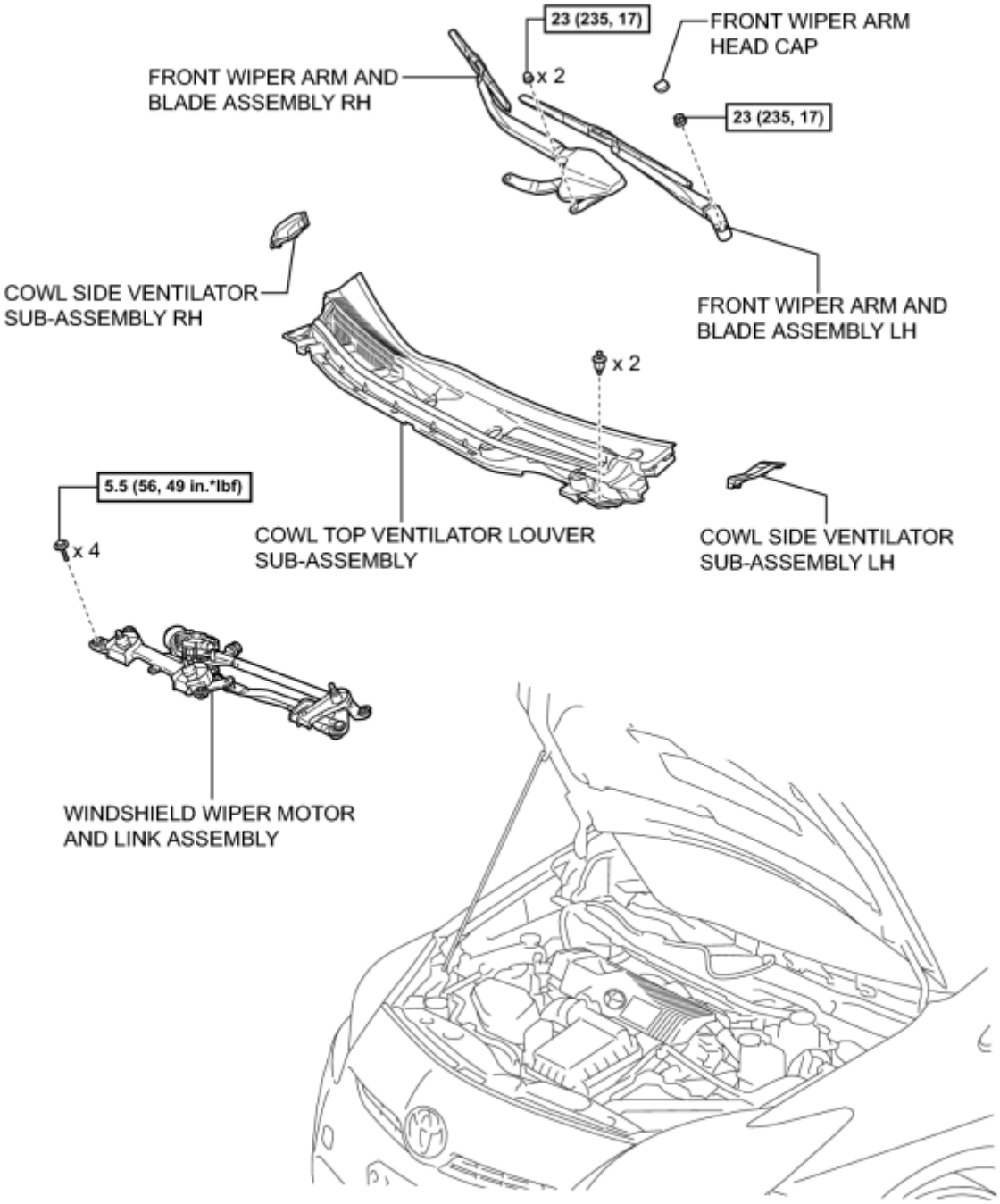
# ILLUSTRATION




P

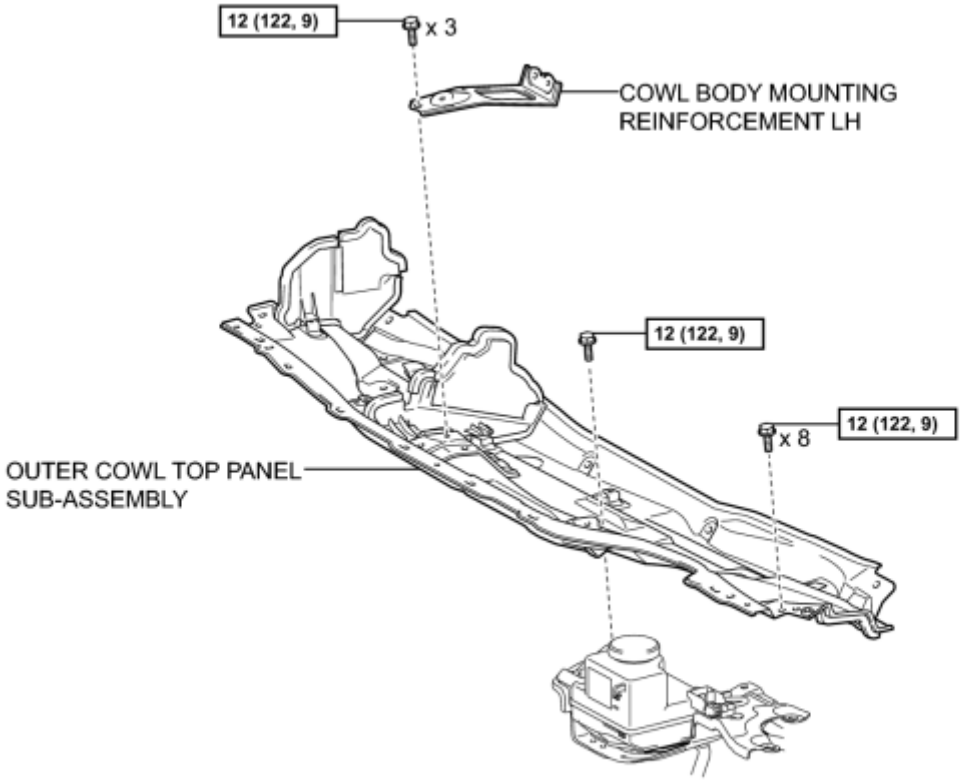
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

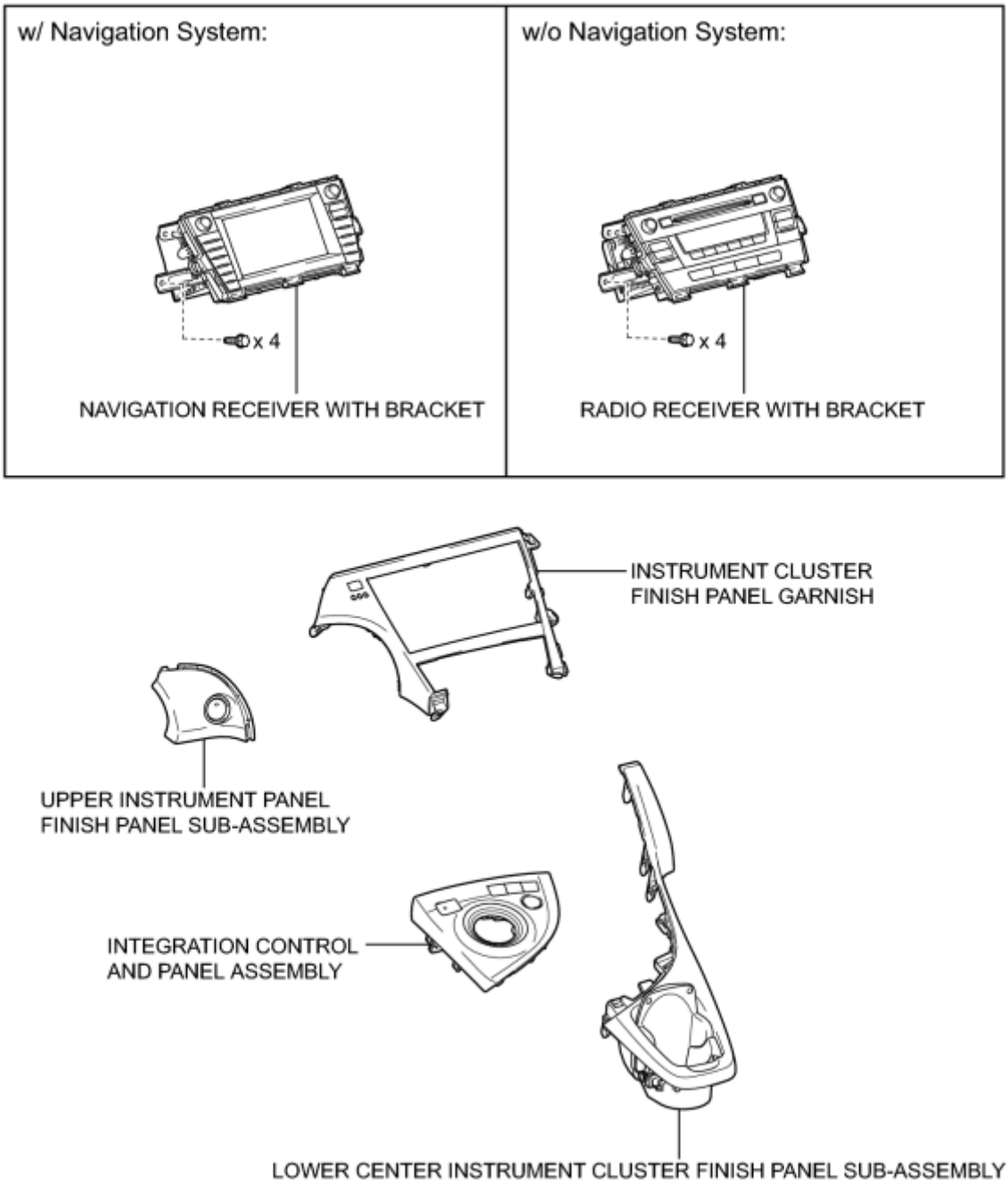
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

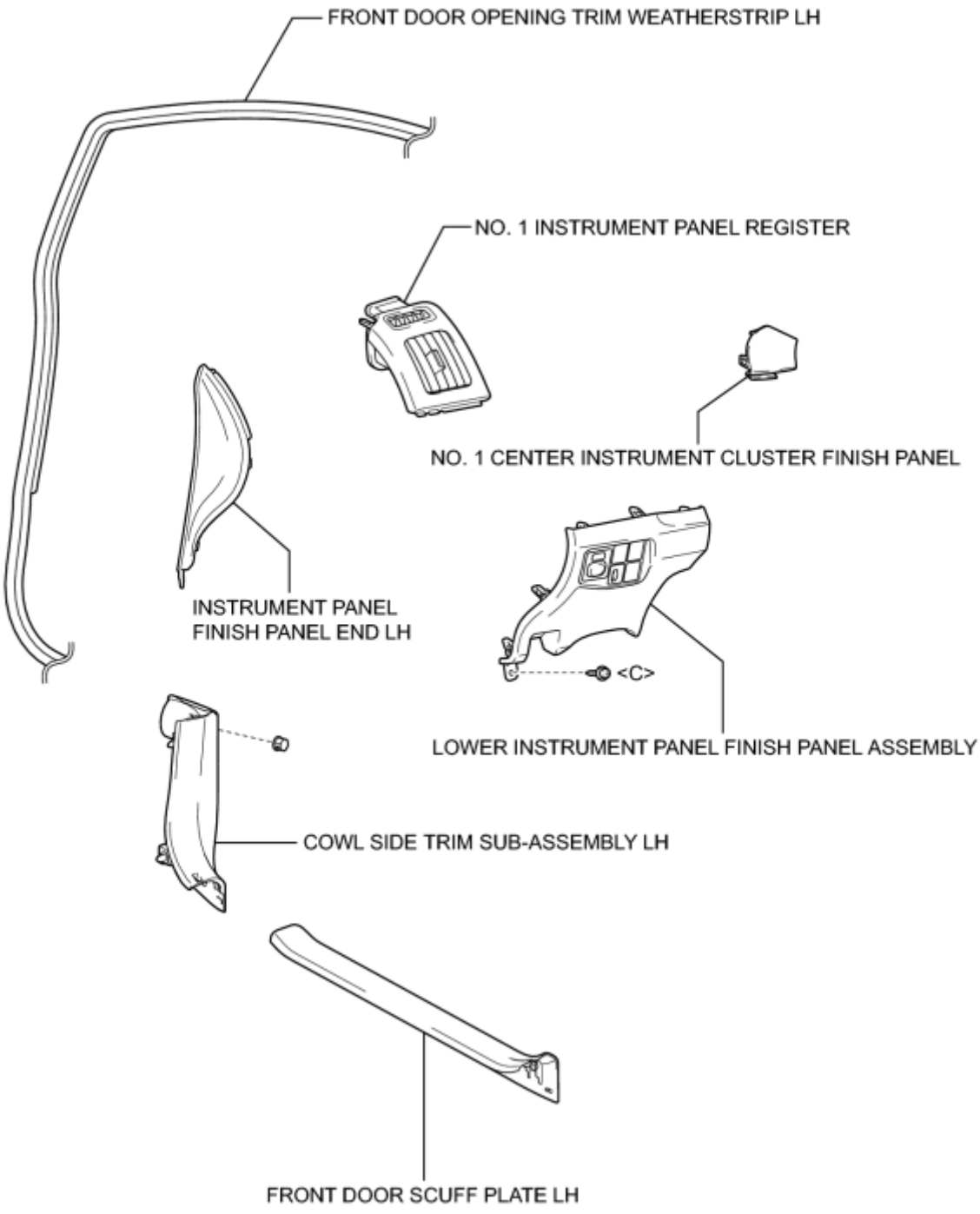
P

# ILLUSTRATION



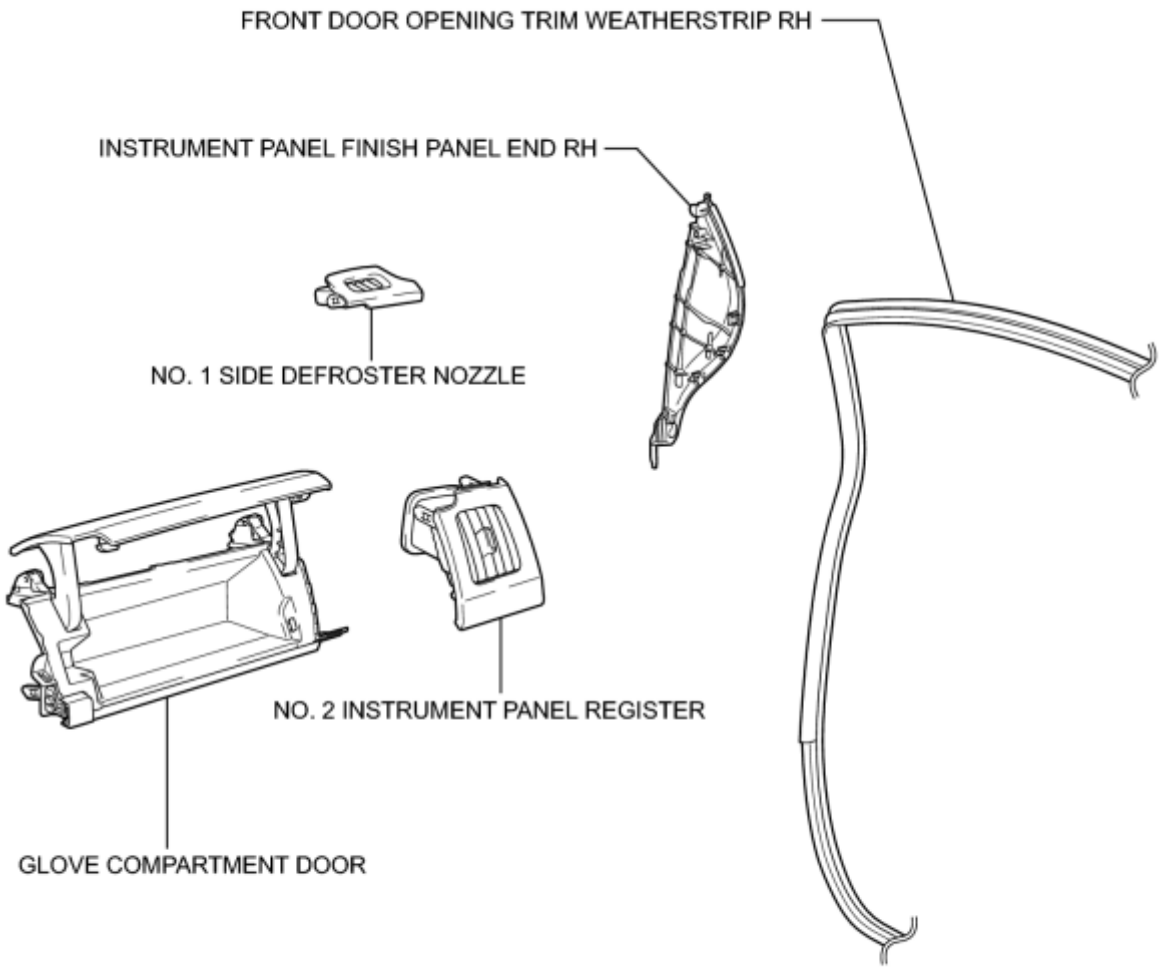

P

# ILLUSTRATION



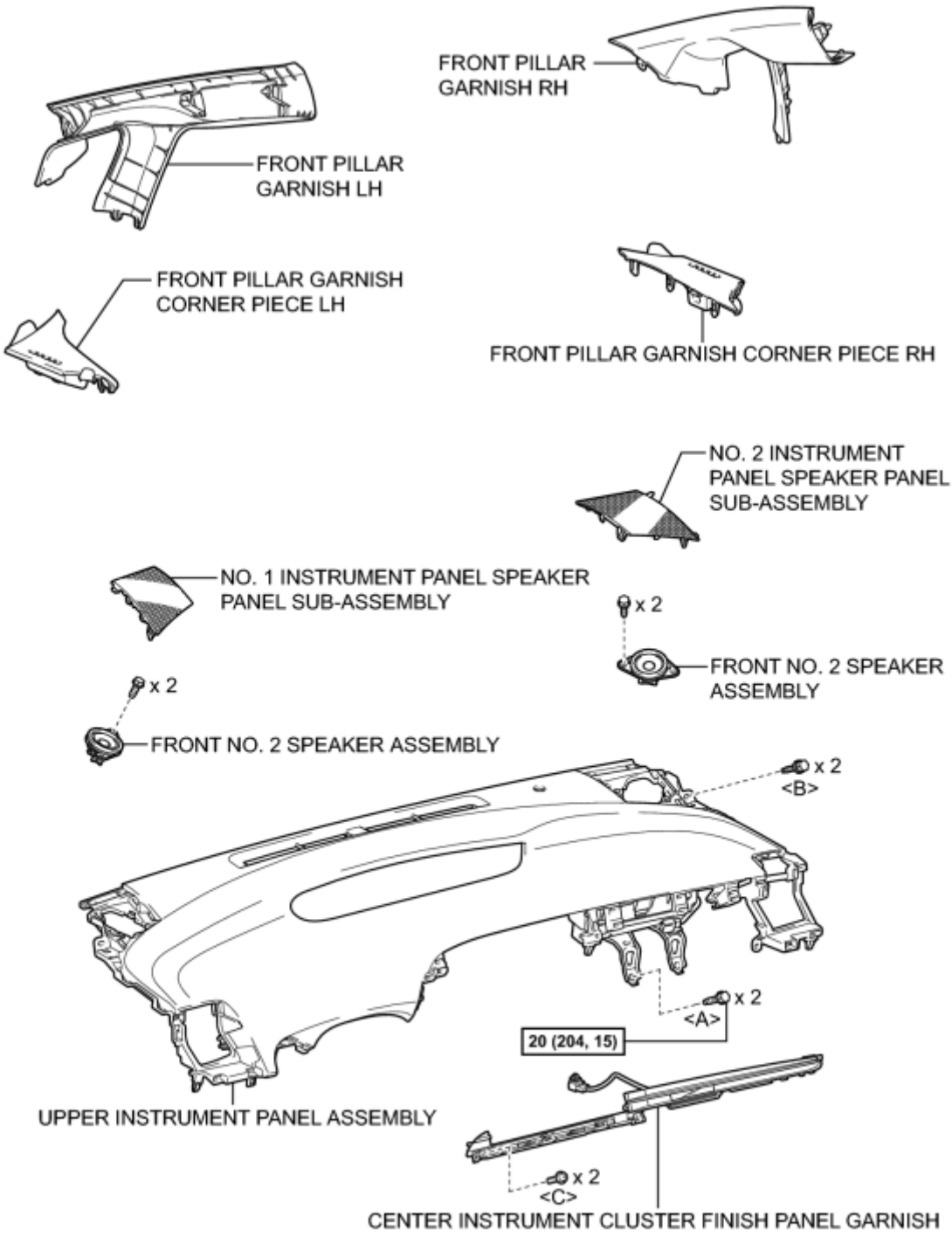

P

# ILLUSTRATION




P

# ILLUSTRATION

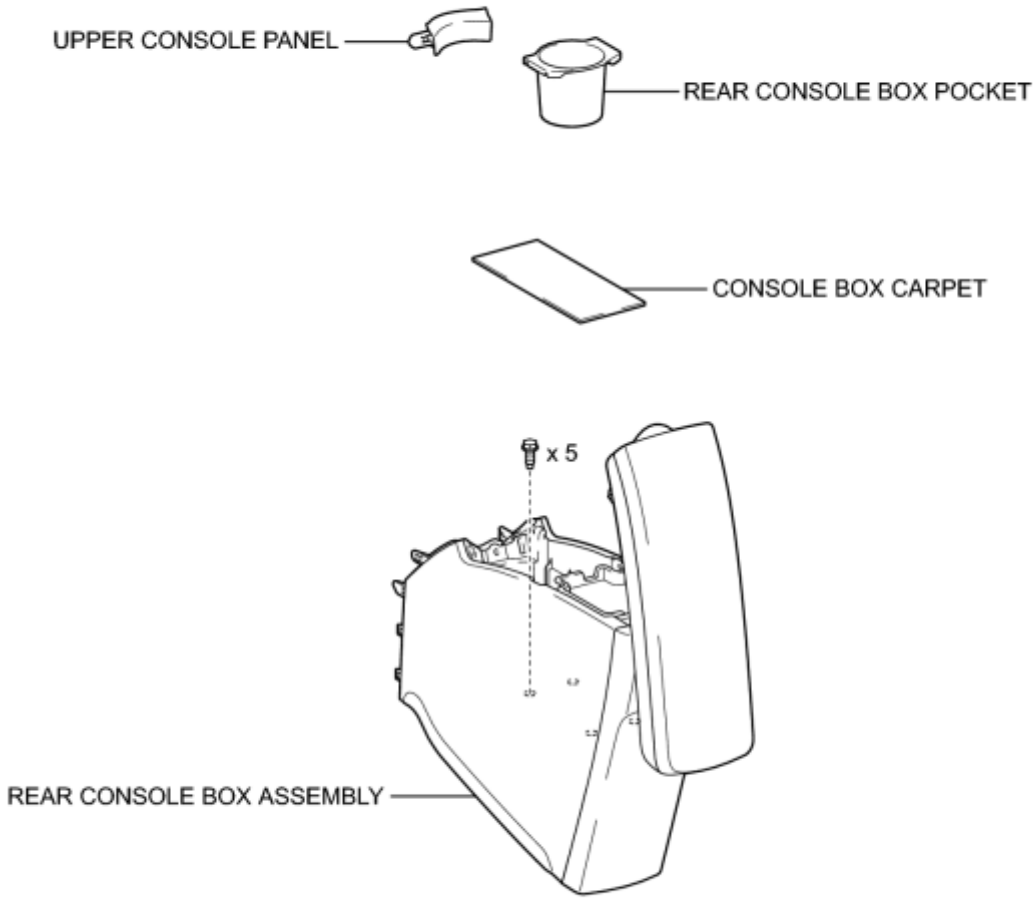



N*m (kgf*cm, ft.*lbf) : Specified torque

P

# ILLUSTRATION

w/ Power Outlet Socket:

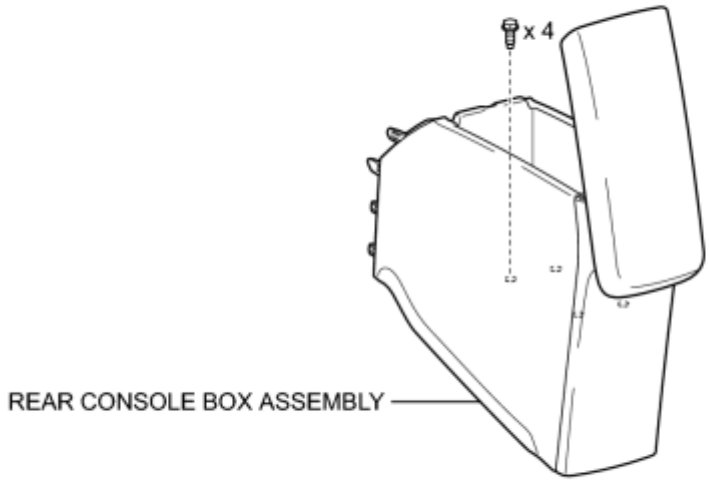



P

# ILLUSTRATION

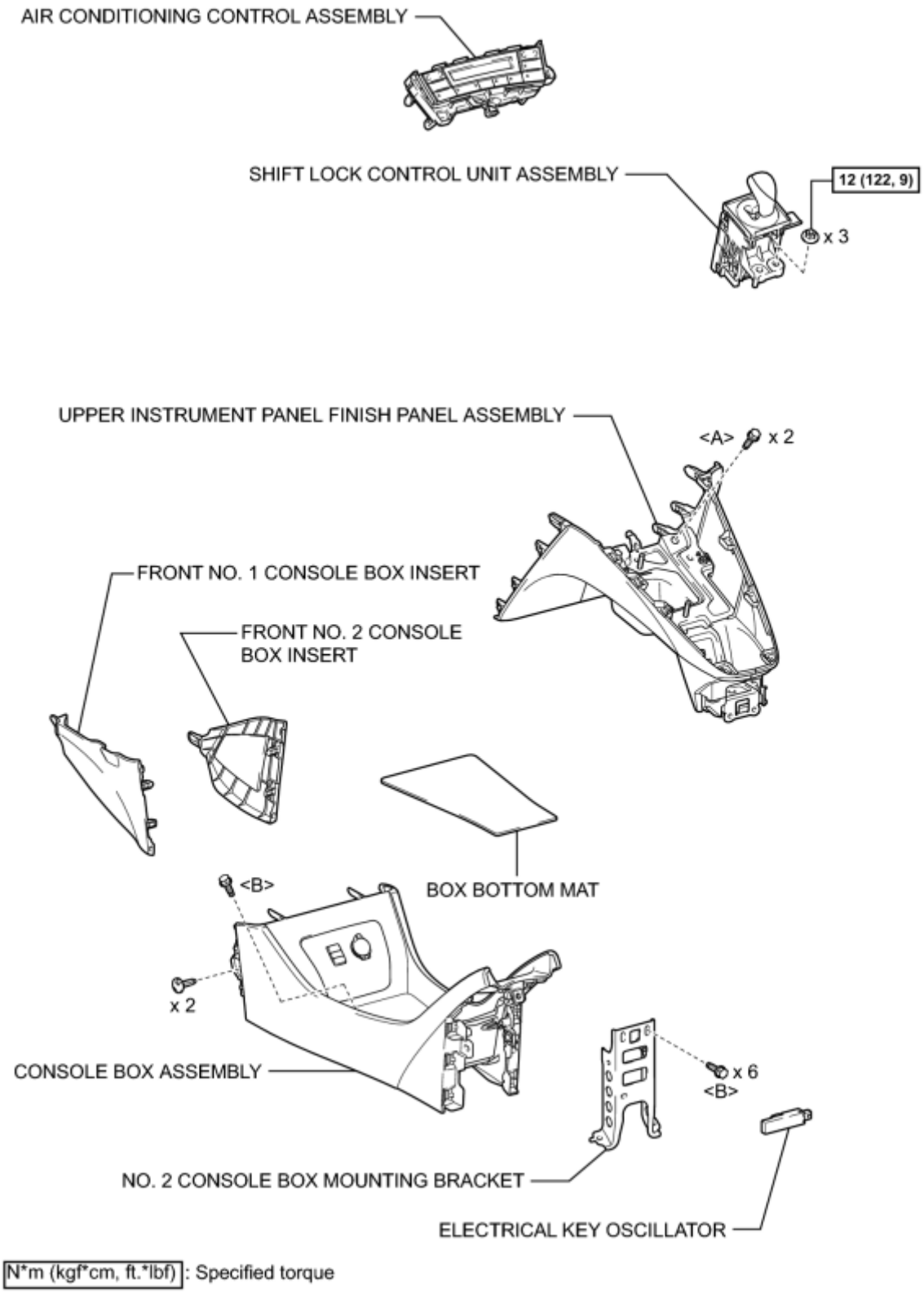
w/o Power Outlet Socket:



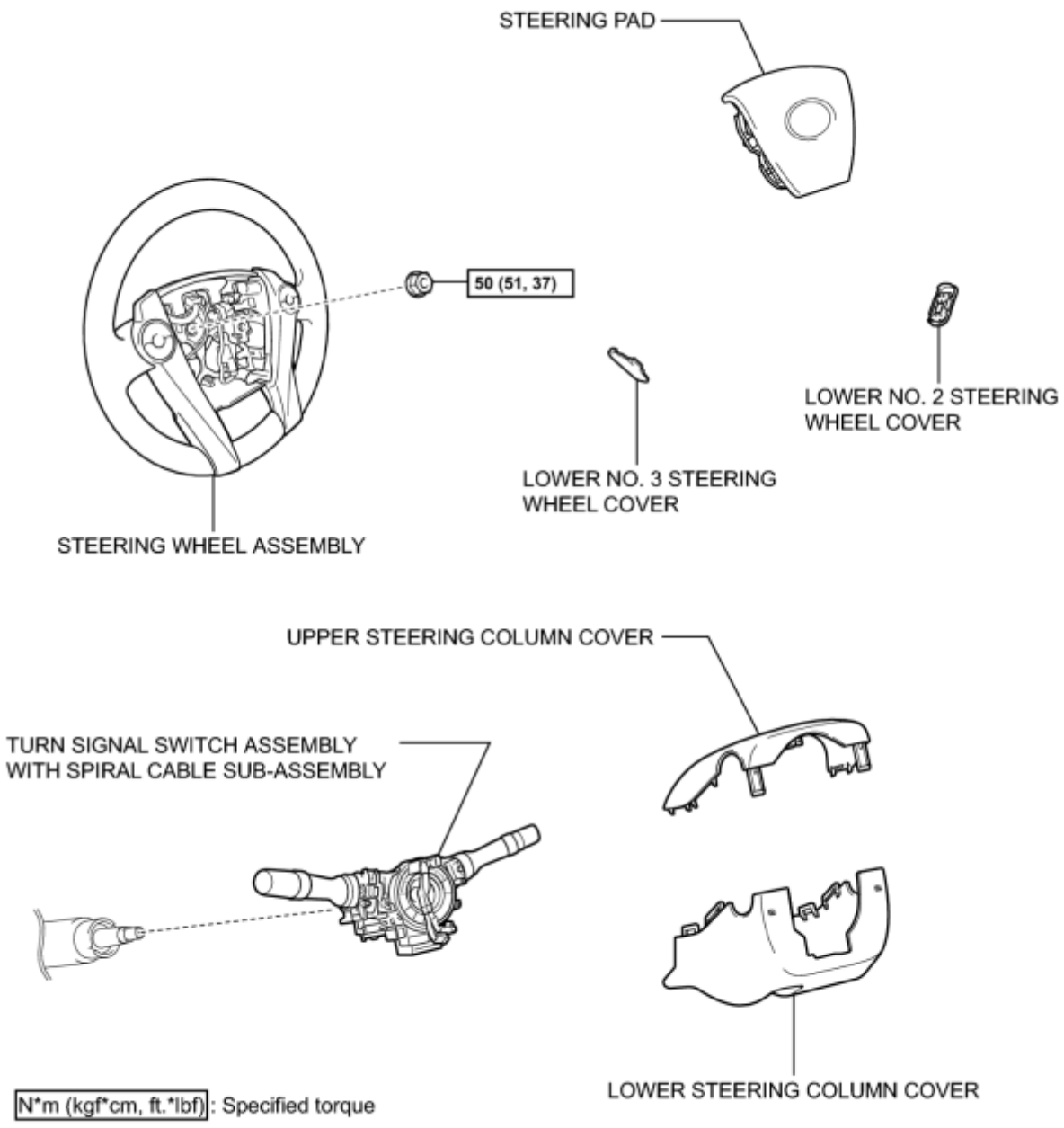

P

# ILLUSTRATION

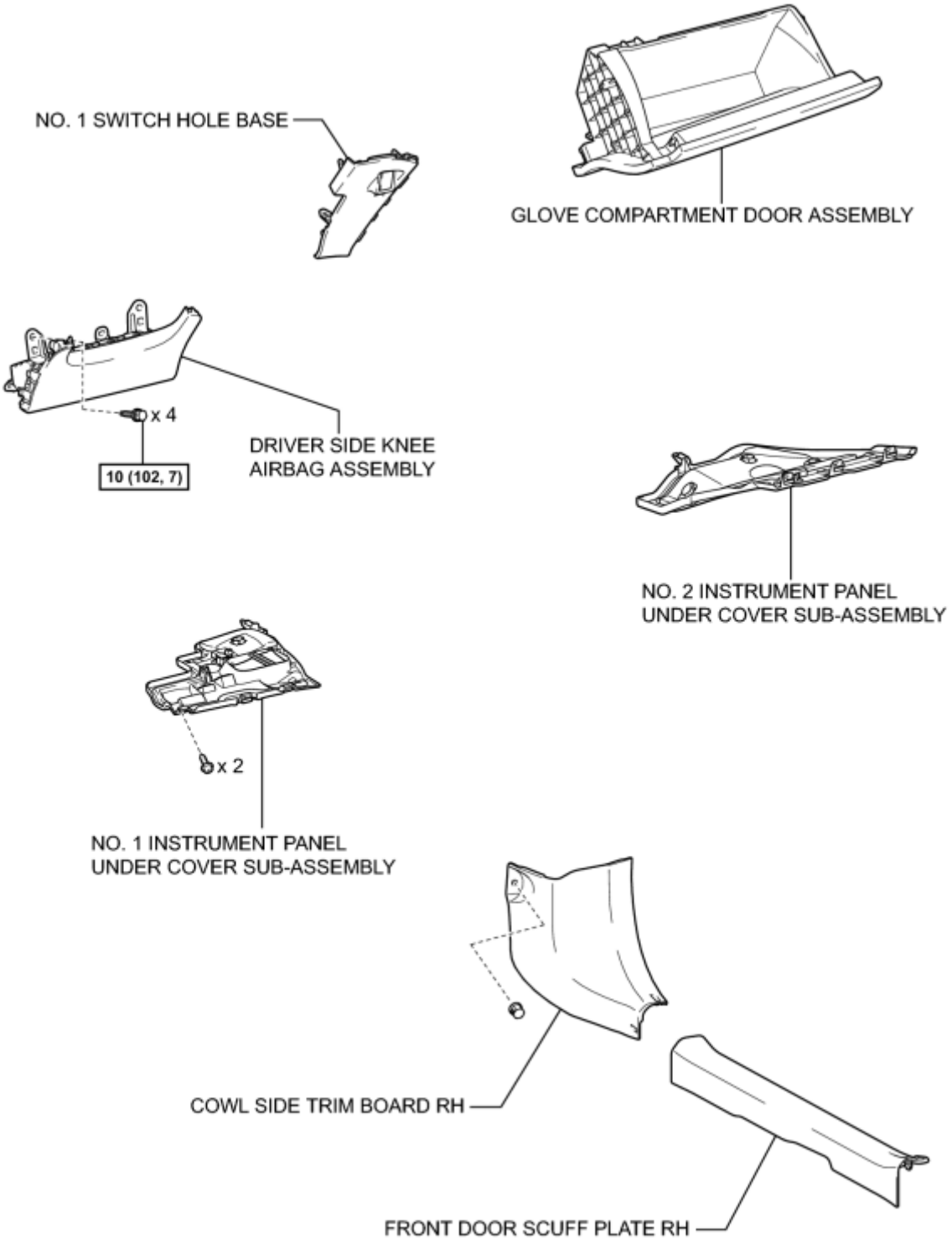



P

# ILLUSTRATION



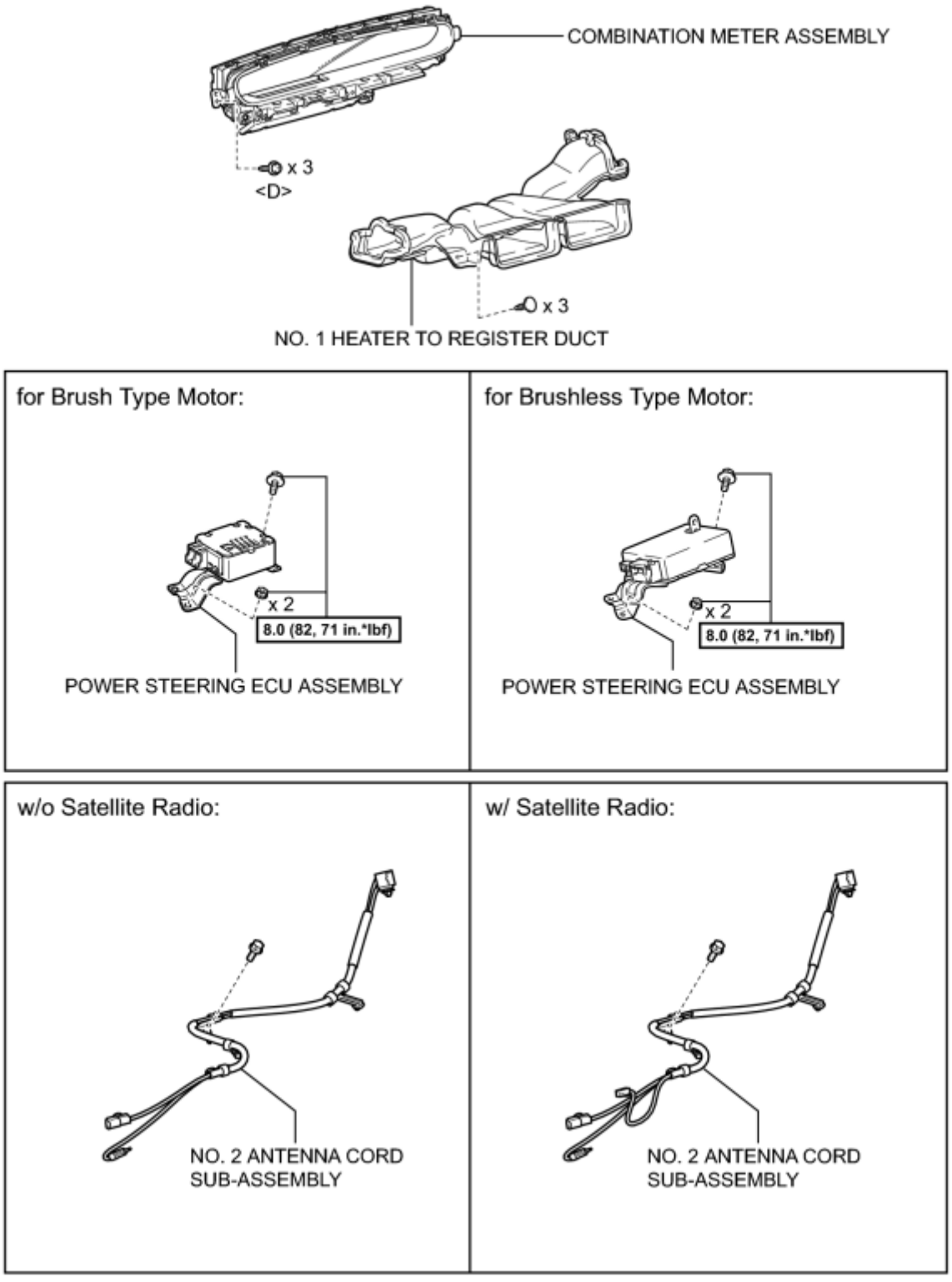

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

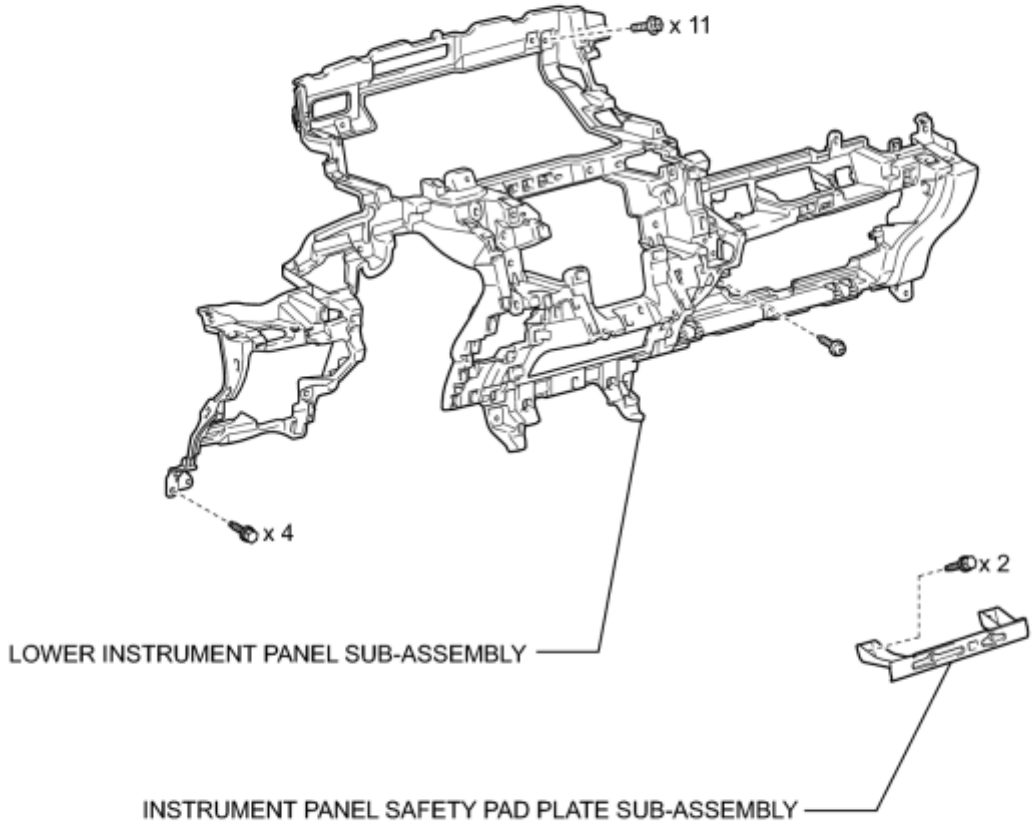
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

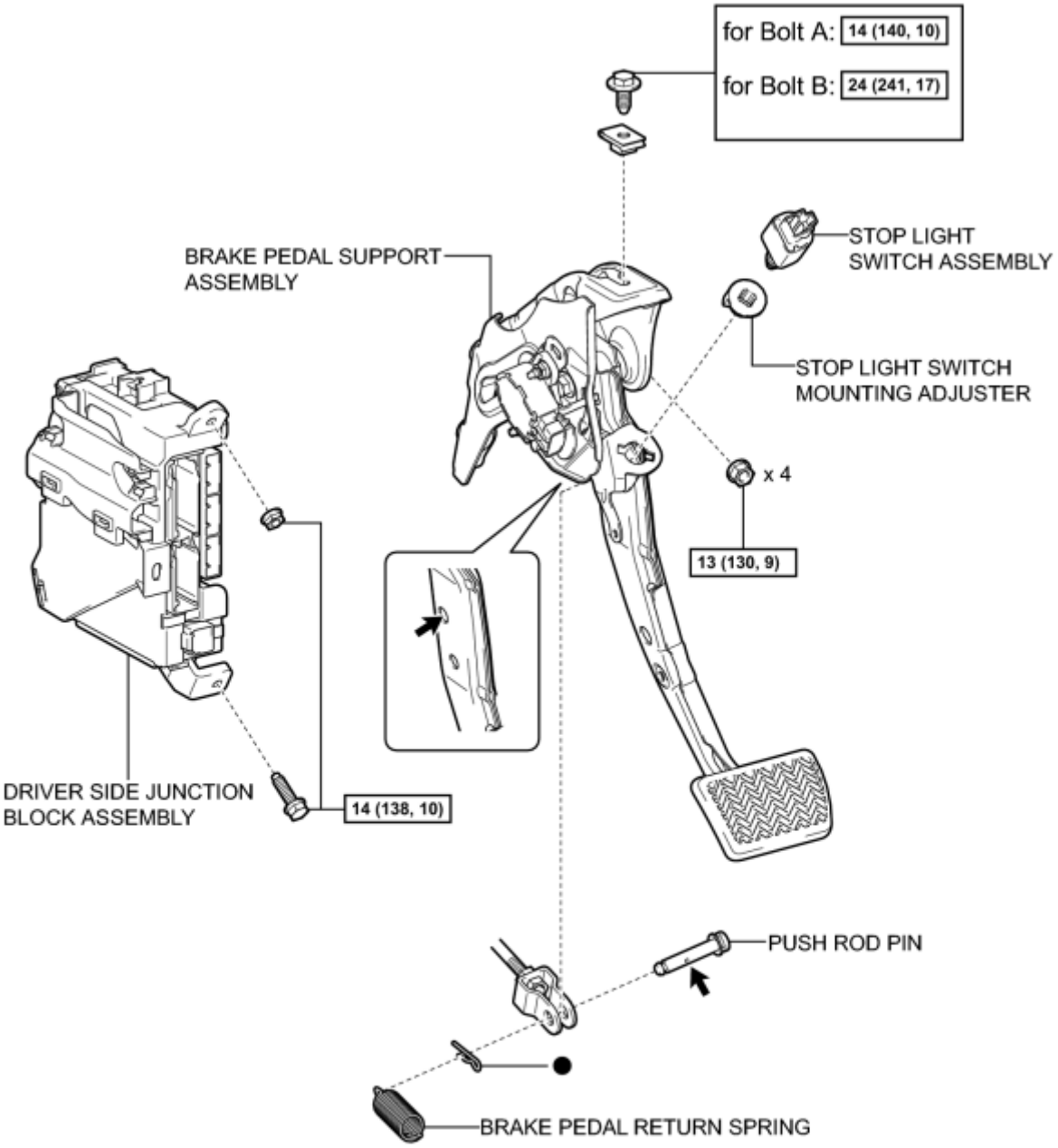
P

# ILLUSTRATION

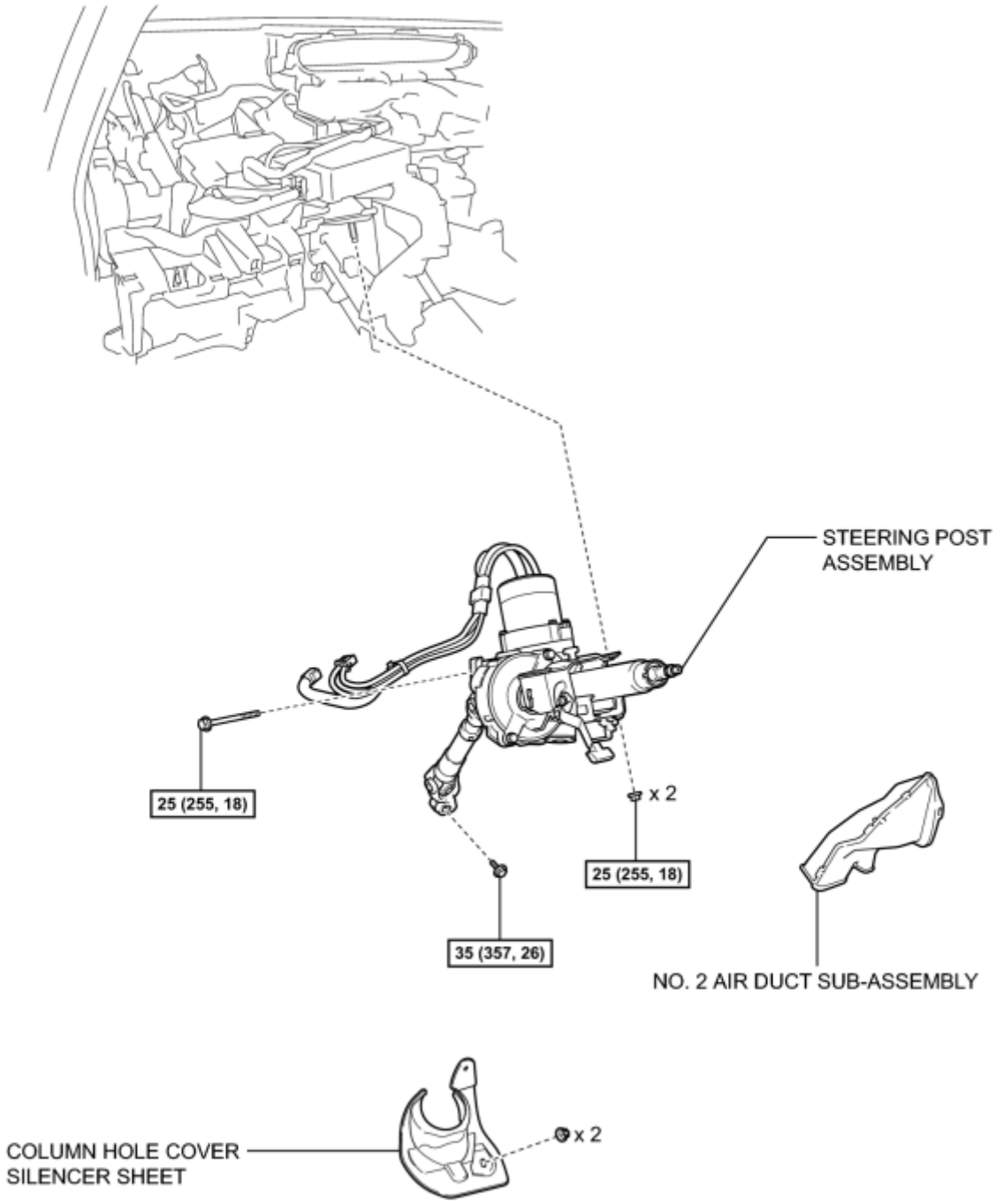



P

# ILLUSTRATION




# ILLUSTRATION

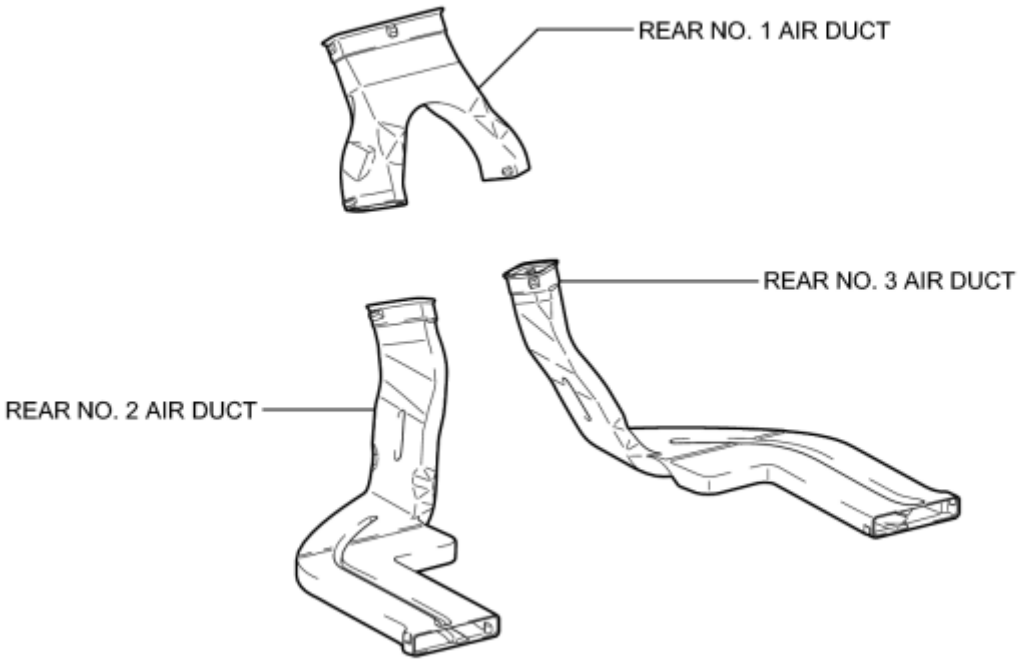



N*m (kgf*cm, ft.*lbf): Specified torque

c

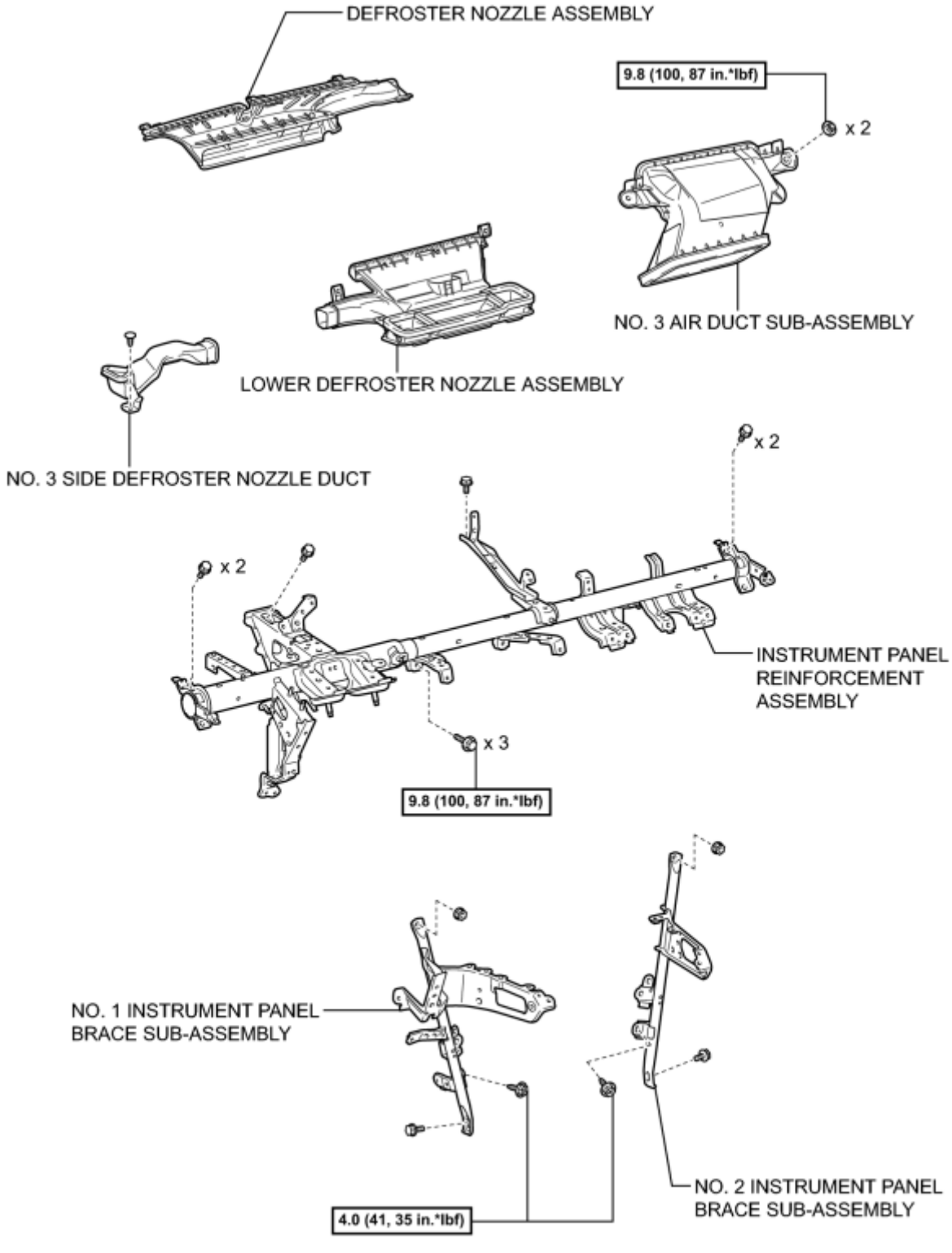
# ILLUSTRATION

w/ Rear Air Duct:




P

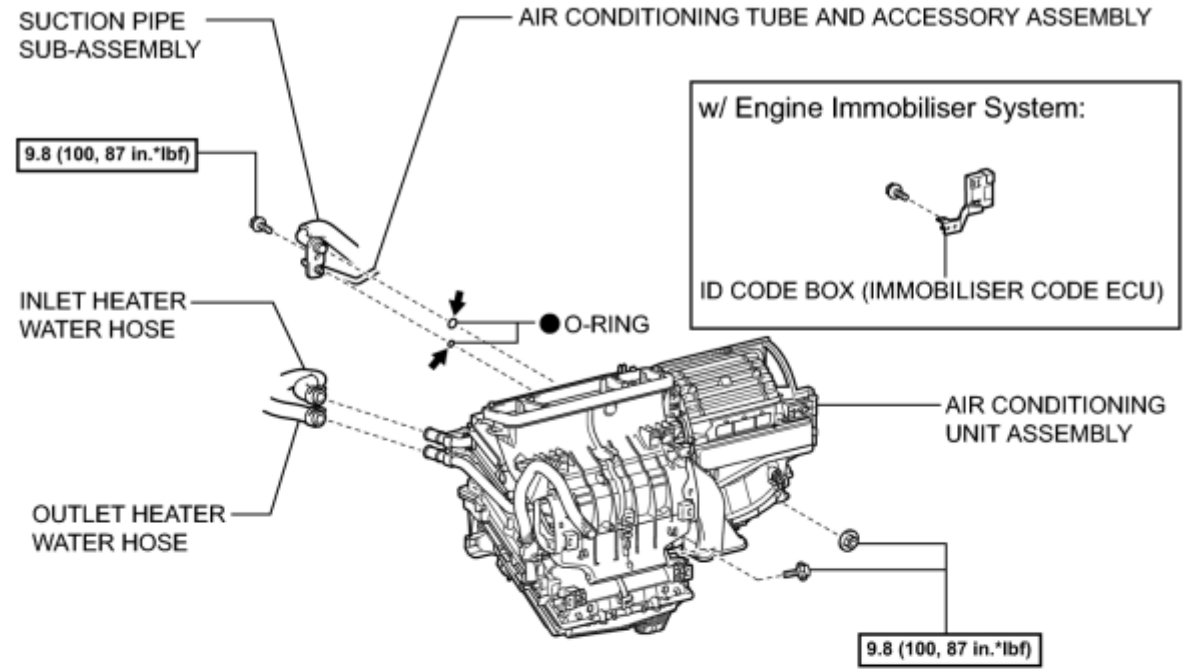
# ILLUSTRATION

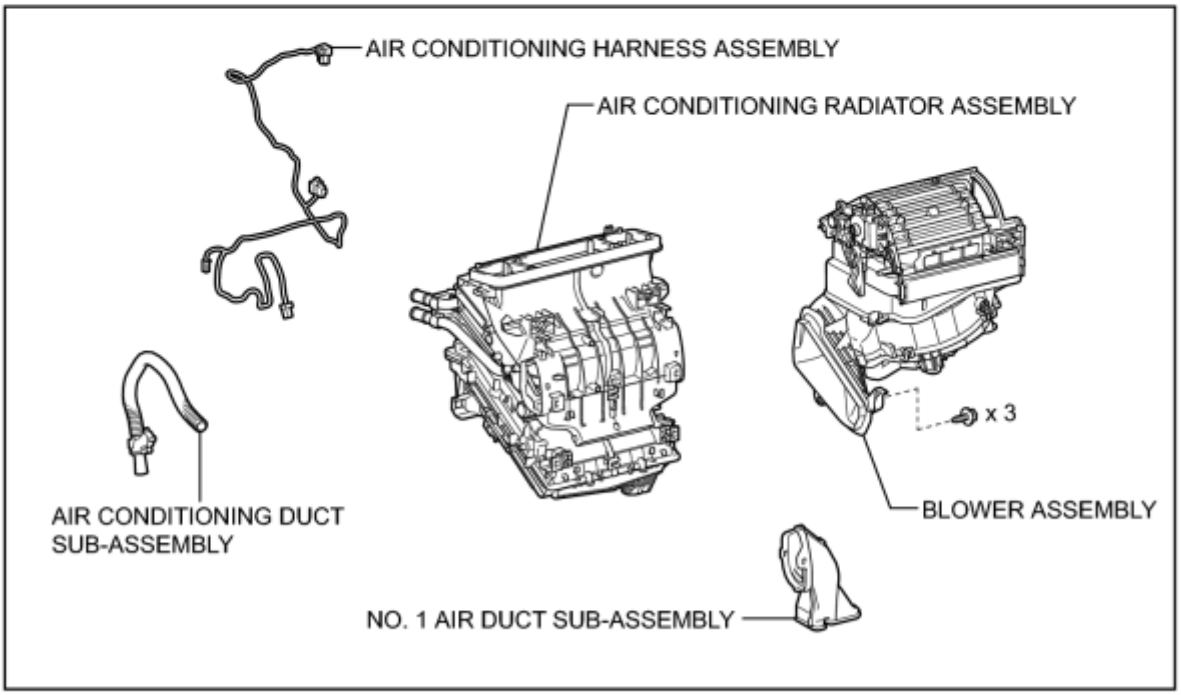



N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION



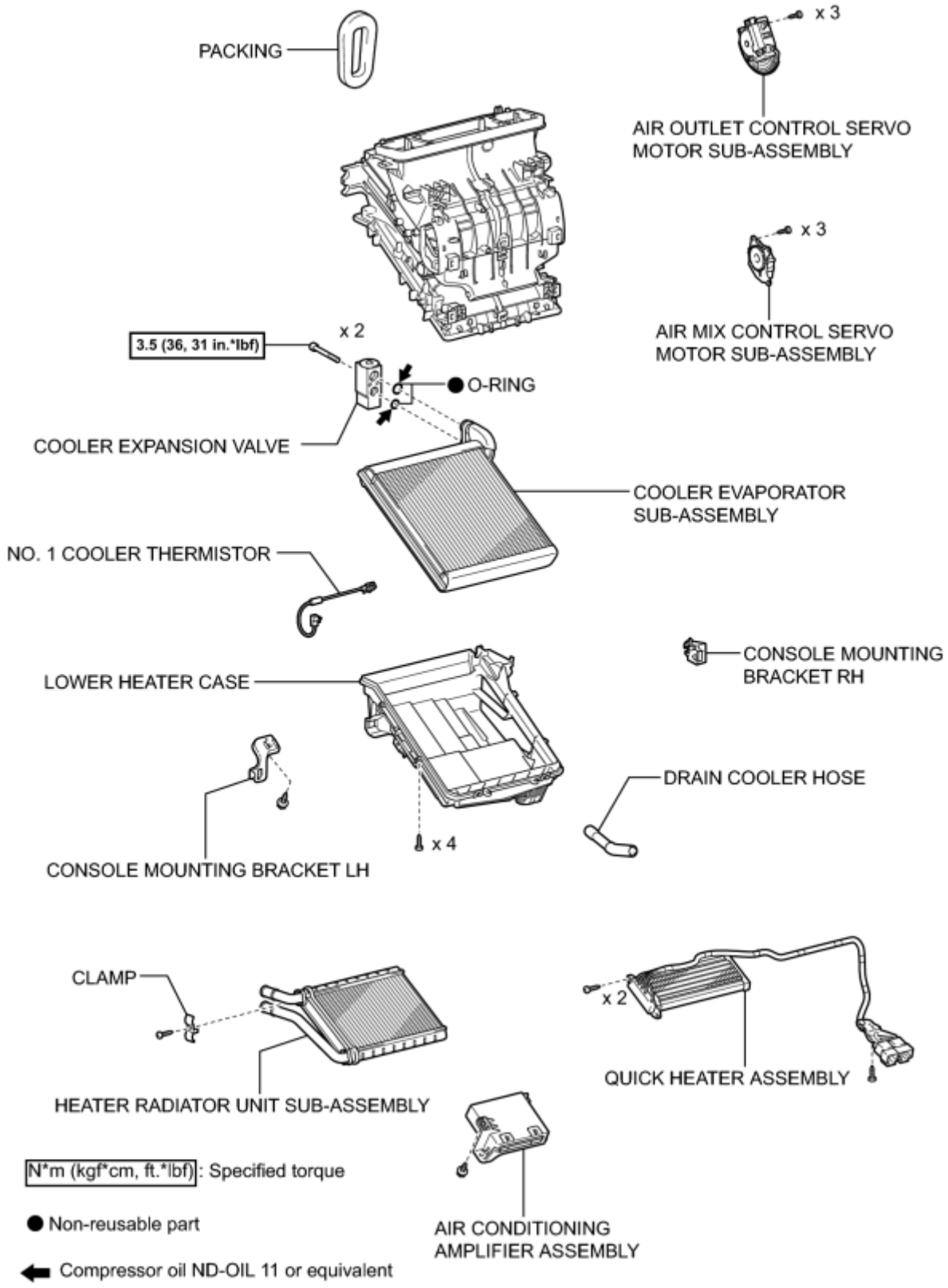

N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

⬅ Compressor oil ND-OIL 11 or equivalent

P

# ILLUSTRATION


PACKING
x 3
AIR OUTLET CONTROL SERVO MOTOR SUB-ASSEMBLY
x 3
AIR MIX CONTROL SERVO MOTOR SUB-ASSEMBLY
3.5 (36, 31 in.*lbf)
x 2
O-RING
COOLER EXPANSION VALVE
COOLER EVAPORATOR SUB-ASSEMBLY
NO. 1 COOLER THERMISTOR
CONSOLE MOUNTING BRACKET RH
LOWER HEATER CASE
x 4
DRAIN COOLER HOSE
CONSOLE MOUNTING BRACKET LH
CLAMP
x 2
QUICK HEATER ASSEMBLY
HEATER RADIATOR UNIT SUB-ASSEMBLY
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
Compressor oil ND-OIL 11 or equivalent
AIR CONDITIONING AMPLIFIER ASSEMBLY

P

# REMOVAL

1. PRECAUTION

INFO

HINT:

Before disconnecting the cable, set the air conditioning control switch to DEF-MODE. (for Automatic Air Conditioning System)

2. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM INFO

3. ALIGN FRONT WHEELS STRAIGHT AHEAD

4. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

5. REMOVE REAR DECK FLOOR BOX INFO

6. REMOVE REAR NO. 3 FLOOR BOARD INFO

7. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

8. REMOVE FRONT WIPER ARM HEAD CAP INFO

9. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO

10. REMOVE FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO

11. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY LH INFO

12. REMOVE COWL SIDE VENTILATOR SUB-ASSEMBLY RH INFO

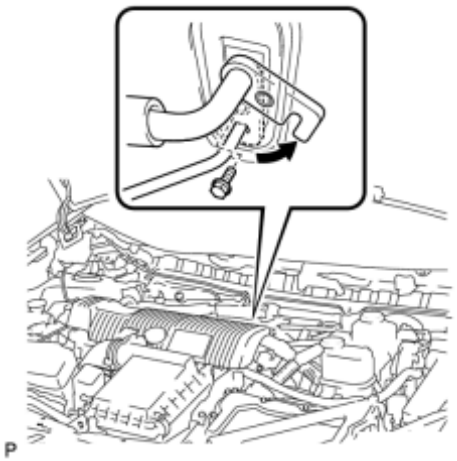
13. REMOVE COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY INFO

14. REMOVE WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY INFO

15. REMOVE COWL BODY MOUNTING REINFORCEMENT LH INFO

16. REMOVE OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

17. DISCONNECT SUCTION PIPE SUB-ASSEMBLY



(a) Remove the bolt and slide the hook connector.

(b) Disconnect the suction pipe assembly.

(c) Remove the O-ring from the suction pipe sub-assembly.

NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

18. DISCONNECT AIR CONDITIONING TUBE AND ACCESSORY ASSEMBLY

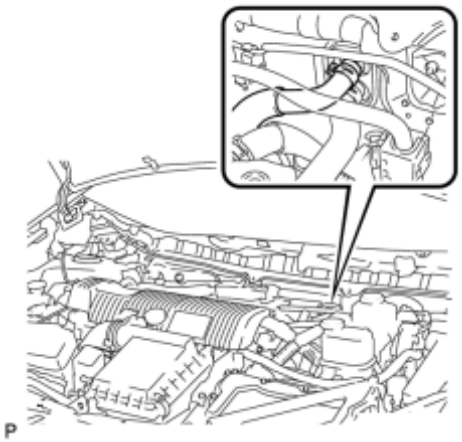
(a) Disconnect the air conditioning tube and accessory assembly.

(b) Remove the O-ring from the air conditioning tube and accessory assembly.

NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

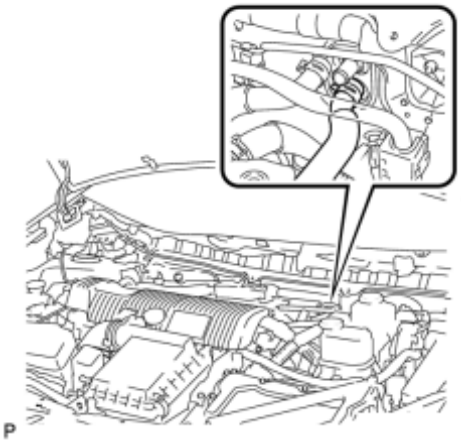
19. DISCONNECT INLET HEATER WATER HOSE



(a) Using pliers, grip the claws of the clip and slide the clip to disconnect the inlet heater water hose.

- Do not apply excessive force to the inlet heater water hose.
- Prepare a drain pan or cloth in case the coolant leaks.

20. DISCONNECT OUTLET HEATER WATER HOSE




(a) Using pliers, grip the claws of the clip and slide the clip to disconnect the outlet heater water hose.

- Do not apply excessive force to the outlet heater water hose.
- Prepare a drain pan or cloth in case the coolant leaks.

21. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

22. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

23. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

24. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

25. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

26. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

27. REMOVE FRONT DOOR SCUFF PLATE LH INFO

28. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

29. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

30. REMOVE NO. 1 INSTRUMENT PANEL REGISTER INFO

31. REMOVE NO. 1 CENTER INSTRUMENT CLUSTER FINISH PANEL INFO

32. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP LH INFO

33. REMOVE INSTRUMENT PANEL FINISH PANEL END LH INFO

34. REMOVE NO. 1 SIDE DEFROSTER NOZZLE INFO

35. REMOVE NO. 2 INSTRUMENT PANEL REGISTER INFO

36. REMOVE GLOVE COMPARTMENT DOOR INFO

37. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH

HINT:

Use the same procedure for the RH side and LH side.

38. REMOVE INSTRUMENT PANEL FINISH PANEL END RH INFO

39. REMOVE FRONT PILLAR GARNISH LH INFO

40. REMOVE FRONT PILLAR GARNISH CORNER PIECE LH INFO

41. REMOVE NO. 1 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY INFO

42. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY INFO

43. REMOVE FRONT PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and LH side.

44. REMOVE FRONT PILLAR GARNISH CORNER PIECE RH INFO

45. REMOVE NO. 2 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY INFO

46. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY

HINT:

Use the same procedure for the RH side and LH side.

47. REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

48. DISCONNECT INSTRUMENT PANEL WIRE INFO

49. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY INFO

50. REMOVE REAR CONSOLE BOX POCKET (w/ Power Outlet Socket) INFO

51. REMOVE UPPER CONSOLE PANEL (w/ Power Outlet Socket) INFO

52. REMOVE CONSOLE BOX CARPET INFO

53. REMOVE REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket) INFO

54. REMOVE REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket) INFO

55. REMOVE ELECTRICAL KEY OSCILLATOR INFO

56. REMOVE NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

57. REMOVE FRONT NO. 1 CONSOLE BOX INSERT INFO

58. REMOVE FRONT NO. 2 CONSOLE BOX INSERT INFO

59. REMOVE BOX BOTTOM MAT INFO

60. SEPARATE CONSOLE BOX ASSEMBLY INFO

61. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO

62. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

63. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

64. REMOVE CONSOLE BOX ASSEMBLY INFO

65. REMOVE NO. 1 SWITCH HOLE BASE INFO

66. REMOVE LOWER NO. 3 STEERING WHEEL COVER INFO

67. REMOVE LOWER NO. 2 STEERING WHEEL COVER INFO

68. REMOVE STEERING PAD INFO

69. REMOVE STEERING WHEEL ASSEMBLY INFO

70. REMOVE LOWER STEERING COLUMN COVER INFO

71. REMOVE UPPER STEERING COLUMN COVER INFO

72. REMOVE TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY INFO

73. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

74. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY INFO

75. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

76. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO

77. REMOVE FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedure for the RH side and LH side.

78. REMOVE COWL SIDE TRIM BOARD RH

HINT:

Use the same procedure for the RH side and LH side.

79. REMOVE NO. 1 HEATER TO REGISTER DUCT INFO

80. REMOVE COMBINATION METER ASSEMBLY INFO

81. REMOVE POWER STEERING ECU ASSEMBLY (for Brush Type Motor) INFO

82. REMOVE POWER STEERING ECU ASSEMBLY (for Brushless Type Motor) INFO

83. REMOVE INSTRUMENT PANEL SAFETY PAD PLATE SUB-ASSEMBLY (for LHD) INFO

84. REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY INFO

85. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY INFO

86. REMOVE DRIVER SIDE JUNCTION BLOCK ASSEMBLY INFO

87. REMOVE STOP LIGHT SWITCH ASSEMBLY INFO

88. REMOVE STOP LIGHT SWITCH MOUNTING ADJUSTER

89. REMOVE BRAKE PEDAL RETURN SPRING INFO

90. REMOVE PUSH ROD PIN INFO

91. REMOVE BRAKE PEDAL SUPPORT ASSEMBLY INFO

92. REMOVE NO. 2 AIR DUCT SUB-ASSEMBLY INFO

93. REMOVE COLUMN HOLE COVER SILENCER SHEET INFO

94. SEPARATE NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

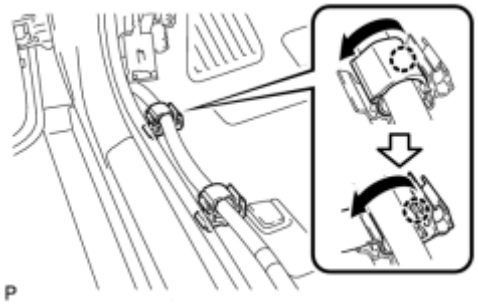
95. REMOVE STEERING POST ASSEMBLY

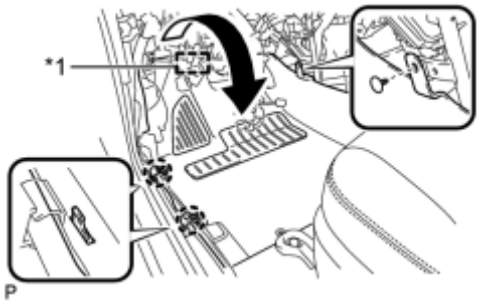
for Brush Type Motor: INFO

for Brushless Type Motor: INFO

96. REMOVE REAR NO. 2 AIR DUCT (w/ Rear Air Duct)

(a) Disengage each claw to open the 2 door scuff plate clamps as shown in the illustration.



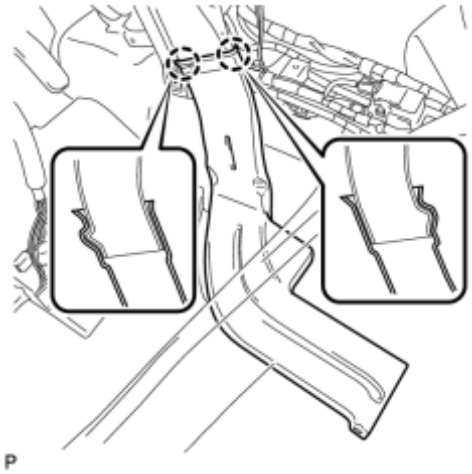



(b) Disengage the clip and fastener.

(c) Disengage the 2 claws and turn back the floor carpet as shown in the illustration.

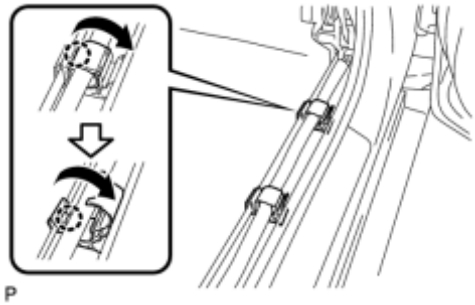
**Text in Illustration**

| | |
|---|---|
| *1 | Fastener |

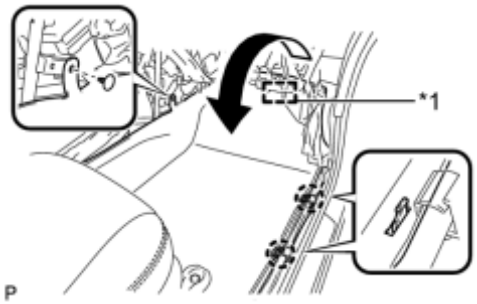


(d) Disengage the 2 claws and remove the rear No. 2 air duct.

97. REMOVE REAR NO. 3 AIR DUCT (w/ Rear Air Duct)



(a) Disengage each claw to open the 2 door scuff plate clamps as shown in the illustration.

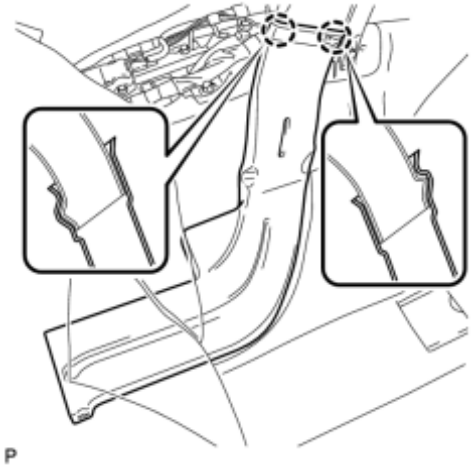



(b) Disengage the clip and fastener.

(c) Disengage the 2 claws and turn back the floor carpet as shown in the illustration.

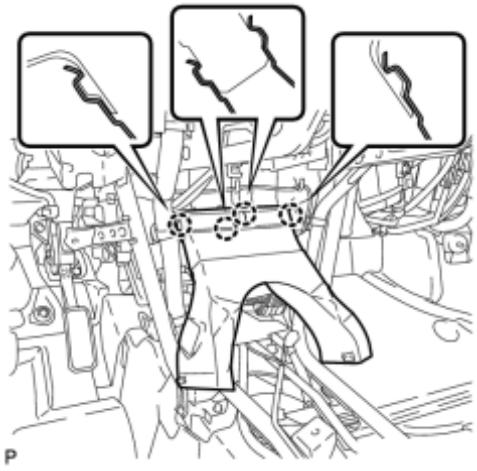
**Text in Illustration**

| | |
|---|---|
| *1 | Fastener |



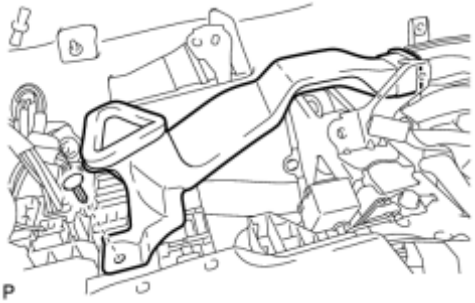

(d) Disengage the 2 claws and remove the rear No. 3 air duct.

98. REMOVE REAR NO. 1 AIR DUCT (w/ Rear Air Duct)




(a) Disengage the 4 claws and remove the rear No. 1 air duct.

99. REMOVE NO. 3 SIDE DEFROSTER NOZZLE DUCT



(a) Remove the clip and No. 3 side defroster nozzle duct.

100. REMOVE NO. 1 INSTRUMENT PANEL BRACE SUB-ASSEMBLY

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Disconnect the center airbag sensor connectors from the center airbag sensor assembly as shown in the illustration.

NOTICE:

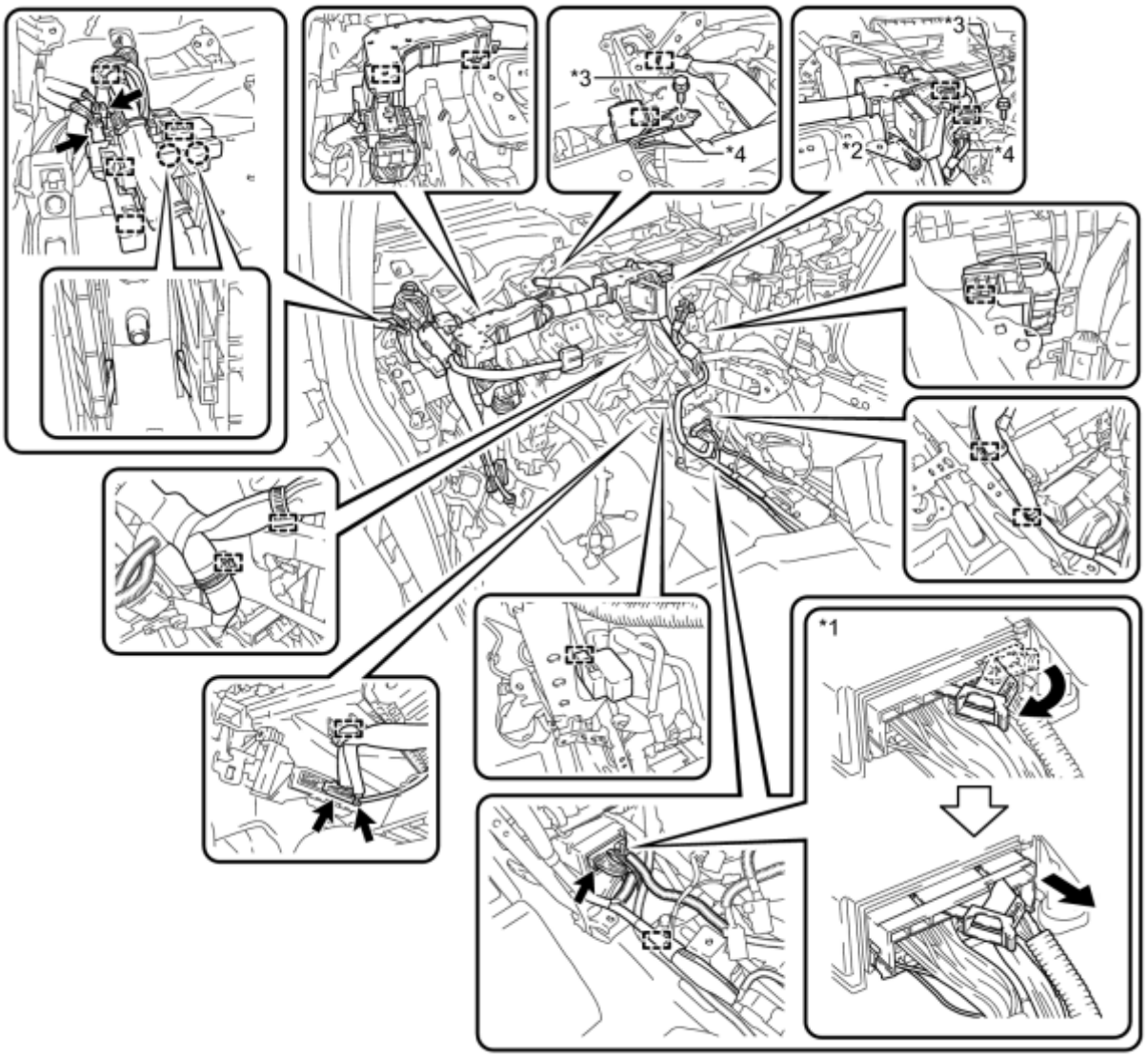
When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(d) Remove the screw.

(e) Remove the 2 bolts and disconnect the 2 earth wires.

(f) Disconnect each connector.

(g) Disengage each clamp and claw.

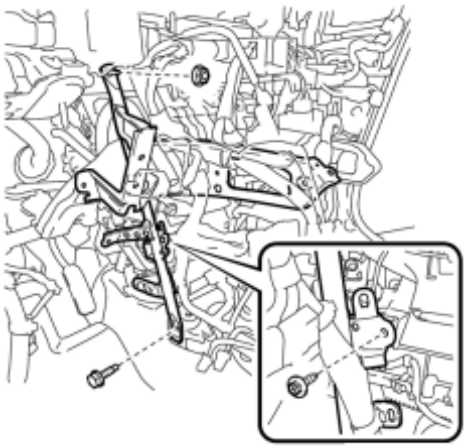



P

**Text in Illustration**

| | | | |
|---|---|---|---|
| *1 | Center Airbag Sensor Connector | *2 | Screw |
| *3 | Bolt | *4 | Earth Wire |

(h) Remove the screw.



P

(i) Remove the bolt, nut and No. 1 instrument panel brace sub-assembly.

101. REMOVE NO. 2 INSTRUMENT PANEL BRACE SUB-ASSEMBLY

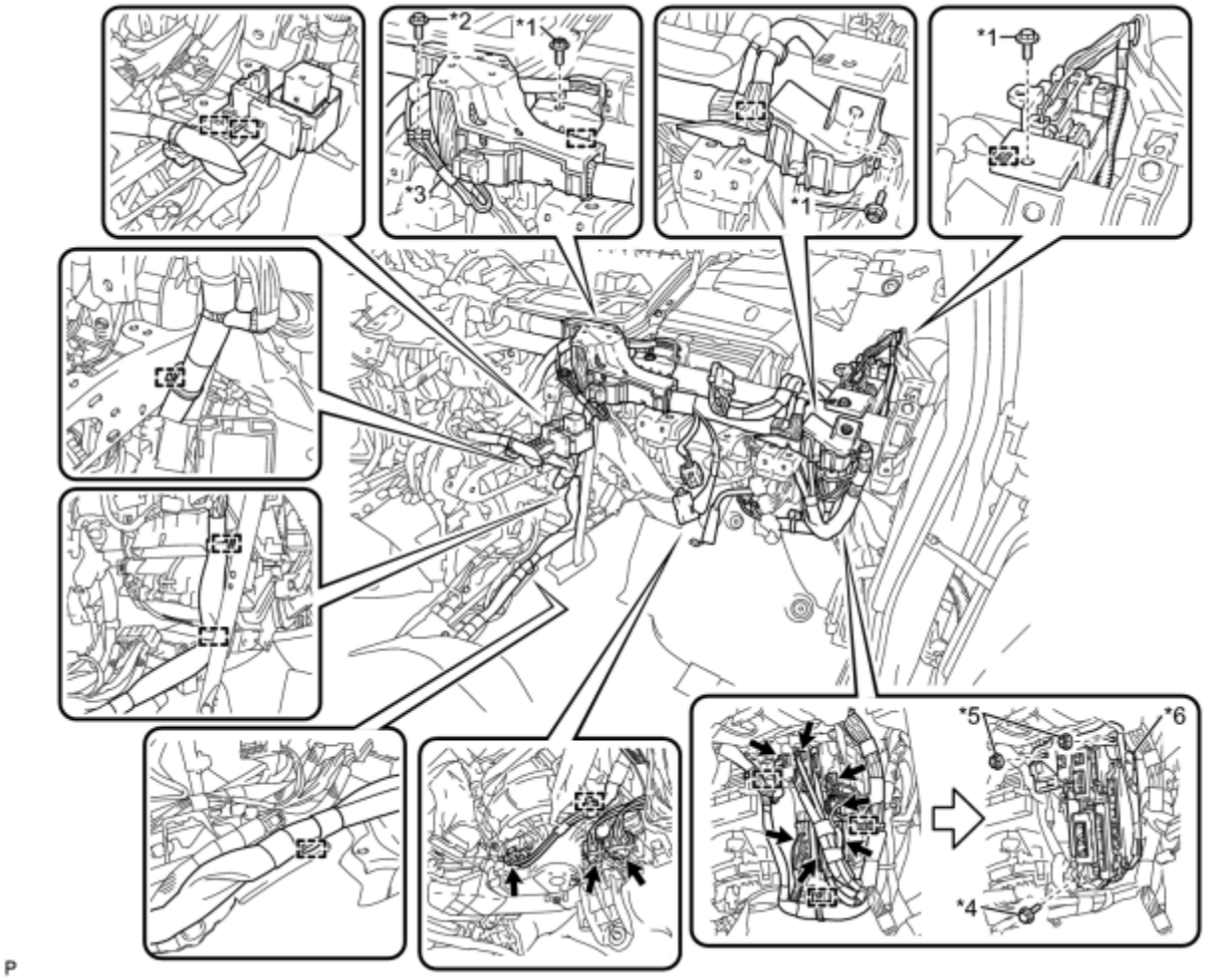
(a) Remove the 3 screws <A>.

(b) Remove the bolt and disconnect the earth wire.

(c) Disconnect each connector.

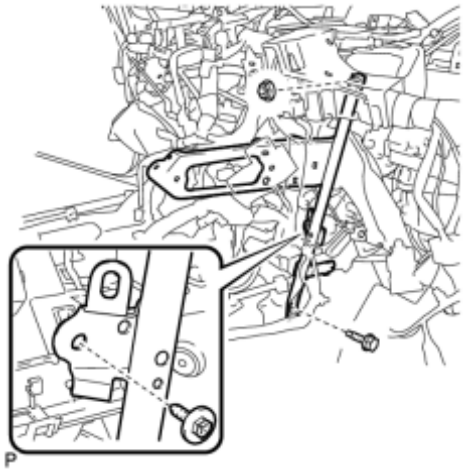
(d) Disengage each clamp.

(e) Remove the screw <B> and 2 nuts from the computer integration box RH.




**Text in Illustration**

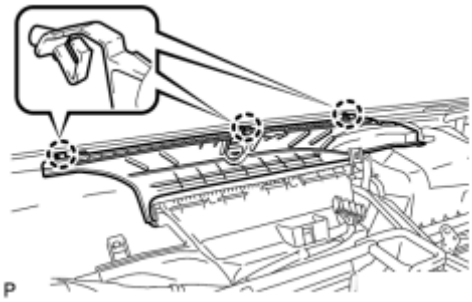
| | | | |
|---|---|---|---|
| *1 | Screw <A> | *2 | Bolt |
| *3 | Earth Wire | *4 | Screw <B> |
| *5 | Nut | *6 | Computer Integration Box RH |



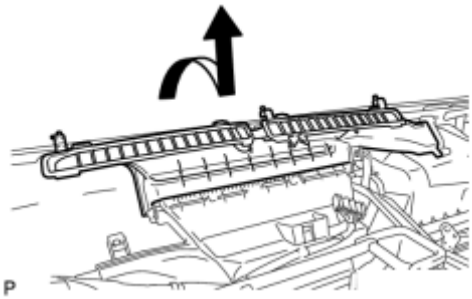

(f) Remove the screw.

(g) Remove the bolt, nut and No. 2 instrument panel brace sub-assembly.

102. REMOVE DEFROSTER NOZZLE ASSEMBLY

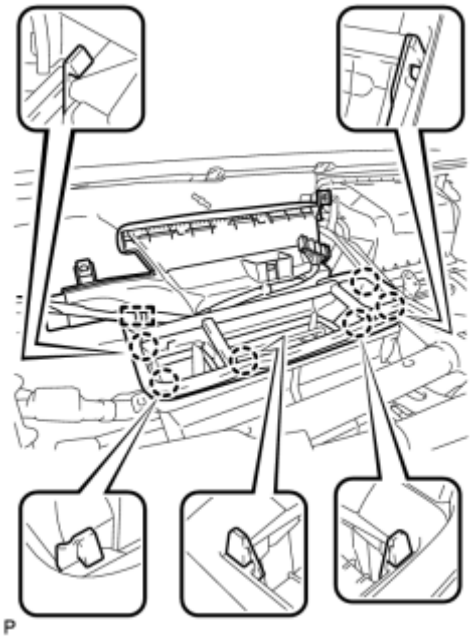


(a) Disengage the 3 claws.



(b) Remove the defroster nozzle assembly as shown in the illustration.

103. REMOVE LOWER DEFROSTER NOZZLE ASSEMBLY

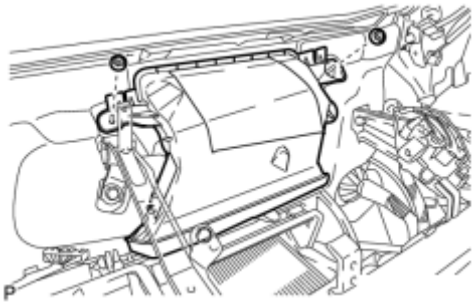


(a) Disengage the clamp.

(b) Disengage the 6 claws and remove the lower defroster nozzle assembly.

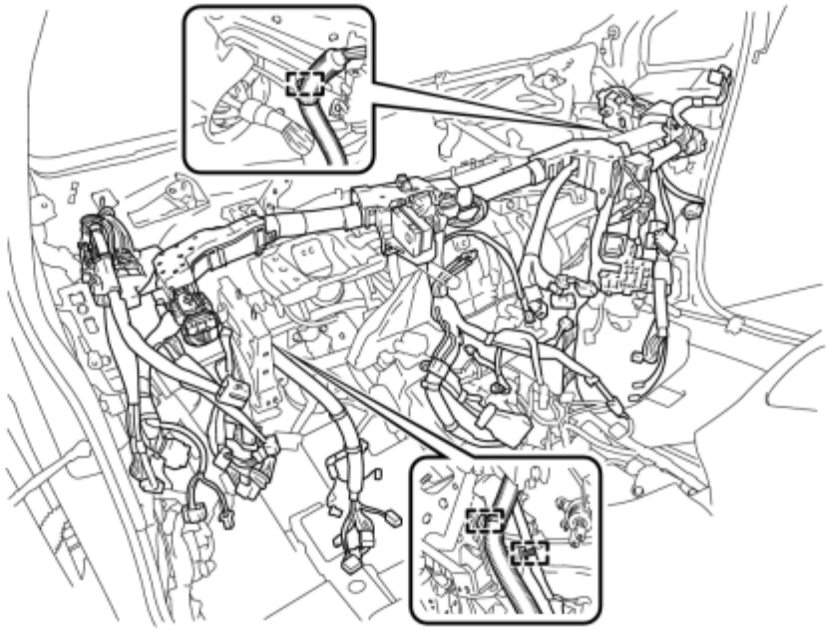
104. REMOVE NO. 3 AIR DUCT SUB-ASSEMBLY

(a) Remove the 2 nuts and No. 3 air duct sub-assembly.

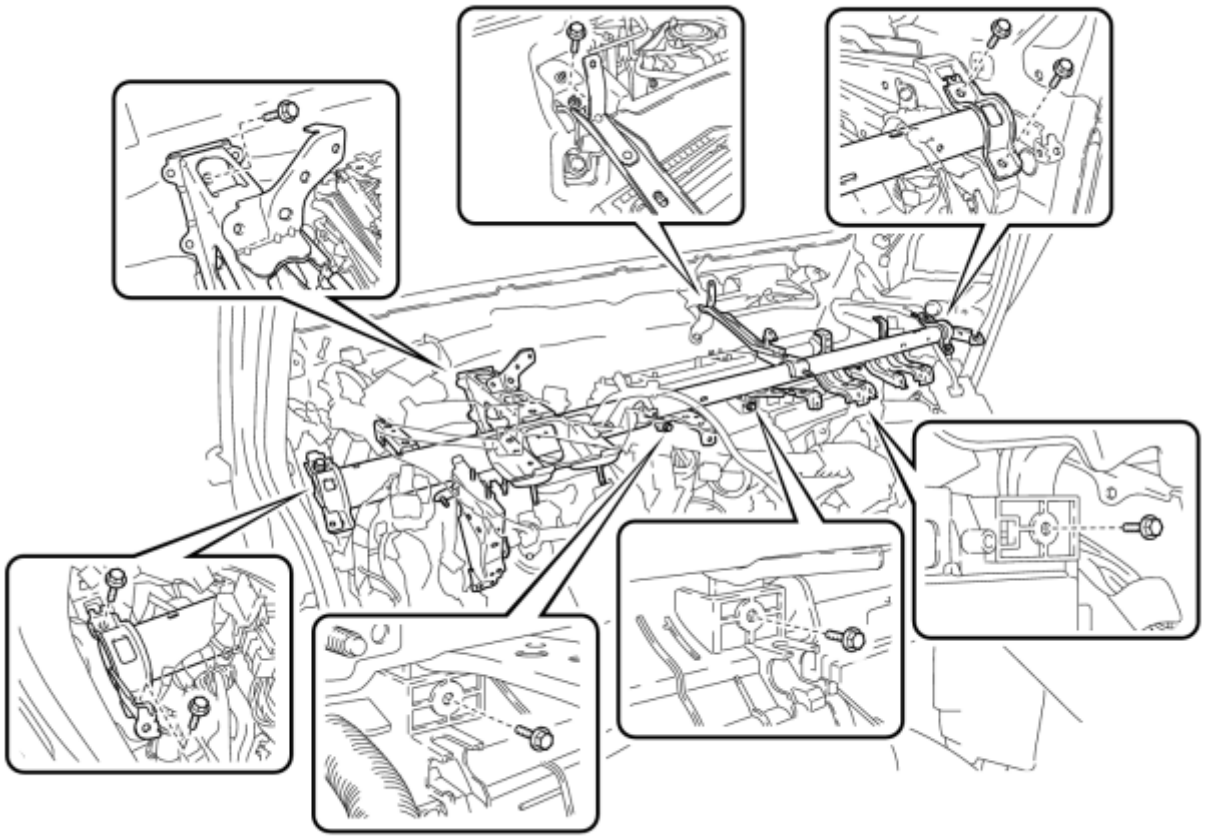


105. REMOVE INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

(a) Disengage each clamp.



(b) Remove the 9 bolts and instrument panel reinforcement assembly.



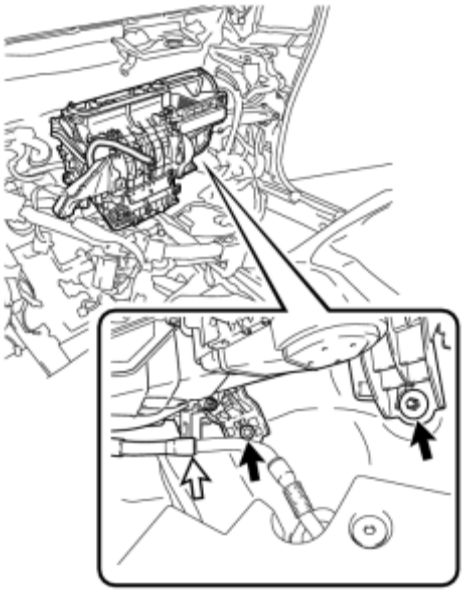
P

106. REMOVE AIR CONDITIONING UNIT ASSEMBLY

NOTICE:

- Be sure to support the air conditioning unit assembly when removing it because failure to do so may cause the bracket of the air conditioning unit assembly to break.
- When disassembling the air conditioning unit, eliminate static electricity by touching the vehicle body to prevent the components from being damaged.

(a) Disengage the cooler drain hose.



P

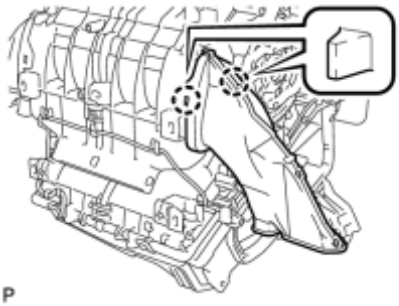
(b) Remove the bolt, nut and air conditioning unit assembly.

# DISASSEMBLY

1. REMOVE ID CODE BOX (IMMOBILISER CODE ECU) (w/ Engine Immobiliser System) INFO

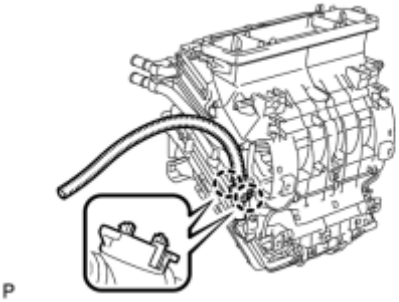
2. REMOVE BLOWER ASSEMBLY INFO

3. REMOVE NO. 1 AIR DUCT SUB-ASSEMBLY




(a) Disengage the 2 claws and remove the No. 1 air duct sub-assembly.

4. REMOVE AIR CONDITIONING DUCT SUB-ASSEMBLY

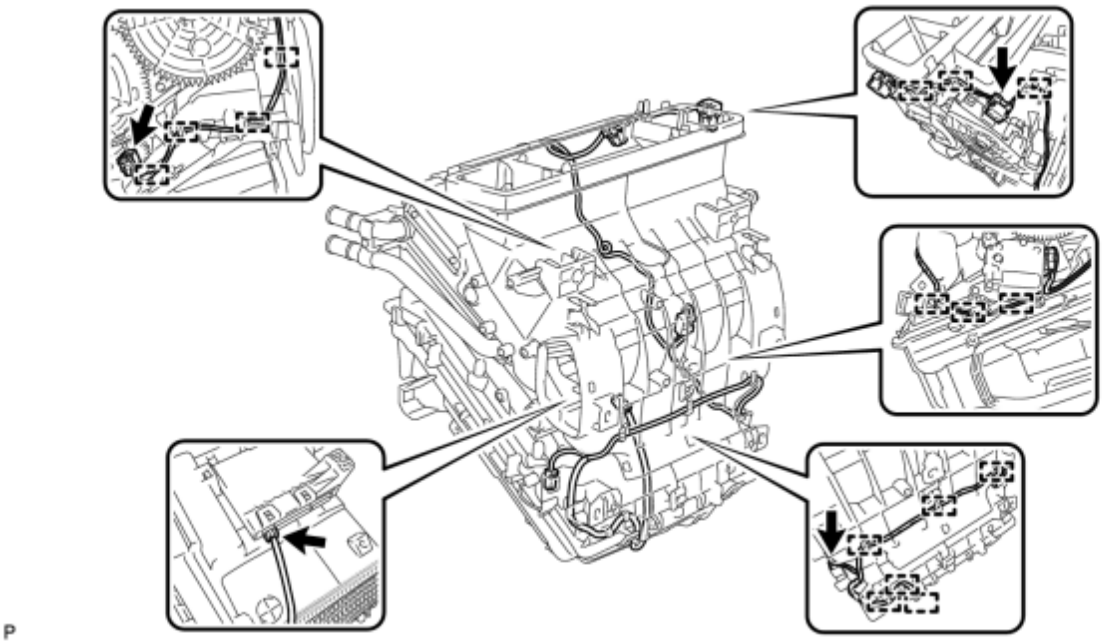



(a) Disengage the 2 claws and remove the air conditioning duct sub-assembly.

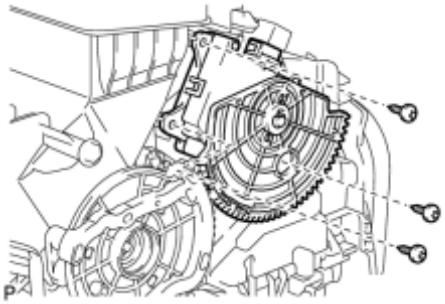
5. REMOVE AIR CONDITIONING HARNESS ASSEMBLY

(a) Disconnect each connector.

(b) Disengage each clamp and remove the air conditioning harness assembly.

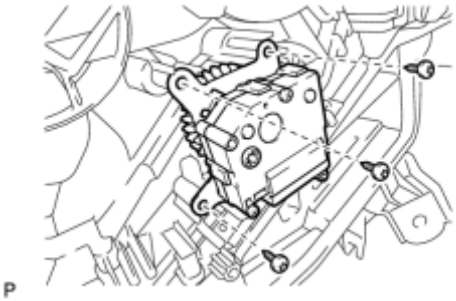


6. REMOVE AIR OUTLET CONTROL SERVO MOTOR SUB-ASSEMBLY



(a) Remove the 3 screws and air outlet control servo motor sub-assembly.

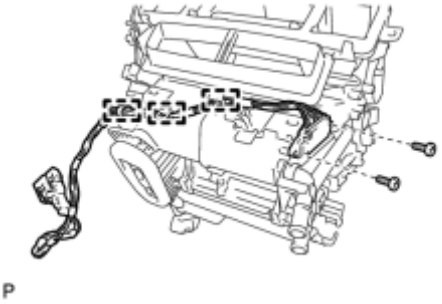
7. REMOVE AIR MIX CONTROL SERVO MOTOR SUB-ASSEMBLY



(a) Remove the 3 screws and air mix control servo motor sub-assembly.

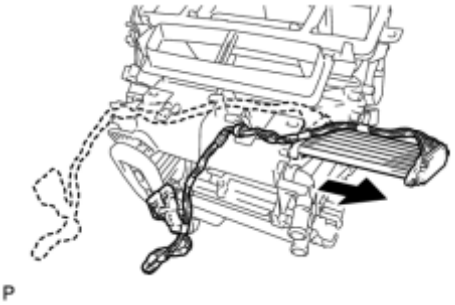
8. REMOVE QUICK HEATER ASSEMBLY

(a) Disengage each clamp.



P

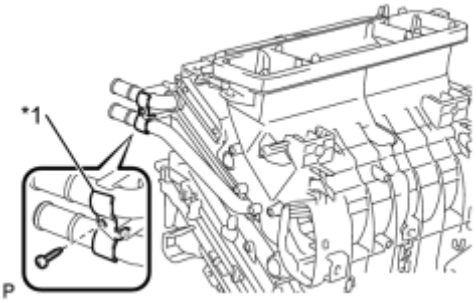
(b) Remove the 2 screws.



P

(c) Remove the quick heater assembly as shown in the illustration.

9. REMOVE HEATER RADIATOR UNIT SUB-ASSEMBLY

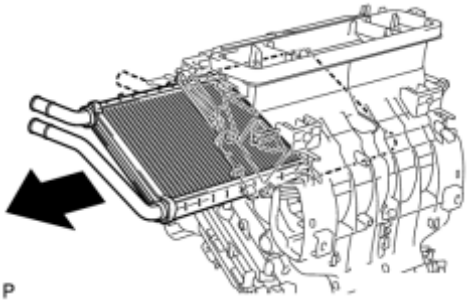



P

(a) Remove the screw and clamp.

## Text in Illustration

| | |
|---|---|
| *1 | Clamp |



P

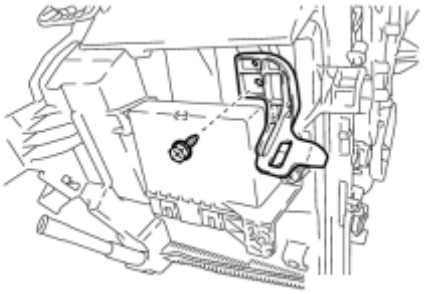
(b) Remove the heater radiator unit sub-assembly as shown in the illustration.

NOTICE:

Prepare a drain pan or cloth in case the cooling water leaks.

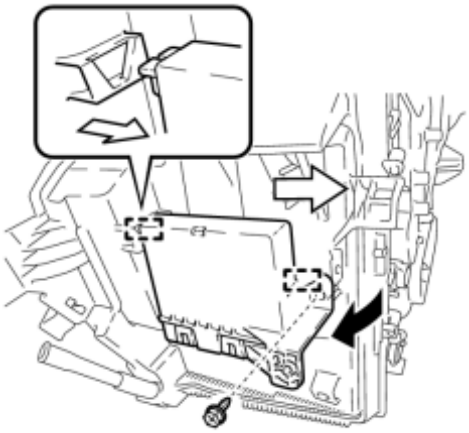
10. REMOVE CONSOLE MOUNTING BRACKET LH

(a) Remove the screw and console mounting bracket LH.



P

11. REMOVE AIR CONDITIONING AMPLIFIER ASSEMBLY



P

(a) Remove the screw.

(b) Disengage the 2 guides and remove the air conditioning amplifier assembly as shown in the illustration.

12. REMOVE CONSOLE MOUNTING BRACKET RH

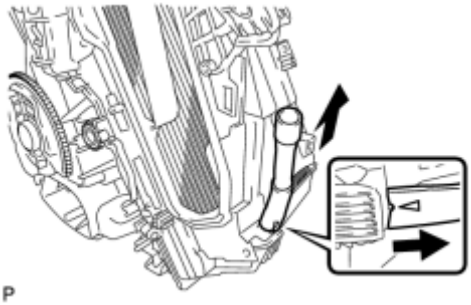


P

(a) Disengage the 2 claws and remove the console mounting bracket RH.

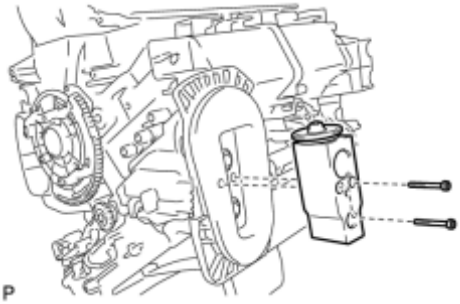
13. REMOVE DRAIN COOLER HOSE

(a) Remove the drain cooler hose as shown in the illustration.



P

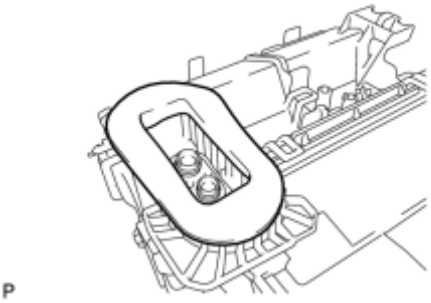
14. REMOVE COOLER EXPANSION VALVE



P

(a) Using a 4 mm hexagon wrench, remove the 2 hexagon bolts and cooler expansion valve.

15. REMOVE COOLER EVAPORATOR SUB-ASSEMBLY



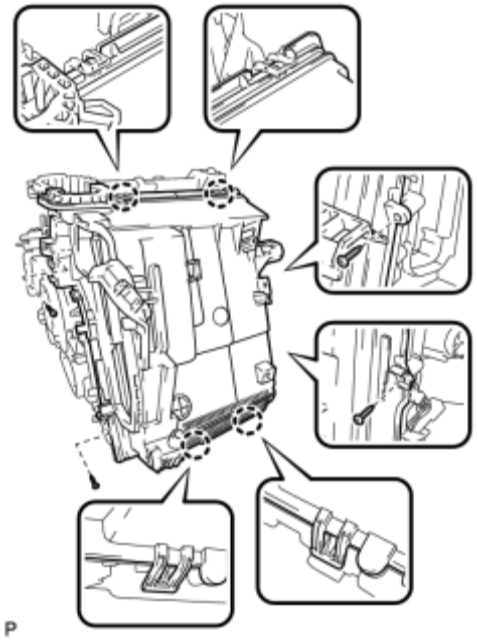
P

(a) Remove the packing.

NOTICE:

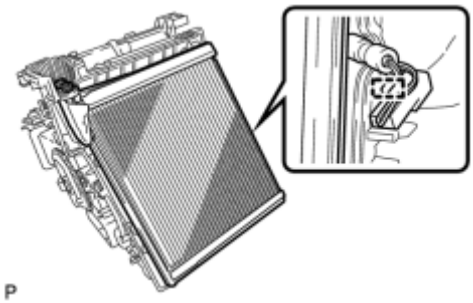
Remove the packing carefully because it will be reused.

(b) Remove the 4 screws.



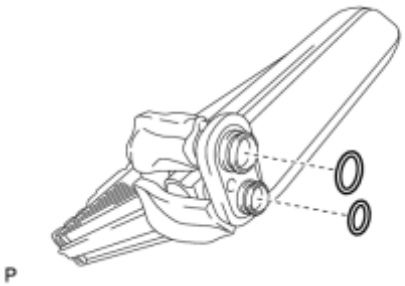
P

(c) Disengage the 4 claws and remove the lower heater case.



P

(d) Disengage the clamp and remove the cooler evaporator sub-assembly with the No. 1 cooler thermistor.



P

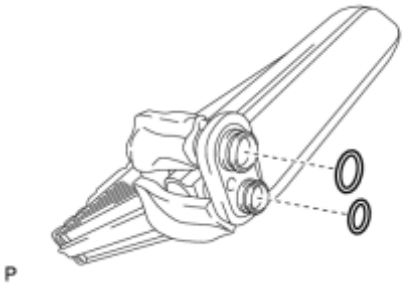
(e) Remove the 2 O-rings from the cooler evaporator sub-assembly.

16. REMOVE NO. 1 COOLER THERMISTOR INFO

# REASSEMBLY

1. INSTALL NO. 1 COOLER THERMISTOR INFO

2. INSTALL COOLER EVAPORATOR SUB-ASSEMBLY



P

(a) Sufficiently apply compressor oil to 2 new O-rings and the fitting surfaces.

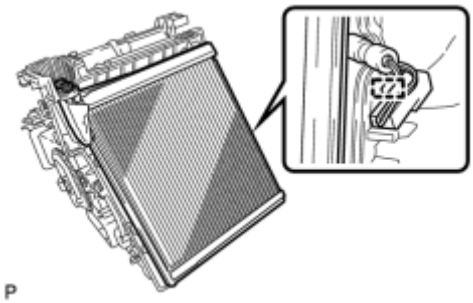
Compressor oil:

ND-OIL 11 or equivalent

(b) Install the 2 O-rings to the cooler evaporator sub-assembly.

NOTICE:

- Keep the O-rings and O-ring fitting surfaces free from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.



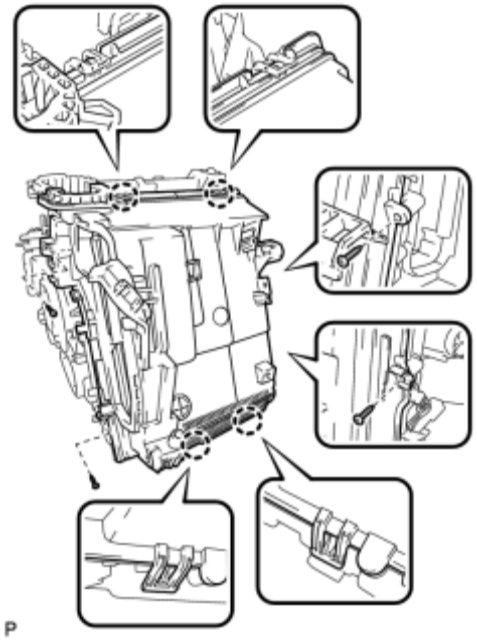
P

(c) Engage the clamp and install the cooler evaporator sub-assembly with the No. 1 cooler thermistor.

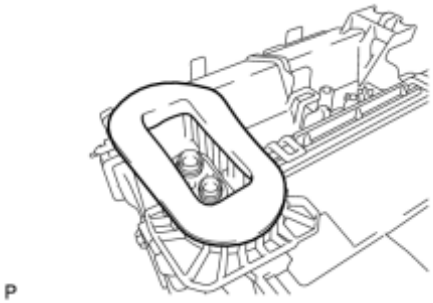
HINT:

Completely cover the tube with the grommet.

(d) Engage the 4 claws.

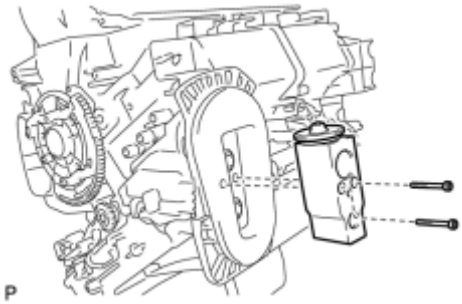


(e) Install the lower heater case with the 4 screws.



(f) Install the packing.

3. INSTALL COOLER EXPANSION VALVE

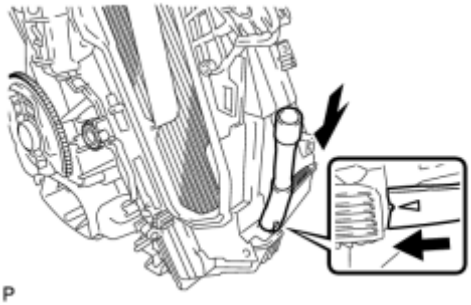


(a) Using a 4 mm hexagon wrench, install the cooler expansion valve with the 2 hexagon bolts.

Torque: **3.5 N·m (36 kgf·cm, 31in·lbf)**

4. INSTALL DRAIN COOLER HOSE

(a) Install the drain cooler hose as shown in the illustration.



P

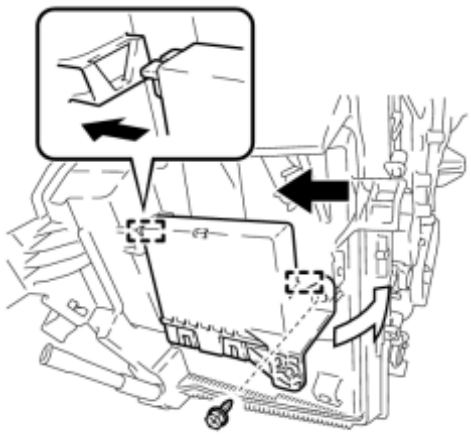
5. INSTALL CONSOLE MOUNTING BRACKET RH



P

(a) Engage the 2 claws and install the console mounting bracket RH.

6. INSTALL AIR CONDITIONING AMPLIFIER ASSEMBLY



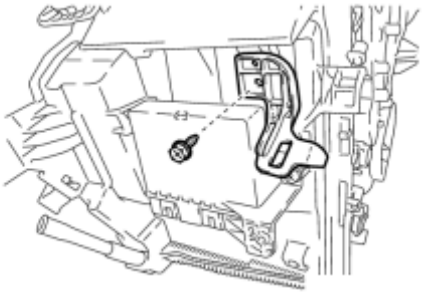
P

(a) Engage the 2 guides to install the air conditioning amplifier assembly as shown in the illustration.

(b) Install the screw.

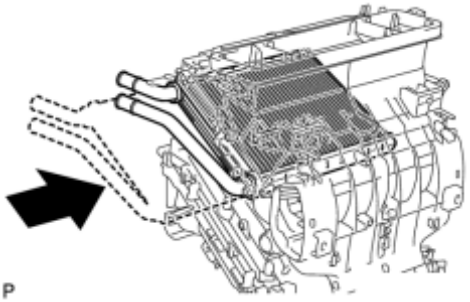
7. INSTALL CONSOLE MOUNTING BRACKET LH

(a) Install the console mounting bracket LH with the screw.



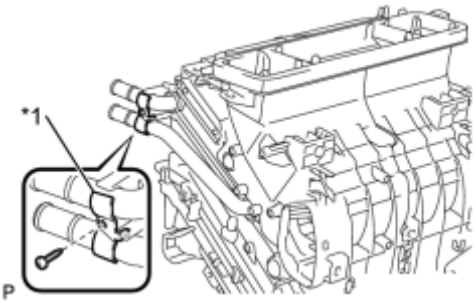
P

8. INSTALL HEATER RADIATOR UNIT SUB-ASSEMBLY



P

(a) Install the heater radiator unit sub-assembly as shown in the illustration.



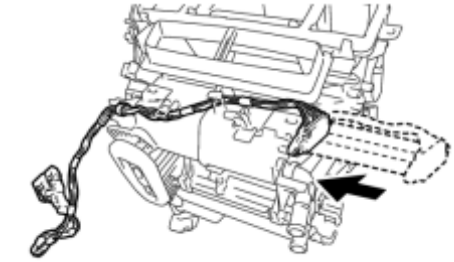

P

(b) Install the clamp with the screw.

## Text in Illustration

| | |
|---|---|
| *1 | Clamp |

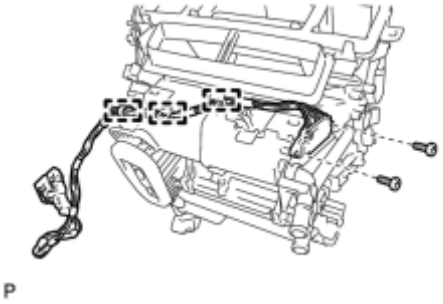
9. INSTALL QUICK HEATER ASSEMBLY



P

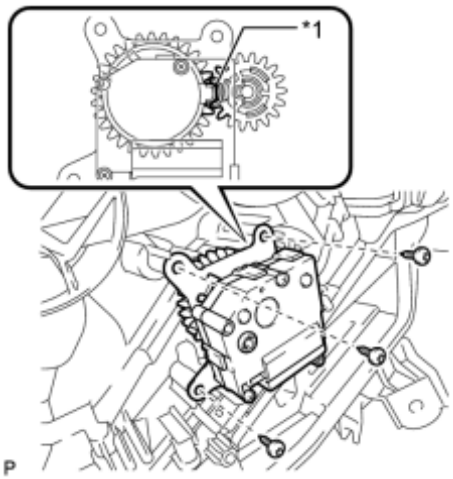
(a) Install the quick heater assembly as shown in the illustration.

(b) Install the 2 screws.



(c) Engage each clamp.

10. INSTALL AIR MIX CONTROL SERVO MOTOR SUB-ASSEMBLY

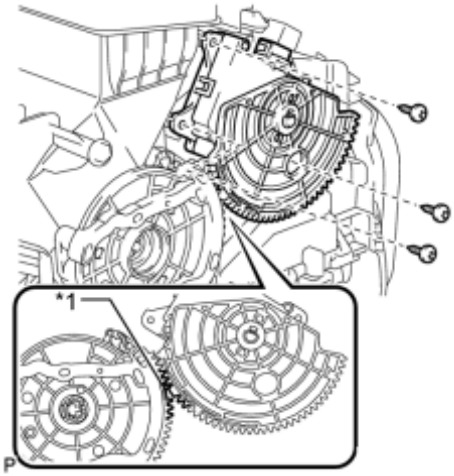



(a) Using the reference point, install the air mix control servo motor sub-assembly with the 3 screws.

## Text in Illustration

| | |
|---|---|
| *1 | Reference Point |

11. INSTALL AIR OUTLET CONTROL SERVO MOTOR SUB-ASSEMBLY




(a) Using the reference point, install the air outlet control servo motor sub-assembly with the 3 screws.

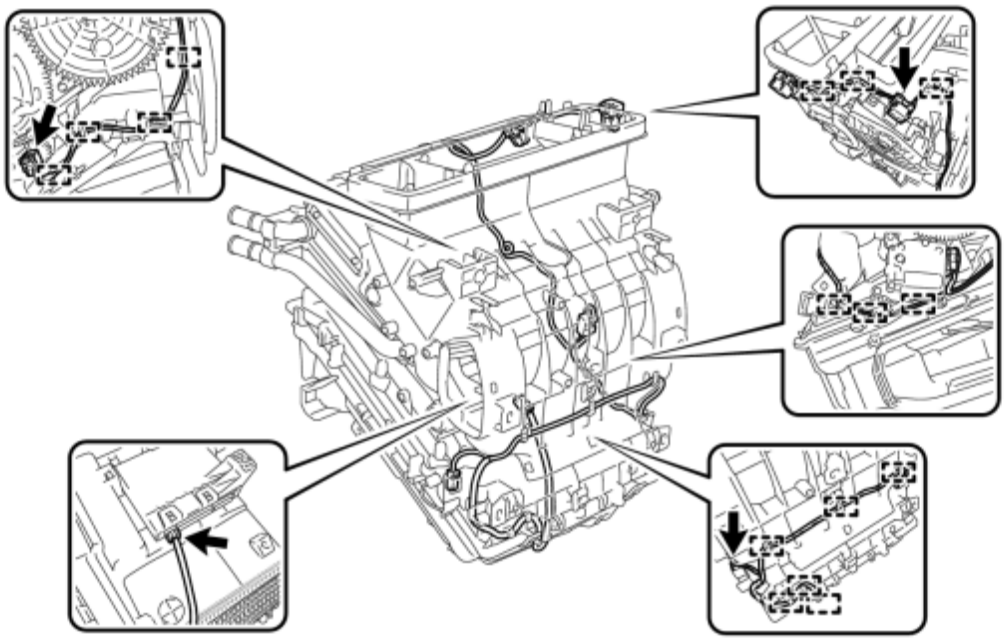
## Text in Illustration

| | |
|---|---|
| *1 | Reference Point |

12. INSTALL AIR CONDITIONING HARNESS ASSEMBLY

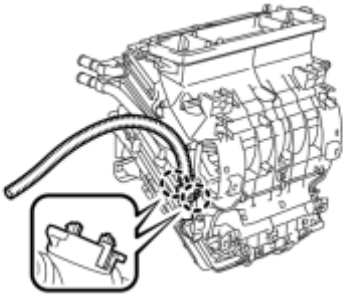
(a) Connect each connector.

(b) Engage each clamp to install the air conditioning harness assembly.



P

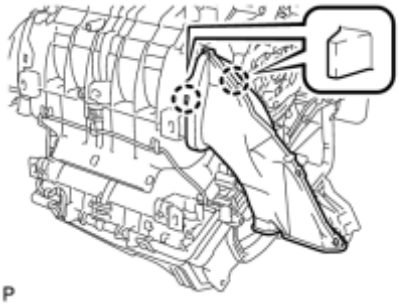
13. INSTALL AIR CONDITIONING DUCT SUB-ASSEMBLY



P

(a) Engage the 2 claws and install the air conditioning duct sub-assembly.

14. INSTALL NO. 1 AIR DUCT SUB-ASSEMBLY



P

(a) Engage the 2 claws to install the No. 1 air duct sub-assembly.

15. INSTALL BLOWER ASSEMBLY INFO

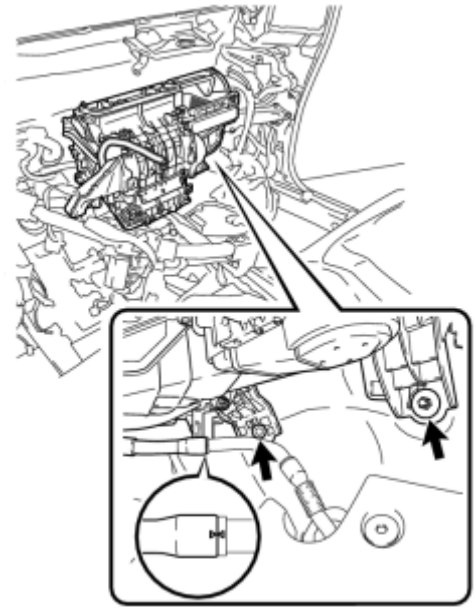
16. INSTALL ID CODE BOX (IMMOBILISER CODE ECU) (w/ Engine Immobiliser System) INFO

# INSTALLATION

1. TEMPORARILY TIGHTEN AIR CONDITIONING UNIT ASSEMBLY

NOTICE:

- Be sure to support the air conditioning unit assembly when removing it because failure to do so may cause the bracket of the air conditioning unit assembly to break.
- When installing the air conditioning unit, eliminate static electricity by touching the vehicle body to prevent the components from being damaged.



P

(a) Temporarily tighten the air conditioning unit assembly with the bolt and nut.

(b) Engage the cooler drain hose as shown in the illustration.

NOTICE:

Connect the cooler drain hose firmly to prevent water leaks.

2. INSTALL INSTRUMENT PANEL REINFORCEMENT ASSEMBLY

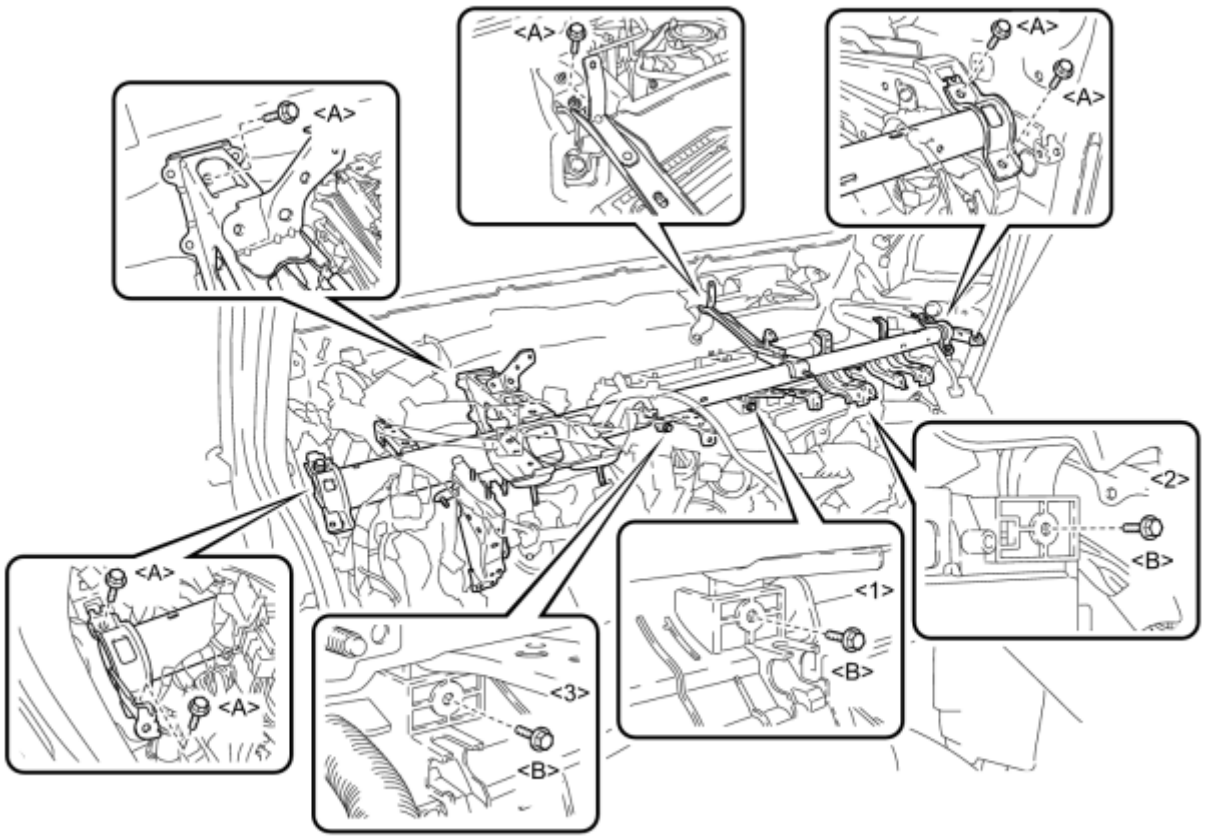
(a) Install the instrument panel reinforcement assembly with the 6 bolts <A>.

(b) Install the air conditioning unit assembly with the 3 bolts <B>

Bolt <B> - Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**

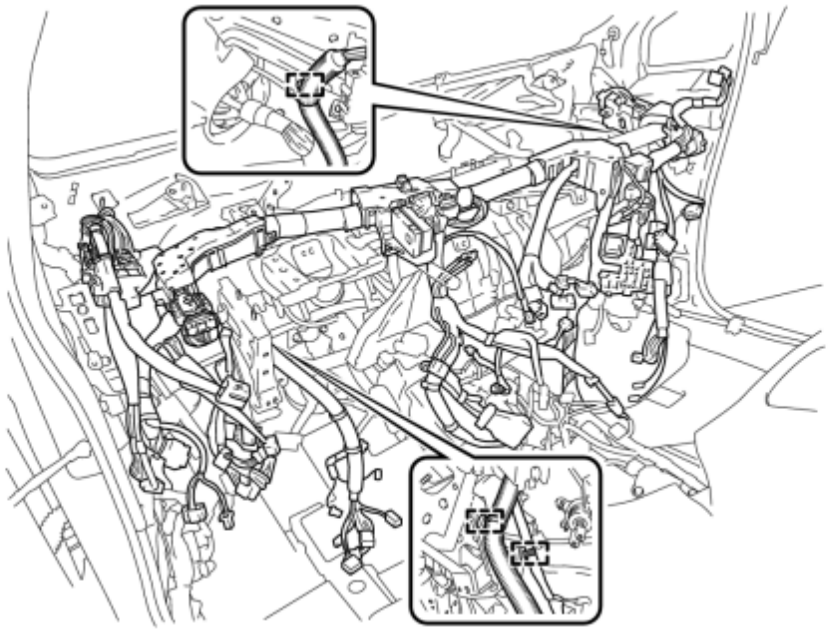
HINT:

Tighten the bolts in the order shown in the illustration.



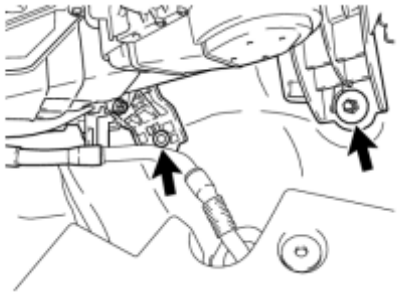

P

(c) Engage each clamp.



P

3. INSTALL AIR CONDITIONING UNIT ASSEMBLY



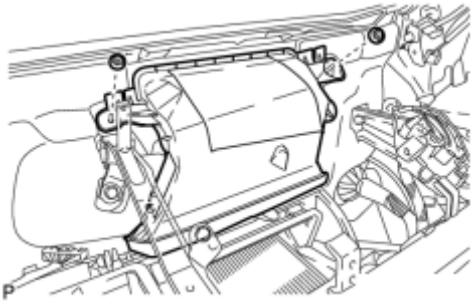
P

(a) Install the air conditioning unit assembly with the bolt and nut.

Bolt - Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**

Nut - Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**

4. INSTALL NO. 3 AIR DUCT SUB-ASSEMBLY



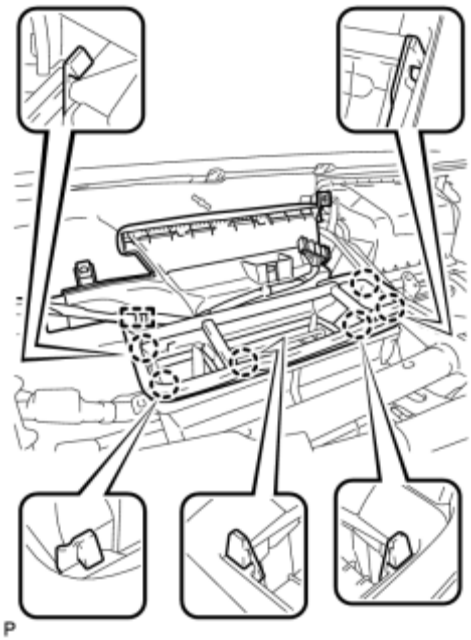
P

(a) Install the No. 3 air duct sub-assembly with the 2 nuts.

Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**

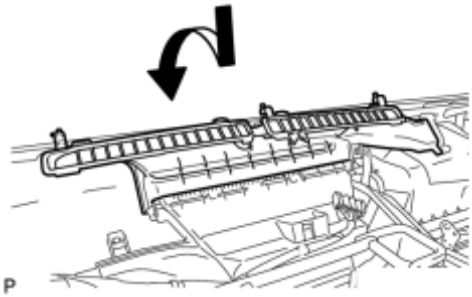
5. INSTALL LOWER DEFROSTER NOZZLE ASSEMBLY

(a) Engage the 6 claws and remove the lower defroster nozzle assembly.

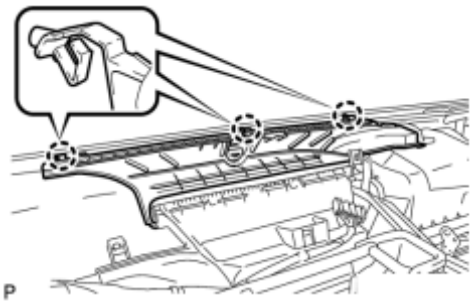


(b) Engage the clamp.

6. INSTALL DEFROSTER NOZZLE ASSEMBLY



(a) Install the defroster nozzle assembly as shown in the illustration.

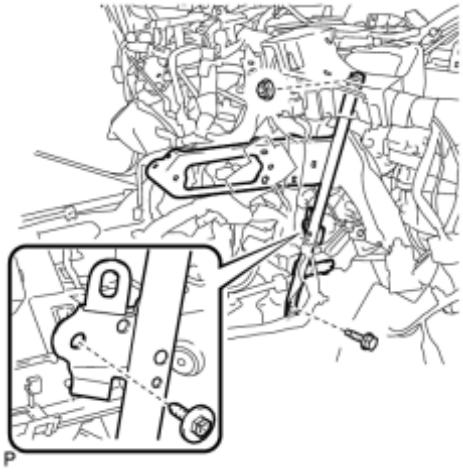


(b) Engage the 3 claws.

7. INSTALL NO. 2 INSTRUMENT PANEL BRACE SUB-ASSEMBLY

(a) Install the No. 2 instrument panel brace sub-assembly with the screw.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**



(b) Install the bolt and nut.

(c) Install the screw <B> and 2 nuts to the computer integration box RH.

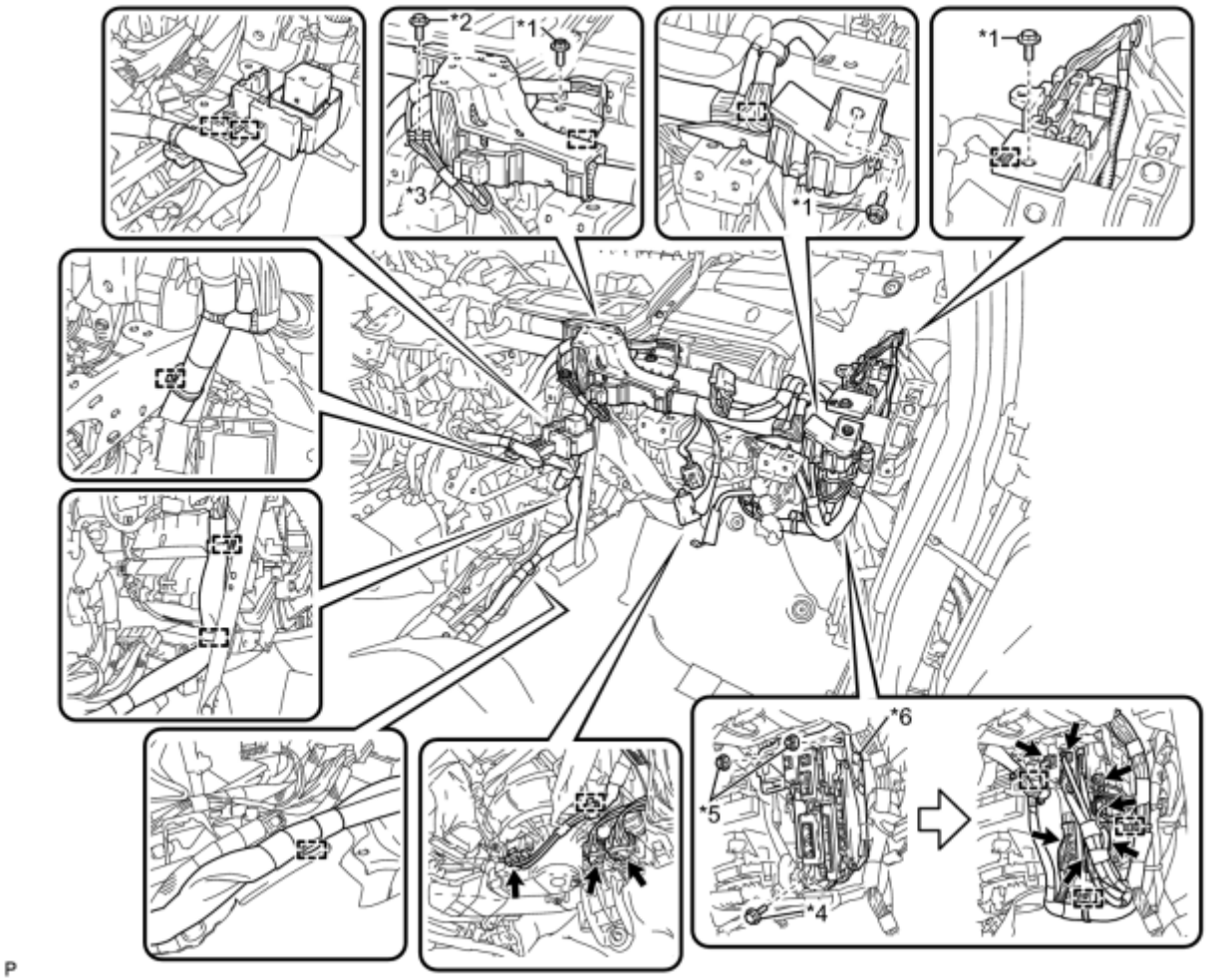
(d) Engage each clamp.

(e) Connect each connector.

(f) Install the 3 screws <A>.

(g) Install the bolt and connect the earth wire.

Torque: **8.4 N·m (86 kgf·cm, 74in·lbf)**



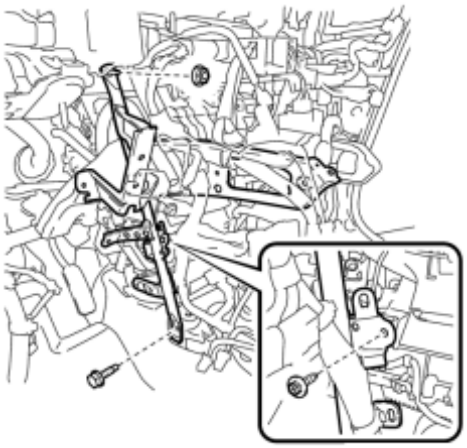

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Screw <A> | *2 | Bolt |
| *3 | Earth Wire | *4 | Screw <B> |
| *5 | Nut | *6 | Computer Integration Box RH |

8. INSTALL NO. 1 INSTRUMENT PANEL BRACE SUB-ASSEMBLY

(a) Install the No. 1 instrument panel brace sub-assembly with the screw.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**



P

(b) Install the bolt and nut.

(c) Check that the power switch is off.

(d) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(e) Connect the center airbag sensor connectors to the center airbag sensor assembly as shown in the illustration.

NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

(f) Check that the waterproof sheet on the top of the center airbag sensor is not folded or deformed.

(g) Check that there is no looseness in the installation parts of the center airbag sensor assembly.

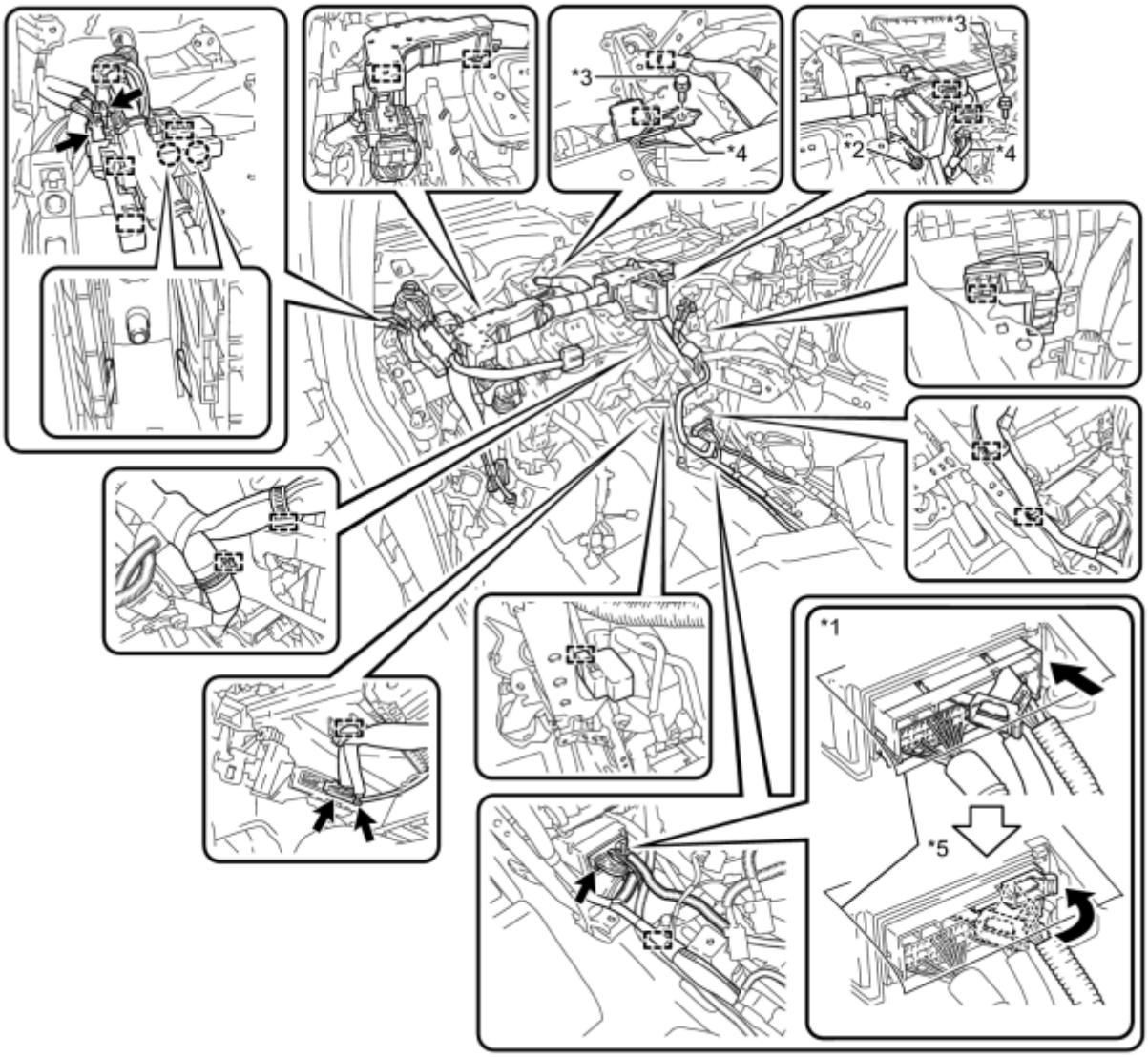
(h) Connect each connector.

(i) Engage each clamp and claw.

(j) Install the screw.

(k) Install the 2 bolts and connect the 2 earth wires.

Torque: **8.4 N·m (86 kgf·cm, 74in·lbf)**



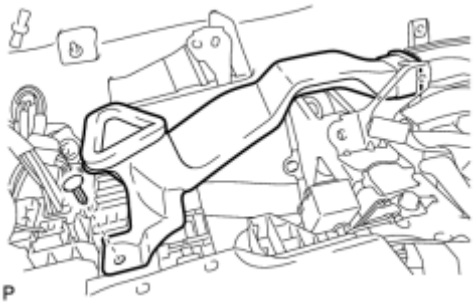

P

### *Text in Illustration*

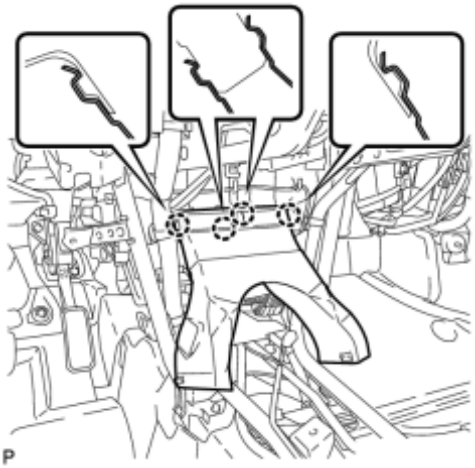
| | | | |
|---|---|---|---|
| *1 | Center Airbag Sensor Connector | *2 | Screw |
| *3 | Bolt | *4 | Earth Wire |
| *5 | Waterproof Sheet | - | - |

9. INSTALL NO. 3 SIDE DEFROSTER NOZZLE DUCT

(a) Install the No. 3 side defroster nozzle duct with the clip.

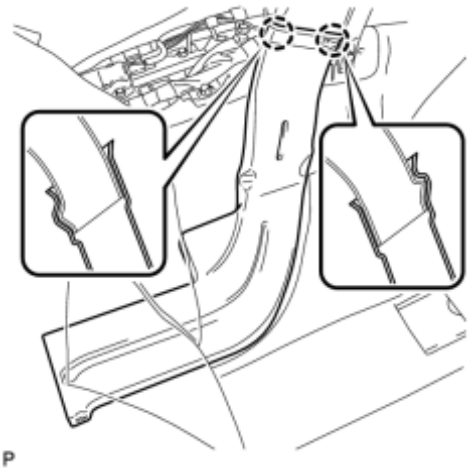


10. INSTALL REAR NO. 1 AIR DUCT (w/ Rear Air Duct)



(a) Engage the 4 claws to install the rear No. 1 air duct.

11. INSTALL REAR NO. 3 AIR DUCT (w/ Rear Air Duct)



(a) Engage the 2 claws to install the rear No. 3 air duct.

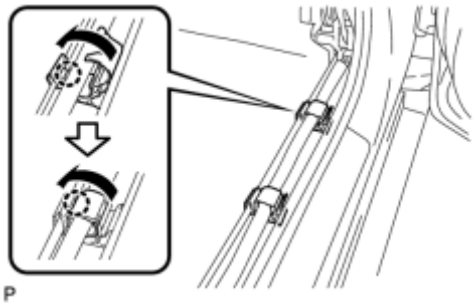
(b) Engage the 2 claws and install the clip.




(c) Engage the fastener to install the floor carpet to the original position.

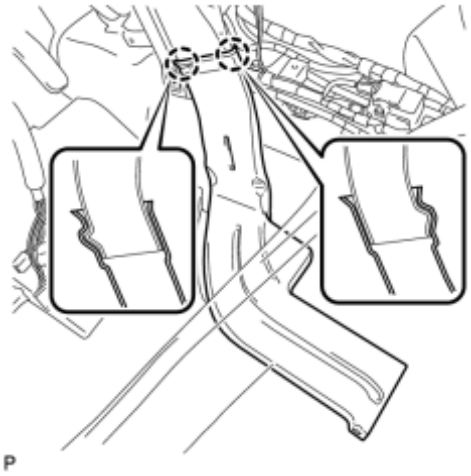
***Text in Illustration***

| | |
|---|---|
| *1 | Fastener |



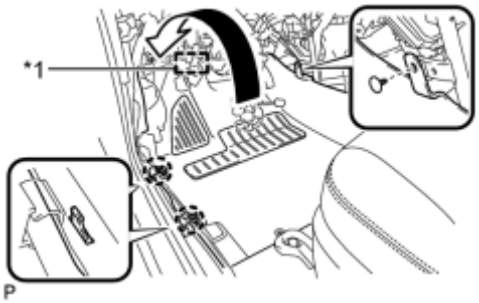

(d) Engage each claw to close the door scuff plate clamps as shown in the illustration.

12. INSTALL REAR NO. 2 AIR DUCT (w/ Rear Air Duct)




(a) Engage the 2 claws to install the rear No. 2 air duct.

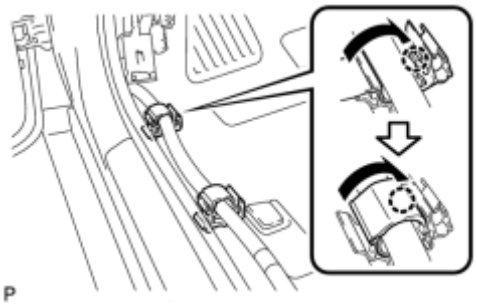
(b) Engage the 2 claws and install the clip.




(c) Engage the fastener to install the floor carpet to the original position as shown in the illustration.

*Text in Illustration*

| | |
|---|---|
| *1 | Fastener |




(d) Engage each claw to close the door scuff plate clamps as shown in the illustration.

13. INSTALL STEERING POST ASSEMBLY

for Brush Type Motor: INFO

for Brushless Type Motor: INFO

14. CONNECT NO. 2 STEERING INTERMEDIATE SHAFT ASSEMBLY INFO

15. INSTALL COLUMN HOLE COVER SILENCER SHEET INFO

16. INSTALL NO. 2 AIR DUCT SUB-ASSEMBLY INFO

17. INSTALL BRAKE PEDAL SUPPORT ASSEMBLY INFO

18. INSTALL PUSH ROD PIN INFO

19. INSTALL BRAKE PEDAL RETURN SPRING INFO

20. INSTALL STOP LIGHT SWITCH MOUNTING ADJUSTER

21. INSTALL STOP LIGHT SWITCH ASSEMBLY INFO

22. INSTALL DRIVER SIDE JUNCTION BLOCK ASSEMBLY INFO

23. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY INFO

24. INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY INFO

25. INSTALL INSTRUMENT PANEL SAFETY PAD PLATE SUB-ASSEMBLY (for LHD) INFO

26. INSTALL POWER STEERING ECU ASSEMBLY (for Brush Type Motor) INFO

27. INSTALL POWER STEERING ECU ASSEMBLY (for Brushless Type Motor) INFO

28. INSTALL COMBINATION METER ASSEMBLY INFO

29. INSTALL NO. 1 HEATER TO REGISTER DUCT INFO

30. INSTALL COWL SIDE TRIM BOARD RH

HINT:

Use the same procedure for the RH side and LH side.

31. INSTALL FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedure for the RH side and LH side.

32. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

33. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

34. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY INFO

35. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

36. ALIGN FRONT WHEELS FACING STRAIGHT AHEAD

37. INSTALL TURN SIGNAL SWITCH ASSEMBLY WITH SPIRAL CABLE SUB-ASSEMBLY INFO

38. INSTALL UPPER STEERING COLUMN COVER INFO

39. INSTALL LOWER STEERING COLUMN COVER INFO

40. INSTALL STEERING WHEEL ASSEMBLY INFO

41. INSTALL STEERING PAD INFO

42. INSTALL LOWER NO. 3 STEERING WHEEL COVER INFO

43. INSTALL LOWER NO. 2 STEERING WHEEL COVER INFO

44. INSTALL NO. 1 SWITCH HOLE BASE INFO

45. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

46. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

47. INSTALL AIR CONDITIONING CONTROL ASSEMBLY INFO

48. INSTALL CONSOLE BOX ASSEMBLY INFO

49. INSTALL BOX BOTTOM MAT INFO

50. INSTALL FRONT NO. 2 CONSOLE BOX INSERT INFO

51. INSTALL FRONT NO. 1 CONSOLE BOX INSERT INFO

52. INSTALL NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

53. INSTALL ELECTRICAL KEY OSCILLATOR INFO

54. INSTALL REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket) INFO

55. INSTALL REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket) INFO

56. INSTALL CONSOLE BOX CARPET INFO

57. INSTALL UPPER CONSOLE PANEL (w/ Power Outlet Socket) INFO

58. INSTALL REAR CONSOLE BOX POCKET (w/ Power Outlet Socket) INFO

59. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY INFO

60. CONNECT INSTRUMENT PANEL WIRE INFO

61. INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

62. INSTALL FRONT NO. 2 SPEAKER ASSEMBLY

HINT:

Use the same procedure for the RH side and LH side.

63. INSTALL NO. 2 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY INFO

64. INSTALL FRONT PILLAR GARNISH CORNER PIECE RH INFO

65. INSTALL FRONT PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and LH side.

66. INSTALL FRONT NO. 2 SPEAKER ASSEMBLY INFO

67. INSTALL NO. 1 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY INFO

68. INSTALL FRONT PILLAR GARNISH CORNER PIECE LH INFO

69. INSTALL FRONT PILLAR GARNISH LH INFO

70. INSTALL INSTRUMENT PANEL FINISH PANEL END RH INFO

71. CONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP RH INFO

72. INSTALL GLOVE COMPARTMENT DOOR INFO

73. INSTALL NO. 2 INSTRUMENT PANEL REGISTER INFO

74. INSTALL NO. 1 SIDE DEFROSTER NOZZLE INFO

75. INSTALL INSTRUMENT PANEL FINISH PANEL END LH INFO

76. CONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP LH INFO

77. INSTALL NO. 1 CENTER INSTRUMENT CLUSTER FINISH PANEL INFO

78. INSTALL NO. 1 INSTRUMENT PANEL REGISTER INFO

79. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

80. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

81. INSTALL FRONT DOOR SCUFF PLATE LH INFO

82. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

83. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

84. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

85. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

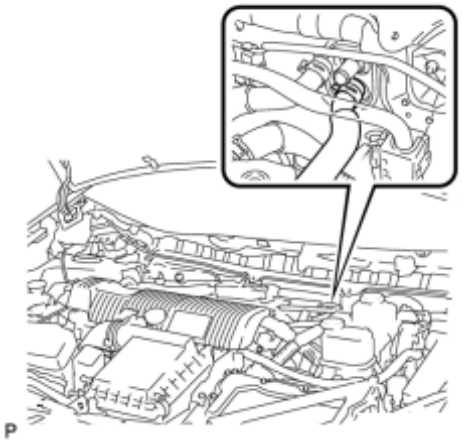
86. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

87. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

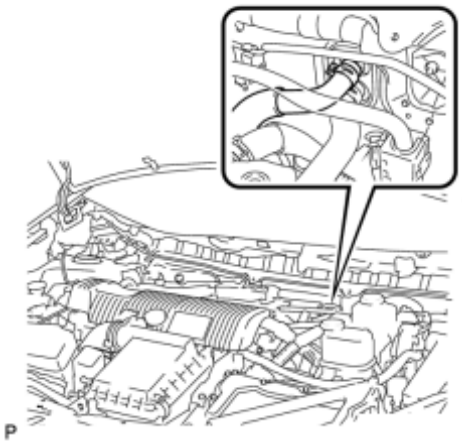
88. CONNECT OUTLET HEATER WATER HOSE

(a) Using pliers, grip the claws of the clip and slide the clip to connect the

outlet heater water hose.




89. CONNECT INLET HEATER WATER HOSE




(a) Using pliers, grip the claws of the clip and slide the clip to connect the inlet heater water hose.

90. CONNECT AIR CONDITIONING TUBE AND ACCESSORY ASSEMBLY

(a) Remove the attached vinyl tape from the pipe.

(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the air conditioning tube and accessory assembly.

Compressor oil:

ND-OIL 11 or equivalent

(c) Install the O-ring on the air conditioning tube and accessory assembly.

NOTICE:

- Keep the O-ring and O-ring fitting surfaces clean from dirt or any foreign objects.

- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.

(d) Install the air conditioning tube and accessory assembly.

91. CONNECT SUCTION PIPE SUB-ASSEMBLY

(a) Remove the attached vinyl tape from the pipe.

(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the suction pipe sub-assembly.

Compressor oil:

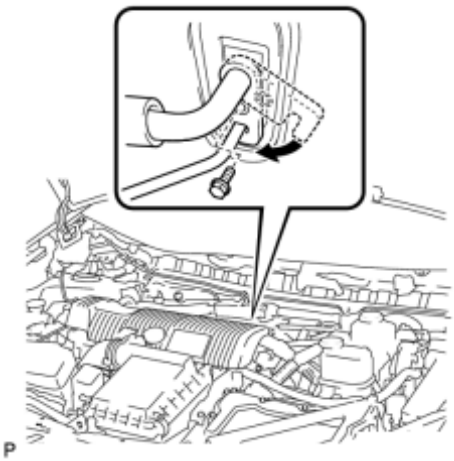
ND-OIL 11 or equivalent

(c) Install the O-ring on the suction pipe sub-assembly.

NOTICE:

- Keep the O-ring and O-ring fitting surfaces clean from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.

(d) Install the suction pipe sub-assembly.




(e) Move the hook connector in the direction indicated by the arrow in the illustration.

(f) Insert the pipe joint into the fitting hole securely and tighten the bolt.

Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**

92. INSTALL OUTER COWL TOP PANEL SUB-ASSEMBLY INFO

93. INSTALL COWL BODY MOUNTING REINFORCEMENT LH INFO

94. INSTALL WINDSHIELD WIPER MOTOR AND LINK ASSEMBLY INFO

95. INSTALL COWL TOP VENTILATOR LOUVER SUB-ASSEMBLY INFO

96. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY LH INFO

97. INSTALL COWL SIDE VENTILATOR SUB-ASSEMBLY RH INFO

98. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY RH INFO

99. INSTALL FRONT WIPER ARM AND BLADE ASSEMBLY LH INFO

100. INSTALL FRONT WIPER ARM HEAD CAP INFO

101. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

102. INSTALL REAR NO. 3 FLOOR BOARD INFO

103. INSTALL REAR DECK FLOOR BOX INFO

104. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

105. ADD COOLANT (for Engine) INFO

106. CHARGE WITH REFRIGERANT INFO

107. WARM UP COMPRESSOR INFO

108. INSPECT FOR REFRIGERANT LEAK INFO

109. INSPECT FOR COOLANT LEAK (for Engine) INFO

110. INSPECT SHIFT LEVER INFO

111. INSPECT STEERING PAD

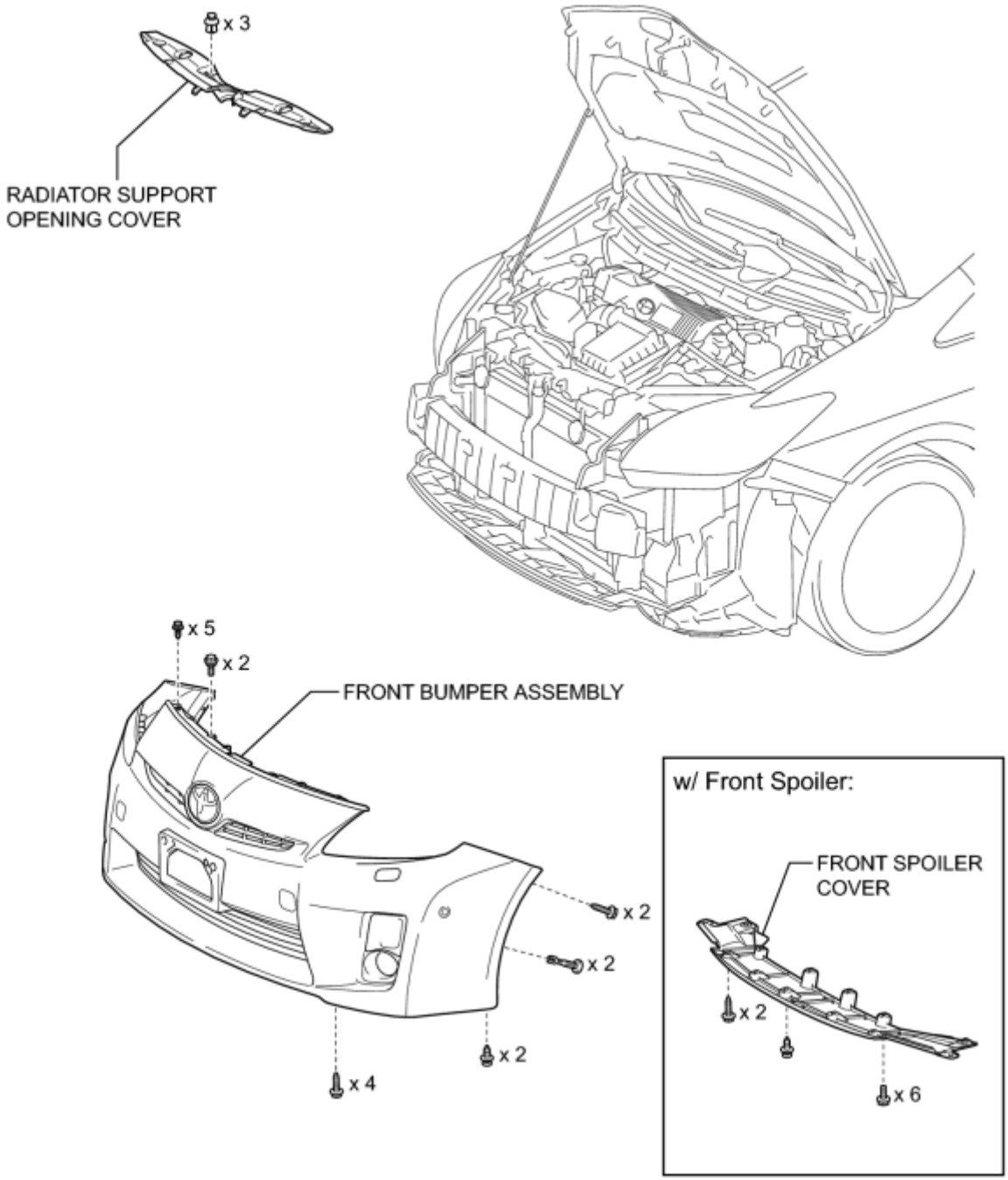
(a) Inspect the steering pad INFO.

112. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

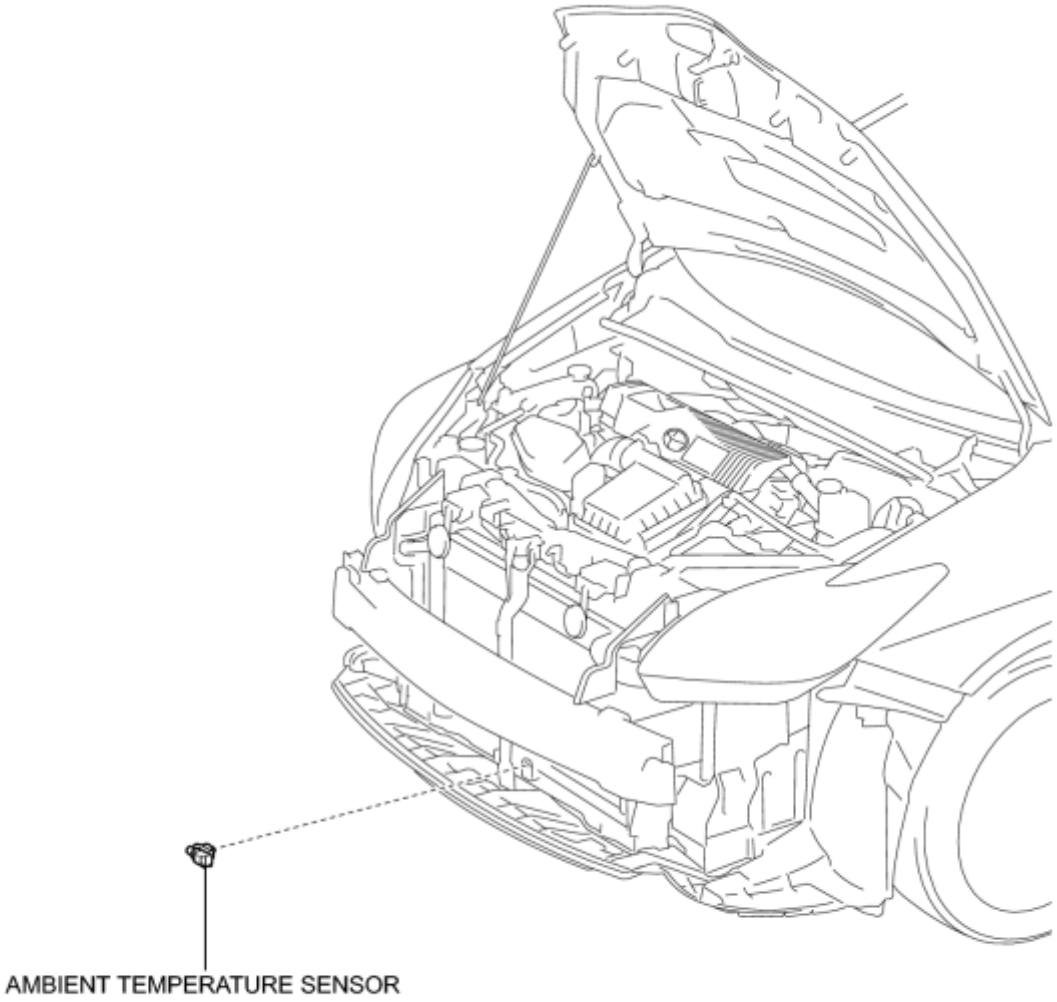
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION



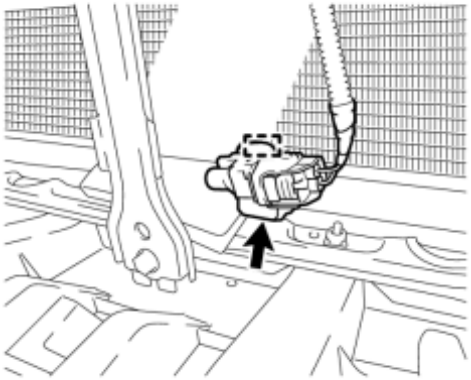

P

# REMOVAL

1. REMOVE RADIATOR SUPPORT OPENING COVER INFO

2. REMOVE FRONT BUMPER ASSEMBLY INFO

3. REMOVE AMBIENT TEMPERATURE SENSOR



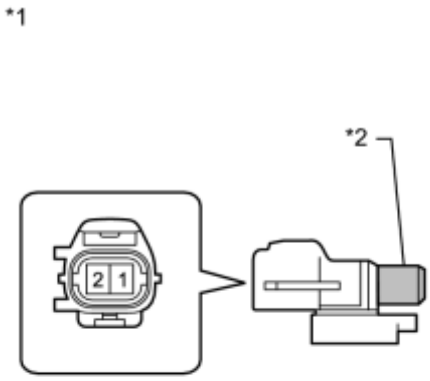
P

(a) Disconnect the connector.

(b) Disengage the clamp to remove the ambient temperature sensor.

# INSPECTION

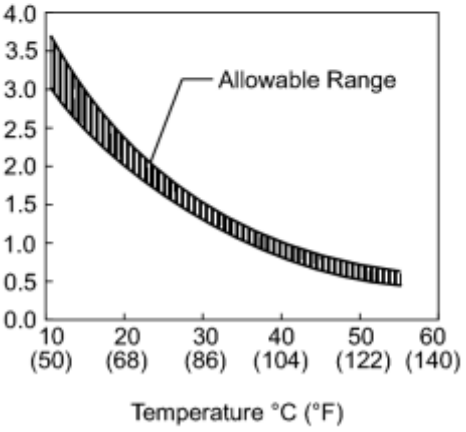
1. INSPECT AMBIENT TEMPERATURE SENSOR




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 10°C (50°F) | 3.00 to 3.73 kΩ |
| 1 - 2 | 15°C (59°F) | 2.45 to 2.88 kΩ |
| 1 - 2 | 20°C (68°F) | 1.95 to 2.30 kΩ |
| 1 - 2 | 25°C (77°F) | 1.60 to 1.80 kΩ |
| 1 - 2 | 30°C (86°F) | 1.28 to 1.47 kΩ |
| 1 - 2 | 35°C (95°F) | 1.00 to 1.22 kΩ |
| 1 - 2 | 40°C (104°F) | 0.80 to 1.00 kΩ |
| 1 - 2 | 45°C (113°F) | 0.65 to 0.85 kΩ |
| 1 - 2 | 50°C (122°F) | 0.50 to 0.70 kΩ |
| 1 - 2 | 55°C (131°F) | 0.44 to 0.60 kΩ |
| 1 - 2 | 60°C (140°F) | 0.36 to 0.50 kΩ |




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Ambient Temperature Sensor) |
| *2 | Sensing Portion |

- Hold the sensor only by its connector. Touching the sensor may change the resistance value.
- When measuring, the sensor temperature must be the same as the ambient temperature.

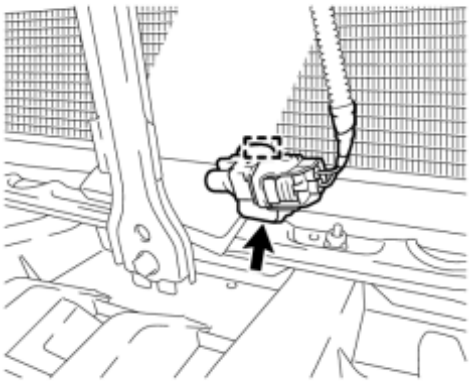
HINT:

As the temperature increases, the resistance decreases (see the graph).

If the resistance is not as specified, replace the ambient temperature sensor.

# INSTALLATION

1. INSTALL AMBIENT TEMPERATURE SENSOR



P

(a) Engage the clamp to install the ambient temperature sensor.

(b) Connect the connector.

2. INSTALL FRONT BUMPER ASSEMBLY INFO

3. INSTALL RADIATOR SUPPORT OPENING COVER INFO

4. ADD WINDSHIELD WASHER FLUID (w/ Headlight Cleaner System) INFO

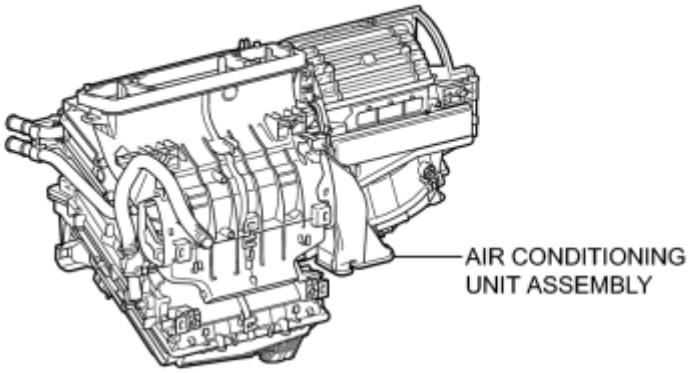
5. ADJUST FOG LIGHT AIMING

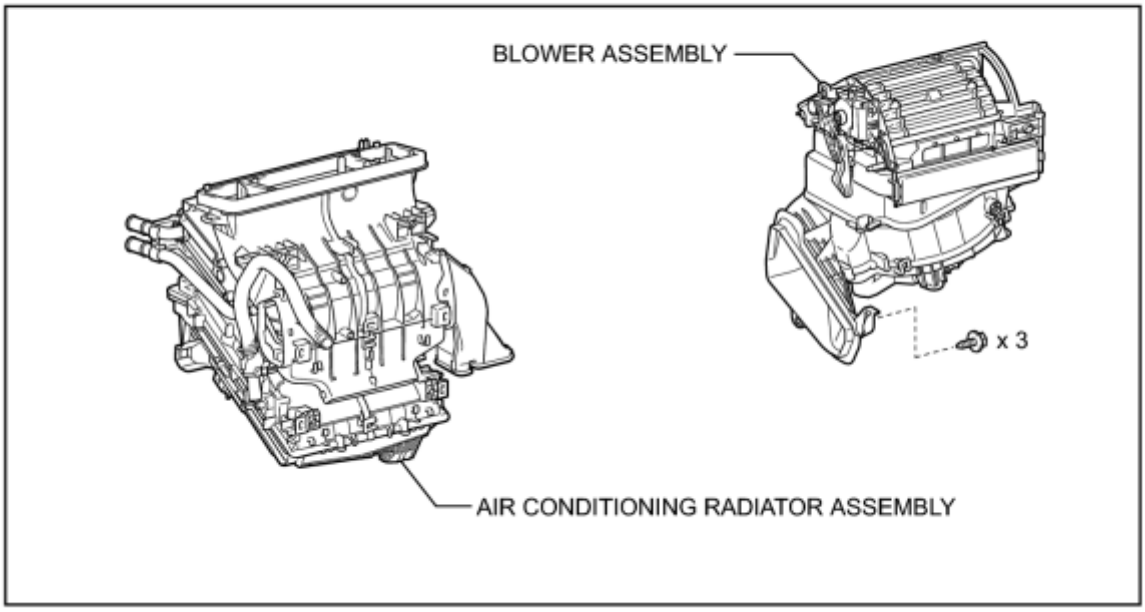
HINT:

Refer to the procedure for Adjust Fog Light Aiming INFO.

# COMPONENTS

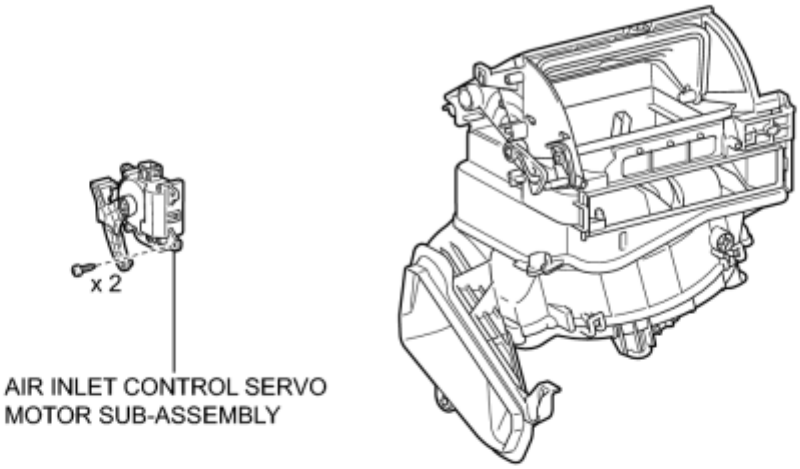
# ILLUSTRATION

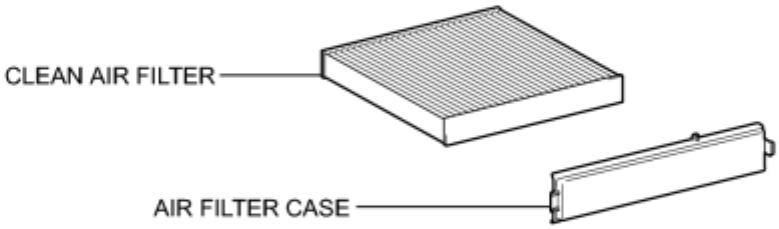


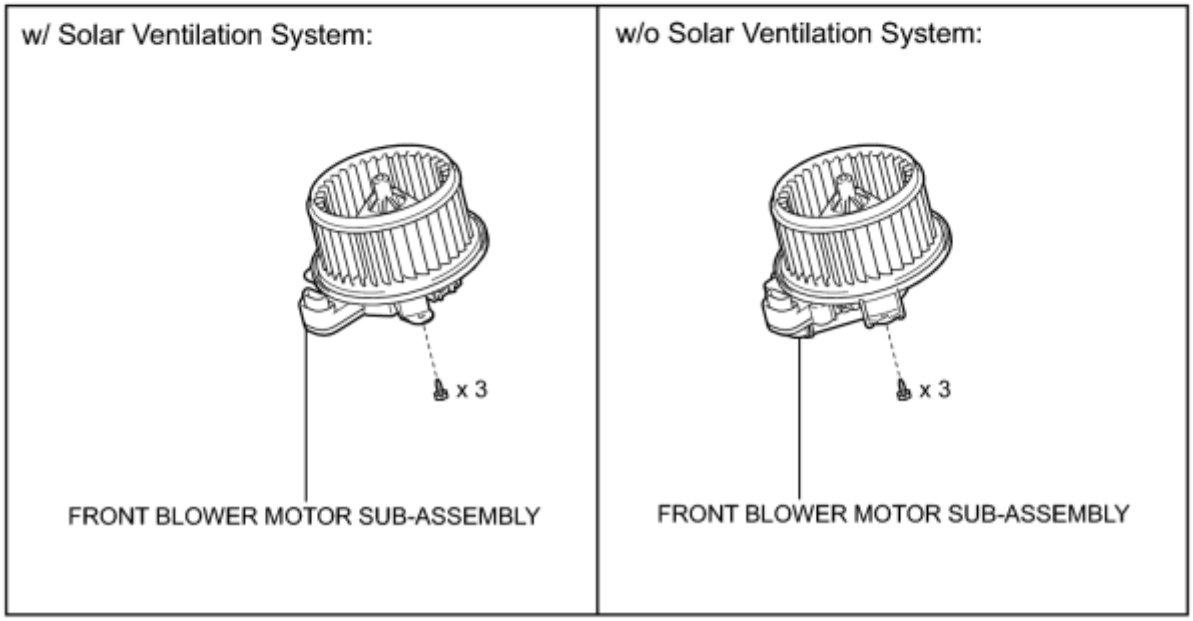




P

# ILLUSTRATION


x 2
AIR INLET CONTROL SERVO
MOTOR SUB-ASSEMBLY


CLEAN AIR FILTER
AIR FILTER CASE


w/ Solar Ventilation System:
x 3
FRONT BLOWER MOTOR SUB-ASSEMBLY
w/o Solar Ventilation System:
x 3
FRONT BLOWER MOTOR SUB-ASSEMBLY

P

# REMOVAL

1. REMOVE AIR CONDITIONING UNIT ASSEMBLY

HINT:

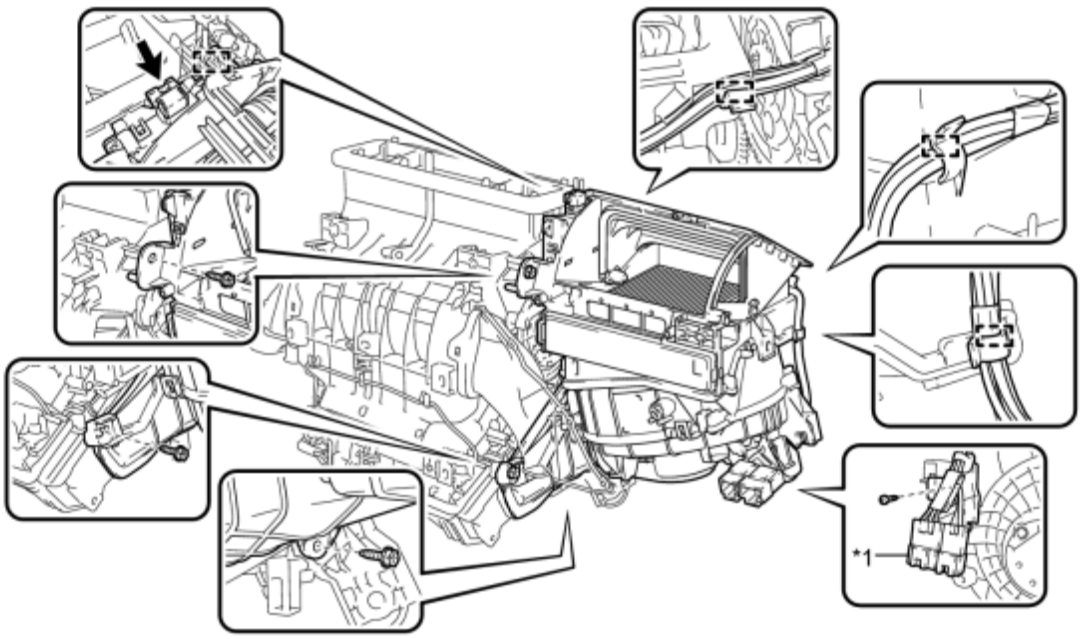
Refer to the procedure for Remove Air Conditioning Unit Assembly INFO.

2. REMOVE BLOWER ASSEMBLY

(a) Remove the screw and disconnect the quick heater connector.

(b) Disconnect the connector and disengage each clamp.

(c) Disengage the 3 screws and guide, and remove the blower assembly.



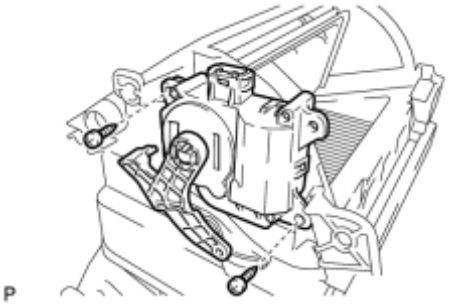

P

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Quick Heater Connector | - | - |

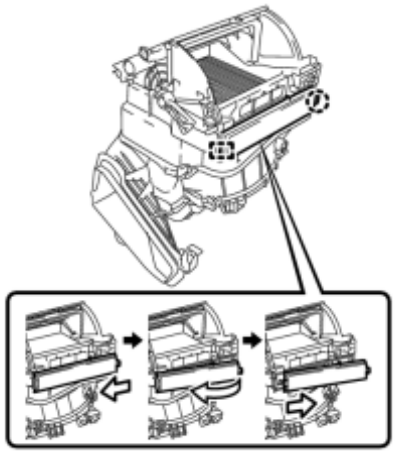
# DISASSEMBLY

1. REMOVE AIR INLET CONTROL SERVO MOTOR SUB-ASSEMBLY



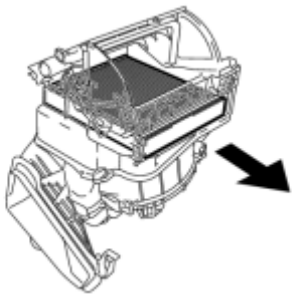
(a) Remove the 2 screws and air inlet control servo motor sub-assembly.

2. REMOVE AIR FILTER CASE



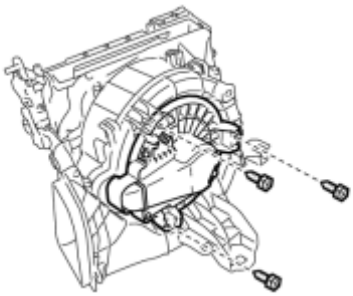
(a) Disengage the claw and guide, and remove the air filter case as shown in the illustration.

3. REMOVE CLEAN AIR FILTER



(a) Remove the clean air filter as shown in the illustration.

4. REMOVE FRONT BLOWER MOTOR SUB-ASSEMBLY (w/o Solar Ventilation System)



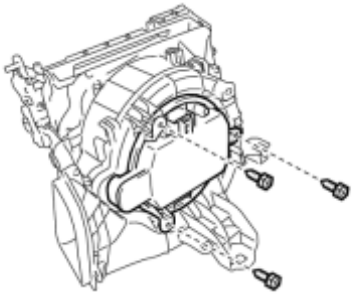
P

(a) Remove the 3 screws and front blower motor sub-assembly.

NOTICE:

Do not remove the front blower motor sub-assembly if it has been damaged or impacted.

5. REMOVE FRONT BLOWER MOTOR SUB-ASSEMBLY (w/ Solar Ventilation System)



P

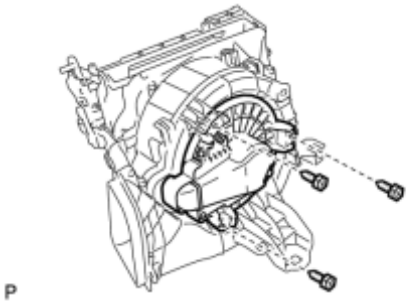
(a) Remove the 3 screws and front blower motor sub-assembly.

NOTICE:

Do not remove the front blower motor sub-assembly if it has been damaged or impacted.

# REASSEMBLY

1. INSTALL FRONT BLOWER MOTOR SUB-ASSEMBLY (w/o Solar Ventilation System)

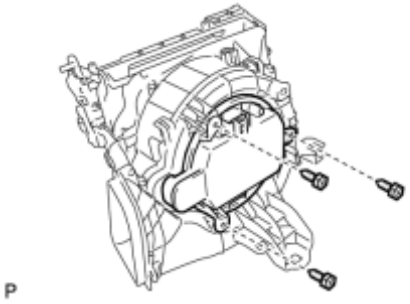



(a) Install the front blower motor sub-assembly with the 3 screws.

NOTICE:

Do not install the front blower motor sub-assembly if it has been damaged or impacted.

2. INSTALL FRONT BLOWER MOTOR SUB-ASSEMBLY (w/ Solar Ventilation System)

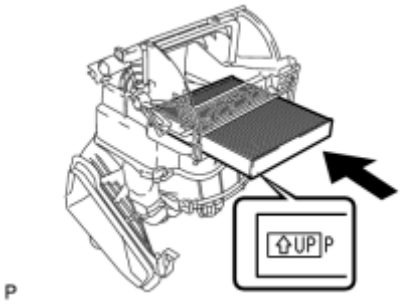



(a) Install the front blower motor sub-assembly with the 3 screws.

NOTICE:

Do not install the front blower motor sub-assembly if it has been damaged or impacted.

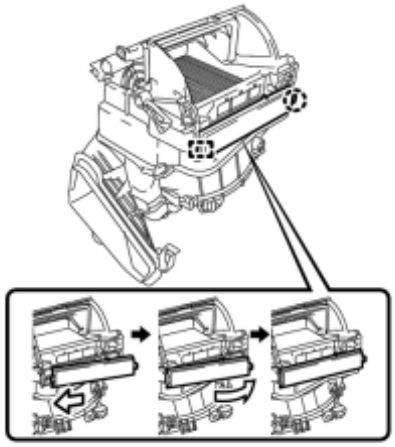
3. INSTALL CLEAN AIR FILTER




(a) Install the clean air filter as shown in the illustration.

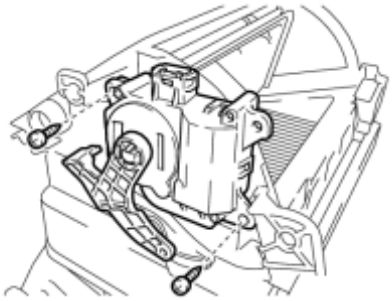
4. INSTALL AIR FILTER CASE

(a) Engage the guide and claw to install the air filter case as shown in the illustration.



P

5. INSTALL AIR INLET CONTROL SERVO MOTOR SUB-ASSEMBLY



P

(a) Install the air inlet control servo motor sub-assembly with the 2 screws.

# INSTALLATION

1. INSTALL BLOWER ASSEMBLY

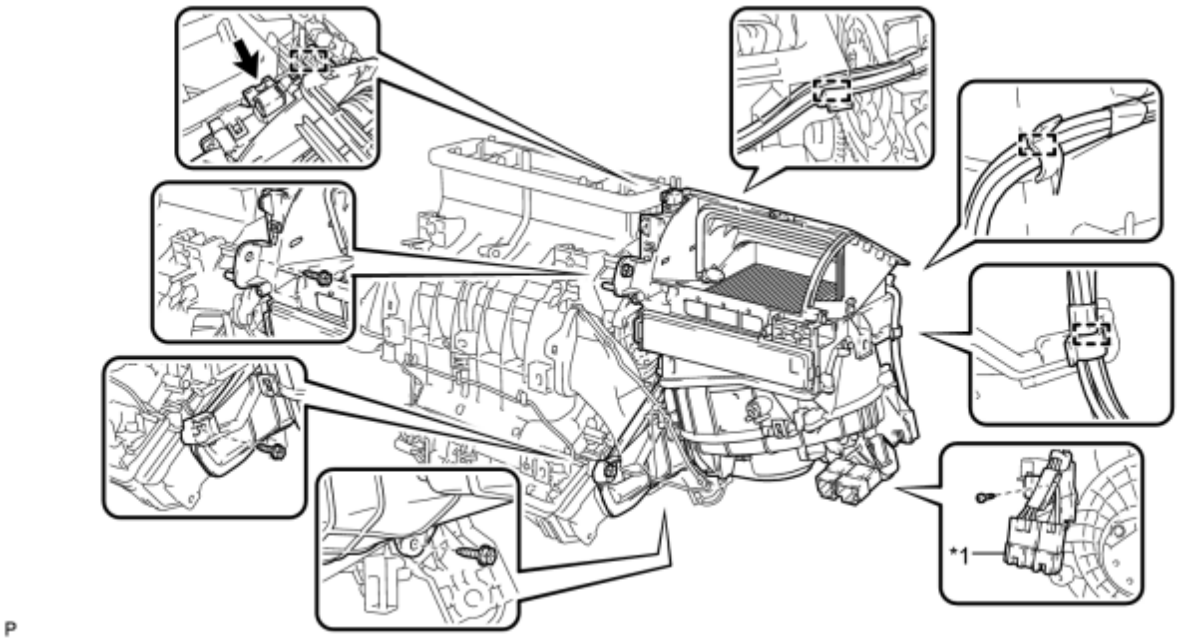
(a) Engage the guide.

(b) Install the blower assembly with the 3 screws.

(c) Connect the connector.

(d) Engage each clamps.

(e) Install the screw and connect the quick heater connector.




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Quick Heater Connector | - | - |

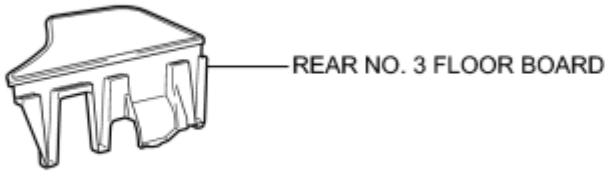
2. INSTALL AIR CONDITIONING UNIT ASSEMBLY

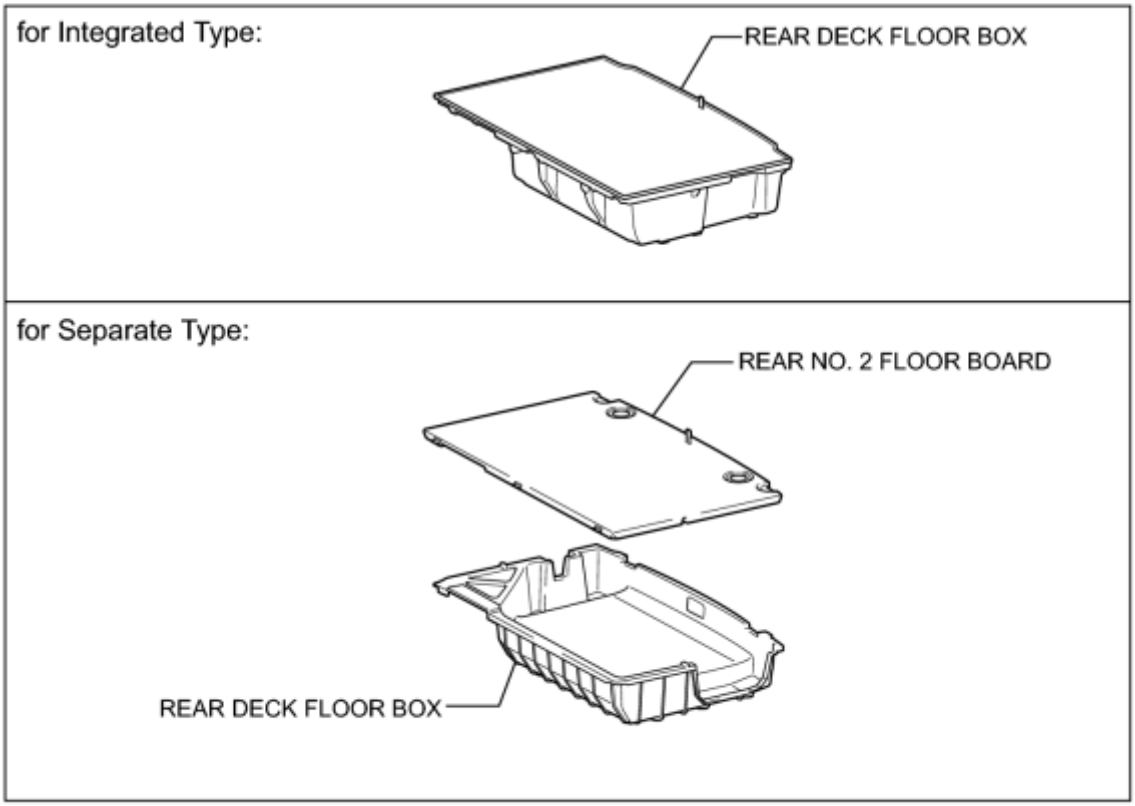
HINT:

Refer to the procedure for Install Air Conditioning Unit Assembly INFO.

# COMPONENTS

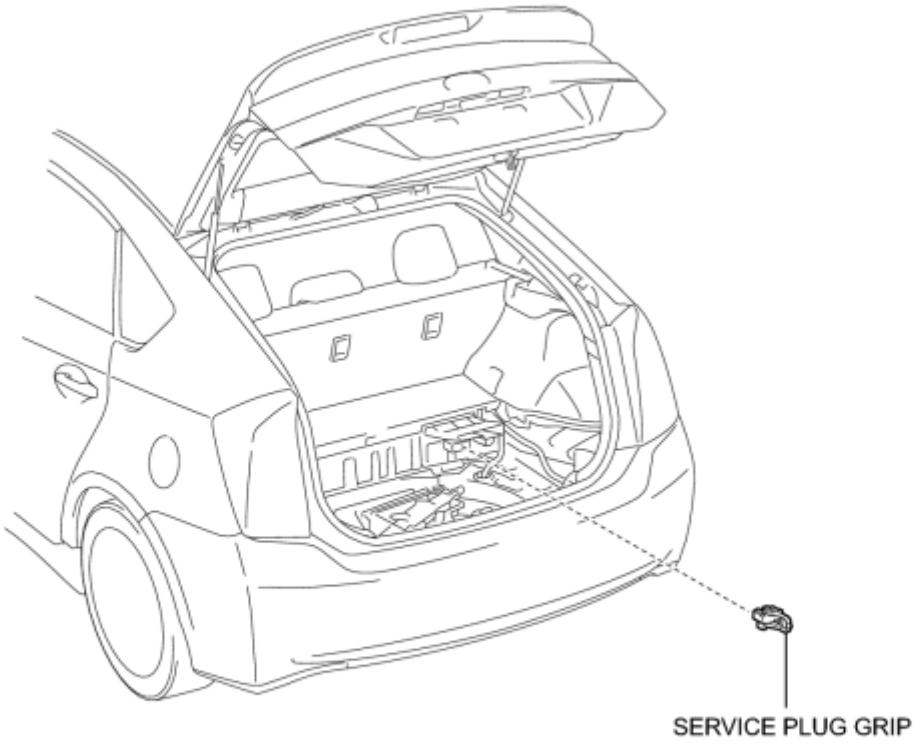
# ILLUSTRATION



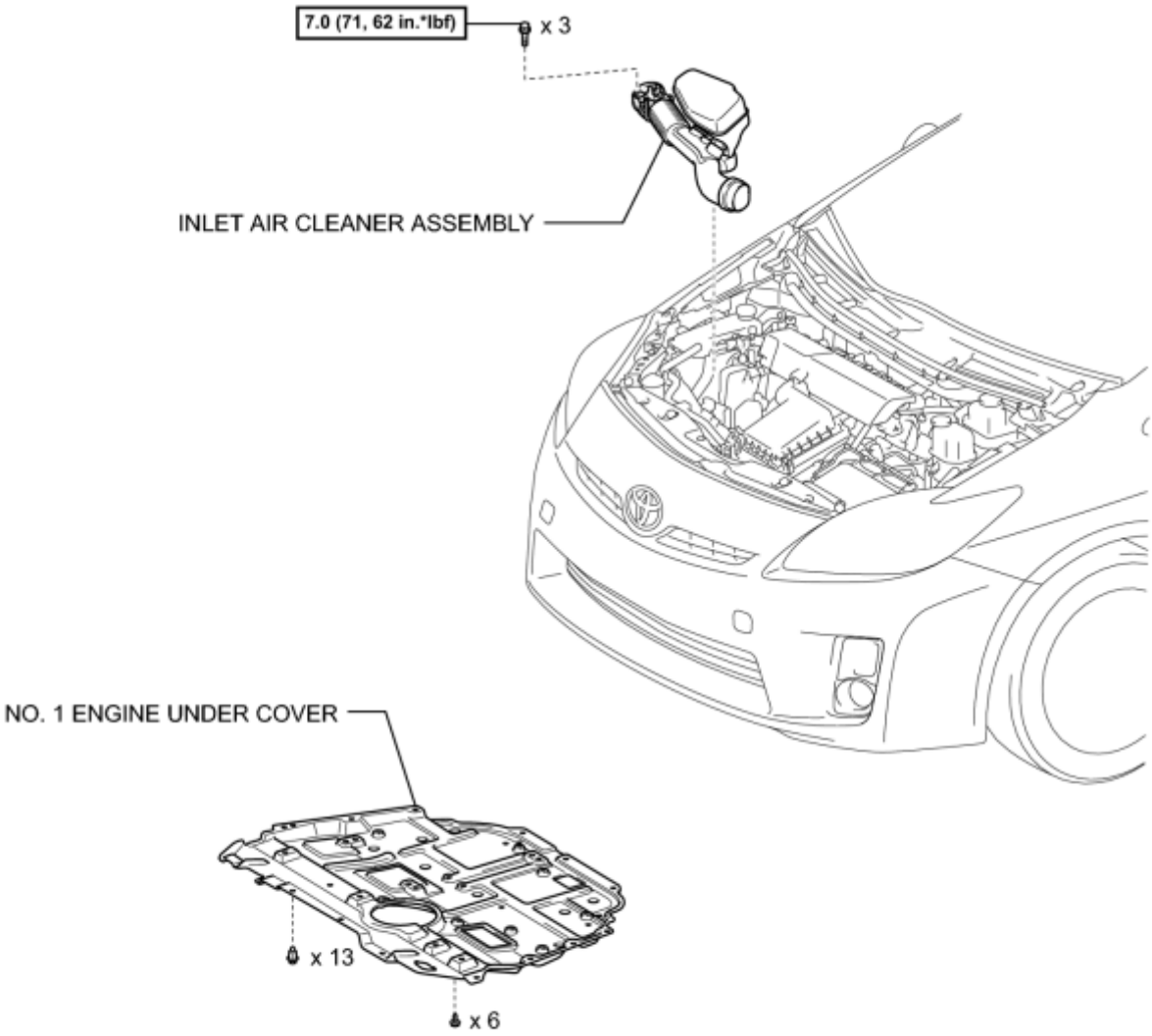

P

# ILLUSTRATION




P

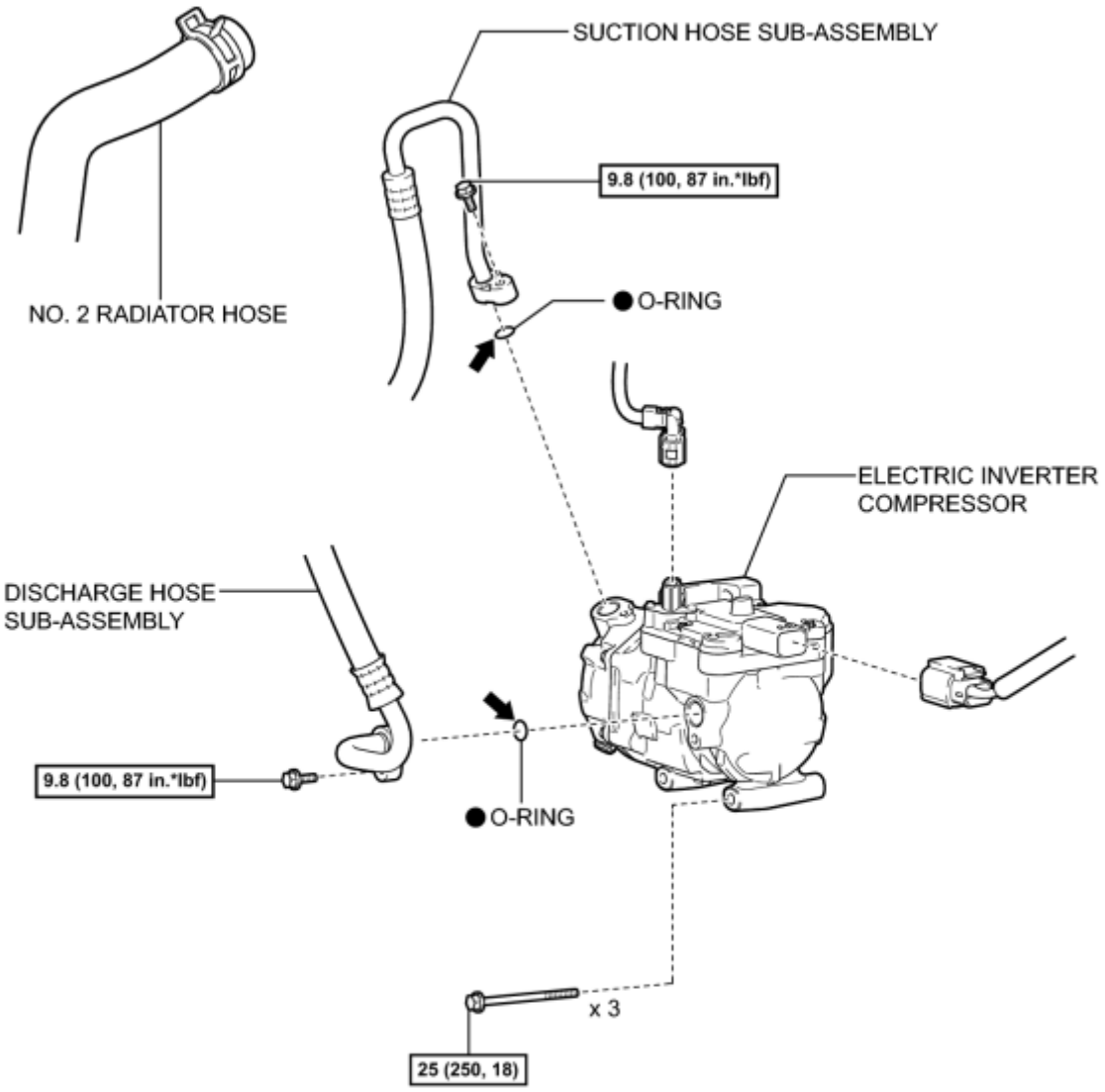
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

⬅ Compressor oil ND-OIL 11 or equivalent

P

# REMOVAL

1. PRECAUTION

INFO

2. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM INFO

3. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

4. REMOVE REAR DECK FLOOR BOX INFO

5. REMOVE REAR NO. 3 FLOOR BOARD INFO

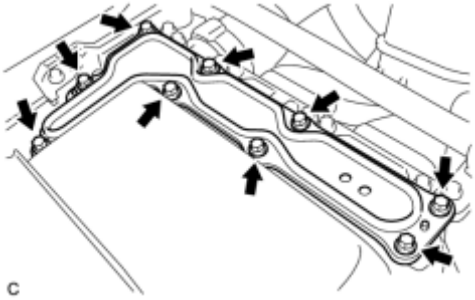
6. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

7. REMOVE SERVICE PLUG GRIP INFO

8. CHECK TERMINAL VOLTAGE




(a) Remove the 9 bolts and inverter terminal cover.

CAUTION:

Wear insulating gloves.

NOTICE:

Make sure to pull the inverter cover straight up, as a connector is connected to the bottom of the cover.

(b) Check the terminal voltage INFO.

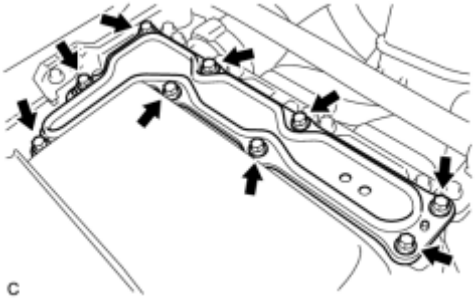
CAUTION:

Wear insulating gloves.

(c) Install the inverter cover with the 9 bolts to the inverter with converter assembly.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

CAUTION:




Wear insulating gloves.

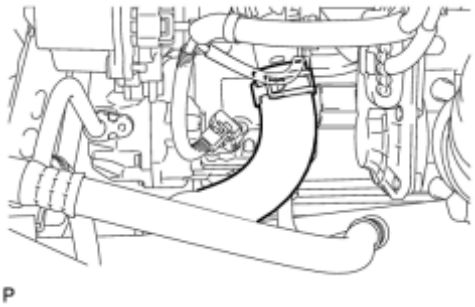
- Make sure that the interlock is fully engaged.
- Do not allow any foreign objects or water drops to enter the inverter with converter assembly.

9. REMOVE INLET AIR CLEANER ASSEMBLY INFO

10. REMOVE NO. 1 ENGINE UNDER COVER

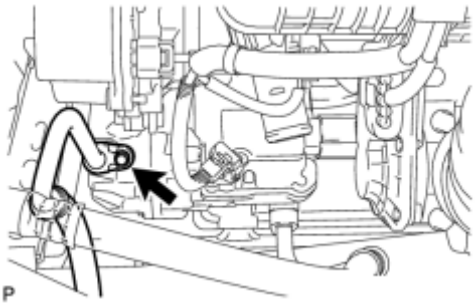
11. DRAIN COOLANT (for Engine) INFO

12. DISCONNECT NO. 2 RADIATOR HOSE




(a) Using pliers, grip the claws of the clip and slide the clip to remove the No. 2 radiator hose.

13. DISCONNECT DISCHARGE HOSE SUB-ASSEMBLY




(a) Remove the bolt and disconnect the discharge hose sub-assembly from the electric inverter compressor.

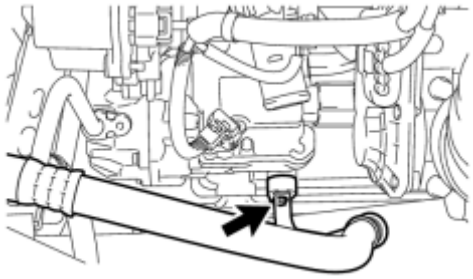
(b) Remove the O-ring from the discharge hose sub-assembly.

NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

14. DISCONNECT SUCTION HOSE SUB-ASSEMBLY

(a) Remove the bolt and disconnect the suction hose sub-assembly from the electric inverter compressor.



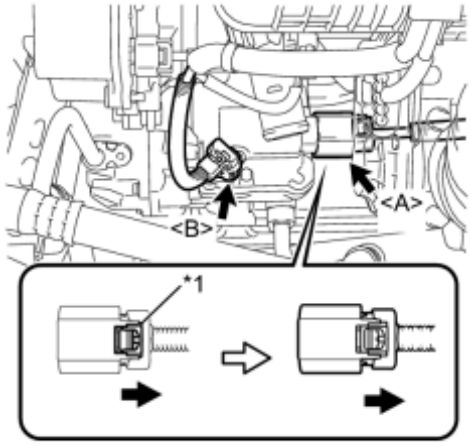
P

(b) Remove the O-ring from the suction hose sub-assembly.

NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

15. REMOVE ELECTRIC INVERTER COMPRESSOR




P

(a) Release the green-colored lock and disconnect the connector <A> as shown in the illustration.

CAUTION:

Wear insulated gloves when performing the procedures.

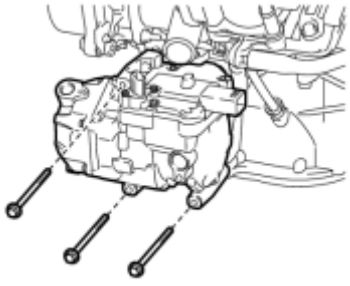
NOTICE:

Insulate the connector by sealing it with tape.

## Text in Illustration

| | |
|---|---|
| *1 | Green-colored Lock |

(b) Disconnect the connector <B>.



P

(c) Remove the 3 bolts and electric inverter compressor.

# INSPECTION

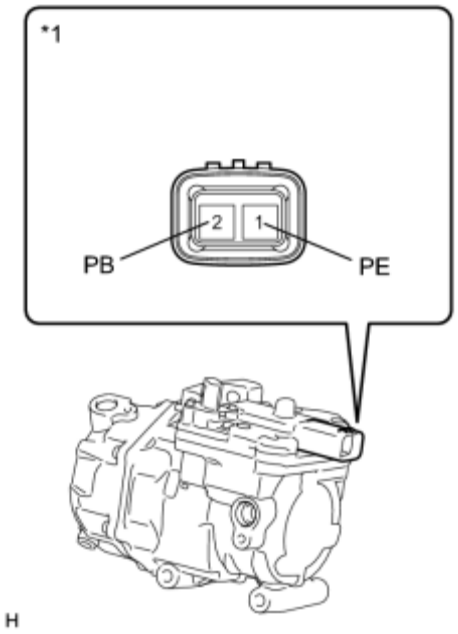
1. INSPECT COMPRESSOR WITH MOTOR ASSEMBLY

CAUTION:

- Because the compressor has a high-voltage circuit, wear insulated gloves and pull out the service plug grip to cut off the high-voltage circuit before inspection.
- Do not touch the high-voltage connectors or terminals for 10 minutes after the service plug grip is removed.

NOTICE:

Do not start the engine with the service plug grip removed because it may cause a malfunction.




(a) Disconnect the compressor with motor assembly connector.

(b) Using a megohmmeter, measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| E1-1 (PE) - Body ground | Always | 2 MΩ or higher |
| E1-2 (PB) - Body ground | Always | 2 MΩ or higher |

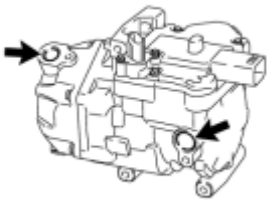
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Compressor with motor assembly) |

If the resistance is not as specified, replace the compressor with motor assembly.

# INSTALLATION

1. ADJUST COMPRESSOR OIL



P

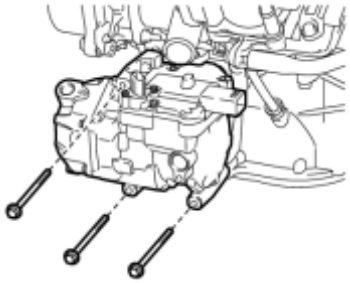
(a) When replacing the electric inverter compressor with a new one, gradually discharge the refrigerant gas from the service valve, and drain the following amount of oil from the new electric inverter compressor before installation.

Standard:

(Oil capacity inside the new electric inverter compressor: 130 to 145 cc (4.4 to 4.9 fl. oz.)) - (Remaining oil amount in the removed electric inverter compressor) = (Oil amount to be removed from the new compressor when replacing)

- When checking the compressor oil level, observe the precautions on the cooler removal/installation.
- If a new compressor and magnetic clutch are installed without removing some oil, there will be too much oil in the system due to the oil remaining in the pipes of the vehicle. Excessive oil in the system prevents heat exchange in the refrigeration cycle and causes refrigeration failure.
- If the amount of oil remaining in the old compressor and magnetic clutch is too small, check the A/C system for oil leaks.
- Be sure to use ND-OIL 11 or equivalent for compressor oil. If any compressor oil other than ND-OIL 11 is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.

2. INSTALL ELECTRIC INVERTER COMPRESSOR



P

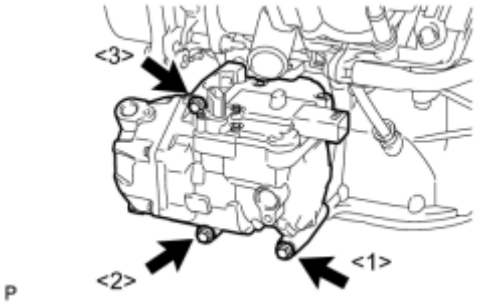
(a) Temporarily install the electric inverter compressor with the 3 bolts.

(b) Install the electric inverter compressor with the 3 bolts.

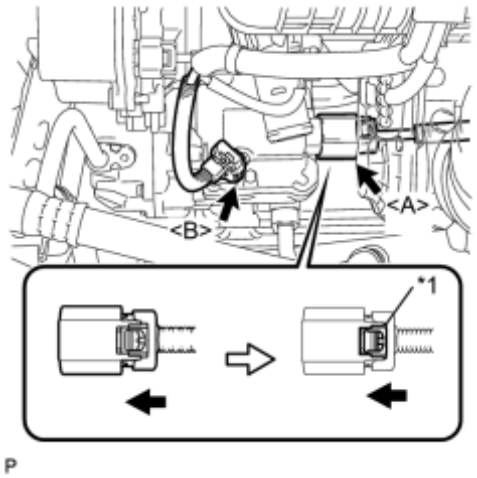
Torque: **25 N·m (250 kgf·cm, 18ft·lbf)**

NOTICE:

Tighten the bolts in the order shown in the illustration to install the




electric inverter compressor.




(c) Connect the connector <A> and lock the green-colored lock as shown in the illustration.

CAUTION:

Wear insulated gloves when performing the procedures.

## Text in Illustration

| | |
|---|---|
| *1 | Green-colored Lock |

(d) Connect the connector <B>.

3. CONNECT SUCTION HOSE SUB-ASSEMBLY

(a) Remove the attached vinyl tape from the hose.

(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the compressor and magnetic clutch.

Compressor oil:

ND-OIL 11 or equivalent

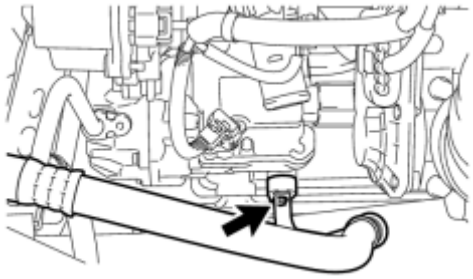
(c) Install the O-ring onto the suction hose sub-assembly.

NOTICE:

- Keep the O-ring and O-ring fitting surfaces free from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.

(d) Install the suction hose sub-assembly onto the compressor and magnetic clutch with the bolt.

Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**



P

4. CONNECT DISCHARGE HOSE SUB-ASSEMBLY

(a) Remove the attached vinyl tape from the hose.

(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the compressor and magnetic clutch.

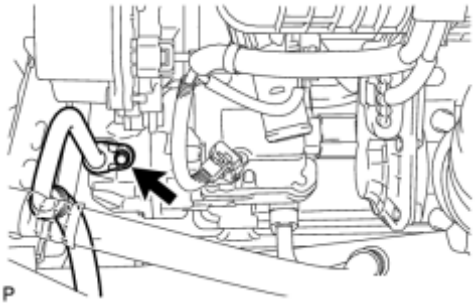
Compressor oil:

ND-OIL 11 or equivalent

(c) Install the O-ring onto the discharge hose sub-assembly.

NOTICE:

- Keep the O-ring and O-ring fitting surfaces free from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.



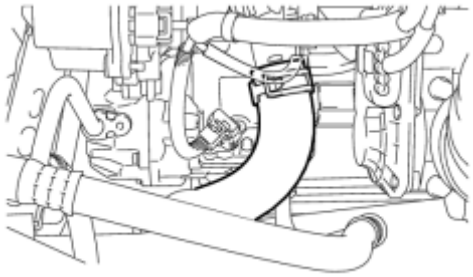
P

(d) Install the discharge hose sub-assembly onto the compressor and magnetic clutch with the bolt.

Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**

5. CONNECT NO. 2 RADIATOR HOSE

(a) Using pliers, grip the claws of the clip and slide the clip to install the No. 2 radiator hose.



P

6. ADD COOLANT (for Engine) INFO

7. INSPECT FOR COOLANT LEAK (for Engine) INFO

8. INSTALL SERVICE PLUG GRIP INFO

9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

10. INSTALL REAR NO. 3 FLOOR BOARD INFO

11. INSTALL REAR DECK FLOOR BOX INFO

12. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

13. CHARGE WITH REFRIGERANT INFO

14. WARM UP COMPRESSOR INFO

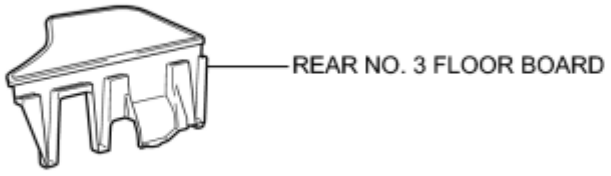
15. INSPECT FOR REFRIGERANT LEAK INFO

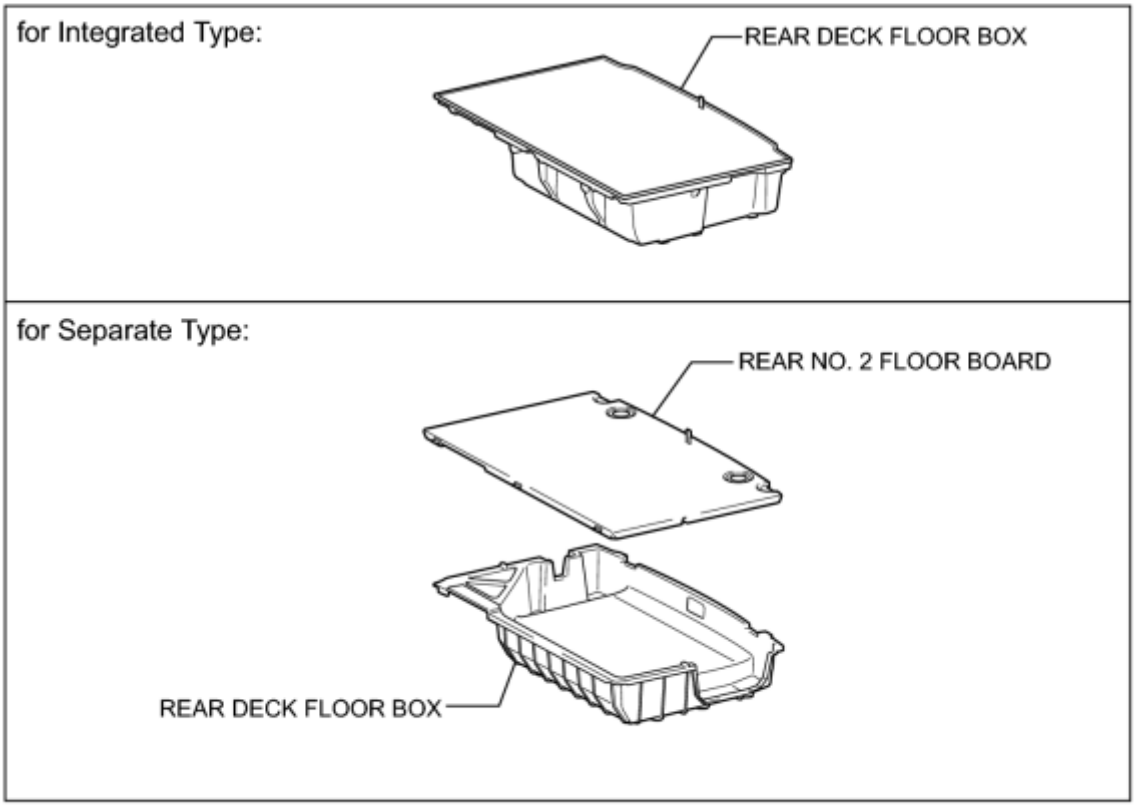
16. INSTALL NO. 1 ENGINE UNDER COVER

17. INSTALL INLET AIR CLEANER ASSEMBLY INFO

# COMPONENTS

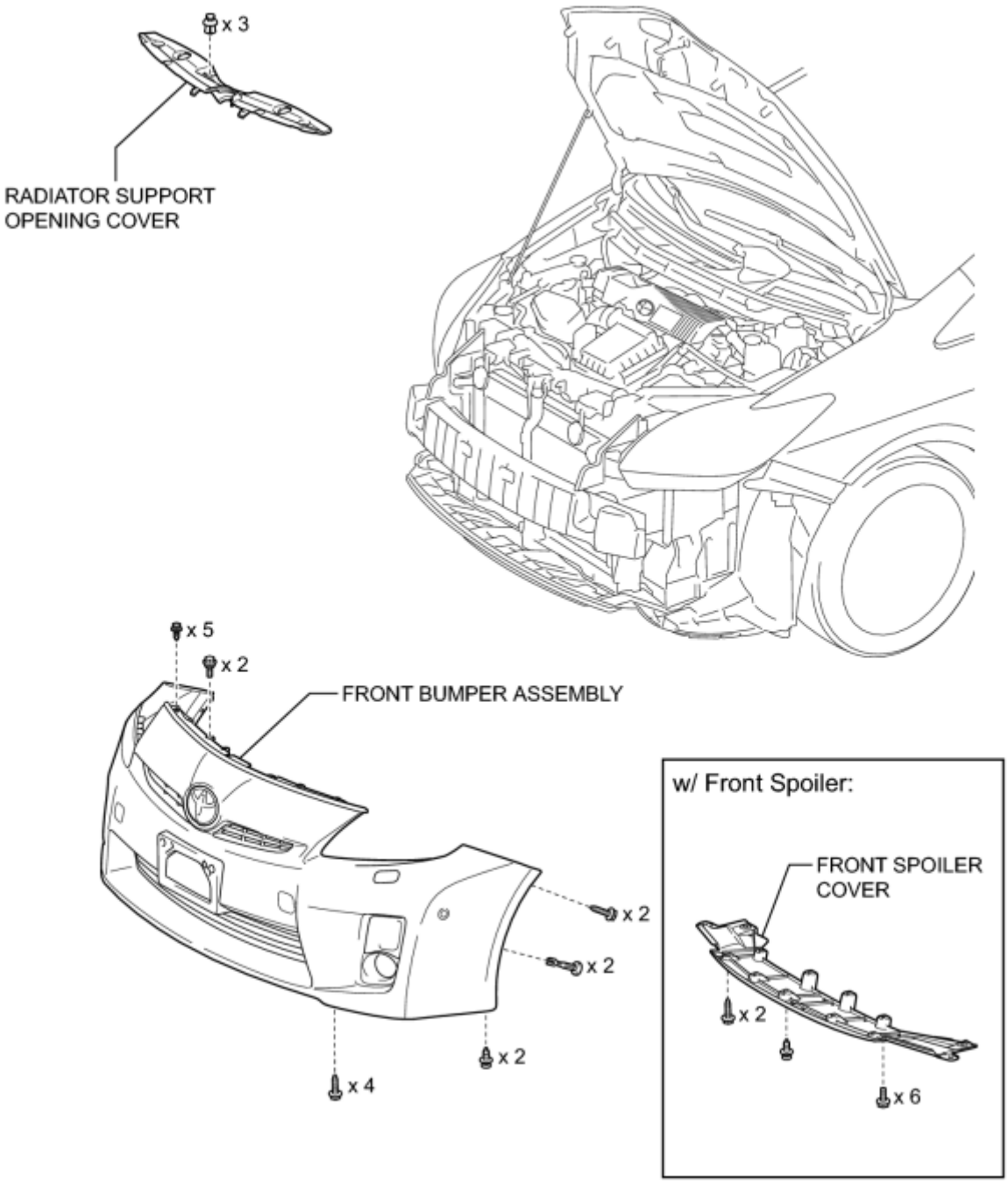
# ILLUSTRATION



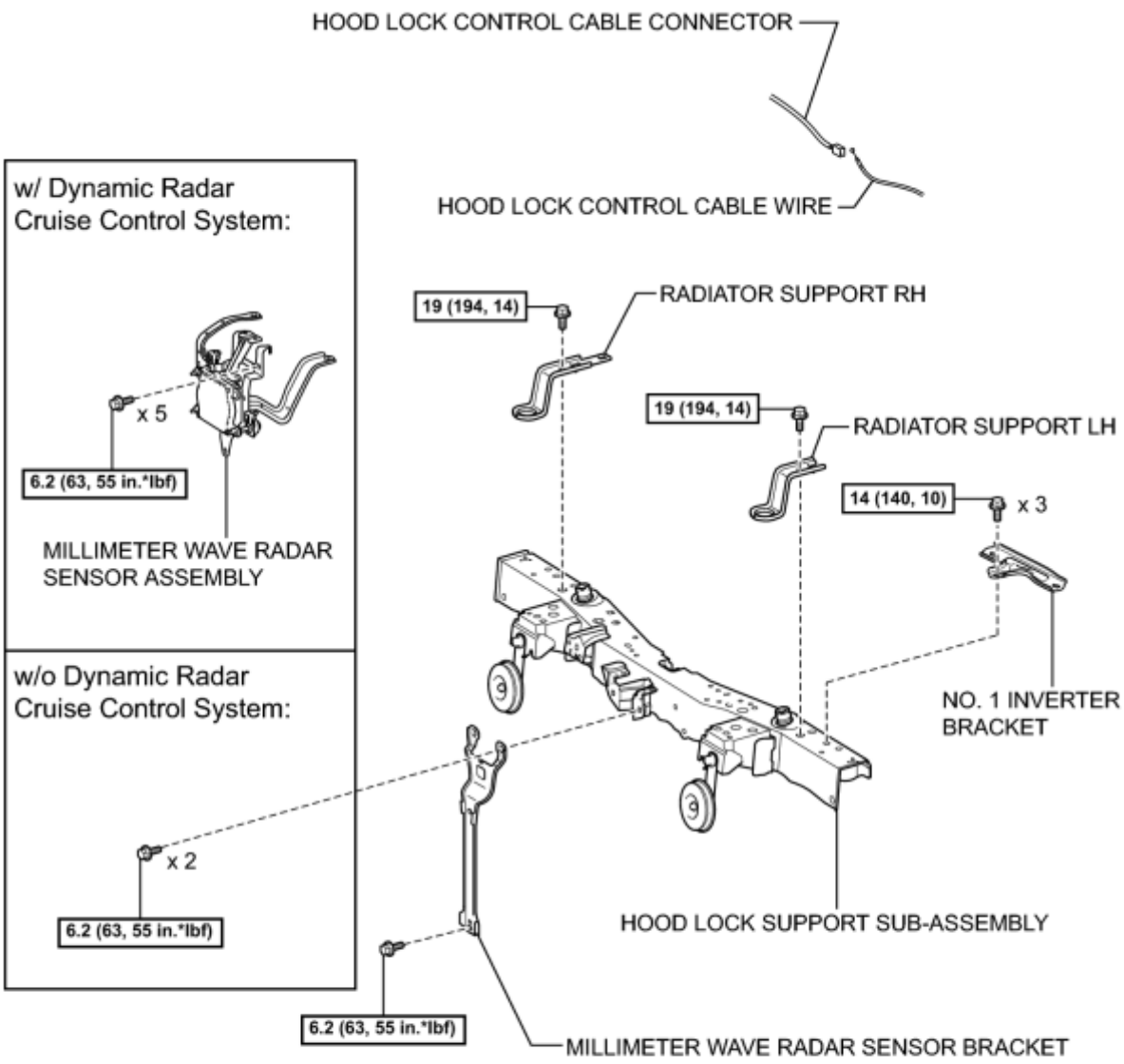

P

# ILLUSTRATION




P

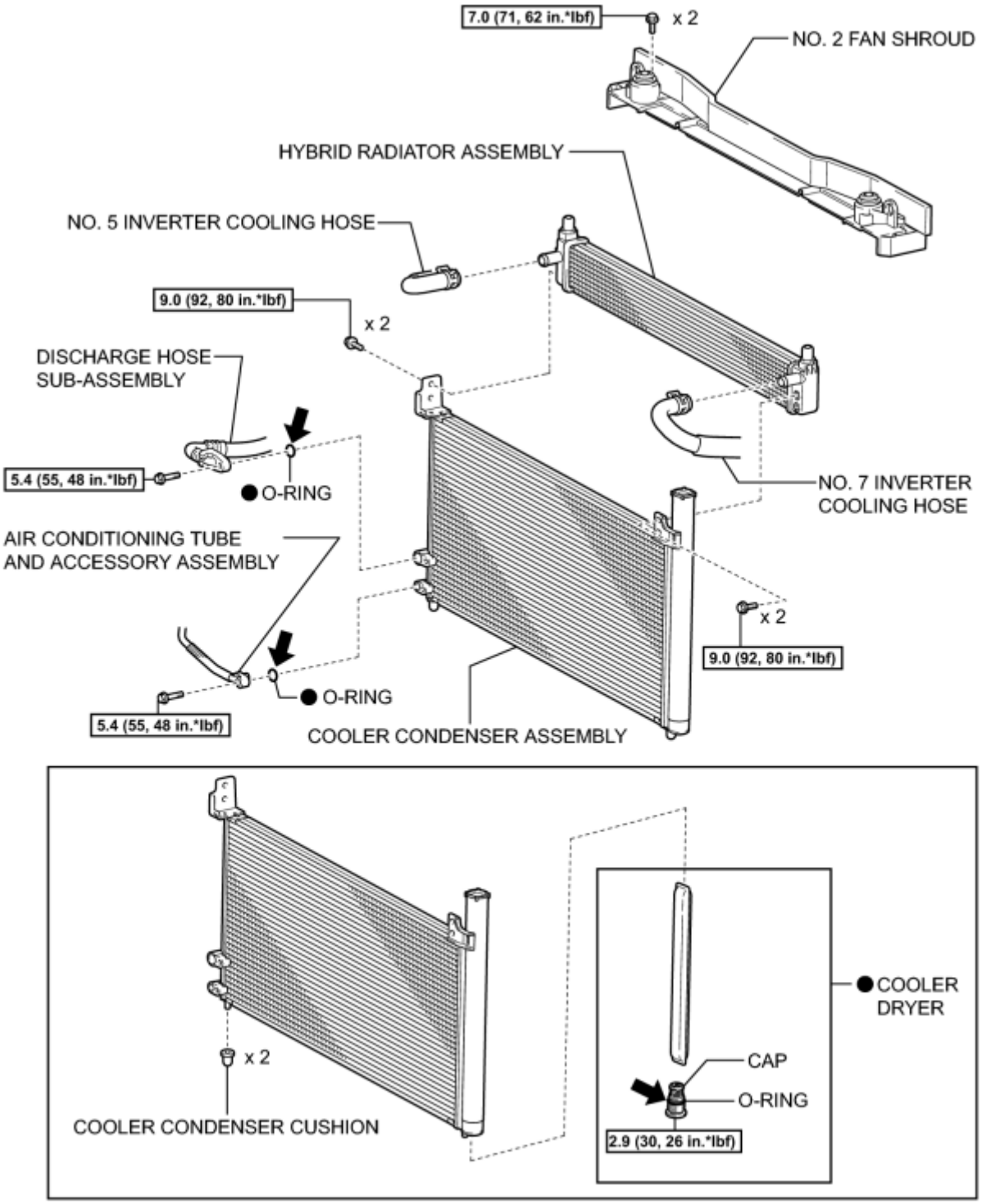
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

⬅ Compressor oil ND-OIL 11 or equivalent

P

# ON-VEHICLE INSPECTION

1. INSPECT COOLER CONDENSER ASSEMBLY

(a) If the cooler condenser assembly fins are dirty, clean them with water and dry with compressed air.

NOTICE:

Do not damage the cooler condenser assembly fins.

(b) If any cooler condenser assembly fins are bent, straighten them using a screwdriver or pliers.

2. INSPECT FOR REFRIGERANT LEAK

(a) Using a halogen leak detector, check pipe joints for refrigerant leaks.

(b) If refrigerant leak is detected in a joint, check the torque of the joint.



# REMOVAL

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

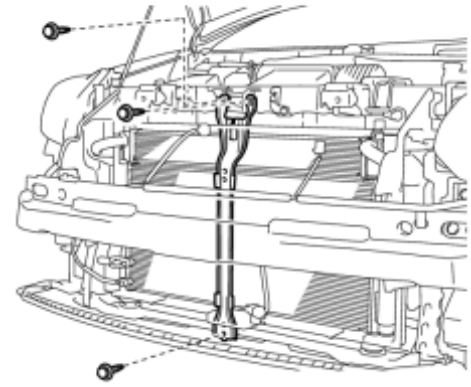
6. REMOVE RADIATOR SUPPORT OPENING COVER INFO

7. REMOVE FRONT BUMPER ASSEMBLY INFO

8. REMOVE MILLIMETER WAVE RADAR SENSOR ASSEMBLY (w/ Dynamic Radar Cruise Control System) INFO

9. REMOVE MILLIMETER WAVE RADAR SENSOR BRACKET

(a) w/o Dynamic Radar Cruise Control System:

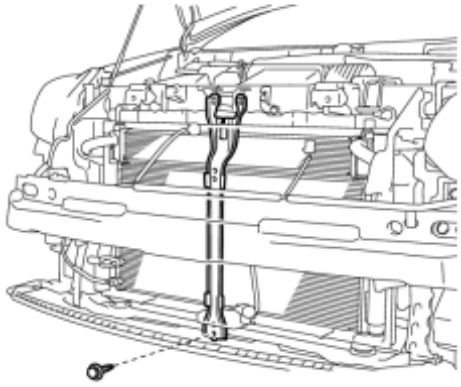


P

(1) Remove the 3 bolts and millimeter wave radar sensor bracket.

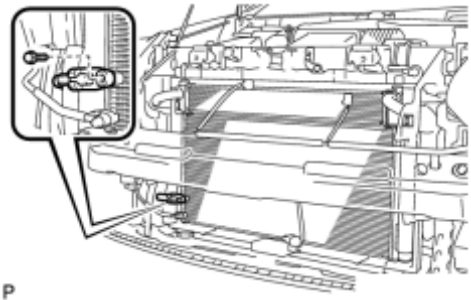
(b) w/ Dynamic Radar Cruise Control System:

(1) Remove the bolt and millimeter wave radar sensor bracket.



P

10. DISCONNECT DISCHARGE HOSE SUB-ASSEMBLY



P

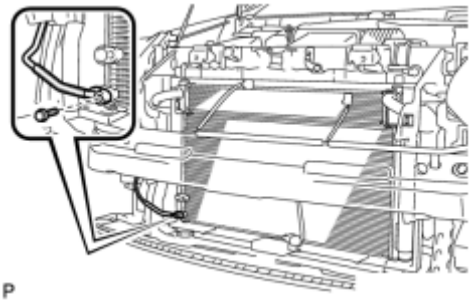
(a) Remove the bolt and disconnect the discharge hose sub-assembly.

(b) Remove the O-ring from the discharge hose sub-assembly.

NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

11. DISCONNECT AIR CONDITIONING TUBE AND ACCESSORY ASSEMBLY



P

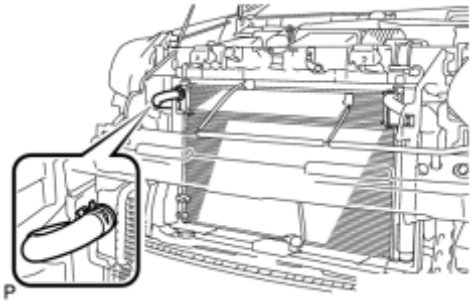
(a) Remove the bolt and disconnect the air conditioning tube and accessory assembly.

(b) Remove the O-ring from the air conditioning tube and accessory assembly.

NOTICE:

Seal the openings of the disconnected parts using vinyl tape to prevent entry of moisture and foreign matter.

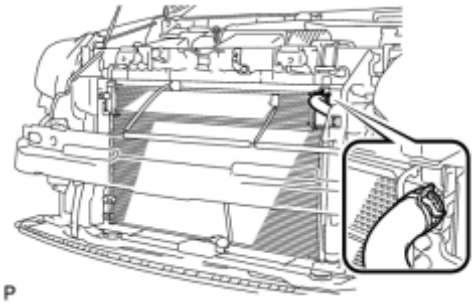
12. DISCONNECT NO. 5 INVERTER COOLING HOSE



(a) Using pliers, grip the claws of the clip and slide the clip to disconnect the No. 5 inverter cooling hose.

- Do not apply excessive force to the No. 5 inverter cooling hose.
- Prepare a drain pan or cloth in case the coolant leaks.

13. DISCONNECT NO. 7 INVERTER COOLING HOSE



(a) Using pliers, grip the claws of the clip and slide the clip to disconnect the No. 7 inverter cooling hose.

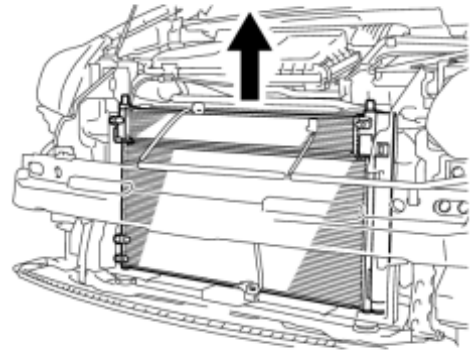
- Do not apply excessive force to the No. 7 inverter cooling hose.
- Prepare a drain pan or cloth in case the coolant leaks.

14. REMOVE NO. 1 INVERTER BRACKET INFO

15. REMOVE HOOD LOCK SUPPORT SUB-ASSEMBLY INFO

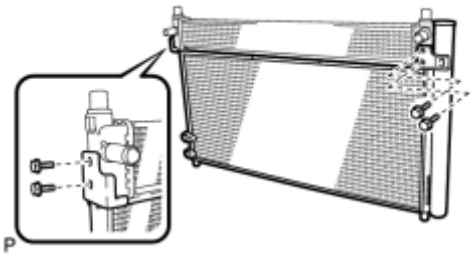
16. REMOVE NO. 2 FAN SHROUD INFO

17. REMOVE COOLER CONDENSER ASSEMBLY



(a) Remove the cooler condenser assembly with hybrid radiator assembly.

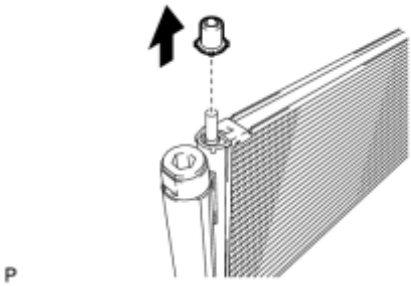
(b) Remove the 4 bolts and cooler condenser assembly from the hybrid radiator assembly.


P

# DISASSEMBLY

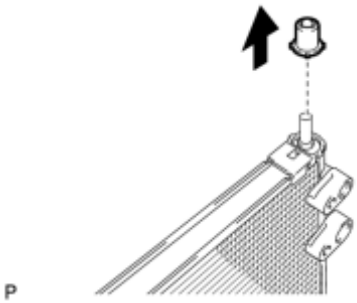
1. REMOVE COOLER CONDENSER CUSHION

(a) for LH Side:



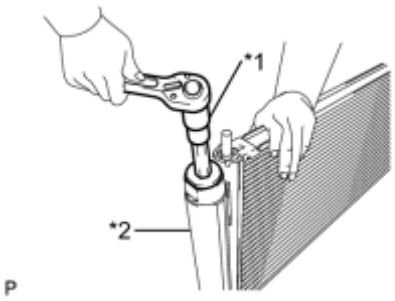

(1) Remove the cooler condenser cushion.

(b) for RH Side:




(1) Remove the cooler condenser cushion.

2. REMOVE COOLER DRYER

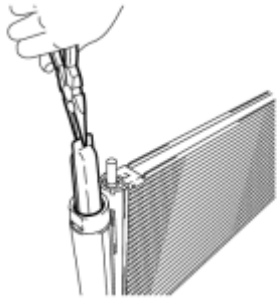



(a) Using a 14 mm straight hexagon wrench, remove the cap from the modulator.

## Text in Illustration

| | |
|---|---|
| *1 | 14 mm Straight Hexagon Wrench |
| *2 | Modulator |

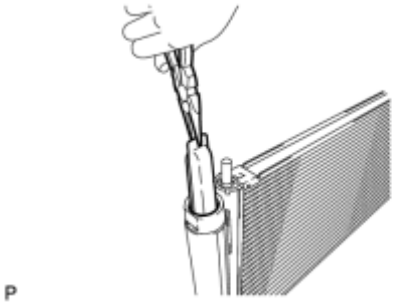
(b) Using pliers, remove the cooler dryer.



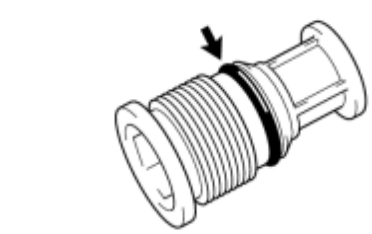
P

# REASSEMBLY

1. INSTALL COOLER DRYER



(a) Using pliers, install a new cooler dryer to the modulator.



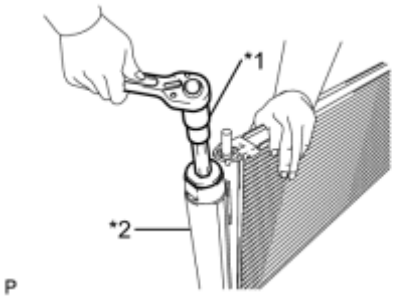
(b) Sufficiently apply compressor oil to a new O-ring and the fitting surfaces of the cap.

Compressor oil:

ND-OIL 11 or equivalent

(c) Using a 14 mm straight hexagon wrench, install the cap to the cooler condenser core.

Torque: **2.9 N·m (30 kgf·cm, 26in·lbf)**




- Keep the O-ring and O-ring fitting surfaces clean from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.

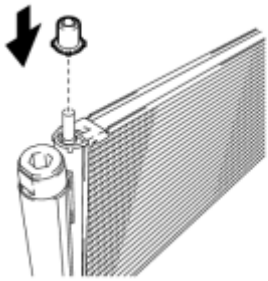
## Text in Illustration

| | |
|---|---|
| *1 | 14 mm Straight Hexagon Wrench |
| *2 | Modulator |

2. INSTALL COOLER CONDENSER CUSHION

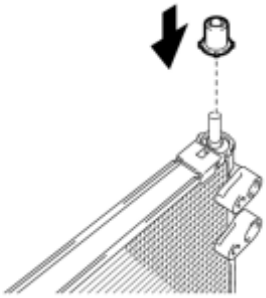
(a) for LH Side:

(1) Install the cooler condenser cushion.



P

(b) for RH Side:

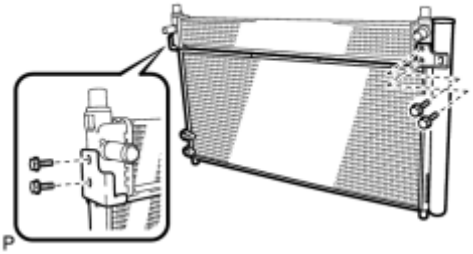


P

(1) Install the cooler condenser cushion.

# INSTALLATION

1. INSTALL COOLER CONDENSER ASSEMBLY



P

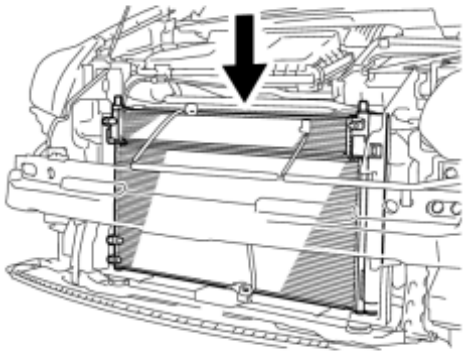
(a) Install the cooler condenser assembly with the 4 bolts to the hybrid radiator assembly.

Torque: **9.0 N·m (92 kgf·cm, 80in·lbf)**

(b) Install the cooler condenser assembly.

HINT:

If the condenser is replaced with a new one, add compressor oil to the new condenser.



P

Capacity:

40 cc (1.35 fl. oz.)

Compressor oil:

ND-11 or equivalent

NOTICE:

Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.

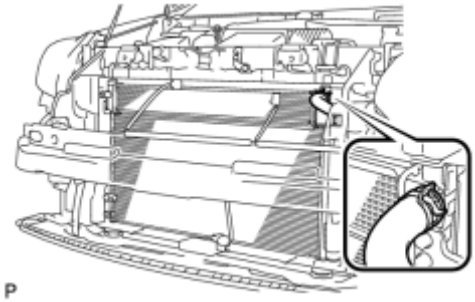
2. INSTALL NO. 2 FAN SHROUD INFO

3. INSTALL HOOD LOCK SUPPORT SUB-ASSEMBLY INFO

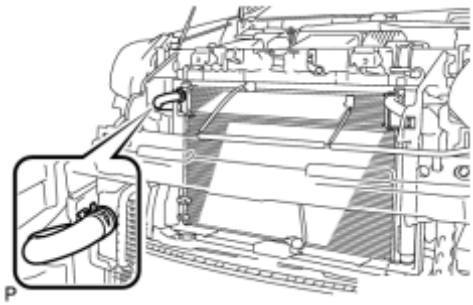
4. INSTALL NO. 1 INVERTER BRACKET INFO

5. CONNECT NO. 7 INVERTER COOLING HOSE

(a) Using pliers, grip the claws of the clip and slide the clip to connect the No. 7 inverter cooling hose.



6. CONNECT NO. 5 INVERTER COOLING HOSE



(a) Using pliers, grip the claws of the clip and slide the clip to connect the No. 5 inverter cooling hose.

7. CONNECT AIR CONDITIONING TUBE AND ACCESSORY ASSEMBLY

(a) Remove the attached vinyl tape from the pipe and the connecting part of the cooler condenser assembly.

(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the pipe joint.

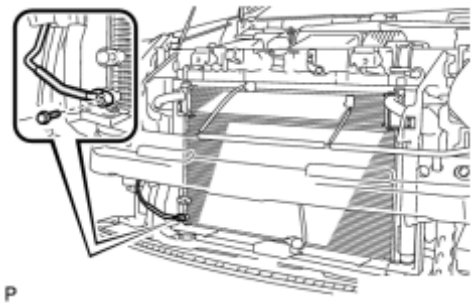
Compressor oil:

ND-OIL 11 or equivalent

(c) Install the O-ring on the air conditioning tube and accessory assembly.

NOTICE:

- Keep the O-ring and O-ring fitting surfaces clean from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.



(d) Install the air conditioning tube and accessory assembly on the cooler condenser assembly with the bolt.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

8. CONNECT DISCHARGE HOSE SUB-ASSEMBLY

(a) Remove the attached vinyl tape from the hose and the connecting part of the cooler condenser assembly.

(b) Sufficiently apply compressor oil to a new O-ring and the fitting surface of the hose joint.

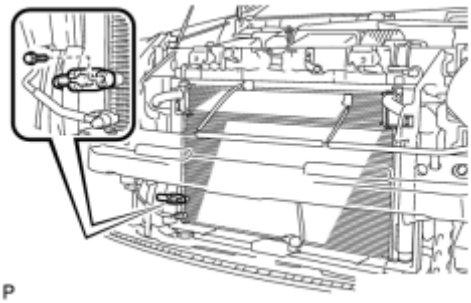
Compressor oil:

ND-OIL 11 or equivalent

(c) Install the O-ring on the discharge hose sub-assembly.

NOTICE:

- Keep the O-ring and O-ring fitting surfaces clean from dirt or any foreign objects.
- Do not use any compressor oil other than ND-OIL 11 or equivalent. If any compressor oil other than ND-OIL 11 or equivalent is used, compressor motor insulation performance may decrease, resulting in a leakage of electric power.



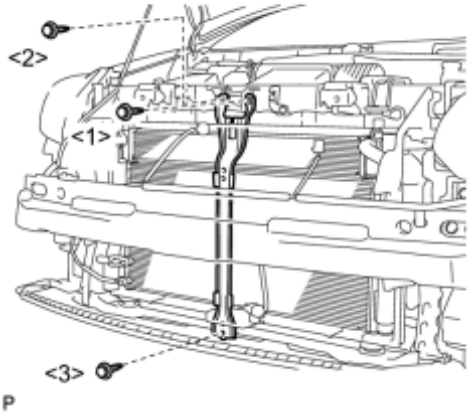
P

(d) Install the discharge hose sub-assembly on the cooler condenser assembly with the bolt.

Torque: **5.4 N·m (55 kgf·cm, 48in·lbf)**

9. INSTALL MILLIMETER WAVE RADAR SENSOR BRACKET

(a) w/o Dynamic Radar Cruise Control System:




P

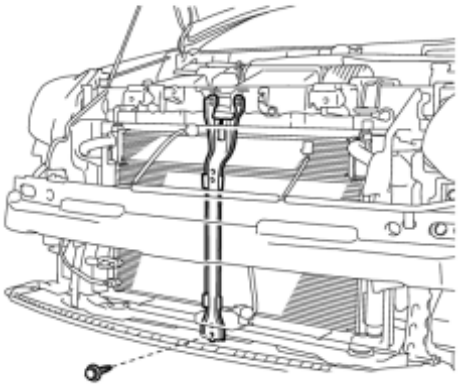
(1) Install the millimeter wave radar sensor bracket with the 3 bolts.

Torque: **6.2 N·m (63 kgf·cm, 55in·lbf)**

NOTICE:

Tighten the bolts in the order shown in the illustration to install the millimeter wave radar sensor bracket.

(b) w/ Dynamic Radar Cruise Control System:



P

(1) Install the millimeter wave radar sensor bracket with the bolt.

Torque: **6.2 N·m (63 kgf·cm, 55in·lbf)**

10. INSTALL MILLIMETER WAVE RADAR SENSOR ASSEMBLY (w/ Dynamic Radar Cruise Control System) INFO

11. INSTALL FRONT BUMPER ASSEMBLY INFO

12. ADD WASHER FLUID (w/ Headlight Cleaner System) INFO

13. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

14. INSTALL REAR NO. 3 FLOOR BOARD INFO

15. INSTALL REAR DECK FLOOR BOX INFO

16. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

17. CHARGE WITH REFRIGERANT INFO

18. ADD COOLANT (for Inverter) INFO

19. WARM UP COMPRESSOR INFO

20. INSPECT FOR REFRIGERANT LEAK INFO

21. INSPECT FOR COOLANT LEAK (for Inverter) INFO

22. ADJUST FOG LIGHT AIMING

HINT:

Refer to the procedure for Adjust Fog Light Aiming INFO.

23. ADJUST HOOD SUB-ASSEMBLY

HINT:

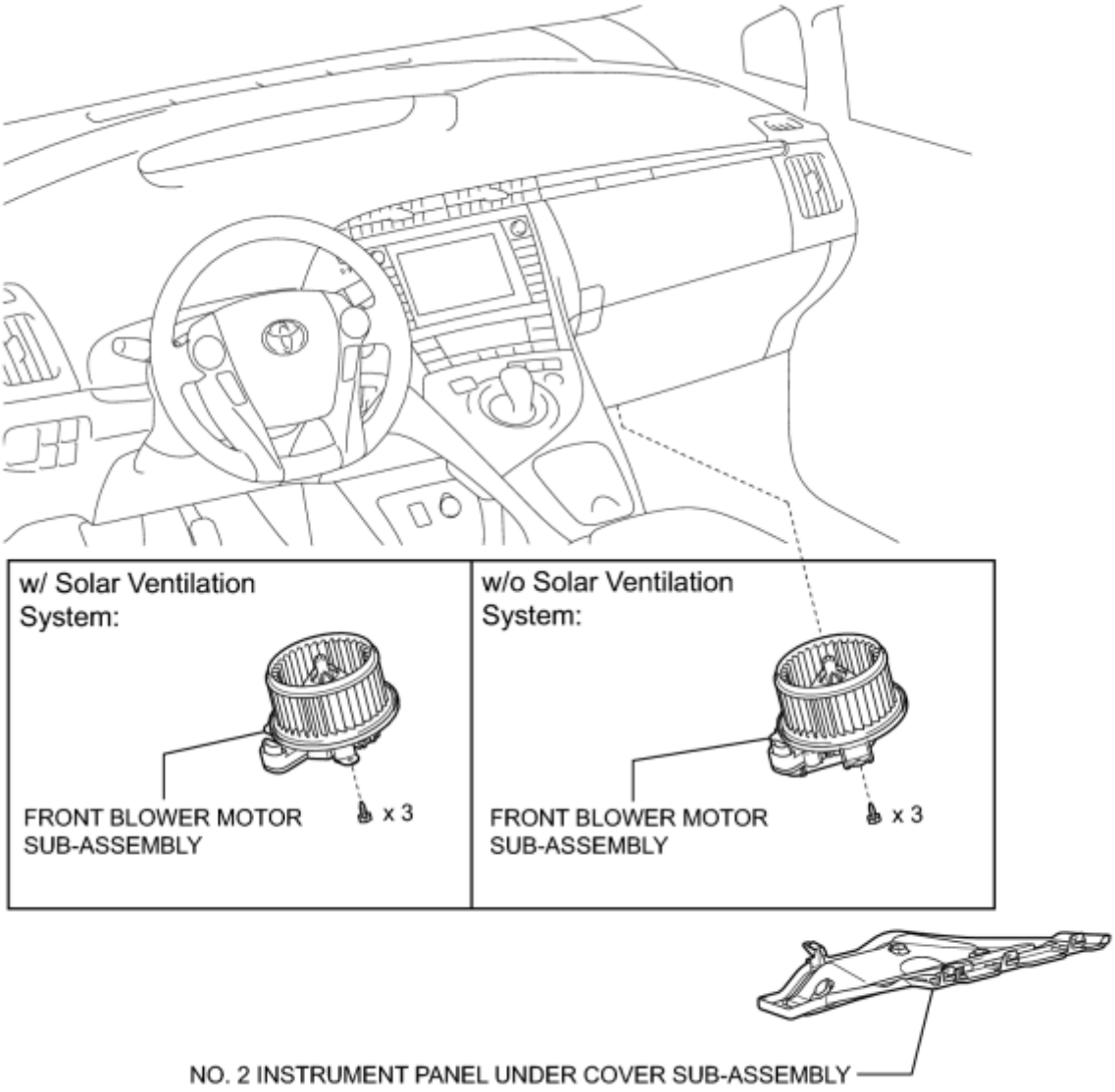
Refer to the procedure for Adjust Hood Sub-assembly INFO.

24. ADJUST MILLIMETER WAVE RADAR SENSOR ASSEMBLY (w/ Dynamic Radar Cruise Control System) INFO

25. INSTALL RADIATOR SUPPORT OPENING COVER INFO

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

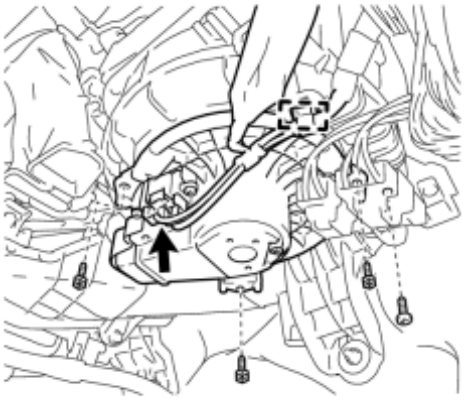
1. PRECAUTION (w/ Solar Ventilation System)

NOTICE:

Make sure to turn off the solar ventilation switch to prevent the blower motor from operating unexpectedly.

2. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

3. REMOVE FRONT BLOWER MOTOR SUB-ASSEMBLY (w/o Solar Ventilation System)



P

(a) Remove the quick heater connector screw.

(b) Disengage the clamp and disconnect the connector.

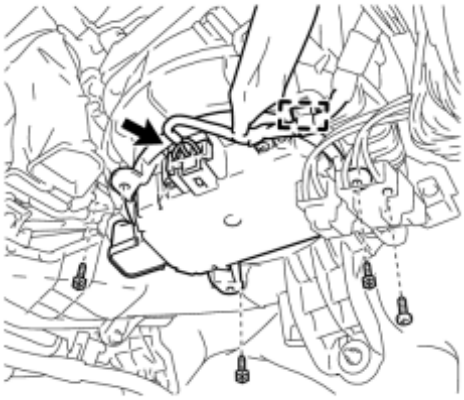
(c) Remove the 3 screws and front blower motor sub-assembly.

NOTICE:

Do not remove the front blower motor sub-assembly if it has been damaged or impacted.

4. REMOVE FRONT BLOWER MOTOR SUB-ASSEMBLY (w/ Solar Ventilation System)

(a) Remove the quick heater connector screw.



P

(b) Disengage the clamp and disconnect the connector.

(c) Remove the 3 screws and front blower motor sub-assembly.

NOTICE:

Do not remove the front blower motor sub-assembly if it has been damaged or impacted.

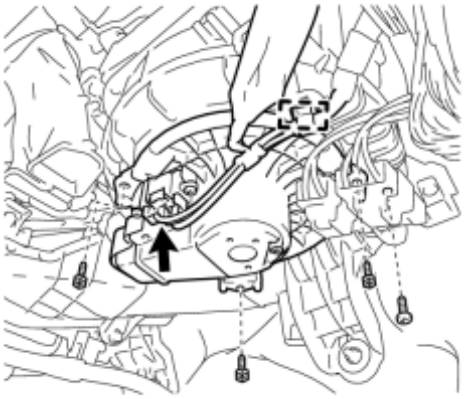
# INSTALLATION

1. PRECAUTION (w/ Solar Ventilation System)

NOTICE:

Make sure to turn off the solar ventilation switch to prevent the blower motor from operating unexpectedly.

2. INSTALL FRONT BLOWER MOTOR SUB-ASSEMBLY (w/o Solar Ventilation System)



P

(a) Install the front blower motor sub-assembly with the 3 screws.

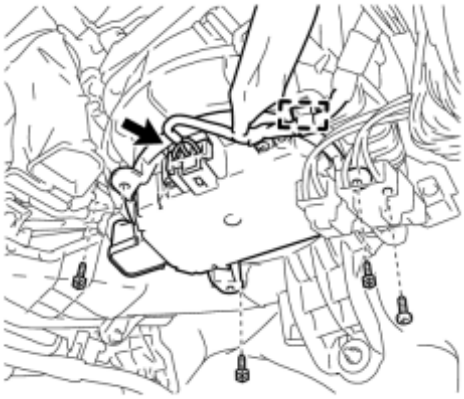
NOTICE:

Do not install the front blower motor sub-assembly if it has been damaged or impacted.

(b) Engage the clamp and connect the connector.

(c) Install the quick heater connector screw.

3. INSTALL FRONT BLOWER MOTOR SUB-ASSEMBLY (w/ Solar Ventilation System)



P

(a) Install the front blower motor sub-assembly with the 3 screws.

NOTICE:

Do not install the front blower motor sub-assembly if it has been damaged or impacted.

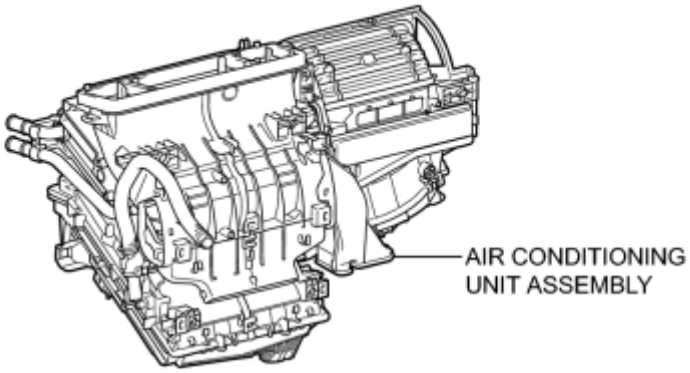
(b) Engage the clamp and connect the connector.

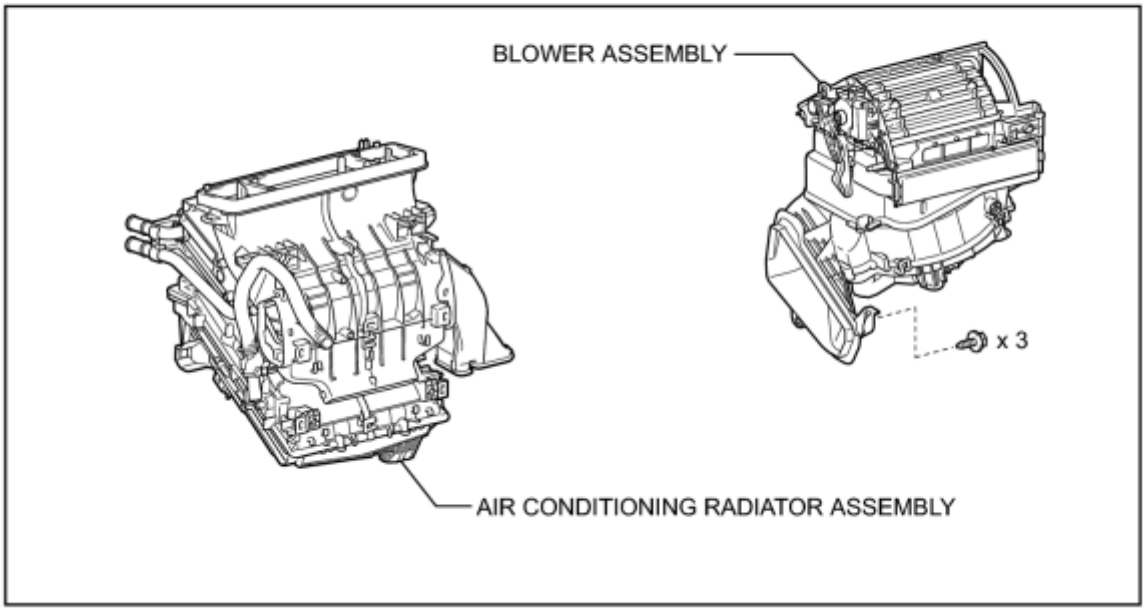
(c) Install the quick heater connector screw.

4. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

# COMPONENTS

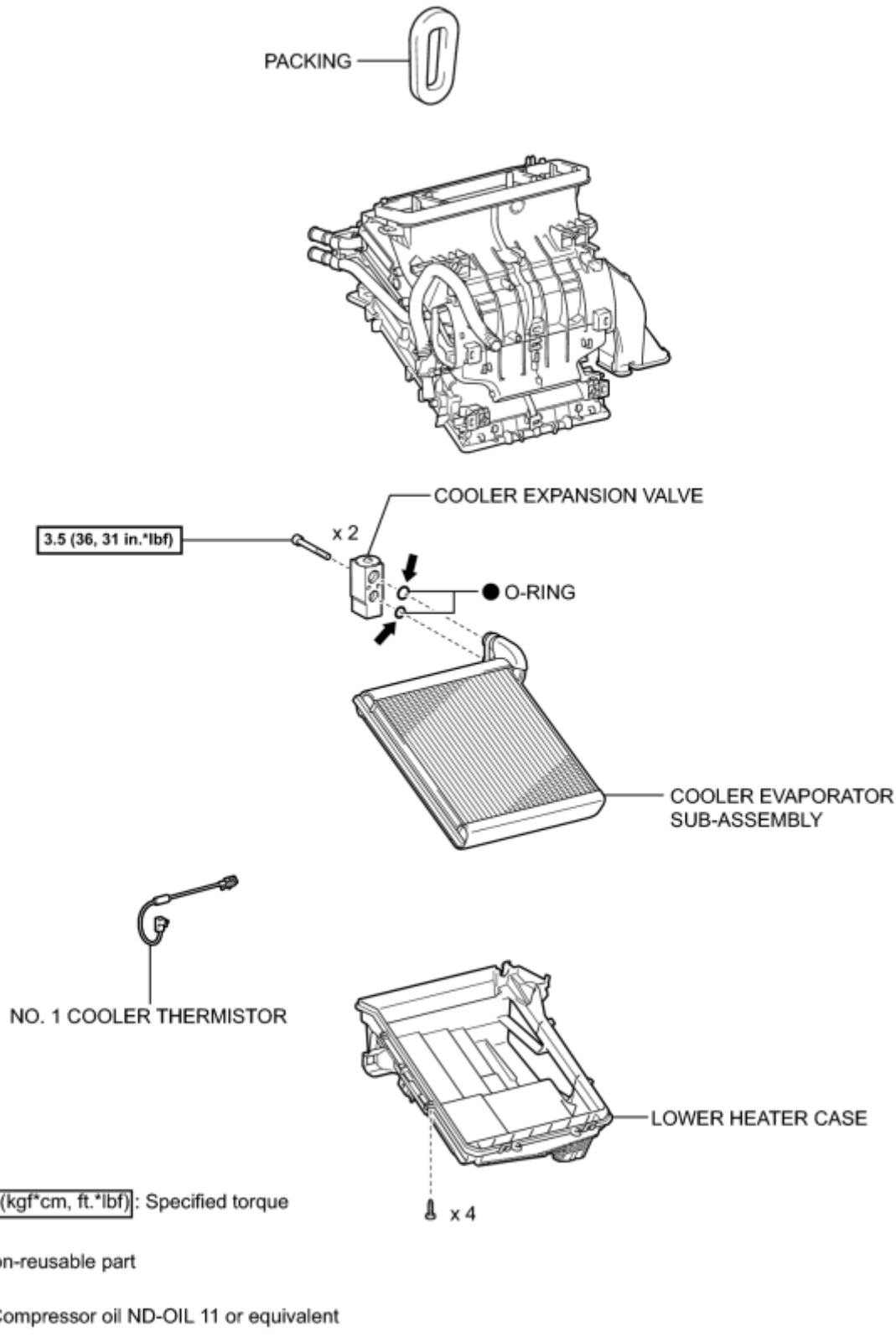
# ILLUSTRATION




P

# ILLUSTRATION


PACKING
COOLER EXPANSION VALVE
3.5 (36, 31 in.*lbf)
x 2
O-RING
COOLER EVAPORATOR SUB-ASSEMBLY
NO. 1 COOLER THERMISTOR
LOWER HEATER CASE
x 4
N*m (kgf*cm, ft.*lbf): Specified torque
Non-reusable part
Compressor oil ND-OIL 11 or equivalent

P

# REMOVAL

1. REMOVE AIR CONDITIONING UNIT ASSEMBLY

HINT:

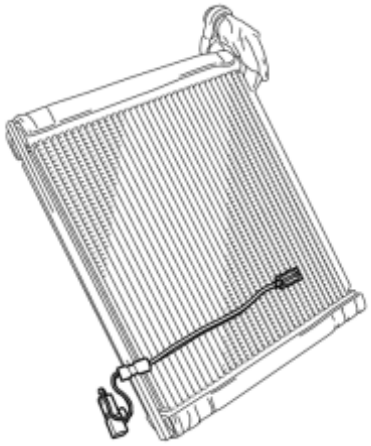
Refer to the procedure for Remove Air Conditioning Unit Assembly INFO.

2. REMOVE BLOWER ASSEMBLY INFO

3. REMOVE COOLER EXPANSION VALVE INFO

4. REMOVE COOLER EVAPORATOR SUB-ASSEMBLY INFO

5. REMOVE NO. 1 COOLER THERMISTOR



P

(a) Remove the No. 1 cooler thermistor.

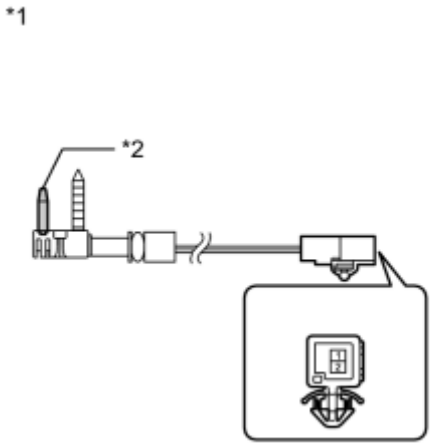
# INSPECTION

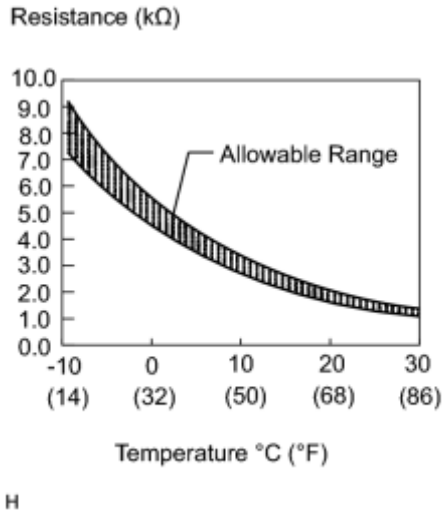
1. INSPECT EVAPORATOR TEMPERATURE SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | -10°C (14°F) | 7.30 to 9.10 kΩ |
| 1 - 2 | -5°C (23°F) | 5.65 to 6.95 kΩ |
| 1 - 2 | 0°C (32°F) | 4.40 to 5.35 kΩ |
| 1 - 2 | 5°C (41°F) | 3.40 to 4.15 kΩ |
| 1 - 2 | 10°C (50°F) | 2.70 to 3.25 kΩ |
| 1 - 2 | 15°C (59°F) | 2.14 to 2.58 kΩ |
| 1 - 2 | 20°C (68°F) | 1.71 to 2.05 kΩ |
| 1 - 2 | 25°C (77°F) | 1.38 to 1.64 kΩ |
| 1 - 2 | 30°C (86°F) | 1.11 to 1.32 kΩ |




H

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Evaporator Temperature Sensor) |
| *2 | Sensing Portion |

- Hold the sensor only by its connector. Touching the sensor may change the resistance value.
- When measuring, the sensor temperature must be the same as the ambient temperature.

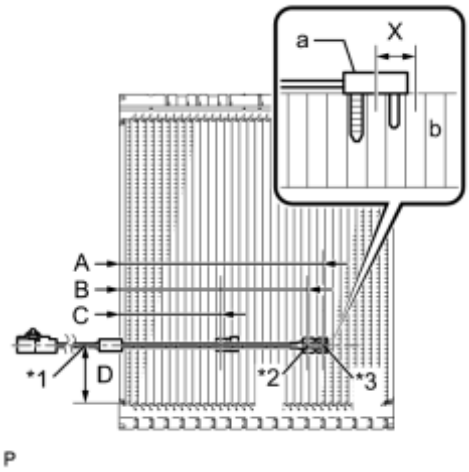
HINT:

As the temperature increases, the resistance decreases (see the graph).

If the resistance is not as specified, replace the evaporator temperature sensor.

# INSTALLATION

1. INSTALL NO. 1 COOLER THERMISTOR




P

(a) Install the No. 1 cooler thermistor as shown in the illustration.

| Part | Length | |
|---|---|---|
| A | 175 mm | 6.89 in. |
| B | 161.6 mm | 6.36 in. |
| C | 87.9 mm | 3.46 in. |
| D | 50 mm | 1.99 in. |

## Text in Illustration

| | |
|---|---|
| *1 | From Tank |
| *2 | Fixed Part |
| *3 | Sensor Part |

- Be sure to insert the thermistor only once because reinserting it into the same position will not allow it to be firmly secured.
- When reusing the evaporator, insert the thermistor one row next to the one that has been used previously (X in the illustration).
- After inserting the thermistor, do not apply excessive force to the wire.
- Directly insert the thermistor until the edge of plastic case "a" comes into contact with evaporator "b".

2. INSTALL COOLER EVAPORATOR SUB-ASSEMBLY INFO

3. INSTALL COOLER EXPANSION VALVE INFO

4. INSTALL BLOWER ASSEMBLY INFO

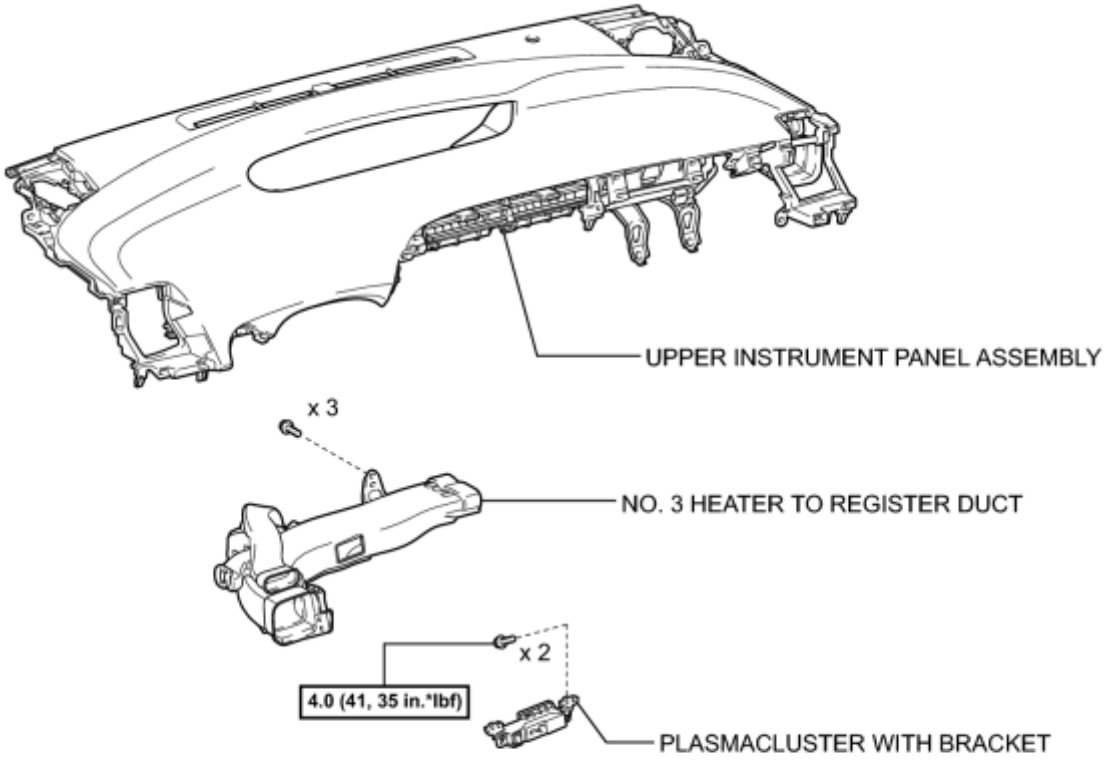
5. INSTALL AIR CONDITIONING UNIT ASSEMBLY

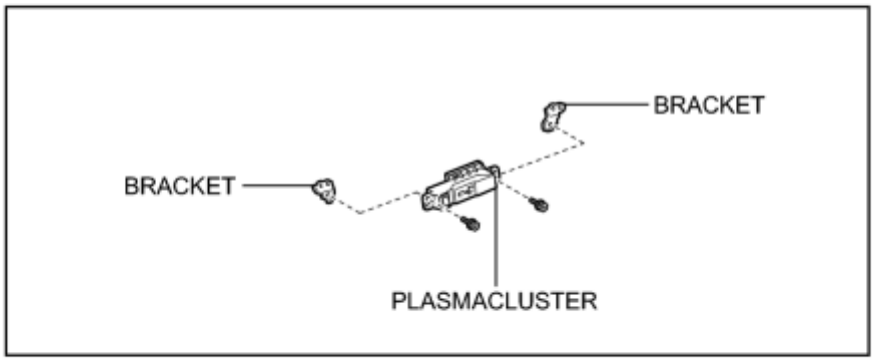
HINT:

Refer to the procedure for Install Air Conditioning Unit Assembly INFO.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

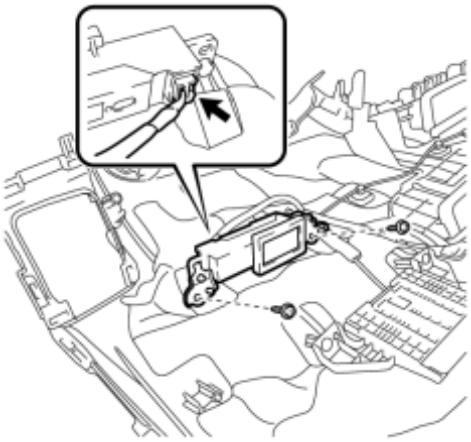
1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure for Remove Upper Instrument Panel Assembly INFO.

2. REMOVE NO. 3 HEATER TO REGISTER DUCT INFO

3. REMOVE PLASMACLUSTER WITH BRACKET

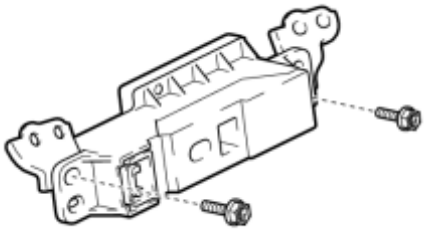


P

(a) Disconnect the connector.

(b) Remove the 2 screws and plasmacluster with bracket.

4. REMOVE PLASMACLUSTER



P

(a) Remove the 2 screws and plasmacluster from the 2 brackets.

# INSTALLATION

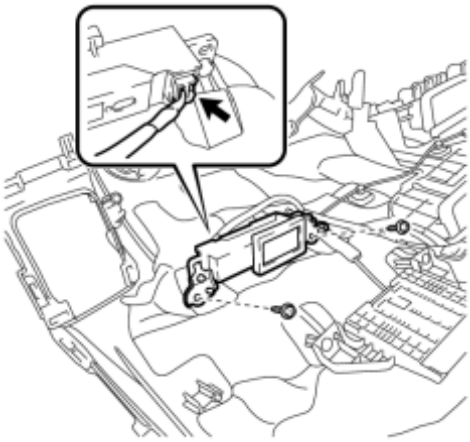
1. INSTALL PLASMACLUSTER



P

(a) Install the plasmacluster with the 2 screws to the 2 brackets.

2. INSTALL PLASMACLUSTER WITH BRACKET



P

(a) Install the plasmacluster with bracket with the 2 screws.

Torque: **4.0 N·m (41 kgf·cm, 35in·lbf)**

(b) Connect the connector.

3. INSTALL NO. 3 HEATER TO REGISTER DUCT INFO

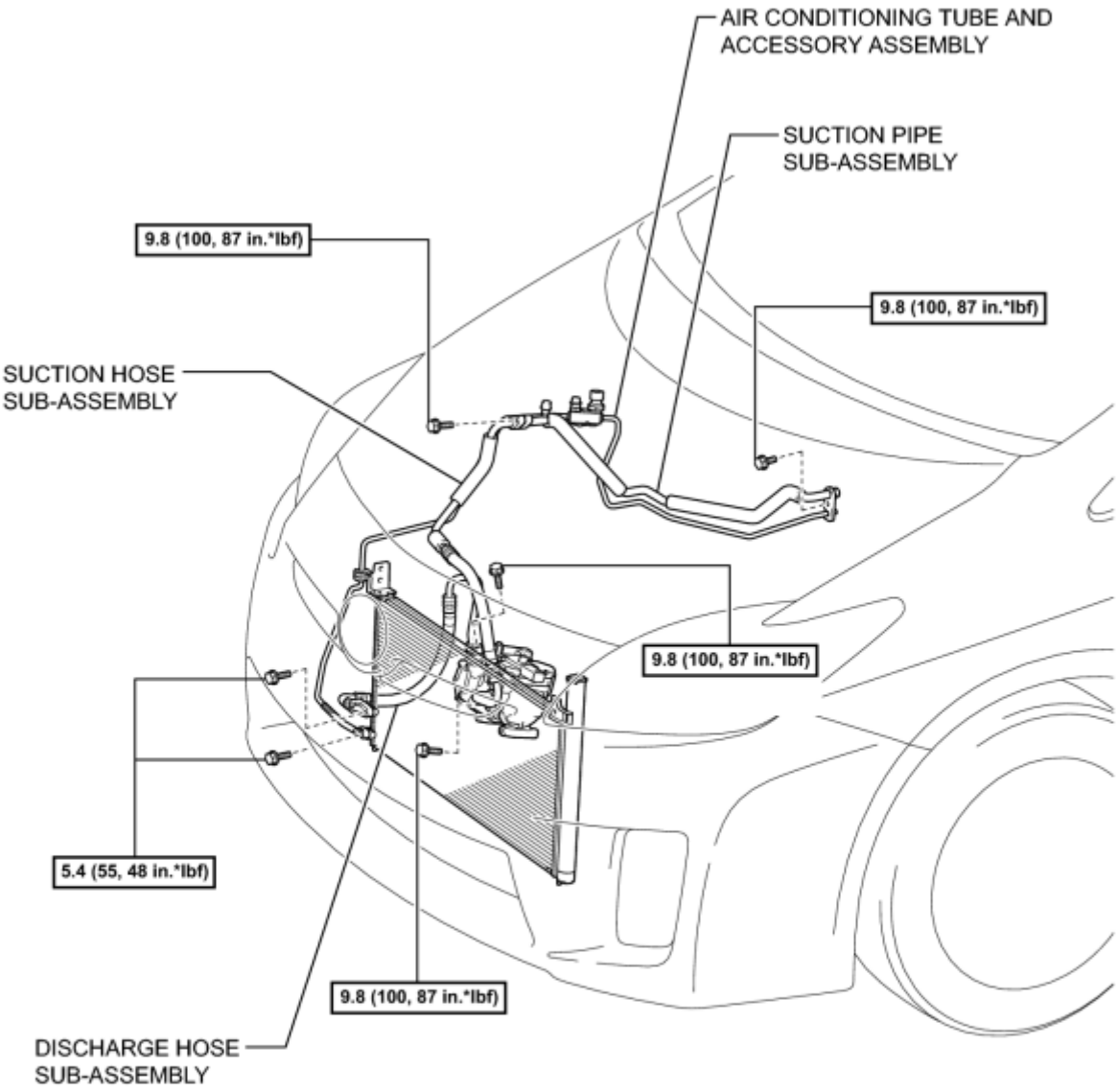
4. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure for Install Upper Instrument Panel Assembly INFO.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ON-VEHICLE INSPECTION

1. INSPECT REFRIGERANT VOLUME

(a) Check the sight glass on the air conditioning tube and accessory.

(1) Prepare the vehicle according to the chart below.

| Item | Condition |
|---|---|
| Vehicle door | Fully open |
| Temperature setting | MAX COOL |
| Blower speed | HI |
| A/C | on |

(2) Compare the sight glass to the following chart.



P

| Item | Symptom | Amount of Refrigerant | Corrective Action |
|---|---|---|---|
| 1 | Bubbles exist | Insufficient* | 1. Check for gas leaks and repair if necessary<br>2. Recharge with a proper amount of refrigerant |
| 2 | No bubbles exist | Empty, insufficient, or excessive | Refer to 3 and 4 |
| 3 | No temperature difference between compressor inlet and outlet | Empty or nearly empty | 1. Check for gas leaks and repair if necessary<br>2. Evacuate the AC system and recharge with a proper amount of refrigerant |
| 4 | Considerable temperature difference between compressor inlet and outlet | Proper or excessive | Refer to 5 and 6 |
| 5 | Immediately after air conditioning is turned off, refrigerant remains clear | Excessive | 1. Recover refrigerant<br>2. Evacuate the AC system and recharge with a proper |

| | | | |
|---|---|---|---|
| | | | amount of refrigerant |
| 6 | Immediately after air conditioning is turned off, refrigerant foams and then becomes clear | Proper | - |

*: Bubbles in the sight glass with the vehicle's interior temperature above 35°C (95°F) can be considered normal if cooling is sufficient.

2. INSPECT REFRIGERANT PRESSURE WITH MANIFOLD GAUGE SET

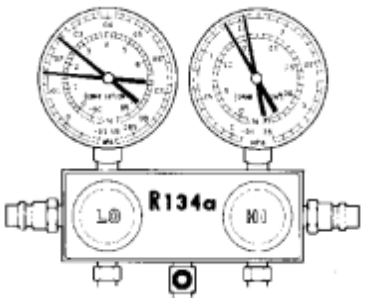
HINT:

This is a method where a manifold gauge set is used to help locate the problem.

(a) Read the manifold gauge pressure when the following conditions are met:

Test conditions:

- Temperature at the air inlet with the switch set at RECIRC is 30 to 35°C (86 to 95°F).
- The blower speed control switch position is at "HI".
- The temperature control dial position is at "COOL".
- The A/C switch is on.
- Doors are fully open.
- The power switch is in a position that enables the A/C compressor to run.



E50573

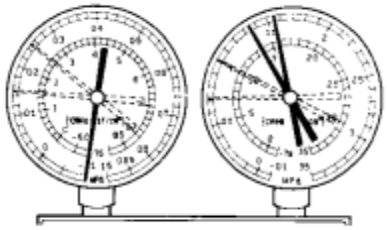
(1) Normally functioning refrigeration system

# Gauge Reading

| Pressure Side | Refrigerant Volume |
|---|---|
| Low | 0.15 to 0.25 MPa (1.5 to 2.5 kgf/cm$^2$, 21 to 36 psi) |
| High | 1.37 to 1.57 MPa (13.9 to 16.0 kgf/cm$^2$, 199 to 228 psi) |

(2) Moisture is present in the refrigeration system.

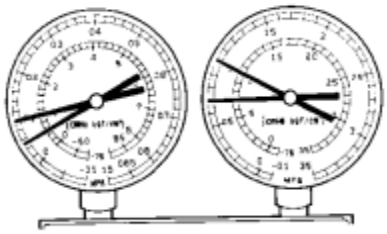
Condition: Periodically cools and then fails to cool


I22117

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| During operation, pressure on low pressure side cycles between normal and vacuum | • Moisture in the AC system will freeze at the expansion valve orifice, causing the refrigeration cycle to temporarily stop<br>• After the system stops, and warms up again, the ice will melt and normal operation will be temporarily restored | • Cooler dryer (integrated into condenser tank) in oversaturated state<br>• Moisture in refrigeration system freezes at expansion valve orifice and blocks circulation of refrigerant | 1. Replace cooler dryer<br>2. Remove moisture in system by repeatedly evacuating air<br>3. Supply a proper amount of new refrigerant |

(3) Insufficient cooling

Condition: Cooling system does not function effectively.

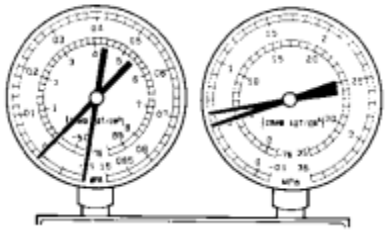


I22118

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Pressure is low on both low and high pressure sides<br>• Bubbles are seen through sight glass continuously<br>• Insufficient cooling performance | Gas leaks from the refrigeration system | • Insufficient refrigerant<br>• Refrigerant leaking | 1. Check for gas leaks and repair if necessary<br>2. Supply a proper amount of new refrigerant<br>3. If the gauge indicates a pressure of close to 0, then it will be necessary to evacuate the system after repairing the leak |

(4) Poor circulation of refrigerant

Condition: Cooling system does not function effectively.



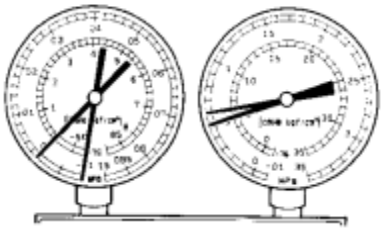
I22119

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Pressure is low on both low and high pressure sides<br>• Frost exists on pipe from condenser to unit | Refrigerant flow is obstructed by dirt inside the pipes of the condenser core | Receiver is clogged | Replace condenser |

(5) Refrigerant does not circulate.

Condition: Cooling system does not function. (Sometimes it may function.)

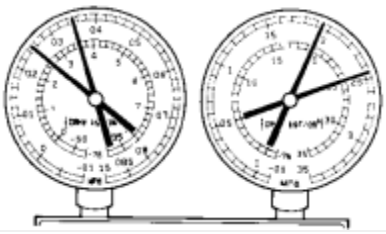


I22120

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Vacuum is indicated on low pressure side and very low pressure is indicated on high pressure side<br>• Frost or condensation is seen on piping on both sides of receiver/drier or expansion valve | • Refrigerant flow is obstructed by moisture or dirt in refrigeration system<br>• Refrigerant flow is disrupted by gas leaks internally through the expansion valve | Refrigerant does not circulate | 1. Check expansion valve<br>2. Replace expansion valve<br>3. Replace condenser<br>4. Evacuate air and supply a proper amount of new refrigerant<br>5. For internal gas leaks at expansion valve, replace expansion valve |

(6) Refrigerant is overcharged or cooling effectiveness of condenser is insufficient.

Condition: Cooling system does not function.



I22121

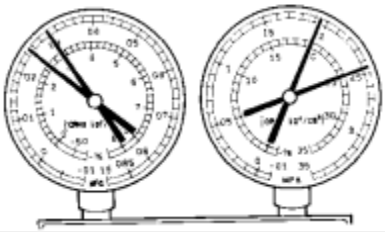
| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Pressure is too | • Unable to develop | • Excessive refrigerant | 1. Clean condenser |

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| high on both low and high pressure sides<br>• No air bubbles are seen through sight glass even when compressor is on | sufficient performance due to excessive use of refrigeration system<br>• Cooling effectiveness of condenser is insufficient | in cycle → excessive refrigerant was added during recharging<br>• Condenser cooling effectiveness is insufficient → condenser fins are clogged at cooling fan | 2. Check the operation of the condenser cooling fan<br>3. If 1 and 2 are normal state, check the amount of refrigerant and supply a proper amount of refrigerant |

(7) Air is present in the refrigeration system.

Condition: Cooling system does not function.

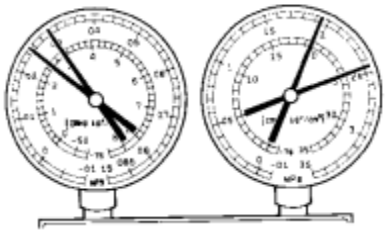
NOTE: These gauge indications occur when the refrigeration system opens and the refrigerant is charged without vacuum purging.



| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Pressure is too high on both low and high pressure sides<br>• The low pressure piping is too hot to touch<br>• Bubbles can be seen through sight glass | Air in system | • Air present in refrigeration system<br>• Insufficient vacuum purging | 1. Check compressor oil to see if it is dirty or insufficient<br>2. Evacuate the system and recharge it with new or purified refrigerant |

(8) Expansion valve malfunction

Condition: Insufficient cooling



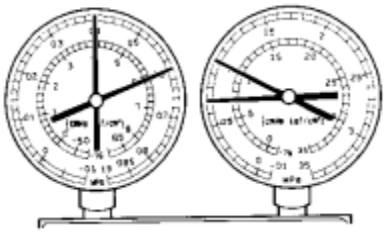
I22123

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|

| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Pressure is too high on both low and high pressure sides<br>• Frost or a large amount of condensation on piping on low pressure side | Expansion valve may be stuck | • Excessive refrigerant in low pressure piping<br>• Expansion valve opened too wide | Check expansion valve |

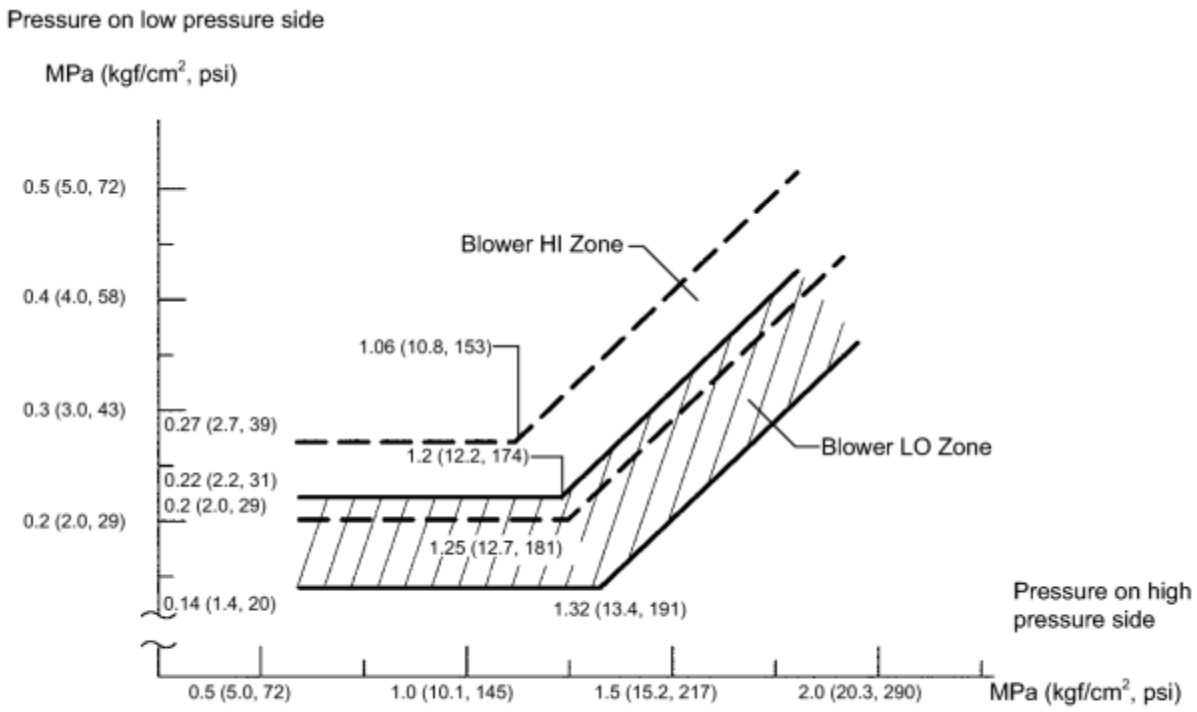
(9) Insufficient compressor compression

Condition: Insufficient cooling



| Symptom | Probable Cause | Diagnosis | Corrective Action |
|---|---|---|---|
| • Pressure is too high on both low and high pressure sides<br>• Pressure is too low on high pressure side | Internal leak in compressor | • Low compression<br>• Leak from a damaged valve, or parts may be broken | Replace compressor |

Gauge readings (Reference)


Pressure on low pressure side
MPa (kgf/cm², psi)
0.5 (5.0, 72)
0.4 (4.0, 58)
0.3 (3.0, 43)
0.2 (2.0, 29)
Blower HI Zone
1.06 (10.8, 153)
0.27 (2.7, 39)
1.2 (12.2, 174)
Blower LO Zone
0.22 (2.2, 31)
0.2 (2.0, 29)
1.25 (12.7, 181)
0.14 (1.4, 20)
1.32 (13.4, 191)
Pressure on high pressure side
0.5 (5.0, 72)
1.0 (10.1, 145)
1.5 (15.2, 217)
2.0 (20.3, 290)
MPa (kgf/cm², psi)

# REPLACEMENT

1. RECOVER REFRIGERANT FROM REFRIGERATION SYSTEM

(a) Turn the A/C switch on.

(b) Operate the A/C with the setting temperature at 25°C (77°F) and the blower level at LO for 10 minutes to circulate the refrigerant. This causes most of the compressor oil from the various components of the A/C system to collect in the A/C compressor.

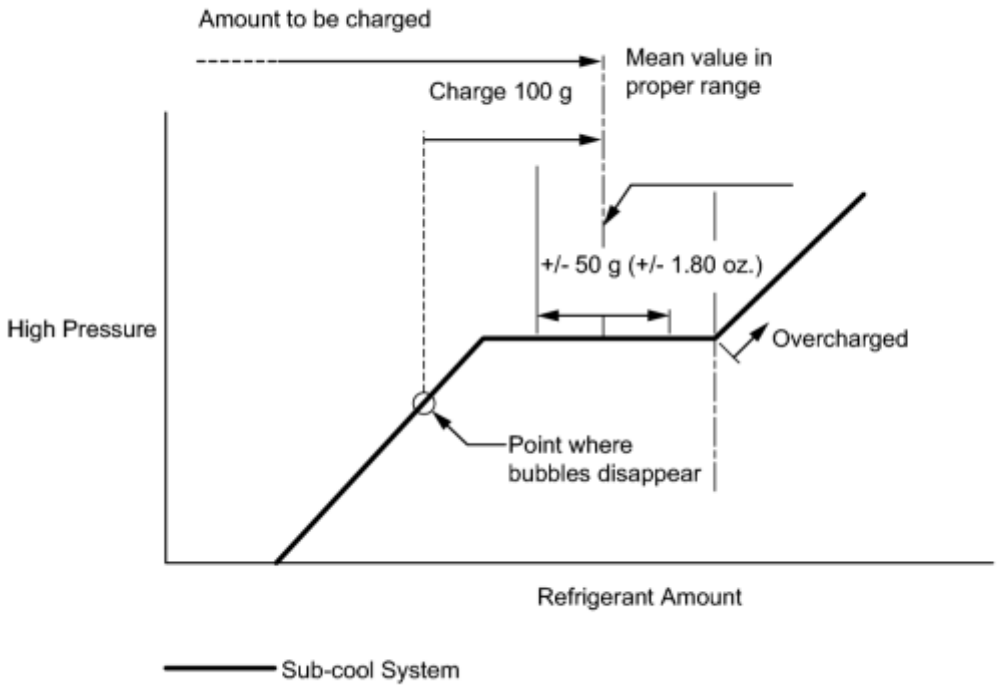
(c) Turn the power switch off.

(d) Recover the refrigerant from the A/C system using a refrigerant recovery unit.

2. CHARGE WITH REFRIGERANT

(a) Perform vacuum purging using a vacuum pump.

(b) Charge with refrigerant HFC-134a (R134a).




P

Standard:

470 g (16.6 oz.)

SST: 09985-20010

09985-02010

09985-02050

09985-02060

09985-02070

09985-02080

09985-02090

09985-02110

09985-02130

09985-02140

09985-02150

NOTICE:

- Do not turn the A/C on before charging with refrigerant. Doing so will cause the compressor to work without refrigerant, resulting in overheating of the cooler compressor.
- Approximately 100 g (3.53 oz.) of refrigerant may need to be charged after bubbles disappear. The refrigerant amount should be checked by quantity, not with the sight glass.
- Avoid using the gauge manifold set that had been used for vehicles with conventional compressor oil (ND-OIL11 or equivalent) as much as possible. This will cause compressor oil remaining in the manifold to enter the vehicle, resulting in insulation performance deterioration. A gauge manifold set that had been used 3 times or less can be reused if an appropriate one is not available.

HINT:

Ensure that sufficient refrigerant is available to recharge the system when using a refrigerant recovery unit. Refrigerant recovery units are not always able to recover 100% of the refrigerant from an A/C system.

3. WARM UP COMPRESSOR

(a) Keep the A/C switch on for at least 2 minutes to warm up the compressor.

NOTICE:

Be sure to warm up the compressor when turning the A/C on after removing and installing the cooler refrigerant lines (including the compressor), to prevent damage to the compressor.

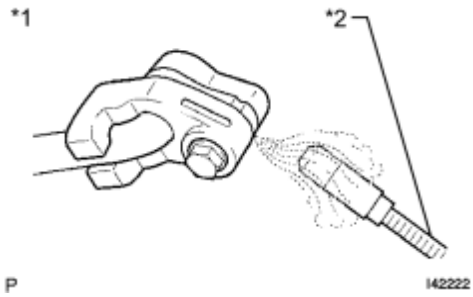
4. INSPECT FOR REFRIGERANT LEAK

(a) After recharging with refrigerant, inspect for refrigerant leaks using a halogen leak detector.

(b) Carry out the test under the following conditions:

- Turn the power switch off.
- Secure good ventilation (the halogen leak detector may react to volatile gases which are not refrigerant, such as evaporated gasoline and exhaust gas).
- Repeat the test 2 or 3 times.
- Make sure that there is some refrigerant remaining in the refrigeration system.

  When the compressor is off: approx. 392 to 588 kPa (3.9 to 5.9 kgf/cm$^2$, 57 to 85 psi)



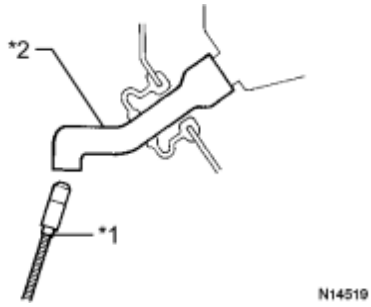

(c) Using a halogen leak detector, inspect for refrigerant leaks from the refrigerant lines.

## Text in Illustration

| | |
|---|---|
| *1 | Inspect for Leak |
| *2 | Halogen Leak Detector |

(d) Bring the halogen leak detector close to the drain hose with the detector's power off, and then turn the detector on.

## Text in Illustration




| | |
|---|---|
| *1 | Halogen Leak Detector |
| *2 | Drain Hose |

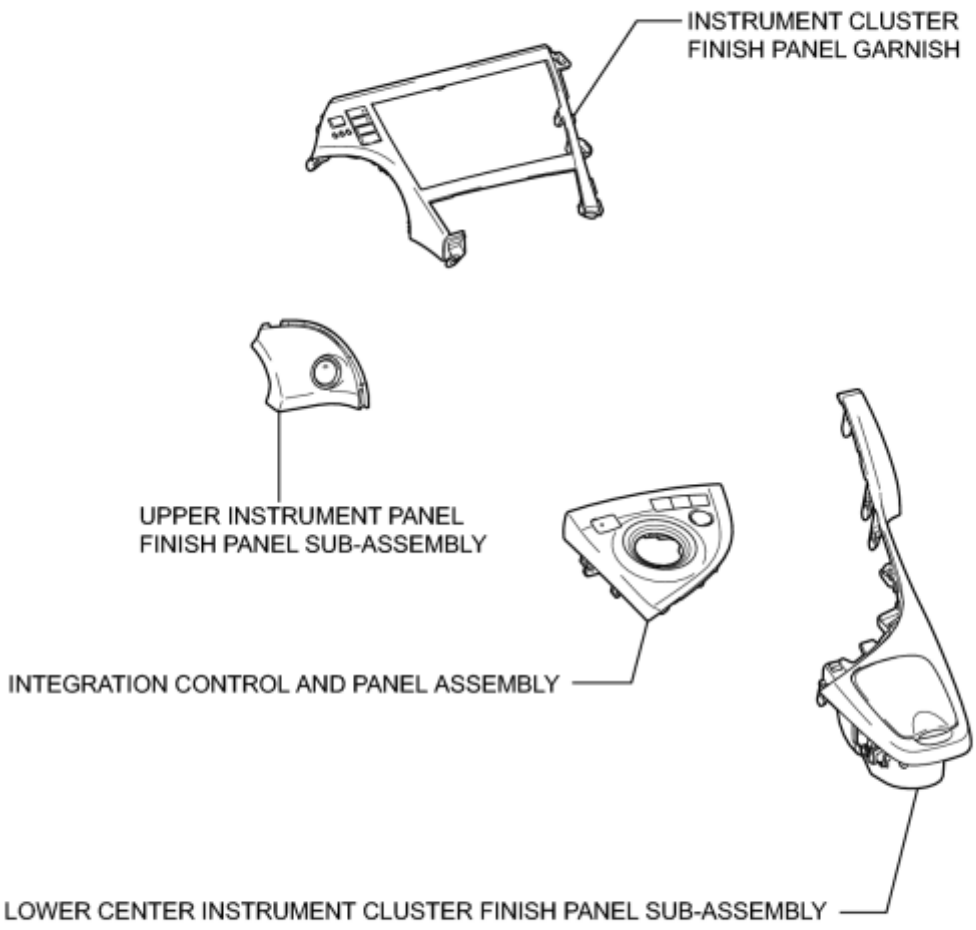
- After the blower motor has stopped, let the cooling unit stand for more than 15 minutes.
- Bring the halogen leak detector sensor under the drain hose.
- When bringing the halogen leak detector close to the drain hose, make sure that the halogen leak detector does not react to volatile gases. If it is not possible to avoid interference from volatile gases, the vehicle should be lifted up to allow testing.

(e) If a refrigerant leak is not detected from the drain hose, remove the blower motor control from the cooling unit. Insert the halogen leak detector sensor into the unit and perform the test.

(f) Disconnect the pressure switch connector and leave it for approximately 20 minutes. Bring the halogen leak detector close to the pressure switch and perform the test.

# COMPONENTS

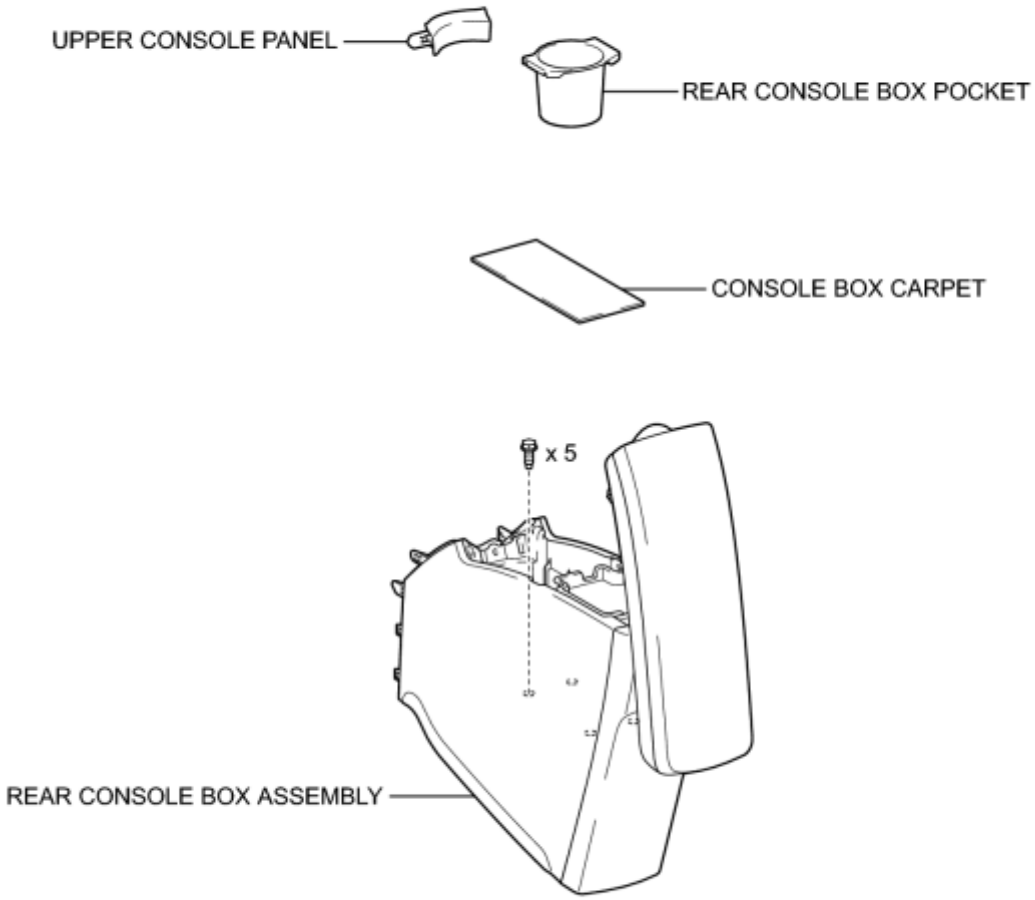
# ILLUSTRATION




P

# ILLUSTRATION

w/ Power Outlet Socket:

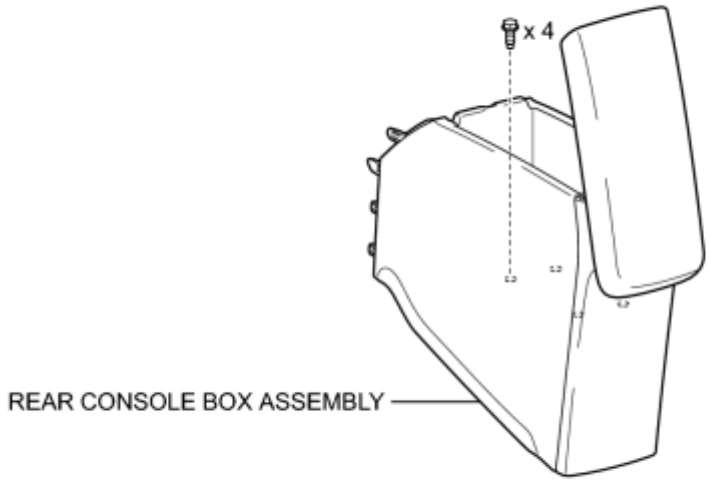



P

# ILLUSTRATION

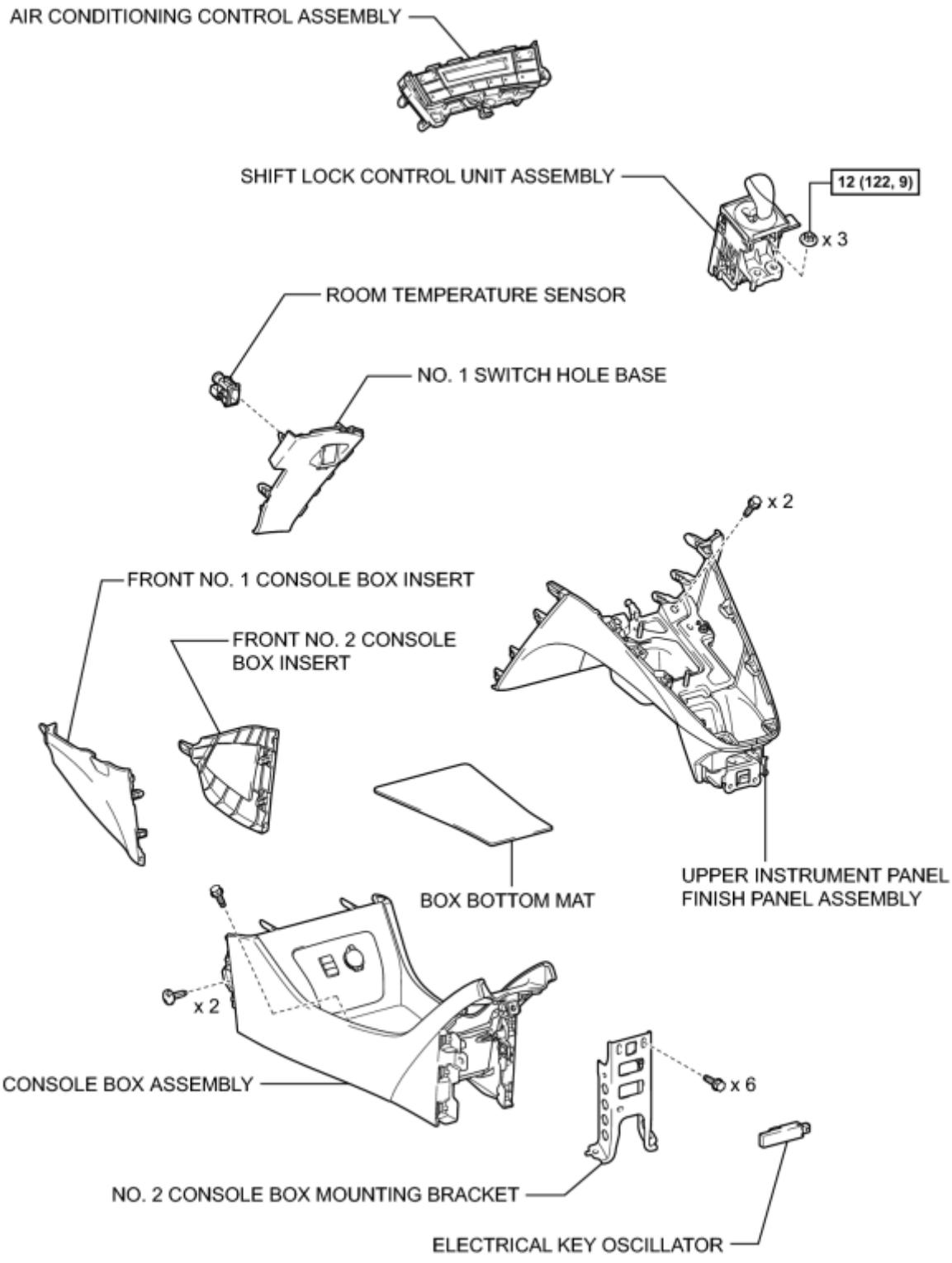
w/o Power Outlet Socket:




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

# REMOVAL

1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

2. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

3. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

4. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

5. REMOVE REAR CONSOLE BOX POCKET (w/ Power Outlet Socket) INFO

6. REMOVE UPPER CONSOLE PANEL (w/ Power Outlet Socket) INFO

7. REMOVE CONSOLE BOX CARPET INFO

8. REMOVE REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket) INFO

9. REMOVE REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket) INFO

10. REMOVE ELECTRICAL KEY OSCILLATOR INFO

11. REMOVE NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

12. REMOVE FRONT NO. 1 CONSOLE BOX INSERT INFO

13. REMOVE FRONT NO. 2 CONSOLE BOX INSERT INFO

14. REMOVE BOX BOTTOM MAT INFO

15. SEPARATE CONSOLE BOX ASSEMBLY INFO

16. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO

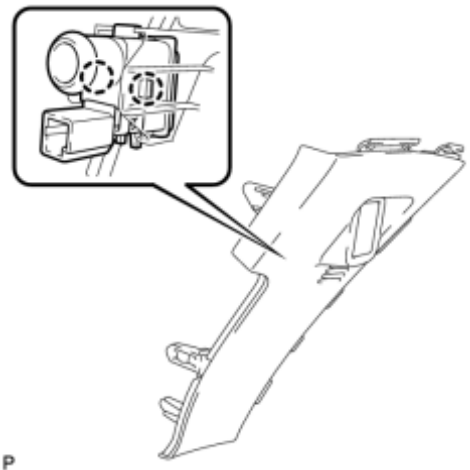
17. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

18. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

19. REMOVE NO. 1 SWITCH HOLE BASE INFO

20. REMOVE ROOM TEMPERATURE SENSOR

(a) Disengage the 2 claws and remove the room temperature sensor from the No. 1 switch hole base.



P

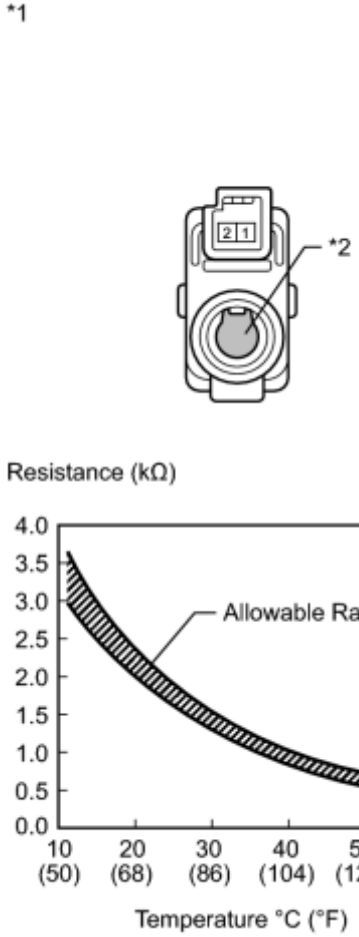
# INSPECTION

1. INSPECT ROOM TEMPERATURE SENSOR

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | 10°C (50°F) | 3.00 to 3.73 kΩ |
| 1 - 2 | 15°C (59°F) | 2.45 to 2.88 kΩ |
| 1 - 2 | 20°C (68°F) | 1.95 to 2.30 kΩ |
| 1 - 2 | 25°C (77°F) | 1.60 to 1.80 kΩ |
| 1 - 2 | 30°C (86°F) | 1.28 to 1.47 kΩ |
| 1 - 2 | 35°C (95°F) | 1.00 to 1.22 kΩ |
| 1 - 2 | 40°C (104°F) | 0.80 to 1.00 kΩ |
| 1 - 2 | 45°C (113°F) | 0.65 to 0.85 kΩ |
| 1 - 2 | 50°C (122°F) | 0.50 to 0.70 kΩ |
| 1 - 2 | 55°C (131°F) | 0.44 to 0.60 kΩ |
| 1 - 2 | 60°C (140°F) | 0.36 to 0.50 kΩ |




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Room Temperature Sensor) |
| *2 | Sensing Portion |

- Hold the sensor only by its connector. Touching the sensor may change the resistance value.
- When measuring, the sensor temperature must be the same as the ambient temperature.

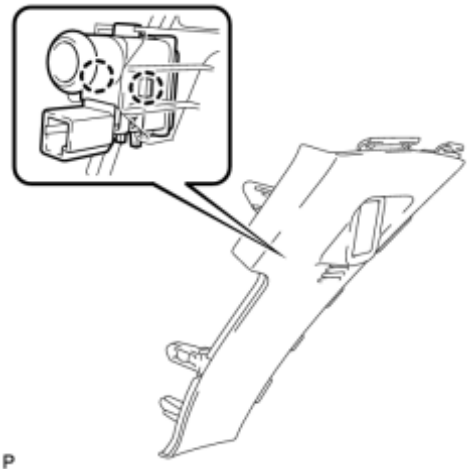
HINT:

As the temperature increases, the resistance decreases (see the graph).

If the resistance is not as specified, replace the room temperature sensor.

# INSTALLATION

1. INSTALL ROOM TEMPERATURE SENSOR



P

(a) Engage the 2 claws to install the room temperature sensor to the No. 1 switch hole base.

2. INSTALL NO. 1 SWITCH HOLE BASE INFO

3. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

4. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

5. INSTALL AIR CONDITIONING CONTROL ASSEMBLY INFO

6. INSTALL CONSOLE BOX ASSEMBLY INFO

7. INSTALL BOX BOTTOM MAT INFO

8. INSTALL FRONT NO. 2 CONSOLE BOX INSERT INFO

9. INSTALL FRONT NO. 1 CONSOLE BOX INSERT INFO

10. INSTALL NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

11. INSTALL ELECTRICAL KEY OSCILLATOR INFO

12. INSTALL REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket) INFO

13. INSTALL REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket) INFO

14. INSTALL CONSOLE BOX CARPET INFO

15. INSTALL UPPER CONSOLE PANEL (w/ Power Outlet Socket) INFO

16. INSTALL REAR CONSOLE BOX POCKET (w/ Power Outlet Socket) INFO

17. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

18. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

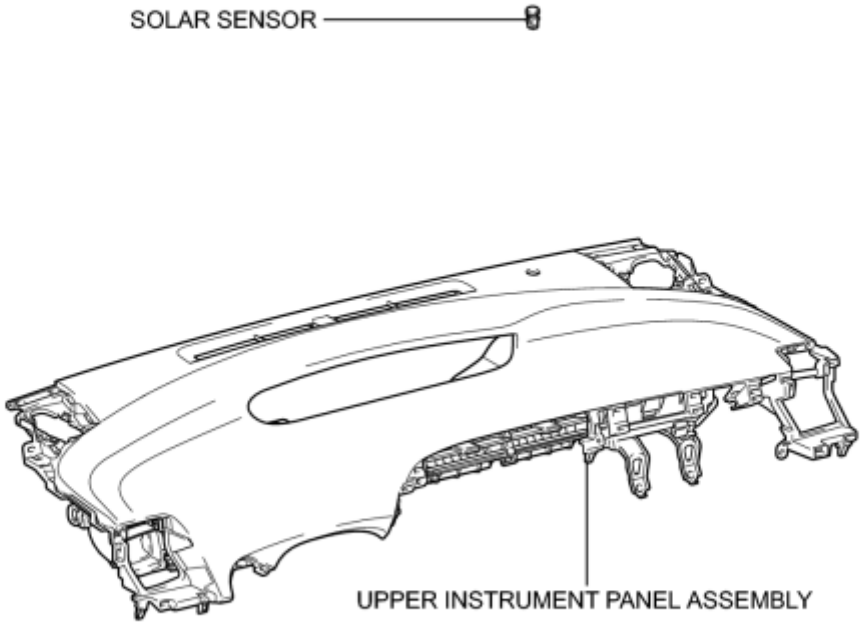
19. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

20. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

21. INSPECT SHIFT LEVER INFO

# COMPONENTS

# ILLUSTRATION




P

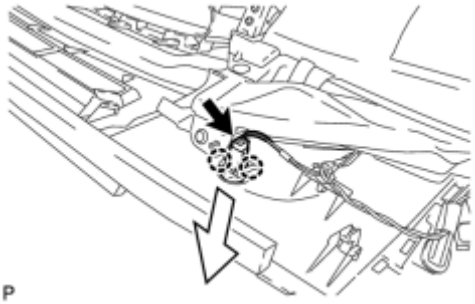
# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure for Remove Upper Instrument Panel Assembly INFO.

2. REMOVE SOLAR SENSOR



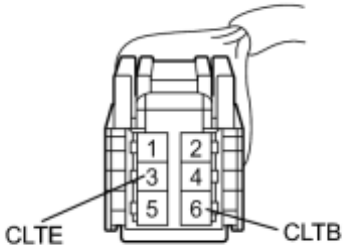

(a) Disconnect the connector.

(b) Disengage the 2 claws and remove the solar sensor as shown in the illustration.

# INSPECTION

1. INSPECT SOLAR SENSOR

*1




(a) Disconnect the solar sensor connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 6 (CLTB) - 3 (CLTE) | Power switch off | Below 1 V |
| 6 (CLTB) - 3 (CLTE) | Power switch on (IG) | 11 to 14 V |

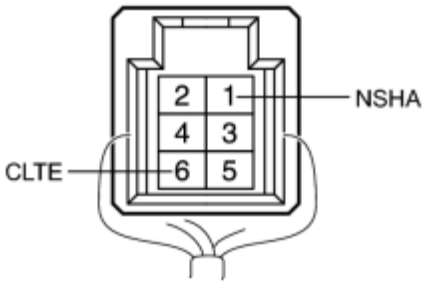
***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Sensor) |

If the voltage is not as specified, repair or replace the wire harness or connector.

(c) Reconnect the solar sensor connector.

*1




(d) Turn the power switch on (IG).

(e) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (NSHA) - 6 (CLTE) | Sensor is exposed to electric light | 0.8 to 4.3 V |
| 1 (NSHA) - 6 (CLTE) | Sensor is covered with a cloth | Below 0.8 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Solar Sensor) |

NOTICE:

- The connection procedure for using a digital tester such as a TOYOTA electrical tester is shown above. When using an analog tester, connect the positive (+) lead to terminal 6 and the negative (-) lead to terminal 1 of the solar sensor.
- While using the battery during inspection, do not bring the positive and negative tester probes too close to each other as a short circuit may occur.

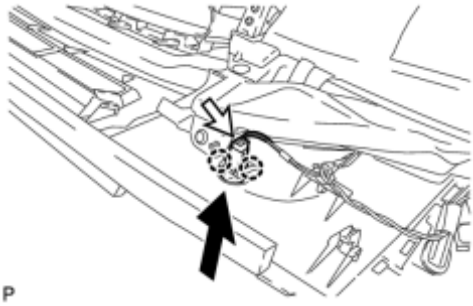
HINT:

- Use an incandescent light for inspection. Bring it within about 30 cm (11.8 in.) of the solar sensor.
- As the inspection light is moved away from the sensor, the voltage decreases.

If the voltage is not as specified, replace the solar sensor.

# INSTALLATION

1. INSTALL SOLAR SENSOR




(a) Engage the 2 claws to install the solar sensor as shown in the illustration.

(b) Connect the connector.

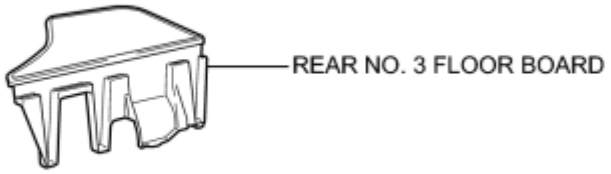
2. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

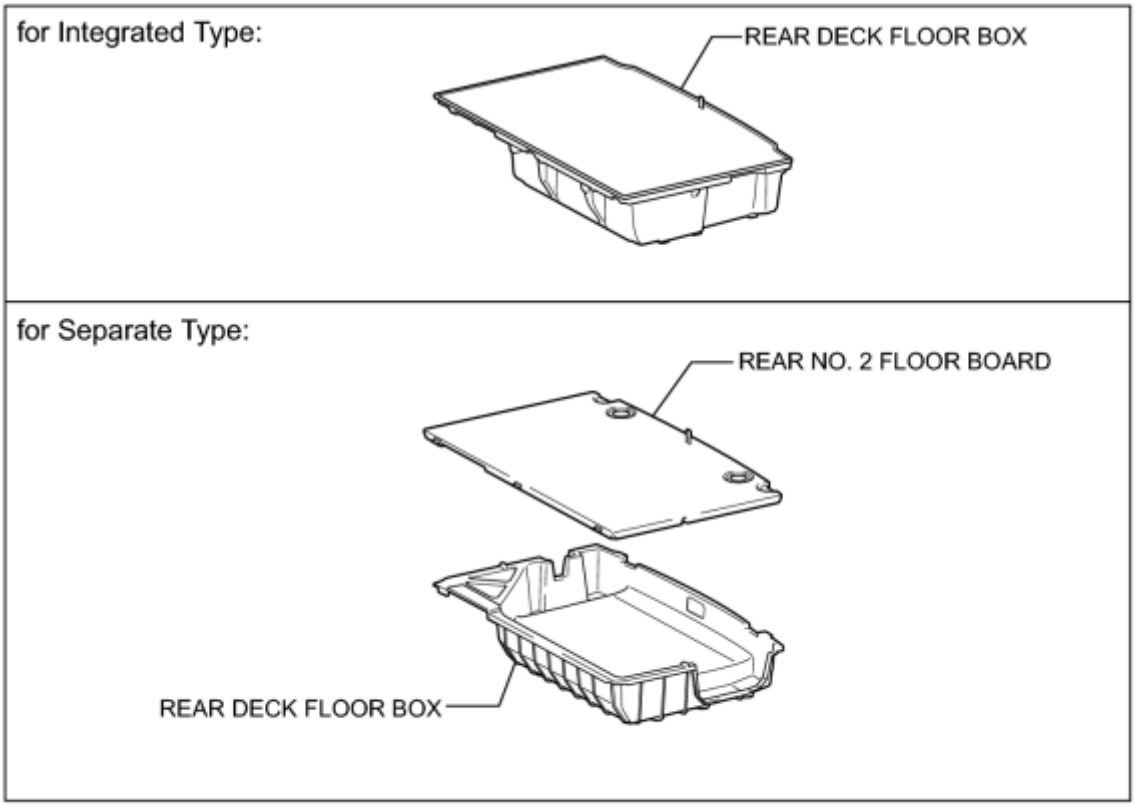
HINT:

Refer to the procedure for Install Upper Instrument Panel Assembly INFO.

# COMPONENTS

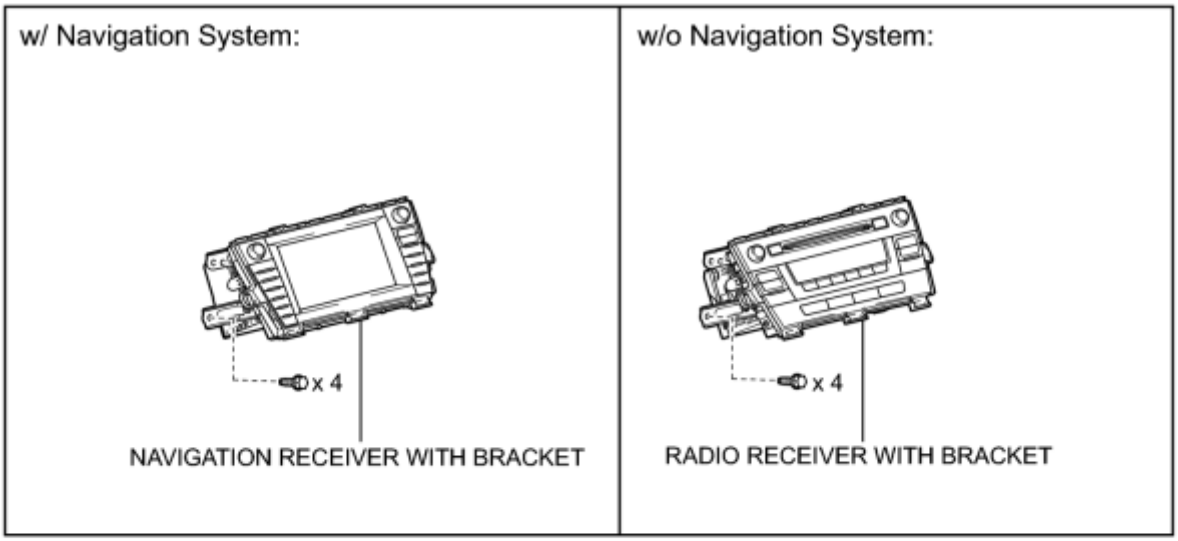
# ILLUSTRATION

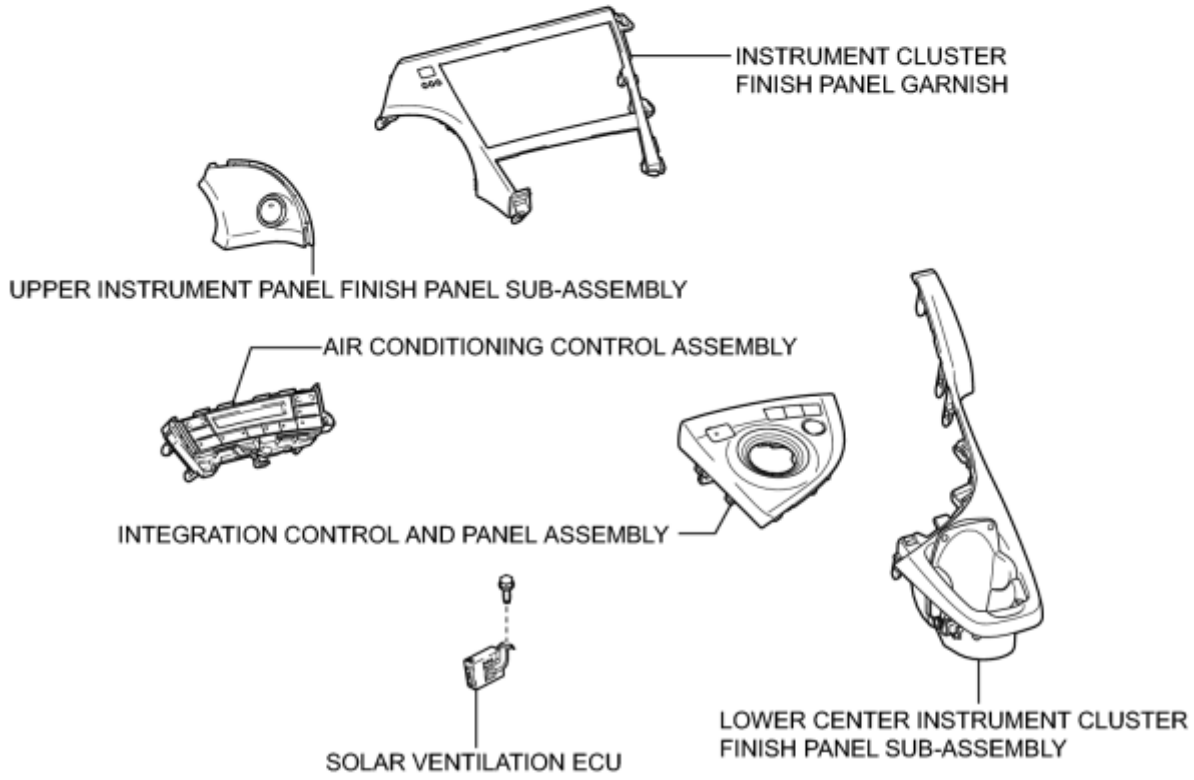



P

# ILLUSTRATION


w/ Navigation System:
x 4
NAVIGATION RECEIVER WITH BRACKET
w/o Navigation System:
x 4
RADIO RECEIVER WITH BRACKET


INSTRUMENT CLUSTER FINISH PANEL GARNISH
UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY
AIR CONDITIONING CONTROL ASSEMBLY
INTEGRATION CONTROL AND PANEL ASSEMBLY
SOLAR VENTILATION ECU
LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

6. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

7. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

8. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

9. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

10. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

11. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO

12. REMOVE SOLAR VENTILATION ECU



(a) Remove the bolt.

P

(b) Disconnect the connector to remove the solar ventilation ECU.

# INSTALLATION

1. INSTALL SOLAR VENTILATION ECU



(a) Connect the connector.

P

(b) Install the solar ventilation ECU with the bolt.

2. INSTALL AIR CONDITIONING CONTROL ASSEMBLY INFO

3. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

4. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

5. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

6. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

7. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

8. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

9. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

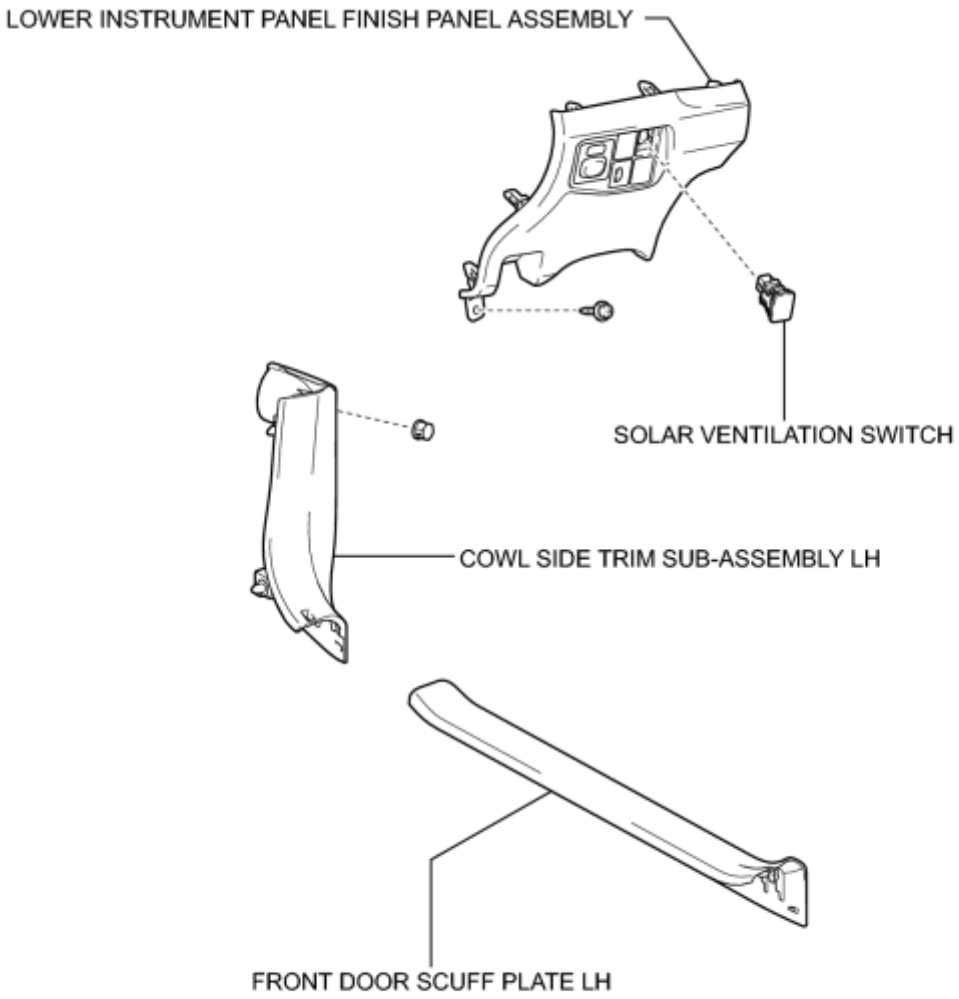
10. INSTALL REAR NO. 3 FLOOR BOARD INFO

11. INSTALL REAR DECK FLOOR BOX INFO

12. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION




P

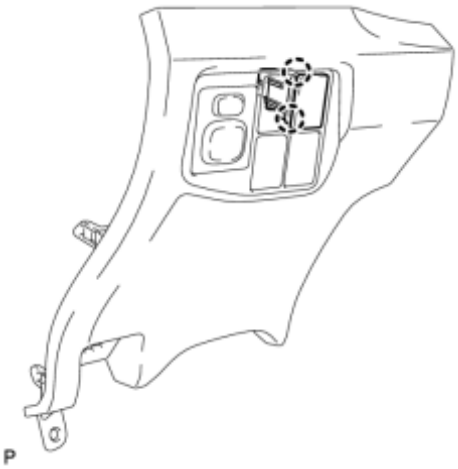
# REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE LH INFO

2. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

3. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

4. REMOVE SOLAR VENTILATION SWITCH



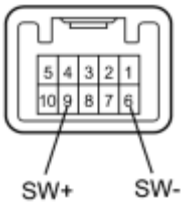

(a) Disengage the 2 claws and remove the solar ventilation switch.

# INSPECTION

1. INSPECT SOLAR VENTILATION SWITCH

*1






(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 9 (SW+) - 6 (SW-) | Solar ventilation switch: off | 10 kΩ or higher |
| 9 (SW+) - 6 (SW-) | Solar ventilation switch: on | Below 1 Ω |

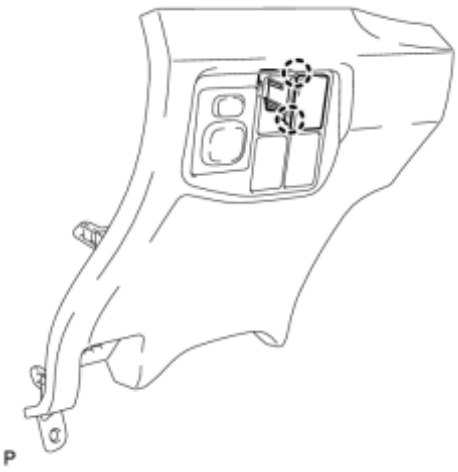
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Solar Ventilation Switch) |

If the resistance is not as specified, replace the solar ventilation switch.

# INSTALLATION

1. INSTALL SOLAR VENTILATION SWITCH




(a) Engage the 2 claws to install the solar ventilation switch.

2. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. INSTALL FRONT DOOR SCUFF PLATE LH INFO

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following system after the terminal is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. GENERAL PRECAUTION

(a) While using the battery during inspection, do not bring the positive (+) and negative (-) tester probes too close to each other as a short circuit may occur.

3. PRECAUTIONS WHEN USING TECHSTREAM

(a) When using the Techstream with the power switch off to troubleshoot:

Connect the Techstream to the vehicle, and turn a courtesy light switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

(b) After all DTCs are cleared, check if the trouble occurs again 6 seconds after the power switch is turned on (IG).

4. OPERATION PRECAUTIONS

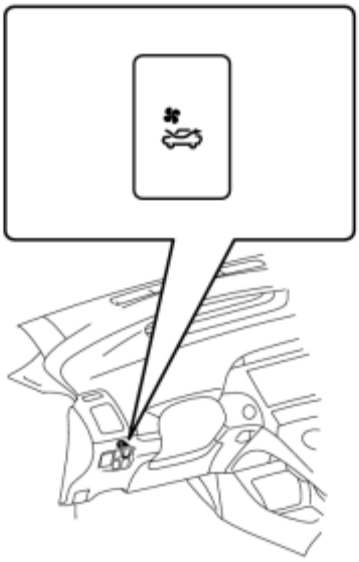
(a) The solar ventilation system operates using electrical power generated by the moon roof glass assembly (solar panel). Therefore, the solar ventilation system stops operating when the amount of electricity generated by the moon roof glass assembly (solar panel) becomes insufficient.

HINT:

If the solar ventilation system stops operating due to the moon roof glass assembly (solar panel) generating an insufficient amount of electricity, the solar ventilation system will resume operating after output from the moon roof glass assembly (solar panel) has recovered.

(b) The solar ventilation system may degrade the air quality in the cabin or lower air conditioning efficiency depending on the usage environment. When ventilation is not necessary, turn the solar ventilation switch off.

- Depending on the usage environment, exhaust emissions from other vehicles or polluted outside air may enter in the cabin.
- Depending on the strength of the sunlight when the outside temperature is low, the cabin temperature may become low because of the cool air drawn into the cabin due to solar ventilation system operation.



- When the cabin temperature is initially low, the temperature may rise because the cool air escapes from the cabin due to solar ventilation system operation.

(c) If it is not necessary to operate the solar ventilation system while working on it, turn the solar ventilation switch off.

CAUTION:

Depending on the usage environment, performing repairs with the solar ventilation switch on may cause the blower motor to operate unexpectedly, resulting in various hazards. This can lead to damage to parts or a serious injury.

(d) Before disconnecting the moon roof glass assembly (solar panel) connector, make sure to cover the entire moon roof glass assembly (solar panel) with a material such as thick fabric which blocks sunlight.

CAUTION:

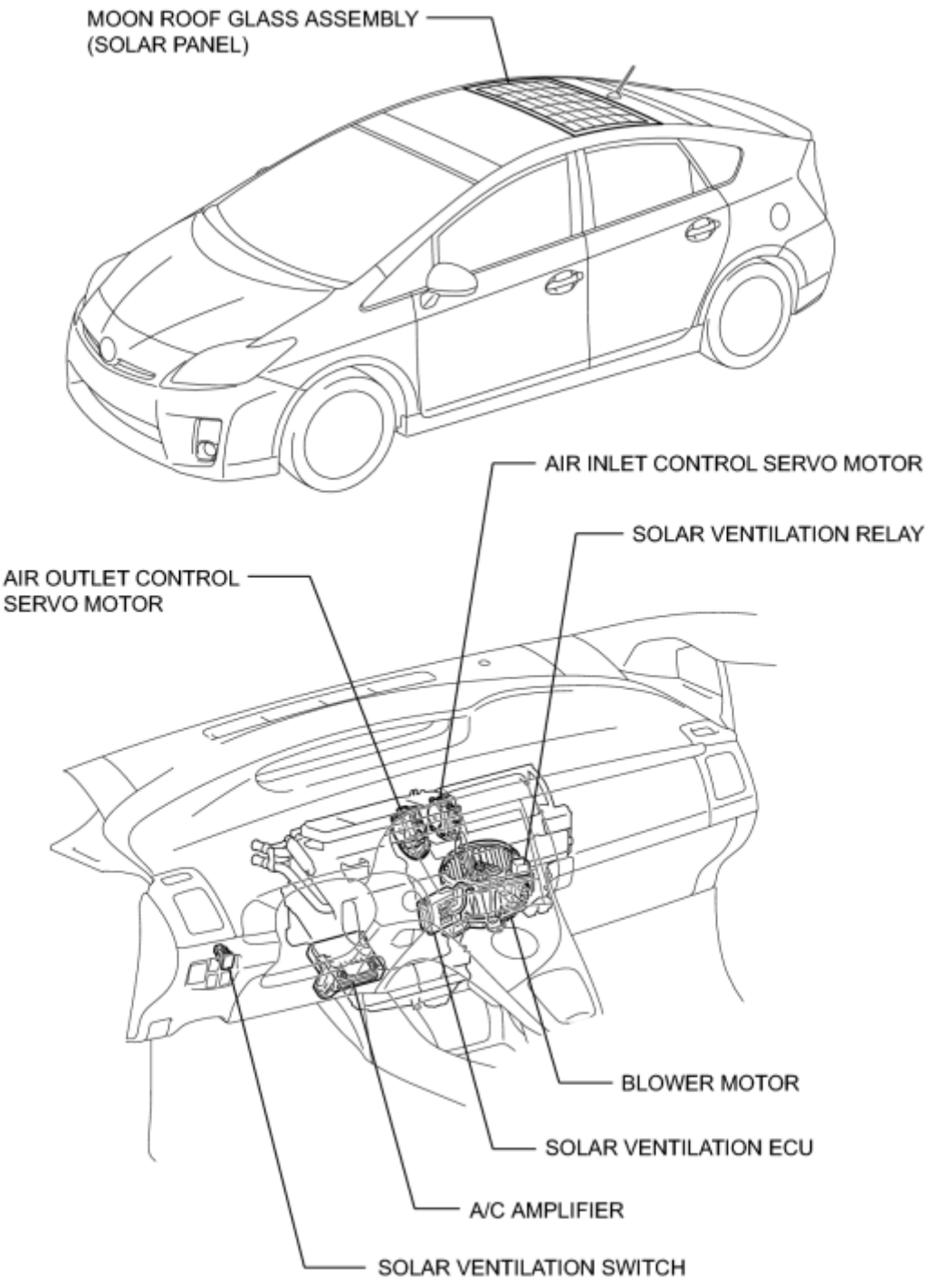
The moon roof glass assembly (solar panel) generates electricity from sunlight and other light sources. If the moon roof glass assembly (solar panel) connector is touched while the moon roof glass assembly (solar panel) is generating electricity, an accidental short circuit or electric shock may occur, causing serious injury.

HINT:

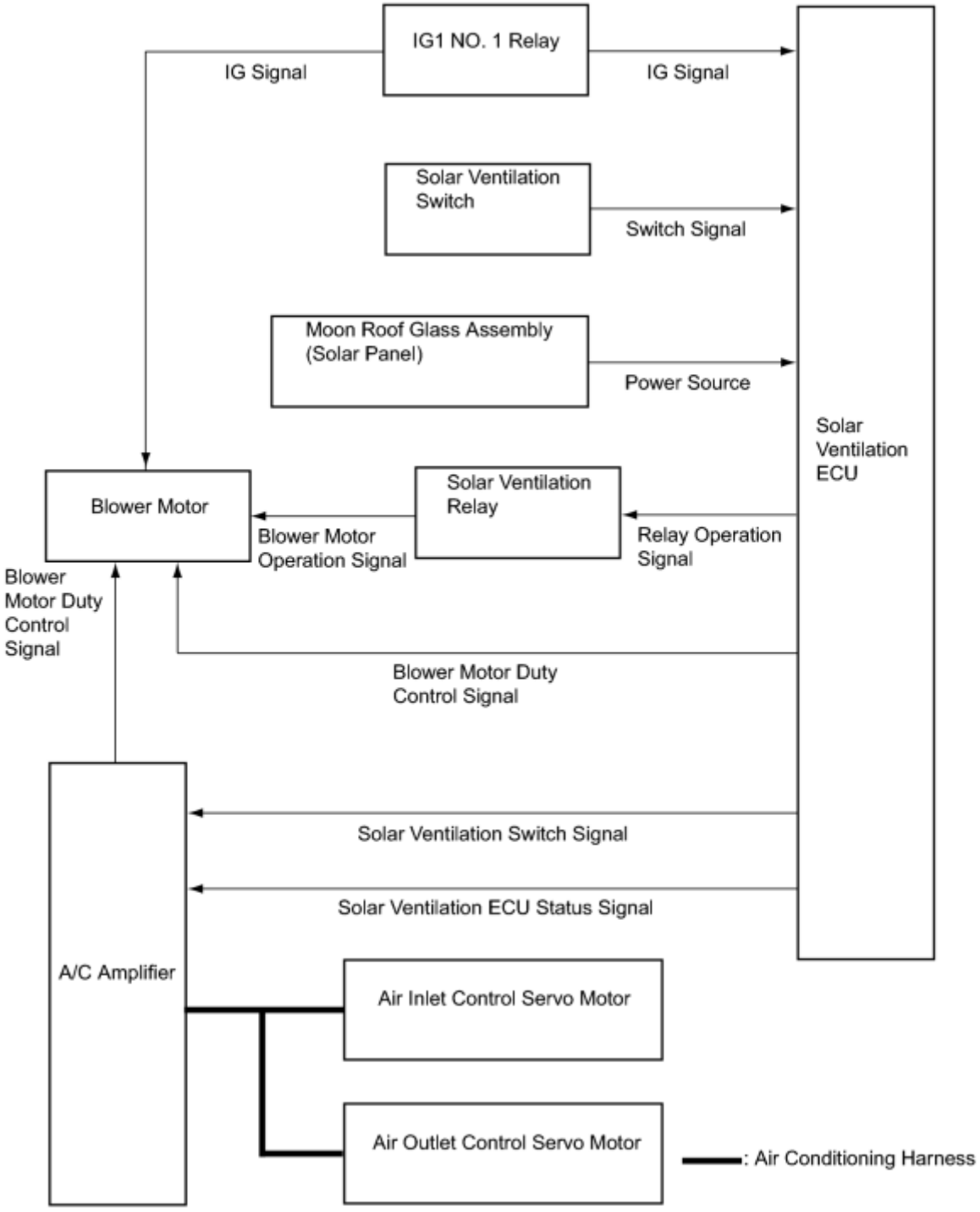
The moon roof glass assembly (solar panel) always generates electricity when exposed to light. When exposed to a light source such as sunlight, approximately 3.6 A and 22 V will be generated.

# PARTS LOCATION

# ILLUSTRATION



# SYSTEM DIAGRAM



# SYSTEM DESCRIPTION

1. GENERAL

(a) The solar ventilation system ventilates the cabin when the vehicle is parked in an extremely hot environment. Ventilation is provided by the system operating the blower motor using electricity generated by the moon roof glass assembly (solar panel) installed on the roof.

HINT:

- The solar ventilation system may operates even when not all conditions of the following table are met. Meeting all conditions of the following System Operation Condition Reference Table is necessary to obtain precise inspection results.

  ***System Operation Conditions Reference Table***

| Item | Condition |
|---|---|
| Amount of sunlight | A sufficient amount of sunlight is received by the moon roof glass assembly (solar panel).<br><br>(The amount of sunlight on a cloudless day between 11:00 and 14:00 is typically sufficient for operation.) |
| Moon roof glass assembly (solar panel) status | The moon roof glass assembly (solar panel) is not in the shade |
| | No fallen leaves or dirt is present on the moon roof glass assembly (solar panel) |
| Ambient temperature | 20 to 40°C (68 to 104°F) |

- Shortly after the solar ventilation system has been activated, it may stop the blower motor if the sunlight is not sufficient even when the rest of the system operation conditions reference table are met.

(b) Activation Control

(1) When the solar ventilation switch is turned on while the power switch is on (IG):

The inlets will be changed to fresh air mode and the outlets will be changed to face mode approximately 1 minute after the power switch is turned off. In addition, the blower motor will be activated and start ventilating the cabin approximately 10 minutes after the power switch is turned off.

HINT:

In order to enhance ventilation efficiency, the inlets will be changed to fresh air mode and the outlets will be changed to face mode automatically when the solar ventilation switch is turned on while the power switch is on (IG).

(2) When the solar ventilation switch is turned on after the power switch is turned off:

The blower motor will be activated and start ventilating the cabin approximately 10 minutes after the solar ventilation switch is turned on.

HINT:

Inlet and outlet modes will remain unchanged when the solar ventilation switch is turned on after the power switch is turned off.

(c) Stop Control

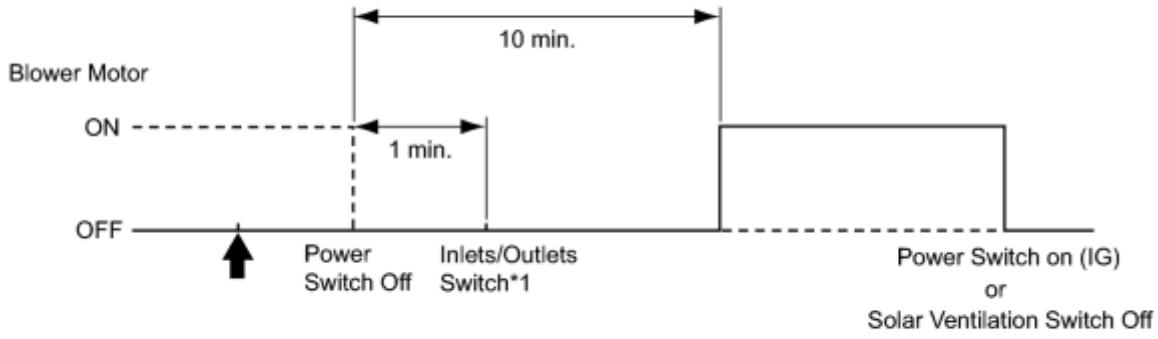
(1) When the solar ventilation switch is turned off or the power switch is turned on (IG), the solar ventilation system will stop operating.

HINT:

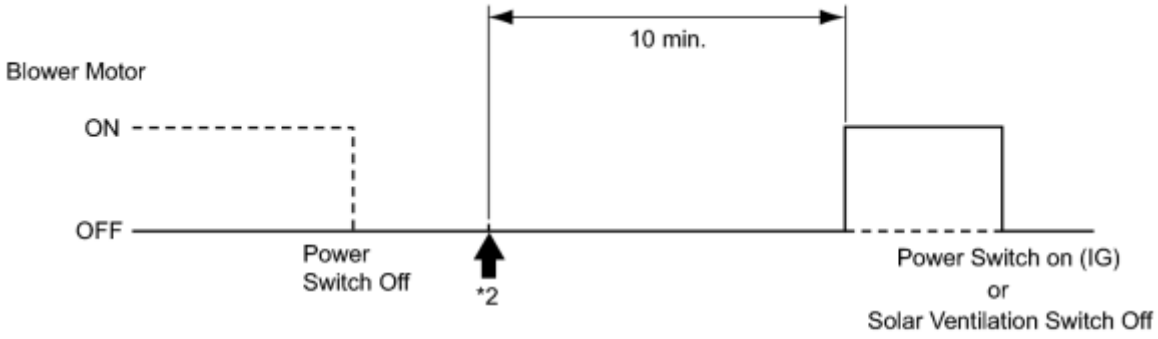
After the power switch is turned on (IG), both the inlets and outlets return to the mode that they were in before the power switch was turned off.

Example:

When the solar ventilation switch is turned on while the power switch is on (IG):




When the solar ventilation switch is turned on after the power switch is turned off:




: Solar Ventilation Switch On

*1: The inlets switch to fresh air mode and the outlets switch to face mode.

*2: The inlets and outlets do not switch.

2. FUNCTION OF MAIN COMPONENTS

(a) The solar ventilation system consists of the following components:

| Component | Function |
|---|---|
| Moon roof glass assembly (solar panel) | Generates power from sunlight and supplies system power to the solar ventilation ECU. |
| Solar ventilation ECU | • Activated by power generated by the moon roof glass assembly (solar panel).<br>• Activates the solar ventilation system by receiving an on signal from the solar ventilation switch and an off signal from the vehicle power switch.<br>• Sends a solar ventilation system condition signal to the A/C amplifier.<br>• Operates the blower motor when the solar ventilation system is turned on. |
| Solar ventilation switch | Turns the solar ventilation system on or off. |
| Solar ventilation relay | Switches the power supply source for the blower motor between the auxiliary battery and solar ventilation ECU according to the power switch condition. |
| Blower motor | • Performs ventilation when the power switch is off based on instructions from the solar ventilation ECU.<br>• Changes its speed according to the amount of sunlight received by the moon roof glass assembly (solar panel). |
| A/C amplifier | • Activates the air outlet control servo motor and air inlet control servo motor according to the signals from the solar ventilation ECU.<br>• Receives solar ventilation system condition signal from the solar ventilation ECU and sends a solar ventilation system condition signal via CAN. |
| Air inlet control servo motor | Switches the inlets to fresh air mode based on signals from the A/C amplifier. |
| Air outlet control servo motor | Switches the outlets to face mode based on signals from the A/C amplifier. |

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the solar ventilation system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | INSPECT BATTERY VOLTAGE |

(a) Inspect the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 3. | CHECK FOR DTC* |

(a) Check for DTCs and note any code that is output.

(b) Clear the DTCs.

(c) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output. | A |
| DTC is output. | B |

B GO TO RELEVANT SYSTEM

A

| | |
|---|---|
| 4. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |

| Result | Proceed to |
| --- | --- |
| Fault is listed in Problem Symptoms Table | B |

B ▶ Go to step 5

A

▼

| | |
| --- | --- |
| 5. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO

(b) Data List / Active Test INFO

(c) Operation Check INFO

(d) Inspection

NEXT

▼

| | |
| --- | --- |
| 6. | ADJUST, REPAIR OR REPLACE |

NEXT ▶ **END**

# OPERATION CHECK

1. SOLAR VENTILATION SYSTEM OPERATION CHECK

(a) Inspection of Voltage Generated by Moon Roof Glass Assembly (Solar Panel)

(1) Park the vehicle in a location with a stable temperature and a sufficient amount of sunlight, and leave the vehicle as is for approximately 10 minutes.

NOTICE:

To ensure stable generation of voltage by the moon roof glass assembly (solar panel), make sure to park the vehicle in a location where the system operation conditions reference table are satisfied.

HINT:

The solar ventilation system operates only when the generated voltage is 10 V or higher. Therefore, make sure to park the vehicle where the system operation conditions reference table are satisfied. This will allow the moon roof glass assembly (solar panel) to generate a voltage of 10 V or higher.

***System Operation Conditions Reference Table***

| Item | Condition |
|---|---|
| Amount of sunlight | A sufficient amount of sunlight is received by the moon roof glass assembly (solar panel).<br><br>(The amount of sunlight on a cloudless day between 11:00 and 14:00 is typically sufficient for operation.) |
| Moon roof glass assembly (solar panel) status | The moon roof glass assembly (solar panel) is not in the shade |
| | No fallen leaves or dirt is present on the moon roof glass assembly (solar panel) |
| Ambient temperature | 20 to 40°C (68 to 104°F) |

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Turn the Techstream on.

(5) Enter the following menus: Body Electrical / Air Conditioner / Data List.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Solar Voltage | Solar panel voltage /<br><br>Variable, 10V les, 10V-11V, 11V-12V, 12V-13V, 13V-14V, 14V-15V, 15V-16V, 16V-17V, 17V-18V, 18V-19V, 19V-20V, 20V-21V, 21V-22V, 22V-23V or 23V | Actual generated voltage displayed | System operation conditions reference table are met INFO. |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | ovr | | |

HINT:

If the Data List items related to the solar ventilation system are not displayed, the following conditions are suspected:

- The voltage generated by the moon roof glass assembly (solar panel) is less than 7 V INFO.
- There is a communication error between the solar ventilation ECU and A/C amplifier INFO.

(b) Operation Check

(1) Check that the Solar Voltage value in the Data List is 10 V or higher.

(2) Turn the solar ventilation switch on.

(3) Turn the power switch off.

(4) Check that the blower motor operates 10 minutes after the power switch is turned off.

HINT:

- The inlets will be changed to fresh air mode and the outlets will be changed to face mode approximately 1 minute after the power switch is turned off.
- Inlet and outlet modes will remain unchanged when the solar ventilation switch is turned on after the power switch is turned off.
- When the moon roof glass assembly (solar panel) is generating high voltage, a noise may occur when the blower motor starts operating. This noise does not indicate a malfunction.
- For details of the solar ventilation system control, refer to System Description INFO.

2. TEST MODE

HINT:

In test mode, the solar ventilation ECU operates the blower motor while the power switch is on (IG). The state of the solar ventilation switch received by the solar ventilation ECU and the status of duty output from the solar ventilation ECU to the blower motor can be checked.

(a) Test Mode Procedure

HINT:

Perform the operation according to the following procedure with the power switch on (IG) and the solar ventilation switch off.

(1) Check that the Solar Voltage value in the Data List is 10 V or higher.

(2) With the power switch on (IG), turn the power switch from off to on (ACC) to on (IG) 3 times within 5 seconds (on (IG) → off → on (ACC) → on (IG) → off → on (ACC) → on (IG) → off → on (ACC) → on (IG)).

HINT:

Operate the power switch 9 times.

(3) Turn the solar ventilation switch from off to on 3 times within 3 seconds (off → on → off → on → off → on) of operating the power switch.

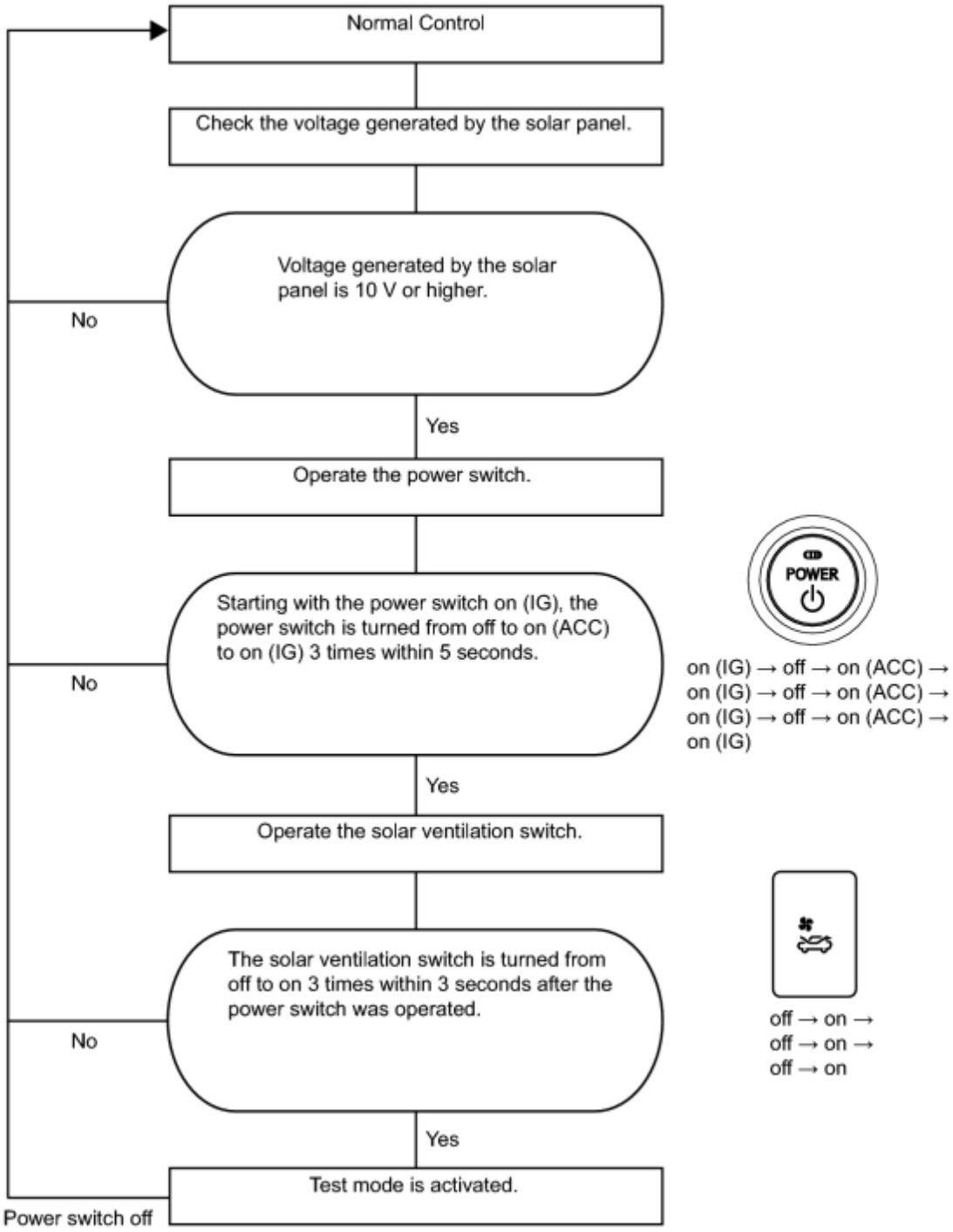
HINT:

Operate the solar ventilation switch 5 times.

(4) Check that test mode is activated and the blower motor rotates at a constant speed.

HINT:

- When the solar ventilation switch is turned off, the blower motor will stop and when the solar ventilation switch is turned on, the blower motor will operate.
- When the power switch is turned off, the solar ventilation system returns to normal control.


Normal Control
Check the voltage generated by the solar panel.
Voltage generated by the solar panel is 10 V or higher.
No
Yes
Operate the power switch.
Starting with the power switch on (IG), the power switch is turned from off to on (ACC) to on (IG) 3 times within 5 seconds.
No
Yes
Operate the solar ventilation switch.
The solar ventilation switch is turned from off to on 3 times within 3 seconds after the power switch was operated.
No
Yes
Test mode is activated.
Power switch off
POWER
on (IG) → off → on (ACC) →
on (IG) → off → on (ACC) →
on (IG) → off → on (ACC) →
on (IG)
off → on →
off → on →
off → on

# PROBLEM SYMPTOMS TABLE

HINT:

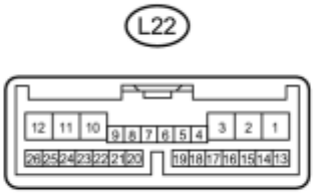
- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Solar Ventilation System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Solar ventilation system does not operate. | Conditions listed in System Operation Conditions Reference Table have not been met | INFO |
| | Solar ventilation ECU power source circuit | INFO |
| | Solar ventilation switch circuit | INFO |
| | IG signal circuit | INFO |
| | Blower motor circuit | INFO |
| | Solar ventilation ECU | INFO |
| Solar ventilation system does not stop. | Solar ventilation switch circuit | INFO |
| | Blower motor circuit | INFO |
| | Solar ventilation ECU | INFO |
| Inlets do not change to fresh air mode. | Air conditioning system | INFO |
| | Solar ventilation switch circuit | INFO |
| | A/C amplifier | INFO |
| Outlets do not change to face mode. | Air conditioning system | INFO |
| | Solar ventilation switch circuit | INFO |
| | A/C amplifier | INFO |
| Blower motor operates but stops after a short while. | Conditions listed in System Operation Conditions Reference Table have not been met | INFO |
| | Solar ventilation ECU power source circuit | INFO |
| | Blower motor circuit | INFO |
| | Use simulation method to check | INFO |
| The blower motor operates by itself or the motor speed changes arbitrarily. | IG signal Circuit | INFO |
| | Solar ventilation ECU | INFO |
| Cabin is smelly or damp. | Conditions listed in System Operation Conditions Reference Table have not been met | INFO |

# TERMINALS OF ECU

1. SOLAR VENTILATION ECU



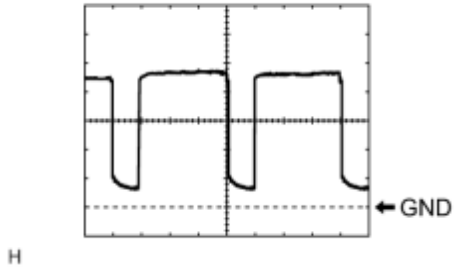

HINT:

Check from the rear of the connector while it is connected to the solar ventilation ECU.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L22-1 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 V |
| L22-5 (BLW) - L22-1 (GND) | V - W-B | Blower motor control signal | Power switch off<br><br>Solar ventilation switch: on (blower motor operating) | Pulse generation<br><br>(See waveform 1) |
| L22-11 (SBI) - L22-1 (GND) | G - W-B | Solar panel voltage | Always<br><br>(System operation conditions reference table met INFO) | 1 to 28 V |
| L22-12 (BLWB) - L22-1 (GND) | R - W-B | Blower motor power source | Power switch off<br><br>Solar ventilation switch: on<br><br>(System operation conditions reference table met INFO) | 1 to 28 V |
| L22-13 (PVSW) - L22-1 (GND) | P - W-B | Solar ventilation switch signal | Solar ventilation switch: off | 4.5 to 5.5 V |
| | | | Solar ventilation switch: on | Below 1 V |
| L22-14 (PVSO) - L22-1 (GND) | P - W-B | Solar ventilation switch status signal | Solar ventilation switch: off | 4.5 to 5.5 V |
| | | | Solar ventilation switch: on | Below 1 V |
| L22-17 (SIND) - L22-1 (GND) | L - W-B | Solar ventilation ECU status signal | Power switch on (IG) | Pulse generation |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | SBI terminal: 7 V or higher<br><br>Solar ventilation system: off | (See waveform 2) |
| L22-25 (IG) - L22-1 (GND) | G - W-B | Power switch status signal | Power switch off | Below 1 V |
| | | | Power switch on (IG) | 11 to 14 V |

(a) Waveform 1:



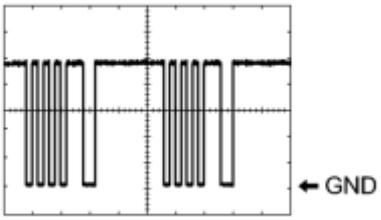

H

| Item | Content |
|---|---|
| Terminal No. | L22-5 (BLW) - L22-1 (GND) |
| Tool Setting | 1 V/DIV., 500 µs/DIV. |
| Vehicle Condition | Power switch off<br><br>Solar ventilation switch: on (blower motor operating) |

HINT:

The waveform varies with the blower speed.

(b) Waveform 2:




H

| Item | Content |
|---|---|
| Terminal No. | L22-17 (SIND) - L22-1 (GND) |
| Tool Setting | 1 V/DIV., 100 ms/DIV. |
| Vehicle Condition | Power switch on (IG)<br><br>SBI terminal: 7 V or higher<br><br>Solar ventilation system: off |

HINT:

The waveform varies with the communication content.

2. A/C AMPLIFIER INFO

# DATA LIST / ACTIVE TEST

1. DATA LIST

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Solar Ventilation Switch | Solar ventilation switch (Switch recognition value at A/C amplifier side) /<br><br>OFF or ON | OFF: Solar ventilation switch off<br><br>ON: Solar ventilation switch on | - |
| Solar Voltage | Solar panel voltage /<br><br>Variable, 10V les, 10V-11V, 11V-12V, 12V-13V, 13V-14V, 14V-15V, 15V-16V, 16V-17V, 17V-18V, 18V-19V, 19V-20V, 20V-21V, 21V-22V, 22V-23V or 23V ovr | Actual generated voltage displayed | System operation conditions reference table are met INFO. |
| Solar Ventilation Switch Status | Solar ventilation switch (Switch recognition value at solar ventilation ECU side) /<br><br>OFF or ON | OFF: Solar ventilation switch off<br><br>ON: Solar ventilation switch on | - |
| Solar IG Status | Solar ventilation ECU IG status / | OFF: Power | When OFF is displayed, a malfunction in the solar |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | OFF or ON | switch off<br><br>ON: Power switch on (IG) | ventilation ECU is suspected. |
| Solar Ventilation Test Mode Status | Solar ventilation ECU test mode status /<br><br>OFF or ON | OFF: Test mode off<br><br>ON: Test mode on | - |

HINT:

If the Data List items related to the solar ventilation system are not displayed, the following conditions are suspected:

- The voltage generated by the moon roof glass assembly (solar panel) is less than 7 V INFO.
- There is a communication error between the solar ventilation ECU and A/C amplifier INFO.

2. ACTIVE TEST

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

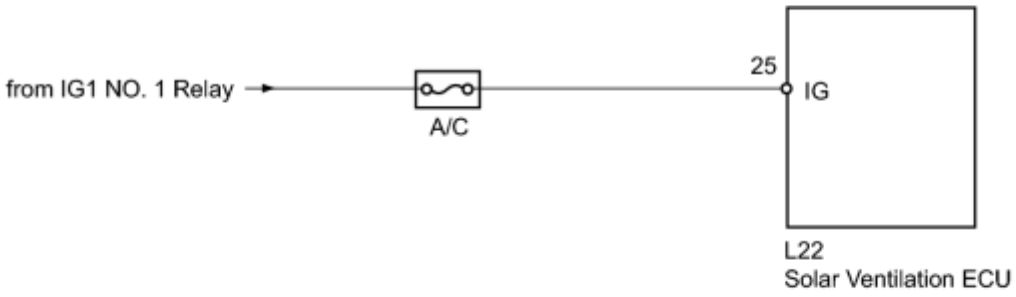
***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Blower Motor | Blower motor | Min.: 0, Max.: 31 | - |

# DESCRIPTION

The solar ventilation system activates when the vehicle power switch is off. If the solar ventilation switch has been turned on, the solar ventilation ECU checks that the vehicle power switch is off and then activates the solar ventilation system.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Before performing this inspection procedure, check if the Data List items for the solar ventilation system are displayed. If the Data List items are not displayed, inspect the communication circuit between the solar ventilation ECU and A/C amplifier INFO.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Solar IG Status | Solar ventilation ECU IG status / OFF or ON | OFF: Power switch off<br><br>ON: Power switch on (IG) | When OFF is displayed, a malfunction in the solar ventilation ECU is suspected. |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| NG | A |
| OK<br><br>(When troubleshooting according to Problem Symptoms Table (for Solar Ventilation System)) | B |
| OK<br><br>(When troubleshooting according to Problem Symptoms Table (for Air Conditioning System)) | C |

C PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

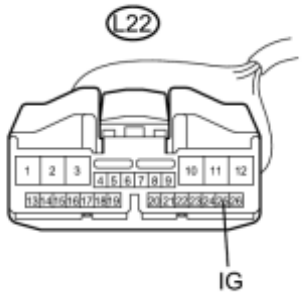
B PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE

A

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - BATTERY) |

(a) Disconnect the solar ventilation ECU connector.

*1




H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L22-25 (IG) - Body ground | Power switch off | Below 1 V |
| L22-25 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE SOLAR VENTILATION ECU**

# DESCRIPTION

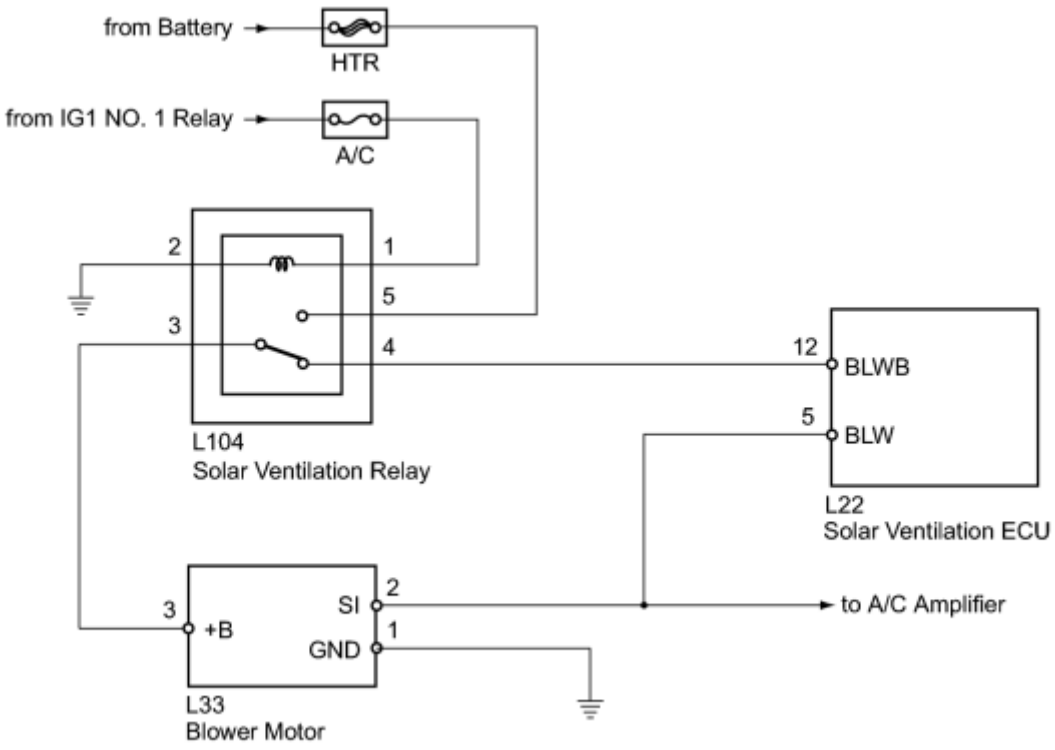
The solar ventilation system and air conditioning system use the same blower motor for ventilation.

In order to be driven by each system, the blower motor switches between two different power sources using the solar ventilation relay. When the power switch is off, power from the solar ventilation system is supplied to the blower motor and when the power switch is in a mode other than off, power from the air conditioning system is supplied to the blower motor.

The blower motor controls its operation and speed using the power and signals supplied by the solar ventilation ECU when the power switch is off.

Changes its speed according to the amount of sunlight received by the moon roof glass assembly (solar panel).

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Active Test.

(e) Check the operation by referring to the table below.

***Air Conditioner***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Blower Motor | Blower motor | Min.: 0, Max.: 31 | - |

OK:

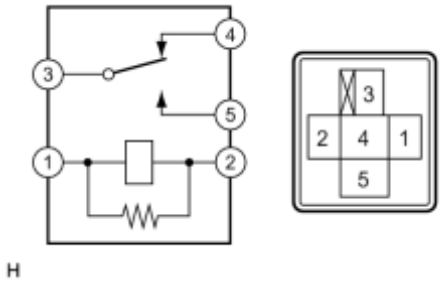
Blower motor operates and blower motor speed level changes.

NG ▶ GO TO AIR CONDITIONING SYSTEM (BLOWER MOTOR CIRCUIT)

OK

▼

| | |
|---|---|
| 2. | INSPECT SOLAR VENTILATION RELAY |




(a) Remove the solar ventilation relay.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Specified Condition |
|---|---|
| 3 - 5 | 10 kΩ or higher |
| 3 - 4 | Below 1 Ω |

| Tester Connection | Specified Condition |
|---|---|
| 3 - 5 | Below 1 Ω<br><br>(when battery voltage is applied to terminals 1 and 2) |
| 3 - 4 | 10 kΩ or higher<br><br>(when battery voltage is applied to terminals 1 and 2) |

NG REPLACE SOLAR VENTILATION RELAY

OK

| 3. | INSPECT SOLAR VENTILATION ECU |
|---|---|

*1




(a) Disconnect the solar ventilation relay connector.

H

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L104-4 - Body ground | Power switch off<br><br>Solar ventilation switch off | Below 1 V |
| L104-4 - Body ground | Power switch off<br><br>Solar ventilation switch on<br><br>(System operation conditions reference table met INFO) | 1 to 28 V |

### *Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation Relay) |

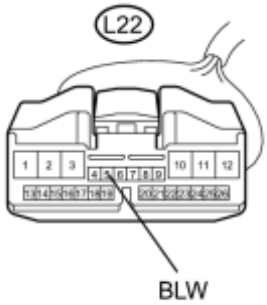
NG ▶ CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - SOLAR VENTILATION RELAY)

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - BLOWER MOTOR) |

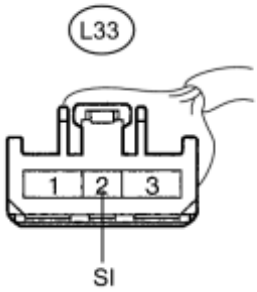
*1




(a) Disconnect the solar ventilation ECU connector.

H

*2




(b) Disconnect the blower motor connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L22-5 (BLW) - L33-2 (SI) | Always | Below 1 Ω |
| L22-5 (BLW) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| | (to Solar Ventilation ECU) |
| *2 | Front view of wire harness connector<br><br>(to Blower Motor) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | INSPECT SOLAR VENTILATION ECU |

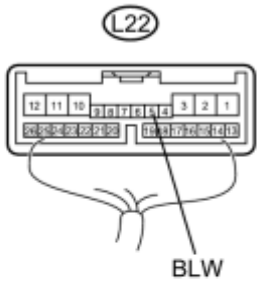
(a) Reinstall the solar ventilation relay.

(b) Reconnect the solar ventilation relay connector.

(c) Reconnect the blower motor connector.

(d) Reconnect the solar ventilation ECU connector.

*1

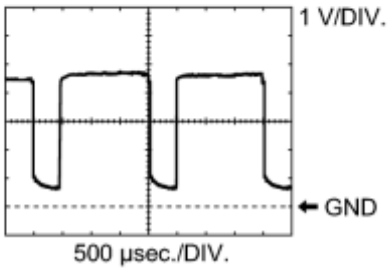



(e) Measure the waveform between terminal L22-5 (BLW) of the solar ventilation ECU and body ground.

| Item | Content |
|---|---|
| Tool setting | 1 V/DIV., 500 µs/DIV. |
| Vehicle condition | Power switch off<br><br>Solar ventilation switch on (blower motor operating) |

OK:

Waveform is as shown in the illustration.




HINT:

The waveform varies with the blower speed.

## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Solar Ventilation ECU) |

NG ▶ REPLACE BLOWER MOTOR

OK ▶ **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 6. | REPLACE BLOWER MOTOR |

(a) Replace the blower motor with a known good one and check if the same problem occurs again INFO.

OK:

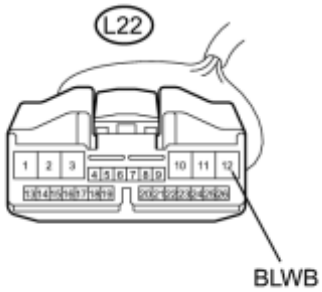
Same problem does not occur.

NG REPLACE SOLAR VENTILATION ECU

OK **END (BLOWER MOTOR WAS DEFECTIVE)**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - SOLAR VENTILATION RELAY) |

*1




H

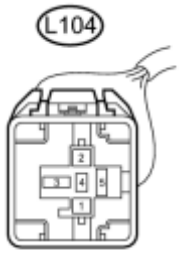
(a) Disconnect the solar ventilation ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*2

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L22-12 (BLWB) - L104-4 | Always | Below 1 Ω |
| L22-12 (BLWB) - Body ground | Always | 10 kΩ or higher |




H

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |
| *2 | Front view of wire harness connector<br><br>(to Solar Ventilation Relay) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

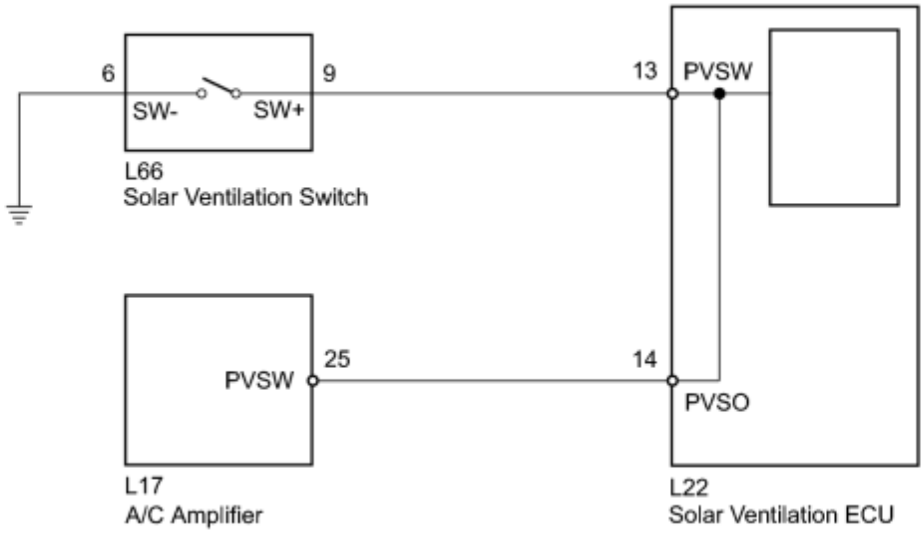
OK **REPLACE SOLAR VENTILATION ECU**

| Solar Ventilation Switch Circuit |
|---|

# DESCRIPTION

The solar ventilation system can operate when the solar ventilation switch is on and the moon roof glass assembly (solar panel) generates the necessary amount of electricity.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

Before performing this inspection procedure, check if the Data List items for the solar ventilation system are displayed. If the Data List items are not displayed, inspect the communication circuit between the solar ventilation ECU and A/C amplifier INFO.

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(e) Check the value(s) by referring to the table below.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Solar Ventilation Switch | Solar ventilation switch (Switch recognition value at A/C amplifier side) / OFF or ON | OFF: Solar ventilation switch off<br><br>ON: Solar ventilation switch on | - |
| Solar Ventilation Switch Status | Solar ventilation switch (Switch recognition value at solar ventilation ECU side) / OFF or ON | OFF: Solar ventilation switch off<br><br>ON: Solar ventilation switch on | - |

OK:

The display is as specified in the Normal Condition column.

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG<br><br>(OFF/ON display does not change for both Solar Ventilation Switch Status and Solar Ventilation Switch even though the solar ventilation switch is operated.) | B |
| NG<br><br>(OFF/ON display does not change for Solar Ventilation Switch even though the solar ventilation switch is operated.) | C |
| NG<br><br>(OFF/ON display does not change for Solar Ventilation Switch Status even though the solar ventilation switch is operated.) | D |

D REPLACE SOLAR VENTILATION ECU

C CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - A/C AMPLIFIER)

B INSPECT SOLAR VENTILATION SWITCH

A **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 2. | INSPECT SOLAR VENTILATION SWITCH |

*1



(a) Remove the solar ventilation switch.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L66-9 (SW+) - L66-6 (SW-) | Solar ventilation switch: off<br><br>(when switch is not pressed) | 10 kΩ or higher |
| L66-9 (SW+) - L66-6 (SW-) | Solar ventilation switch: on<br><br>(when switch is pressed) | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Solar Ventilation Switch) |

NG ▶ REPLACE SOLAR VENTILATION SWITCH

OK

▼

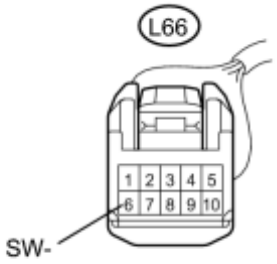
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION SWITCH - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L66-6 (SW-) - Body ground | Always | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation Switch) |

H

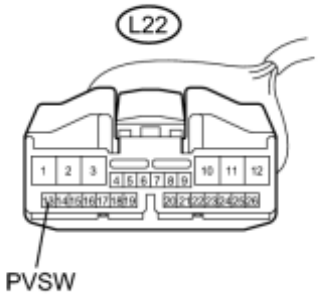
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION SWITCH - SOLAR VENTILATION ECU) |

*1




H

(a) Disconnect the solar ventilation ECU connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L22-13 (PVSW) - L66-9 (SW+) | Always | Below 1 Ω |
| L22-13 (PVSW) - Body ground | Always | 10 kΩ or higher |

## Text in Illustration

*2




H

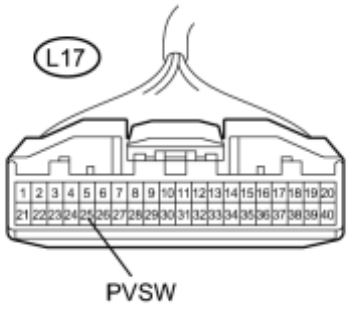
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |
| *2 | Front view of wire harness connector<br><br>(to Solar Ventilation Switch) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE SOLAR VENTILATION ECU**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - A/C AMPLIFIER) |

*1



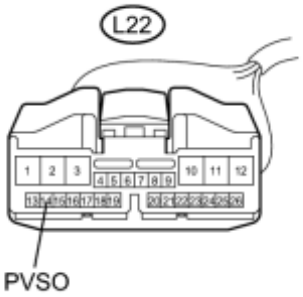

H

(a) Disconnect the A/C amplifier connector.

(b) Measure the resistance according to the value(s) in the table below.

*2

Standard Resistance:




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L17-25 (PVSW) - L22-14 (PVSO) | Always | Below 1 Ω |
| L17-25 (PVSW) - Body ground | Always | 10 kΩ or higher |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | REPLACE SOLAR VENTILATION ECU |

(a) Replace the solar ventilation ECU with a known good one and check if the same problem occurs again INFO .

OK:

Same problem does not occur.

NG ▶ REPLACE A/C AMPLIFIER

OK ▶ **END (SOLAR VENTILATION ECU WAS DEFECTIVE)**

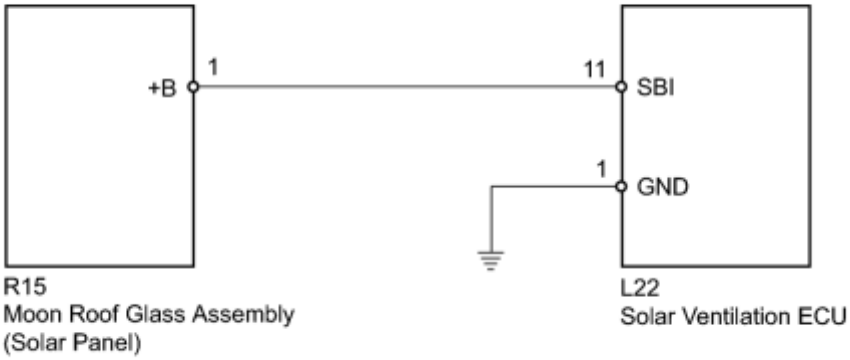
| Solar Ventilation ECU Power Source Circuit |
|---|

# DESCRIPTION

For the solar ventilation system, the moon roof glass assembly (solar panel) generates electricity using sunlight to generate the required power.

The electricity generated by the moon roof glass assembly (solar panel) is sent to the solar ventilation ECU and used as the power source for the solar ventilation system.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT MOON ROOF GLASS ASSEMBLY (SOLAR PANEL) |

(a) Leave the vehicle for 10 minutes in a location where the following conditions are met, and then measure the voltage.

***System Operation Conditions Reference Table***

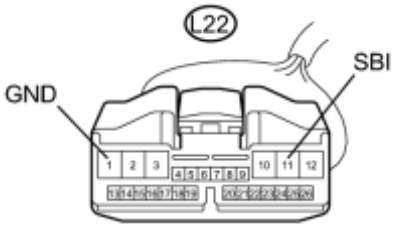
| Items | Condition |
|---|---|
| Amount of sunlight | A sufficient amount of sunlight is received by the moon roof glass assembly (solar panel).<br><br>(The amount of sunlight on a cloudless day between 11:00 and 14:00 is typically sufficient for operation.) |
| Moon roof glass assembly (solar panel) status | The moon roof glass assembly (solar panel) is not in the shade |
| | No fallen leaves or dirt is present on the moon roof glass assembly (solar |

| Items | Condition |
|---|---|
| | panel) |
| Ambient temperature | 20 to 40°C (68 to 104°F) |

NOTICE:

To ensure stable generation of voltage by the moon roof glass assembly (solar panel), make sure to park the vehicle in a location where the system operation conditions reference table are satisfied.

*1




(b) Disconnect the solar ventilation ECU connector.

CAUTION:

The moon roof glass assembly (solar panel) generates electricity when exposed to a light source such as sunlight. If an inspection of the moon roof glass assembly (solar panel) is performed while electricity is being generated, work carefully in order to prevent an accidental short circuit or electric shock.

H

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L22-11 (SBI) - L22-1 (GND) | System operation conditions reference table are met. | 12 V or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |

NG ▶ CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - SOLAR PANEL, BODY GROUND)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM |

(a) Reconnect the solar ventilation ECU connector.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Air Conditioner / Data List.

(f) Check the value(s) by referring to the table below.

(1) Check that the Solar Voltage value in the Data List is 10 V or higher.

***Air Conditioner***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Solar Voltage | Solar panel voltage /<br><br>Variable, 10V les, 10V-11V, 11V-12V, 12V-13V, 13V-14V, 14V-15V, 15V-16V, 16V-17V, 17V-18V, 18V-19V, 19V-20V, 20V-21V, 21V-22V, 22V-23V or 23V ovr | Actual generated voltage displayed | System operation conditions reference table are met INFO. |

OK:

10 V or higher

HINT:

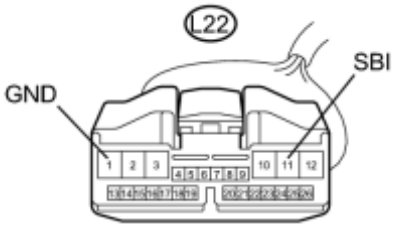
If the Data List items are not displayed, inspect the communication circuit between the solar ventilation ECU and A/C amplifier INFO.

NG REPLACE SOLAR VENTILATION ECU

OK **PROCEED TO NEXT SUSPECTED AREA SHOWN IN PROBLEM SYMPTOMS TABLE**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - SOLAR PANEL, BODY GROUND) |

*1




(a) Disconnect the solar ventilation ECU connector.

H

*2




H

(b) Disconnect the moon roof glass assembly (solar panel) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L22-11 (SBI) - R15-1 (+B) | Always | Below 1 Ω |
| L22-1 (GND) - Body ground | Always | Below 1 Ω |
| L22-11 (SBI) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |
| *2 | Front view of wire harness connector<br><br>(to Moon Roof Glass Assembly (Solar Panel)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE MOON ROOF GLASS ASSEMBLY (SOLAR PANEL)**

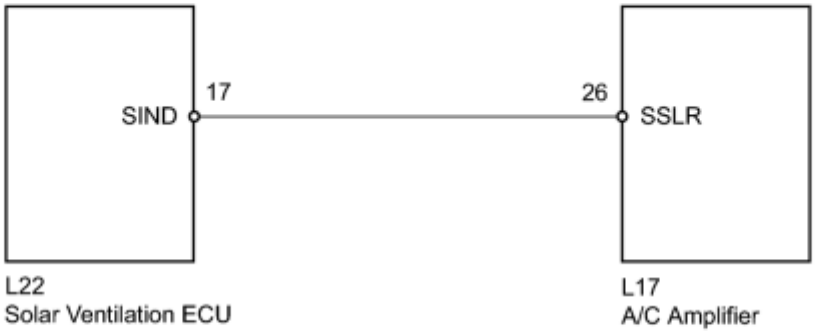
Communication Circuit between Solar Ventilation ECU and A/C Amplifier

# DESCRIPTION

The solar ventilation ECU communicates with the A/C amplifier using a direct line. The A/C amplifier checks the condition of the solar ventilation system based on signals sent via the direct line.

When this circuit malfunctions, Data List items for the solar ventilation system will not be displayed.

# WIRING DIAGRAM

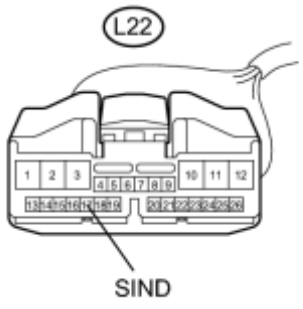



# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (SOLAR VENTILATION ECU - A/C AMPLIFIER) |

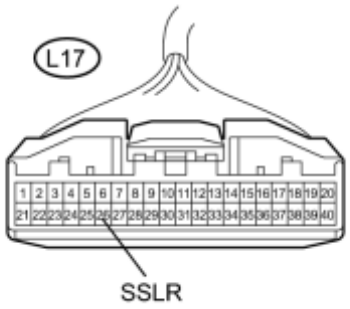
*1




H

(a) Disconnect the solar ventilation ECU connector.

*2




H

(b) Disconnect the A/C amplifier connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L22-17 (SIND) - L17-26 (SSLR) | Always | Below 1 Ω |
| L22-17 (SIND) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Solar Ventilation ECU) |
| *2 | Front view of wire harness connector<br><br>(to A/C Amplifier) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 2. | REPLACE SOLAR VENTILATION ECU |

(a) Replace the solar ventilation ECU with a known good one and check if the same problem occurs again INFO .

OK:

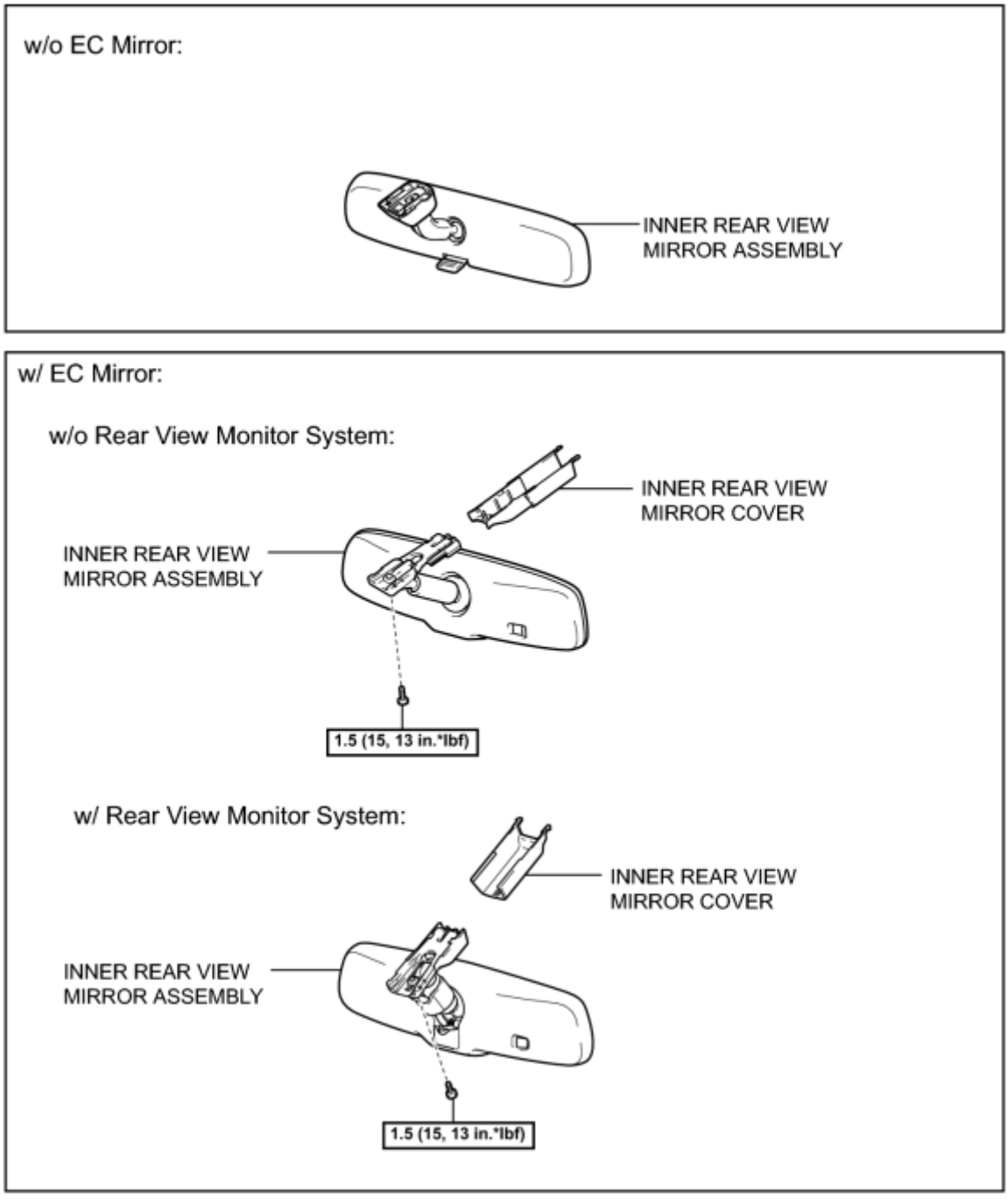
Same problem does not occur.

NG ▶ REPLACE A/C AMPLIFIER

OK ▶ **END (SOLAR VENTILATION ECU WAS DEFECTIVE)**

# COMPONENTS

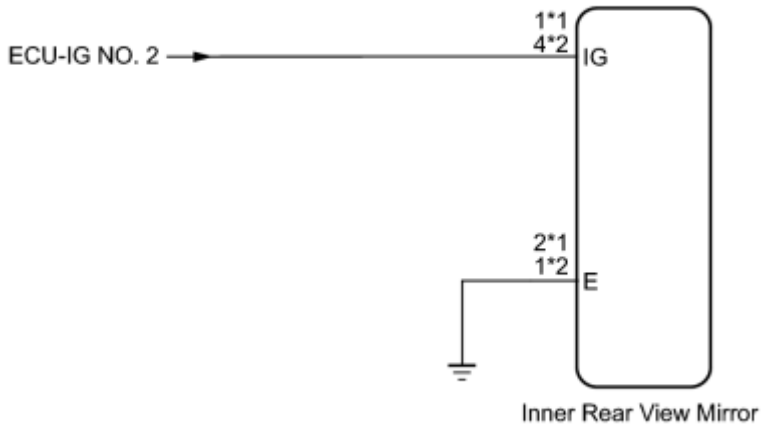
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# SYSTEM DIAGRAM




*1: w/ Garage Door Opener

*2: w/o Garage Door Opener

C

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

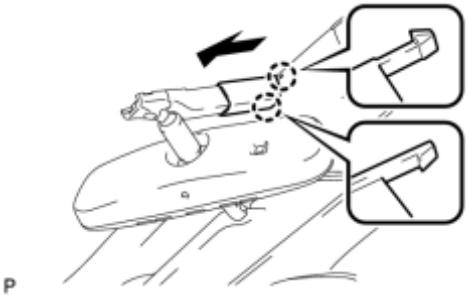
### *Automatic Glare-resistant EC Mirror*

| Symptom | Suspected Area | See page |
|---|---|---|
| Auto glare-resistant EC mirror does not operate | ECU-IG No. 2 fuse | - |
| | Inner rear view mirror | INFO |
| | Wire harness or connector | - |

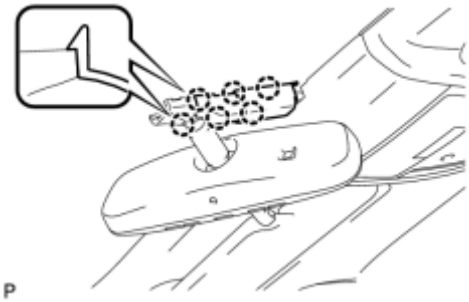
# REMOVAL

1. REMOVE INNER REAR VIEW MIRROR COVER (w/ EC Mirror)

(a) w/o Rear View Monitor System:

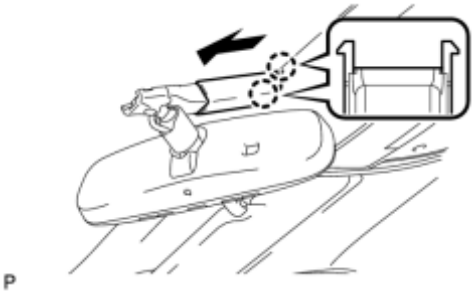


(1) Disengage the 2 claws and slide the inner rear view mirror cover as shown in the illustration.



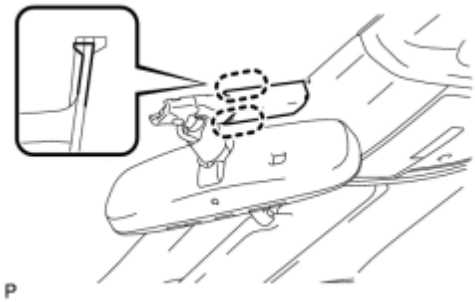
(2) Disengage the 6 claws and remove the inner rear view mirror cover.

(b) w/ Rear View Monitor System:

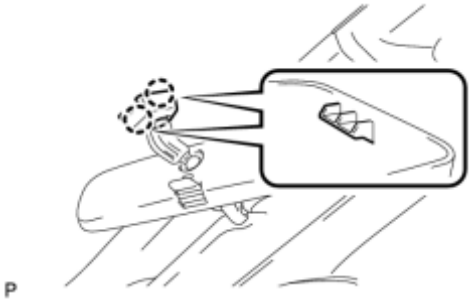


(1) Disengage the 2 claws and slide the inner rear view mirror cover as shown in the illustration.

(2) Disengage the 2 claws and remove the inner rear view mirror cover.



2. REMOVE INNER REAR VIEW MIRROR ASSEMBLY (w/o EC Mirror)



(a) Disengage the 2 claws and disconnect the inner rear view mirror cover.




(b) Remove the inner rear view mirror as shown in the illustration.

3. REMOVE INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror)

(a) w/o Rear View Monitor System:

(1) Disconnect the connector.




(2) Using "TORX" socket wrench (T20), remove the screw and inner rear view mirror assembly.

(b) w/ Rear View Monitor System:



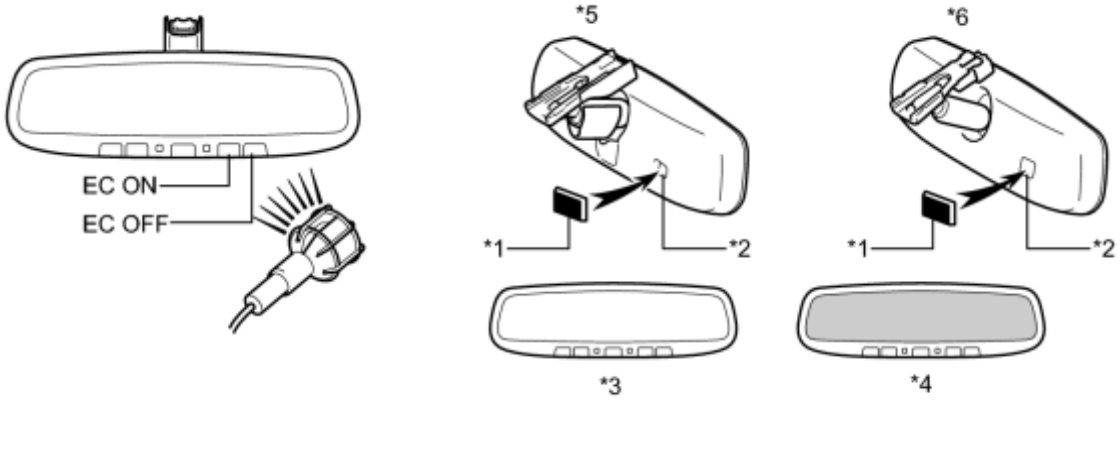

(1) Disconnect the connector.

(2) Using "TORX" socket wrench (T20), remove the screw and inner rear view mirror assembly.

# INSPECTION

1. INSPECT INNER REAR VIEW MIRROR ASSEMBLY (w/ GARAGE DOOR OPENER SYSTEM)

(a) Inspect the operation of the electrochromic inner mirror.




***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Black Colored Tape | *2 | Forward Sensor |
| *3 | Bright | *4 | Dark |
| *5 | w/ Rear View Monitor System | *6 | w/o Rear View Monitor System |

(1) Connect the positive (+) lead from a battery to terminal 1 and the negative (-) lead to terminal 2.

(2) Press the EC ON switch.

(3) Attach black colored tape to the forward sensor to prevent it from sensing.

(4) Light up the mirror with an electric light, and check that the mirror surface changes from bright to dark.

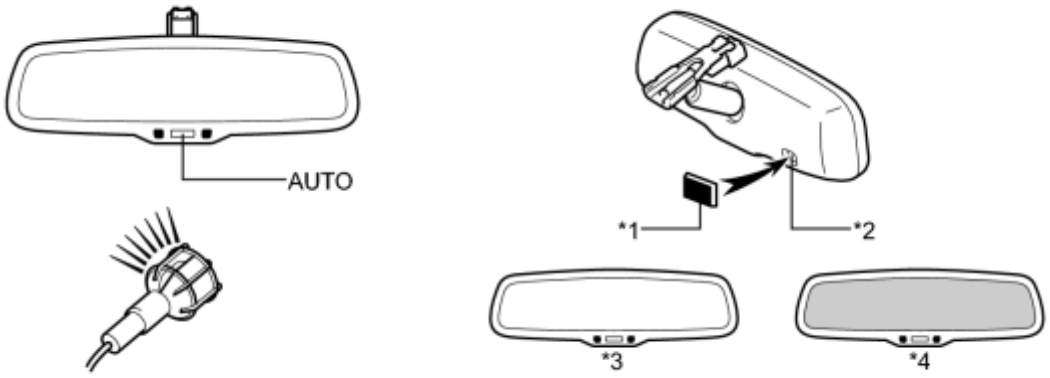
Standard:

Mirror surface changes from bright to dark.

If the result is not as specified, replace the mirror assembly.

2. INSPECT INNER REAR VIEW MIRROR ASSEMBLY (w/o GARAGE DOOR OPENER)

(a) Inspect the operation of the electrochromic inner mirror.




H

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Black Colored Tape | *2 | Forward Sensor |
| *3 | Bright | *4 | Dark |

(1) Connect the positive (+) lead from a battery to terminal 4 and the negative (-) lead to terminal 1.

(2) Press the AUTO switch.

(3) Attach black colored tape to the forward sensor to prevent it from sensing.

(4) Light up the mirror with an electric light, and check that the mirror surface changes from bright to dark.

Standard:

Mirror surface changes from bright to dark.

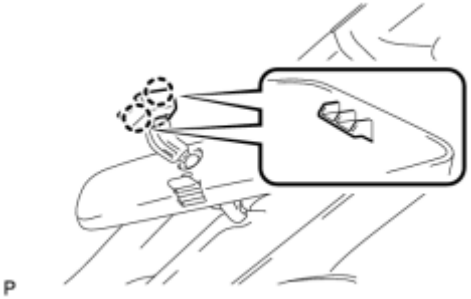
If the result is not as specified, replace the mirror assembly.

# INSTALLATION

1. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (w/o EC Mirror)



(a) Install the inner rear view mirror as shown in the illustration.



(b) Engage the 2 claws and connect the inner rear view mirror cover.

2. INSTALL INNER REAR VIEW MIRROR ASSEMBLY (w/ EC Mirror)

(a) w/o Rear View Monitor System:



(1) Using "TORX" socket wrench (T20), install the inner rear view mirror with the screw.

Torque: **1.5 N·m (15 kgf·cm, 13in·lbf)**

(2) Connect the connector.

(b) w/ Rear View Monitor System:



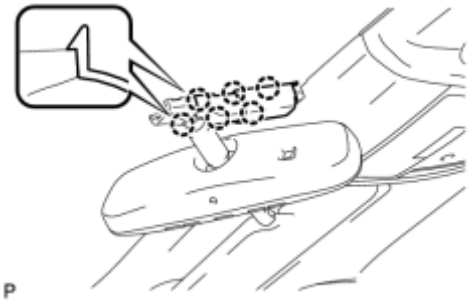
(1) Using "TORX" socket wrench (T20), install the inner rear view mirror with the screw.

Torque: **1.5 N·m (15 kgf·cm, 13in·lbf)**

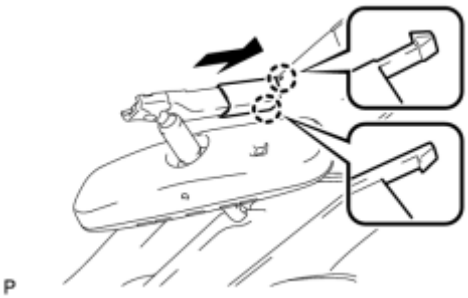
(2) Connect the connector.

3. INSTALL INNER REAR VIEW MIRROR COVER (w/ EC Mirror)

(a) w/o Rear View Monitor System:



(1) Engage the 6 claws and install the inner rear view mirror cover.



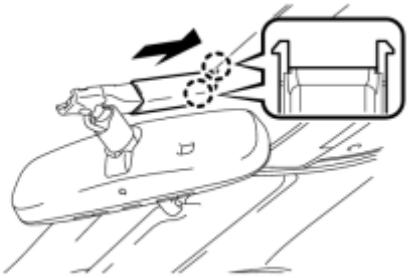
(2) Engage the 2 claws and install the inner rear view mirror cover as shown in the illustration.

(b) w/ Rear View Monitor System:

(1) Engage the 2 claws and install the inner rear view mirror cover.



P



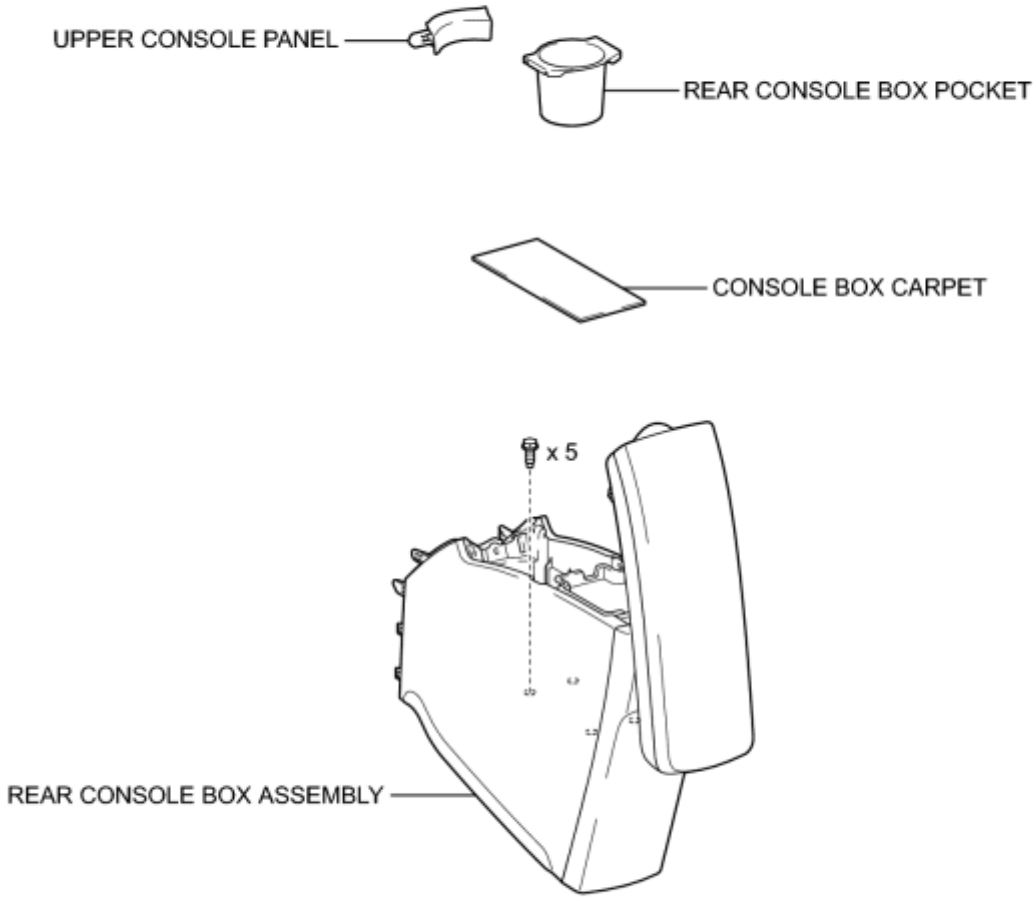
P

(2) Engage the 2 claws and install the inner rear view mirror cover as shown in the illustration.

# COMPONENTS

# ILLUSTRATION

w/ Power Outlet Socket:

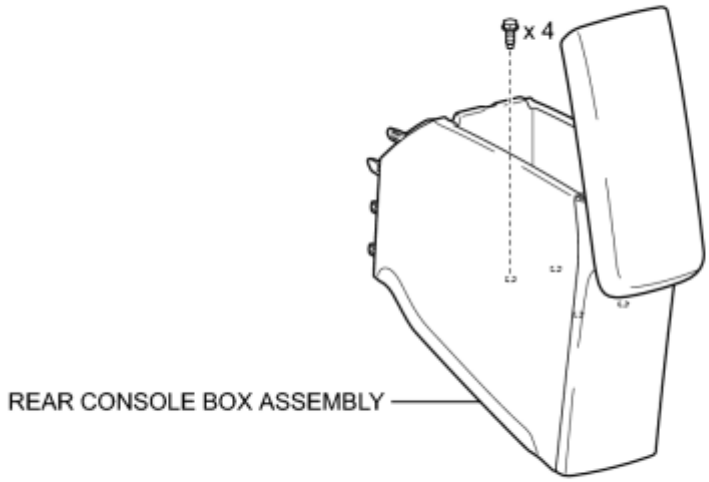



P

# ILLUSTRATION

w/o Power Outlet Socket:

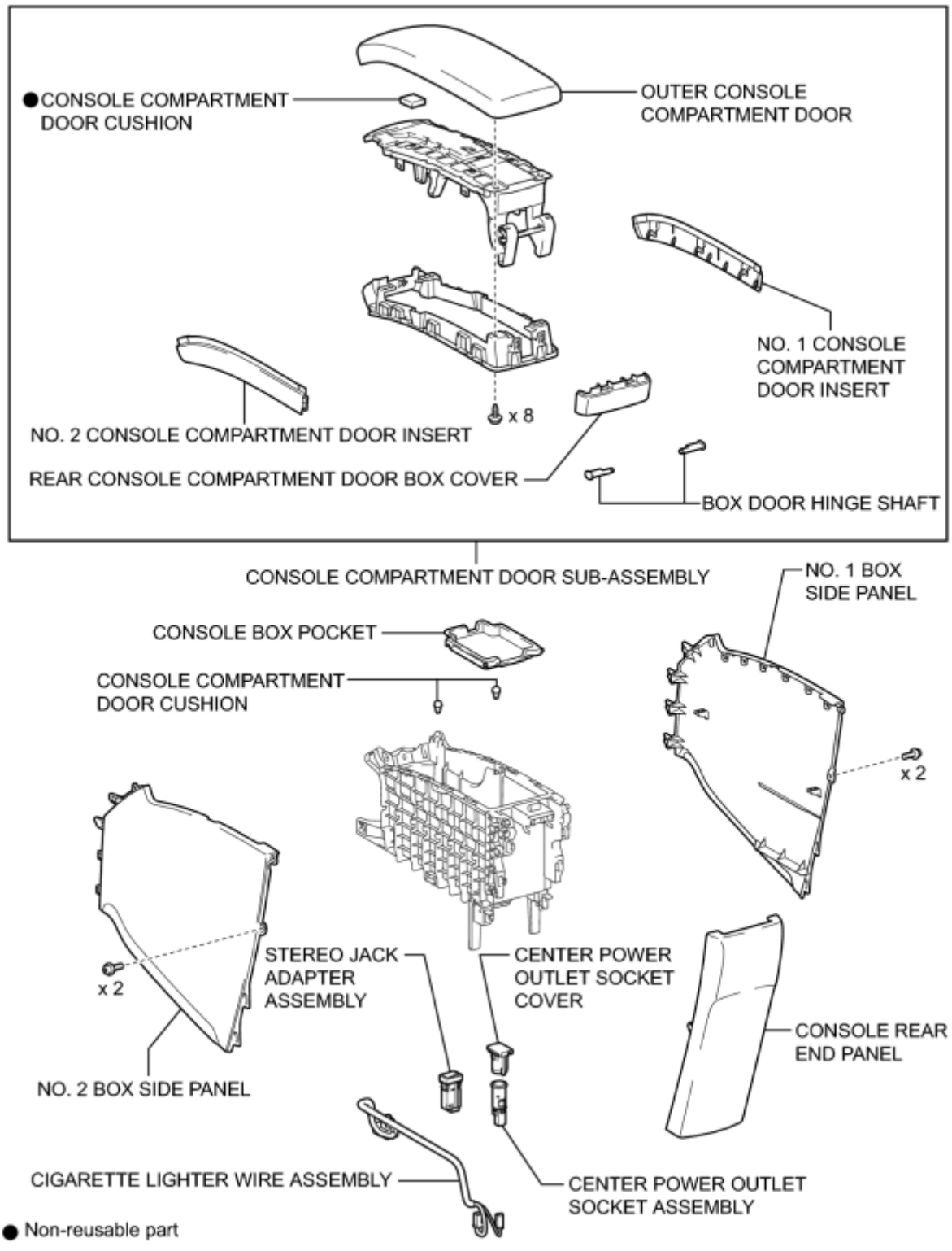



P

# ILLUSTRATION

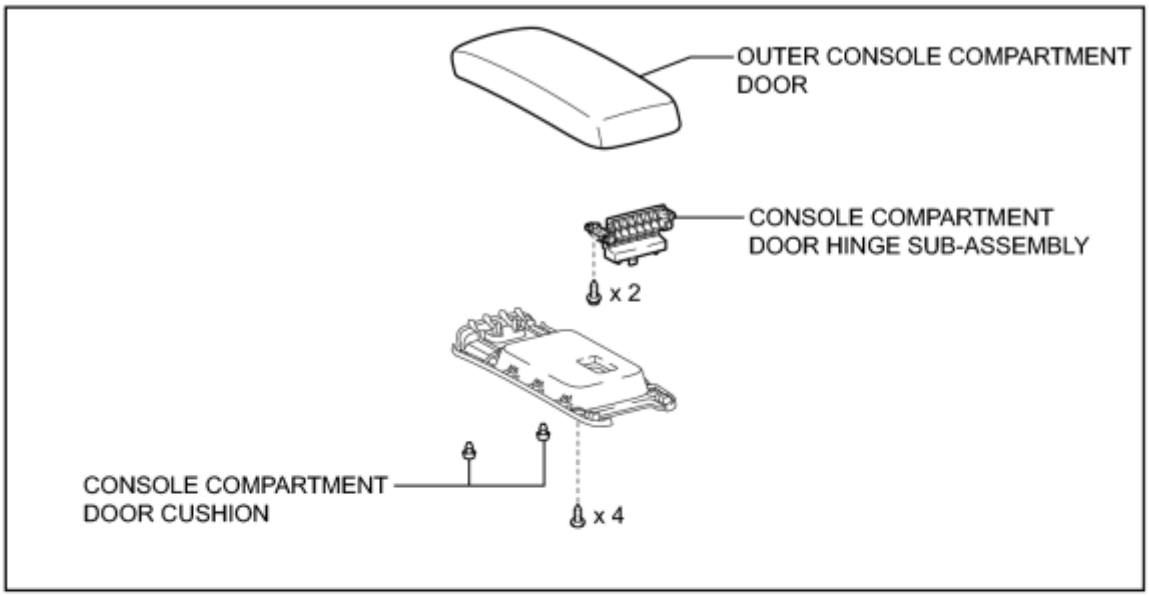
w/ Power Outlet Socket:

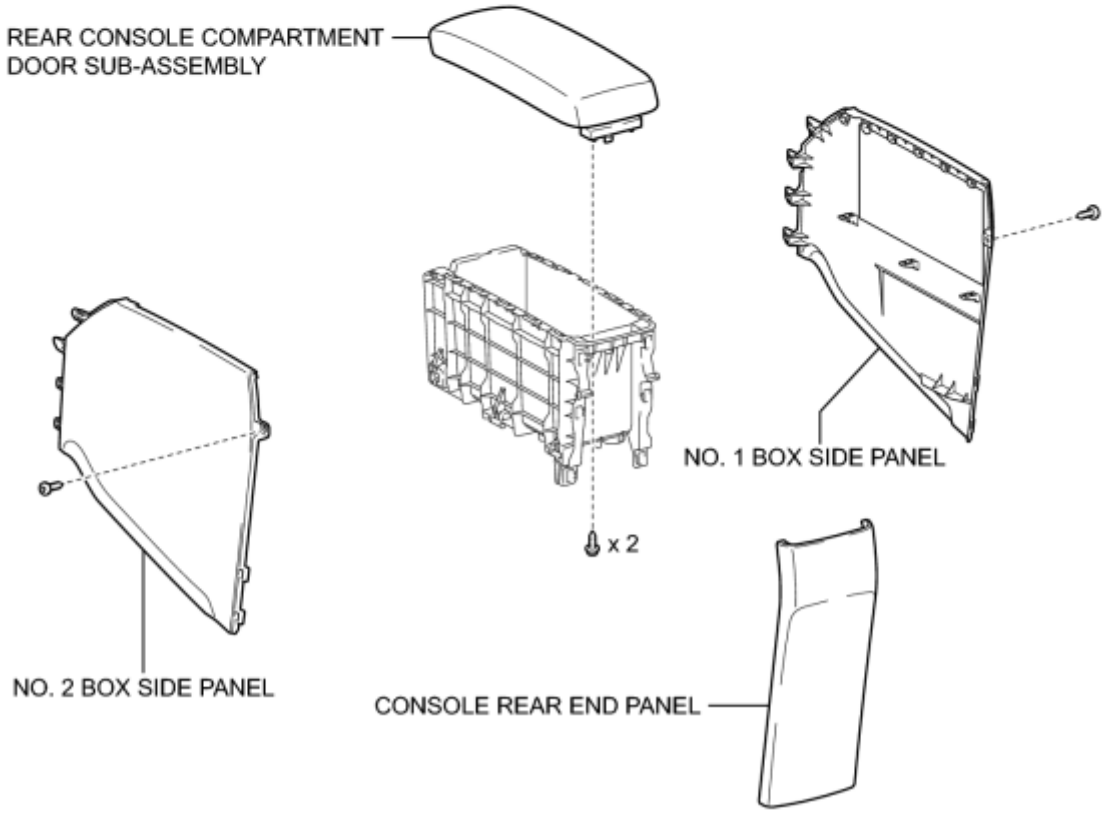



P

# ILLUSTRATION

w/o Power Outlet Socket:

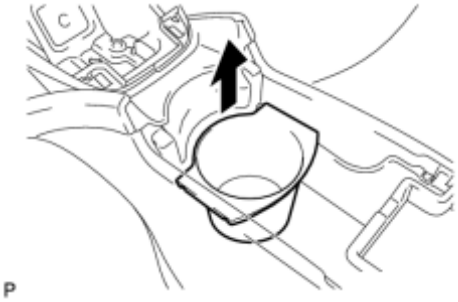



P

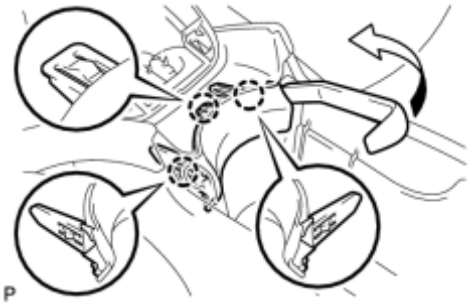
# REMOVAL

1. REMOVE REAR CONSOLE BOX POCKET (w/ Power Outlet Socket)



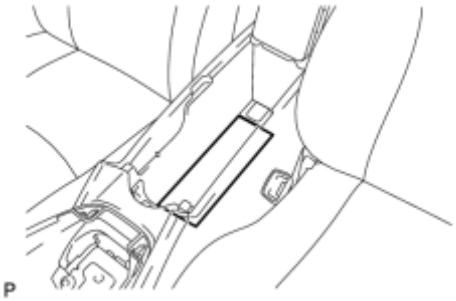
(a) Remove the rear console box pocket.

2. REMOVE UPPER CONSOLE PANEL (w/ Power Outlet Socket)



(a) Using a moulding remover, disengage the 3 claws to remove the upper console panel as shown in the illustration.

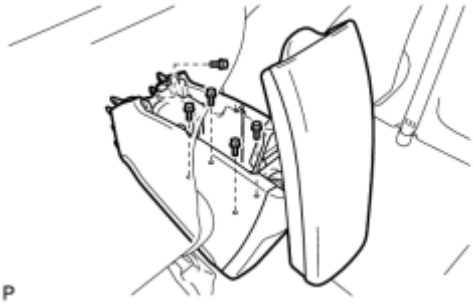
3. REMOVE CONSOLE BOX CARPET

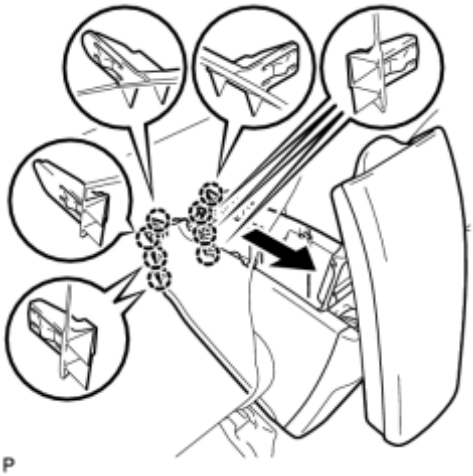


(a) Remove the console box carpet.

4. REMOVE REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket)

(a) Remove the 5 bolts.

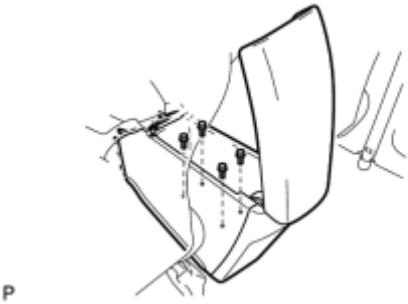




(b) Pull the rear console box assembly in the direction indicated by the arrow to disengage the 8 claws.

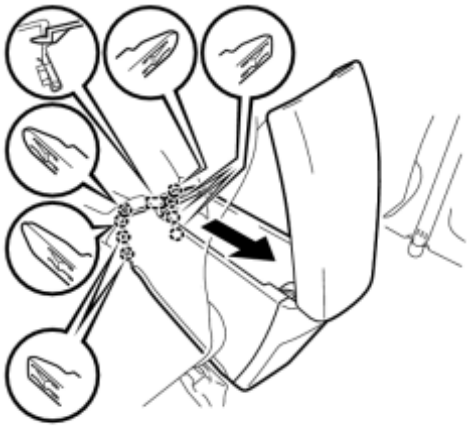
(c) Disconnect the connector and remove the rear console box assembly.

5. REMOVE REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket)



(a) Remove the 4 bolts.

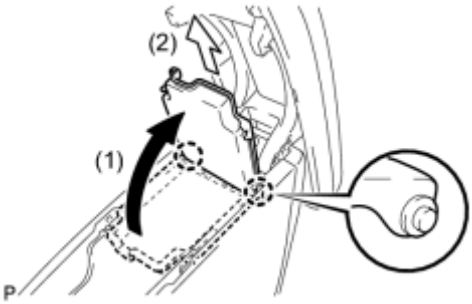
(b) Pull the rear console box assembly in the direction indicated by the arrow to disengage the 8 claws and guide.



P

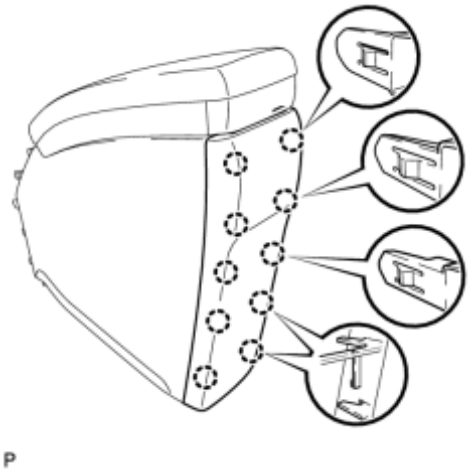
# DISASSEMBLY

1. REMOVE CONSOLE BOX POCKET (w/ Power Outlet Socket)



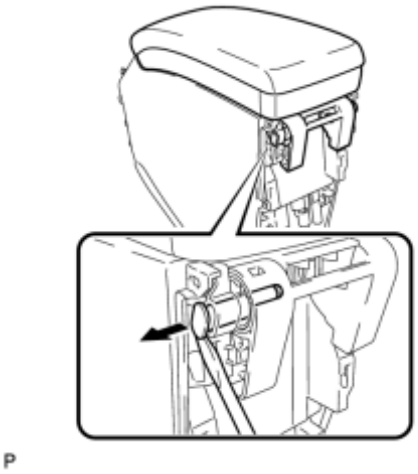

(a) Disengage the 2 claws and remove the console box pocket as shown in the illustration.

2. REMOVE CONSOLE REAR END PANEL (w/ Power Outlet Socket)




(a) Disengage the 10 claws to remove the console rear end panel.

3. REMOVE CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY (w/ Power Outlet Socket)

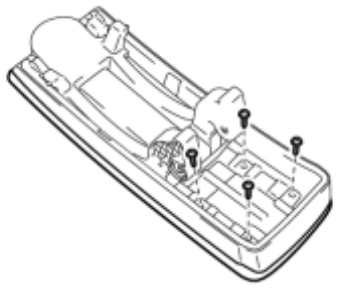



(a) Using a screwdriver, pull out the box door hinge shafts.

- The illustration is for the LH side.
- Use the same procedure for the RH side and LH side.

(b) Remove the console compartment door sub-assembly.

4. REMOVE REAR CONSOLE COMPARTMENT DOOR BOX COVER (w/ Power Outlet Socket)



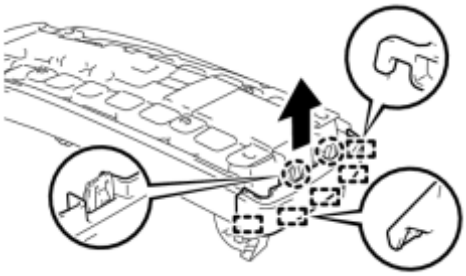
P

(a) Remove the 4 screws.



P

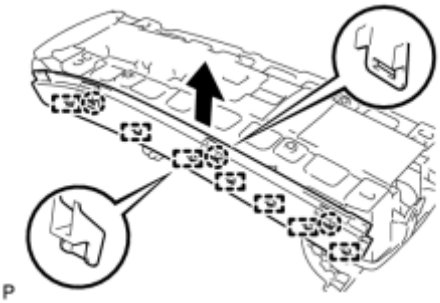
(b) Remove the 4 screws and the outer console compartment door.



P

(c) Pull the rear console compartment door box cover in the direction indicated by the arrow to disengage the 2 claws and 5 guides, and remove the rear console compartment door box cover.

5. REMOVE NO. 2 CONSOLE COMPARTMENT DOOR INSERT (w/ Power Outlet Socket)



P

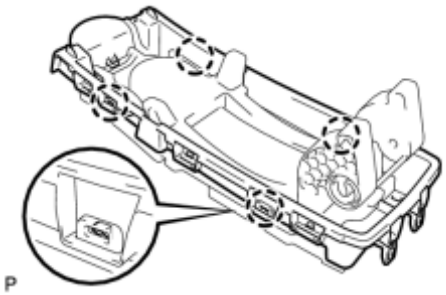
(a) Pull the No. 2 console compartment door insert in the direction indicated by the arrow to disengage the 3 claws and 7 guides, and remove the No. 2 console compartment door insert.

6. REMOVE NO. 1 CONSOLE COMPARTMENT DOOR INSERT (w/ Power Outlet Socket)

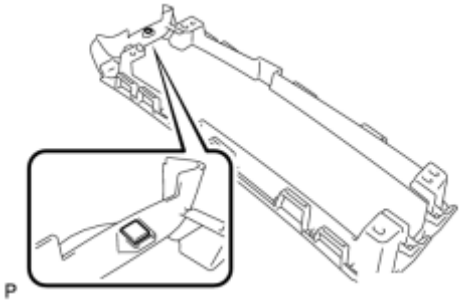
HINT:

Use the same procedure for the RH side and LH side.

7. REMOVE CONSOLE COMPARTMENT DOOR CUSHION (w/ Power Outlet Socket)

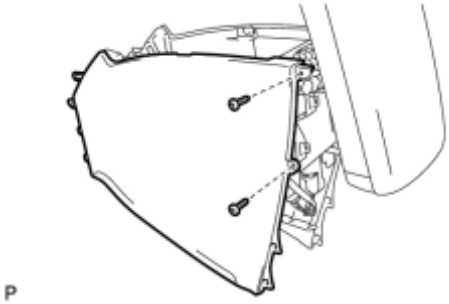


(a) Disengage the 4 claws and remove the inner console compartment door.

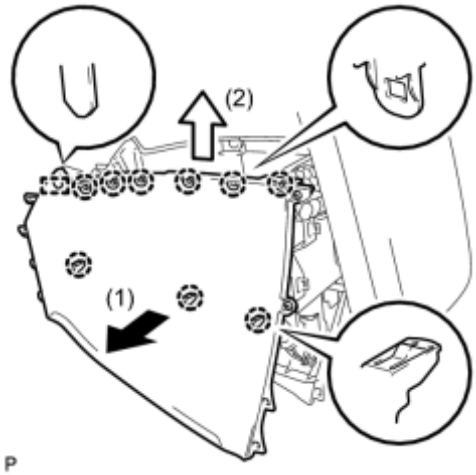


(b) Remove the console compartment door cushion.

8. REMOVE NO. 2 BOX SIDE PANEL (w/ Power Outlet Socket)



(a) Remove the 2 screws.




(b) Pull the No. 2 box side panel in the direction indicated by the arrow to disengage the 9 claws and guide, and remove the No. 2 box side panel.

9. REMOVE NO. 1 BOX SIDE PANEL (w/ Power Outlet Socket)

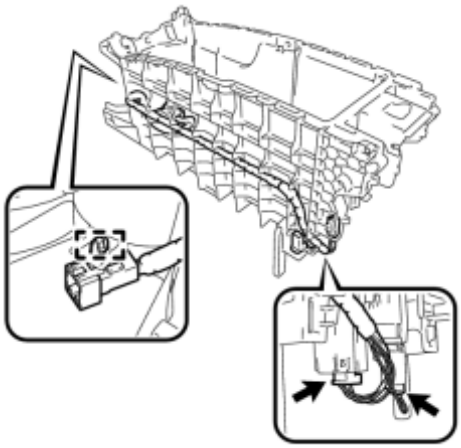
HINT:

Use the same procedure for the RH side and LH side.

10. REMOVE CONSOLE COMPARTMENT DOOR CUSHION (w/ Power Outlet Socket)

(a) Remove the 2 console compartment door cushions.

11. REMOVE CIGARETTE LIGHTER WIRE ASSEMBLY (w/ Power Outlet Socket)



P

(a) Disconnect the 2 connectors.

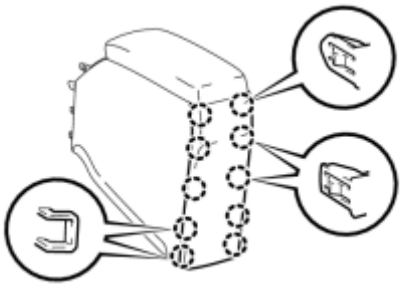
(b) Disengage the clamp and remove the cigarette lighter wire assembly.

12. REMOVE STEREO JACK ADAPTER ASSEMBLY (w/ Power Outlet Socket) INFO

13. REMOVE CENTER POWER OUTLET SOCKET ASSEMBLY (w/ Power Outlet Socket) INFO

14. REMOVE CENTER POWER OUTLET SOCKET COVER (w/ Power Outlet Socket) INFO

15. REMOVE CONSOLE REAR END PANEL (w/o Power Outlet Socket)

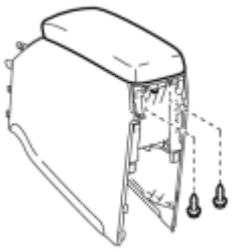


P

(a) Disengage the 10 claws to remove the console rear end panel.

16. REMOVE REAR CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY (w/o Power Outlet Socket)

(a) Remove the 2 screws and remove the rear console compartment door sub-assembly.



P

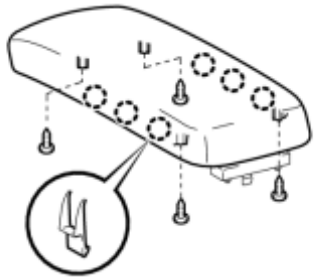
17. REMOVE CONSOLE COMPARTMENT DOOR HINGE SUB-ASSEMBLY (w/o Power Outlet Socket)



P

(a) Remove the 2 screws and the console compartment door hinge sub-assembly.

18. REMOVE OUTER CONSOLE COMPARTMENT DOOR (w/o Power Outlet Socket)

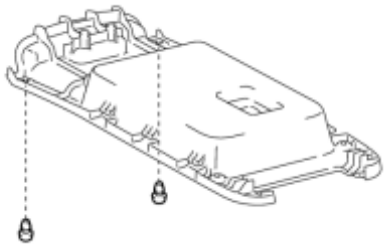


P

(a) Remove the 4 screws.

(b) Disengage the 6 claws and remove the outer console compartment door.

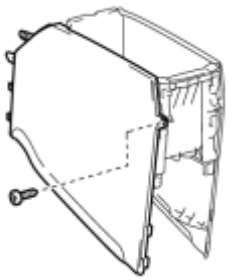
19. REMOVE CONSOLE COMPARTMENT DOOR CUSHION (w/o Power Outlet Socket)



P

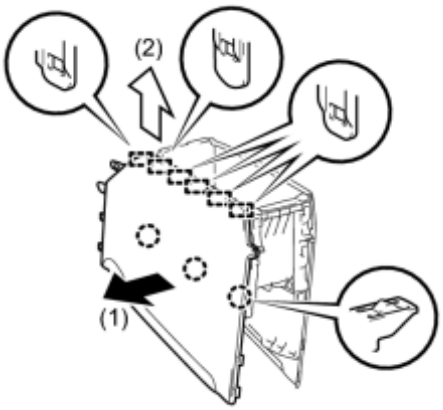
(a) Remove the 2 console compartment door cushions.

20. REMOVE NO. 2 BOX SIDE PANEL (w/o Power Outlet Socket)



P

(a) Remove the screw.




P

(b) Disengage the 3 claws and 6 guides and remove the No. 2 box side panel.

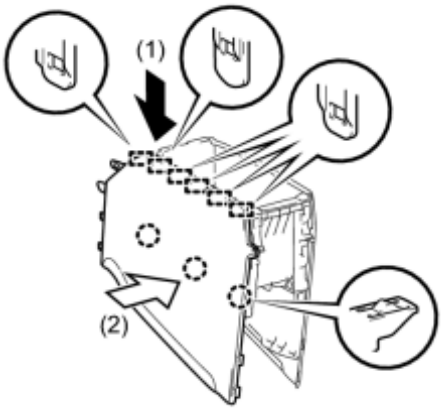
21. REMOVE NO. 1 BOX SIDE PANEL (w/o Power Outlet Socket)

HINT:

Use the same procedure for the RH side and LH side.

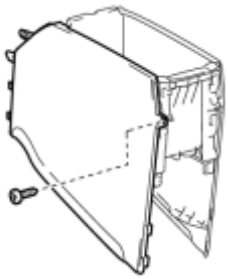
# REASSEMBLY

1. INSTALL NO. 2 BOX SIDE PANEL (w/o Power Outlet Socket)




P

(a) Engage the 6 guides and 3 claws as shown in the illustration.



P

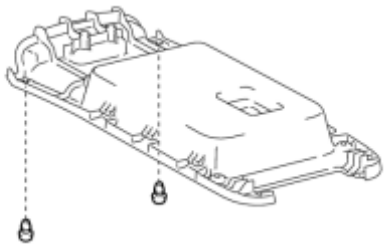
(b) Install the No. 2 box side panel with the screw.

2. INSTALL NO. 1 BOX SIDE PANEL (w/o Power Outlet Socket)

HINT:

Use the same procedure for the RH side and LH side.

3. INSTALL CONSOLE COMPARTMENT DOOR CUSHION (w/o Power Outlet Socket)

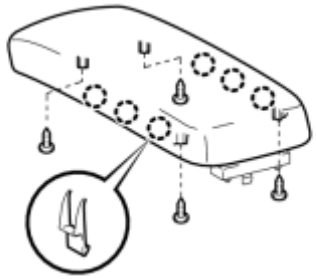


P

(a) Install the 2 console compartment door cushions.

4. INSTALL OUTER CONSOLE COMPARTMENT DOOR (w/o Power Outlet Socket)

(a) Engage the 6 claws.



P

(b) Install the outer console compartment door with the 4 screws.

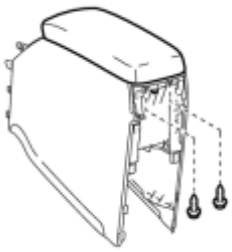
5. INSTALL CONSOLE COMPARTMENT DOOR HINGE SUB-ASSEMBLY (w/o Power Outlet Socket)



P

(a) Install the console compartment door hinge sub-assembly with the 2 screws.

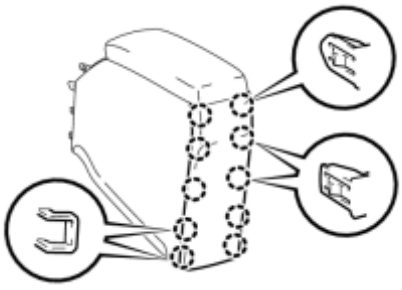
6. INSTALL REAR CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY (w/o Power Outlet Socket)



P

(a) Install the rear console compartment door sub-assembly with the 2 screws.

7. INSTALL CONSOLE REAR END PANEL (w/o Power Outlet Socket)



P

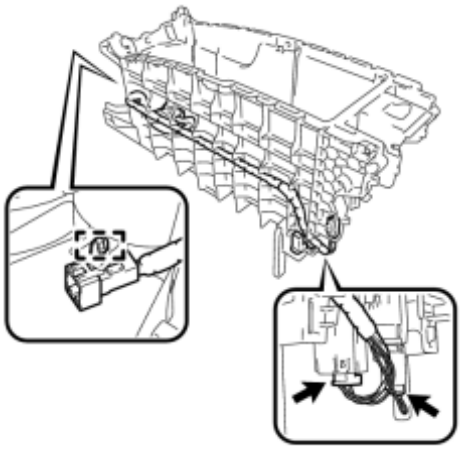
(a) Engage the 10 claws to install the console rear end panel.

8. INSTALL CENTER POWER OUTLET SOCKET COVER (w/ Power Outlet Socket) INFO

9. INSTALL CENTER POWER OUTLET SOCKET ASSEMBLY (w/ Power Outlet Socket) INFO

10. INSTALL STEREO JACK ADAPTER ASSEMBLY (w/ Power Outlet Socket) INFO

11. INSTALL CIGARETTE LIGHTER WIRE ASSEMBLY (w/ Power Outlet Socket)



P

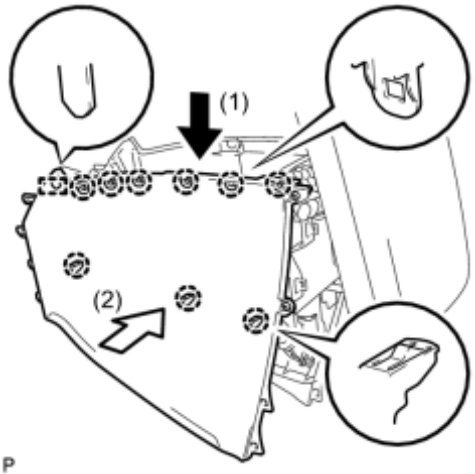
(a) Engage the clamp.

(b) Connect the 2 connectors to install the cigarette lighter wire assembly.

12. INSTALL CONSOLE COMPARTMENT DOOR CUSHION (w/ Power Outlet Socket)

(a) Install the 2 console compartment door cushions.

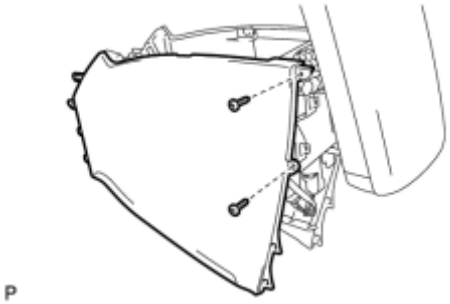
13. INSTALL NO. 2 BOX SIDE PANEL (w/ Power Outlet Socket)




P

(a) Engage the 9 claws and guide as shown in the illustration.

(b) Install the No. 2 box side panel with the 2 screws.

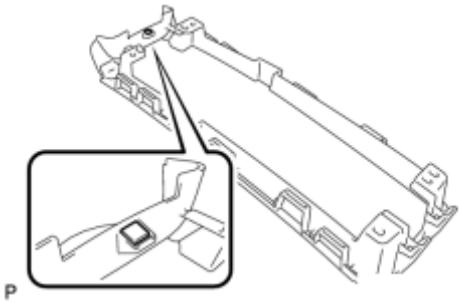


14. INSTALL NO. 1 BOX SIDE PANEL (w/ Power Outlet Socket)

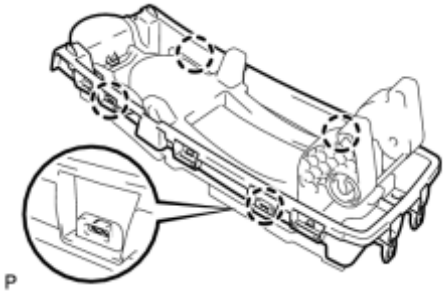
HINT:

Use the same procedure for the RH side and LH side.

15. INSTALL CONSOLE COMPARTMENT DOOR CUSHION (w/ Power Outlet Socket)

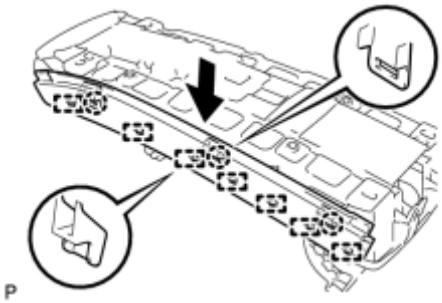


(a) Install a new console compartment door cushion.



(b) Engage the 4 claws to install the inner console compartment door.

16. INSTALL NO. 2 CONSOLE COMPARTMENT DOOR INSERT (w/ Power Outlet Socket)



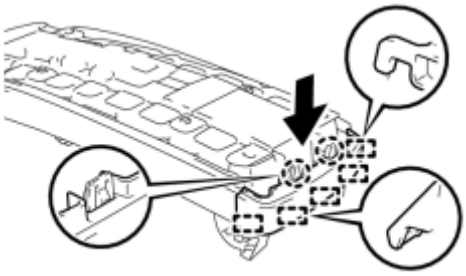
(a) Engage the 3 claws and 7 guides to install the No. 2 console compartment door insert as shown in the illustration.

17. INSTALL NO. 1 CONSOLE COMPARTMENT DOOR INSERT (w/ Power Outlet Socket)

HINT:

Use the same procedure for the RH side and LH side.

18. INSTALL REAR CONSOLE COMPARTMENT DOOR BOX COVER (w/ Power Outlet Socket)



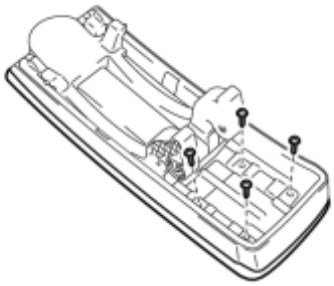
P

(a) Engage the 2 claws and 5 guides to install the rear console compartment door box cover as shown in the illustration.



P

(b) Temporarily install the outer console compartment door with the 4 screws.



P

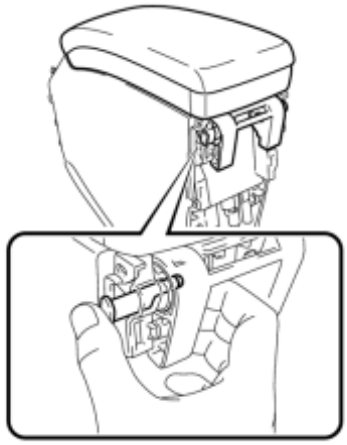
(c) Install the outer console compartment door with the 4 screws.

19. INSTALL CONSOLE COMPARTMENT DOOR SUB-ASSEMBLY (w/ Power Outlet Socket)

(a) Temporarily install the console compartment door sub-assembly.

(b) Push in the box door hinge shafts by hand as far as possible.

- The illustration is for the LH side.
- Use the same procedure for the RH side and LH side.



P

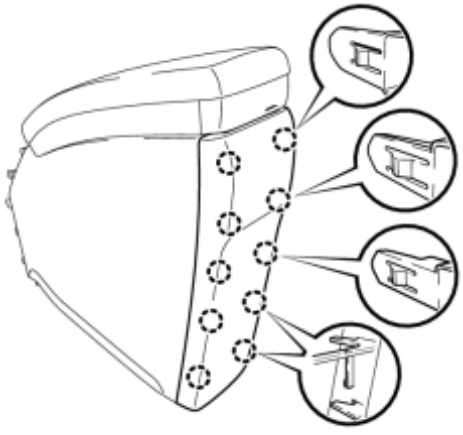


P

(c) Using pliers, push in the box door hinge shafts completely and install the console compartment door sub-assembly.

- The illustration is for the LH side.
- Use the same procedure for the RH side and LH side.

20. INSTALL CONSOLE REAR END PANEL (w/ Power Outlet Socket)

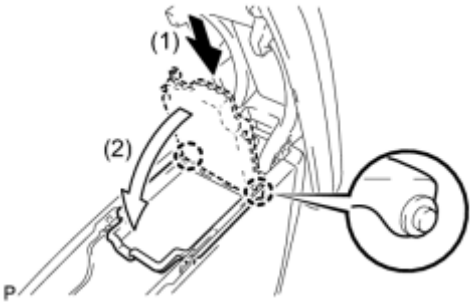


P

(a) Engage the 10 claws to install the console rear end panel.

21. INSTALL CONSOLE BOX POCKET (w/ Power Outlet Socket)

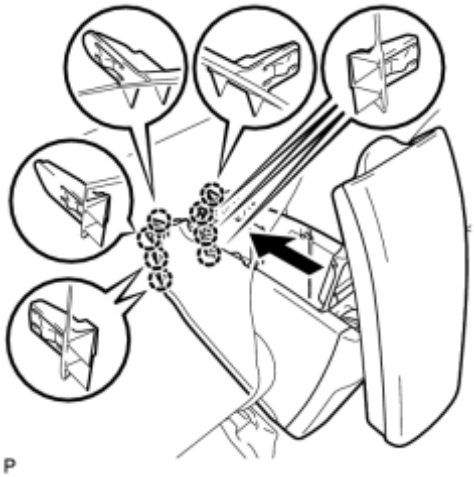
(a) Engage the 2 claws and install the console box pocket as shown in the illustration.


(1)
(2)
P

# INSTALLATION

1. INSTALL REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket)

(a) Connect the connector.

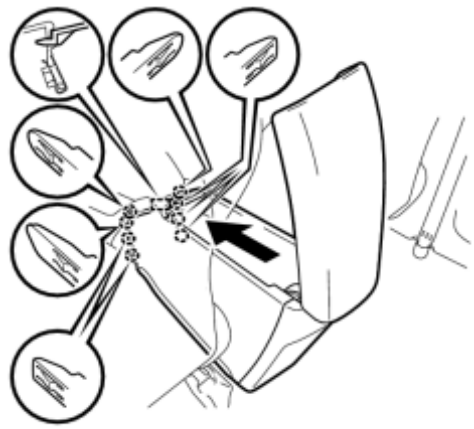


(b) Engage the 8 claws as shown in the illustration.

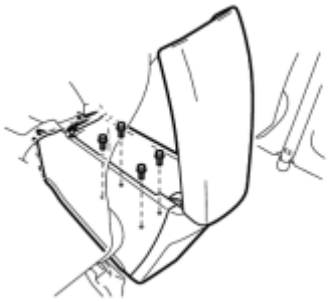


(c) Install the rear console box assembly with the 5 bolts.

2. INSTALL REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket)

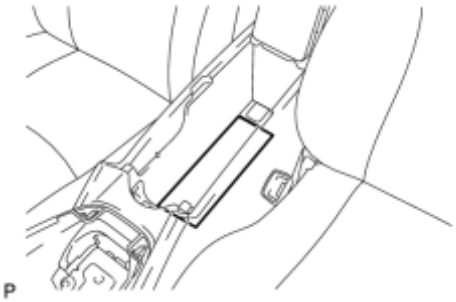


(a) Engage the 8 claws and guide as shown in the illustration.



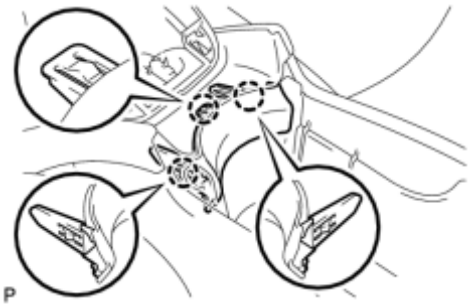
(b) Install the rear console box assembly with the 4 bolts.

3. INSTALL CONSOLE BOX CARPET



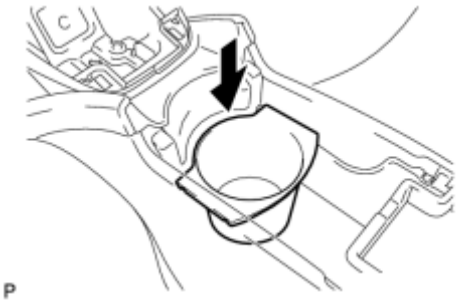
(a) Install the console box carpet.

4. INSTALL UPPER CONSOLE PANEL (w/ Power Outlet Socket)



(a) Engage the 3 claws to install the upper console panel.

5. INSTALL REAR CONSOLE BOX POCKET (w/ Power Outlet Socket)



(a) Install the rear console box pocket as shown in the illustration.

# PRECAUTION

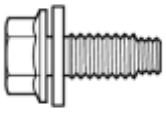
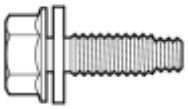
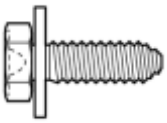
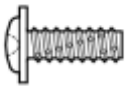
1. PRECAUTION FOR VEHICLE WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

(a) Some operations in this section may affect the SRS airbags. Prior to performing the corresponding operations, read the precautions regarding the SRS airbags INFO.

2. TABLE OF BOLT, SCREW AND NUT

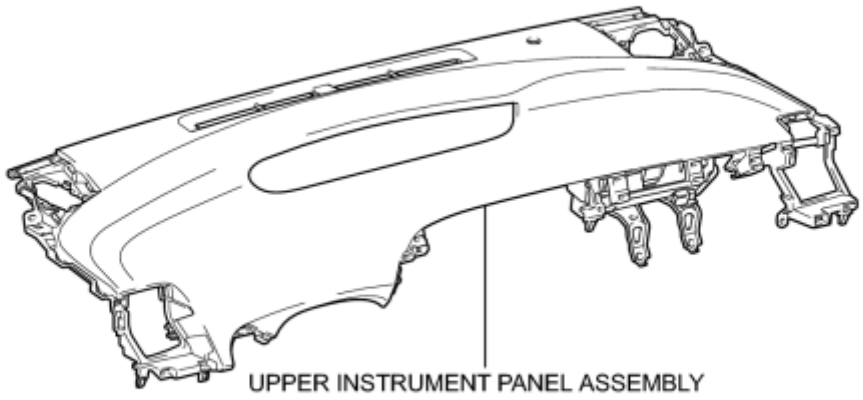
HINT:

All bolts, screws and nuts relevant to installing and removing the instrument panel are shown along with their alphabet codes in the table below.

| Code | Shape | Size | Code | Shape | Size |
|---|---|---|---|---|---|
| <A> |  | φ=8 mm<br>(0.314 in.)<br>Length=21 mm<br>(0.827 in.) | <B> |  | φ=6 mm<br>(0.236 in.)<br>Length=20 mm<br>(0.787 in.) |
| <C> |  | φ=6 mm<br>(0.236 in.)<br>Length=20 mm<br>(0.787 in.) | <D> |  | φ=5 mm<br>(0.197 in.)<br>Length=14 mm<br>(0.551 in.) |

# COMPONENTS

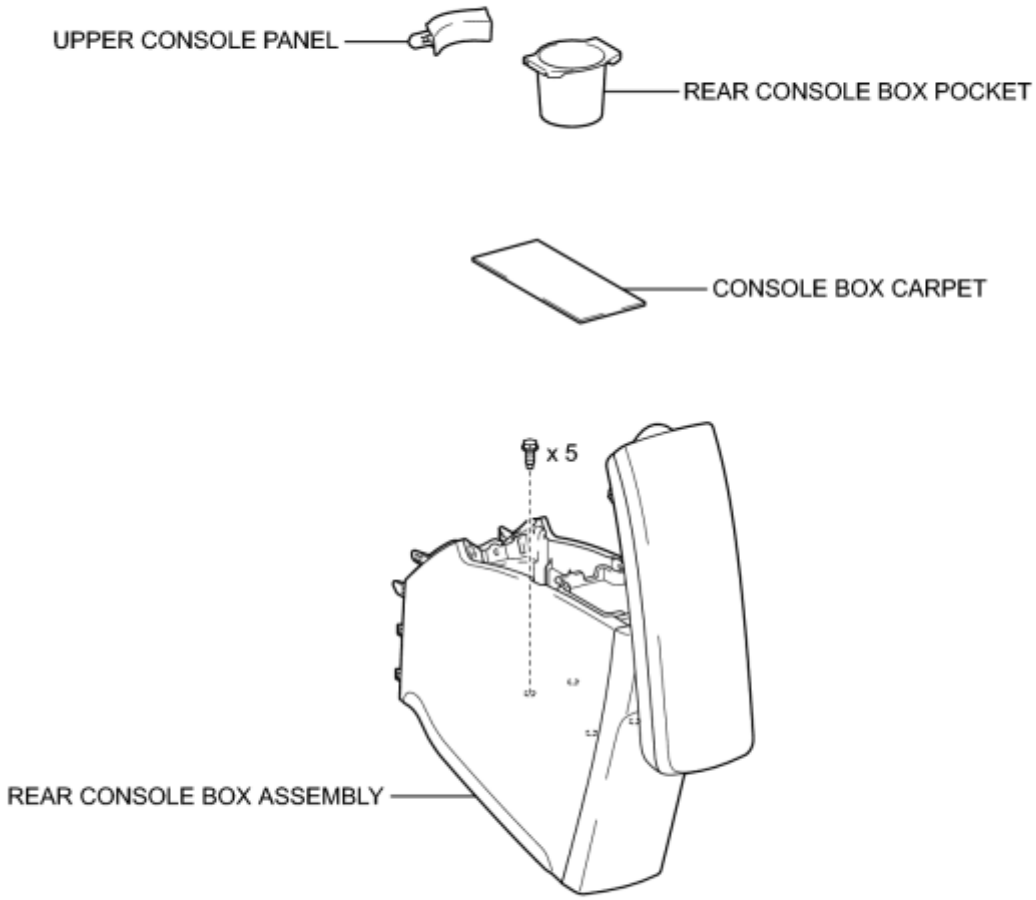
# ILLUSTRATION




P

# ILLUSTRATION

w/ Power Outlet Socket:

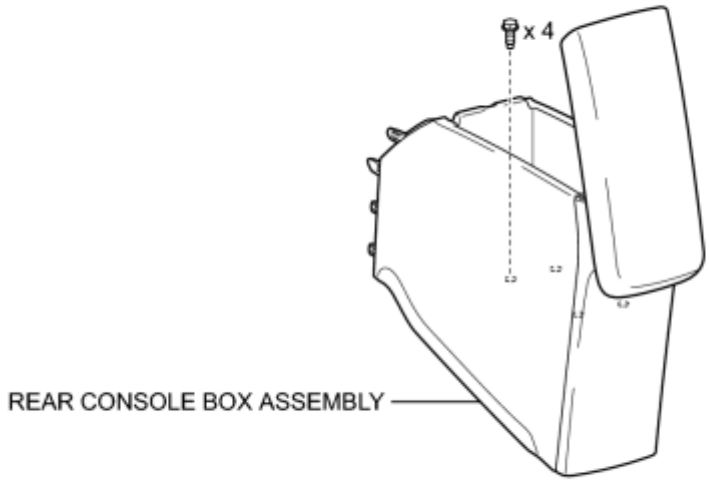



P

# ILLUSTRATION

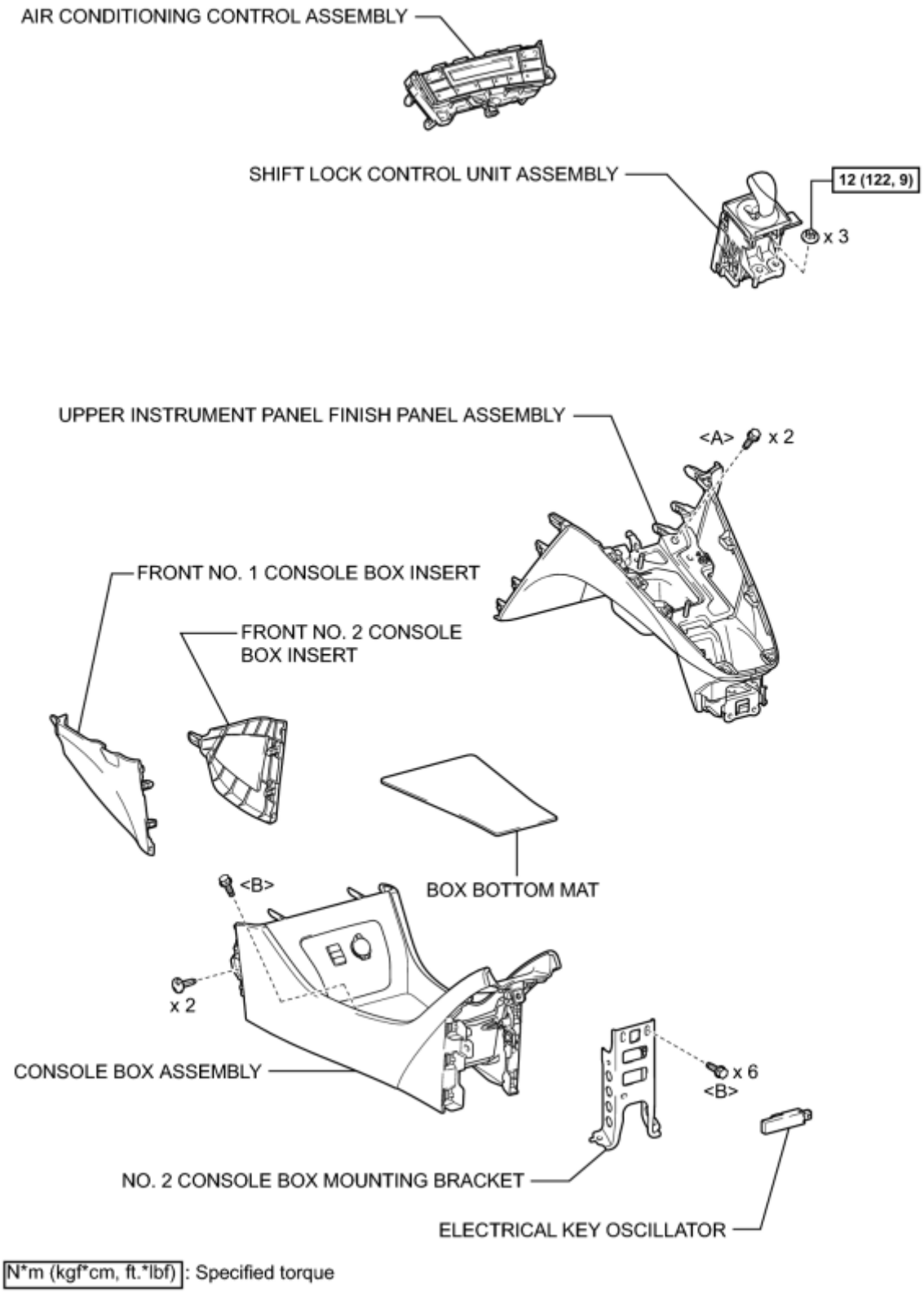
w/o Power Outlet Socket:



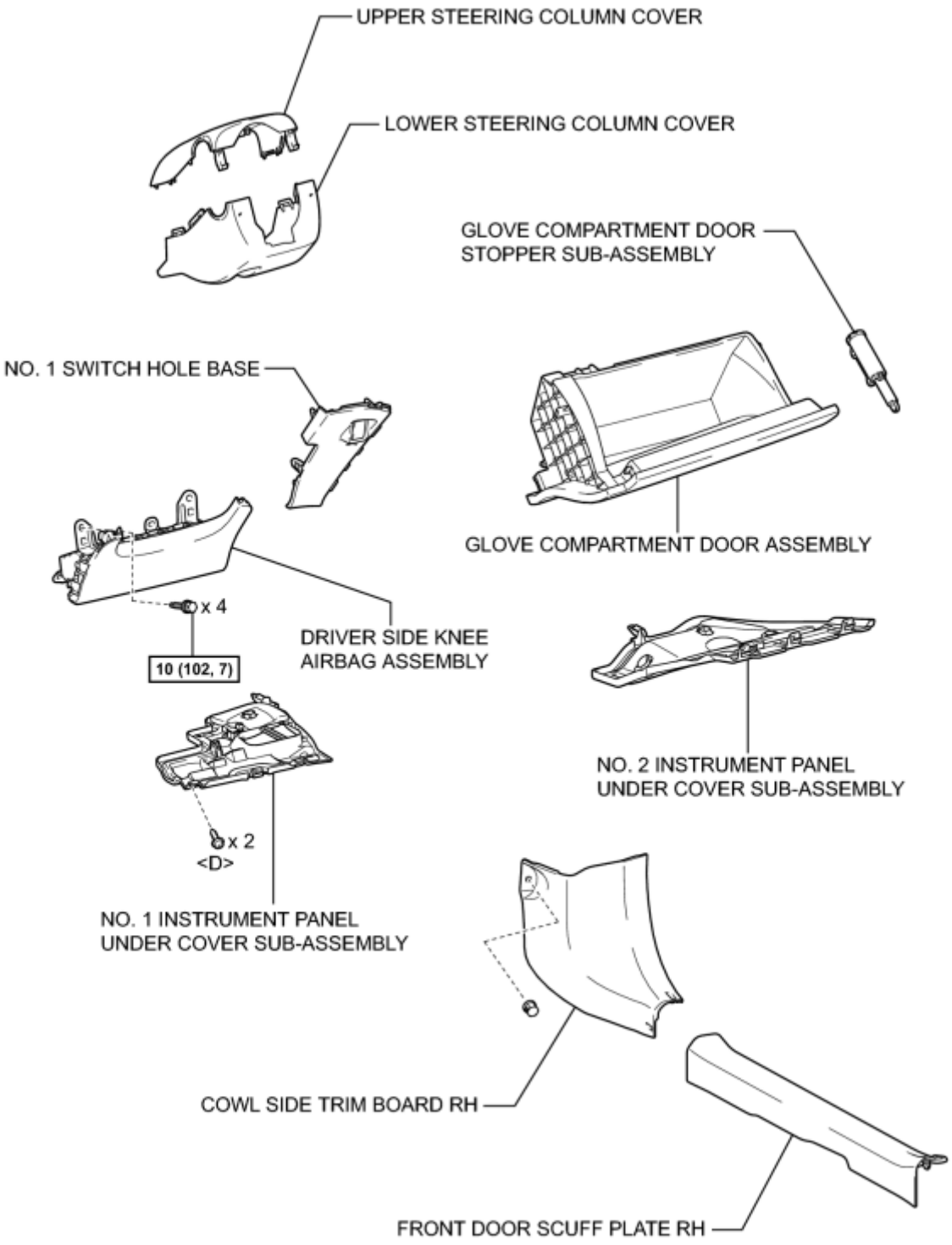

P

# ILLUSTRATION




P

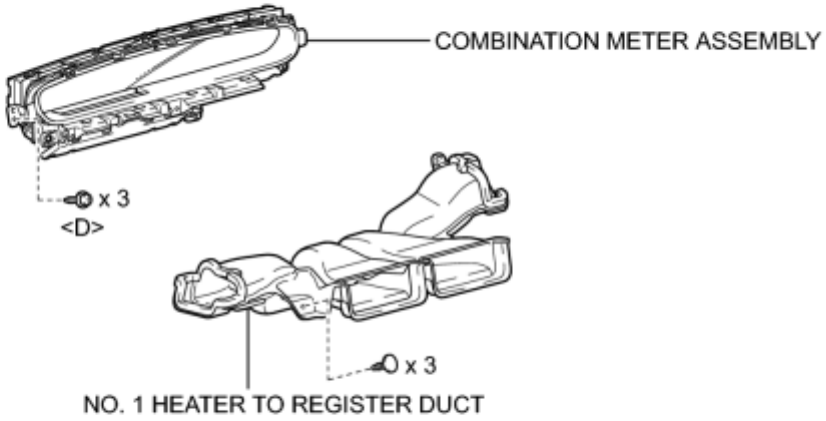
# ILLUSTRATION

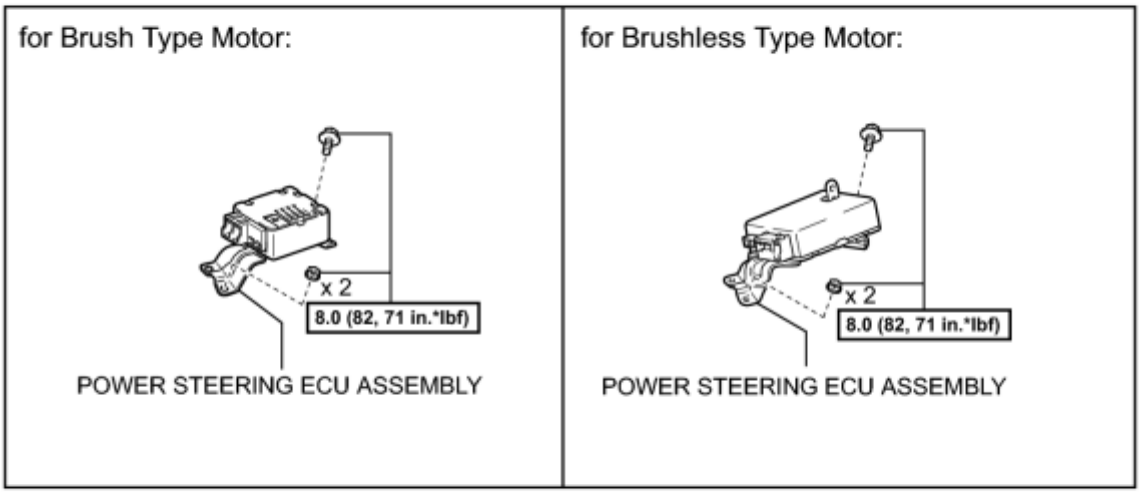



N*m (kgf*cm, ft.*lbf) : Specified torque

P

# ILLUSTRATION



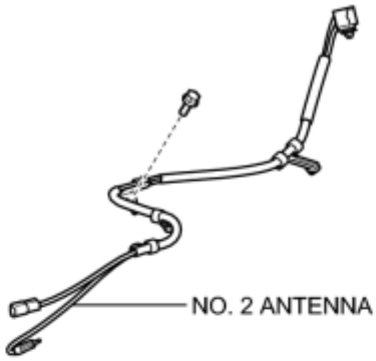




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION

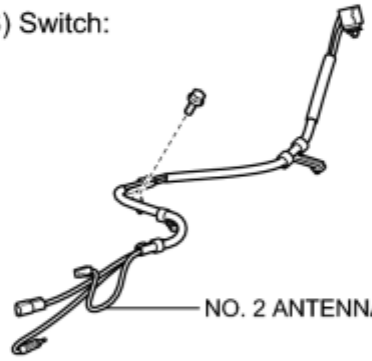
w/o Satellite Radio:



NO. 2 ANTENNA CORD SUB-ASSEMBLY

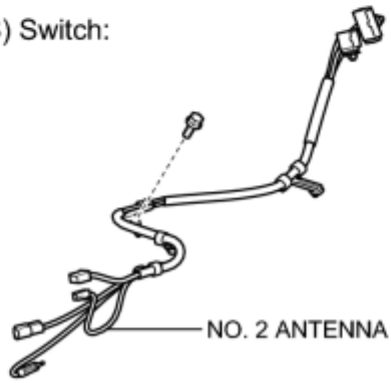
w/ Satellite Radio:

w/o Manual (SOS) Switch:



NO. 2 ANTENNA CORD SUB-ASSEMBLY

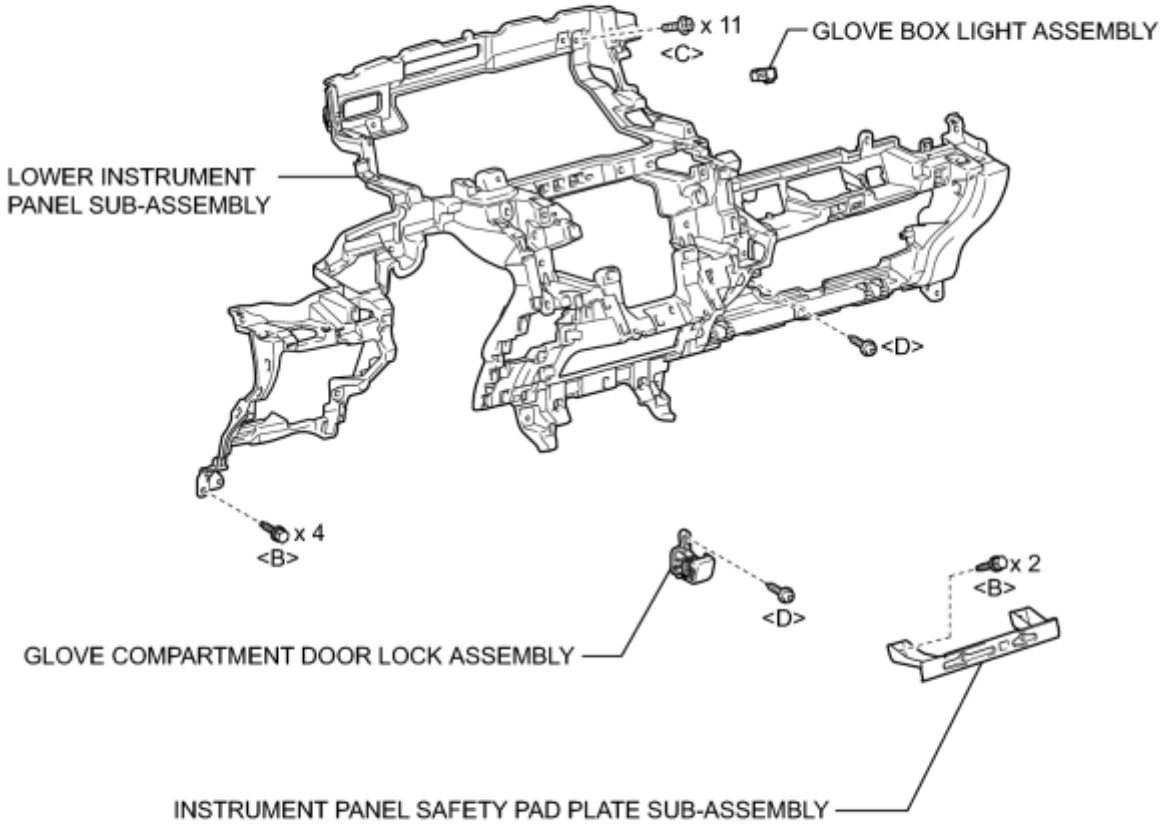
w/ Manual (SOS) Switch:



NO. 2 ANTENNA CORD SUB-ASSEMBLY

P

# ILLUSTRATION


x 11
<C>
GLOVE BOX LIGHT ASSEMBLY
LOWER INSTRUMENT PANEL SUB-ASSEMBLY
<D>
x 4
<B>
<D>
x 2
<B>
GLOVE COMPARTMENT DOOR LOCK ASSEMBLY
INSTRUMENT PANEL SAFETY PAD PLATE SUB-ASSEMBLY

P

# REMOVAL

1. PRECAUTION

INFO

2. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

(a) Remove the upper instrument panel assembly INFO.

3. REMOVE REAR CONSOLE BOX POCKET (w/ Power Outlet Socket) INFO

4. REMOVE UPPER CONSOLE PANEL (w/ Power Outlet Socket) INFO

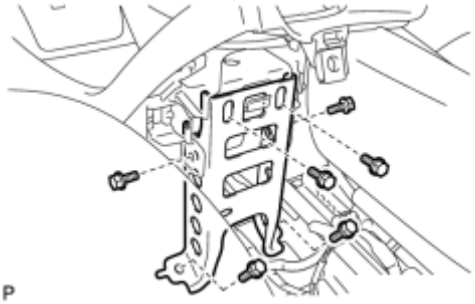
5. REMOVE CONSOLE BOX CARPET INFO

6. REMOVE REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket) INFO

7. REMOVE REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket) INFO

8. REMOVE ELECTRICAL KEY OSCILLATOR INFO

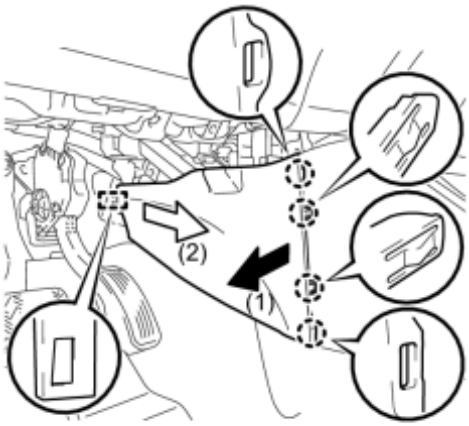
9. REMOVE NO. 2 CONSOLE BOX MOUNTING BRACKET




(a) Remove the 6 bolts <B> and No. 2 console box mounting bracket.

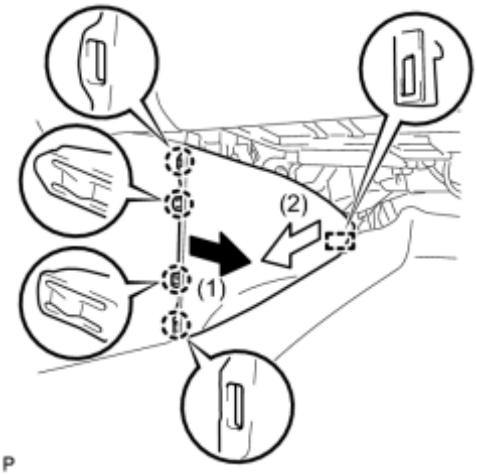
10. REMOVE FRONT NO. 1 CONSOLE BOX INSERT

(a) Pull the front No. 1 console box insert in the direction indicated by the arrow to disengage the 4 claws and guide, and remove the front No. 1 console box insert.




P

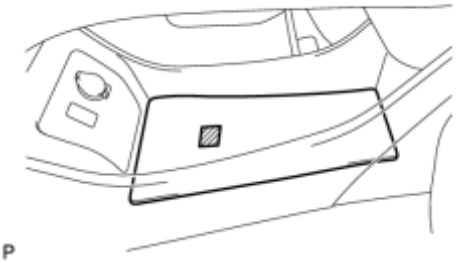
11. REMOVE FRONT NO. 2 CONSOLE BOX INSERT




P

(a) Pull the front No. 2 console box insert in the direction indicated by the arrow to disengage the 4 claws and guide, and remove the front No. 2 console box insert.

12. REMOVE BOX BOTTOM MAT

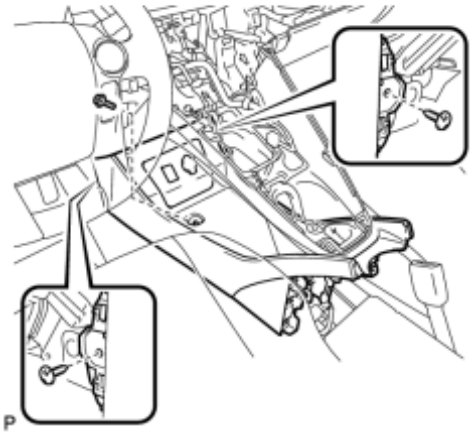


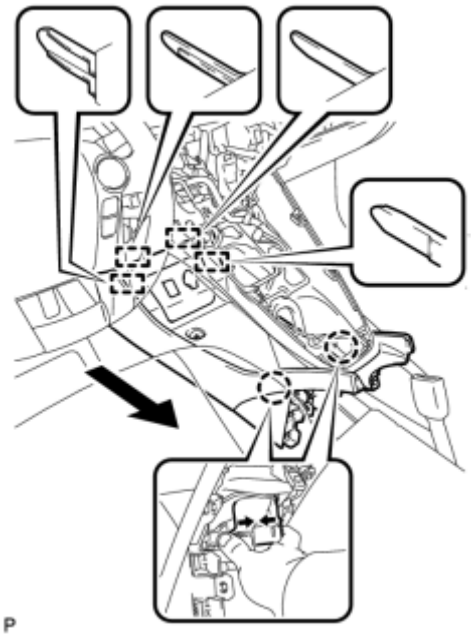
P

(a) Disengage the fastener and remove the box bottom mat.

13. SEPARATE CONSOLE BOX ASSEMBLY

(a) Remove the bolt <B> and 2 clips.





(b) While pushing the parts shown in the illustration inward, pull the console box assembly in the direction indicated by the arrow to disengage the 2 claws and 4 guides.

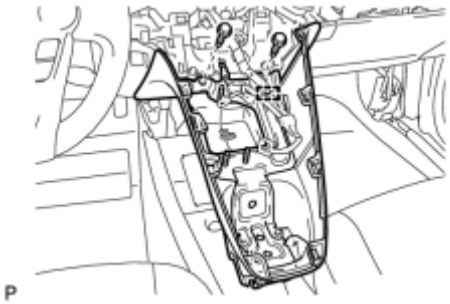
(c) Disconnect the connector and separate the console box assembly.

14. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO

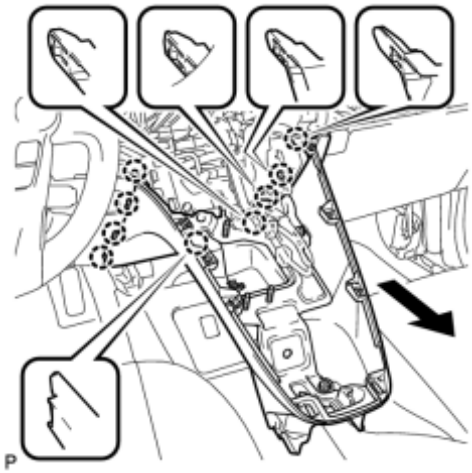
15. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

16. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY

(a) Disengage the clamp.

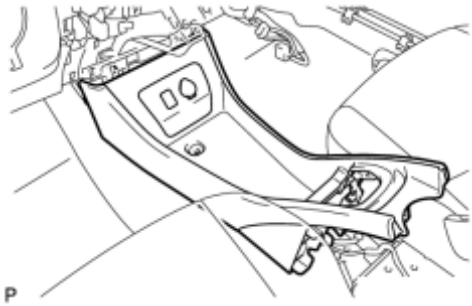


(b) Remove the 2 bolts <A>.



(c) Pull the upper instrument panel finish panel assembly in the direction indicated by the arrow to disengage the 9 claws and remove the upper instrument panel finish panel assembly.

17. REMOVE CONSOLE BOX ASSEMBLY



(a) Remove the console box assembly.

18. REMOVE NO. 1 SWITCH HOLE BASE

(a) Disengage the 5 claws.

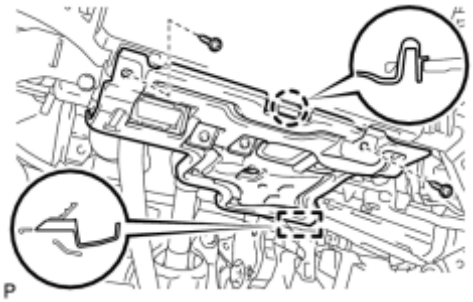


(b) Disconnect the connector to remove the No. 1 switch hole base.

19. REMOVE LOWER STEERING COLUMN COVER INFO

20. REMOVE UPPER STEERING COLUMN COVER INFO

21. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY



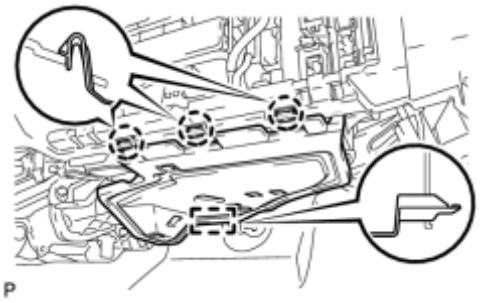
(a) Remove the 2 screws <D>.

(b) Disengage the claw and guide.

(c) Disconnect each connector and remove the No. 1 instrument panel under cover sub-assembly.

22. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY INFO

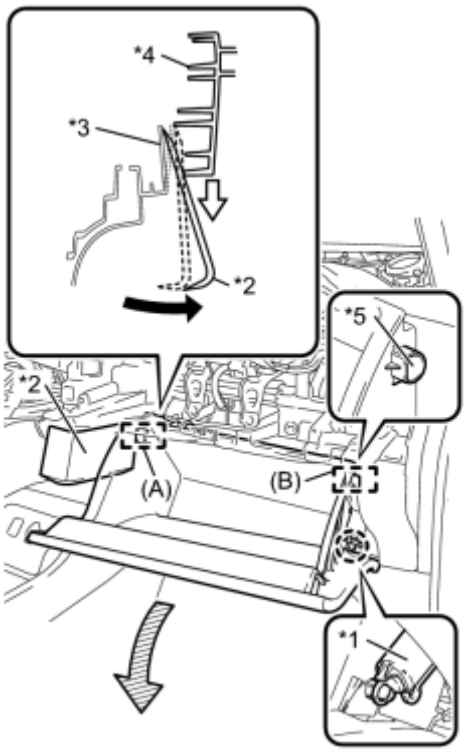
23. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY



(a) Disengage the 3 claws and guide.

(b) Disconnect each connector and remove the No. 2 instrument panel under cover sub-assembly.

24. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY




P

(a) Disengage the claw and release the glove compartment door stopper.

## Text in Illustration

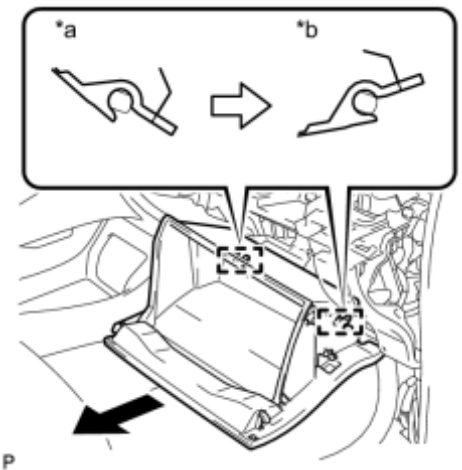
| | |
|---|---|
| *1 | Glove Compartment Door Stopper Sub-assembly |
| *2 | Moulding Remover |
| *3 | Lower Instrument Panel Sub-assembly |
| *4 | Glove Compartment Door Assembly |
| *5 | Stopper |

(b) Insert the moulding remover into the location shown in the illustration.

(c) Move the moulding remover in the direction indicated by the arrow to bend the lower instrument panel sub-assembly and release the stopper (A).

HINT:

Use the same procedure to release the stopper (B).




P

(d) Open the glove compartment door assembly to approximately 55° from its closed position. Pull it horizontally in the direction indicated by the arrow to disengage the 2 hinges and remove the glove compartment door assembly.

## Text in Illustration

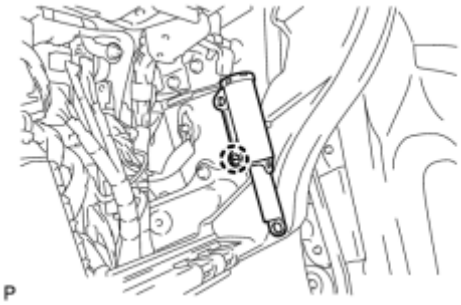
| | |
|---|---|
| *a | Close |
| *b | Open Approximately |

NOTICE:

Pulling the glove compartment door assembly upward to remove it causes

the hinges to deform. Be sure to pull out the glove compartment door assembly horizontally.

25. REMOVE GLOVE COMPARTMENT DOOR STOPPER SUB-ASSEMBLY




(a) Disengage the claw to remove the glove compartment door stopper sub-assembly.

26. REMOVE FRONT DOOR SCUFF PLATE RH

HINT:

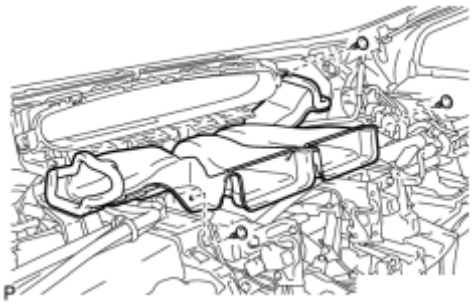
Use the same procedure for the RH side and LH side INFO.

27. REMOVE COWL SIDE TRIM BOARD RH

HINT:

Use the same procedure for the RH side and LH side INFO.

28. REMOVE NO. 1 HEATER TO REGISTER DUCT




(a) Remove the 3 clips and the No. 1 heater to register duct.

29. REMOVE COMBINATION METER ASSEMBLY INFO

30. REMOVE POWER STEERING ECU ASSEMBLY (for Brush Type Motor) INFO

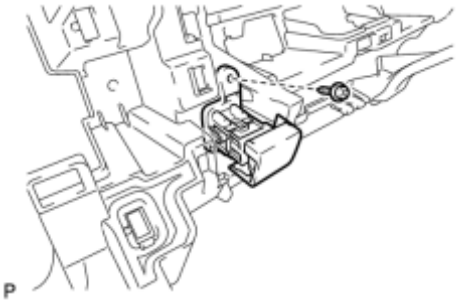
31. REMOVE POWER STEERING ECU ASSEMBLY (for Brushless Type Motor) INFO

32. REMOVE INSTRUMENT PANEL SAFETY PAD PLATE SUB-ASSEMBLY



(a) Remove the 2 bolts <B> and instrument panel safety pad plate sub-assembly.

33. REMOVE GLOVE COMPARTMENT DOOR LOCK ASSEMBLY



(a) Remove the screw <D> and glove compartment door lock assembly.

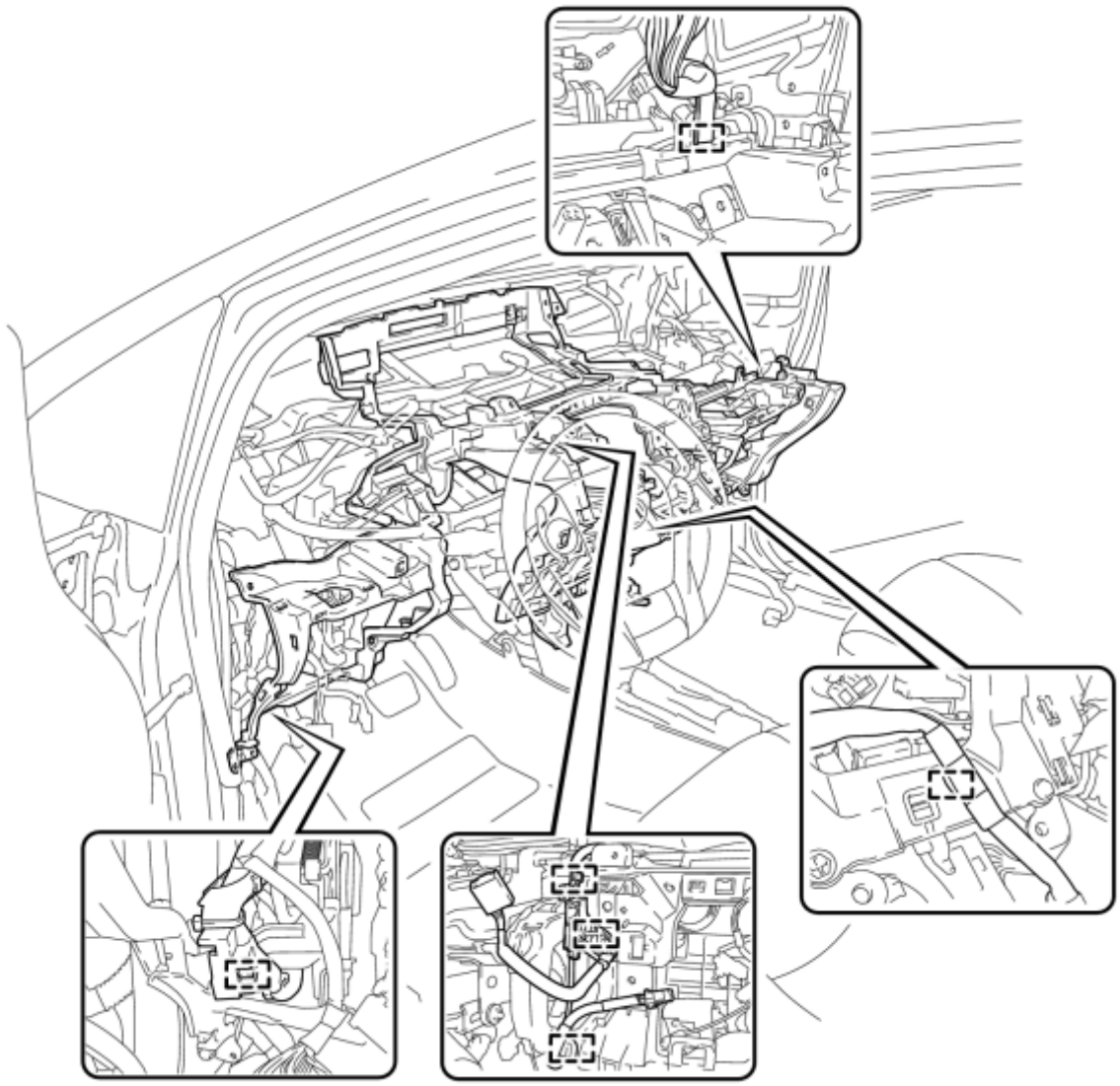
34. REMOVE GLOVE BOX LIGHT ASSEMBLY INFO

35. REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/o Satellite Radio) INFO

36. REMOVE NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/ Satellite Radio) INFO

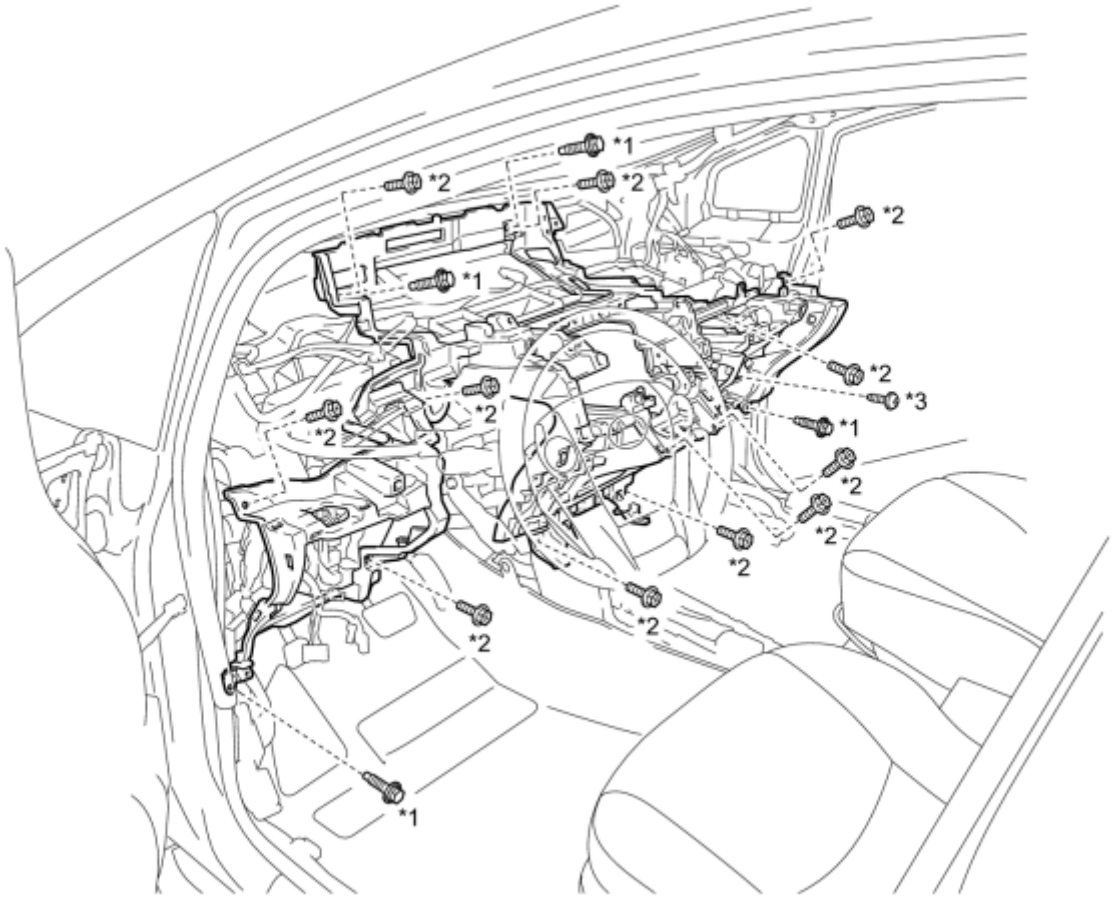
37. REMOVE LOWER INSTRUMENT PANEL SUB-ASSEMBLY

(a) Disengage each clamp.



P

(b) Remove the 4 bolts <B>, 11 bolts <C>, screw <D> and lower instrument panel sub-assembly.




### *Text in Illustration*

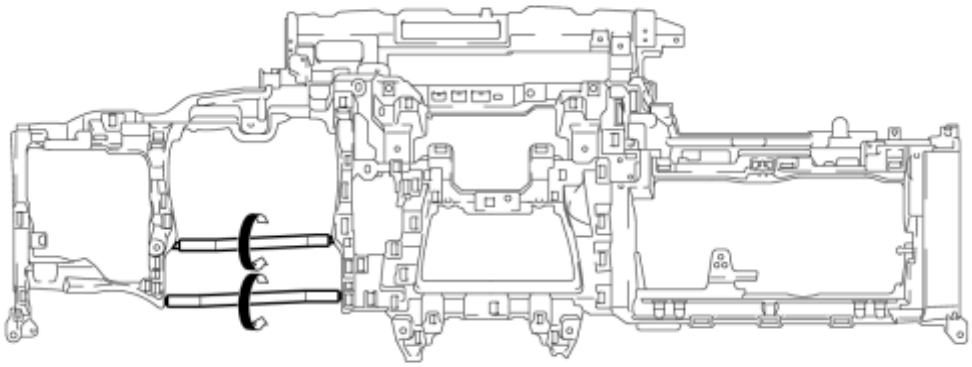
| | | | |
|---|---|---|---|
| *1 | Bolt <B> | *2 | Bolt <C> |
| *3 | Screw <D> | - | - |

# INSTALLATION

1. INSTALL LOWER INSTRUMENT PANEL SUB-ASSEMBLY

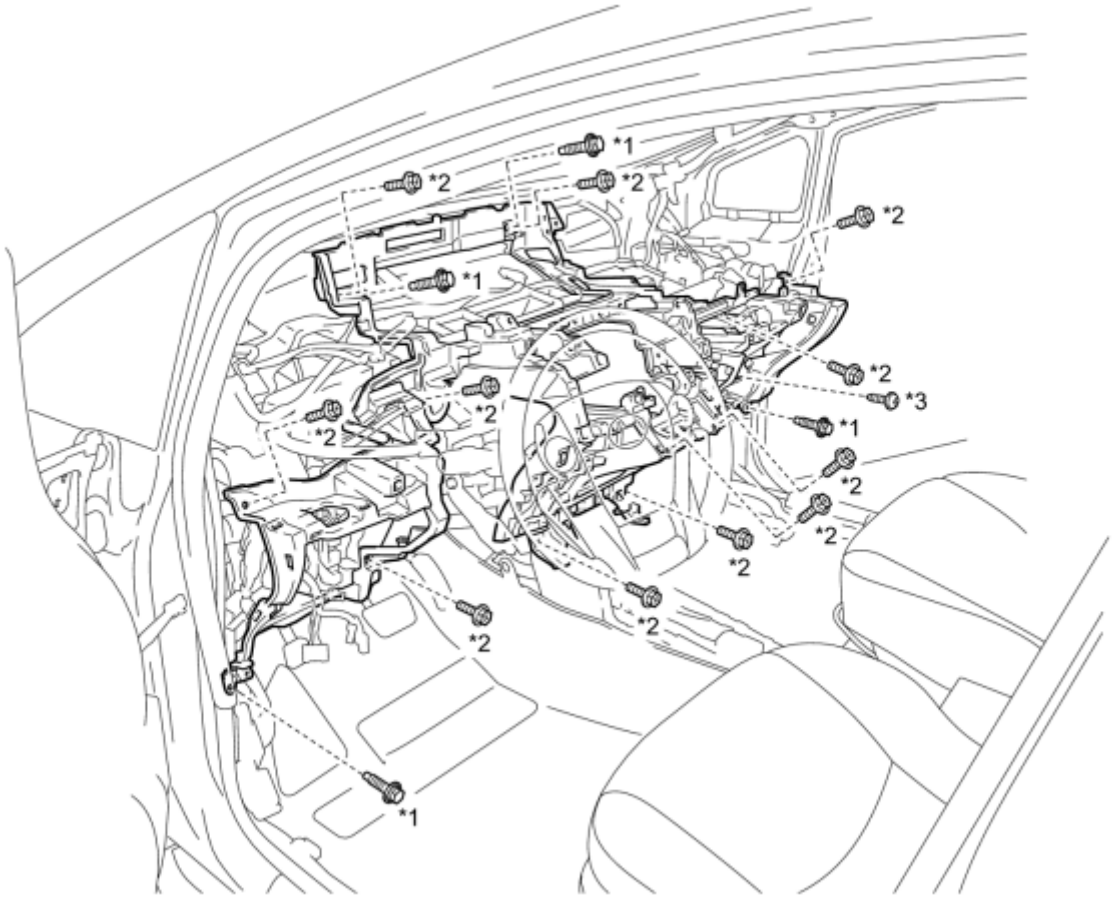
(a) When using a new lower instrument panel sub-assembly:

(1) Immediately before installing the lower instrument panel sub-assembly, twist and cut off the portions shown in the illustration.



P

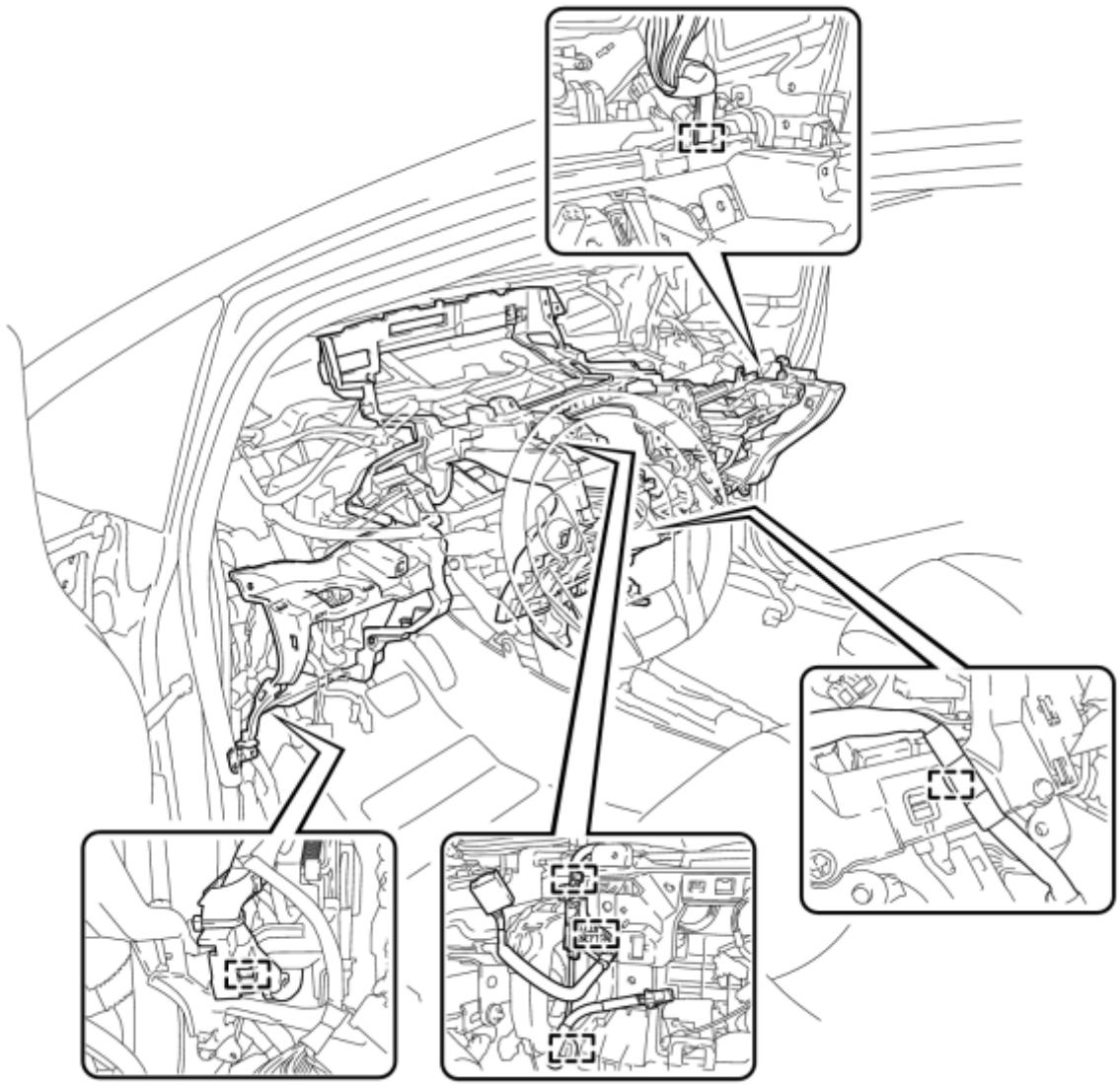
(b) Install the lower instrument panel sub-assembly with the 4 bolts <B>, 11 bolts <C> and screw <D>.




### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Bolt <B> | *2 | Bolt <C> |
| *3 | Screw <D> | - | - |

(c) Engage each clamp.



P

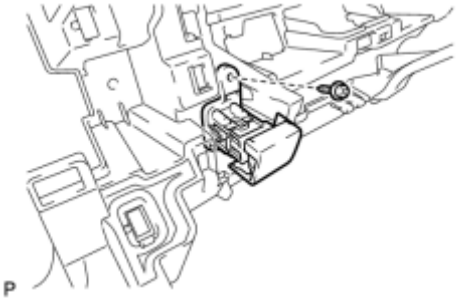
2. INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/o Satellite Radio) INFO

3. INSTALL NO. 2 ANTENNA CORD SUB-ASSEMBLY (w/ Satellite Radio) INFO

4. INSTALL GLOVE BOX LIGHT ASSEMBLY INFO

5. INSTALL GLOVE COMPARTMENT DOOR LOCK ASSEMBLY

(a) Install the glove compartment door lock assembly with the screw <D>.



6. INSTALL INSTRUMENT PANEL SAFETY PAD PLATE SUB-ASSEMBLY



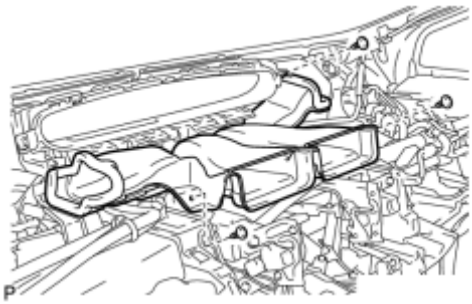
(a) Install the instrument panel safety pad plate sub-assembly with the 2 bolts <B>.

7. INSTALL POWER STEERING ECU ASSEMBLY (for Brush Type Motor) INFO

8. INSTALL POWER STEERING ECU ASSEMBLY (for Brushless Type Motor) INFO

9. INSTALL COMBINATION METER ASSEMBLY INFO

10. INSTALL NO. 1 HEATER TO REGISTER DUCT



(a) Install the No. 1 heater to register duct with the 3 clips.

11. INSTALL COWL SIDE TRIM BOARD RH

HINT:

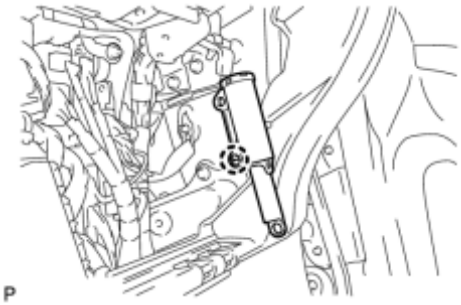
Use the same procedure for the RH side and LH side INFO.

12. INSTALL FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedure for the RH side and LH side INFO.

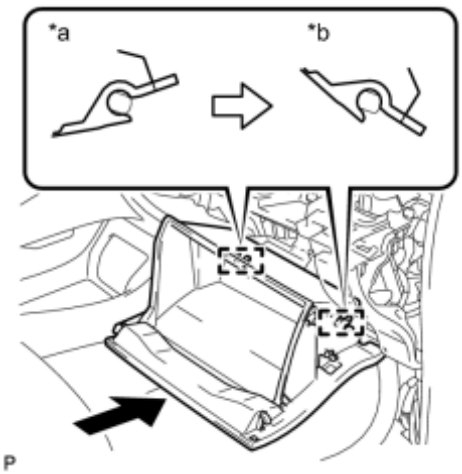
13. INSTALL GLOVE COMPARTMENT DOOR STOPPER SUB-ASSEMBLY



P

(a) Engage the claw to install the glove compartment door stopper sub-assembly.

14. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY




P

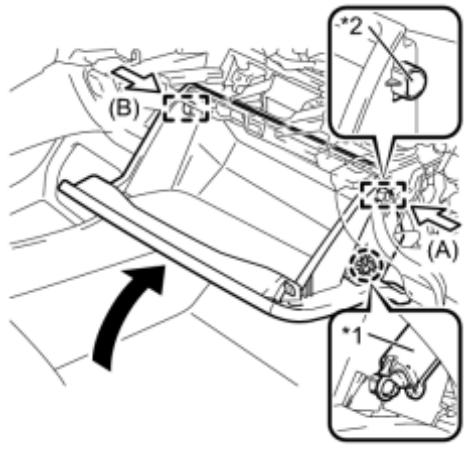
(a) With the glove compartment door assembly opened approximately 55° from its closed position, engage the 2 hinges horizontally.

## Text in Illustration

| | |
|---|---|
| *a | Opened Approximately 55° |
| *b | Closed |

NOTICE:

Engaging the hinges from the top will deform the hinges. Be sure to install the glove compartment door assembly horizontally.




P

(b) Slightly bend the stoppers (A) and (B) in the directions indicated by the arrows in the illustration and engage the stoppers to install the glove compartment door assembly.

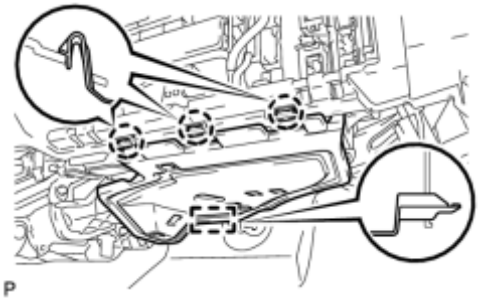
## Text in Illustration

| | |
|---|---|
| *1 | Glove Compartment Door Stopper Sub-assembly |
| *2 | Stopper |

(c) Engage the claw and connect the glove compartment door stopper sub-assembly.

15. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

(a) Connect each connector.

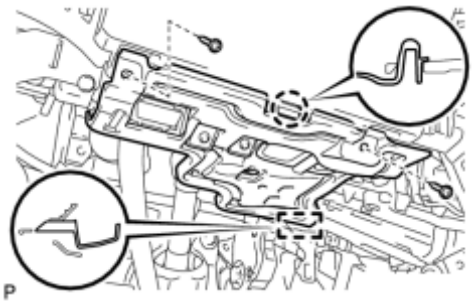



(b) Engage the guide and 3 claws to install the No. 2 instrument panel under cover sub-assembly.

16. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY INFO

17. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY

(a) Connect each connector.




(b) Engage the guide and claw.

(c) Install the No. 1 instrument panel under cover sub-assembly with the 2 screws <D>.

18. INSTALL UPPER STEERING COLUMN COVER INFO

19. INSTALL LOWER STEERING COLUMN COVER INFO

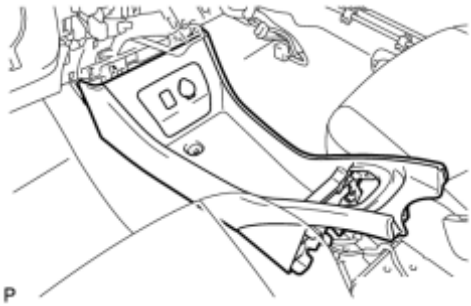
20. INSTALL NO. 1 SWITCH HOLE BASE

(a) Connect the connector.

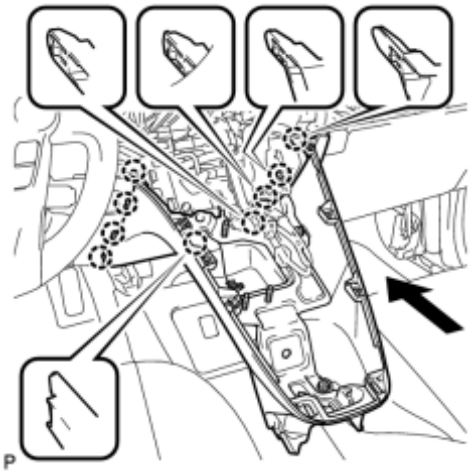
(b) Engage the 5 claws to install the No. 1 switch hole base.



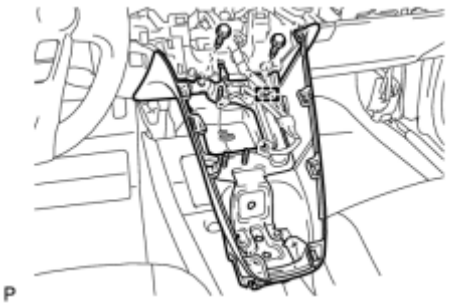
21. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY



(a) Temporarily install the console box assembly.



(b) Engage the 9 claws as shown in the illustration.



(c) Install the upper instrument panel finish panel assembly with the 2 bolts <A>.

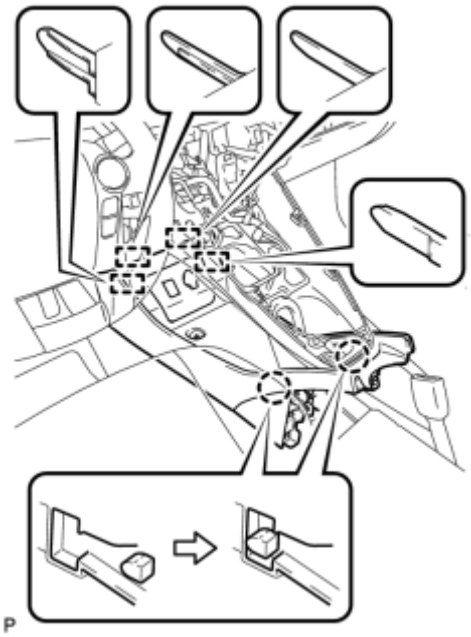
(d) Engage the clamp.

22. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

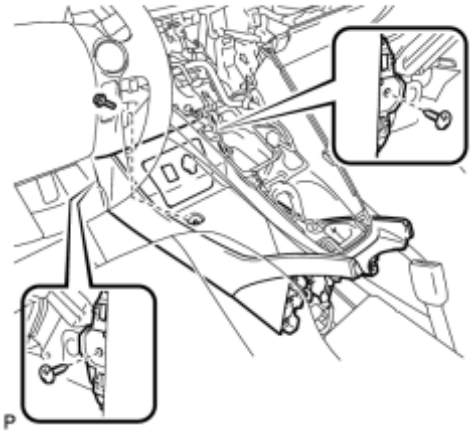
23. INSTALL AIR CONDITIONING CONTROL ASSEMBLY INFO

24. INSTALL CONSOLE BOX ASSEMBLY

(a) Connect the connector.



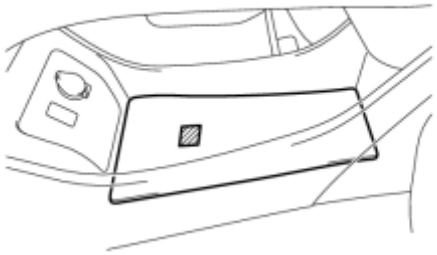

(b) Engage the 4 guides and 2 claws as shown in the illustration.




(c) Install the console box assembly with the bolt <B> and 2 clips.

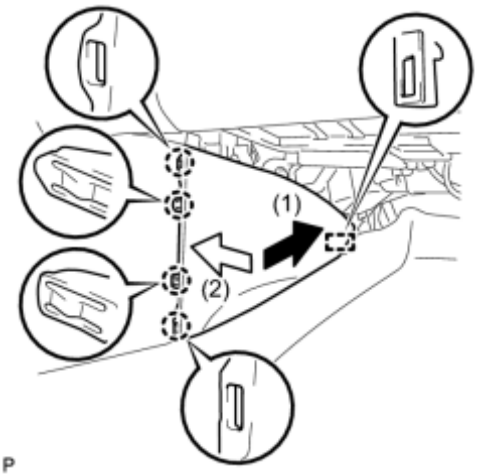
25. INSTALL BOX BOTTOM MAT

(a) Engage the fastener to install the box bottom mat.



P

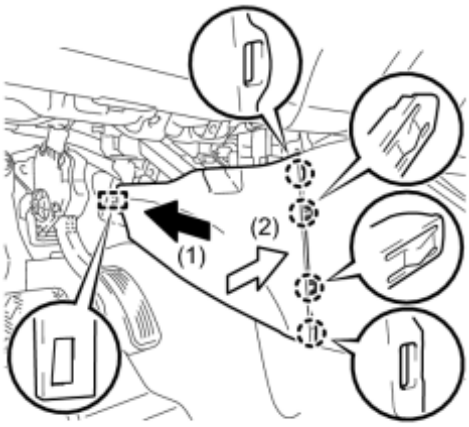
26. INSTALL FRONT NO. 2 CONSOLE BOX INSERT




P

(a) Engage the guide and 4 claws to install the front No. 2 console box insert as shown in the illustration.

27. INSTALL FRONT NO. 1 CONSOLE BOX INSERT

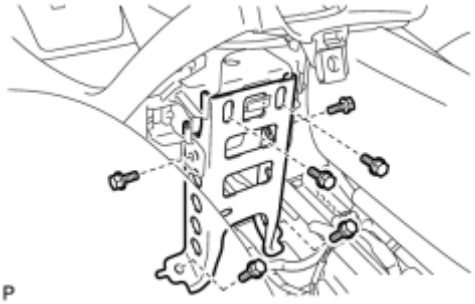



P

(a) Engage the guide and 4 claws to install the front No. 1 console box insert as shown in the illustration.

28. INSTALL NO. 2 CONSOLE BOX MOUNTING BRACKET

(a) Install the No. 2 console box mounting bracket with the 6 bolts <B>.



P

29. INSTALL ELECTRICAL KEY OSCILLATOR INFO

30. INSTALL REAR CONSOLE BOX ASSEMBLY (w/ Power Outlet Socket) INFO

31. INSTALL REAR CONSOLE BOX ASSEMBLY (w/o Power Outlet Socket) INFO

32. INSTALL CONSOLE BOX CARPET INFO

33. INSTALL UPPER CONSOLE PANEL (w/ Power Outlet Socket) INFO

34. INSTALL REAR CONSOLE BOX POCKET (w/ Power Outlet Socket) INFO

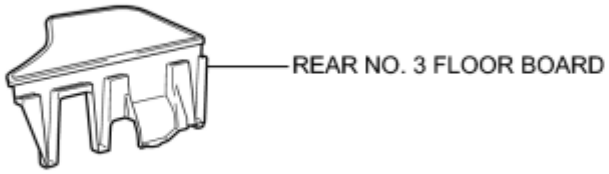
35. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

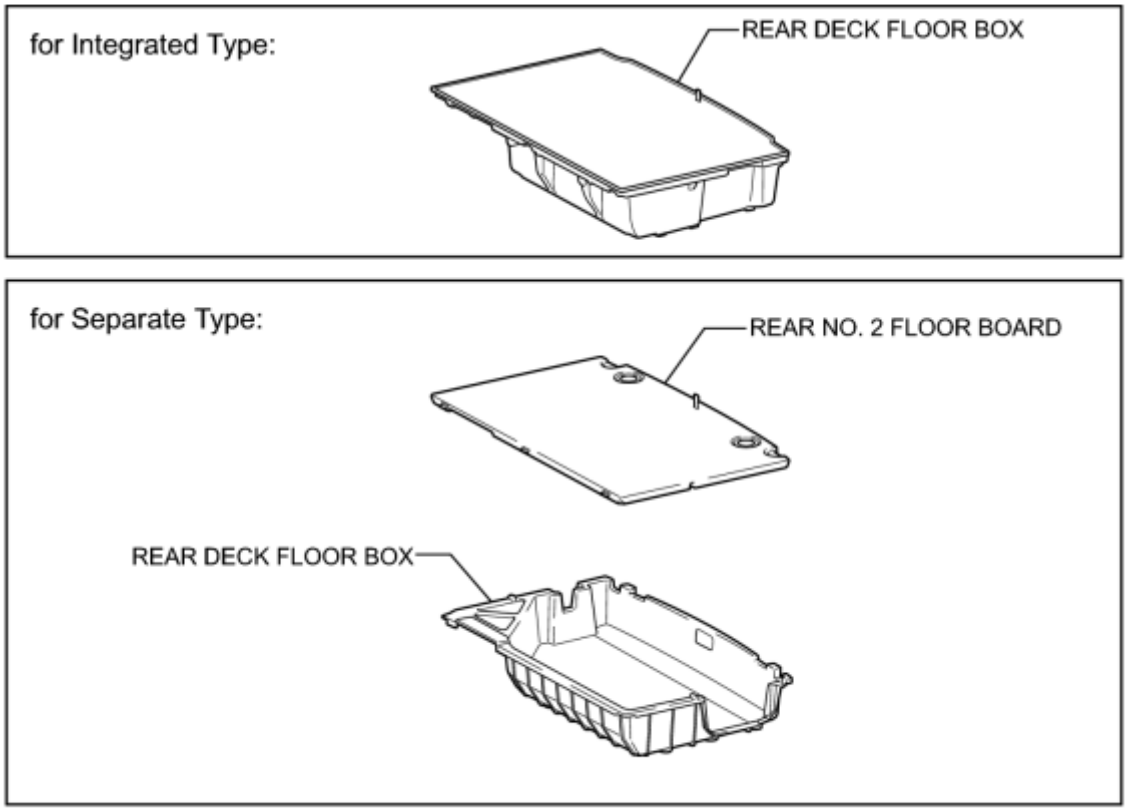
(a) Install the upper instrument panel assembly INFO.

36. INSPECT SHIFT LEVER INFO

# COMPONENTS

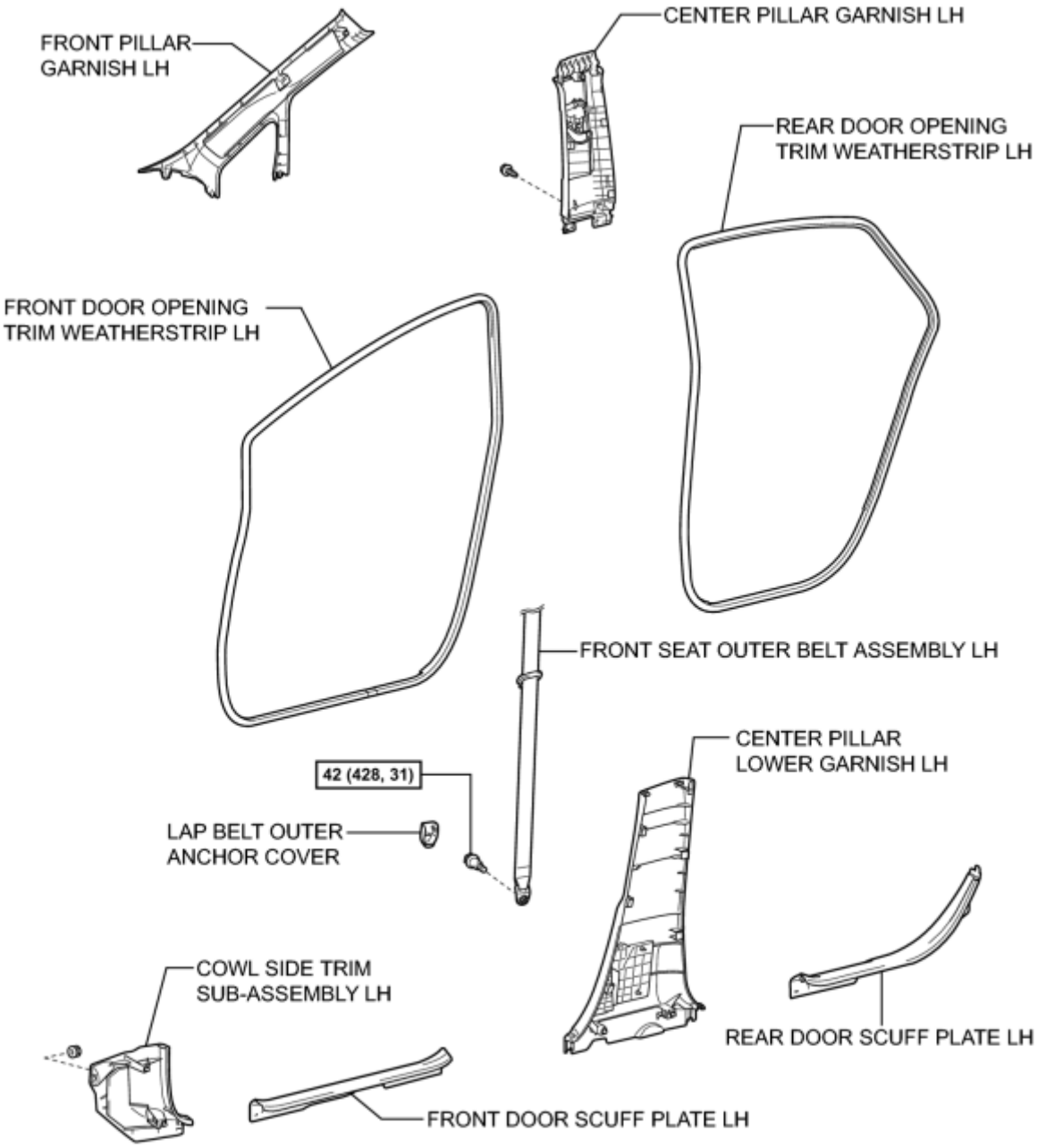
# ILLUSTRATION




P

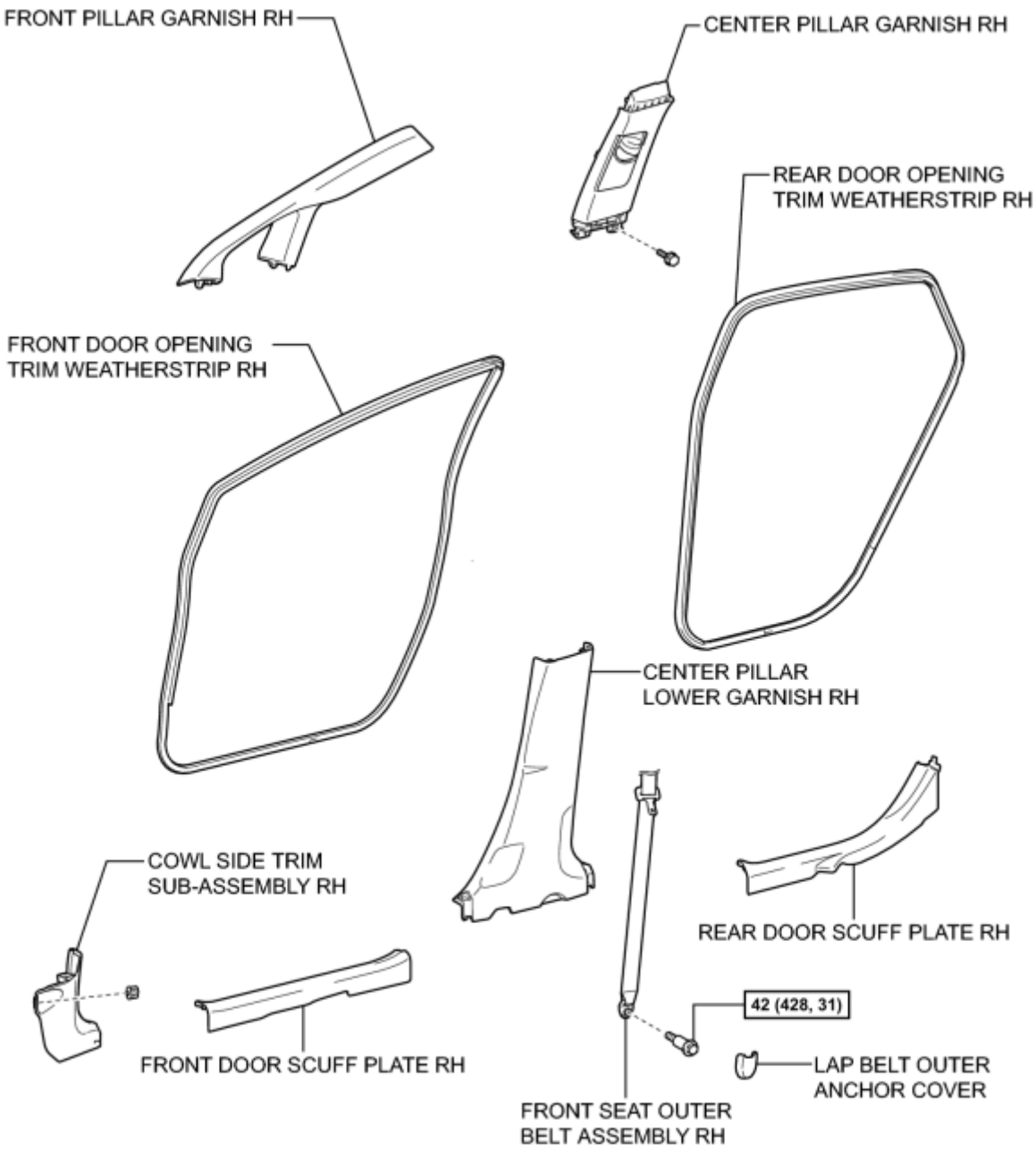
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

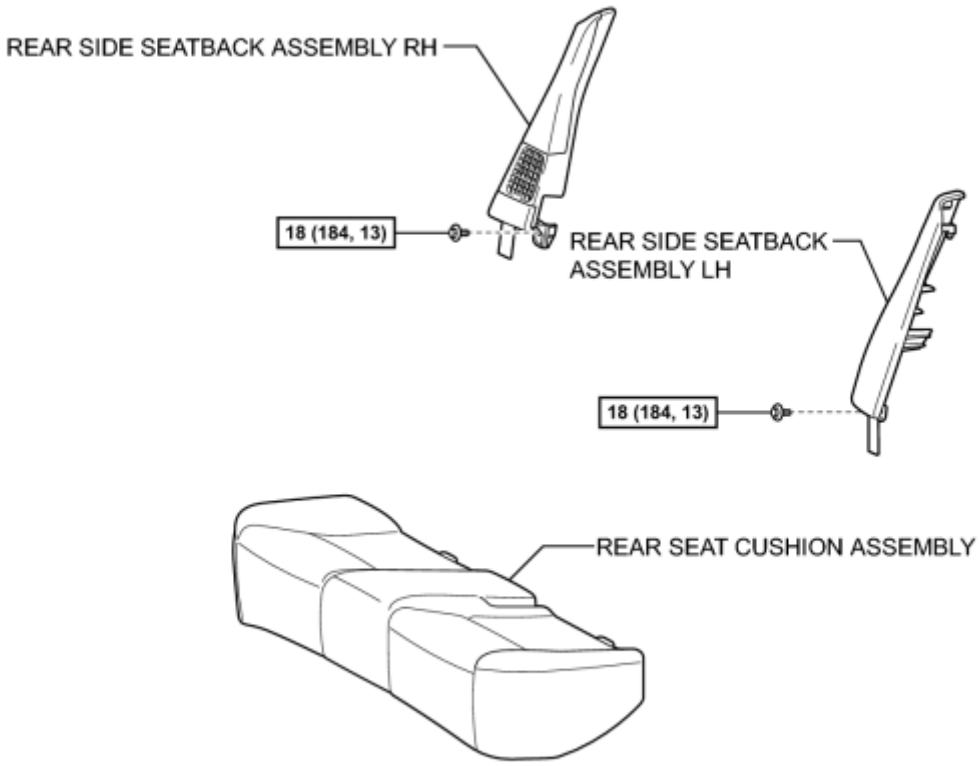
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

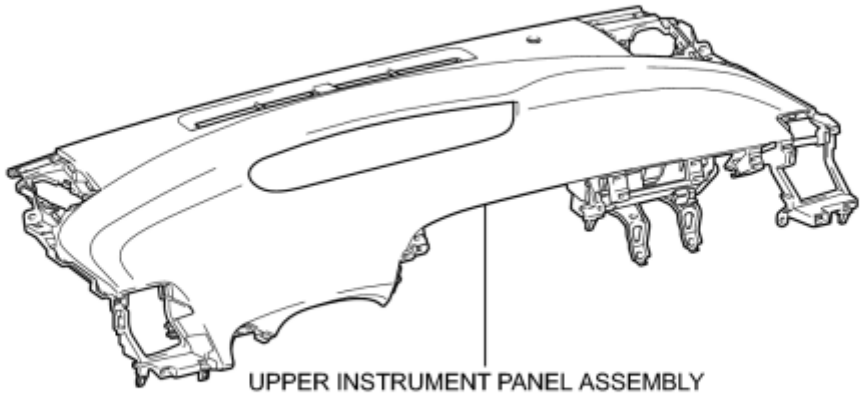
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

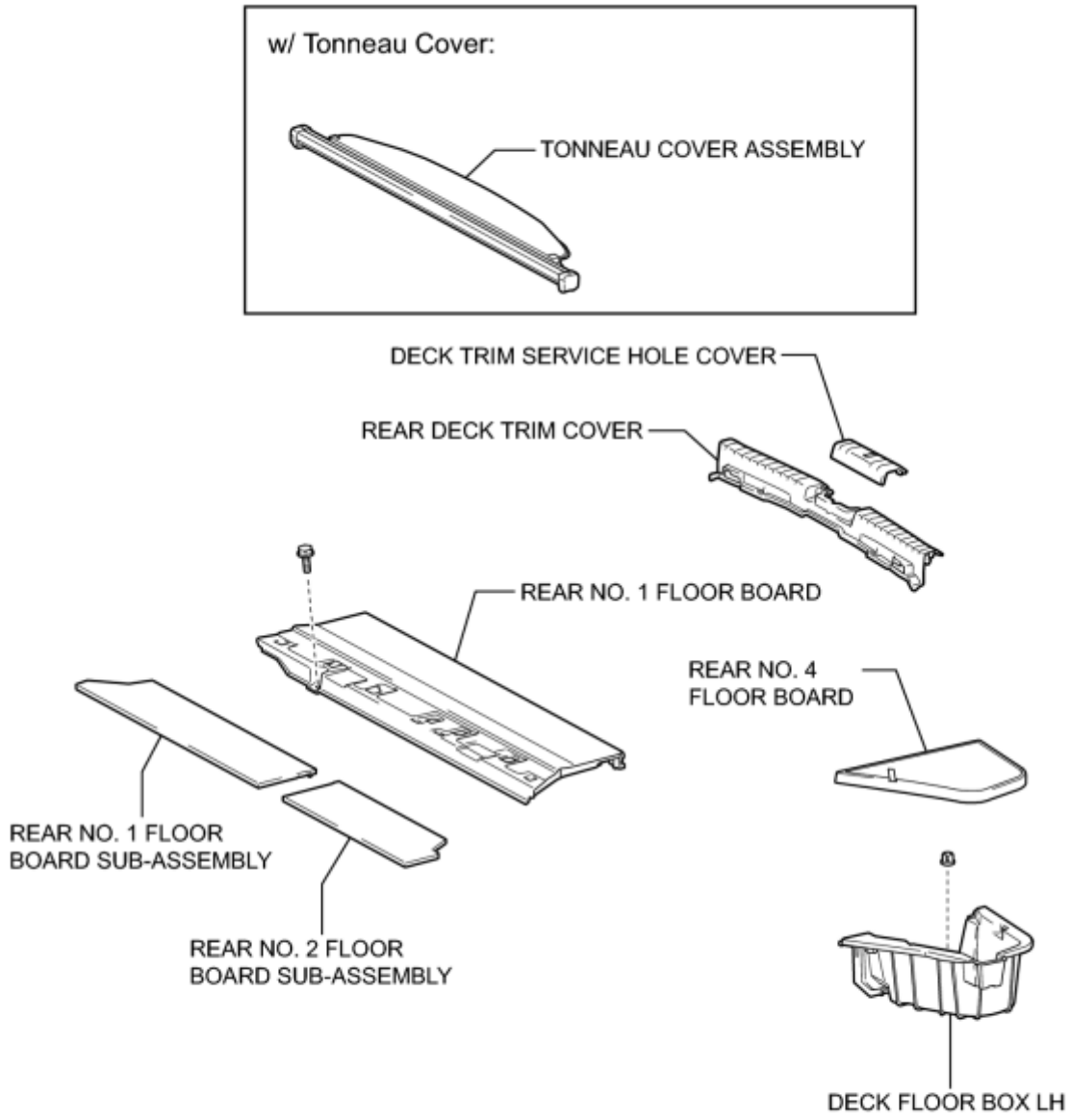
P

# ILLUSTRATION



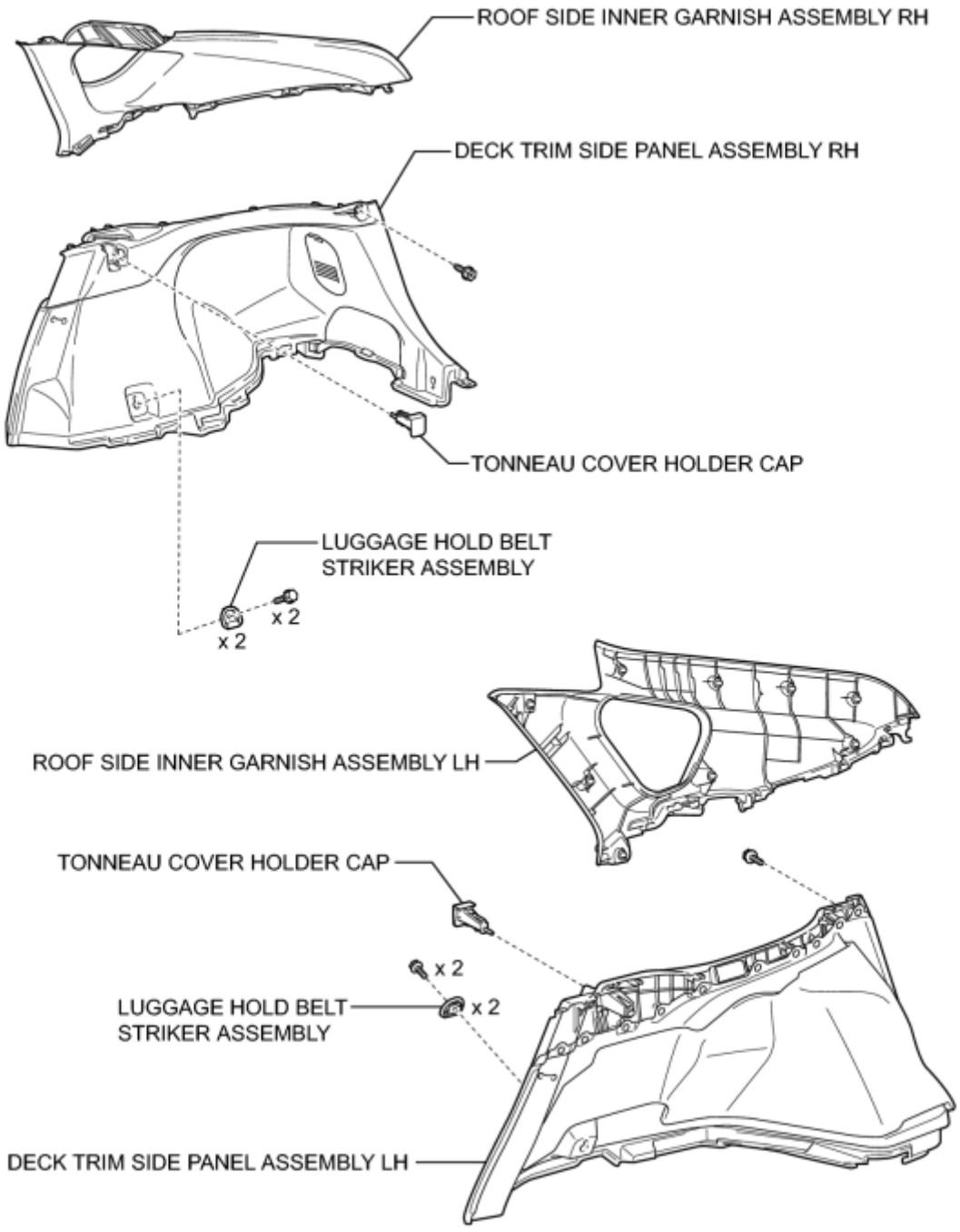

P

# ILLUSTRATION




P

# ILLUSTRATION



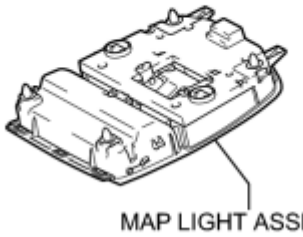

P

# ILLUSTRATION

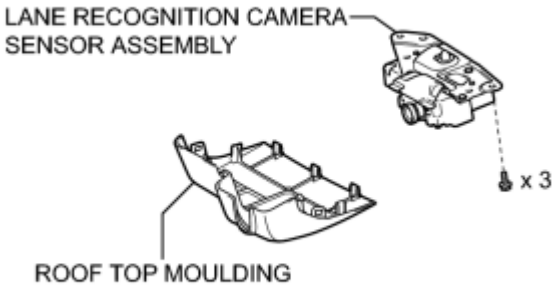
w/o Lane Keeping Assist System:



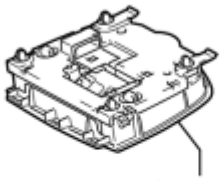

w/o Sliding Roof:




w/ Lane Keeping Assist System:




w/ Sliding Roof:




w/ EC Mirror:

w/o Rear View Monitor System:

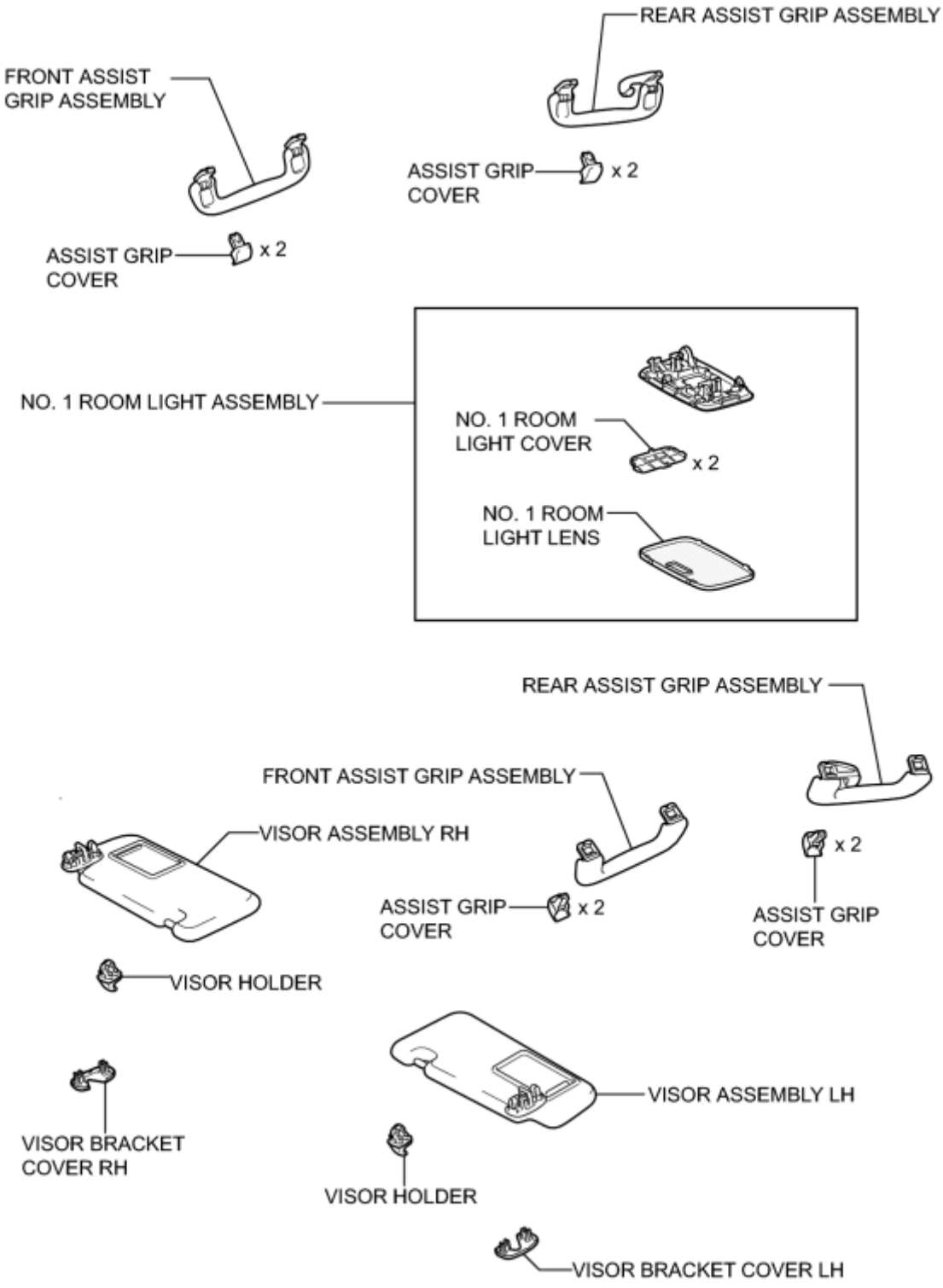



w/ Rear View Monitor System:




P

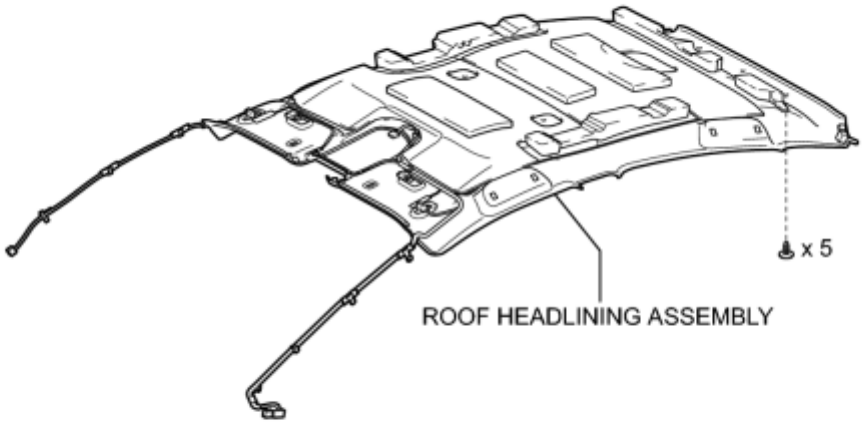
# ILLUSTRATION



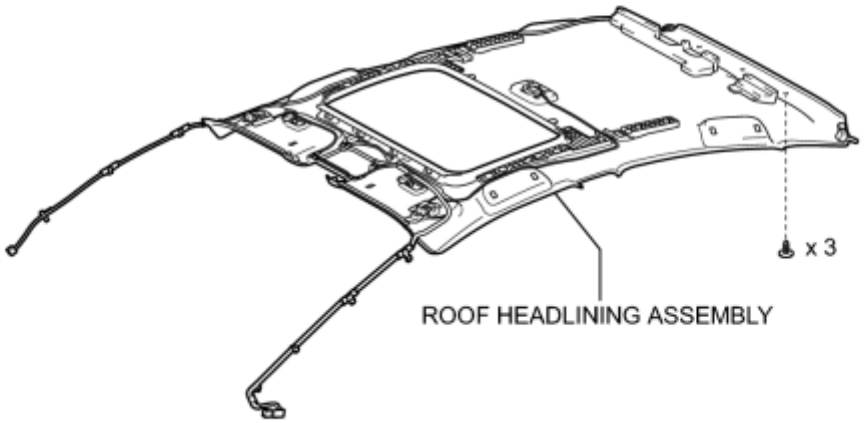

P

# ILLUSTRATION

w/o Sliding Roof:

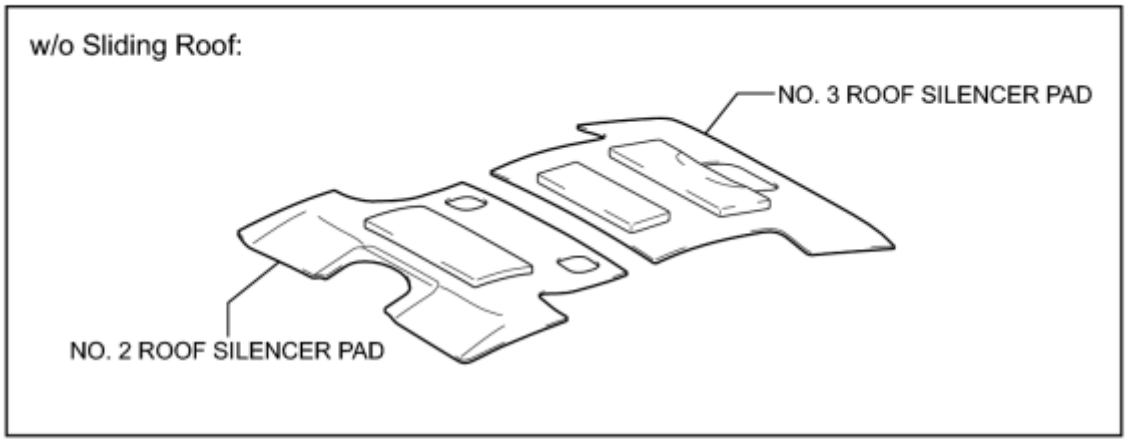


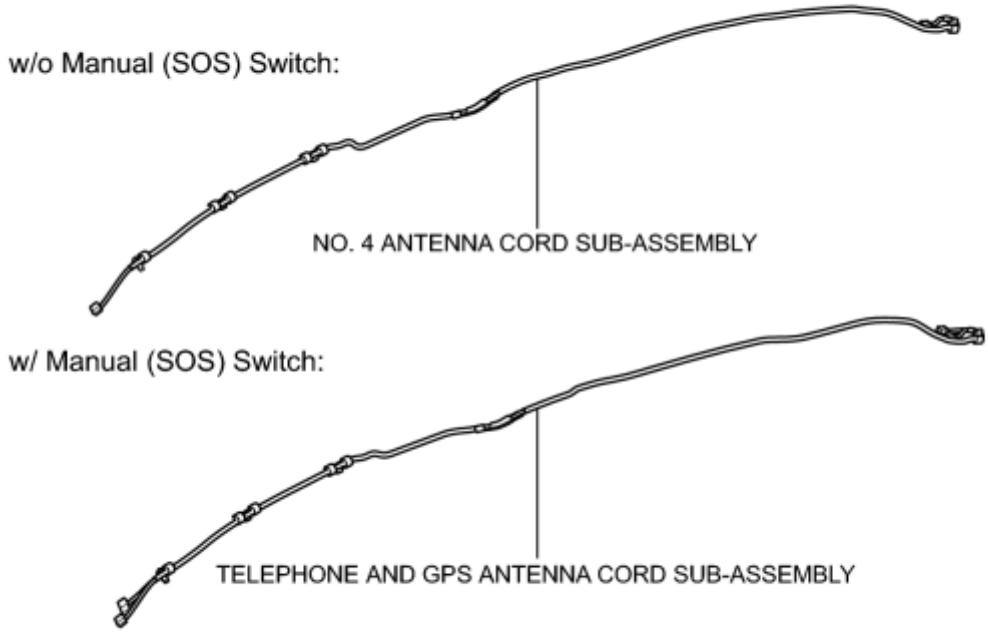

w/ Sliding Roof:




P

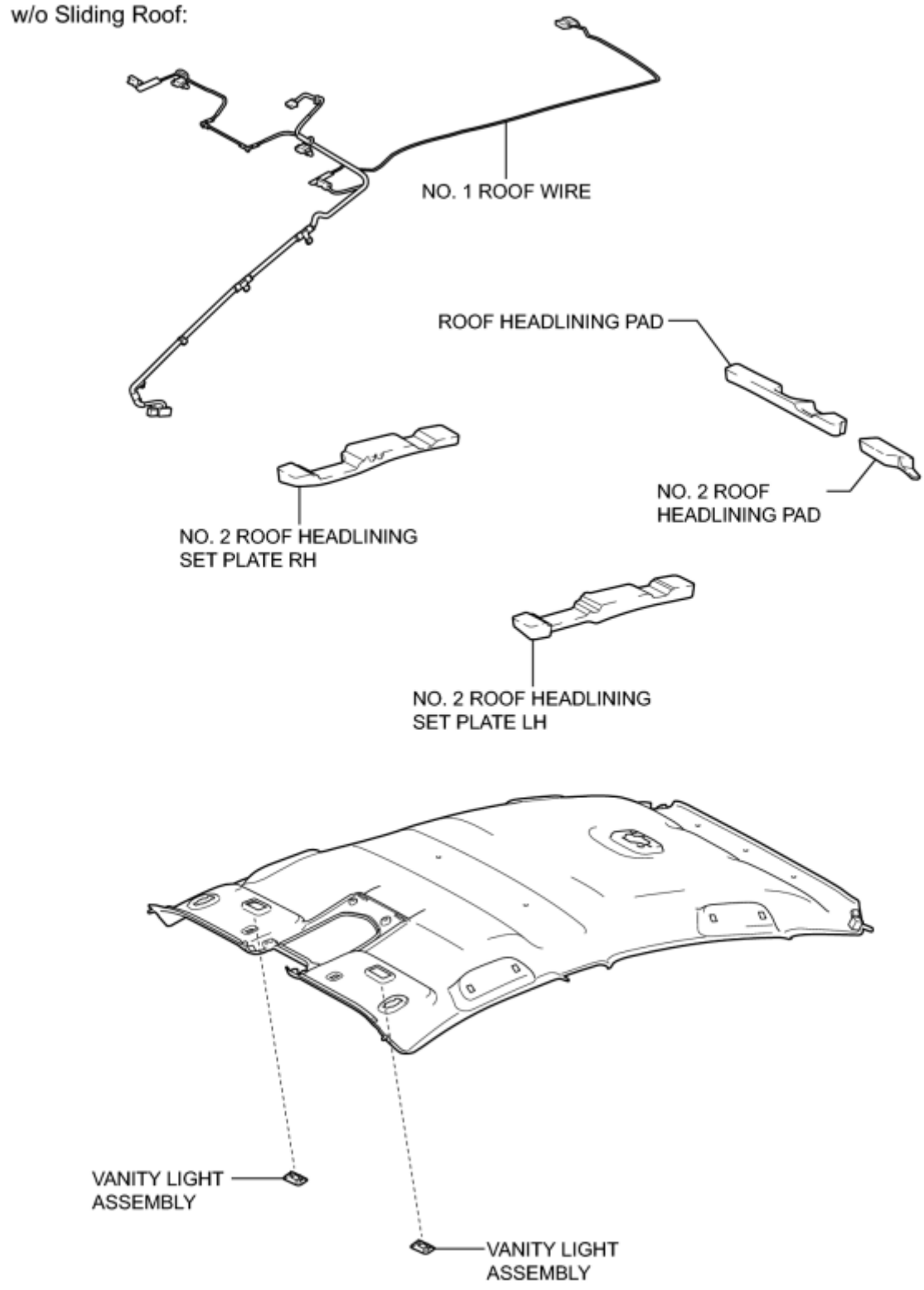
# ILLUSTRATION




P

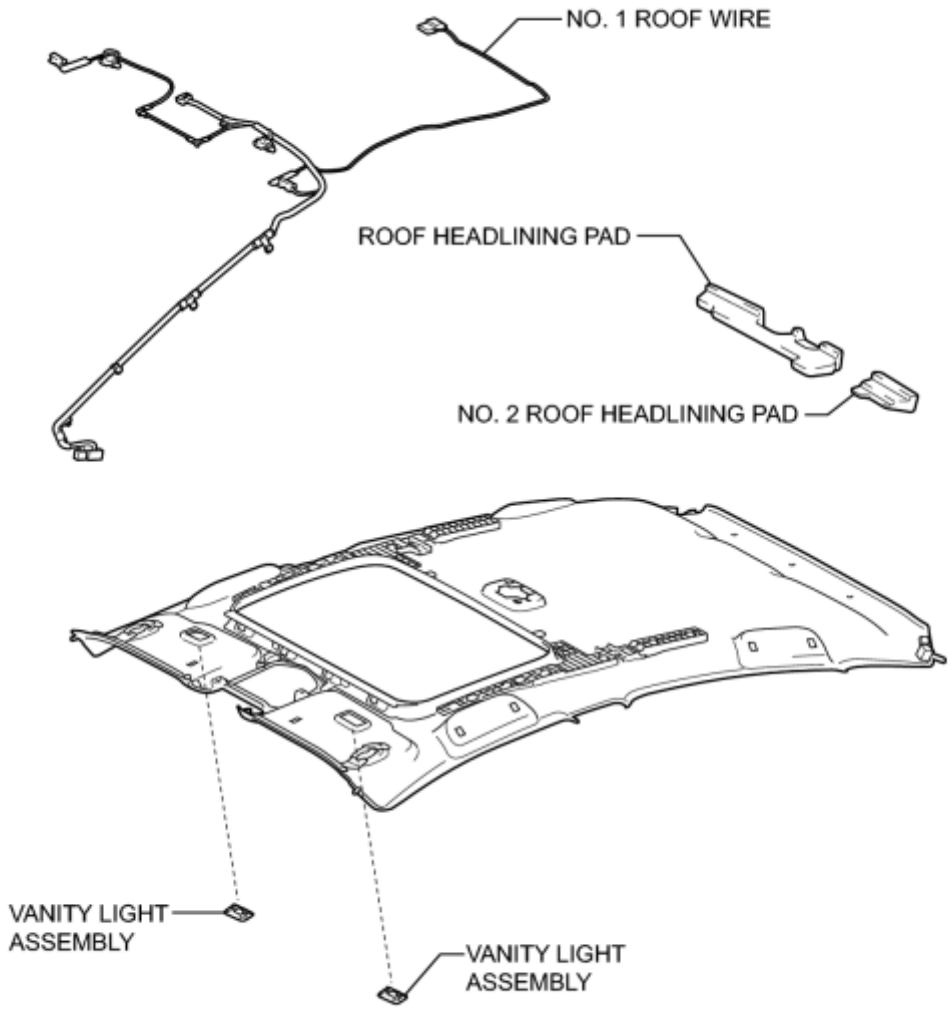
# ILLUSTRATION




P

# ILLUSTRATION

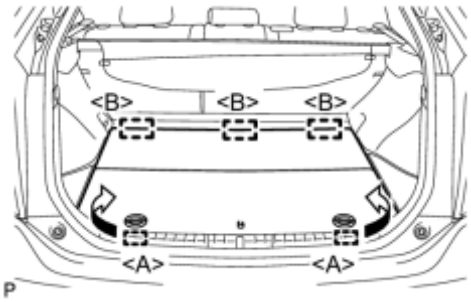
w/ Sliding Roof:




P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type)




(a) Disengage the 2 guides <A> as shown in the illustration.

(b) Disengage the 3 guides <B> and remove the rear No. 2 floor board.

2. REMOVE REAR DECK FLOOR BOX

(a) Remove the rear deck floor box.

3. REMOVE REAR NO. 3 FLOOR BOARD




(a) Disengage the 2 guides and remove the rear No. 3 floor board.

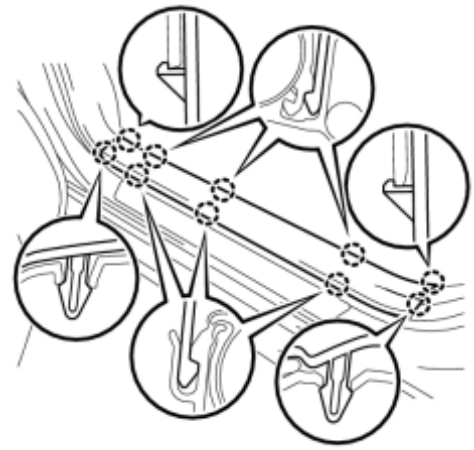
4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

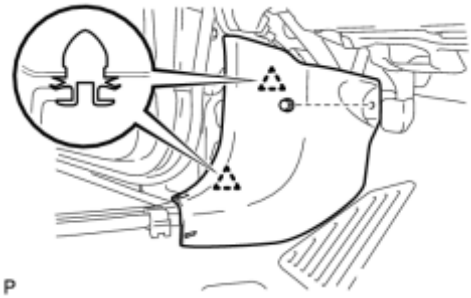
5. REMOVE FRONT DOOR SCUFF PLATE LH

(a) Disengage the 10 claws and remove the front door scuff plate LH.



P

6. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH

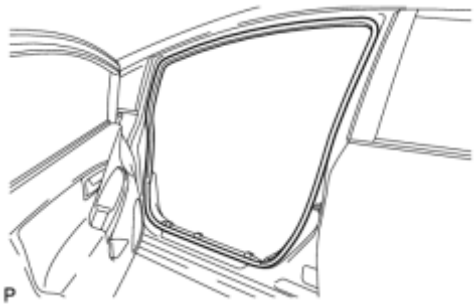


P

(a) Remove the clip.

(b) Disengage the 2 clips and remove the cowl side trim sub-assembly LH.

7. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP LH

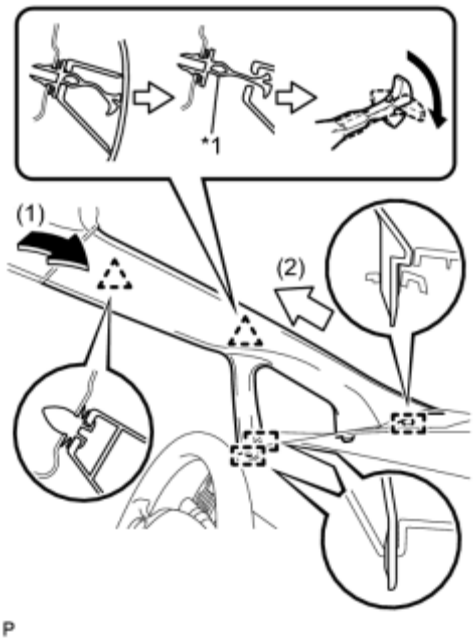


P

(a) Remove the front door opening trim weatherstrip LH.

8. REMOVE FRONT PILLAR GARNISH LH

(a) Pull the upper part of the garnish toward the inside of the cabin and disengage the 2 clips.




P

## Text in Illustration

| | |
|---|---|
| *1 | Front Pillar Garnish Clip |

HINT:

Make the front pillar garnish RH hang down from the front pillar garnish clip.

(b) Turn the end of the front pillar garnish clip 90° with needle-nosed pliers and remove it from the front pillar garnish RH.

NOTICE:

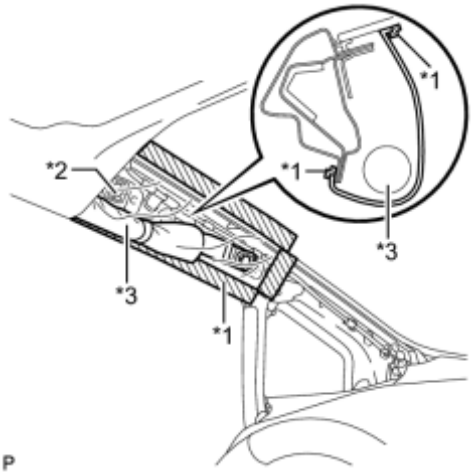
- Front pillar garnish clips are reusable if they are not removed from the vehicle and have no damage.
- Replace the front pillar garnish clips with new ones if they are removed from the vehicle.

HINT:

Tape the needle-nosed pliers tip before use.

(c) Disengage the 3 guides and remove the front pillar garnish LH.

(d) Protect the curtain shield airbag assembly.




P

## Text in Illustration

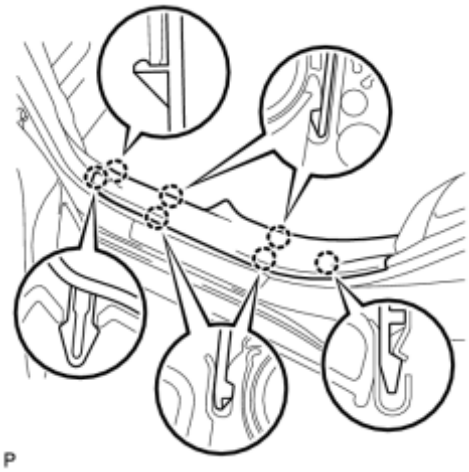
| | |
|---|---|
| *1 | Adhesive Tape |
| *2 | Protective Cover |
| *3 | Curtain Shield Airbag Assembly |

(1) Cover the airbag with a cloth or piece of nylon and secure the ends of the cover with tape as shown in the illustration.

NOTICE:

Cover the curtain shield airbag with a protective cover as soon as the front pillar garnish is removed.

9. REMOVE REAR DOOR SCUFF PLATE LH



(a) Disengage the 7 claws and remove the rear door scuff plate LH.

10. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP LH



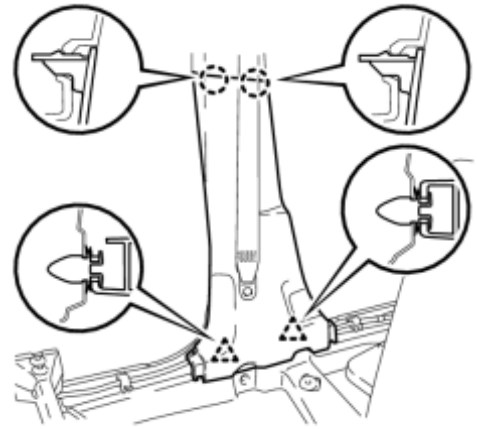
(a) Remove the rear door opening trim weatherstrip LH.

11. REMOVE LAP BELT OUTER ANCHOR COVER (for LH Side) INFO

12. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY LH INFO

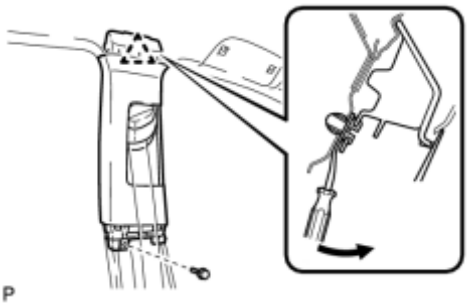
13. REMOVE CENTER PILLAR LOWER GARNISH LH

(a) Disengage the 2 claws and 2 clips, and remove the center pillar lower garnish LH.



P

14. REMOVE CENTER PILLAR GARNISH LH



P

(a) Remove the screw.

(b) Using a clip remover, disengage the clip.

(c) Pass the floor anchor of the front seat outer seat belt assembly LH through the center pillar garnish LH and remove the center pillar garnish LH.

15. REMOVE FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side.

16. REMOVE COWL SIDE TRIM SUB-ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

17. REMOVE FRONT DOOR OPENING TRIM WEATHERSTRIP RH

HINT:

Use the same procedure described for the LH side.

18. REMOVE FRONT PILLAR GARNISH RH

HINT:

Use the same procedure described for the LH side.

19. REMOVE REAR DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side.

20. REMOVE REAR DOOR OPENING TRIM WEATHERSTRIP RH

HINT:

Use the same procedure described for the LH side.

21. REMOVE LAP BELT OUTER ANCHOR COVER (for RH Side)

HINT:

Use the same procedure described for the LH side.

22. DISCONNECT FRONT SEAT OUTER BELT ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

23. REMOVE CENTER PILLAR LOWER GARNISH RH

HINT:

Use the same procedure described for the LH side.

24. REMOVE CENTER PILLAR GARNISH RH

HINT:

Use the same procedure described for the LH side.

25. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

26. REMOVE REAR SIDE SEATBACK ASSEMBLY LH INFO

27. REMOVE REAR SIDE SEATBACK ASSEMBLY RH INFO

28. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

(a) Remove the upper instrument panel assembly INFO.

29. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover)

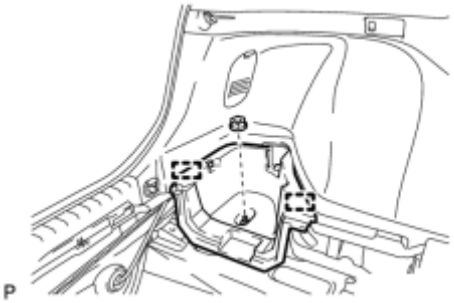
(a) Remove the tonneau cover assembly.

30. REMOVE REAR NO. 4 FLOOR BOARD



(a) Disengage the guide and remove the rear No. 4 floor board.

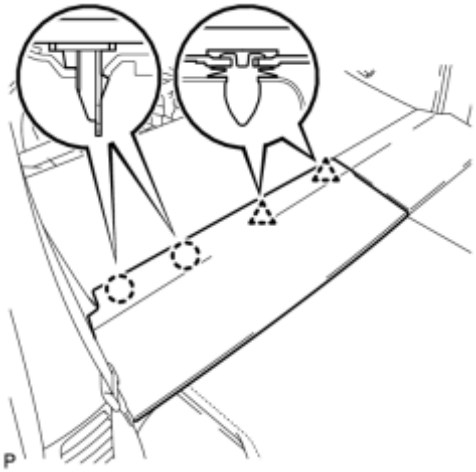
31. REMOVE DECK FLOOR BOX LH



(a) Remove the clip.

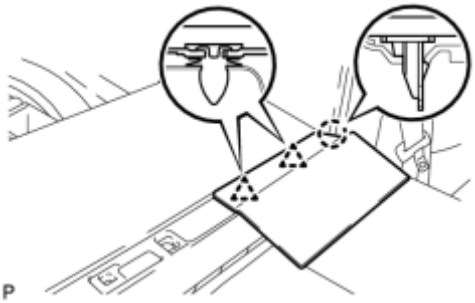
(b) Disengage the 2 guides and remove the deck floor box LH.

32. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY



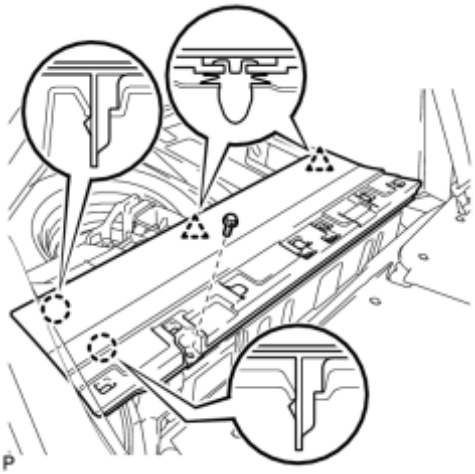
(a) Disengage the 2 claws and 2 clips, and remove the rear No. 1 floor board sub-assembly.

33. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY



(a) Disengage the claw and 2 clips, and remove the rear No. 2 floor board sub-assembly.

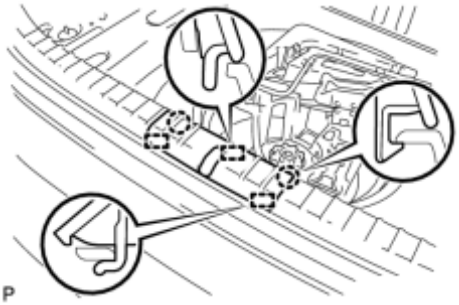
34. REMOVE REAR NO. 1 FLOOR BOARD



(a) Remove the bolt.

(b) Disengage the 2 claws and 2 clips, and remove the rear No. 1 floor board.

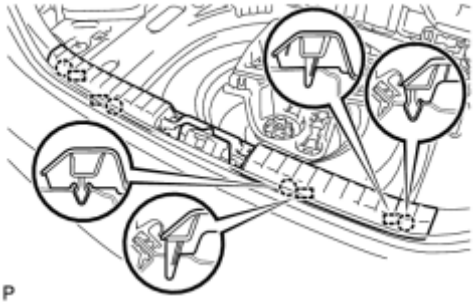
35. REMOVE DECK TRIM SERVICE HOLE COVER



(a) Disengage the 2 claws and 3 guides, and remove the deck trim service hole cover.

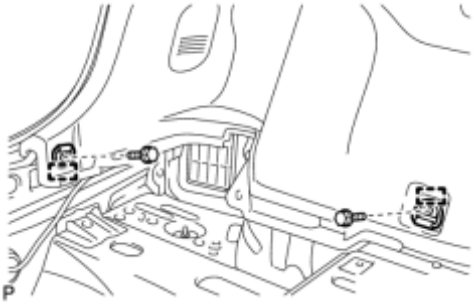
36. REMOVE REAR DECK TRIM COVER

(a) Disengage the 4 claws and 4 guides, and remove the rear deck trim



cover.

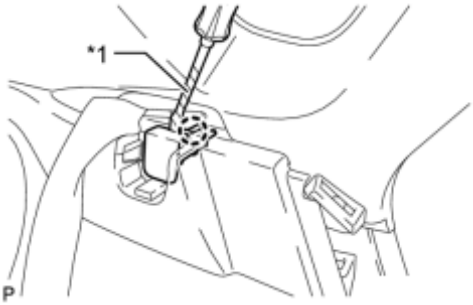
37. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side)



(a) Remove the 2 bolts.

(b) Disengage each guide and remove the 2 luggage hold belt striker assemblies.

38. REMOVE TONNEAU COVER HOLDER CAP (for LH Side)




(a) Using a screwdriver, disengage the claw and remove the tonneau cover holder cap.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

HINT:

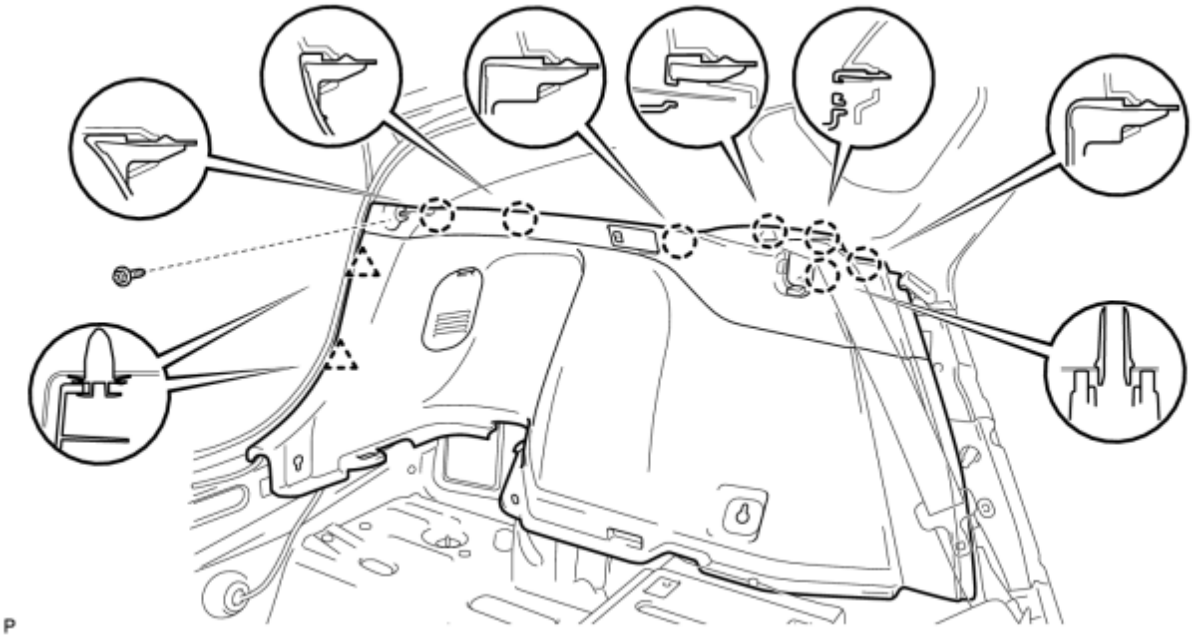
Tape the screwdriver tip before use.

39. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH

(a) Remove the screw.

(b) Disengage the 7 claws and 2 clips.

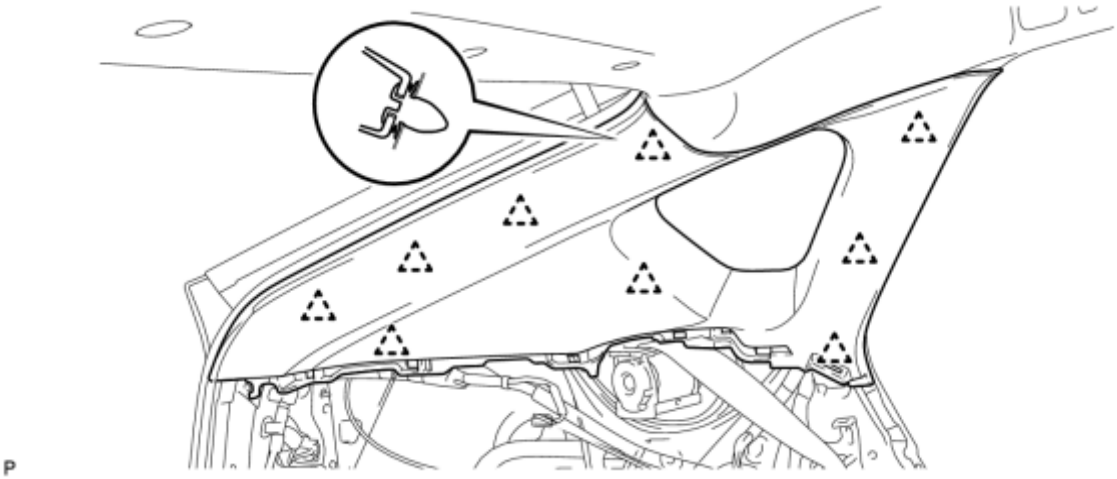
(c) Disconnect the connector and remove the deck trim side panel assembly LH.



P

40. REMOVE ROOF SIDE INNER GARNISH ASSEMBLY LH

(a) Disengage the 9 clips and remove the roof side inner garnish assembly LH.



P

41. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

HINT:

Use the same procedure described for the LH side.

42. REMOVE TONNEAU COVER HOLDER CAP (for RH Side)

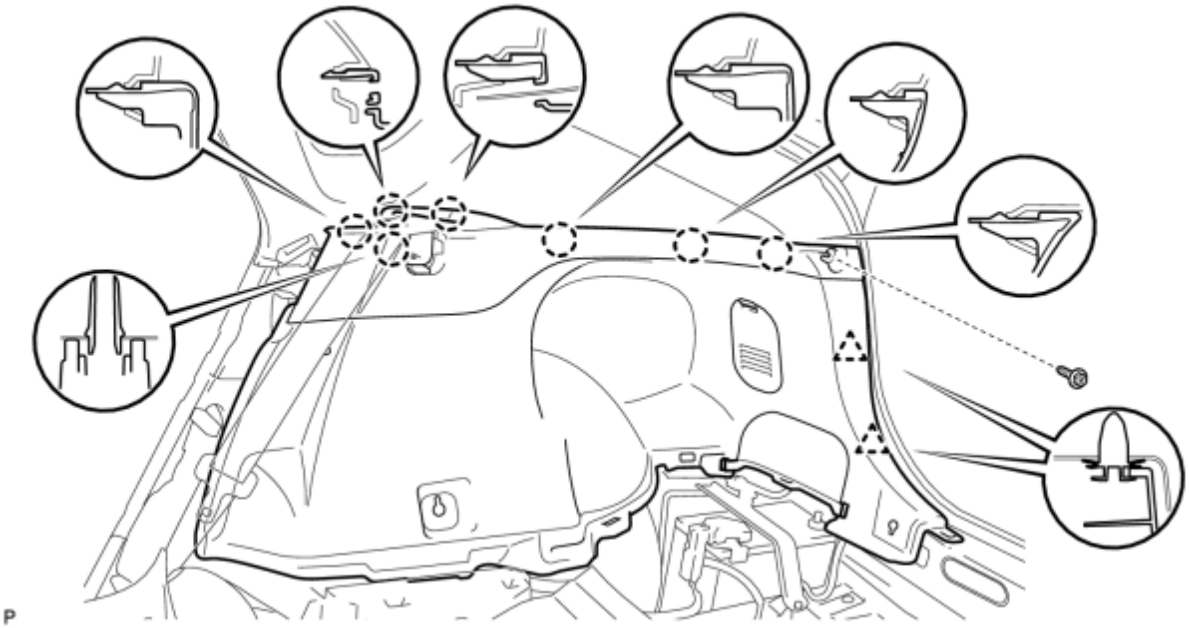
HINT:

Use the same procedure described for the LH side.

43. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH

(a) Remove the screw.

(b) Disengage the 7 claws and 2 clips, and remove the deck trim side panel assembly RH.



P

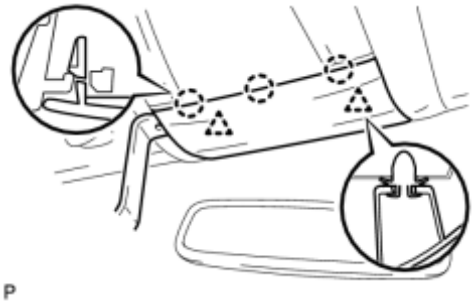
44. REMOVE ROOF SIDE INNER GARNISH ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

45. REMOVE INNER REAR VIEW MIRROR COVER (w/ EC Mirror) INFO

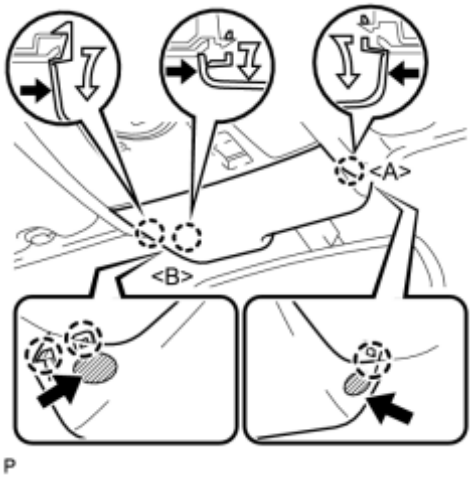
46. REMOVE ROOF TOP MOULDING (w/o Lane Keeping Assist System)



P

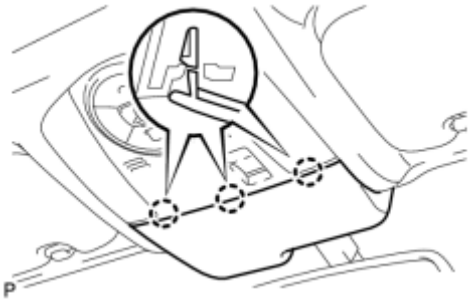
(a) Using a moulding remover, disengage the 3 claws and 2 clips, and remove the roof top moulding.

47. REMOVE ROOF TOP MOULDING (w/ Lane Keeping Assist System)




(a) Disengage the claw <A> as shown in the illustration.

(b) Disengage the 2 claws <B> as shown in the illustration.



(c) Disengage the 3 claws and remove the roof top moulding.

48. REMOVE LANE RECOGNITION CAMERA SENSOR ASSEMBLY (w/ Lane Keeping Assist System) INFO

49. REMOVE MAP LIGHT ASSEMBLY (w/o Sliding Roof) INFO

50. REMOVE MAP LIGHT ASSEMBLY (w/ Sliding Roof) INFO

51. REMOVE NO. 1 ROOM LIGHT ASSEMBLY INFO

52. REMOVE FRONT ASSIST GRIP ASSEMBLY

(a) Using a clip remover, disengage the 4 claws.

NOTICE:

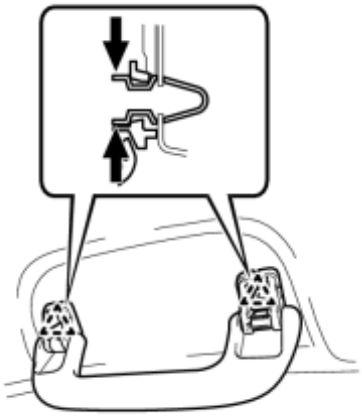
Do not forcibly pry the assist grip covers to prevent them from being deformed.

- Gently pry on the assist grip covers as shown in the illustration to remove them.




- Tape the clip remover tip before use.

(b) Pull off the 2 assist grip covers by hand.




(c) Disengage the 2 clips and remove the front assist grip assembly.

(d) Remove the 2 clips from the vehicle body.

HINT:

Use the same procedure for the other front assist grip.

53. REMOVE REAR ASSIST GRIP ASSEMBLY

(a) Using a clip remover, disengage the 4 claws.

NOTICE:

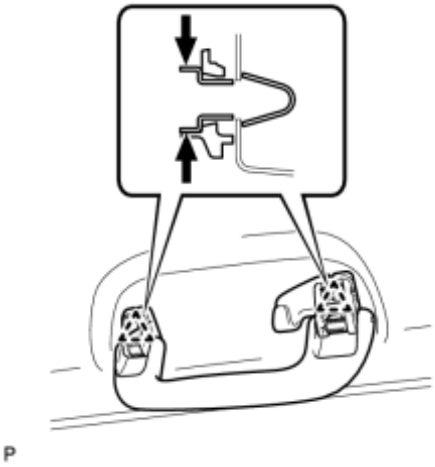
Do not forcibly pry the assist grip covers to prevent them from being




deformed.

- Gently pry on the assist grip covers as shown in the illustration to remove them.
- Tape the clip remover tip before use.

(b) Pull off the 2 assist grip covers by hand.




(c) Disengage the 2 clips and remove the rear assist grip assembly.

(d) Remove the 2 clips from the vehicle body.

HINT:

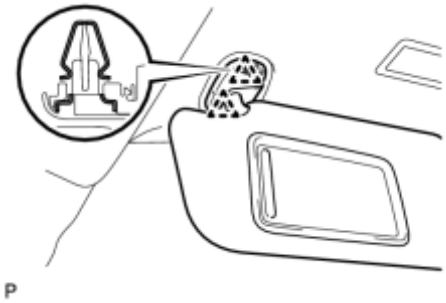
Use the same procedure for the other rear assist grip.

54. REMOVE VISOR BRACKET COVER LH

(a) Using a moulding remover, disengage the 3 claws and remove the visor bracket cover LH.




55. REMOVE VISOR ASSEMBLY LH




(a) Disengage the 2 clips and remove the visor assembly LH.

56. REMOVE VISOR BRACKET COVER RH

HINT:

Use the same procedure described for the LH side.

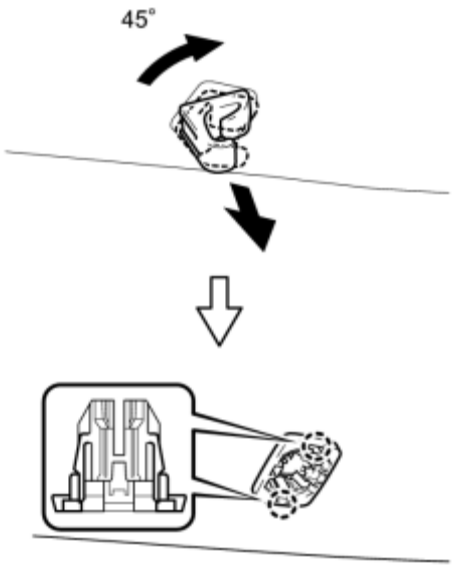
57. REMOVE VISOR ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

58. REMOVE VISOR HOLDER

(a) Turn the visor holder approximately 45° and pull it out as shown in the illustration.




P

(b) Disengage the 2 claws and remove the visor holder.

HINT:

Use the same procedure for the other visor holder.

59. REMOVE ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)

(a) w/ EC Mirror:

(1) Disengage the 2 clamps and disconnect the inner rear view mirror connector.

(b) w/ Lane Keeping Assist System:

(1) Disengage the clamp and disconnect the inner rear view mirror connector.

(c) w/o Manual (SOS) Switch:

(1) Disengage the 3 clamps and disconnect the connector from the front pillar RH.

(2) Disengage the clamp and disconnect the connector from the rear pillar RH.

(d) w/ Manual (SOS) Switch:

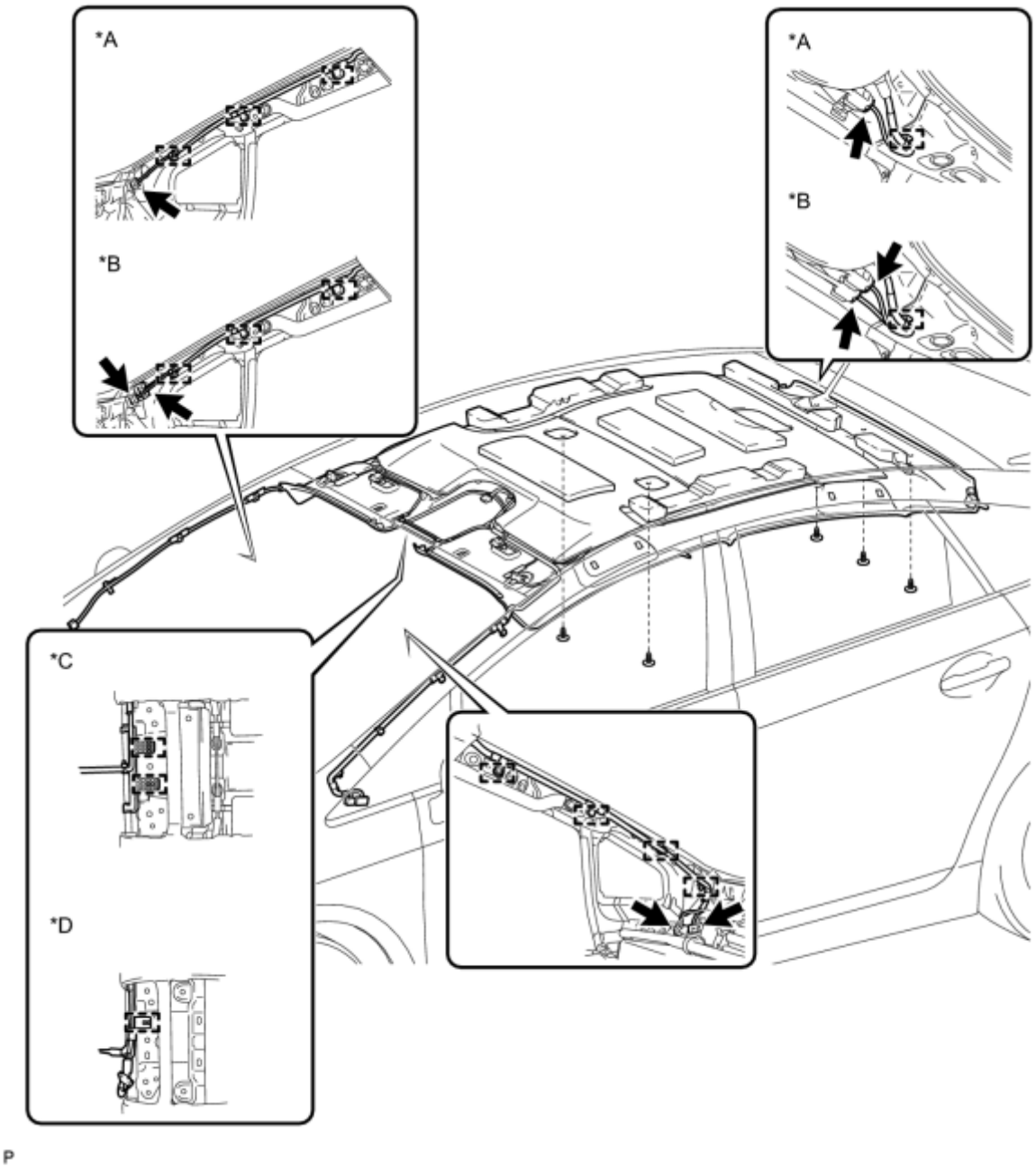
(1) Disengage the 3 clamps and disconnect the 2 connectors from the front pillar RH.

(2) Disengage the clamp and disconnect the 2 connectors from the rear pillar RH.

(e) Disengage the 4 clamps from the front pillar LH.

(f) Disconnect the 2 No. 1 roof wire connectors from the connector holder.

(g) Remove the 5 clips.




P

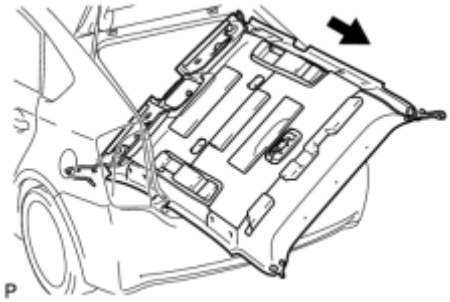
### *Text in Illustration*

| | | | |
|---|---|---|---|
| *A | w/o Manual (SOS) Switch | *B | w/ Manual (SOS) Switch |
| *C | w/ EC Mirror | *D | w/ Lane Keeping Assist System |

(h) Remove the roof headlining assembly from the vehicle through the back door.

NOTICE:

Do not damage the roof headlining assembly or body interior.



60. REMOVE ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)

(a) w/ EC Mirror:

(1) Disengage the 2 clamps and disconnect the inner rear view mirror connector.

(b) w/o Manual (SOS) Switch:

(1) Disengage the 3 clamps and disconnect the connector from the front pillar RH.

(2) Disengage the clamp and disconnect the connector from the rear pillar RH.

(c) w/ Manual (SOS) Switch:

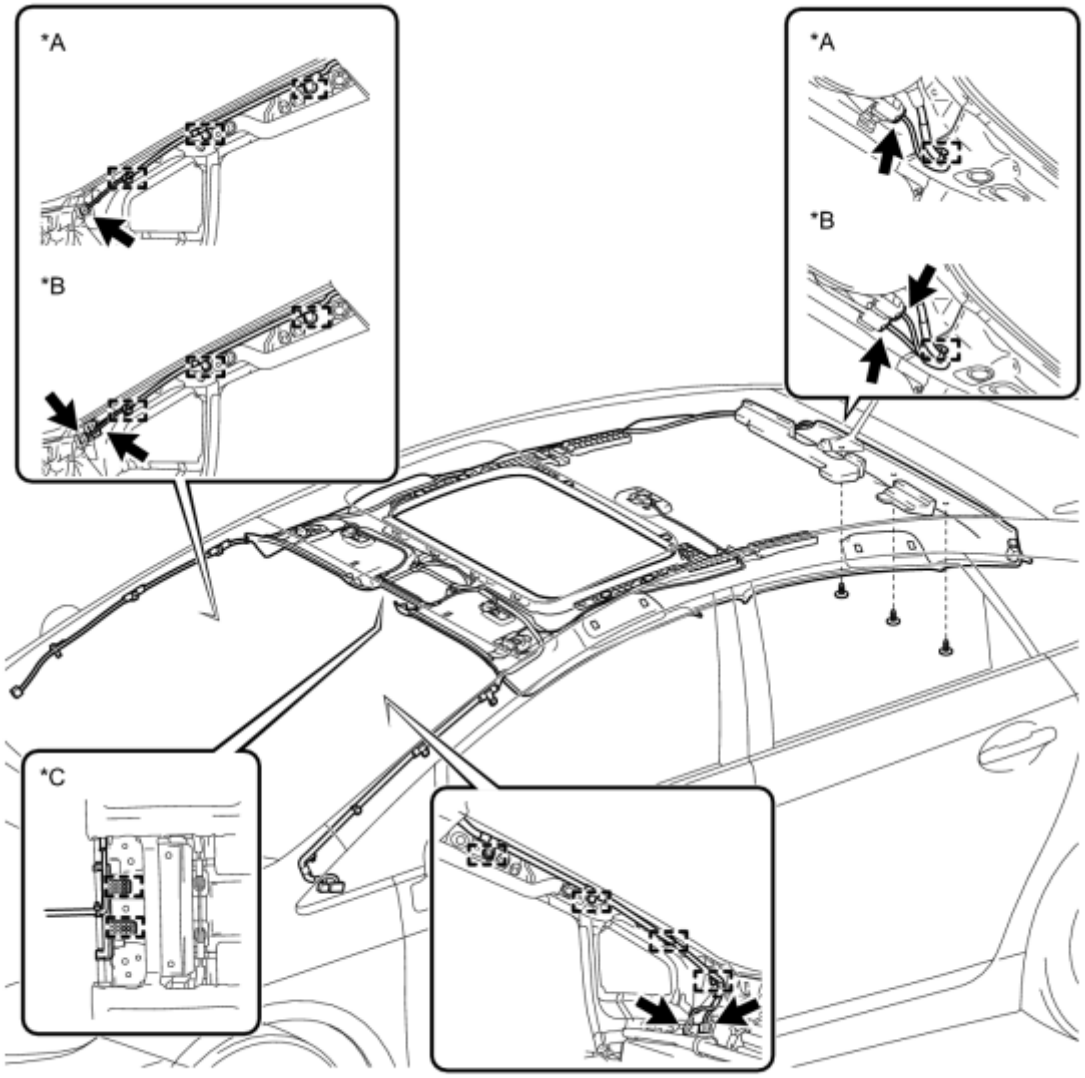
(1) Disengage the 3 clamps and disconnect the 2 connectors from the front pillar RH.

(2) Disengage the clamp and disconnect the 2 connectors from the rear pillar RH.

(d) Disengage the 4 clamps from the front pillar LH.

(e) Disconnect the 2 No. 1 roof wire connectors from the connector holder.

(f) Remove the 3 clips.

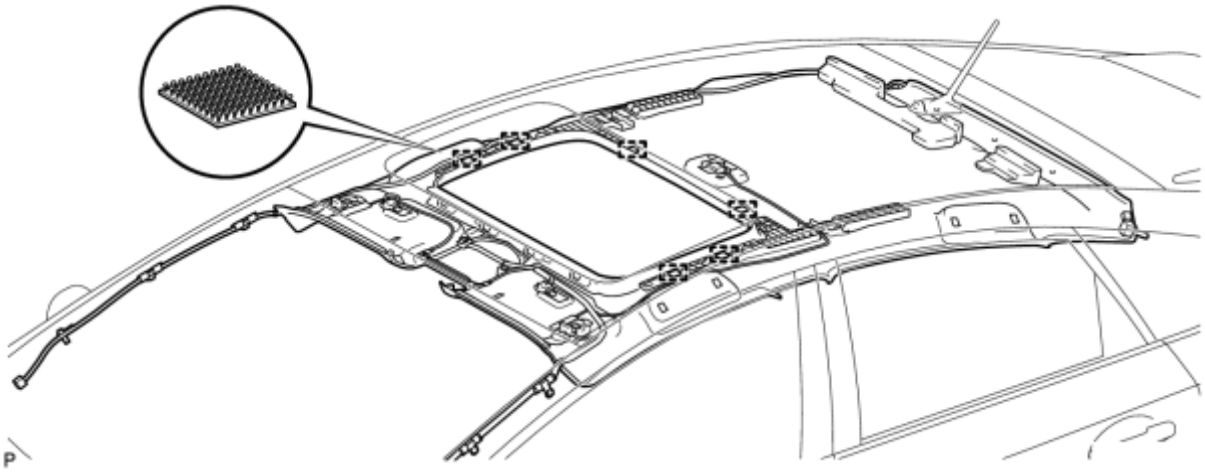


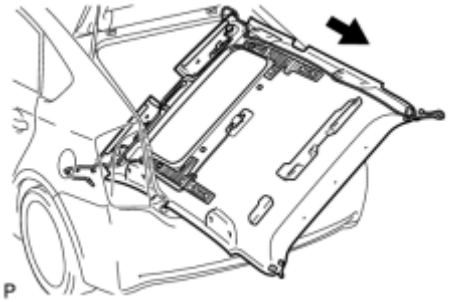

P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *A | w/o Manual (SOS) Switch | *B | w/ Manual (SOS) Switch |
| *C | w/ EC Mirror | - | - |

(g) Disengage the 6 fasteners.





(h) Remove the roof headlining assembly from the vehicle through the back door.

NOTICE:

Do not damage the roof headlining assembly or body interior.

# DISASSEMBLY

1. REMOVE VANITY LIGHT ASSEMBLY

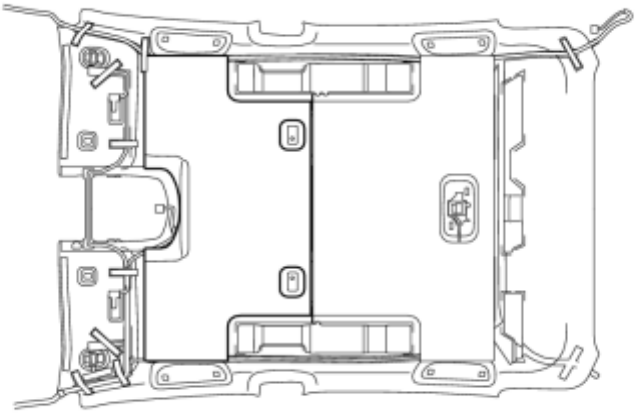
(a) Remove the vanity light assembly INFO.

HINT:

Use the same procedure for the other vanity light.

2. REMOVE NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)

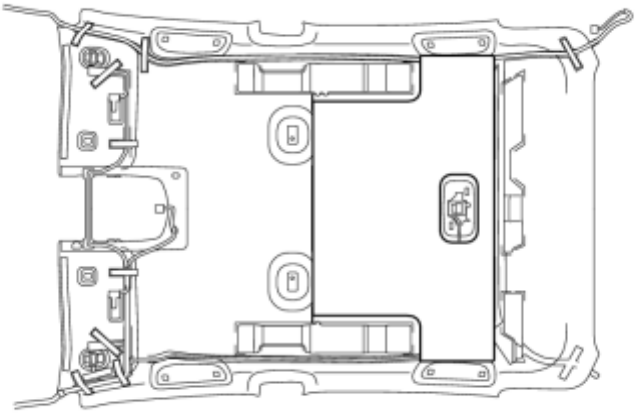
(a) Remove the No. 2 roof silencer pad from the roof headlining assembly.



P

3. REMOVE NO. 3 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Remove the No. 3 roof silencer pad from the roof headlining assembly.



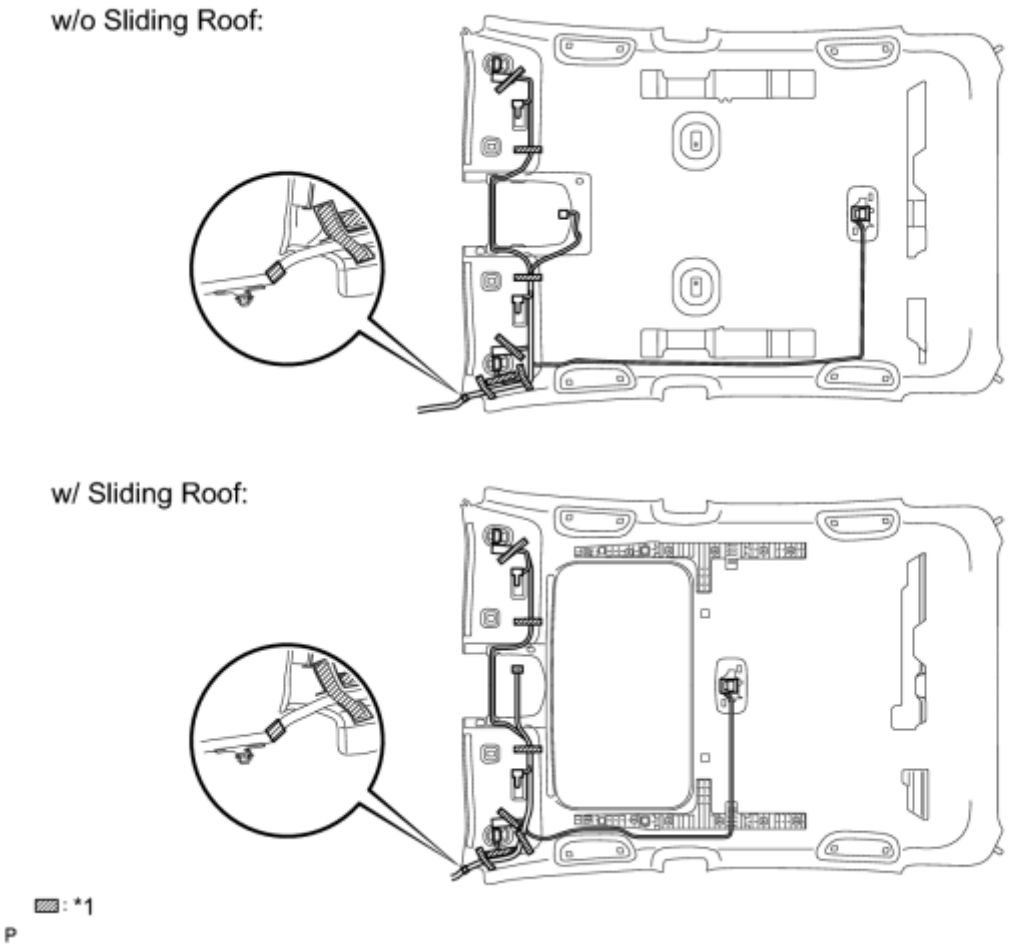
P

4. REMOVE NO. 4 ANTENNA CORD SUB-ASSEMBLY (w/o Manual (SOS) Switch) INFO

5. REMOVE TELEPHONE AND GPS ANTENNA CORD SUB-ASSEMBLY (w/ Manual (SOS) Switch) INFO

6. REMOVE NO. 1 ROOF WIRE

(a) Remove the adhesive tape from the roof headlining assembly.



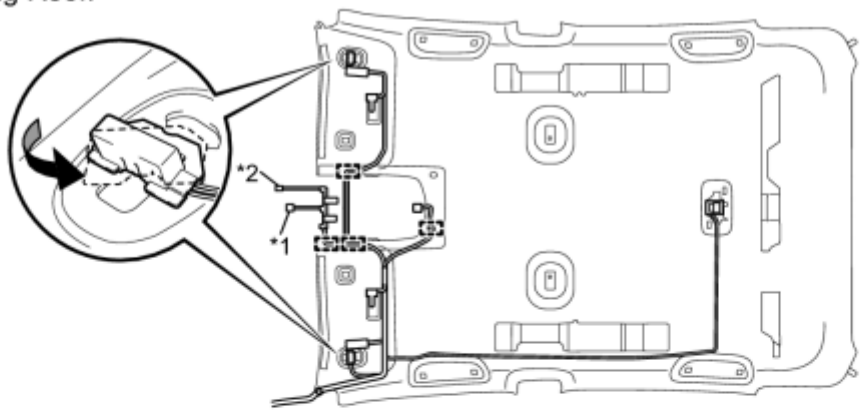

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Adhesive Tape | - | - |

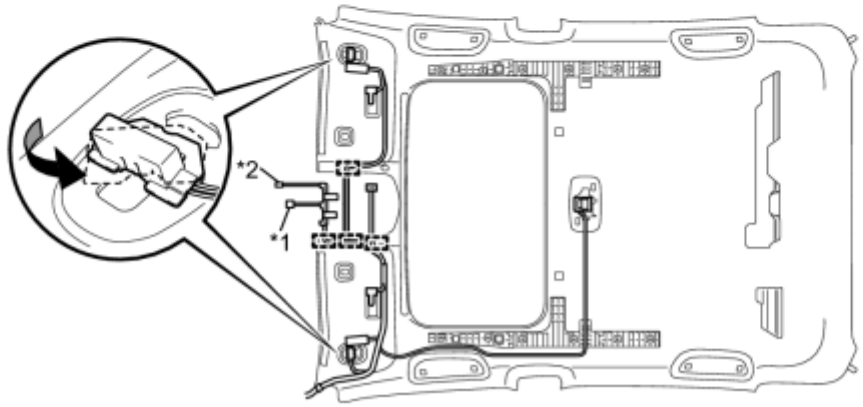
(b) Turn the visor connectors counterclockwise approximately 45° and separate the connectors and each clamp from the roof headlining assembly.

(c) Remove the No. 1 roof wire from the roof headlining assembly.

w/o Sliding Roof:




w/ Sliding Roof:



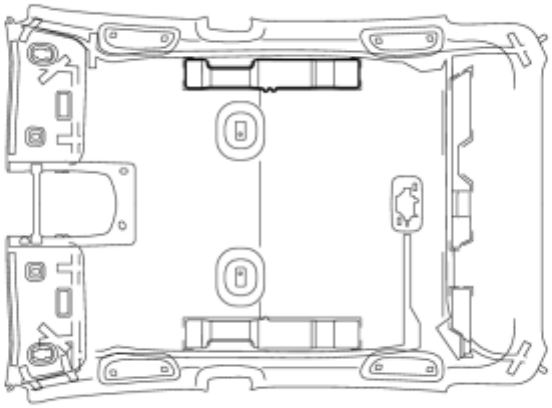

P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | w/ EC Mirror | *2 | w/ Rain Sensor |

7. REMOVE NO. 2 ROOF HEADLINING SET PLATE RH (w/o Sliding Roof)

(a) Remove the No. 2 roof headlining set plate RH from the roof headlining assembly.



P

8. REMOVE NO. 2 ROOF HEADLINING SET PLATE LH (w/o Sliding Roof)

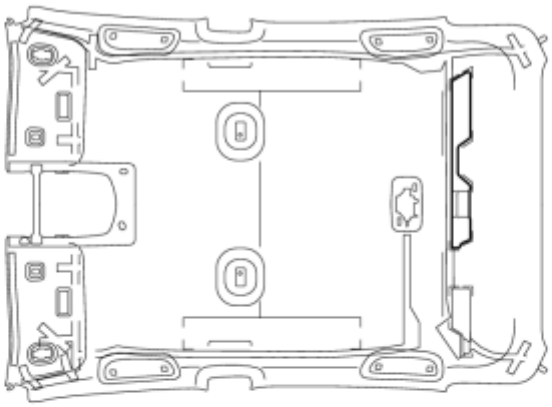
HINT:

Use the same procedure described for the RH side.

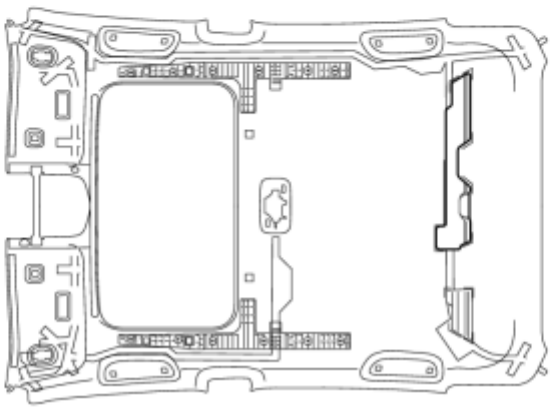
9. REMOVE ROOF HEADLINING PAD

(a) Remove the roof headlining pad from the roof headlining assembly.

w/o Sliding Roof:



w/ Sliding Roof:

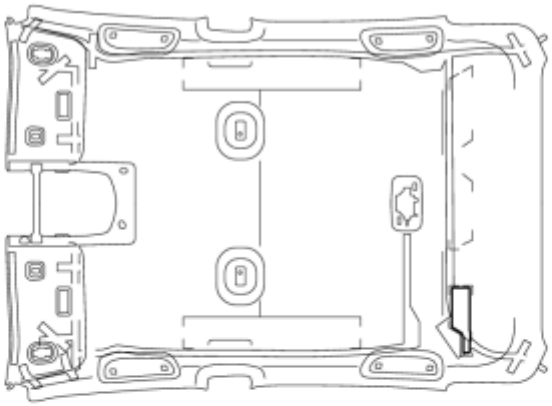


P

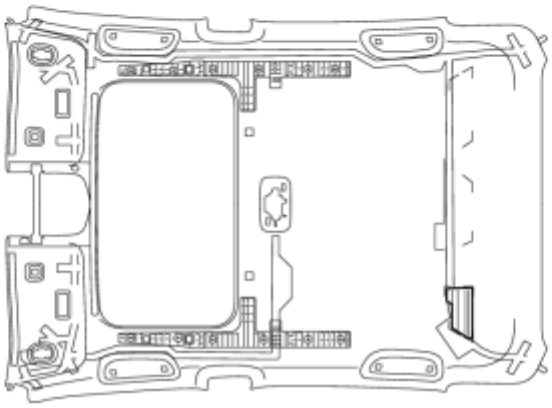
10. REMOVE NO. 2 ROOF HEADLINING PAD

(a) Remove the No. 2 roof headlining pad from the roof headlining assembly.

w/o Sliding Roof:



w/ Sliding Roof:

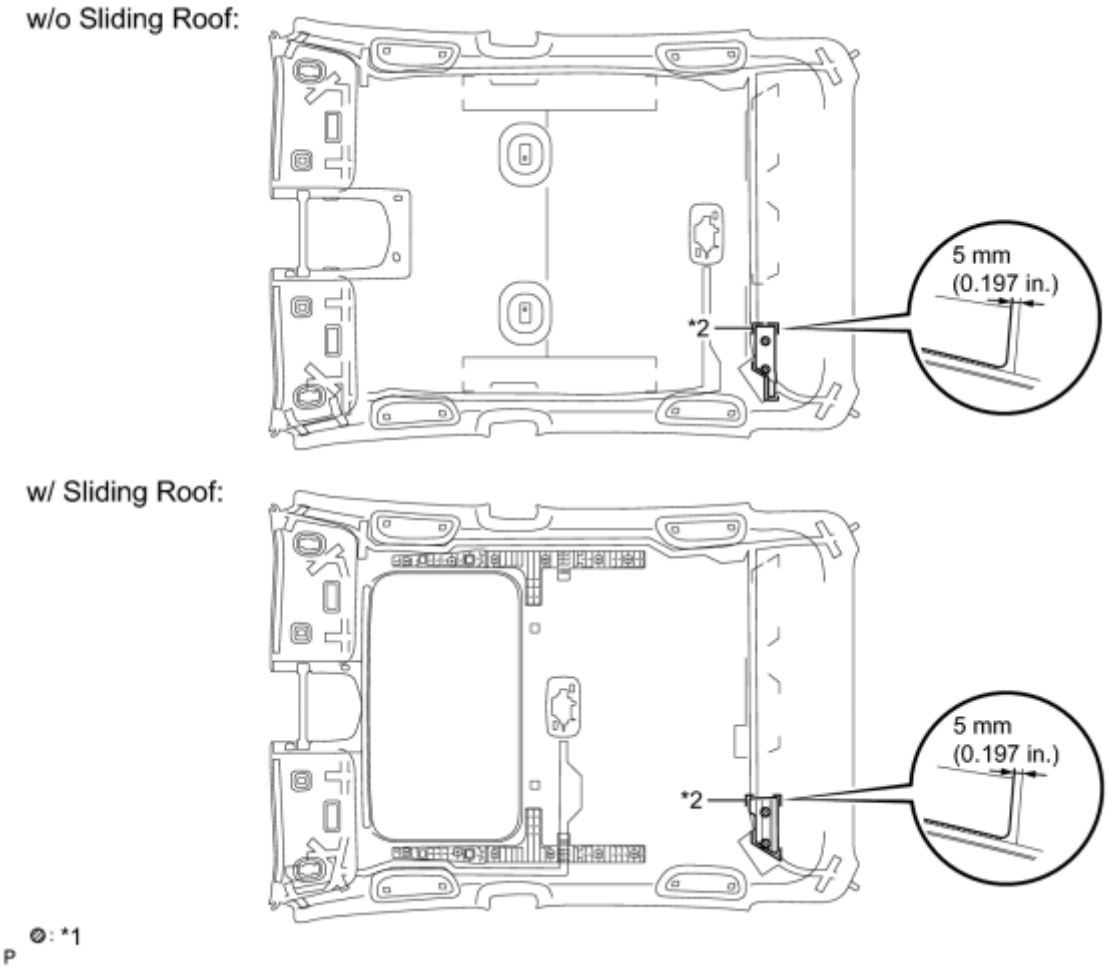


P

# REASSEMBLY

1. INSTALL NO. 2 ROOF HEADLINING PAD

(a) Align the markings on the roof headlining assembly with the No. 2 roof headlining pad and install the pad using hot-melt glue as shown in the illustration.



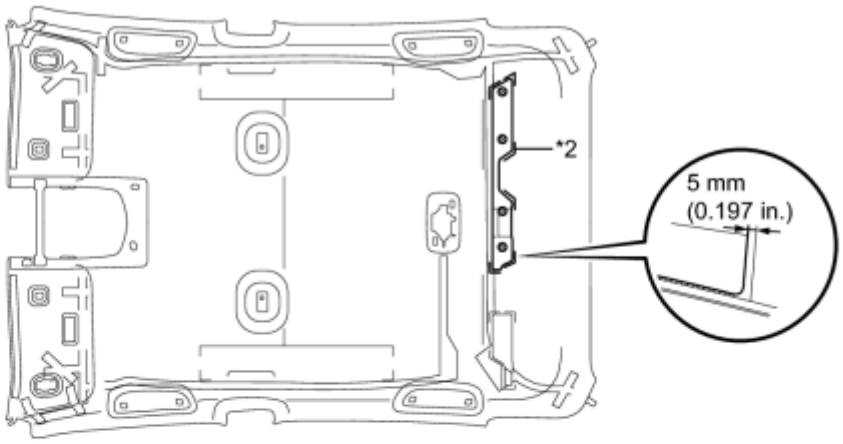

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Hot-melt Glue | *2 | Marking |

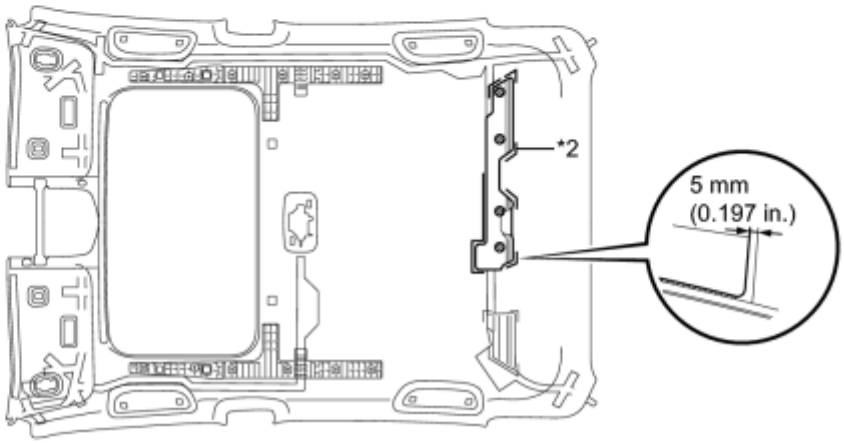
2. INSTALL ROOF HEADLINING PAD

(a) Align the markings on the roof headlining assembly with the roof headlining pad and install the pad using hot-melt glue as shown in the illustration.

w/o Sliding Roof:




w/ Sliding Roof:



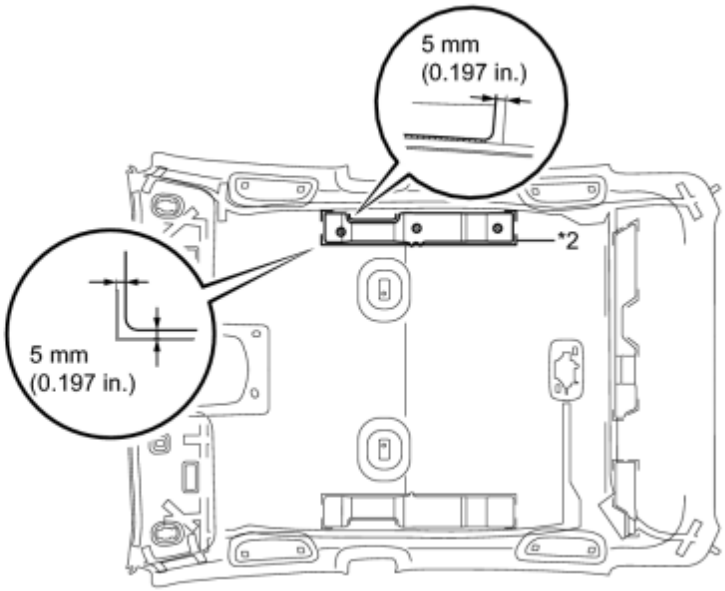

P ⊘: *1

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Hot-melt Glue | *2 | Marking |

3. INSTALL NO. 2 ROOF HEADLINING SET PLATE RH (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 roof headlining set plate RH and install the set plate using hot-melt glue as shown in the illustration.




### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Hot-melt Glue | *2 | Marking |

4. INSTALL NO. 2 ROOF HEADLINING SET PLATE LH (w/o Sliding Roof)

HINT:

Use the same procedure described for the RH side.

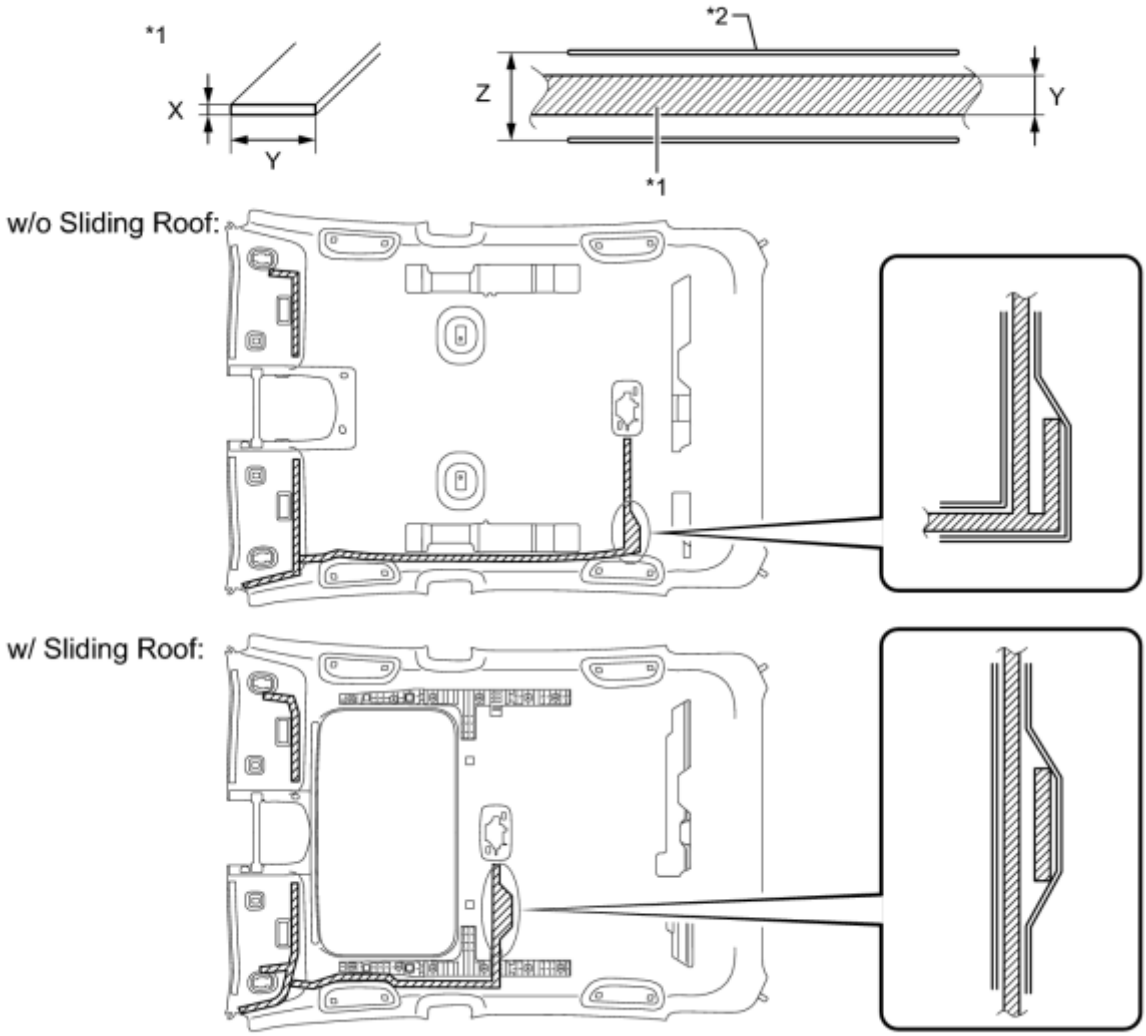
5. INSTALL NO. 1 ROOF WIRE

(a) Apply double-sided tape as shown in the illustration.

(b) Peel off the release paper from the double-sided tape.

(c) Attach the No. 1 roof wire along the double-sided tape so that the marking surface of the wire harness faces downward.

Tape Attachment Locations (Reference):




P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Double-sided Tape | *2 | Marking |

Double-sided Tape Size:

X

1 mm (0.0394 in.)

Y

20 mm (0.787 in.)

Z

40 mm (1.57 in.)

(d) Align the pink marking tape <A> on the vehicle front side on the No. 1 roof wire with the vehicle front side tab on the roof headlining, and apply adhesive tape.

HINT:

Make sure that the No. 1 roof wire is not twisted and that the marking line (white) faces up.

(e) Turn the visor connector RH clockwise approximately 45° to install the connector to the roof headlining assembly.

(f) Align the pink marking tape <B> on the No. 1 roof wire with the markings on the roof headlining, and apply adhesive tape.

(g) Engage each clamp.

(h) Align the pink marking tape <C> on the No. 1 roof wire with the markings on the roof headlining, and apply adhesive tape.

(i) Turn the visor connector LH clockwise approximately 45° to install the connector to the roof headlining assembly.

(j) Attach the No. 1 roof wire, starting from the front of the vehicle, while aligning it with the double-side tape.

NOTICE:

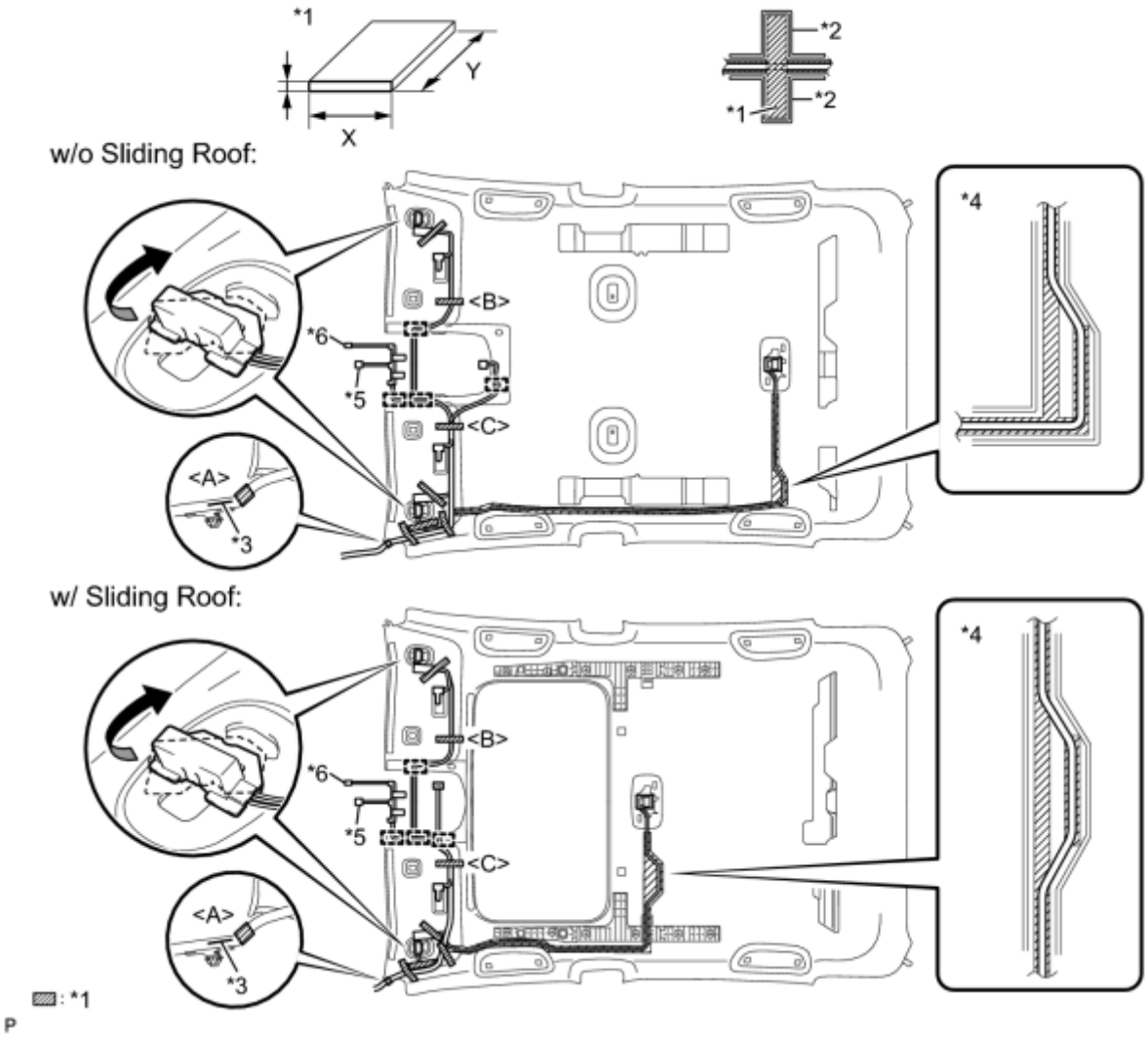
- Securely attach the No. 1 roof wire.
- If any of the No. 1 roof wire is left loose, this will cause abnormal noise. Make sure to attach the No. 1 roof wire without leaving any loose.

HINT:

Secure the extra length of the No. 1 roof wire in the adjustment area.

(k) Apply adhesive tape by aligning it with the markings on the roof headlining.

Tape Attach ment Locations (Reference):




### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Adhesive Tape | *2 | Marking |
| *3 | Marking Line (White) | *4 | Adjustment Area |
| *5 | w/ EC Mirror | *6 | w/ Rain Sensor |

Adhesive Tape Size:

X

20 mm (0.787 in.)

Y

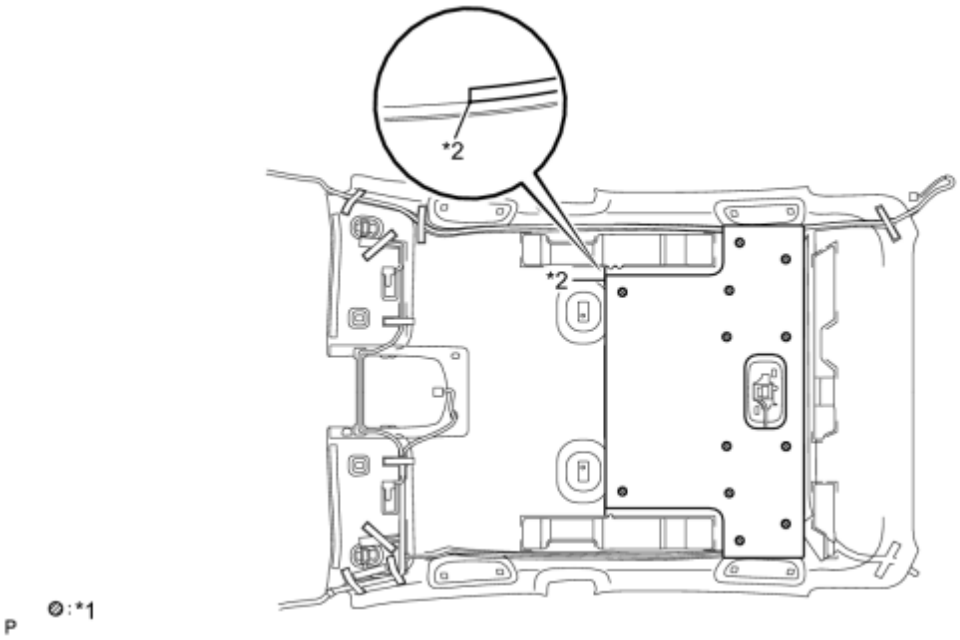
100 mm (3.94 in.)

6. INSTALL NO. 4 ANTENNA CORD SUB-ASSEMBLY (w/o Manual (SOS) Switch) INFO

7. INSTALL TELEPHONE AND GPS ANTENNA CORD SUB-ASSEMBLY (w/ Manual (SOS) Switch) INFO

8. INSTALL NO. 3 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 3 roof silencer pad and install the set plate using hot-melt glue as shown in the illustration.




*Text in Illustration*

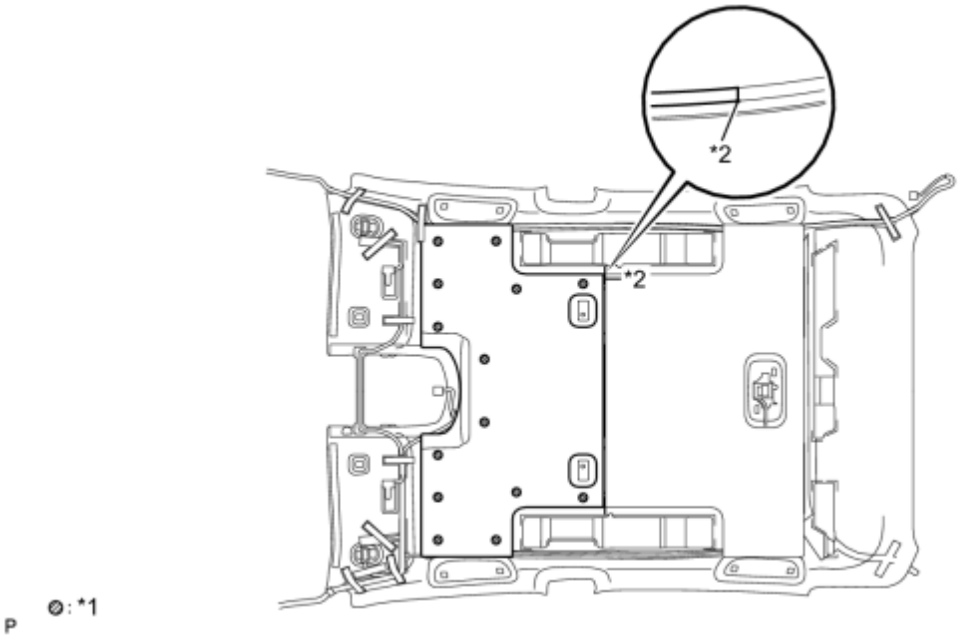
| | | | |
|---|---|---|---|
| *1 | Hot-melt Glue | *2 | Marking |

NOTICE:

Securely attach the No. 1 roof wire. Failure to do so may cause abnormal noise.

9. INSTALL NO. 2 ROOF SILENCER PAD (w/o Sliding Roof)

(a) Align the markings on the roof headlining assembly with the No. 2 roof silencer pad and install the set plate using hot-melt glue as shown in the illustration.




### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Hot-melt Glue | *2 | Marking |

10. INSTALL VANITY LIGHT ASSEMBLY

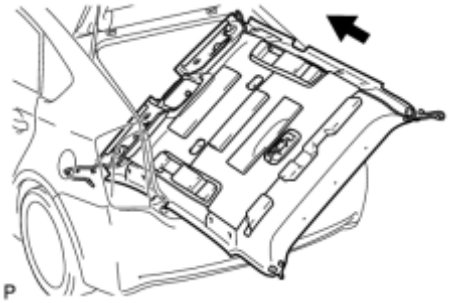
(a) Install the vanity light assembly INFO.

HINT:

Use the same procedure for the other vanity light.

# INSTALLATION

1. INSTALL ROOF HEADLINING ASSEMBLY (w/o Sliding Roof)



(a) Put the roof headlining assembly into the vehicle through the back door.

NOTICE:

Do not damage the roof headlining assembly or body interior.

(b) Install the 5 clips.

(c) Connect the 2 connectors to the connector holder.

(d) Engage the 4 clamps to the front pillar LH.

(e) w/o Manual (SOS) Switch:

(1) Engage the 3 clamps and connect the connector to the front pillar RH.

(2) Disengage the clamp and disconnect the connector to the rear pillar RH.

(f) w/ Manual (SOS) Switch:

(1) Engage the 3 clamps and connect the 2 connectors to the front pillar RH.

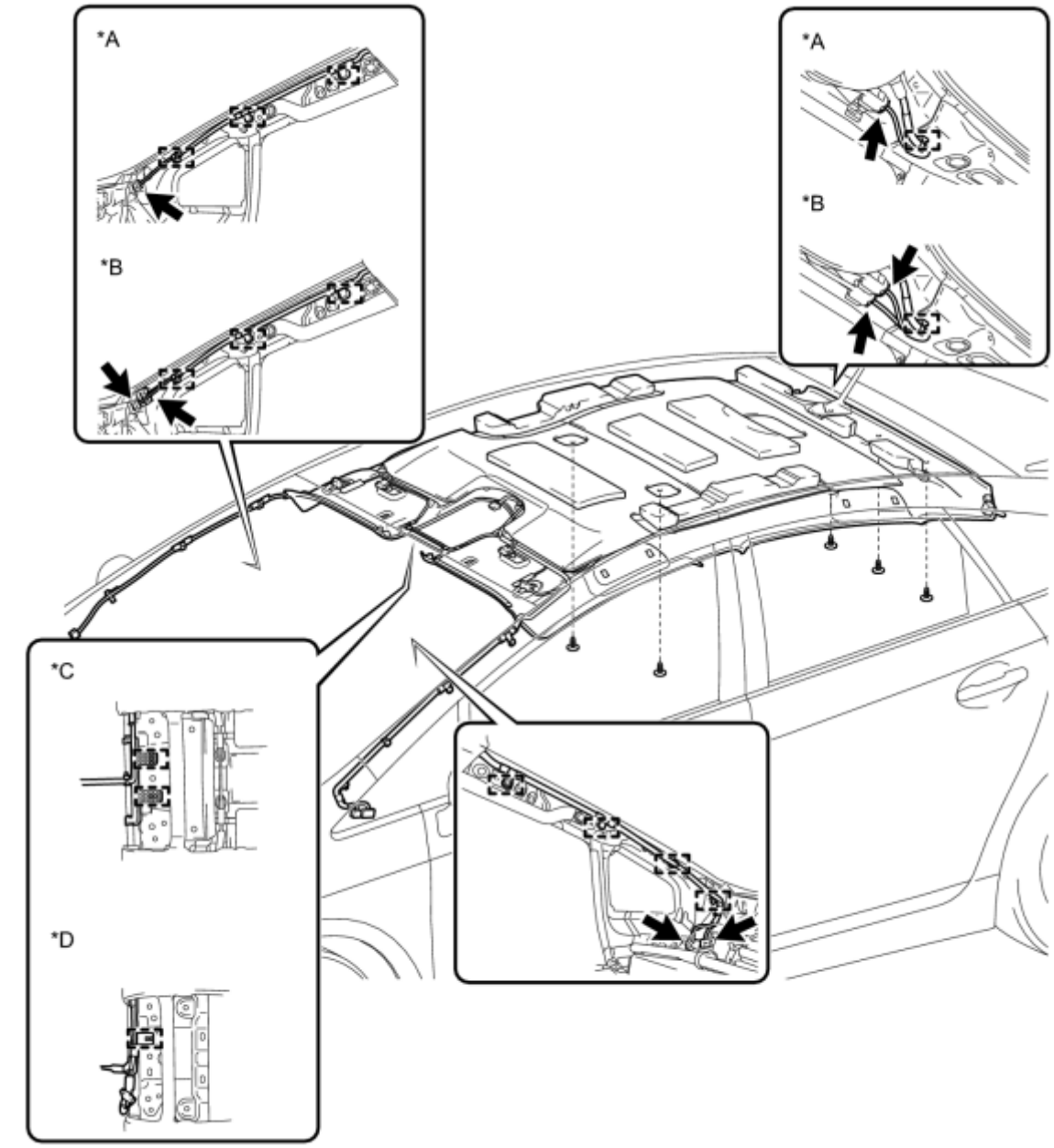
(2) Engage the clamp and connect the 2 connectors to the rear pillar RH.

(g) w/ EC Mirror:

(1) Connect the inner rear view mirror connector and engage the 2 clamps.

(h) w/ Lane Keeping Assist System:

(1) Connect the inner rear view mirror connector and engage the clamp.




P

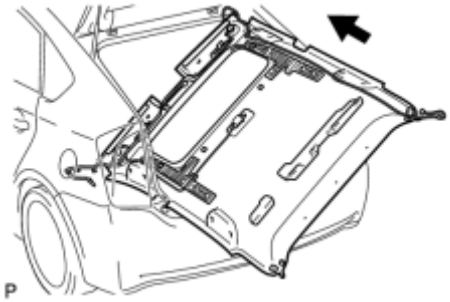
### *Text in Illustration*

| | | | |
|---|---|---|---|
| *A | w/o Manual (SOS) Switch | *B | w/ Manual (SOS) Switch |
| *C | w/ EC Mirror | *D | w/ Lane Keeping Assist System |

2. INSTALL ROOF HEADLINING ASSEMBLY (w/ Sliding Roof)

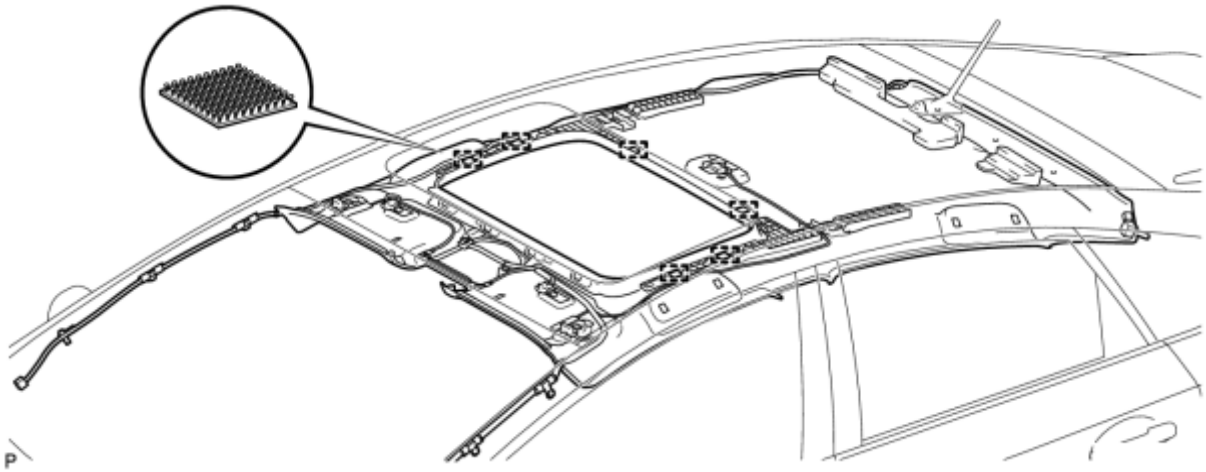
(a) Put the roof headlining assembly into the vehicle through the back door.

NOTICE:



Do not damage the roof headlining assembly or body interior.

(b) Engage the 6 fasteners.



(c) Install the 3 clips.

(d) Connect the 2 connectors to the connector holder.

(e) Engage the 4 clamps to the front pillar LH.

(f) w/o Manual (SOS) Switch:

(1) Engage the 3 clamps and connect the connector to the front pillar RH.

(2) Disengage the clamp and disconnect the connector to the rear pillar RH.

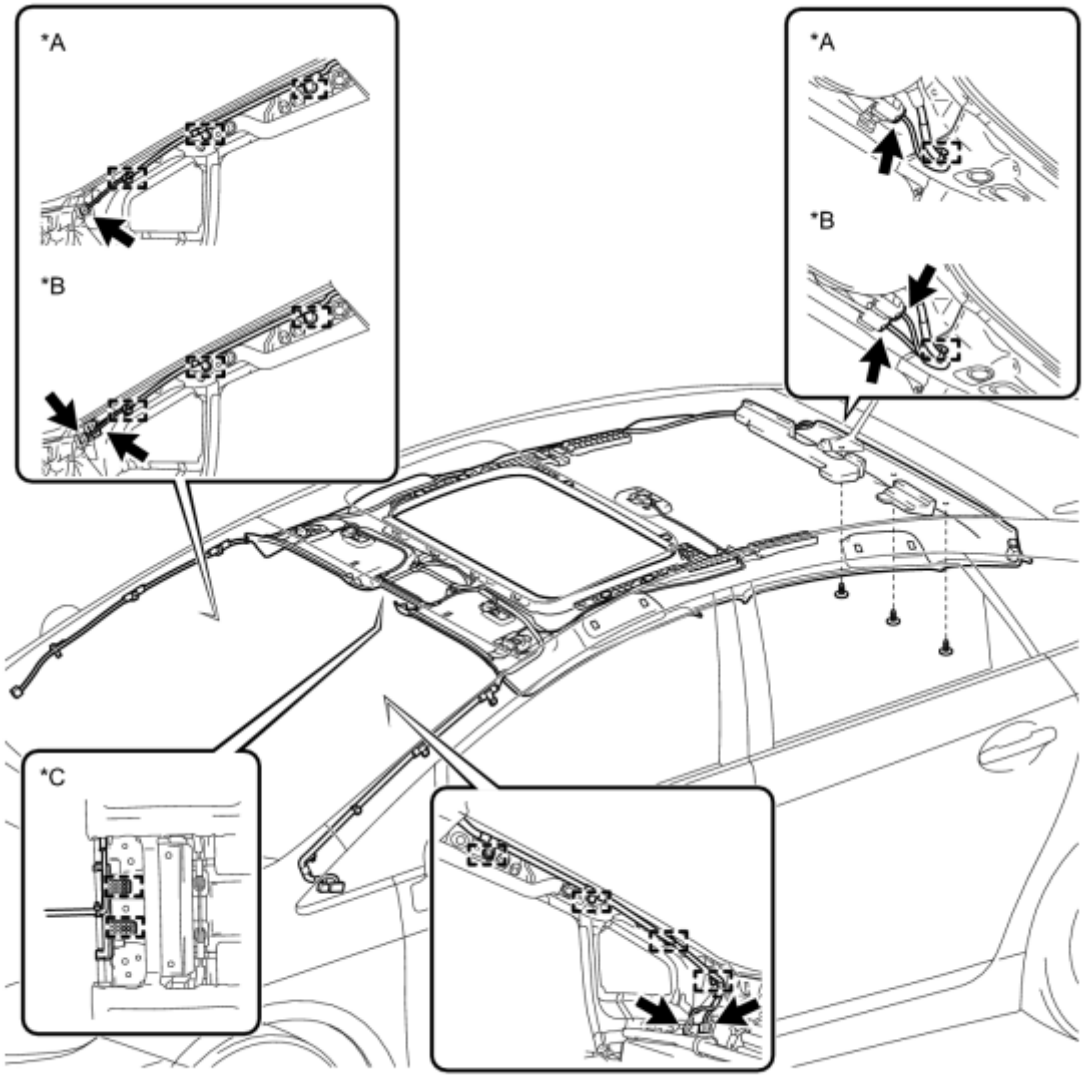
(g) w/ Manual (SOS) Switch:

(1) Engage the 3 clamps and connect the 2 connectors to the front pillar RH.

(2) Engage the clamp and connect the 2 connectors to the rear pillar RH.

(h) w/ EC Mirror:

(1) Connect the inner rear view mirror connector and engage the 2 clamps.



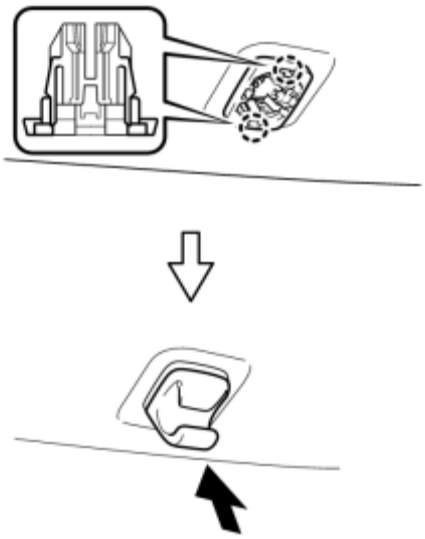

P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *A | w/o Manual (SOS) Switch | *B | w/ Manual (SOS) Switch |
| *C | w/ EC Mirror | - | - |

3. INSTALL VISOR HOLDER

(a) Engage the 2 claws.



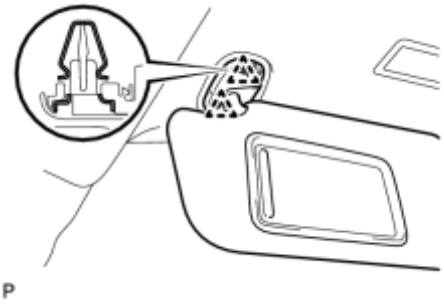
P

(b) Push in the visor holder as shown in the illustration.

HINT:

Use the same procedure for the other visor holder.

4. INSTALL VISOR ASSEMBLY LH



P

(a) Engage the 2 clips to install the visor assembly LH.

5. INSTALL VISOR BRACKET COVER LH

(a) Engage the 3 claws to install the visor bracket cover LH.



6. INSTALL VISOR ASSEMBLY RH

HINT:

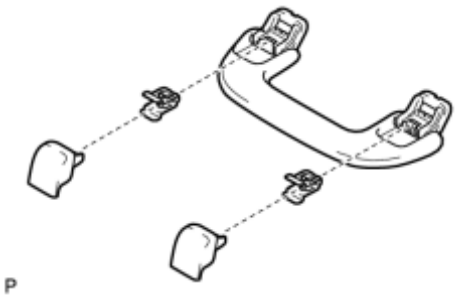
Use the same procedure described for the LH side.

7. INSTALL VISOR BRACKET COVER RH

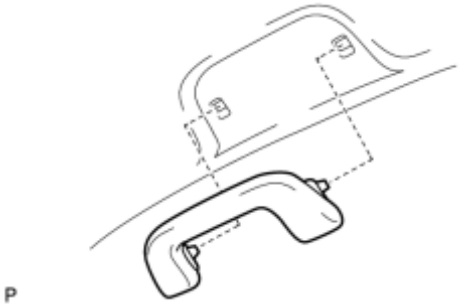
HINT:

Use the same procedure described for the LH side.

8. INSTALL FRONT ASSIST GRIP ASSEMBLY



(a) Assemble the front assist grip assembly as shown in the illustration.



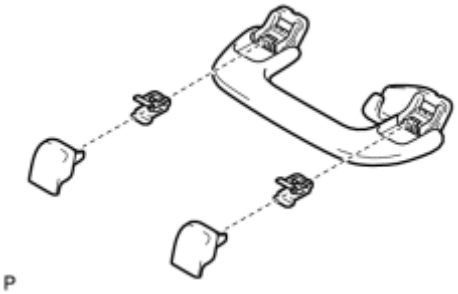
(b) Install the front assist grip assembly.

HINT:

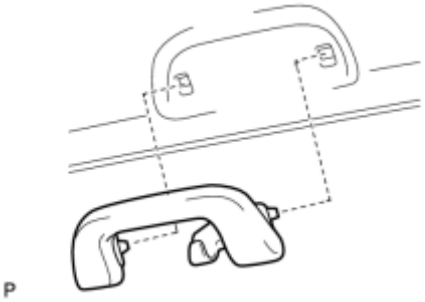
Use the same procedure for the other front assist grip.

9. INSTALL REAR ASSIST GRIP ASSEMBLY

(a) Assemble the rear assist grip assembly as shown in the illustration.



P



P

(b) Install the rear assist grip assembly.

HINT:

Use the same procedure for the other rear assist grip.

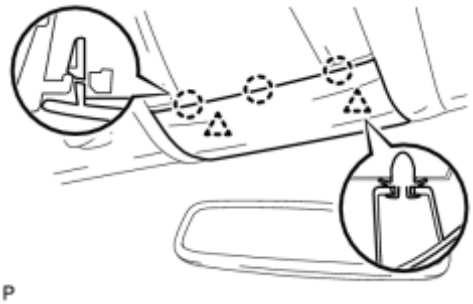
10. INSTALL NO. 1 ROOM LIGHT ASSEMBLY INFO

11. INSTALL MAP LIGHT ASSEMBLY (w/o Sliding Roof) INFO

12. INSTALL MAP LIGHT ASSEMBLY (w/ Sliding Roof) INFO

13. INSTALL LANE RECOGNITION CAMERA SENSOR ASSEMBLY (w/ Lane Keeping Assist System) INFO

14. INSTALL ROOF TOP MOULDING (w/o Lane Keeping Assist System)

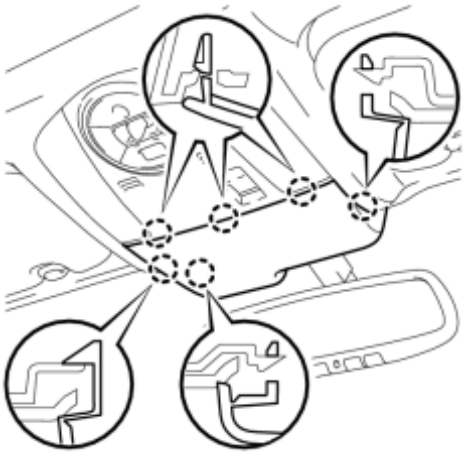


P

(a) Engage the 3 claws and 2 clips to install the roof top moulding.

15. INSTALL ROOF TOP MOULDING (w/ Lane Keeping Assist System)

(a) Engage the 6 claws to install the roof top moulding.

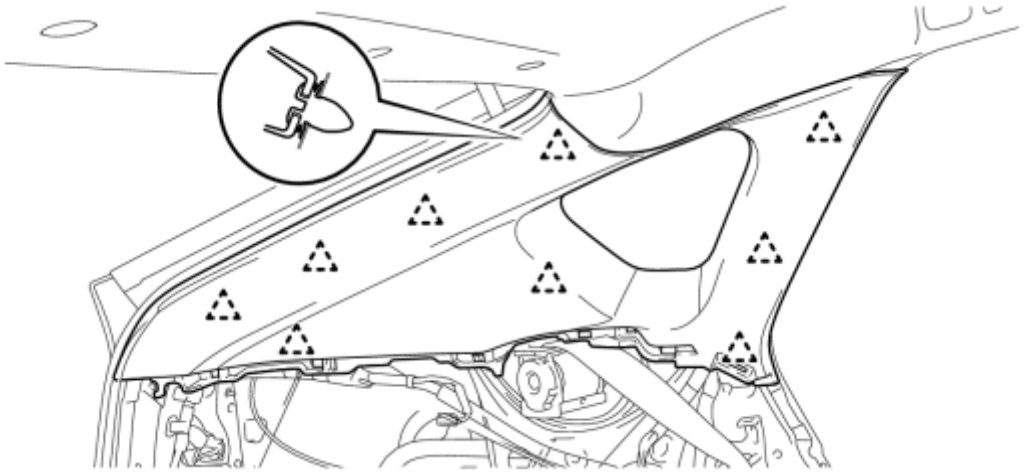


P

16. INSTALL INNER REAR VIEW MIRROR COVER (w/ EC Mirror) INFO

17. INSTALL ROOF SIDE INNER GARNISH ASSEMBLY LH

(a) Engage the 9 clips to install the roof side inner garnish assembly LH.



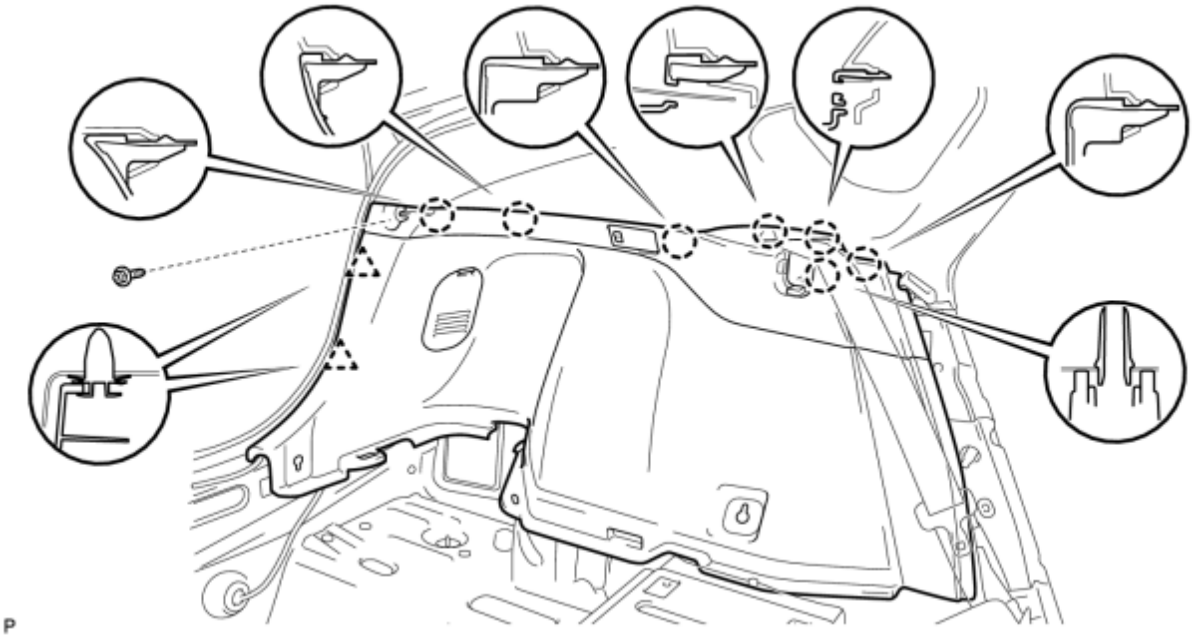
P

18. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH

(a) Connect the connector.

(b) Engage the 7 claws and 2 clips.

(c) Install the deck trim side panel assembly LH with the screw.

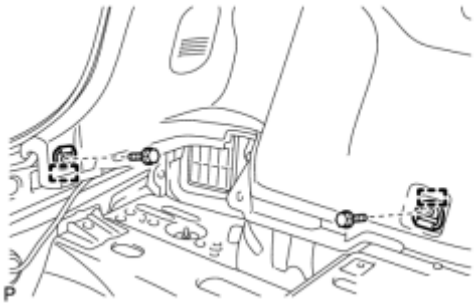


19. INSTALL TONNEAU COVER HOLDER CAP (for LH Side)



(a) Engage the claw to install the tonneau cover holder cap.

20. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side)



(a) Engage the 2 guides.

(b) Install the 2 luggage hold belt striker assemblies with the 2 bolts.

21. INSTALL ROOF SIDE INNER GARNISH ASSEMBLY RH

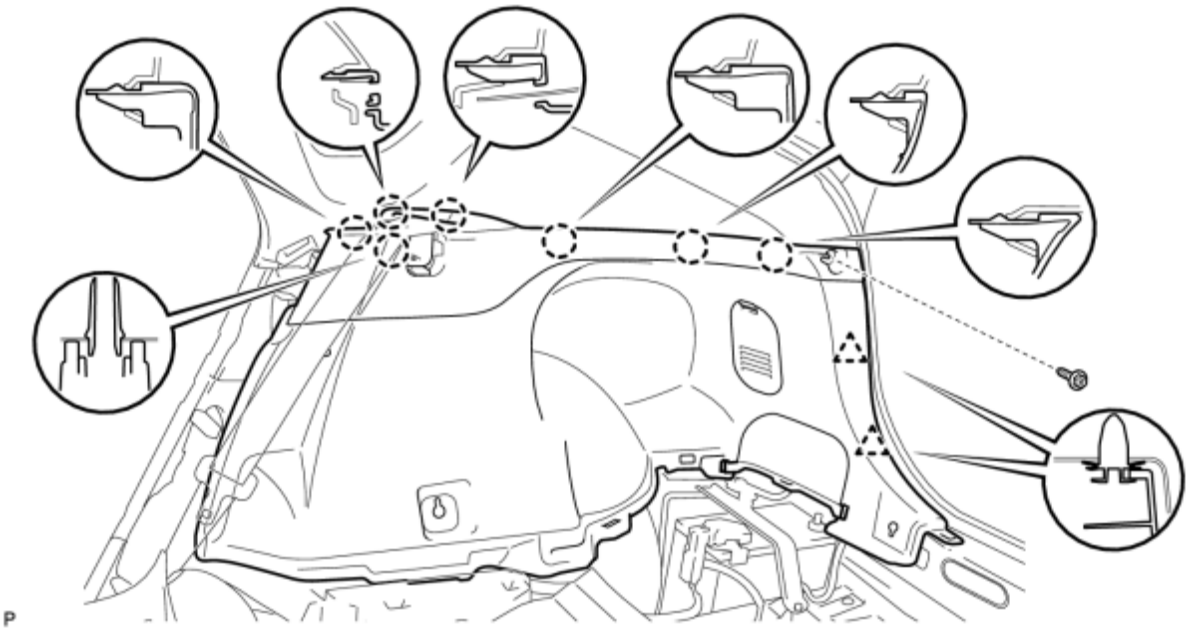
HINT:

Use the same procedure described for the LH side.

22. INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH

(a) Engage the 7 claws and 2 clips.

(b) Install the deck trim side panel assembly RH with the screw.




23. INSTALL TONNEAU COVER HOLDER CAP (for RH Side)

HINT:

Use the same procedure described for the LH side.

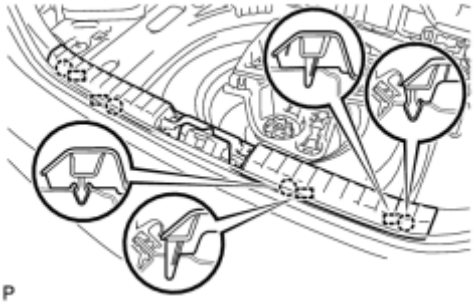
24. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

HINT:

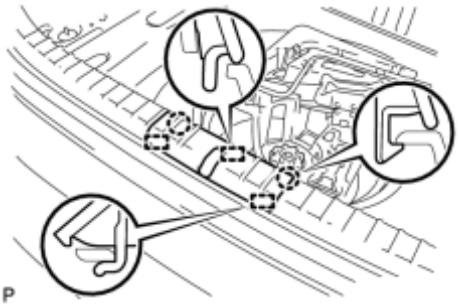
Use the same procedure described for the LH side.

25. INSTALL REAR DECK TRIM COVER

(a) Engage the 4 claws and 4 guides to install the rear deck trim cover.



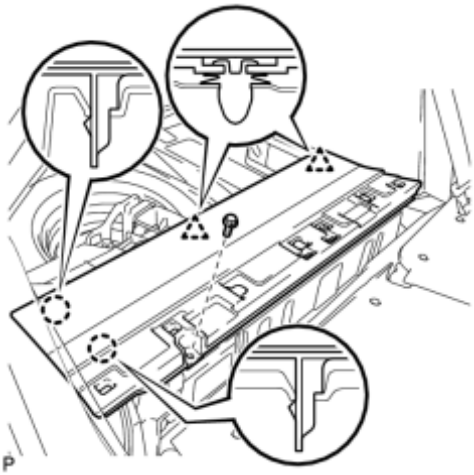

26. INSTALL DECK TRIM SERVICE HOLE COVER




(a) Engage the 3 guides.

(b) Engage the 2 claws to install the deck trim service hole cover.

27. INSTALL REAR NO. 1 FLOOR BOARD

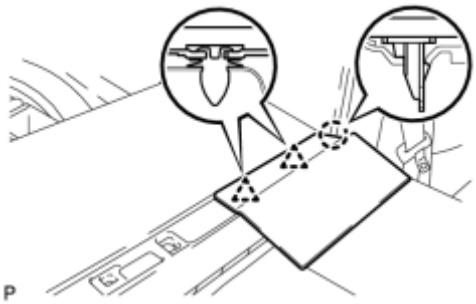



(a) Engage the 2 claws and 2 clips.

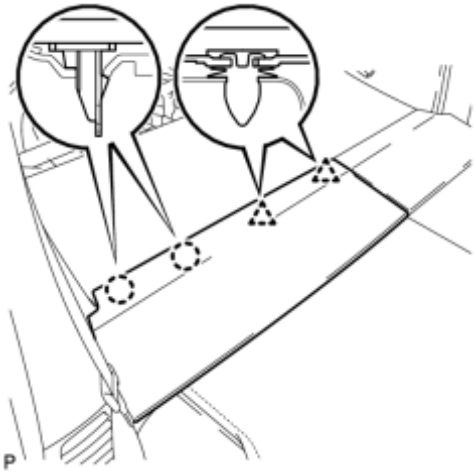
(b) Install the rear No. 1 floor board with the bolt.

28. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY

(a) Engage the claw and 2 clips to install the rear No. 2 floor board sub-assembly.



29. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY



(a) Engage the 2 claws and 2 clips to install the rear No. 1 floor board sub-assembly.

30. INSTALL DECK FLOOR BOX LH



(a) Engage the 2 guides.

(b) Install the deck floor box LH with the clip.

31. INSTALL REAR NO. 4 FLOOR BOARD

(a) Engage the guide to install the rear No. 4 floor board.



32. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover)

(a) Install the tonneau cover assembly.

33. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

(a) Install the upper instrument panel assembly INFO.

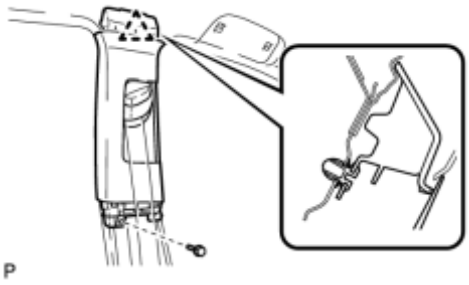
34. INSTALL REAR SIDE SEATBACK ASSEMBLY LH INFO

35. INSTALL REAR SIDE SEATBACK ASSEMBLY RH INFO

36. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

37. INSTALL CENTER PILLAR GARNISH LH

(a) Pass the floor anchor of the front seat outer seat belt assembly LH through the center pillar garnish LH.

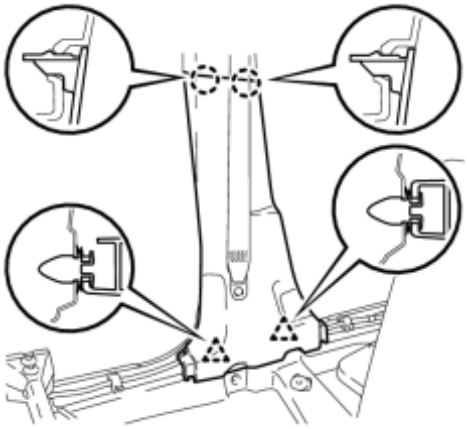


(b) Engage the clip.

(c) Install the center pillar garnish LH with the screw.

38. INSTALL CENTER PILLAR LOWER GARNISH LH

(a) Engage the 2 claws and 2 clips to install the center pillar lower garnish LH.

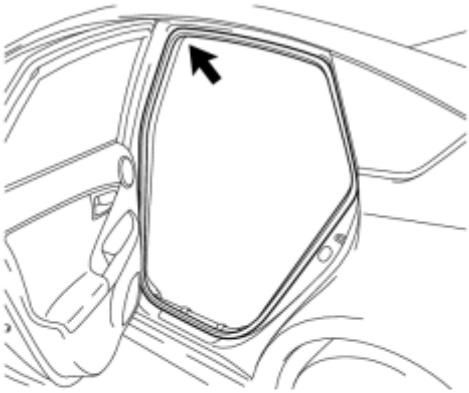


P

39. CONNECT FRONT SEAT OUTER BELT ASSEMBLY LH INFO

40. INSTALL LAP BELT OUTER ANCHOR COVER (for LH Side) INFO

41. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH




P

(a) Align the alignment mark (Red) on the weatherstrip with the protruding portion on the body indicated by the arrow in the illustration, and install the rear door opening trim weatherstrip LH.

## Text in Illustration

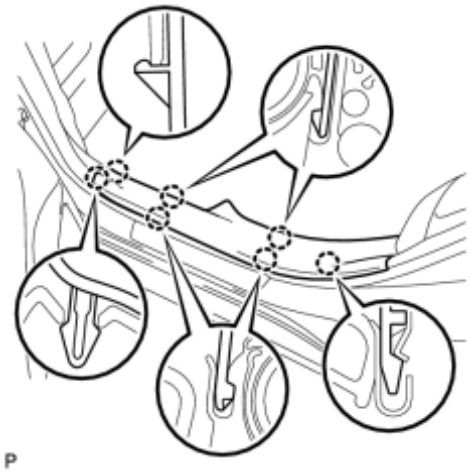
| | |
|---|---|
| *1 | Alignment Mark (Red) |

NOTICE:

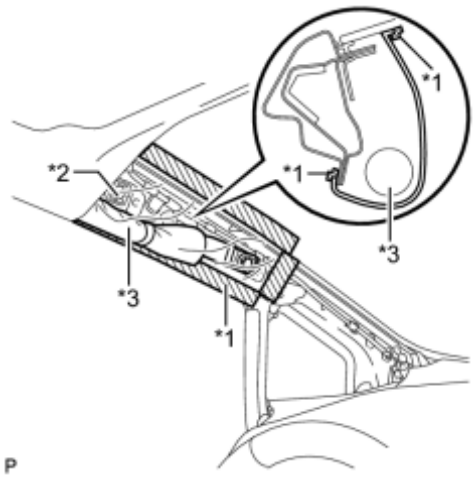
After installation, check that the corners fit correctly.

42. INSTALL REAR DOOR SCUFF PLATE LH

(a) Engage the 7 claws to install the rear door scuff plate LH.




43. INSTALL FRONT PILLAR GARNISH LH




(a) Remove the protective cover.

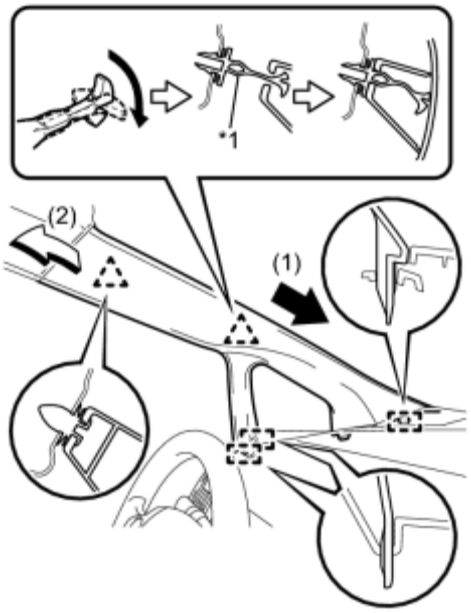
## Text in Illustration

| | |
|---|---|
| *1 | Adhesive Tape |
| *2 | Protective Cover |
| *3 | Curtain Shield Airbag Assembly |

(b) Engage the 3 guides.

## Text in Illustration

| | |
|---|---|
| *1 | Front Pillar Garnish Clip |




P

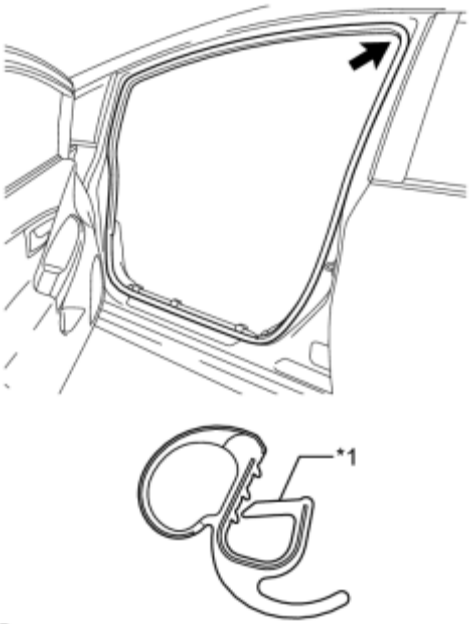
(c) Turn the end of the front pillar garnish clip 90° with needle-nosed pliers and install it to the front pillar garnish RH.

HINT:

Tape the needle-nosed pliers tip before use.

(d) Engage the 2 clips to install the front pillar garnish LH.

44. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP LH




P

(a) Align the alignment mark (Yellow) on the weatherstrip with the protruding portion on the body indicated by the arrow in the illustration, and install the front door opening trim weatherstrip LH.

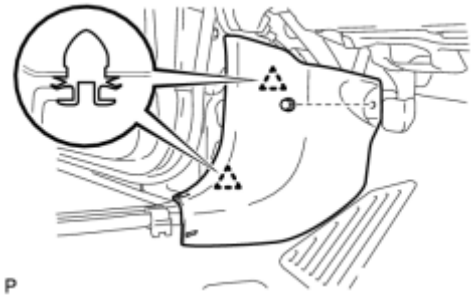
# Text in Illustration

| | |
|---|---|
| *1 | Alignment Mark (Yellow) |

NOTICE:

After installation, check that the corners fit correctly.

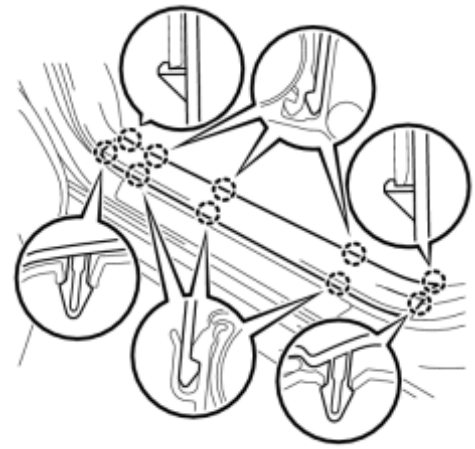
45. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH



(a) Engage the 2 clips.

(b) Install the cowl side trim board LH with the clip.

46. INSTALL FRONT DOOR SCUFF PLATE LH



(a) Engage the 10 claws to install the front door scuff plate LH.

47. INSTALL CENTER PILLAR GARNISH RH

HINT:

Use the same procedure described for the LH side.

48. INSTALL CENTER PILLAR LOWER GARNISH RH

HINT:

Use the same procedure described for the LH side.

49. CONNECT FRONT SEAT OUTER BELT ASSEMBLY RH

HINT:

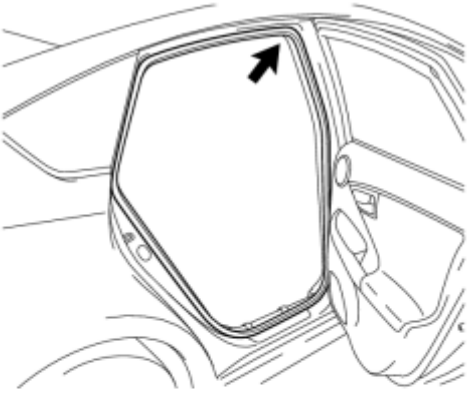
Use the same procedure described for the LH side.

50. INSTALL LAP BELT OUTER ANCHOR COVER (for RH Side)

HINT:

Use the same procedure described for the LH side.

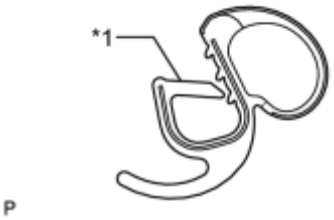
51. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP RH



(a) Align the alignment mark (Blue) on the weatherstrip with the protruding portion on the body indicated by the arrow in the illustration, and install the rear door opening trim weatherstrip LH.

## Text in Illustration

| | |
|---|---|
| *1 | Alignment Mark (Blue) |




NOTICE:

After installation, check that the corners fit correctly.

52. INSTALL REAR DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side.

53. INSTALL FRONT PILLAR GARNISH RH

HINT:

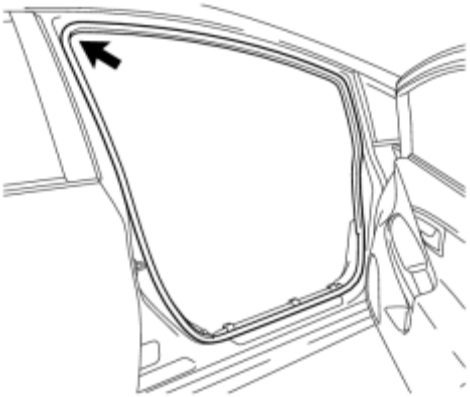
Use the same procedure described for the LH side.

54. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP RH

(a) Align the alignment mark (White) on the weatherstrip with the protruding portion on the body indicated by the arrow in the illustration, and install the front door opening trim weatherstrip RH.

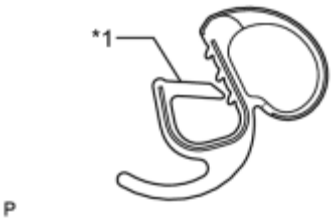
## Text in Illustration

| | |
|---|---|
| *1 | Alignment Mark (White) |



NOTICE:

After installation, check that the corners fit correctly.




55. INSTALL COWL SIDE TRIM SUB-ASSEMBLY RH

HINT:

Use the same procedure described for the LH side.

56. INSTALL FRONT DOOR SCUFF PLATE RH

HINT:

Use the same procedure described for the LH side.

57. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

58. INSTALL REAR NO. 3 FLOOR BOARD

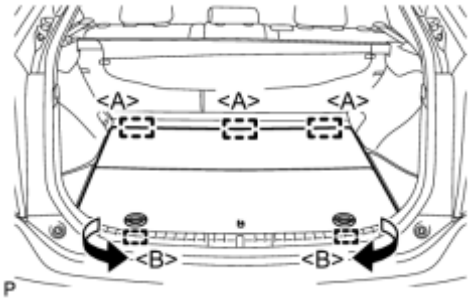



(a) Engage the 2 guides to install the rear No. 3 floor board.

59. INSTALL REAR DECK FLOOR BOX

(a) Install the rear deck floor box.

60. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type)




(a) Engage the 3 guides <A>.

(b) Engage the 2 guides <B> and install the rear No. 2 floor board as shown in the illustration.

61. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

62. ADJUST LANE RECOGNITION CAMERA SENSOR ASSEMBLY (w/ Lane Keeping Assist System) INFO

# PRECAUTION

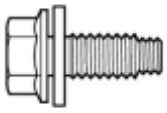
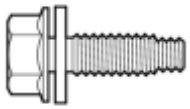
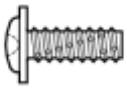
1. PRECAUTION FOR VEHICLE WITH SRS AIRBAG AND SEAT BELT PRETENSIONER

(a) Some operations in this section may affect the SRS airbags. Prior to performing the corresponding operations, read the precautions regarding the SRS airbags INFO.

2. TABLE OF BOLT, SCREW AND NUT

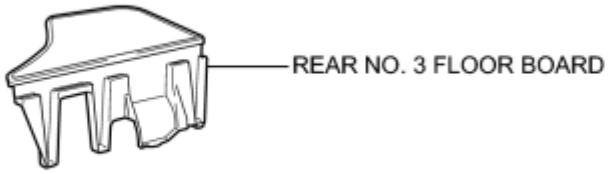
HINT:

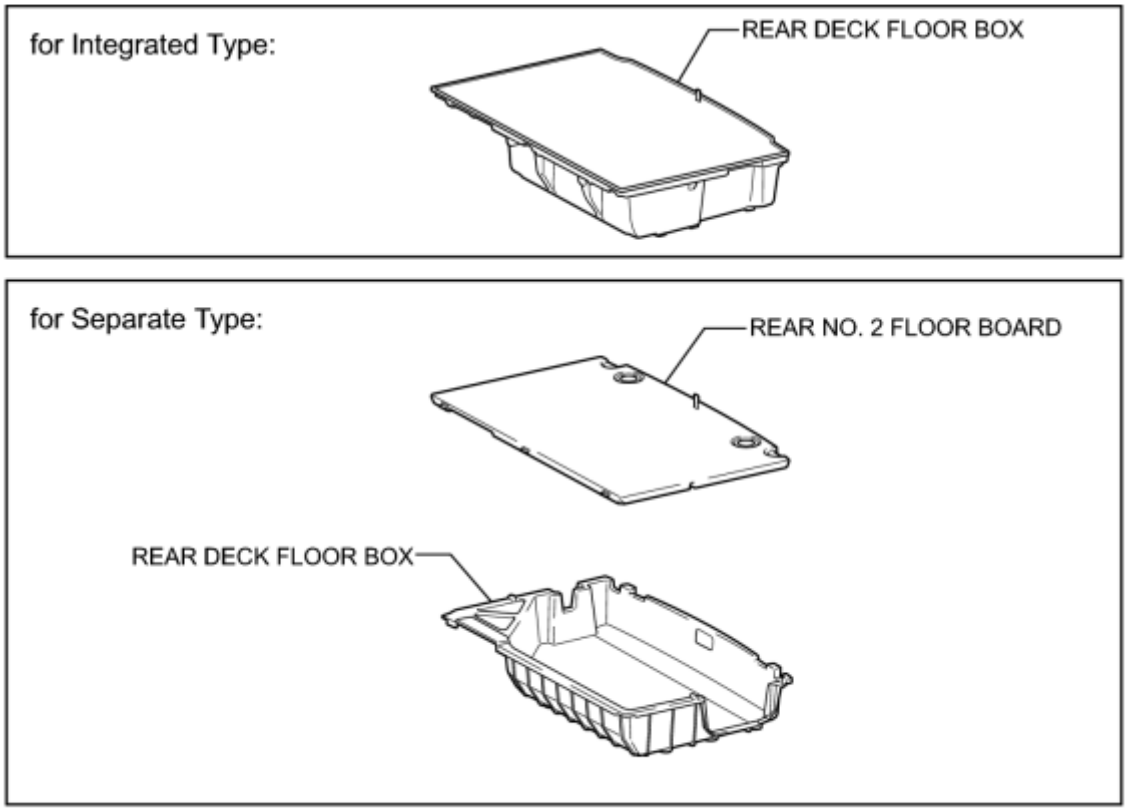
All bolts, screws and nuts relevant to installing and removing the instrument panel are shown along with their alphabet codes in the table below.

| Code | Shape | Size | Code | Shape | Size |
|---|---|---|---|---|---|
| <A> |  | φ=8 mm<br>(0.314 in.)<br>Length=21 mm<br>(0.827 in.) | <B> |  | φ=6 mm<br>(0.236 in.)<br>Length=20 mm<br>(0.787 in.) |
| <C> |  | φ=5 mm<br>(0.197 in.)<br>Length=14 mm<br>(0.551 in.) | | | |

# COMPONENTS

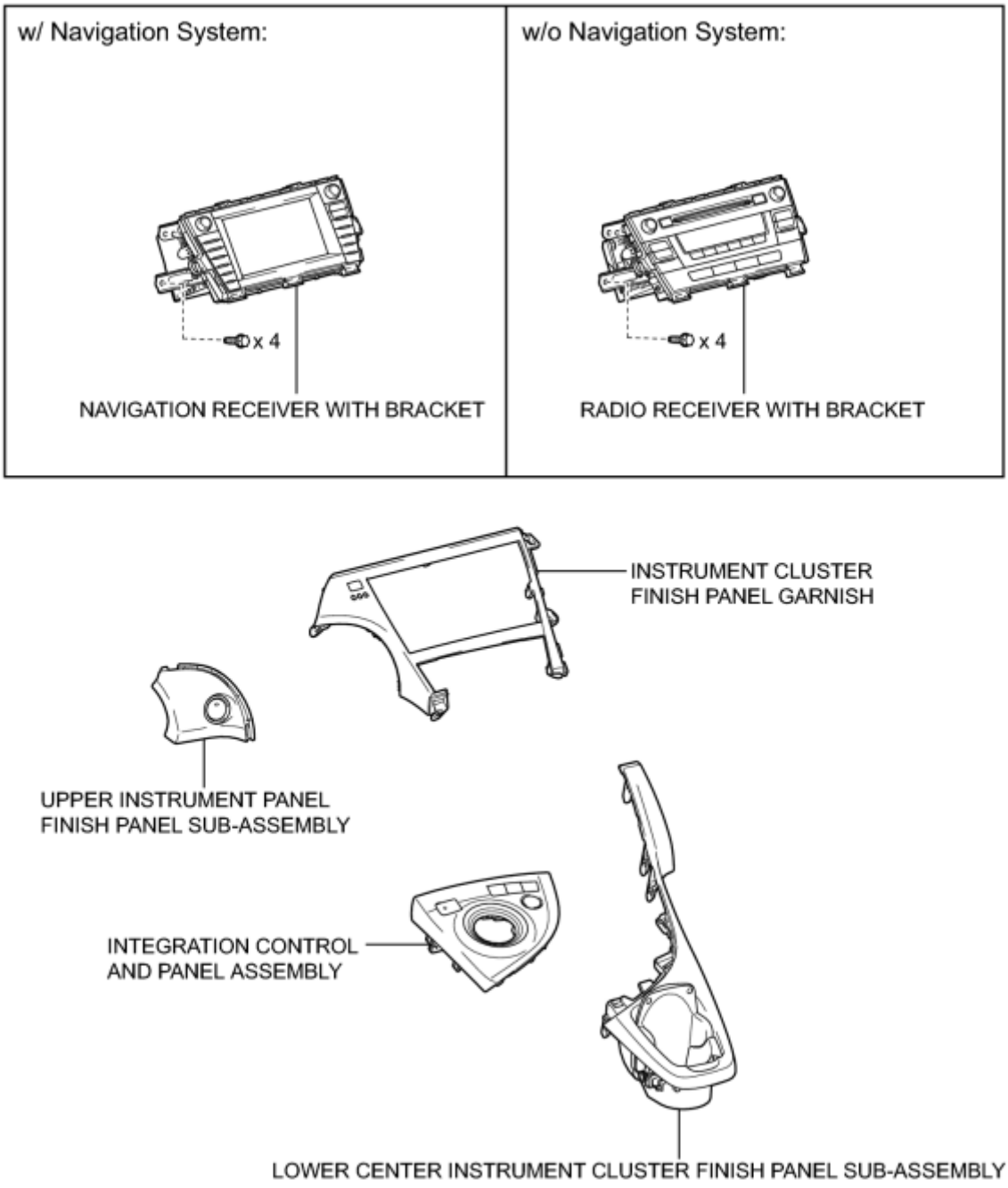
# ILLUSTRATION



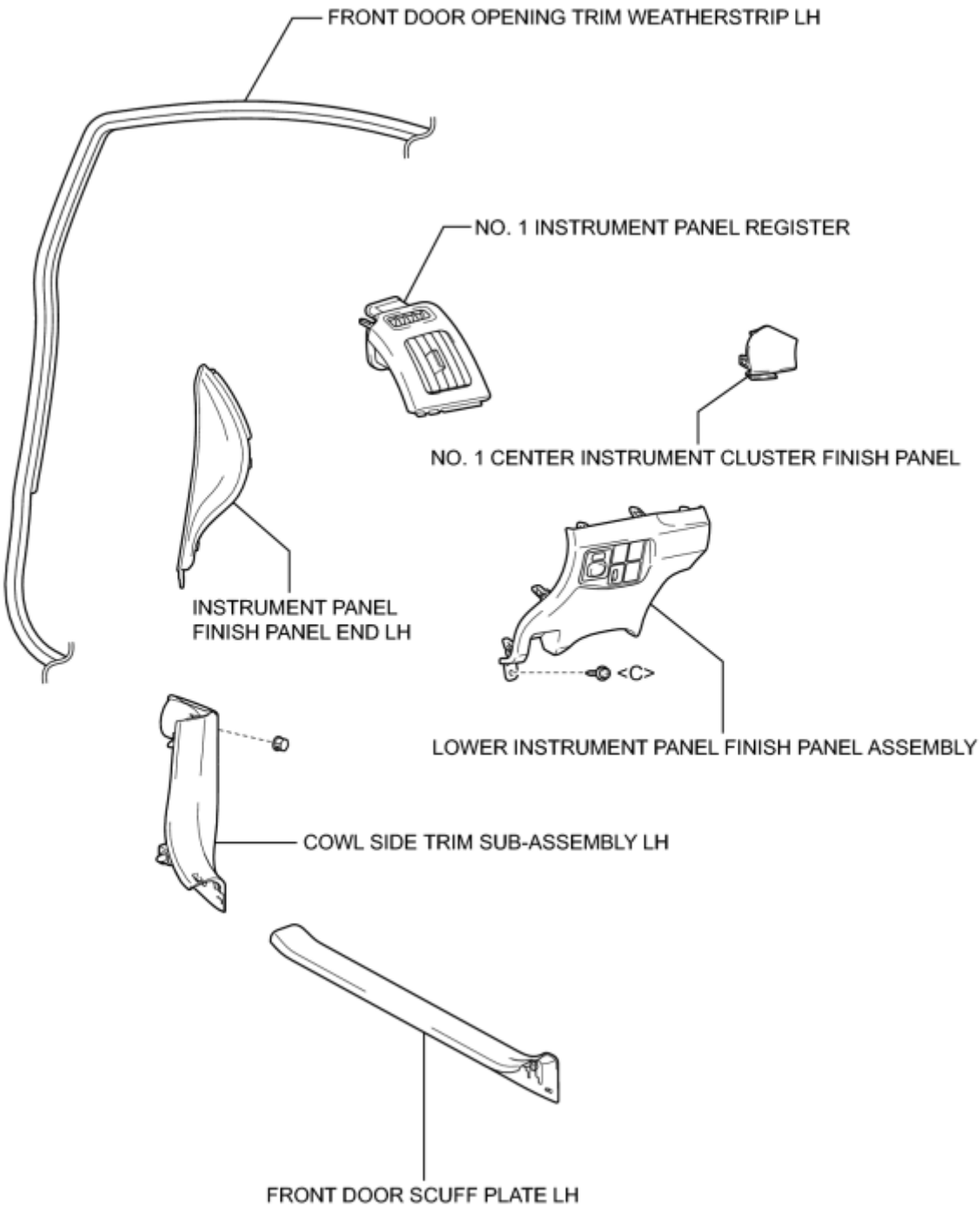

P

# ILLUSTRATION



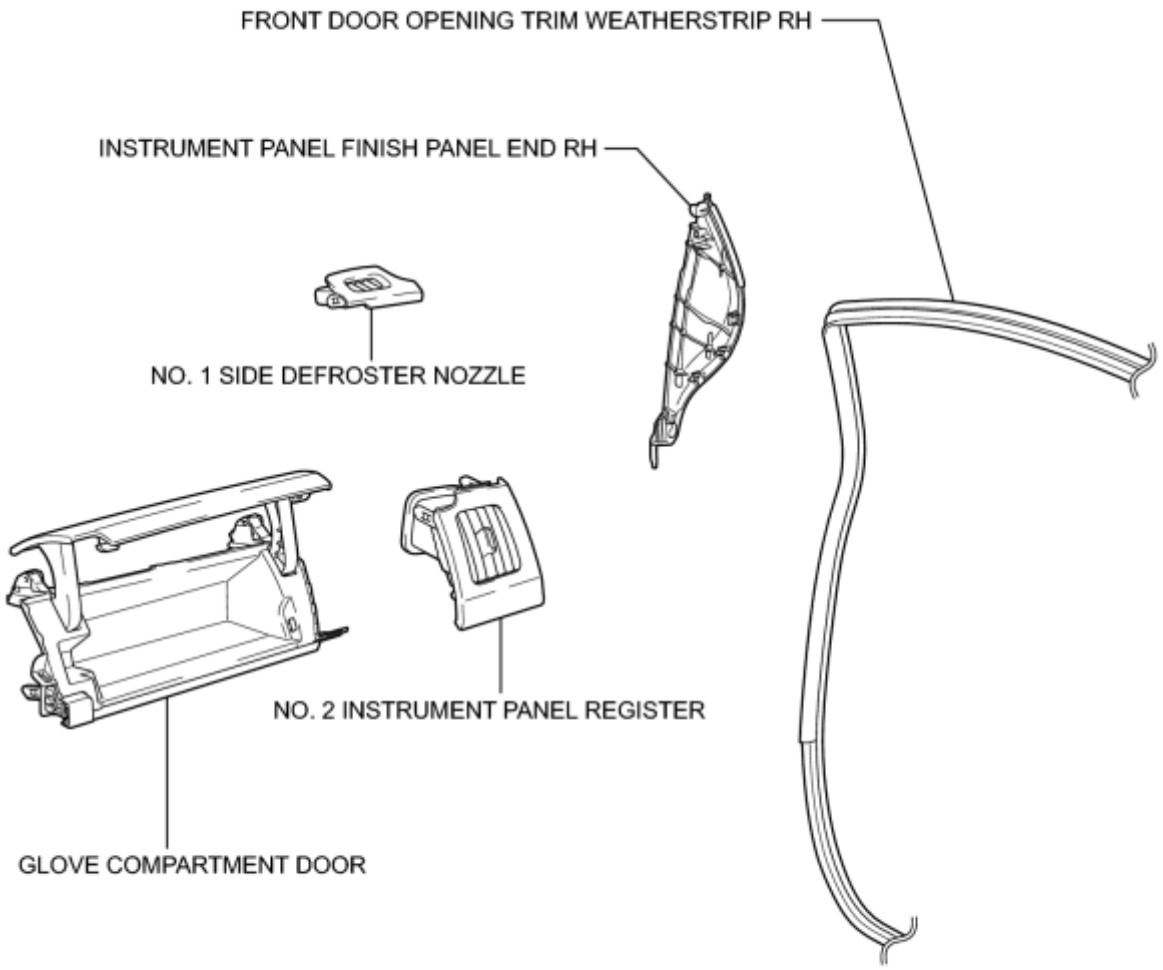

P

# ILLUSTRATION



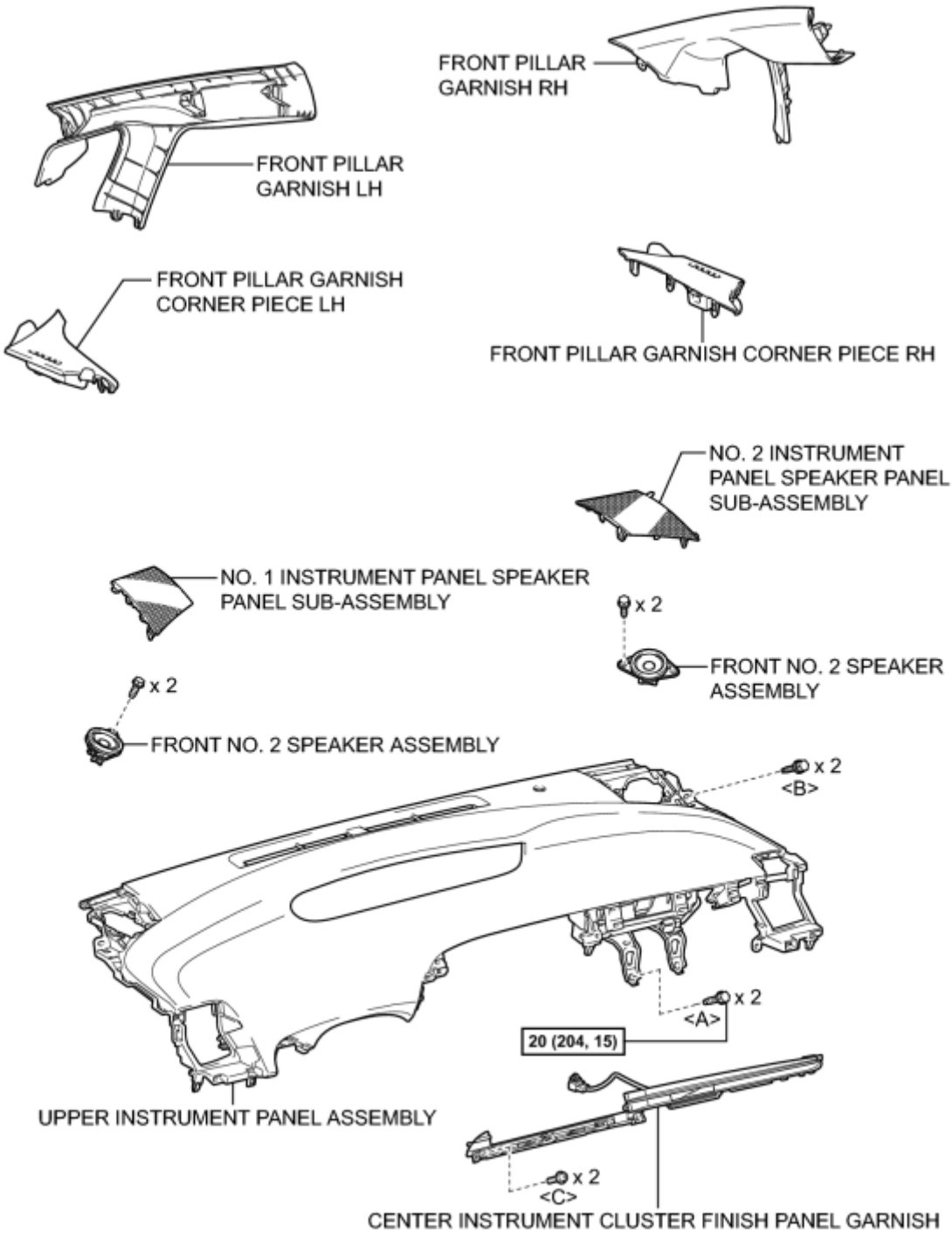

P

# ILLUSTRATION




P

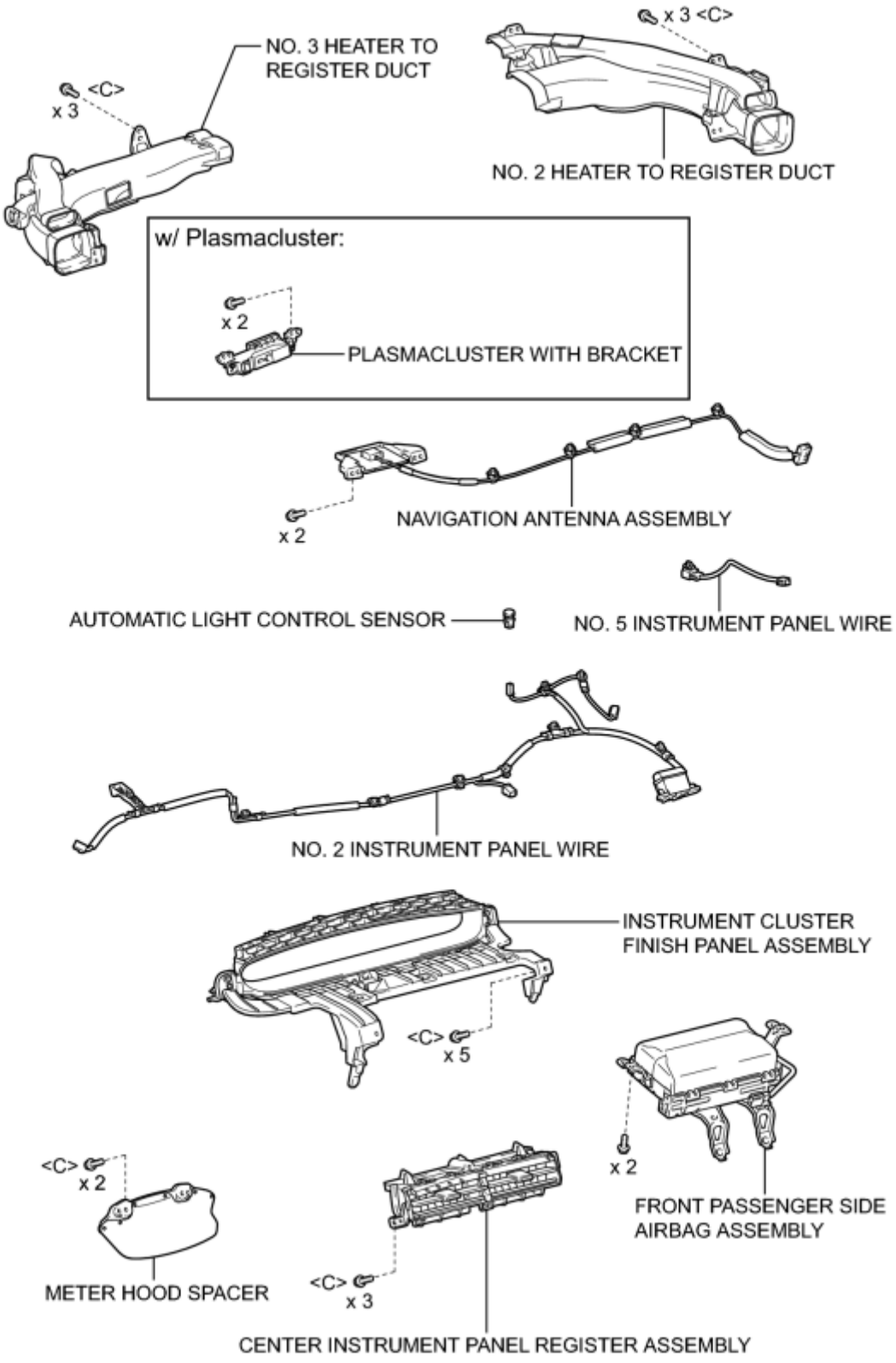
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

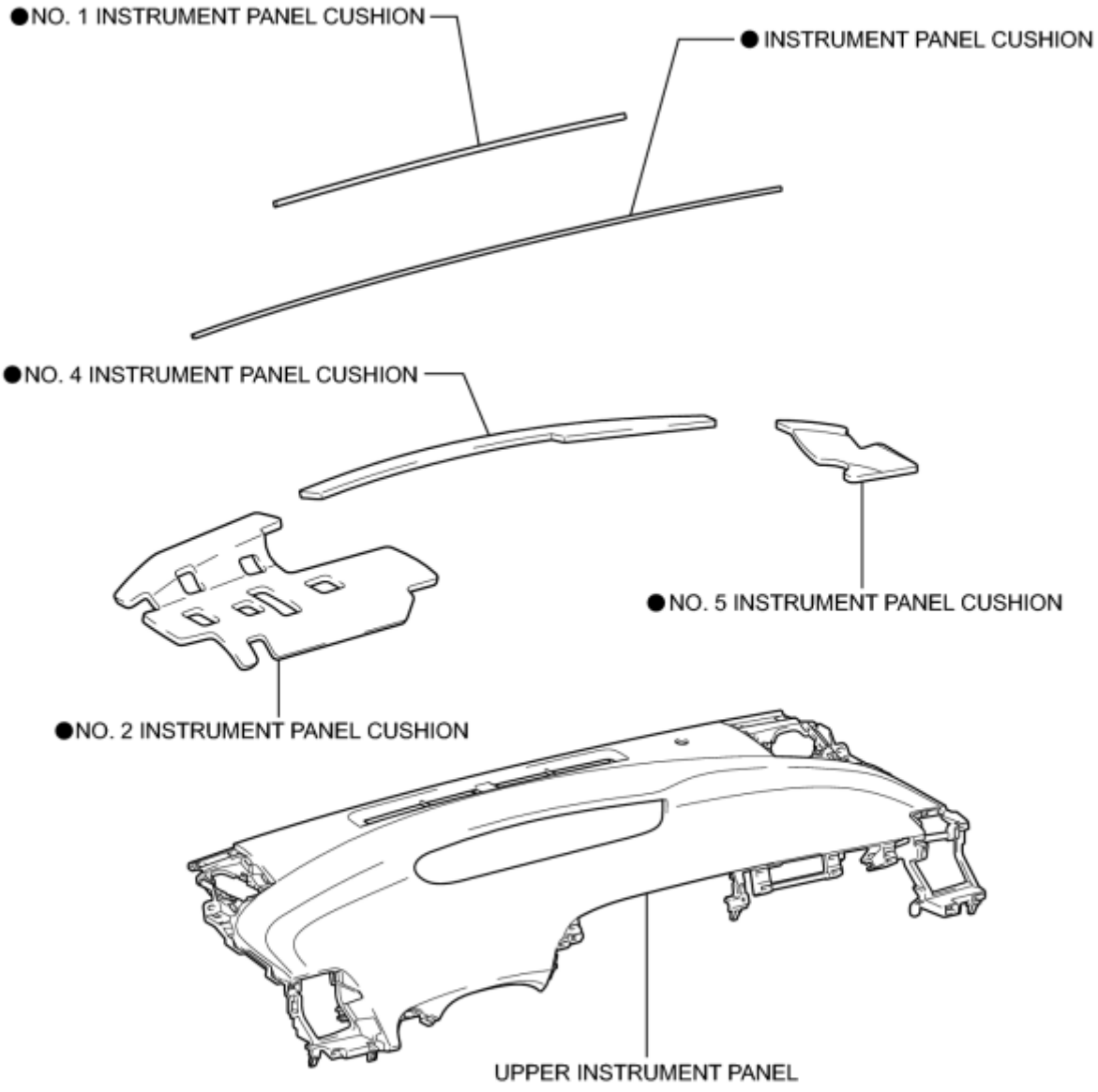
P

# ILLUSTRATION




P

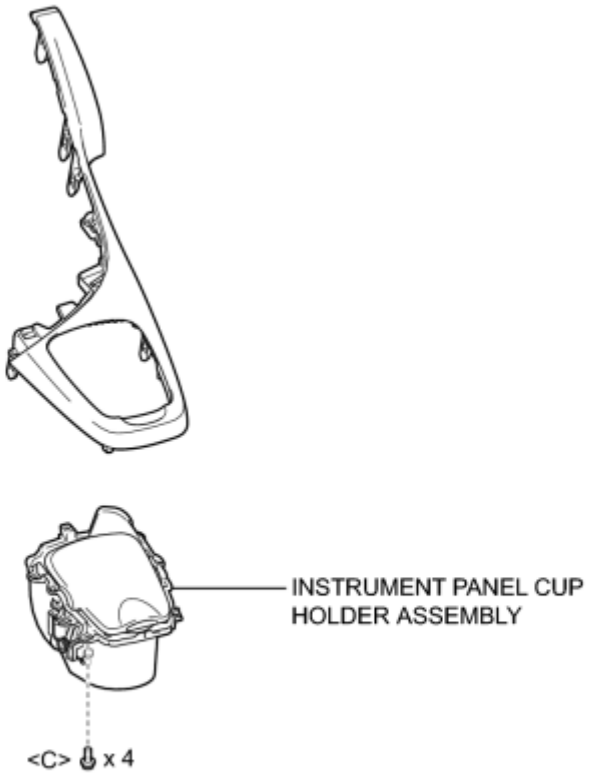
# ILLUSTRATION




● Non-reusable part

P

# ILLUSTRATION




P

# REMOVAL

1. PRECAUTION

INFO

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

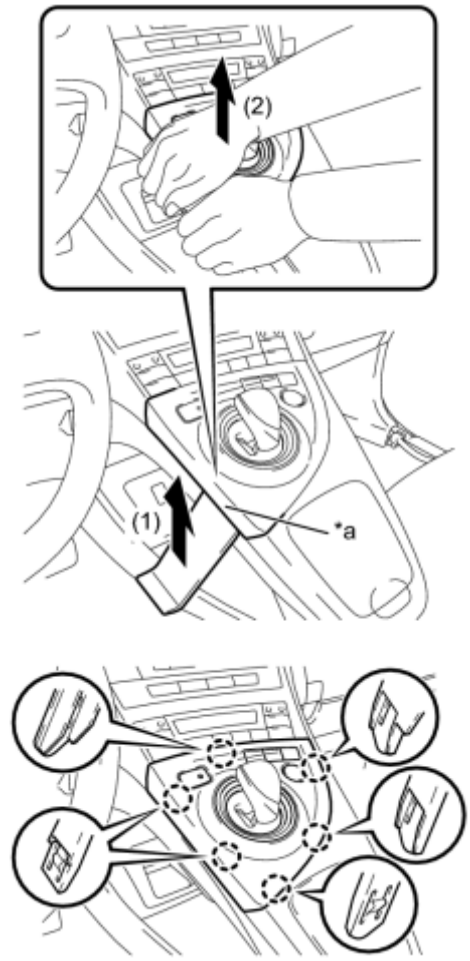
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY

(a) Using a moulding remover, slightly lift the panel at the position shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *a | Lift slightly |

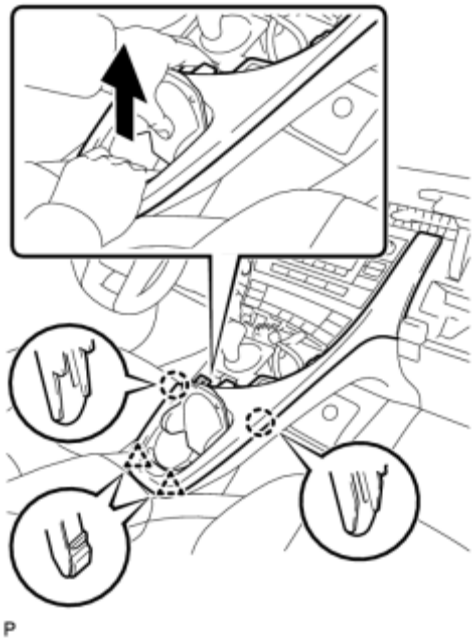



(b) Pull the integration control and panel assembly in the direction indicated by the arrow to disengage the 6 claws.

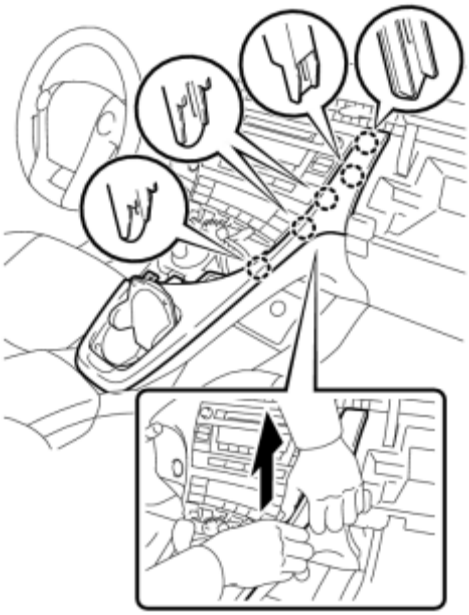
(c) Disconnect each connector and remove the integration control and panel assembly.

7. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

(a) Pull the lower center instrument cluster finish panel sub-assembly in the direction indicated by the arrow to disengage the 2 claws and 2 clips.



P

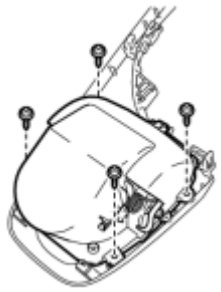


P

(b) Pull the lower center instrument cluster finish panel sub-assembly in the direction indicated by the arrow to disengage the 5 claws and remove the lower center instrument cluster finish panel sub-assembly.

8. REMOVE INSTRUMENT PANEL CUP HOLDER ASSEMBLY

(a) Remove the 4 screws <C> and instrument panel cup holder assembly from the lower center instrument cluster finish panel sub-assembly.

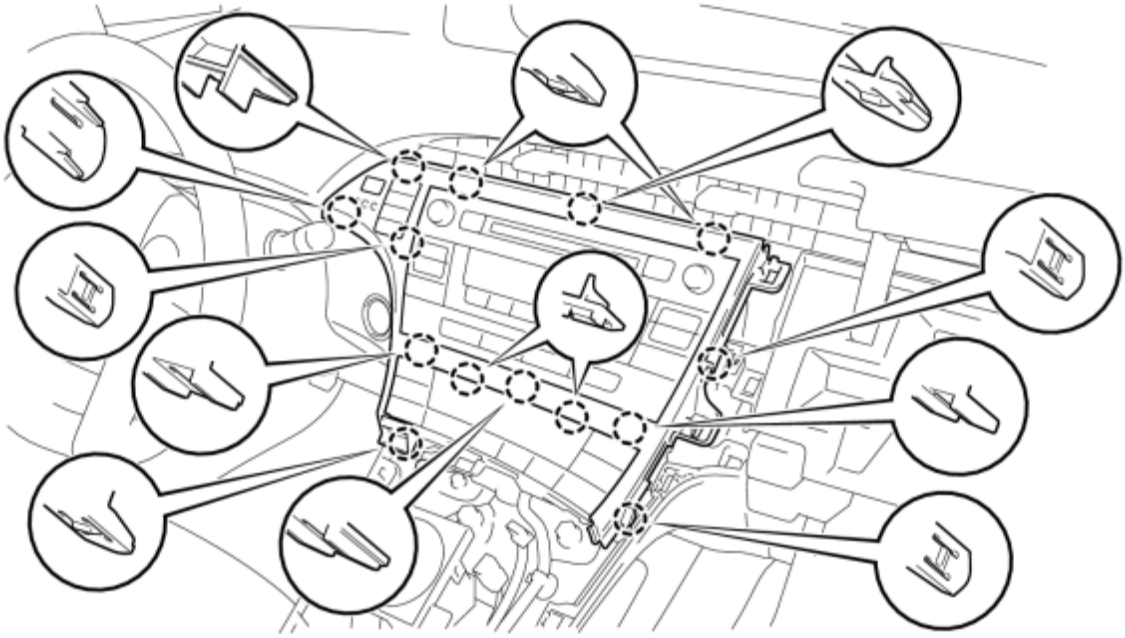


P

9. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH

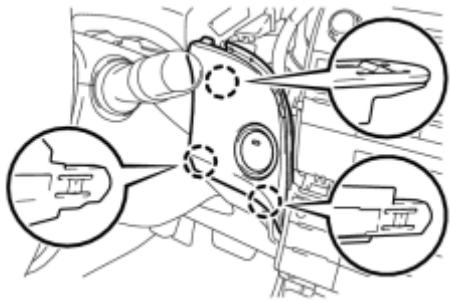
(a) Disengage the 14 claws.

(b) Disconnect the connector and remove the instrument cluster finish panel garnish.



P

10. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY



P

(a) Disengage the 3 claws.

(b) Disconnect the connector and remove the upper instrument panel finish panel sub-assembly.

11. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

12. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

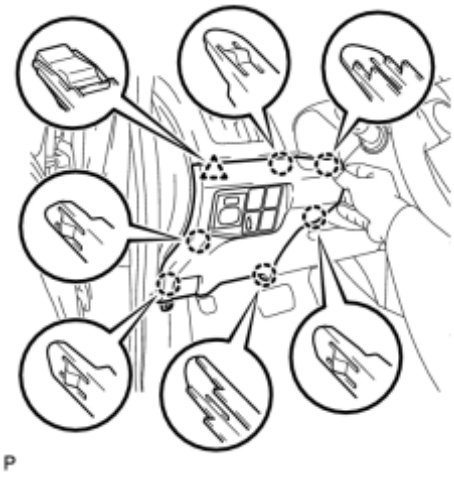
13. REMOVE FRONT DOOR SCUFF PLATE LH INFO

14. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

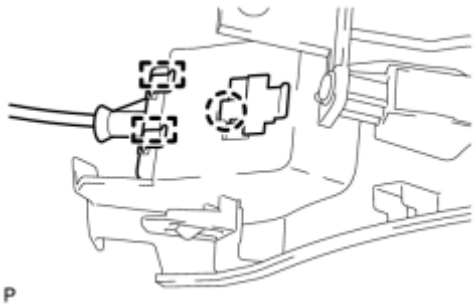
15. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY



(a) Remove the screw <C>.



(b) Disengage the 6 claws and clip as shown in the illustration.



(c) Disengage the claw and 2 guides and disconnect the hood lock control cable.

(d) Disconnect each connector and clamp, and remove the lower instrument panel finish panel assembly.

16. REMOVE NO. 1 INSTRUMENT PANEL REGISTER



(a) Pull the No. 1 instrument panel register in the direction indicated by the arrow to disengage the 2 claws.



(b) Pull the No. 1 instrument panel register in the direction indicated by the arrow to disengage the 2 claws and remove the No. 1 instrument panel register.

17. REMOVE NO. 1 CENTER INSTRUMENT CLUSTER FINISH PANEL

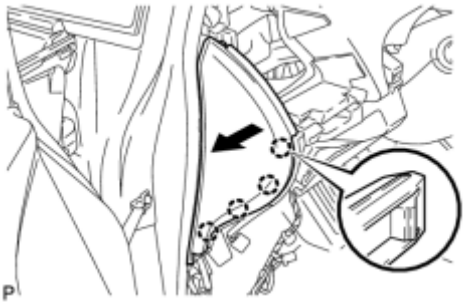


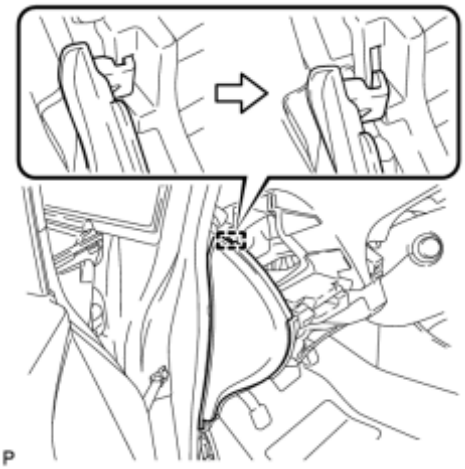
(a) Disengage the 4 claws to remove the No. 1 center instrument cluster finish panel.

18. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP LH

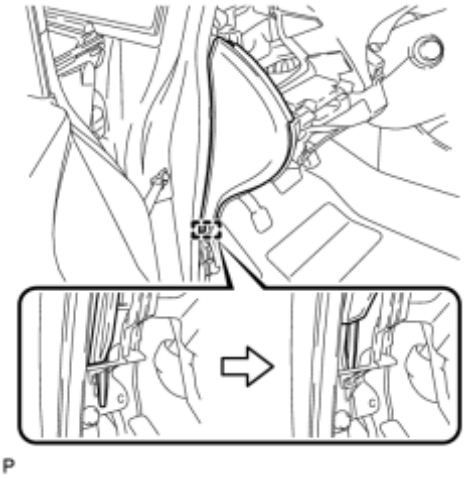
19. REMOVE INSTRUMENT PANEL FINISH PANEL END LH

(a) Pull the instrument panel finish panel end LH in the direction indicated by the arrow to disengage the 4 claws.





(b) Disengage the guide as shown in the illustration.



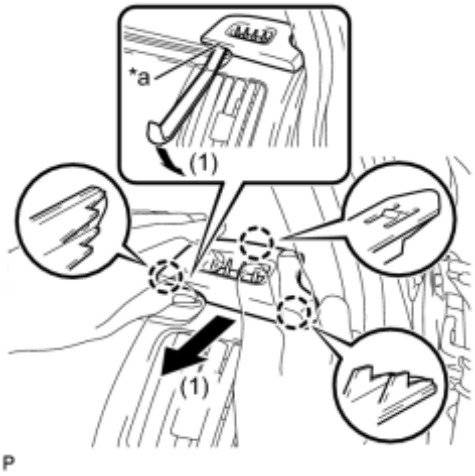
(c) Disengage the guide and remove the instrument panel finish panel end LH as shown in the illustration.

20. REMOVE NO. 1 SIDE DEFROSTER NOZZLE

(a) Using a moulding remover, slightly lift the panel at the position shown in the illustration.

# Text in Illustration

| | |
|---|---|
| *a | Lift slightly |




(b) Pull the No. 1 side defroster nozzle in the direction indicated by the arrow to disengage the 3 claws and remove the No. 1 side defroster nozzle.

21. REMOVE NO. 2 INSTRUMENT PANEL REGISTER




(a) Pull the No. 2 instrument panel register in the direction indicated by the arrow to disengage the claw and clip.

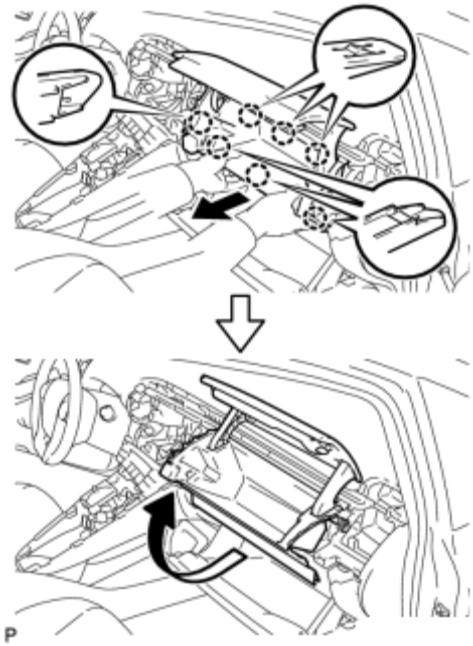



(b) Pull the No. 2 instrument panel register in the direction indicated by the arrow to disengage the 2 claws and remove the No. 2 instrument panel register.

22. REMOVE GLOVE COMPARTMENT DOOR

(a) Open the glove compartment door assembly.

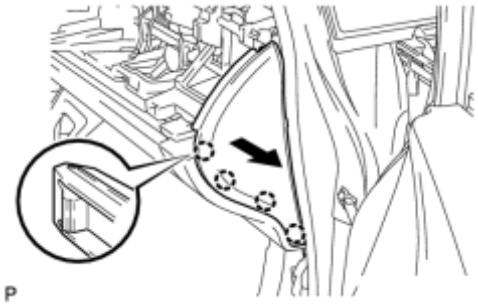
(b) Pull the glove compartment door in the direction indicated by the arrow to disengage the 7 claws.



(c) Pull the glove compartment door in the direction indicated by the arrow to remove the glove compartment door.

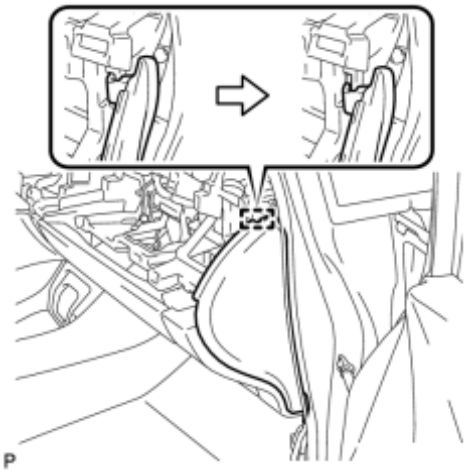
23. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP RH

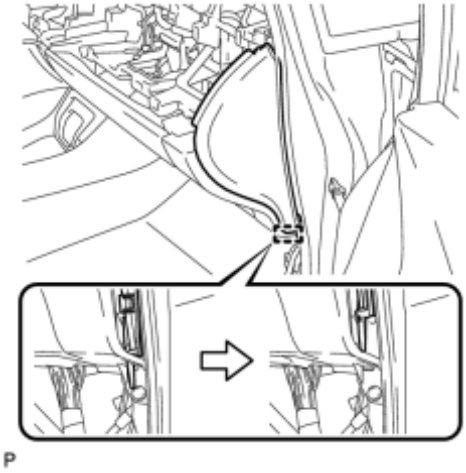
24. REMOVE INSTRUMENT PANEL FINISH PANEL END RH



(a) Pull the instrument panel finish panel end RH in the direction indicated by the arrow to disengage the 4 claws.

(b) Disengage the guide as shown in the illustration.

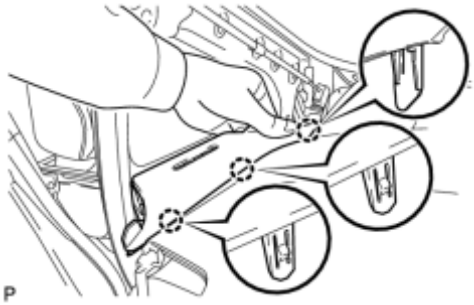



(c) Disengage the guide and remove the instrument panel finish panel end RH as shown in the illustration.

25. REMOVE FRONT PILLAR GARNISH LH INFO

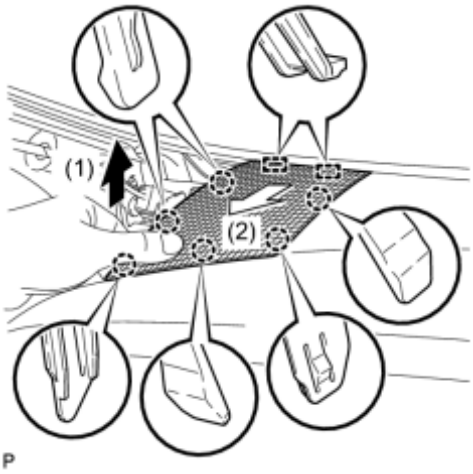
26. REMOVE FRONT PILLAR GARNISH CORNER PIECE LH




(a) Disengage the 3 claws and front pillar garnish corner piece LH as shown in the illustration.

27. REMOVE NO. 1 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY

(a) Pull the No. 1 instrument panel speaker panel sub-assembly in the direction indicated by the arrow to disengage the 6 claws and 2 guides, and remove the No. 1 instrument panel speaker panel sub-assembly.



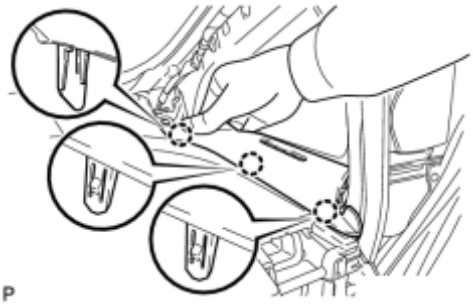

28. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY INFO

29. REMOVE FRONT PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and LH side INFO.

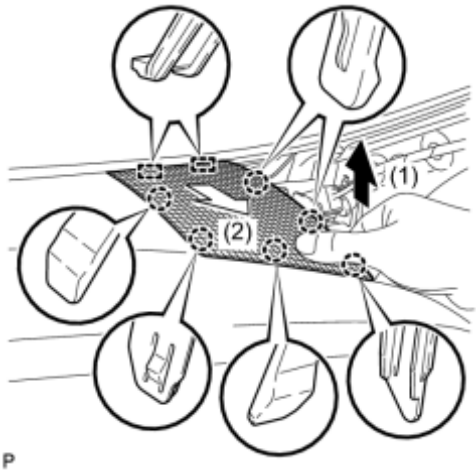
30. REMOVE FRONT PILLAR GARNISH CORNER PIECE RH




(a) Disengage the 3 claws and front pillar garnish corner piece RH as shown in the illustration.

31. REMOVE NO. 2 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY

(a) Pull the No. 2 instrument panel speaker panel sub-assembly in the direction indicated by the arrow to disengage the 6 claws and 2 guides, and remove the No. 2 instrument panel speaker panel sub-assembly.




P

32. REMOVE FRONT NO. 2 SPEAKER ASSEMBLY

HINT:

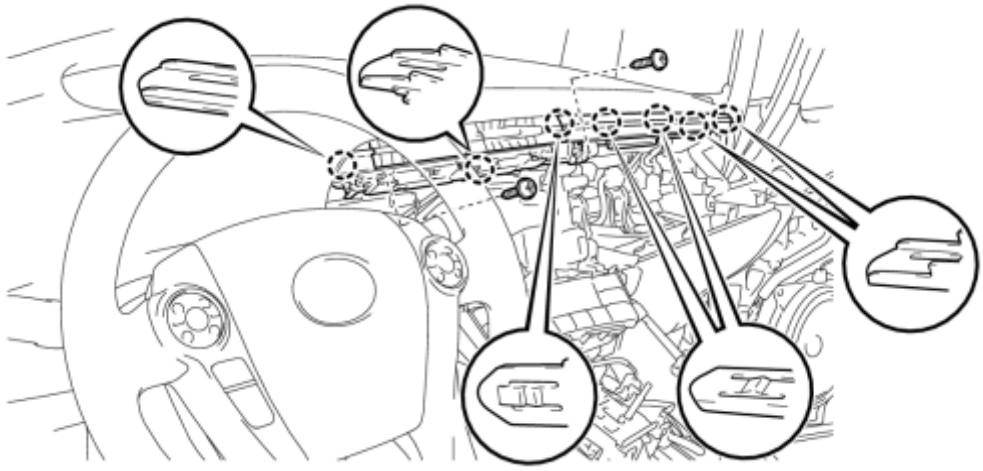
Use the same procedure for the RH side and LH side INFO.

33. REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Remove the 2 screws <C>.

(b) Disengage the 7 claws.

(c) Disconnect the connector and remove the center instrument cluster finish panel garnish.



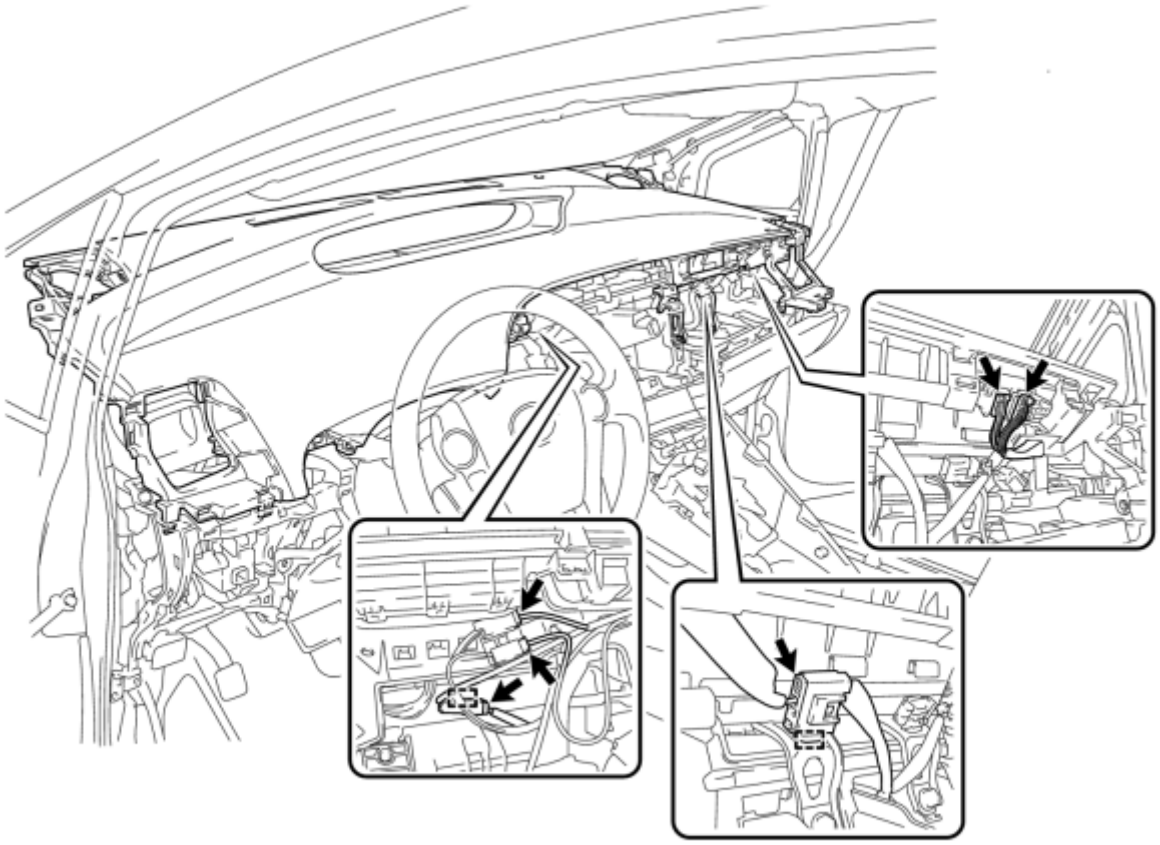
P

34. DISCONNECT NO. 3 INSTRUMENT PANEL WIRE INFO

35. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

(a) Disconnect each connector.

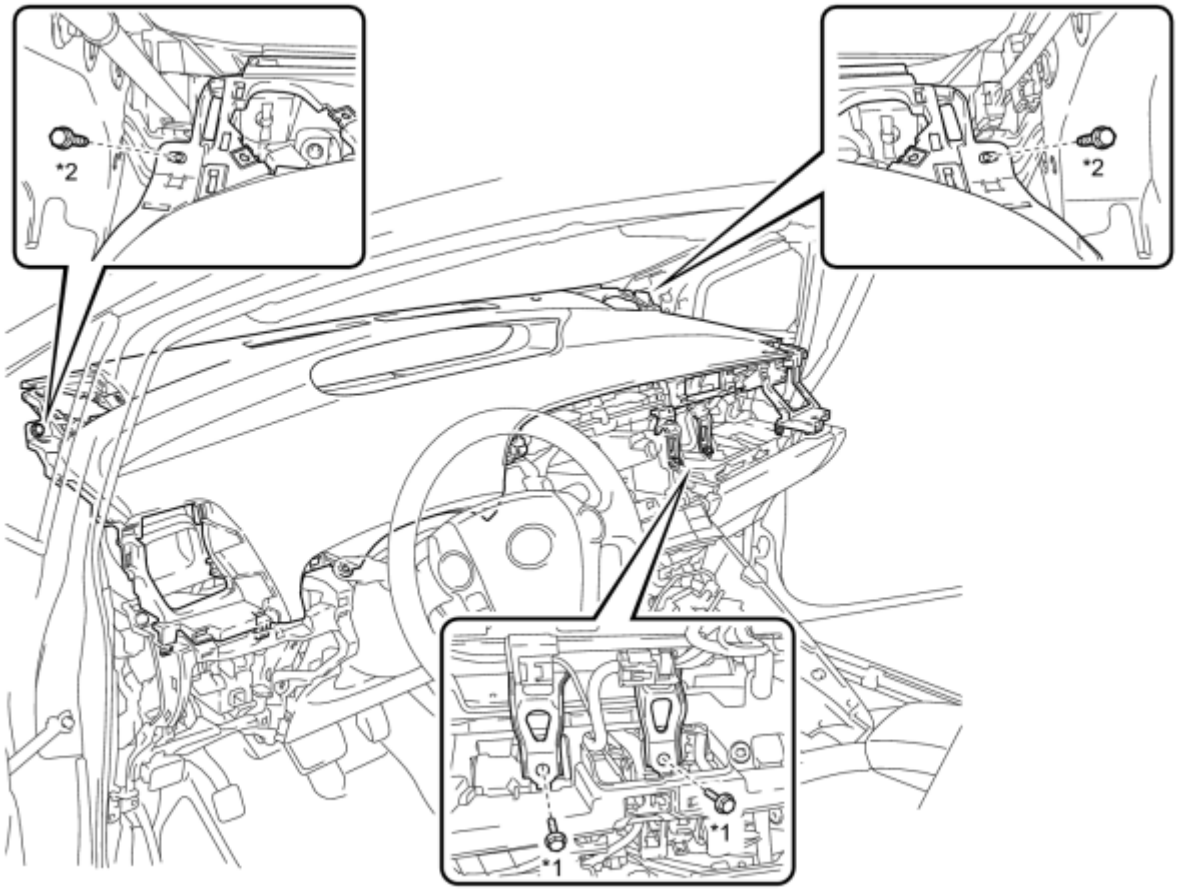
(b) Disengage the 2 clamps.



P

(c) Remove the 2 bolts <B>.

(d) Remove the 2 passenger airbag bolts <A>.



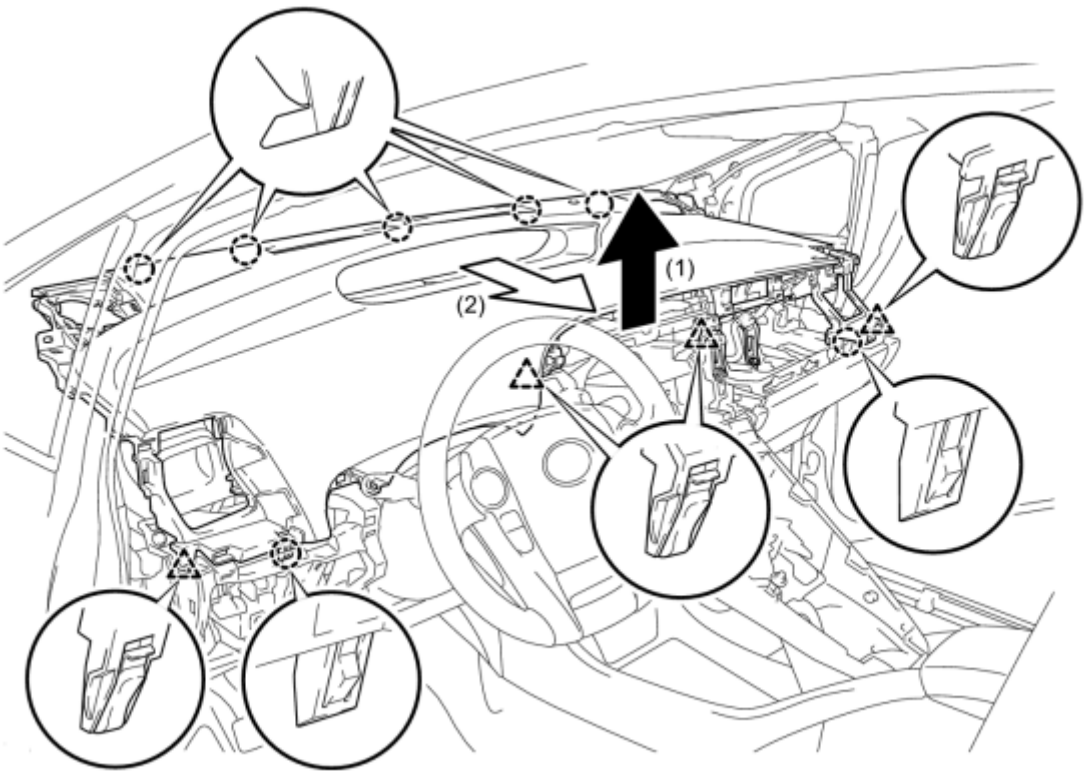

P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Passenger Airbag Bolt <A> | *2 | Bolt <B> |

(e) Pull the upper instrument panel assembly in the direction indicated by the arrow to disengage the 2 claws and 4 clips.

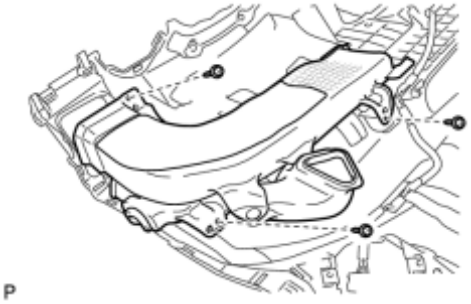
(f) Pull the upper instrument panel assembly in the direction indicated by the arrow to disengage the 5 claws and remove the upper instrument panel assembly.




P

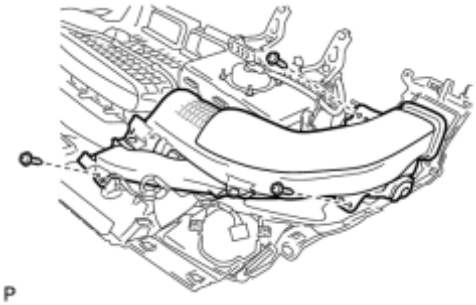
# DISASSEMBLY

1. REMOVE NO. 3 HEATER TO REGISTER DUCT



(a) Remove the 3 screws <C> and No. 3 heater to register duct.

2. REMOVE NO. 2 HEATER TO REGISTER DUCT



(a) Remove the 3 screws <C> and No. 2 heater to register duct.

3. REMOVE PLASMACLUSTER WITH BRACKET (w/ Plasmacluster) INFO

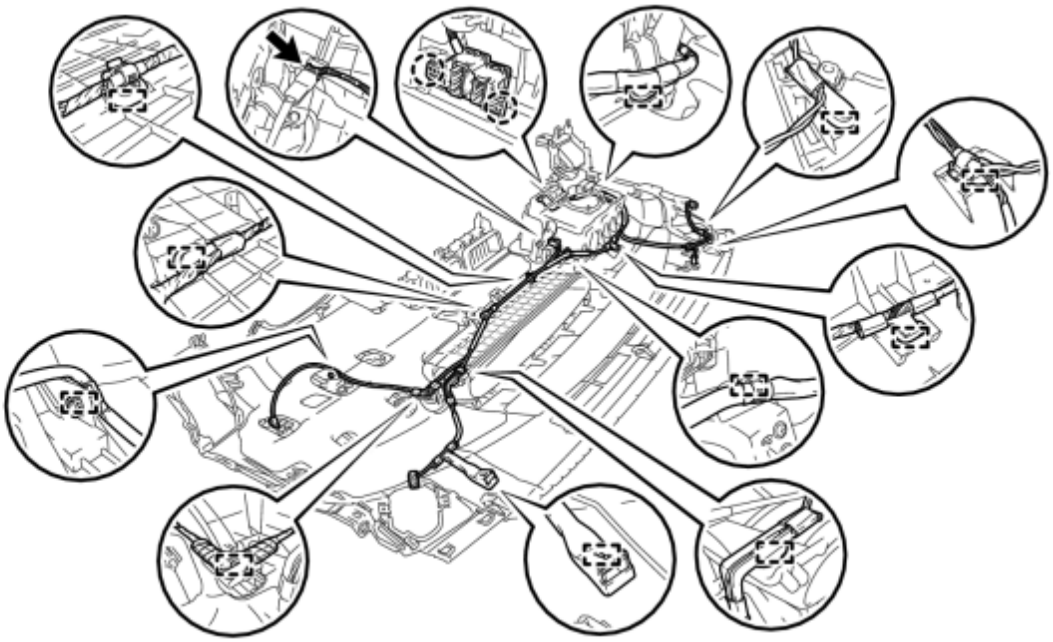
4. REMOVE NAVIGATION ANTENNA ASSEMBLY (w/ Navigation System) INFO

5. REMOVE AUTOMATIC LIGHT CONTROL SENSOR INFO

6. REMOVE NO. 2 INSTRUMENT PANEL WIRE

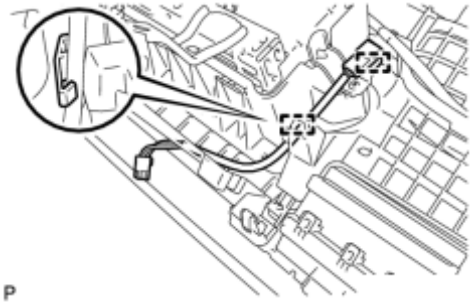
(a) Disconnect the connector.

(b) Disengage the 2 claws and each clamp, and remove the No. 2 instrument panel wire.



P

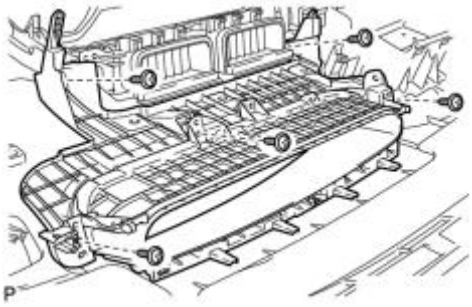
7. REMOVE NO. 5 INSTRUMENT PANEL WIRE



P

(a) Disengage the 2 clamps and remove the No. 5 instrument panel wire.

8. REMOVE INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY

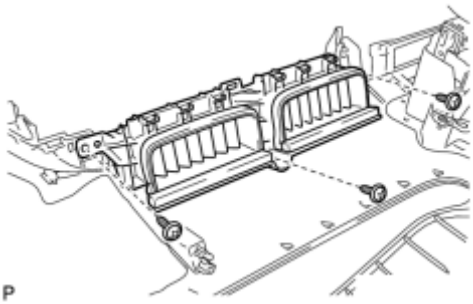


P

(a) Remove the 5 screws <C> and instrument cluster finish panel assembly.

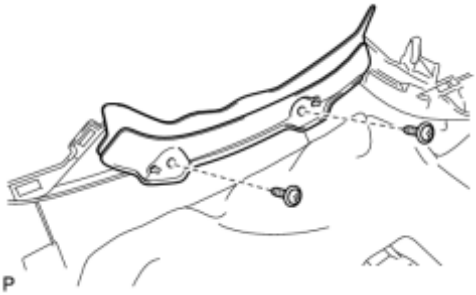
9. REMOVE CENTER INSTRUMENT PANEL REGISTER ASSEMBLY

(a) Remove the 3 screws <C> and center instrument panel register




assembly.

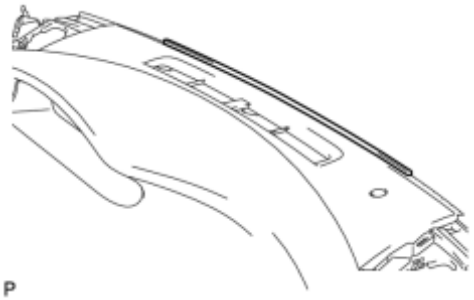
10. REMOVE METER HOOD SPACER




(a) Remove the 2 screws <C> and meter hood spacer.

11. REMOVE FRONT PASSENGER SIDE AIRBAG ASSEMBLY INFO

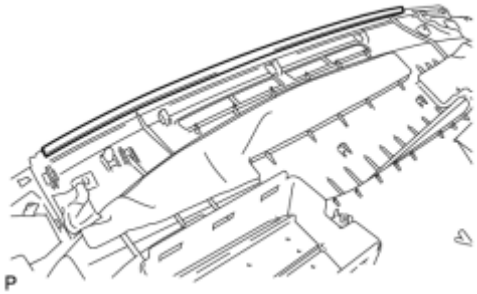
12. REMOVE NO. 1 INSTRUMENT PANEL CUSHION



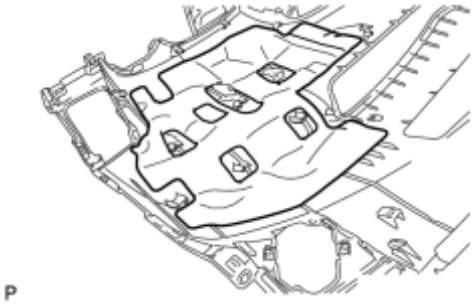

(a) Remove the No. 1 instrument panel cushion.

13. REMOVE INSTRUMENT PANEL CUSHION

(a) Remove the instrument panel cushion.

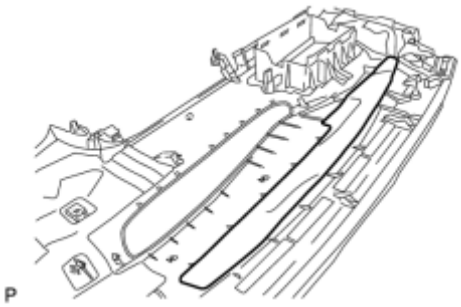



14. REMOVE NO. 2 INSTRUMENT PANEL CUSHION



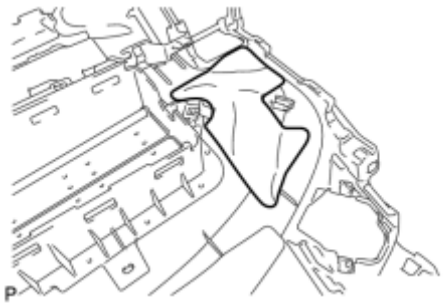

(a) Remove the No. 2 instrument panel cushion.

15. REMOVE NO. 4 INSTRUMENT PANEL CUSHION




(a) Remove the No. 4 instrument panel cushion.

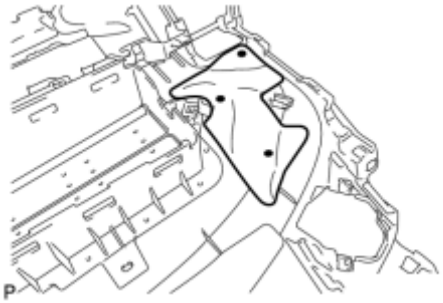
16. REMOVE NO. 5 INSTRUMENT PANEL CUSHION




(a) Remove the No. 5 instrument panel cushion.

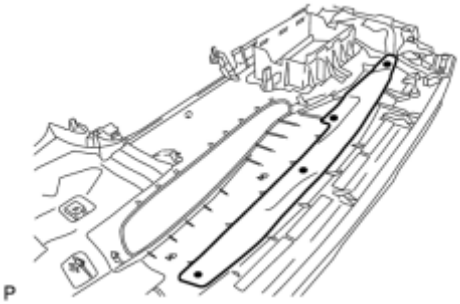
# REASSEMBLY

1. INSTALL NO. 5 INSTRUMENT PANEL CUSHION



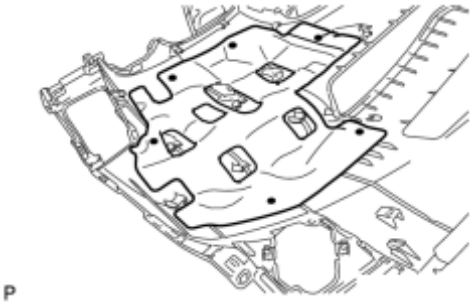
(a) Using hot-melt glue and install a new No. 5 instrument panel cushion as shown in the illustration.

2. INSTALL NO. 4 INSTRUMENT PANEL CUSHION



(a) Using hot-melt glue and install a new No. 4 instrument panel cushion as shown in the illustration.

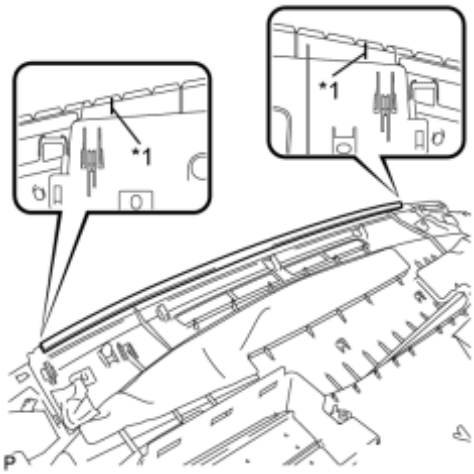
3. INSTALL NO. 2 INSTRUMENT PANEL CUSHION



(a) Using hot-melt glue and install a new No. 2 instrument panel cushion as shown in the illustration.

4. INSTALL INSTRUMENT PANEL CUSHION

(a) Align the marking lines on the upper instrument panel with the ends of the instrument panel cushion and install a new instrument panel cushion

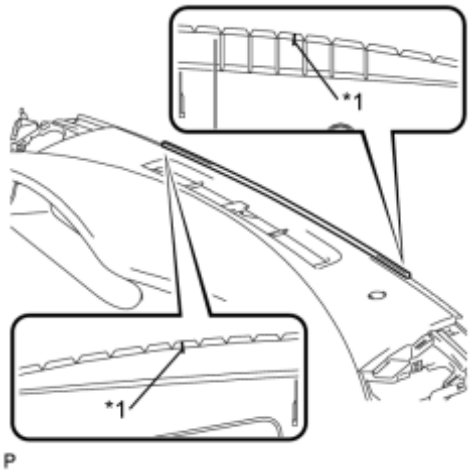



as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Marking Line |

5. INSTALL NO. 1 INSTRUMENT PANEL CUSHION



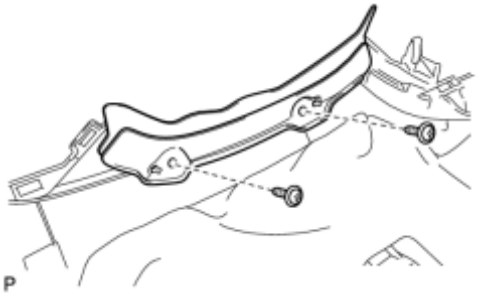

(a) Align the marking lines on the upper instrument panel with the ends of the No. 1 instrument panel cushion and install a new No. 1 instrument panel cushion as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | Marking Line |

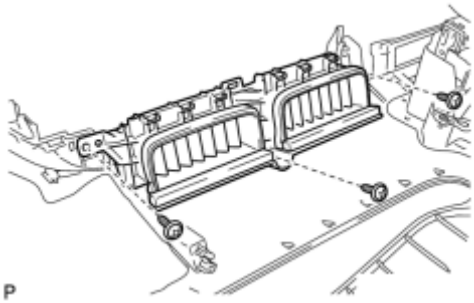
6. INSTALL FRONT PASSENGER SIDE AIRBAG ASSEMBLY INFO

7. INSTALL METER HOOD SPACER



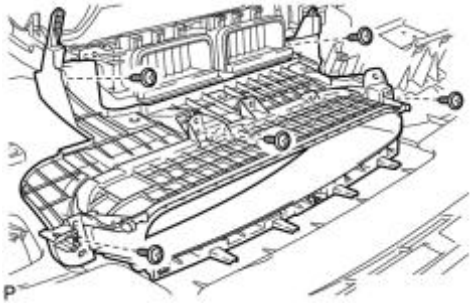
(a) Install the meter hood spacer with the 2 screws <C>.

8. INSTALL CENTER INSTRUMENT PANEL REGISTER ASSEMBLY



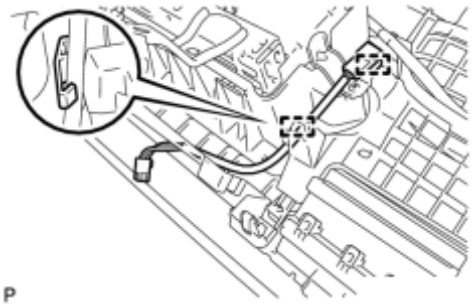
(a) Install the center instrument panel register assembly with the 3 screws <C>.

9. INSTALL INSTRUMENT CLUSTER FINISH PANEL ASSEMBLY



(a) Install the instrument cluster finish panel assembly with the 5 screws <C>.

10. INSTALL NO. 5 INSTRUMENT PANEL WIRE

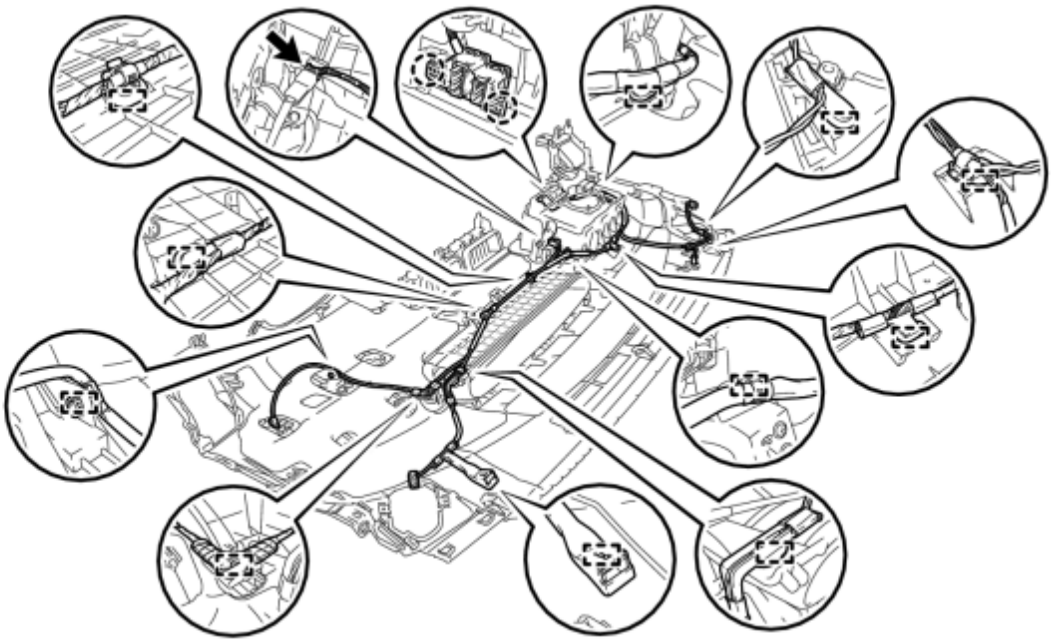


(a) Engage the 2 clamps to install the No. 5 instrument panel wire.

11. INSTALL NO. 2 INSTRUMENT PANEL WIRE

(a) Engage each clamp and 2 claws.

(b) Connect the connector to install the No. 2 instrument panel wire.



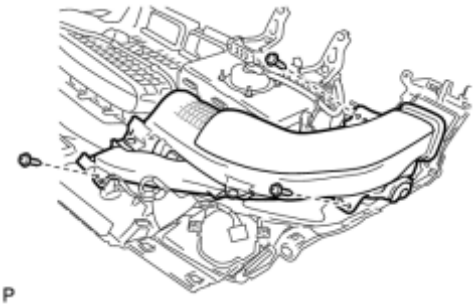
P

12. INSTALL AUTOMATIC LIGHT CONTROL SENSOR INFO

13. INSTALL NAVIGATION ANTENNA ASSEMBLY (w/ Navigation System) INFO

14. INSTALL PLASMACLUSTER WITH BRACKET (w/ Plasmacluster) INFO

15. INSTALL NO. 2 HEATER TO REGISTER DUCT



P

(a) Install the No. 2 heater to register duct with the 3 screws <C>.

16. INSTALL NO. 3 HEATER TO REGISTER DUCT

(a) Install the No. 3 heater to register duct with the 3 screws <C>.



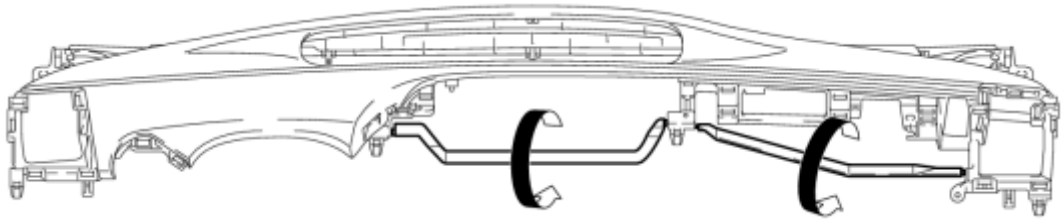
P

# INSTALLATION

1. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

(a) When using a new upper instrument panel sub-assembly:

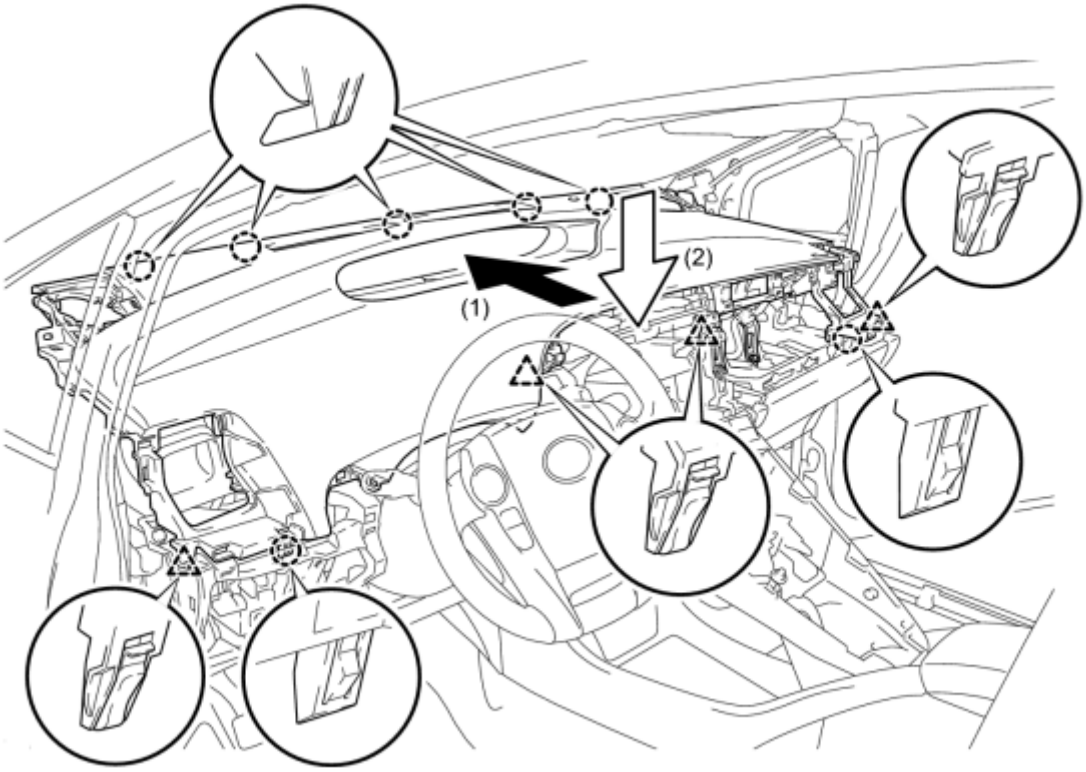
(1) Immediately before installing the upper instrument panel assembly, twist and cut off the portions shown in the illustration.



P

(b) Engage the 5 claws as shown in the illustration.

(c) Engage the 2 claws and 4 clips, and install the upper instrument panel assembly as shown in the illustration.

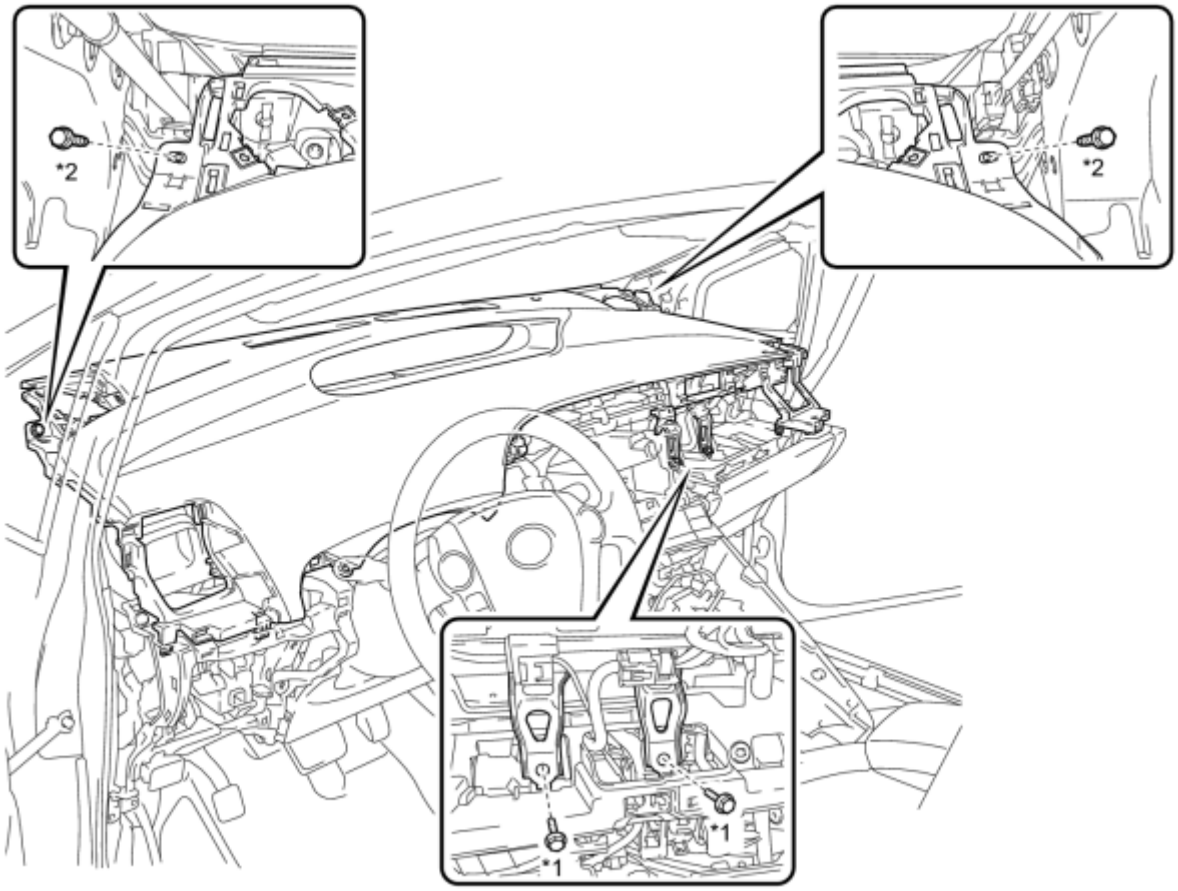



P

(d) Install the 2 bolts <B>.

(e) Install the 2 passenger airbag bolts <A>.

Torque: **20 N·m (204 kgf·cm, 15ft·lbf)**



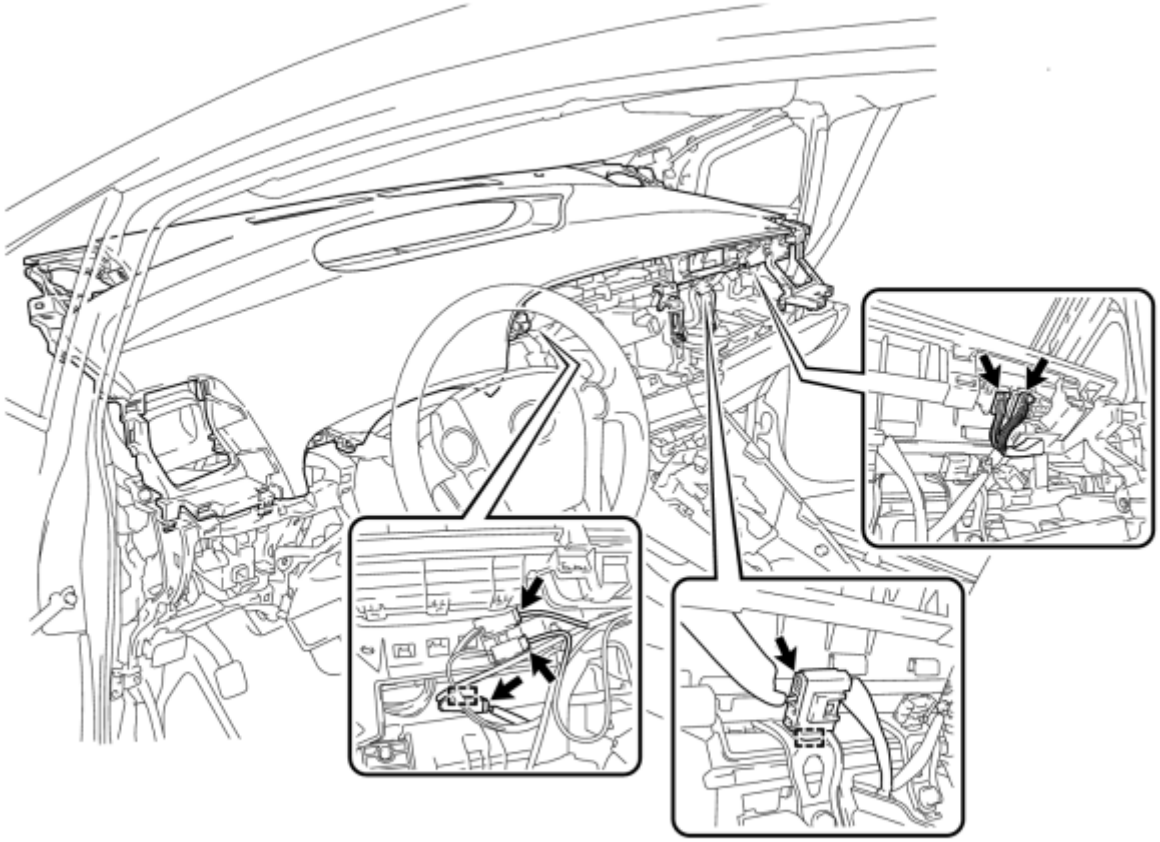

P

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Passenger Airbag Bolt <A> | *2 | Bolt <B> |

(f) Engage the 2 clamps.

(g) Connect each connector.



P

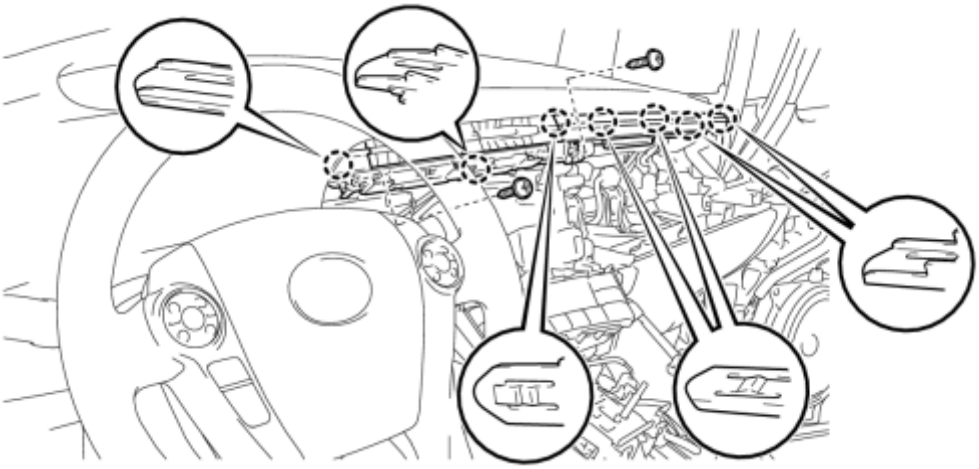
2. CONNECT NO. 3 INSTRUMENT PANEL WIRE INFO

3. INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH

(a) Connect the connector.

(b) Engage the 7 claws.

(c) Install the center instrument cluster finish panel garnish with the 2 screws <C>.



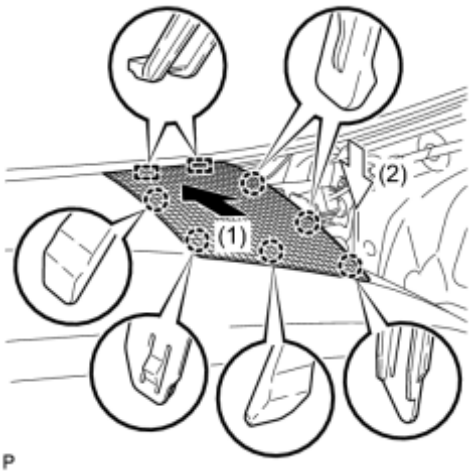
P

4. INSTALL FRONT NO. 2 SPEAKER ASSEMBLY

HINT:

Use the same procedure for the RH side and LH side INFO.

5. INSTALL NO. 2 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY

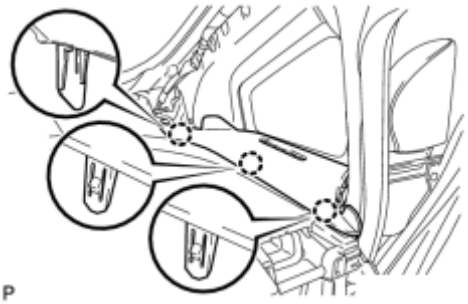



P

(a) Engage the 2 guides and 6 claws to install the No. 2 instrument panel speaker panel sub-assembly as shown in the illustration.

6. INSTALL FRONT PILLAR GARNISH CORNER PIECE RH

(a) Engage the 3 claws to install the front pillar garnish corner piece RH.



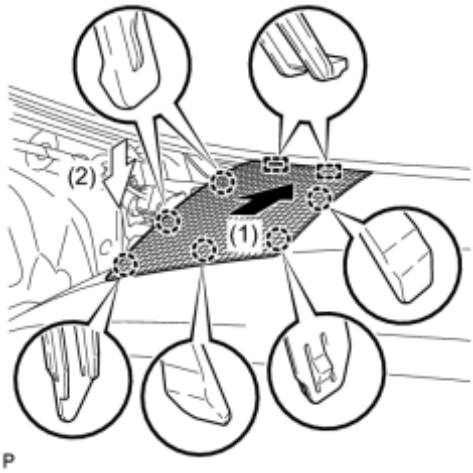
7. INSTALL FRONT PILLAR GARNISH RH

HINT:

Use the same procedure for the RH side and LH side INFO.

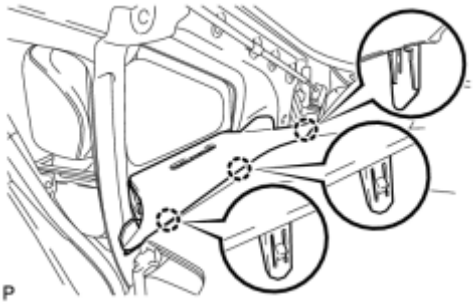
8. INSTALL FRONT NO. 2 SPEAKER ASSEMBLY INFO

9. INSTALL NO. 1 INSTRUMENT PANEL SPEAKER PANEL SUB-ASSEMBLY




(a) Engage the 2 guides and 6 claws to install the No. 1 instrument panel speaker panel sub-assembly as shown in the illustration.

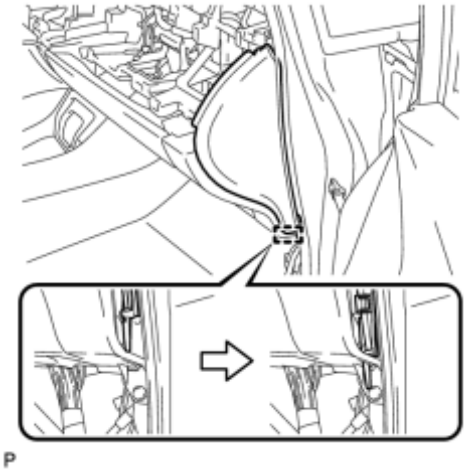
10. INSTALL FRONT PILLAR GARNISH CORNER PIECE LH



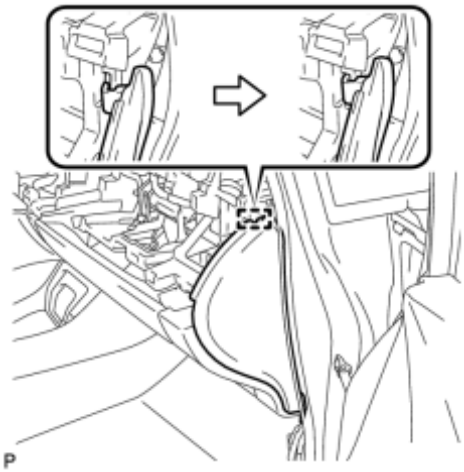
(a) Engage the 3 claws to install the front pillar garnish corner piece LH.

11. INSTALL FRONT PILLAR GARNISH LH INFO

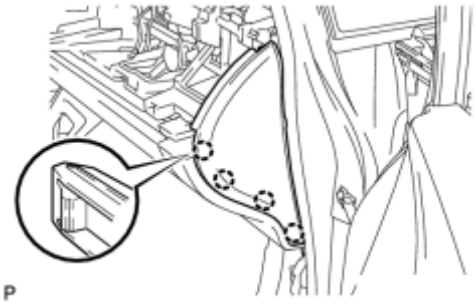
12. INSTALL INSTRUMENT PANEL FINISH PANEL END RH




(a) Engage the guide as shown in the illustration.




(b) Engage the guide as shown in the illustration.



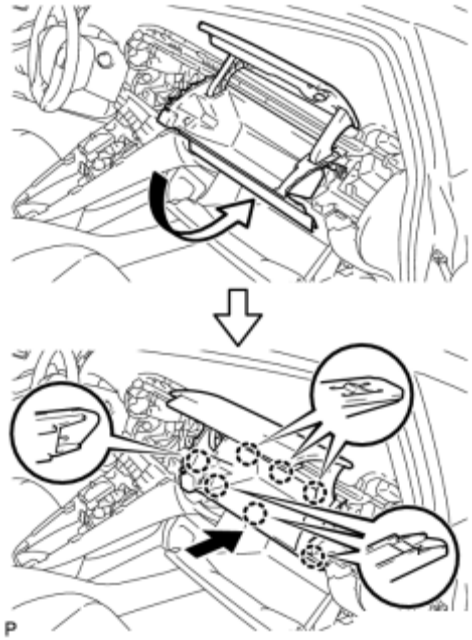

(c) Engage the 4 claws to install the instrument panel finish panel end RH.

13. CONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP RH INFO

14. INSTALL GLOVE COMPARTMENT DOOR

(a) Open the glove compartment door assembly.

(b) Insert the glove compartment door as shown in the illustration.



(c) Engage the 7 claws to install the glove compartment door.

15. INSTALL NO. 2 INSTRUMENT PANEL REGISTER



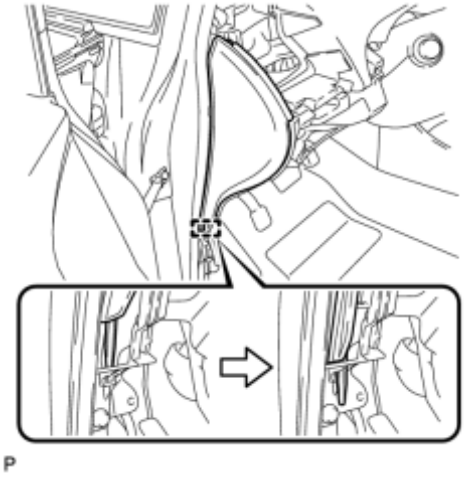
(a) Engage the 3 claws and clip to install the No. 2 instrument panel register.

16. INSTALL NO. 1 SIDE DEFROSTER NOZZLE

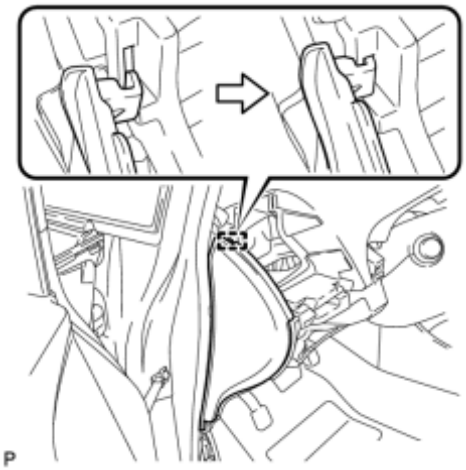


(a) Engage the 3 claws to install the No. 1 side defroster nozzle.

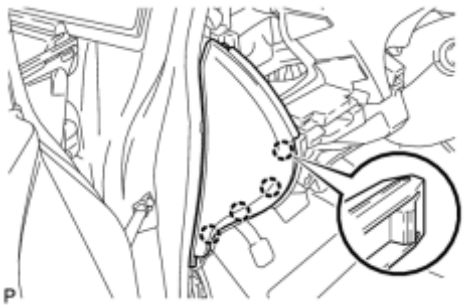
17. INSTALL INSTRUMENT PANEL FINISH PANEL END LH



(a) Engage the guide as shown in the illustration.



(b) Engage the guide as shown in the illustration.



(c) Engage the 4 claws to install the instrument panel finish panel end LH.

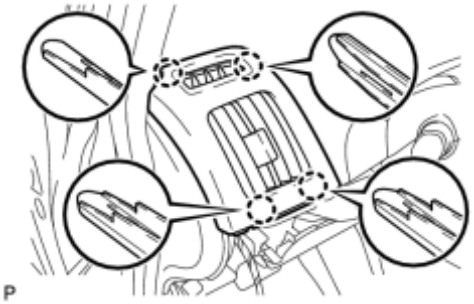
18. CONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP LH INFO

19. INSTALL NO. 1 CENTER INSTRUMENT CLUSTER FINISH PANEL

(a) Engage the 4 claws to install the No. 1 center instrument cluster finish panel.



20. INSTALL NO. 1 INSTRUMENT PANEL REGISTER

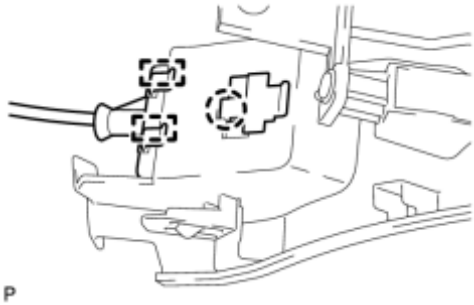


(a) Engage the 4 claws to install the No. 1 instrument panel register.

21. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY

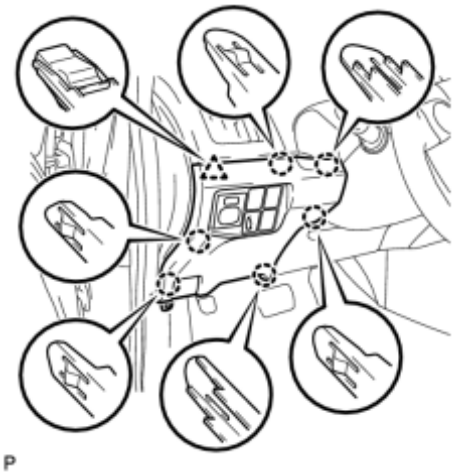
(a) Connect each connector.

(b) Engage the clamp.



(c) Engage the 2 guides and claw to connect the hood lock control cable.

(d) Engage the 6 claws and clip.





(e) Install the lower instrument panel finish panel assembly with the screw <C>.

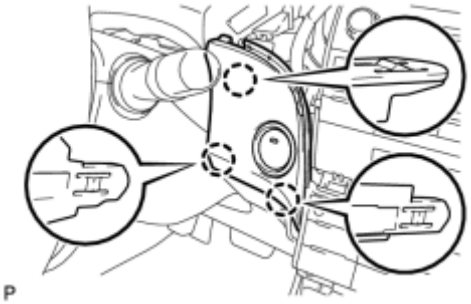
22. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

23. INSTALL FRONT DOOR SCUFF PLATE LH INFO

24. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

25. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

26. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY



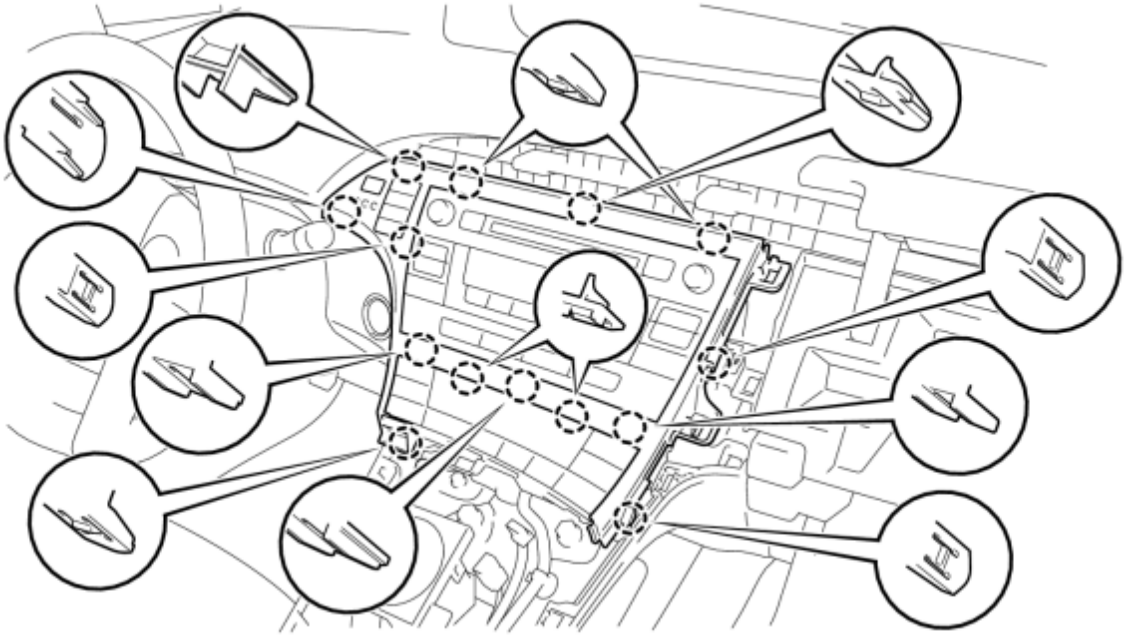
(a) Connect the connector.

(b) Engage the 3 claws to install the upper instrument panel finish panel sub-assembly.

27. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH

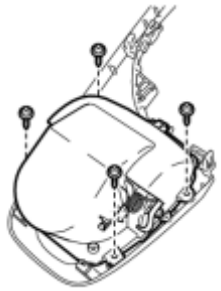
(a) Connect the connector.

(b) Engage the 14 claws to install the instrument cluster finish panel garnish.



P

28. INSTALL INSTRUMENT PANEL CUP HOLDER ASSEMBLY

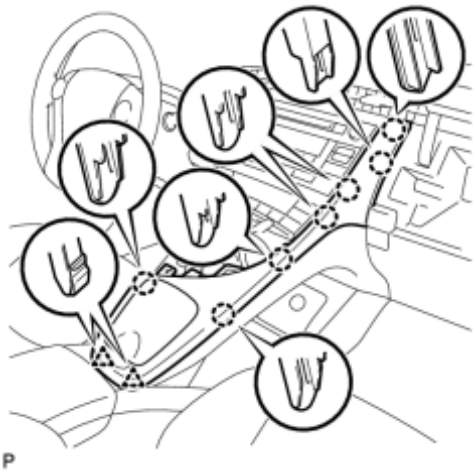


P

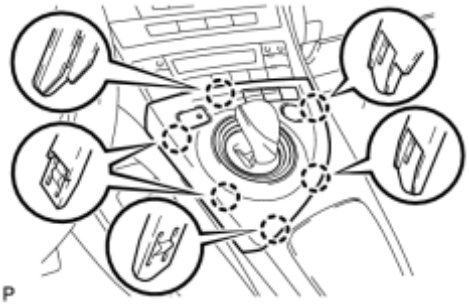
(a) Install the instrument panel cup holder with the 4 screws <C> to the lower center instrument cluster finish panel sub-assembly.

29. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY

(a) Engage the 7 claws and 2 clips to install the lower center instrument cluster finish panel sub-assembly.



30. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY



(a) Connect each connector.

(b) Engage the 6 claws to install the integration control and panel assembly.

31. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

32. INSTALL REAR NO. 3 FLOOR BOARD INFO

33. INSTALL REAR DECK FLOOR BOX INFO

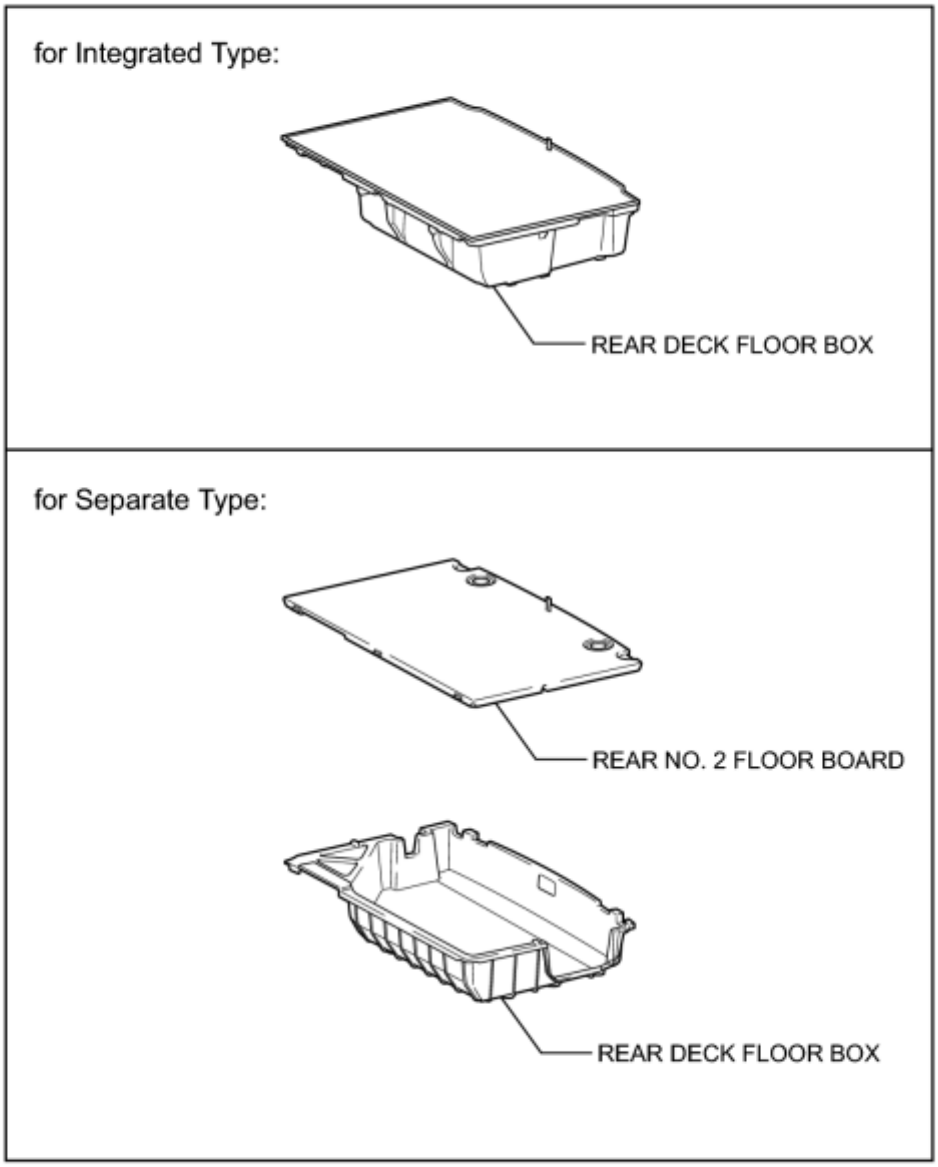
34. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

35. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

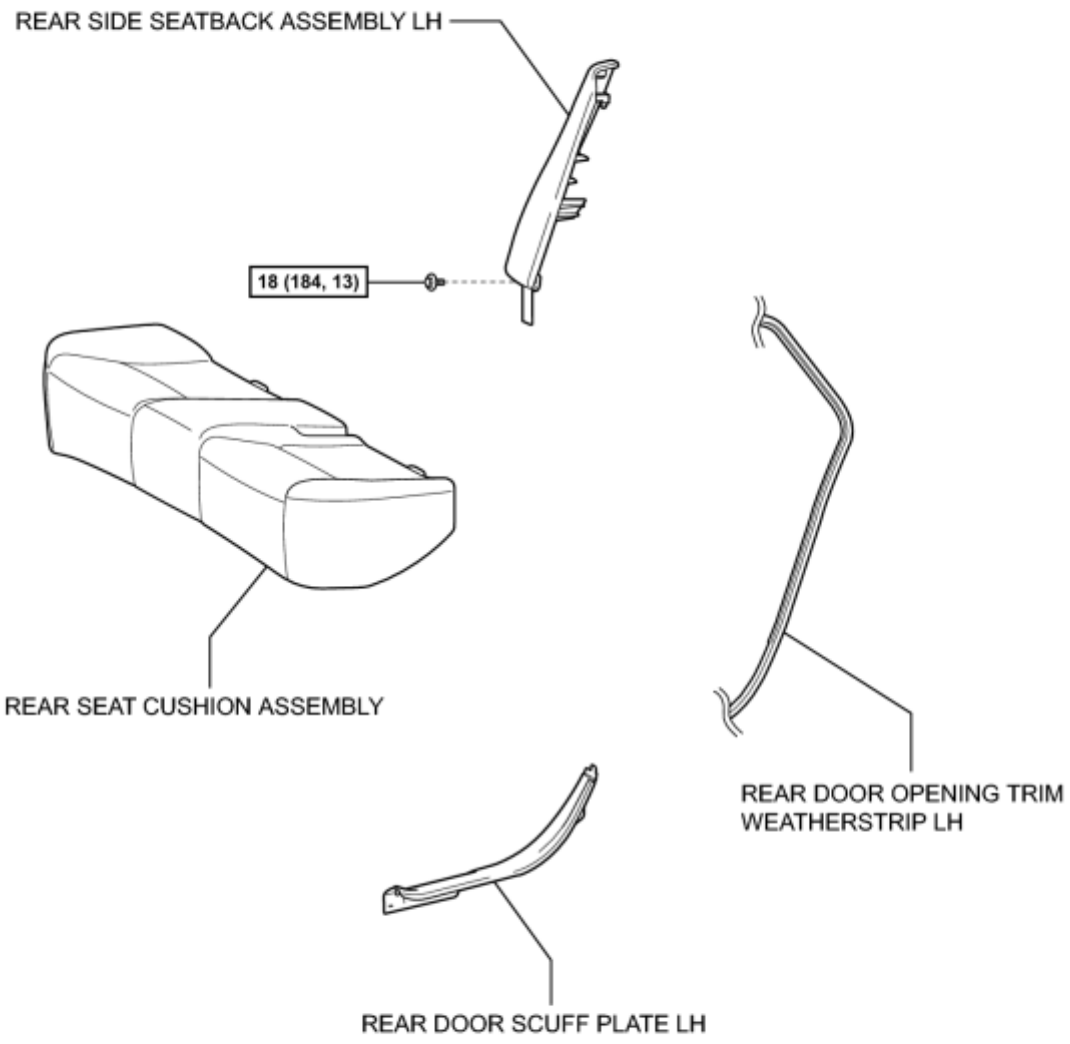
# COMPONENTS

# ILLUSTRATION




P

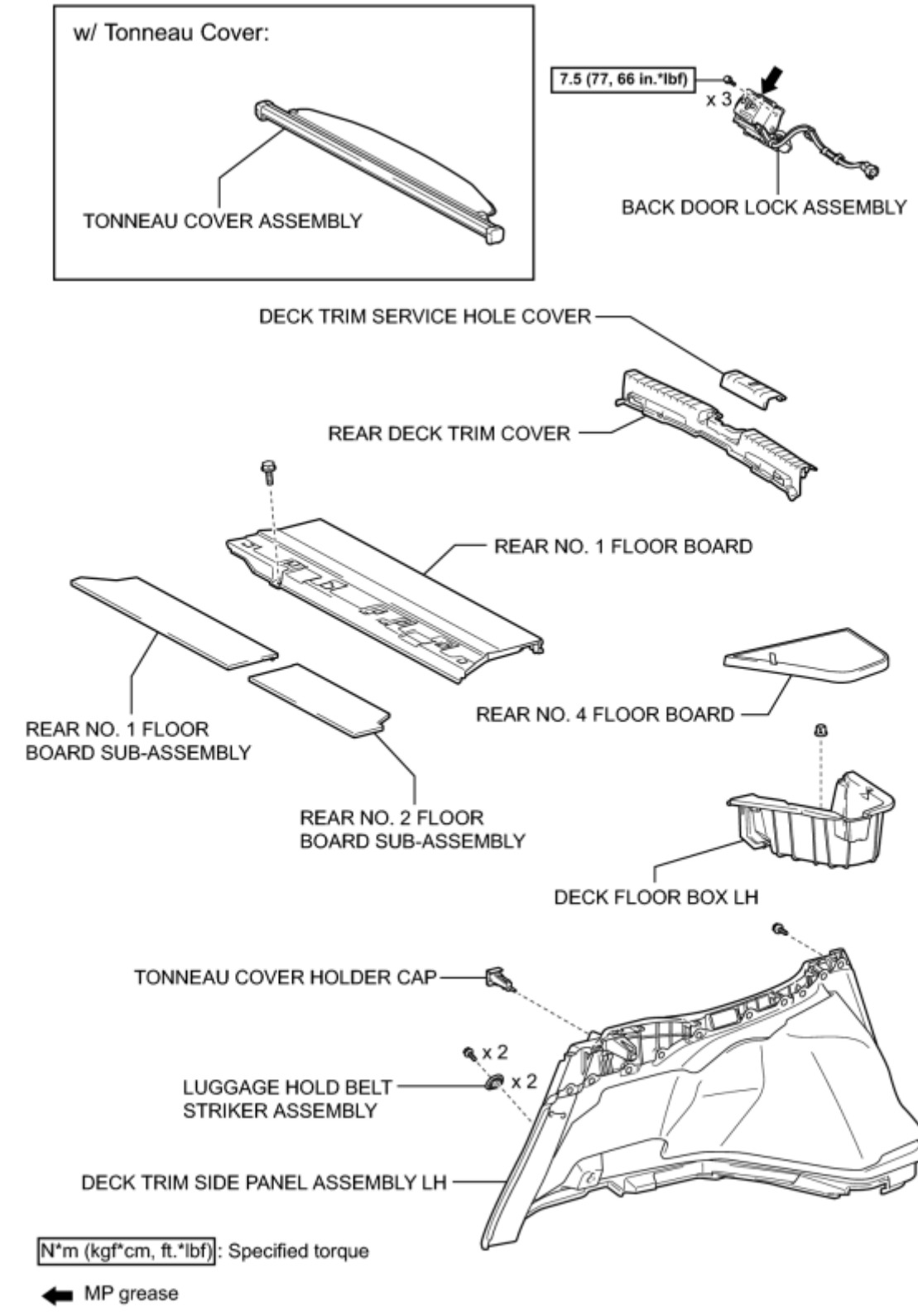
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION


w/ Tonneau Cover:
TONNEAU COVER ASSEMBLY
7.5 (77, 66 in.*lbf)
x 3
BACK DOOR LOCK ASSEMBLY
DECK TRIM SERVICE HOLE COVER
REAR DECK TRIM COVER
REAR NO. 1 FLOOR BOARD
REAR NO. 1 FLOOR
BOARD SUB-ASSEMBLY
REAR NO. 4 FLOOR BOARD
REAR NO. 2 FLOOR
BOARD SUB-ASSEMBLY
DECK FLOOR BOX LH
TONNEAU COVER HOLDER CAP
x 2
LUGGAGE HOLD BELT
STRIKER ASSEMBLY
x 2
DECK TRIM SIDE PANEL ASSEMBLY LH
N*m (kgf*cm, ft.*lbf): Specified torque
MP grease

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR DOOR SCUFF PLATE LH INFO

4. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP LH

5. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

6. REMOVE REAR SIDE SEATBACK ASSEMBLY LH INFO

7. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

8. REMOVE REAR NO. 4 FLOOR BOARD INFO

9. REMOVE DECK FLOOR BOX LH INFO

10. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

11. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

12. REMOVE REAR NO. 1 FLOOR BOARD INFO

13. REMOVE DECK TRIM SERVICE HOLE COVER INFO

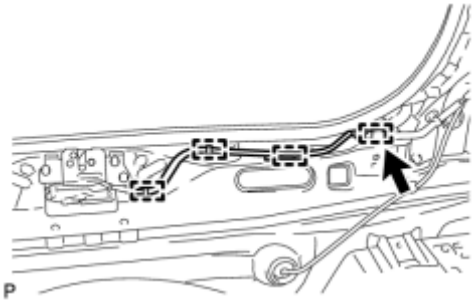
14. REMOVE REAR DECK TRIM COVER INFO

15. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

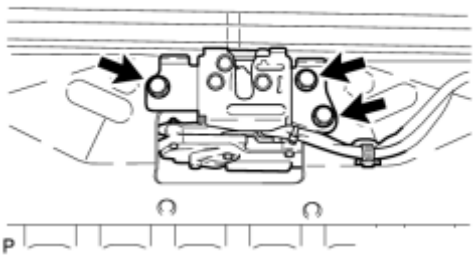
16. REMOVE TONNEAU COVER HOLDER CAP INFO

17. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH INFO

18. REMOVE BACK DOOR LOCK ASSEMBLY



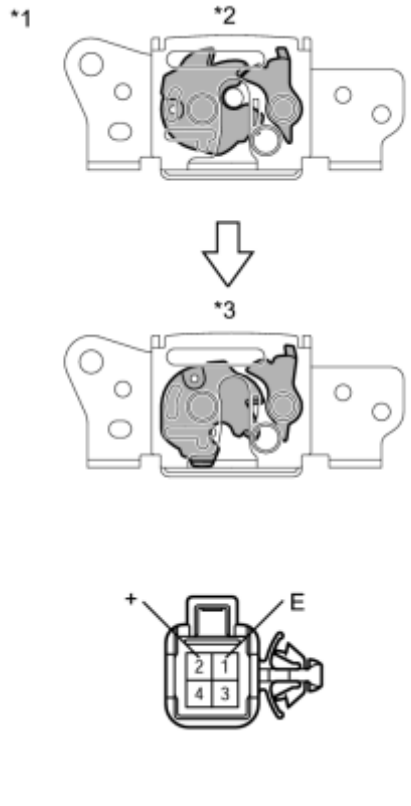

(a) Disconnect the connector and disengage the 4 clamps.



(b) Remove the 3 bolts and back door lock assembly.

# INSPECTION

1. INSPECT BACK DOOR COURTESY SWITCH (BACK DOOR LOCK ASSEMBLY)




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (E) - 2 (+) | Locked | 10 kΩ or higher |
| | Unlocked | Below 1 Ω |

## Text in Illustration

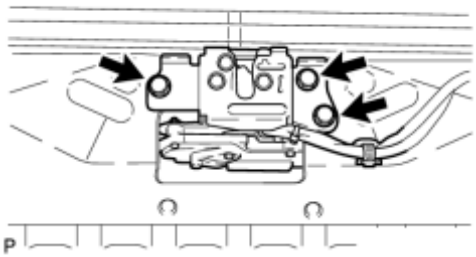
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Back Door Lock Assembly) |
| *2 | Lock |
| *3 | Unlock |

If the result is not specified, replace the back door lock assembly.

# INSTALLATION

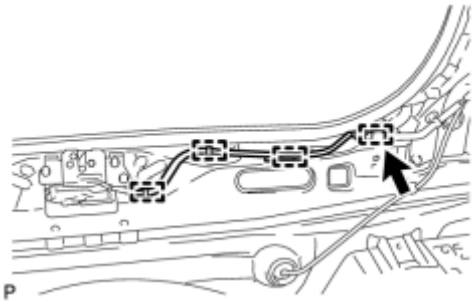
1. INSTALL BACK DOOR LOCK ASSEMBLY

(a) Apply MP grease to the sliding parts of the back door lock assembly.



(b) Install the back door lock assembly with the 3 bolts.

Torque: **7.5 N·m (77 kgf·cm, 66in·lbf)**



(c) Engage the 4 clamps and connect the connector.

2. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH INFO

3. INSTALL TONNEAU COVER HOLDER CAP INFO

4. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY INFO

5. INSTALL REAR DECK TRIM COVER INFO

6. INSTALL DECK TRIM SERVICE HOLE COVER INFO

7. INSTALL REAR NO. 1 FLOOR BOARD INFO

8. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

9. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

10. INSTALL DECK FLOOR BOX LH INFO

11. INSTALL REAR NO. 4 FLOOR BOARD INFO

12. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

13. INSTALL REAR SIDE SEATBACK ASSEMBLY LH INFO

14. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

15. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP LH INFO

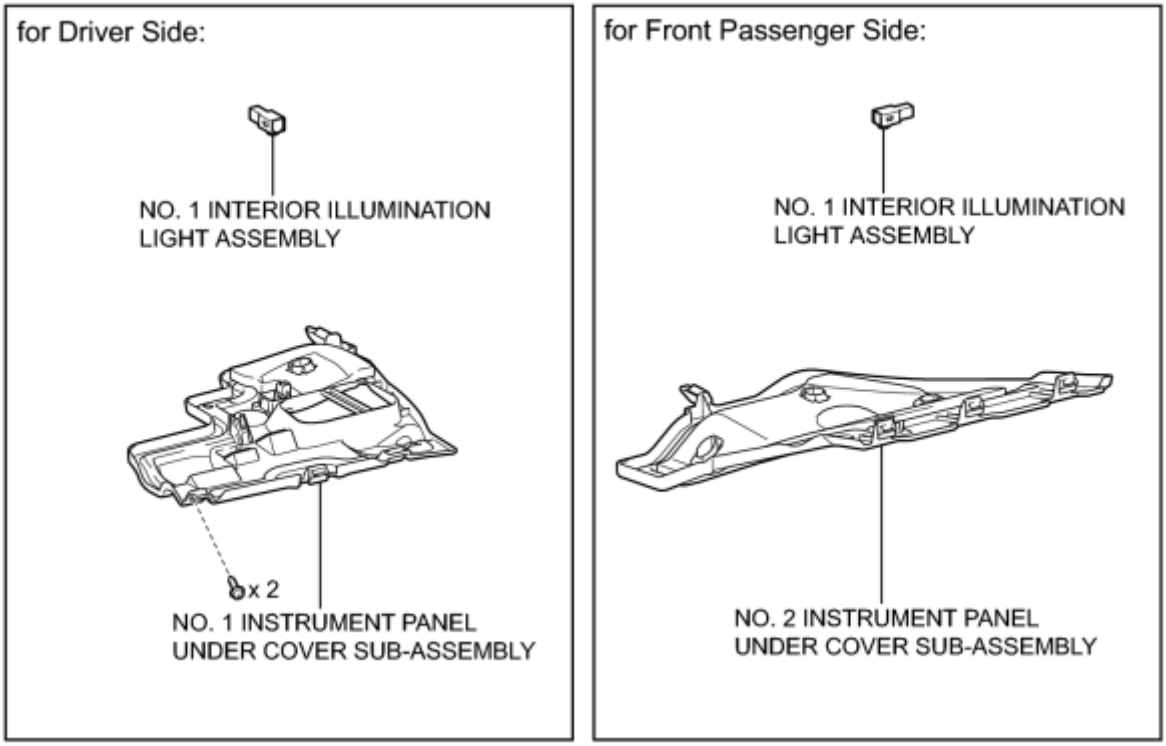
16. INSTALL REAR DOOR SCUFF PLATE LH INFO

17. INSTALL REAR DECK FLOOR BOX INFO

18. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION

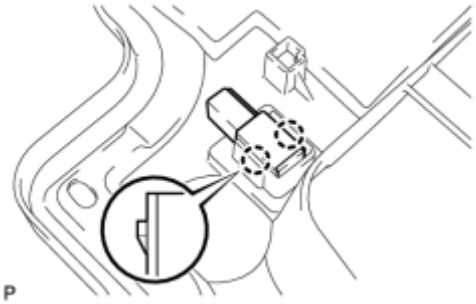



P

# REMOVAL

1. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for Driver Side) INFO

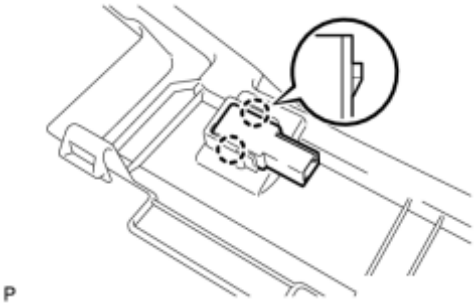
2. REMOVE NO. 1 INTERIOR ILLUMINATION LIGHT ASSEMBLY (for Driver Side)




(a) Using a screwdriver, disengage the 2 claws and remove the No. 1 interior illumination light assembly.

3. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for Front Passenger Side) INFO

4. REMOVE NO. 1 INTERIOR ILLUMINATION LIGHT ASSEMBLY (for Front Passenger Side)




(a) Using a screwdriver, disengage the 2 claws and remove the No. 1 interior illumination light assembly.

# INSPECTION

1. INSPECT FOOTWELL LIGHT (NO. 1 INTERIOR ILLUMINATION LIGHT ASSEMBLY)

*1




(a) Connect a positive (+) lead from the battery to terminal 1 and a negative (-) lead to terminal 2.

(b) Check that the footwell light comes on.

OK:

Footwell light comes on.

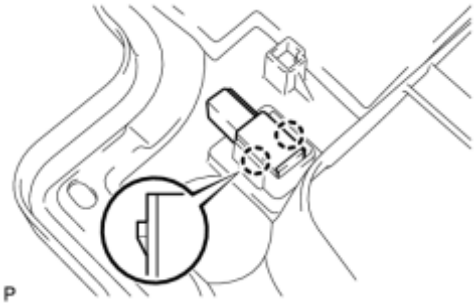
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Footwell Light (No. 1 Interior Illumination Light Assembly)) |

If the result is not as specified, replace the bulb or light socket.

# INSTALLATION

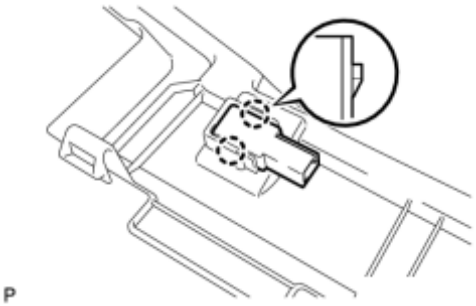
1. INSTALL NO. 1 INTERIOR ILLUMINATION LIGHT ASSEMBLY (for Driver Side)




(a) Engage the 2 claws and install the No. 1 interior illumination light assembly.

2. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for Driver Side) INFO

3. INSTALL NO. 1 INTERIOR ILLUMINATION LIGHT ASSEMBLY (for Front Passenger Side)

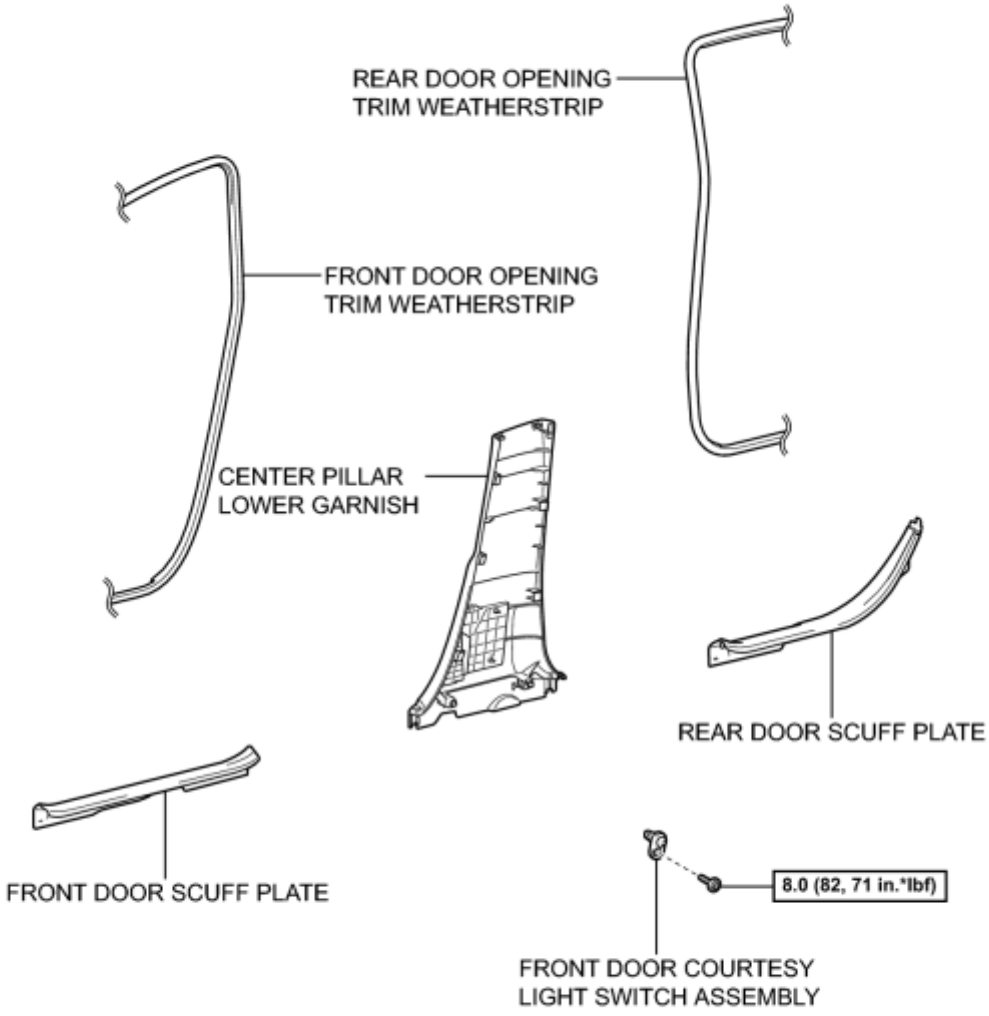



(a) Engage the 2 claws and install the No. 1 interior illumination light assembly.

4. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY (for Front Passenger Side)
INFO

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE INFO

2. REMOVE REAR DOOR SCUFF PLATE INFO

3. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP INFO

4. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP INFO

5. REMOVE CENTER PILLAR LOWER GARNISH INFO

6. REMOVE FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY

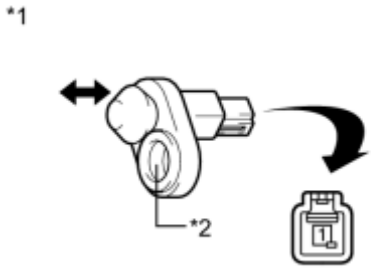
(a) Disconnect the connector.




(b) Using a T30 "TORX" socket wrench, remove the bolt and front door courtesy light switch assembly.

# INSPECTION

1. INSPECT FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - Switch body | Pushed | 10 kΩ or higher |
| 1 - Switch body | Not pushed | Below 1 Ω |

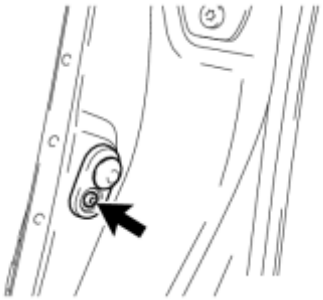
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Front Door Courtesy Light Switch Assembly) |
| *2 | Switch Body |

If the result is not as specified, replace the front door courtesy light switch assembly.

# INSTALLATION

1. INSTALL FRONT DOOR COURTESY LIGHT SWITCH ASSEMBLY



P

(a) Using a T30 "TORX" socket wrench, install the front door courtesy light switch assembly with the bolt.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

(b) Connect the connector.

2. INSTALL CENTER PILLAR LOWER GARNISH INFO

3. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP INFO

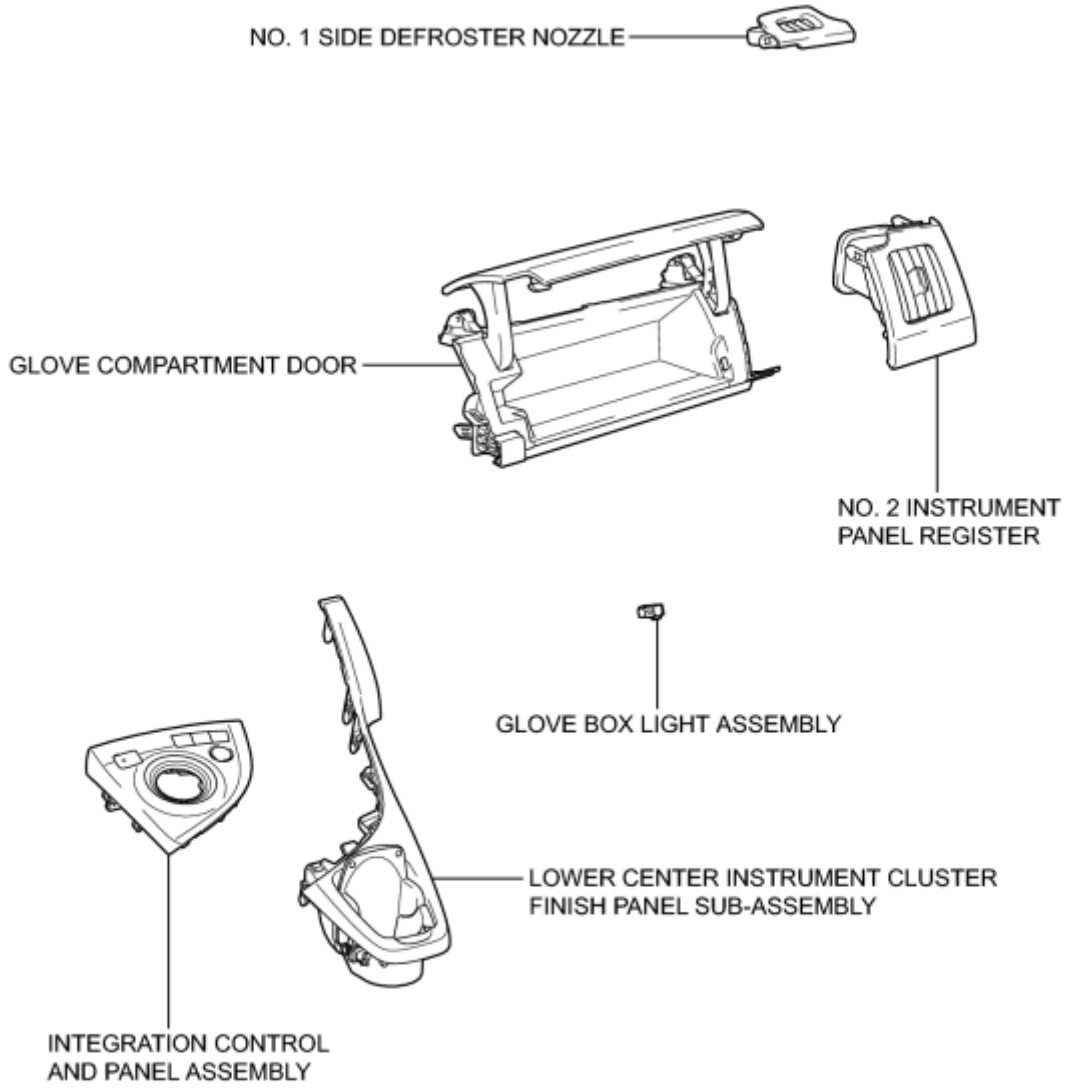
4. CONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP INFO

5. INSTALL REAR DOOR SCUFF PLATE INFO

6. INSTALL FRONT DOOR SCUFF PLATE INFO

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

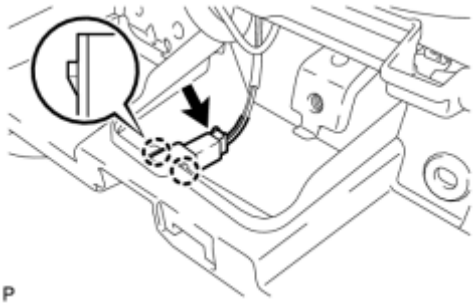
2. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

3. REMOVE NO. 1 SIDE DEFROSTER NOZZLE INFO

4. REMOVE NO. 2 INSTRUMENT PANEL REGISTER INFO

5. REMOVE GLOVE COMPARTMENT DOOR INFO

6. REMOVE GLOVE BOX LIGHT ASSEMBLY




(a) Disconnect the connector.

(b) Using a screwdriver, disengage the 2 claws and remove the glove box light assembly.

# INSPECTION

1. INSPECT GLOVE BOX LIGHT ASSEMBLY

*1




(a) Connect a positive (+) lead from the battery to terminal 2 and a negative (-) lead to terminal 1.

(b) Check that the glove box light comes on.

OK:

Glove box light comes on.

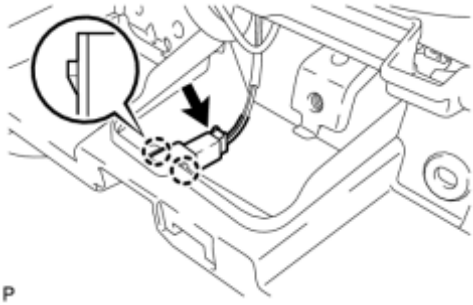
***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Glove Box Light Assembly) |

If the result is not as specified, replace the glove box light assembly.

# INSTALLATION

1. INSTALL GLOVE BOX LIGHT ASSEMBLY




(a) Engage the 2 claws and install the glove box light assembly.

(b) Connect the connector.

2. INSTALL GLOVE COMPARTMENT DOOR INFO

3. INSTALL NO. 2 INSTRUMENT PANEL REGISTER INFO

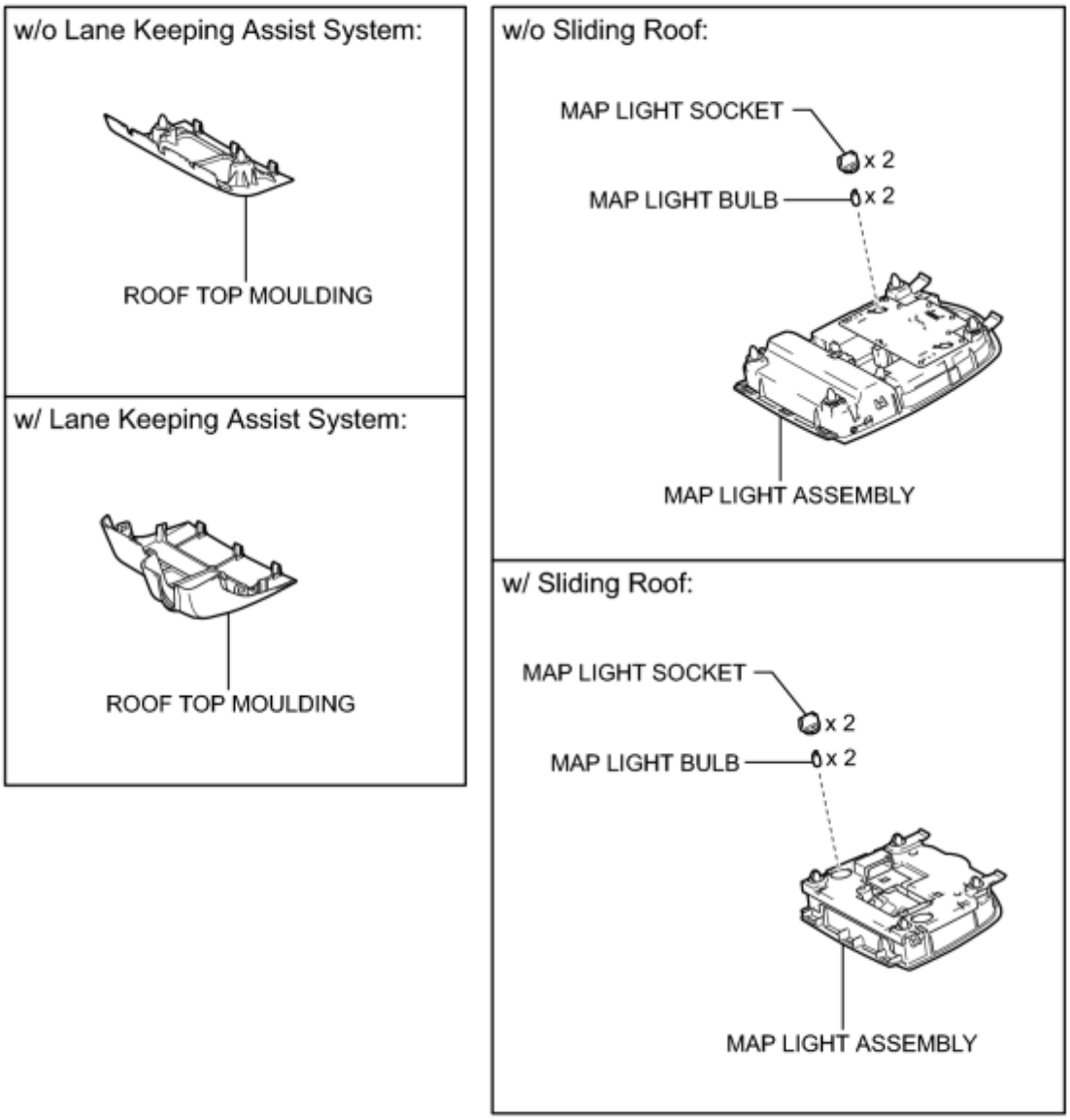
4. INSTALL NO. 1 SIDE DEFROSTER NOZZLE INFO

5. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

6. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION



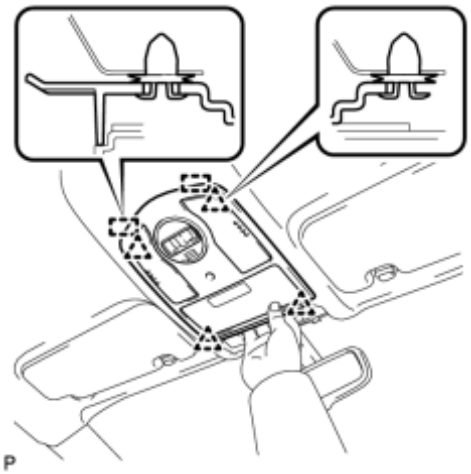

P

# REMOVAL

1. REMOVE ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

2. REMOVE ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

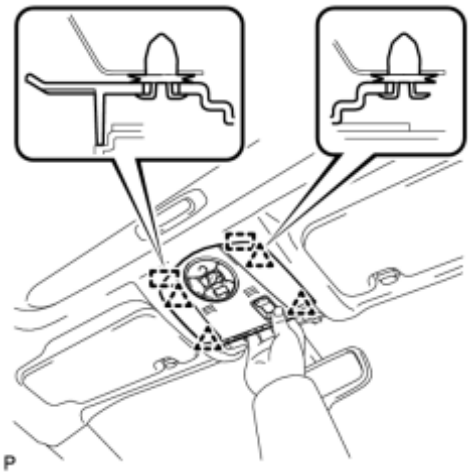
3. REMOVE MAP LIGHT ASSEMBLY (w/o Sliding Roof)




(a) Disengage the 4 clips and 2 guides as shown in the illustration.

(b) Disconnect the connector and remove the map light assembly.

4. REMOVE MAP LIGHT ASSEMBLY (w/ Sliding Roof)

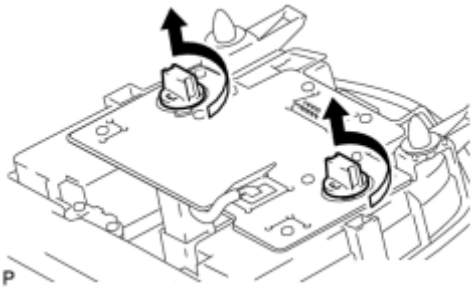



(a) Disengage the 4 clips and 2 guides as shown in the illustration.

(b) Disconnect the connector and remove the map light assembly.

5. REMOVE MAP LIGHT BULB

(a) Turn the 2 map light bulbs and 2 map light sockets in the direction indicated by the arrows in the illustration and remove them as a unit.



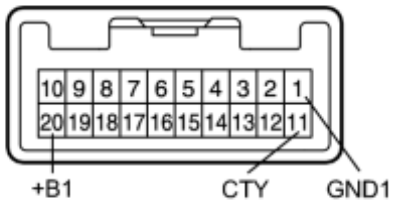
(b) Remove the 2 map light bulbs from the 2 map light sockets.

# INSPECTION

1. INSPECT MAP LIGHT ASSEMBLY (w/o Sliding Roof)

(a) Inspect the interior light operation.

*1




(1) Connect a positive (+) lead from the battery to terminal 20 (+B1) and a negative (-) lead to terminal 11 (CTY).

P

(2) Turn the interior light door switch on.

(3) Turn the personal light switch off.

(4) Check that the interior lights come on.

OK:

Interior lights come on.

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Map Light Assembly) |

If the result is not as specified, replace the bulb or map light assembly.

(b) Inspect the personal light operation.

(1) Connect a positive (+) lead from the battery to terminal 20 (+B1) and a negative (-) lead to terminal 1 (GND1).

(2) Check that the personal lights come on.

OK:

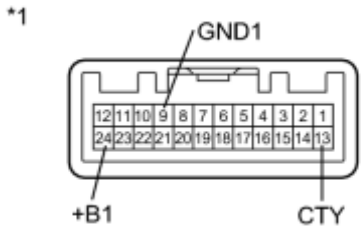
| Condition | Specified Condition |
|---|---|

| Condition | Specified Condition |
|---|---|
| Personal light switch LH on | Personal light LH comes on |
| Personal light switch LH off | Personal light LH does not come on |
| Personal light switch RH on | Personal light RH comes on |
| Personal light switch RH off | Personal light RH does not come on |

If the result is not as specified, replace the bulb or map light assembly.

2. INSPECT MAP LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Inspect the interior light operation.




(1) Connect a positive (+) lead from the battery to terminal 24 (+B1) and a negative (-) lead to terminal 13 (CTY).

(2) Turn the interior light door switch on.

(3) Turn the personal light switch off.

(4) Check that the interior lights come on.

OK:

Interior lights come on.

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Map Light Assembly) |

If the result is not as specified, replace the bulb or map light assembly.

(b) Inspect the personal light operation.

(1) Connect a positive (+) lead from the battery to terminal 24 (+B1) and a negative (-) lead to terminal 9 (GND1).

(2) Check that the personal lights come on.

OK:

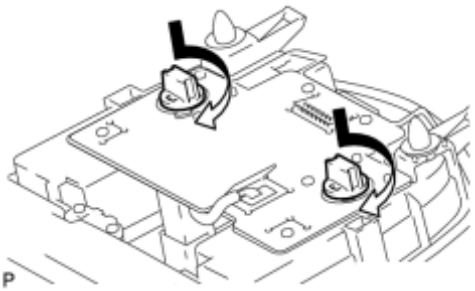
| Condition | Specified Condition |
|---|---|
| Personal light switch LH on | Personal light LH comes on |
| Personal light switch LH off | Personal light LH does not come on |
| Personal light switch RH on | Personal light RH comes on |
| Personal light switch RH off | Personal light RH does not come on |

If the result is not as specified, replace the bulb or map light assembly.

# INSTALLATION

1. INSTALL MAP LIGHT BULB

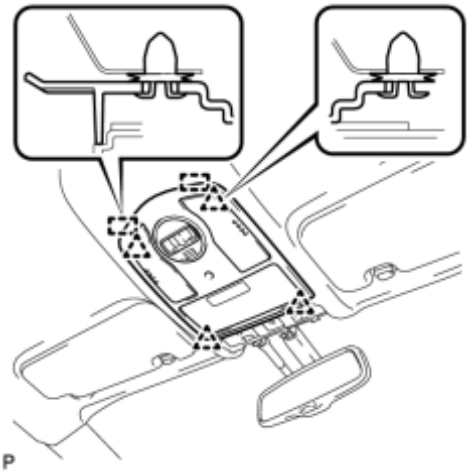
(a) Install the 2 map light bulbs to the 2 map light sockets.



(b) Turn the 2 map light bulbs and 2 map light sockets in the direction indicated by the arrows in the illustration and install them as a unit.

2. INSTALL MAP LIGHT ASSEMBLY (w/o Sliding Roof)

(a) Connect the connector.

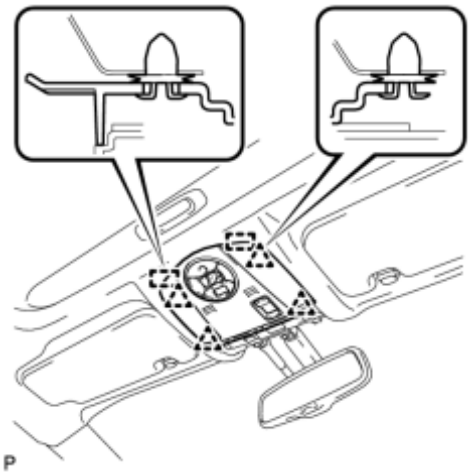


(b) Engage the 2 guides and 4 clips, and install the map light assembly.

3. INSTALL MAP LIGHT ASSEMBLY (w/ Sliding Roof)

(a) Connect the connector.

(b) Engage the 2 guides and 4 clips, and install the map light assembly.

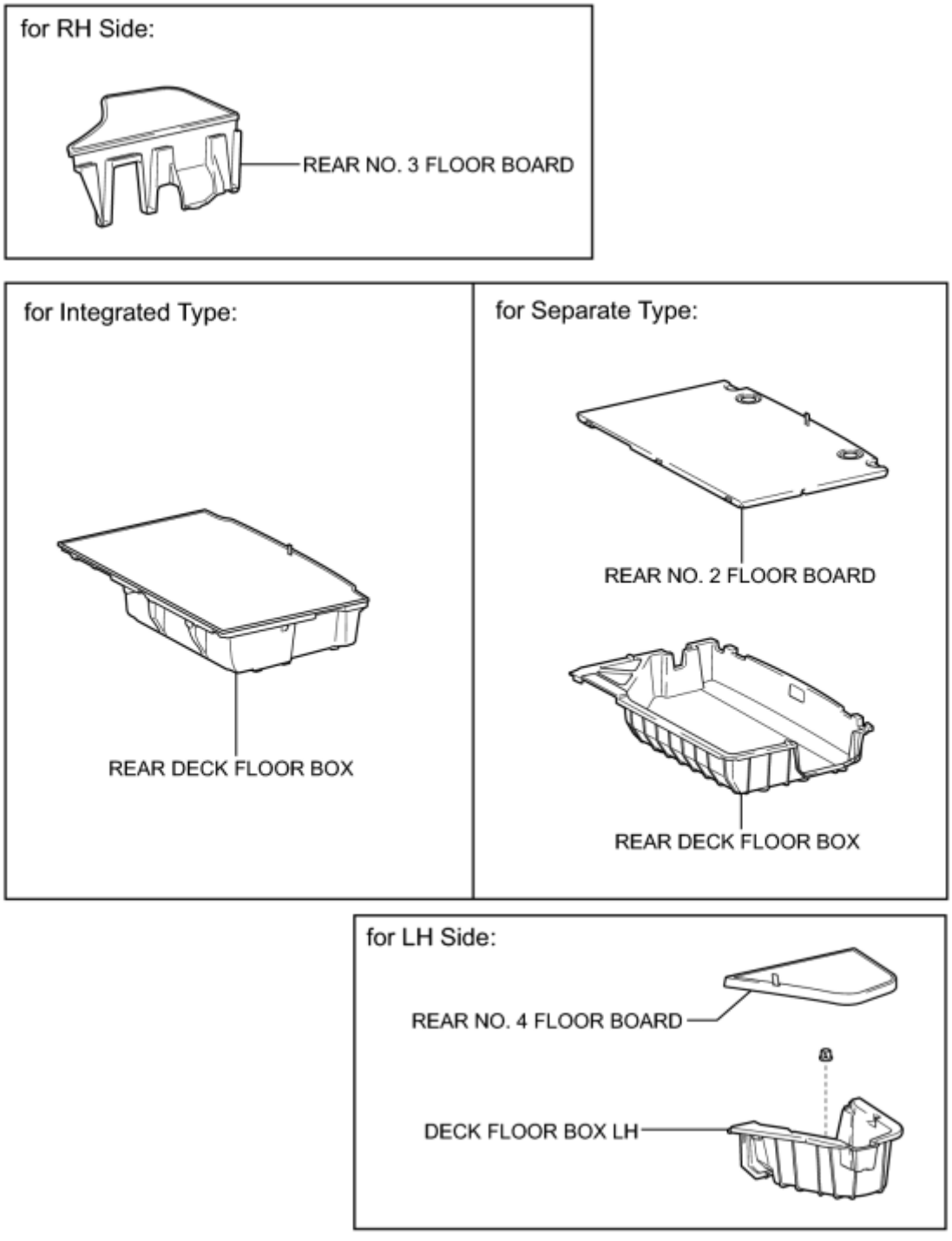



4. INSTALL ROOF TOP MOULDING (w/o Lane Keeping Assist System) INFO

5. INSTALL ROOF TOP MOULDING (w/ Lane Keeping Assist System) INFO

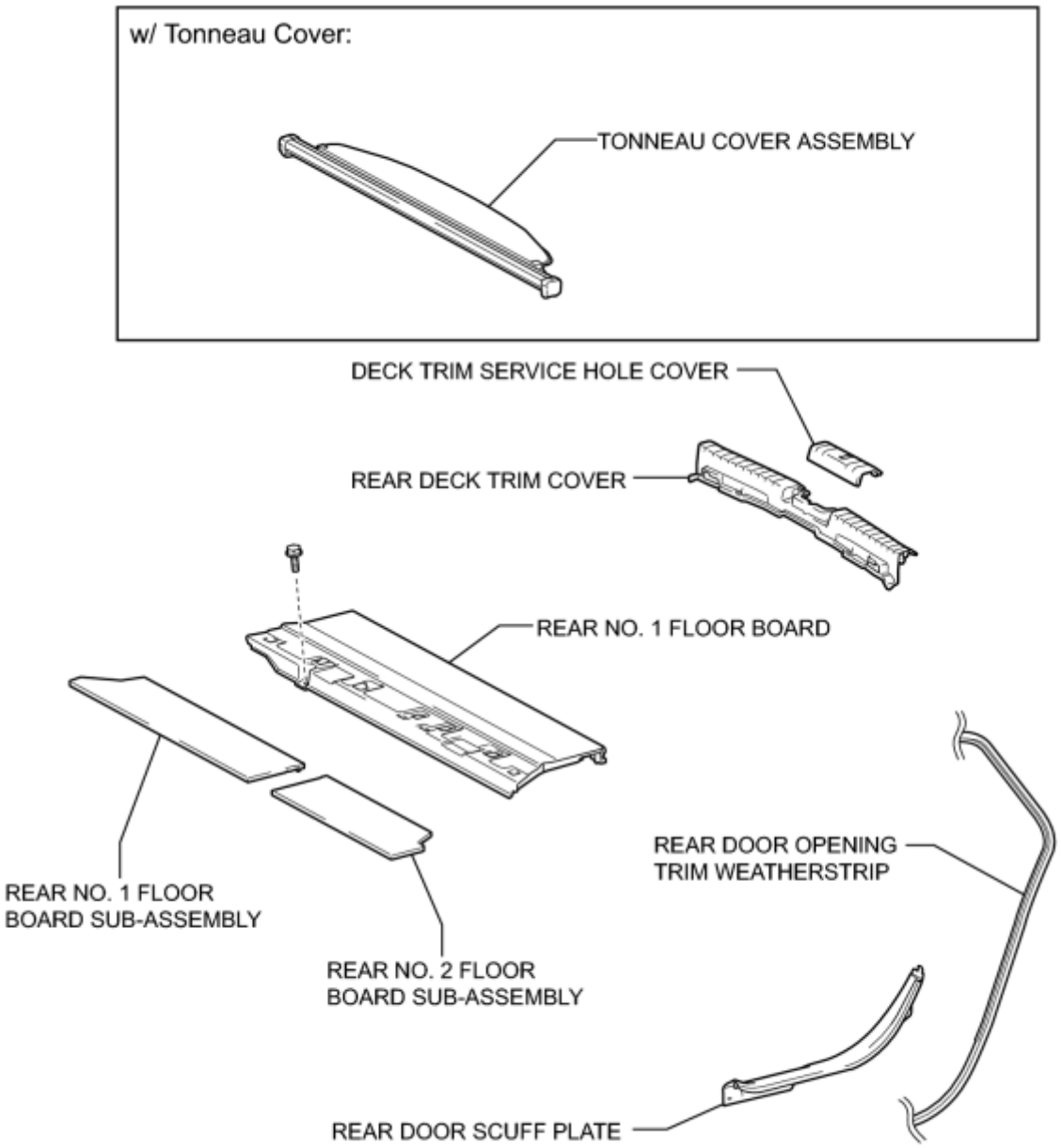
# COMPONENTS

# ILLUSTRATION



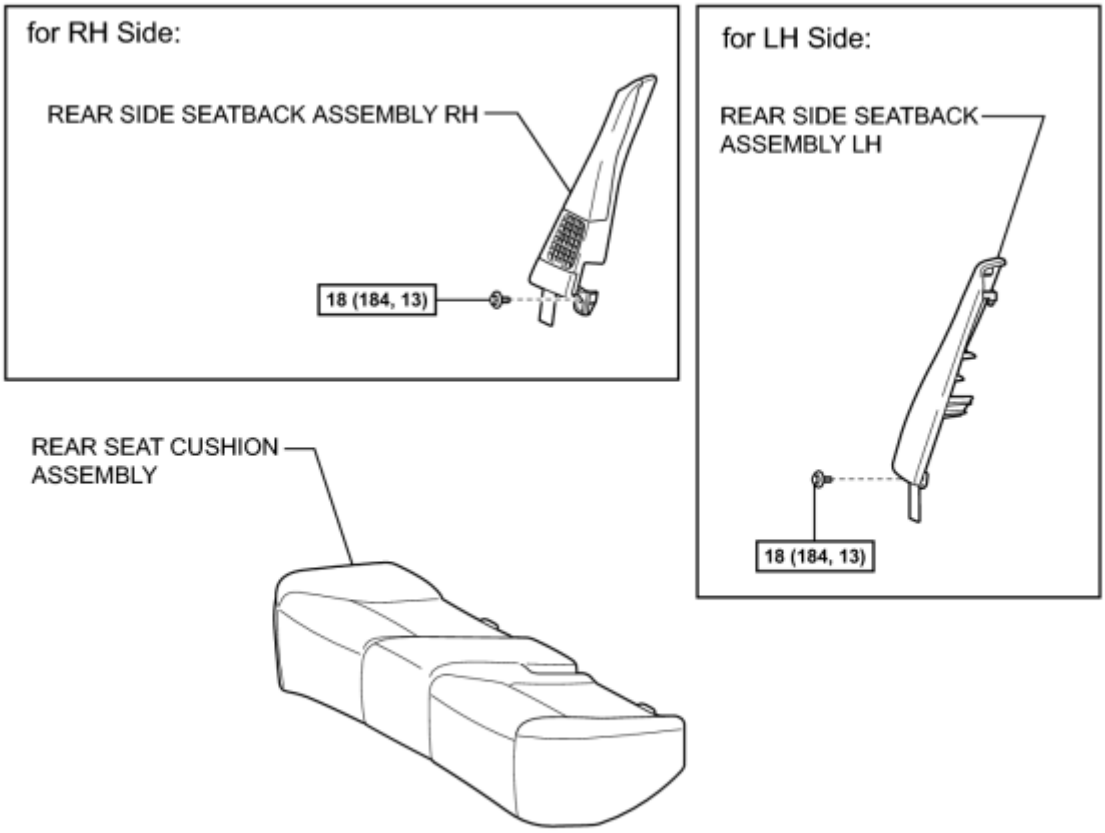

P

# ILLUSTRATION




P

# ILLUSTRATION

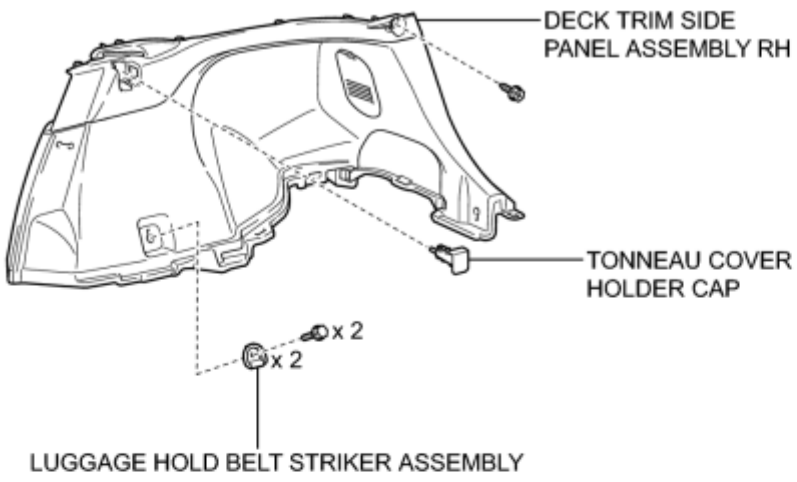



N*m (kgf*cm, ft.*lbf): Specified torque

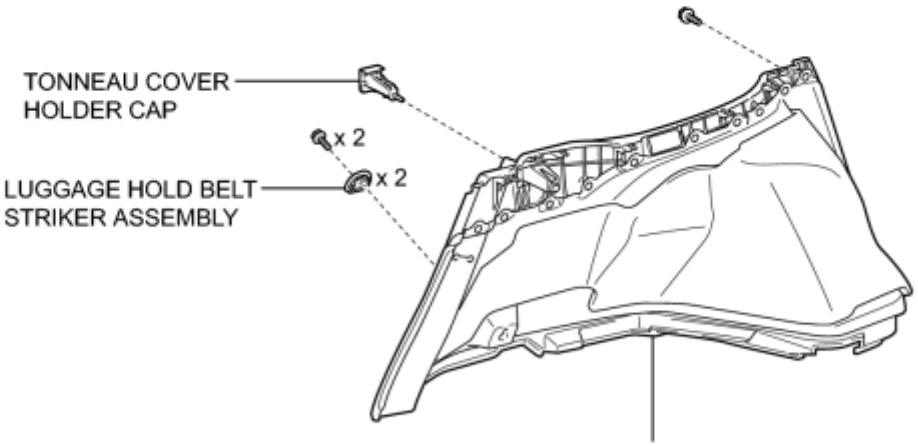
P

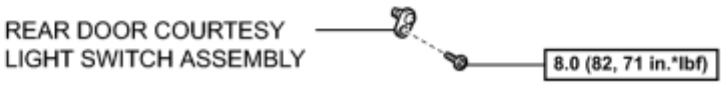
# ILLUSTRATION

for RH Side:




for LH Side:




N*m (kgf*cm, ft.*lbf): Specified torque

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD (for RH Side) INFO

4. REMOVE REAR NO. 4 FLOOR BOARD (for LH Side) INFO

5. REMOVE DECK FLOOR BOX LH (for LH Side) INFO

6. REMOVE REAR DOOR SCUFF PLATE INFO

7. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP INFO

8. REMOVE TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

9. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

10. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

11. REMOVE REAR NO. 1 FLOOR BOARD INFO

12. REMOVE DECK TRIM SERVICE HOLE COVER INFO

13. REMOVE REAR DECK TRIM COVER INFO

14. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

15. REMOVE REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

16. REMOVE REAR SIDE SEATBACK ASSEMBLY RH (for RH Side)

HINT:

Use the same procedure described for the LH side.

17. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

18. REMOVE TONNEAU COVER HOLDER CAP (for LH Side) INFO

19. REMOVE DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

20. REMOVE LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

HINT:

Use the same procedure described for the LH side.

21. REMOVE TONNEAU COVER HOLDER CAP (for RH Side)

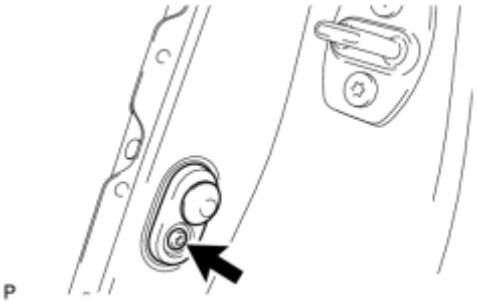
HINT:

Use the same procedure described for the LH side.

22. REMOVE DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

23. REMOVE REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY

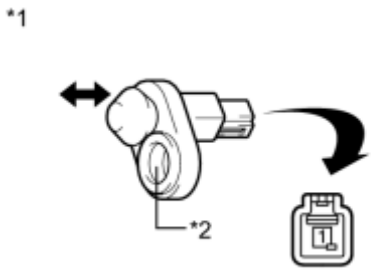
(a) Disconnect the connector.



(b) Using a T30 "TORX" socket wrench, remove the bolt and rear door courtesy light switch assembly.

# INSPECTION

1. INSPECT REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - Switch body | Pushed | 10 kΩ or higher |
| 1 - Switch body | Not pushed | Below 1 Ω |

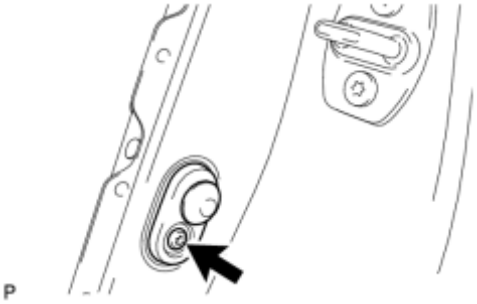
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Rear Door Courtesy Light Switch Assembly) |
| *2 | Switch Body |

If the result is not as specified, replace the rear door courtesy light switch assembly.

# INSTALLATION

1. INSTALL REAR DOOR COURTESY LIGHT SWITCH ASSEMBLY




(a) Using a T30 "TORX" socket wrench, install the rear door courtesy light switch assembly with the bolt.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

(b) Connect the connector.

2. INSTALL DECK TRIM SIDE PANEL ASSEMBLY LH (for LH Side) INFO

3. INSTALL TONNEAU COVER HOLDER CAP (for LH Side) INFO

4. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for LH Side) INFO

5. INSTALL DECK TRIM SIDE PANEL ASSEMBLY RH (for RH Side) INFO

6. INSTALL TONNEAU COVER HOLDER CAP (for RH Side)

HINT:

Use the same procedure described for the LH side.

7. INSTALL LUGGAGE HOLD BELT STRIKER ASSEMBLY (for RH Side)

HINT:

Use the same procedure described for the LH side.

8. INSTALL REAR SIDE SEATBACK ASSEMBLY LH (for LH Side) INFO

9. INSTALL REAR SIDE SEATBACK ASSEMBLY RH (for RH Side)

HINT:

Use the same procedure described for the LH side.

10. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

11. INSTALL REAR DECK TRIM COVER INFO

12. INSTALL DECK TRIM SERVICE HOLE COVER INFO

13. INSTALL REAR NO. 1 FLOOR BOARD INFO

14. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY INFO

15. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY INFO

16. INSTALL TONNEAU COVER ASSEMBLY (w/ Tonneau Cover) INFO

17. INSTALL DECK FLOOR BOX LH (for LH Side) INFO

18. INSTALL REAR NO. 4 FLOOR BOARD (for LH Side) INFO

19. CONNECT REAR DOOR OPENING TRIM WEATHERSTRIP INFO

20. INSTALL REAR DOOR SCUFF PLATE INFO

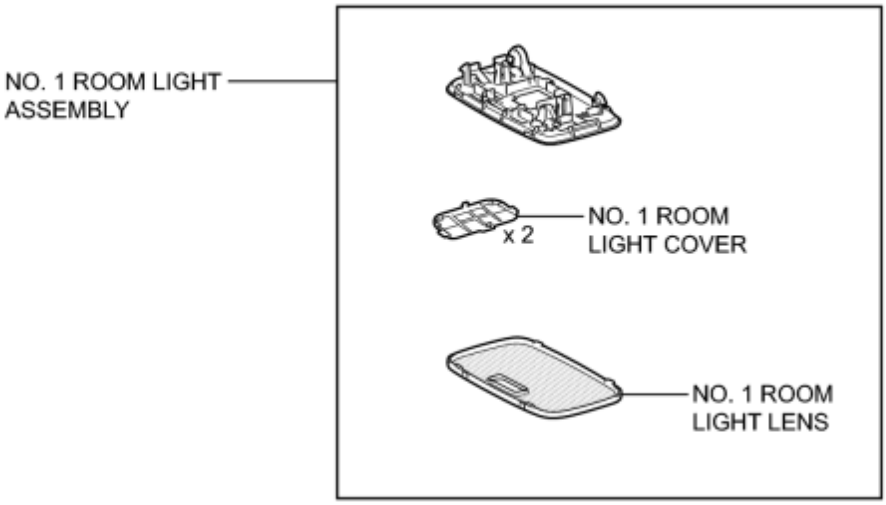
21. INSTALL REAR NO. 3 FLOOR BOARD (for RH Side) INFO

22. INSTALL REAR DECK FLOOR BOX INFO

23. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

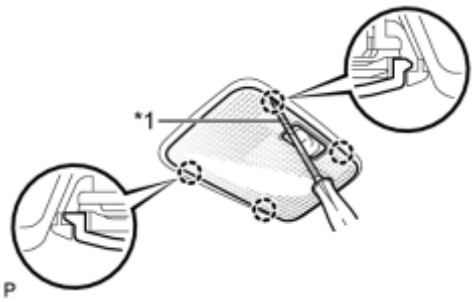
# ILLUSTRATION




P

# REMOVAL

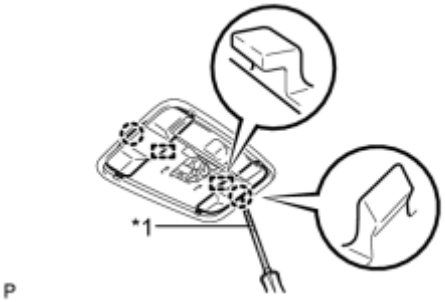
1. REMOVE NO. 1 ROOM LIGHT ASSEMBLY




(a) Using a screwdriver wrapped with protective tape, disengage the 4 claws and remove the No. 1 room light lens.

## Text in Illustration

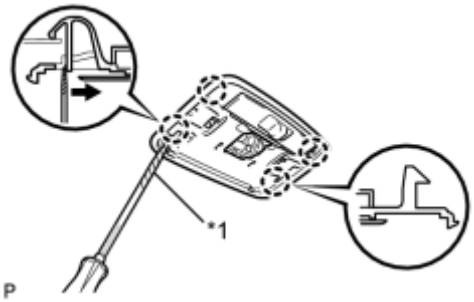
| | |
|---|---|
| *1 | Protective Tape |




(b) Using a screwdriver wrapped with protective tape, disengage the 2 claws and 2 guides, and remove the 2 No. 1 room light covers.

## Text in Illustration

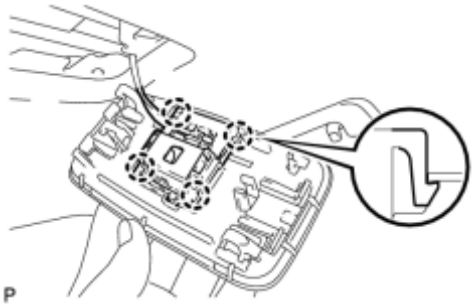
| | |
|---|---|
| *1 | Protective Tape |




(c) Using a screwdriver wrapped with protective tape, disengage the 4 claws and disconnect the No. 1 room light assembly as shown in the illustration.

## Text in Illustration

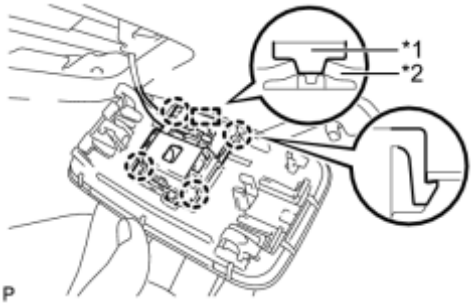
| | |
|---|---|
| *1 | Protective Tape |




(d) Using a screwdriver, disengage the 4 claws and disconnect the room light switch base from the No. 1 room light assembly.

# INSTALLATION

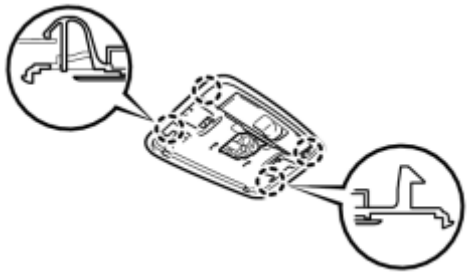
1. INSTALL NO. 1 ROOM LIGHT ASSEMBLY




(a) Align the switch parts shown in the illustration and engage the 4 claws to install the room light switch base to the No. 1 room light assembly.

## Text in Illustration

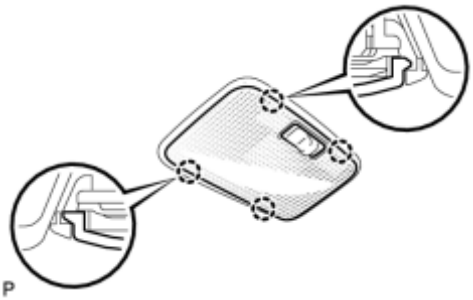
| | |
|---|---|
| *1 | Switch Part of Room Light Switch Base |
| *2 | Switch Part of No. 1 Room Light Assembly |



(b) Engage the 4 claws and install the No. 1 room light assembly.



(c) Engage the 2 claws and 2 guides to install the 2 No. 1 room light covers.

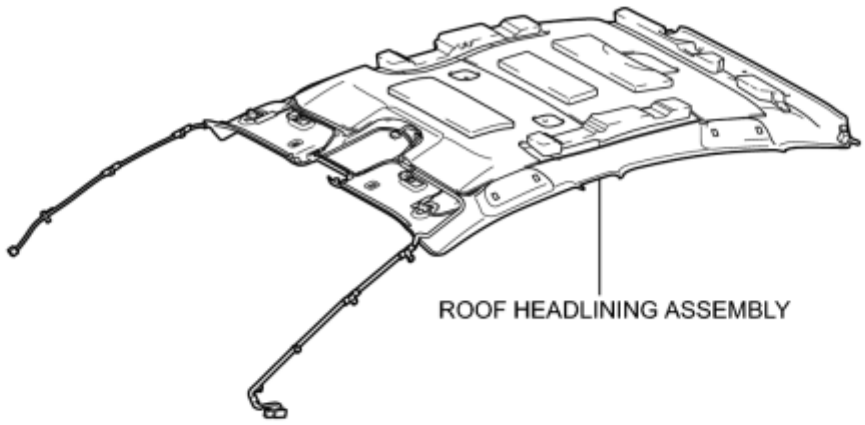


(d) Engage the 4 claws to install the No. 1 room light lens.

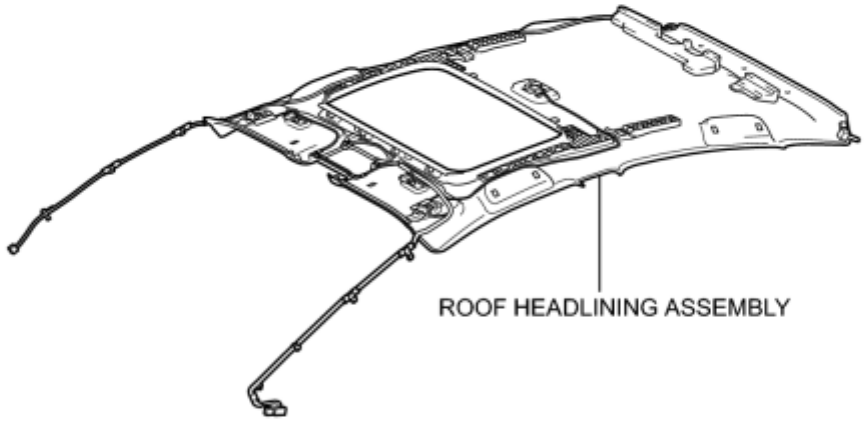
# COMPONENTS

# ILLUSTRATION

w/o Sliding Roof:




w/ Sliding Roof:







P

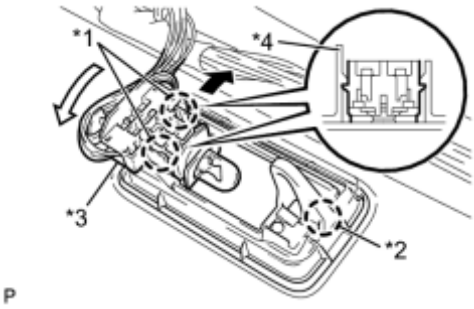
# REMOVAL

1. REMOVE ROOF HEADLINING ASSEMBLY

HINT:

Refer to the procedure up to Remove Roof Headlining Assembly INFO.

2. REMOVE VANITY LIGHT ASSEMBLY




(a) Tilt the tab to disengage the 2 claws <A> and separate the bulb holder from the vanity light as shown in the illustration.

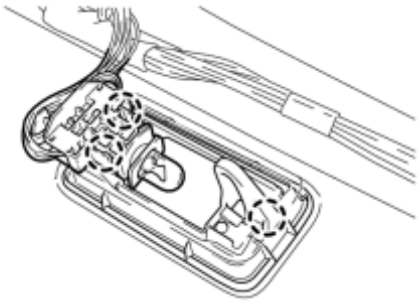
## Text in Illustration

| | |
|---|---|
| *1 | Claw <A> |
| *2 | Claw <B> |
| *3 | Bulb Holder |
| *4 | Tab |

(b) Disengage the claw <B> and remove the vanity light assembly.

# INSTALLATION

1. INSTALL VANITY LIGHT ASSEMBLY



P

(a) Engage the 3 claws and install the vanity light assembly.

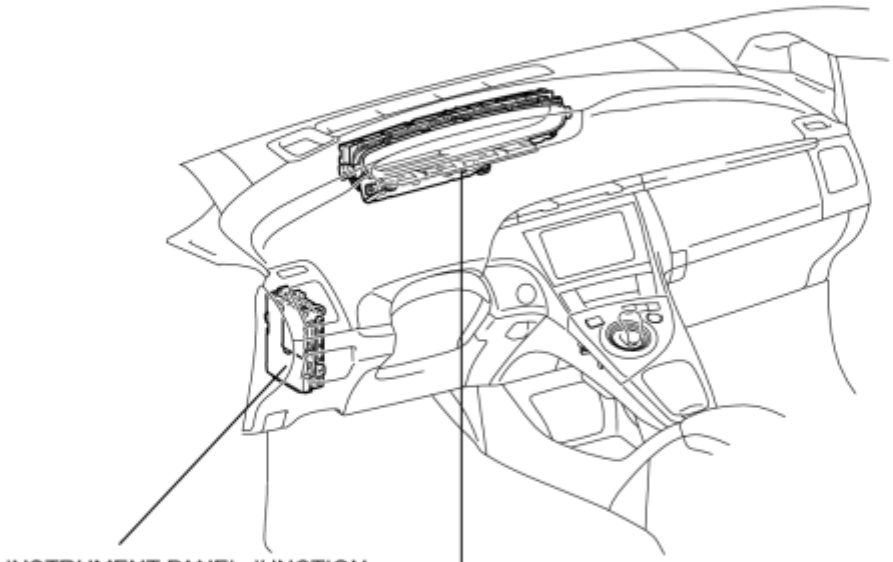
2. INSTALL ROOF HEADLINING ASSEMBLY

HINT:

Refer to the procedure from Install Roof Headlining Assembly INFO.

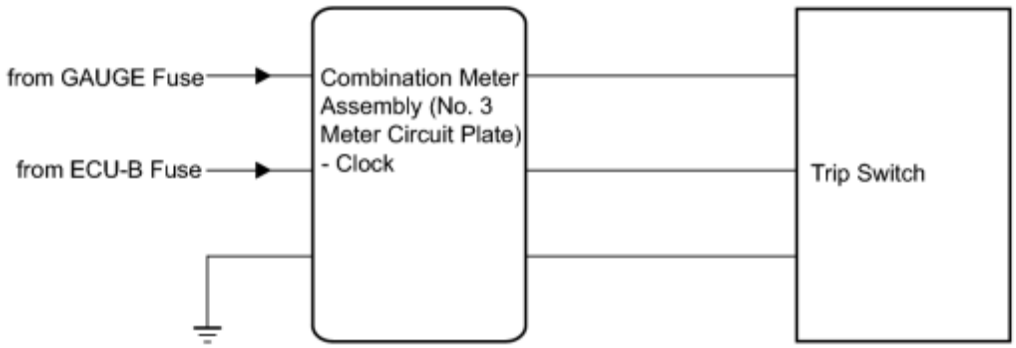
# PARTS LOCATION

# ILLUSTRATION



# SYSTEM DIAGRAM

1. DIRECT LINE SIGNAL



# SYSTEM DESCRIPTION

1. COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

| Item | Detail |
|---|---|
| Clock | Time is displayed and can be adjusted by pressing the trip switch. |

# HOW TO PROCEED WITH TROUBLESHOOTING

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

NEXT

| | |
|---|---|
| 3. | PROBLEM SYMPTOM CONFIRMATION |

NEXT

| | |
|---|---|
| 4. | PROBLEM SIMULATION |

NEXT

| | |
|---|---|
| 5. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

NEXT

| | |
|---|---|
| 6. | CIRCUIT INSPECTION |

NEXT

| | |
|---|---|
| 7. | REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 8. | CONFIRMATION TEST |

NEXT **END**

# PROBLEM SYMPTOMS TABLE

HINT:

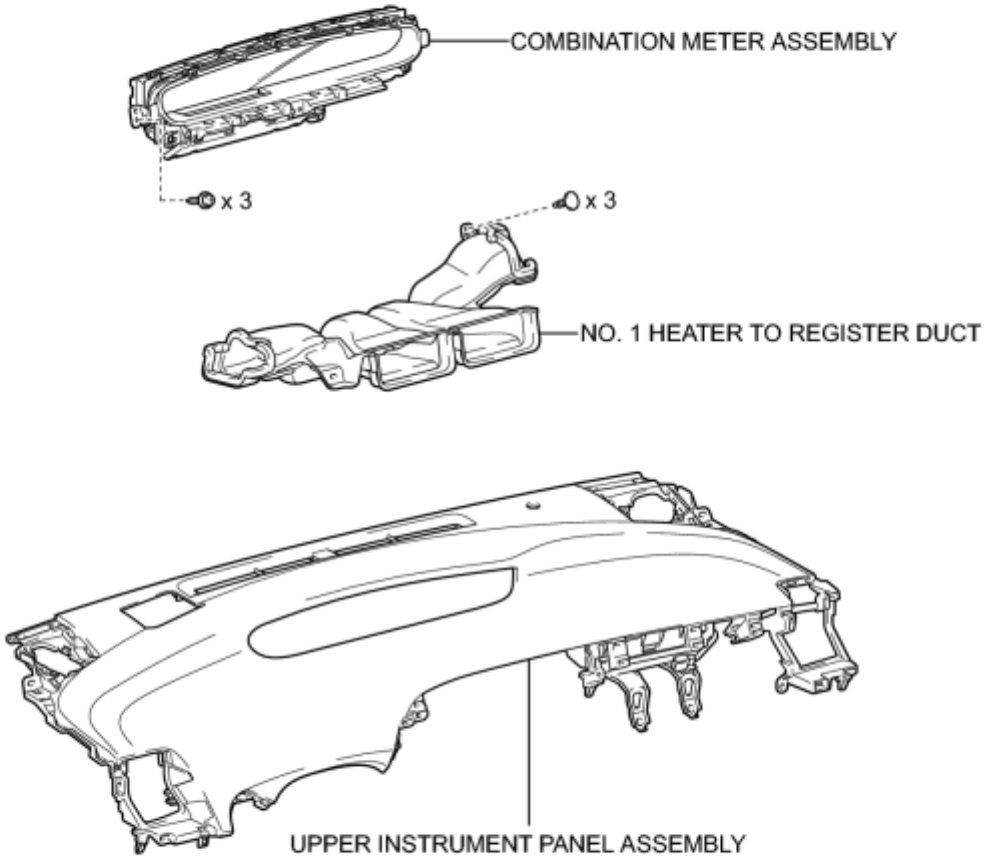
Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Clock*

| Symptom | Suspected Area | See page |
|---|---|---|
| Clock does not operate at all. | Fuse (ECU-B, GAUGE) | - |
| | Wire Harness or Connector | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Clock display illumination malfunction | PANEL Fuse | - |
| | Wire Harness or Connector | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Clock loses or gains time. | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Clock cannot be adjusted. | Trip Switch | INFO |
| | Wire Harness or Connector | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |

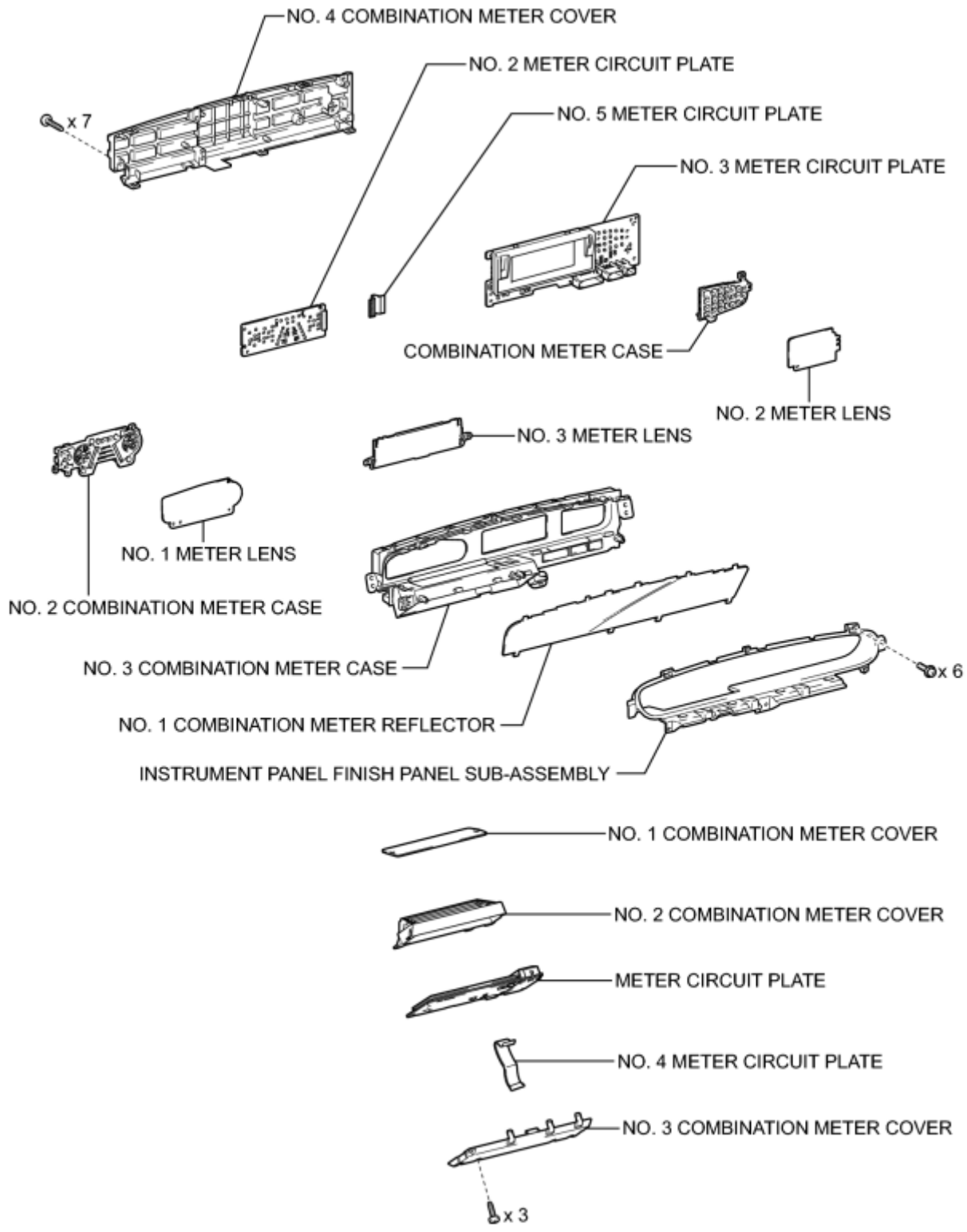
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION


NO. 4 COMBINATION METER COVER
x 7
NO. 2 METER CIRCUIT PLATE
NO. 5 METER CIRCUIT PLATE
NO. 3 METER CIRCUIT PLATE
COMBINATION METER CASE
NO. 2 METER LENS
NO. 3 METER LENS
NO. 1 METER LENS
NO. 2 COMBINATION METER CASE
NO. 3 COMBINATION METER CASE
x 6
NO. 1 COMBINATION METER REFLECTOR
INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY
NO. 1 COMBINATION METER COVER
NO. 2 COMBINATION METER COVER
METER CIRCUIT PLATE
NO. 4 METER CIRCUIT PLATE
NO. 3 COMBINATION METER COVER
x 3

P

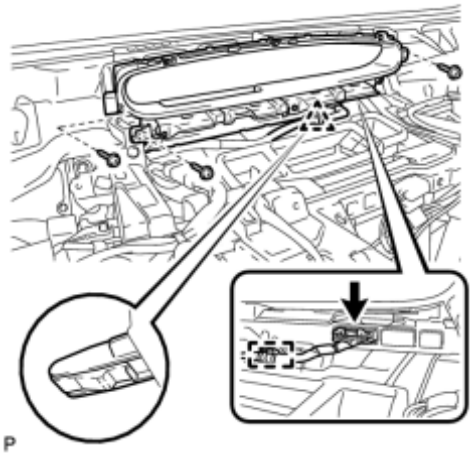
# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

(a) Remove the upper instrument panel assembly INFO.

2. REMOVE NO. 1 HEATER TO REGISTER DUCT INFO

3. REMOVE COMBINATION METER ASSEMBLY



(a) Disconnect the connector.

(b) Disengage the clamp.

(c) Remove the 3 screws.

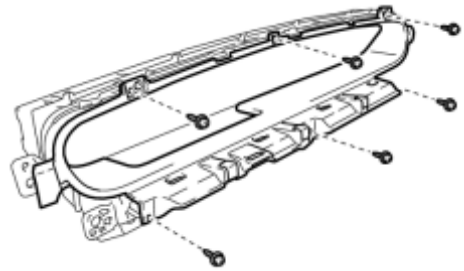
(d) Disengage the clip and remove the combination meter assembly.

# DISASSEMBLY

NOTICE:

When disassembling the combination meter assembly, eliminate static electricity by touching the vehicle body to prevent components from being damaged.

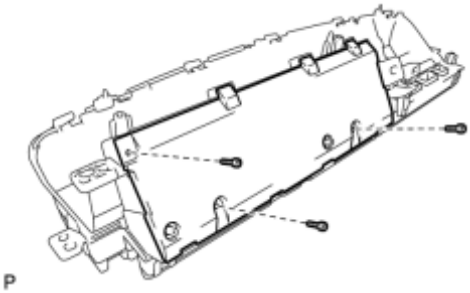
1. REMOVE INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY



P

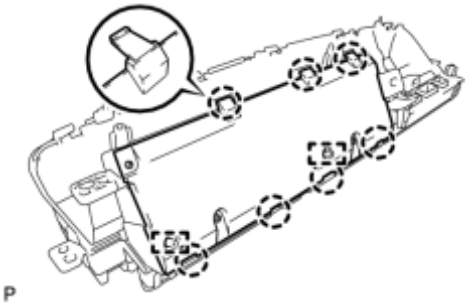
(a) Remove the 6 screws and instrument panel finish panel sub-assembly.

2. REMOVE NO. 3 COMBINATION METER COVER



P

(a) Remove the 3 screws.

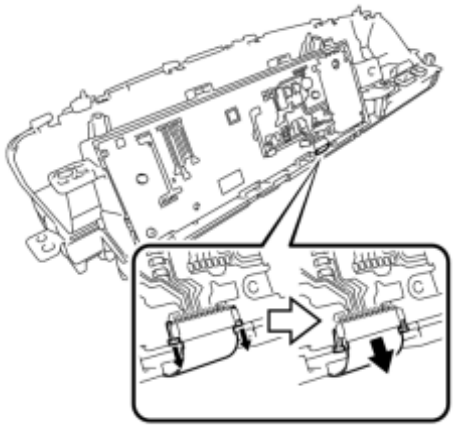


P

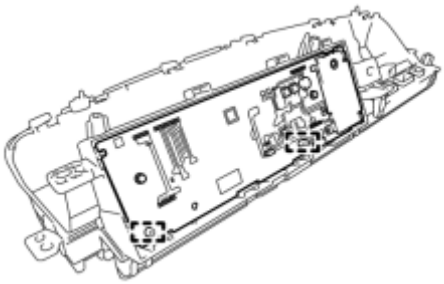
(b) Disengage the 7 claws and 2 guides to remove the No. 3 combination meter cover.

3. REMOVE METER CIRCUIT PLATE

(a) Disconnect the connector as shown in the illustration.



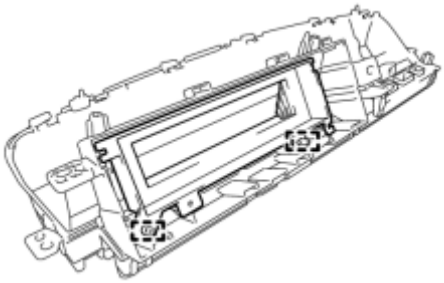
P



P

(b) Disengage the 2 guides to remove the meter circuit plate.

4. REMOVE NO. 2 COMBINATION METER COVER

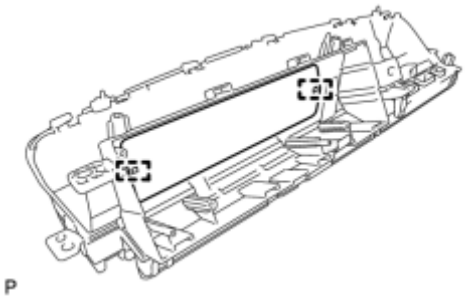


P

(a) Disengage the 2 guides to remove the No. 2 combination meter cover.

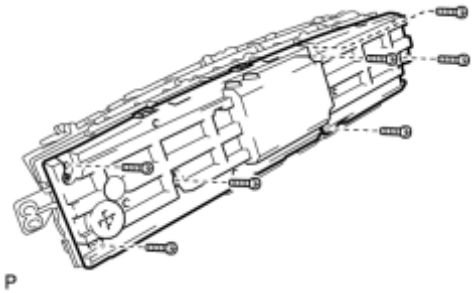
5. REMOVE NO. 1 COMBINATION METER COVER

(a) Disengage the 2 guides to remove the No. 1 combination meter cover.



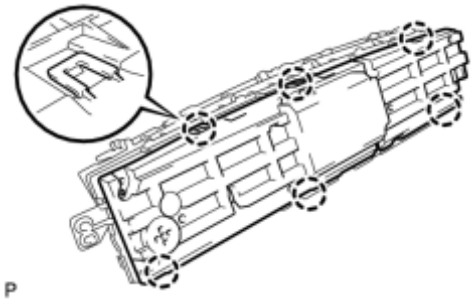
P

6. REMOVE NO. 4 COMBINATION METER COVER



P

(a) Remove the 7 screws.

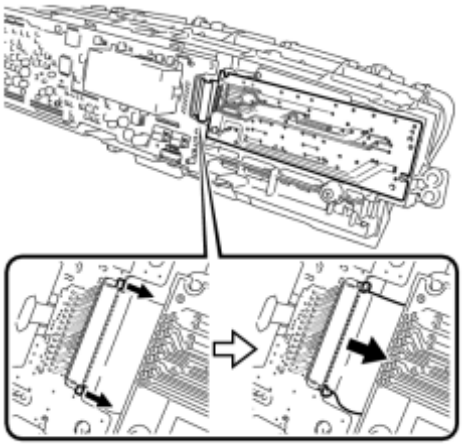


P

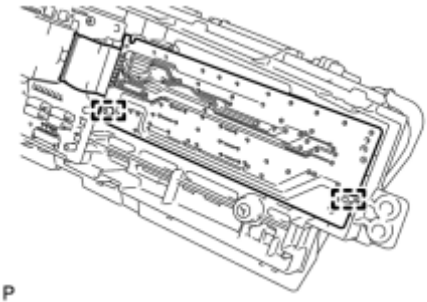
(b) Disengage the 6 claws to remove the No. 4 combination meter cover.

7. REMOVE NO. 2 METER CIRCUIT PLATE

(a) Disconnect the connector as shown in the illustration.

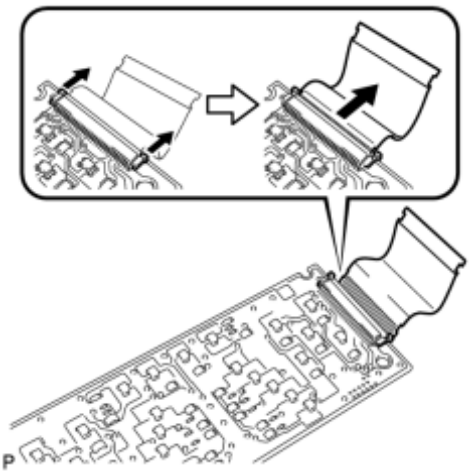


P



P

(b) Disengage the 2 guides to remove the No. 2 meter circuit plate.

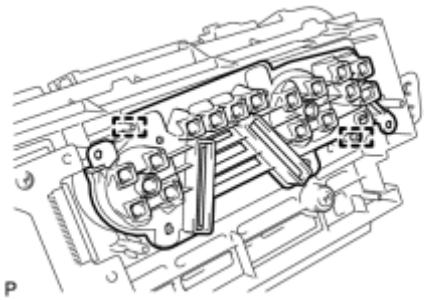


P

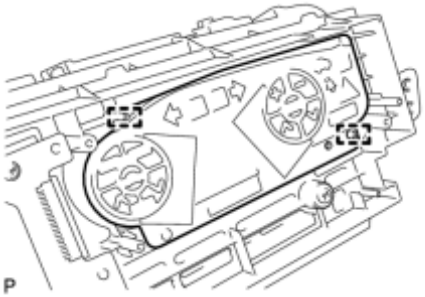
(c) Disconnect the connector to remove the No. 5 meter circuit plate from the No. 2 meter circuit plate as shown in the illustration.

8. REMOVE NO. 2 COMBINATION METER CASE

(a) Disengage the 2 guides to remove the No. 2 combination meter case.

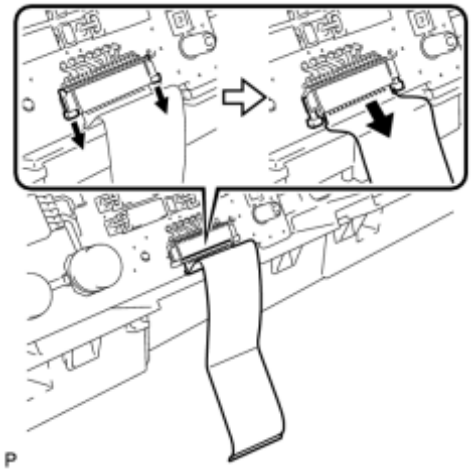


9. REMOVE NO. 1 METER LENS



(a) Disengage the 2 guides to remove the No. 1 meter lens.

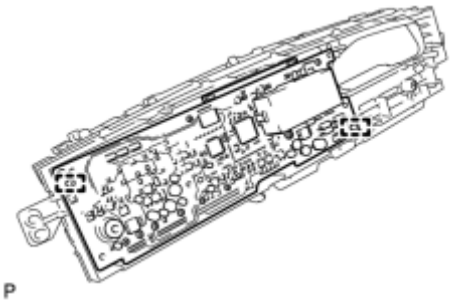
10. REMOVE NO. 4 METER CIRCUIT PLATE



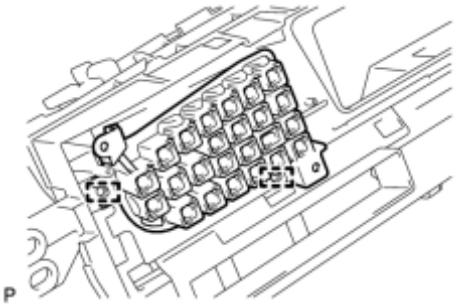
(a) Disconnect the connector to remove the No. 4 meter circuit plate as shown in the illustration.

11. REMOVE NO. 3 METER CIRCUIT PLATE

(a) Disengage the 2 guides to remove the No. 3 meter circuit plate.

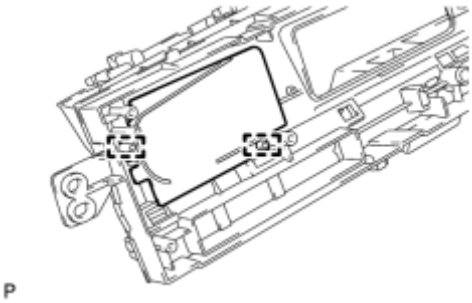


12. REMOVE COMBINATION METER CASE



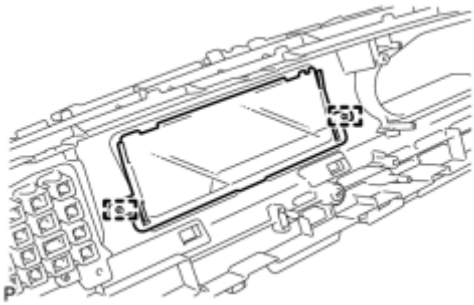
(a) Disengage the 2 guides to remove the combination meter case.

13. REMOVE NO. 2 METER LENS



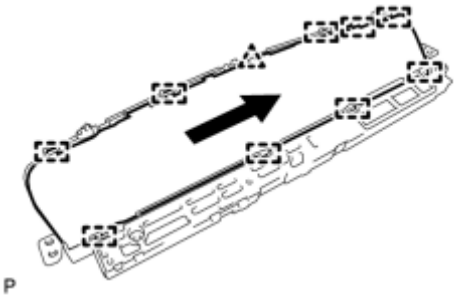
(a) Disengage the 2 guides to remove the No. 2 meter lens.

14. REMOVE NO. 3 METER LENS



(a) Disengage the 2 guides to remove the No. 3 meter lens.

15. REMOVE NO. 1 COMBINATION METER REFLECTOR



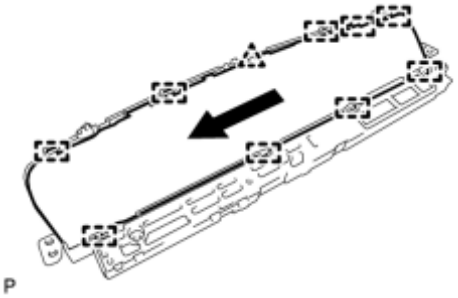

(a) Disengage the clip and 9 guides, and remove the No. 1 combination meter reflector as shown in the illustration.

16. REMOVE NO. 3 COMBINATION METER CASE

# REASSEMBLY

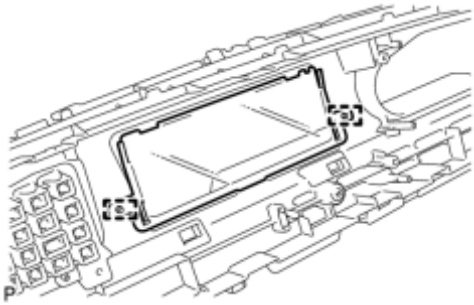
1. INSTALL NO. 3 COMBINATION METER CASE

2. INSTALL NO. 1 COMBINATION METER REFLECTOR



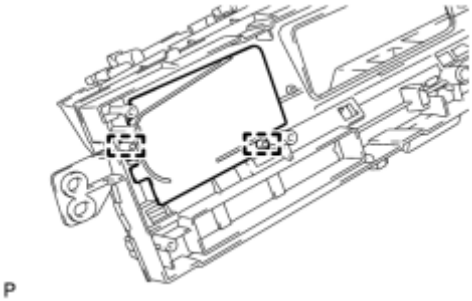
(a) Engage the clip and 9 guides to install the No. 1 combination meter reflector as shown in the illustration.

3. INSTALL NO. 3 METER LENS



(a) Engage the 2 guides to install the No. 3 meter lens.

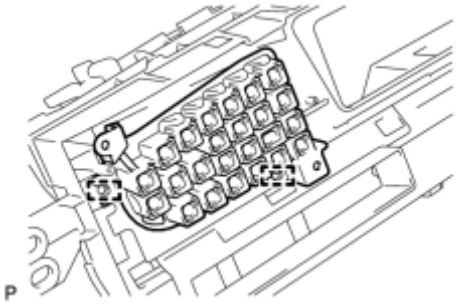
4. INSTALL NO. 2 METER LENS



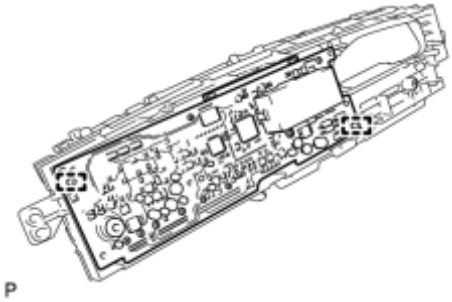
(a) Engage the 2 guides to install the No. 2 meter lens.

5. INSTALL COMBINATION METER CASE

(a) Engage the 2 guides to install the combination meter case.

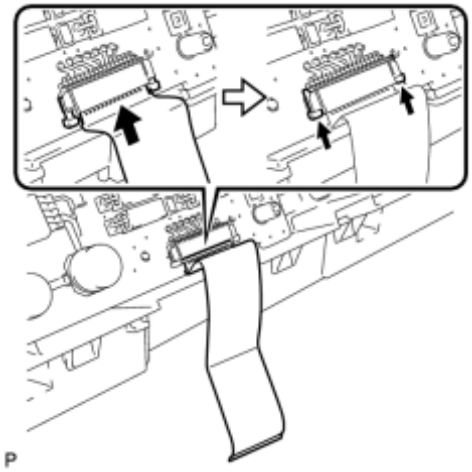


6. INSTALL NO. 3 METER CIRCUIT PLATE



(a) Engage the 2 guides to install the No. 3 meter circuit plate.

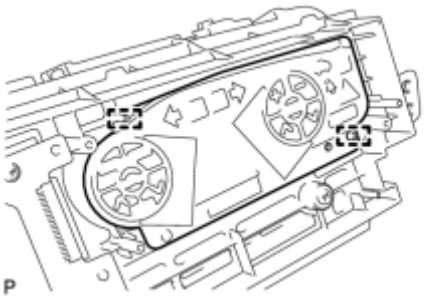
7. INSTALL NO. 4 METER CIRCUIT PLATE



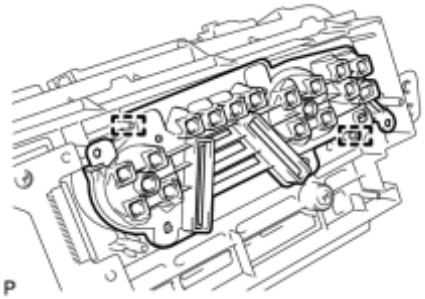
(a) Connect the connector to install the No. 4 meter circuit plate to the No. 3 meter circuit plate.

8. INSTALL NO. 1 METER LENS

(a) Engage the 2 guides to install the No. 1 meter lens.

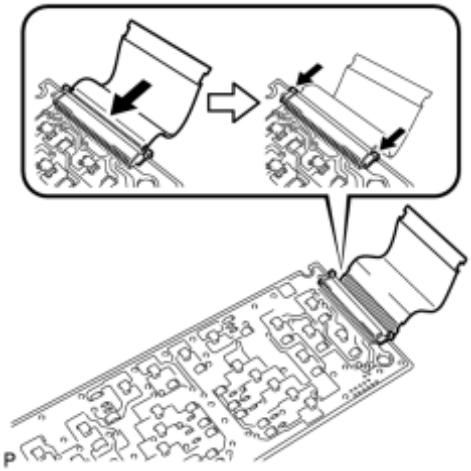


9. INSTALL NO. 2 COMBINATION METER CASE



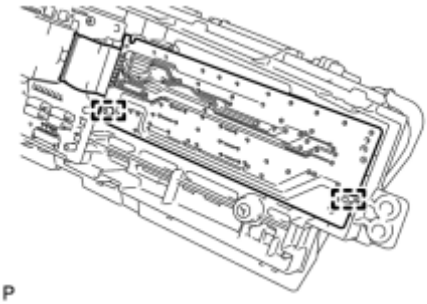
(a) Engage the 2 guides to install the No. 2 combination meter case.

10. INSTALL NO. 2 METER CIRCUIT PLATE

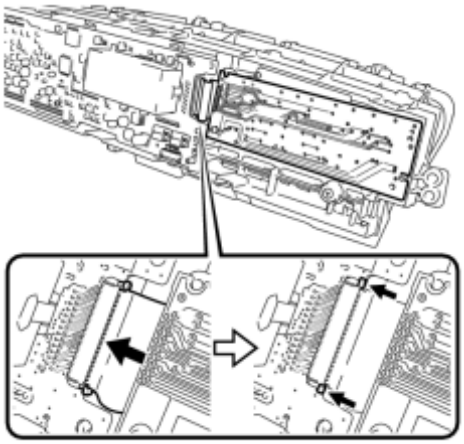


(a) Connect the connector to install the No. 5 meter circuit plate to the No. 2 meter circuit plate.

(b) Engage the 2 guides to install the No. 2 meter circuit plate.



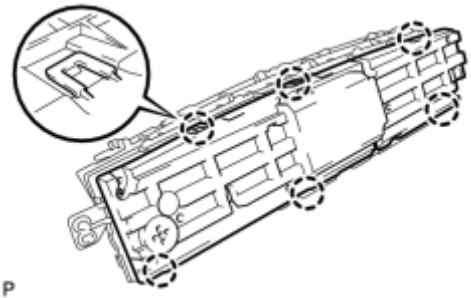
P



P

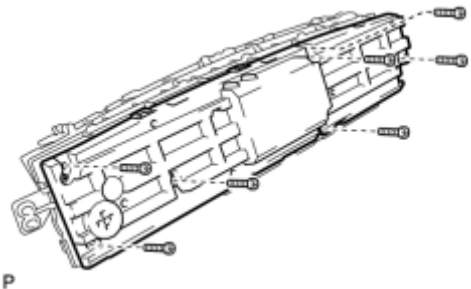
(c) Connect the connector as shown in the illustration.

11. INSTALL NO. 4 COMBINATION METER COVER



P

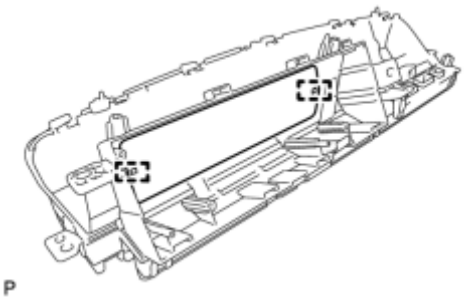
(a) Engage the 6 claws.



P

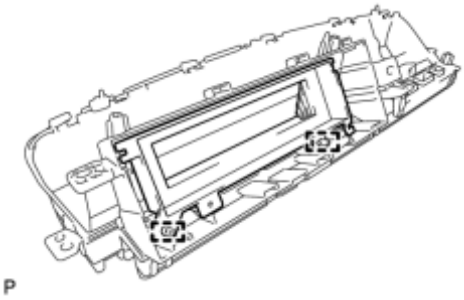
(b) Install the No. 4 combination meter cover with the 7 screws.

12. INSTALL NO. 1 COMBINATION METER COVER



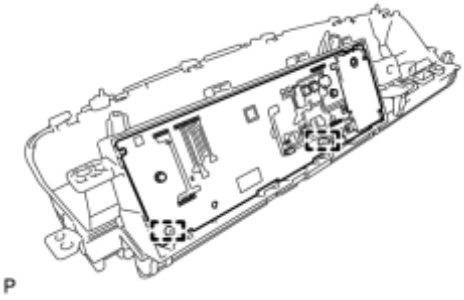

(a) Engage the 2 guides to install the No. 1 combination meter cover.

13. INSTALL NO. 2 COMBINATION METER COVER



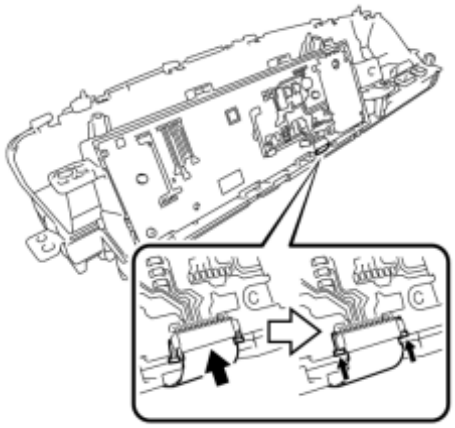

(a) Engage the 2 guides to install the No. 2 combination meter cover.

14. INSTALL METER CIRCUIT PLATE



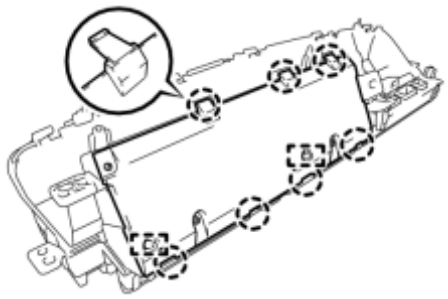

(a) Engage the 2 guides to install the meter circuit plate.

(b) Connect the connector as shown in the illustration.



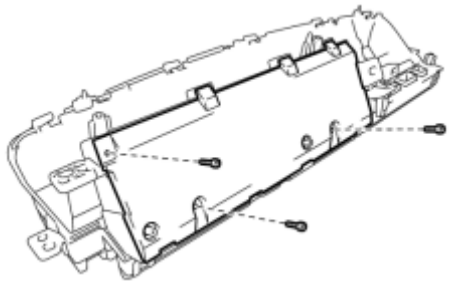
P

15. INSTALL NO. 3 COMBINATION METER COVER



P

(a) Engage the 7 claws and 2 guides.

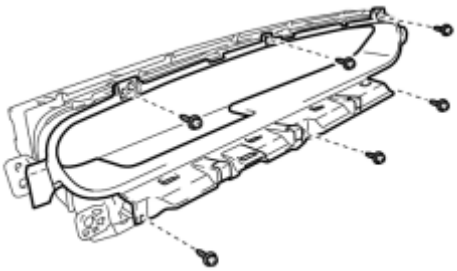


P

(b) Install the No. 3 combination meter cover with the 3 screws.

16. INSTALL INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY

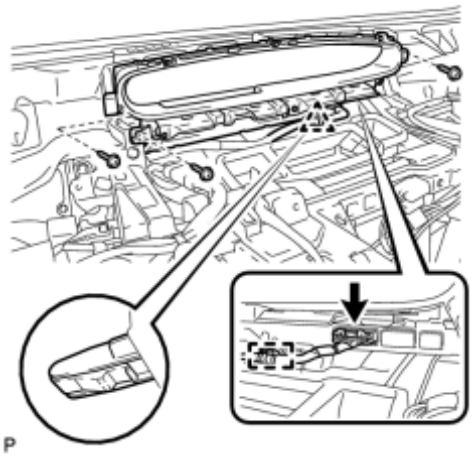
(a) Install the instrument panel finish panel sub-assembly with the 6 screws.



P

# INSTALLATION

1. INSTALL COMBINATION METER ASSEMBLY




(a) Engage the clip.

(b) Install the combination meter assembly with the 3 screws.

(c) Engage the clamp.

(d) Connect the connector.

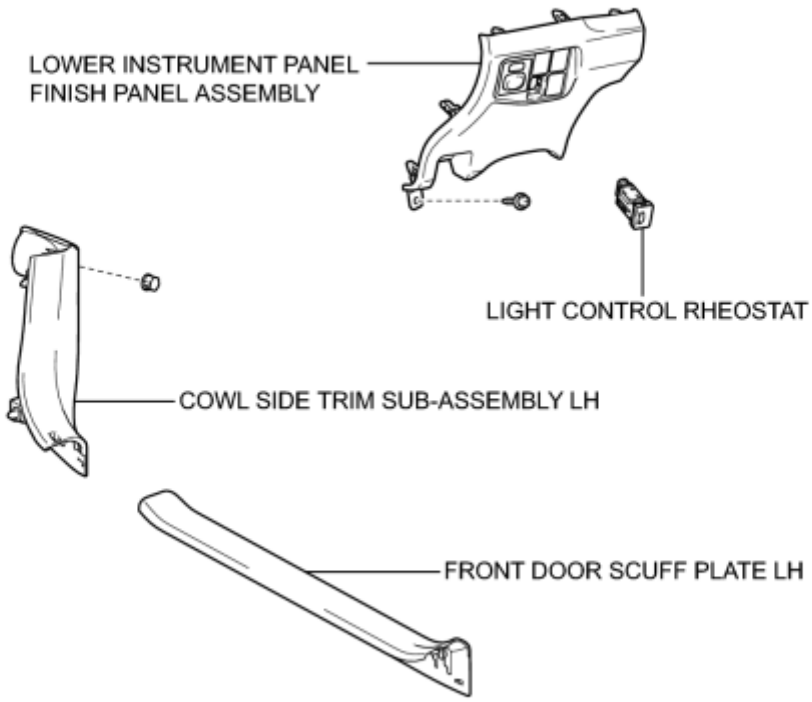
2. INSTALL NO. 1 HEATER TO REGISTER DUCT INFO

3. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

(a) Install the upper instrument panel assembly INFO.

# COMPONENTS

# ILLUSTRATION




P

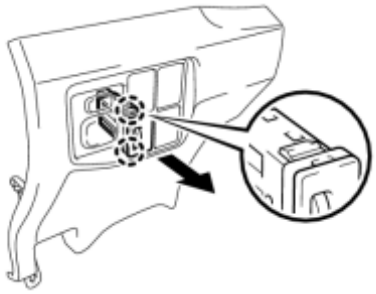
# REMOVAL

1. REMOVE FRONT DOOR SCUFF PLATE LH INFO

2. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

3. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

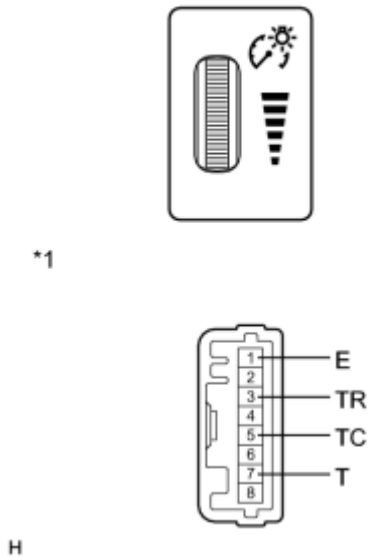
4. REMOVE LIGHT CONTROL RHEOSTAT




(a) Disengage the 2 claws to remove the light control rheostat.

# INSPECTION

1. INSPECT LIGHT CONTROL RHEOSTAT




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (E) - 3 (TR) | Turn the light control rheostat knob fully downwards (MIN.) | Below 50 Ω |
| 1 (E) - 3 (TR) | Light control rheostat knob position is between MIN. and MAX. | The value changes gradually (Between 0 to 12 kΩ |
| 1 (E) - 3 (TR) | Turn the light control rheostat knob fully upwards (MAX.) | 8 to 12 kΩ |
| 5 (TC) - 7 (T) | Light control rheostat knob position is except below | Below 50 Ω |
| 5 (TC) - 7 (T) | Turn the light control rheostat knob fully upwards (Tail cancel switch is on) | 8 to 12 kΩ |

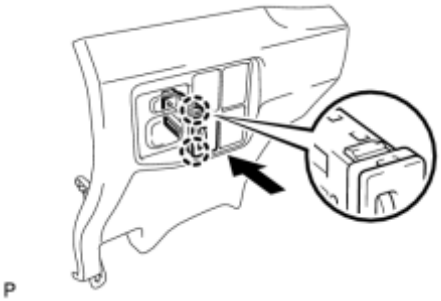
## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Light Control Rheostat) |

If the value is not as specified, replace the light control rheostat INFO.

# INSTALLATION

1. INSTALL LIGHT CONTROL RHEOSTAT



P

(a) Engage the 2 claws to install the light control rheostat.

2. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

4. INSTALL FRONT DOOR SCUFF PLATE LH INFO

# PRECAUTION

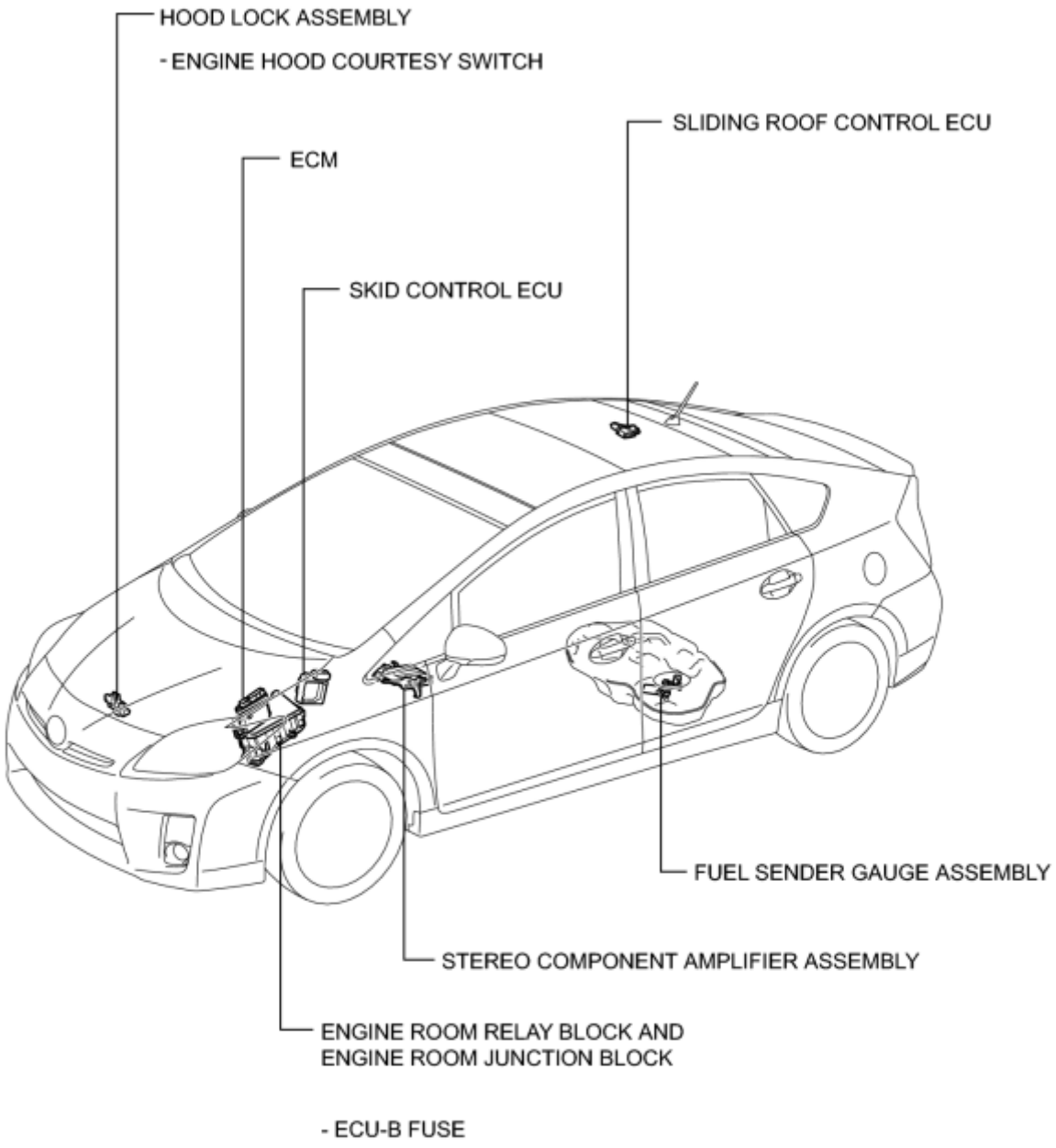
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

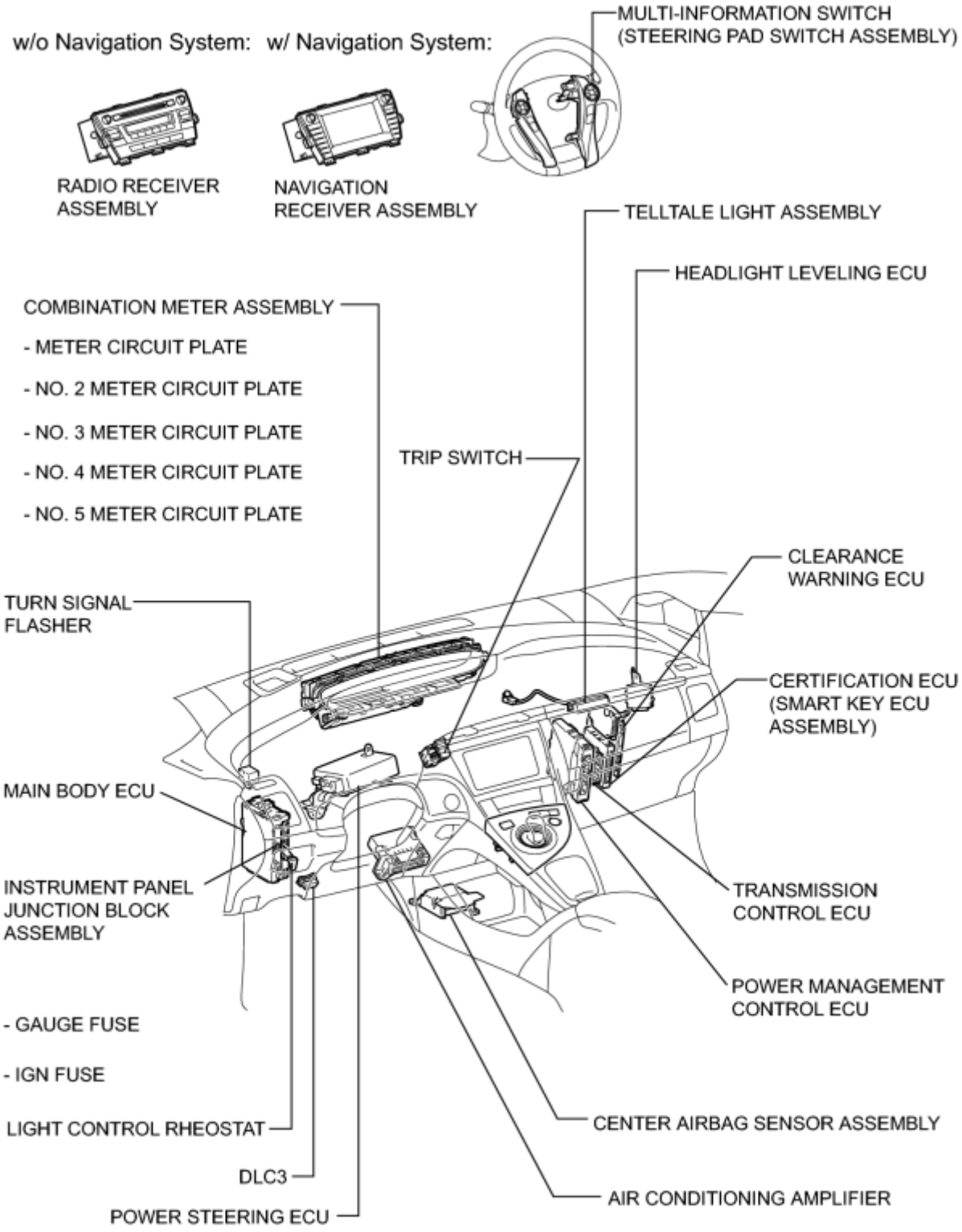
# PARTS LOCATION

# ILLUSTRATION



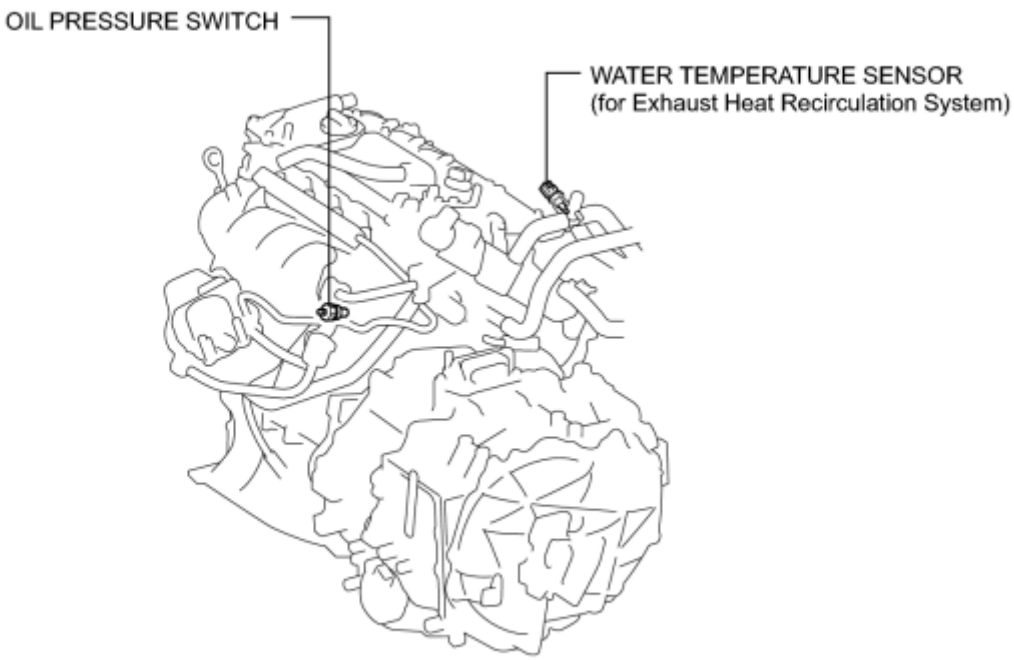

H

# ILLUSTRATION



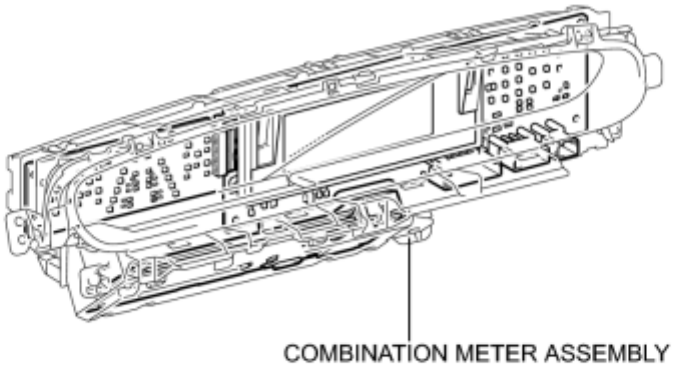

H

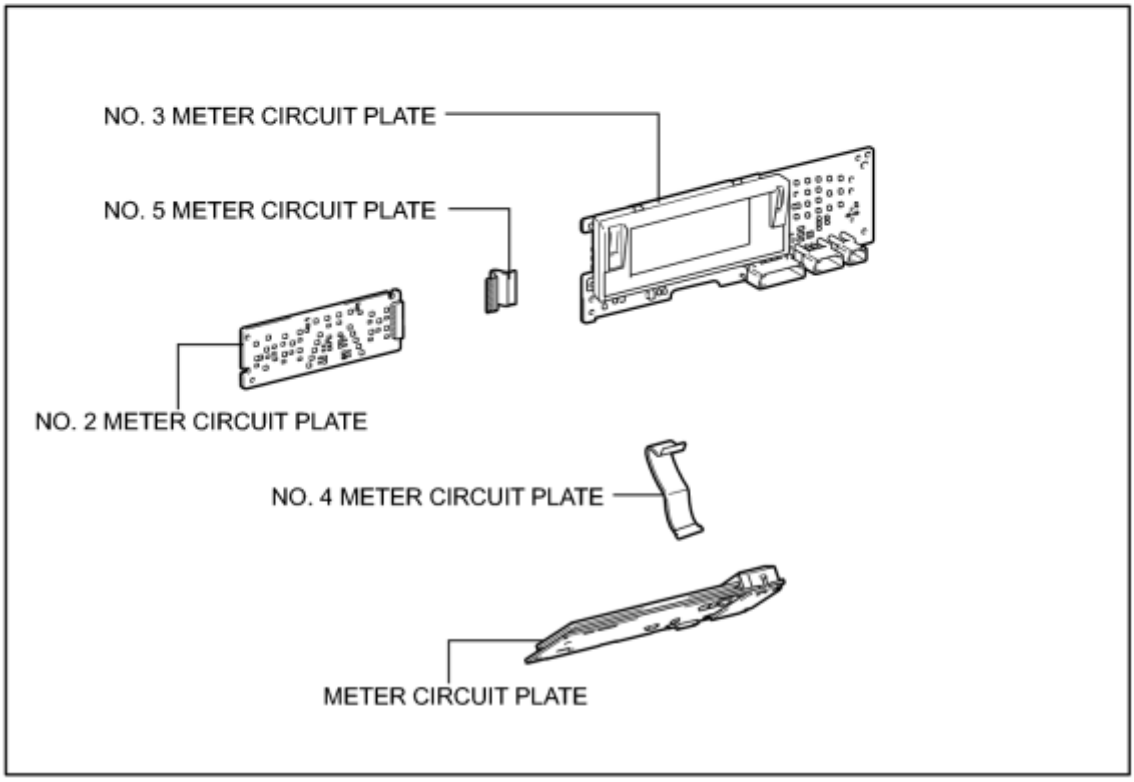
# ILLUSTRATION




H

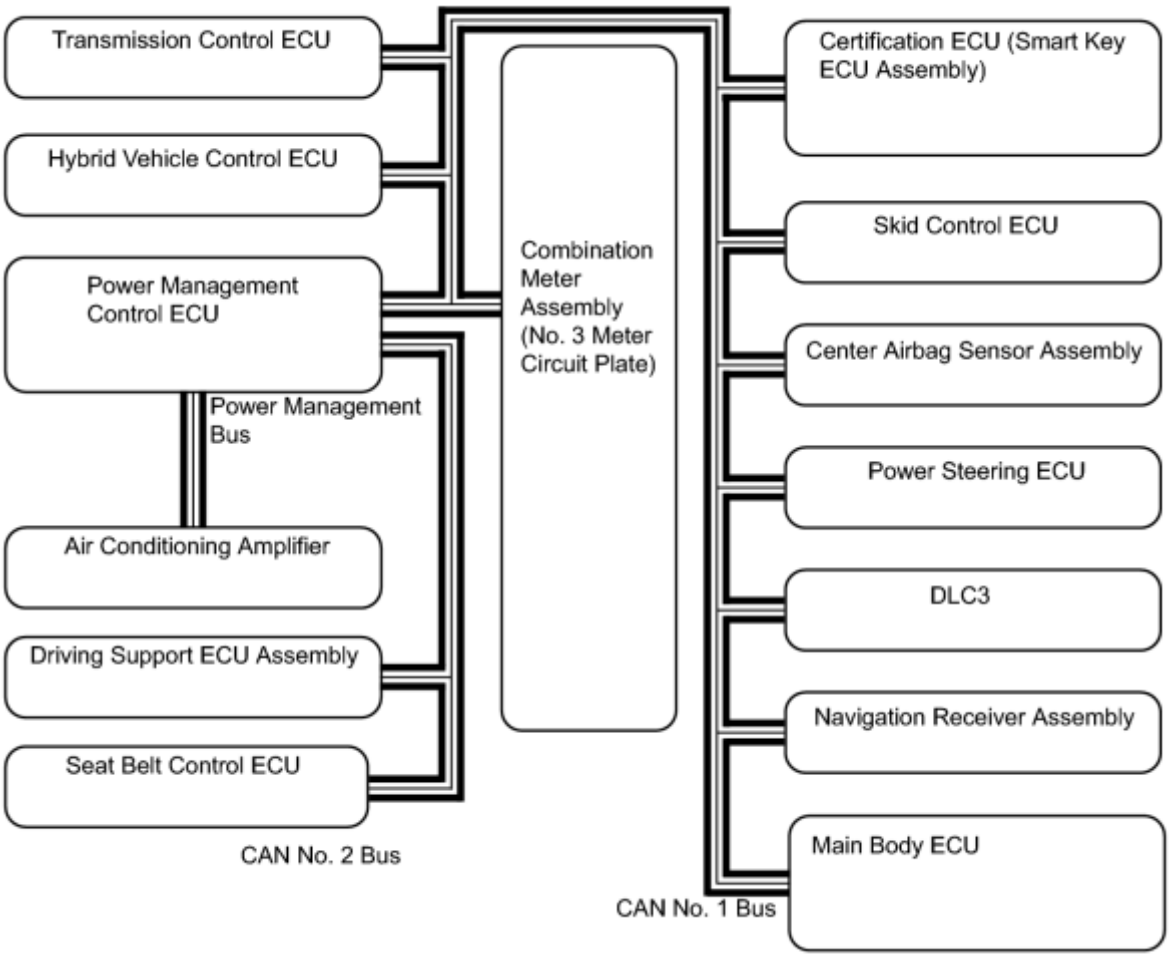
# ILLUSTRATION


COMBINATION METER ASSEMBLY

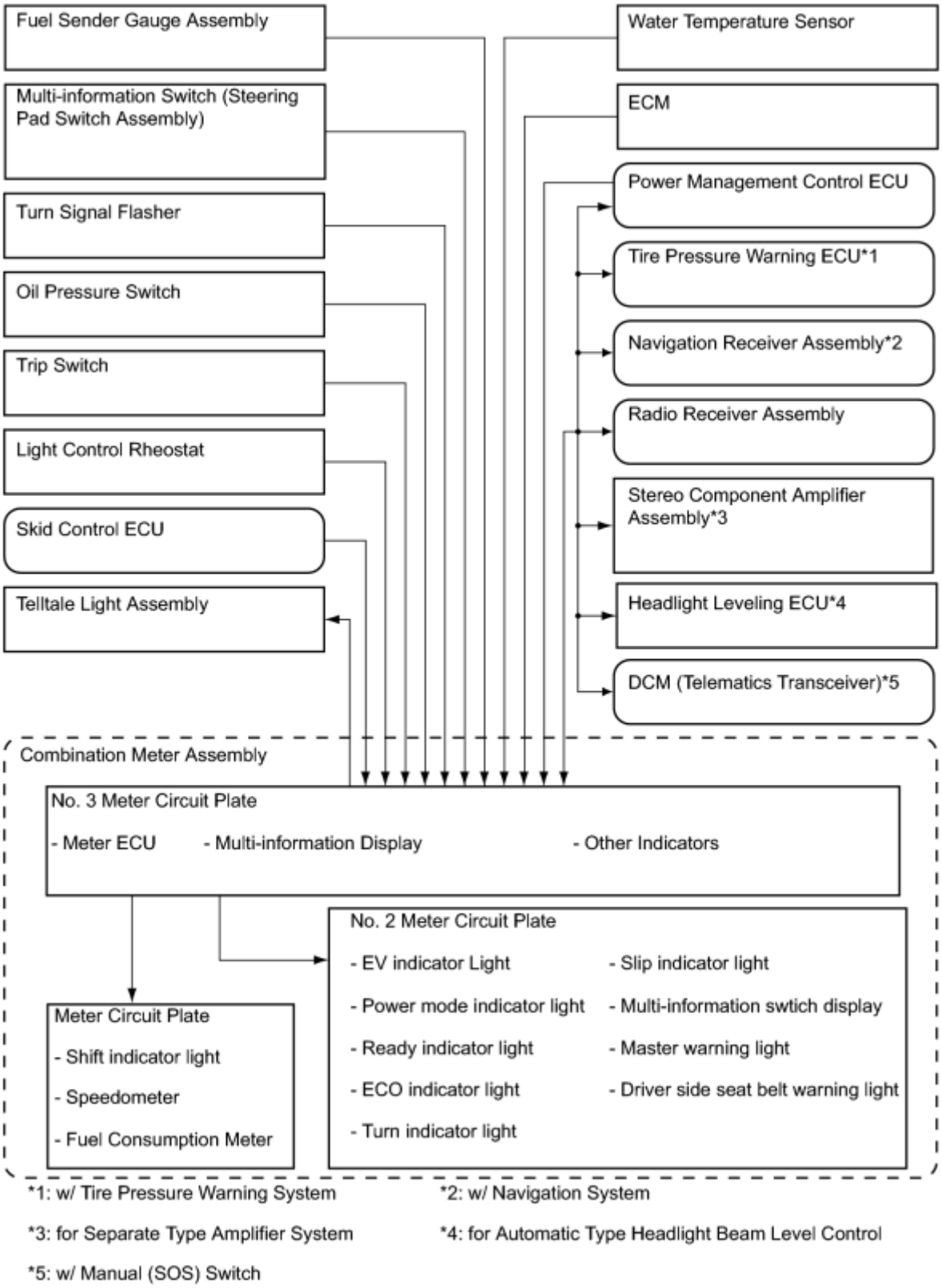

NO. 3 METER CIRCUIT PLATE
NO. 5 METER CIRCUIT PLATE
NO. 2 METER CIRCUIT PLATE
NO. 4 METER CIRCUIT PLATE
METER CIRCUIT PLATE

P

# SYSTEM DIAGRAM




: CAN Communication Line




*1: w/ Tire Pressure Warning System

*2: w/ Navigation System

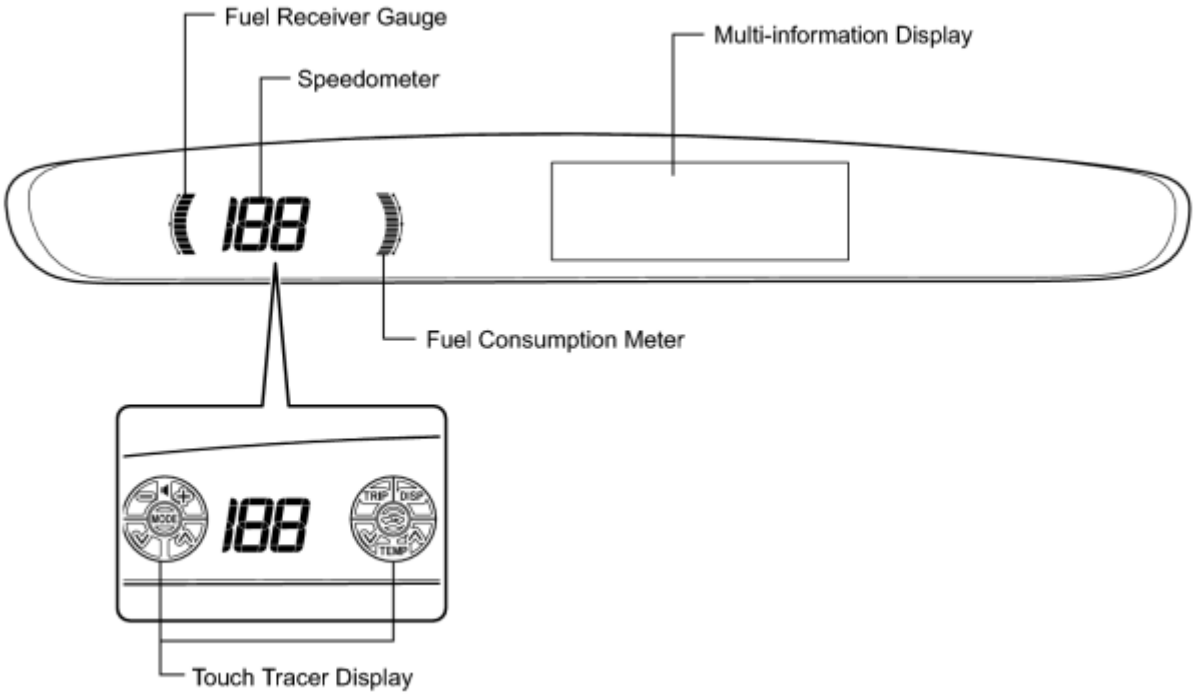
*3: for Separate Type Amplifier System

*4: for Automatic Type Headlight Beam Level Control

*5: w/ Manual (SOS) Switch

# SYSTEM DESCRIPTION

1. OUTLINE OF COMBINATION METER ASSEMBLY




H

2. INPUT AND OUTPUT SIGNALS OF COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

(a) Meter or Gauge

| Meter or Gauge | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Speedometer | Vehicle speed | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Fuel receiver gauge | Fuel level | Fuel Sender Gauge Assembly | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| ODO/TRIP meter | ODO/TRIP change | Multi-information Switch (Steering Pad Switch Assembly) | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Unit change | Trip switch | Direct Line | |
| | ODO | Skid Control ECU | CAN (CAN No. 1 Bus) | |

| Meter or Gauge | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Meter illumination | Illumination level | Light Control Rheostat | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Auto dimmer | Main Body ECU | CAN (CAN No. 1 Bus) | |
| | Tail cancel | Combination Meter Assembly (No. 3 Meter Circuit Plate) | CAN (CAN No. 1 Bus) | Main Body ECU |
| | Lounge illumination off | | | |
| | Illumination level | Combination Meter Assembly (No. 3 Meter Circuit Plate) | CAN (CAN No. 1 Bus) | Certification ECU (Smart Key ECU Assembly) |

(b) Warning or Indicator

| Warning or Indicator | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Coolant temperature hot warning light | Coolant temperature hot warning light | ECM | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Coolant hot warning light | Water Temperature Sensor | Direct Line | |
| Turn indicator light | Turn indicator light | Turn Signal Flasher | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Fuel level warning light | Fuel level | Fuel Sender Gauge Assembly | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Brake warning light | Brake warning light | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Parking brake switch | Main Body ECU | CAN (CAN No. 1 Bus) | |
| Electrically controlled brake warning light | Electrically controlled brake warning | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| SRS warning light | SRS warning light | Center Airbag Sensor Assembly | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Open door warning light | Each door courtesy switch | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Charge warning light | Charge warning light | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| MIL (Check engine warning light) | MIL (Check engine warning light) | ECM | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |

| Warning or Indicator | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Driver side seat belt warning light | Driver side seat belt buckle switch | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| ABS warning light | ABS warning light | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EPS warning light | EPS warning light | Power Steering ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| SET indicator light | SET indicator light | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| LKA indicator light*1 | LKA indicator light | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Headlight leveling indicator light*2 | Headlight leveling indicator light | Headlight Leveling ECU | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Head indicator light*3 | Head indicator light | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Tail indicator light*4 | Taillight | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Slip indicator light | Slip indicator | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Cruise main indicator light | Cruise main indicator | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Cruise main indicator light | Cruise main indicator (Constant speed control mode) | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Cruise main indicator (Vehicle-to-vehicle distance control mode)*5 | | | |
| Shift position indicator | Shift position | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Power mode indicator light | Power mode indicator light | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| PCS warning light*6 | PCS warning | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 |

| Warning or Indicator | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| | | | | Meter Circuit Plate) |
| Tire pressure warning light*7 | Tire pressure warning | Tire Pressure Warning ECU | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Front fog indictor light | Front fog indicator | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Security indicator light | Security indicator light | Certification ECU (Smart Key ECU Assembly) | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| ECO mode indicator light | ECO mode indicator | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV indicator light | EV indicator | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Ready indicator light | Ready indicator | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Master warning light | Each system warning | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | | Power Steering ECU | | |
| | | Certification ECU (Smart Key ECU Assembly) | | |
| | | Center Airbag Sensor Assembly | | |
| | | Power Management Control ECU | | |
| | | Main Body ECU | | |
| | | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | |
| | | Headlight Leveling ECU | | |
| | | Tire Pressure Warning ECU*7 | CAN (CAN MS Bus) | |

- *1: w/ Lane-keeping Assist System
- *2: w/ Automatic Type Headlight Beam Level Control
- *3: for U.S.A.
- *4: except U.S.A.
- *5: w/ Dynamic Radar Cruise Control System
- *6: w/ Pre-collision System
- *7: w/ Tire Pressure Warning System

(c) Cruise Information Display

| Cruise Information Display | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Average fuel consumption (1 minute/5 minutes) | Fuel injection | ECM | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Vehicle speed | Skid Control ECU | CAN (CAN No. 1 Bus) | |
| | ODO | | | |
| | Multi-information switch | Multi-information Switch (Steering Pad Switch Assembly) | Direct Line | |
| Average vehicle speed | Vehicle speed | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | ODO | | | |
| | Multi-information switch | Multi-information Switch (Steering Pad Switch Assembly) | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Average fuel consumption after power switch on | Fuel injection | ECM | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Vehicle speed | Skid Control ECU | Direct Line | |
| | ODO | | CAN (CAN No. 1 Bus) | |
| | Multi-information switch | Multi-information Switch (Steering Pad Switch Assembly) | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Hybrid System Indicator | Eco-zone indicator level | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| ECO Driving Indicator Light | Ecology Lamp Indicator signal | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Power mode indicator status | | | |
| | EV indicator | | | |
| | Shift position | | | |
| | Motor inverter high temperature warning | | | |
| | Hybrid system warning | | | |
| | Vehicle speed signal | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Lowest fuel consumption | Engine speed | ECM | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Fuel injection | | | |
| | Vehicle speed | Skid Control ECU | Direct Line | |

| Cruise Information Display | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| | Vehicle speed | | CAN (CAN No. 1 Bus) | |
| Driving range | Engine speed | ECM | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Fuel injection | | | |
| | Engine variation | | | |
| | Vehicle speed | Skid Control ECU | Direct Line | |
| | Vehicle speed | | CAN (CAN No. 1 Bus) | |
| | Destination | Main Body ECU | CAN (CAN No. 1 Bus) | |
| | Fuel level | Fuel Sender Gauge Assembly | Direct Line | |
| Multi-information display change | Multi-information switch | Multi-information Switch (Steering Pad Switch Assembly) | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Energy flow display | Energy flow | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |

(d) Multi-information Display Message

| Multi-information Display Message | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Multi-information display change | Multi-information switch | Multi-information switch (Steering Pad Switch Assembly) | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Brake! message | Brake! message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Maintenance mode message | Maintenance mode message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Certification mode message | Certification mode message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Adjusting LKA camera message*1 | Adjusting LKA camera message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |

| Multi-information Display Message | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Check LKA system message*1 | Check LKA system message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| LKA not available message*1 | LKA not available message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Clean radar sensor message*2 | Clean radar sensor message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Adjusting front radar beam message*2 | Adjusting front radar beam message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Checking cruise control C/D message | Checking cruise control C/D message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Checking cruise control brake message | Checking cruise control brake message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Cruise not available message | Cruise not available message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Check PCS system message*3 | Check PCS system message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| PCS temporary not available message*3 | PCS temporary not available message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Precrash brake OFF message*3 | Precrash brake OFF message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Check cruise control system message | Check cruise control system message | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Auto power off to | Auto power off to conserve | Power | CAN (CAN No. | Combination |

| Multi-information Display Message | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| conserve battery message | battery message | Management Control ECU | 1 Bus) | Meter Assembly (No. 3 Meter Circuit Plate) |
| Turn power off message | Turn power off message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Shift to [P] position message | Shift to [P] position message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | | Certification ECU (Smart Key ECU Assembly) | | |
| Shift to [P] position when parked message | Shift to [P] position when parked message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Low traction battery HV battery is not charged in neutral N message | Low traction battery HV battery is not charged in neutral N message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| [P] lock malfunction when parking. Park in flat place and apply parking brake securely message | [P] lock malfunction when parking. Park in flat place and apply parking brake securely message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | | Transmission Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Check hybrid system message | Check hybrid system message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Check stop light system message | Check stop light system message | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Engine oil pressure low message | Engine oil pressure low message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | | Oil Pressure Switch | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |

| Multi-information Display Message | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Shift to [P] position and push power switch turn off message | Shift to [P] position and push power switch turn off message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Key detected in vehicle message | Key detected in vehicle message | Certification ECU (Smart Key ECU Assembly) | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Depress brake pedal, touch power switch with key message | Depress brake pedal, touch power switch with key message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Depress brake pedal and push power switch to start message | Depress brake pedal and push power switch to start message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Shift to [P] position to start message | Shift to [P] position to start message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Key battery low message | Key battery low message | Certification ECU (Smart Key ECU Assembly) | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Key not detected message | Key not detected message | Certification ECU (Smart Key ECU Assembly) | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Hybrid system overheat message | Hybrid system overheat message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Check headlight system message | Check headlight system message | Headlight Leveling ECU Assembly | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Oil maintenance required soon message*4 | ODO | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Oil maintenance required message*4 | ODO | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Resetting oil | ODO | Skid Control ECU | CAN (CAN No. | Combination |

| Multi-information Display Message | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| maintenance data message*4 | | | 1 Bus) | Meter Assembly (No. 3 Meter Circuit Plate) |
| Oil maintenance reset unfinished message*4 | ODO | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode currently not available message | EV mode currently not available message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode currently not available warming up message | EV mode currently not available warming up message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode currently not available low battery message | EV mode currently not available low battery message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode currently not available excessive speed message | EV mode currently not available excessive speed message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode currently not available excessive acceleration message | EV mode currently not available excessive acceleration message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode deactivated message | EV mode deactivated message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode deactivated not low battery message | EV mode deactivated not low battery message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode deactivated excessive speed message | EV mode deactivated excessive speed message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| EV mode deactivated excessive acceleration message | EV mode deactivated excessive acceleration message | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |

- *1: w/ Lane-keeping Assist System

- *2: w/ Dynamic Radar Cruise Control System
- *3: w/ Pre-collision System
- *4: for U.S.A.

(e) Buzzer

| Buzzer | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Key reminder buzzer | Driver side door courtesy switch | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Power switch | | | |
| Shift down reject buzzer | Shift down reject buzzer | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Seat belt warning buzzer | Driver side seat belt buckle switch | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Front passenger side door courtesy switch | | | |
| | Driver side door courtesy switch | | | |
| | Parking brake switch | | | |
| | Front passenger side seat belt buckle switch | Center Airbag Sensor Assembly | CAN (CAN No. 1 Bus) | |
| | Shift position R | Power Management Control ECU | CAN (CAN No. 1 Bus) | |
| | Shift position P | | | |
| | Vehicle speed | Skid Control ECU | CAN (CAN No. 1 Bus) | |
| Driving with any door opened warning buzzer | Vehicle speed | Skid Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Each door courtesy switch | Main Body ECU | | |
| Smart key warning buzzer | Power switch | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Engine immobiliser certification buzzer | Certification complete | Certification ECU (Smart Key ECU Assembly) | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Driving with parking brake unreleased warning buzzer | Parking brake switch | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Vehicle speed | Skid Control ECU | CAN (CAN No. 1 Bus) | |
| Sliding roof open warning*1 | Sliding roof open warning buzzer request | Main Body ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| Dynamic radar cruise control low speed | Dynamic radar cruise control low speed | Driving Support ECU Assembly | CAN (CAN No. 2 Bus) | Combination Meter Assembly (No. 3 |

| Buzzer | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| cancel buzzer*2 | cancel | | | Meter Circuit Plate) |
| NDB warning buzzer | NDB warning buzzer | Power Management Control ECU | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |

- *1: w/ Sliding Roof
- *2: w/ Dynamic Radar Cruise Control System

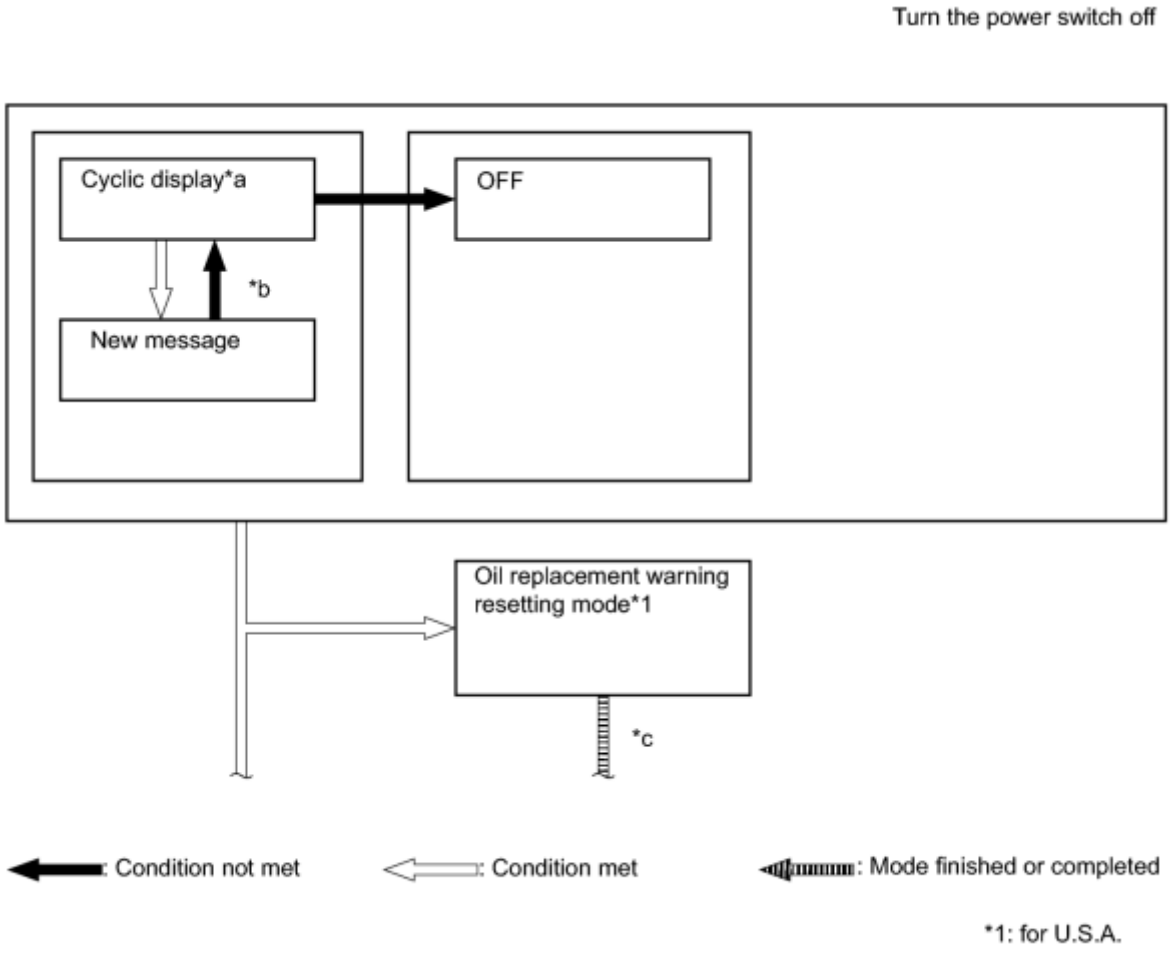
(f) Others

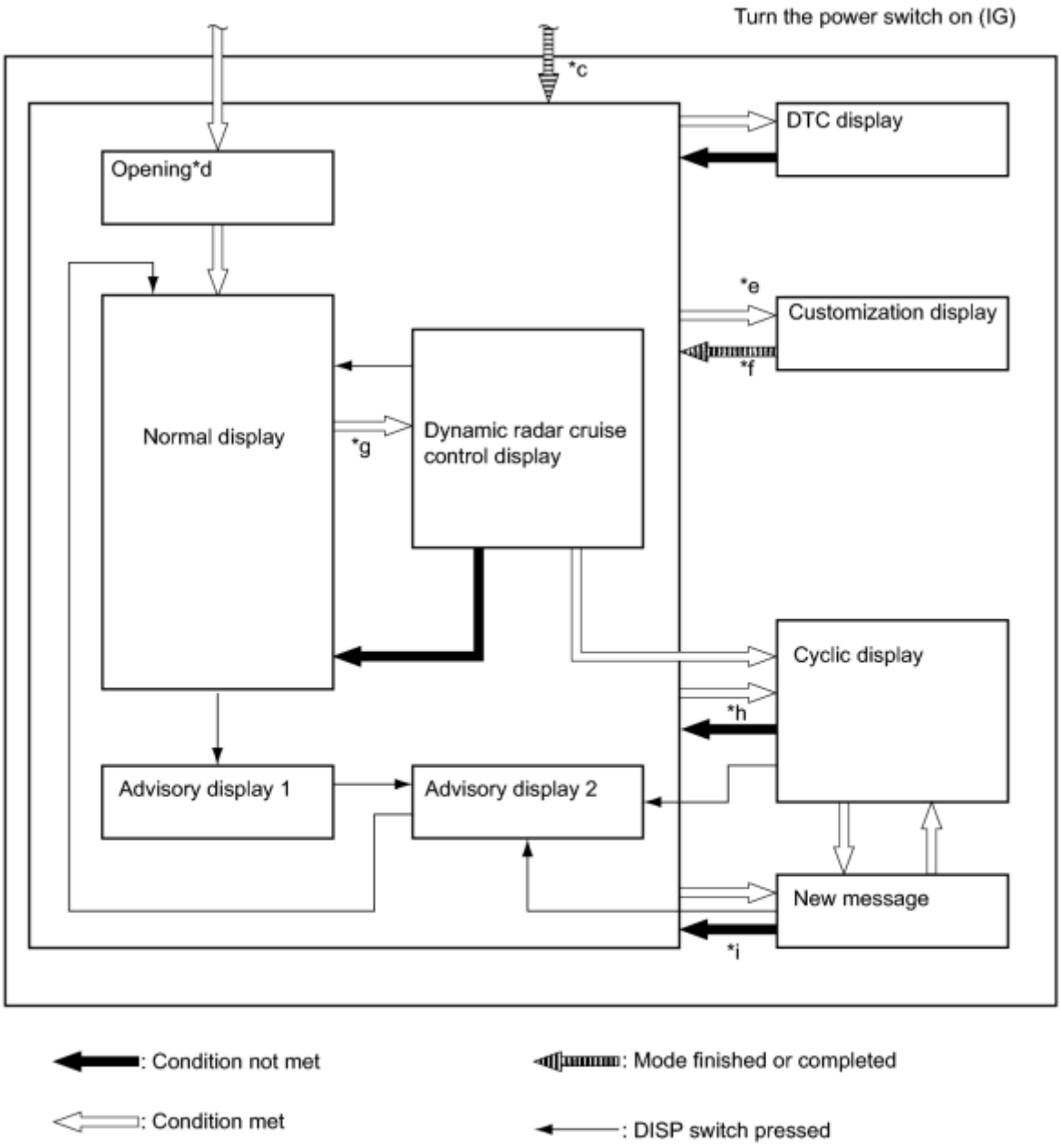
| Signal | Communication Signal | Sender | Communication Line | Receiver |
|---|---|---|---|---|
| Vehicle speed signal | Vehicle speed | Skid Control ECU | Direct Line | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Vehicle speed | Combination Meter Assembly (No. 3 Meter Circuit Plate) | Direct Line | Radio Receiver Assembly |
| | | | | Navigation Receiver Assembly*1 |
| | | | | Stereo Component Amplifier Assembly*2 |
| | | | | Power Management Control ECU |
| | | | | Tire Pressure Warning ECU*3 |
| | | | | Headlight Leveling ECU Assembly*4 |
| | | | | DCM (Telematics Transceiver)*5 |
| Front passenger side seat belt warning light | Front passenger side seat belt buckle switch | Center Airbag Sensor Assembly | CAN (CAN No. 1 Bus) | Combination Meter Assembly (No. 3 Meter Circuit Plate) |
| | Front passenger side seat belt warning light | Combination Meter Assembly (No. 3 Meter Circuit Plate) | Direct Line | Telltale Light Assembly |

- *1: w/ Navigation System
- *2: for Separate Type Amplifier System
- *3: w/ Tire Pressure Warning System
- *4: for Automatic Type Headlight Beam Level Control
- *5: w/ Manual (SOS) Switch

3. MULTI-INFORMATION DISPLAY FLOW CHART

(a) Multi-information display flow chart






Display Shifting Condition:

| No. | Display Shifting Condition |
|---|---|
| *a | Display cycles between messages. |
| *b | Conditions are not met and all new messages have been displayed. |
| *c | Mode has completed or reset mode is interrupted. |
| *d | If the power switch turned off, then on (IG) during the opening, then the opening display will be shown |

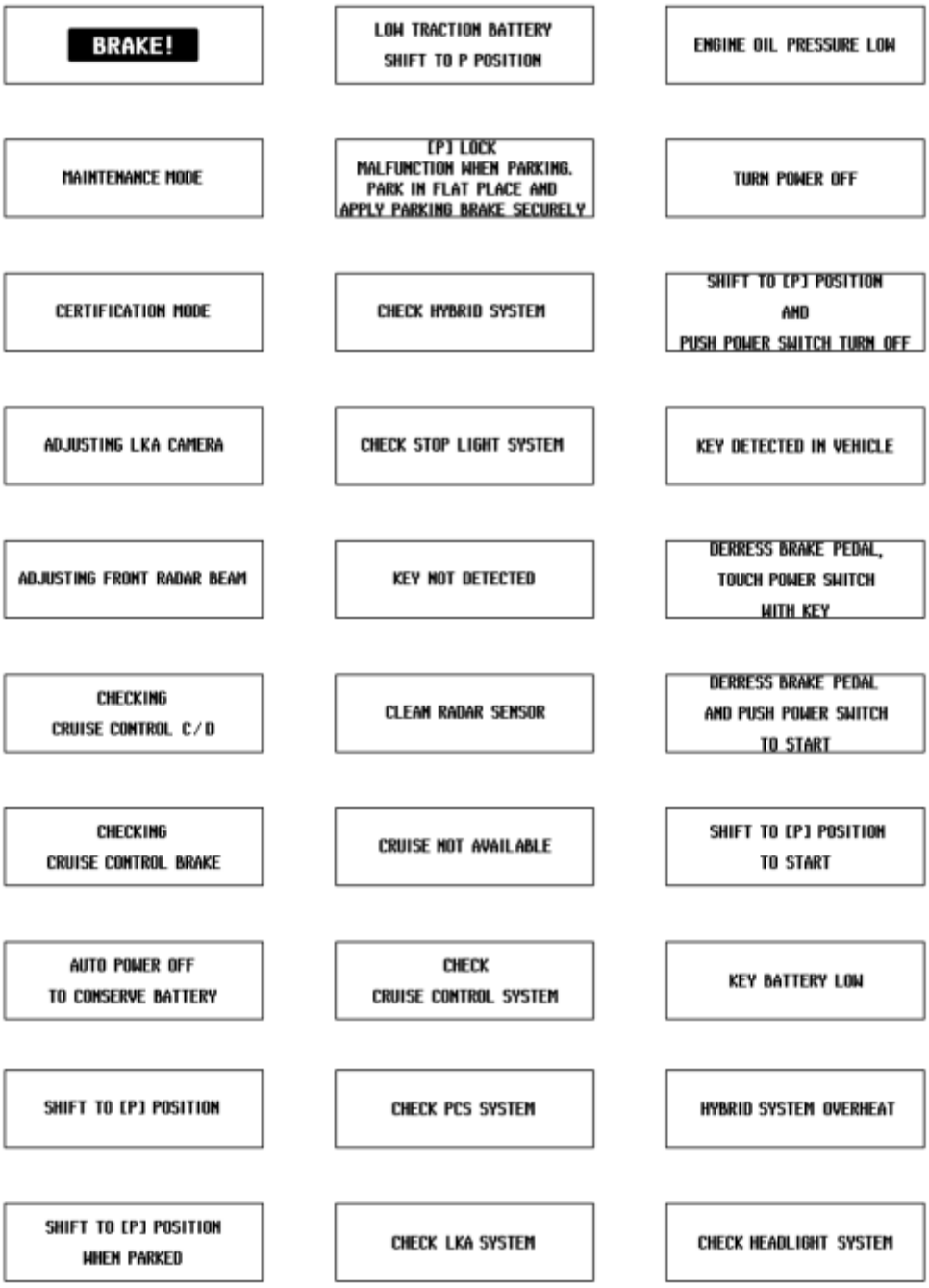
| No. | Display Shifting Condition |
|---|---|
| | from the beginning. |
| *e | Conditions are met and vehicle speed is less than 8 km/h (5 mph). |
| *f | Conditions for displaying new messages other than the door open warning are met, or the vehicle speed is more than 8 km/h (5 mph). |
| *g | Mode has completed and conditions for dynamic radar cruise display are met. |
| *h | Up or down switch is not operated for more than 6 seconds. |
| *i | The advisory display will be shown as the last of the normal displays. |

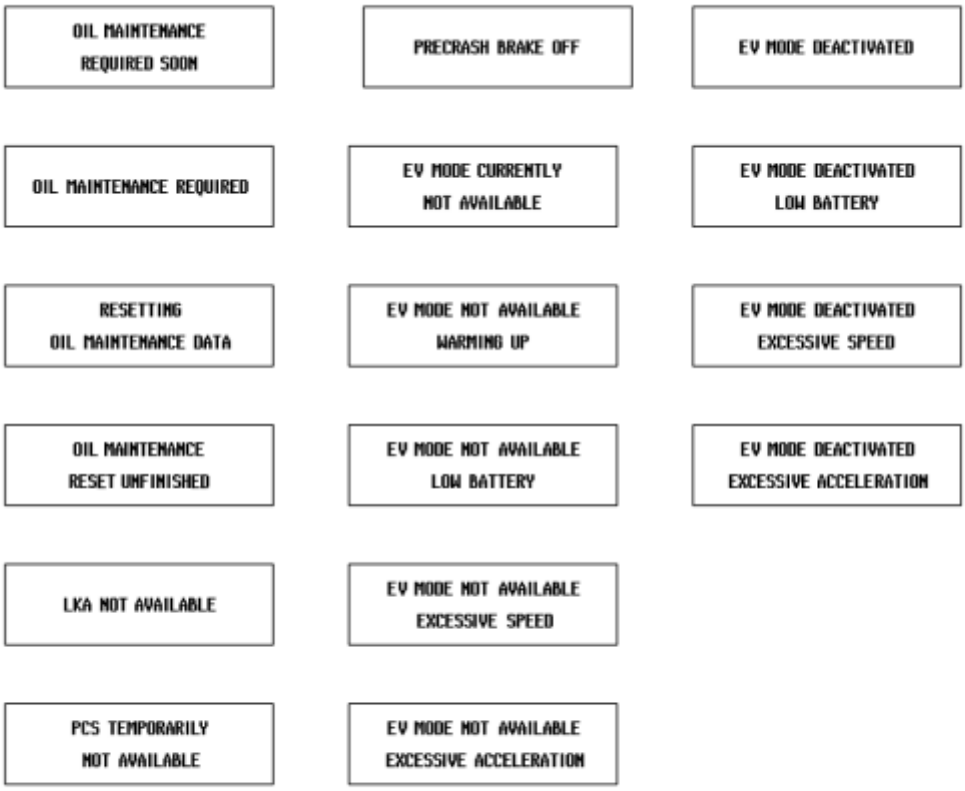
4. EACH WARNING DISPLAY

(a) Each warning display for combination meter assembly

HINT:

Illustrations may differ from the actual screen displayed depending on the specifications of the vehicle.


BRAKE!
LOW TRACTION BATTERY
SHIFT TO P POSITION
ENGINE OIL PRESSURE LOW
MAINTENANCE MODE
[P] LOCK
MALFUNCTION WHEN PARKING.
PARK IN FLAT PLACE AND
APPLY PARKING BRAKE SECURELY
TURN POWER OFF
CERTIFICATION MODE
CHECK HYBRID SYSTEM
SHIFT TO [P] POSITION
AND
PUSH POWER SWITCH TURN OFF
ADJUSTING LKA CAMERA
CHECK STOP LIGHT SYSTEM
KEY DETECTED IN VEHICLE
ADJUSTING FRONT RADAR BEAM
KEY NOT DETECTED
DEPRESS BRAKE PEDAL,
TOUCH POWER SWITCH
WITH KEY
CHECKING
CRUISE CONTROL C/D
CLEAN RADAR SENSOR
DEPRESS BRAKE PEDAL
AND PUSH POWER SWITCH
TO START
CHECKING
CRUISE CONTROL BRAKE
CRUISE NOT AVAILABLE
SHIFT TO [P] POSITION
TO START
AUTO POWER OFF
TO CONSERVE BATTERY
CHECK
CRUISE CONTROL SYSTEM
KEY BATTERY LOW
SHIFT TO [P] POSITION
CHECK PCS SYSTEM
HYBRID SYSTEM OVERHEAT
SHIFT TO [P] POSITION
WHEN PARKED
CHECK LKA SYSTEM
CHECK HEADLIGHT SYSTEM




5. LED INITIAL CHECK

(a) Check the illumination function of the warning or indicator lights listed below when turning the power switch on (IG).

OK:

| Warning or Indicator Light | Specified Condition |
|---|---|
| PCS*1, Tire pressure*2, ECO mode, Master, Coolant temperature hot | Warning or indicator light comes on for about 3 seconds after turning the power switch on (IG). |
| SRS | Warning light comes on for about 6 seconds after turning the power switch on (IG). |
| Charge, MIL (Check engine), EPS, | Indicator or warning light comes on when turning the power switch on (IG) before hybrid system starts. |
| Brake, ABS, Slip, Electrically controlled brake | • Indicator or warning light comes on when turning the power switch on (IG) before hybrid system starts.*3<br>• Indicator or warning light comes on when turn the power switch off to on (READY) for 3 seconds, then goes off. |

- *1: w/ Pre-collision System

- *2: w/ Tire Pressure Warning System
- *3: When turning the power switch on (IG), if it takes 3 seconds or more for the READY indicator light to illuminate, the warning or indicator light turns off right after the READY indicator light illuminates.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Perform troubleshooting according to the following flow chart.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

NEXT

| | |
|---|---|
| 3. | CHECK CAN COMMUNICATION SYSTEM* |

(a) Check for DTC output INFO.

Result:

| Result | Proceed to |
|---|---|
| No CAN DTC is output | A |
| CAN DTC is output | B |

B INFO GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 4. | PROBLEM SYMPTOM CONFIRMATION |

NEXT

| | |
|---|---|
| 5. | SYMPTOM SIMULATION |

NEXT

| | |
|---|---|
| 6. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

NEXT

| | |
|---|---|
| 7. | CIRCUIT INSPECTION |

NEXT

| | |
|---|---|
| 8. | REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 9. | CONFIRMATION TEST |

NEXT **END**

# CUSTOMIZE PARAMETERS

1. METER/GAUGE SYSTEM

(a) Combination Meter

NOTICE:

- Be sure to record the current value before customizing.

HINT:

The following items can be customized using the Techstream.

***Warning***

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Key Remind Sound | Slow | Function to change the cycle of the key reminder buzzer | Normal, Fast or Slow |
| Driver Side Seatbelt Warning Buzzer*1 | ON | Function to turn on/off the seat belt warning buzzer | ON or OFF |
| Front Passenger Side Seatbelt Warning Buzzer*1 | ON | Function to turn on/off the seat belt warning buzzer | ON or OFF |
| Rear Seatbelt Warning Buzzer*2 | ON | Function to turn on/off the rear seat belt warning buzzer | ON or OFF |
| Reverse Buzzer | Continual | Function to change the type of the reverse warning buzzer | Single or Continual |

- *1: This setting is only valid for the buzzer which sounds at 20 km/h (12 mph) or more.
- *2: w/ Rear Seat Belt Warning

# INITIALIZATION

1. OIL MAINTENANCE WARNING RESETTING PROCEDURE

HINT:

The ODO/TRIP change switch is located on the left side of the multi-information switch (steering pad switch assembly).

(a) Turn the power switch on (IG).

(b) Press the ODO/TRIP change switch until the TRIP A meter appears.

(c) Turn the power switch off.

(d) Turn the power switch on (IG) while pressing and holding the unit change switch. Hold the unit change switch until the following conditions are met and 5 seconds have elapsed.

(1) The TRIP A meter shows "-----".

(2) The TRIP A meter shows "COMPLETE".

(3) The master warning light illuminates.

(4) When "COMPLETE" disappears and the master warning light turns off, the resetting procedure is complete.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptom are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Entire System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Entire combination meter assembly does not operate. | Power Source Circuit | INFO |
| Meter illumination is always dark. | Meter Illumination Circuit | INFO |
| Meter illumination does not dim at night. | Meter Illumination Circuit | INFO |
| Operating light control rheostat does not change light brightness. | Light Control Rheostat Circuit | INFO |
| Trip switch malfunction | Trip Switch Circuit | INFO |

### *Meter or Gauge*

| Symptom | Suspected Area | See page |
|---|---|---|
| Speedometer malfunction | Speedometer Circuit | INFO |
| Fuel receiver gauge malfunction | Fuel Receiver Gauge Circuit | INFO |

### *Warning Light or Indicator Light*

| Symptom | Suspected Area | See page |
|---|---|---|
| Hybrid System Indicator malfunction | Power Management Control ECU | - |
| | CAN Communication System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| High beam indicator light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Lighting System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Turn indicator light malfunction | Lighting System | INFO |
| | Wire Harness or Connector | - |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Fuel level warning light does not come on. | Combination Meter Assembly (LED) | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Wire Harness or Connector | - |
| | Fuel Sender Gauge Assembly | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Brake warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Main Body ECU | INFO |
| | Brake Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Brake warning light does not go off. | Combination Meter Assembly (LED) | INFO |
| | Main Body ECU | INFO |
| | Brake Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| SRS warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | SRS Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| SRS warning light does not go off. | Combination Meter Assembly (LED) | INFO |
| | SRS Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| ECO Driving Indicator Light malfunction | Combination Meter Assembly (LED) | INFO |
| | CAN Communication System | - |
| | Power Management Control ECU | - |
| | Skid Control ECU | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Open door warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Door Courtesy Switch | INFO |
| | Main Body ECU | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Charge warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Power Management Control ECU | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| MIL (Check engine warning light) malfunction | MIL Circuit | INFO |
| | Combination Meter Assembly (No. 3 | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Meter Circuit Plate) | |
| Driver side seat belt warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Driver Side Seat Belt Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| ABS warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | ABS Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| ABS warning light does not go off. | Combination Meter Assembly (LED) | INFO |
| | ABS Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EPS warning light malfunction | Combination Meter Assembly (LED) | INFO |
| | EPS Warning Light Circuit (for Blushless Type Motor) | INFO |
| | EPS Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Slip indicator light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Slip Indicator Light Circuit | INFO |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Slip indicator light does not go off. | Combination Meter Assembly (LED) | INFO |
| | Slip Indicator Light Circuit | INFO |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| Cruise main indicator light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Cruise Main Indicator Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Cruise main indicator light malfunction (w/ Dynamic Radar Cruise Control System) | Combination Meter Assembly (LED) | INFO |
| | Dynamic Radar Cruise Control System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Master warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Shift indicator light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Power Management Control ECU | - |
| | Combination Meter Assembly (No. 4 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Head indicator light malfunction (for U.S.A.) | Combination Meter Assembly (LED) | INFO |
| | Lighting System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Tail indicator light does not come on. (except U.S.A.) | Combination Meter Assembly (LED) | INFO |
| | Wire Harness or Connector | - |
| | EPS Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| ECO Driving Indicator Light malfunction | Combination Meter Assembly (LED) | INFO |
| | CAN Communication System | - |
| | Power Management Control ECU | - |
| | Skid Control ECU | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| PCS warning light malfunction (w/ Pre-collision System) | Combination Meter Assembly (LED) | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Dynamic Radar Cruise Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Tire pressure warning light malfunction (w/ Tire Pressure Warning System) | Combination Meter Assembly (LED) | INFO |
| | Tire Pressure Warning System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Electrically controlled brake warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Electrically Controlled Brake Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Electrically controlled brake warning light does not go off. | Combination Meter Assembly (LED) | INFO |
| | Electrically Controlled Brake Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| ECO mode indicator light malfunction | Combination Meter Assembly (LED) | INFO |
| | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Ready indicator light malfunction | Combination Meter Assembly (LED) | INFO |
| | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV indicator light malfunction | Combination Meter Assembly (LED) | INFO |
| | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 5 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 2 Meter Circuit Plate) | INFO |
| | Combination Meter Assembly (No. 3 | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Meter Circuit Plate) | |
| Power mode indicator light malfunction | Combination Meter Assembly (LED) | INFO |
| | Hybrid Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Set indicator light malfunction (w/ Dynamic Radar Cruise Control) | Combination Meter Assembly (LED) | INFO |
| | Dynamic Radar Cruise Control System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| LKA indicator light malfunction (w/ Lane-keeping Assist System) | Combination Meter Assembly (LED) | INFO |
| | Lane-keeping Assist System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Headlight leveling indicator light malfunction (w/ Automatic Type Headlight Beam Level Control) | Combination Meter Assembly (LED) | INFO |
| | Wire Harness or Connector | - |
| | Lighting System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Coolant hot warning light malfunction | Combination Meter Assembly (LED) | INFO |
| | Wire Harness or Connector | - |
| | Exhaust Heat Recirculation System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Security indicator light malfunction | Wire Harness or Connector | - |
| | Theft Deterrent System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |

### *Cruise Information Display*

| Symptom | Suspected Area | See page |
|---|---|---|
| Average vehicle speed display malfunction | Skid Control ECU | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Driving range display malfunction | Hybrid Vehicle Control System | - |
| | Skid Control ECU | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Average fuel consumption display or average fuel | Hybrid Vehicle Control System | - |

| Symptom | Suspected Area | See page |
|---|---|---|
| consumption after refueling display malfunction | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Current fuel consumption display malfunction | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Average vehicle speed display malfunction | Skid Control ECU | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Driving time display malfunction | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Energy flow display malfunction | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Operating multi-information switch does not change multi-information display. | Multi-information Switch (Steering Pad Switch Assembly) | INFO |
| | Wire Harness or Connector | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |

### *Multi-information Display*

| Symptom | Suspected Area | See page |
|---|---|---|
| Multi-information display does not light up (Combination meter assembly operates normally). | Combination Meter Assembly (Multi-information Display) | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Multi-information display malfunction (All warning displays come on, cruise information display does not come on and outside temperature display indicates "F".) (for U.S.A.) | CAN Communication System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Multi-information display malfunction (All warning displays come on, cruise information display does not come on and outside temperature display indicates "C".) (except U.S.A.) | CAN Communication System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Oil maintenance required soon is displayed, not displayed, or not displayed correctly. (for U.S.A.) | Oil Maintenance Reminder Reset Procedure Undone | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Oil maintenance required is displayed, not displayed, or not displayed correctly. (for U.S.A.) | Oil Maintenance Reminder Reset Procedure Undone | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Resetting oil maintenance data is displayed, not displayed, or not displayed correctly. (for U.S.A.) | Oil Maintenance Reminder Reset Procedure Undone | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Oil maintenance reset unfinished is displayed, not displayed, or not displayed correctly. (for U.S.A.) | Oil Maintenance Reminder Reset Procedure Undone | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Brake! message is displayed, not displayed, or not displayed correctly. | Skid Control ECU | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Engine oil pressure low message is displayed, not displayed, or not displayed correctly. | Oil Pressure Switch | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Key not detected message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Key battery low message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Depress brake pedal touch power switch with key message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Shift to P position and push power switch to turn power off message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Check stop light system message is displayed, not displayed, or not displayed correctly. | Vehicle Stability Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Key detected in vehicle message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Depress brake pedal and push power switch to start message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Checking cruise control C/D message is displayed, not displayed, or not displayed correctly. (w/ Dynamic Radar Cruise Control System) | Dynamic Radar Cruise Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Checking cruise control brake message is displayed, not displayed, or not displayed correctly. (w/ Dynamic Radar Cruise Control System) | Dynamic Radar Cruise Control System | - |
| | Combination Meter Assembly | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | (No. 3 Meter Circuit Plate) | |
| Check PCS system message is displayed, not displayed, or not displayed correctly. (w/ Pre-collision System) | Pre-collision System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| PCS temporarily not available message is displayed, not displayed, or not displayed correctly. (w/ Pre-collision System) | Pre-collision System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Precrash brake off message is displayed, not displayed, or not displayed correctly. (w/ Pre-collision System) | Pre-collision System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Shift to P position message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Shift to P position to start message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Turn power off message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Maintenance mode message display is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Certification mode message display is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Hybrid system overheat message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Check hybrid system message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Check brake system message is displayed, not displayed, or not displayed correctly. | Electrically Controlled Brake System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Check headlight system message is displayed, not displayed, or not displayed correctly. | Lighting System | INFO |
| | Combination Meter Assembly | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| | (No. 3 Meter Circuit Plate) | |
| Check LKA system is displayed, not displayed, or not displayed correctly. (w/ Lane-keeping Assist System) | Lane-keeping Assist System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| LKA not available is displayed, not displayed, or not displayed correctly. (w/ Lane-keeping Assist System) | Lane-keeping Assist System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode not available warming up message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode not available low battery message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode not available excessive speed message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode not available excessive acceleration message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode currently not available message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode deactivated low battery message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode deactivated excessive speed message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode deactivated excessive acceleration message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| EV mode deactivated message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |

| Symptom | Suspected Area | See page |
|---|---|---|
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Adjusting LKA camera message is displayed, not displayed, or not displayed correctly. (w/ Lane-keeping Assist System) | Lane-keeping Assist System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Adjusting front radar beam message is displayed, not displayed, or not displayed correctly. (w/ Dynamic Radar Cruise Control System) | Dynamic Radar Cruise Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Shift to [P] position when parked message is displayed, not displayed, or not displayed correctly. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Low traction battery shift to P position message is not charged in neutral N is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| [P] lock malfunction when parking. Park in flat place and apply parking brake securely message is displayed, not displayed, or not displayed correctly. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Clean radar sensor message is displayed, not displayed, or not displayed correctly. (w/ Dynamic Radar Cruise Control System) | Dynamic Radar Cruise Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Cruise not available message is displayed, not displayed, or not displayed correctly. | Dynamic Radar Cruise Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |

### *Buzzer*

| Symptom | Suspected Area | See page |
|---|---|---|
| All the buzzer does not operate. | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Seat belt warning buzzer does not operate. | Seat Belt Warning Buzzer ON/OFF Setting | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Shift down reject buzzer does not operate. | Hybrid Transaxle System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Key reminder buzzer does not operate. | Smart Key System | - |

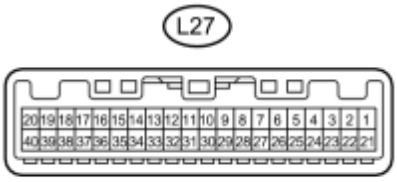
| Symptom | Suspected Area | See page |
|---|---|---|
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Sliding roof open warning buzzer does not operate. (w/ Sliding Roof) | Sliding Roof Control System | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Driving with parking brake unreleased warning buzzer does not operate. | Parking Brake Switch | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Driving with any door opened warning buzzer does not operate. | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Smart key system buzzer does not sound. | Smart Key System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Engine immobiliser certification buzzer does not operate. | Engine Immobiliser System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| Dynamic radar cruise control cancel buzzer does not operate. (w/ Dynamic Radar Cruise Control System) | Dynamic Radar Cruise Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| NDB warning buzzer does not operate. | Hybrid Vehicle Control System | - |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |

### *Others*

| Symptom | Suspected Area | See page |
|---|---|---|
| Front passenger side seat belt warning light does not come on. | Combination Meter Assembly (LED) | INFO |
| | Front Passenger Side Seat Belt Warning Light Circuit | INFO |
| | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |
| | Telltale Light Assembly | INFO |
| Other systems that use the speed signal do not operate normally. | Speed Signal Circuit | INFO |
| Customizable parameters cannot be changed (Customizable parameters can be changed by using the Techstream). | Combination Meter Assembly (No. 3 Meter Circuit Plate) | INFO |

# TERMINALS OF ECU

1. COMBINATION METER ASSEMBLY




H

(a) Measure the voltage and resistance according to the value(s) in the table below.

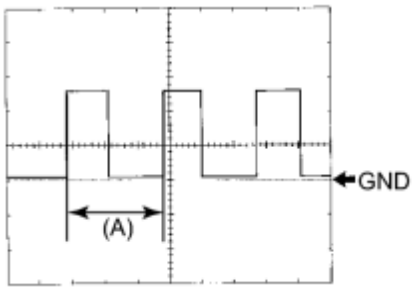
| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-2 (TC O) - Body ground | G - Body ground | Trip switch signal (Unit change switch) | Unit change switch not pressed | 11 to 14 V |
| | | | Unit change switch pressed | Below 1 V |
| L27-3 (TIRE)*1 - Body ground | G - Body ground | Tire pressure warning light signal | Power switch on (IG), tire pressure warning light off | 3.2 V or higher |
| | | | Power switch on (IG), tire pressure warning light blinks | Below 3.2 V |
| L27-5 (S) - Body ground | R - Body ground | Oil pressure switch signal | Power switch on (IG), oil pressure warning display off | Below 1 V |
| | | | Power switch on (IG), oil pressure warning display comes on | 11 to 14 V |
| L27-6 (LVWG) - Body ground | L - Body ground | Headlight leveling indicator light signal | Power switch on (IG), headlight leveling indicator light off | 11 to 14 V |
| | | | Power switch on (IG), headlight leveling indicator light blinks | Below 1 V ←→ 11 to 14 V |
| L27-7 (+S) - Body ground | V - Body ground | Speed signal for other systems (Output) | Power switch on (IG), front wheel turns slowly | Pulse generation (See waveform 1) |
| L27-8 (SI) - Body ground | V - Body ground | Speed signal (Input) | Power switch on (IG), front wheel turns slowly | Pulse generation (See waveform 1) |
| L27-9 (E2) - Body ground | G - Body ground | Ground (Water temperature sensor ground) | Always | Below 1 Ω |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-10 (CANH) - Body ground | P - Body ground | CAN communication signal | Power switch off | 200 Ω or higher |
| L27-11 (CANL) - Body ground | W - Body ground | CAN communication signal | Power switch off | 200 Ω or higher |
| L27-12 (HOUR) - Body ground | B - Body ground | Trip switch signal (Hour adjust switch) | Hour adjust switch not pressed | 11 to 14 V |
| | | | Hour adjust switch pressed | Below 1 V |
| L27-13 (MIN) - Body ground | B - Body ground | Trip switch signal (Minute adjust switch) | Minute adjust switch not pressed | 11 to 14 V |
| | | | Minute adjust switch pressed | Below 1 V |
| L27-14 (L) - Body ground | B - Body ground | Fuel level signal | Power switch on (IG), fuel level warning light off | Below 1 V |
| | | | Power switch on (IG), fuel level warning light on | 3 to 7 V |
| L27-15 (ES2) - Body ground | W - Body ground | Ground | Always | Below 1 Ω |
| L27-16 (TWS3) - Body ground | B - Body ground | Water temperature sensor signal | Power switch on (IG), coolant temperature below 113°C (235°F) | 0.2 to 4.8 V |
| | | | Power switch on (IG), coolant temperature below 120°C (248°F) or more | Below 0.15 V |
| L27-17 (RST) - Body ground | R - Body ground | Trip switch signal (Set switch) | Set switch not pressed | 11 to 14 V |
| | | | Set switch pressed | Below 1 V |
| L27-18 (B) - Body ground | R - Body ground | Battery | Power switch off | 11 to 14 V |
| L27-19 (IG+) - Body ground | L - Body ground | Power switch signal | Power switch off | Below 1 V |
| | | | Power switch on (IG) | 11 to 14 V |
| L27-20 (IG2) - Body ground | G - Body ground | Power switch signal | Power switch off | Below 1 V |
| | | | Power switch on (IG) | 11 to 14 V |
| L27-21 (PBLT) - Body ground | Y - Body ground | Front passenger side seat belt warning light signal | Power switch on (IG), front passenger side seat belt warning light off | 11 to 14 V |
| | | | Power switch on (IG), front passenger side seat belt warning light blinks | Below 1 V ←→ 11 to 14 V |
| L27-22 (LP) - Body ground | B - Body ground | Security indicator light signal | Power switch on (IG), security indicator light off | Below 2 V |
| | | | Security indicator light blinks | Pulse generation |
| L27-25 (EFI) - Body ground | LG - Body ground | MIL (Check engine warning light) signal | Power switch on (IG), MIL (Check engine warning light) | 11 to 14 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | off | |
| | | | Power switch on (IG), MIL (Check engine warning light) comes on | Below 1 V |
| L27-26 (B) - Body ground | Y - Body ground | Turn LH indicator light signal | Power switch on (IG), turn LH indicator light off | 11 to 14 V |
| | | | Power switch on (IG), turn LH indicator light blinks | Below 1 V ←→ 11 to 14 V |
| L27-27 (B) - Body ground | G - Body ground | Turn RH indicator light signal | Power switch on (IG), turn RH indicator light off | 11 to 14 V |
| | | | Power switch on (IG), turn RH indicator light blinks | Below 1 V ←→ 11 to 14 V |
| L27-29 (STRG) - Body ground | G - Body ground | Multi-information switch (steering pad switch assembly) signal | Always | Pulse generation |
| L27-30 (ES) - Body ground | BR - Body ground | Ground (Signal ground) | Always | Below 1 Ω |
| L27-35 (TC) - Body ground | G - Body ground | Light control rheostat signal (Tail cancel switch) | Power switch on (IG), light control rheostat position except below | 1 to 6 V |
| | | | Power switch on (IG), turn the light control rheostat fully upwards | Below 1 V |
| L27-36 (SW1) - Body ground | B - Body ground | Light control rheostat signal | Always | 4 to 6 V |
| L27-37 (SW2) - Body ground | B - Body ground | Light control rheostat signal | Power switch on (IG), light control rheostat except on tail cancel position | 1 to 6 V<br><br>(Gradually change) |
| L27-38 (SW3) - Body ground | R - Body ground | Light control rheostat signal (Rheostat ground) | Always | Below 1 Ω |
| L27-39 (RL) - Body ground | L - Body ground | Light control rheostat LED illumination signal | Power switch on (IG), light control rheostat LED illumination off | Below 1 V |
| | | | Power switch on (IG), light control rheostat LED illumination illuminates | 4 to 6 V |
| L27-40 (RV) - Body ground | W - Body ground | Light control rheostat illumination signal | Power switch on (IG), light control rheostat illumination off | Below 1 V |
| | | | Power switch on (IG), light control rheostat illumination illuminates | 4 to 6 V |

- *1: w/ Tire Pressure Warning System

(b) Waveform 1 (Reference): Using an oscilloscope:

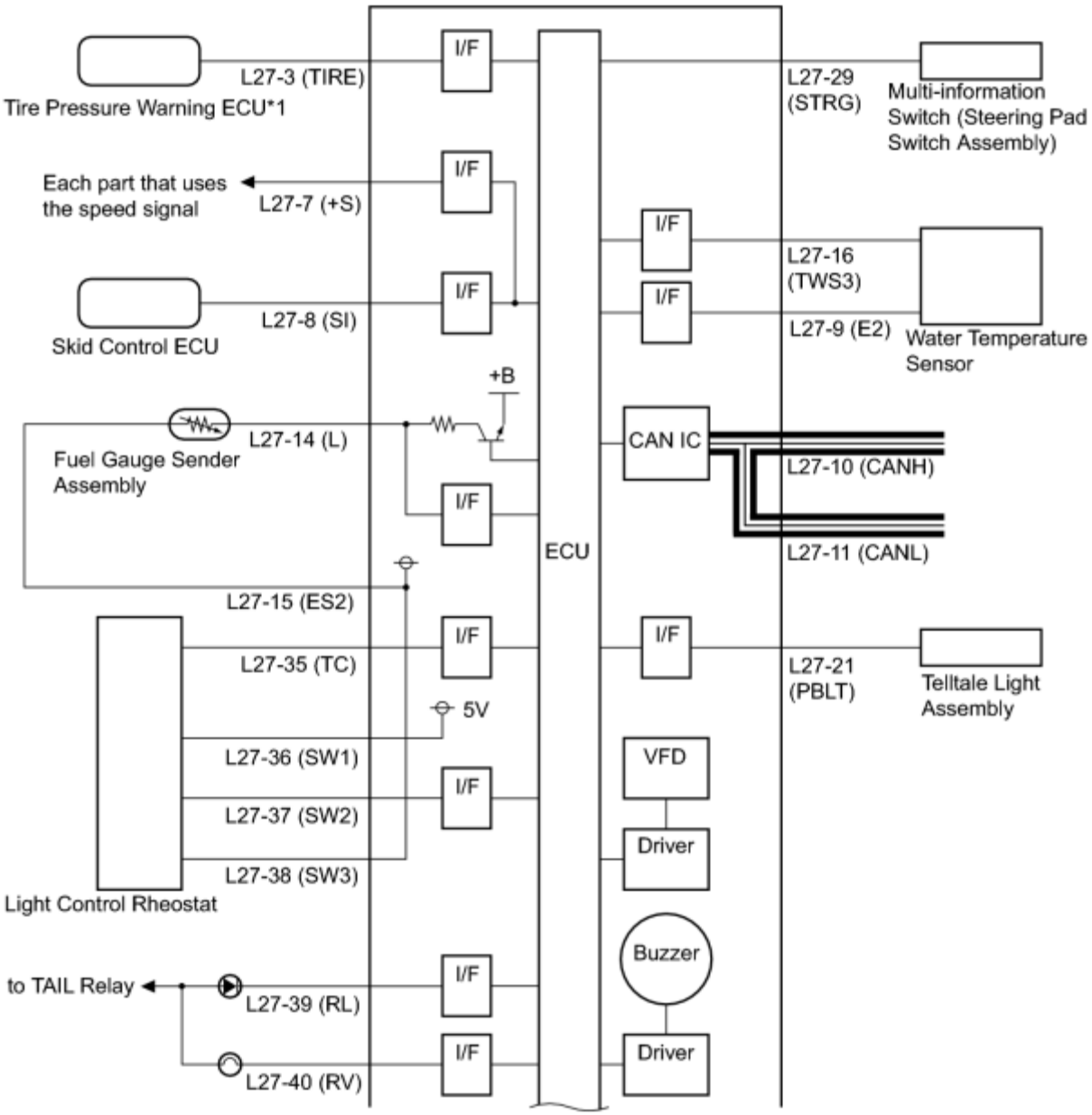



| Item | Condition |
|---|---|
| Tool setting | 5 V/DIV., 20 ms./DIV. |
| Vehicle condition | Driving at approx. 20 km/h (12 mph) |

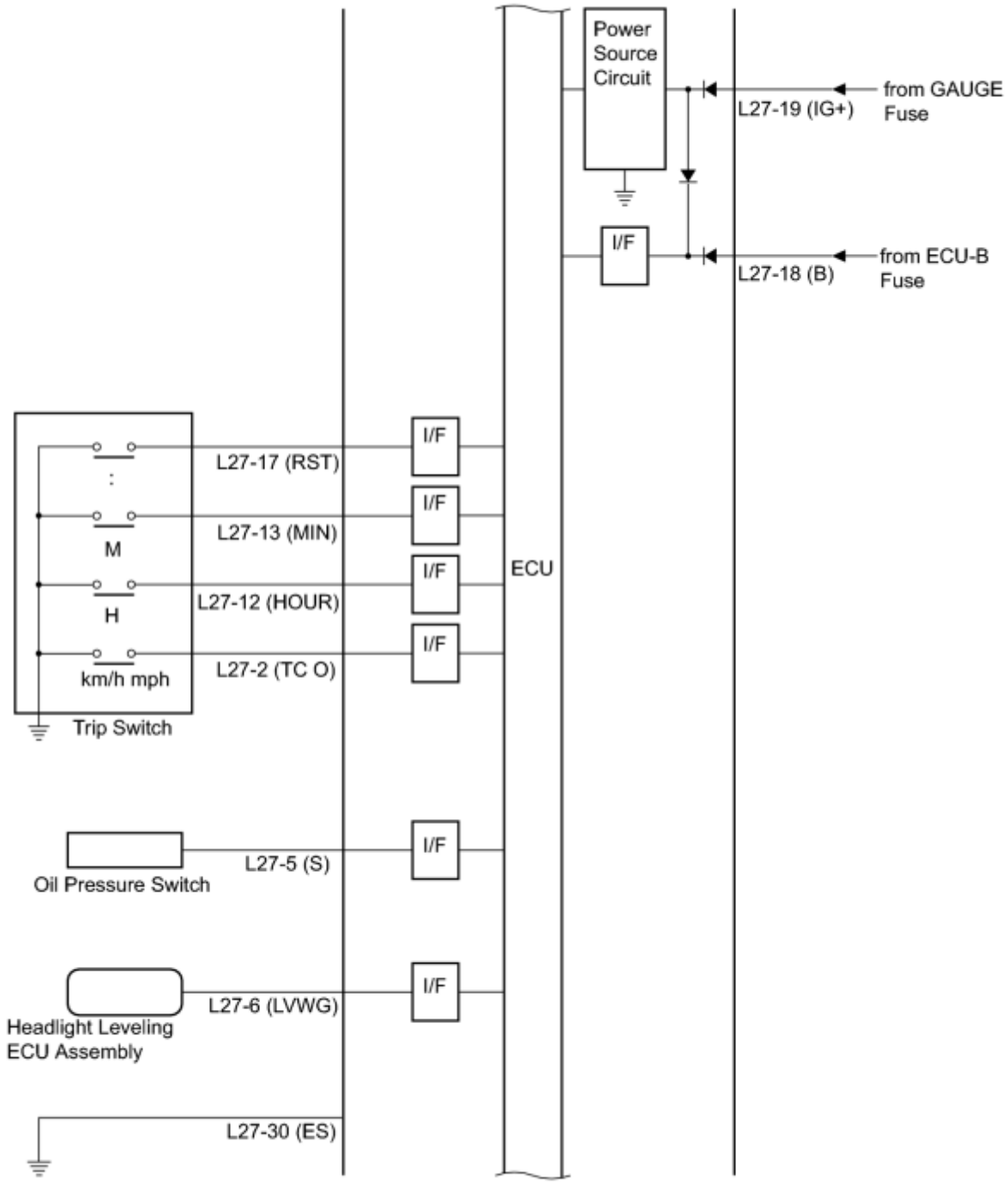
HINT:

When the system is functioning normally, one wheel revolution generates 4 pulses. As the vehicle speed increases, the width indicated by (A) in the illustration narrows.

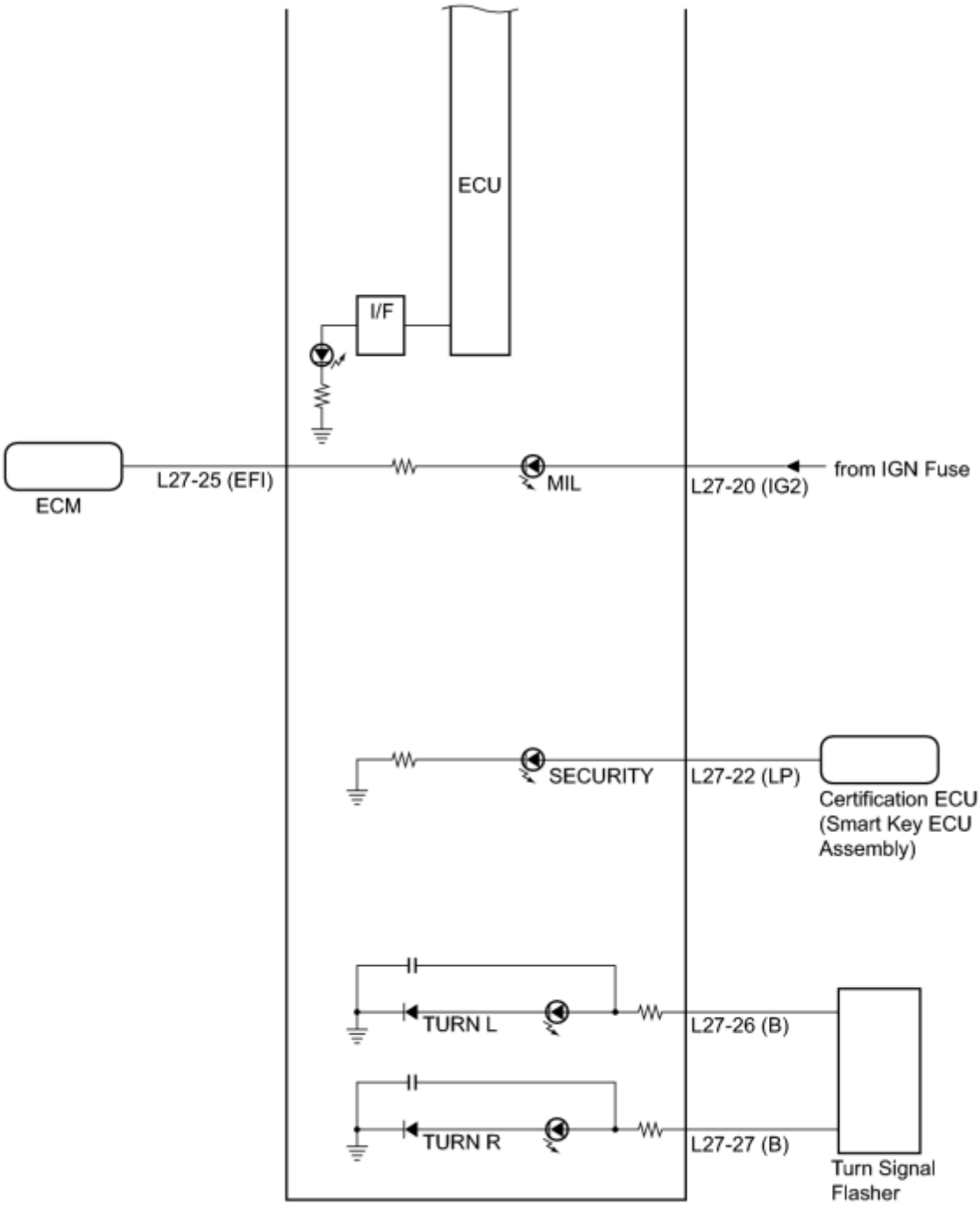
2. COMBINATION METER ASSEMBLY INNER CIRCUIT


Tire Pressure Warning ECU*1
L27-3 (TIRE)
I/F
L27-29 (STRG)
Multi-information Switch (Steering Pad Switch Assembly)
Each part that uses the speed signal
L27-7 (+S)
I/F
Skid Control ECU
L27-8 (SI)
I/F
I/F
L27-16 (TWS3)
I/F
L27-9 (E2)
Water Temperature Sensor
+B
Fuel Gauge Sender Assembly
L27-14 (L)
CAN IC
L27-10 (CANH)
I/F
ECU
L27-11 (CANL)
L27-15 (ES2)
L27-35 (TC)
I/F
I/F
L27-21 (PBLT)
Telltale Light Assembly
5V
L27-36 (SW1)
VFD
I/F
L27-37 (SW2)
Driver
L27-38 (SW3)
Light Control Rheostat
Buzzer
to TAIL Relay
L27-39 (RL)
I/F
Driver
L27-40 (RV)
I/F
*1: Tire Pressure Warning System
: CAN Communication Line

H


Power Source Circuit
from GAUGE Fuse
L27-19 (IG+)
I/F
from ECU-B Fuse
L27-18 (B)
I/F
L27-17 (RST)
I/F
L27-13 (MIN)
I/F
L27-12 (HOUR)
I/F
L27-2 (TC O)
ECU
:
M
H
km/h mph
Trip Switch
I/F
L27-5 (S)
Oil Pressure Switch
I/F
L27-6 (LVWG)
Headlight Leveling ECU Assembly
L27-30 (ES)

H




H

| Terminal No. (Symbol) | | Wire Harness Side |
|---|---|---|
| L27 | 1 | - |
| | 2 (TC O) | Trip Switch |
| | 3 (TIRE) | Tire Pressure Warning ECU*1 |

| Terminal No. (Symbol) | Wire Harness Side |
|---|---|
| 4 | - |
| 5 (S) | Oil Pressure Switch |
| 6 (LVWG) | Headlight Leveling ECU Assembly |
| 7 (+S) | Each part that uses the speed signal |
| 8 (SI) | Skid Control ECU |
| 9 (E2) | Ground (Water Temperature Sensor Ground) |
| 10 (CANH) | CAN Communication Line |
| 11 (CANL) | CAN Communication Line |
| 12 (HOUR) | Trip Switch |
| 13 (MIN) | Trip Switch |
| 14 (L) | Fuel Sender Gauge Assembly |
| 15 (ES2) | Fuel Sender Gauge Assembly |
| 16 (TWS3) | Water Temperature Sensor |
| 17 (RST) | Trip Switch |
| 18 (B) | ECU-B Fuse |
| 19 (IG+) | GAUGE Fuse |
| 20 (IG2) | IGN Fuse |
| 21 (PBLT) | Telltale Light Assembly |
| 22 (LP) | Certification ECU (Smart Key ECU Assembly) |
| 23 | - |
| 24 | - |
| 25 (EFI) | ECM |
| 26 (B) | Turn Signal Flasher |
| 27 (B) | Turn Signal Flasher |
| 28 | - |
| 29 (STRG) | Multi-information Switch (Steering Pad Switch Assembly) |
| 30 (ES) | Ground |
| 31 | - |
| 32 | - |
| 33 | - |
| 34 | - |
| 35 (TC) | Light Control Rheostat |
| 36 (SW1) | Light Control Rheostat |
| 37 (SW2) | Light Control Rheostat |
| 38 (SW3) | Light Control Rheostat |
| 39 (RL) | Each part that uses the illumination signal |
| 40 (RV) | PANEL Fuse |

- *1: w/ Tire Pressure Warning System

# DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) Check the DLC3 INFO.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Trouble Codes.

(e) Check for DTCs.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Trouble Code.

(e) Clear the DTCs.

# FAIL-SAFE CHART

### *Engine Coolant Temperature Hot Warning Light*

| Condition | Response | Recovery |
|---|---|---|
| Engine coolant temperature data is interrupted for 3.1 seconds. | The warning light comes on. | Engine coolant temperature data is received. |

### *Shift Indicator*

| Condition | Response | Recovery |
|---|---|---|
| Shift position data is interrupted for 3.1 seconds. | All indicator lights go off. | Normal data is received. |

### *ABS, EBD, BA, TRAC, and VSC*

| Condition | Response | Recovery |
|---|---|---|
| ABS, brake, VSC, or slip data is interrupted for 1 second. | The warning light comes on. | Normal data is received. |
| Brake date is interrupted for 10 seconds. | | |

### *Door*

| Condition | Response | Recovery |
|---|---|---|
| Each door condition data is interrupted for 10 seconds. | The data received most recently remains indicated. | Normal data is received. |

### *Driver Side Seat Belt*

| Condition | Response | Recovery |
|---|---|---|
| Driver side front seat inner belt assembly data is interrupted for 10 seconds. | The data received most recently remains indicated. | Normal data is received. |

### *Head*1*

| Condition | Response | Recovery |
|---|---|---|
| Regular data is interrupted for 10 seconds. | The data received most recently remains indicated. | Normal data is received. |

### *Tail*2*

| Condition | Response | Recovery |
|---|---|---|
| Regular data is interrupted for 10 seconds. | The data received most recently remains indicated. | Normal data is received. |

### *Beam*

| Condition | Response | Recovery |
|---|---|---|
| Regular data is interrupted for 10 seconds. | The data received most recently remains indicated. | Normal data is received. |

### *SRS*

| Condition | Response | Recovery |
|---|---|---|

| Condition | Response | Recovery |
|---|---|---|
| SRS data is interrupted for 10 seconds or there is a malfunction in the combination meter assembly (meter ECU). | The warning light comes on. | Normal data is received. |

### *EPS*

| Condition | Response | Recovery |
|---|---|---|
| Regular data is interrupted for 1 second. | The warning light comes on. | Normal data is received. |

### *Multi-information Display*

| Condition | Response | Recovery |
|---|---|---|
| Cruise information data is interrupted for 3.1 seconds. | The display becomes blank (only measurement units are displayed). | Normal data is received. |

- *1: for U.S.A.
- *2: except U.S.A.

# DATA LIST / ACTIVE TEST

1. DATA LIST

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Warm up the engine.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus:

(1) for Combination Meter: Body Electrical / Combination Meter / Data List.

(2) for ABS/VSC/TRAC: Chassis / ABS/VSC/TRAC / Data List.

(3) for Engine: Powertrain / Engine / Data List.

(g) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Tail Cancel SW | Tail cancel switch/OFF or ON | OFF: Tail cancel switch off<br>ON: Tail cancel switch on | - |
| P-Seatbelt Buckle SW | Front passenger side seat belt buckle switch/OFF or ON | OFF: Front passenger side seat belt unfastened<br>ON: Front passenger side seat belt fastened | - |
| Vehicle Speed Meter | Vehicle speed/Min.: 0 km/h (0 mph), Max.:199 km/h (124 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| Coolant Temperature | Engine coolant temperature/-40 to 127.5°C | After warming up: 80 to 100°C (176 to 212°F) | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | (-40 to 261.5°F) | | |
| Head Up Display Switch (Up)*1 | Headup display position up switch/OFF or ON | OFF: Headup display position up switch not pressed | - |
| | | ON: Headup display position up switch pressed | |
| Head Up Display Switch (Down)*1 | Headup display position down switch/OFF or ON | OFF: Headup display position down switch not pressed | - |
| | | ON: Headup display position down switch pressed | |
| Head Up Display Switch (Main)*1 | Headup display main switch/OFF or ON | OFF: Headup display main switch not pressed | - |
| | | ON: Headup display main switch pressed | |
| Timer Switch M on Combination Meter | Minute adjust switch/OFF or ON | OFF: Minute adjust switch not pressed | - |
| | | ON: Minute adjust switch pressed | |
| Timer Switch H on Combination Meter | Hour adjust switch/OFF or ON | OFF: Hour adjust switch not pressed | - |
| | | ON: Hour adjust switch pressed | |
| Timer Switch 00 on Combination Meter | Second adjust switch/OFF or ON | OFF: Reset switch not pressed | - |
| | | ON: Reset switch pressed | |
| Fuel Input | Fuel input signal/Min.: 0, Max. 127.5 | 10th segment comes on: 39.6 to 45.0 | Unit: Liter |
| | | 9th segment comes on: 35.7 to 39.6 | |
| | | 8th segment comes on: 31.8 to 35.7 | |
| | | 7th segment comes on: 27.9 to 31.8 | |
| | | 6th segment comes on: 24.0 to 27.9 | |
| | | 5th segment comes on: 20.1 to 24.0 | |
| | | 4th segment comes on: 16.2 to 20.1 | |
| | | 3rd segment comes on: 12.3 to 16.2 | |
| | | 2nd segment comes on: 8.4 to 12.3 | |
| | | 1st segment comes on: 6.1 to 8.4 | |
| Check Engine SW | Check power switch/OFF or ON | OFF: Check power switch off | - |
| | | ON: Check power switch on | |
| Light Control Up SW | Light control rheostat up switch/OFF or ON | OFF: Light control rheostat up switch not pressed | - |
| | | ON: Light control rheostat up switch pressed | |
| Light Control | Light control rheostat | OFF: Light control rheostat down | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Down SW | down switch/OFF or ON | switch not pressed | |
| | | ON: Light control rheostat down switch pressed | |
| Light Control Switch*1 | Display contrast adjust switch/OFF or ON | OFF: Display contrast adjust switch not pressed | - |
| | | ON: Display contrast adjust switch pressed | |
| Multi Display Select Switch | DISP switch in the multi-information switch (steering pad switch assembly)/OFF or ON | OFF: DISP switch in the multi-information switch (steering pad switch assembly) not pressed | - |
| | | ON: DISP switch in the multi-information switch (steering pad switch assembly) pressed | |
| Drive Monitor Reset SW | TRIP switch in the multi-information switch (steering pad switch assembly)/OFF or ON | OFF: TRIP switch in the multi-information switch (steering pad switch assembly) not pressed | - |
| | | ON: TRIP switch in the multi-information switch (steering pad switch assembly) pressed more than 1 second | |
| +B Voltage Value | Battery voltage/Min.: 0 V, Max.: 25.5 V | 11 to 14 V | - |
| Rheostat value | Light control rheostat value/Min.: 0 (dark), Max.: 255 (bright) | The light control rheostat value 0 (dark) | - |
| | | The light control rheostat value 255 (bright) | - |
| Integrated Value for Oil Maintenance*2 | Oil maintenance warning value/Min.: 0, Max.: 25500 (mile) | Driving distance after performing oil maintenance resetting procedure displayed | If the value is 5000 (miles) or more, perform the oil maintenance resetting procedure after changing the oil. |
| TPMS Operation State*3 | The condition of the tire pressure/OFF, ON, or Unknown | OFF: Tire pressure warning system not operated | - |
| | | ON: Tire pressure warning system operated | |
| | | Unknown: Wire harness between combination meter assembly and tire pressure warning ECU open | |
| 2nd-Row Seatbelt Buckle (R)*4 | Rear right seat belt buckle switch/OFF or ON | OFF: Rear right passenger seat belt unfastened | - |
| | | ON: Rear right passenger seat belt fastened | |
| 2nd-Row Seatbelt | Rear left seat belt buckle | OFF: Rear left passenger seat belt | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Buckle (L)*4 | switch/OFF or ON | unfastened | |
| | | ON: Rear left passenger seat belt fastened | |
| 2nd-Row Seatbelt Buckle (C)*4 | Rear center seat belt buckle switch/OFF or ON | OFF: Rear center passenger seat belt unfastened | - |
| | | ON: Rear right passenger seat belt fastened | |
| Oil Pressure Switch | Oil pressure switch/OFF or ON | OFF: Engine oil pressure low | - |
| | | ON: Engine oil pressure not low | |
| Key Remind Sound | The customized setting of the key remind buzzer/Normal, Fast, Slow | - | The customized setting of the key reminder buzzer displayed |
| Driver Side Seatbelt Warning Buzzer | The condition of the driver side seat belt warning buzzer/OFF or ON | OFF: The driver side seat belt warning buzzer does not sound at the vehicle speed of 20 km/h (12 mph) or more when the driver side seat belt unfastened | The customized setting of the driver side seat belt warning buzzer is displayed |
| | | ON: The driver side seat belt warning buzzer sounds at the vehicle speed of 20 km/h (12 mph) or more when the driver side seat belt unfastened | |
| P-Seatbelt Warning Buzzer | The condition of the front passenger side seat belt warning buzzer/OFF or ON | OFF: The front passenger side seat belt warning buzzer does not sound at the vehicle speed of 20 km/h (12 mph) or more when the front passenger side seat belt unfastened | The customized setting of the front passenger side seat belt warning buzzer is displayed |
| | | ON: The front passenger side seat belt warning buzzer sounds at the vehicle speed of 20 km/h (12 mph) or more when the front passenger side seat belt unfastened | |
| Rear Seatbelt Warning Buzzer*4 | The condition of the rear seat belt warning buzzer/OFF or ON | OFF: The rear seat belt warning buzzer does not sound at the vehicle speed of 20 km/h (12 mph) or more when the rear passenger side seat belt unfastened | The customized setting of the rear seat belt warning buzzer displayed |
| | | ON: The rear seat belt warning buzzer sounds at the vehicle speed of 20 km/h (12 mph) or more when the rear passenger side seat belt unfastened | |
| Reverse Buzzer | The customized setting of the reverse | Continual: When the shift lever moves to R, buzzer sounds | The customized setting of the reverse buzzer |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | buzzer/Continual or Single | continuously | displayed |
| | | Single: When the shift lever moves to R, a single buzzer sounds | |
| Number of Trouble Code | The number of the DTC which is currently output | 0 | - |

- *1: w/ Headup Display
- *2: for U.S.A.
- *3: w/ Tire Pressure Warning System
- *4: w/ Rear Seat Belt Warning

### *ABS/VSC/TRAC*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| FL Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| RR Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| RL Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| Vehicle Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |

### *Engine*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Coolant Temp | Engine coolant temperature/Min.: -40°C (-40°F), Max: 215°C (419°F) | 80 to 100°C (176 to 212°F): After warming up | • If -40°C (-40°F): sensor circuit open<br>• If 140°C (284°F) or more: sensor circuit shorted |

2. ACTIVE TEST

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the operation by referring to the table below.

***Combination Meter***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Speed Meter Operation | Speedometer | 0, 40, 80, 120 mph*1<br>0, 40, 80, 120, 160, 200, 240 km/h*2 | Confirm that the vehicle is stopped with the engine idling |
| Fuel Meter Operation | Fuel receiver gauge | EMPTY, 1/2, FULL | Confirm that the vehicle is stopped with the engine idling |
| Fuel Consumption Meter Operation | Fuel consumption meter | OFF, MIN., 1/4, 1/2, 3/4, MAX. | Confirm that the vehicle is stopped with the engine idling |
| A/T Indicator Operation 1 | Shift indicator light (D, P, N. R, 4, 3, 2, L) | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| A/T Indicator Operation 2 | A/T shift indicator light (S, 6, 5) | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Airbag | SRS warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Doors All Open | Door indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Front Passenger Side Seat Belt | Front passenger side seat belt warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Driver Side Seat Belt | Driver side seat belt warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp ABS | ABS warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Charge | Charge warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Slip | Slip indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Coolant Hot | Coolant hot warning light | OFF or ON | Confirm that the vehicle is stopped with the |

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| | | | engine idling |
| Indicat. Lamp Beam | High beam indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Head*1 | Head indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Tail*2 | Tail indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Fr FOG | Front fog indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Rr FOG*3 | Rear fog indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Precrash*4 | Precrash warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Driver Side Door Open | Door open warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Front Passenger Side Door Open | Door open warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Rear Door RH Open | Door open warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Rear Door LH Open | Door open warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Back Door Open | Door open warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Headlamp Auto Leveling*5 | Headlight leveling indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Tire Pressure Warning System*6 | Tire pressure warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp ECB | Electrically controlled brake warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp ECT PWR | ECT PWR indicator light | OFF or ON | Confirm that the vehicle is stopped with the |

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| | | | engine idling |
| Drift From The Lane*7 | LKA indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Cruise | Cruise main indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Lamp Brake | Brake warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. EPS | EPS warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Master Warning | Master warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Ready (HV) | Ready indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. EV Mode | EV mode indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. SET | Set indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. Radar Cruise*8 | Cruise main indicator light (constant speed control mode or vehicle-to-vehicle distance control mode) | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| Indicat. ECO MODE | ECO mode indicator light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |
| HV System Indicator | Hybrid System Indicator | MIN, -50, 0, 100, 200, 300, 400, MAX | Confirm that the vehicle is stopped with the engine idling |
| Meter Display 1 | Multi-information display | All the dots in the multi-information display OFF or ON | Confirm that the vehicle is stopped with the engine idling |

- *1: for U.S.A.
- *2: except U.S.A.
- *3: w/ Rear Fog Light
- *4: w/ Pre-collision System
- *5: w/ Automatic Type Headlight Beam Level Control
- *6: w/ Tire Pressure Warning System
- *7: w/ Lane-keeping Assist System
- *8: w/ Dynamic Radar Cruise Control System

# DIAGNOSTIC TROUBLE CODE CHART

*Meter/Gauge System*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| U0129 | Lost Communication with Skid Control ECU | 1. Skid control ECU<br>2. CAN communication system<br>3. Combination meter assembly | INFO |
| U0100 | Lost Communication with ECM / PCM "A" | 1. Power Management Control ECU<br>2. CAN communication system<br>3. Combination meter assembly | INFO |
| B1500 | Fuel Sender Open Detected | 1. Harness or connector<br>2. Combination meter assembly<br>3. Fuel sender gauge assembly | INFO |
| B1503 | Exhaust Heat Management Warning Detected | 1. Harness or connector<br>2. Water temperature sensor<br>3. Combination meter assembly | INFO |
| B1504 | Lost Communication with Steering SW | 1. Harness or connector<br>2. Spiral cable<br>3. Multi-information switch (Steering pad switch assembly)<br>4. Combination Meter Assembly | INFO |
| U0131 | Lost Communication with Power Steering Control Module | 1. Power steering ECU<br>2. CAN communication system<br>3. Combination meter assembly | INFO |
| U0142 | Lost Communication with Main Body ECU | 1. Main body ECU<br>2. CAN communication system<br>3. Combination meter assembly | INFO |
| U0151 | Lost Communication with Airbag ECU | 1. Center airbag sensor assembly<br>2. CAN communication system | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | 3. Combination meter assembly | |

# ON-VEHICLE INSPECTION

1. INSPECT SPEEDOMETER

(a) Check speedometer operation.

NOTICE:

- The meter ECU (No. 3 meter circuit plate) receives the vehicle speed signal from the skid control ECU via CAN communication. Therefore, perform the following inspection referring to values on the Data List of the skid control ECU because it is the source of the vehicle speed signal.
- The Data List values of the skid control ECU are used for this inspection. Therefore, make sure to perform the inspection after confirming that no DTCs are output from the brake control system.
- If the tire size or tire inflation pressure is not within the specified range, or the tires are excessively worn, the speedometer indication error will increase. Therefore, make sure to perform the inspection after checking that the tire size, tire inflation pressure and tire wear are in the specified range.

(1) Before starting the following inspection, check if the Brake Control System outputs the DTCs.

(2) Check the values by referring to the table below.

ABS/VSC/TRAC:

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle Speed | Vehicle speed/Min.: 0 mph (0 km/ h), Max.: 326 km/h (203 mph) | Vehicle stop: 0 km/h (0 mph) | - |

***Reference: mph (for U.S.A.)***

| Techstream Indication (mph) | Acceptable Range (mph) |
|---|---|
| 20 | 20 |
| 40 | 40 |
| 60 | 60 |
| 80 | 80 |
| 100 | 100 |
| 120 | 120 |
| 140 | 140 |

***Reference: km/h (for Canada)***

| Techstream Indication (km/h) | Acceptable Range (km/h) |
|---|---|
| 20 | 20 |
| 40 | 40 |
| 60 | 60 |
| 80 | 80 |
| 100 | 100 |

| Techstream Indication (km/h) | Acceptable Range (km/h) |
|---|---|
| 120 | 120 |
| 140 | 140 |
| 160 | 160 |
| 180 | 180 |

*Reference: km/h (except Canada)*

| Techstream Indication (km/h) | Acceptable Range (km/h) |
|---|---|
| 20 | 21.0 to 25.0 |
| 40 | 41.7 to 46.2 |
| 60 | 62.7 to 67.2 |
| 80 | 83.4 to 88.4 |
| 100 | 104.3 to 109.3 |
| 120 | 125.1 to 130.6 |
| 140 | 145.8 to 151.8 |
| 160 | 166.2 to 173.2 |
| 180 | 186.9 to 194.5 |

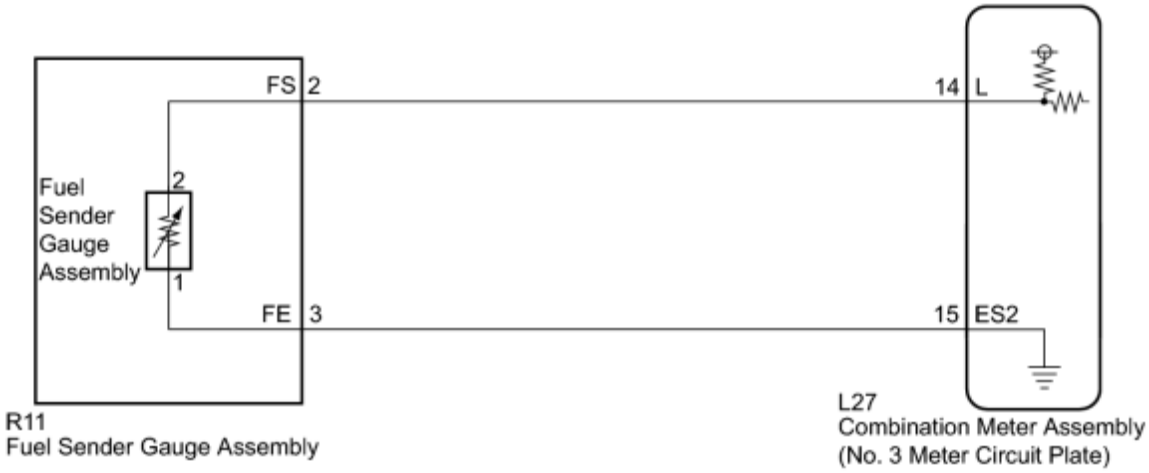
| | | |
|---|---|---|
| DTC | B1500 | Fuel Sender Open Detected |

# DESCRIPTION

This DTC is stored when the combination meter assembly (No. 3 meter circuit plate) detects a fuel sender gauge malfunction via a direct line.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1500 | When IG voltage is 9.5 V or more and the following condition is detected:<br>1. Fuel sender gauge operation malfunction | • Harness or connector<br>• Combination meter assembly (No. 3 meter circuit plate)<br>• Fuel sender gauge assembly |

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (FUEL INPUT) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Fuel Input | Fuel input signal/Min.: 0, Max.: 127.5 | 10th segment comes on: 39.6 to 45.0 | Unit: Liter |
| | | 9th segment comes on: 35.7 to 39.6 | |
| | | 8th segment comes on: 31.8 to 35.7 | |
| | | 7th segment comes on: 27.9 to 31.8 | |
| | | 6th segment comes on: 24.0 to 27.9 | |
| | | 5th segment comes on: 20.1 to 24.0 | |
| | | 4th segment comes on: 16.2 to 20.1 | |
| | | 3rd segment comes on: 12.3 to 16.2 | |
| | | 2nd segment comes on: 8.4 to 12.3 | |
| | | 1st segment comes on: 6.1 to 8.4 | |

Result:

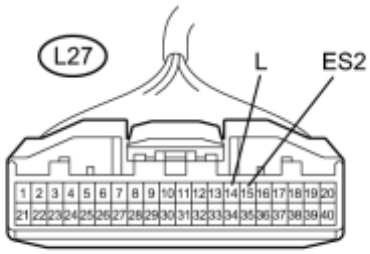
| Result | Proceed to |
|---|---|
| Fuel level data can be displayed on the Techstream and DTC B1500 is output. | A |
| Fuel level data cannot be displayed on the Techstream. | B |

B ▶ INSPECT FUEL SENDER GAUGE ASSEMBLY

A ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 2. | INSPECT FUEL SENDER GAUGE ASSEMBLY |

*1




H

(a) Disconnect the L27 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-14 (L) - L27-15 (ES2) | Always | 12.0 to 415.0 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter Assembly (No. 3 Meter Circuit Plate)) |

NG ▶ CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - FUEL SENDER GAUGE ASSEMBLY)

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - FUEL SENDER GAUGE ASSEMBLY) |

(a) Disconnect the R11 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-14 (L) - R11-2 (FS) | Always | Below 1 Ω |
| L27-14 (L) - Body ground | Always | 10 kΩ or higher |
| L27-15 (ES2) - R11-3 (FE) | Always | Below 1 Ω |
| L27-15 (ES2) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | INSPECT FUEL SENDER GAUGE ASSEMBLY |

(a) Remove the fuel sender gauge assembly INFO.

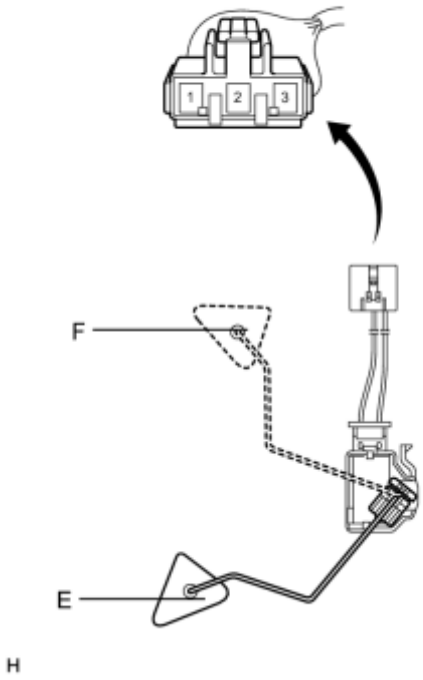
(b) Check that the float moves smoothly between E and F.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Float level is F (upper) | 12 to 18 Ω |
| 1 - 2 | Float level is between F | 12 to 415 Ω (Gradually |

| | | |
|---|---|---|
| | (upper) and E (lower) | changes) |
| 1 - 2 | Float level is E (lower) | 405 to 415 Ω |




*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Sender Gauge Assembly) |

NG ▶ REPLACE FUEL SENDER GAUGE ASSEMBLY

OK

▼

| | |
|---|---|
| 5. | REPLACE COMBINATION METER ASSEMBLY (METER CIRCUIT PLATE) |

(a) Replace the combination meter assembly (meter circuit plate) to a new or a known good one INFO.

OK:

The operation of the fuel receiver gauge returns to normal.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

OK ▶ **END**

| DTC | B1503 | Exhaust Heat Management Warning Detected |
|---|---|---|

# DESCRIPTION

This DTC is stored when the combination meter assembly (No. 3 meter circuit plate) detects a malfunction in the water temperature sensor that is connected to the combination meter assembly (No. 3 meter circuit plate) via a direct line.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1503 | When IG voltage is 9.5 V or more and the following condition is detected:<br>1. Water temperature sensor operation malfunction<br>2. Water temperature sensor circuit open or short<br>3. Engine coolant temperature is 120°C (248°F) or more | • Harness or connector<br>• Water temperature sensor<br>• Combination meter assembly (No. 3 meter circuit plate) |

HINT:

This DTC is for the water temperature sensor which is used to detect the engine water temperature sensor for the exhaust heat recirculation system, not for the engine coolant temperature sensor which is used for the EFI system.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Set the vehicle in the maintenance mode using the Techstream INFO.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Combination Meter / Data List.

(f) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Coolant Temperature | Engine coolant temperature/-40 to 127.5°C (-40 to 261.5°F) | After warming up: 80 to 100°C (176 to 212°F) | - |

HINT:

- The coolant temperature value in this inspection is the data sent from the engine coolant temperature sensor for the SFI system.
- When the Data List values do not match, a signal output error of the ECM is suspected.

OK:

Engine coolant temperature displayed on the Techstream is 80 to 100°C (176 to 212°F) after warming up.

NG ▶ GO TO EXHAUST HEAT RECIRCULATION SYSTEM

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - WATER TEMPERATURE SENSOR) |

(a) Disconnect the G2 connector.

(b) Disconnect the L27 connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| G2-2 (TWS3) - L27-16 (TWS3) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| G2-1 (E2) - L27-9 (E2) | Always | Below 1 Ω |
| G2-2 (TWS3) or L27-16 (TWS3) - Body ground | Always | 10 kΩ or higher |

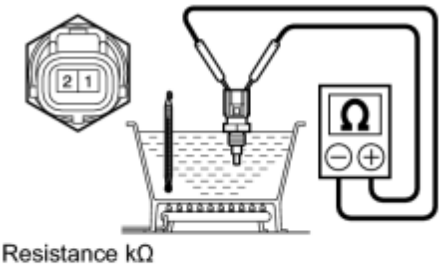
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

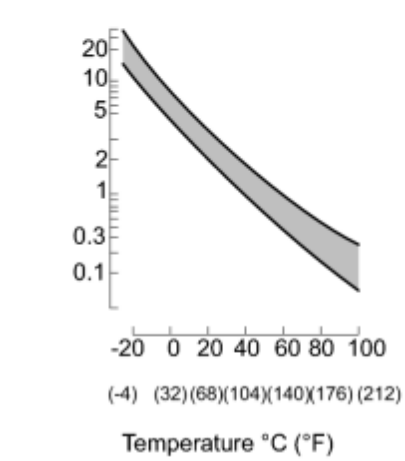
OK

▼

| | |
|---|---|
| 3. | WATER TEMPERATURE SENSOR |

*1




(a) Remove the water temperature sensor INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (E2) - 2 (TWS3) | Temperature is 20°C (68°F) | 2.32 to 2.59 kΩ |
| 1 (E2) - 2 (TWS3) | Temperature is 80°C (176°F) | 0.310 to 0.326 kΩ |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Water Temperature Sensor) |

NG ▶ REPLACE WATER TEMPERATURE SENSOR

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

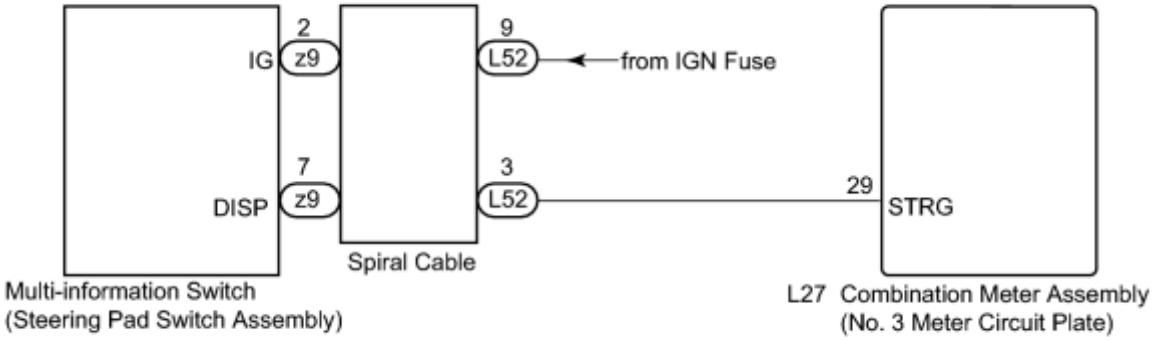
| DTC | B1504 | Lost Communication with Steering SW |
|---|---|---|

# DESCRIPTION

The combination meter assembly (No. 3 meter circuit plate) communicates with the multi-information switch (steering pad switch assembly) via a direct line . If the combination meter assembly (No. 3 meter circuit plate) detects a communication malfunction, it stores this DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1504 | When the IG voltage is 9.5 V or more and power switch on (IG) and the following condition is detected:<br><br>1. Multi-information switch (steering pad switch assembly) communication error has been detected more than 3 seconds. | • Harness or connector<br>• Spiral cable<br>• Multi-information switch (steering pad switch assembly)<br>• Combination meter assembly (No. 3 meter circuit plate) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

Before starting the following inspection, confirm the multi-information switch (steering pad switch assembly) setting.

# PROCEDURE

| 1. | READ VALUE USING TECHSTREAM (MULTI DISPLAY SELECT SWITCH) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Multi Display Select Switch | DISP switch in the multi-information switch (steering pad switch assembly)/OFF or ON | OFF: DISP switch in the multi-information switch (steering pad switch assembly) not pressed | - |
| | | ON: DISP switch in the multi-information switch (steering pad switch assembly) pressed | - |
| Drive Monitor Reset SW | TRIP switch in the multi-information switch (steering pad switch assembly)/OFF or ON | OFF: TRIP switch in the multi-information switch (steering pad switch assembly) not pressed | - |
| | | ON: TRIP switch in the multi-information switch (steering pad switch assembly) pressed more than 1 second | - |

OK:

Steering pad switch assembly (multi-information switch) condition displayed on the Techstream changes with the actual switch operation.

NG ▶ CHECK SPIRAL CABLE

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 2. | CHECK SPIRAL CABLE |

(a) Check the spiral cable INFO.

NG ▶ REPLACE SPIRAL CABLE

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - STEERING PAD SWITCH ASSEMBLY) |

(a) Disconnect the L27 and z9 connectors.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z9-2 (IG) - Body ground | Power switch off | Below 1 V |
| z9-2 (IG) - Body ground | Power switch on (IG) | 11 to 14 V |

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z9-7 (DISP) - L27-29 (STRG) | Always | Below 1 Ω |
| L27-29 (STRG) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | REPLACE MULTI-INFORMATION SWITCH (STEERING PAD SWITCH ASSEMBLY) |

(a) Replace the multi-information switch (steering pad switch assembly) with a new or a known good one INFO .

OK:

The operation of the combination meter assembly (No. 3 meter circuit plate) returns to normal.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

OK ▶ **END**

| | | |
|---|---|---|
| DTC | U0100 | Lost Communication with ECM / PCM "A" |
| DTC | U0129 | Lost Communication with Skid Control ECU |
| DTC | U0131 | Lost Communication with Power Steering Control Module |
| DTC | U0142 | Lost Communication with Main Body ECU |
| DTC | U0151 | Lost Communication with Airbag ECU |

# DESCRIPTION

The combination meter assembly (No. 3 meter circuit plate) communicates with the ECM via the CAN communication system (CAN No. 1 Bus).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0100 | When IG voltage is 9.5 V or more and the following condition is detected:<br>1. No communication with ECM continues for 2 seconds or more | • ECM<br>• CAN communication system<br>• Combination meter assembly (No. 3 meter circuit plate) |
| U0129 | When IG voltage is 9.5 V or more and the following condition is detected:<br>1. No communication with skid control ECU continues for 3 seconds or more | • Skid control ECU<br>• CAN communication system<br>• Combination meter assembly (No. 3 meter circuit plate) |
| U0131 | When IG voltage is 9.5 V or more and the following condition is detected:<br>1. No communication with power steering ECU continues for 3 seconds or more | • Power steering ECU<br>• CAN communication system<br>• Combination meter assembly (No. 3 meter circuit plate) |
| U0142 | When IG voltage is 9.5 V or more and the following condition is detected:<br>1. No communication with main body ECU continues for 3 seconds or more | • Main body ECU<br>• CAN communication system<br>• Combination meter assembly (No. 3 meter circuit plate) |
| U0151 | When IG voltage is 9.5 V or more and the following condition is detected:<br>1. No communication with center airbag sensor assembly continues for 10 seconds or more | • Center airbag sensor assembly<br>• CAN communication system<br>• Combination meter assembly (No. 3 meter circuit plate) |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CONFIRM DTC OUTPUT |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Trouble Codes.

(e) Clear the stored DTCs.

(f) Drive the vehicle at more than 5 km/h (3.1 mph) for at least 60 seconds.

(g) Stop the vehicle.

(h) Check for DTCs INFO.

Result:

| Result | Proceed to |
|---|---|
| DTC is output. | A |
| DTC is not output. | B |

HINT:

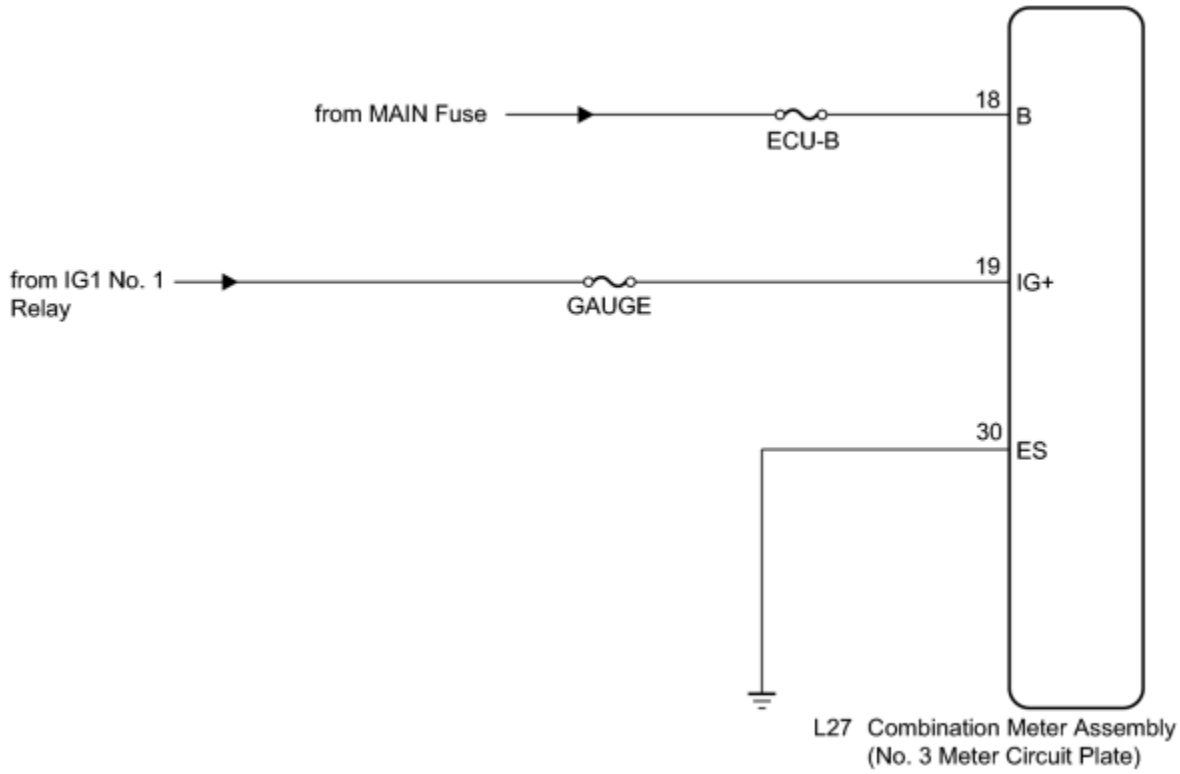
If CAN communication system DTC U0100, U0129, U0131, U0142, or U0151 and another DTC are output at the same time, perform troubleshooting for CAN communication system DTC U0100, U0129, U0131, U0142, or U0151 first.

B ▶ USE SIMULATION METHOD TO CHECK
A ▶ **GO TO CAN COMMUNICATION SYSTEM**

# DESCRIPTION

This circuit is the power source circuit for the meter. This circuit provides two types of power sources; one is a constant power source, and the other is an IG power source. If a voltage of 12 V is not applied to terminal IG+ when the power switch is turned on (IG), the indicators will not operate.

# WIRING DIAGRAM




C

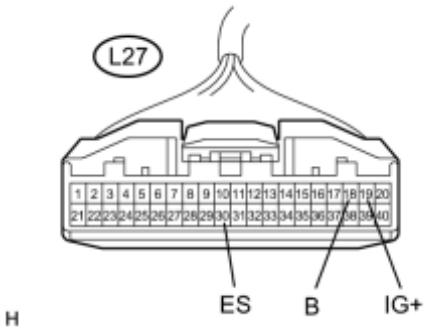
# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY CIRCUIT) |

(a) Disconnect the L27 connector.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-30 (ES) - Body ground | Always | Below 1 Ω |

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-19 (IG+) - Body ground | Power switch off | Below 1 V |
| L27-19 (IG+) - Body ground | Power switch on (IG) | 11 to 14 V |
| L27-18 (B) - Body ground | Power switch off | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter Assembly (No. 3 Meter Circuit Plate)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

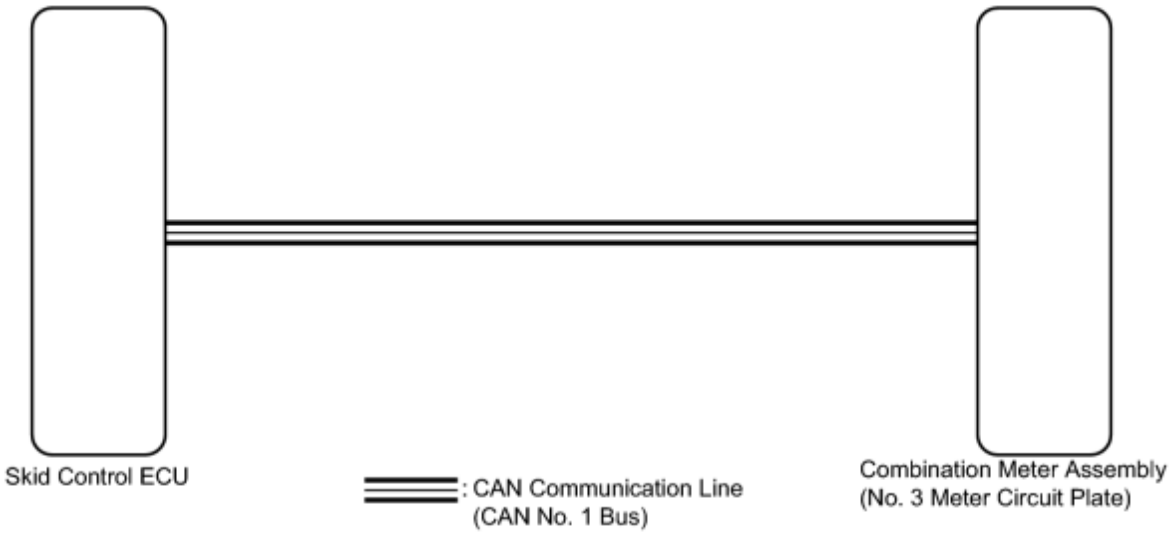
# DESCRIPTION

The meter ECU (No. 3 meter circuit plate) receives vehicle speed signals from the skid control ECU via the CAN communication system (CAN No. 1 Bus). The speed sensor detects the wheel speed and sends the appropriate signals to the skid control ECU. The skid control ECU supplies power to the vehicle speed sensor. The skid control ECU detects vehicle speed signals based on the pulses of the voltage.

HINT:

- Factors that affect the indicated vehicle speed include tire size, tire inflation, and tire wear. The speed indicated on the speedometer has an allowable margin of error. This can be tested using a speedometer tester (calibrated chassis dynamometer). For details about testing and the margin of error, see the reference chart INFO.
- If the vehicle speed sensor circuit has a malfunction, the skid control ECU stores the DTCs. Troubleshoot the Brake Control System INFO.

# WIRING DIAGRAM




C

# INSPECTION PROCEDURE

NOTICE:

If the vehicle speed is outside the allowable range when tested, perform the on-vehicle inspection INFO.

HINT:

Before starting the following inspection, check tire size and tire air pressure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| CAN communication DTC is not output. | A |
| CAN communication DTC is output. | B |

B GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM (SPEED METER OPERATION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the operation by referring to the table below.

***Combination Meter***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Speed Meter Operation | Speedometer | 0, 40, 80, 120 mph*1 | Confirm that the vehicle is stopped with the engine idling |
| | | 0, 40, 80, 120, 160, 200, 240 km/h*2 | |

- *1: for U.S.A.
- *2: except U.S.A.

OK:

Speedometer indication is normal.

NG REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

OK

| | |
|---|---|
| 3. | CHECK BRAKE CONTROL SYSTEM |

(a) Check if the brake control system output the DTC INFO.

Result:

| Result | Proceed to |
|---|---|
| The DTC is not output. | A |
| The DTC is output. | B |

B GO TO BRAKE CONTROL SYSTEM

A

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (FR/FL/RR/RL WHEEL SPEED, VEHICLE SPEED METER) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus:

(1) for ABS/VSC/TRAC: Chassis / ABS/VSC/TRAC / Data List.

(2) for Combination Meter: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

*ABS/VSC/TRAC*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FR Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| FL Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| RR Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |
| RL Wheel Speed | Vehicle speed/Min.: 0 km/h (0 mph), Max.: 326 km/h (202 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |

*Combination Meter*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle Speed Meter | Vehicle speed/Min.: 0 mph (0 km/h), Max.: 255 km/h (158 mph) | Almost the same as actual vehicle speed (Speedometer tester) | - |

OK:

When the Data List values of the ECUs match, an internal malfunction of the combination meter assembly is suspected.

NG:

When the Data List values of the ECUs do not match, a signal output error of the skid control ECU or an internal malfunction of the combination meter assembly is suspected.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (METER CIRCUIT PLATE)

OK ▶ **GO TO BRAKE CONTROL SYSTEM**

| | |
|---|---|
| 5. | REPLACE COMBINATION METER ASSEMBLY (METER CIRCUIT PLATE) |

(a) Replace the meter circuit plate with a new or a known good one INFO.

OK:

The operation of the speedometer returns to normal.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO.4 METER CIRCUIT PLATE)

OK ▶ **END**

| | |
|---|---|
| 6. | REPLACE COMBINATION METER ASSEMBLY (NO.4 METER CIRCUIT PLATE) |

(a) Replace the combination meter assembly (No. 4 meter circuit plate) with a new or a known good one INFO.

OK:

The operation of the speedometer returns to normal.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

OK ▶ **END**

| | |
|---|---|
| 7. | REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE) |

(a) Replace the combination meter assembly (No. 3 meter circuit plate) with a new or a known good one INFO.

OK:

The operation of the speedometer returns to normal.

NG ▶ REPLACE SKID CONTROL ECU

OK ▶ **END**

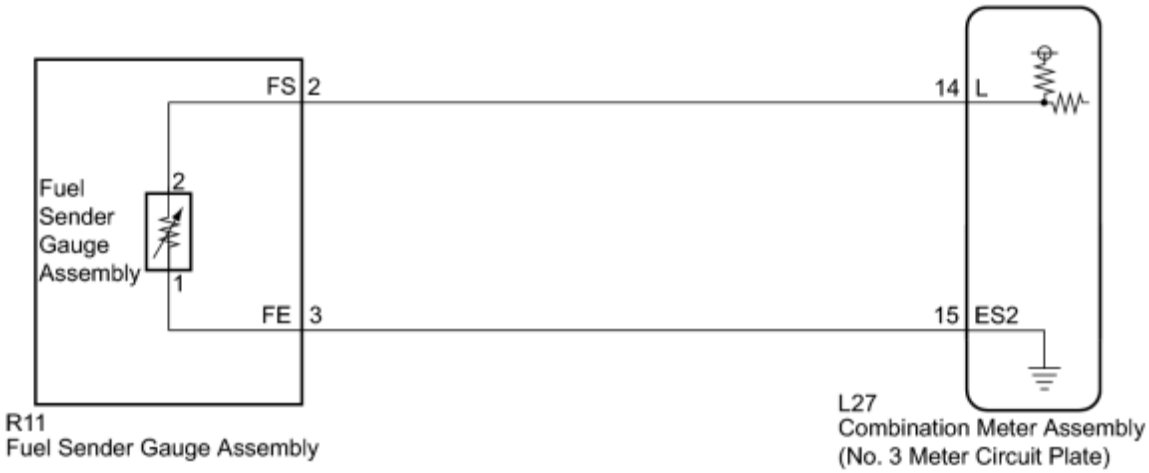
# DESCRIPTION

- The meter ECU (No. 3 meter circuit plate) uses the fuel sender gauge assembly to determine the level of the fuel in the fuel tank. The resistance of the fuel sender gauge will vary between approximately 12 Ω with the float at the full position, and 415 Ω with the float at the empty position. The meter outputs battery voltage through two resistors of 820 Ω that are mounted in parallel inside the meter ECU (No. 3 meter circuit plate). The meter ECU (No. 3 meter circuit plate) measures the voltage between the variable resistor in the fuel sender gauge and the two resistors mounted in parallel in the meter. Voltage measured at this point will vary as the float of the fuel sender gauge is moved. The highest voltage observed should be approximately half of the battery voltage.

HINT:

The fuel level warning light will come on when the fuel level is below 6.0 liters (6.3 US qts, 5.3 Imp.qts).

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM (FUEL METER OPERATION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the operation by referring to the table below.

***Combination Meter***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Fuel Meter Operation | Fuel receiver gauge | Empty, 1/2, Full | Confirm that the vehicle is stopped with the engine idling |

OK:

Fuel receiver gauge indication is normal.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (FUEL INPUT) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter following menus: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Fuel Input | Fuel input signal/Min.: 0, Max.: 127.5 | 10th segment comes on: 39.6 to 45.0 | Unit: Liter |
| | | 9th segment comes on: 35.7 to 39.6 | |
| | | 8th segment comes on: 31.8 to 35.7 | |
| | | 7th segment comes on: 27.9 to 31.8 | |
| | | 6th segment comes on: 24.0 to 27.9 | |
| | | 5th segment comes on: 20.1 to 24.0 | |
| | | 4th segment comes on: 16.2 to 20.1 | |
| | | 3rd segment comes on: 12.3 to 16.2 | |
| | | 2nd segment comes on: 8.4 to 12.3 | |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | 1st segment comes on: 6.1 to 8.4 | |

Result:

| Result | Proceed to |
|---|---|
| Fuel level data can be displayed on the Techstream. | A |
| Fuel level data cannot be displayed on the Techstream. | B |

B CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - FUEL SENDER GAUGE ASSEMBLY)

A **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - FUEL SENDER GAUGE ASSEMBLY) |

(a) Disconnect the L27 and R11 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

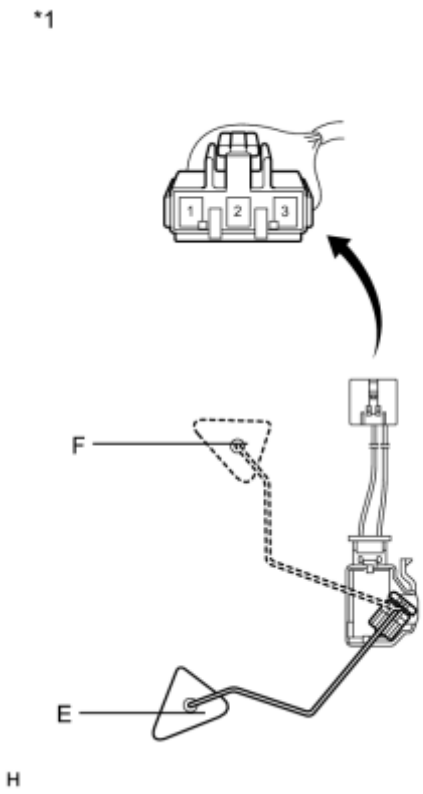
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-14 (L) - R11-2 (FS) | Always | Below 1 Ω |
| L27-15 (ES2) - R11-3 (FE) | Always | Below 1 Ω |
| L27-14 (L) - Body ground | Always | 10 kΩ or higher |
| L27-15 (ES2) - Body ground | Always | 10 kΩ or higher |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 4. | INSPECT FUEL SENDER GAUGE ASSEMBLY |

(a) Remove the fuel sender gauge assembly INFO.




(b) Check that the float moves smoothly between F and E.

(c) Check if the fuel sender gauge arm is deformed.

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Float level is F (upper) | 12 to 18 Ω |
| 1 - 2 | Float level is between F (upper) and E (lower) | 12 to 415 Ω (Gradually changes) |
| 1 - 2 | Float level is E (lower) | 405 to 415 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Fuel Sender Gauge Assembly) |

NG ▶ REPLACE FUEL SENDER GAUGE ASSEMBLY

OK

▼

| | |
|---|---|
| 5. | REPLACE COMBINATION METER ASSEMBLY (METER CIRCUIT PLATE) |

(a) Replace the combination meter assembly (meter circuit plate) with a new or a known good one INFO.

OK:

There is no deformation.

NG ▶ REPLACE NO. 4 METER CIRCUIT PLATE

OK ▶ **END**

| | |
|---|---|
| 6. | REPLACE NO. 4 METER CIRCUIT PLATE |

(a) Replace the combination meter assembly (No. 4 meter circuit plate) with a new or a known good one INFO.

OK:

The operation of the fuel receiver gauge returns to normal.

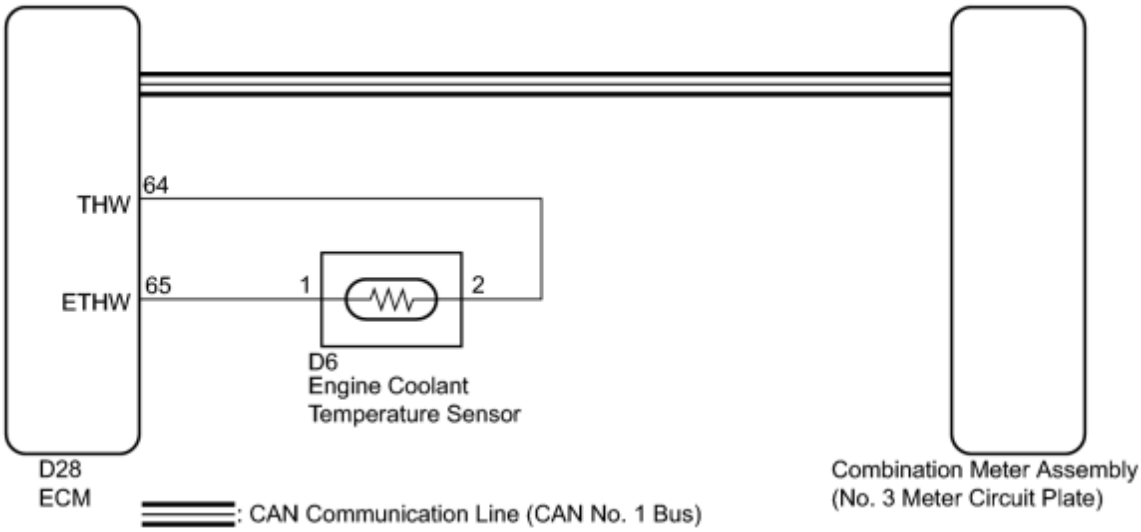
NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

OK ▶ **END**

# DESCRIPTION

In this circuit, the meter ECU (meter circuit plate No.3) receives engine coolant temperature signals from the ECM using the CAN communication system (CAN No. 1 Bus). The meter ECU (meter circuit plate No.3) displays engine coolant temperature that is calculated based on the data received from the ECM.

# WIRING DIAGRAM




C

# INSPECTION PROCEDURE

HINT:

- If there is an open or short in the engine coolant temperature sensor circuit, the ECM stores the DTCs. Troubleshoot the SFI System INFO.
- If the exhaust heat recirculation system has a malfunction, the engine coolant temperature hot warning light comes on to inform the driver of the malfunction.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| CAN communication DTC is not output. | A |
| CAN communication DTC is output. | B |

B GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 2. | SYSTEM CHECK |

(a) Check the coolant hot warning light.

Result:

| Result | Proceed to |
|---|---|
| Coolant hot warning light does not come on. | A |
| Coolant hot warning light remains on. | B |

B CHECK FOR DTC

A

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM (COOLANT HOT INDICATOR) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Active Test.

(e) Check the operation by referring to the table below.

***Combination Meter***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Coolant Hot Indicator | Coolant hot warning light | OFF or ON | Confirm that the vehicle is stopped with the engine idling |

OK:

Coolant hot warning light operation is normal.

NG REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

OK

| | |
|---|---|
| 4. | CHECK FOR DTC |

(a) Check for the DTC.

Result:

| Result | Proceed to |
|---|---|
| No DTC is output. | A |
| DTC P0115 is output. | B |
| DTC B1503 is output. | C |

C GO TO METER / GAUGE SYSTEM

B GO TO SFI SYSTEM

A

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (COOLANT TEMPERATURE, COOLANT TEMP) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus:

(1) for Combination Meter: Body Electrical / Combination Meter / Data List.

(2) for Engine: Powertrain / Engine / Data List.

(e) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Coolant Temperature | Engine coolant temperature/-40 to 127.5°C (-40 to 261.5°F) | After warming up: 80 to 100°C (176 to 212°F) | - |

***Engine***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Coolant | Engine coolant temperature/Min.: -40°C | After warming up: 80 to | • If -40°C (-40°F): sensor |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Temp | (-40°F), Max.: 215°C (419°F) | 100°C (176 to 212°F) | circuit open<br>• If 140°C (284°F) or more: sensor circuit shorted |

OK:

When the Data List values of the ECUs do not match, a signal output error of the ECM is suspected.

NG ▶ REPLACE ECM

OK

▼

| | |
|---|---|
| 6. | REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE) |

(a) Replace the combination meter assembly (No. 3 meter circuit plate) with a new or a known good one INFO.

OK:

The operation of the coolant hot warning light returns to normal.

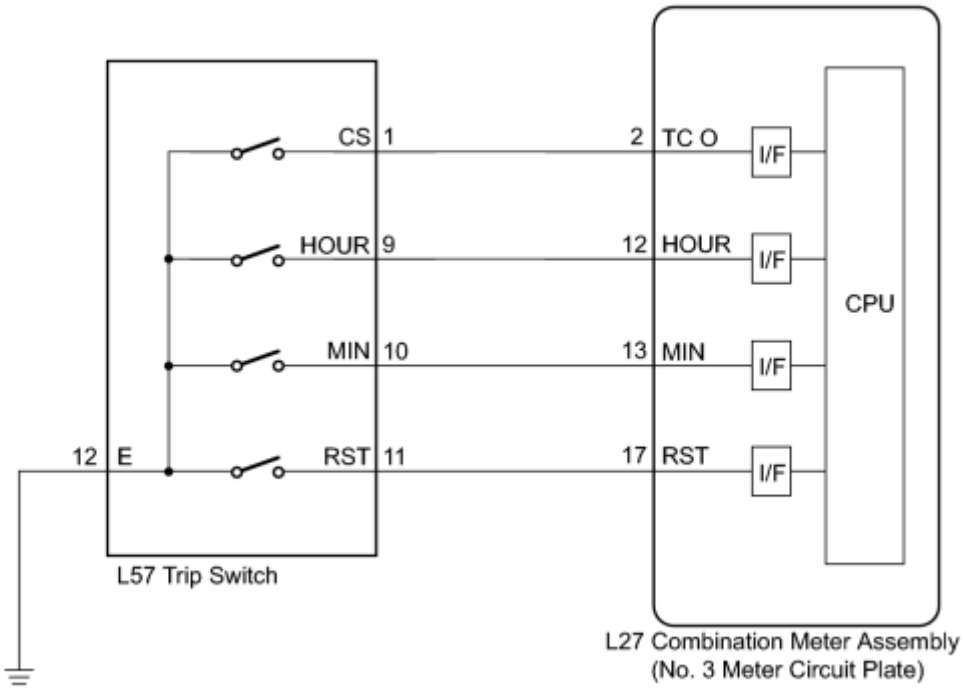
NG ▶ REPLACE ECM

OK ▶ **END**

# DESCRIPTION

The meter ECU (meter circuit plate No.3) receives trip switch signals from the trip switch via the direct line in this circuit.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

*Combination Meter*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Timer Switch H on Combination Meter | Timer switch H on combination meter/OFF or ON | OFF: Hour adjust switch not pressed | - |
| | | ON: Hour adjust switch pressed | |
| Timer Switch M on Combination Meter | Timer switch M on combination meter/OFF or ON | OFF: Minute adjust switch not pressed | - |
| | | ON: Minute adjust switch pressed | |
| Timer Switch 00 on Combination Meter | Timer switch 00 on combination meter/OFF or ON | OFF: Reset switch not pressed | - |
| | | ON: Reset switch pressed | |

OK:

The value displayed on the Techstream changes as the actual switch operation.

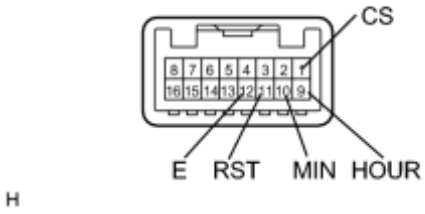
NG ▶ INSPECT TRIP SWITCH

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 2. | INSPECT TRIP SWITCH |




(a) Remove the trip switch.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (CS) - 12 (E) | Unit change switch pressed | Below 1 Ω |
| 1 (CS) - 12 (E) | Unit change switch not pressed | 10 kΩ or higher |
| 9 (HOUR) - 12 (E) | Hour adjust switch pressed | Below 1 Ω |
| 9 (HOUR) - 12 (E) | Hour adjust switch not pressed | 10 kΩ or higher |
| 10 (MIN) - 12 (E) | Minute adjust switch pressed | Below 1 Ω |
| 10 (MIN) - 12 (E) | Minute adjust switch not pressed | 10 kΩ or higher |
| 11 (RST) - 12 (E) | Set switch pressed | Below 1 Ω |
| 11 (RST) - 12 (E) | Set switch not pressed | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Trip Switch) |

NG ▶ REPLACE TRIP SWITCH

OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - TRIP SWITCH) |

(a) Disconnect the L27 and L57 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-2 (TC O) - L57-1 (CS) | Always | Below 1 Ω |
| L27-2 (TC O) - Body ground | Always | 10 kΩ or higher |
| L27-12 (HOUR) - L57-9 (HOUR) | Always | Below 1 Ω |
| L27-12 (HOUR) - Body ground | Always | 10 kΩ or higher |
| L27-13 (MIN) - L57-10 (MIN) | Always | Below 1 Ω |
| L27-13 (MIN) - Body ground | Always | 10 kΩ or higher |
| L27-17 (RST) - L57-11 (RST) | Always | Below 1 Ω |
| L27-17 (RST) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

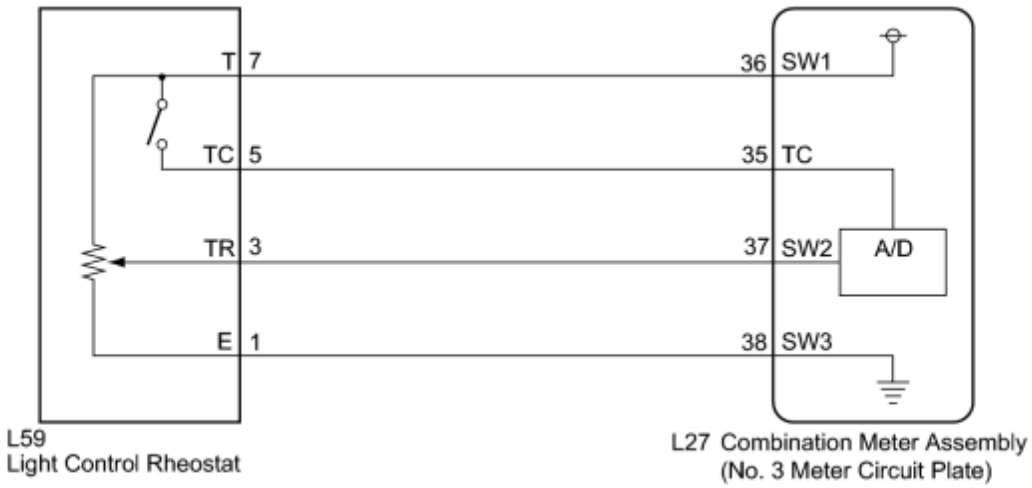
# DESCRIPTION

The meter ECU (meter circuit plate No.3) receives signals from this circuit to adjust the illumination of the meter, and instrument panel. The meter ECU (meter circuit plate No.3) sets the illumination level based on the user operation of the light control rheostat.

HINT:

- The meter illumination level can be adjusted by operating the light control rheostat.
- The meter illumination dims when the light control switch is turned to the tail or head position at night.
- Setting the meter illumination to maximum brightness cancels the above dimming of the meter illumination.
- Setting the meter illumination to minimum brightness turns off the meter illumination when the light control switch is changed to the tail or head position.

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | SYSTEM CHECK |

(a) Confirm the symptoms.

Result:

| Result | Proceed to |
|---|---|
| Meter illumination does not change in operating the light control rheostat. | A |
| Dimmer function cannot be canceled. | B |

B READ VALUE USING TECHSTREAM (TAIL CANCEL SW)

A

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (RHEOSTAT VALUE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Rheostat value | Light control rheostat/Min.: 0 (dark), Max.: 255 (bright) | The light control rheostat value 0 (dark) | The value changes with the rheostat operation |
| | | The light control rheostat value 255 (bright) | |

OK:

The value displayed on the Techstream gradually changes as the actual rheostat knob operation.

NG INSPECT LIGHT CONTROL RHEOSTAT

OK

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM (TAIL CANCEL SW) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Tail Cancel SW | Tail cancel switch/OFF or ON | OFF: Tail cancel switch off | - |
| | | ON: Tail cancel switch on | - |

HINT:

The tail cancel switch is operated by turning the light control rheostat knob fully upward

OK:

Condition displayed on the Techstream is the same as the actual light control rheostat knob position.

NG ▶ INSPECT LIGHT CONTROL RHEOSTAT

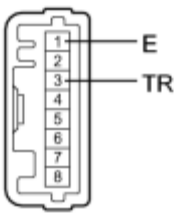
OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 4. | INSPECT LIGHT CONTROL RHEOSTAT |



*1

(a) Remove the light control rheostat.




H

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 (E) - 3 (TR) | Turn the light control rheostat knob fully downwards (MIN.) | Below 50 Ω |
| | Light control rheostat knob position is between MIN. and MAX. | The value changes gradually (Between 0 to 12 kΩ) |
| | Turn the light control rheostat knob fully upwards (MAX.) | 8 to 12 kΩ |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Light Control Rheostat) |

NG ▶ REPLACE LIGHT CONTROL RHEOSTAT

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - LIGHT CONTROL RHEOSTAT) |

(a) Disconnect the L27 and L59 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-37 (SW2) - L59-3 (TR) | Always | Below 1 Ω |
| L27-37 (SW2) - Body ground | Always | 10 kΩ or higher |
| L27-38 (SW3) - L59-1 (E) | Always | Below 1 Ω |
| L27-38 (SW3) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 6. | READ VALUE USING TECHSTREAM (TAIL CANCEL SW) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Data List.

(e) Check the values by referring to the table below.

*Combination Meter*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Tail Cancel SW | Tail cancel switch/OFF or ON | OFF: Tail cancel switch off | - |
| | | ON: Tail cancel switch on | - |

HINT:

The tail cancel switch is operated by turning the light control rheostat knob fully upward

OK:

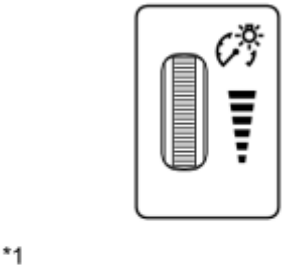
Condition displayed on the Techstream is the same as the actual light control rheostat knob position.

NG ▶ INSPECT LIGHT CONTROL RHEOSTAT

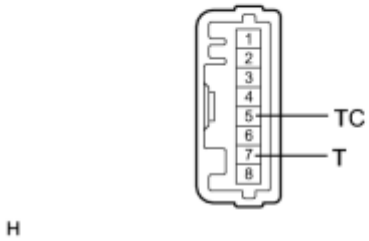
OK

▼

| | |
|---|---|
| 7. | INSPECT LIGHT CONTROL RHEOSTAT |




(a) Remove the light control rheostat.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 5 (TC) - 7 (T) | Light control rheostat position is except below | Below 50 Ω |
| | Turn the light control rheostat knob fully upwards (Tail cancel switch is on) | 8 to 12 kΩ |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Light Control Rheostat) |

NG ▶ REPLACE LIGHT CONTROL RHEOSTAT

OK

▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - LIGHT CONTROL RHEOSTAT) |

(a) Disconnect the L27 and L59 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-36 (SW1) - L59-7 (T) | Always | Below 1 Ω |
| L27-36 (SW1) - Body ground | Always | 10 kΩ or higher |
| L27-35 (TC) - L59-5 (TC) | Always | Below 1 Ω |
| L27-35 (TC) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

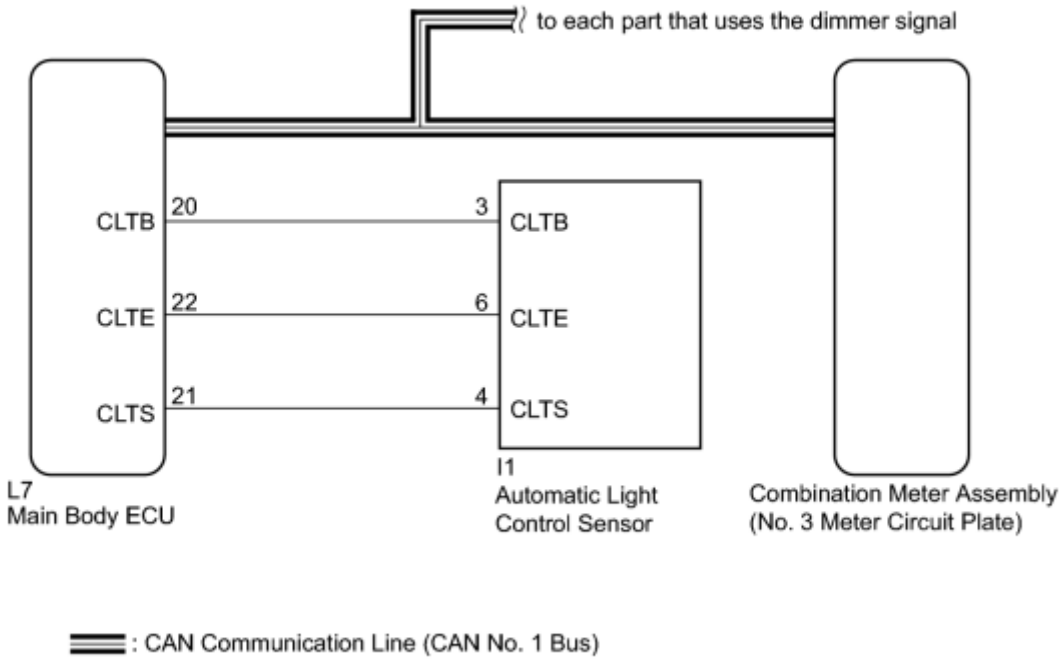
# DESCRIPTION

The meter ECU (meter circuit plate No.3) receives signals from this circuit to adjust the illumination of the meter, and instrument panel. The meter ECU (meter circuit plate No.3) sets the illumination level based on the user operation of the light control rheostat.

HINT:

- The meter illumination level can be adjusted by operating the light control rheostat.
- The meter illumination dims when the light control switch is turned to the tail or head position at night.
- Setting the meter illumination to maximum brightness cancels the above dimming of the meter illumination.

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

HINT:

- The meter illumination can be customized by turning the light control rheostat.
- Setting the meter illumination to minimum brightness turns off the meter illumination when the light control switch is changed to the tail, head, or AUTO position at night.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| CAN communication DTC is not output. | A |
| CAN communication DTC is output. | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK DTC (LIGHT SENSOR CIRCUIT) |

(a) Check if DTC B1244 is output INFO.

Result:

| Result | Proceed to |
|---|---|
| B1244 is not output. | A |
| B1244 is output. | B |

B ▶ GO TO LIGHTING SYSTEM

A ▼

| | |
|---|---|
| 3. | CHECK OPERATION (HEATER CONTROL PANEL) |

(a) Turn the power switch on (IG).

(b) Turn the light control switch to the tail, head, or AUTO position.

(c) Cover the automatic light control sensor.

(d) Check the heater control panel illumination.

Result:

| Result | Proceed to |
|---|---|
| Heater control panel illumination does not operate normally. | A |
| Heater control panel illumination operates normally. | B |

HINT:

Both the heater control panel and the combination meter assembly illumination dim according to the dimmer signal. Therefore, when only the meter illumination is always dark, there may be a malfunction in the combination meter assembly.

B ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

A ▼

| | |
|---|---|
| 4. | CHECK OPERATION (AUTOMATIC LIGHT CONTROL SYSTEM) |

(a) Turn the power switch on (IG).

(b) Turn the light control switch to the AUTO position.

(c) Cover the automatic light control sensor.

(d) Check the taillights and low beam headlights.

OK:

The taillights and low beam headlights come on.

(e) Uncover the automatic light control sensor.

(f) Check the low beam headlights and taillights.

OK:

The taillights and low beam headlights go off.

Result:

| Result | Proceed to |
|---|---|
| Automatic light control system operates normally. | A |
| Automatic light control system does not operate normally. | B |

B ▶ CHECK LIGHTING SETTING

A ▼

| | |
|---|---|
| 5. | REPLACE MAIN BODY ECU |

(a) Replace the main body ECU with a new or a normal one INFO.

OK:

The operation of the combination meter assembly returns to normal.

HINT:

The meter ECU (meter circuit plate No.3) controls the meter illumination based on an auto dimmer signal from the main body ECU. When the meter illumination is always dark (very dim), it may be due to the main body ECU sending an auto dimmer signal to the meter ECU (meter circuit plate No.3) because of a malfunction in the main body ECU.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)
OK ▶ **END**

Meter Illumination does not Dim at Night

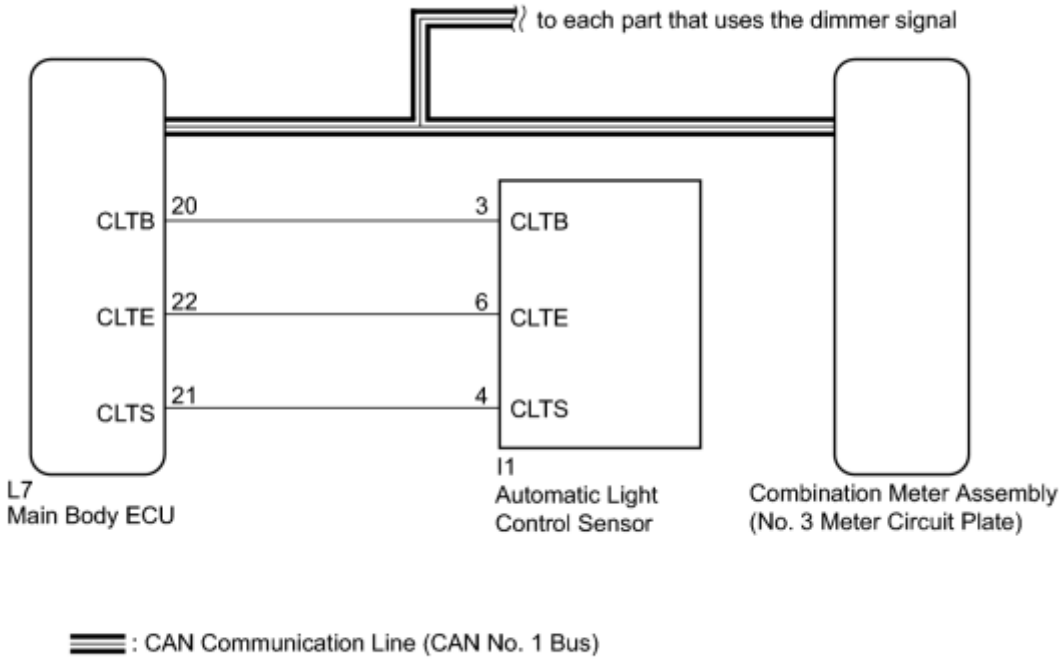
# DESCRIPTION

In this circuit, the meter ECU (meter circuit plate No.3) receives auto dimmer signals from the main body ECU using the CAN communication system (CAN No. 1 Bus). When the meter ECU (meter circuit plate No.3) receives an auto dimmer signal, it dims the meter illumination (warning and indicator lights). The main body ECU determines whether it is daytime, twilight, or nighttime based on the waveform transmitted from the automatic light control sensor. If the main body ECU determines that it is nighttime and the light control switch is in the tail, head, or AUTO position, the ECU sends an auto dimmer signal. According to the signal, the combination meter assembly dims the meter illumination.

HINT:

When the meter illumination does not dim at night, there may be a malfunction in the automatic light control sensor, main body ECU, CAN communication system, harness or connector, or combination meter assembly.

# WIRING DIAGRAM




H

# INSPECTION PROCEDURE

HINT:

- The automatic light control sensor sensitiveness can be customized INFO.

- Setting the meter illumination to maximum brightness prevents the meter illumination from dimming when the light control switch is changed to the tail, head, or AUTO position at night. Therefore, check the meter illumination setting before proceeding to the following steps.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if a CAN communication DTC is output INFO.

Result:

| Result | Proceed to |
|---|---|
| CAN communication DTC is not output. | A |
| CAN communication DTC is output. | B |

B ▶ GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 2. | CHECK DTC (LIGHT CONTROL SENSOR CIRCUIT) |

(a) Check if DTC B1244 is output INFO.

Result:

| Result | Proceed to |
|---|---|
| B1244 is not output. | A |
| B1244 is output. | B |

B ▶ GO TO LIGHTING SYSTEM

A ▼

| | |
|---|---|
| 3. | CHECK OPERATION (HEATER CONTROL PANEL) |

(a) Turn the power switch on (IG).

(b) Turn the light control switch to the tail, head, or AUTO position.

(c) Cover the light control switch.

(d) Check the heater control panel illumination.

Result:

| Result | Proceed to |
|---|---|
| Heater control panel illumination does not operate normally. | A |
| Heater control panel illumination operates normally. | B |

HINT:

Both the heater control panel and combination meter assembly illumination dim according to the dimmer signal. Therefore, when only the meter illumination does not dim at night, replace the combination meter assembly.

B REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)

A

| | |
|---|---|
| 4. | CHECK OPERATION (AUTOMATIC LIGHT CONTROL SYSTEM) |

(a) Turn the power switch on (IG).

(b) Turn the light control switch to the AUTO position.

(c) Cover the automatic light control sensor.

(d) Check the taillights and low beam headlights.

OK:

The taillights and low beam headlights come on.

(e) Uncover the automatic light control sensor.

(f) Check the low beam headlights and taillights.

OK:

The low beam headlights and taillights go off.

Result:

| Result | Proceed to |
|---|---|
| Automatic light control system operates normally. | A |
| Automatic light control system does not operate normally. | B |

B CHECK LIGHTING SETTING

A

| | |
|---|---|
| 5. | REPLACE MAIN BODY ECU |

(a) Replace the main body ECU with a new or a known good one INFO.

OK:

The operation of the combination meter assembly returns to normal.

HINT:

The meter ECU (meter circuit plate No.3) controls the meter illumination based on an auto dimmer signal from the main body ECU. If the meter does not dim when the light control switch is in the tail, head, or AUTO position at night, it may be for either of 2 reasons. The first reason is that the main body ECU does not send an auto dimmer signal. The second is that the meter ECU (meter circuit plate No.3) does not dim the meter illumination even though the meter ECU (meter circuit plate No.3) receives an auto dimmer signal.

NG ▶ REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)
OK ▶ **END**

# DESCRIPTION

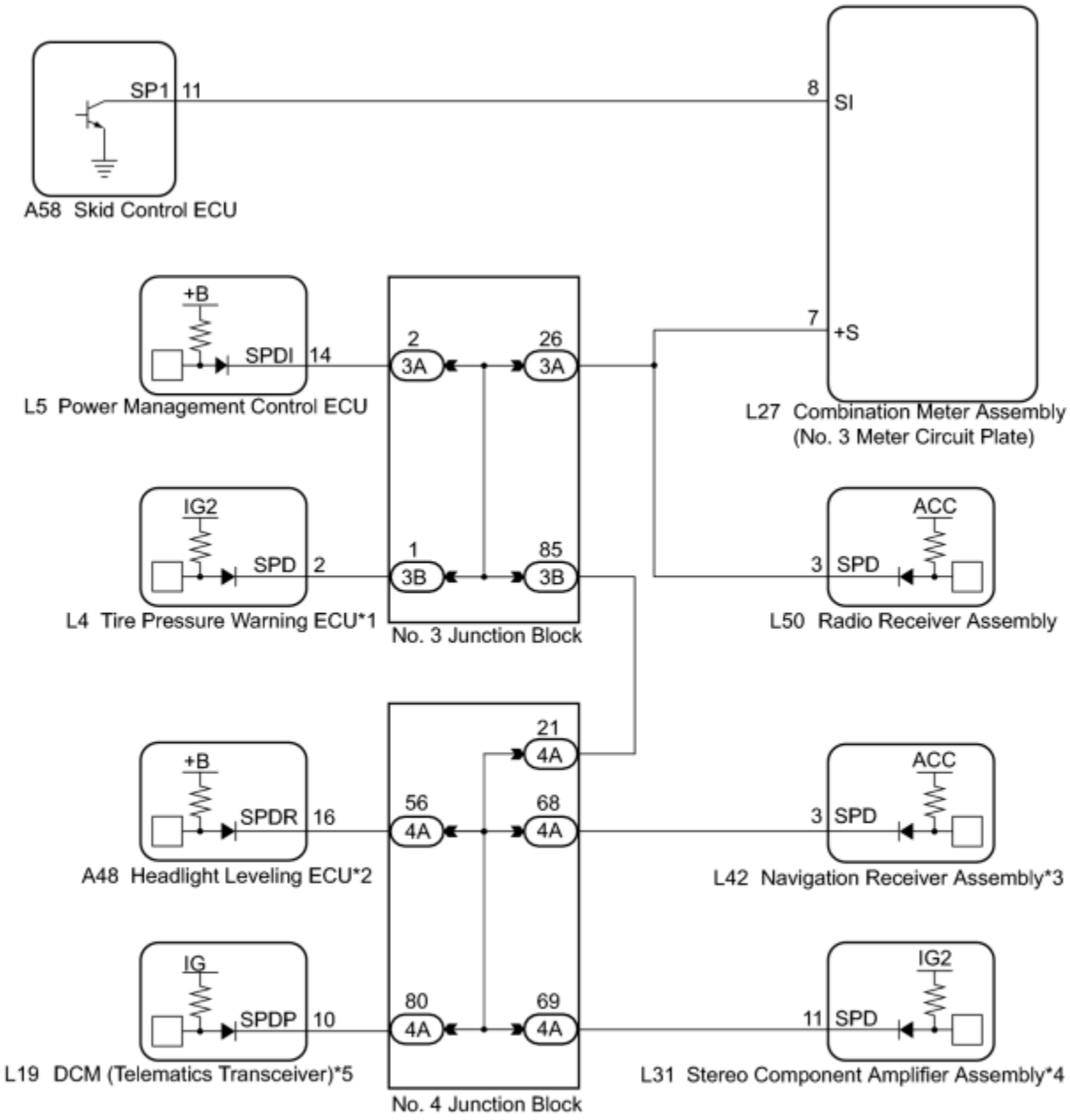
The combination meter assembly (No. 3 meter circuit plate) receives the vehicle speed signal from this circuit. The wheel speed sensors produce an output that varies according to the vehicle speed. The wheel speed sensor output is received by the skid control ECU which uses this information to create the vehicle speed sensor signal*1. The vehicle speed sensor signal consists of pulses sent to the combination meter assembly from the skid control ECU. To create this signal, 12 V is output from IG2 which is behind a resistor in the combination meter assembly. This voltage is sent to the skid control ECU. The pulse signal is created by switching the transistor in the skid control ECU on and off, making the voltage on the wire drop to 0 V. A similar system is used for the output of this signal from the combination meter assembly via terminal +S. A voltage of 12 V or 5 V is applied to terminal +S from each ECU or relay that is connected to this terminal. The transistor in the combination meter assembly is controlled by the signal from the skid control ECU. When this transistor is turned on, this transistor makes the voltage supplied by the various ECUs (via their respective internal resistors) drop to 0 V. Each ECU connected to terminal +S of the combination meter assembly controls its respective system based on the pulse signal.

- *1: This vehicle speed sensor signal is created by the skid control ECU. There is no actual component that is referred to as the vehicle speed sensor. In addition, for some other systems, vehicle speed information may be exchanged using CAN communication.

HINT:

This circuit is used for the systems connected to terminal +S. This signal is not used for combination meter assembly (no. 3 meter circuit plate) operation. Combination meter assembly components such as the speedometer operate using data received via CAN communication.

# WIRING DIAGRAM




*1: w/ Tire Pressure Warning System

*2: w/ Automatic Type Headlight Beam Level Control

*3: w/ Navigation System

*4: for Separate Type Amplifier System

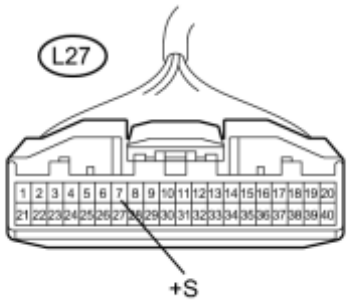
*5: w/ Manual (SOS) Switch

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | INSPECT ECU TERMINAL VOLTAGE (INPUT VOLTAGE) |

*1




H

(a) Disconnect the L27 connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-7 (+S) - Body ground | Power switch on (IG) | 4.5 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter Assembly (No. 3 Meter Circuit Plate)) |

HINT:

If any of the ECUs specified in the wiring diagram supplies power to the combination meter assembly, the combination meter assembly will output a waveform.

NG ▶ CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - RADIO RECEIVER ASSEMBLY)

OK

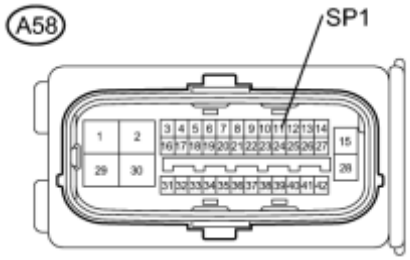
▼

| | |
|---|---|
| 2. | INSPECT COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE) (OUTPUT VOLTAGE) |

(a) Reconnect the L27 connector.

(b) Disconnect the A58 connector.

*1




(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-11 (SP1) - Body ground | Power switch on (IG) | 11 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Skid Control ECU) |

NG ▶ CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - SKID CONTROL ECU)

OK

▼

| | |
|---|---|
| 3. | INSPECT SKID CONTROL ECU (INPUT WAVEFORM) |

(a) Check the input waveform.

(1) Reconnect the A58 connector.

(2) Remove the combination meter assembly with the connector(s) still connected.

(3) Connect an oscilloscope to terminal L27-8 (SI) and body ground.

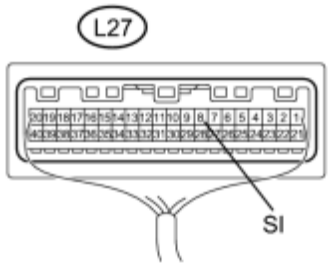
(4) Turn the power switch on (IG).

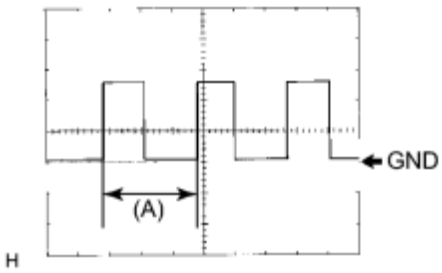
(5) Turn the wheel slowly.

(6) Check the signal waveform according to the condition(s) in the table below.

*1

| Item | Condition |
|---|---|
| Tool setting | 5 V/DIV., 20 ms./DIV. |
| Vehicle condition | Driving at approx. 20 km/h (12 mph) |




## Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Combination Meter Assembly) |

OK:

The waveform is displayed as shown in the illustration.

HINT:

When the system is functioning normally, one wheel revolution generates 4 pulses. As the vehicle speed increases, the width indicated by (A) in the illustration narrows.

NG REPLACE SKID CONTROL ECU

OK **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - SKID CONTROL ECU) |

(a) Disconnect the L27 and A58 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A58-11 (SP1) - L27-8 (SI) | Always | Below 1 Ω |
| A58-11 (SP1) - Body ground | Always | 10 kΩ or higher |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK **REPLACE COMBINATION METER ASSEMBLY (NO. 3 METER CIRCUIT PLATE)**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (NO. 3 METER CIRCUIT PLATE - RADIO RECEIVER ASSEMBLY) |

(a) Disconnect the L27 and L50 connectors.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L50-3 (SPD) - L27-7 (+S) | Always | Below 1 Ω |
| L50-3 (SPD) - Body ground | Always | 10 kΩ or higher |

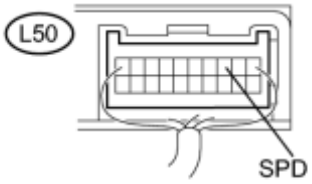
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | INSPECT RADIO RECEIVER ASSEMBLY (OUTPUT VOLTAGE) |

*1




(a) Reconnect the L50 connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L50-3 (SPD) - Body ground | Power switch on (IG) | 4 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Radio Receiver Assembly) |

NG ▶ REPLACE RADIO RECEIVER ASSEMBLY

OK

▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - NO. 3 JUNCTION BLOCK) |

(a) Disconnect the 3A connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-7 (+S) - 3A-26 | Always | Below 1 Ω |
| L27-7 (+S) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (NO. 3 JUNCTION BLOCK (INSTRUMENT PANEL WIRE)) |

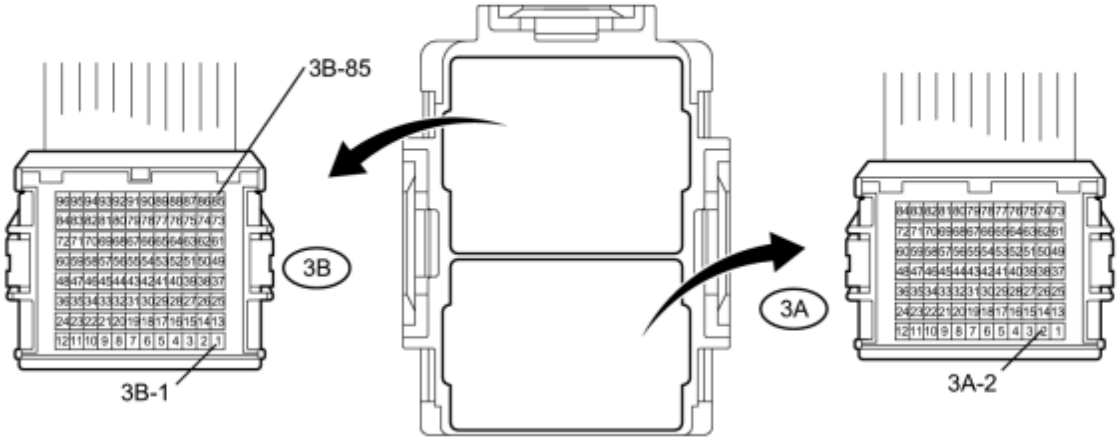
(a) Inspect for a short in the circuit that is connected to the junction block connector shown in the wiring diagram.

HINT:

If voltage is not present, it is possible that an ECU or circuit has a malfunction. The malfunctioning ECU or circuit will be diagnosed in the following steps.

(1) Disconnect the 3B connector.

*1




H

(2) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3A-2 - Body ground | Power switch on (IG) | 4.5 to 14 V |
| 3B-1 - Body ground | Power switch on (IG) | 4.5 to 14 V |
| 3B-85 - Body ground | Power switch on (IG) | 4.5 to 14 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to No. 3 Junction Block) |

Result:

| Result | Proceed to |
|---|---|
| Voltage is not present in one circuit. | A |
| Voltage is present in all the circuits. | B |

B ▶ REPLACE NO. 3 JUNCTION BLOCK (INSTRUMENT PANEL WIRE)

A

▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (NO. 3 JUNCTION BLOCK - NO. 4 JUNCTION BLOCK) |

(a) Disconnect the 4A connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 3B-85 - 4A-21 | Always | Below 1 Ω |
| 3B-85 - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

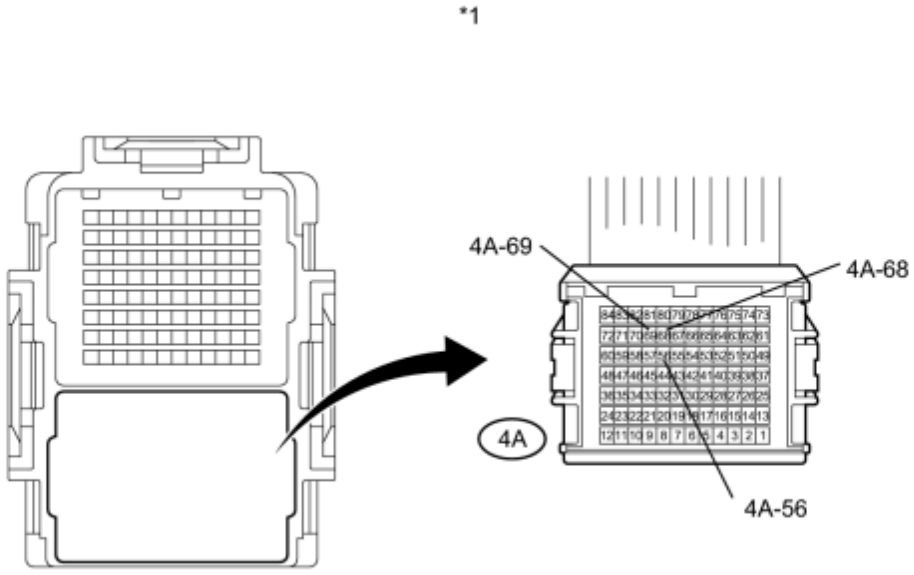
| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (NO. 4 JUNCTION BLOCK (INSTRUMENT PANEL WIRE)) |

(a) Inspect for a short in the circuit that is connected to the junction block connector shown in the wiring diagram.

HINT:

If voltage is not present, it is possible that an ECU or circuit has a malfunction. The malfunctioning ECU or circuit will be diagnosed in the following steps.

(1) Measure the voltage according to the value(s) in the table below.




H

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 4A-56 - Body ground | Power switch on (IG) | 4.5 to 14 V |
| 4A-68 - Body ground | Power switch on (IG) | 4.5 to 14 V |
| 4A-69 - Body ground | Power switch on (IG) | 4.5 to 14 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to No. 4 Junction Block) |

Result:

| Result | Proceed to |
|---|---|
| Voltage is not present in one circuit. | A |
| Voltage is present in all the circuits. | B |

B ▶ REPLACE NO. 4 JUNCTION BLOCK (INSTRUMENT PANEL WIRE)

A

▼

| | |
|---|---|
| 11. | SYSTEM CHECK |

(a) Select the circuit for which voltage was not present in step 7 or 9.

Result:

| Tester Connection | System that Uses the Circuit | Proceed to |
|---|---|---|
| 3A-2 - Body ground | Smart Key System | A |
| 4A-69 - Body ground | Audio/Visual System | A |
| 4A-68*1 - Body ground | Navigation System | A |
| 3B-1*2 - Body ground | Tire Pressure Warning ECU | A |
| 4A-56*3 - Body ground | Lighting System | A |
| 4A-80*4 - Body ground | Safety Connect System | B |

- *1: w/ Navigation System
- *2: w/ Tire Pressure Warning System
- *3: w/ Automatic Type Headlight Beam Level Control
- *4: w/ Manual (SOS) Switch

B CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) CIRCUIT)

A

| | |
|---|---|
| 12. | SYSTEM CHECK |

(a) Select the circuit for which voltage was not present in step 7 or 9.

Result:

| Tester Connection | System that Uses the Circuit | Proceed to |
|---|---|---|
| 3A-2 - Body ground | Smart Key System | A |
| 4A-69 - Body ground | Audio/Visual System | B |
| 4A-68*1 - Body ground | Navigation System | C |
| 3B-1*2 - Body ground | Tire Pressure Warning ECU | D |
| 4A-56*3 - Body ground | Lighting System | E |

- *1: w/ Navigation System
- *2: w/ Tire Pressure Warning System
- *3: w/ Automatic Type Headlight Beam Level Control

E CHECK HARNESS AND CONNECTOR (HEADLIGHT LEVELING ECU CIRCUIT)

D CHECK HARNESS AND CONNECTOR (TIRE PRESSURE WARNING ECU CIRCUIT)

C CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY CIRCUIT)

B CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER ASSEMBLY CIRCUIT)

A

▼

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU CIRCUIT) |

(a) Disconnect the L5 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-14 (SPDI) - Body ground | Always | 10 kΩ or higher |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 14. | CHECK HARNESS AND CONNECTOR (STEREO COMPONENT AMPLIFIER ASSEMBLY CIRCUIT) |

(a) Disconnect the L31 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L31-11 (SPD) - Body ground | Always | 10 kΩ or higher |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK **REPLACE STEREO COMPONENT AMPLIFIER ASSEMBLY**

| | |
|---|---|
| 15. | CHECK HARNESS AND CONNECTOR (NAVIGATION RECEIVER ASSEMBLY CIRCUIT) |

(a) Disconnect the L42 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L42-3 (SPD) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE NAVIGATION RECEIVER ASSEMBLY**

| | |
|---|---|
| 16. | CHECK HARNESS AND CONNECTOR (TIRE PRESSURE WARNING ECU CIRCUIT) |

(a) Disconnect the L4 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L4-2 (SPD) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE TIRE PRESSURE WARNING ECU**

| | |
|---|---|
| 17. | CHECK HARNESS AND CONNECTOR (HEADLIGHT LEVELING ECU CIRCUIT) |

(a) Disconnect the A48 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A48-16 (SPDR) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE HEADLIGHT LEVELING ECU ASSEMBLY**

| | |
|---|---|
| 18. | CHECK HARNESS AND CONNECTOR (DCM (TELEMATICS TRANSCEIVER) CIRCUIT) |

(a) Disconnect the L19 connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

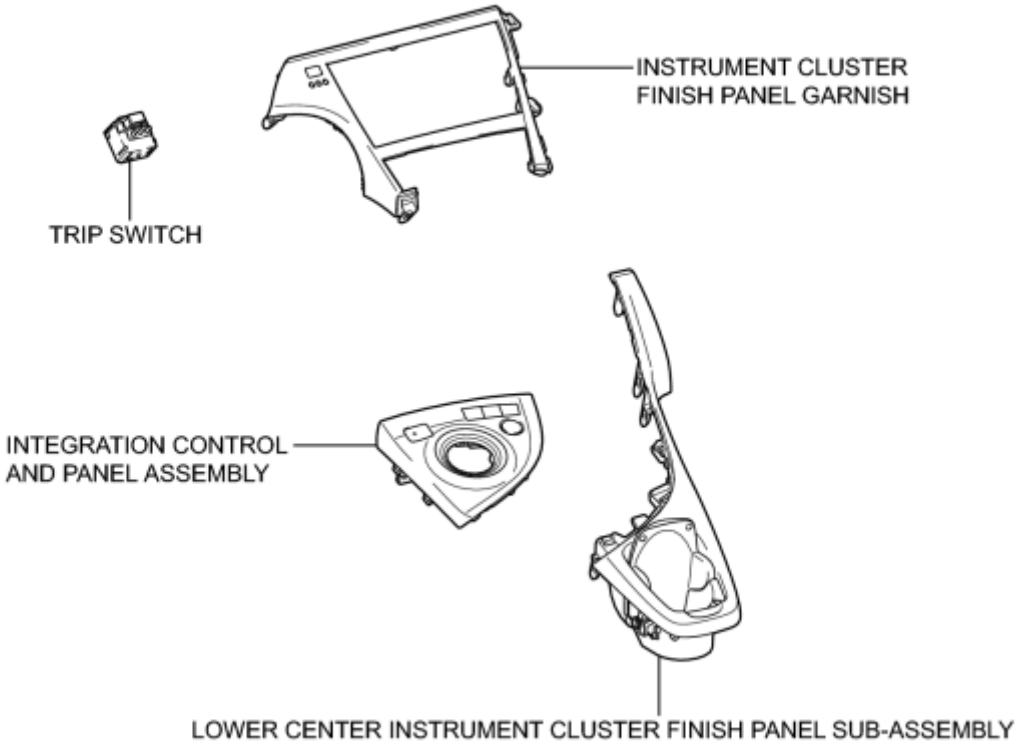
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L19-10 (SPDP) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE DCM (TELEMATICS TRANSCEIVER)**

# COMPONENTS

# ILLUSTRATION




P

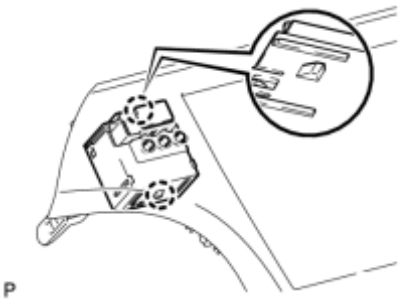
# REMOVAL

1. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

2. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

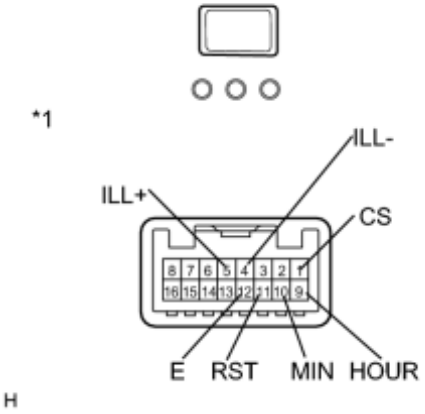
3. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

4. REMOVE TRIP SWITCH




(a) Disengage the 2 claws to remove the trip switch.

# INSPECTION




1. INSPECT TRIP SWITCH

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 (CS) - 12 (E) | Unit change switch not pressed | 10 kΩ or higher |
| 1 (CS) - 12 (E) | Unit change switch pressed | Below 1 Ω |
| 9 (HOUR) - 12 (E) | Hour adjust switch not pressed | 10 kΩ or higher |
| 9 (HOUR) - 12 (E) | Hour adjust switch pressed | Below 1 Ω |
| 10 (MIN) - 12 (E) | Minute adjust switch not pressed | 10 kΩ or higher |
| 10 (MIN) - 12 (E) | Minute adjust switch pressed | Below 1 Ω |
| 11 (RST) - 12 (E) | Set switch not pressed | 10 kΩ or higher |
| 1 (RST) - 12 (E) | Set switch pressed | Below 1 Ω |

(b) Apply battery voltage from the wire harness back side between the terminals of the switch, and check the lighting condition of the trip switch.

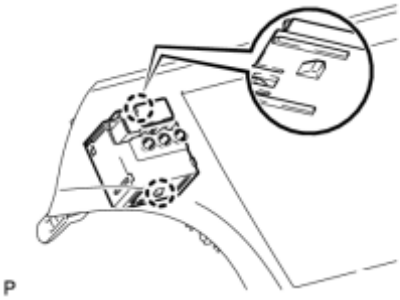
OK:

| Measurement Condition | Condition | Specified Condition |
|---|---|---|
| Battery positive (+) → 5 (ILL+)<br><br>Battery negative (-) → 4 (ILL-) | Always | Trip switch illuminates |

If the result is not as specified, replace the trip switch INFO.

# INSTALLATION

1. INSTALL TRIP SWITCH




(a) Engage the 2 claws to install the trip switch.

2. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

3. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

4. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

# PRECAUTION

1. NOTICE FOR INITIALIZATION

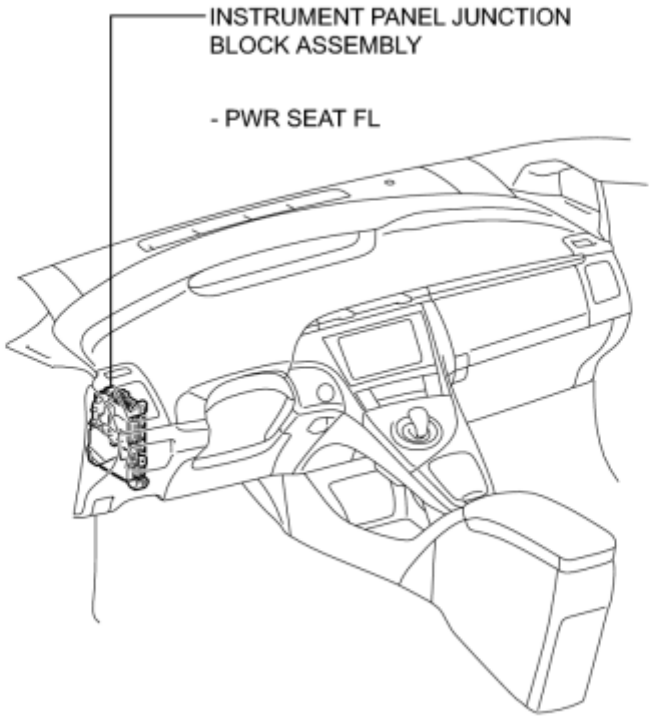
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

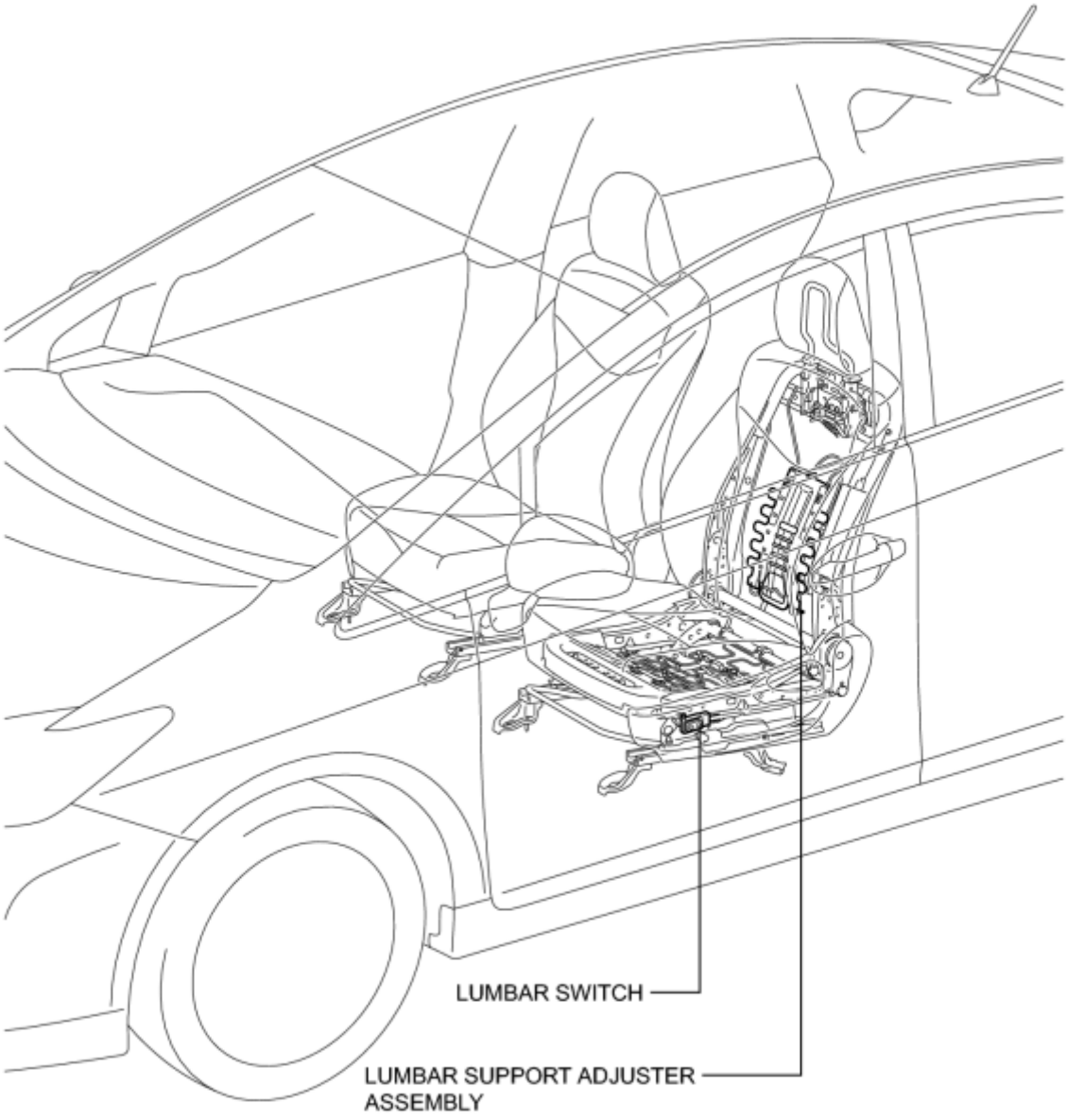
# PARTS LOCATION

# ILLUSTRATION



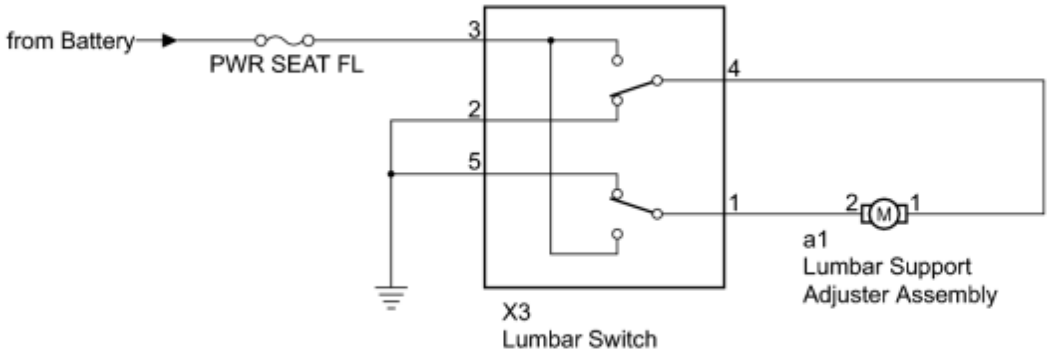

H

# ILLUSTRATION




H

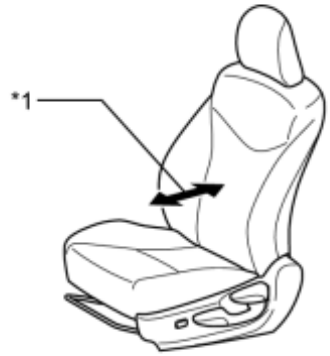
# SYSTEM DIAGRAM




H

# OPERATION CHECK

1. CHECK POWER SEAT FUNCTION




(a) Check the basic function.

(1) Operate the lumbar support switch and check to make sure the seat function works:

- Lumbar support function (*1)

2. CHECK LUMBAR SUPPORT MOTOR

(a) Inspect the PTC operation inside the power seat motor.

NOTICE:

The inspection should be performed with the seat installed in the vehicle.

(1) Move the lumbar support to either the foremost or rearmost position by operating the lumbar support switch, and keep it there for approximately 60 seconds.

(2) Try to move the lumbar support beyond the maximum position using the switch. Measure the time needed for shutting off the electrical current after the lumbar support stops moving (verify when current is shut off or listening for the motor to stop).

Standard:

4 to 90 seconds

(3) Release the lumbar support switch and wait for approximately 60 seconds.

(4) Operate the lumbar support switch to move the lumbar support to the opposite position and check that the motor operates.

# PROBLEM SYMPTOMS TABLE

HINT:

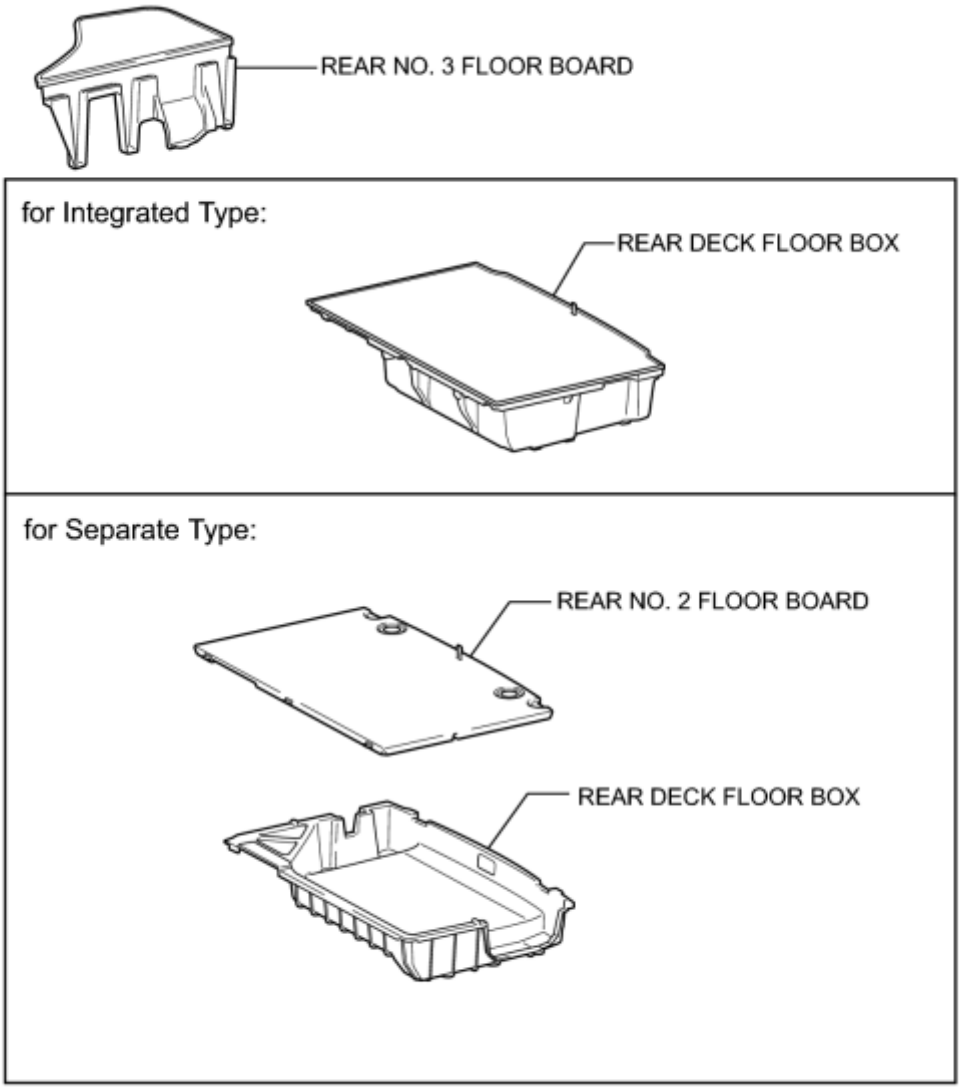
- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays and relays related to this system before inspecting the suspected areas below.

### *Front Power Seat Control System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Lumbar support operation function does not operate | Lumbar switch | INFO |
| | Front power seat assembly (lumbar support motor) | INFO |
| | Harness or connector | - |

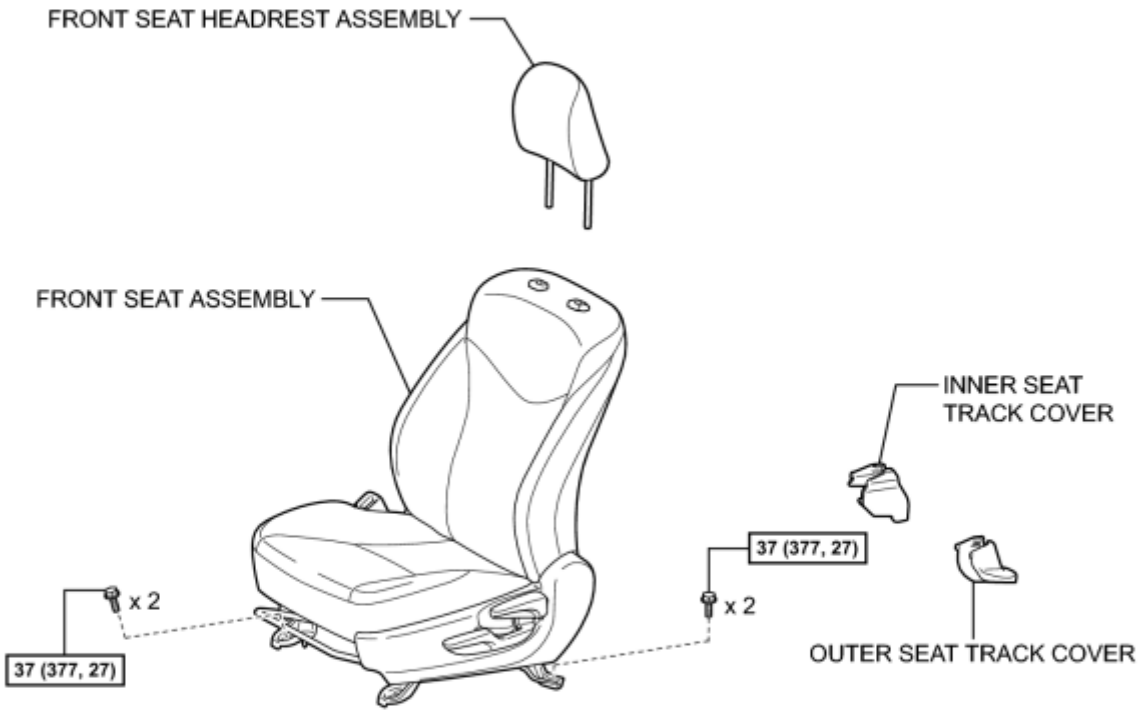
# COMPONENTS

# ILLUSTRATION




P

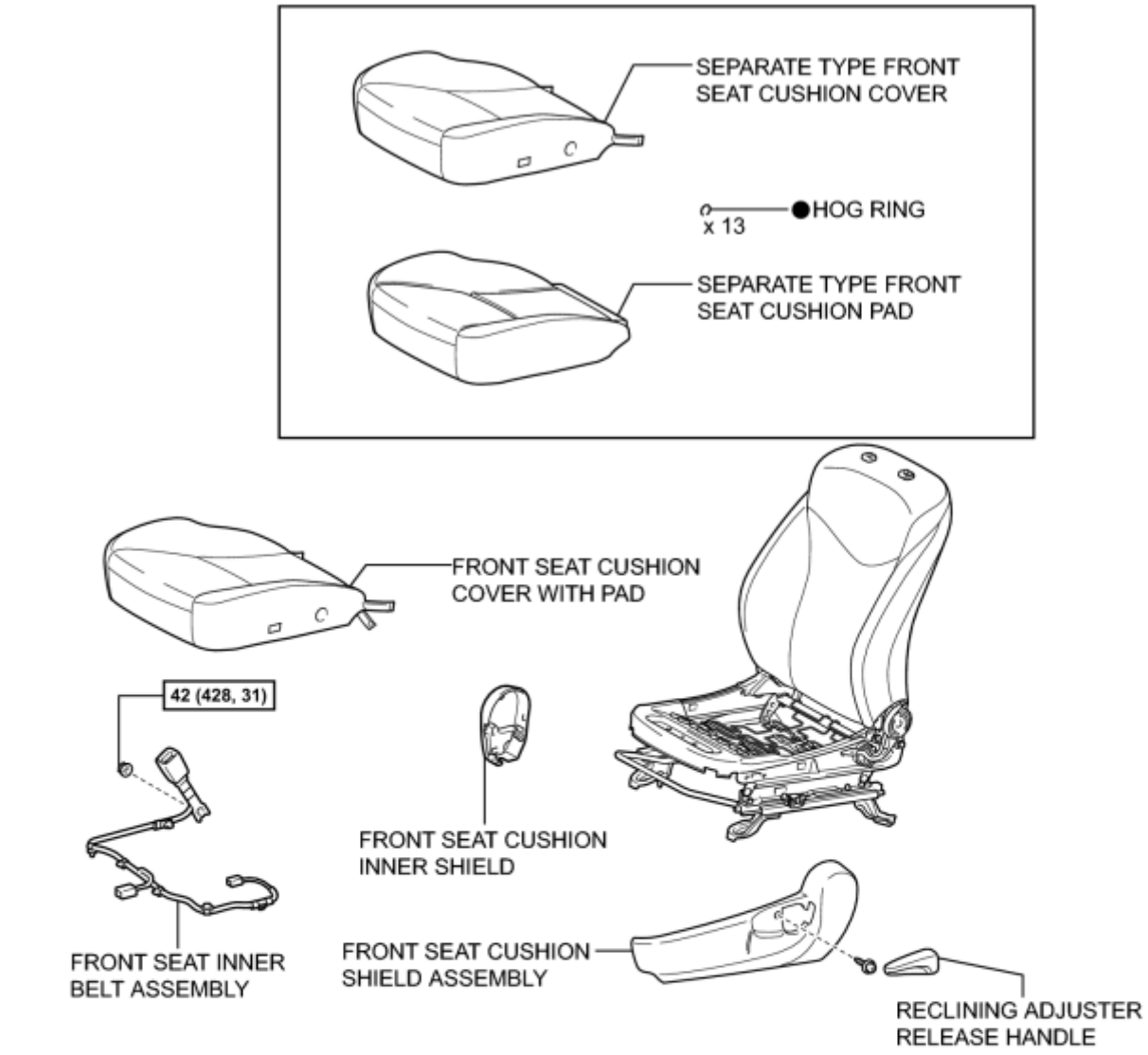
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION

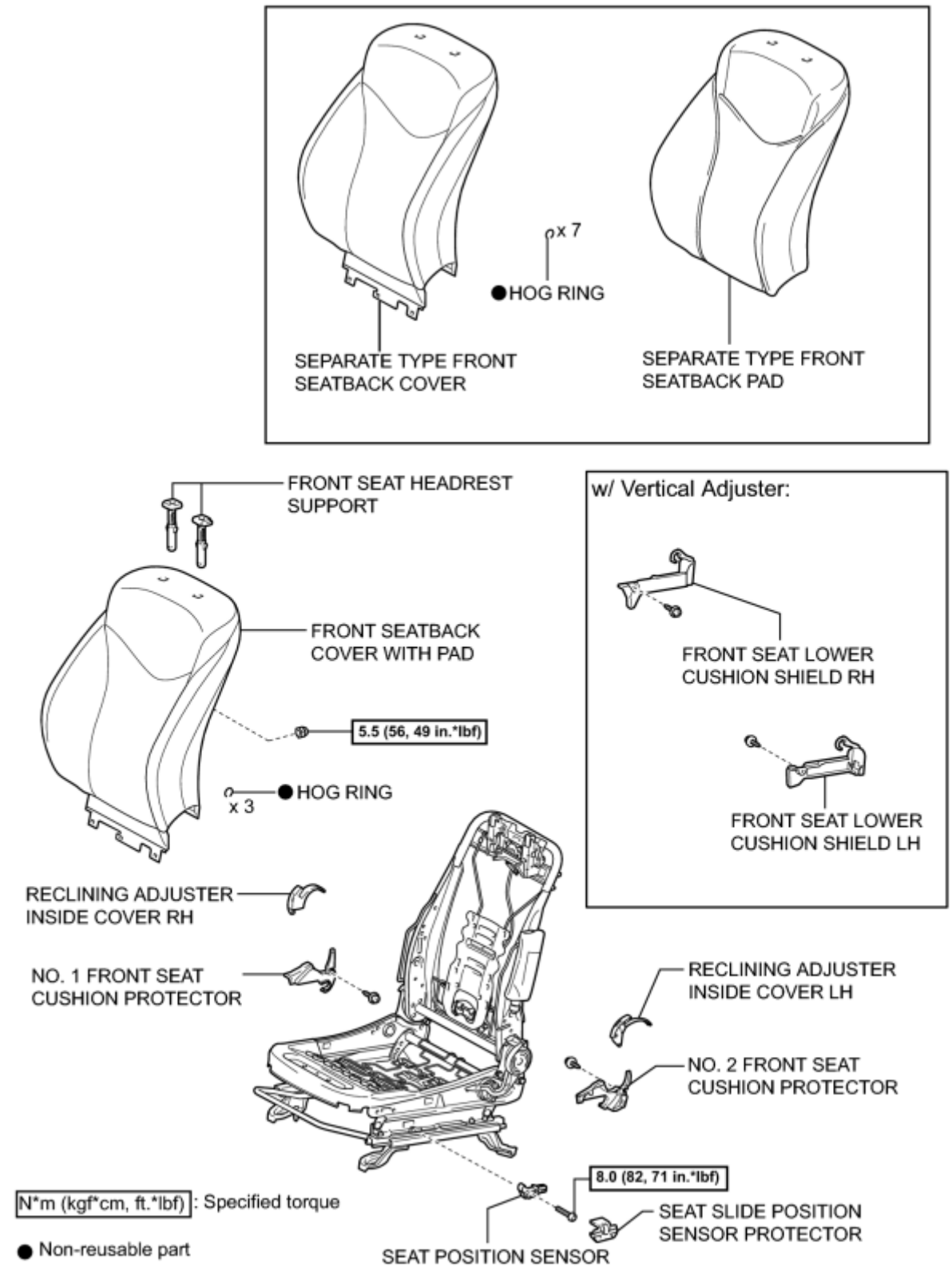



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

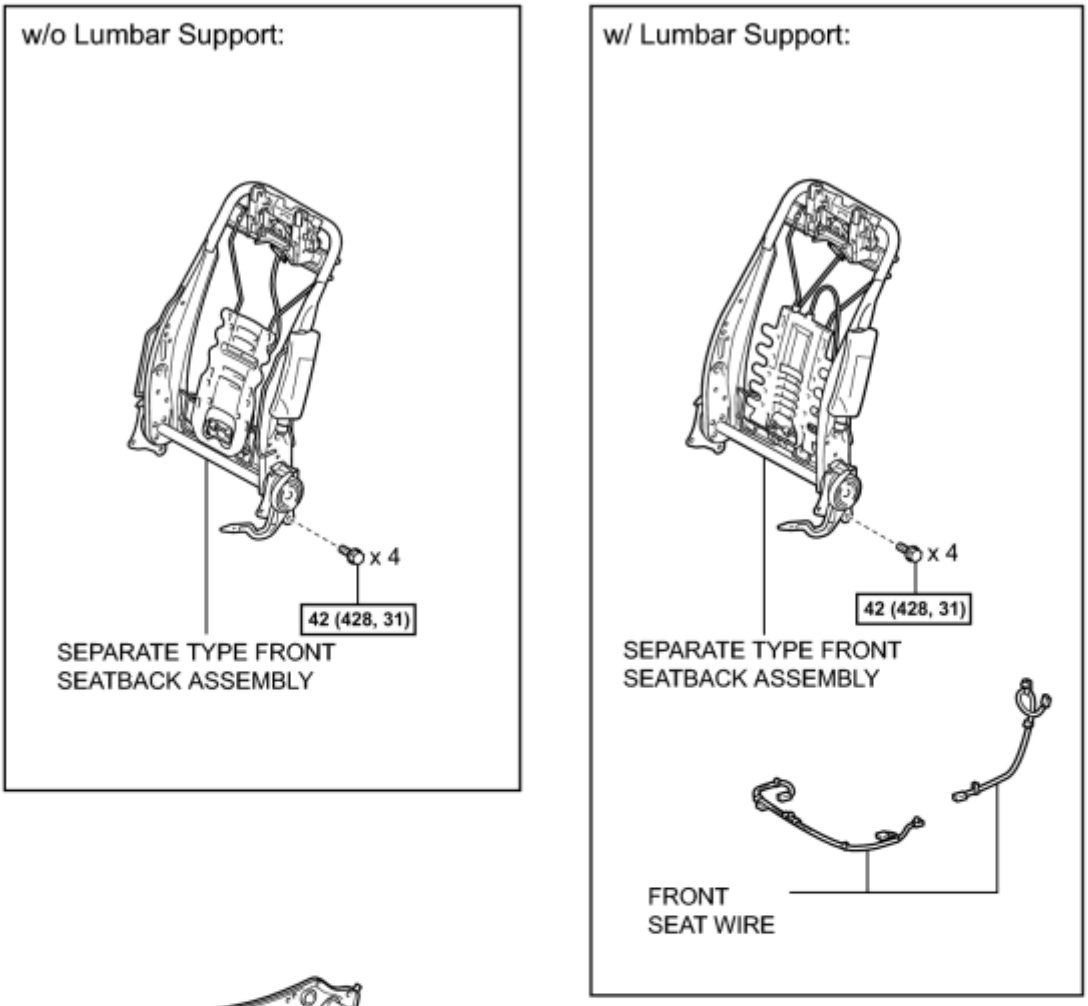
P

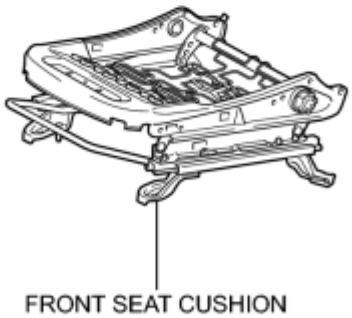
# ILLUSTRATION

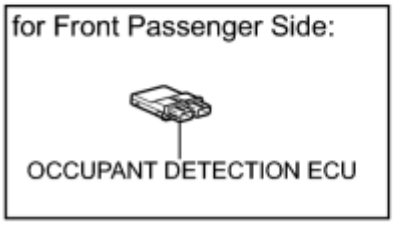



P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

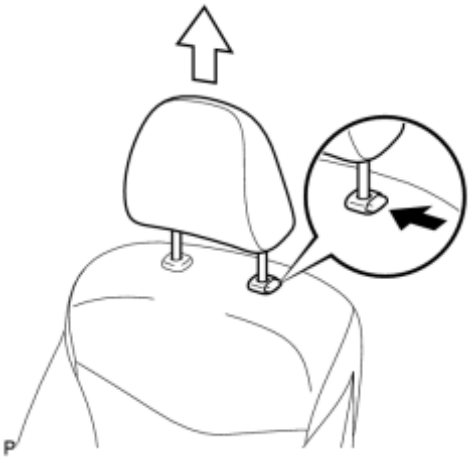
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT SEAT HEADREST ASSEMBLY



(a) Press the headrest support button and pull up the headrest as shown in the illustration to remove it.

6. REMOVE OUTER SEAT TRACK COVER

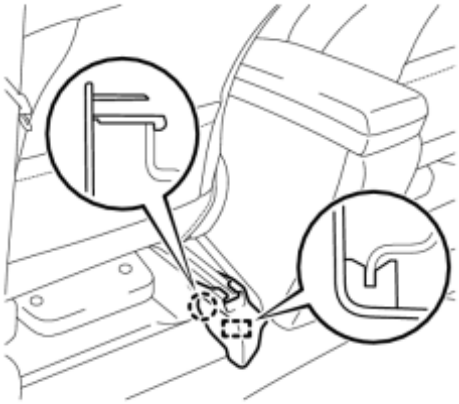
(a) Lift up the seat track adjusting handle and move the seat to the foremost position.



P

(b) Disengage the 2 claws and remove the outer seat track cover.

7. REMOVE INNER SEAT TRACK COVER



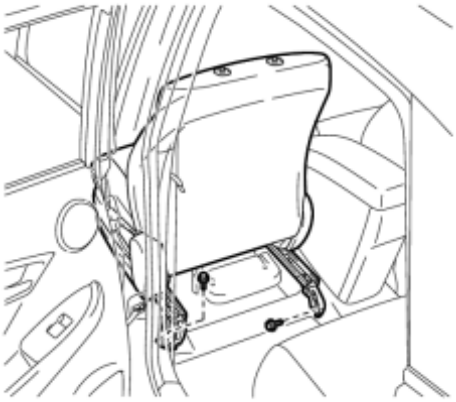
P

(a) Disengage the claw.

(b) Separate the guide and remove the inner seat track cover.

8. REMOVE FRONT SEAT ASSEMBLY

(a) Remove the 2 bolts on the rear side of the seat.



P

(b) Lift up the seat track adjusting handle and move the seat to the rearmost position.



P

(c) Remove the 2 bolts on the front side of the seat.

(d) Lift up the seat track adjusting handle and move the seat to the center position. Also, operate the reclining adjuster release handle and move the seatback to the upright position.

(e) Disconnect the connectors under the seat.

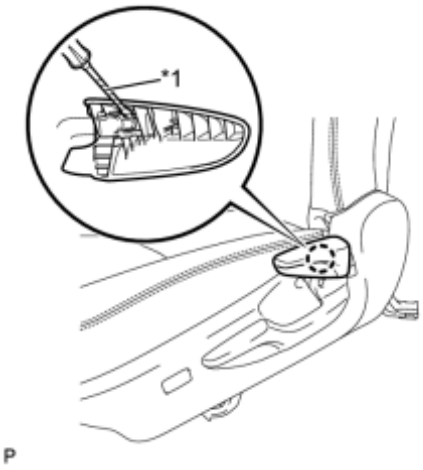
(f) Remove the seat.

NOTICE:

Be careful not to damage the vehicle body.

# DISASSEMBLY

1. REMOVE RECLINING ADJUSTER RELEASE HANDLE

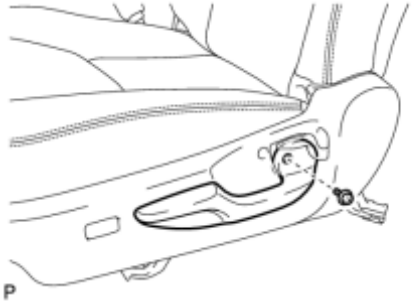



(a) Using a screwdriver wrapped with protective tape, disengage the claw and remove the reclining adjuster release handle.

## Text in Illustration

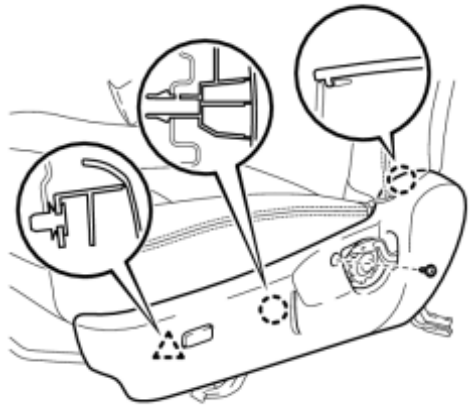
| | |
|---|---|
| *1 | Protective Tape |

2. REMOVE VERTICAL ADJUSTING HANDLE (w/ Vertical Adjuster)




(a) Remove the screw and vertical adjusting handle.

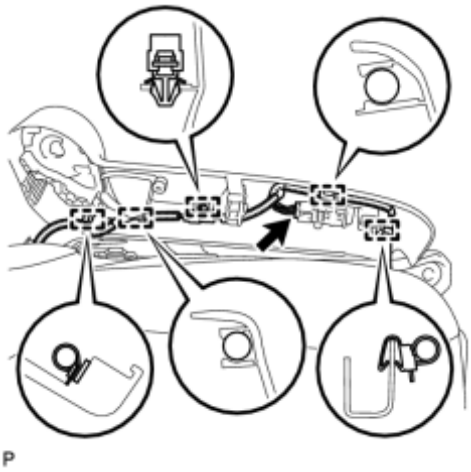
3. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY




(a) Remove the screw.

(b) Disengage the 2 claws and clip.

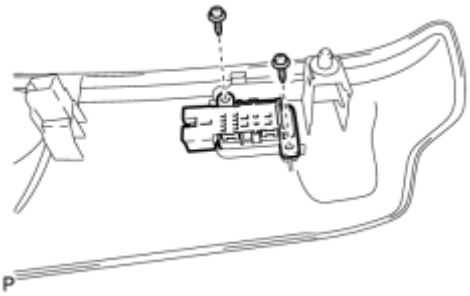
(c) w/ Lumbar Support:



(1) Disconnect the connector.

(2) Disengage the 5 clamps and remove the front seat cushion shield assembly.

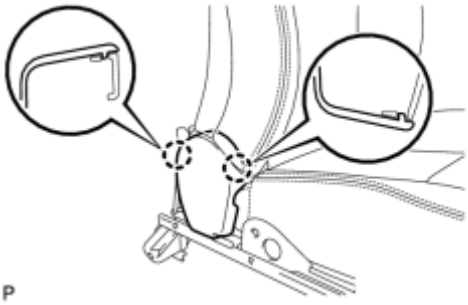
4. REMOVE LUMBAR SWITCH (w/ Lumbar Support)



(a) Remove the 2 screws and lumbar switch.

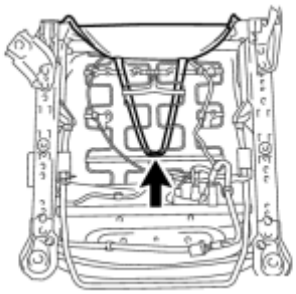
5. REMOVE FRONT SEAT INNER BELT ASSEMBLY INFO

6. REMOVE FRONT SEAT CUSHION INNER SHIELD



(a) Disengage the 2 claws and remove the front seat cushion inner shield.

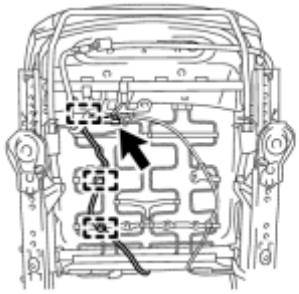
7. REMOVE FRONT SEAT CUSHION COVER WITH PAD



P

(a) Remove the hook.

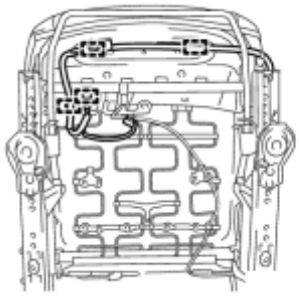
(b) w/ Lumbar Support:



P

(1) Disconnect the connector.

(2) Disengage the 3 clamps.

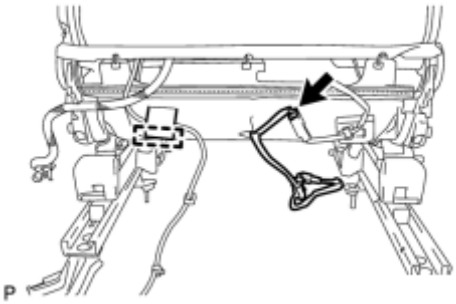


P

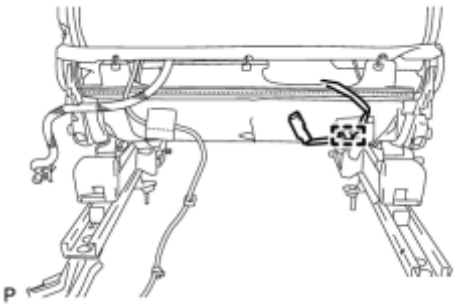
(3) Disengage the 4 clamps.

(c) w/ Seat Heater System:

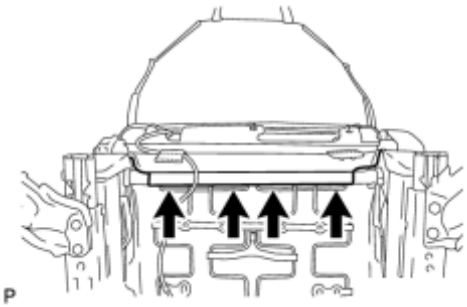
(1) Disconnect the connector.



(2) Unfasten the front seat cushion cover with pad as shown in the illustration.

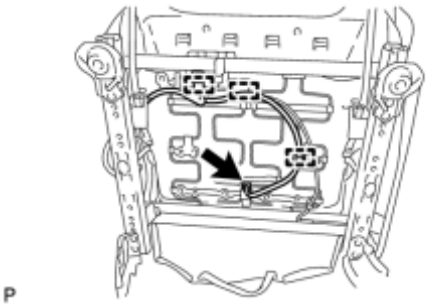


(3) Disengage the clamp.



(d) Disengage the 4 hooks.

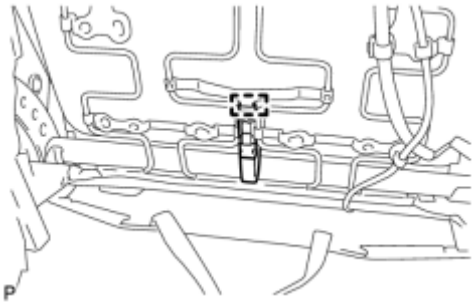
(e) for Passenger Side:



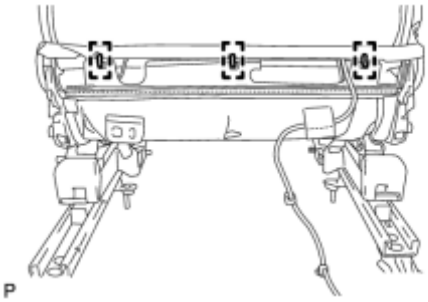
(1) Disconnect the connector.

(2) Disengage the 3 clamps.

(3) Disengage the guide and remove the belt warning occupant detection



sensor.

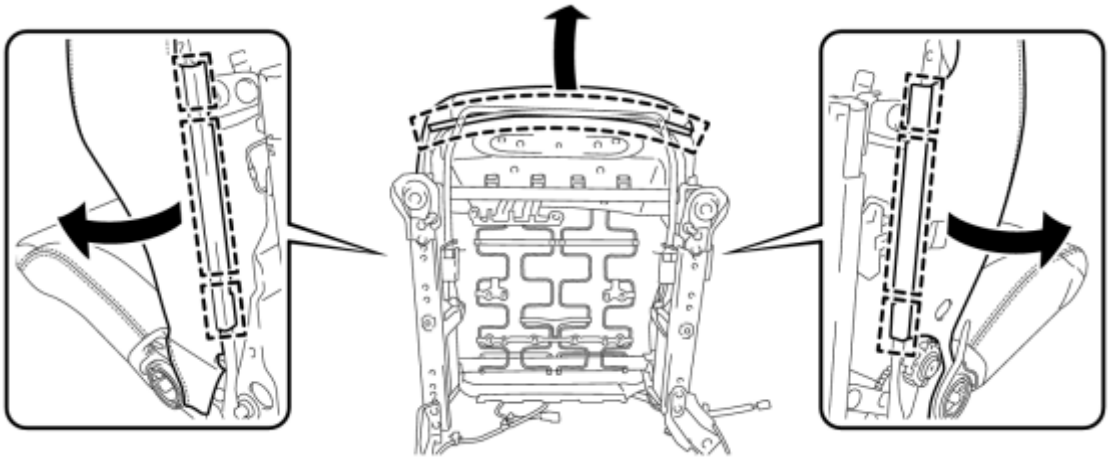


(f) Remove the 3 hog rings.



(g) Disengage the 2 hooks as shown in the illustration.

(h) Disengage each hook and remove the front seat cushion cover with pad as shown in the illustration.



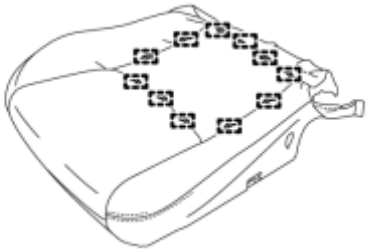
P

8. REMOVE SEPARATE TYPE FRONT SEAT CUSHION COVER



P

(a) Remove the 2 hog rings.

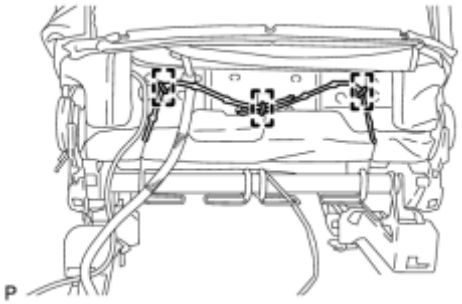


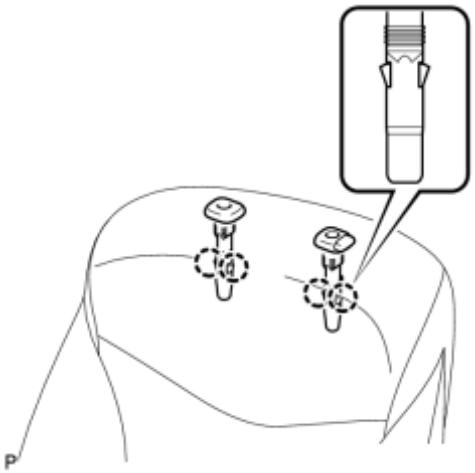
P

(b) Remove the 11 hog rings and separate type front seat cushion cover.

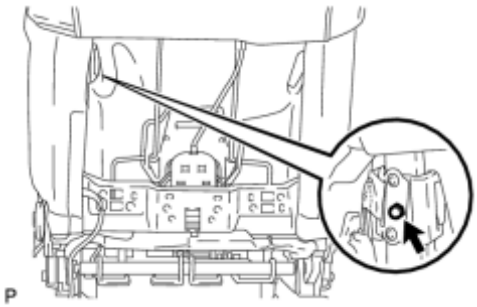
9. REMOVE FRONT SEATBACK COVER WITH PAD

(a) Remove the 3 hog rings.





(b) Disengage the 4 claws and remove the 2 front seat headrest supports.



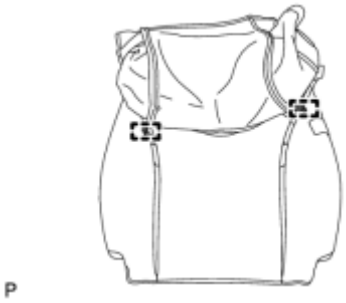
(c) Turn back the separate type front seatback cover to remove the nut, and separate the bracket of the separate type front seatback cover RH.

(d) Remove the separate type front seatback cover with pad from the front seat frame assembly with adjuster.

10. REMOVE SEPARATE TYPE FRONT SEATBACK COVER

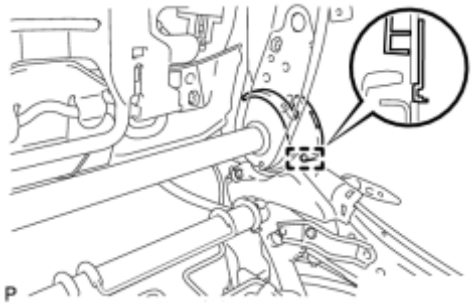


(a) Remove the 5 hog rings.



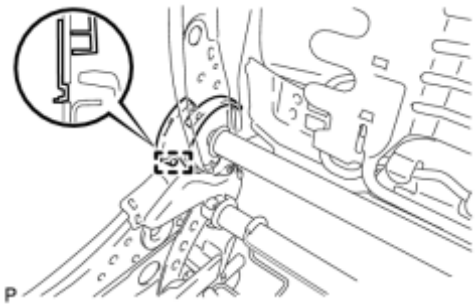
(b) Remove the 2 hog rings and the separate type front seatback cover.

11. REMOVE RECLINING ADJUSTER INSIDE COVER LH



(a) Disengage the guide and remove the reclining adjuster inside cover LH.

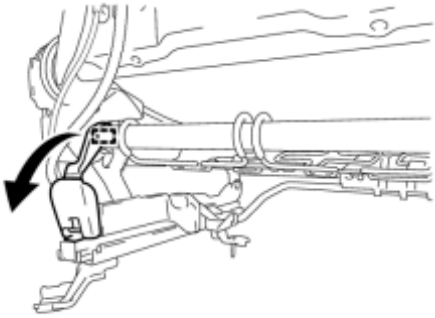
12. REMOVE RECLINING ADJUSTER INSIDE COVER RH



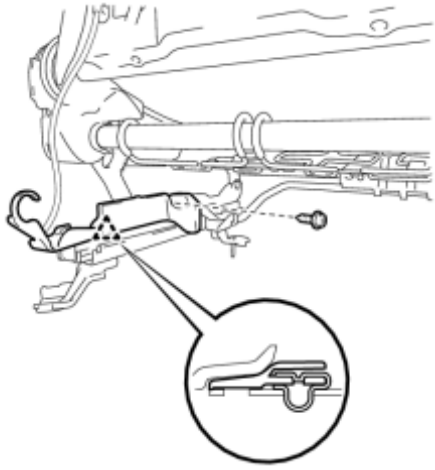
(a) Disengage the guide and remove the reclining adjuster inside cover RH.

13. REMOVE FRONT SEAT LOWER CUSHION SHIELD LH (w/ Vertical Adjuster)

(a) Disengage the hook as shown in the illustration.



P

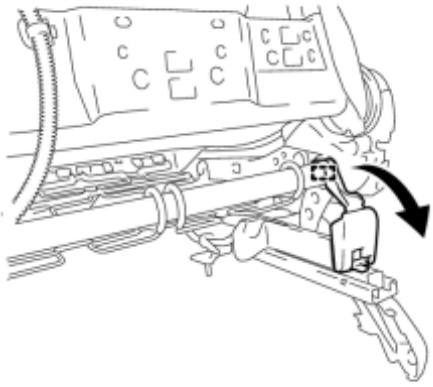


P

(b) Remove the screw.

(c) Disengage the clip and remove the front seat lower cushion shield LH.

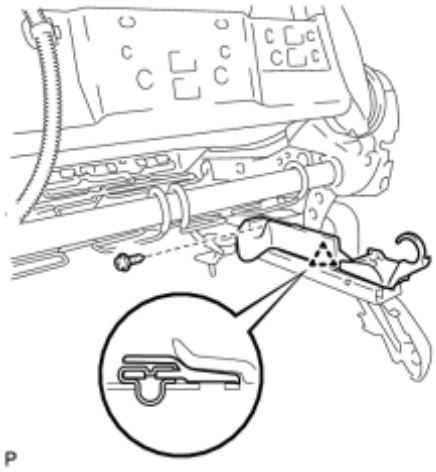
14. REMOVE FRONT SEAT LOWER CUSHION SHIELD RH (w/ Vertical Adjuster)



P

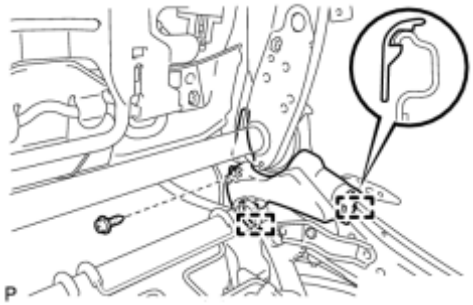
(a) Disengage the hook as shown in the illustration.

(b) Remove the screw.



(c) Disengage the clip and remove the front seat lower cushion shield RH.

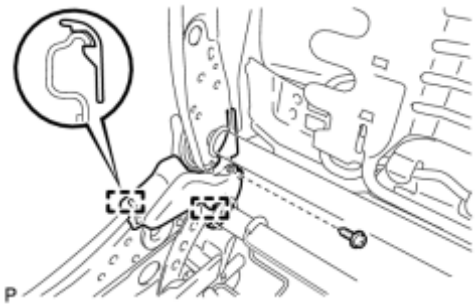
15. REMOVE NO. 2 FRONT SEAT CUSHION PROTECTOR



(a) Remove the screw.

(b) Disengage the 2 guides and remove the No. 2 front seat cushion protector.

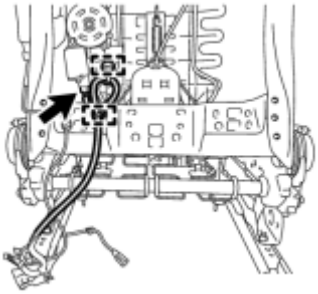
16. REMOVE NO. 1 FRONT SEAT CUSHION PROTECTOR



(a) Remove the screw.

(b) Disengage the 2 guides and remove the No. 1 front seat cushion protector.

17. REMOVE FRONT SEAT WIRE (w/ Lumbar Support)



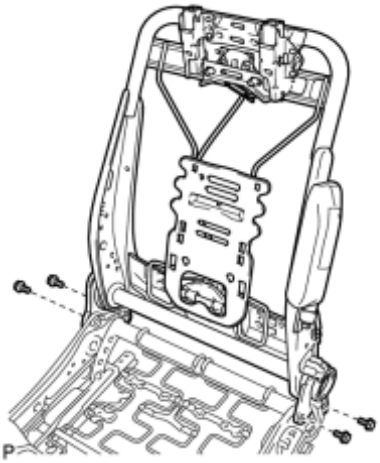
(a) Disconnect the connector.

(b) Disengage the 2 clamps and remove the front seat wire.

18. REMOVE OCCUPANT DETECTION ECU (for Front Passenger Side) INFO

19. REMOVE SEAT POSITION SENSOR INFO

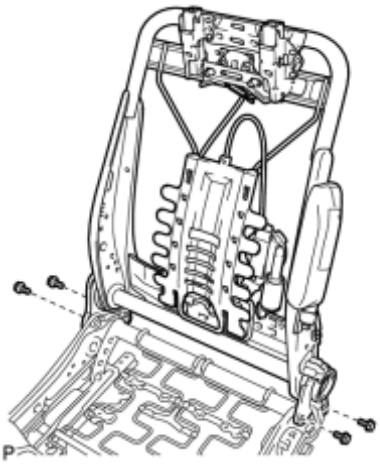
20. REMOVE SEPARATE TYPE FRONT SEATBACK ASSEMBLY (w/o Lumbar Support)



(a) Remove the 4 bolts and separate type front seatback assembly.

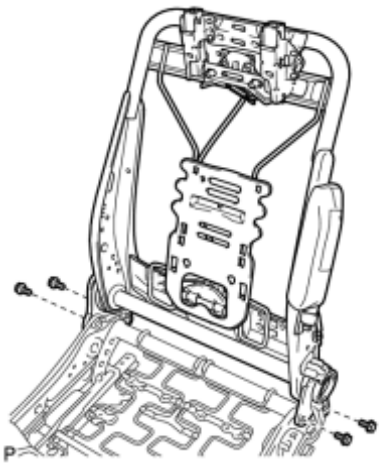
21. REMOVE SEPARATE TYPE FRONT SEATBACK ASSEMBLY (w/ Lumbar Support)

(a) Remove the 4 bolts and separate type front seatback assembly.



# REASSEMBLY

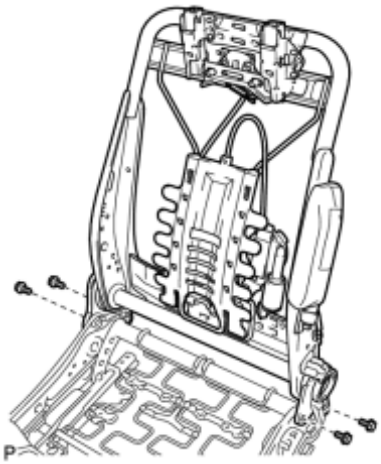
1. INSTALL SEPARATE TYPE FRONT SEATBACK ASSEMBLY (w/o Lumbar Support)



(a) Install the separate type front seatback assembly with the 4 bolts.

Torque: **42 N·m (428 kgf·cm, 31ft·lbf)**

2. INSTALL SEPARATE TYPE FRONT SEATBACK ASSEMBLY (w/ Lumbar Support)



(a) Install the separate type front seatback assembly with the 4 bolts.

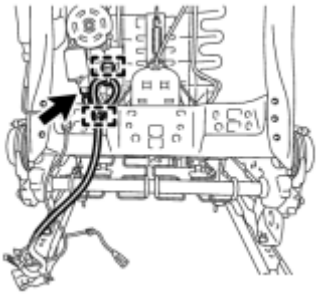
Torque: **42 N·m (428 kgf·cm, 31ft·lbf)**

3. INSTALL SEAT POSITION SENSOR INFO

4. INSTALL OCCUPANT DETECTION ECU (for Front Passenger Side) INFO

5. INSTALL FRONT SEAT WIRE (w/ Lumbar Support)

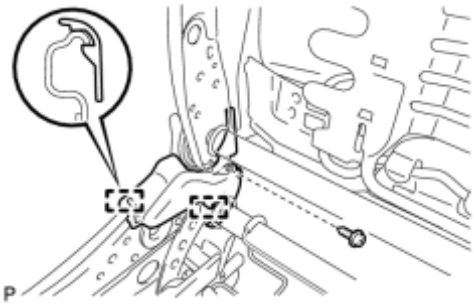
(a) Engage the 2 clamps and install the front seat wire.



P

(b) Connect the connector.

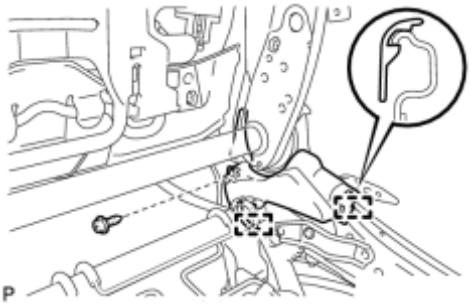
6. INSTALL NO. 1 FRONT SEAT CUSHION PROTECTOR



P

(a) Engage the 2 guides and install the No. 1 front seat cushion protector with the screw.

7. INSTALL NO. 2 FRONT SEAT CUSHION PROTECTOR

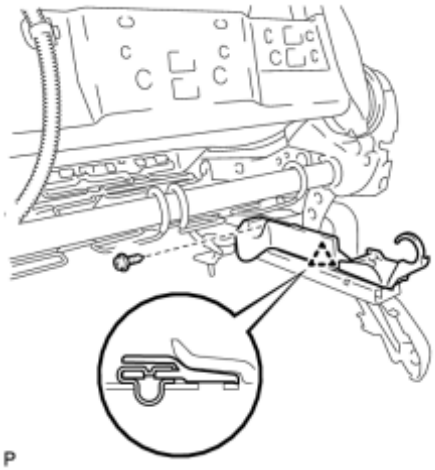


P

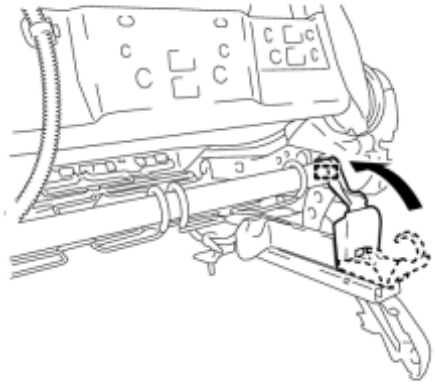
(a) Engage the 2 guides and install the No. 2 front seat cushion protector with the screw.

8. INSTALL FRONT SEAT LOWER CUSHION SHIELD RH (w/ Vertical Adjuster)

(a) Engage the clip and install the screw.



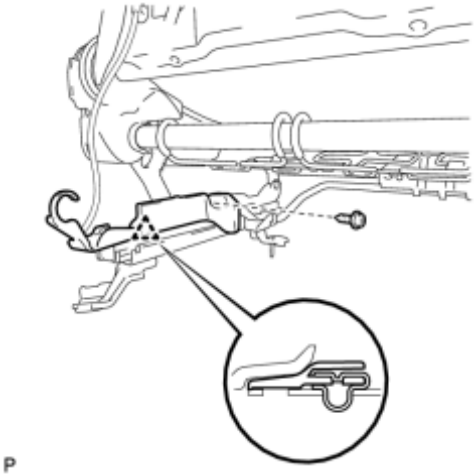
P



P

(b) Engage the hook and install the front seat lower cushion shield RH as shown in the illustration.

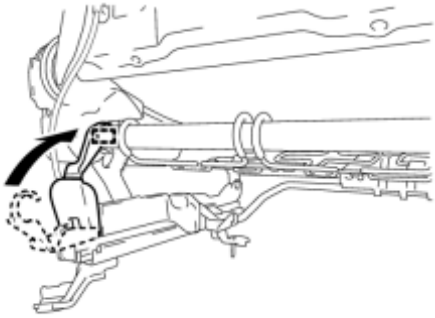
9. INSTALL FRONT SEAT LOWER CUSHION SHIELD LH (w/ Vertical Adjuster)



P

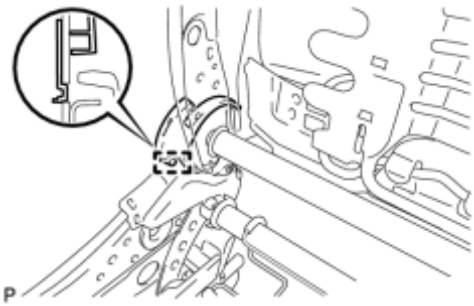
(a) Engage the clip and install the screw.

(b) Engage the hook and install the front seat lower cushion shield LH as shown in the illustration.



P

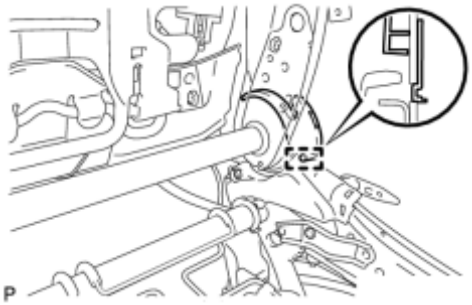
10. INSTALL RECLINING ADJUSTER INSIDE COVER RH



P

(a) Engage the guide and install the reclining adjuster inside cover RH.

11. INSTALL RECLINING ADJUSTER INSIDE COVER LH



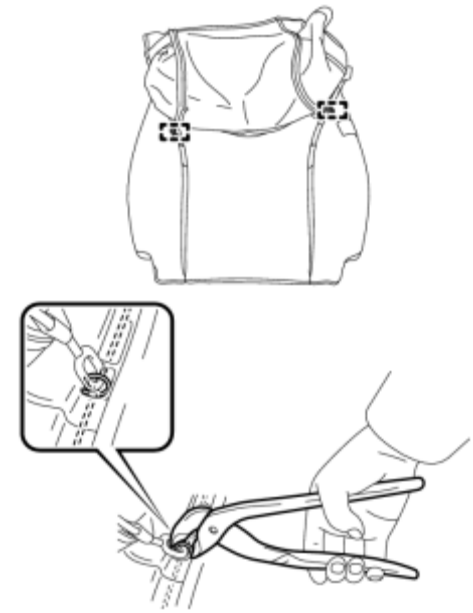
P

(a) Engage the guide and install the reclining adjuster inside cover LH.

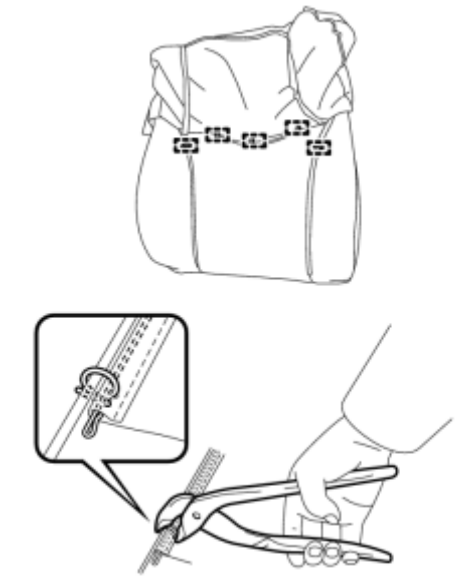
12. INSTALL SEPARATE TYPE FRONT SEATBACK COVER

(a) Using hog ring pliers, install 2 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.



P

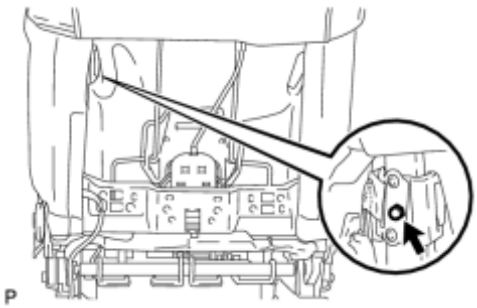


P

(b) Using hog ring pliers, install 5 new hog rings

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

13. INSTALL FRONT SEATBACK COVER WITH PAD



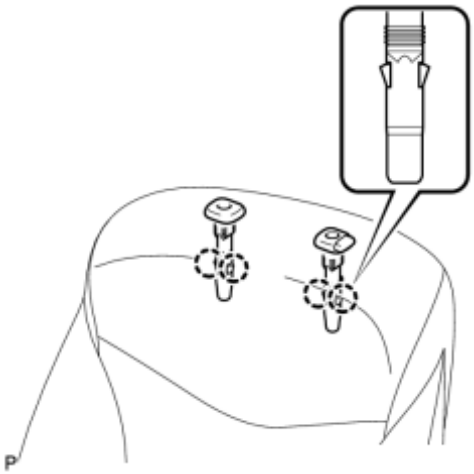
P

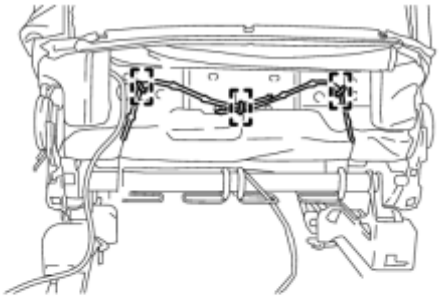
(a) Install the front seatback cover bracket with the nut.

Torque: **5.5 N·m (56 kgf·cm, 49in·lbf)**

- For vehicles with side airbags, the side airbags may not be activated normally unless the front seatback cover is securely installed.
- Check that the strap is not twisted after installing the bracket.
- Install the bracket securely.

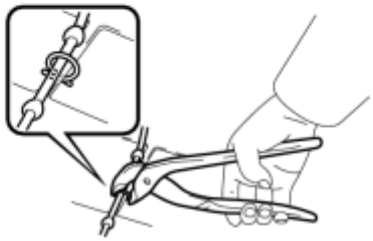
(b) Engage the 4 claws and install the 2 front seat headrest supports.





(c) Using hog ring pliers, install the separate type front seat cushion cover to the separate type front seat cushion pad with 3 new hog rings.

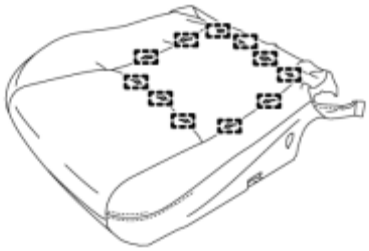
- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

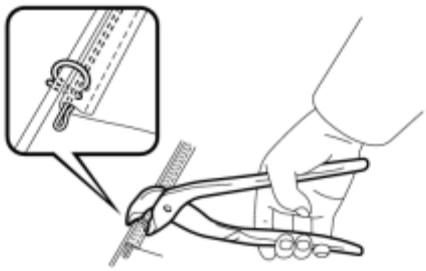


14. INSTALL SEPARATE TYPE FRONT SEAT CUSHION COVER

(a) Using hog ring pliers, install 11 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.



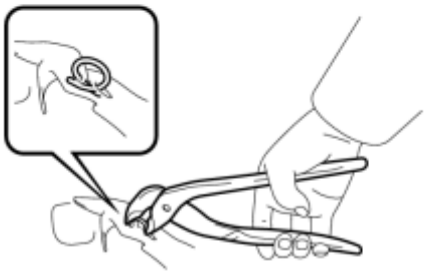


P



(b) Using hog ring pliers, install the separate type front seat cushion cover to the separate type front seat cushion pad with 2 new hog rings.

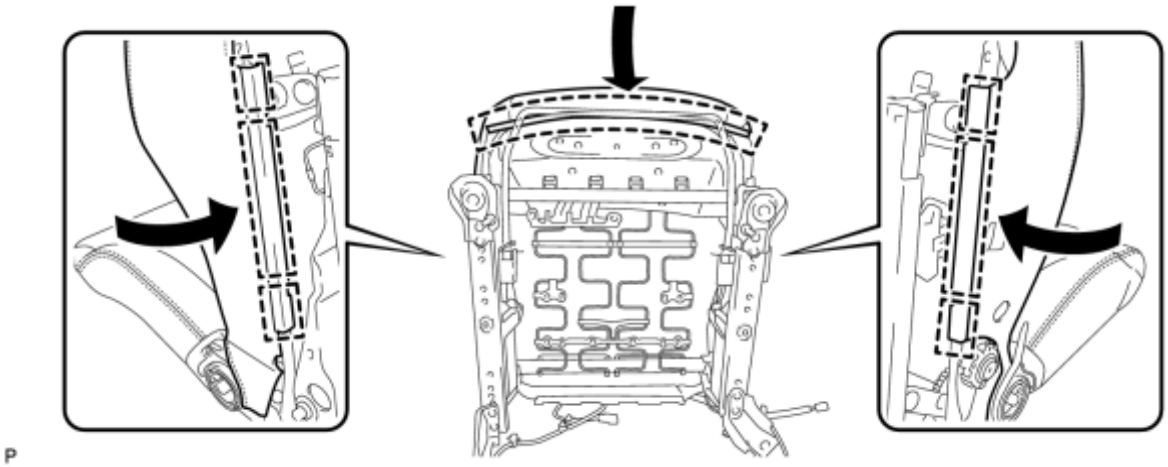
- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.



P

15. INSTALL FRONT SEAT CUSHION COVER WITH PAD

(a) Engage each hook as shown in the illustration.

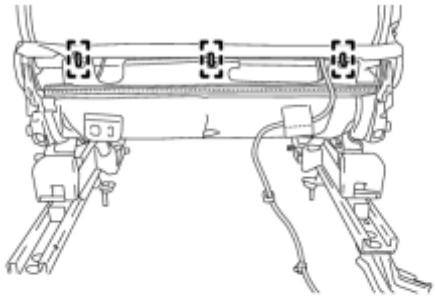


P



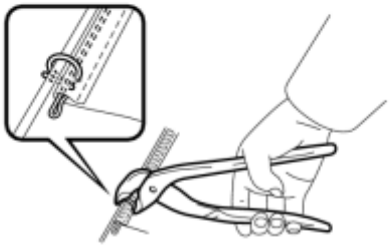
P

(b) Engage the 2 hooks as shown in the illustration.



(c) Using hog ring pliers, install 3 new hog rings

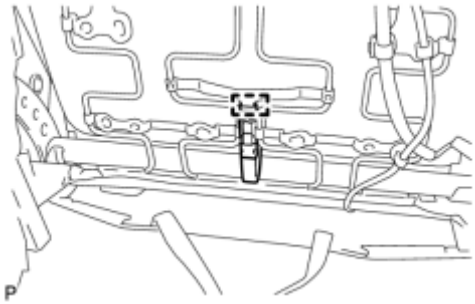
- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.



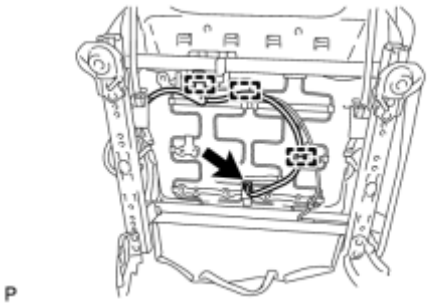
P

(d) for Passenger Side:

(1) Engage the guide and install the belt warning occupant detection

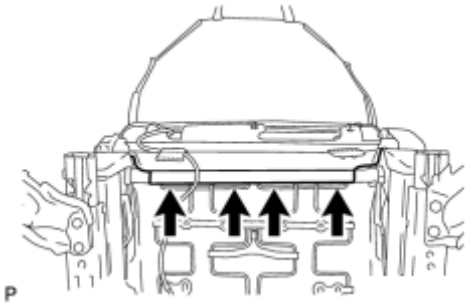


sensor.



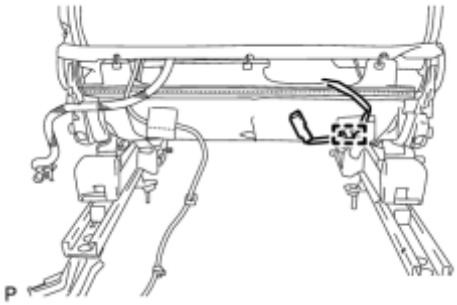
(2) Engage the 3 clamps.

(3) Connect the connector.



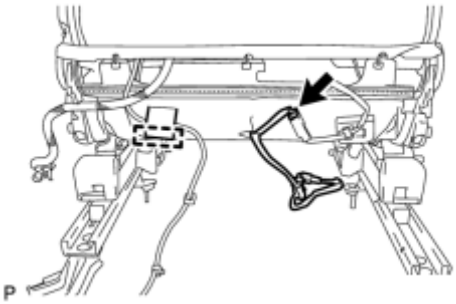
(e) Engage the 4 hooks.

(f) w/ Seat Heater System:



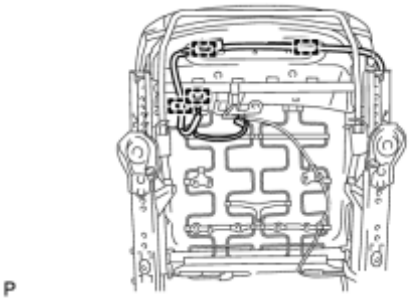
(1) Engage the clamp.

(2) Fasten the front seat cushion cover with pad as shown in the illustration.

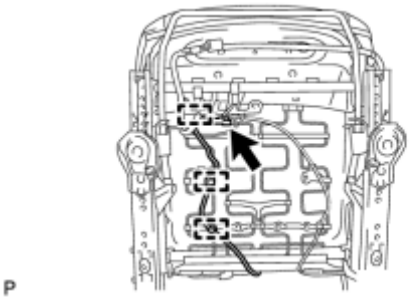


(3) Connect the connector.

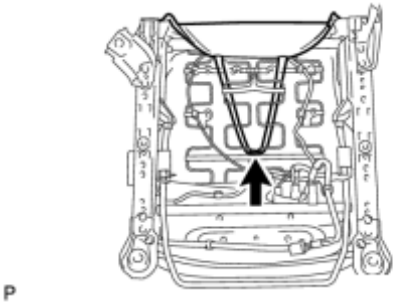
(g) w/ Lumber support:



(1) Engage the 4 clamps.



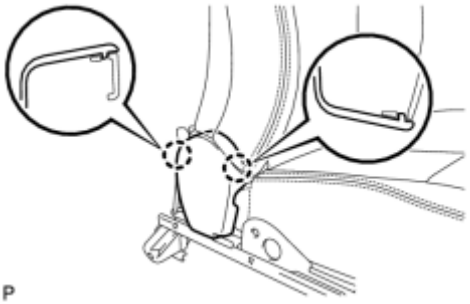
(2) Engage the 3 clamps and connect the connector.



(h) Engage the hook and install the front seat cushion cover with pad.

16. INSTALL FRONT SEAT CUSHION INNER SHIELD

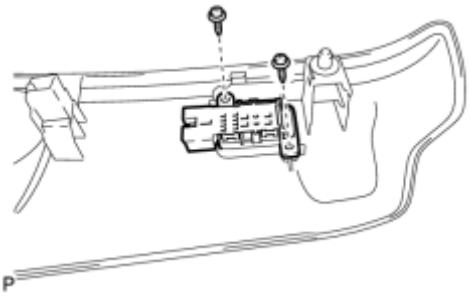
(a) Engage the 2 claws and install the front seat cushion inner shield.



P

17. INSTALL FRONT SEAT INNER BELT ASSEMBLY INFO

18. INSTALL LUMBAR SWITCH (w/ Lumbar Support)

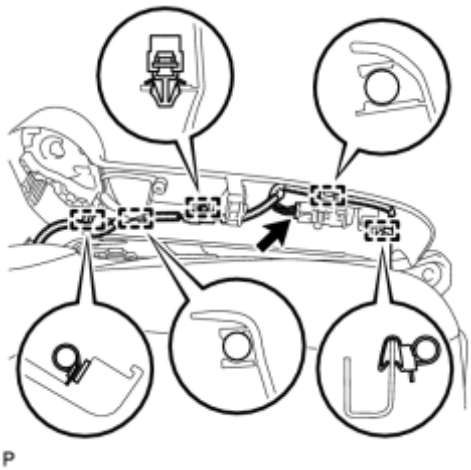


P

(a) Install the lumbar switch with the 2 screws.

19. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY

(a) w/ Lumber Support:

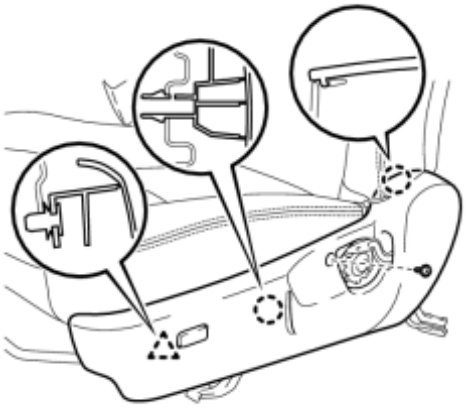


P

(1) Disengage the 5 clamps.

(2) Connect the connector.

(b) Engage the clip and 2 claws.



P

(c) Install the front seat cushion shield assembly with the screw.

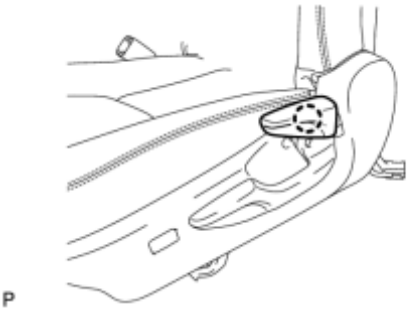
20. INSTALL VERTICAL ADJUSTING HANDLE (w/ Vertical Adjuster)



P

(a) Install the vertical adjusting handle with the screw.

21. INSTALL RECLINING ADJUSTER RELEASE HANDLE



P

(a) Engage the claw and install the reclining adjuster release handle.

# INSTALLATION

1. INSTALL FRONT SEAT ASSEMBLY

(a) Place the front seat assembly in the cabin.

NOTICE:

Be careful not to damage the vehicle body.

(b) Connect the connectors under the seat.

(c) Temporarily install the front seat assembly with the 4 bolts.

(d) Lift up the seat track adjusting handle and move the seat to the rearmost position.



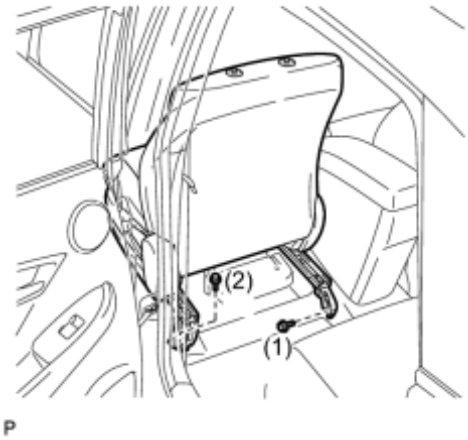

(e) Tighten the 2 bolts on the front side of the seat.

Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

HINT:

Tighten the bolts in the order indicated in the illustration.

(f) Lift up the seat track adjusting handle and move the seat to the foremost position.




(g) Tighten the 2 bolts on the rear side of the seat.

Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

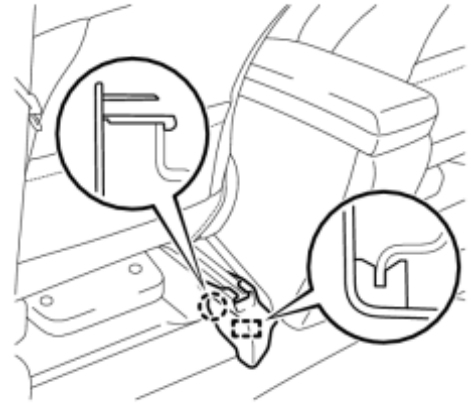
HINT:

Tighten the bolts in the order indicated in the illustration.

2. ZERO POINT CALIBRATION AND SENSITIVITY CHECK (for Front Passenger Seat)

(a) Perform zero point calibration and sensitivity check INFO.

3. INSTALL INNER SEAT TRACK COVER



P

(a) Engage the claw and guide and install the inner seat track cover.

4. INSTALL OUTER SEAT TRACK COVER

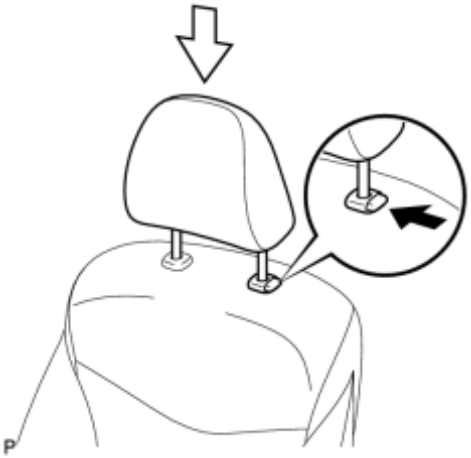


P

(a) Engage the 2 claws and install the outer seat track cover.

5. INSTALL FRONT SEAT HEADREST ASSEMBLY

(a) Install the front seat headrest assembly as shown in the illustration.




6. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

7. INSTALL REAR NO. 3 FLOOR BOARD INFO

8. INSTALL REAR DECK FLOOR BOX INFO

9. INSTALL REAR NO. 2 FLOOR BOARD INFO

10. INSPECT FRONT SEAT ASSEMBLY

(a) During sliding operation of the front seat, check that the left and right adjusters move together smoothly and lock simultaneously.

If the seat adjusters do not lock simultaneously, loosen the seat mounting bolts to adjust the adjuster position.

(b) w/ Seat Heater Seat System:

Check the seat heater operation.

(1) Turn the power switch on (IG).

(2) Push the seat heater switch on.

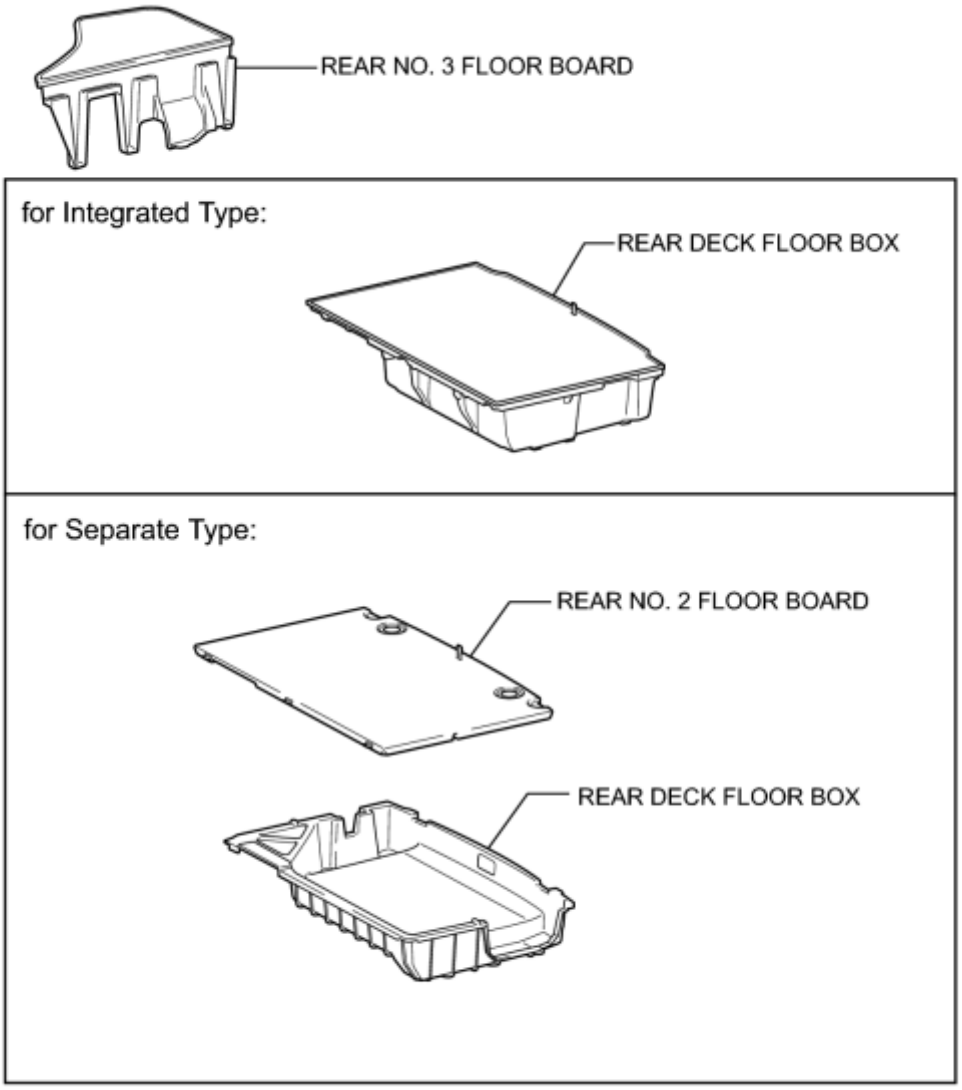
(3) Wait 5 minutes or more and confirm that the seat surface becomes warm.

11. INSPECT SRS WARNING LIGHT

INFO

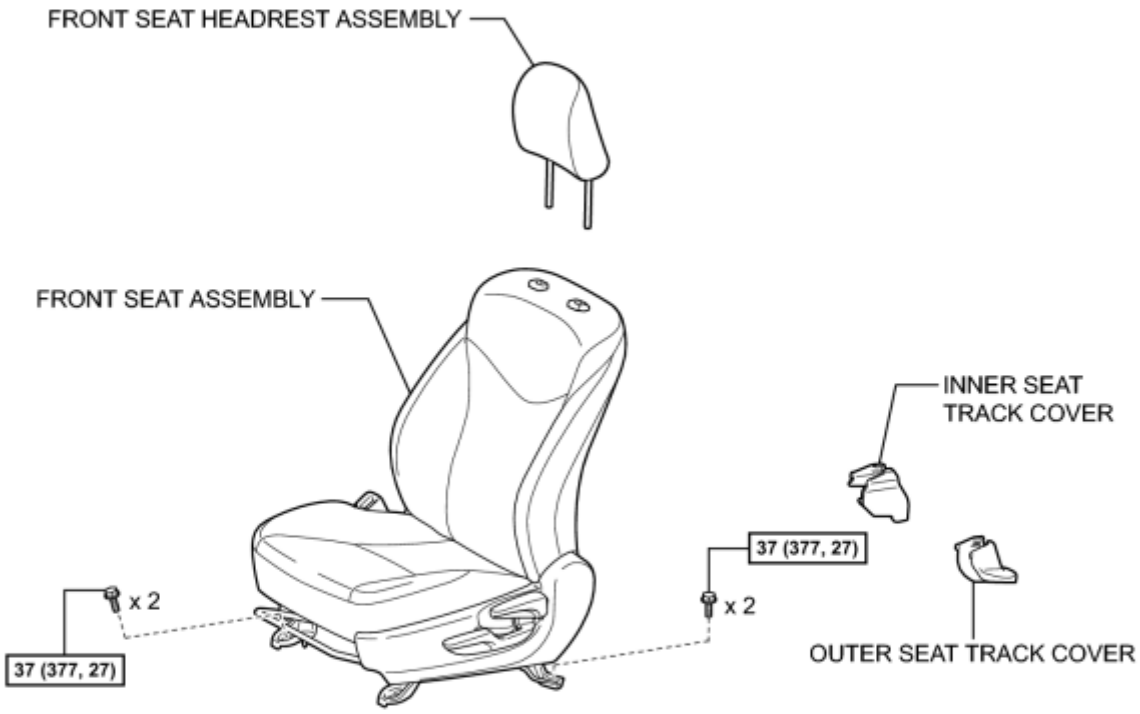
# COMPONENTS

# ILLUSTRATION




P

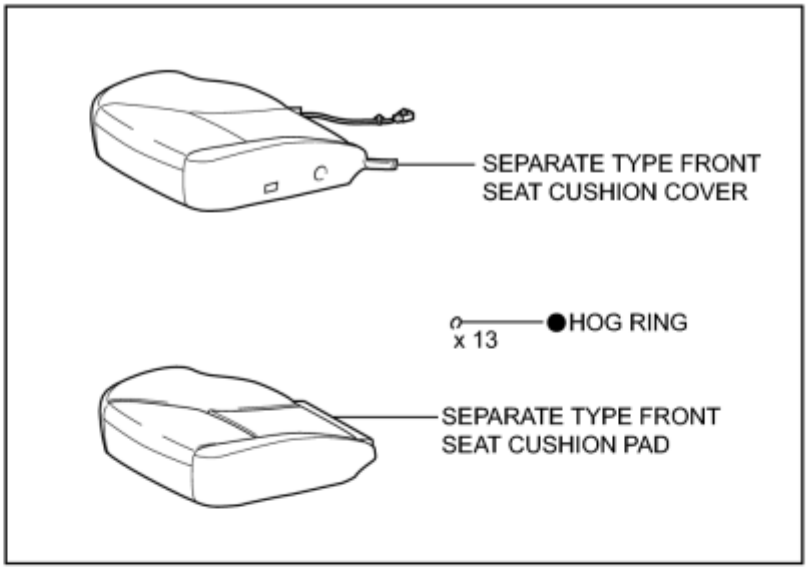
# ILLUSTRATION

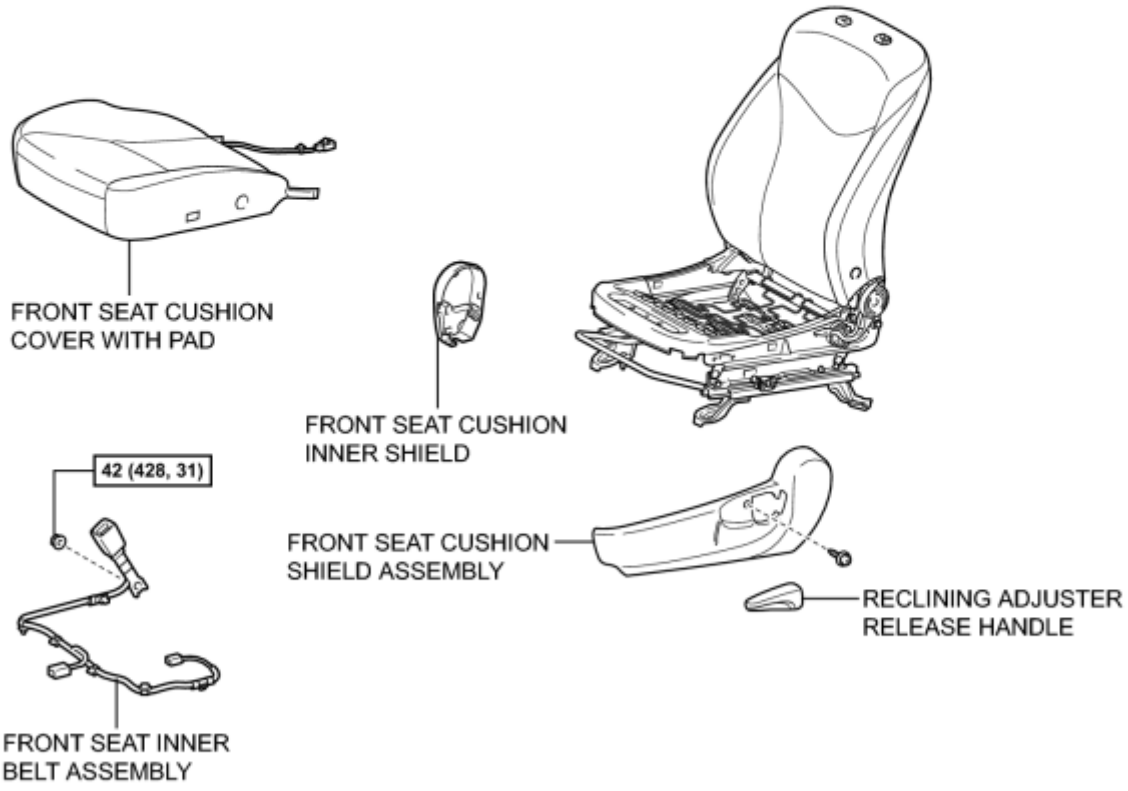



N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Seat Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT SEAT HEADREST ASSEMBLY INFO

6. REMOVE OUTER SEAT TRACK COVER INFO

7. REMOVE INNER SEAT TRACK COVER INFO

8. REMOVE FRONT SEAT ASSEMBLY INFO

9. REMOVE RECLINING ADJUSTER RELEASE HANDLE INFO

10. REMOVE VERTICAL ADJUSTING HANDLE INFO

11. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY INFO

12. REMOVE FRONT SEAT INNER BELT ASSEMBLY INFO

13. REMOVE FRONT SEAT CUSHION INNER SHIELD INFO

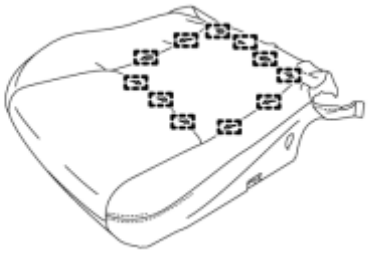
14. REMOVE FRONT SEAT CUSHION COVER WITH PAD INFO

15. REMOVE SEPARATE TYPE FRONT SEAT CUSHION COVER

(a) Remove the 2 hog rings.



P



P

(b) Remove the 11 hog rings and the separate type front seat cushion cover.

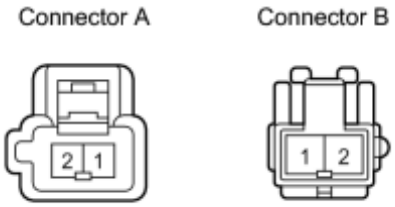
# INSPECTION

1. INSPECT FRONT SEAT CUSHION HEATER (w/o Lumbar Support Function)

(a) Apply battery voltage and check the seatback heater.

OK:

*1




| Connection | Condition | Specified Condition |
|---|---|---|
| Battery positive (+) → Terminal A-1<br><br>Battery negative (-) → Terminal A-2 | Always | seatback heater becomes warm |

H

NOTICE:

Immediately after confirming that the seat heater is functioning normally, remove the battery ideas. Falling to do so may cause the seat heater to overheat.

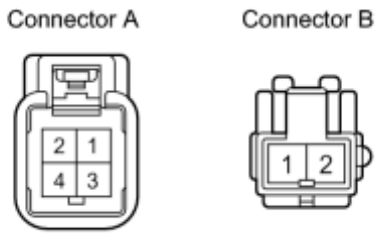
If the result is not as specified, replace the separate type front seat cushion cover.

2. INSPECT FRONT SEAT CUSHION HEATER (w/ Lumbar Support Function)

(a) Apply battery voltage and check the seatback heater.

OK:

*1




| Connection | Condition | Specified Condition |
|---|---|---|
| Battery positive (+) → Terminal A-2<br><br>Battery negative (-) → Terminal A-4 | Always | seatback heater becomes warm |

H

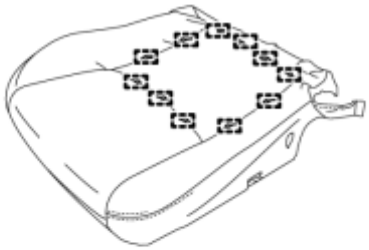
NOTICE:

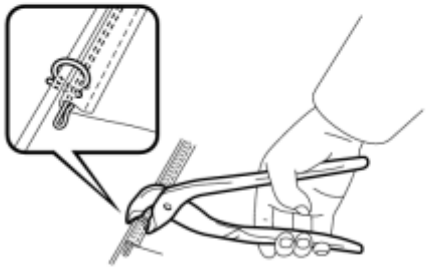
Immediately after confirming that the seat heater is functioning normally, remove the battery ideas. Falling to do so may cause the seat heater to overheat.

If the result is not as specified, replace the separate type front seat cushion cover.

# INSTALLATION

1. INSTALL SEPARATE TYPE FRONT SEAT CUSHION COVER



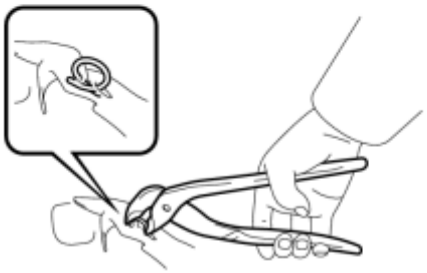


P

(a) Using hog ring pliers, install 11 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.





P

(b) Using hog ring pliers, install the separate type front seat cushion cover to the separate type front seat cushion pad with 2 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

2. INSTALL FRONT SEAT CUSHION COVER WITH PAD INFO

3. INSTALL FRONT SEAT CUSHION INNER SHIELD INFO

4. INSTALL FRONT SEAT INNER BELT ASSEMBLY INFO

5. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY INFO

6. INSTALL VERTICAL ADJUSTING HANDLE INFO

7. INSTALL RECLINING ADJUSTER RELEASE HANDLE INFO

8. INSTALL FRONT SEAT ASSEMBLY INFO

9. INSTALL INNER SEAT TRACK COVER INFO

10. INSTALL OUTER SEAT TRACK COVER INFO

11. INSTALL FRONT SEAT HEADREST ASSEMBLY INFO

12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

13. INSTALL REAR NO. 3 FLOOR BOARD INFO

14. INSTALL REAR DECK FLOOR BOX INFO

15. INSTALL REAR NO. 2 FLOOR BOARD INFO

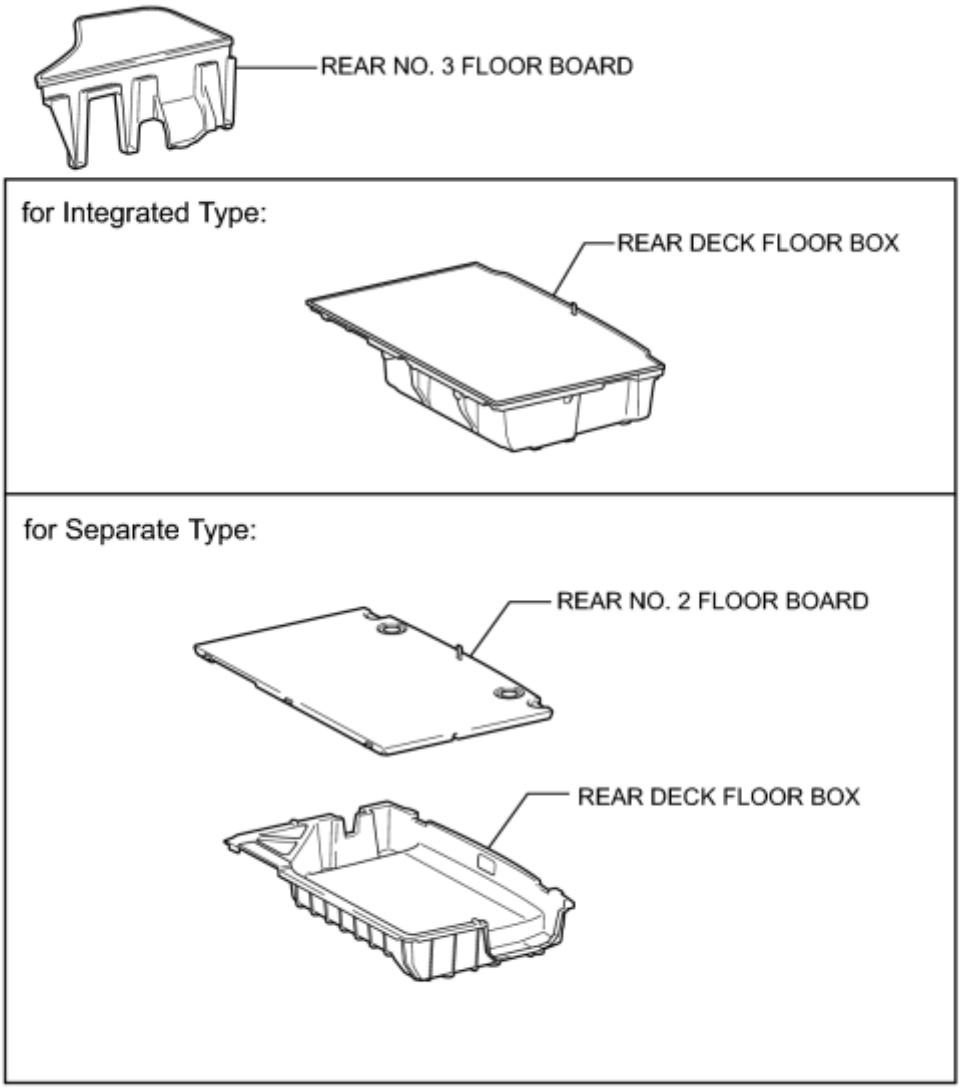
16. INSPECT FRONT SEAT ASSEMBLY INFO

17. INSPECT SRS WARNING LIGHT

INFO

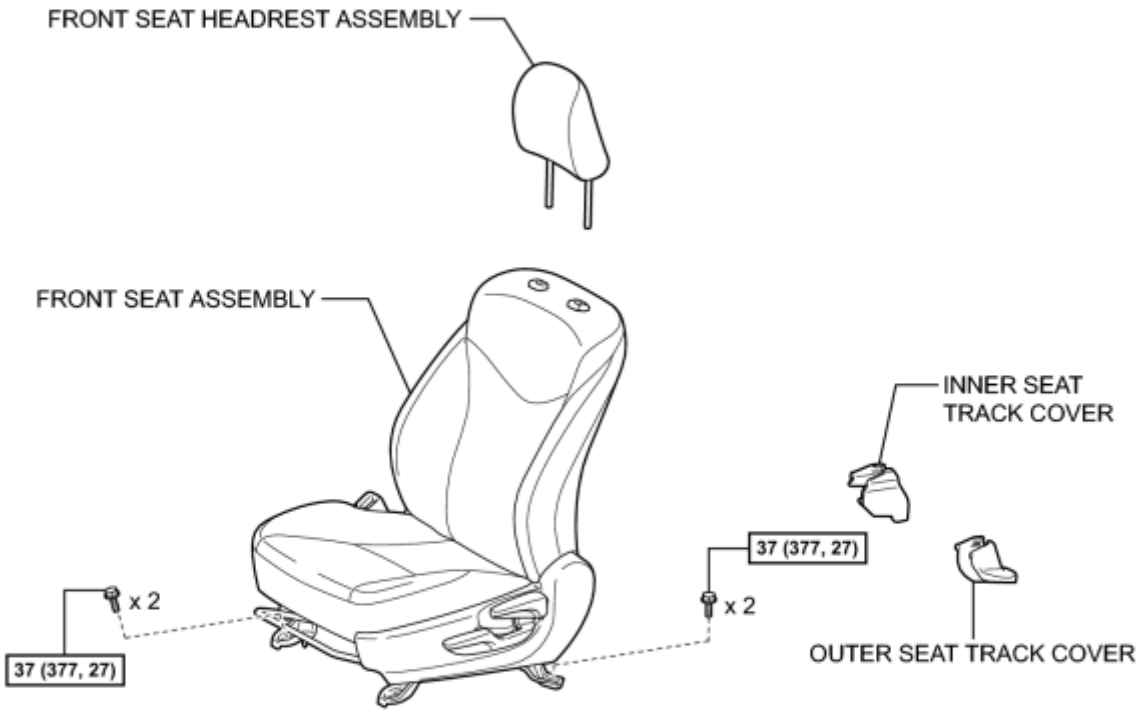
# COMPONENTS

# ILLUSTRATION




P

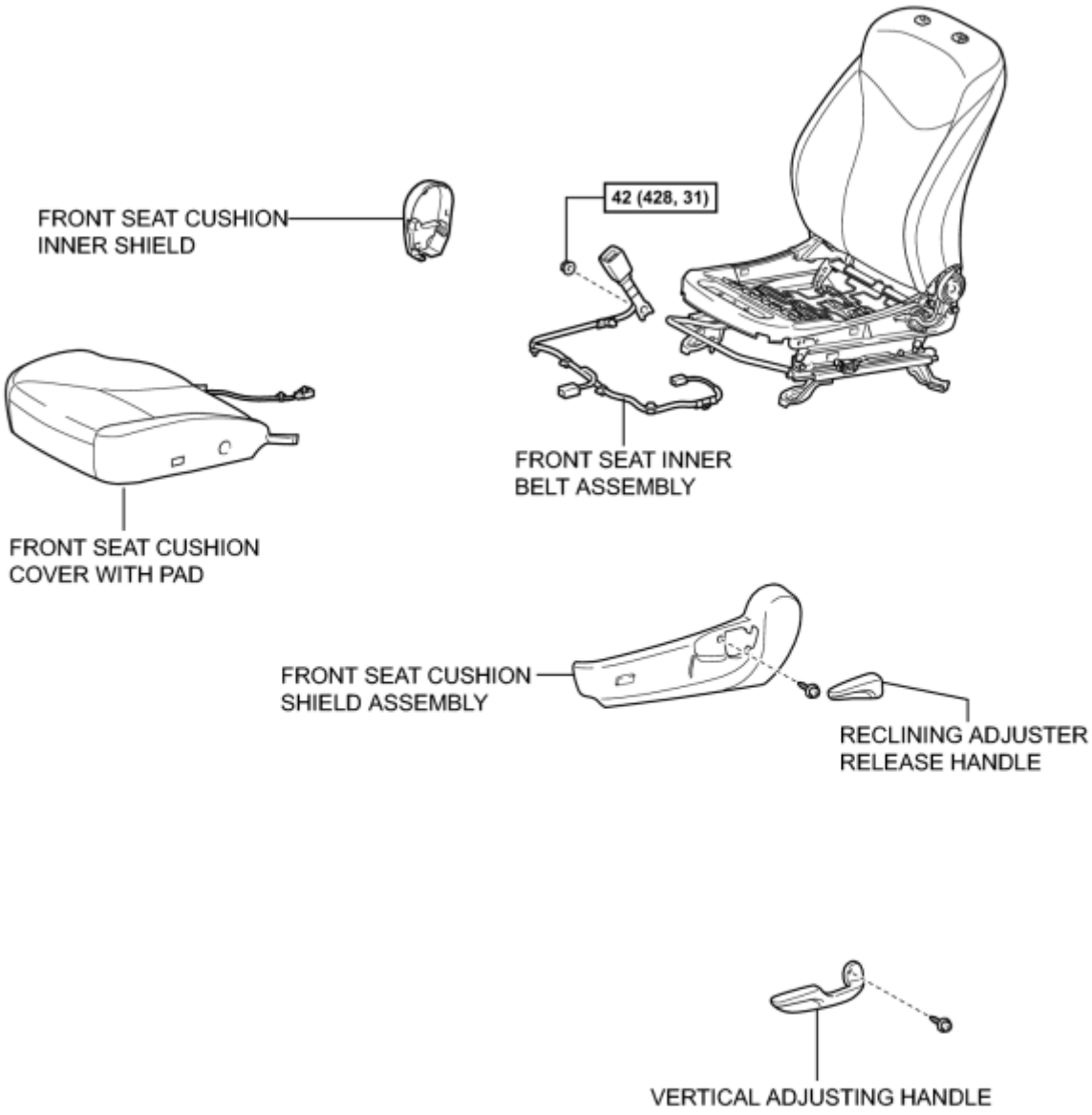
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION

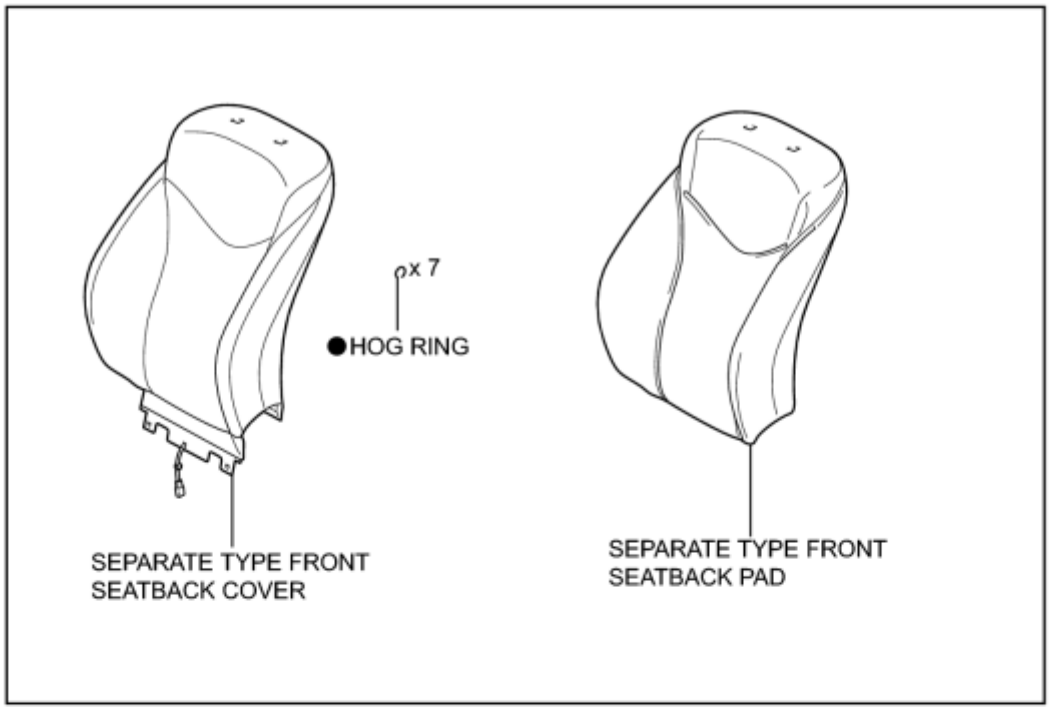


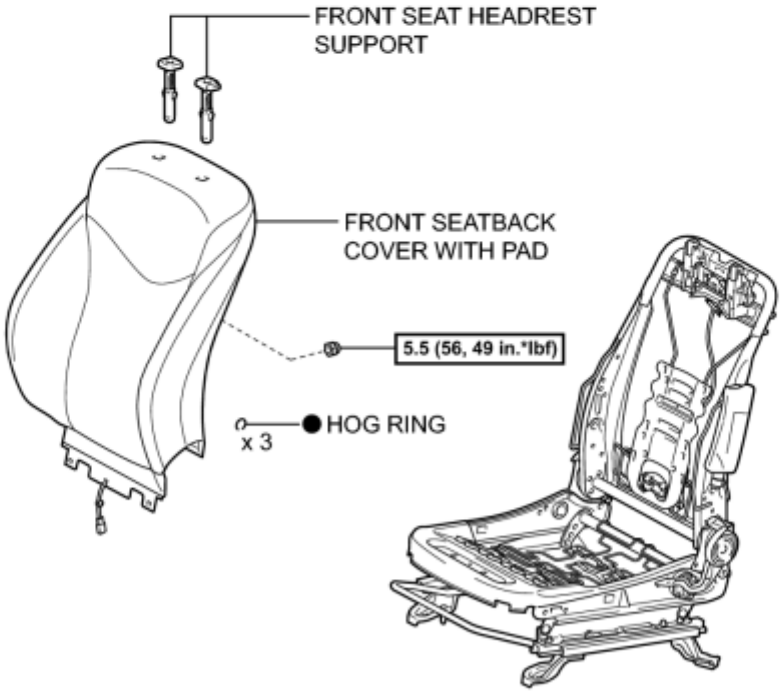

N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

● Non-reusable part

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Seat Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT SEAT HEADREST ASSEMBLY INFO

6. REMOVE OUTER SEAT TRACK COVER INFO

7. REMOVE INNER SEAT TRACK COVER INFO

8. REMOVE FRONT SEAT ASSEMBLY INFO

9. REMOVE RECLINING ADJUSTER RELEASE HANDLE INFO

10. REMOVE VERTICAL ADJUSTING HANDLE INFO

11. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY INFO

12. REMOVE FRONT SEAT INNER BELT ASSEMBLY INFO

13. REMOVE FRONT SEAT CUSHION INNER SHIELD INFO

14. REMOVE FRONT SEAT CUSHION COVER WITH PAD INFO

15. REMOVE FRONT SEATBACK COVER WITH PAD INFO

16. REMOVE SEPARATE TYPE FRONT SEATBACK COVER

(a) Remove the 5 hog rings.



P



P

(b) Remove the 2 hog rings and separate type front seatback cover.

# INSPECTION

1. INSPECT FRONT SEATBACK HEATER




(a) Apply battery voltage and check the seatback heater.

OK:

| Connection | Condition | Specified Condition |
|---|---|---|
| Battery positive (+) → Terminal 2<br><br>Battery negative (-) → Terminal 1 | Always | seatback heater becomes warm |

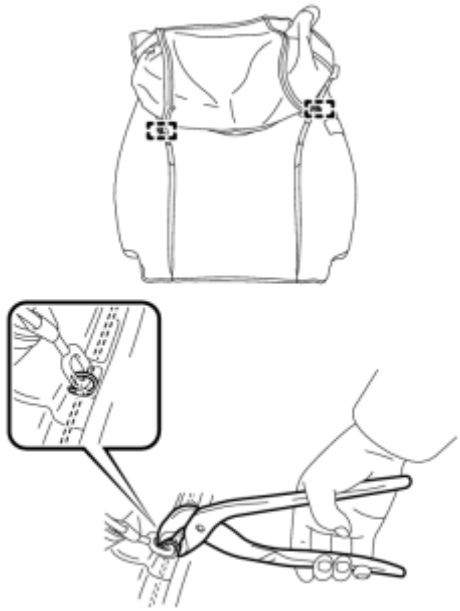
NOTICE:

Immediately after confirming that the seat heater is functioning normally, remove the battery ideas. Falling to do so may cause the seat heater to overheat.

If the result is not as specified, replace the separate type front seat back cover.

# INSTALLATION

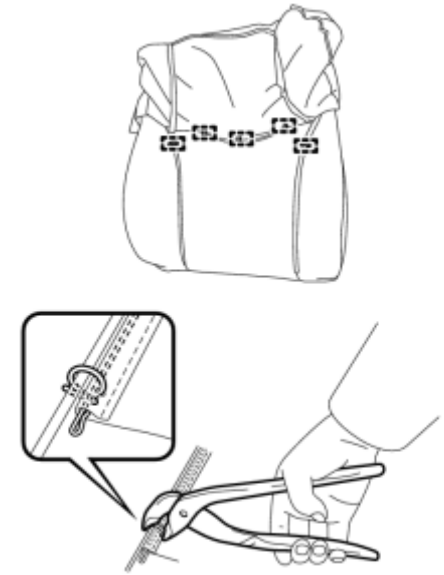
1. INSTALL SEPARATE TYPE FRONT SEATBACK COVER



P

(a) Using hog ring pliers, install 2 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.



P

(b) Using hog ring pliers, install 5 new hog rings

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

2. INSTALL FRONT SEATBACK COVER WITH PAD INFO

3. INSTALL FRONT SEAT CUSHION COVER WITH PAD INFO

4. INSTALL FRONT SEAT CUSHION INNER SHIELD INFO

5. INSTALL FRONT SEAT INNER BELT ASSEMBLY INFO

6. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY INFO

7. INSTALL VERTICAL ADJUSTING HANDLE INFO

8. INSTALL RECLINING ADJUSTER RELEASE HANDLE INFO

9. INSTALL FRONT SEAT ASSEMBLY INFO

10. INSTALL INNER SEAT TRACK COVER INFO

11. INSTALL OUTER SEAT TRACK COVER INFO

12. INSTALL FRONT SEAT HEADREST ASSEMBLY INFO

13. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

14. INSTALL REAR NO. 3 FLOOR BOARD INFO

15. INSTALL REAR DECK FLOOR BOX INFO

16. INSTALL REAR NO. 2 FLOOR BOARD INFO

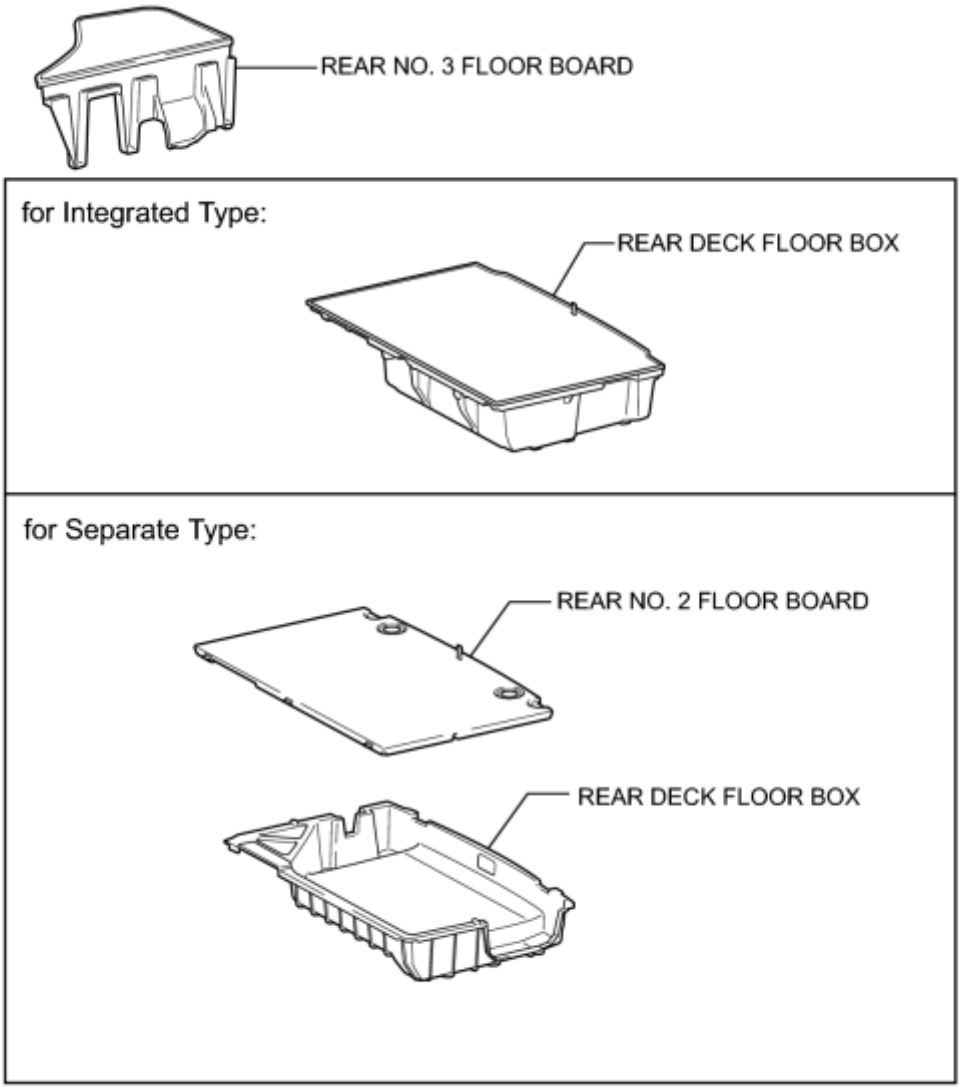
17. INSPECT FRONT SEAT ASSEMBLY INFO

18. INSPECT SRS WARNING LIGHT

INFO

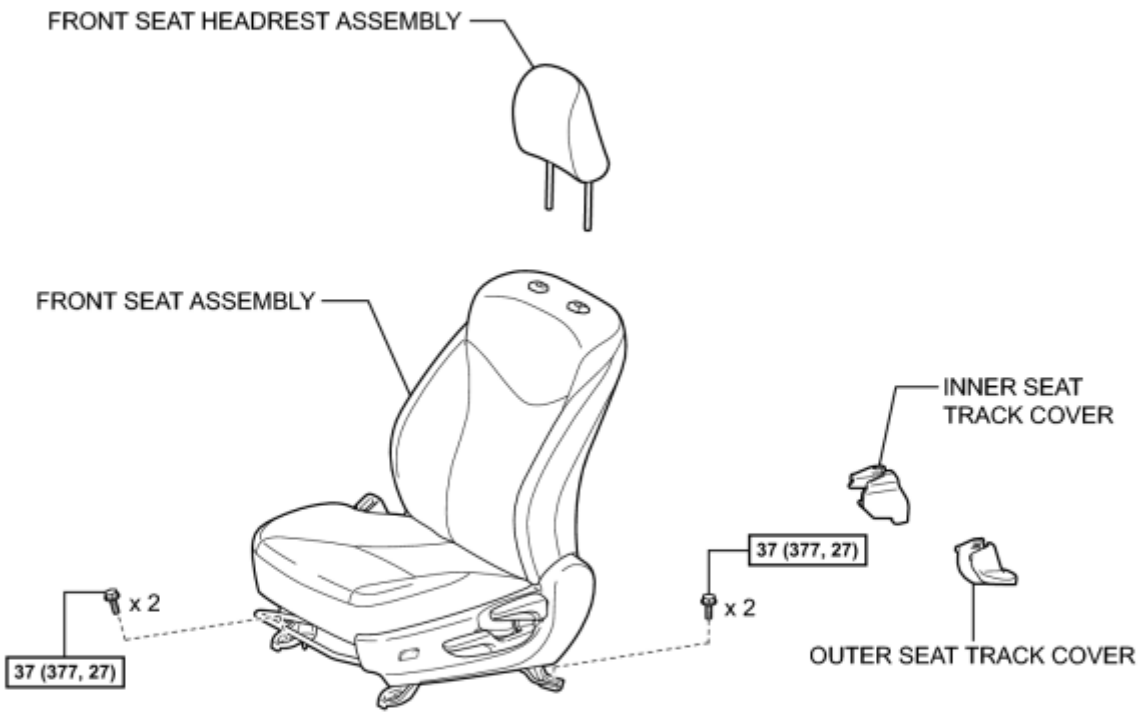
# COMPONENTS

# ILLUSTRATION




P

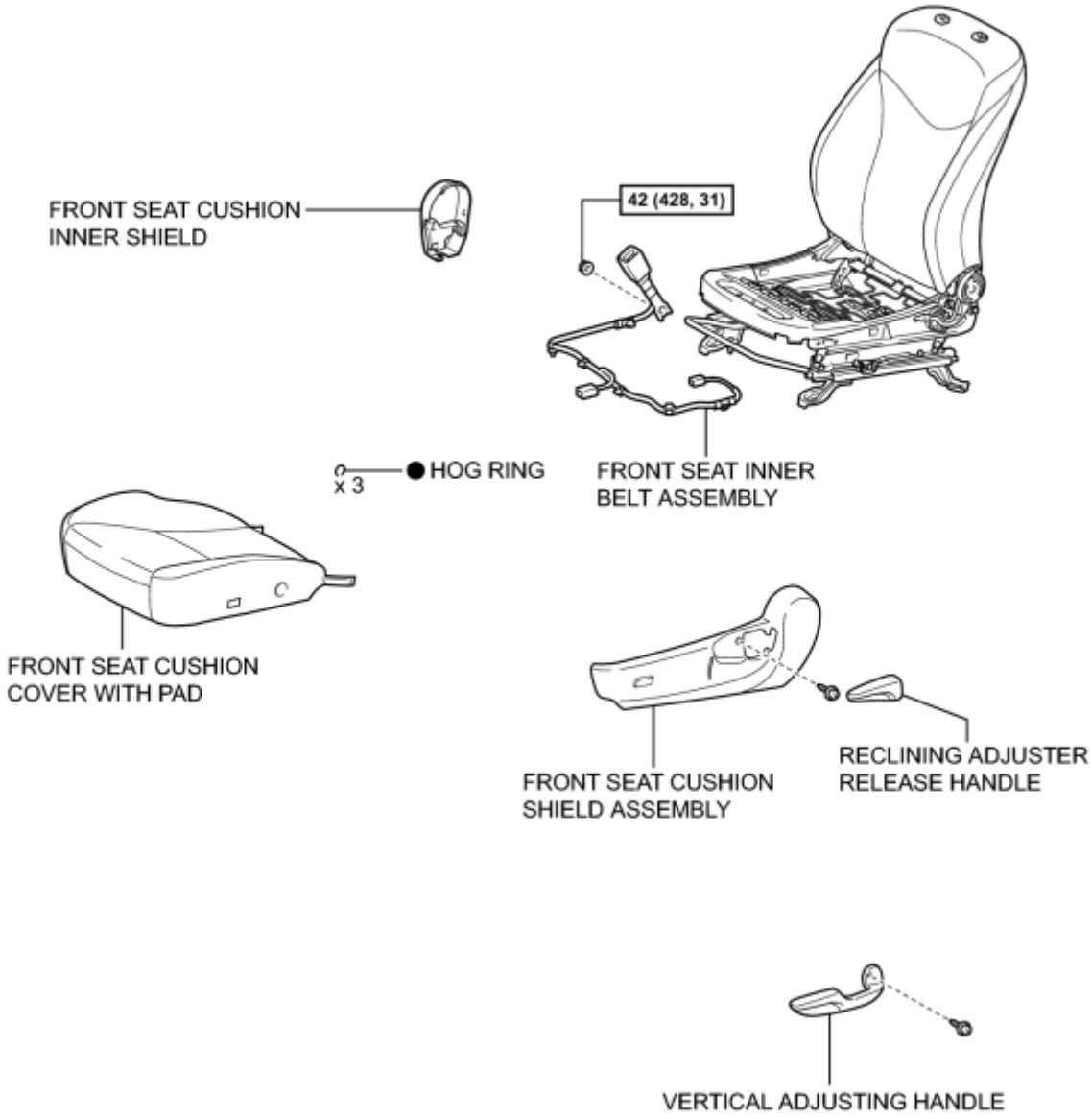
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION

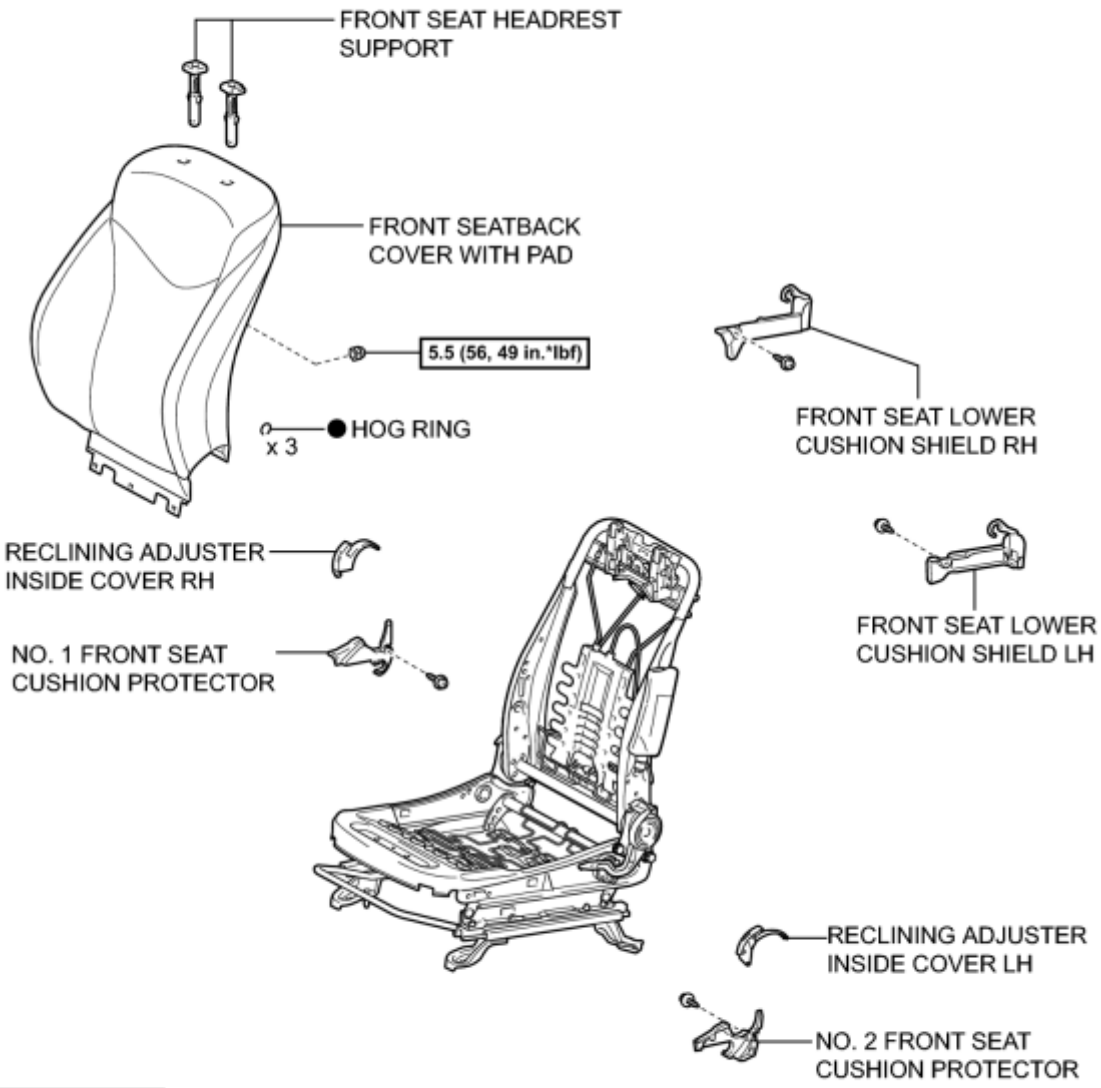



N*m (kgf*cm, ft.*lbf): Specified torque

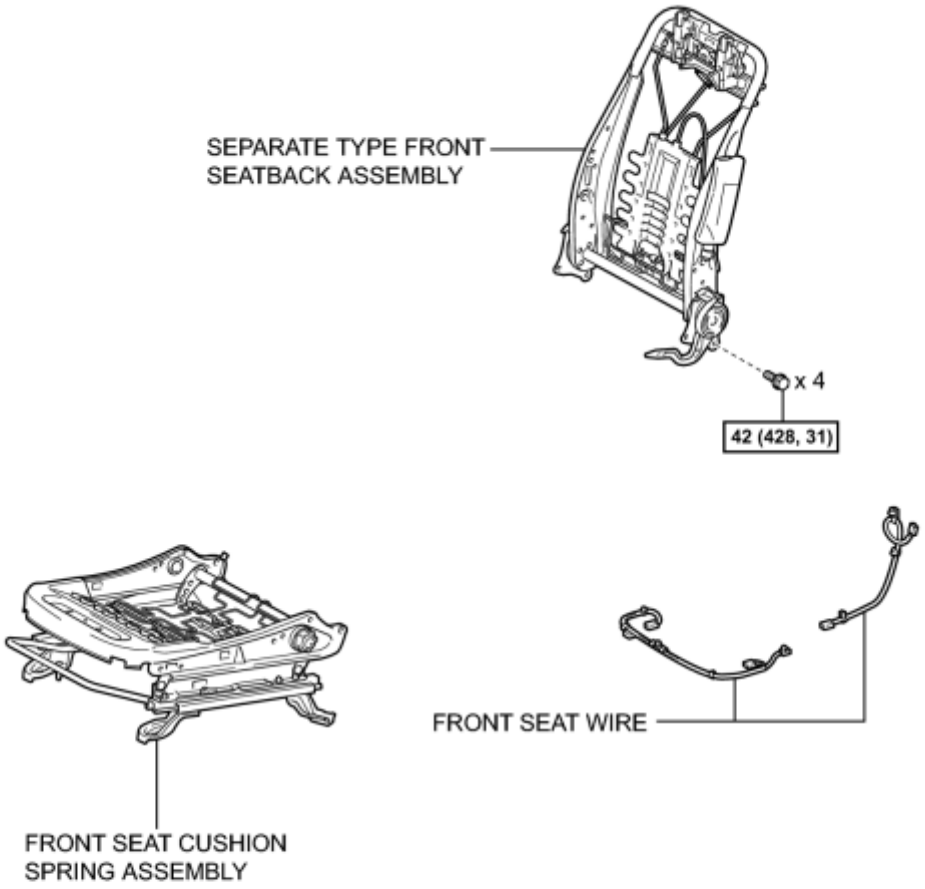
● Non-reusable part

P

# ILLUSTRATION




# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Seat Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT SEAT HEADREST ASSEMBLY INFO

6. REMOVE OUTER SEAT TRACK COVER INFO

7. REMOVE INNER SEAT TRACK COVER INFO

8. REMOVE FRONT SEAT ASSEMBLY INFO

9. REMOVE RECLINING ADJUSTER RELEASE HANDLE INFO

10. REMOVE VERTICAL ADJUSTING HANDLE INFO

11. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY INFO

12. REMOVE FRONT SEAT INNER BELT ASSEMBLY INFO

13. REMOVE FRONT SEAT CUSHION INNER SHIELD INFO

14. REMOVE FRONT SEAT CUSHION COVER WITH PAD INFO

15. REMOVE FRONT SEATBACK COVER WITH PAD INFO

16. REMOVE RECLINING ADJUSTER INSIDE COVER LH INFO

17. REMOVE RECLINING ADJUSTER INSIDE COVER RH INFO

18. REMOVE FRONT SEAT LOWER CUSHION SHIELD LH INFO

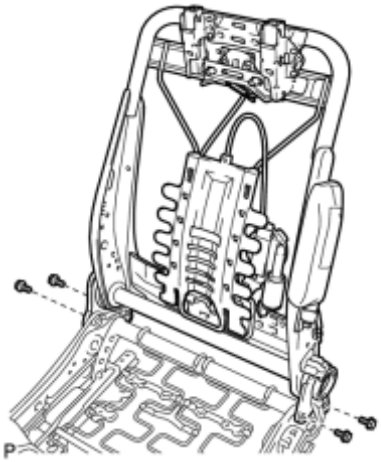
19. REMOVE FRONT SEAT LOWER CUSHION SHIELD RH INFO

20. REMOVE NO. 2 FRONT SEAT CUSHION PROTECTOR INFO

21. REMOVE NO. 1 FRONT SEAT CUSHION PROTECTOR INFO

22. REMOVE FRONT SEAT WIRE INFO

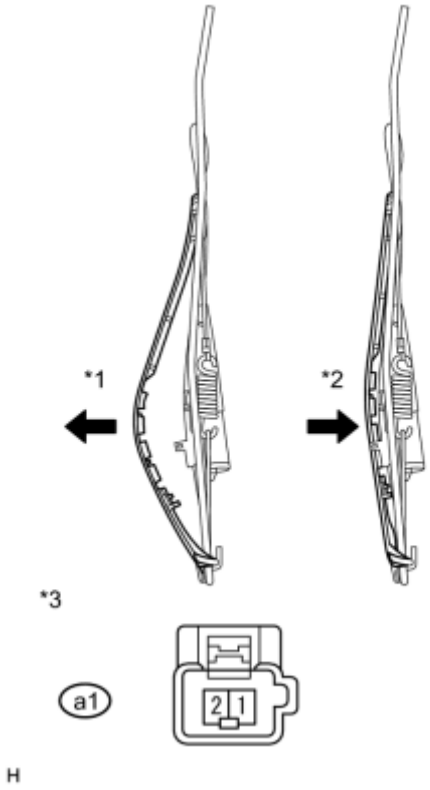
23. REMOVE SEPARATE TYPE FRONT SEATBACK ASSEMBLY



(a) Remove the 4 bolts and separate type front seatback assembly.

# INSPECTION

1. INSPECT LUMBAR SUPPORT ADJUSTER ASSEMBLY




(a) Check operation of the lumbar support adjuster assembly.

(1) Check if the seat moves smoothly when the battery is connected to the lumbar support adjuster assembly connector terminals.

OK:

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → 1<br>Battery positive (-) → 2 | Hold |
| Battery positive (+) → 2<br>Battery positive (-) → 1 | Release |

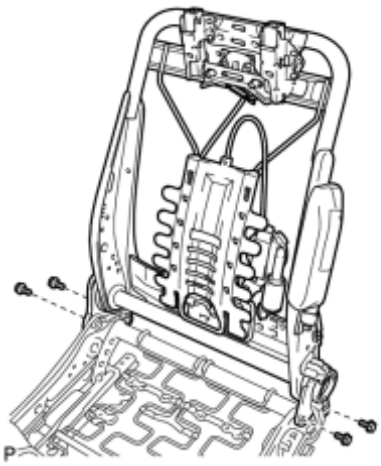
## Text in Illustration

| | |
|---|---|
| *1 | Hold |
| *2 | Release |
| *3 | Front view of wire harness connector<br>(to Lumbar Support Adjuster Assembly) |

If the result is not as specified, replace the separate type front seat back assembly.

# INSTALLATION

1. INSTALL SEPARATE TYPE FRONT SEATBACK ASSEMBLY



(a) Install the separate type front seatback assembly with the 4 bolts.

Torque: **42 N·m (428 kgf·cm, 31ft·lbf)**

2. INSTALL FRONT SEAT WIRE INFO

3. INSTALL NO. 1 FRONT SEAT CUSHION PROTECTOR INFO

4. INSTALL NO. 2 FRONT SEAT CUSHION PROTECTOR INFO

5. INSTALL FRONT SEAT LOWER CUSHION SHIELD RH (for Power Seat) INFO

6. INSTALL FRONT SEAT LOWER CUSHION SHIELD LH (for Power Seat) INFO

7. INSTALL RECLINING ADJUSTER INSIDE COVER RH INFO

8. INSTALL RECLINING ADJUSTER INSIDE COVER LH INFO

9. INSTALL FRONT SEATBACK COVER WITH PAD INFO

10. INSTALL FRONT SEAT CUSHION COVER WITH PAD INFO

11. INSTALL FRONT SEAT CUSHION INNER SHIELD INFO

12. INSTALL FRONT SEAT INNER BELT ASSEMBLY INFO

13. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY INFO

14. INSTALL VERTICAL ADJUSTING HANDLE INFO

15. INSTALL RECLINING ADJUSTER RELEASE HANDLE INFO

16. INSTALL FRONT SEAT ASSEMBLY INFO

17. INSTALL INNER SEAT TRACK COVER INFO

18. INSTALL OUTER SEAT TRACK COVER INFO

19. INSTALL FRONT SEAT HEADREST ASSEMBLY INFO

20. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

21. INSTALL REAR NO. 3 FLOOR BOARD INFO

22. INSTALL REAR DECK FLOOR BOX INFO

23. INSTALL REAR NO. 2 FLOOR BOARD INFO

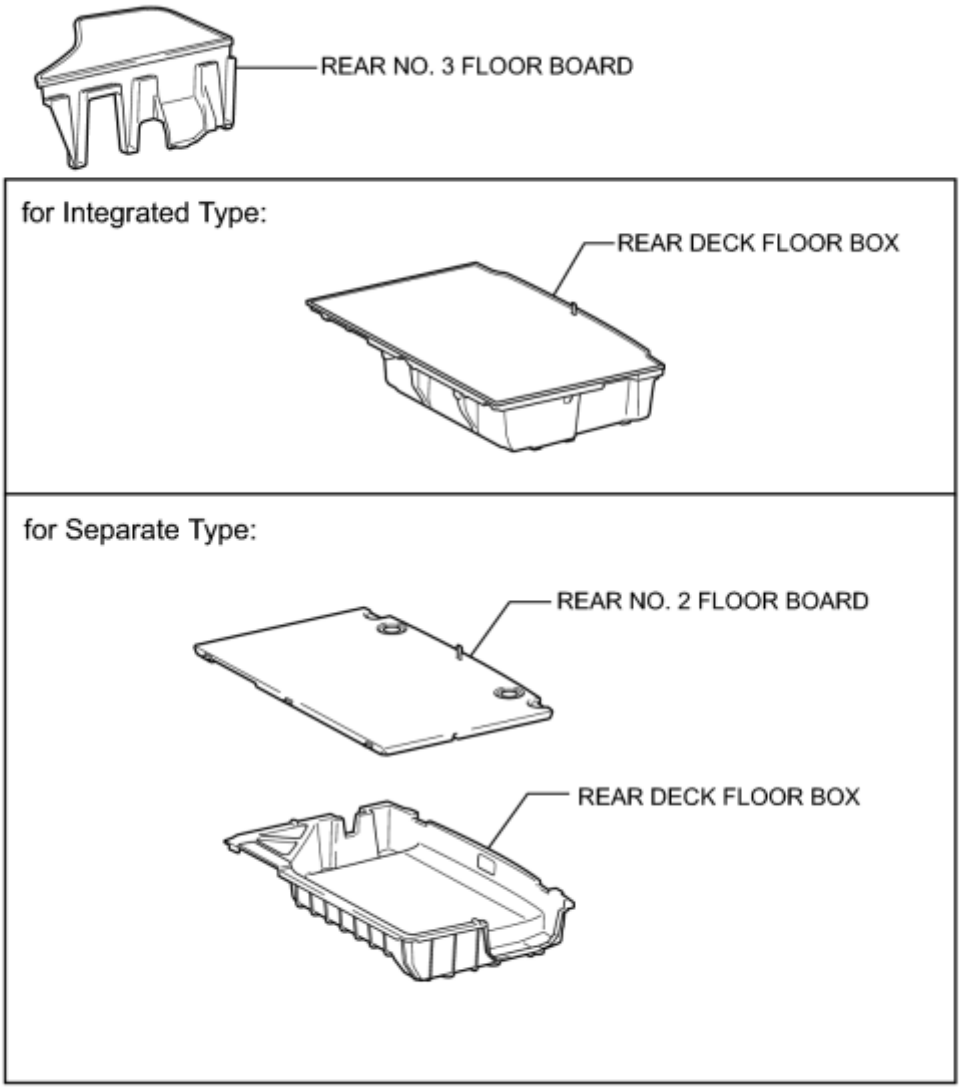
24. INSPECT FRONT SEAT ASSEMBLY INFO

25. INSPECT SRS WARNING LIGHT

INFO

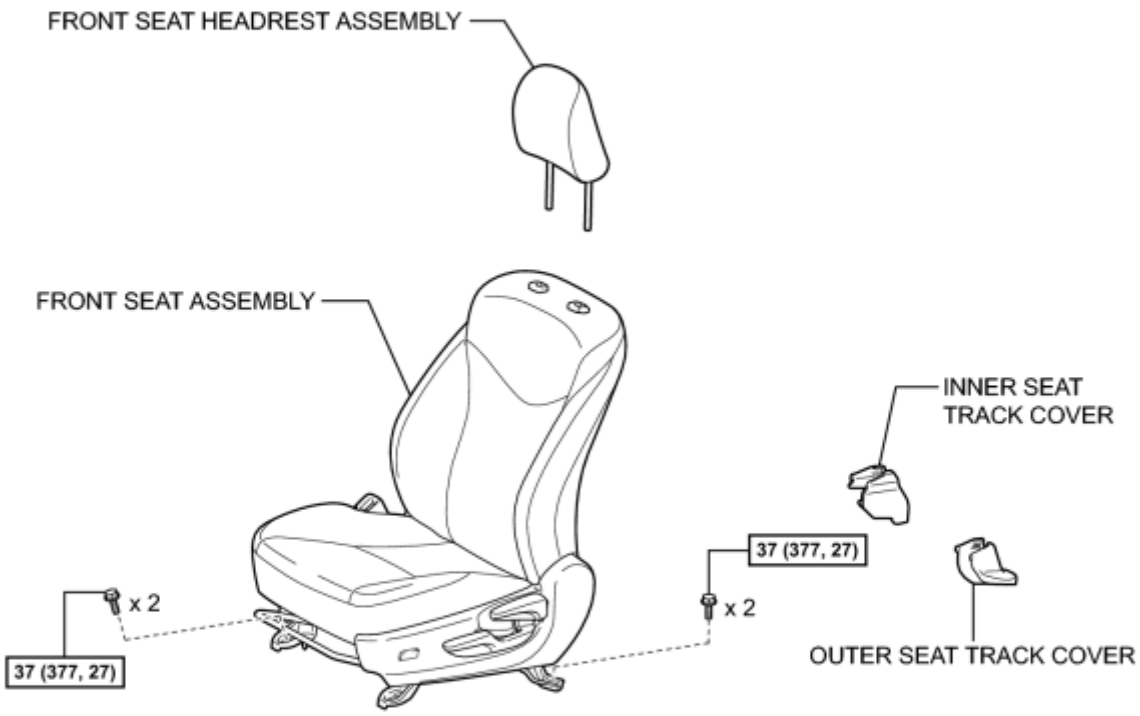
# COMPONENTS

# ILLUSTRATION




P

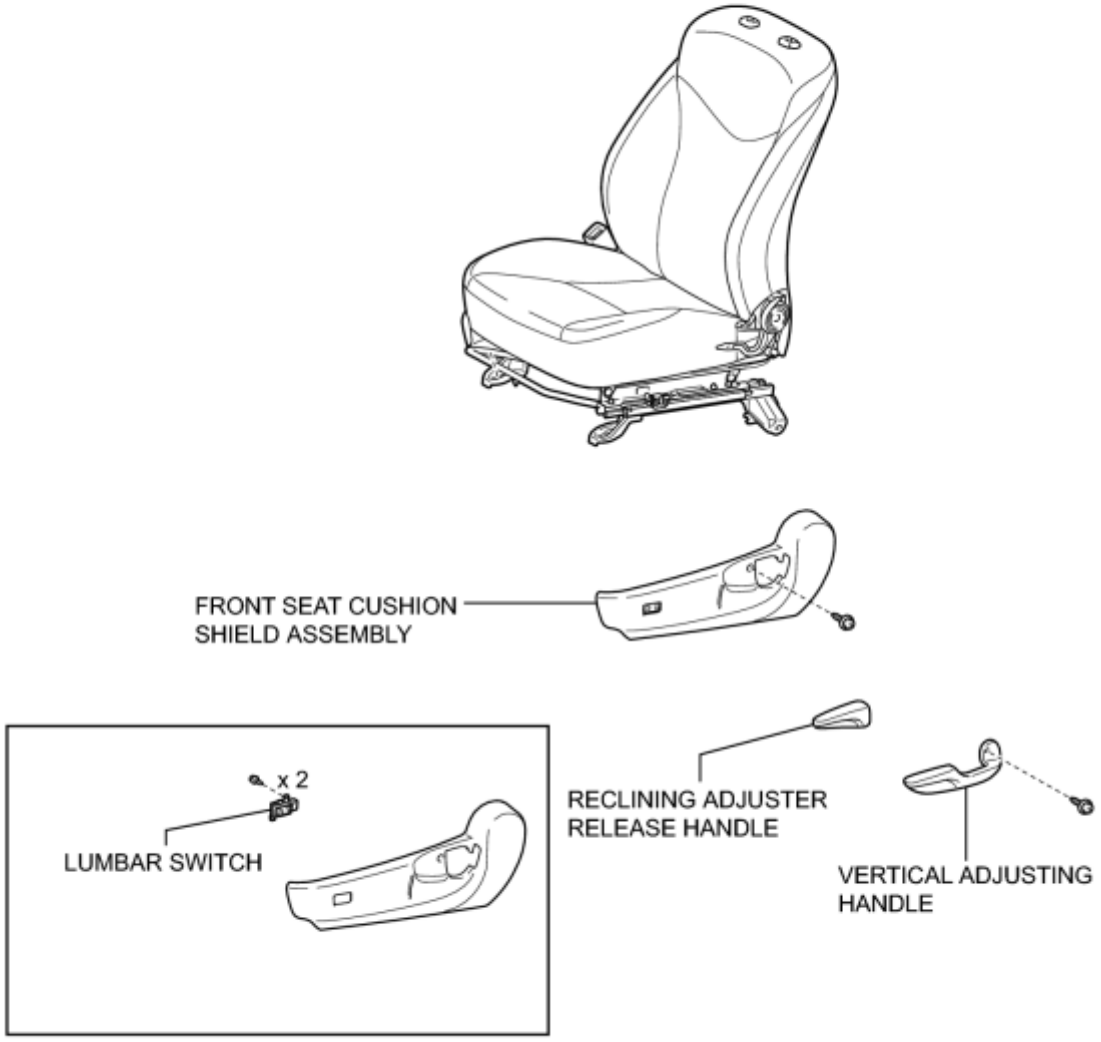
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

P

# ILLUSTRATION


FRONT SEAT CUSHION
SHIELD ASSEMBLY
x 2
LUMBAR SWITCH
RECLINING ADJUSTER
RELEASE HANDLE
VERTICAL ADJUSTING
HANDLE

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD INFO

2. REMOVE REAR DECK FLOOR BOX (for Separate Type) INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

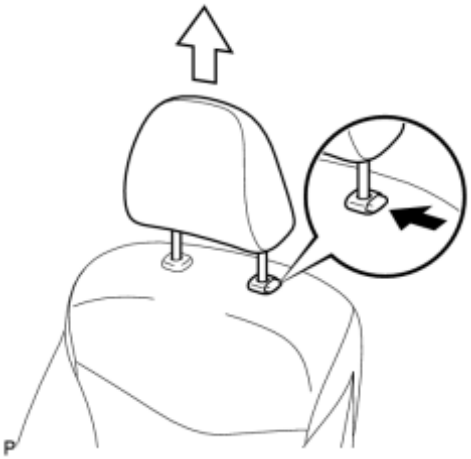
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE FRONT SEAT HEADREST ASSEMBLY



(a) Press the headrest support button and pull up the headrest as shown in the illustration to remove it.

6. REMOVE OUTER SEAT TRACK COVER

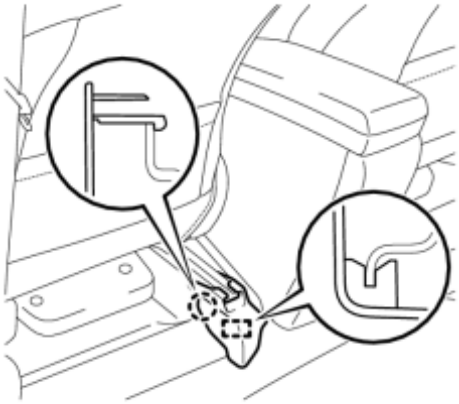
(a) Lift up the seat track adjusting handle and move the seat to the foremost position.



P

(b) Disengage the 2 claws and remove the outer seat track cover.

7. REMOVE INNER SEAT TRACK COVER



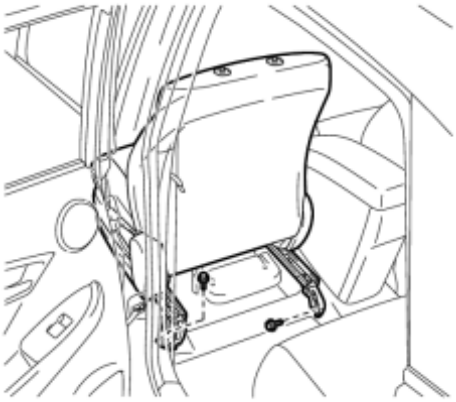
P

(a) Disengage the claw.

(b) Separate the guide and remove the inner seat track cover.

8. REMOVE FRONT SEAT ASSEMBLY

(a) Remove the 2 bolts on the rear side of the seat.



P

(b) Lift up the seat track adjusting handle and move the seat to the rearmost position.



P

(c) Remove the 2 bolts on the front side of the seat.

(d) Lift up the seat track adjusting handle and move the seat to the center position. Also, operate the reclining adjuster release handle and move the seatback to the upright position.

(e) Disconnect the connectors under the seat.

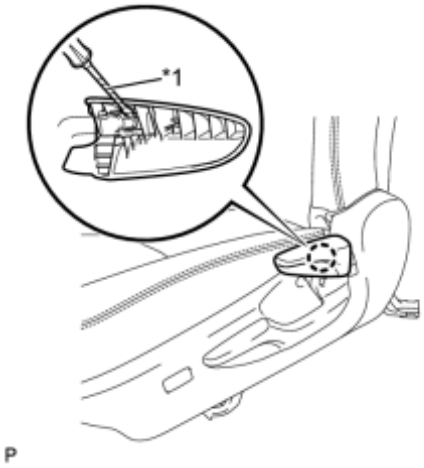
(f) Remove the seat.

NOTICE:

Be careful not to damage the vehicle body.

9. REMOVE RECLINING ADJUSTER RELEASE HANDLE

(a) Using a screwdriver wrapped with protective tape, disengage the claw and remove the reclining adjuster release handle.




## Text in Illustration

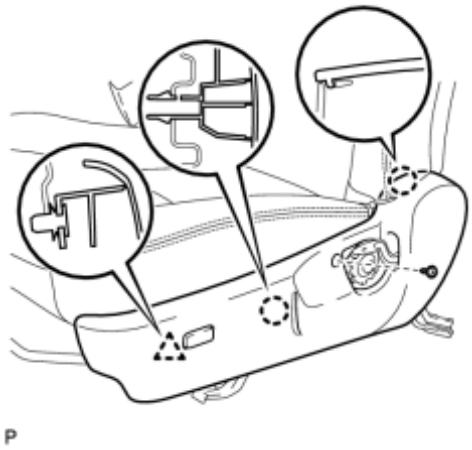
| | |
|---|---|
| *1 | Protective Tape |

10. REMOVE VERTICAL ADJUSTING HANDLE (w/ Vertical Adjuster)




(a) Remove the screw and vertical adjusting handle.

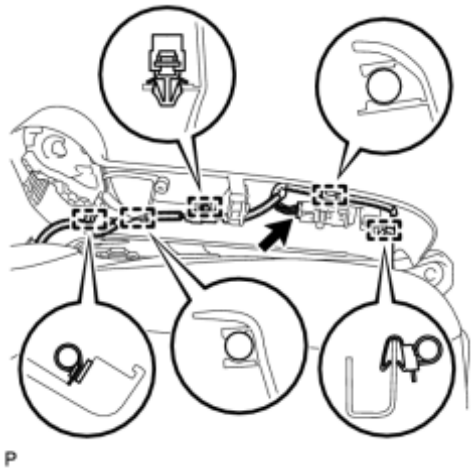
11. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY




(a) Remove the screw.

(b) Disengage the 2 claws and clip.

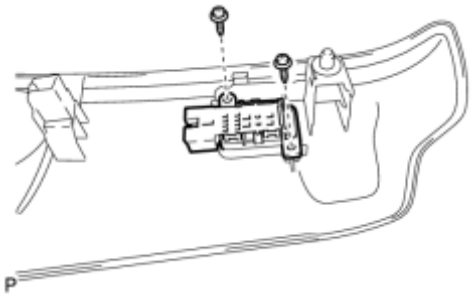
(c) Disconnect the connector.



P

(d) Disengage the 5 clamps and remove the front seat cushion shield assembly.

12. REMOVE LUMBAR SWITCH

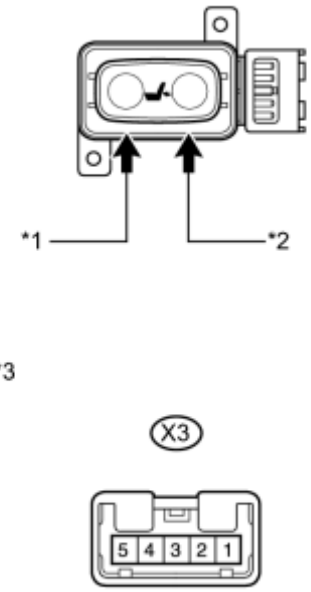


P

(a) Remove the 2 screws and lumbar switch.

# INSPECTION

1. INSPECT LUMBAR SWITCH




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Hold | Below 1 Ω |
| 1 - 2 | Off | Below 1 Ω |
| 1 - 2 | Release | 10 kΩ or higher |
| 3 - 4 | Hold | Below 1 Ω |
| 3 - 4 | Release | 10 kΩ or higher |
| 5 - 4 | Hold | 10 kΩ or higher |
| 5 - 4 | Off | Below 1 Ω |
| 5 - 4 | Release | Below 1 Ω |
| 1 - 3 | Hold | 10 kΩ or higher |
| 1 - 3 | Release | Below 1 Ω |

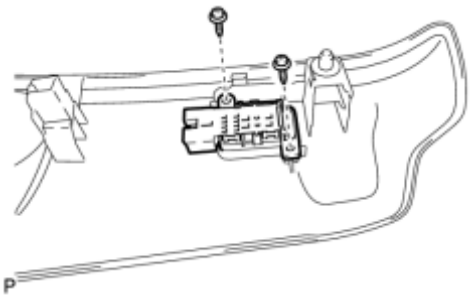
## Text in Illustration

| | |
|---|---|
| *1 | Hold |
| *2 | Release |
| *3 | Front view of wire harness connector<br><br>(to Lumbar Switch LH) |

If the result is not as specified, replace the lumbar switch.

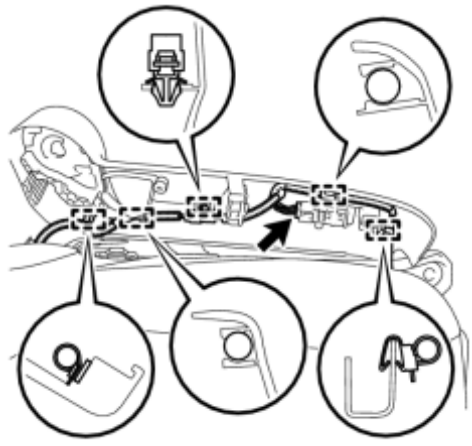
# INSTALLATION

1. INSTALL LUMBAR SWITCH



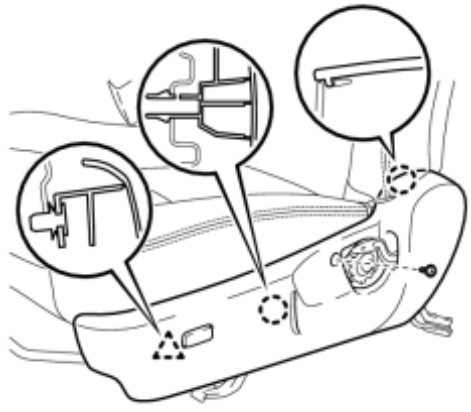
(a) Install the lumbar switch with the 2 screws.

2. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY



(a) Disengage the 5 clamps.

(b) Connect the connector.



(c) Engage the clip and 2 claws.

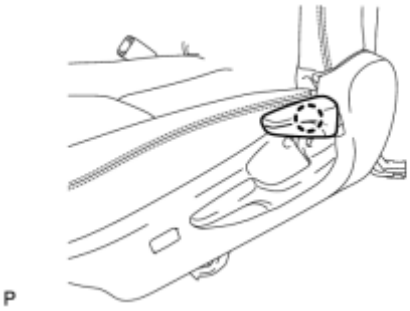
(d) Install the front seat cushion shield assembly with the screw.

3. INSTALL VERTICAL ADJUSTING HANDLE (w/ Vertical Adjuster)




(a) Install the vertical adjusting handle with the screw.

4. INSTALL RECLINING ADJUSTER RELEASE HANDLE




(a) Engage the claw and install the reclining adjuster release handle.

5. INSTALL FRONT SEAT ASSEMBLY

(a) Place the front seat assembly in the cabin.

NOTICE:

Be careful not to damage the vehicle body.

(b) Connect the connectors under the seat.

(c) Temporarily install the front seat assembly with the 4 bolts.

(d) Lift up the seat track adjusting handle and move the seat to the rearmost position.

(e) Tighten the 2 bolts on the front side of the seat.

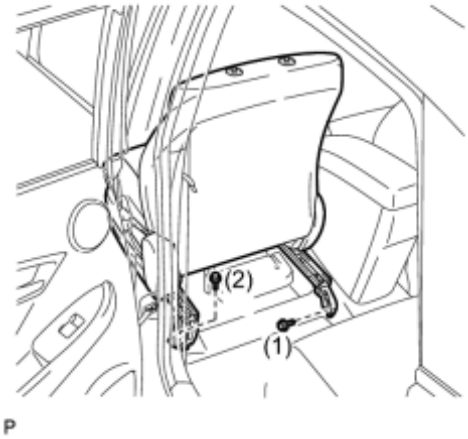
Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

HINT:

Tighten the bolts in the order indicated in the illustration.




(f) Lift up the seat track adjusting handle and move the seat to the foremost position.




(g) Tighten the 2 bolts on the rear side of the seat.

Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

HINT:

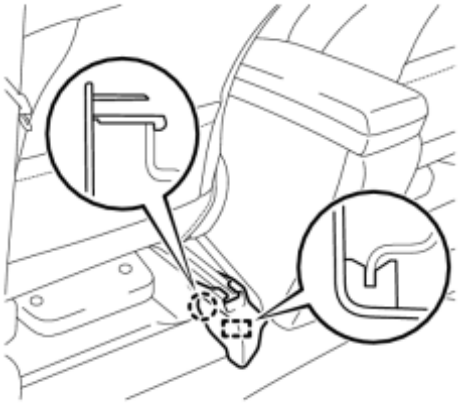
Tighten the bolts in the order indicated in the illustration.

6. ZERO POINT CALIBRATION AND SENSITIVITY

(a) Perform zero point calibration and sensitivity check INFO.

7. INSTALL INNER SEAT TRACK COVER

(a) Engage the claw and guide, and install the inner seat track cover.



P

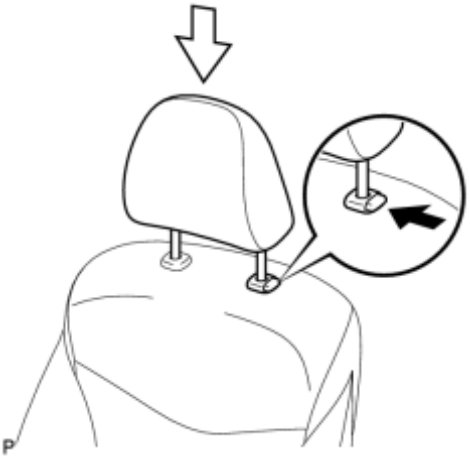
8. INSTALL OUTER SEAT TRACK COVER



P

(a) Engage the 2 claws and install the outer seat track cover.

9. INSTALL FRONT SEAT HEADREST ASSEMBLY



P

(a) Install the front seat headrest assembly as shown in the illustration.

10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

11. INSTALL REAR NO. 3 FLOOR BOARD INFO

12. INSTALL REAR DECK FLOOR BOX (for Separate Type) INFO

13. INSTALL REAR NO. 2 FLOOR BOARD INFO

14. INSPECT FRONT SEAT ASSEMBLY

(a) During sliding operation of the front seat, check that the left and right adjusters move together smoothly and lock simultaneously.

If the seat adjusters do not lock simultaneously, loosen the seat mounting bolts to adjust the adjuster position.

(b) w/ Seat Heater Seat System:

Check the seat heater operation.

(1) Turn the power switch on (IG).

(2) Push the seat heater switch on.

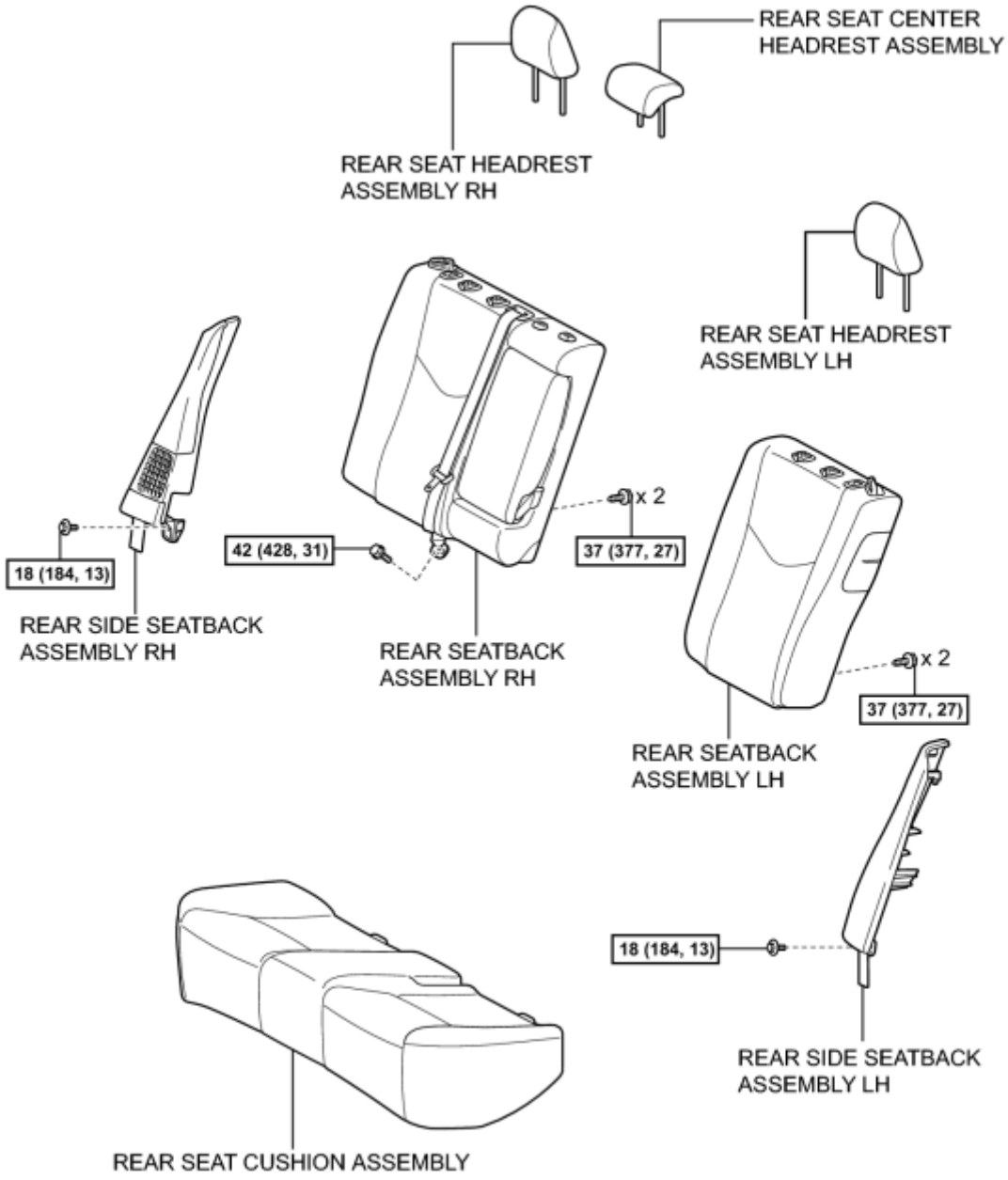
(3) Wait 5 minutes or more and confirm that the seat surface becomes warm.

15. INSPECT SRS WARNING LIGHT

INFO

# COMPONENTS

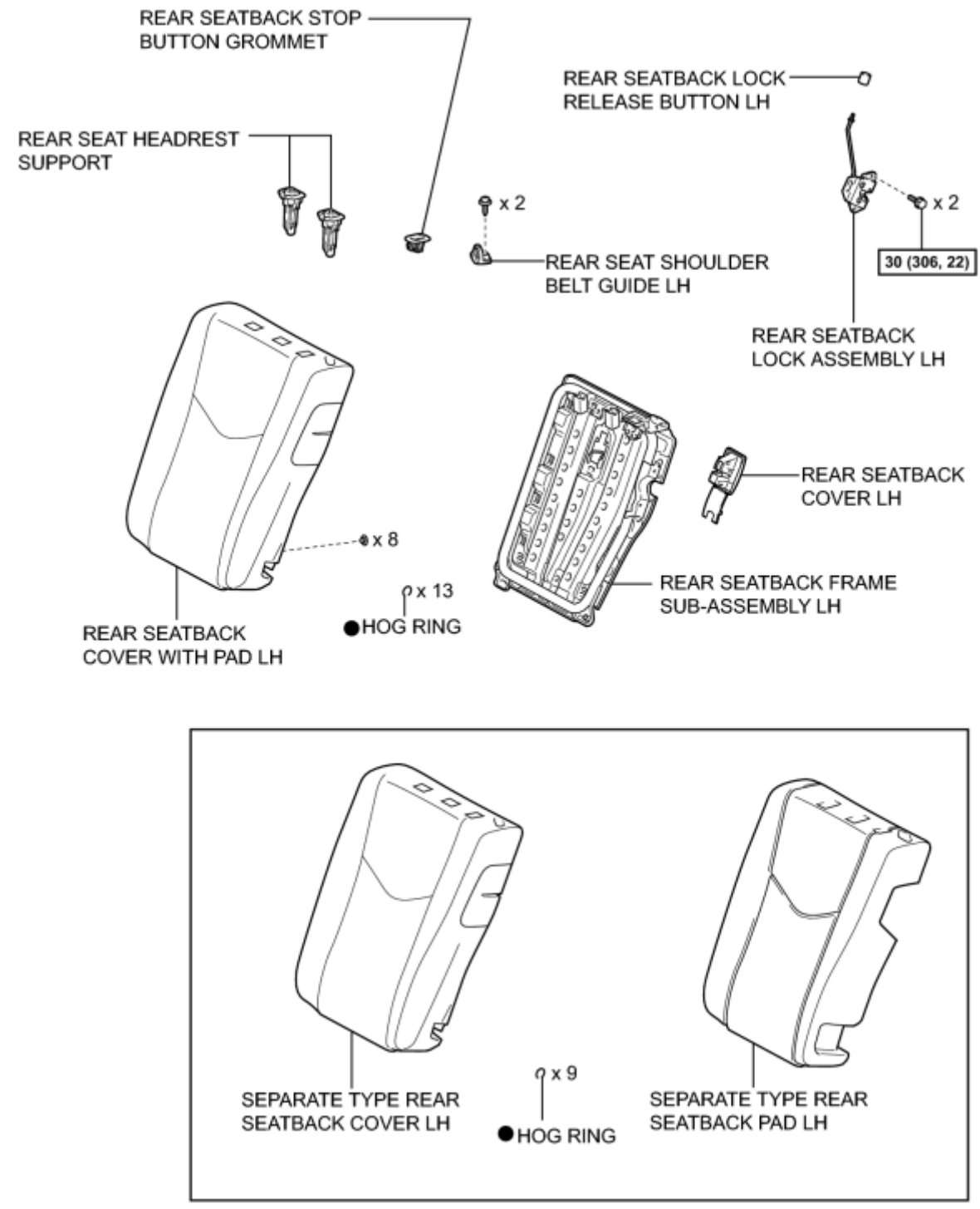
# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

P

# ILLUSTRATION

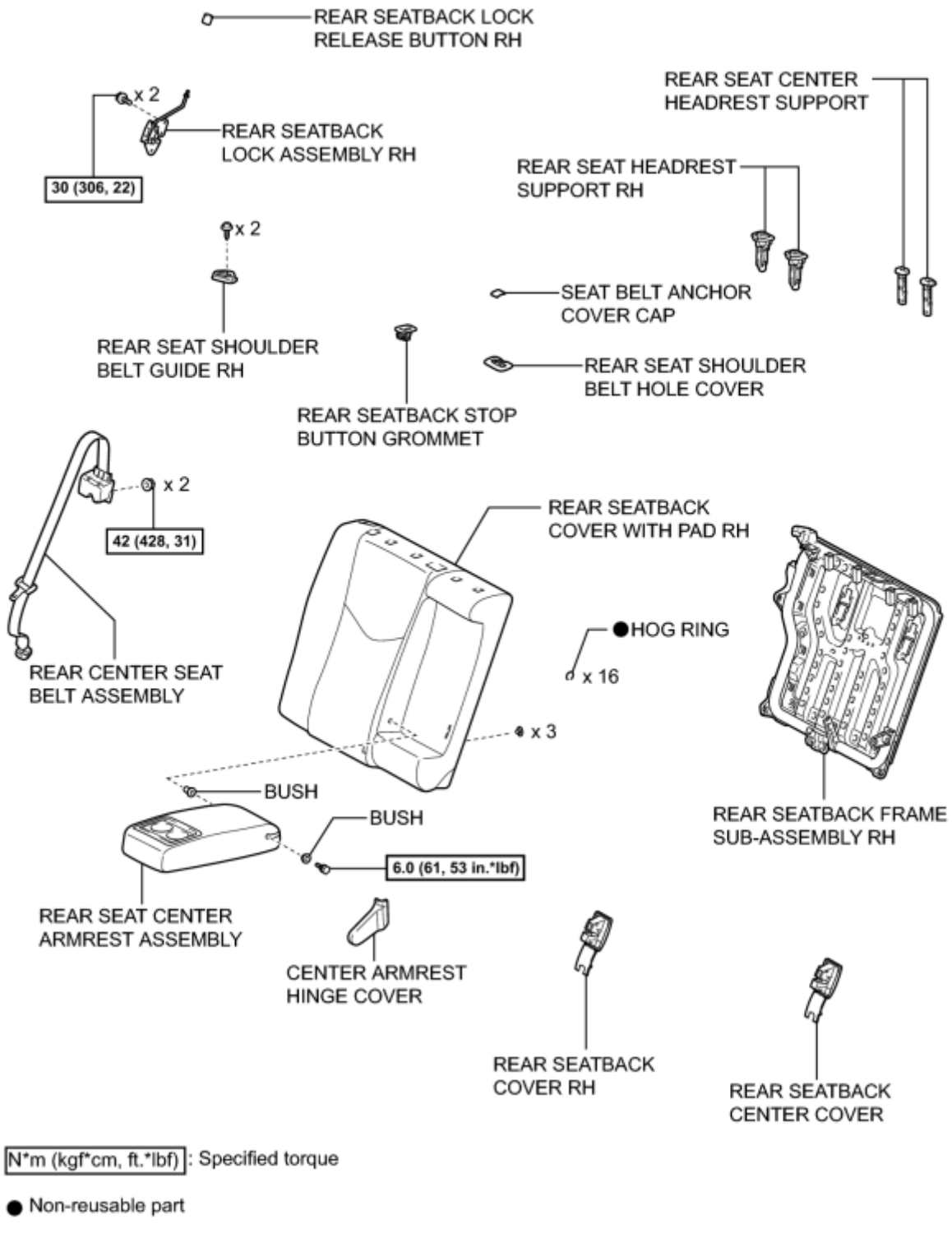



N*m (kgf*cm, ft.*lbf): Specified torque

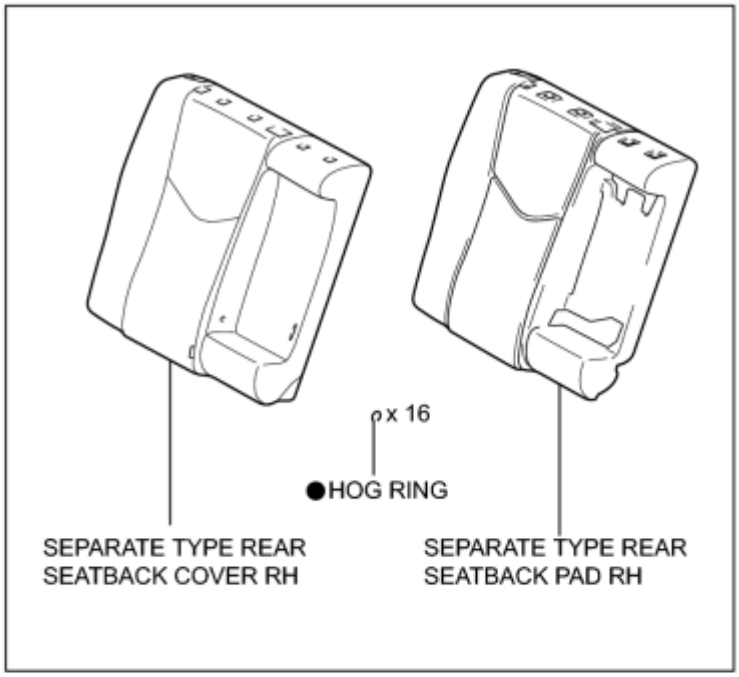
● Non-reusable part

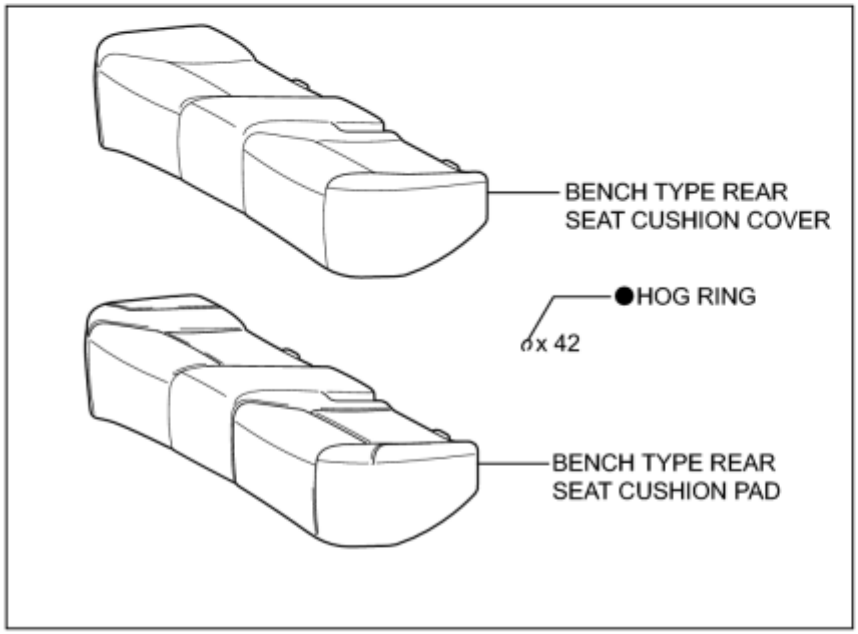
P

# ILLUSTRATION




# ILLUSTRATION



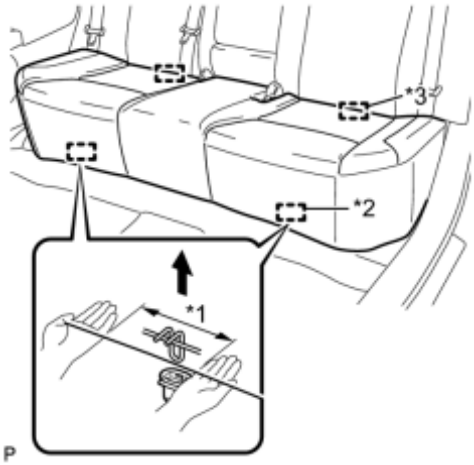




● Non-reusable part

P

# REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY




(a) Disengage the 2 front hooks of the seat cushion from the vehicle body as shown in the illustration.

## Text in Illustration

| | |
|---|---|
| *1 | 100 mm (3.94 in.) or less |
| *2 | Hook |
| *3 | Guide |

NOTICE:

Follow the instructions below carefully as the cushion frame deforms easily.

(1) Choose a hook to detach first. Place your hands near the hook as shown in the illustration. Then lift the seat cushion to detach the hook.

(2) Repeat the above procedure for the other hook.

(b) Disengage the 2 guides of the seat cushion from the seatback.

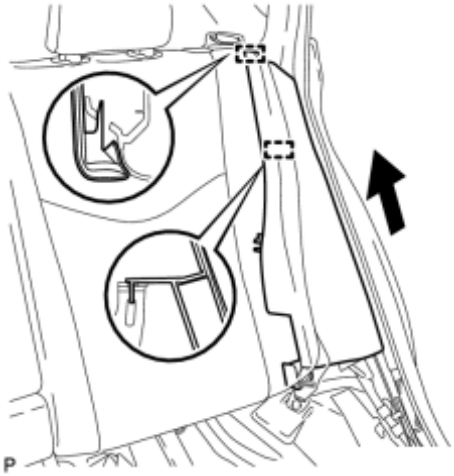
(c) Remove the rear seat cushion assembly.

2. REMOVE REAR SIDE SEATBACK ASSEMBLY LH




(a) Remove the bolt.

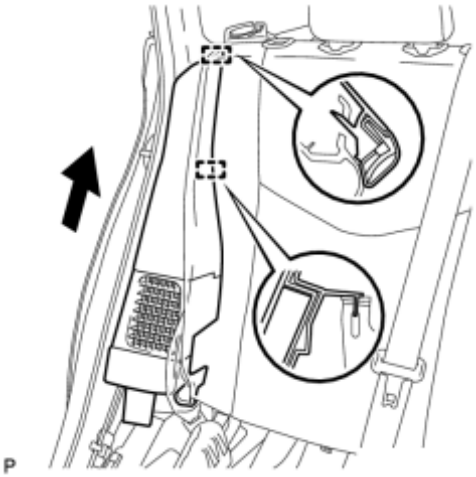
(b) Disengage the 2 guides and remove the rear side seatback assembly LH as shown in the illustration.



3. REMOVE REAR SIDE SEATBACK ASSEMBLY RH



(a) Remove the bolt.



(b) Disengage the 2 guides and remove the rear side seatback assembly RH as shown in the illustration.

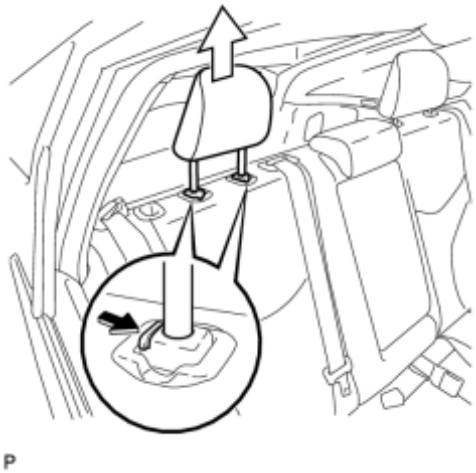
4. DISCONNECT REAR CENTER SEAT BELT ASSEMBLY INFO

5. REMOVE REAR SEAT HEADREST ASSEMBLY LH




(a) Press the 2 headrest support buttons and pull up the rear seat headrest assembly LH as shown in the illustration.

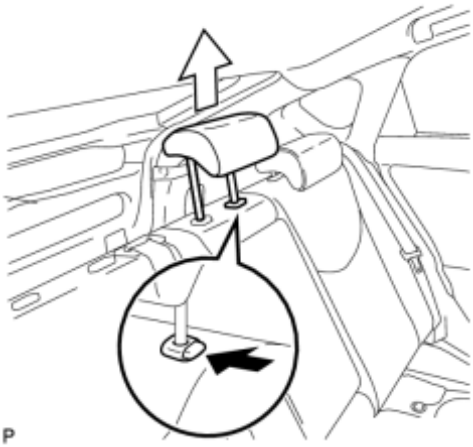
6. REMOVE REAR SEAT HEADREST ASSEMBLY RH




(a) Press the 2 headrest support buttons and pull up the rear seat headrest assembly RH as shown in the illustration.

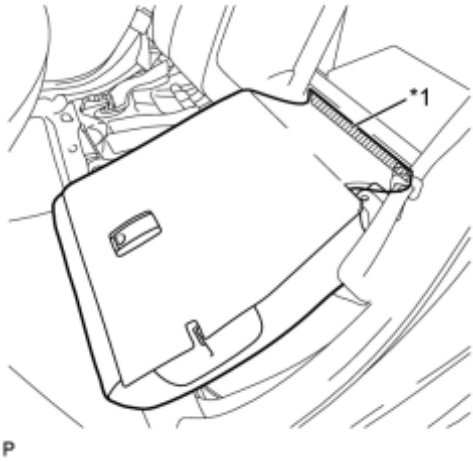
7. REMOVE REAR SEAT CENTER HEADREST ASSEMBLY

(a) Press the headrest support button and pull up the rear seat center headrest assembly as shown in the illustration.




8. REMOVE REAR SEATBACK ASSEMBLY LH

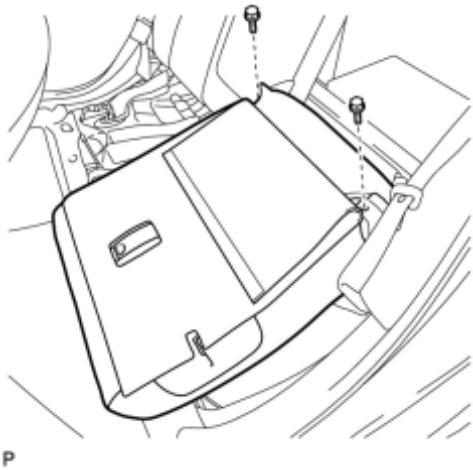
(a) Fold the rear seatback assembly LH forward.




(b) Disengage the fastener.

## Text in Illustration

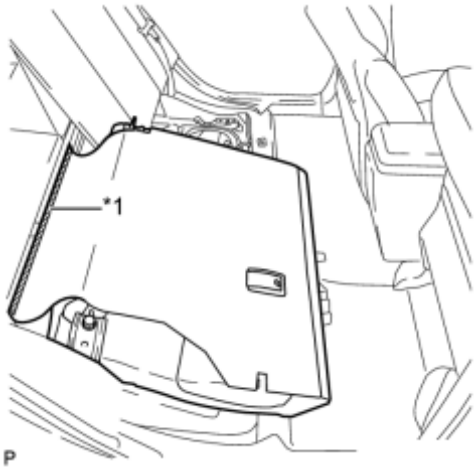
| | |
|---|---|
| *1 | Fastener |




(c) Remove the 2 bolts and rear seatback assembly LH.

9. REMOVE REAR SEATBACK ASSEMBLY RH

(a) Fold the rear seatback assembly RH forward.




(b) Disengage the fastener.

## Text in Illustration

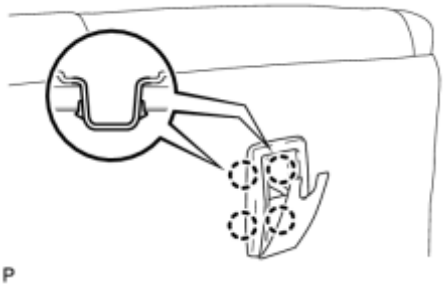
| | |
|---|---|
| *1 | Fastener |




(c) Remove the 2 bolts and rear seatback assembly RH.

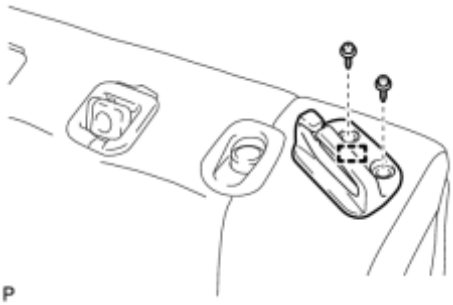
# DISASSEMBLY

1. REMOVE REAR SEATBACK COVER LH



(a) Disengage the 4 claws and remove the rear seatback cover LH.

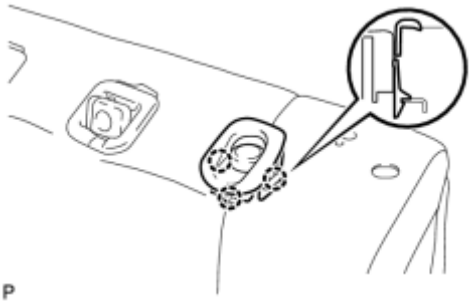
2. REMOVE REAR SEAT SHOULDER BELT GUIDE LH



(a) Remove the 2 screws.

(b) Disengage the guide and remove the rear seat shoulder belt guide LH.

3. REMOVE REAR SEATBACK STOP BUTTON GROMMET



(a) Disengage the 3 claws and remove the rear seatback stop button grommet.

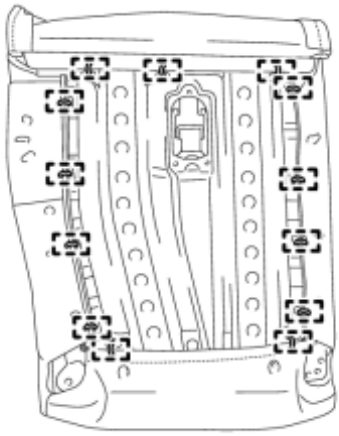
4. REMOVE REAR SEATBACK COVER WITH PAD LH

(a) Using a clip remover, remove the 2 clips.



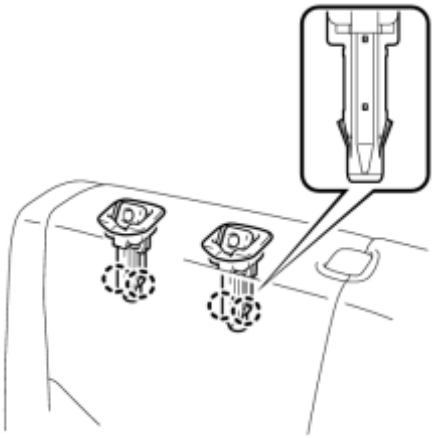
P

(b) Disengage the 6 clips.



P

(c) Remove the 13 hog rings.

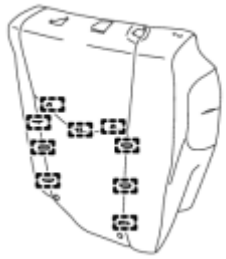


P

(d) Disengage the 4 claws and remove the 2 rear seat headrest supports.

(e) Remove the rear seatback cover with pad LH from the rear seatback frame sub-assembly LH.

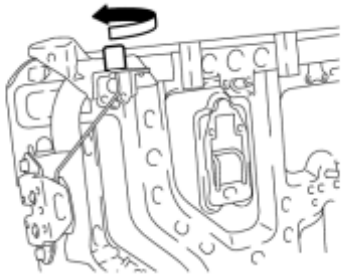
5. REMOVE SEPARATE TYPE REAR SEATBACK COVER LH



P

(a) Remove the 9 hog rings.

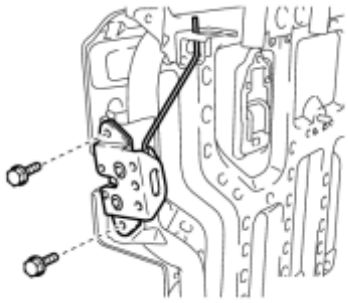
6. REMOVE REAR SEATBACK LOCK RELEASE BUTTON LH



P

(a) Remove the rear seatback frame LH from the rear seatback lock release button LH as shown in the illustration.

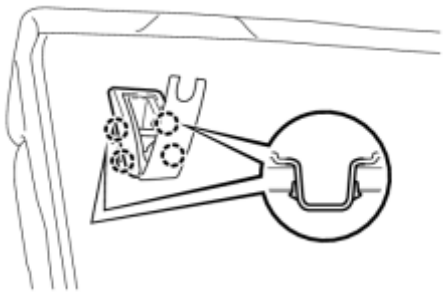
7. REMOVE REAR SEATBACK LOCK ASSEMBLY LH



P

(a) Remove the 2 bolts and rear seatback lock assembly LH.

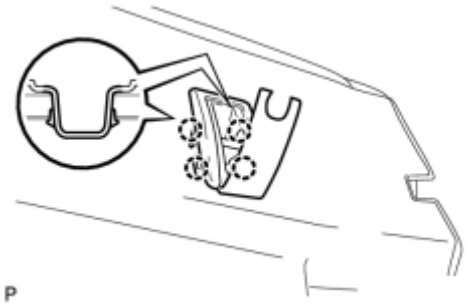
8. REMOVE REAR SEATBACK CENTER COVER



P

(a) Disengage the 4 claws and remove the rear seatback center cover.

9. REMOVE REAR SEATBACK COVER RH




(a) Disengage the 4 claws and remove the rear seatback cover RH.

10. REMOVE REAR SEAT SHOULDER BELT GUIDE RH




(a) Remove the 2 screws.

(b) Disengage the guide and remove the rear seat shoulder belt guide RH.

11. REMOVE REAR SEATBACK STOP BUTTON GROMMET

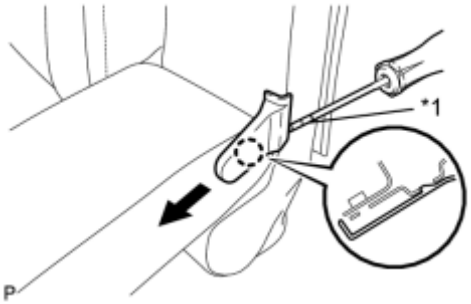



(a) Disengage the 3 claws and remove the rear seatback stop button grommet.

12. REMOVE CENTER ARMREST HINGE COVER

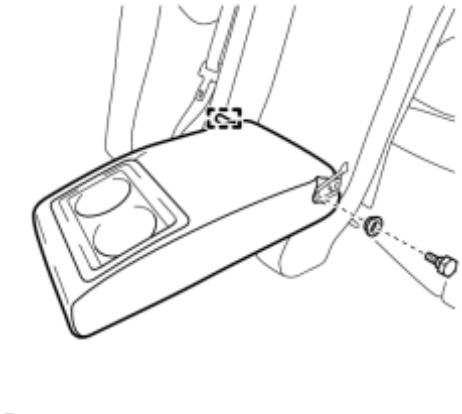
(a) Using a screwdriver wrapped with protective tape, disengage the claw and remove the center armrest hinge cover as shown in the illustration.

# Text in Illustration



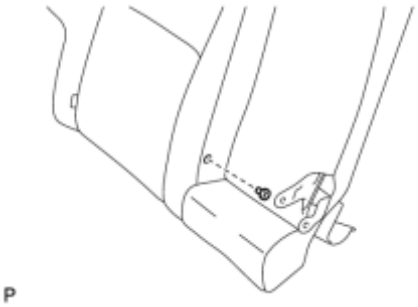

| | |
|---|---|
| *1 | Protective Tape |

13. REMOVE REAR SEAT CENTER ARMREST ASSEMBLY




(a) Remove the bolt and bush.

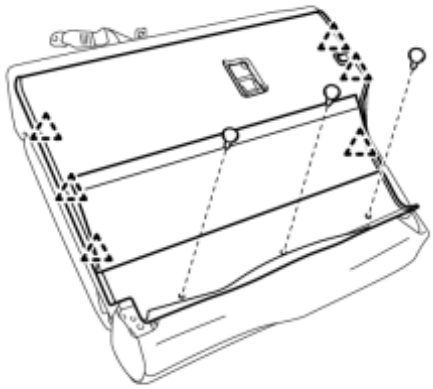
(b) Separate the pin and remove the center armrest assembly.




(c) Remove the bush.

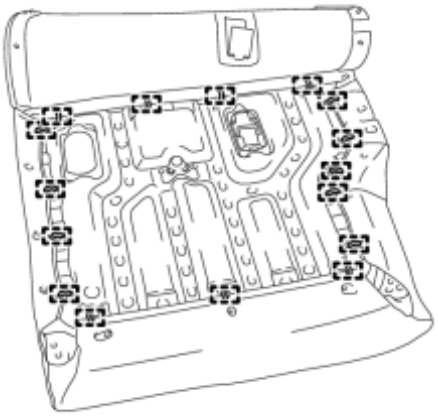
14. REMOVE REAR SEATBACK COVER WITH PAD RH

(a) Using a clip remover, remove the 3 clips.



P

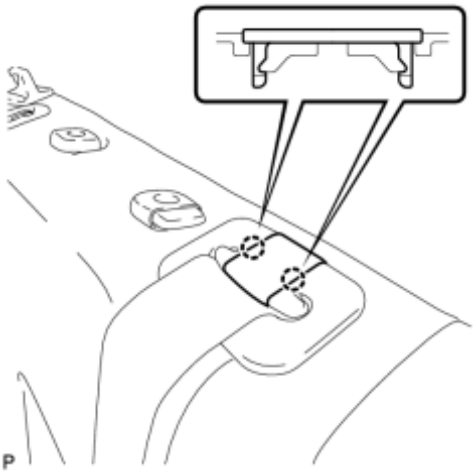
(b) Disengage the 6 clips.



P

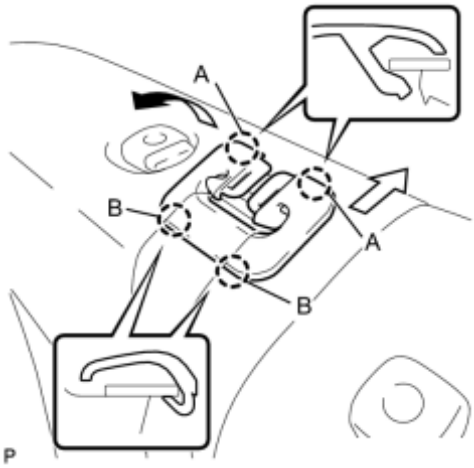
(c) Remove the 16 hog rings.

(d) Disengage the guide and remove the rear seat shoulder belt guide RH.



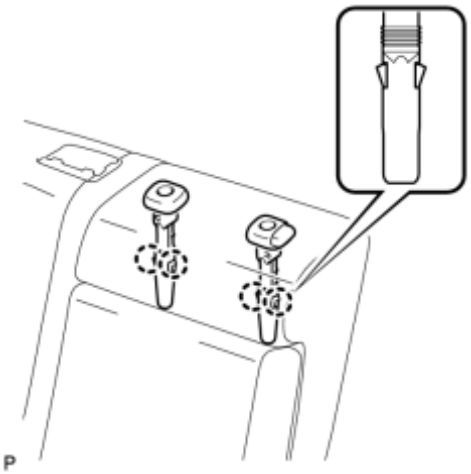
P

(e) Disengage the 2 claws and remove the seat belt anchor cover cap.

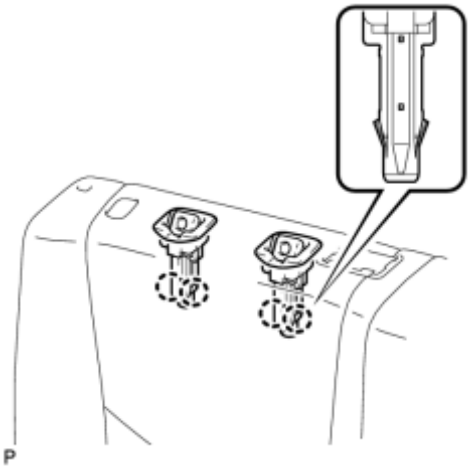



(f) Move the rear seat shoulder belt hole cover in the direction indicated by the arrow in the illustration to disengage the 2 claws (A).

(g) Move the rear seat shoulder belt hole cover in the direction indicated by the arrow in the illustration to disengage the 2 claws (B) and remove the cover.




(h) Disengage the 4 claws and remove the 2 rear seat center headrest supports.




(i) Disengage the 4 claws and remove the 2 rear seat headrest supports.

(j) Remove the rear seatback cover with pad RH from the rear seatback frame sub-assembly RH.

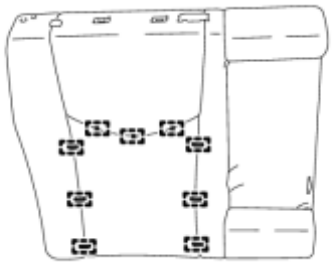
15. REMOVE REAR CENTER SEAT BELT ASSEMBLY INFO

16. REMOVE SEPARATE TYPE REAR SEATBACK COVER RH



P

(a) Remove the 7 hog rings.

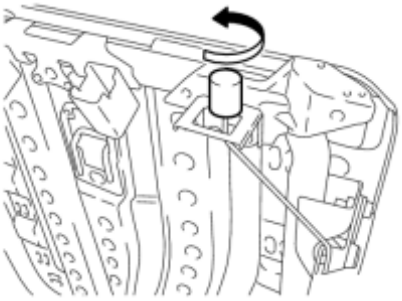


P

(b) Remove the 9 hog rings.

(c) Remove the separate type rear seatback cover RH.

17. REMOVE REAR SEATBACK LOCK RELEASE BUTTON RH

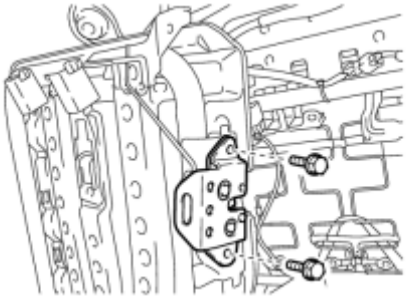


P

(a) Remove the rear seatback frame RH from the rear seatback lock release button RH as shown in the illustration.

18. REMOVE REAR SEATBACK LOCK ASSEMBLY RH

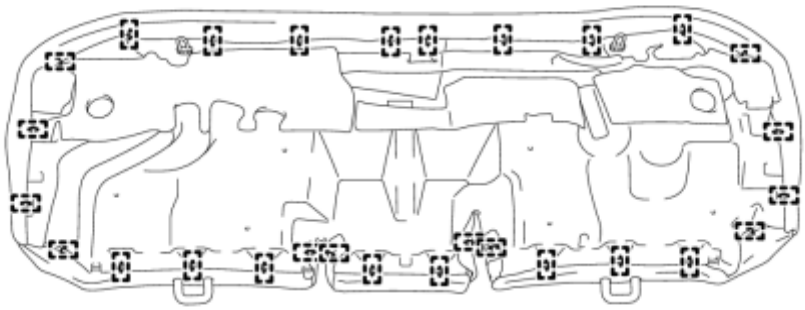
(a) Remove the 2 bolts and rear seatback lock assembly RH.



P

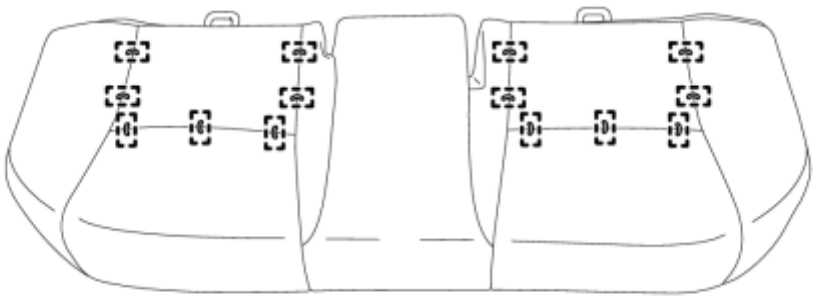
19. REMOVE BENCH TYPE REAR SEAT CUSHION COVER

(a) Remove the 28 hog rings.



P

(b) Remove the 14 hog rings and rear seat cushion cover.

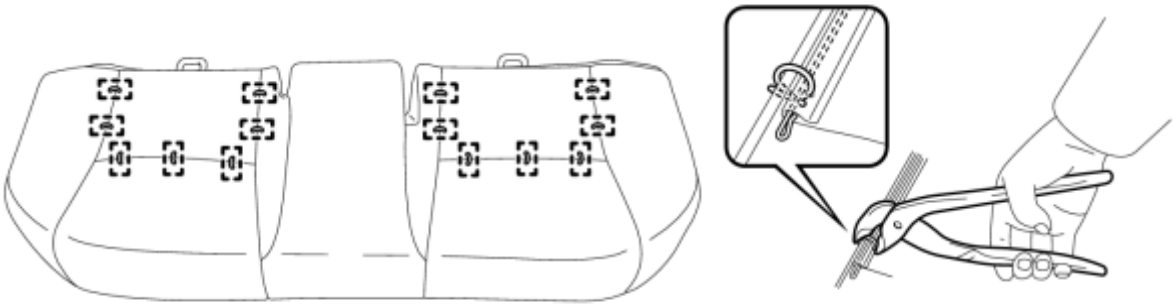


P

# REASSEMBLY

1. INSTALL BENCH TYPE REAR SEAT CUSHION COVER

(a) Using hog ring pliers, install the rear seat cushion cover with 14 new hog rings.

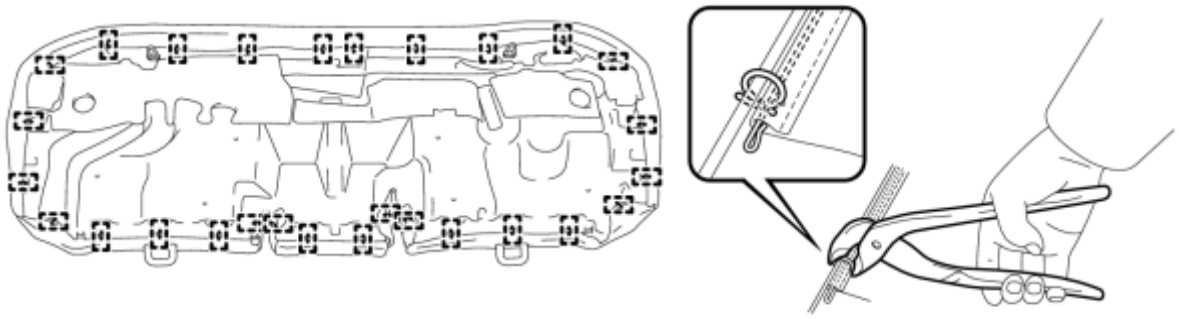


P

NOTICE:

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

(b) Using hog ring pliers, install the rear seat cushion cover with 28 new hog rings.

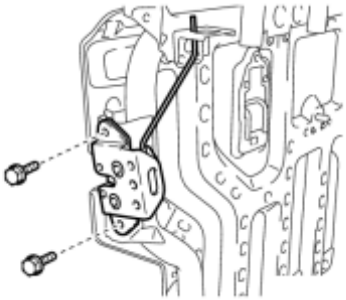


P

NOTICE:

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

2. INSTALL REAR SEATBACK LOCK ASSEMBLY LH

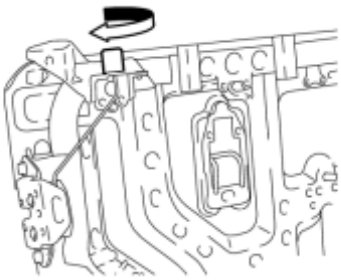


P

(a) Install the rear seatback lock assembly LH with the 2 bolts.

Torque: **30 N·m (306 kgf·cm, 22ft·lbf)**

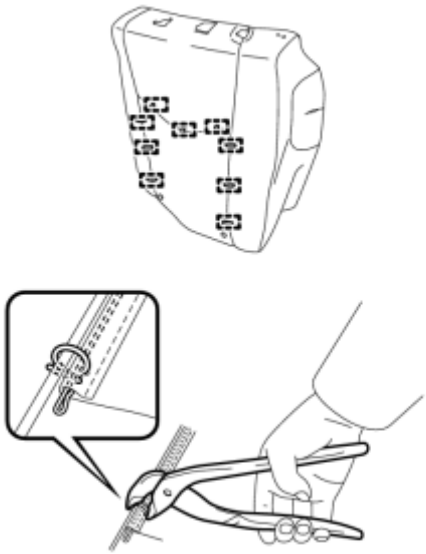
3. INSTALL REAR SEATBACK LOCK RELEASE BUTTON LH



P

(a) Install the rear seatback lock release button LH to the rear seatback frame LH as shown in the illustration.

4. INSTALL SEPARATE TYPE REAR SEATBACK COVER LH



P

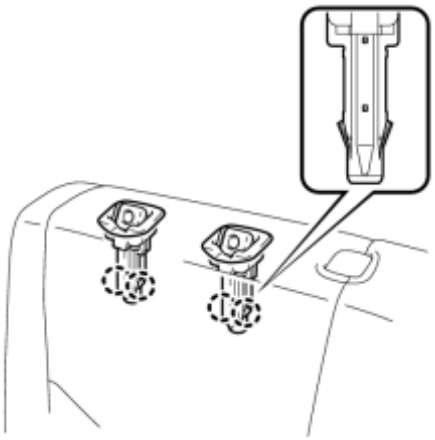
(a) Using hog ring pliers, install the separate type rear seatback cover LH to the separate type rear seatback pad LH with 9 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

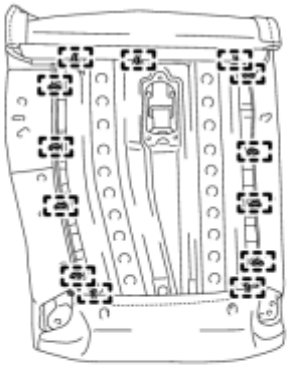
5. INSTALL REAR SEATBACK COVER WITH PAD LH

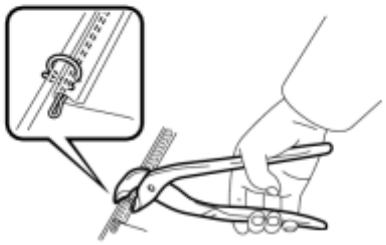
(a) Temporarily install the rear seatback cover with pad LH to the rear seatback frame sub-assembly LH.

(b) Engage the 4 claws and install the 2 rear seat headrest supports.



P





P

(c) Using hog ring pliers, install 13 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

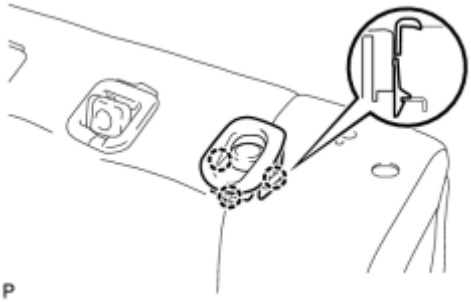


P

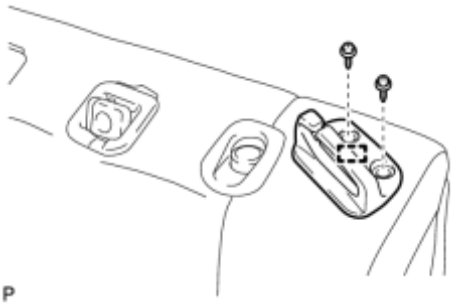
(d) Engage the 6 clips and Install the rear seatback cover with pad LH with the 2 clips.

6. INSTALL REAR SEATBACK STOP BUTTON GROMMET

(a) Engage the 3 claws and install the rear seatback stop button grommet.

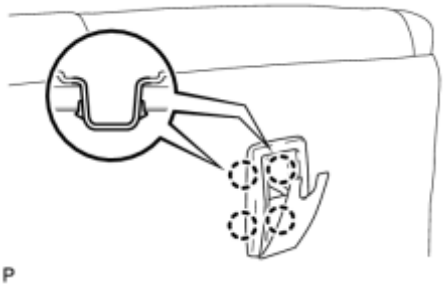


7. INSTALL REAR SEAT SHOULDER BELT GUIDE LH



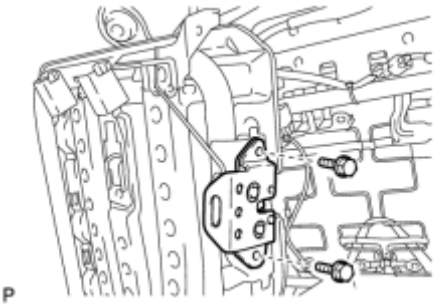
(a) Engage the guide and install the rear seat shoulder belt guide LH with the 2 screws.

8. INSTALL REAR SEATBACK COVER LH



(a) Engage the 4 claws and install the rear seatback cover LH.

9. INSTALL REAR SEATBACK LOCK ASSEMBLY RH

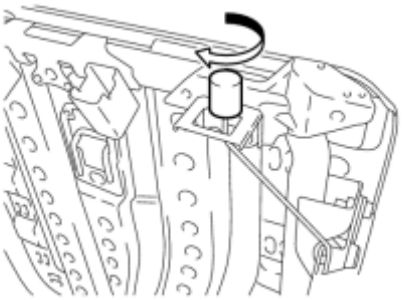


(a) Install the rear seatback lock assembly RH with 2 bolts.

Torque: **30 N·m (306 kgf·cm, 22ft·lbf)**

10. INSTALL REAR SEATBACK LOCK RELEASE BUTTON RH

(a) Install the rear seatback lock release button RH to the rear seatback frame RH as shown in the illustration.

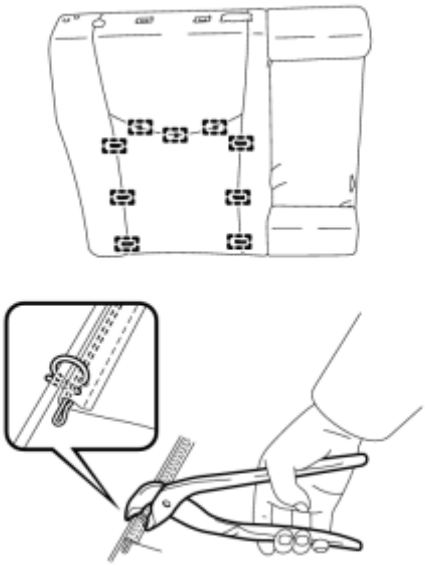


P

11. INSTALL REAR CENTER SEAT BELT ASSEMBLY INFO

12. INSTALL SEPARATE TYPE REAR SEATBACK COVER RH

(a) Temporarily install the separate type rear seatback cover RH.



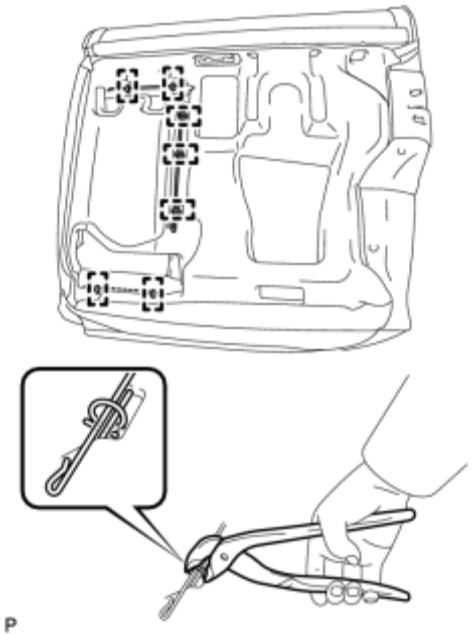
P

(b) Using hog ring pliers, install 9 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.

(c) Using hog ring pliers, install the rear seatback cover with pad RH with 7 new hog rings.

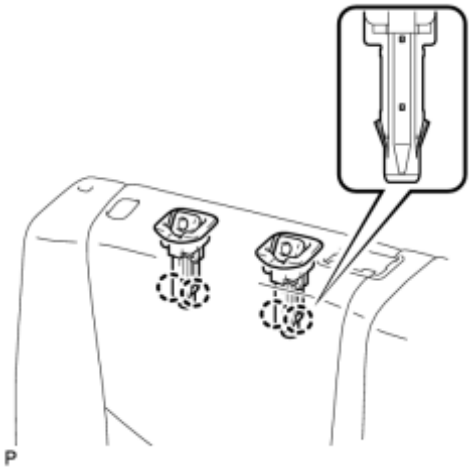
- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as much as possible.



(d) Install the rear seatback cover with pad RH.

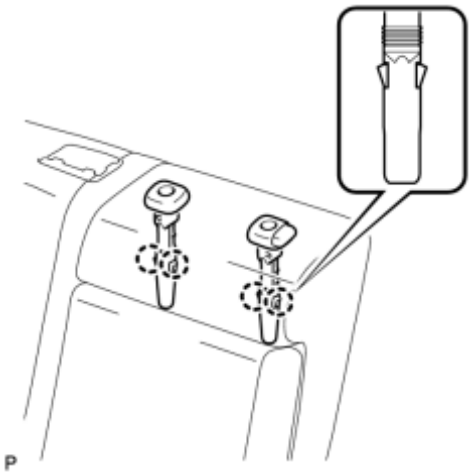
13. INSTALL REAR SEATBACK COVER WITH PAD RH

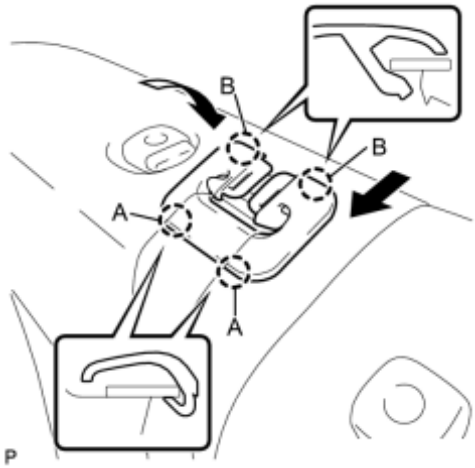
(a) Temporarily install the rear seatback cover with pad RH.



(b) Engage the 4 claws and install the 2 rear seat headrest supports.

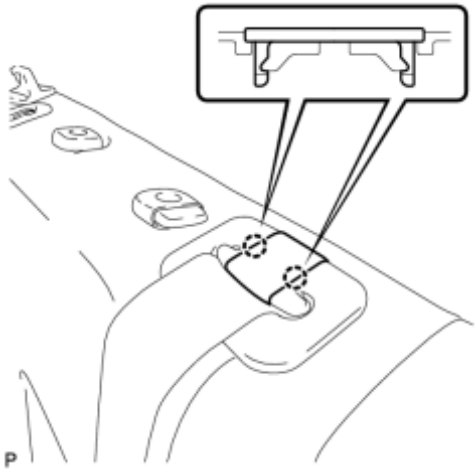
(c) Engage the 4 claws and install the 2 rear seat center headrest supports.






(d) Move the rear seat shoulder belt hole cover in the direction indicated by the arrow in the illustration to engage the 2 claws (A).

(e) Move the rear seat shoulder belt hole cover in the direction indicated by the arrow in the illustration to disengage the 2 claws (B) and remove the cover.

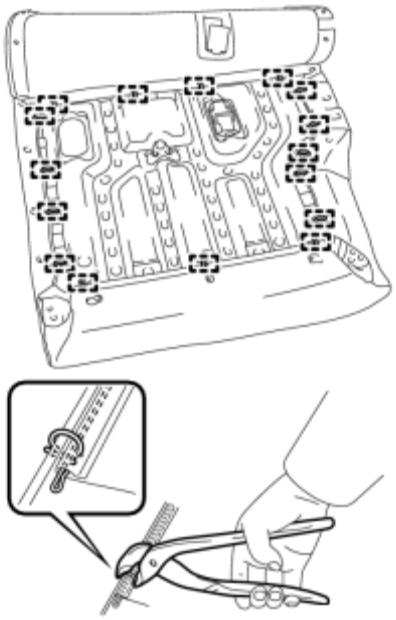


(f) Engage the 2 claws and install the seat belt anchor cover cap.

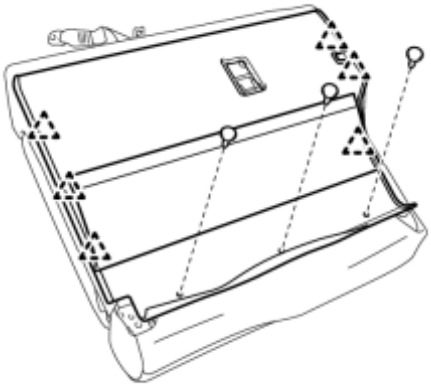
(g) Using hog ring pliers, install 16 new hog rings.

- Be careful not to damage the cover.
- When installing the hog rings, take care to minimize wrinkles as

much as possible.



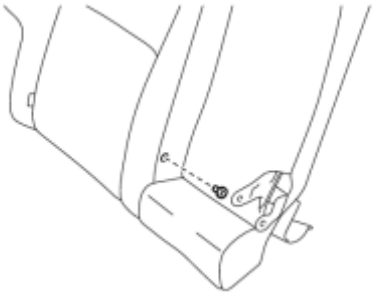
P



P

(h) Engage the 6 clips and Install the rear seatback cover with pad RH with the 3 clips.

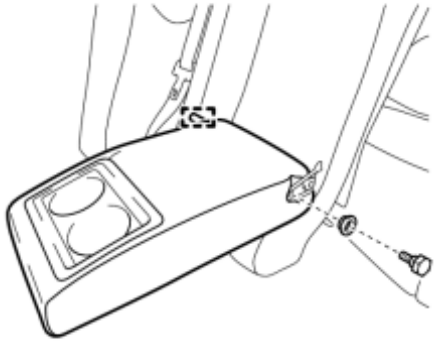
14. INSTALL REAR SEAT CENTER ARMREST ASSEMBLY



P

(a) Install the bush.

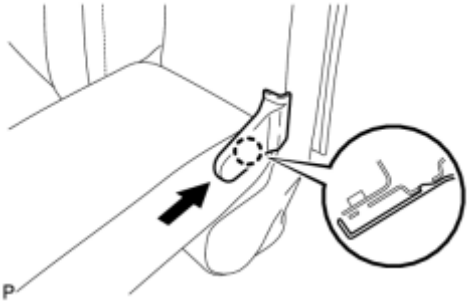
(b) Insert the pin into the rear seatback.



P

(c) Install the rear seat center armrest assembly with the bolt and bush.

15. INSTALL CENTER ARMREST HINGE COVER



P

(a) Engage the claw and install the center armrest hinge cover as shown in the illustration.

16. INSTALL REAR SEATBACK STOP BUTTON GROMMET



P

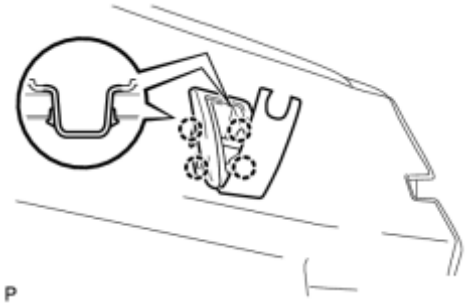
(a) Engage the 3 claws and install the rear seatback stop button grommet.

17. INSTALL REAR SEAT SHOULDER BELT GUIDE RH

(a) Engage the guide and install the rear seat shoulder belt guide RH with the 2 screws.

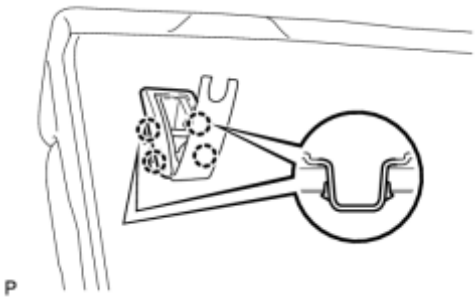


18. INSTALL REAR SEATBACK COVER RH



(a) Engage the 4 claws and install the rear seatback cover RH.

19. INSTALL REAR SEATBACK CENTER COVER



(a) Engage the 4 claws and install the rear seatback center cover.

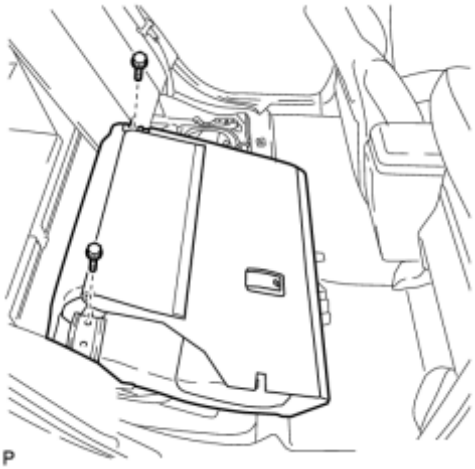
# INSTALLATION

1. INSTALL REAR SEATBACK ASSEMBLY RH

(a) Place the rear seatback assembly RH in the cabin.

NOTICE:

Be careful not to damage the vehicle body.




(b) Install the rear seatback assembly RH with the 2 bolts.

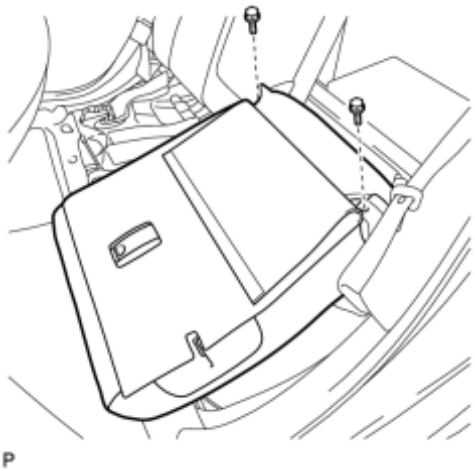
Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

2. INSTALL REAR SEATBACK ASSEMBLY LH

(a) Place the rear seatback assembly LH in the cabin.

NOTICE:

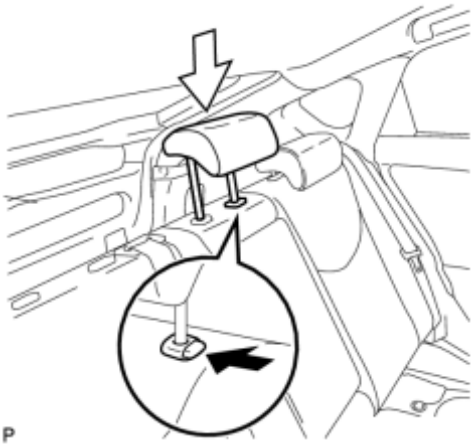
Be careful not to damage the vehicle body.




(b) Install the rear seatback assembly LH with the 2 bolts.

Torque: **37 N·m (377 kgf·cm, 27ft·lbf)**

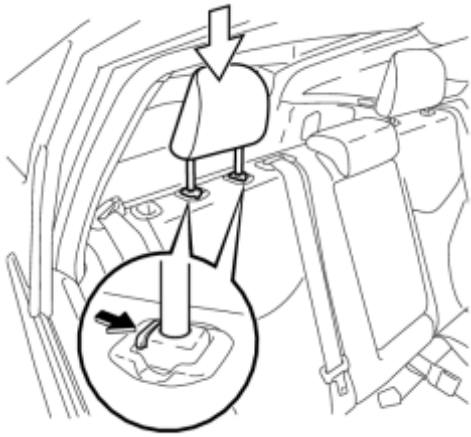
3. INSTALL REAR SEAT CENTER HEADREST ASSEMBLY



P

(a) Install the rear seat center headrest assembly as shown in the illustration.

4. INSTALL REAR SEAT HEADREST ASSEMBLY RH

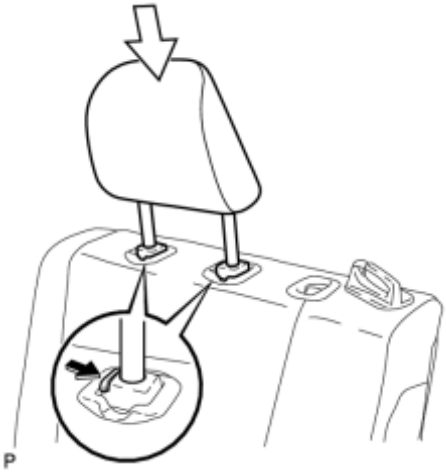


P

(a) Install the rear seat headrest assembly RH as shown in the illustration.

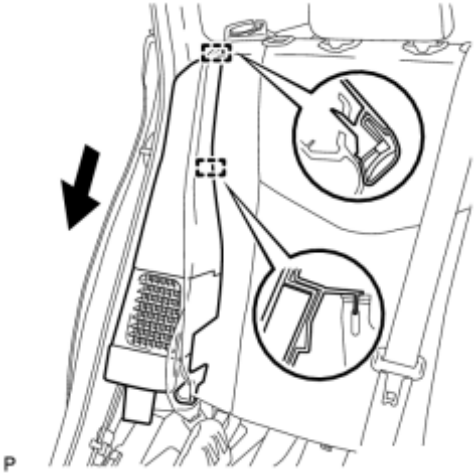
5. INSTALL REAR SEAT HEADREST ASSEMBLY LH

(a) Install the rear seat headrest assembly LH as shown in the illustration.



6. CONNECT REAR CENTER SEAT BELT ASSEMBLY INFO

7. INSTALL REAR SIDE SEATBACK ASSEMBLY RH



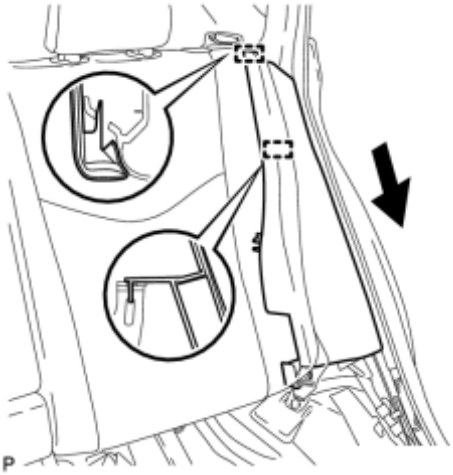
(a) Engage the 2 guides as shown in the illustration.



(b) Install the rear side seatback assembly RH with the bolt.

Torque: **18 N·m (184 kgf·cm, 13ft·lbf)**

8. INSTALL REAR SIDE SEATBACK ASSEMBLY LH



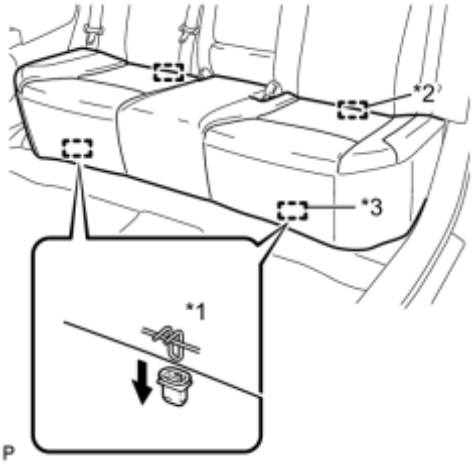
(a) Engage the 2 guides as shown in the illustration.



(b) Install the rear side seatback assembly LH with the bolt.

Torque: **18 N·m (184 kgf·cm, 13ft·lbf)**

9. INSTALL REAR SEAT CUSHION ASSEMBLY




(a) Engage the 2 guides of the seat cushion to the seatback.

# Text in Illustration

| | |
|---|---|
| *1 | 100 mm (3.94 in.) or less |
| *2 | Guide |
| *3 | Hook |

(b) Engage the 2 front hooks of the seat cushion to the vehicle body.

NOTICE:

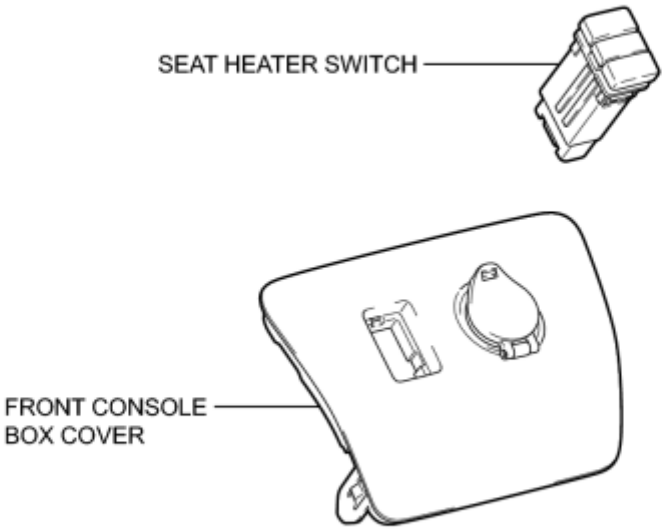
When installing the seat cushion, make sure that the seat belt buckle is not under the seat cushion.

HINT:

Confirm that the seat cushion is firmly installed.

# COMPONENTS

# ILLUSTRATION

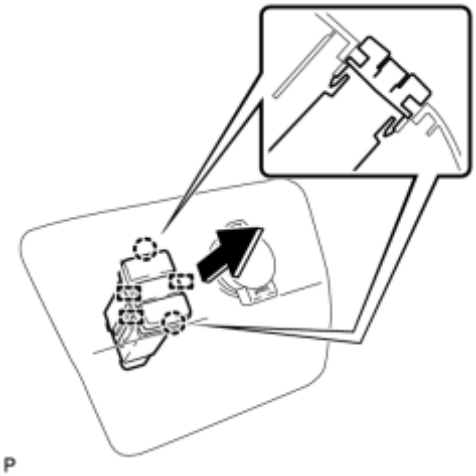



P

# REMOVAL

1. REMOVE FRONT CONSOLE BOX COVER INFO

2. REMOVE SEAT HEATER SWITCH



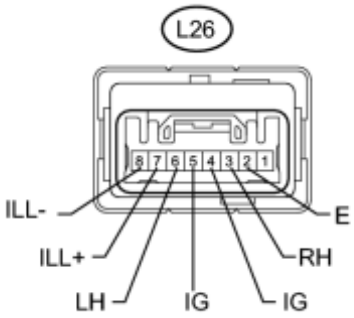
P

(a) Disengage the 2 claws and 3 guides, and remove the seat heater switch as shown in the illustration.

# INSPECTION

1. INSPECT SEAT HEATER SWITCH

*1




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| L26-5 (IG) - L26-6 (LH) | "L" switch off | 10 kΩ or higher |
| L26-5 (IG) - L26-6 (LH) | "L" switch on | Below 1 Ω |
| L26-4 (IG) - L26-3 (RH) | "R" switch off | 10 kΩ or higher |
| L26-4 (IG) - L26-3 (RH) | "R" switch on | Below 1 Ω |

If the result is not as specified, replace the seat heater switch.

(b) Turn the seat heater switch on and check if the seat heater switch indicator comes on.

OK:

| Connection | Switch Condition | Specified Condition |
|---|---|---|
| Battery positive (+) → L26-5 (IG)<br>Battery negative (-) → L26-2 (E) | "L" Switch on | Comes on |
| Battery positive (+) → L26-4 (IG)<br>Battery negative (-) → L26-2 (E) | "R " Switch off | Comes on |

If the result is not as specified, replace the seat heater switch.

(c) Check if the seat heater switch comes on.

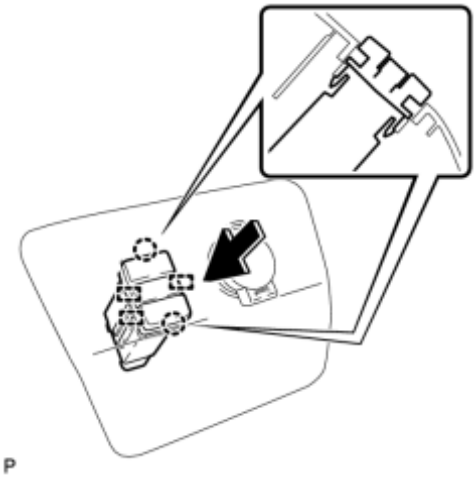
OK:

| Connection | Switch Condition | Specified Condition |
|---|---|---|
| Battery positive (+) → L26-7 (ILL+)<br>Battery positive (-) → L26-8 (ILL-) | Always | Comes on |

If the result is not as specified, replace the seat heater switch.

# INSTALLATION

1. INSTALL SEAT HEATER SWITCH




(a) Engage the 3 guides and 2 claws, and install the seat heater switch as shown in the illustration.

2. INSTALL FRONT CONSOLE BOX COVER INFO

# PRECAUTION

1. NOTICE FOR INITIALIZATION

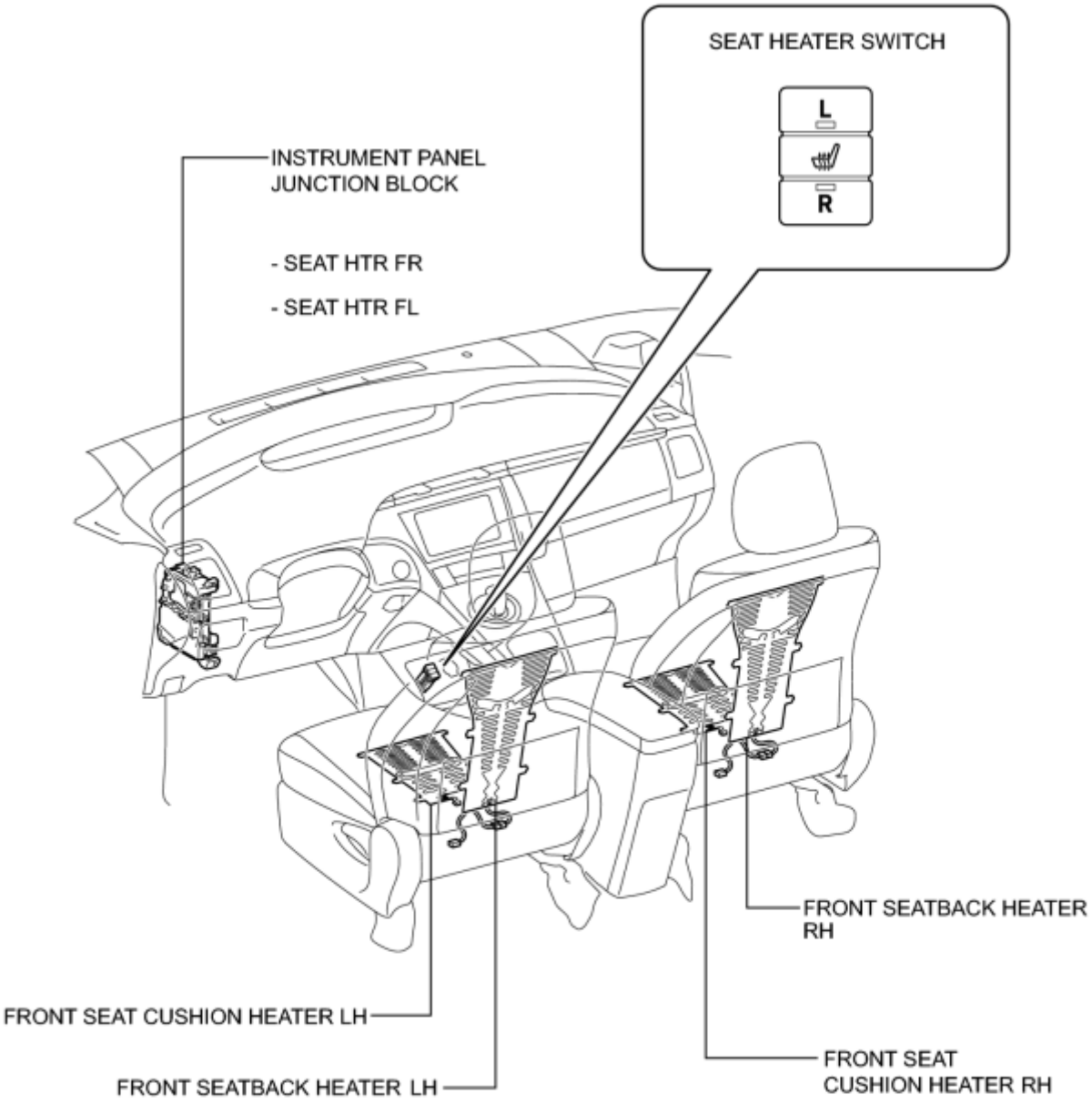
NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

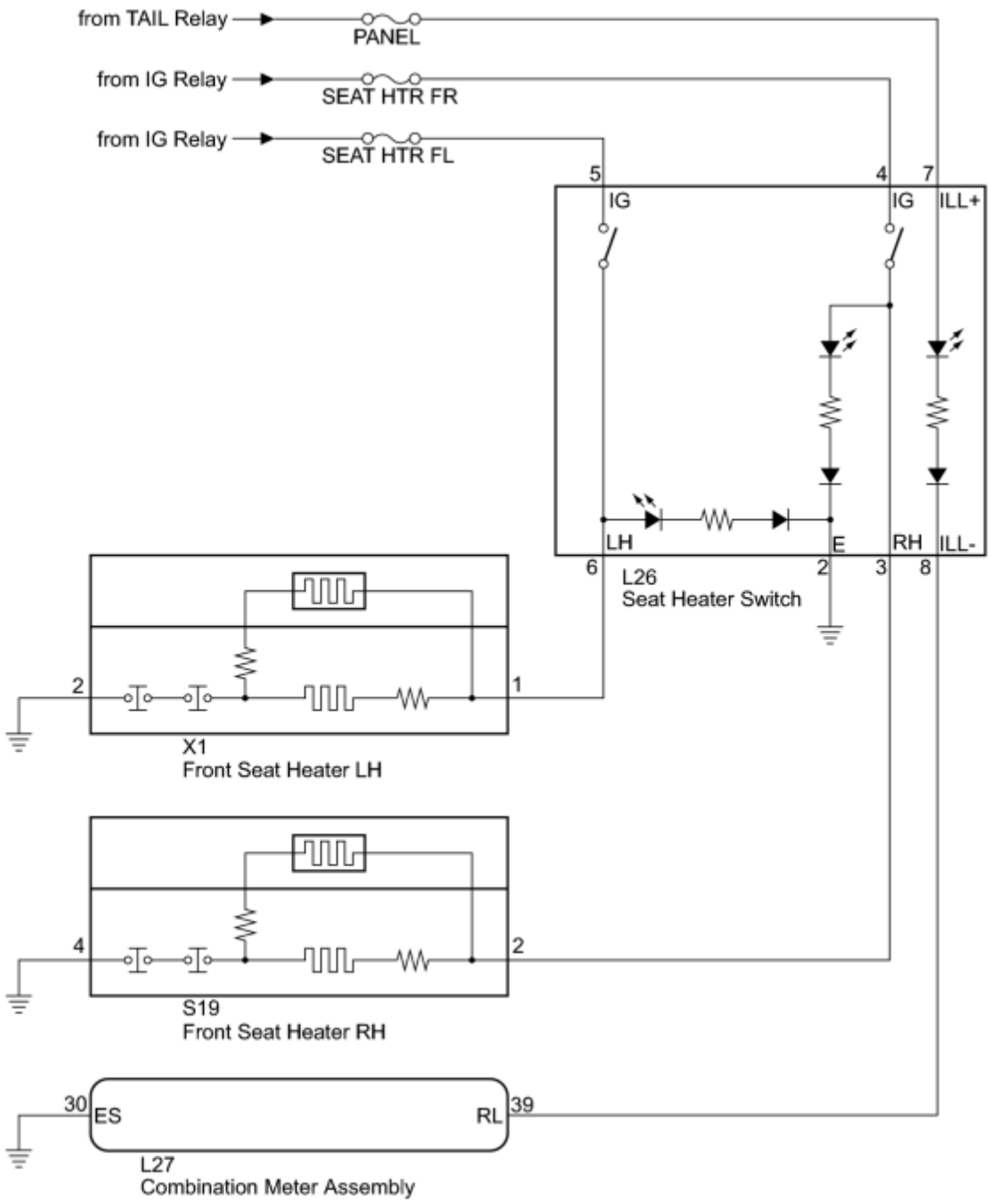
# PARTS LOCATION

# ILLUSTRATION




H

# SYSTEM DIAGRAM




H

# PROBLEM SYMPTOMS TABLE

HINT:

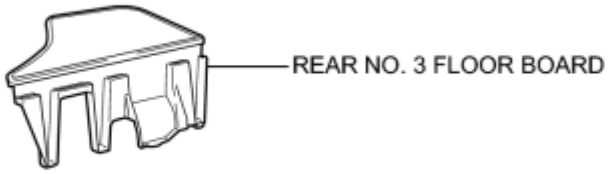
- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses related to this system before inspecting the suspected areas below.

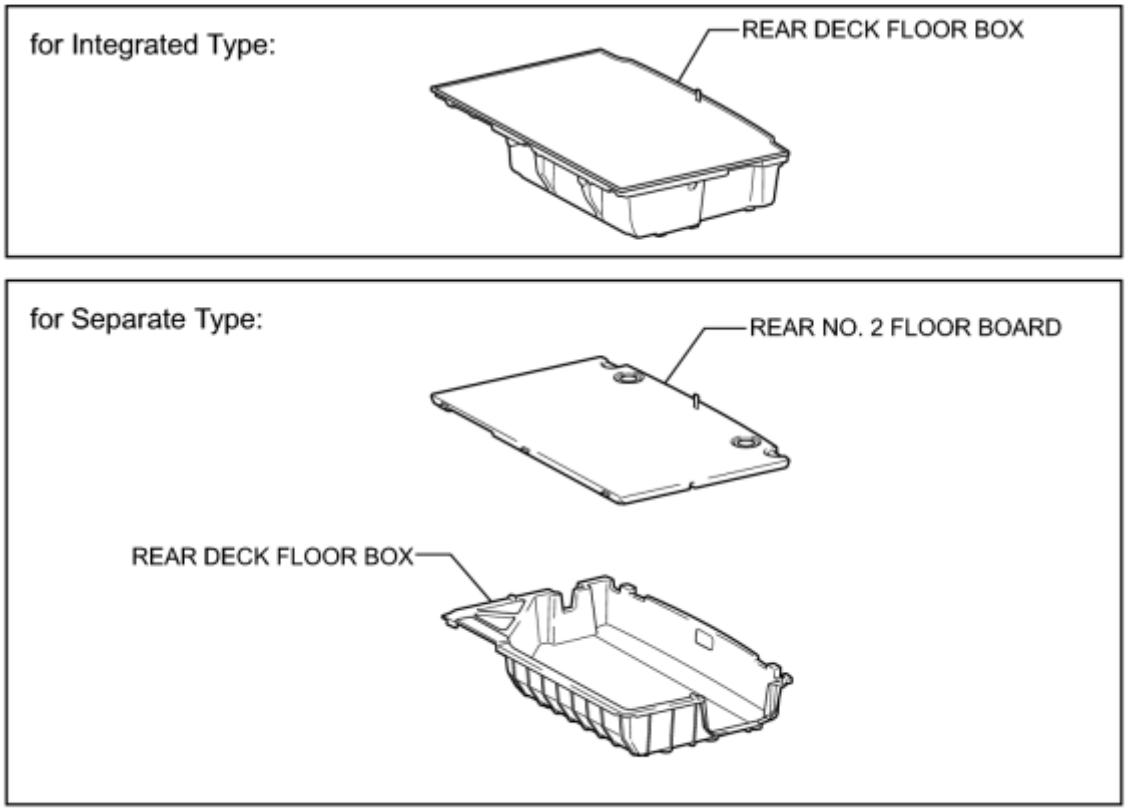
### *Seat Heater System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Seat heater does not operate (Front LH side) | Seat heater switch | INFO |
| | Front seat cushion heater assembly LH | INFO |
| | Front seat back heater assembly LH | INFO |
| | Wire harness or connector | - |
| Seat heater does not operate (Front RH side) | Seat heater switch | INFO |
| | Front seat cushion heater assembly RH | INFO |
| | Front seat back heater assembly RH | INFO |
| | Wire harness or connector | - |

# COMPONENTS

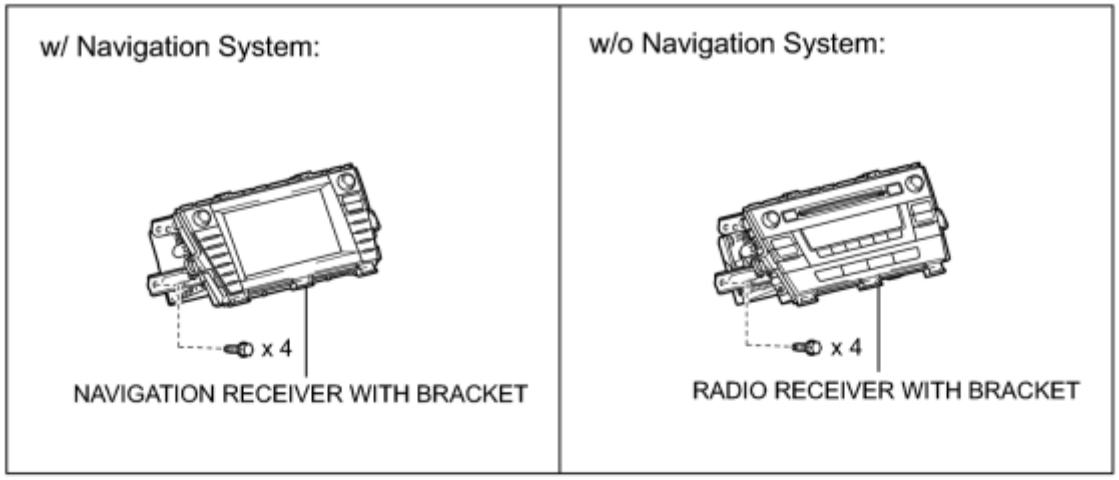
# ILLUSTRATION

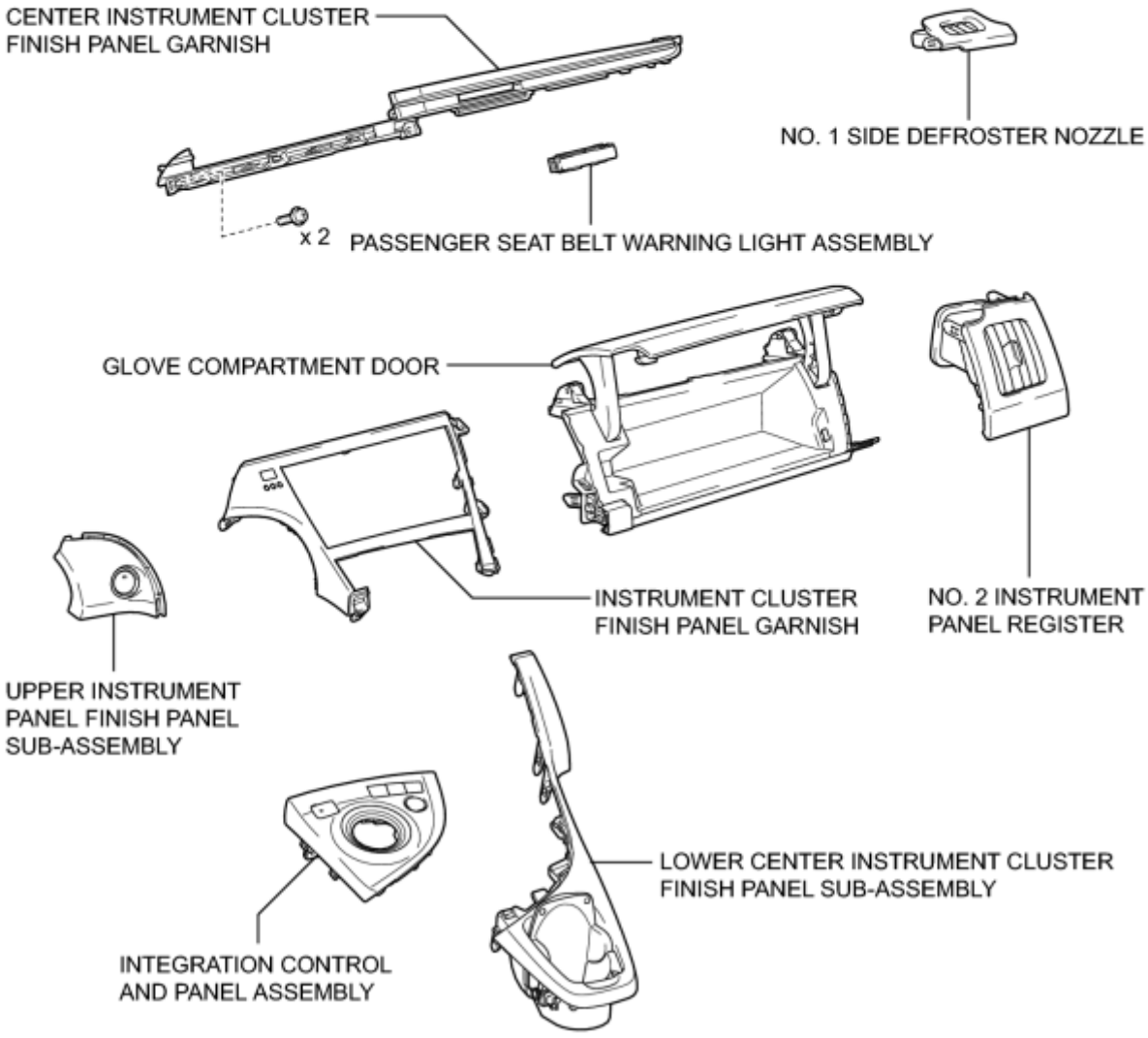



P

# ILLUSTRATION


w/ Navigation System:
x 4
NAVIGATION RECEIVER WITH BRACKET
w/o Navigation System:
x 4
RADIO RECEIVER WITH BRACKET


CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 1 SIDE DEFROSTER NOZZLE
x 2
PASSENGER SEAT BELT WARNING LIGHT ASSEMBLY
GLOVE COMPARTMENT DOOR
INSTRUMENT CLUSTER FINISH PANEL GARNISH
NO. 2 INSTRUMENT PANEL REGISTER
UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY
LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY
INTEGRATION CONTROL AND PANEL ASSEMBLY

# REMOVAL

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

7. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

8. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

9. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

10. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

11. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

12. REMOVE NO. 1 SIDE DEFROSTER NOZZLE INFO

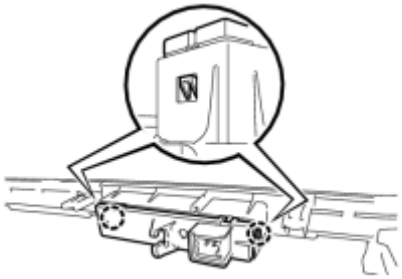
13. REMOVE NO. 2 INSTRUMENT PANEL REGISTER INFO

14. REMOVE GLOVE COMPARTMENT DOOR INFO

15. REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

16. REMOVE PASSENGER SEAT BELT WARNING LIGHT ASSEMBLY

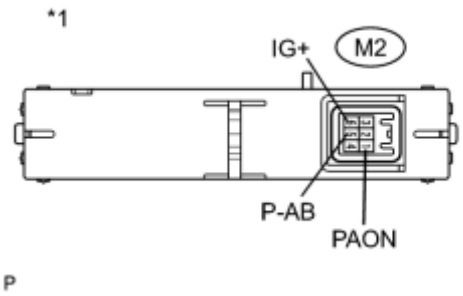
(a) Disengage the 2 claws to remove the passenger seat belt warning light assembly.



C

# INSPECTION

1. INSPECT PASSENGER SEAT BELT WARNING LIGHT ASSEMBLY




(a) Apply battery voltage to the connector and check the passenger airbag ON/OFF indicator condition.

Result:

| Connection | Result |
|---|---|
| Battery positive (+) → M2-6 (IG+)<br><br>Battery negative (-) → M2-1 (PAON) | "ON" comes on |
| Battery positive (+) → M2-6 (IG+)<br><br>Battery negative (-) → M2-5 (P-AB) | "OFF" comes on |

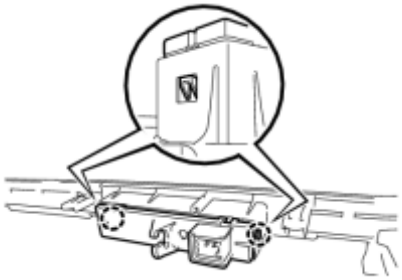
## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Passenger Seat Belt Warning Light Assembly) |

If the result is not as specified, replace the passenger seat belt warning light assembly.

# INSTALLATION

1. INSTALL PASSENGER SEAT BELT WARNING LIGHT ASSEMBLY



C

(a) Engage the 2 claws to install the passenger seat belt warning light assembly.

2. INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

3. INSTALL GLOVE COMPARTMENT DOOR INFO

4. INSTALL NO. 2 INSTRUMENT PANEL REGISTER INFO

5. INSTALL NO. 1 SIDE DEFROSTER NOZZLE INFO

6. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

7. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

8. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

9. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

10. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

11. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

12. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

13. INSTALL REAR NO. 3 FLOOR BOARD INFO

14. INSTALL REAR DECK FLOOR BOX INFO

15. INSTALL REAR NO. 2 FLOOR BOARD INFO

16. PERFORM DIAGNOSTIC SYSTEM CHECK

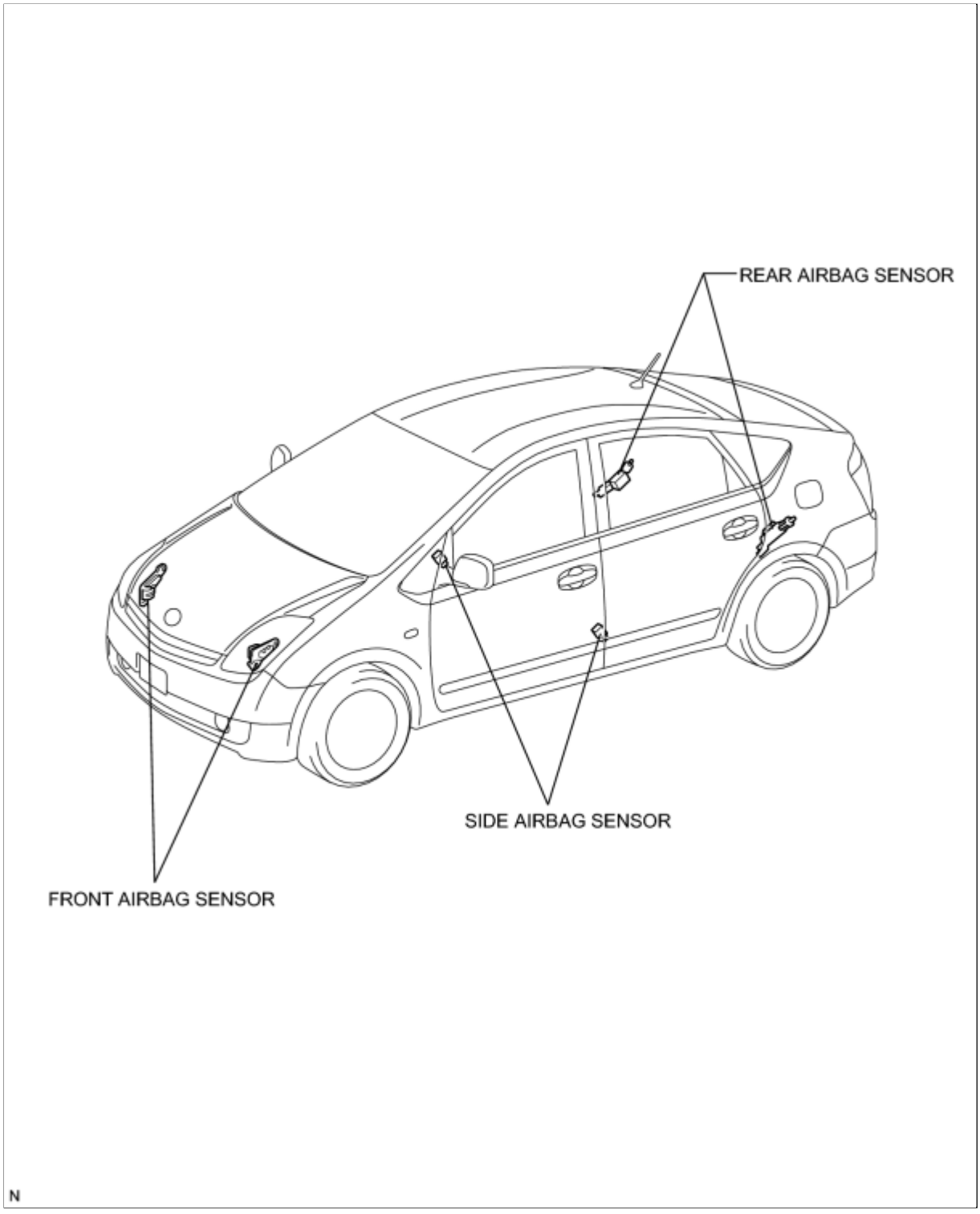
(a) Perform a diagnostic system check INFO.

17. INSPECT SRS WARNING LIGHT

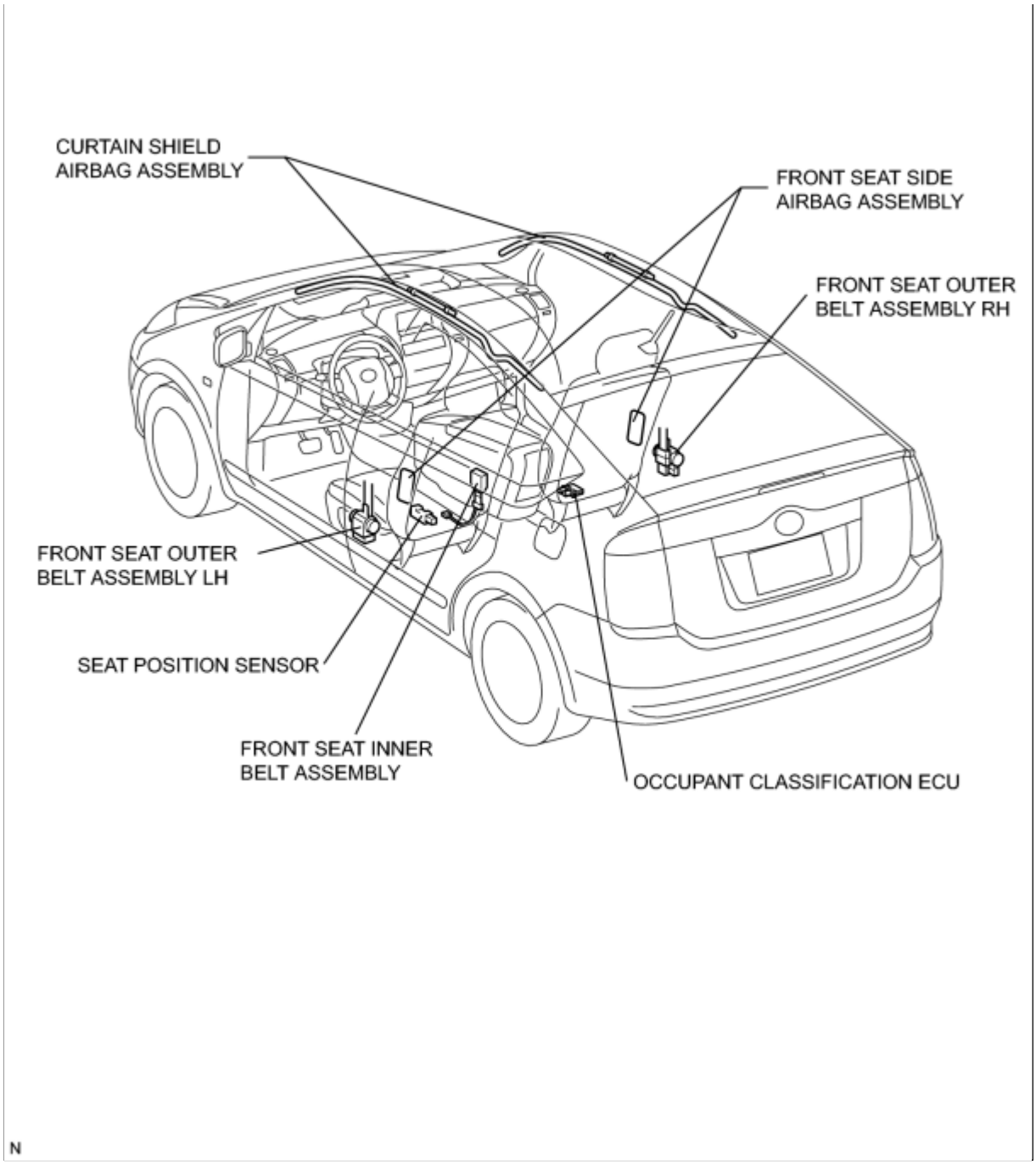
(a) Inspect the SRS warning light INFO.

## PARTS LOCATION

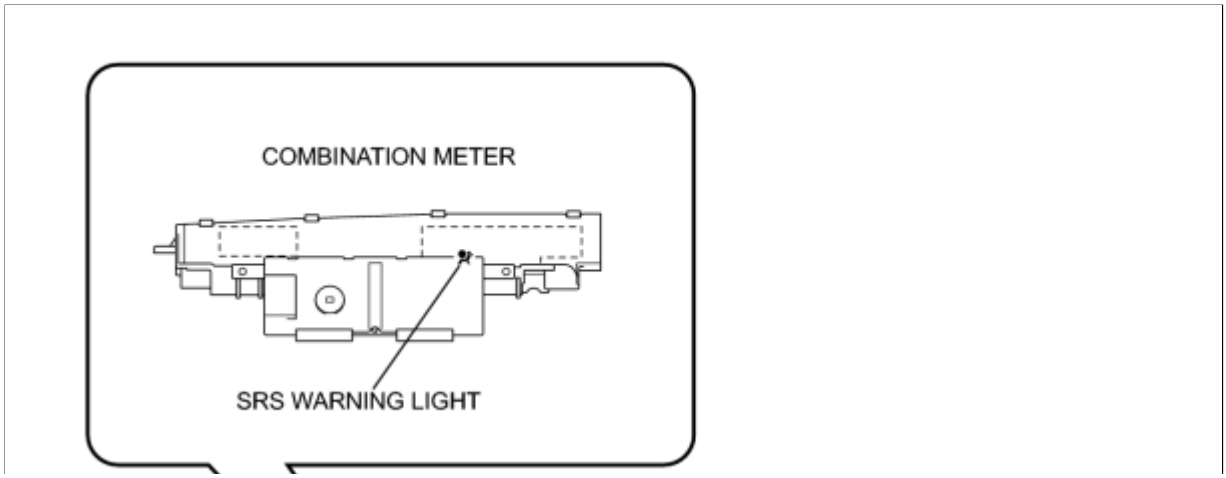
## ILLUSTRATION

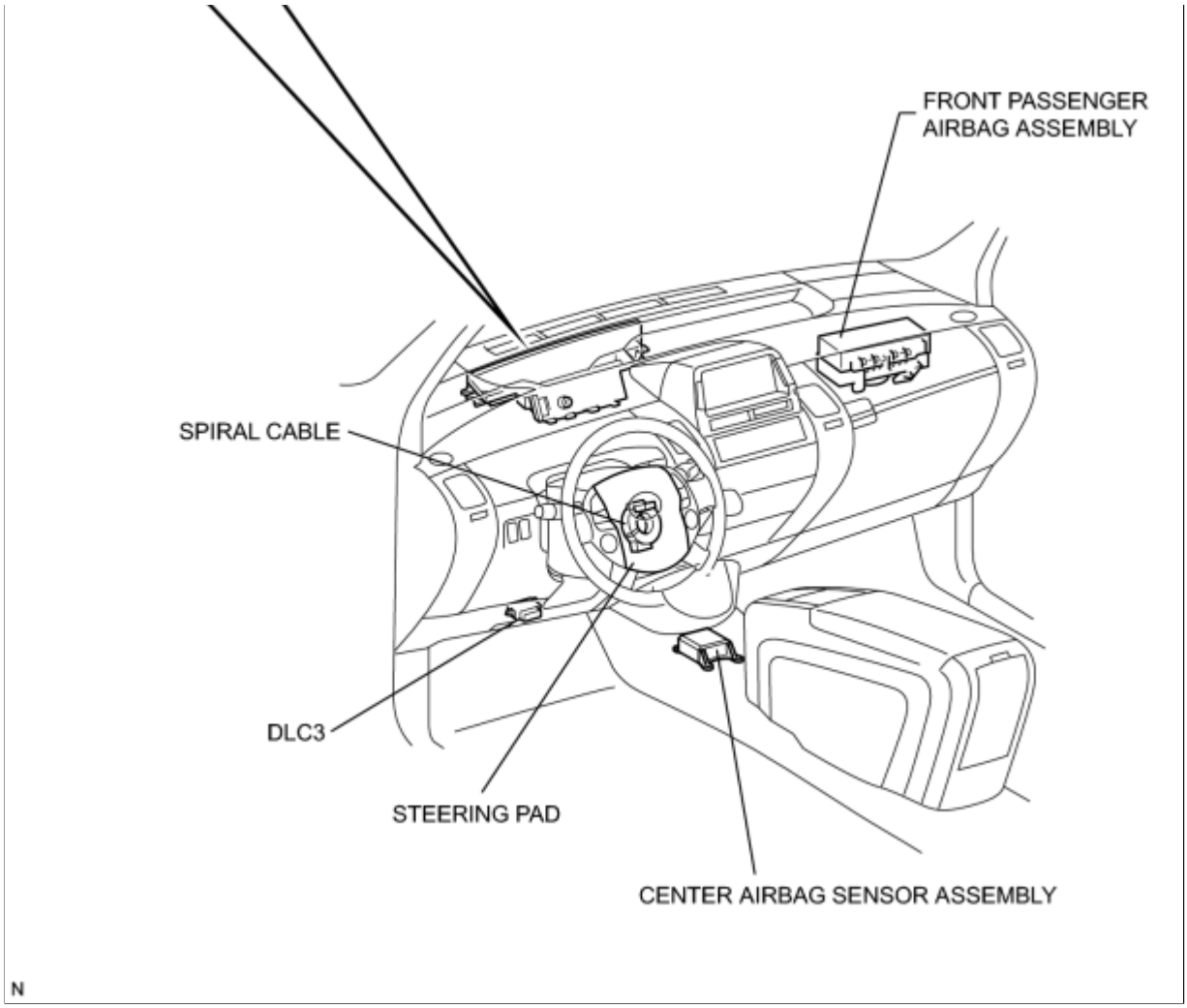



## ILLUSTRATION

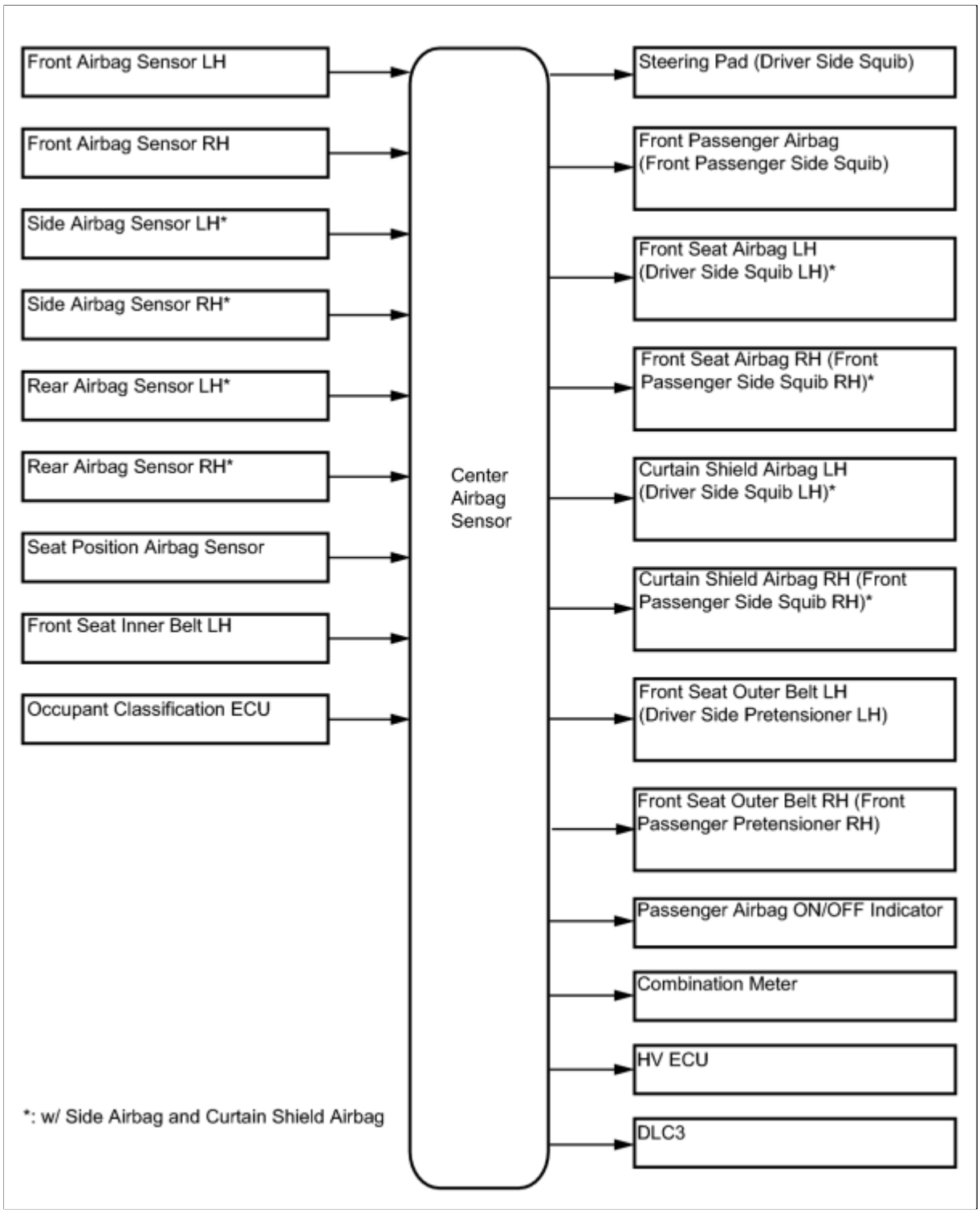



## ILLUSTRATION




FRONT PASSENGER
AIRBAG ASSEMBLY
SPIRAL CABLE
DLC3
STEERING PAD
CENTER AIRBAG SENSOR ASSEMBLY
N

# SYSTEM DIAGRAM



# PRECAUTION

**CAUTION:**

- The vehicle is equipped with a Supplemental Restraint System (SRS), which consists of a steering pad, front passenger airbag, curtain shield airbag, front seat side airbag, seat belt pretensioner, center airbag sensor, front airbag sensor, side airbag sensor, rear airbag sensor, occupant classification ECU and seat position airbag sensor. Failure to carry out service procedures in the correct sequence could cause SRS parts to unexpectedly deploy and possibly lead to serious injuries. Furthermore, if a mistake is made when service SRS parts, they may fail to operate when required. Before performing servicing (including installation/removal, inspection and replacement of parts), be sure to read the following precautions.
- Before starting work, wait at least 90 seconds after the power switch is turned OFF and after the cable of the negative (-) battery terminal is disconnected. (SRS parts are equipped with a back-up power source. If work is started within 90 seconds of turning the power switch OFF and disconnecting the cable from the negative (-) battery terminal, SRS parts may deploy.)

  (The SRS is equipped with a back-up power source, so if work is started within 90 seconds of disconnecting the negative (-) terminal cable of the battery, the SRS may be deployed).
- Do not expose the steering pad, front passenger airbag, center airbag sensor, front airbag sensor, front seat inner belt, seat position airbag sensor, occupant classification ECU, front seat airbag, side airbag sensor, curtain shield airbag, rear seat airbag, rear airbag sensor, front seat outer belt or rear seat outer belt directly to hot air or flames.

**NOTICE:**

- Malfunction symptoms of SRS parts are difficult to confirm. DTCs are the most important source of information when troubleshooting. During troubleshooting, always confirm DTCs before disconnecting the cable from the negative (-) battery terminal.
- Even in the case of a minor collision when the SRS does not deploy, the steering pad, front passenger airbag, center airbag sensor, front airbag sensor, front seat inner belt, seat position airbag sensor, occupant classification ECU, front seat side airbag, side airbag sensor, curtain shield airbag, rear seat airbag, rear airbag sensor, front seat outer belt or rear seat outer belt should be inspected.
- Before repair work, remove airbag sensors as necessary if any kind of impact is likely to occur to an airbag sensor during the operation.
- Never use SRS parts from another vehicle. When replacing SRS parts, replace them with new ones.
- Never disassemble or attempt to repair SRS parts.
- If an SRS part has been dropped, or if there are any cracks, dents or other defects in the case, bracket or connector, replace the SRS part with a new one.
- Use an ohmmeter/voltmeter with high impedance (10 kΩ/V minimum) for troubleshooting the electrical circuits.
- Information labels are attached to the periphery of SRS parts. Follow the cautions and instructions on the labels.
- After work on SRS parts is completed, perform the SRS warning light check INFO .
- When the cable is disconnected from the negative (-) battery terminal, the memory settings of each system will be cleared. Because of this, be sure to write down the settings of each system before starting work. When work is finished, reset the settings of each system as before. Never use a back-up power supply from outside the vehicle to avoid erasing the memory in a system.
- If the vehicle is equipped with a mobile communication system, refer to the precaution in the INTRODUCTION section INFO .
- When disconnecting the cable from the negative (-) battery terminal, initialize the following system(s) after the cable is reconnected.

| SYSTEM NAME | SEE PROCEDURE |
|---|---|
| Power Window Control System | INFO |

**HINT:**

**In the airbag system, the center airbag sensor, front airbag sensor LH and RH, side airbag sensor LH and RH, rear airbag sensor LH and RH are collectively referred to as the airbag sensors.**

## 1. HANDLING PRECAUTIONS FOR AIRBAG SENSORS

(a) Before starting the following operations, wait for at least 90 seconds after disconnecting the negative (-) terminal cable from the battery:

(1) Replacement of the airbag sensors.

(2) Adjustment of the front/rear doors of the vehicle equipped with the side airbag and curtain shield airbag (fitting adjustment).

(b) When connecting or disconnecting the airbag sensor connectors, ensure that each sensor is installed in the vehicle.

(c) Do not use the airbag sensors which has been dropped during the operation or transportation.

(d) Do not disassemble the airbag sensors.

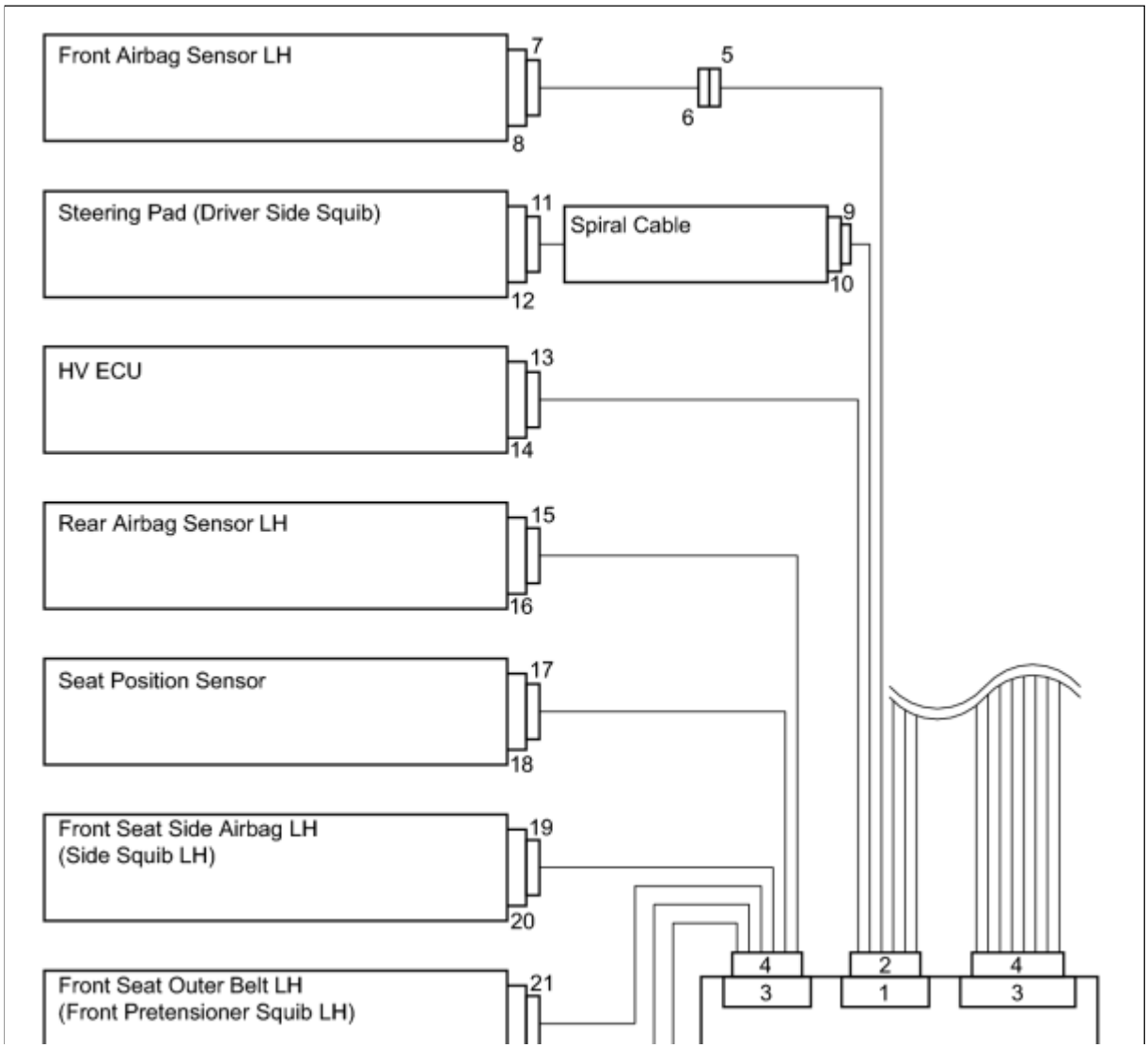
## 2. INSPECTION PROCEDURE FOR VEHICLE INVOLVED IN ACCIDENT

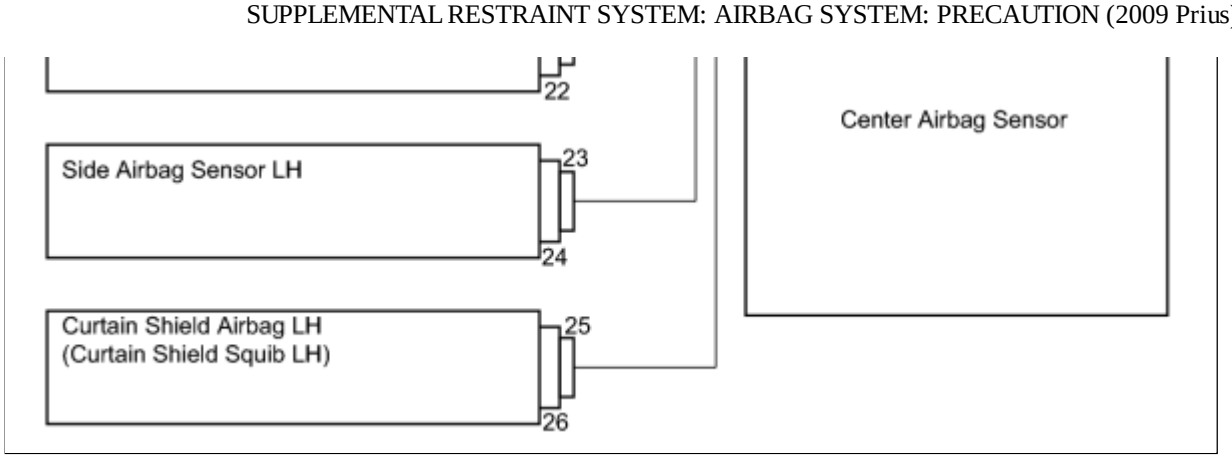
(a) When the airbag has not deployed, confirm the DTCs by checking the SRS warning light. If there is any malfunction in the SRS airbag system, perform troubleshooting.

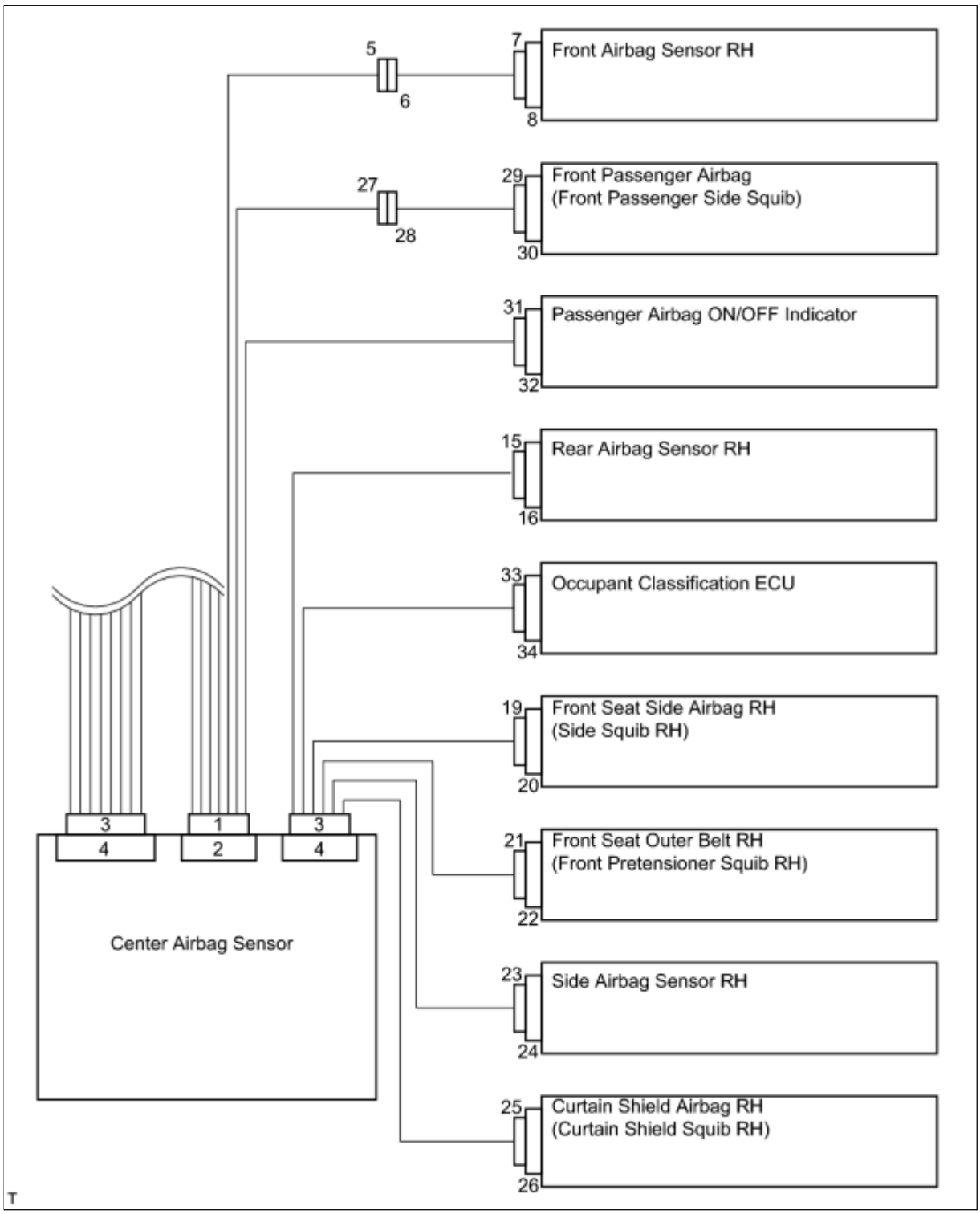
(b) When any of the airbags have deployed, replace the airbag sensors and check the installation condition.

## 3. SRS CONNECTORS

(a) SRS connectors are located as shown in the following illustration.

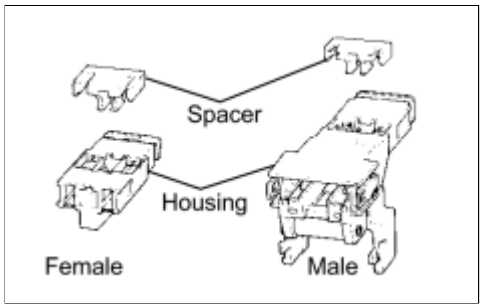



22
Center Airbag Sensor
Side Airbag Sensor LH
23
24
Curtain Shield Airbag LH
(Curtain Shield Squib LH)
25
26


5
6
7
8
Front Airbag Sensor RH
27
28
29
30
Front Passenger Airbag
(Front Passenger Side Squib)
31
32
Passenger Airbag ON/OFF Indicator
15
16
Rear Airbag Sensor RH
33
34
Occupant Classification ECU
19
20
Front Seat Side Airbag RH
(Side Squib RH)
3
4
1
2
3
4
21
22
Front Seat Outer Belt RH
(Front Pretensioner Squib RH)
Center Airbag Sensor
23
24
Side Airbag Sensor RH
25
26
Curtain Shield Airbag RH
(Curtain Shield Squib RH)
T

| NO. | ITEM | APPLICATION |
|---|---|---|
| (1) | Terminal Twin-Lock Mechanism | Connectors 5, 6, 7, 9, 10, 15, 19, 20, 23, 27, 28 |
| (2) | Activation Prevention Mechanism | Connectors 2, 4, 10, 12, 20, 22, 26, 28, 30 |
| (3) | Half Connection Prevention Mechanism | Connectors 6, 7, 9, 15, 19, 23, 27 |
| (4) | Connector Lock Mechanism (1) | Connectors 11, 21, 25, 29 |
| (5) | Connector Lock Mechanism (2) | Connectors 2, 4 |
| (6) | Improper Connection Prevention Lock Mechanism | Connectors 1, 3 |

(b) All connectors in the SRS, except the seat position airbag sensor connector, are colored yellow to distinguish them from other connectors. These connectors have special functions, and are specially designed for the SRS. All SRS connectors use durable gold-plated terminals, and are placed in the locations shown above to ensure high reliability.

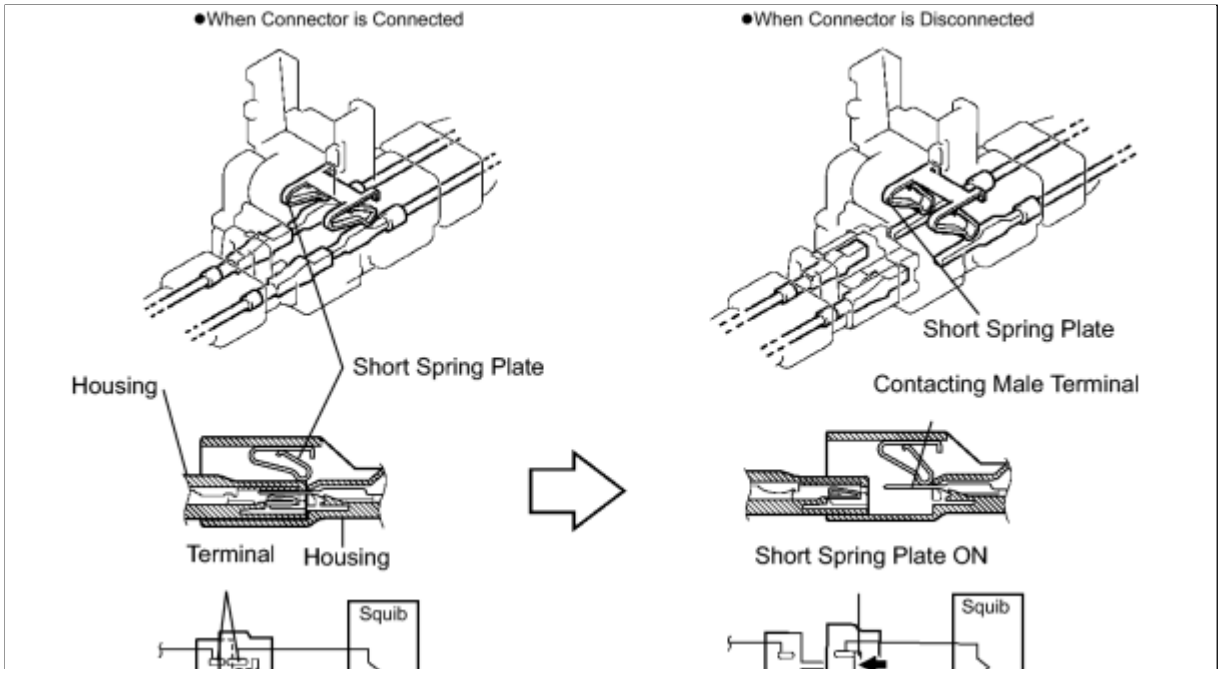


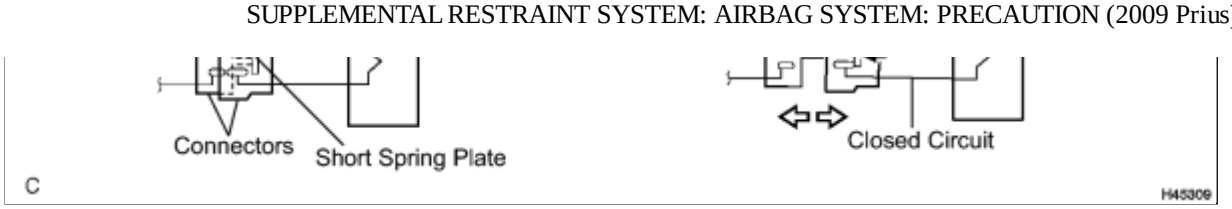

(1) Terminal twin-lock mechanism:

All connectors with a terminal twin-lock mechanism have a two-piece component consisting of a housing and a spacer. This design enables the terminal to be locked securely by two locking devices (the retainer and the lance) to prevent terminals from coming out.

(2) Activation prevention mechanism:

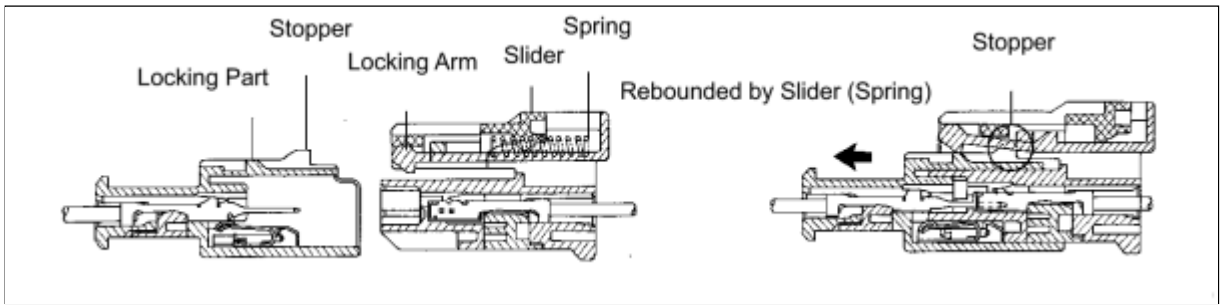
All connectors with an activation prevention mechanism contain a short spring plate. When these connectors are disconnected, the short spring plate creates a short circuit by automatically connecting the positive (+) and negative (-) terminals of the squib.





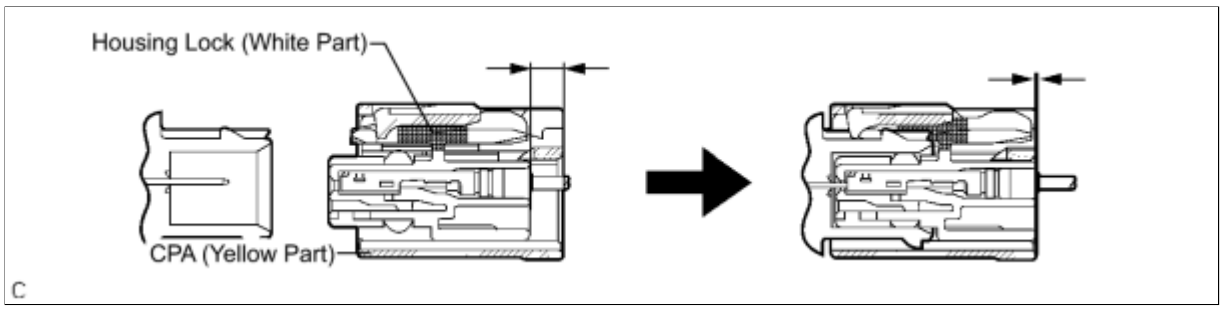

(3) Half connection prevention mechanism:

If the connector is not completely connected, the connector is disconnected due to the spring operation so that no continuity exists.



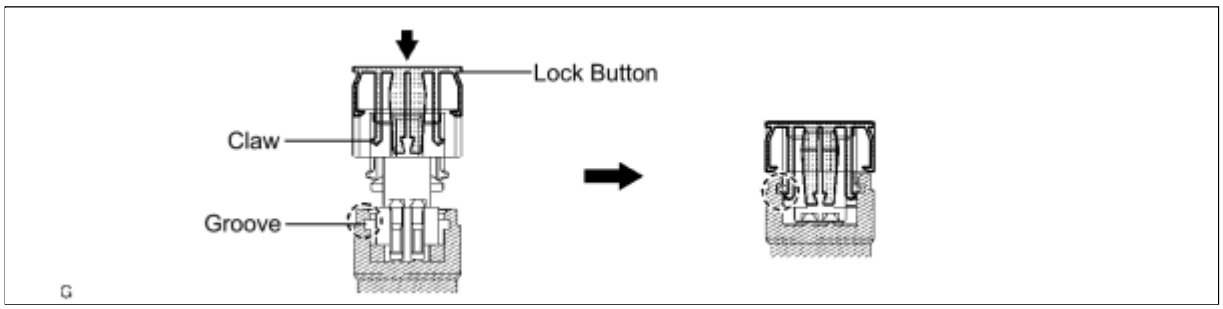

(4) Connector position assurance mechanism:

Only when the housing lock (white part) is completely engaged, the CPA (yellow part) slides, which completes the connector engagement.



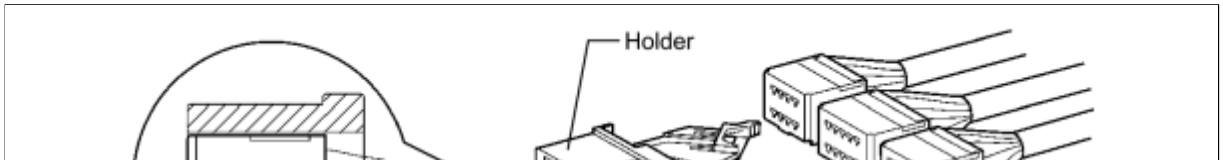

(5) Connector lock mechanism (1):

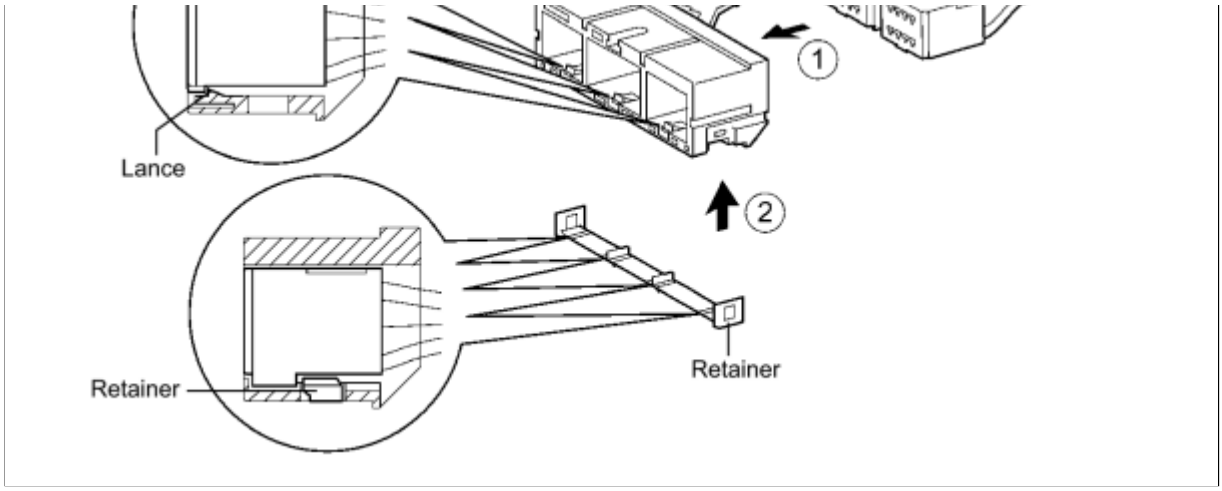
Locking the connector lock button connects the connector securely.




(6) Connector lock mechanism (2):

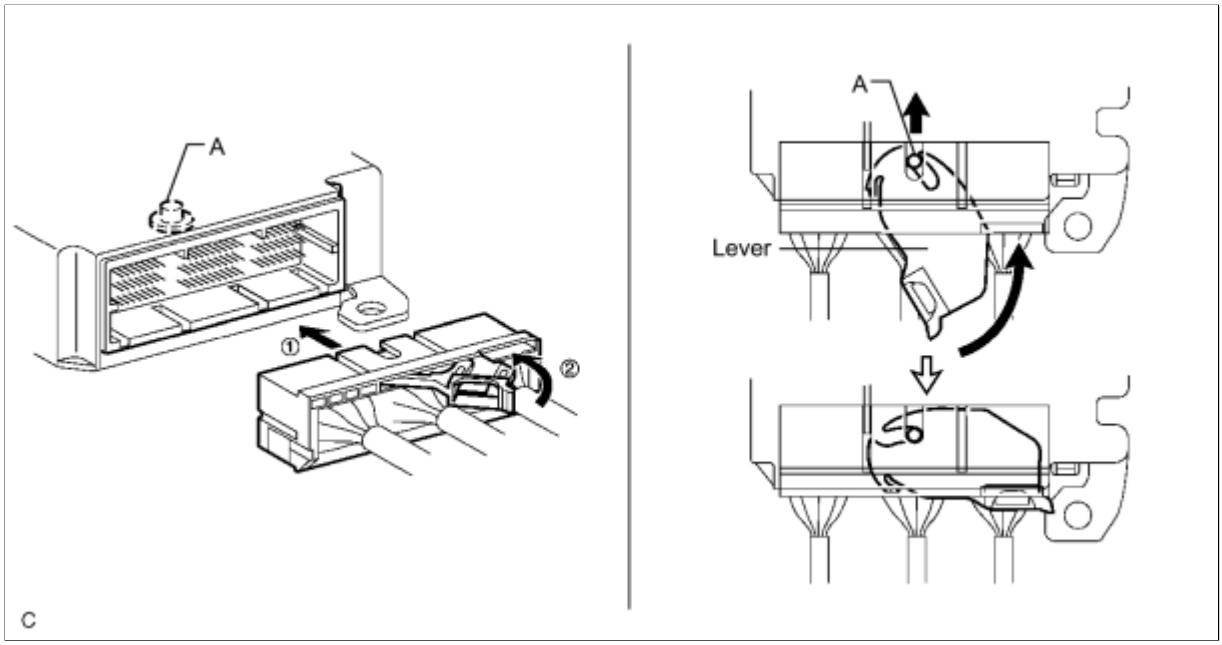
Both the primary lock with holder lances and the secondary lock with retainer prevent the connectors from being disconnected.






(7) Improper connection prevention lock mechanism:

When connecting the holder, the lever is pushed into the end by rotating around the A axis to lock the holder securely.



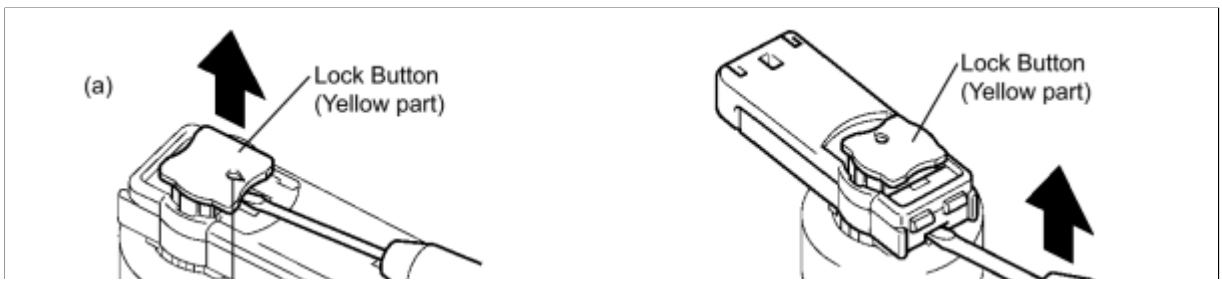

## 4. DISCONNECTION OF CONNECTORS FOR STEERING PAD, FRONT PASSENGER AIRBAG (SQUIB SIDE), CURTAIN SHIELD AIRBAG AND FRONT SEAT OUTER BELT

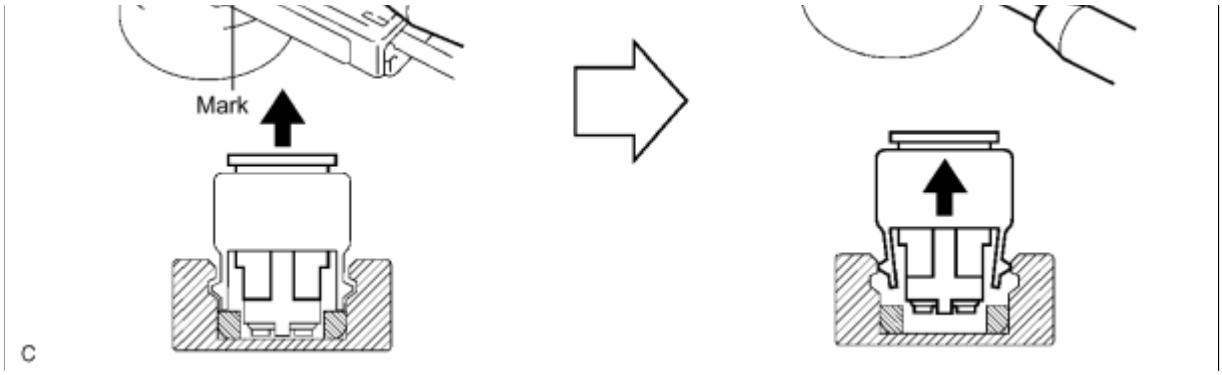
**HINT:**

**Tape the screwdriver tip before use.**

(a) Release the lock button (yellow part) of the connector using a screwdriver.

(b) Insert the screwdriver tip between the connector and the base, and then raise the connector.

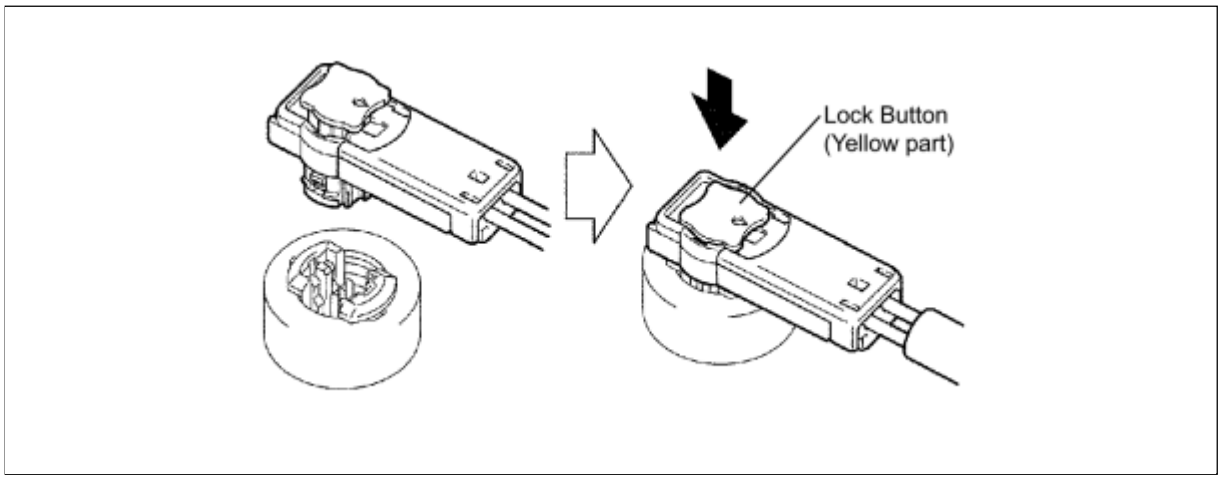





**5. CONNECTION OF CONNECTORS FOR STEERING PAD, FRONT PASSENGER AIRBAG (SQUIB SIDE), CURTAIN SHIELD AIRBAG AND FRONT SEAT OUTER BELT**

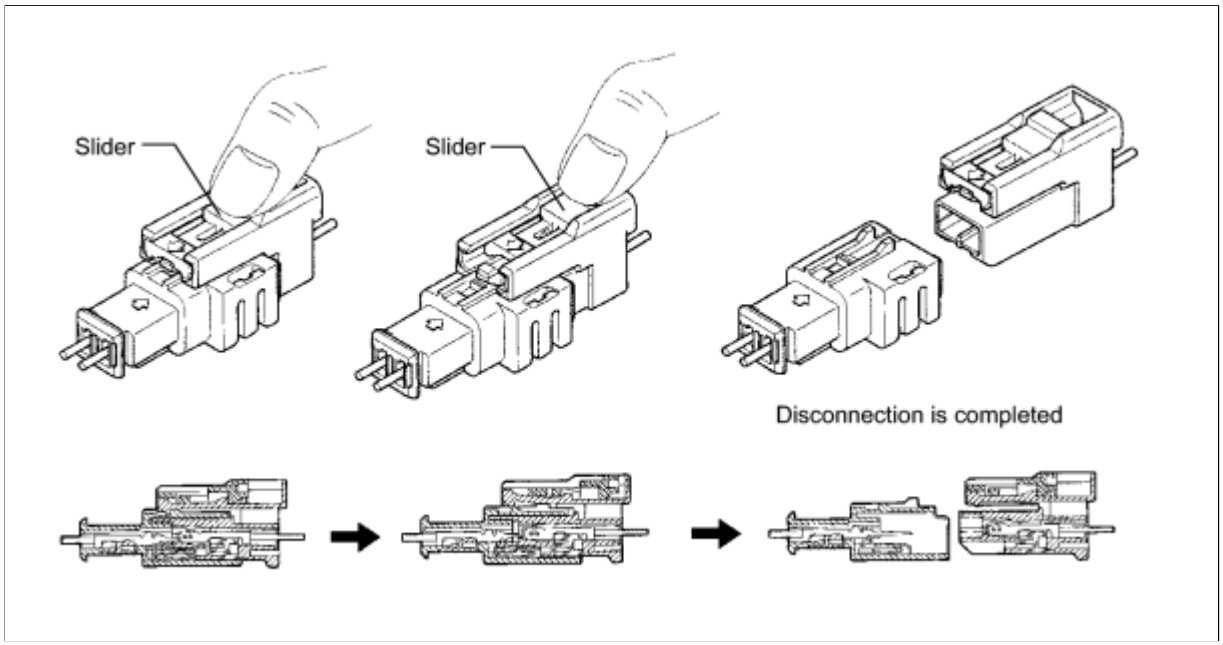
(a) Connect the connector.

(b) Push down securely on the lock button (yellow part) of the connector. When locking, a click sound can be heard.




**6. DISCONNECTION OF CONNECTOR FOR FRONT PASSENGER AIRBAG (INSTRUMENT PANEL WIRE SIDE)**

(a) Place a finger on the slider, slide the slider to release the lock, and then disconnect the connector.

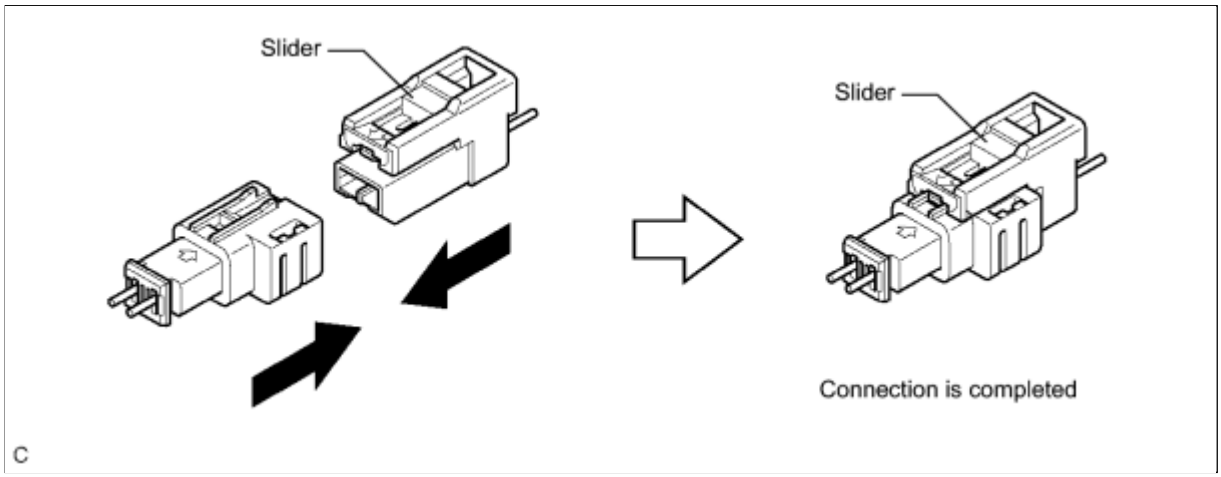


### 7. CONNECTION OF CONNECTOR FOR FRONT PASSENGER AIRBAG (INSTRUMENT PANEL WIRE SIDE)

(a) Connect the connector as shown in the illustration. When locking, make sure that the slider returns to its original position and a click sound can be heard.

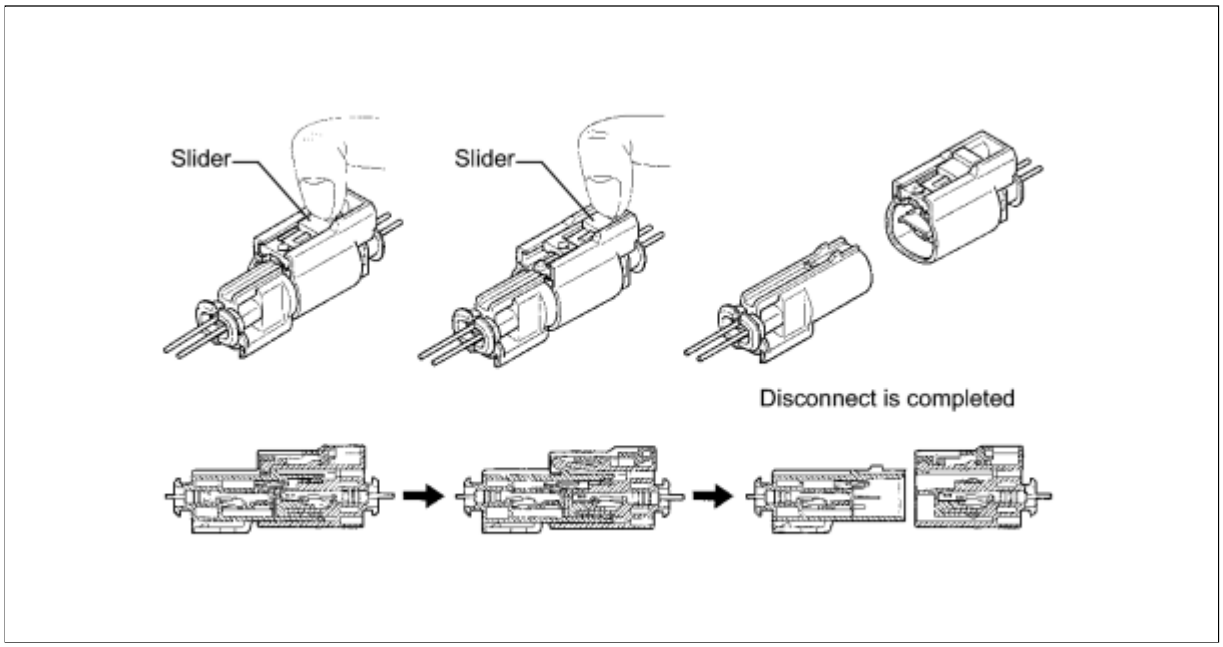
**HINT:**

**When connecting, the slider will slide. Be sure not to touch the slider while connecting, as it may result in an insecure fit.**




### 8. DISCONNECTION OF CONNECTORS FOR FRONT SEAT AIRBAG

(a) Place a finger on the slider, slide the slider to release the lock, and then disconnect the connector.

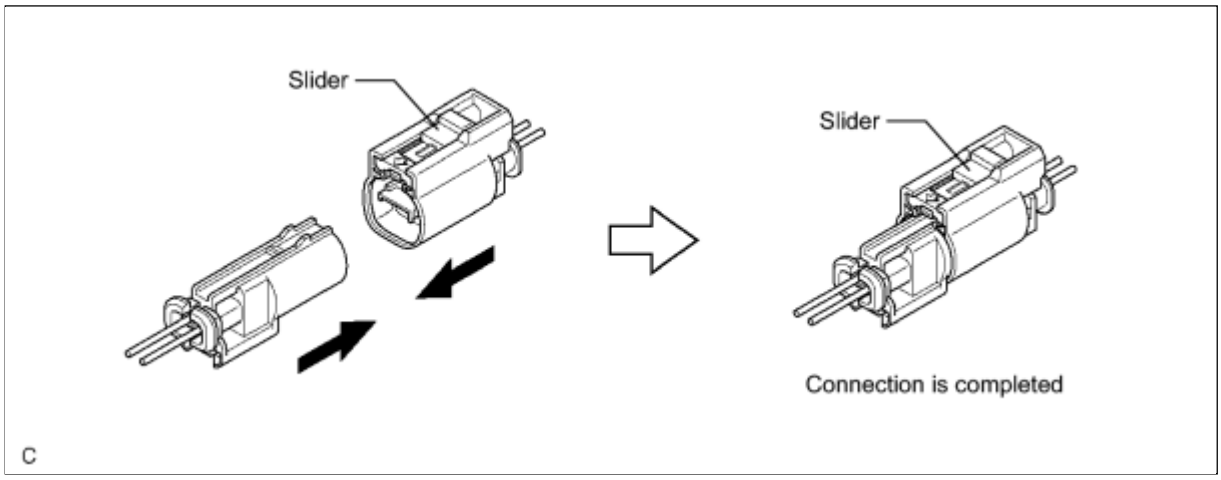



### 9. CONNECTION OF CONNECTORS FOR FRONT SEAT AIRBAG

(a) Connect the connector as shown in the illustration. When locking, make sure that the slider returns to its original position and a click sound can be heard.

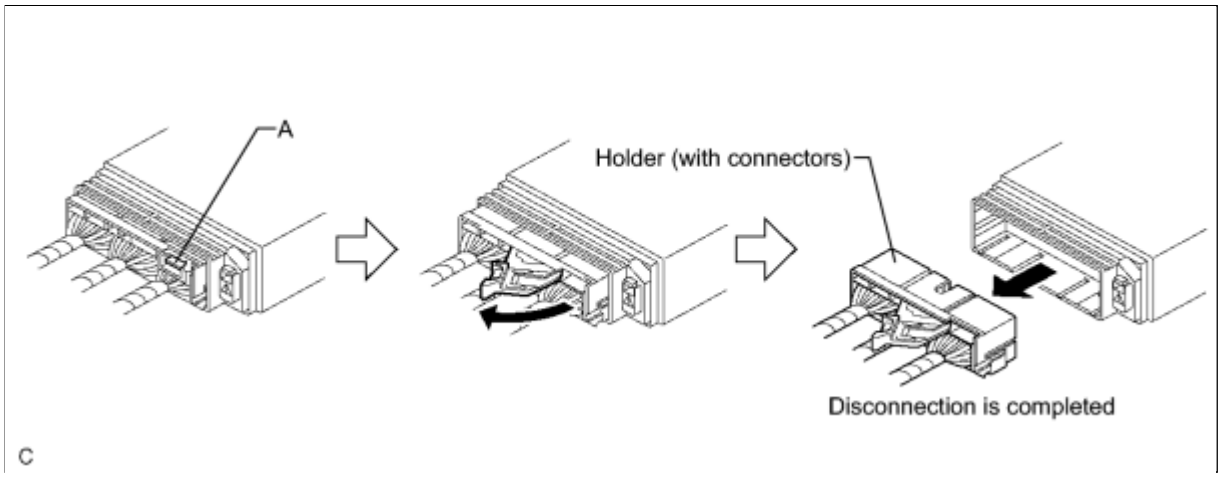
**HINT:**

**When connecting, the slider will slide. Be sure not to touch the slider while connecting, as it may result in an insecure fit.**




**10. DISCONNECTION OF CONNECTOR FOR CENTER AIRBAG SENSOR**

(a) Pull the lever by pushing part A as shown in the illustration and disconnect the holder (with connectors).

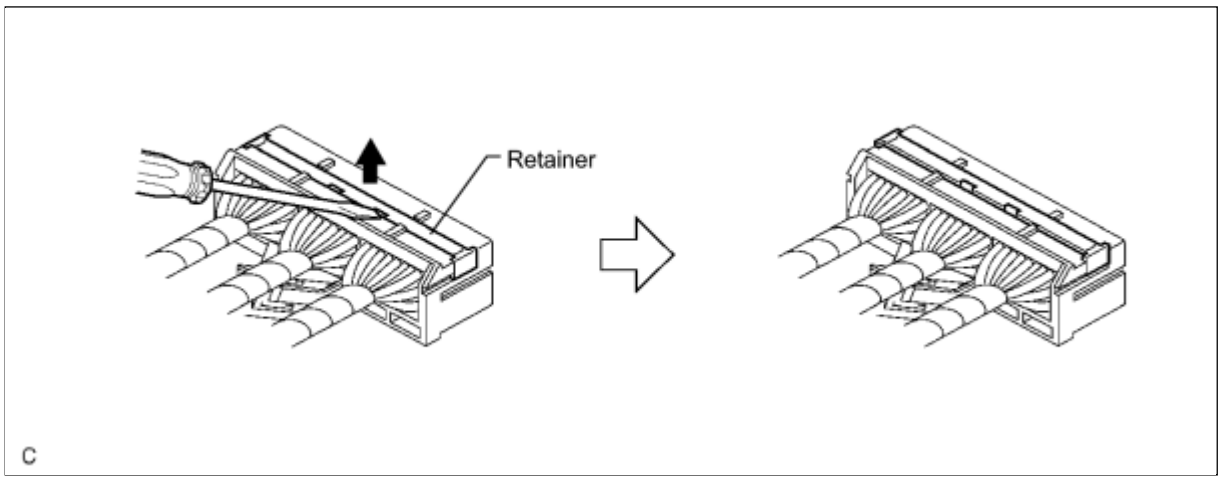



**HINT:**

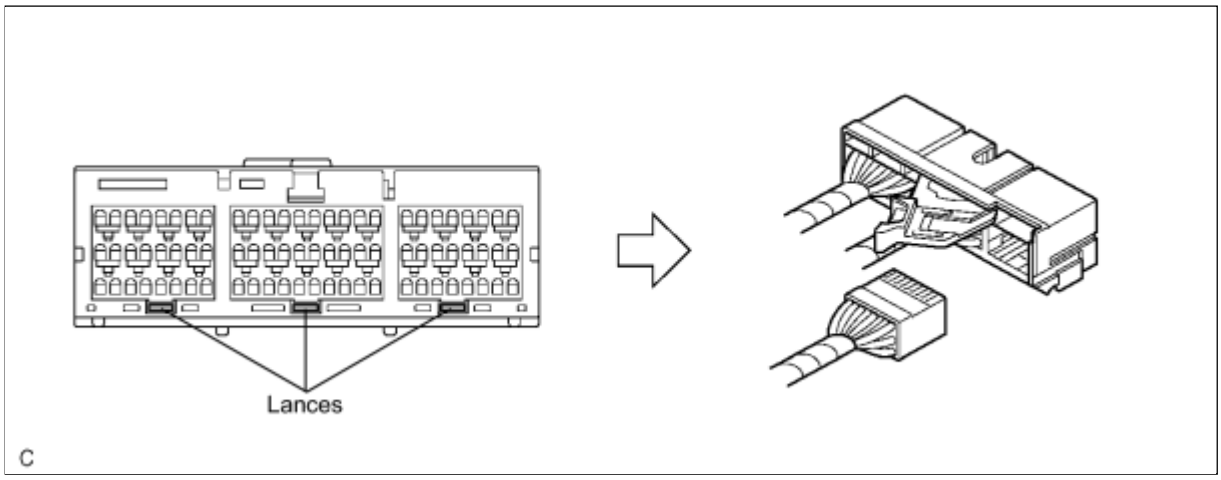
**Perform the following procedures when replacing the holder.**

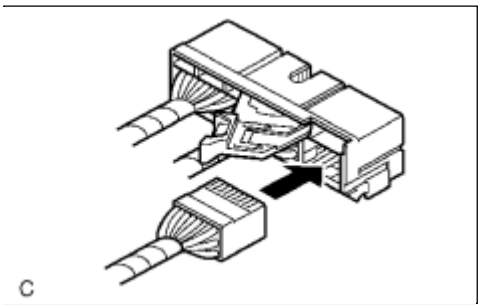
(b) Remove the holder.

(1) Using a screwdriver, unlock the retainer.



(2) Release the fitting lance and remove the holder.




(c) Install the holder.

(1) Install the connectors to the holder. When locking, a click sound can be heard.

**HINT:**

**The retainer is locked when the holder is connected.**

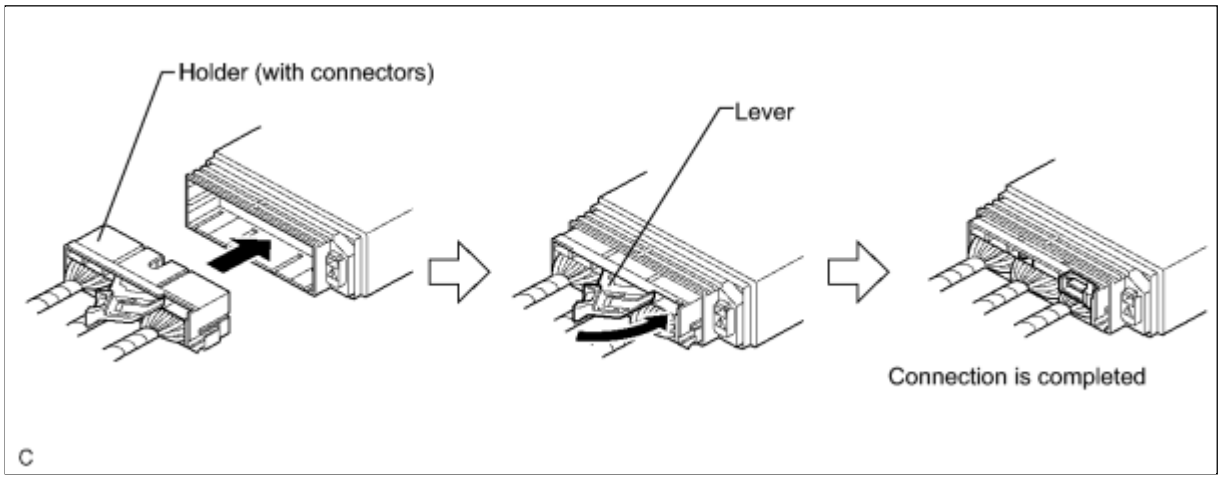
### 11. CONNECTION OF CONNECTOR FOR CENTER AIRBAG SENSOR

(a) Firmly insert the holder (with connectors) into the center airbag sensor until it cannot be pushed any further.

(b) Push the lever to connect the holder (with connectors). When locking, a click sound can be heard.

**HINT:**

**The holder slides in to the center airbag sensor when it is being connected. Be sure not to hold the holder while connecting, as it may result in an insecure fit.**



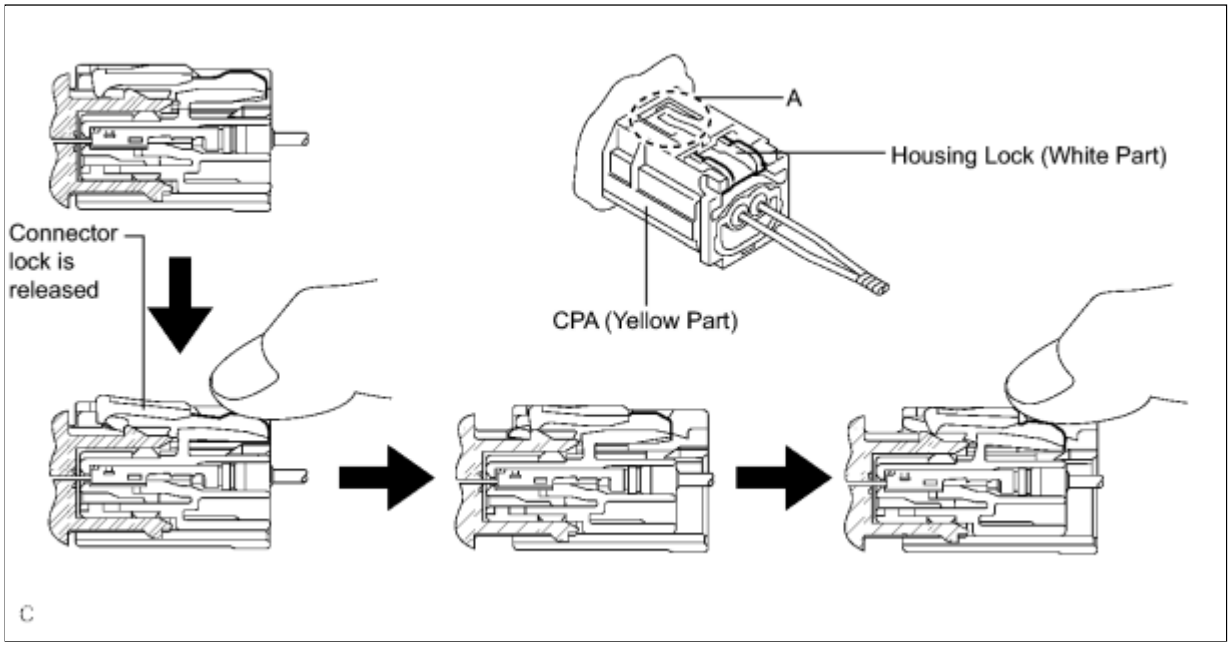

### 12. DISCONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

(a) Push down the housing lock (white part) and slide the CPA (yellow part). At this time, the connector cannot be disconnected yet.

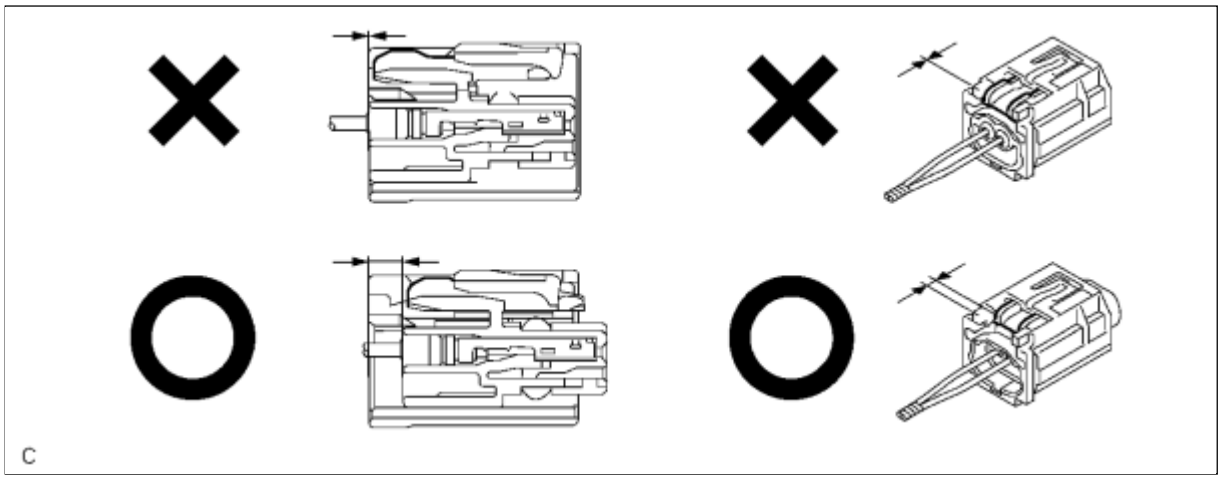
(b) Push down the housing lock (white part) again and disconnect the connector.

**HINT:**

**Do not push down the A part shown in the illustration when disconnecting.**

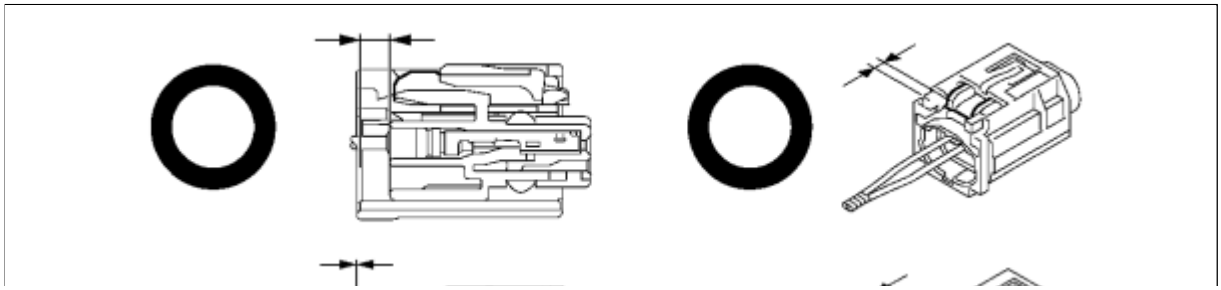



(c) After disconnecting the connector, check that the position of the housing lock (white part) is as shown in the illustration.




### 13. CONNECTION OF CONNECTOR FOR FRONT AIRBAG SENSOR

(a) Before connecting the connectors, check that the position of the housing lock (white part) is as shown in the illustration.

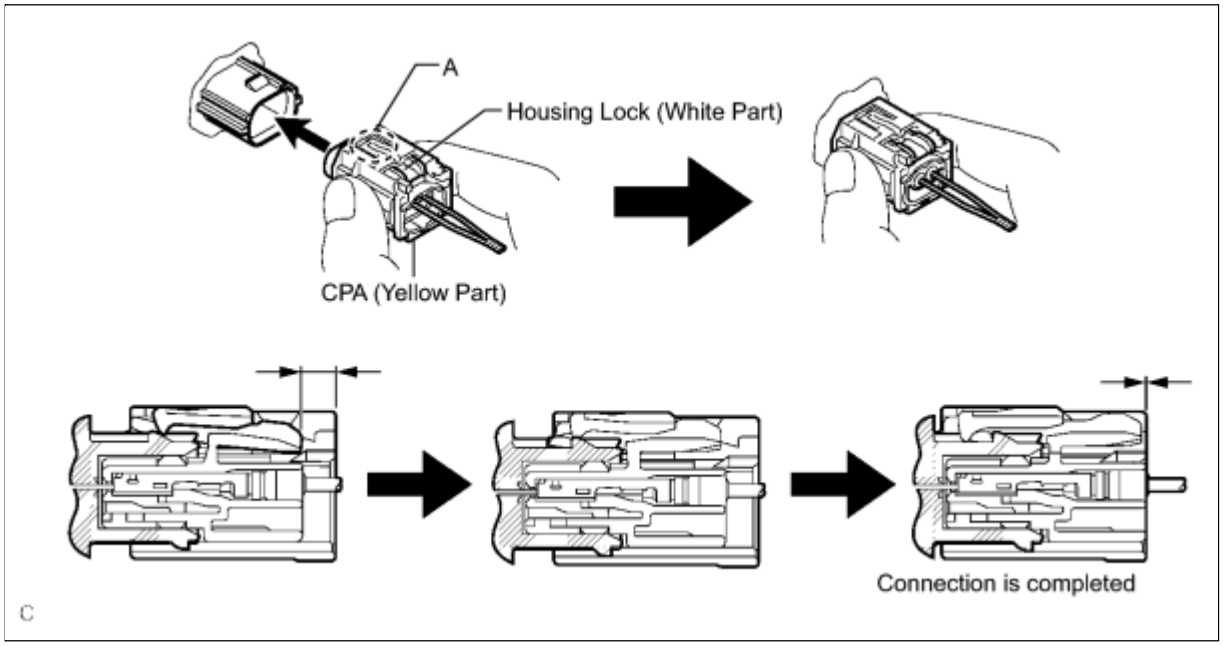




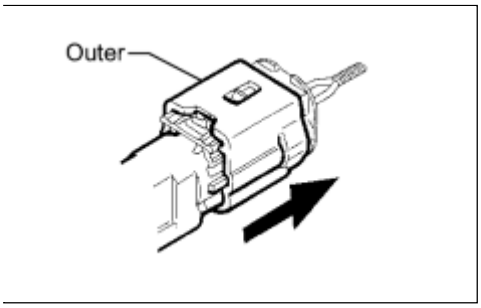
(b) Be sure to engage the connectors until they are locked. When locking, make sure that a click sound can be heard.

**HINT:**

**When connecting them, the housing lock (white part) slides. Be sure not to hold the housing lock (white part) and part A, as it may result in an insecure fit.**




### 14. DISCONNECTION OF CONNECTORS FOR SIDE AIRBAG SENSOR AND REAR AIRBAG SENSOR

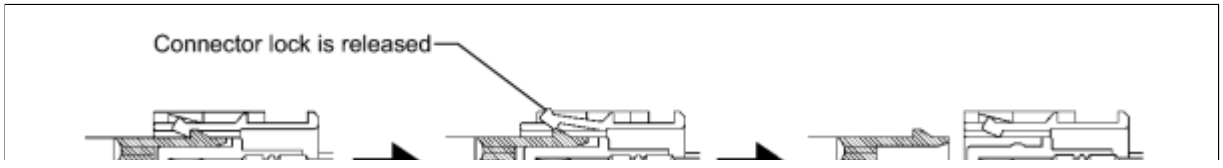


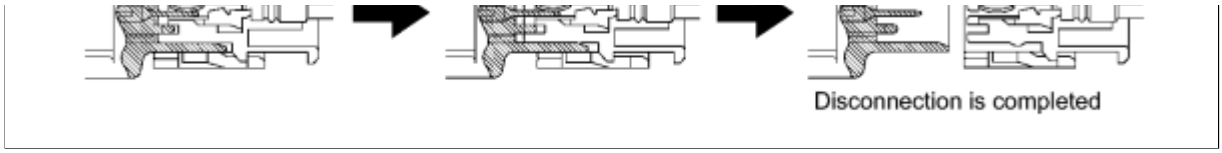

(a) While holding both the sides of the outer connector locking sleeve, slide the outer in the direction shown by the arrow.

(b) When the connector lock is released, the connectors are disconnected.

**HINT:**

**Be sure to hold both outer flank sides. Holding the top and bottom will make disconnection difficult.**



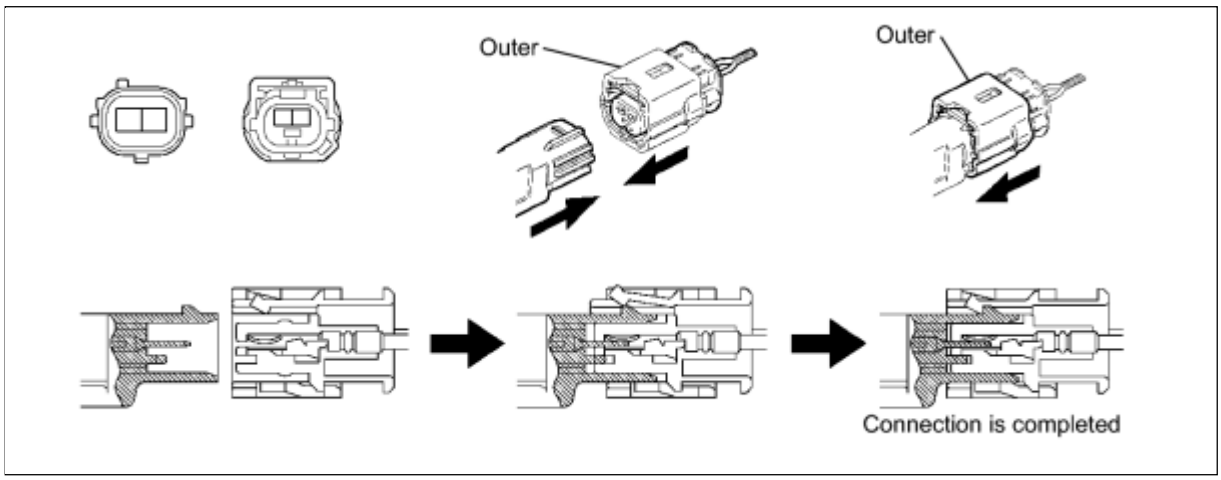



### 15. CONNECTION OF CONNECTORS FOR SIDE AIRBAG SENSOR AND REAR AIRBAG SENSOR

(a) Connect the connector as shown in the illustration When locking, make sure that the outer returns to its original position and a click sound can be heard.

**HINT:**

**When connecting, the outer will slide. Be sure not to hold the outer while connecting, as it may result in an insecure fit.**



# SYSTEM DESCRIPTION

## 1. SRS AIRBAG SYSTEM OUTLINE

(a) FRONTAL COLLISION

(1) The driver and front passenger airbag are designed to supplement seat belts in the event of a front collision in order to help reduce shock to the head and chest of the driver and front passenger.

(2) Frontal collisions are detected by the center airbag sensor and two front airbag sensors. The driver and front passenger airbag and the seat belt pretensioner then operate simultaneously.

(3) Electrical deceleration sensors are built into the two front airbag sensors in the engine compartment in order to detect the severity of the impact during the initial stage of the collision. The deployment of the driver and front passenger airbags are controlled in two stages according to the severity of the impact.

(b) SIDE COLLISION

(1) The front seat airbag and curtain shield airbag are designed to help reduce shock to the driver, front passenger and rear outer passenger. The curtain shield airbag was designed to help reduce shock to the front and rear passengers in the event of a side collision.

(2) Side collisions are detected by the side airbag sensor installed in the bottom of the center pillar and the rear airbag sensor installed in the bottom of the rear pillar. Front side collisions are detected by the side airbag sensor, causing the front seat side airbag and curtain shield airbag to deploy simultaneously. Rear side collisions are detected by the rear airbag sensor to deploy only the curtain shield airbag.

## 2. CONSTRUCTION AND OPERATION

(a) FRONT AIRBAG SENSOR

(1) The front airbag sensors are installed on the right and left side members.

(2) The deceleration sensor and safing sensor are built into the airbag sensor front and distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a frontal collision. Accordingly, the extent of the initial collision can be detected in detail.

(b) SIDE AIRBAG SENSOR

(1) The side airbag sensors are installed on the right and left center pillars.

(2) The side airbag sensor consists of the deceleration sensor, safing sensor, ignition control circuit, and diagnostic circuit. The side airbag sensor receives signals from the deceleration sensor and determines whether the front seat side airbag and curtain shield airbag should be activated, and diagnoses system malfunctions simultaneously.

(c) REAR AIRBAG SENSOR

(1) The rear airbag sensor is installed on the bottom of the right and left rear pillars respectively.

(2) The deceleration sensor and safing sensor are built into the rear airbag sensor and the distortion that is created in the sensor is converted into an electric signal based on the vehicle deceleration rate during a rear side collision.

(d) CENTER AIRBAG SENSOR

(1) General

- The center airbag sensor is installed on the center floor under the instrument panel.
- The center airbag sensor consists of the deceleration sensor, safing sensor, electrical safing sensor, ignition control circuit and diagnostic circuit.
- The center airbag sensor receives signals from the deceleration sensors and safing sensors built into the center airbag sensor and front airbag sensor.
- The center airbag sensor causes the front seat side airbag and the curtain shield airbag to deploy when receiving signals from the deceleration sensor and the safing sensor built into the side airbag sensor.
- The center airbag sensor receives signals from the deceleration sensors and the electrical safing sensors built into the center airbag sensor and the rear airbag sensor, and determines whether or

sensors built into the center airbag sensor and the rear airbag sensor, and determines whether or not the curtain shield airbag should be activated, and then diagnoses system malfunctions.

- The center airbag sensor can be check using check mode, which can detect and output DTCs. If the malfunction does not recur during troubleshooting, joggling each connector or driving on various type of roads with the center airbag sensor in check mode as a simulation method makes it possible to obtain more accurate information.

(2) Deceleration sensor and ignition control circuit

- The deceleration sensor is built into the center airbag sensor, and the distortion created based on the deceleration of the vehicle during a frontal or rear side collision is converted into an electric signal.
- The ignition control circuit performs calculations based on the signal output from the deceleration sensors of the center airbag sensor and front airbag sensor. If the calculated values are greater than the specified values, the airbag deploy.

(3) Safing sensor

- The safing sensor is built into the center airbag sensor. During a frontal collision, the sensor turns on and outputs an ON signal to the center airbag sensor if a deceleration rate greater than the specified value is applied to the safing sensor.

(4) Electronic safing sensor

- The electronic safing sensor is built into the center airbag sensor. During a rear side collision, the sensor turns on and outputs an ON signal to the center airbag sensor if a deceleration rate greater than the specified value is applied to the electronic safing sensor.

(5) Back-up power source

- The back-up power source consists of a condenser and a DC-DC converter. When the power system does not function during a collision, the condenser discharges and supplies electric power to the system. The DC-DC converter operates as a boosting transformer when the battery voltage falls below a predetermined level.

(6) Diagnostic circuit

- This circuit constantly diagnoses the system malfunctions. When a malfunction is detected, it lights up the SRS warning light on the combination meter to inform the driver.

(7) Memory circuit

- When a malfunction is detected in the diagnostic circuit, it is coded and stored in the memory circuit.

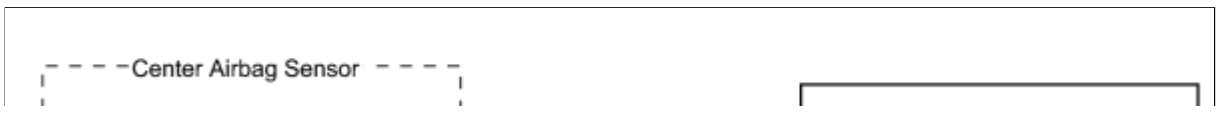
(e) SRS WARNING LIGHT

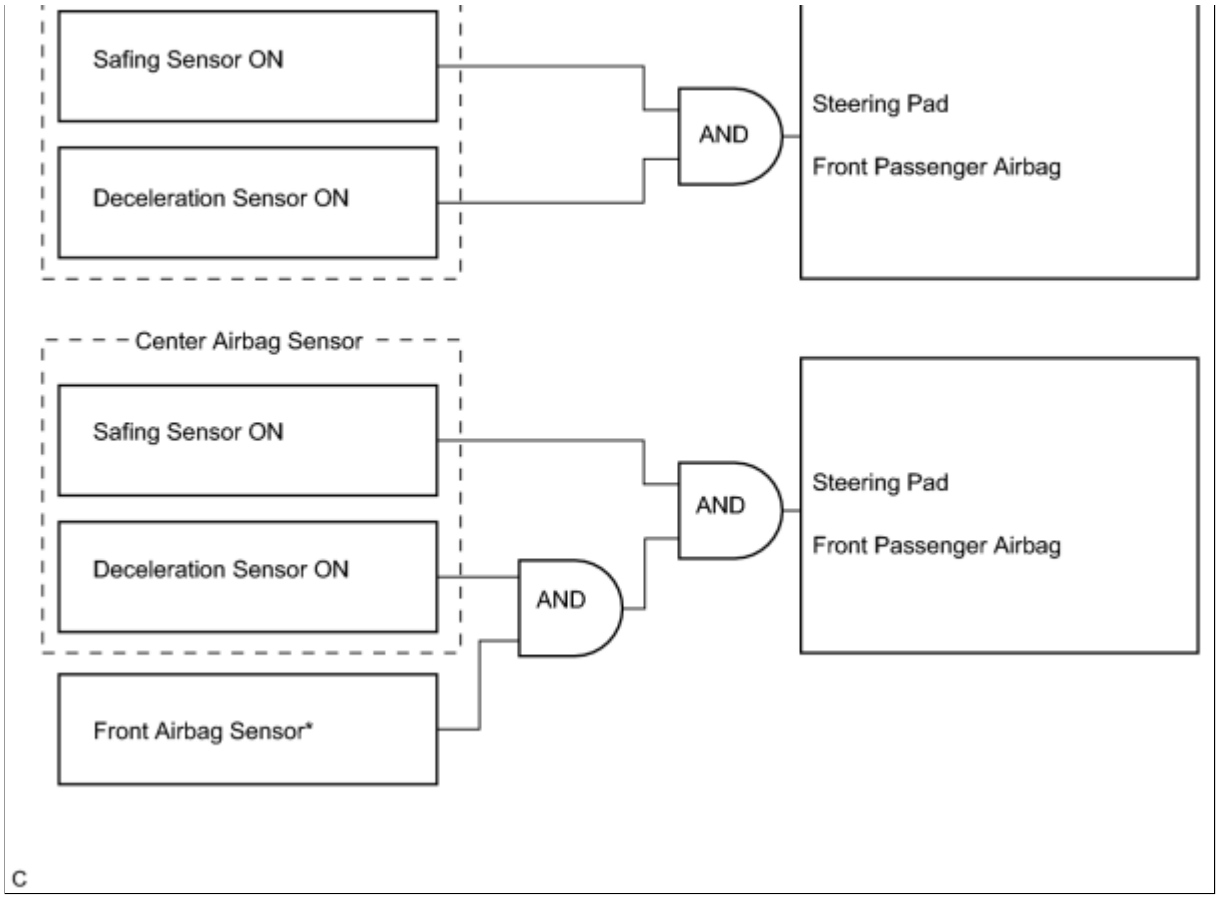
(1) The SRS warning light is located on the combination meter. The SRS warning light informs the driver of detected malfunctions in the diagnostic circuit of the center airbag sensor or the SRS airbag system. Under normal operating conditions when the power switch is turned on, the SRS warning light comes on for approximately 6 seconds and then goes off.

### 3. DEPLOYMENT CONDITION

When the vehicle collides and the shock is greater than the specified value, the SRS is activated automatically. The center airbag sensor includes the safing sensor and deceleration sensor. The safing sensor was designed to the turned on at a smaller deceleration rate than the deceleration sensor.

(a) The center airbag sensor determines whether or not ignition is necessary based on signals from the deceleration sensor and the front airbag sensor*. If the deceleration sensor, front airbag sensor* and safing sensor turn on simultaneously, current flows to the squibs to deploy the SRS as shown in the illustration below.

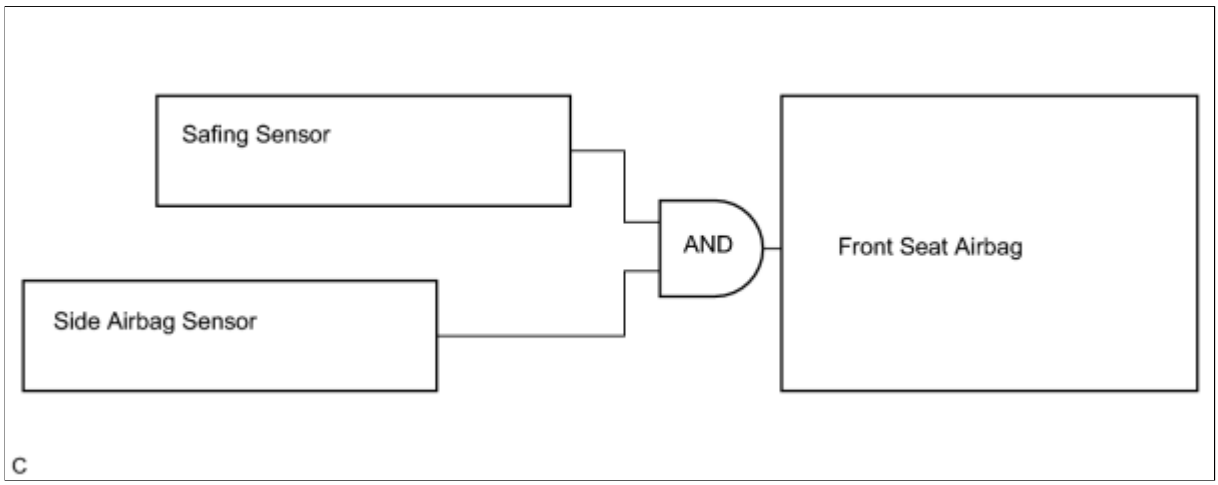




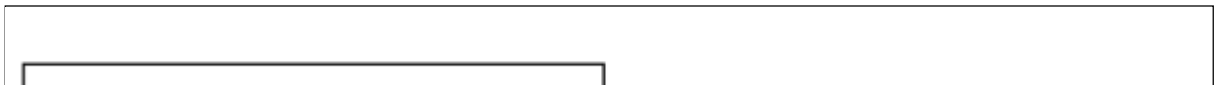

**HINT:**

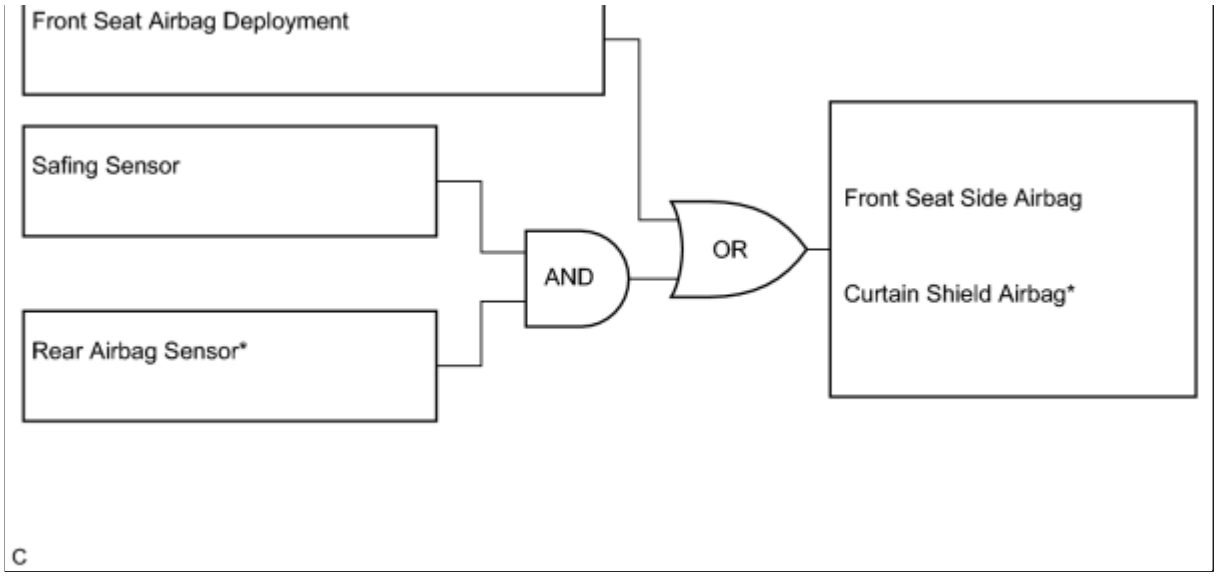
***: In case of front collision, the ignition signal could be output with the deceleration sensor ON signal even without a signal from the front airbag sensor.**

(b) The center airbag sensor determines whether or not ignition is necessary based on signals from the side airbag sensor. If the side airbag sensor and safing sensor turn on simultaneously, current flows to the squib to deploy the SRS as shown in the illustration below.




(c) The center airbag sensor determines whether or not ignition is necessary based on signals from the rear airbag sensor. If the rear airbag sensor and safing sensor turn on simultaneously, current flows to the squib to deploy the SRS as shown in the illustration below.






**HINT:**

***: If the front seat side airbag deploys, the curtain shield airbag will also deploy, regardless of whether the signal is output from the rear airbag sensor.**

# HOW TO PROCEED WITH TROUBLESHOOTING

**HINT:**

- Use these procedures to troubleshoot the airbag system.
- *: Use the Techstream.

| | |
|---|---|
| **1.** | **VEHICLE BROUGHT TO WORKSHOP** |

**NEXT**

| | |
|---|---|
| **2.** | **INSPECT BATTERY VOLTAGE** |

Standard voltage:
11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding.

**NEXT**

| | |
|---|---|
| **3.** | **CHECK MULTIPLEX COMMUNICATION SYSTEM*** |

(a) Check the DTC INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** **CHECK MULTIPLEX COMMUNICATION SYSTEM**

**A**

| | |
|---|---|
| **4.** | **CHECK CAN COMMUNICATION SYSTEM*** |

| | |
|---|---|
| 4. | **CHECK CAN COMMUNICATION SYSTEM*** |

(a) Check the DTC INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** ▶ **CHECK CAN COMMUNICATION CIRCUIT**

**A** ▼

| | |
|---|---|
| 5. | **WARNING LIGHT CHECK** |

**NEXT** ▼

| | |
|---|---|
| 6. | **CHECK DTC (Present and Past DTCs)*** |

(a) Check the DTC INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B** ▶ **PROBLEM SYMPTOMS TABLE**

**A** ▼

| | |
|---|---|
| 7. | **DTC CHART** |

**NEXT**

| | |
|---|---|
| **8.** | **CIRCUIT INSPECTION** |

**NEXT**

| | |
|---|---|
| **9.** | **REPAIR** |

**NEXT**

| | |
|---|---|
| **10.** | **CLEAR DTC (Present and Past DTCs)*** |

**NEXT**

| | |
|---|---|
| **11.** | **CHECK DTC (Present and Past DTCs)*** |

(a) Check the DTC INFO .

Result:

| RESULT | PROCEED TO |
|---|---|
| DTC is not output | A |
| DTC is output | B |

**B Go to step 6**

A

| | |
|---|---|
| 12. | CONFIRMATION TEST |

NEXT END

# PROBLEM SYMPTOMS TABLE

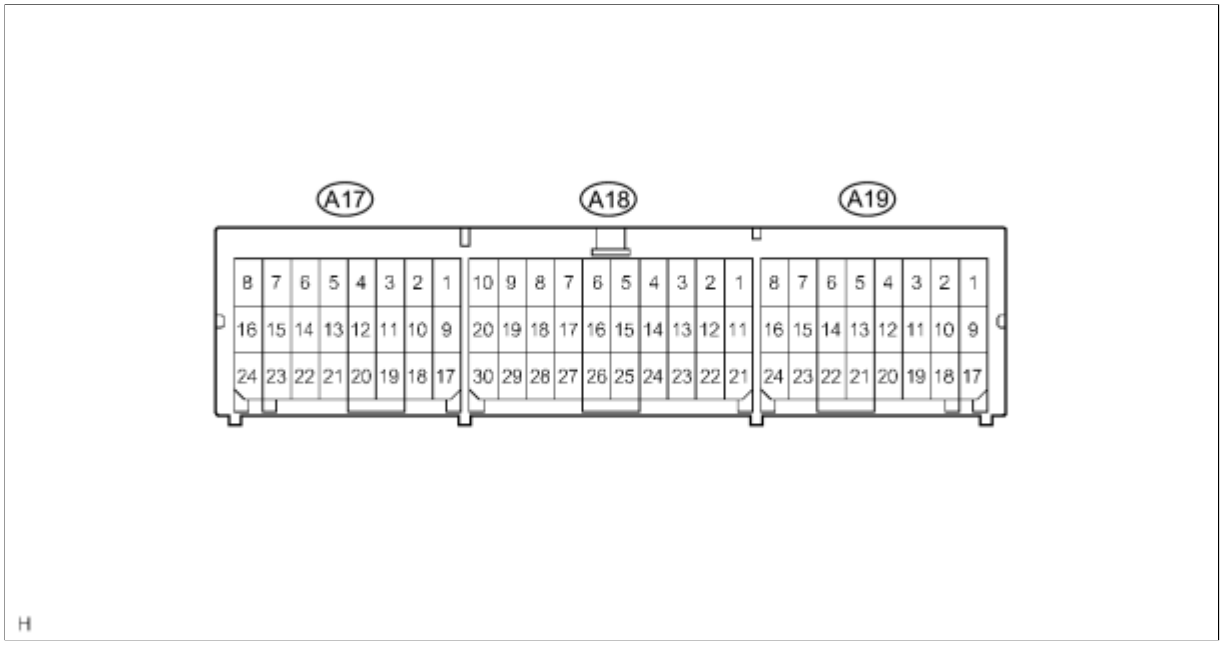
**HINT:**

- Use the table below to help determine the cause of the problem symptom. The potential causes of the symptoms are listed in order of probability in the "Suspected area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

**Airbag System**

| SYMPTOM | SUSPECTED AREA | SEE PAGE |
|---|---|---|
| The SRS warning light goes off after the primary check, but comes on. | Source Voltage Drop | INFO |
| When the power switch is on (IG), the SRS warning light sometimes comes on after approximately 6 seconds. | SRS Warning Light Remains ON | INFO |
| The SRS warning light remains on when DTC is not output. | SRS Warning Light Remains ON | INFO |
| The SRS warning light does not come on with the power switch on (IG). | SRS Warning Light does not Come ON | INFO |
| SRS warning light is blink. | TC and CG Terminal Circuit | INFO |
| DTC cannot read. | TC and CG Terminal Circuit | INFO |

# TERMINALS OF ECU




| TERMINAL NO. | TERMINAL SYMBOL | DESTINATION |
|---|---|---|
| A17-1 | SFD+ | Front seat side airbag LH (Side squib LH) |
| A17-2 | SFD- | Front seat side airbag LH (Side squib LH) |
| A17-3 | ICD- | Curtain shield airbag LH (Driver side curtain shield squib) |
| A17-4 | ICD+ | Curtain shield airbag LH (Driver side curtain shield squib) |
| A17-5 | PD+ | Front seat outer belt LH (Driver side pretensioner squib) |
| A17-6 | PD- | Front seat outer belt LH (Driver side pretensioner squib) |
| A17-9 | DSP+ | Seat position sensor |
| A17-10 | DBE+ | Front seat inner belt LH |
| A17-17 | DSP- | Seat position sensor |
| A17-18 | DBE- | Front seat inner belt LH |
| A17-19 | VUPD | Side airbag sensor LH |
| A17-20 | VUCD | Rear airbag sensor LH |
| A17-21 | ESD | Side airbag sensor LH |
| A17-22 | ESCD | Rear airbag sensor LH |
| A18-1 | P2+ | Front passenger airbag (Front passenger side squib 2nd step) |
| A18-2 | P2- | Front passenger airbag (Front passenger side squib 2nd step) |
| A18-3 | P- | Front passenger airbag (Front passenger side squib) |
| A18-4 | P+ | Front passenger airbag (Front passenger side squib) |
| A18-5 | D+ | Steering pad (Driver side squib) |
| A18-6 | D- | Steering pad (Driver side squib) |
| A18-7 | D2- | Steering pad (Driver side squib 2nd step) |
| A18-8 | D2+ | Steering pad (Driver side squib 2nd step) |

| | | |
|---|---|---|
| A18-13 | PBEW | Combination meter |
| A18-14 | LA | Combination meter |
| A18-15 | TC | DLC3 |
| A18-16 | SIL | DLC3 |
| A18-17 | P-AB | Front passenger seat belt warning light (Passenger airbag ON/OFF indicator) |
| A18-21 | IG2 | IGN fuse |
| A18-22 | GSW2 | HV ECU |
| A18-23 | PAON | Front passenger seat belt warning light (Passenger airbag ON/OFF indicator) |
| A18-25 | E1 | Ground |
| A18-26 | E2 | Ground |
| A18-27 | -SR | Front airbag sensor RH |
| A18-28 | -SL | Front airbag sensor LH |
| A18-29 | +SR | Front airbag sensor RH |
| A18-30 | +SL | Front airbag sensor LH |
| A19-3 | PP- | Front seat outer belt RH (Front passenger side pretensioner squib RH) |
| A19-4 | PP+ | Front seat outer belt RH (Front passenger side pretensioner squib RH) |
| A19-5 | ICP+ | Curtain shield airbag RH (Curtain shield squib RH) |
| A19-6 | ICP- | Curtain shield airbag RH (Curtain shield squib RH) |
| A19-7 | SFP- | Front seat side airbag RH (Side squib RH) |
| A19-8 | SFP+ | Front seat side airbag RH (Side squib RH) |
| A19-16 | FSP+ | Occupant classification ECU |
| A19-19 | ESCP | Side airbag sensor RH |
| A19-20 | ESP | Rear airbag sensor RH |
| A19-21 | VUCP | Side airbag sensor RH |
| A19-22 | VUPP | Rear airbag sensor RH |
| A19-24 | FSP- | Occupant classification ECU |

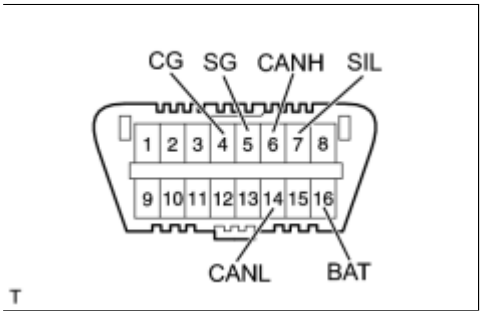
# DIAGNOSIS SYSTEM

## 1. DESCRIPTION

The center airbag sensor controls the functions of the Supplemental Restraint System (SRS) on the vehicle. Data of the SRS can be read in the Data Link Connector 3 (DLC3) of the vehicle. When the system seems to be malfunctioning, use the Techstream to check for a malfunction and perform repairs.

## 2. CHECK DLC3

(a) The ECU uses ISO 15765-4 for communication. The terminal arrangement of the DLC3 complies with SAE J1962 and matches the ISO 15765-4 format.




| SYMBOLS (TERMINAL NO.) | TERMINAL DESCRIPTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|---|
| SIL (7) - SG (5) | Bus "+" line | During transmission | Pulse generation |
| CG (4) - Body ground | Chassis ground | Always | Below 1 Ω |
| SG (5) - Body ground | Signal ground | Always | Below 1 Ω |
| BAT (16) - Body ground | Battery positive | Always | 11 to 14 V |
| CANH (6) - CANL (14) | CAN bus line | Power switch is OFF* | 54 to 69 Ω |
| CANH (6) - Battery positive | HIGH-level CAN bus line | Power switch is OFF* | 1 kΩ or more |
| CANH (6) - CG (4) | HIGH-level CAN bus line | Power switch is OFF* | 1 kΩ or more |
| CANL (14) - Battery positive | LOW-level CAN bus line | Power switch is OFF* | 1 MΩ or more |
| CANL (14) - CG (4) | LOW-level CAN bus line | Power switch is OFF* | 1 MΩ or more |

**NOTICE:**

***: Before measuring the resistance, leave the vehicle as is for at least 1 minute and do not operate the power switch, any other switches or the doors.**

If the result is not as specified, the DLC3 may have a malfunction. Repair or replace the harness and connector.

**HINT:**

**Connect the cable of the Techstream to the DLC3, turn the power switch ON (IG) and attempt to use the tester. If the display indicates that a communication error has occurred, there is a problem either with the vehicle or with the Techstream.**

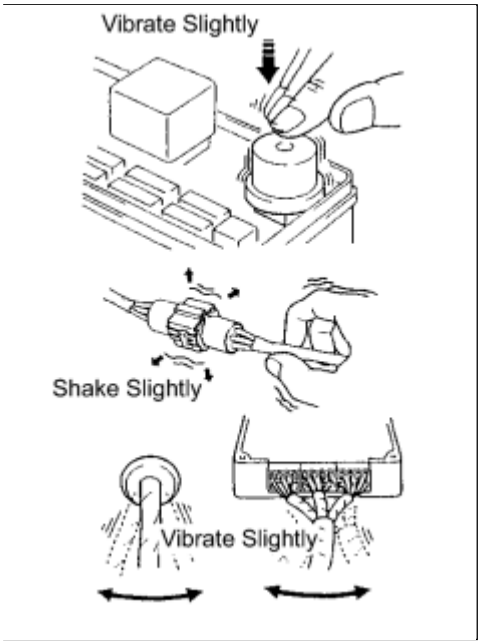
- If communication is normal when the tester is connected to another vehicle, inspect the DLC3 on the original vehicle.
- If communication is still not possible when the tool is connected to

another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

### 3. SYMPTOM SIMULATION

**HINT:**

**The most difficult case in troubleshooting is when no problem symptoms occur. In such a case, a thorough problem analysis must be carried out. A simulation of the same or similar conditions and environment in which the problem occurred in the customer's vehicle should be carried out. No matter how much skill or experience a technician has, troubleshooting without confirming the problem symptoms will lead to important repairs being overlooked and mistakes or delays.**




(a) Vibration method: When vibration seems to be the major cause.

**HINT:**

**Perform the simulation method only during the primary check period (for approximately 6 seconds after the power switch ON (IG)).**

(1) Slightly vibrate the part of the sensor considered to be the problem cause with your fingers and check whether the malfunction occurs.

**HINT:**

**Shaking the relays too strongly may result in open relays.**

(2) Slightly shake the connector vertically and horizontally.

(3) Slightly shake the wire harness vertically and horizontally.

The connector joint and fulcrum of the vibration are the major areas to be checked thoroughly.

### 4. FUNCTION OF SRS WARNING LIGHT

(a) Primary check.

(1) Turn the power switch OFF. Wait for at least 2 seconds, then turn the power switch ON (IG). The SRS warning light comes on for approximately 6 seconds and the diagnosis of the airbag system (including the seat belt pretensioners) is performed.

**HINT:**

**If trouble is detected during the primary check, the SRS warning light remains on even after the primary check period (for approximately 6 seconds) has elapsed.**

(b) Constant check.

(1) After the primary check, the center airbag sensor constantly monitors the airbag system for trouble.

**HINT:**

**If trouble is detected during the constant check, the center airbag sensor functions as follows:**

- The SRS warning light comes on.
- The SRS warning light goes off, and then comes on. This blinking pattern indicates a source voltage drop. The SRS warning light goes off 10 seconds after the source voltage returns to normal.

(c) Review.

(1) When the airbag system is normal:

(1) When the airbag system is normal:

The SRS warning light comes on only during the primary check period (for approximately 6 seconds after the power switch is turned ON (IG)).

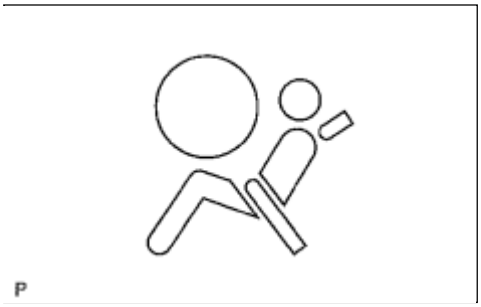
(2) When the airbag system has trouble:

- The SRS warning light remains on even after the primary check period has elapsed.
- The SRS warning light goes off after the primary check, but comes on again during the constant check.
- The SRS warning light does not come on when turning the power switch from OFF to ON (IG).

**HINT:**

**The center airbag sensor keeps the SRS warning light on if the airbag has been deployed.**

### 5. SRS WARNING LIGHT CHECK




(a) Turn the power switch ON (IG), and check that the SRS warning light comes on for approximately 6 seconds (primary check).

(b) Check that the SRS warning light goes off approximately 6 seconds after the power switch is turned ON (IG) (constant check).

**HINT:**

**When any of the following symptoms occur, refer to the "Problem Symptoms Table"** INFO **.**

- The SRS warning light comes on occasionally after the primary check period has elapsed.
- The SRS warning light comes on, but a DTC is not output.
- The power switch is turned from OFF to ON (IG), but the SRS warning light does not come on.

### 6. ACTIVATION PREVENTION MECHANISM

(a) FUNCTION OF ACTIVATION PREVENTION MECHANISM

(1) An activation prevention mechanism is built into the connector on the center airbag sensor side of the airbag system squib circuit to prevent accidental airbag activation.

(2) This mechanism closes the circuit when the connector is disconnected by bringing the short spring into contact with the terminals and shutting off external electricity to prevent accidental airbag activation.

(b) RELEASE METHOD OF ACTIVATION PREVENTION MECHANISM

(1) To release the activation prevention mechanism, insert a piece of paper with the same thickness as the male terminal (approximately 0.5 mm (0.020 in.)) between the terminals and the short spring to break the connection.

(2) Refer to the illustrations below concerning connectors utilizing the activation prevention mechanism and its release method.

**CAUTION:**

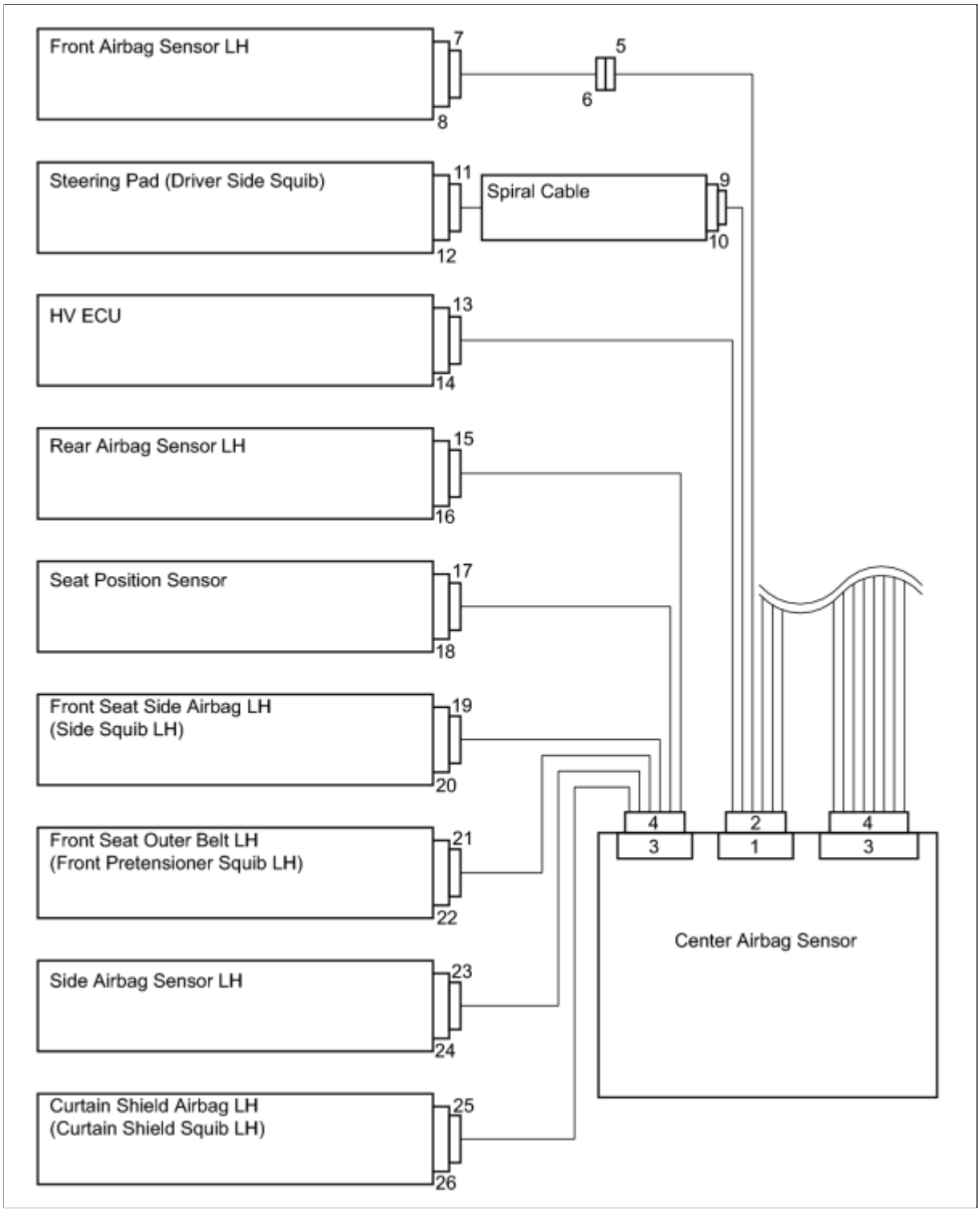
**Never release the activation prevention mechanism on the squib connector even when inspecting with the squib disconnected.**

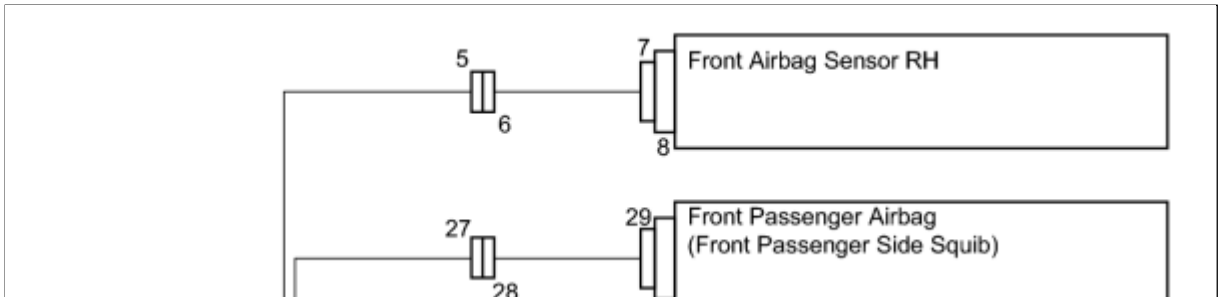
**NOTICE:**

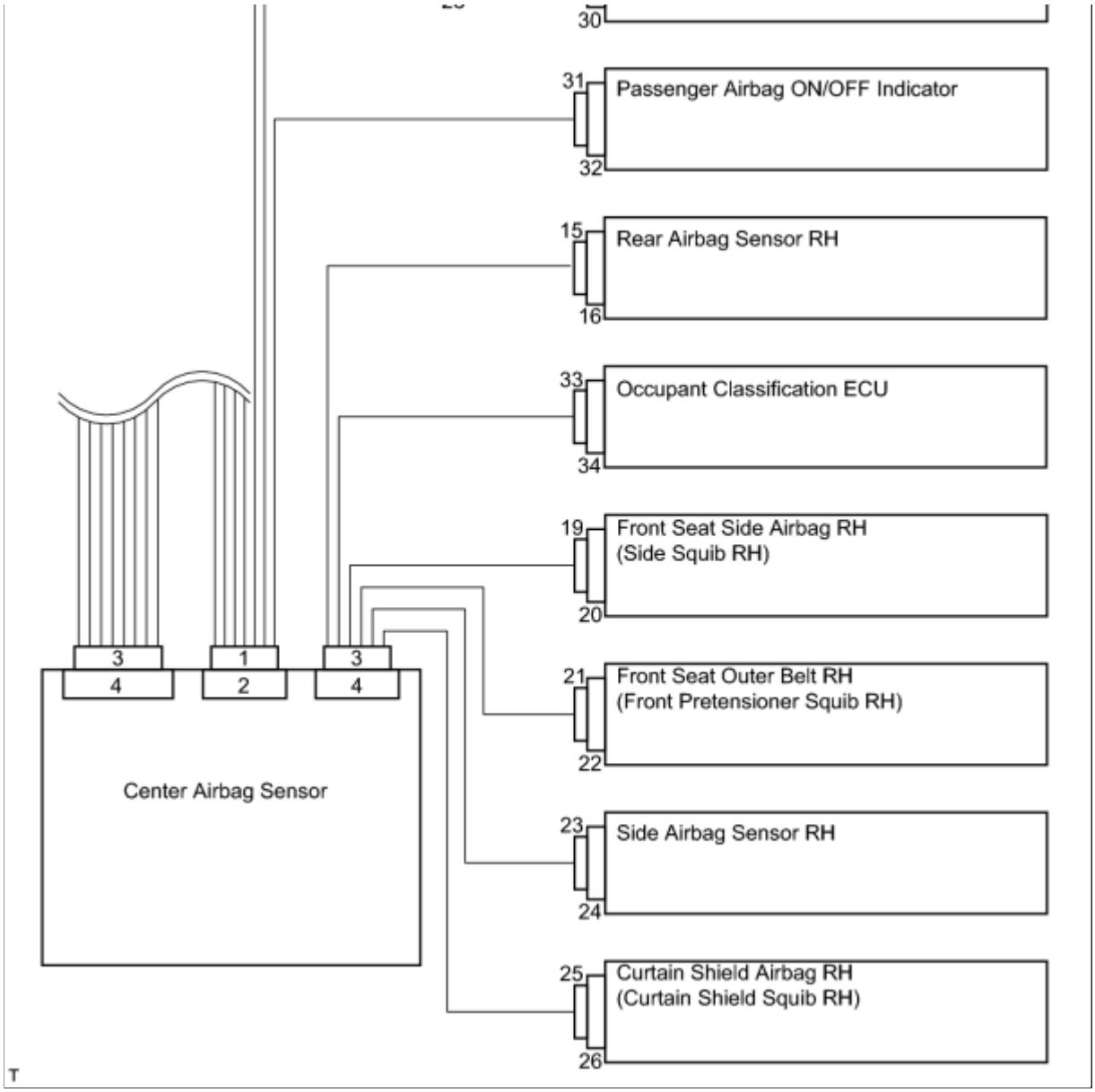
- Do not release the activation prevention mechanism unless specially directed by the troubleshooting procedure.

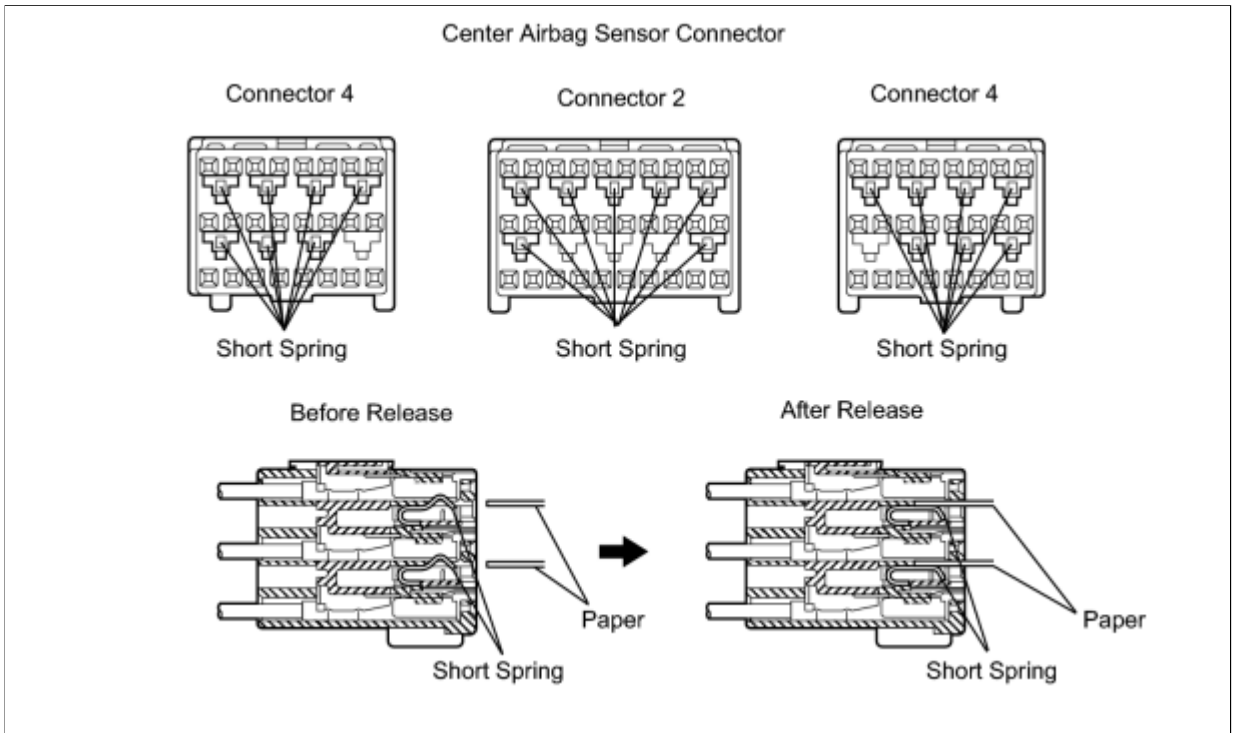
Do not release the activation prevention mechanism unless specially directed by the troubleshooting procedure.

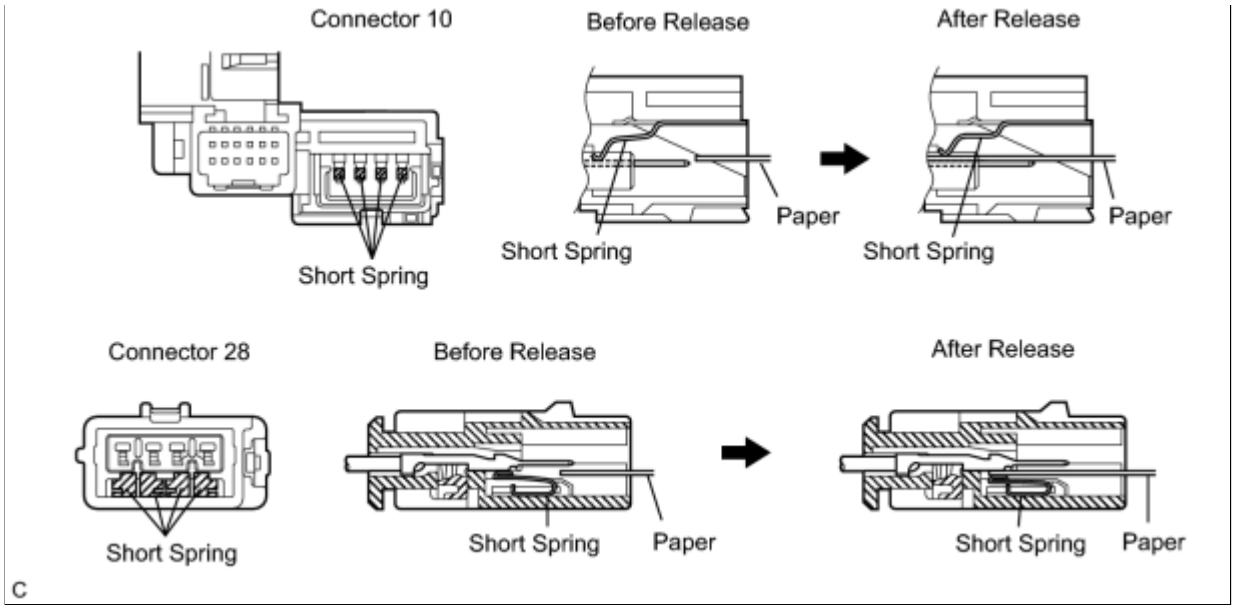
- To prevent the terminal and the short spring from being damaged, always use a piece of paper of the same thickness as the male terminal.



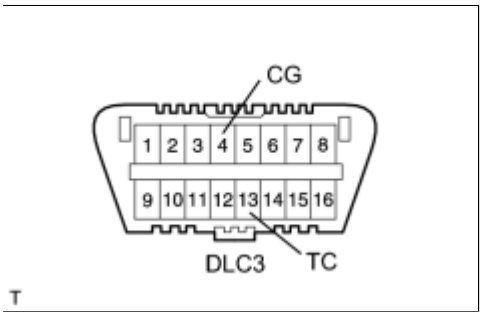

30
31
Passenger Airbag ON/OFF Indicator
32
15
Rear Airbag Sensor RH
16
33
Occupant Classification ECU
34
19
Front Seat Side Airbag RH
(Side Squib RH)
20
3
1
3
4
2
4
21
Front Seat Outer Belt RH
(Front Pretensioner Squib RH)
22
Center Airbag Sensor
23
Side Airbag Sensor RH
24
25
Curtain Shield Airbag RH
(Curtain Shield Squib RH)
26
T


Center Airbag Sensor Connector
Connector 4
Connector 2
Connector 4
Short Spring
Short Spring
Short Spring
Before Release
After Release
Paper
Paper
Short Spring
Short Spring


Connector 10
Before Release
After Release
Short Spring
Short Spring
Paper
Short Spring
Paper
Connector 28
Before Release
After Release
Short Spring
Short Spring
Paper
Short Spring
Paper
C

# DTC CHECK / CLEAR

## 1. CHECK DTC (USING SST CHECK WIRE)




(a) Check for DTCs (Present DTC).

(1) Turn the power switch ON (IG), and wait for approximately 60 seconds.

(2) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

**SST: 09843-18040**

**NOTICE:**

**Connect the terminals to the correct positions to avoid a malfunction.**

(b) Check for DTCs (Past DTC).

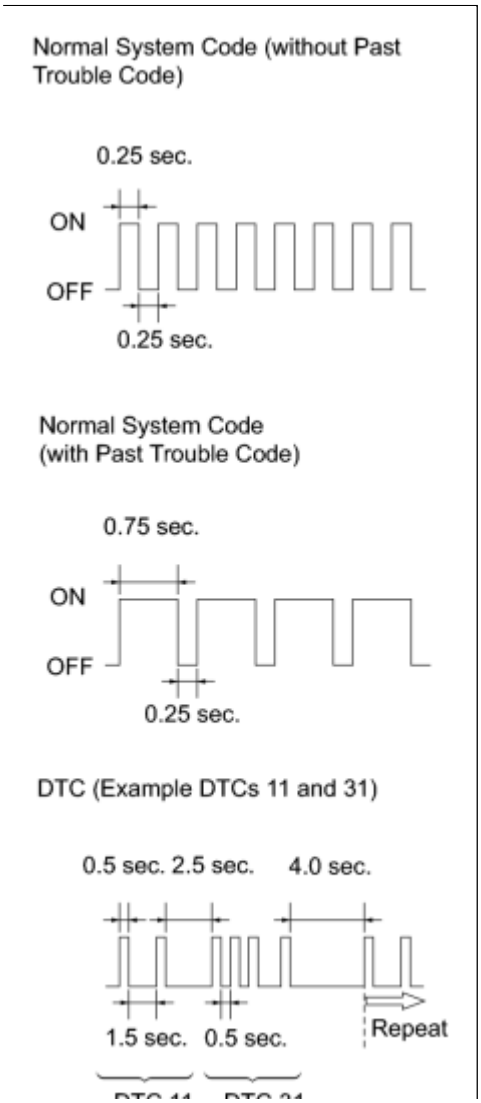
(1) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3.

**SST: 09843-18040**

**NOTICE:**

**Connect the terminals to the correct positions to avoid a malfunction.**

(2) Turn the power switch ON (IG), and wait for approximately 60 seconds.




(c) Read the DTCs.

(1) Read the blinking patterns of the DTCs. As examples, the blinking patterns for the normal system code and DTCs 11 and 31 are shown in the illustration.

- Normal system code indication (without past DTC)

  The light blinks twice per second.
- Normal system code indication (with past DTC)

  When the past DTC is stored in the center airbag sensor, the light blinks once per second.
- DTC indication

  The first blinking pattern indicates the first digit DTC. The second blinking pattern occurs after a 1.5-second pause.

If there are 2 or more DTCs, there is a 2.5-second pause between each DTC. After all DTCs are shown, there is a 4.0-second pause, and they are all repeated.

- If 2 or more malfunctions are found, the indication begins with the lowest numbered DTC.
- If DTCs are indicated without connecting the terminals, proceed to the "TC and CG Terminal Circuit" INFO .

DTC 11 DTC 31

T

### 2. CLEAR DTC (USING SST CHECK WIRE)

(a) Clear the DTCs.

(1) When the power switch is turned OFF, the DTCs are cleared.

**HINT:**

**Depending on the DTCs, the DTCs may not all be cleared by turning off the power switch. In this case, proceed to the next step.**

(2) Using SST, connect terminals 13 (TC) and 4 (CG) of the DLC3, and then turn the power switch on.

**SST: 09843-18040**

(3) Disconnect terminal 13 (TC) of the DLC3 within 3 to 10 seconds after the DTCs are output, and check that the SRS warning light comes on after 3 seconds.

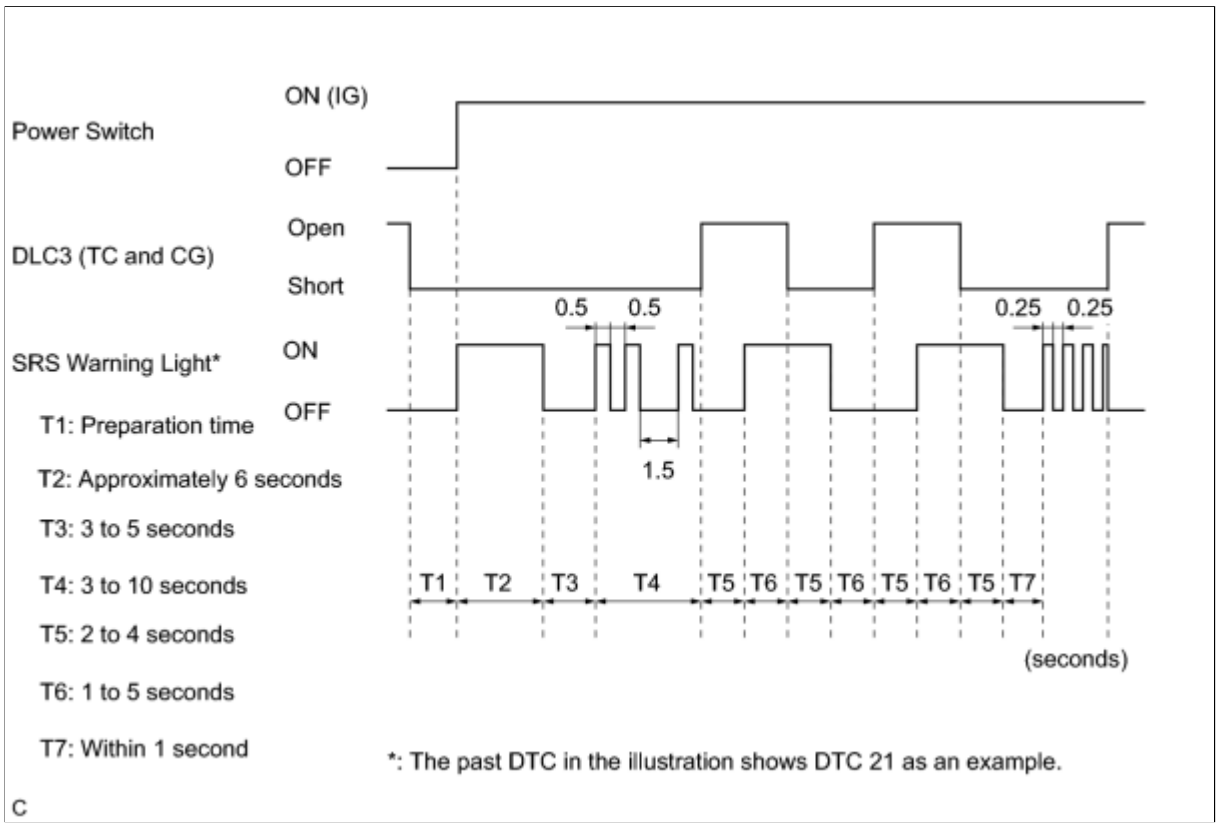
(4) Within 2 to 4 seconds of the SRS warning light coming on, connect terminals 13 (TC) and 4 (CG) of the DLC3.

(5) The SRS warning light goes off within 2 to 4 seconds of connecting terminals 13 (TC) and 4 (CG) of the DLC3. Then, disconnect terminal 13 (TC) within 2 to 4 seconds of the SRS warning light going off.

(6) The SRS warning light comes on again within 2 to 4 seconds of disconnecting terminal 13 (TC). Then, reconnect terminals 13 (TC) and 4 (CG) within 2 to 4 seconds of the SRS warning light coming on.

(7) Check that the SRS warning light goes off within 2 to 4 seconds of connecting terminals 13 (TC) and 4 (CG) of the DLC3. Also check that the normal system code is output within 1 second of the SRS warning light going off.

If DTCs are not cleared, repeat these procedure until the DTCs are cleared.




C

### 3. CHECK DTC (USING TECHSTREAM)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch ON (IG).

(c) Check the DTCs by following the prompts on the Techstream screen.

**HINT:**

**Refer to the Techstream operator's manual for further details.**

### 4. CLEAR DTC (USING TECHSTREAM)

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch ON (IG).

(c) Clear the DTCs by following the prompts on the Techstream screen.

**HINT:**

**Refer to the Techstream operator's manual for further details.**

# CHECK MODE PROCEDURE

### 1. CHECK MODE (SIGNAL CHECK): DTC CHECK

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch ON (IG).

(c) Select the SIGNAL CHECK, and proceed to check with the Techstream.

**NOTICE:**

**Select the SIGNAL CHECK from the DTC CHECK screen displayed on the Techstream to clear the output DTCs (both present and past).**

**HINT:**

- DTCs can be detected more sensitively in check mode than in normal diagnosis mode.
- Perform the check mode inspection when a malfunction in each squib circuit is suspected even after the normal system code is output through the normal diagnosis mode inspection.

# DATA LIST / ACTIVE TEST

## 1. READ DATA LIST

**HINT:**

**Using the Techstream's DATA LIST allows switch, sensor, actuator and other item values to be read without removing any parts. Reading the DATA LIST early in troubleshooting is one way to save time.**

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch ON (IG).

(c) Read the DATA LIST according to the display on the Techstream.

**Center airbag sensor:**

| TESTER DISPLAY | MEASUREMENT ITEM/RANGE | NORMAL CONDITION | DIAGNOSTIC NOTE |
|---|---|---|---|
| Driver Seat Position | Seat position (Driver side)/<br>Forward: Seat position forward<br>Bkward: Seat position backward<br>FAIL: Failure detected | Forward/Bkward | - |
| Passenger Classification | Front passenger classification/<br>NG: Data is not determined<br>OFF: Vacant<br>CHILD: Child (Less than 36 kg [79.37 lb]) seated<br>AF05: Adult (36 to 54 kg [79.37 to 119.05 lb]) seated<br>AM50: Adult (More than 54 kg [119.05 lb]) seated<br>FAIL: Failure detected | NG/OFF/CHILD /AF05/AM50/FAIL | - |
| Driver Buckle SW | Buckle switch (Driver side)/<br>Unset: Seat belt not fastened<br>Set: Seat belt fastened<br>NG: Data not determined | Unset/Set | - |
| Passenger Buckle SW | Buckle switch (Front passenger side)/<br>Unset: Seat belt not fastened<br>Set: Seat belt fastened<br>NG: Data not determined | Unset/Set | - |
| Display Type Information | Display type identification information/<br>LR: Display indicated by LH/RH<br>DP: Display indicated by Driver/Passenger | DP | - |
| Number of Past DTC | Number of past DTCs/<br>Min.: 0, Max.: 255 | 0 | - |

# DIAGNOSTIC TROUBLE CODE CHART

If a DTC is displayed during the DTC check, check the circuit listed for the DTC in the table below.

**HINT:**

- When the SRS warning light remains on and the normal system code is output, a decrease in the source voltage is likely to occur. This malfunction is not stored in the memory of the center airbag sensor. If the power source voltage returns to normal, the SRS warning light will automatically go off.
- When 2 or more DTCs are indicated, the DTC with the lowest number appears first.
- If a DTC is not listed on the DTC chart, the center airbag sensor may have malfunction.
- In the case of any malfunctions concerning open circuits, shorts to ground, or shorts to B+ due to squibs, other DTCs may not be set. In this case, repair the malfunction currently indicated and then perform malfunction diagnosis again.
- Mark in the check mode column:

  -: DTC does not correspond to check mode.

  ○: DTC corresponds to check mode.

- When DTC B1650/32 is set as a result of troubleshooting the Supplemental Restraint System (SRS), perform troubleshooting for the occupant classification system.

**AIRBAG SYSTEM:**

| DTC CODE | DETECTION ITEM | CHECK MODE | SRS WARNING LIGHT | SEE PAGE |
|---|---|---|---|---|
| B1000/31 | Center Airbag Sensor Assembly Malfunction | - | ON | INFO |
| B1610/13 | Front Airbag Sensor RH Circuit Malfunction | - | ON | INFO |
| B1615/14 | Front Airbag Sensor LH Circuit Malfunction | - | ON | INFO |
| B1620/21 | Driver Side - Side Airbag Sensor Circuit Malfunction | - | ON | INFO |
| B1625/22 | Front Passenger Side - Side Airbag Sensor Circuit Malfunction | - | ON | INFO |
| B1630/23 | Driver Side Rear Airbag Sensor Circuit Malfunction | - | ON | INFO |
| B1635/24 | Front Passenger Side Rear Airbag Sensor Circuit Malfunction | - | ON | INFO |
| B1650/32 | Occupant Classification System Malfunction | - | ON | INFO |
| B1655/37 | Driver Side Seat Belt Buckle Switch Circuit Malfunction | - | ON | INFO |
| B1660/43 | Passenger Airbag ON / OFF Indicator Circuit Malfunction | - | ON | INFO |
| B1800/51 | Short in Driver Side Squib Circuit | ○ | ON | INFO |
| B1801/51 | Open in Driver Side Squib Circuit | ○ | ON | INFO |
| B1802/51 | Short to GND in Driver Side Squib Circuit | ○ | ON | INFO |
| B1803/51 | Short to B+ in Driver Side Squib Circuit | ○ | ON | INFO |
| B1805/52 | Short in Front Passenger Side Squib Circuit | ○ | ON | INFO |
| B1806/52 | Open in Front Passenger Side Squib Circuit | ○ | ON | INFO |
| B1807/52 | Short to GND in Front Passenger Side Squib Circuit | ○ | ON | INFO |

| | | | | |
|---|---|---|---|---|
| B1808/52 | Short to B+ in Front Passenger Side Squib Circuit | ○ | ON | INFO |
| B1810/53 | Short in Driver Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1811/53 | Open in Driver Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1812/53 | Short to GND in Driver Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1813/53 | Short to B+ in Driver Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1815/54 | Short in Front Passenger Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1816/54 | Open in Front Passenger Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1817/54 | Short to GND in Front Passenger Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1818/54 | Short to B+ in Front Passenger Side Squib 2nd Step Circuit | ○ | ON | INFO |
| B1830/57 | Short in Driver Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1831/57 | Open in Driver Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1832/57 | Short to GND in Driver Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1833/57 | Short to B+ in Driver Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1835/58 | Short in Front Passenger Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1836/58 | Open in Front Passenger Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1837/58 | Short to GND in Front Passenger Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1838/58 | Short to B+ in Front Passenger Side Curtain Shield Squib Circuit | ○ | ON | INFO |
| B1908/74 | Short to B+ in Front Passenger Side Front Pretensioner Squib Circuit | ○ | ON | INFO |
| B1653/35 | Seat Position Airbag Sensor Circuit Malfunction | ○ | ON | INFO |
| B1820/55 | Short in Front Driver Side - Side Squib Circuit | ○ | ON | INFO |
| B1821/55 | Open in Front Driver Side - Side Squib Circuit | ○ | ON | INFO |
| B1822/55 | Short to GND in Front Driver Side - Side Squib Circuit | ○ | ON | INFO |
| B1823/55 | Short to B+ in Front Driver Side - Side Squib Circuit | ○ | ON | INFO |
| B1825/56 | Short in Front Passenger Side - Side Squib Circuit | ○ | ON | INFO |
| B1826/56 | Open in Front Passenger Side - Side Squib Circuit | ○ | ON | INFO |
| B1827/56 | Short to GND in Front Passenger Side - Side Squib Circuit | ○ | ON | INFO |
| B1828/56 | Short to B+ in Front Passenger Side - Side Squib Circuit | ○ | ON | INFO |
| B1900/73 | Short in Front Driver Side Pretensioner Squib Circuit | ○ | ON | INFO |

| DTC | B1000/31 | Center Airbag Sensor Assembly Malfunction |
|---|---|---|

## DESCRIPTION

The center airbag sensor consists of the airbag sensor, the safing sensor, the drive circuit, the diagnosis circuit and the power control.

When the center airbag sensor receives signals from the airbag sensor, it determines whether or not the SRS should be activated.

DTC B1000/31 is set when a malfunction is detected in the center airbag sensor.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1000/31 | Center airbag sensor malfunction | Center airbag sensor |

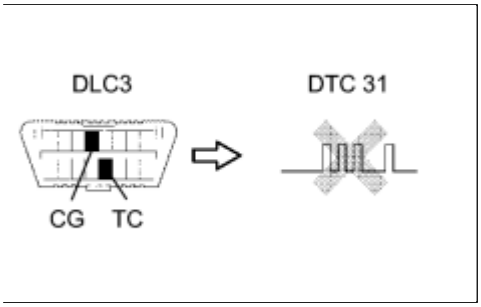
**HINT:**

**When any other DTCs are set simultaneously with B1000/31, repair the malfunctions indicated by those DTCs first.**

## INSPECTION PROCEDURE

## PROCEDURE

| 1. | CHECK CENTER AIRBAG SENSOR ASSEMBLY |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Clear the DTCs INFO .

(f) Turn the power switch OFF.

(g) Turn the power switch ON (IG), and wait for at least 60 seconds.

(h) Check for DTCs INFO .

OK:

DTC B1000/31 is not output.

**NG** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| DTC | B1610/13 | Front Airbag Sensor RH Circuit Malfunction |
|---|---|---|

## DESCRIPTION

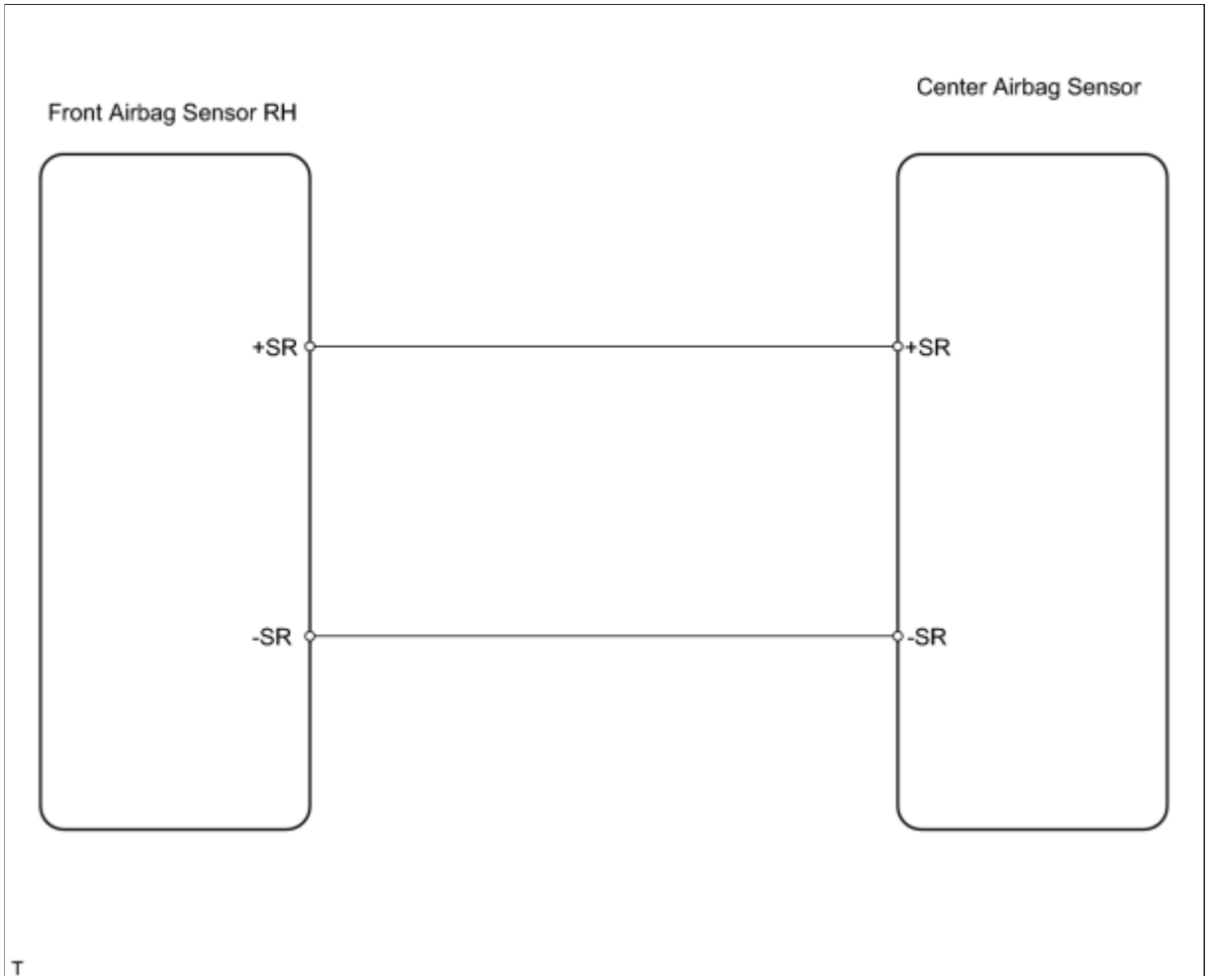
The front airbag sensor RH consists of the diagnostic circuit and the front deceleration sensor.

If the center airbag sensor receives signals from the frontal deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1610/13 is recorded when a malfunction is detected in the front airbag sensor RH circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1610/13 | When one of following conditions is met:<br>• Center airbag sensor receives a line short signal, an open signal, a short to ground signal or a short to B+ signal from the front airbag sensor RH for 2 seconds.<br>• Front airbag sensor RH malfunction<br>• Center airbag sensor malfunction | • Instrument panel wire<br>• Engine room main wire<br>• Front airbag sensor RH<br>• Center airbag sensor |

## WIRING DIAGRAM



## INSPECTION PROCEDURE

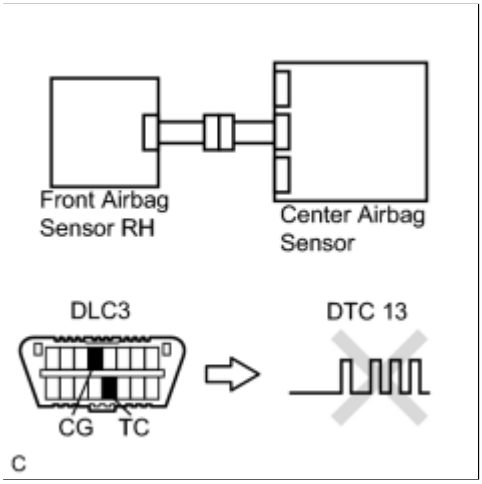
## PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.




(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check the DTCs INFO .

OK:

DTC B1610/13 is not output.

**HINT:**

**DTCs other than DTC B1610/13 may be output at this time, but they are not related to this check.**

OK ▶ USE SIMULATION METHOD TO CHECK

NG ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and the front airbag sensor RH.

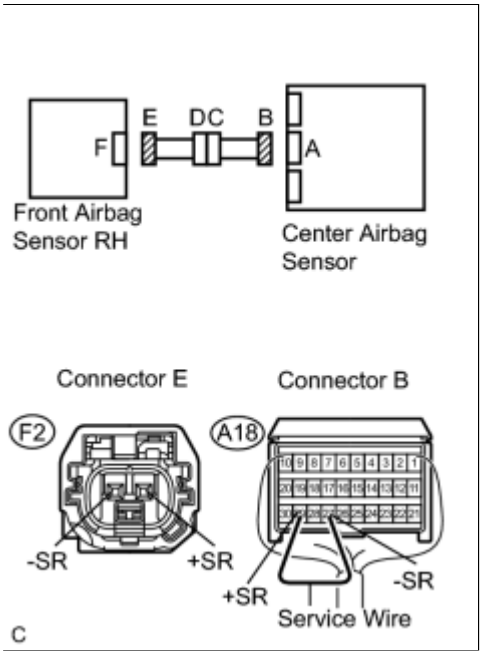
OK:

The connectors are properly connected.

NG ▶ CONNECT CONNECTOR

OK ▼

| 3. | CHECK FRONT AIRBAG SENSOR RH CIRCUIT (OPEN) |
|---|---|




(a) Disconnect the connectors from the center airbag sensor and the front airbag sensor RH.

(b) Using a service wire, connect terminals A18-29 (+SR) and A18-27 (-SR) of connector B.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

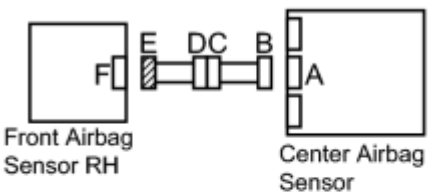
Standard resistance:

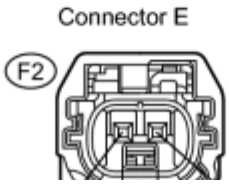
| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F2-2 (+SR) - F2-1 (-SR) | Below 1 Ω |

NG ▶ **CHECK ENGINE ROOM MAIN WIRE (OPEN)**

**OK** ▼

| 4. | CHECK FRONT AIRBAG SENSOR RH CIRCUIT (SHORT) |
|---|---|




(a) Disconnect the service wire from connector B.

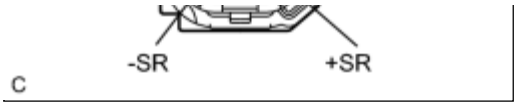
(b) Measure the resistance of the wire harness side connector.

Standard resistance:

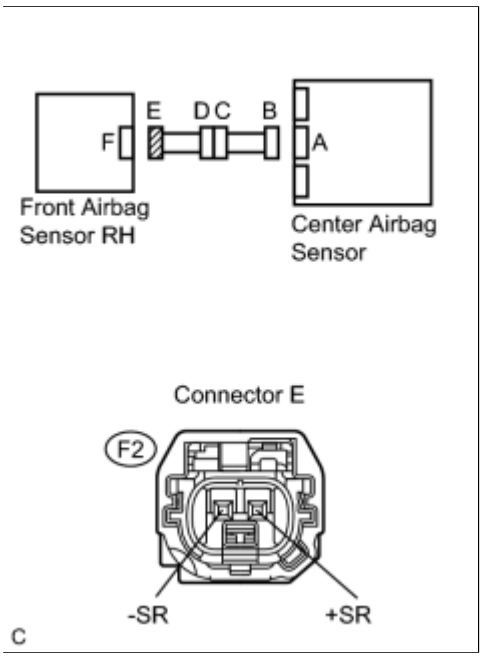
| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F2-2 (+SR) - F2-1 (-SR) | 1 MΩ or higher |

NG ▶ **CHECK ENGINE ROOM MAIN WIRE (SHORT)**

**OK**




| 5. | CHECK FRONT AIRBAG SENSOR RH CIRCUIT (TO B+) |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

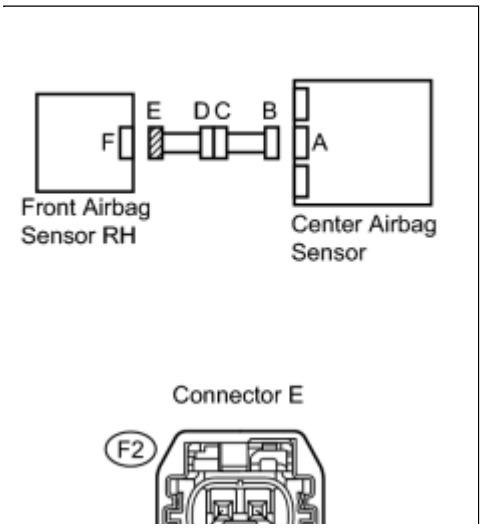
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F2-2 (+SR) - Body ground | Below 1 V |
| F2-1 (-SR) - Body ground | Below 1 V |

NG ▶ CHECK ENGINE ROOM MAIN WIRE (TO B+)

OK ▼

| 6. | CHECK FRONT AIRBAG SENSOR RH CIRCUIT (TO GROUND) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F2-2 (+SR) - Body ground | 1 MΩ or higher |
| F2-1 (-SR) - Body ground | 1 MΩ or higher |

NG ▶ CHECK ENGINE ROOM MAIN WIRE (TO GROUND)




OK

| 7. | CHECK FRONT AIRBAG SENSOR RH |
|---|---|

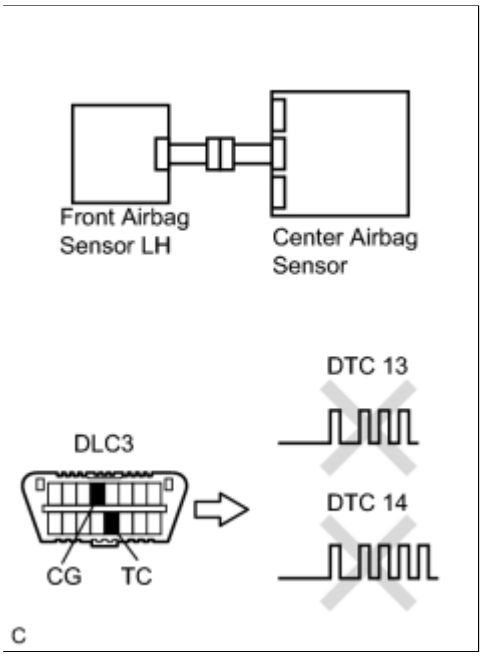
(a) Connect the connectors to the center airbag sensor.

(b) Interchange the front airbag sensor RH with the front airbag sensor LH and connect the connectors to them.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Clear the DTCs INFO .




(f) Turn the power switch OFF.

(g) Turn the power switch ON (IG), and wait for at least 60 seconds.

(h) Check the DTCs INFO .

**Result**

| RESULT | PROCEED TO |
|---|---|
| DTC B1610/13 and B1615/14 are not output. | A |
| DTC B1610/13 is output. | B |
| DTC B1615/14 is output. | C |

**HINT:**

**DTCs other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.**

**C** ▶ **REPLACE FRONT AIRBAG SENSOR RH**

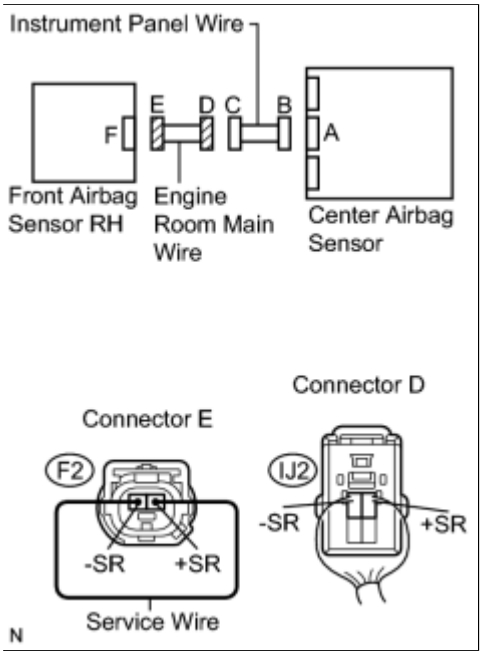
**B** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**A** ▶ **USE SIMULATION METHOD TO CHECK**

| 8. | CHECK ENGINE ROOM MAIN WIRE (OPEN) |
|---|---|

(a) Disconnect the service wire from connector B.

(b) Disconnect the instrument panel wire connector from the engine room main wire.




**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector when connecting.**

(c) Using a service wire, connect terminals F2-2 (+SR) and F2-1 (-SR) of connector E.

(d) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-1 (+SR) - IJ2-2 (-SR) | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

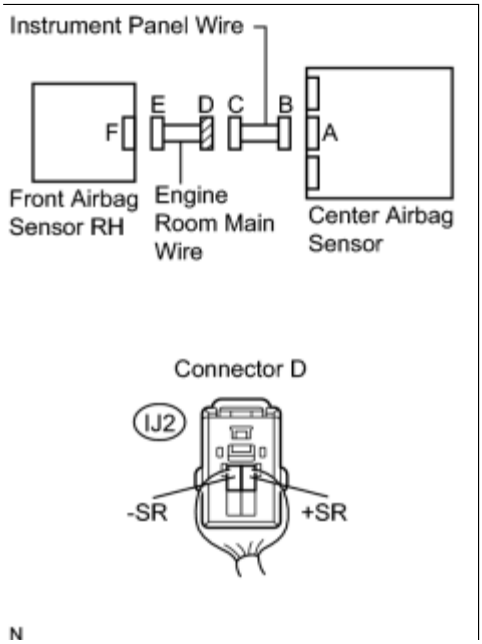
**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| 9. | CHECK ENGINE ROOM MAIN WIRE (SHORT) |
|---|---|

(a) Disconnect the engine room main wire connector from the instrument panel wire.

(b) Measure the resistance of the wire harness side connector.

Standard resistance:

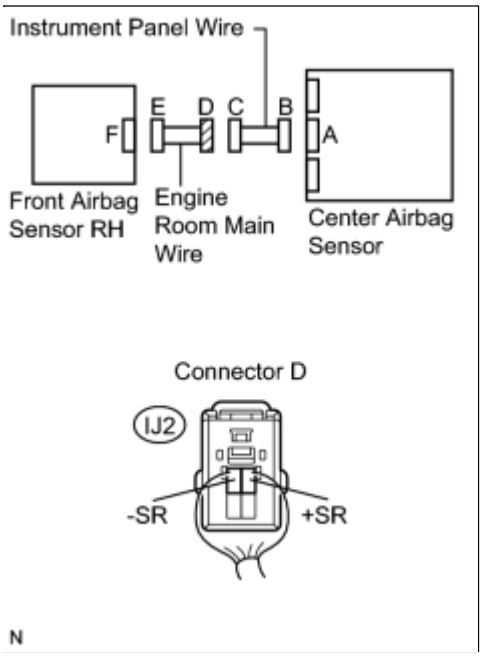



| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-1 (+SR) - IJ2-2 (-SR) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| 10. | CHECK ENGINE ROOM MAIN WIRE (TO B+) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the engine room main wire connector from the instrument panel wire.

(d) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(e) Turn the power switch ON (IG).

(f) Measure the voltage of the wire harness side connector.

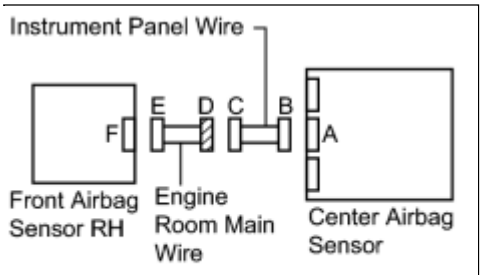
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-1 (+SR) - Body ground | Below 1 V |
| IJ2-2 (-SR) - Body ground | Below 1 V |

**NG** ▶ **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| 11. | CHECK ENGINE ROOM MAIN WIRE (TO GROUND) |
|---|---|

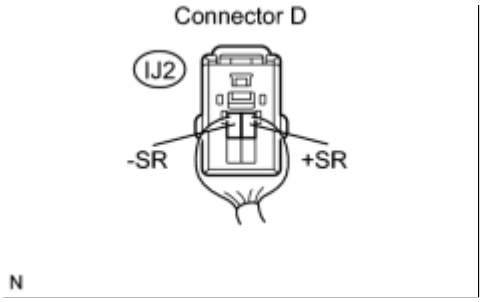



(a) Disconnect the engine room main wire connector from the instrument panel wire.

(b) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-1 (+SR) - Body ground | 1 MΩ or higher |
| IJ2-2 (-SR) - Body ground | 1 MΩ or higher |




**NG** ▶ **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| DTC | B1615/14 | Front Airbag Sensor LH Circuit Malfunction |
|---|---|---|

## DESCRIPTION

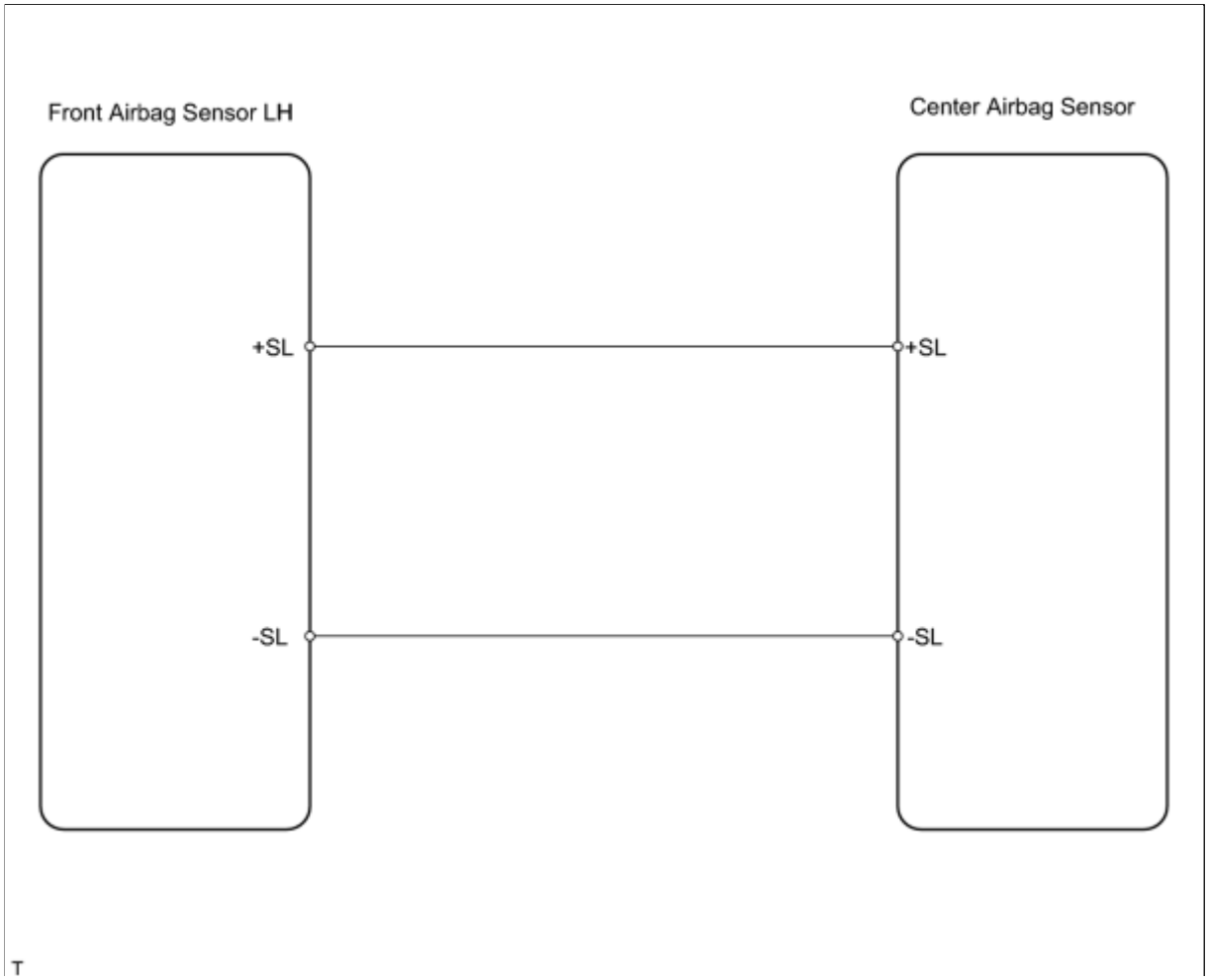
The front airbag sensor LH consists of the diagnostic circuit and the front deceleration sensor.

If the center airbag sensor receives signals from the frontal deceleration sensor, it determines whether or not the SRS should be activated.

DTC B1615/14 is recorded when a malfunction is detected in the front airbag sensor LH circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1615/14 | When one of following conditions is met:<br>• The center airbag sensor receives a line short signal, an open signal, a short to ground signal or a short to B+ signal from the front airbag sensor LH sensor for 2 seconds.<br>• Front airbag sensor LH malfunction<br>• Center airbag sensor malfunction | • Instrument panel wire<br>• Engine room main wire<br>• Front airbag sensor LH<br>• Center airbag sensor |

## WIRING DIAGRAM



## INSPECTION PROCEDURE

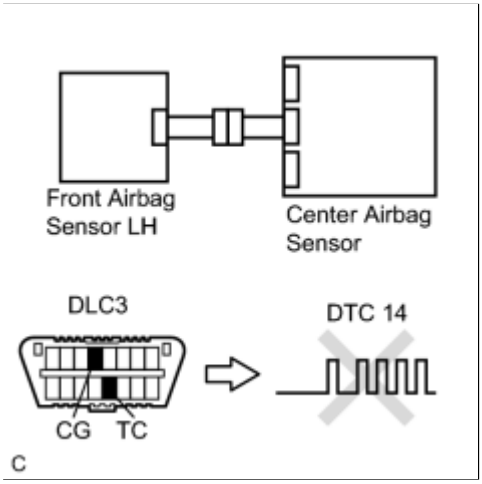
## PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.




(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check for DTCs INFO .

OK:

DTC B1615/14 is not output.

**HINT:**

**DTCs other than DTC B1615/14 may be output at this time, but they are not related to this check.**

OK ▶ USE SIMULATION METHOD TO CHECK

NG ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and the front airbag sensor LH.

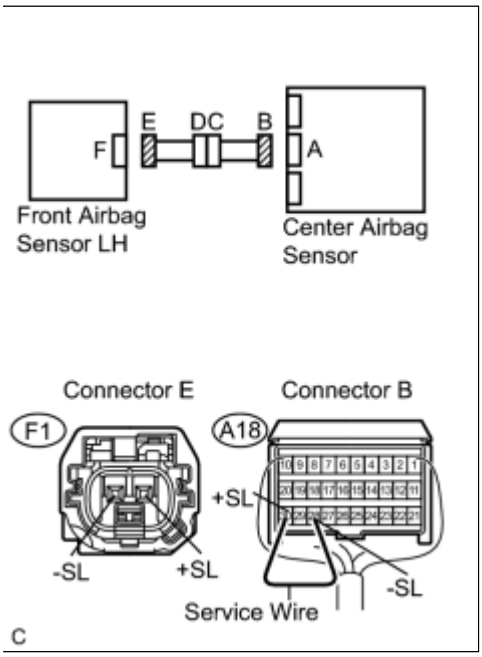
OK:

The connectors are properly connected.

NG ▶ CONNECT CONNECTOR

OK ▼

| 3. | CHECK FRONT AIRBAG SENSOR LH CIRCUIT (OPEN) |
|---|---|




(a) Disconnect the connectors from the center airbag sensor and the front airbag sensor LH.

(b) Using a service wire, connect A18-30 (+SL) and A18-28 (-SL) of connector B.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

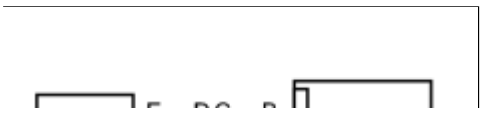
| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F1-2 (+SL) - F1-1 (-SL) | Below 1 Ω |

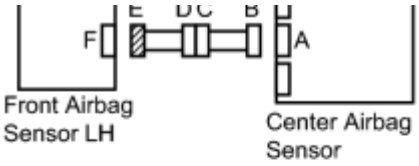
**NG** ▶ **CHECK ENGINE ROOM MAIN WIRE (OPEN)**

**OK**

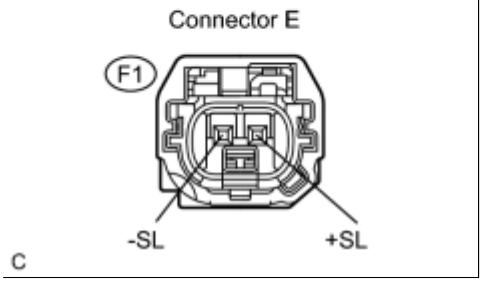
▼

| 4. | CHECK FRONT AIRBAG SENSOR LH CIRCUIT (SHORT) |
|---|---|






(a) Disconnect the service wire from connector B.




(b) Measure the resistance of the wire harness side connector.

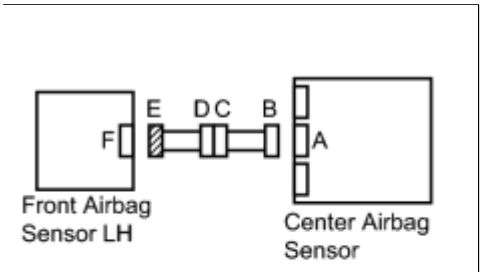
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F1-2 (+SL) - F1-1 (-SL) | 1 MΩ or higher |

**NG** ▶ **CHECK ENGINE ROOM MAIN WIRE (SHORT)**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK FRONT AIRBAG SENSOR LH CIRCUIT (TO B+)** |



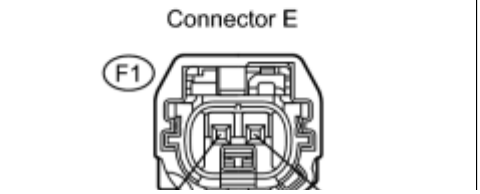

(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F1-2 (+SL) - Body ground | Below 1 V |
| F1-1 (-SL) - Body ground | Below 1 V |



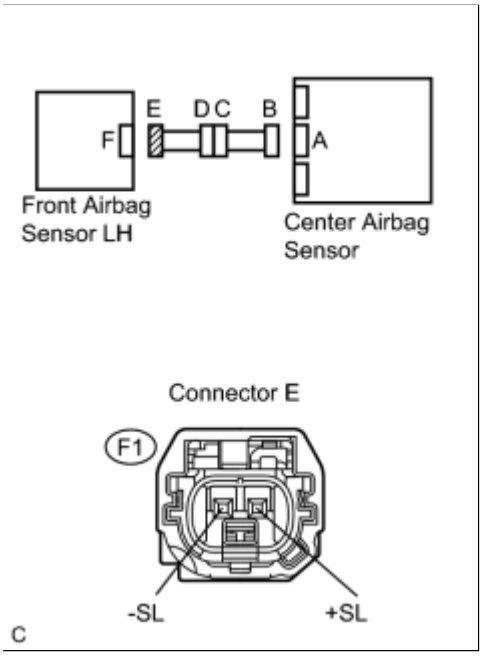

**NG** ▶ **CHECK ENGINE ROOM MAIN WIRE (TO B+)**




**OK**

| 6. | CHECK FRONT AIRBAG SENSOR LH CIRCUIT (TO GROUND) |
|---|---|

(a) Turn the power switch OFF.




(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| F1-2 (+SL) - Body ground | 1 MΩ or higher |
| F1-1 (-SL) - Body ground | 1 MΩ or higher |

**NG** ▶ **CHECK ENGINE ROOM MAIN WIRE (TO GROUND)**

**OK**

| 7. | CHECK FRONT AIRBAG SENSOR LH |
|---|---|

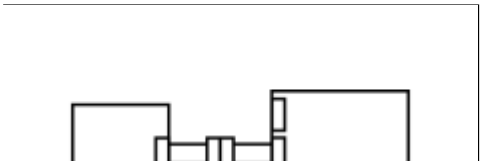
(a) Connect the connectors to the center airbag sensor.

(b) Interchange the front airbag sensor LH with the front airbag sensor RH and connect the connectors to them.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

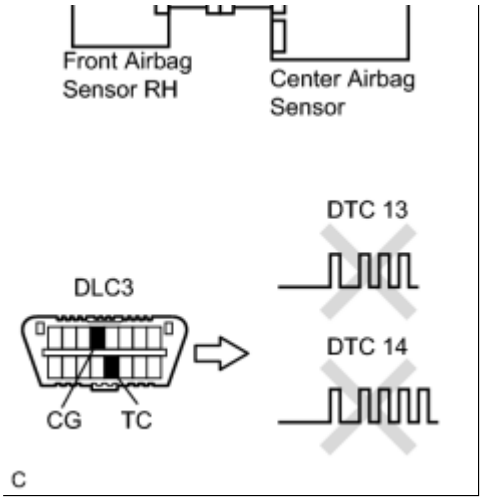
(e) Clear the DTCs INFO .



(f) Turn the power switch OFF.

(g) Turn the power switch ON (IG), and wait for at least 60 seconds.

(h) Check for DTCs INFO




(f) Check for DTCs [redacted].

**Result**

| RESULT | PROCEED TO |
|---|---|
| DTC B1610/13 and B1615/14 are not output. | A |
| DTC B1615/14 is output. | B |
| DTC B1610/13 is output. | C |

**HINT:**

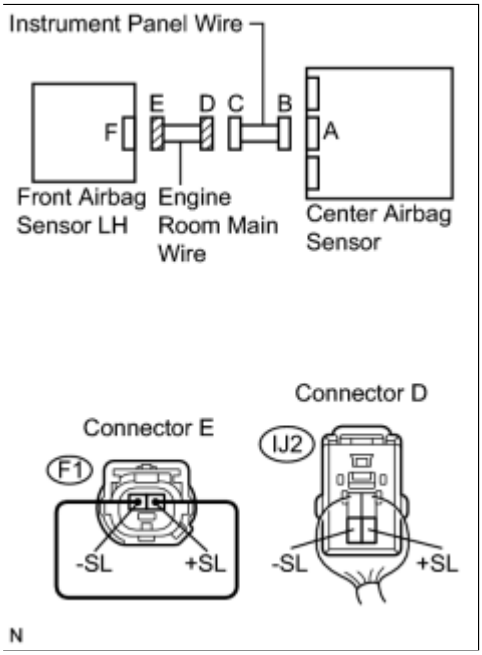
**DTCs other than DTC B1610/13 and B1615/14 may be output at this time, but they are not related to this check.**

**C ▶ REPLACE FRONT AIRBAG SENSOR LH**

**B ▶ REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**A ▶ USE SIMULATION METHOD TO CHECK**

| 8. | CHECK ENGINE ROOM MAIN WIRE (OPEN) |
|---|---|




(a) Disconnect the service wire from connector B.

(b) Disconnect the instrument panel wire connector from the engine room main wire.

(c) Using a service wire, connect terminals F1-2 (+SL) and F1-1 (-SL) of connector E.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(d) Measure the resistance of the wire harness side connector.

Standard resistance:

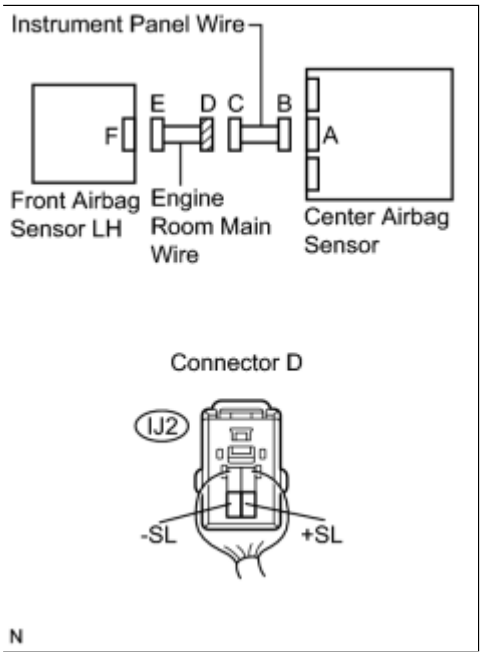
| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-3 (+SL) - IJ2-4(-SL) | Below 1 Ω |

**NG ▶ REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

**OK ▶ REPAIR OR REPLACE**

**OK** ▶ **INSTRUMENT PANEL WIRE**

| 9. | CHECK ENGINE ROOM MAIN WIRE (SHORT) |
|---|---|




(a) Disconnect the engine room main wire connector from the instrument panel wire.

(b) Measure the resistance of the wire harness side connector.

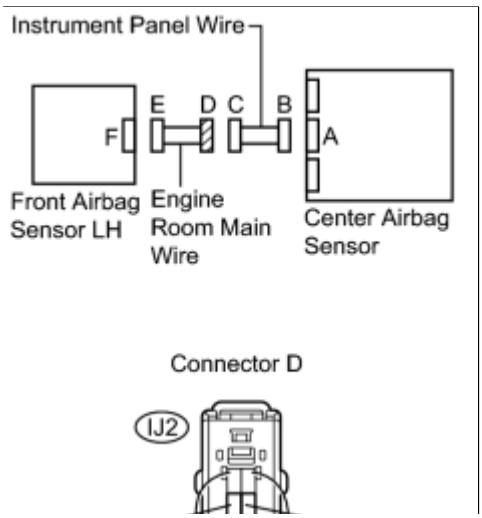
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-3 (+SL) - IJ2-4 (-SL) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| 10. | CHECK ENGINE ROOM MAIN WIRE (TO B+) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the engine room main wire connector from the instrument panel wire.

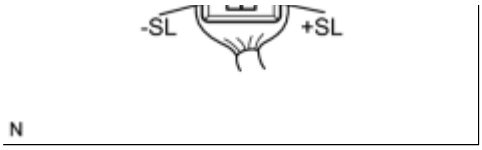
(d) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(e) Turn the power switch ON (IG).

(f) Measure the voltage of the wire harness side connector.

Standard voltage:

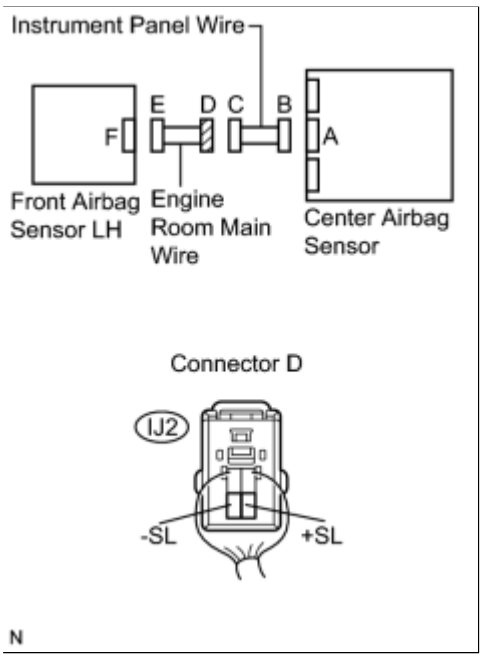
| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-3 (+SL) - Body ground | Below 1 V |
| IJ2-4 (-SL) - Body ground | Below 1 V |




**NG** ▶ **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| 11. | CHECK ENGINE ROOM MAIN WIRE (TO GROUND) |
|---|---|




(a) Disconnect the engine room main wire connector from the instrument panel wire.

(b) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IJ2-3 (+SL) - Body ground | 1 MΩ or higher |
| IJ2-4 (-SL) - Body ground | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE ENGINE ROOM MAIN WIRE**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| DTC | B1620/21 | Driver Side - Side Airbag Sensor Circuit Malfunction |
|---|---|---|

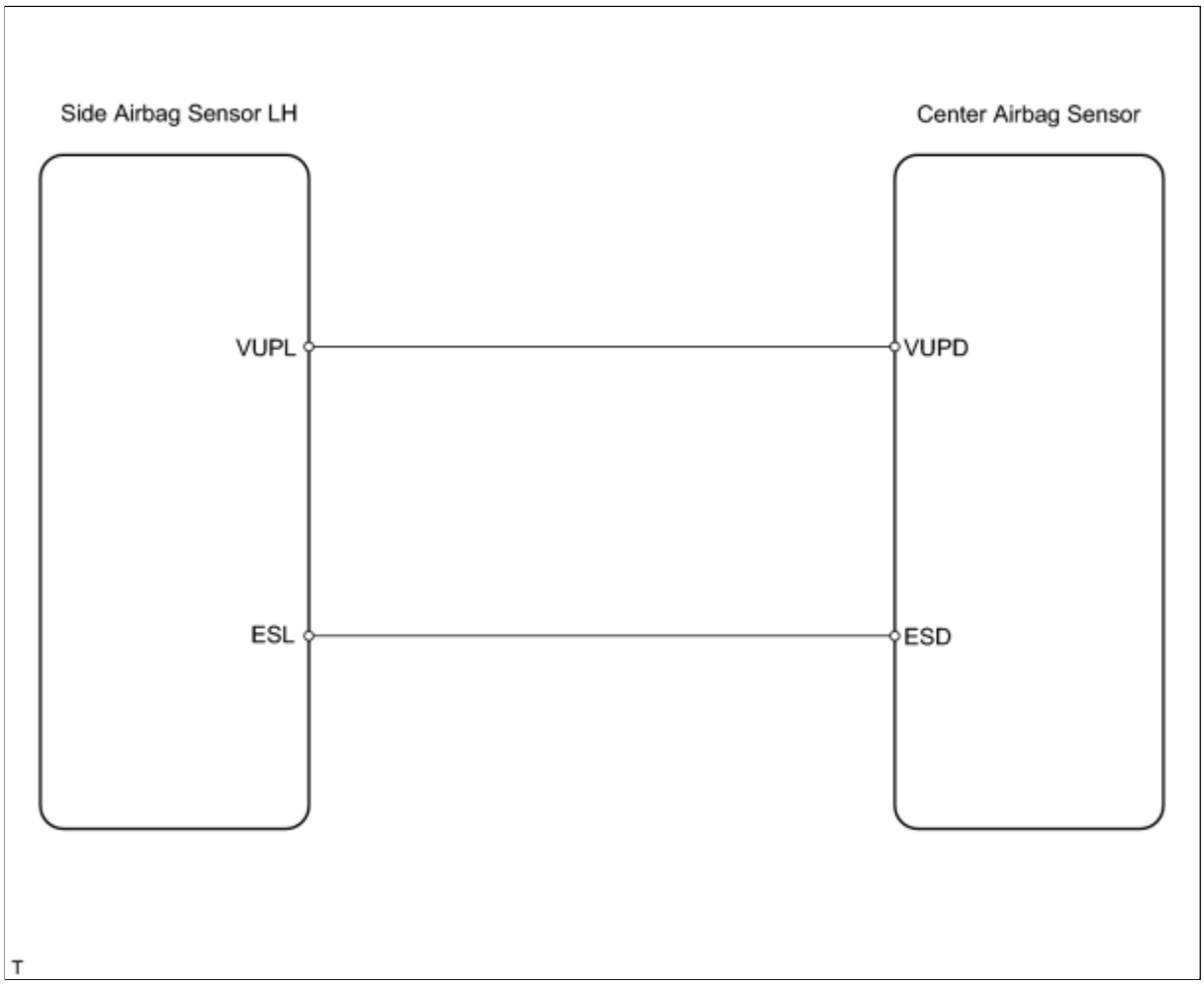
## DESCRIPTION

The side airbag sensor LH consists of the safing sensor, the diagnostic circuit and the lateral deceleration sensor. The center airbag sensor receives signals from the lateral deceleration sensor and determines whether or not the SRS should be activated.

DTC B1620/21 is recorded when a malfunction is detected in the side airbag sensor LH circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1620/21 | When one of following conditions is met:<br>• Center airbag sensor receives line short signal, open signal, short to ground or B+ short signal from side airbag sensor LH sensor for 2 seconds<br>• Side airbag sensor LH malfunction<br>• Center airbag sensor malfunction | • Floor wire<br>• Center airbag sensor<br>• Side airbag sensor LH |

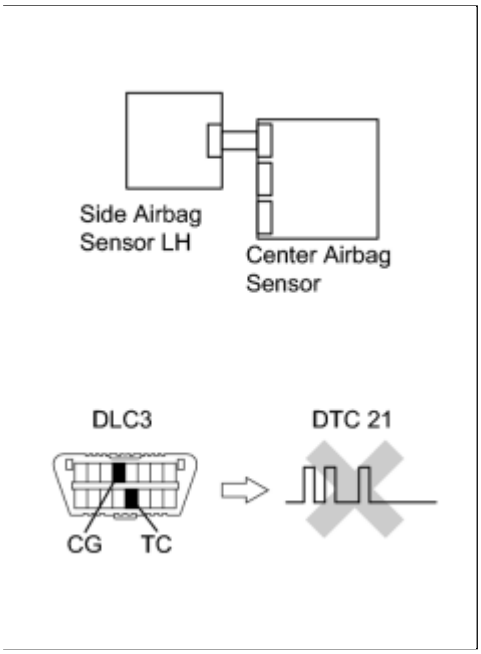
## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |




(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check for DTCs INFO .

OK:
DTC B1620/21 is not output.

**HINT:**

**DTCs other than DTC B1620/21 may be output at this time, but they are not related to this check.**

OK ▶ USE SIMULATION METHOD TO CHECK

NG ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and side airbag sensor LH.

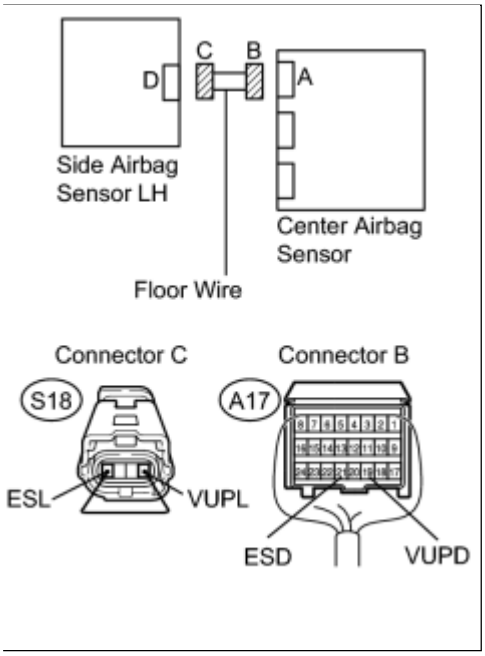
OK:
Connectors are connected.

NG ▶ CONNECT CONNECTOR

OK ▼

| 3. | CHECK FLOOR WIRE (OPEN) |
|---|---|

(a) Disconnect the connectors from the center airbag sensor and side airbag sensor LH.




(b) Using a service wire, connect terminals S18-2 (VUPL) and S18-1 (ESL) of connector C.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

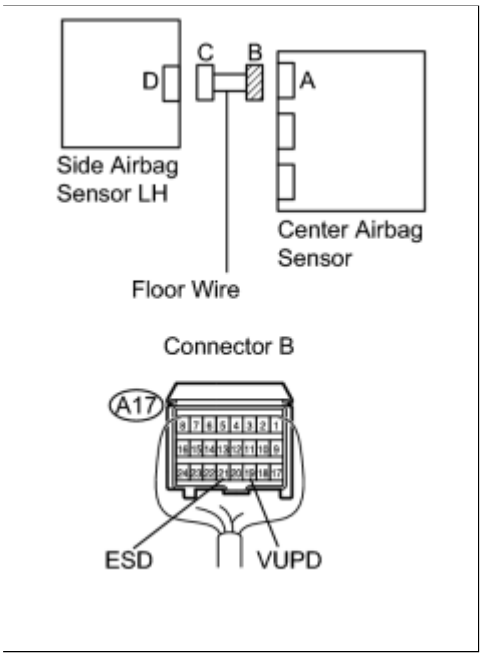
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-19 (VUPD) - A17-21 (ESD) | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 4. | CHECK FLOOR WIRE (SHORT) |
|---|---|




(a) Disconnect the service wire from connector C.

(b) Measure the resistance of the wire harness side connector.

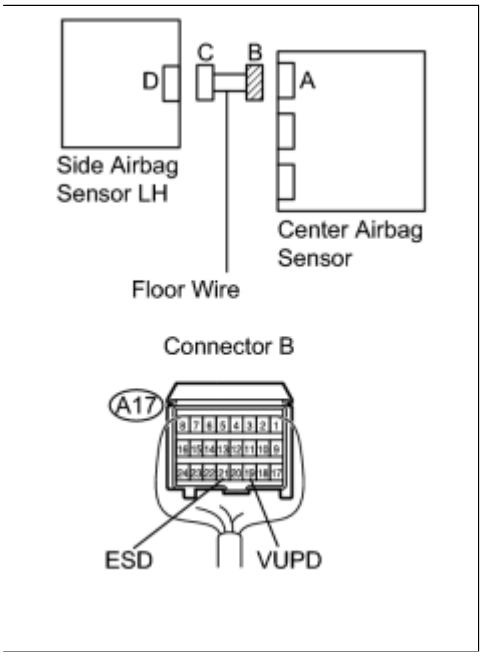
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-19 (VUPD) - A17-21 (ESD) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 5. | CHECK FLOOR WIRE (TO B+) |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

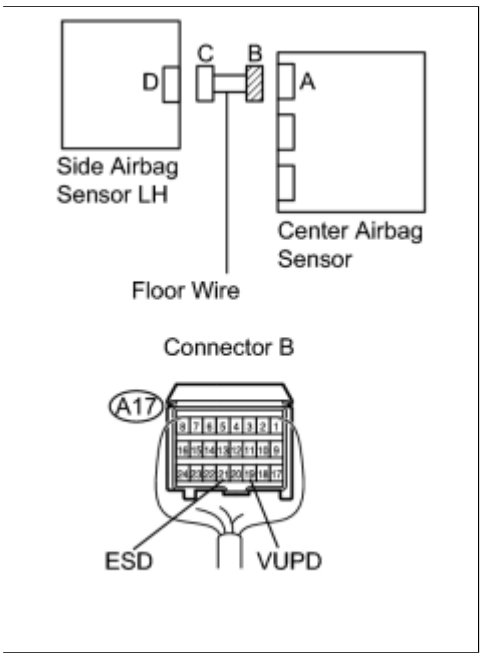
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-19 (VUPD) - Body ground | Below 1 V |
| A17-21 (ESD) - Body ground | Below 1 V |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 6. | CHECK FLOOR WIRE (TO GROUND) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-19 (VUPD) - Body ground | 1 MΩ or higher |
| A17-21 (ESD) - Body ground | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 7. | CHECK SIDE AIRBAG SENSOR LH |
|---|---|

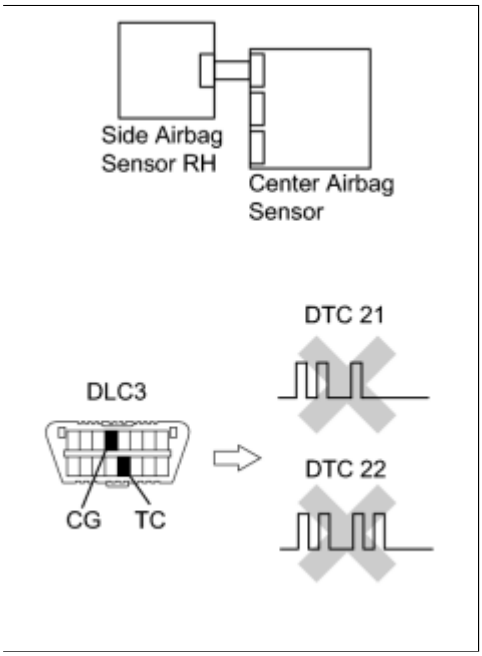
(a) Connect the connector to the center airbag sensor.

(b) Interchange the side airbag sensor LH with the side airbag sensor RH and connect the connectors to them.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Clear the DTCs INFO .




(f) Turn the power switch OFF.

(g) Turn the power switch ON (IG), and wait for at least 60 seconds.

(h) Check for DTCs INFO .

**Result**

| RESULT | PROCEED TO |
|---|---|
| DTC B1620/21 and B1625/22 are not output | A |
| DTC B1620/21 is output | B |
| DTC B1625/22 is output | C |

**HINT:**

**DTCs other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.**

**C** ▶ **REPLACE SIDE AIRBAG SENSOR LH**

**B** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**A** ▶ **USE SIMULATION METHOD TO CHECK**

| DTC | B1625/22 | Front Passenger Side - Side Airbag Sensor Circuit Malfunction |
|---|---|---|

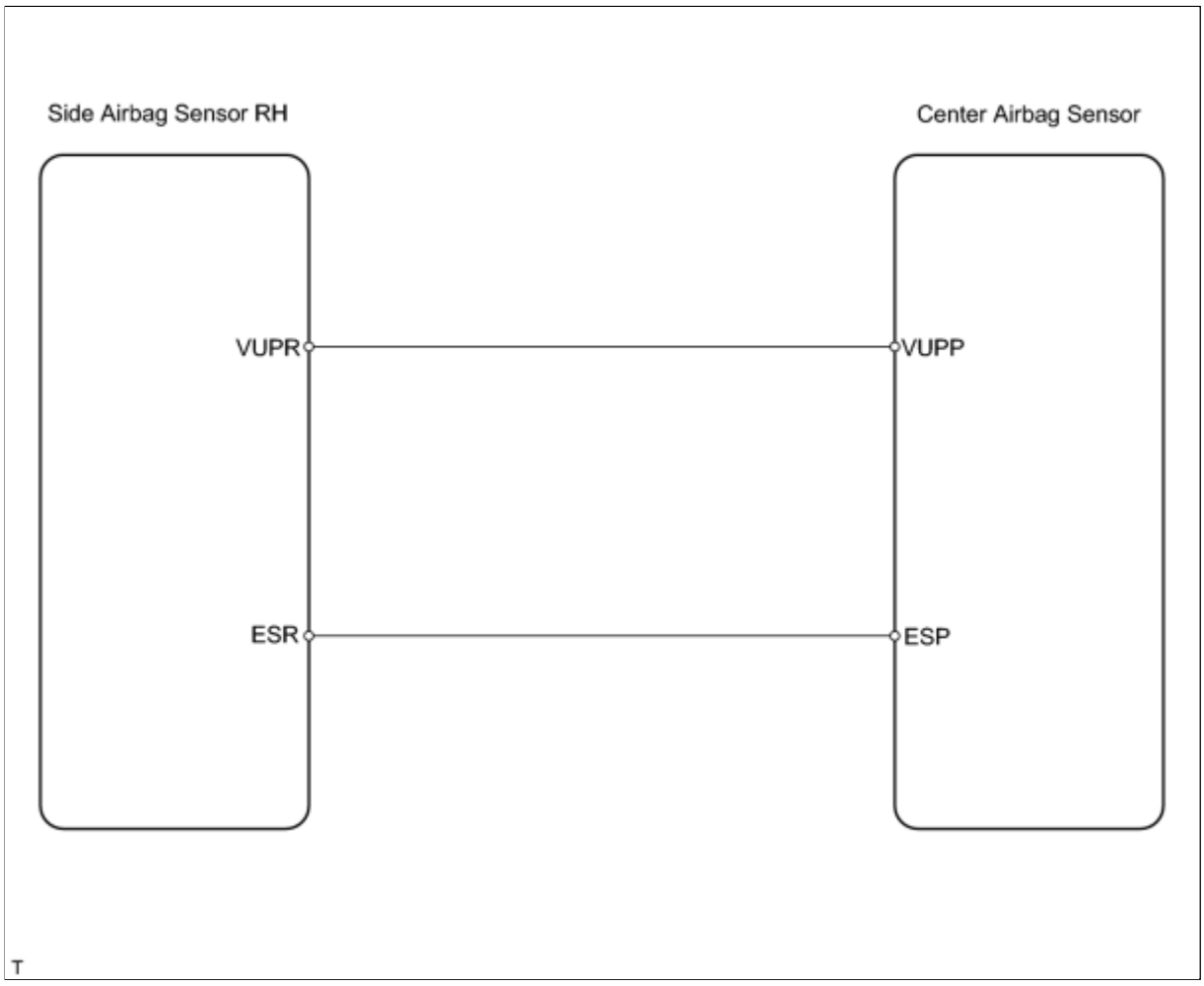
## DESCRIPTION

The side airbag sensor RH consists of the safing sensor, the diagnostic circuit and the lateral deceleration sensor. The center airbag sensor receives signals from the lateral deceleration sensor and determines whether or not the SRS should be activated.

DTC B1625/22 is recorded when a malfunction is detected in the side airbag sensor RH circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1625/22 | When one of following conditions is met:<br>• Center airbag sensor receives line short signal, open signal, short to ground or B+ short signal from side airbag sensor RH sensor for 2 seconds<br>• Side airbag sensor RH malfunction<br>• Center airbag sensor malfunction | • Floor wire No. 2<br>• Center airbag sensor<br>• Side airbag sensor RH |

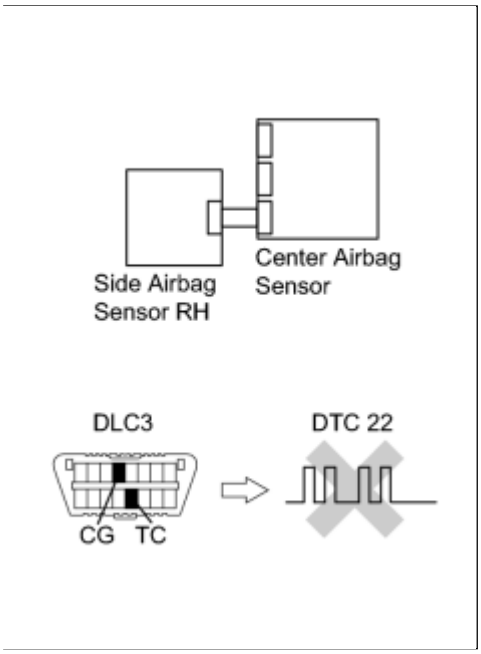
## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |




(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check for DTCs INFO .

OK:
DTC B1622/25 is not output.

**HINT:**

**DTCs other than DTC B1622/25 may be output at this time, but they are not related to this check.**

OK ▶ USE SIMULATION METHOD TO CHECK

NG ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and side airbag sensor RH.

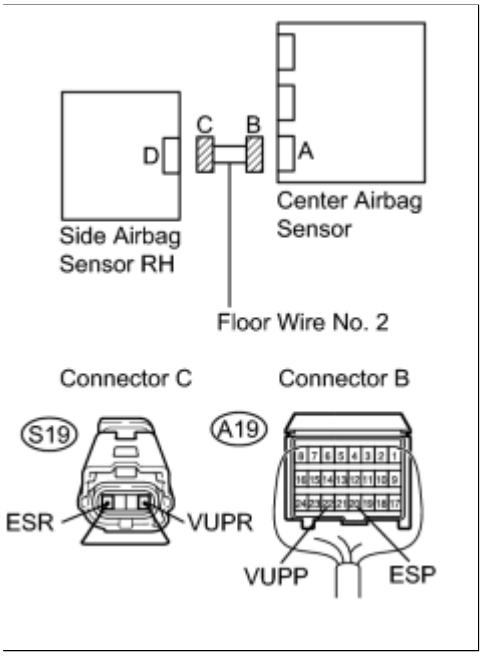
OK:
Connectors are connected.

NG ▶ CONNECT CONNECTOR

OK ▼

| 3. | CHECK FLOOR WIRE NO. 2 (OPEN) |
|---|---|

(a) Disconnect the connectors from the center airbag sensor and side airbag sensor RH.




(b) Using a service wire, connect terminals S19-2 (VUPR) and S19-1 (ESR) of connector C.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

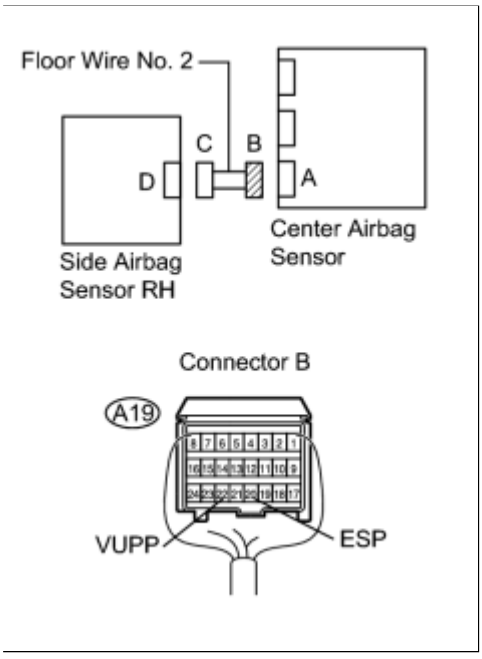
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-22 (VUPP) - A19-20 (ESP) | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 4. | CHECK FLOOR WIRE NO. 2 (SHORT) |
|---|---|




(a) Disconnect the service wire from connector C.

(b) Measure the resistance of the wire harness side connector.

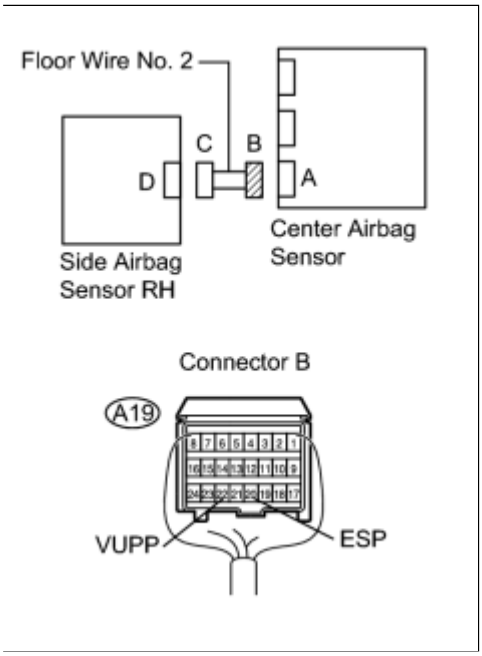
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-22 (VUPP) - A19-20 (ESP) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 5. | CHECK FLOOR WIRE NO. 2 (TO B+) |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

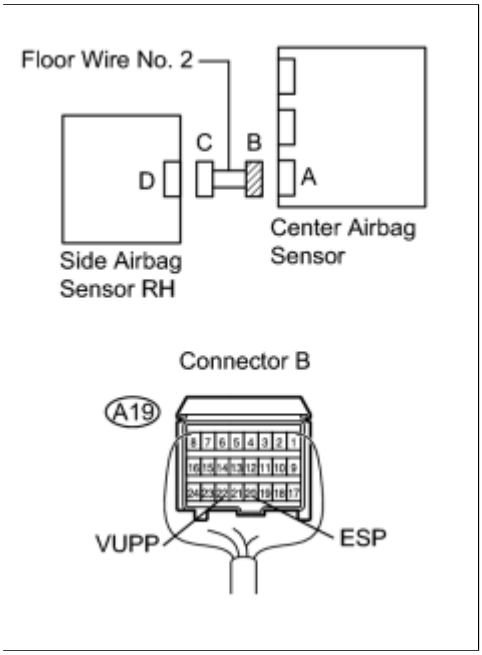
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-22 (VUPP) - Body ground | Below 1 V |
| A19-20 (ESP) - Body ground | Below 1 V |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 6. | CHECK FLOOR WIRE NO. 2 (TO GROUND) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-22 (VUPP) - Body ground | 1 MΩ or higher |
| A19-20 (ESP) - Body ground | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 7. | CHECK SIDE AIRBAG SENSOR RH |
|---|---|

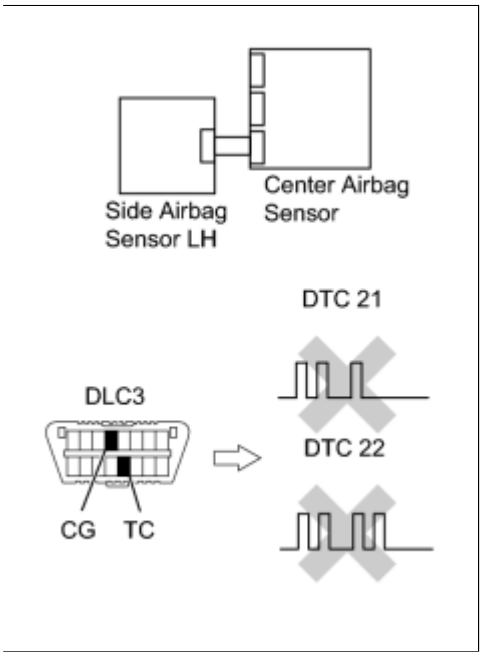
(a) Connect the connector to the center airbag sensor.

(b) Interchange the side airbag sensor RH with the side airbag sensor LH and connect the connectors to them.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Clear the DTCs INFO .




(f) Turn the power switch OFF.

(g) Turn the power switch ON (IG), and wait for at least 60 seconds.

(h) Check for DTCs INFO .

**Result**

| RESULT | PROCEED TO |
|---|---|
| DTC B1620/21 and B1625/22 are not output | A |
| DTC B1625/22 is output | B |
| DTC B1620/21 is output | C |

**HINT:**

**DTCs other than DTC B1620/21 and B1625/22 may be output at this time, but they are not related to this check.**

**C** ▶ **REPLACE SIDE AIRBAG SENSOR RH**

**B** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**A** ▶ **USE SIMULATION METHOD TO CHECK**

| DTC | B1630/23 | Driver Side Rear Airbag Sensor Circuit Malfunction |
|---|---|---|

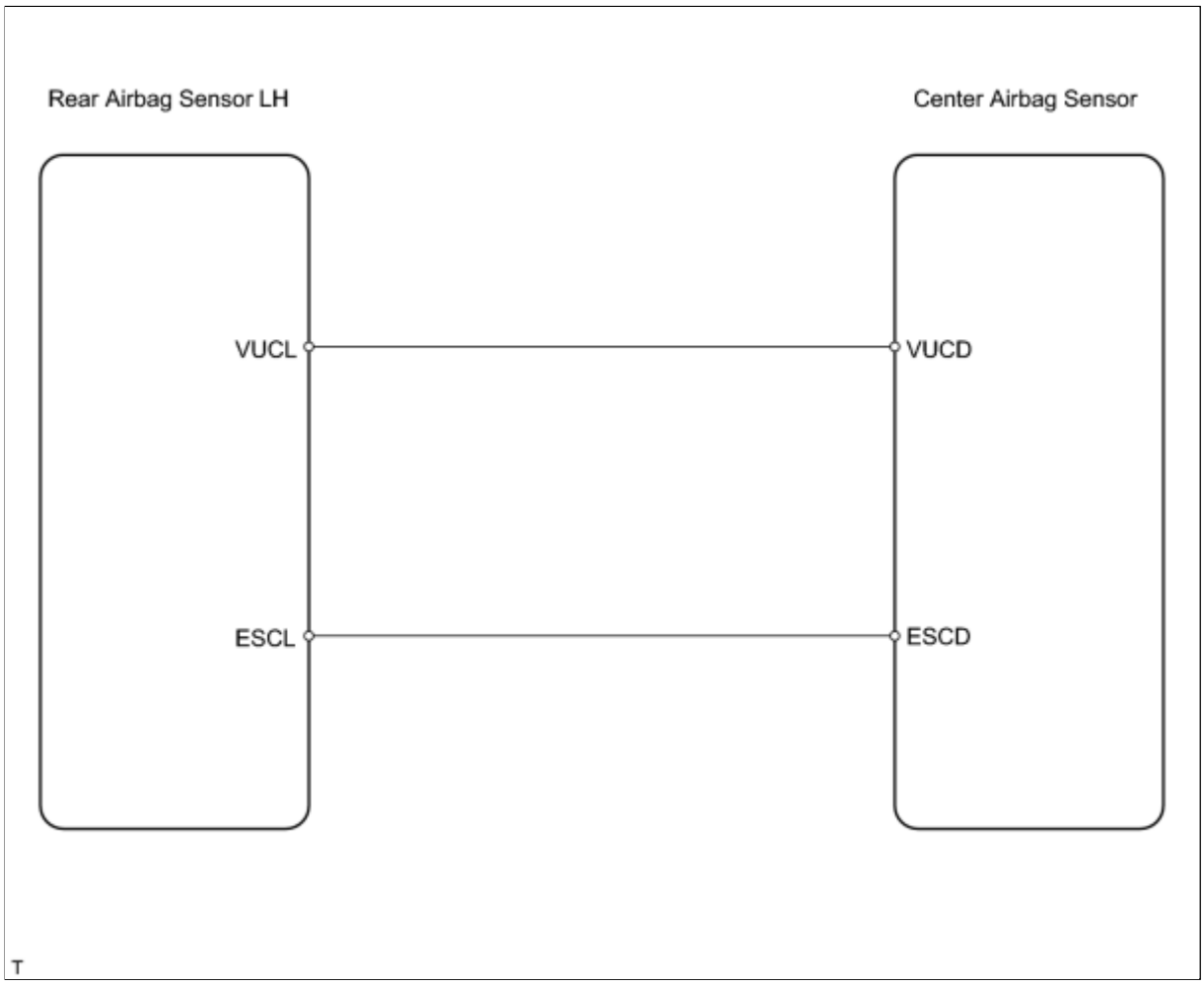
## DESCRIPTION

The rear airbag sensor LH consists of the safing sensor, the diagnostic circuit and the lateral deceleration sensor. The center airbag sensor receives signals from the lateral deceleration sensor and determines whether or not the SRS should be activated.

DTC B1630/23 is recorded when a malfunction is detected in the rear airbag sensor LH circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1630/23 | When one of following conditions is met:<br>• Center airbag sensor receives line short signal, open signal, short to ground or B+ short signal from rear airbag sensor LH sensor for 2 seconds<br>• Rear airbag sensor LH malfunction<br>• Center airbag sensor malfunction | • Floor wire<br>• Center airbag sensor<br>• Rear airbag sensor LH |

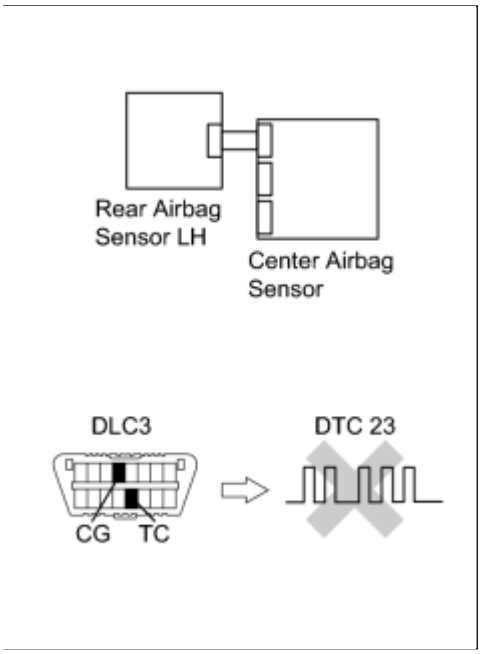
## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |




(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check for DTCs INFO .

OK:

DTC B1630/23 is not output.

**HINT:**

**DTCs other than DTC B1630/23 may be output at this time, but they are not related to this check.**

OK ▶ USE SIMULATION METHOD TO CHECK

NG ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and rear airbag sensor LH.

OK:

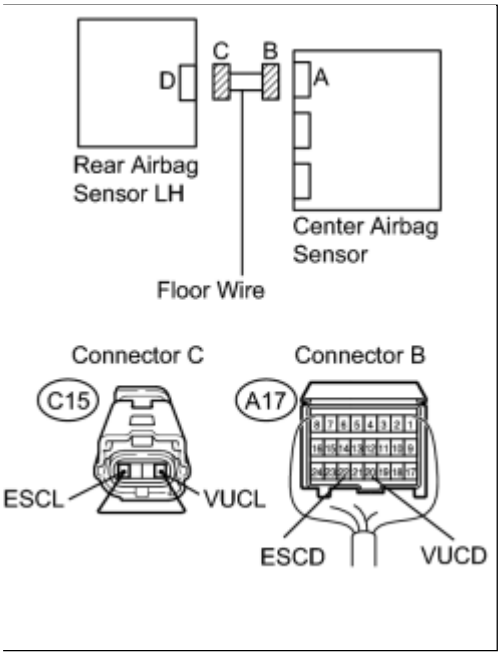
Connectors are connected.

NG ▶ CONNECT CONNECTOR

OK ▼

| 3. | CHECK FLOOR WIRE (OPEN) |
|---|---|

(a) Disconnect the connectors from the center airbag sensor and rear airbag sensor LH.




(b) Using a service wire, connect terminals C15-2 (VUCL) and C15-1 (ESCL) of connector C.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

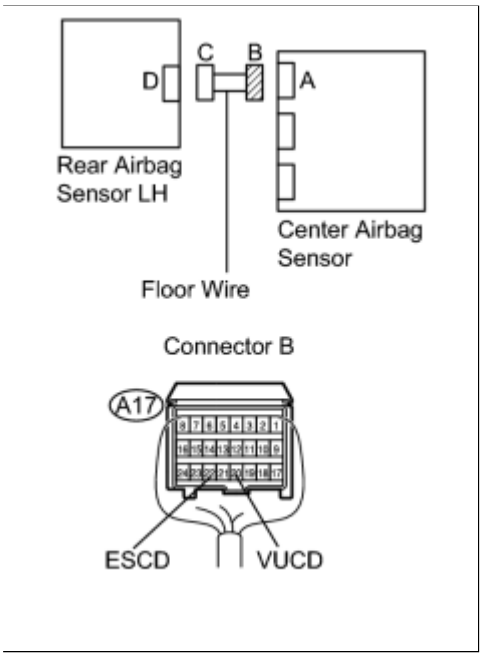
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-20 (VUCD) - A17-22 (ESCD) | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 4. | CHECK FLOOR WIRE (SHORT) |
|---|---|




(a) Disconnect the service wire from connector C.

(b) Measure the resistance of the wire harness side connector.

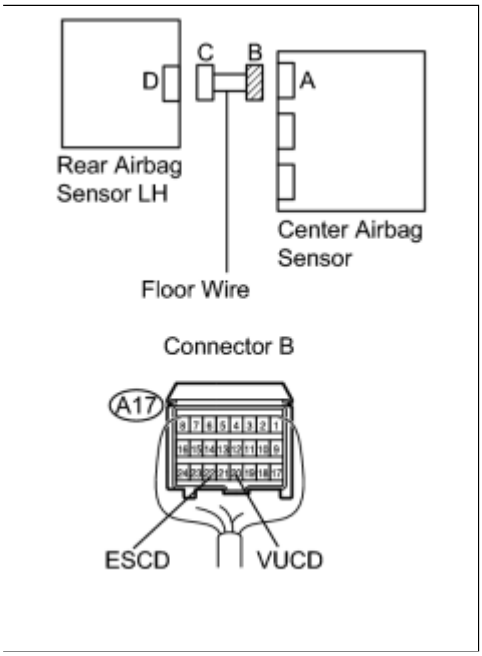
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-20 (VUCD) - A17-22 (ESCD) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 5. | CHECK FLOOR WIRE (TO B+) |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

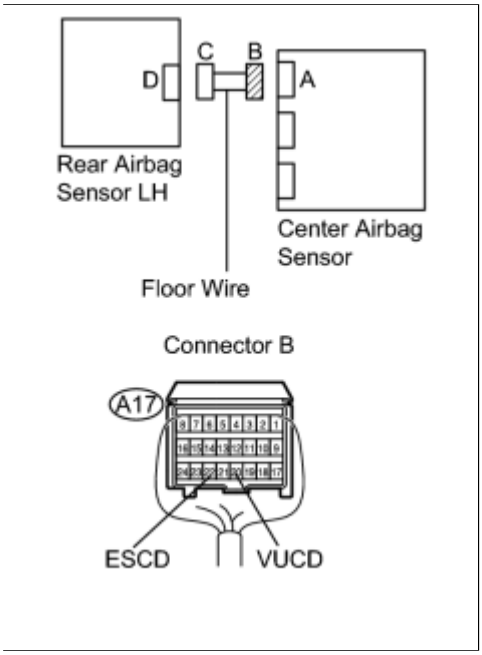
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-20 (VUCD) - Body ground | Below 1 V |
| A17-22 (ESCD) - Body ground | Below 1 V |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 6. | CHECK FLOOR WIRE (TO GROUND) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A17-20 (VUCD) - Body ground | 1 MΩ or higher |
| A17-22 (ESCD) - Body ground | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 7. | CHECK REAR AIRBAG SENSOR LH |
|---|---|

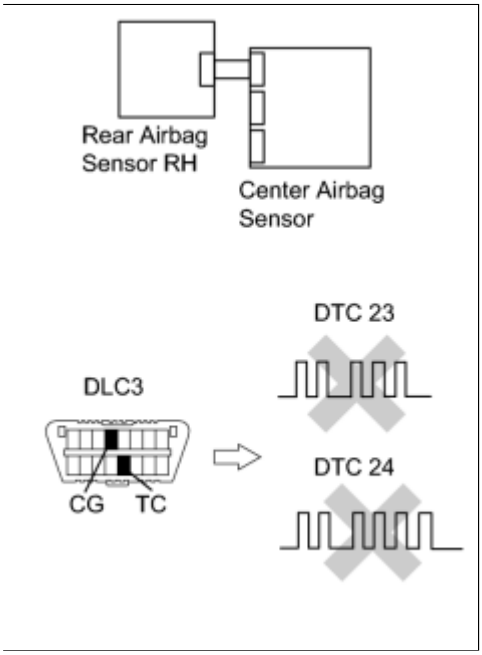
(a) Connect the connector to the center airbag sensor.

(b) Interchange the side airbag sensor LH with the side airbag sensor RH and connect the connectors to them.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Clear the DTCs INFO .




(f) Turn the power switch OFF.

(g) Turn the power switch ON (IG), and wait for at least 60 seconds.

(h) Check for DTCs INFO .

**Result**

| RESULT | PROCEED TO |
|---|---|
| DTC B1630/23 and B1635/24 are not output | A |
| DTC B1630/23 is output | B |
| DTC B1635/24 is output | C |

**HINT:**

**DTCs other than DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.**

**C** ▶ **REPLACE REAR AIRBAG SENSOR LH**

**B** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**A** ▶ **USE SIMULATION METHOD TO CHECK**

| DTC | B1635/24 | Front Passenger Side Rear Airbag Sensor Circuit Malfunction |
|---|---|---|

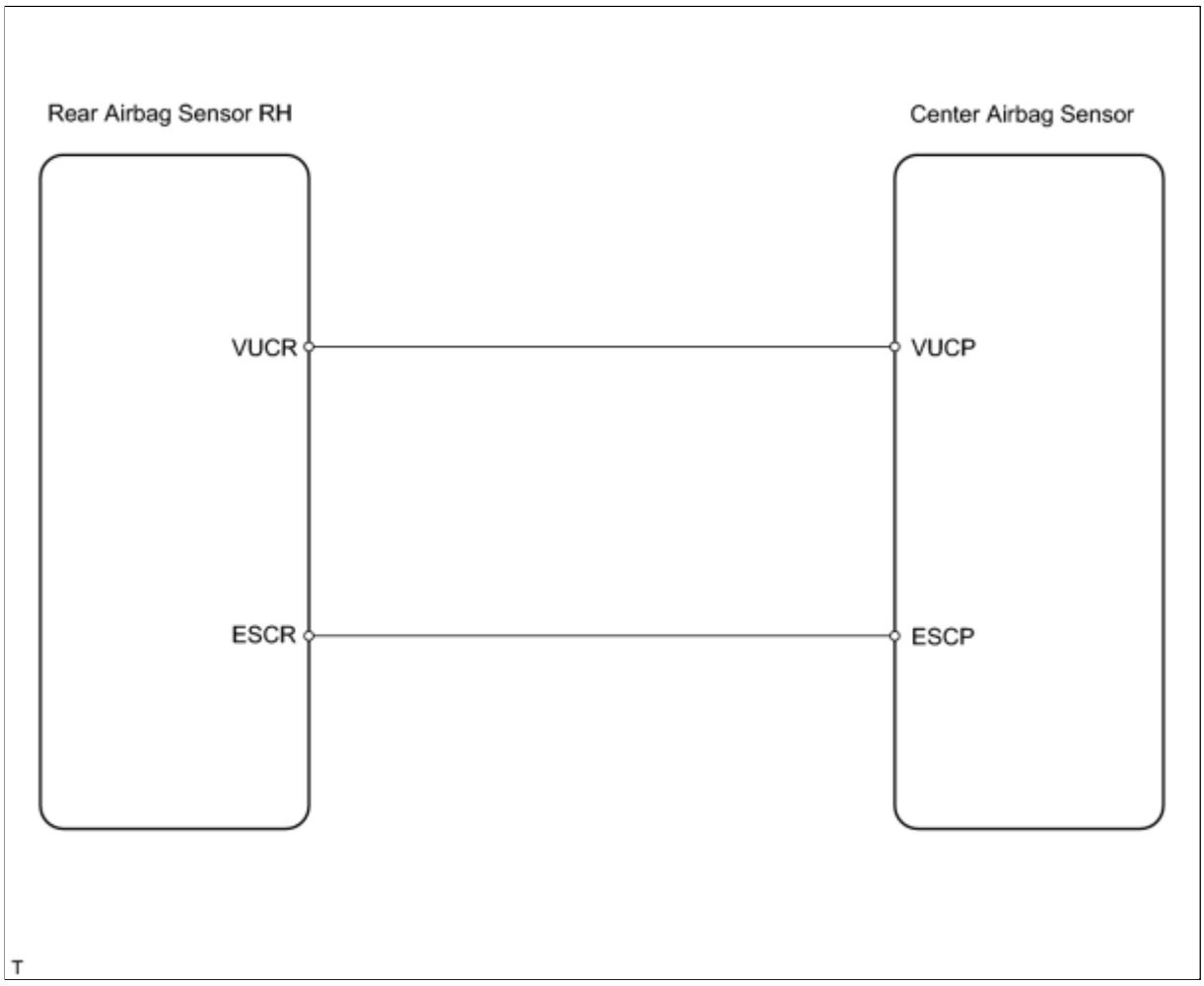
## DESCRIPTION

The rear airbag sensor RH consists of the safing sensor, the diagnostic circuit and the lateral deceleration sensor. The center airbag sensor receives signals from the lateral deceleration sensor and determines whether or not the SRS should be activated.

DTC B1635/24 is recorded when a malfunction is detected in the rear airbag sensor RH circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1635/24 | When one of following conditions is met:<br>• Center airbag sensor receives line short signal, open signal, short to ground or B+ short signal from rear airbag sensor RH sensor for 2 seconds<br>• Rear airbag sensor RH malfunction<br>• Center airbag sensor malfunction | • Floor wire No. 2<br>• Center airbag sensor sensor<br>• Rear airbag sensor RH |

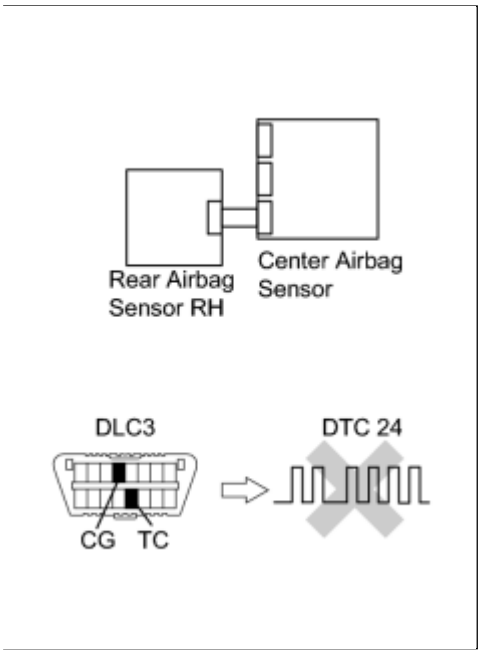
## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |




(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check for DTCs INFO .

OK:

DTC B1635/24 is not output.

**HINT:**

**DTCs other than DTC B1635/24 may be output at this time, but they are not related to this check.**

OK ▶ USE SIMULATION METHOD TO CHECK

NG ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and rear airbag sensor RH.

OK:

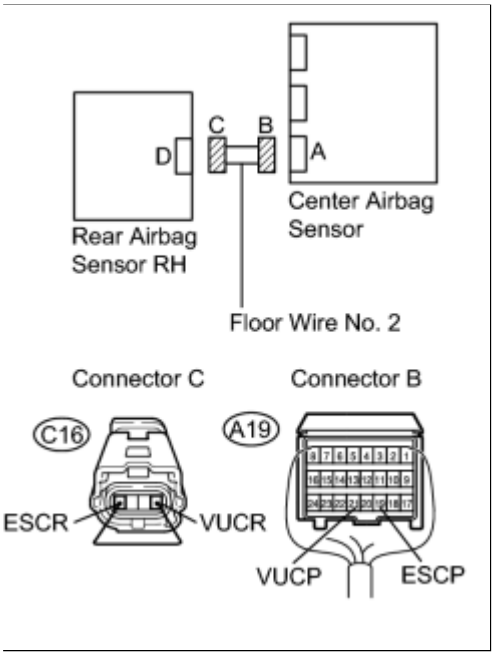
Connectors are connected.

NG ▶ CONNECT CONNECTOR

OK ▼

| 3. | CHECK FLOOR WIRE NO. 2 (OPEN) |
|---|---|

(a) Disconnect the connectors from the center airbag sensor and rear airbag sensor RH.




(b) Using a service wire, connect terminals C16-2 (VUCR) and C16-1 (ESCR) of connector C.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

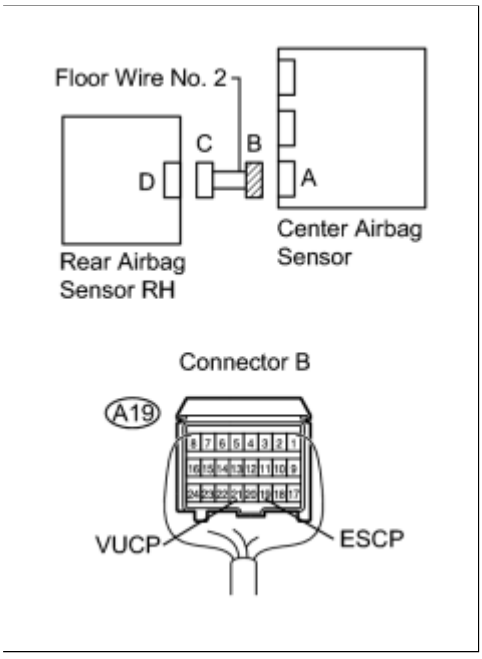
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-21 (VUCP) - A19-19 (ESCP) | Below 1 Ω |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 4. | CHECK FLOOR WIRE NO. 2 (SHORT) |
|---|---|




(a) Disconnect the service wire from connector C.

(b) Measure the resistance of the wire harness side connector.

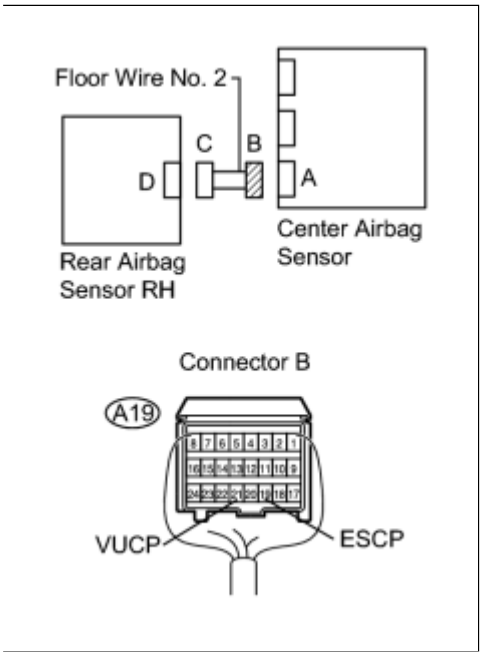
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-21 (VUCP) - A19-19 (ESCP) | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 5. | CHECK FLOOR WIRE NO. 2 (TO B+) |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

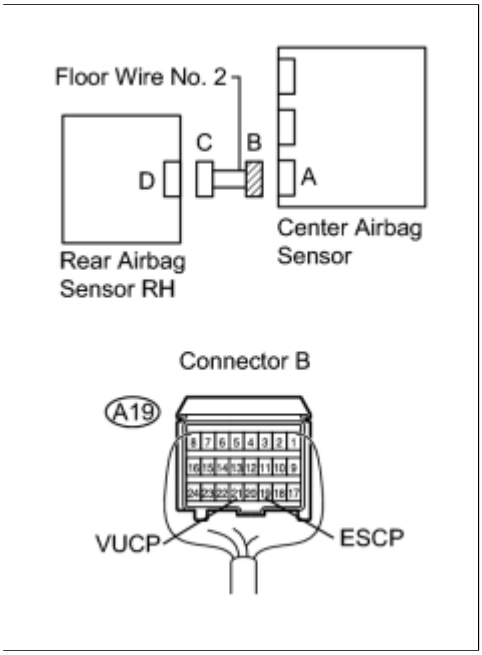
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-21 (VUCP) - Body ground | Below 1 V |
| A19-19 (ESCP) - Body ground | Below 1 V |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 6. | CHECK FLOOR WIRE NO. 2 (TO GROUND) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-21 (VUCP) - Body ground | 1 MΩ or higher |
| A19-19 (ESCP) - Body ground | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| 7. | CHECK REAR AIRBAG SENSOR RH |
|---|---|

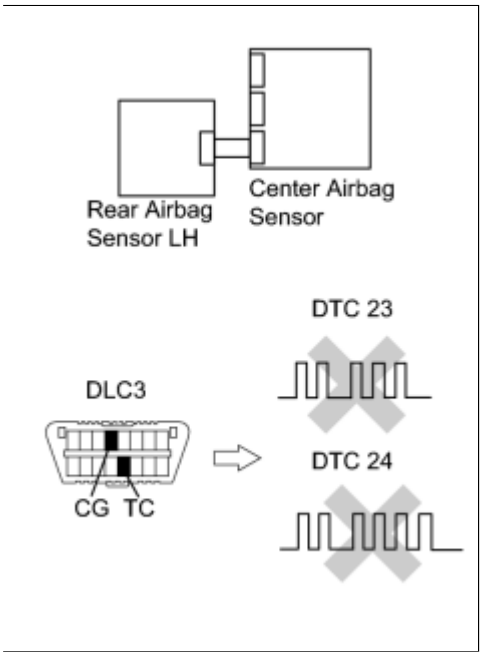
(a) Connect the connector to the center airbag sensor.

(b) Interchange the rear airbag sensor RH with the rear airbag sensor LH and connect the connectors to them.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Clear the DTCs INFO .




(f) Turn the power switch OFF.

(g) Turn the power switch ON (IG), and wait for at least 60 seconds.

(h) Check for DTCs INFO .

**Result**

| RESULT | PROCEED TO |
|---|---|
| DTC B1630/23 and B1635/24 are not output | A |
| DTC B1635/24 is output | B |
| DTC B1630/23 is output | C |

**HINT:**

**DTCs other than DTC B1630/23 and B1635/24 may be output at this time, but they are not related to this check.**

**C** ▶ **REPLACE REAR AIRBAG SENSOR RH**

**B** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**A** ▶ **USE SIMULATION METHOD TO CHECK**

| DTC | B1650/32 | Occupant Classification System Malfunction |
|---|---|---|

## DESCRIPTION

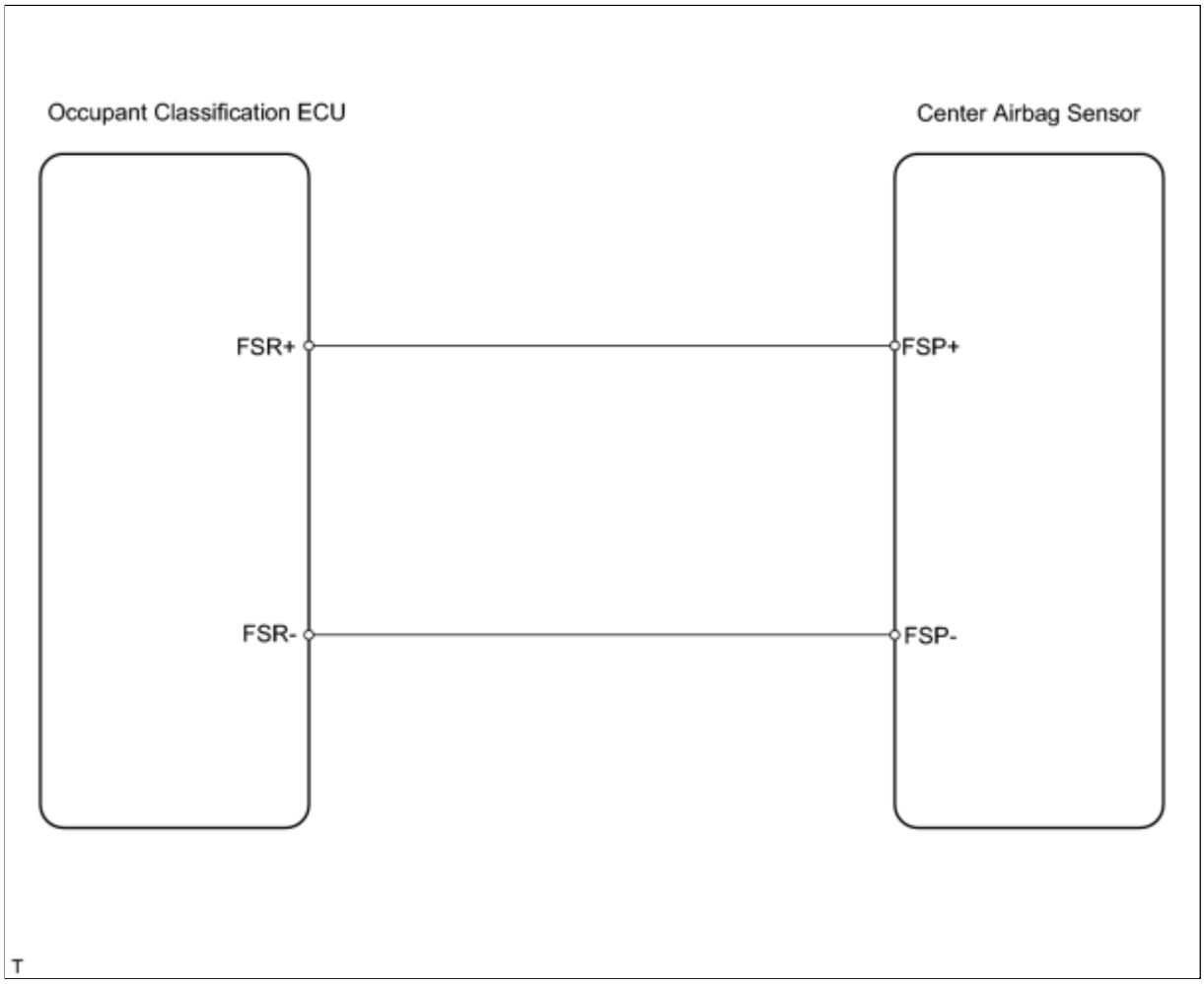
The occupant classification system circuit consists of the center airbag sensor and the occupant classification system.

When the center airbag sensor receives signals from the occupant classification ECU, it determines whether or not the front passenger airbag, front seat side airbag RH and seat belt pretensioner RH should be operated.

DTC B1650/32 is set when a malfunction is detected in the occupant classification system circuit.

| DTC NO. | DTC DETECTION CONDITIONS | TROUBLE AREAS |
|---|---|---|
| B1650/32 | When one of following conditions is met:<br>• Occupant classification system malfunction<br>• Center airbag sensor detects line short signal, open signal, short to ground signal or short to B+ signal from occupant classification system circuit for 2 seconds<br>• Center airbag sensor malfunction | • Floor wire No. 2<br>• Occupant classification system<br>• Center airbag sensor |

## WIRING DIAGRAM



## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC (OCCUPANT CLASSIFICATION ECU) |

(a) Turn the power switch ON (IG), and wait for at least 10 seconds.

(b) Using the Techstream, check for DTCs of the occupant classification ECU INFO .

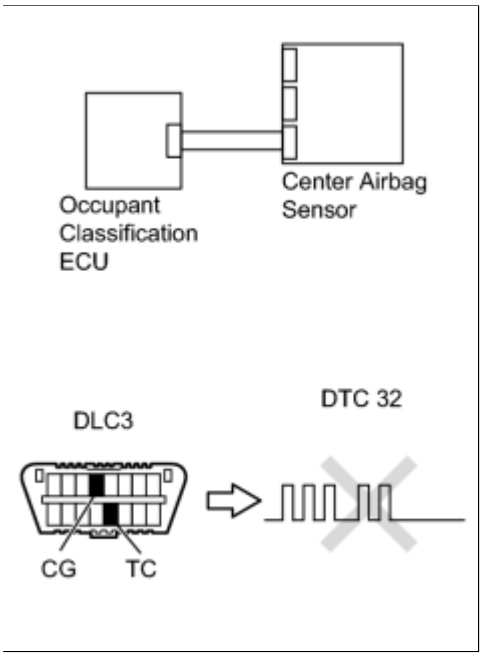
OK:

DTC is not output.

**OK** ▶ **GO TO DTC CHART**

**NG** ▼

| | |
|---|---|
| 2. | CHECK DTC (CENTER AIRBAG SENSOR ASSEMBLY) |




(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check for DTCs INFO .

OK:

DTC B1650/32 is not output.

**HINT:**

**DTCs other than DTC B1650/32 may be output at this time, but they are not related to this check.**

NG ▶ **USE SIMULATION METHOD TO CHECK**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK CONNECTION OF CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and the occupant classification ECU.

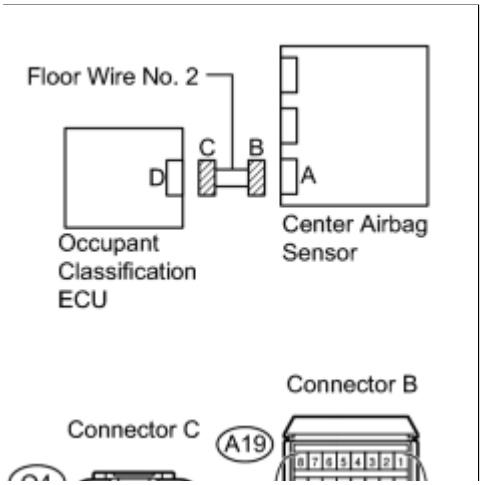
OK:

Connectors are connected.

NG ▶ **CONNECT CONNECTOR**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK FLOOR WIRE NO. 2 (OPEN)** |




(a) Disconnect the connectors from the center airbag sensor and the occupant classification ECU.

(b) Using a service wire, connect terminals O4-8 (FSR+) and O4-4 (FSR-) of connector C.

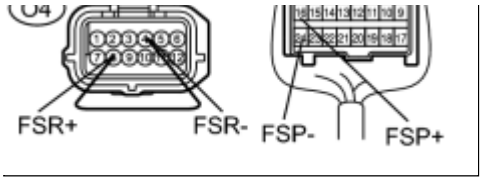
**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

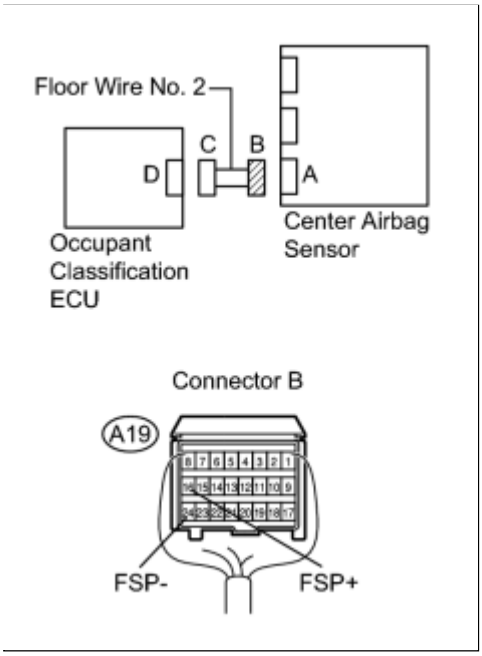
| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-16 (FSP+) - A19-24 (FSP-) | Below 1 Ω |




NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK FLOOR WIRE NO. 2 (SHORT)** |




(a) Disconnect the service wire from connector C.

(b) Measure the resistance of the wire harness side connector.

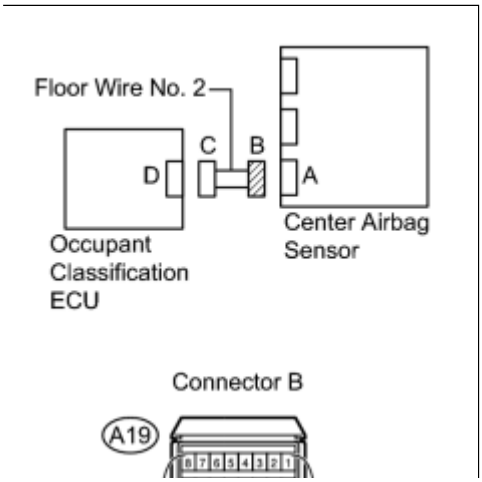
Standard resistance:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-16 (FSP+) - A19-24 (FSP-) | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| | |
|---|---|
| **6.** | **CHECK FLOOR WIRE NO. 2 (TO B+)** |




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

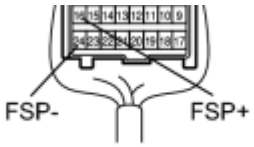
(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

Standard voltage:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-16 (FSP+) - Body ground | Below 1 V |
| A19-24 (FSP-) - Body ground | Below 1 V |

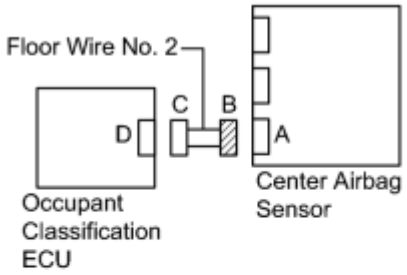
NG ▶ **REPAIR OR**

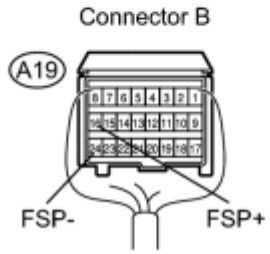



NG → REPLACE FLOOR WIRE NO. 2

OK ↓

| 7. | CHECK FLOOR WIRE NO. 2 (TO GROUND) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A19-16 (FSP+) - Body ground | 1 MΩ or higher |
| A19-24 (FSP-) - Body ground | 1 MΩ or higher |

NG → REPAIR OR REPLACE FLOOR WIRE NO. 2

OK ↓

| 8. | CHECK CENTER AIRBAG SENSOR ASSEMBLY |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Replace the center airbag sensor INFO .

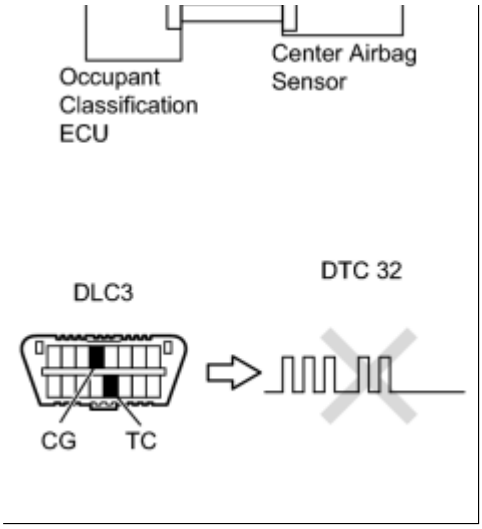
**HINT:**

**Perform the inspection using parts from a normal vehicle when possible.**



(d) Connect the connectors to the center airbag sensor.

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.




(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check for DTCs INFO .

OK:
DTC B1650/32 is not output.

**HINT:**

**DTCs other than DTC B1650/32 may be output at this time, but they are not related to this check.**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

**NG** ▼

| 9. | REPLACE OCCUPANT CLASSIFICATION ECU |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Replace the occupant classification ECU INFO .

**NEXT** ▼

| 10. | PERFORM ZERO POINT CALIBRATION |
|---|---|

(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch ON (IG).

(d) Using the Techstream, perform the zero point calibration INFO .

OK:
"Zero Point Calibration is complete." is displayed on the tester.

NEXT

| | |
|---|---|
| 11. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform the sensitivity check INFO .

Standard value:

27 to 33 kg (59.52 to 72.75 lb)

NEXT END

| DTC | B1653/35 | Seat Position Airbag Sensor Circuit Malfunction |
|---|---|---|

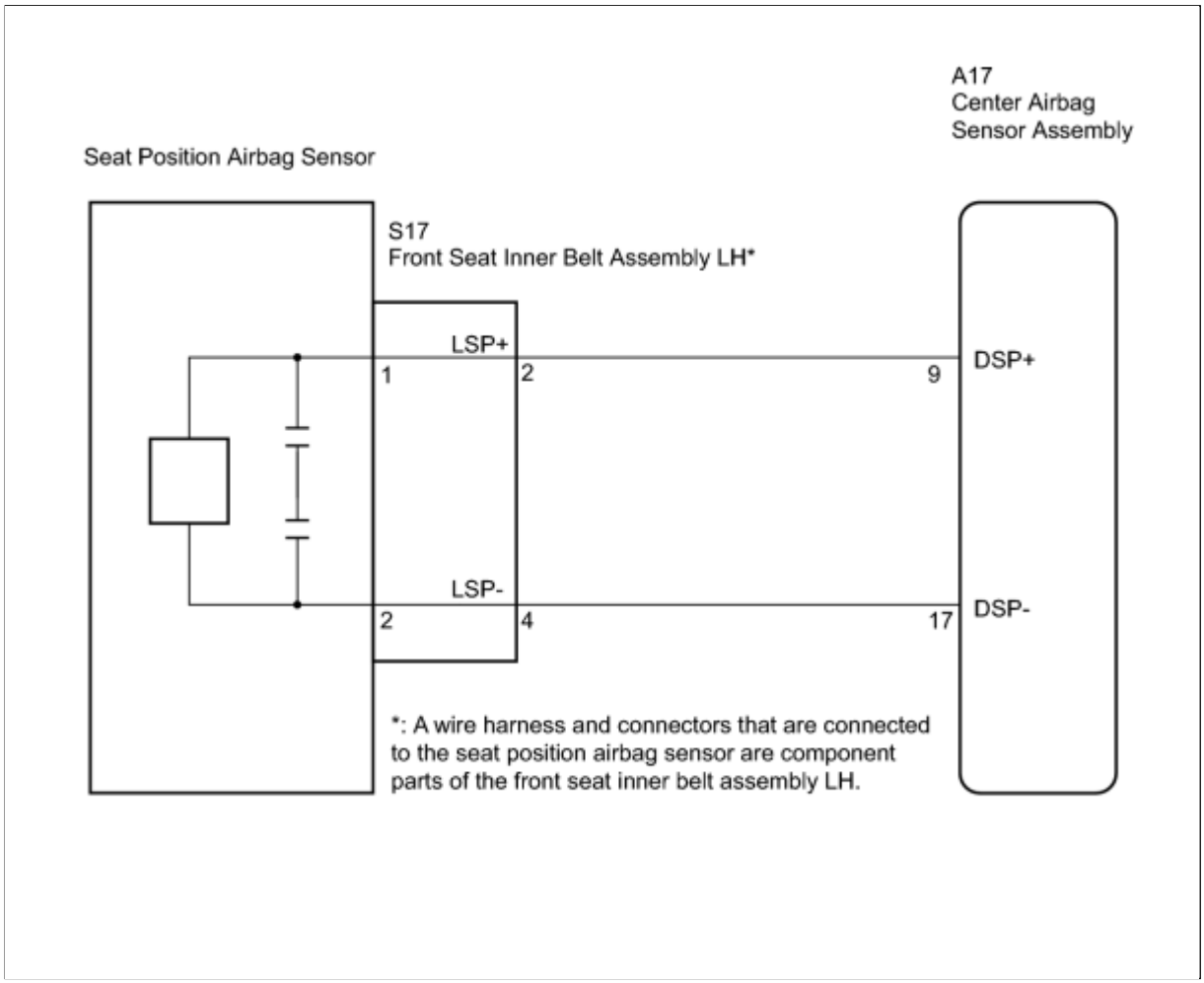
## DESCRIPTION

The seat position airbag sensor circuit consists of the center airbag sensor assembly and the seat position airbag sensor.

DTC B1653/35 is recorded when a malfunction is detected in the seat position airbag sensor circuit.

| DTC NO. | DTC DETECTING CONDITION | TROUBLE AREA |
|---|---|---|
| B1653/35 | • The center airbag sensor assembly receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the seat position airbag sensor circuit for 2 seconds.<br>• Seat position airbag sensor malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire<br>• Front seat inner belt assembly LH<br>• Seat position airbag sensor<br>• Center airbag sensor assembly |

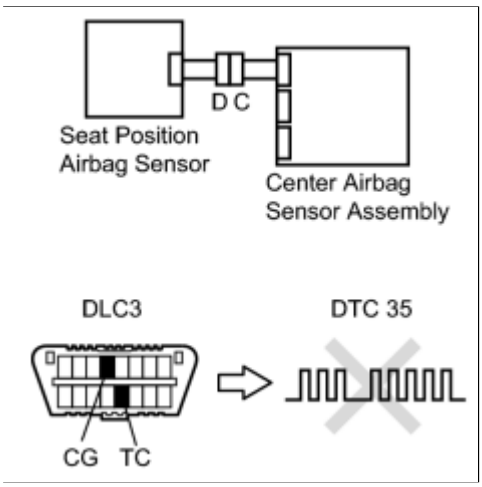
## WIRING DIAGRAM



# INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC |




(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs stored in the memory INFO .

(c) Turn the power switch OFF.

(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check for DTCs INFO .

OK:

DTC B1653/35 is not output.

**HINT:**

**Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.**

**NG** ▶ **CHECK CONNECTION OF CONNECTORS**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTORS |

(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor assembly and the seat position airbag sensor.

OK:

The connectors are properly connected.

**NG** ▶ **CONNECT CONNECTORS, THEN GO TO STEP 1**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK CONNECTORS** |

(a) Disconnect the connectors from the center airbag sensor assembly and the seat position airbag sensor.

(b) Check that the connectors are not damaged.

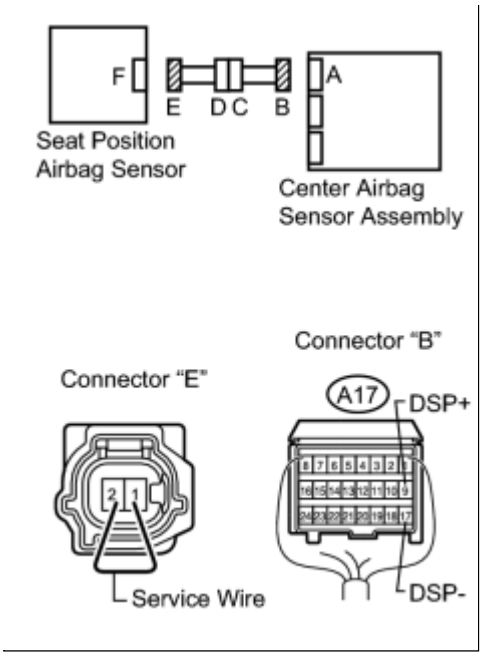
OK:

The connectors are not deformed or damaged.

**NG** ▶ **REPAIR OR REPLACE WIRE HARNESS**

**OK** ▼

| | |
|---|---|
| **4.** | **CHECK SEAT POSITION AIRBAG SENSOR CIRCUIT (OPEN)** |




(a) Using a service wire, connect terminals 1 and 2 of connector "E".

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector when connecting.**

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

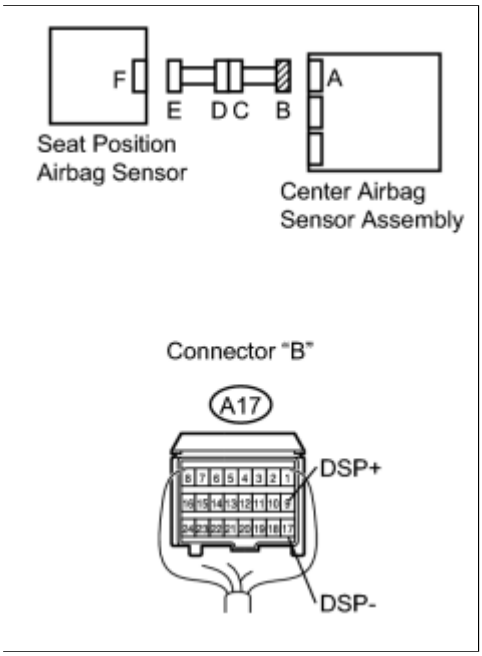
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|

| | | |
|---|---|---|
| A17-9 (DSP+) - A17-17 (DSP-) | Always | Below 1 Ω |

**NG** ▶ **CHECK FRONT SEAT INNER BELT ASSEMBLY LH (OPEN)**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK SEAT POSITION AIRBAG SENSOR CIRCUIT (SHORT)** |




(a) Disconnect the service wire from connector E.

(b) Measure the resistance between the terminals of connector E according to the value(s) in the table below.

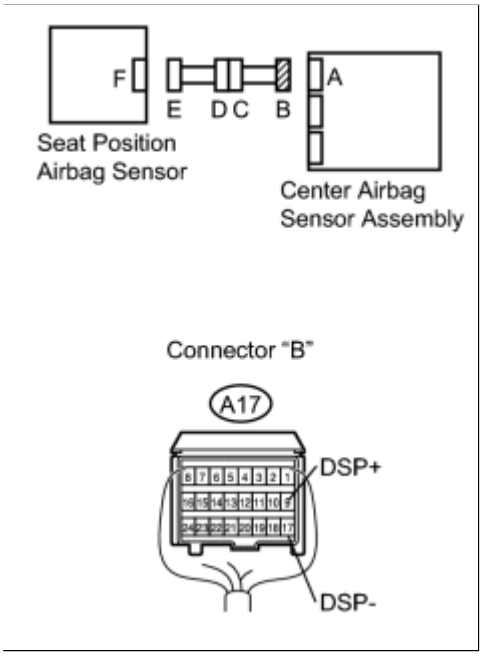
Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| A17-9 (DSP+) - A17-17 (DSP-) | Always | 1 MΩ or higher |

**NG** ▶ **CHECK FRONT SEAT INNER BELT ASSEMBLY LH (SHORT)**

**OK** ▼

| | |
|---|---|
| **6.** | **CHECK SEAT POSITION AIRBAG SENSOR CIRCUIT (SHORT TO B+)** |




(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage according to the value(s) in the table below.

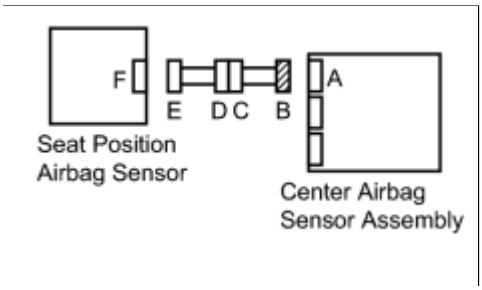
Standard voltage:

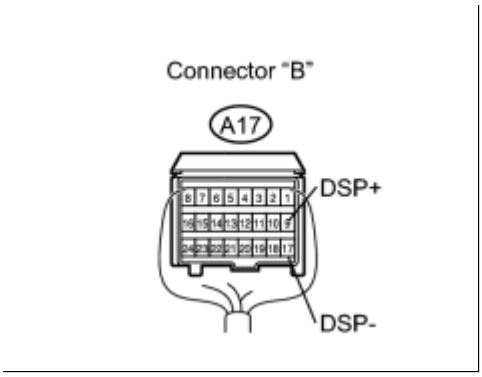
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| A17-9 (DSP+) - Body ground | Power switch ON (IG) | Below 1 V |
| A17-17 (DSP-) - Body ground | Power switch ON (IG) | Below 1 V |

**NG** ▶ **CHECK FRONT SEAT INNER BELT ASSEMBLY LH (SHORT TO B+)**

**OK** ▼

| | |
|---|---|
| **7.** | **CHECK SEAT POSITION AIRBAG SENSOR CIRCUIT (SHORT TO GROUND)** |






(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Measure the resistance according to the value(s) in the table below.

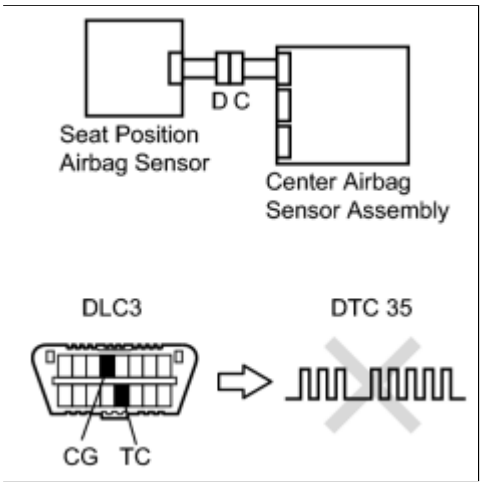
Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| A17-9 (DSP+) - Body ground | Always | 1 MΩ or higher |
| A17-17 (DSP-) - Body ground | Always | 1 MΩ or higher |

**NG** ▶ **CHECK FRONT SEAT INNER BELT ASSEMBLY LH (SHORT TO GROUND)**

**OK** ▼

| | |
|---|---|
| **8.** | **CHECK SEAT POSITION AIRBAG SENSOR** |




(a) Connect the connectors to the center airbag sensor assembly and the seat position airbag sensor.

(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG), and wait for at least 60 seconds.

(d) Clear the DTCs stored in the memory INFO .

(e) Turn the power switch OFF.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Check for DTCs INFO .

OK:

DTC B1653/35 is not output.

**HINT:**

**Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.**

**NG** ▶ **REPLACE SEAT POSITION AIRBAG SENSOR**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| 9. | REPLACE SEAT POSITION AIRBAG SENSOR |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

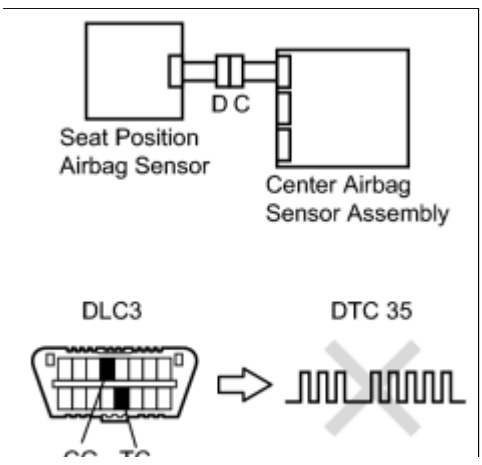
(c) Replace the seat position airbag sensor INFO .

**HINT:**

**Perform inspection using parts from a normal vehicle if possible.**

**NEXT** ▼

| 10. | CHECK CENTER AIRBAG SENSOR ASSEMBLY |
|---|---|




(a) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG), and wait for at least 60 seconds.

(c) Clear the DTCs stored in the memory INFO .

(d) Turn the power switch OFF.

(e) Turn the power switch ON (IG), and wait for at least 60 seconds.

(f) Check for DTCs INFO .

OK:
DTC B1653/35 is not output.

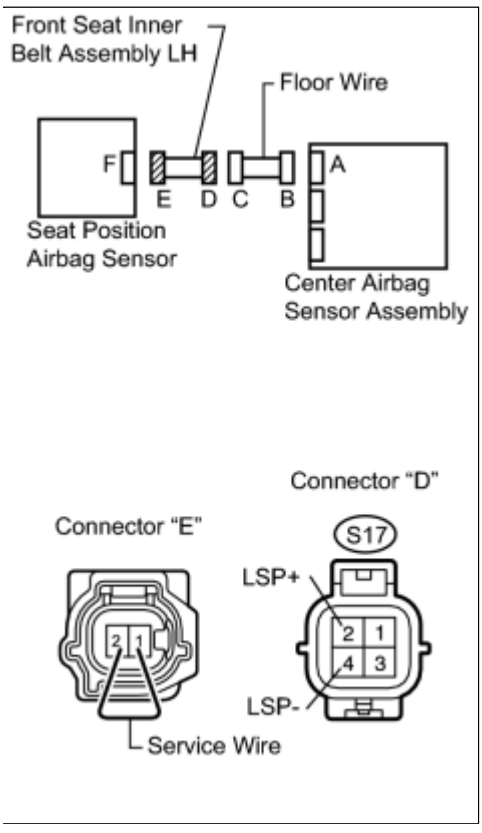
**HINT:**

**Codes other than DTC B1653/35 may be output at this time, but they are not related to this check.**

**NG** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**OK** ▶ **END**

| 11. | CHECK FRONT SEAT INNER BELT ASSEMBLY LH (OPEN) |
|---|---|




(a) Disconnect the floor wire connector from the front seat inner belt assembly LH.

**HINT:**

**The service wire has already been inserted into connector "E".**

(b) Measure the resistance according to the value(s) in the table below.

Standard resistance:

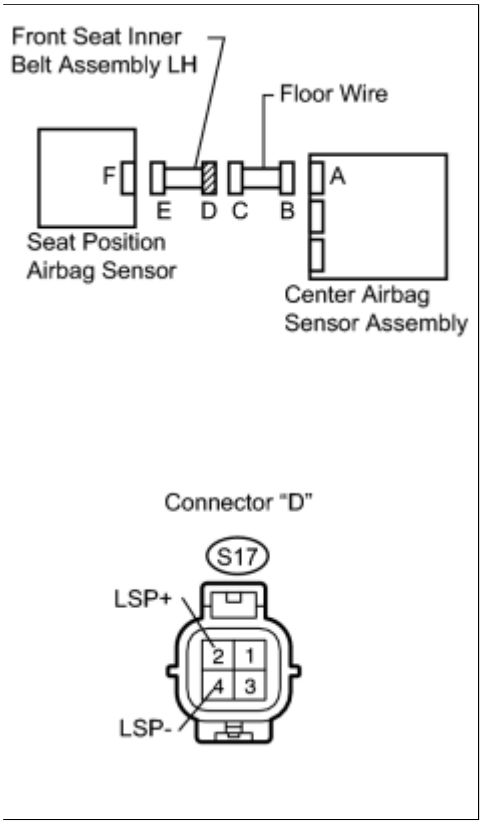
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|

| | | |
|---|---|---|
| S17-2 (LSP+) - S17-4 (LSP-) | Always | Below 1 Ω |

**NG** ▶ **REPLACE FRONT SEAT INNER BELT ASSEMBLY LH**

**OK** ▶ **REPAIR OR REPLACE FLOOR WIRE**

| | |
|---|---|
| **12.** | **CHECK FRONT SEAT INNER BELT ASSEMBLY LH (SHORT)** |




(a) Disconnect the floor wire connector from the front seat inner belt assembly LH.

(b) Measure the resistance according to the value(s) in the table below.

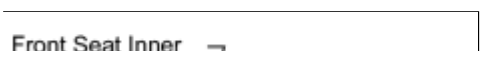
Standard resistance:

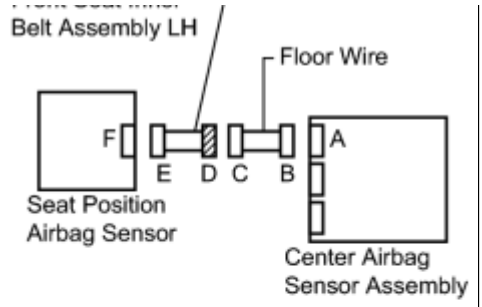
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| S17-2 (LSP+) - S17-4 (LSP-) | Always | 1 MΩ or higher |

**NG** ▶ **REPLACE FRONT SEAT INNER BELT ASSEMBLY LH**

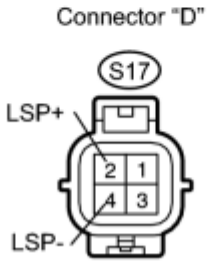
**OK** ▶ **REPAIR OR REPLACE FLOOR WIRE**

| | |
|---|---|
| **13.** | **CHECK FRONT SEAT INNER BELT ASSEMBLY LH (SHORT TO B+)** |






(a) Turn the power switch OFF.




(b) Disconnect the negative(-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the floor wire connector from the front seat inner belt assembly LH.

(d) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(e) Turn the power switch ON (IG).

(f) Measure the voltage according to the value(s) in the table below.

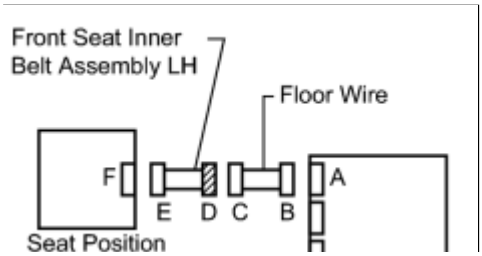
Standard voltage:

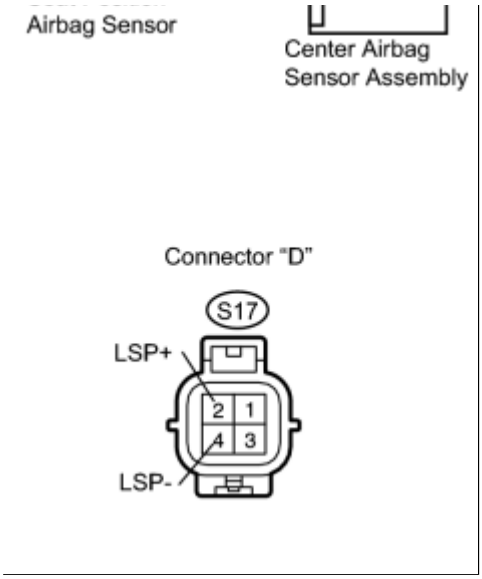
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| S17-2 (LSP+) - Body ground | Power switch ON (IG) | Below 1 V |
| S17-4 (LSP-) - Body ground | Power switch ON (IG) | Below 1 V |

**NG** ▶ **REPLACE FRONT SEAT INNER BELT ASSEMBLY LH**

**OK** ▶ **REPAIR OR REPLACE FLOOR WIRE**

| | |
|---|---|
| **14.** | **CHECK FRONT SEAT INNER BELT ASSEMBLY LH (SHORT TO GROUND)** |






(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the floor wire connector from the front seat inner belt assembly LH.

(d) Measure the resistance according to the value(s) in the table below.

Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| S17-2 (LSP+) - Body ground | Always | 1 MΩ or higher |
| S17-4 (LSP-) - Body ground | Always | 1 MΩ or higher |

**NG** ▶ **REPLACE FRONT SEAT INNER BELT ASSEMBLY LH**

**OK** ▶ **REPAIR OR REPLACE FLOOR WIRE**

| DTC | B1655/37 | Driver Side Seat Belt Buckle Switch Circuit Malfunction |
|---|---|---|

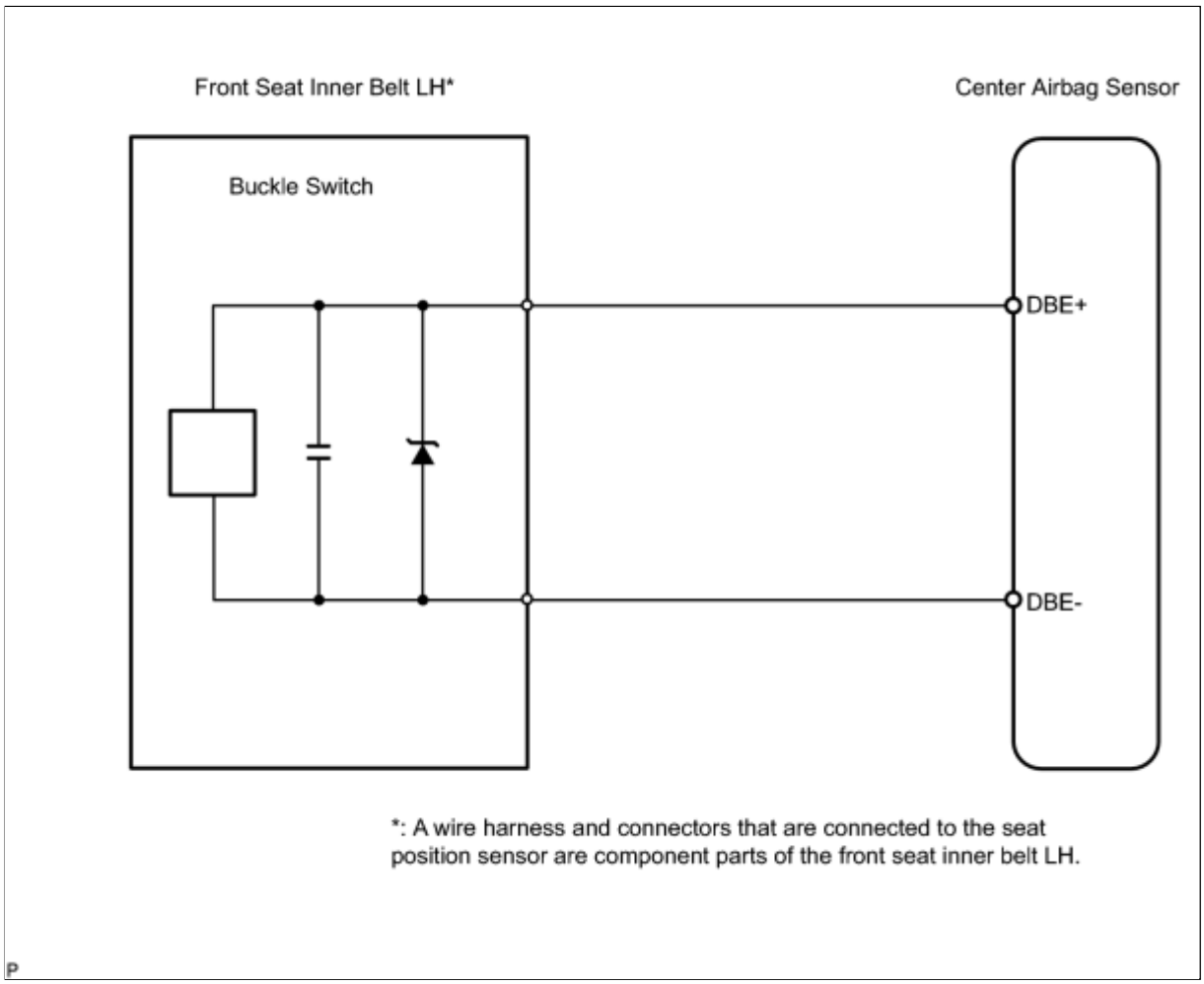
## DESCRIPTION

The driver side seat belt buckle switch circuit consists of the center airbag sensor and the front seat inner belt LH.

DTC B1655/37 is recorded when a malfunction is detected in the driver side seat belt buckle switch circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1655/37 | When one of following conditions is met:<br>• Center airbag sensor receives a line short signal, an open signal, a short to ground signal or a short to B+ signal from the driver side seat belt buckle switch sensor for 2 seconds.<br>• Front seat inner belt LH malfunction<br>• Center airbag sensor malfunction | • Floor wire<br>• Front seat inner belt LH (Driver side seat belt buckle switch)<br>• Center airbag sensor |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

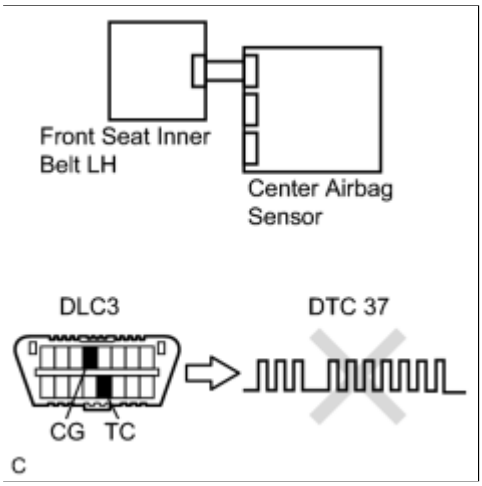
PROCEDURE

| | |
|---|---|
| 1. | CHECK FOR DTC |

(a) Turn the power switch ON (IG), and wait for at least 60 seconds.

(b) Clear the DTCs INFO .

(c) Turn the power switch OFF.




(d) Turn the power switch ON (IG), and wait for at least 60 seconds.

(e) Check the DTCs INFO .

OK:

DTC B1655/37 is not output.

**HINT:**

**DTCs other than DTC B1655/37 may be output at this time, but they are not related to this check.**

OK ▶ USE SIMULATION METHOD TO CHECK

NG ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and the front seat inner belt LH.

OK:

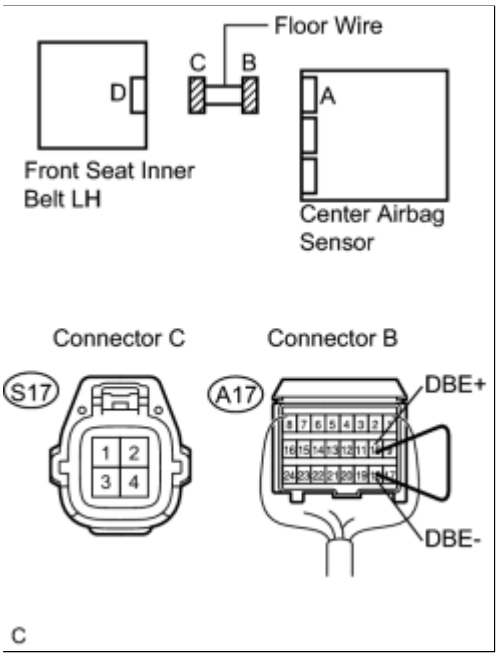
Connectors are connected.

NG ▶ CONNECT CONNECTOR

OK ▼

| | |
|---|---|
| 3. | CHECK FLOOR WIRE (OPEN) |

(a) Disconnect the connectors from the center airbag sensor and the front seat inner belt LH.




(b) Using a service wire, connect terminals A17-10 (DBE+) and A17-18 (DBE-) of connector B.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

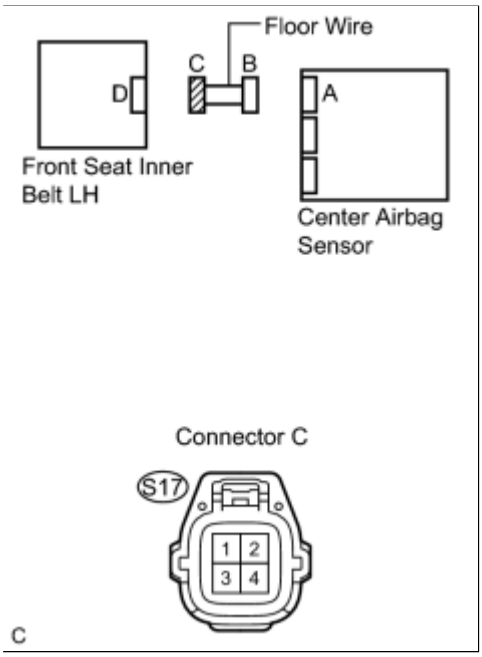
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| S17-1 - S17-3 | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 4. | CHECK FLOOR WIRE (SHORT) |
|---|---|




(a) Disconnect the service wire from connector B.

(b) Measure the resistance of the wire harness side connector.

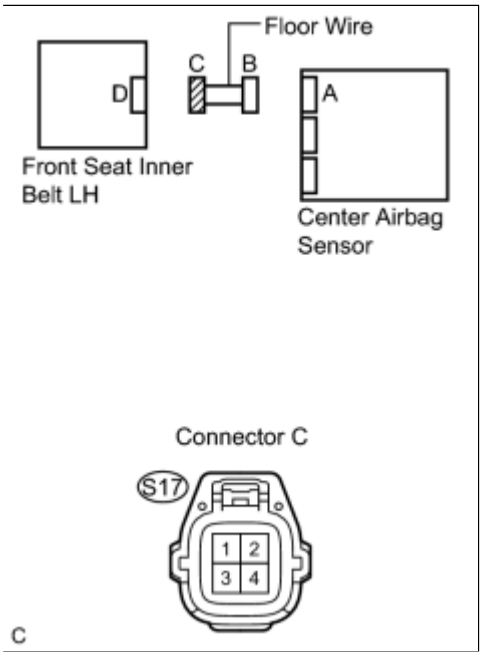
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| S17-1 - S17-3 | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| | |
|---|---|
| **5.** | **CHECK FLOOR WIRE (TO B+)** |




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

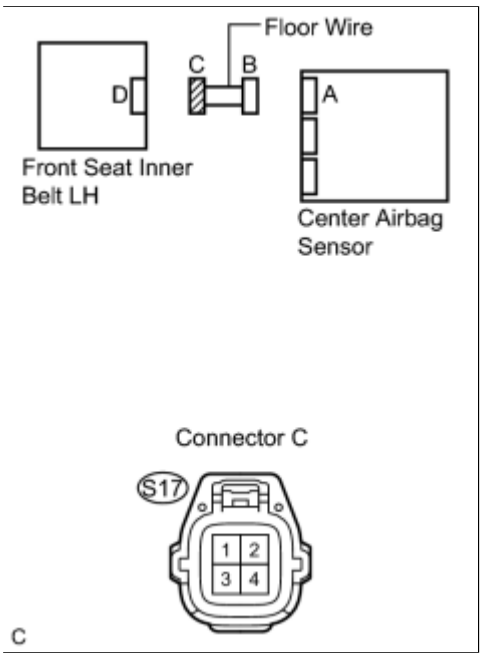
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| S17-1 - Body ground | Below 1 V |
| S17-3 - Body ground | Below 1 V |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| | |
|---|---|
| **6.** | **CHECK FLOOR WIRE (TO GROUND)** |




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

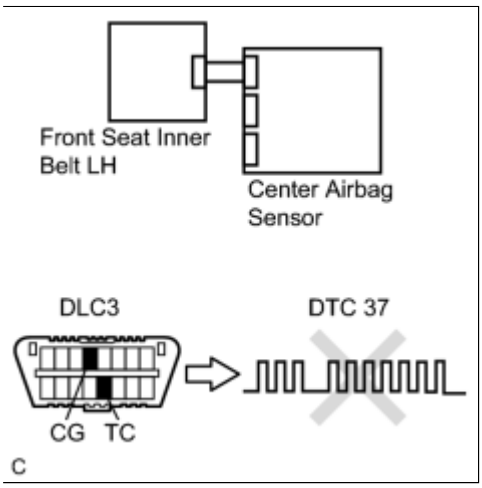
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| S17-1 - Body ground | 1 MΩ or higher |
| S17-3 - Body ground | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 7. | CHECK FRONT SEAT INNER BELT ASSEMBLY LH |
|---|---|




(a) Connect the connectors to the center airbag sensor and the front seat inner belt LH.

(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG), and wait for at least 60 seconds.

(d) Clear the DTCs INFO .

(e) Turn the power switch OFF.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Check the DTCs INFO .

OK:

DTC B1655/37 is not output.

**HINT:**

**DTCs other than DTC B1655/37 may be output at this time, but they are not related to this check.**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

**NG** ▼

| 8. | REPLACE FRONT SEAT INNER BELT ASSEMBLY LH |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

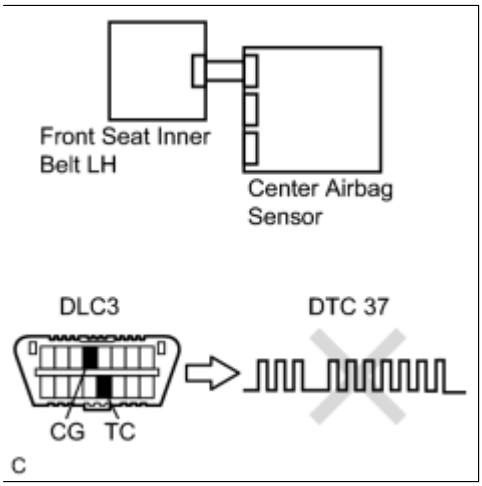
(c) Replace the front seat inner belt LH INFO .

**HINT:**

**Perform inspection using parts from a normal vehicle if possible.**

**NEXT** ▼

| 9. | CHECK CENTER AIRBAG SENSOR ASSEMBLY |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG), and wait for at least 60 seconds.

(c) Clear the DTCs INFO .

(d) Turn the power switch OFF.

(e) Turn the power switch ON (IG), and wait for at least 60 seconds.

(f) Check the DTCs INFO .

OK:

DTC B1655/37 is not output.

**HINT:**

**DTCs other than DTC B1655/37 may be output at this time, but they are not related to this check.**

**NG** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| DTC | B1660/43 | Passenger Airbag ON/OFF Indicator Circuit Malfunction |
|---|---|---|

## DESCRIPTION

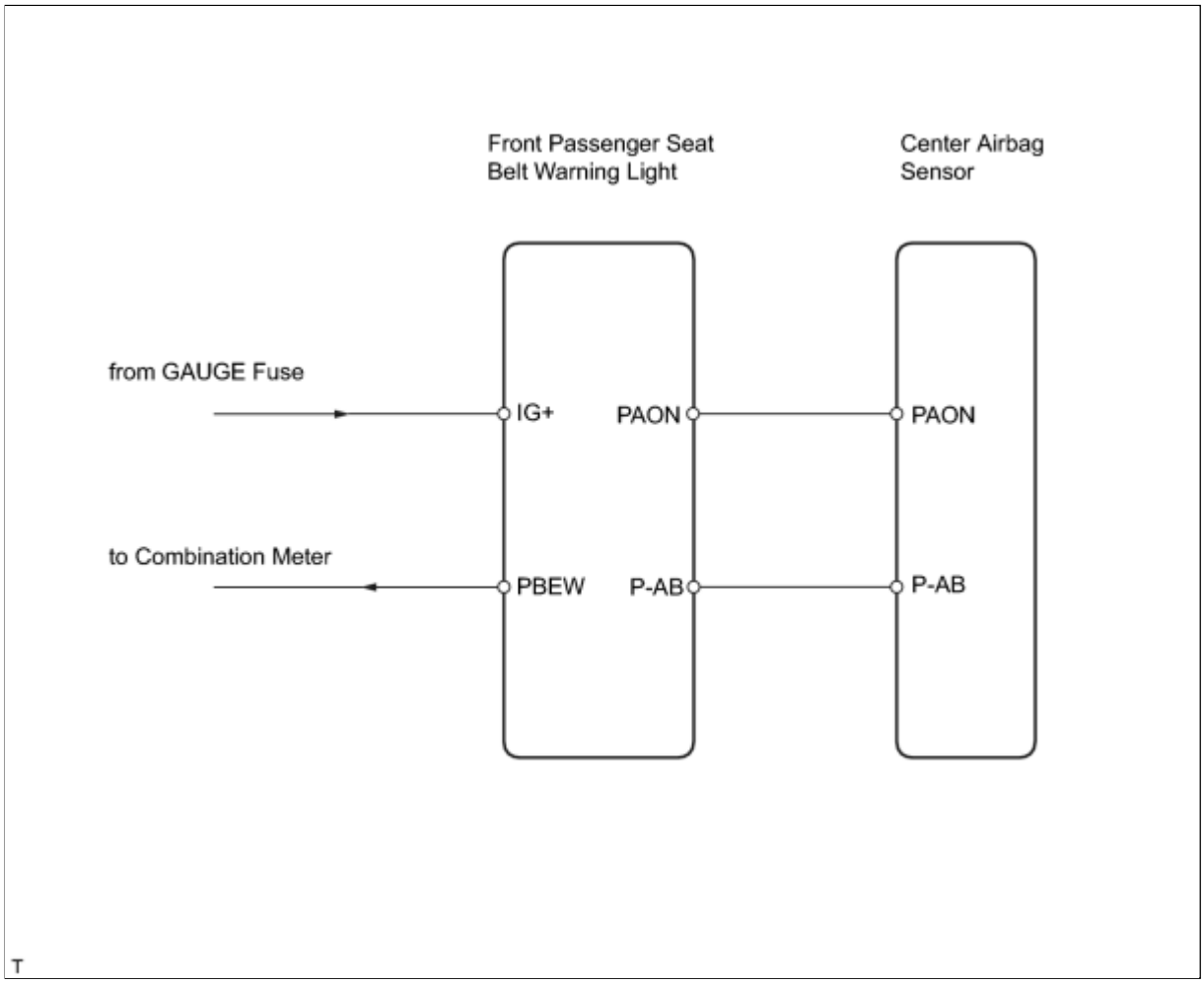
The passenger airbag ON / OFF indicator circuit consists of the center airbag sensor and the front passenger seat belt warning light.

This circuit indicates the operation condition of the front passenger airbag, front passenger side airbag and passenger side seat belt pretensioner.

DTC B1660/43 is set when a malfunction is detected in the passenger airbag ON / OFF indicator circuit.

| DTC NO. | DTC DETECTION CONDITIONS | TROUBLE AREAS |
|---|---|---|
| B1660/43 | When one of following is met:<br>• Center airbag sensor detects line short signal, open signal, short to ground signal or short to B+ signal from passenger airbag ON / OFF indicator circuit for 2 seconds<br>• Front passenger seat belt warning light malfunction<br>• Center airbag sensor malfunction | • Instrument panel wire<br>• Front passenger airbag ON / OFF Indicator light<br>• Center airbag sensor |

## WIRING DIAGRAM



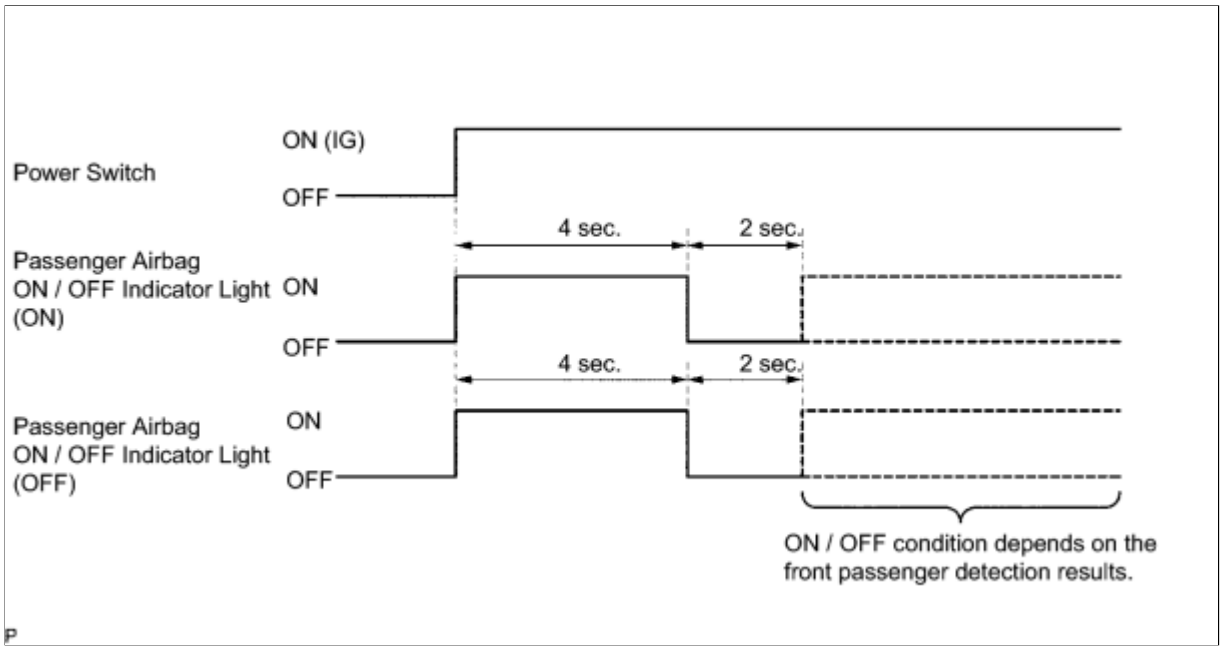
## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | CHECK PASSENGER AIRBAG ON / OFF INDICATOR OPERATION |

(a) Turn the power switch ON (IG).

(b) Check the passenger airbag ON / OFF indicator operation.




**Result**

| ON / OFF INDICATOR ILLUMINATION | PROCEED TO |
|---|---|
| Always ON | A |
| OFF | B |

B ▶ CHECK CONNECTION OF CONNECTOR

A ▼

| | |
|---|---|
| 2. | CHECK CONNECTION OF CONNECTOR |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and the front passenger seat belt warning light.

OK:

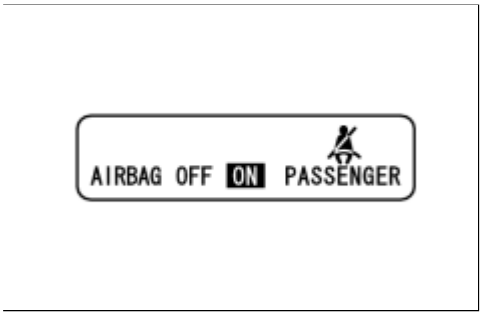
Connectors are connected.

NG ▶ **CONNECT CONNECTOR**

**OK**

▼

| | |
|---|---|
| **3.** | **CHECK FRONT PASSENGER AIRBAG ON / OFF INDICATOR LIGHT** |




(a) Disconnect the connector from the center airbag sensor.

(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG).

(d) Check the passenger airbag ON / OFF indicator operation.

OK:

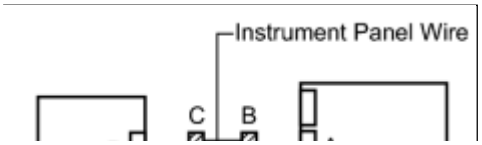
Neither ON nor OFF passenger airbag ON / OFF indicator comes on.

**OK** ▶ **CHECK FRONT PASSENGER AIRBAG ON / OFF INDICATOR LIGHT**

**NG**

▼

| | |
|---|---|
| **4.** | **CHECK INSTRUMENT PANEL WIRE (OPEN)** |

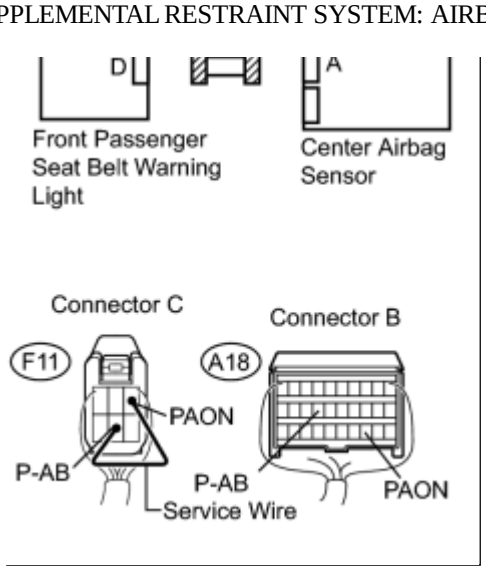



(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connector from the front passenger seat belt warning light.

(d) Using a service wire, connect terminals F11-1 (PAON) and F11-5 (P-AB) of connector C.




**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(e) Measure the resistance of the wire harness side connector.

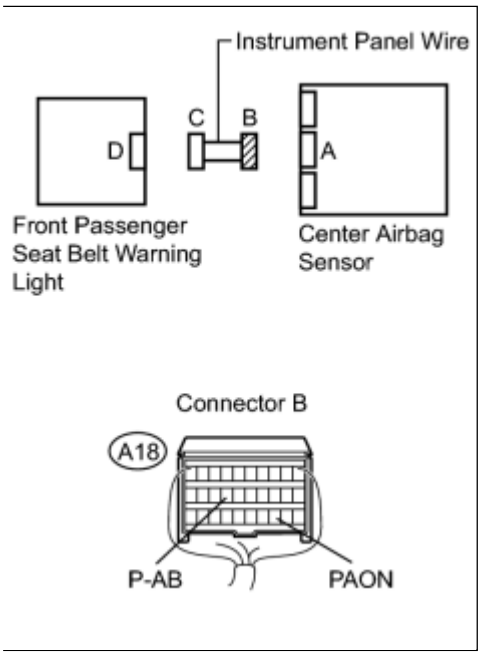
Standard resistance:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-17 (P-AB) - A18-23 (PAON) | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▼

| 5. | CHECK INSTRUMENT PANEL WIRE (SHORT) |
|---|---|




(a) Disconnect the service wire from connector C.

(b) Measure the resistance of the wire harness side connector.

Standard resistance:

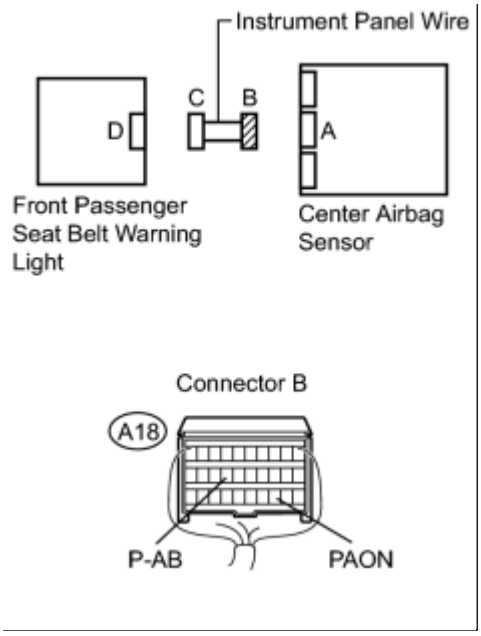
| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-17 (P-AB) - A18-23 (PAON) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▼

| 6. | CHECK INSTRUMENT PANEL WIRE (TO B+) |
|---|---|

(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.




(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

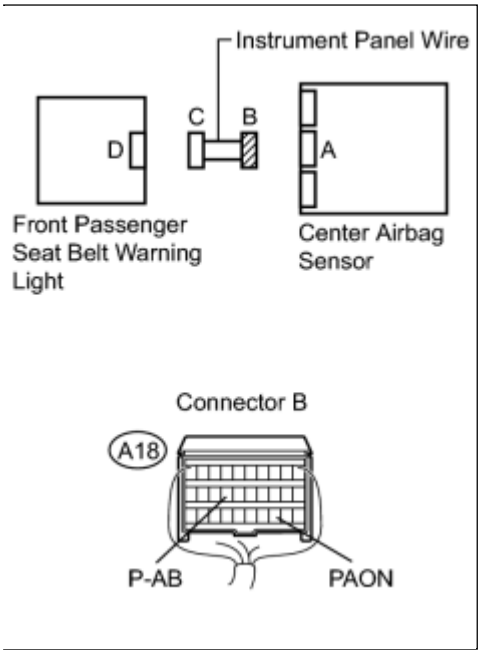
Standard voltage:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-23 (PAON) - Body ground | Below 1 V |
| A18-17 (P-AB) - Body ground | Below 1 V |

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▼

| 7. | CHECK INSTRUMENT PANEL WIRE (TO GROUND) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

Standard resistance:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-17 (P-AB) -Body ground | 1 MΩ or higher |
| A18-23 (PAON) -Body ground | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▶ **REPLACE FRONT PASSENGER AIRBAG ON/OFF INDICATOR LIGHT**

| 8. | CHECK CONNECTION OF CONNECTOR |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Check that the connectors are properly connected to the center airbag sensor and the front passenger seat belt warning light.

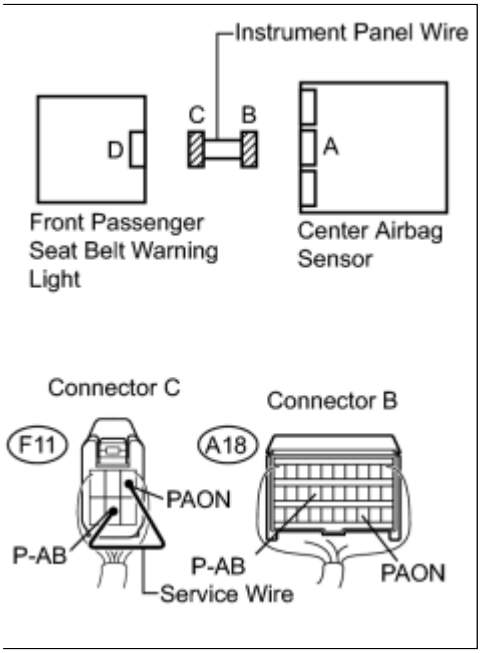
OK:

Connectors are connected.

**NG** ▶ **CONNECT CONNECTOR**

**OK** ▼

| 9. | CHECK INSTRUMENT PANEL WIRE (OPEN) |
|---|---|




(a) Disconnect the connector from the center airbag sensor and the front passenger seat belt warning light.

(b) Using a service wire, connect terminals F11-1 (PAON) and F11-5 (P-AB) of connector C.

**NOTICE:**

**Do not forcibly insert a service wire into the terminals of the connector.**

(c) Measure the resistance of the wire harness side connector.

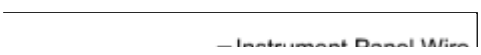
Standard resistance:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-23 (PAON) - A18-17 (P-AB) | Below 1 Ω |

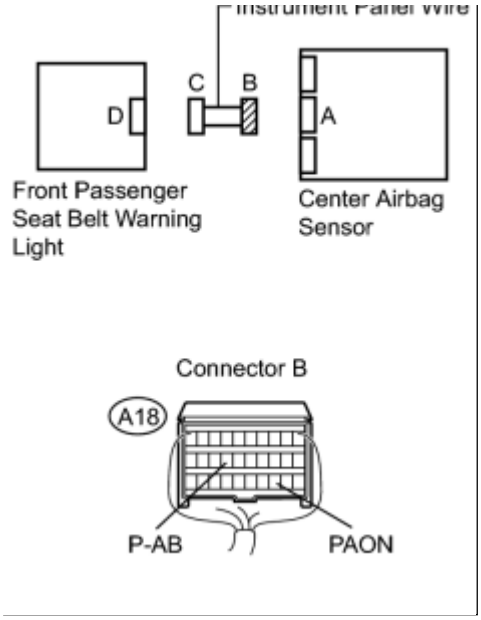
**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▼

| 10. | CHECK INSTRUMENT PANEL WIRE (SHORT) |
|---|---|



(a) Disconnect the service wire from connector C.




(b) Measure the resistance of the wire harness side connector.

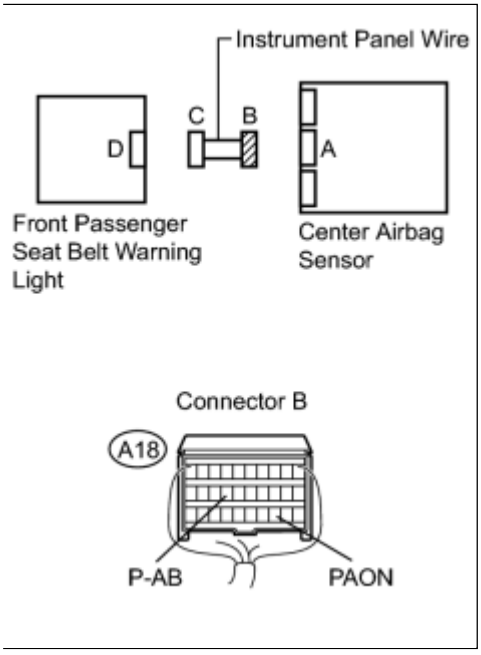
Standard resistance:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-17 (P-AB) - A18-23 (PAON) | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▼

| 11. | CHECK INSTRUMENT PANEL WIRE (TO B+) |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

Standard voltage:

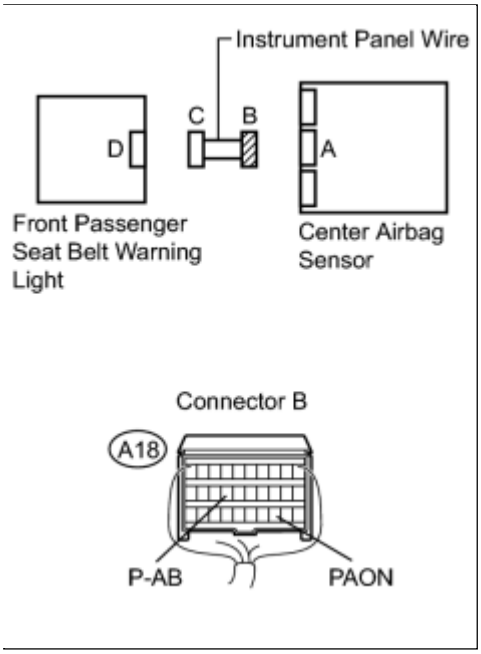
| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-23 (PAON) - Body ground | Below 1 V |
| A18-17 (P-AB) - Body ground | Below 1 V |

NG ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▼

| 12. | CHECK INSTRUMENT PANEL WIRE (TO GROUND) |
|---|---|

(a) Turn the power switch OFF.




(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Measure the resistance of the wire harness side connector.

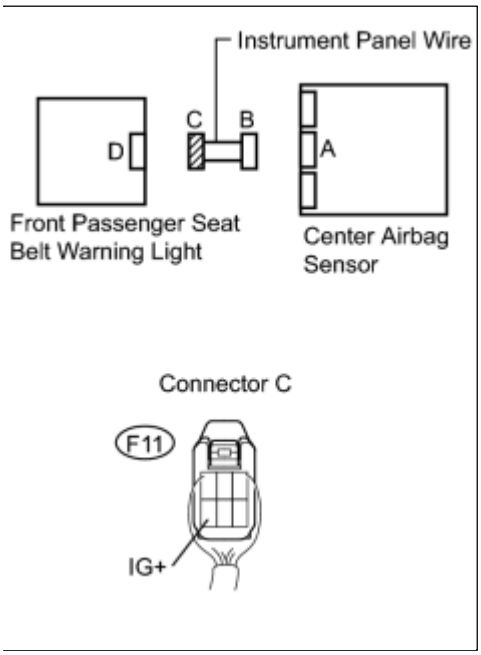
Standard resistance:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-17 (P-AB) - Body ground | 1 MΩ or higher |
| A18-23 (PAON) - Body ground | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▼

| 13. | CHECK WIRE HARNESS (POWER SOURCE) |
|---|---|




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

Standard voltage:

| TERMINAL CONNECTION | SPECIFIED CONDITION |
|---|---|
| F11-6 (IG+) - Body ground | 10 to 14 V |

NG ▶ **REPAIR OR REPLACE POWER SOURCE CIRCUIT**

**OK** ▼

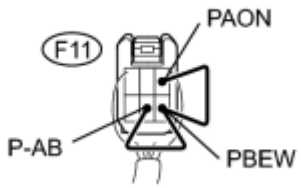
| 14. | CHECK FRONT PASSENGER AIRBAG ON / OFF INDICATOR LIGHT |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Using a service wire, connect terminals F11-5 (P-AB) and F11-4 (PBEW) of the front passenger seat belt warning light.

(d) Using a service wire, connect terminals F11-1 (PAON) and F11-4 (PBEW) of the front passenger seat belt warning light.




(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG).

(g) Check the front passenger airbag ON / OFF indicator operation.

OK:

Front passenger airbag ON / OFF indicator comes on

NG ▶ **REPLACE FRONT PASSENGER AIRBAG ON / OFF INDICATOR LIGHT**

**OK** ▼

| 15. | CHECK CENTER AIRBAG SENSOR ASSEMBLY |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Connect the connectors to the center airbag sensor and the front passenger seat belt warning light.

(d) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(e) Turn the power switch ON (IG), and wait for at least 60 seconds.

(f) Clear the DTCs INFO .

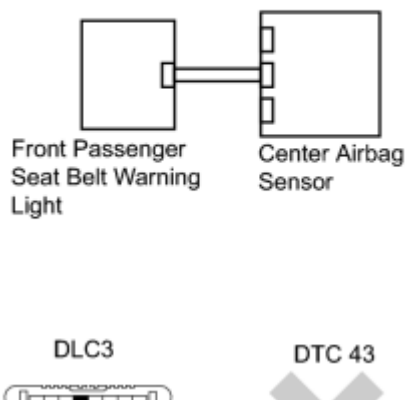
(g) Turn the power switch OFF.

(h) Turn the power switch ON (IG), and wait for at least 60 seconds.

(i) Check for DTCs INFO .

OK:

DTC B1660/43 is not output.




**HINT:**




**DTCs other than DTC B1660/43 may be output at this time, but they are not related to this check.**

**NG** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| **DTC** | **B1800/51** | **Short in Driver Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1801/51** | **Open in Driver Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1802/51** | **Short to GND in Driver Side Squib Circuit** |

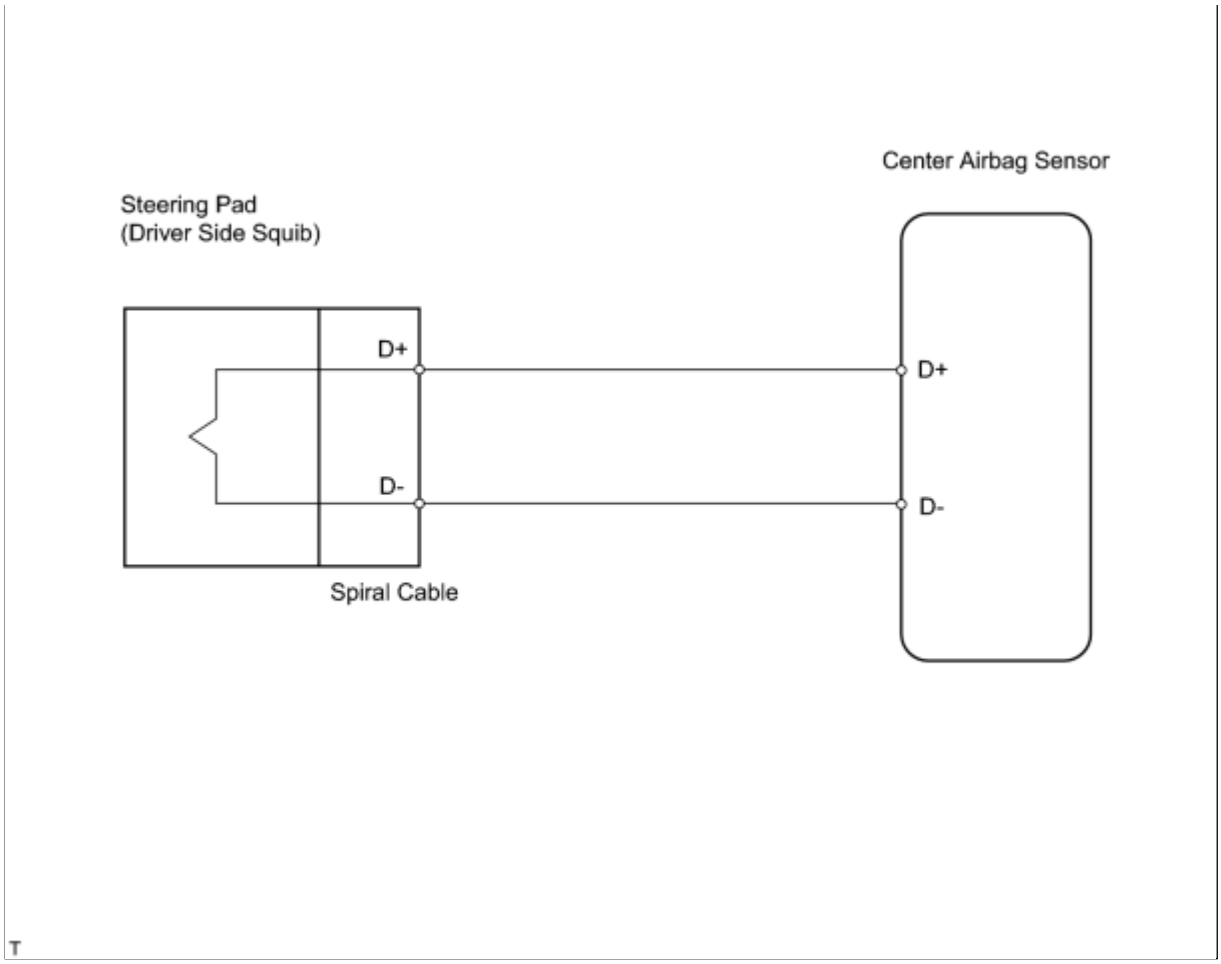
| | | |
|---|---|---|
| **DTC** | **B1803/51** | **Short to B+ in Driver Side Squib Circuit** |

## DESCRIPTION

The driver side squib circuit consists of the center airbag sensor, the spiral cable and the steering pad.
The circuit instructs the SRS to deploy when deployment conditions are met.
These DTCs are recorded when a malfunction is detected in the driver side squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1800/51 | Center airbag sensor receives a line short signal 5 times from the driver side squib circuit during primary check. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib)<br>• Center airbag sensor |
| B1801/51 | Center airbag sensor receives an open signal from the driver side squib circuit for 2 seconds. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib)<br>• Center airbag sensor |
| B1802/51 | Center airbag sensor receives a short to ground signal from the driver side squib circuit for 0.5 seconds. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib)<br>• Center airbag sensor |
| B1803/51 | Center airbag sensor receives a short to B+ signal from the driver side squib circuit for 0.5 seconds. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib)<br>• Center airbag sensor |

## WIRING DIAGRAM



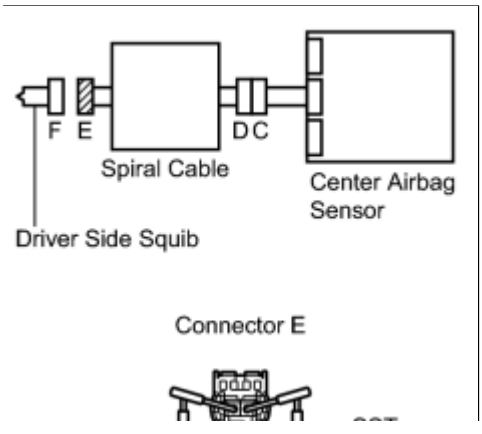

## INSPECTION PROCEDURE

**HINT:**

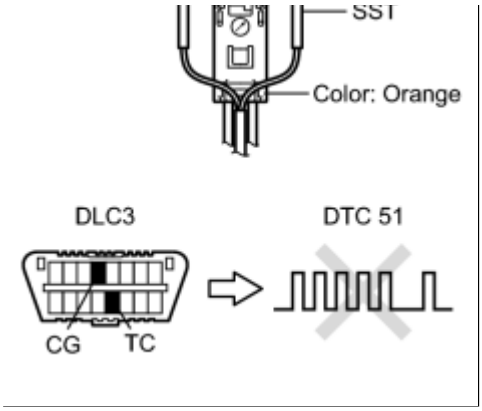
- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK STEERING PAD (DRIVER SIDE SQUIB)** |




(a) Turn the power switch OFF.




(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connectors from the steering pad.

(d) Connect SST (resistance 2.1 Ω) to connector E (orange connector).

**CAUTION:**

**Never connect SST to the steering pad (driver side squib) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1800, B1801, B1802, B1803 or 51 is not output.

**HINT:**

**DTCs other than DTC B1800, B1801, B1802, B1803 or 51 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE STEERING PAD**

**NG** ▼

| | |
|---|---|
| **2.** | **CHECK CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect SST from the spiral cable.

(d) Check that the spiral cable connectors (on the steering pad side) are not damaged.

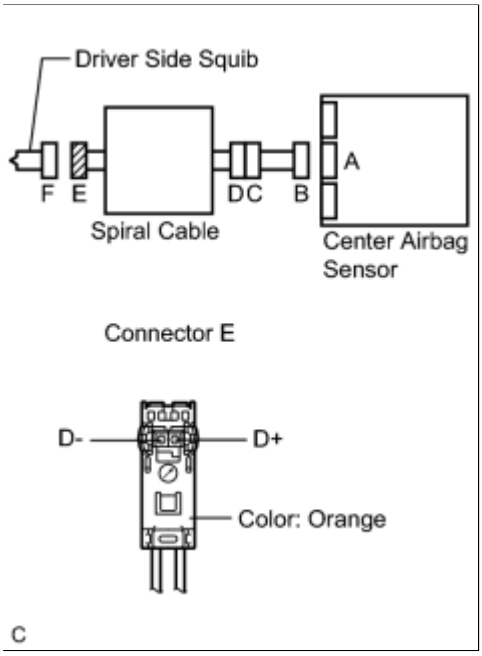
OK:

Lock button is not disengaged, and claw of lock is not deformed or damaged.

**NG** ▶ **REPLACE SPIRAL CABLE**

**OK** ▼

| 3. | CHECK DRIVER SIDE SQUIB CIRCUIT |
|---|---|




(a) Disconnect the connectors from the center airbag sensor.

(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG).

(d) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| D+ - Body ground | Below 1 V |
| D- - Body ground | Below 1 V |

(e) Turn the power switch OFF.

(f) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(g) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| D+ - D- | Below 1 Ω |
| D+ - Body ground | 1 MΩ or higher |
| D- - Body ground | 1 MΩ or higher |

(h) Release the activation prevention mechanism built into connector B INFO .

(i) Measure the resistance of the wire harness side connector.

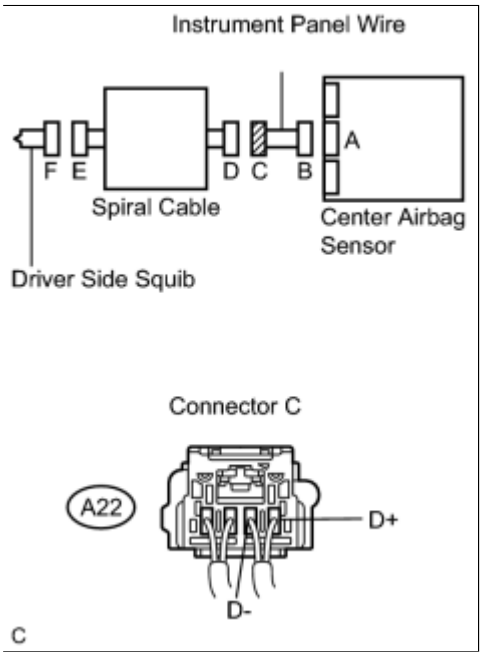
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| D+ - D- | 1 MΩ or higher |

**OK** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**NG** ▼

| | |
|---|---|
| **4.** | **CHECK INSTRUMENT PANEL WIRE** |




(a) Restore the released activation prevention mechanism of connector B to its original position.

(b) Disconnect the instrument panel wire connector from the spiral cable.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG).

(e) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A22-1 (D+) - Body ground | Below 1 V |
| A22-2 (D-) - Body ground | Below 1 V |

(f) Turn the power switch OFF.

(g) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(h) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A22-1 (D+) - A22-2 (D-) | Below 1 Ω |
| A22-1 (D+) - Body ground | 1 MΩ or higher |
| A22-2 (D-) - Body ground | 1 MΩ or higher |

(i) Release the activation prevention mechanism built into connector B INFO .

(j) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A22-1 (D+) - A22-2 (D-) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

**OK** ▶ **REPLACE SPIRAL CABLE**

| | | |
|---|---|---|
| **DTC** | **B1805/52** | **Short in Front Passenger Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1806/52** | **Open in Front Passenger Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1807/52** | **Short to GND in Front Passenger Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1808/52** | **Short to B+ in Front Passenger Side Squib Circuit** |

## DESCRIPTION

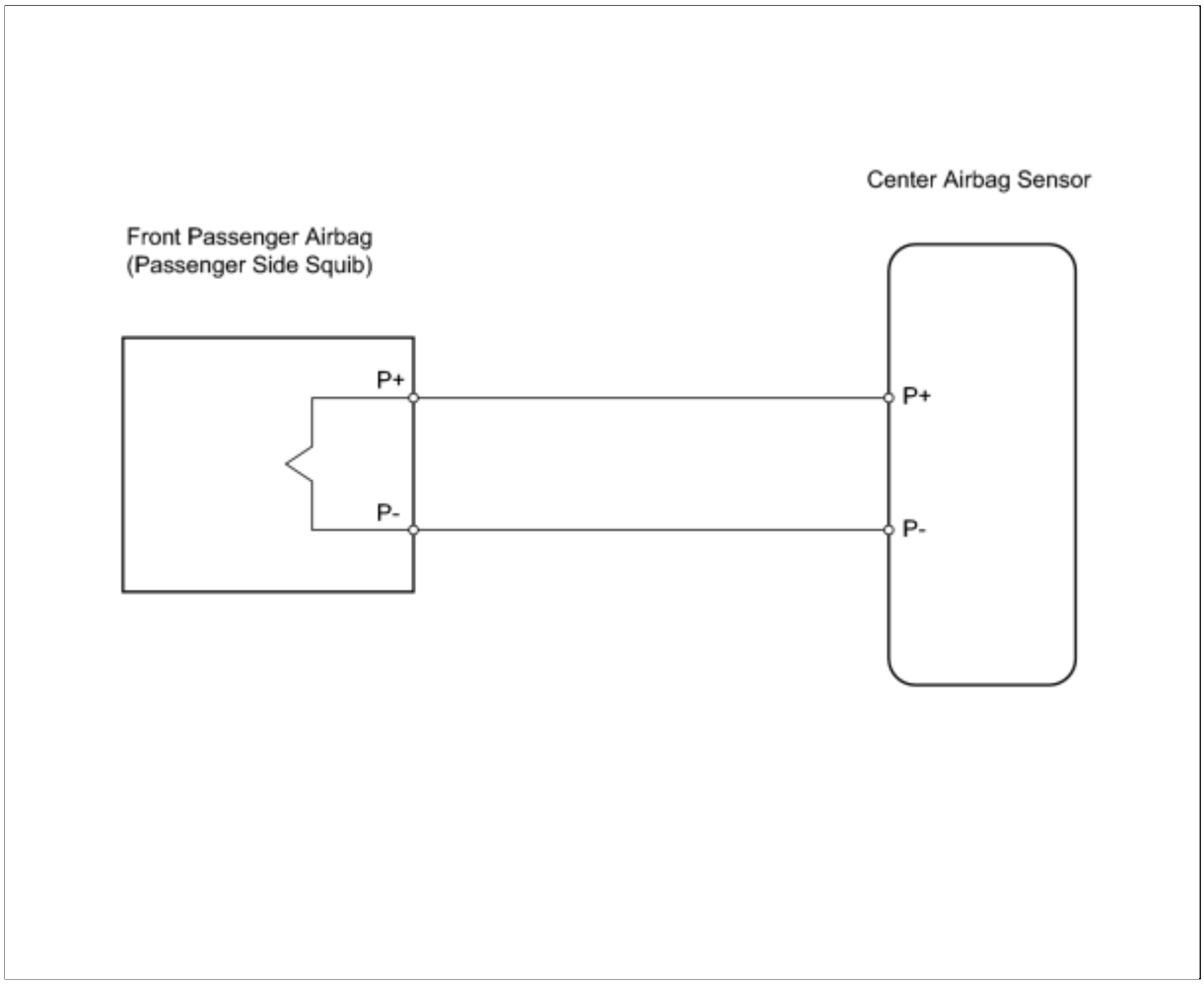
The front passenger side squib circuit consists of the center airbag sensor and the front passenger airbag.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1805/52 | Center airbag sensor receives a line short signal 5 times from the front passenger side squib circuit during primary check. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib)<br>• Center airbag sensor |
| B1806/52 | Center airbag sensor receives an open circuit signal from the front passenger side squib circuit for 2 seconds. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib)<br>• Center airbag sensor |
| B1807/52 | Center airbag sensor receives a short to ground signal from the front passenger side squib circuit for 0.5 seconds. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib)<br>• Center airbag sensor |
| B1808/52 | Center airbag sensor receives a short to B+ signal from the front passenger side squib circuit for 0.5 seconds. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib)<br>• Center airbag sensor |

## WIRING DIAGRAM



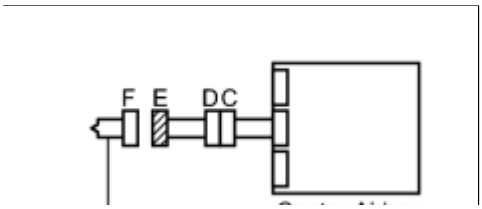

## INSPECTION PROCEDURE

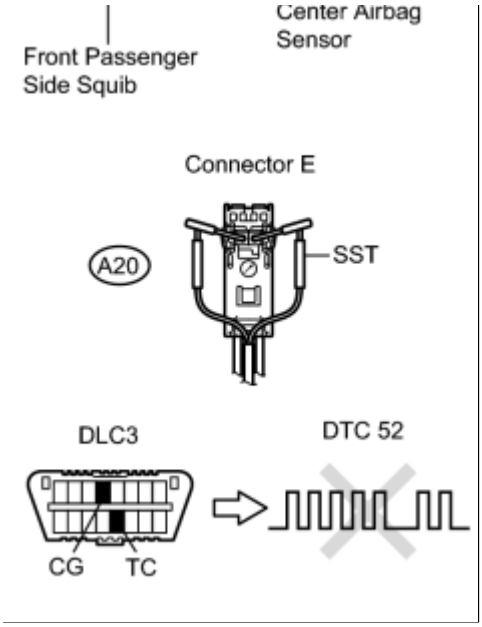
**HINT:**

- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

| | |
|---|---|
| 1. | CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB) |






(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connectors from the front passenger airbag.

(d) Connect SST (resistance 2.1 Ω) to connector E (orange connector).

**CAUTION:**

**Never connect SST to the front passenger airbag (front passenger side squib) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1805, B1806, B1807, B1808 or 52 is not output.

**HINT:**

**DTCs other than DTC B1805, B1806, B1807, B1808 or 52 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

**NG** ▼

| | |
|---|---|
| 2. | **CHECK CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect SST from connector E.

(d) Check that the instrument panel wire connectors (on the front passenger side airbag) are not damaged.

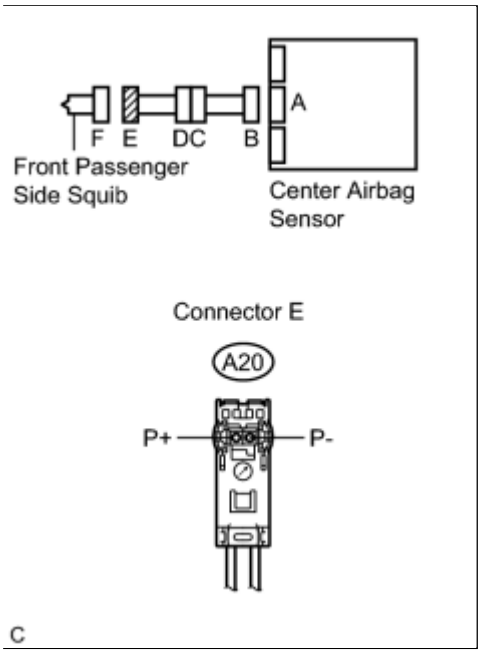
OK:

Lock button is not disengaged, and claw of lock is not deformed or damaged.

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

**OK** ▼

| | |
|---|---|
| 3. | **CHECK FRONT PASSENGER SIDE SQUIB CIRCUIT** |




(a) Disconnect the connector from the center airbag sensor.

(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG).

(d) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A20-1 (P+) - Body ground | Below 1 V |
| A20-2 (P-) - Body ground | Below 1 V |

(e) Turn the power switch OFF.

(f) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(g) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A20-1 (P+) - A20-2 (P-) | Below 1 Ω |
| A20-1 (P+) - Body ground | 1 MΩ or higher |
| A20-2 (P-) - Body ground | 1 MΩ or higher |

(h) Release the activation prevention mechanism built into connector B INFO .

(i) Measure the resistance of the wire harness side connector.

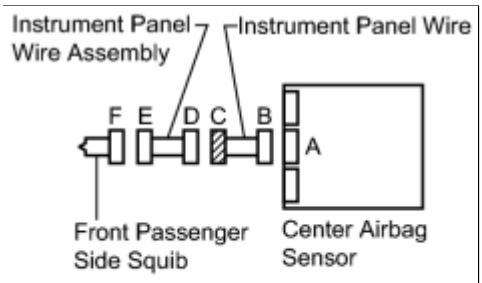
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A20-1 (P+) - A20-2 (P-) | 1 MΩ or higher |

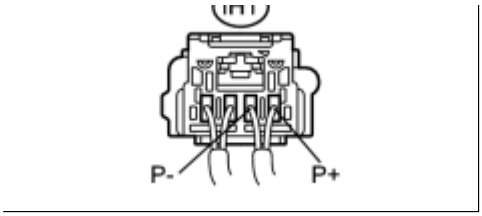
**OK** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**NG** ▼

| | |
|---|---|
| **4.** | **CHECK INSTRUMENT PANEL WIRE ASSEMBLY** |




(a) Restore the released activation prevention mechanism of connector B to its original position.




(b) Disconnect the instrument panel wire connector from the instrument panel wire assembly.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG).

(e) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IH1-1 (P+) - Body ground | Below 1 V |
| IH1-2 (P-) - Body ground | Below 1 V |

(f) Turn the power switch OFF.

(g) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(h) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IH1-1 (P+) - IH1-2 (P-) | Below 1 Ω |
| IH1-1 (P+) - Body ground | 1 MΩ or higher |
| IH1-2 (P-) - Body ground | 1 MΩ or higher |

(i) Release the activation prevention mechanism built into connector B INFO .

(j) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IH1-1 (P+) - IH1-2 (P-) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| | | |
|---|---|---|
| **DTC** | **B1810/53** | **Short in Driver Side Squib 2nd Step Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1811/53** | **Open in Driver Side Squib 2nd Step Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1812/53** | **Short to GND in Driver Side Squib 2nd Step Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1813/53** | **Short to B+ in Driver Side Squib 2nd Step Circuit** |

## DESCRIPTION

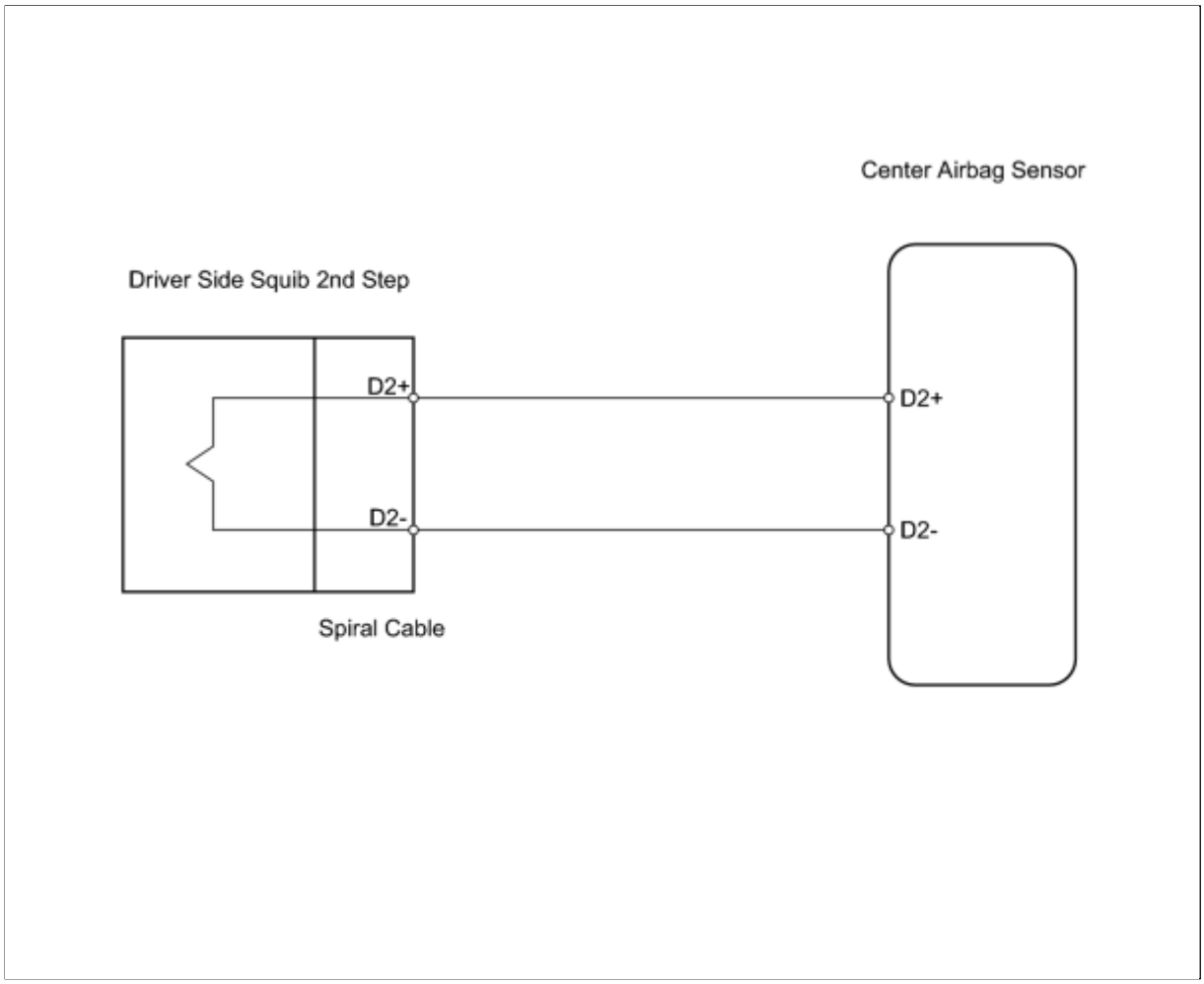
The driver side squib 2nd step circuit consists of the center airbag sensor, the spiral cable and the steering pad.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the driver side squib 2nd step circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1810/53 | Center airbag sensor receives a line short signal 5 times from the driver side squib 2nd step circuit during primary check. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib 2nd step)<br>• Center airbag sensor |
| B1811/53 | Center airbag sensor receives an open signal from the driver side squib 2nd step circuit for 2 seconds. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib 2nd step)<br>• Center airbag sensor |
| B1812/53 | Center airbag sensor receives a short circuit to ground signal from the driver side 2nd step circuit for 0.5 seconds. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib 2nd step)<br>• Center airbag sensor |
| B1813/53 | Center airbag sensor receives a short circuit to B+ signal from the driver side squib 2nd step circuit for 0.5 seconds. | • Instrument panel wire<br>• Spiral cable<br>• Steering pad (Driver side squib 2nd step)<br>• Center airbag sensor |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**HINT:**

- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK STEERING PAD (DRIVER SIDE SQUIB 2ND STEP)** |

(a) Turn the power switch OFF.

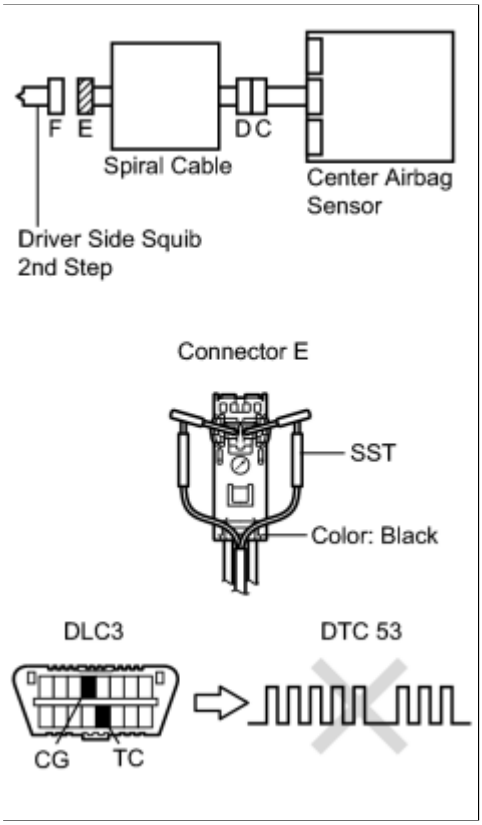
(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connectors from the steering pad.

(d) Connect SST to the spiral cable connector E (black connector).

**CAUTION:**

Never connect SST to the steering pad (driver side squib 2nd step)




**Never connect SST to the steering pad (driver side squib 2nd step) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1810, B1811, B1812, B1813 or 53 is not output.

**HINT:**

**DTCs other than DTC B1810, B1811, B1812, B1813 or 53 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE STEERING PAD**

**NG** ▼

| 2. | CHECK CONNECTOR |
|---|---|

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect SST from the spiral cable.

(d) Check that the spiral cable connector (on the steering pad side) is not damaged.

OK:

Lock button is not disengaged, and claw of lock is not deformed or damaged.

**NG** ▶ **REPLACE SPIRAL CABLE**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK DRIVER SIDE SQUIB 2ND STEP CIRCUIT** |

(a) Disconnect the connector from the center airbag sensor.

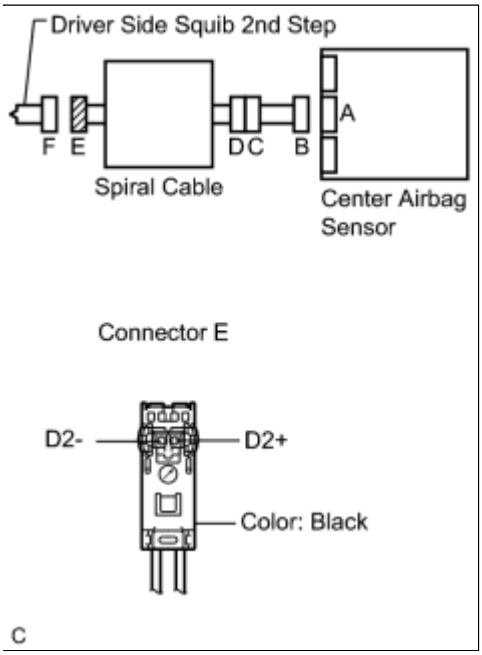
(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG).

(d) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| D2+ - Body ground | Below 1 V |
| D2- - Body ground | Below 1 V |




(e) Turn the power switch OFF.

(f) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(g) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| D2+ - D2- | Below 1 Ω |
| D2+ - Body ground | 1 MΩ or higher |
| D2- - Body ground | 1 MΩ or higher |

(h) Release the activation prevention mechanism built into connector B INFO .

(i) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| D2+ - D2- | 1 MΩ or higher |

**OK** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**OK** ▼

| 4. | CHECK INSTRUMENT PANEL WIRE |
|---|---|

(a) Restore the released activation prevention mechanism of connector B to its original position.

(b) Disconnect the instrument panel wire connector from the spiral cable.

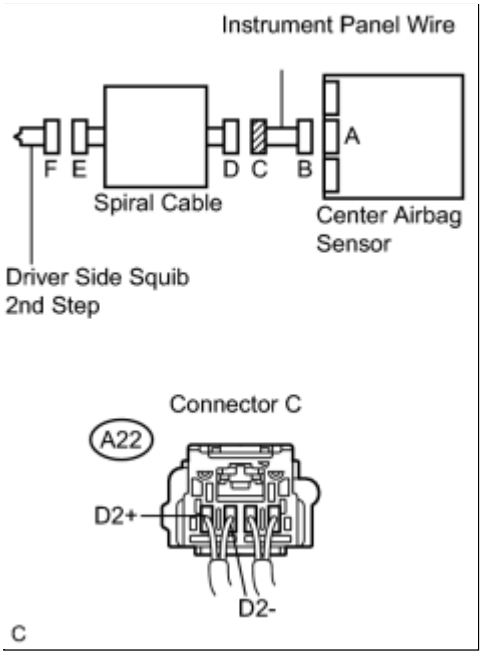
(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG).

(e) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A22-4 (D2+) - Body ground | Below 1 V |
| A22-3 (D2-) - Body ground | Below 1 V |




(f) Turn the power switch OFF.

(g) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(h) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A22-4 (D2+) - A22-3 (D2-) | Below 1 Ω |
| A22-4 (D2+) - Body ground | 1 MΩ or higher |
| A22-3 (D2-) - Body ground | 1 MΩ or higher |

(i) Release the activation prevention mechanism built into connector B INFO .

(j) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A22-4 (D2+) - A22-3 (D2-) | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE INSTRUMENT**

| | |
|---|---|
| | **PANEL WIRE ASSEMBLY** |
| **OK** ▶ | **REPLACE SPIRAL CABLE** |

| | | |
|---|---|---|
| **DTC** | **B1815/54** | **Short in Front Passenger Side Squib 2nd Step Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1816/54** | **Open in Front Passenger Side Squib 2nd Step Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1817/54** | **Short to GND in Front Passenger Side Squib 2nd Step Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1818/54** | **Short to B+ in Front Passenger Side Squib 2nd Step Circuit** |

## DESCRIPTION

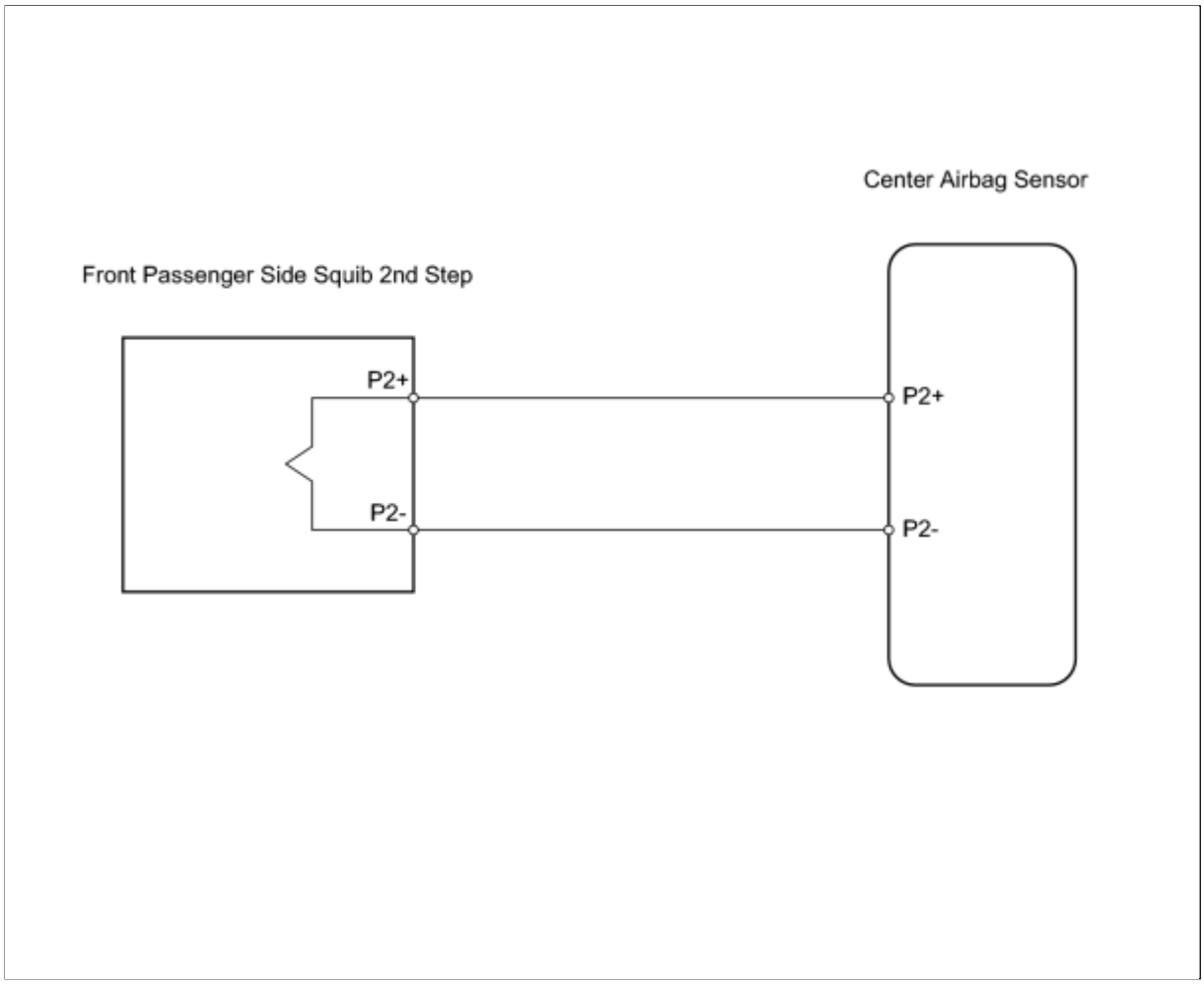
The front passenger side squib 2nd step circuit consists of the center airbag sensor and the front passenger airbag.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side squib 2nd step circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1815/54 | Center airbag sensor receives a line short signal 5 times from the front passenger side squib 2nd step circuit during primary check. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib 2nd step)<br>• Center airbag sensor |
| B1816/54 | Center airbag sensor receives an open signal from the front passenger side squib 2nd step circuit for 2 seconds. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib 2nd step)<br>• Center airbag sensor |
| B1817/54 | Center airbag sensor receives a short to ground signal from the front passenger side squib 2nd step circuit for 0.5 seconds. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib 2nd step)<br>• Center airbag sensor |
| B1818/54 | Center airbag sensor receives a short to B+ signal from the front passenger side squib 2nd step circuit for 0.5 seconds. | • Instrument panel wire<br>• Instrument panel wire assembly<br>• Front passenger airbag (Front passenger side squib 2nd step)<br>• Center airbag sensor |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**HINT:**

- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK FRONT PASSENGER AIRBAG ASSEMBLY (FRONT PASSENGER SIDE SQUIB 2ND STEP)** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

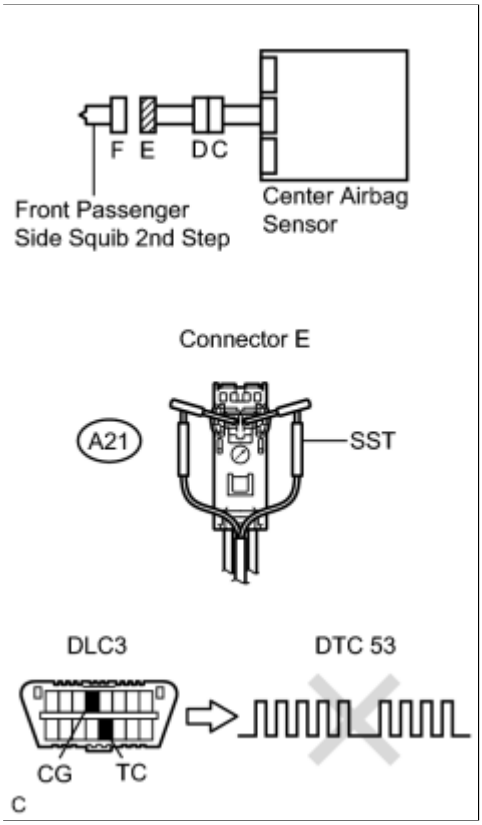
(c) Disconnect the connector to the front passenger airbag.

(d) Connect SST (resistance 2.1 Ω) to connector E (black connector).

CAUTION:

**CAUTION:**

**Never connect SST to the front passenger airbag (front passenger side squib 2nd step) for measurement, as this may lead to a serious injury due to airbag deployment.**




**NOTICE:**

- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1815, B1816, B1817, B1818 or 54 is not output.

**HINT:**

**Codes other than DTC B1815, B1816, B1817, B1818 and 54 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE FRONT PASSENGER AIRBAG ASSEMBLY**

**NG** ▼

| | |
|---|---|
| **2.** | **CHECK CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect SST from connector E.

(d) Check that the instrument panel wire assembly connector (on the front passenger airbag side) are not damaged.

OK:

Lock button is not disengaged, and claw of lock is not deformed or damaged.

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

**OK**

| | |
|---|---|
| **3.** | **CHECK FRONT PASSENGER SIDE SQUIB 2ND STEP CIRCUIT** |

(a) Disconnect the connector from the center airbag sensor.

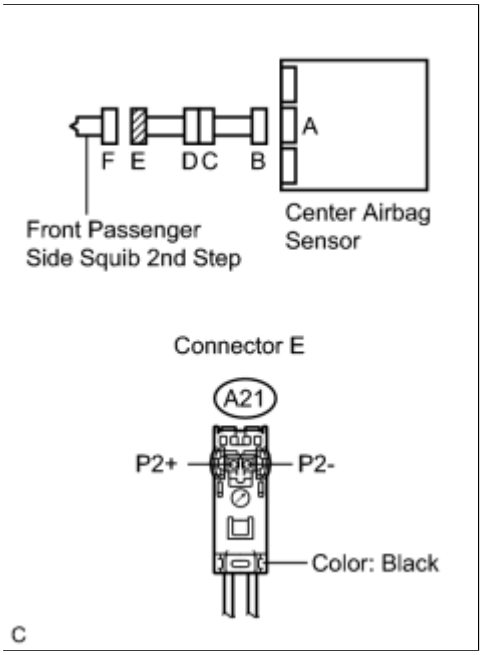
(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG).

(d) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A21-1 (P2+) - Body ground | Below 1 V |
| A21-2 (P2-) - Body ground | Below 1 V |




(e) Turn the power switch OFF.

(f) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(g) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A21-1 (P2+) - A21-2 (P2-) | Below 1 Ω |
| A21-1 (P2+) - Body ground | 1 MΩ or higher |
| A21-2 (P2-) - Body ground | 1 MΩ or higher |

(h) Release the activation prevention mechanism built into connector B INFO .

(i) Measure the resistance of the wire harness side connector.

Standard resistance:

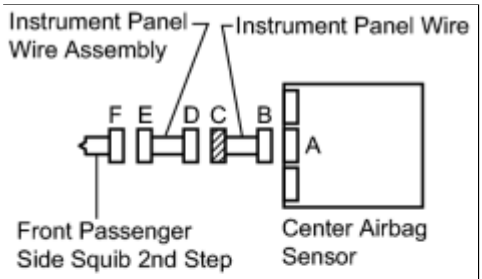
| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A21-1 (P2+) - A21-2 (P2-) | 1 MΩ or higher |

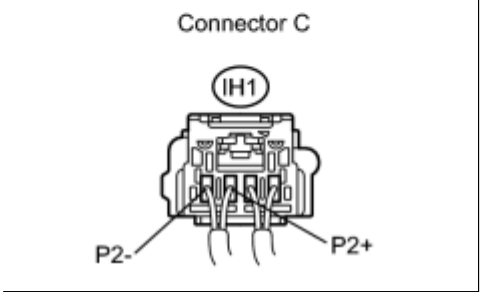
**OK** ▶ **REPLACE CENTER AIRBAG SENSOR**

**ASSEMBLY**

**NG**

| | |
|---|---|
| **4.** | **CHECK INSTRUMENT PANEL WIRE ASSEMBLY** |




(a) Restore the released activation prevention mechanism of connector B to its original position.

(b) Disconnect the instrument panel wire connector from the instrument panel wire assembly.

(c) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(d) Turn the power switch ON (IG).

(e) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IH1-4 (P2-) - Body ground | Below 1 V |
| IH1-3 (P2+) - Body ground | Below 1 V |

(f) Turn the power switch OFF.

(g) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(h) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IH1-4 (P2-) - IH1-3 (P2+) | Below 1 Ω |

| | |
|---|---|
| IH1-4 (P2-) - Body ground | 1 MΩ or higher |
| IH1-3 (P2+) - Body ground | 1 MΩ or higher |

(i) Release the activation prevention mechanism built into connector B INFO .

(j) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| IH1-4 (P2-) - IH1-3 (P2+) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE ASSEMBLY**

**OK** ▶ **REPAIR OR REPLACE INSTRUMENT PANEL WIRE**

| | | |
|---|---|---|
| **DTC** | **B1820/55** | **Short in Front Driver Side - Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1821/55** | **Open in Front Driver Side - Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1822/55** | **Short to GND in Front Driver Side - Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1823/55** | **Short to B+ in Front Driver Side - Side Squib Circuit** |

## DESCRIPTION

The front driver side - side squib circuit consists of the center airbag sensor assembly and the front seat side airbag assembly LH.

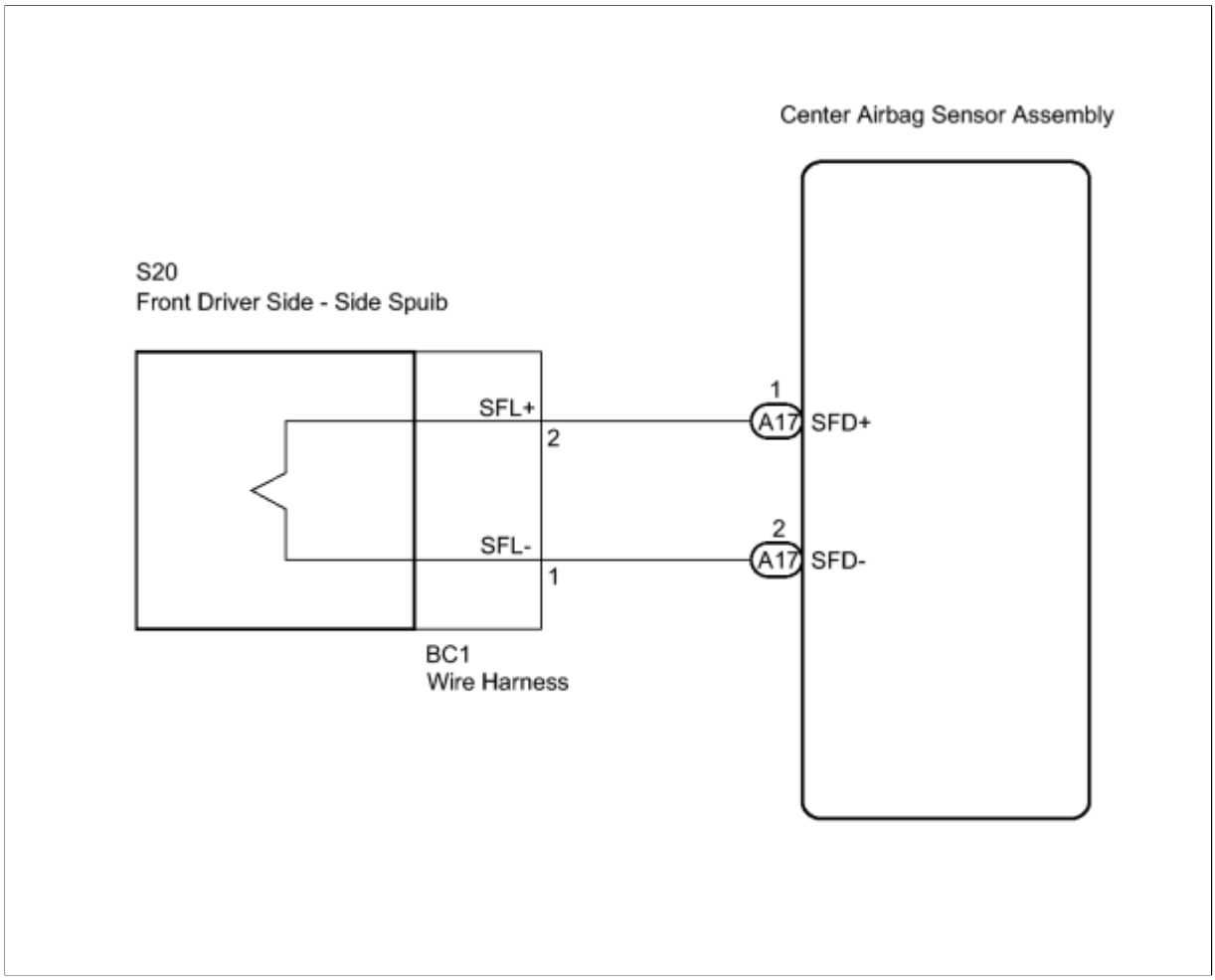
This circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front driver side - side squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1820/55 | • The center airbag sensor assembly receives a line short circuit signal 5 times in the front driver side - side squib circuit during primary check.<br>• Front driver side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire<br>• Front seat side airbag assembly LH (Front driver side - side squib)<br>• Center airbag sensor assembly |
| B1821/55 | • The center airbag sensor assembly receives an open circuit signal in the front driver side - side squib circuit for 2 seconds.<br>• Front driver side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire<br>• Front seat side airbag assembly LH (Front driver side - side squib)<br>• Center airbag sensor assembly |
| B1822/55 | • The center airbag sensor assembly receives a short circuit to ground signal in the front driver side - side squib circuit for 0.5 seconds.<br>• Front driver side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire<br>• Front seat side airbag assembly LH (Front driver side - side squib)<br>• Center airbag sensor assembly |
| B1823/55 | • The center airbag sensor assembly receives a short circuit to B+ signal in the front driver side - side squib circuit for 0.5 seconds.<br>• Front driver side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire<br>• Front seat side airbag assembly LH (Front driver side - side squib)<br>• Center airbag sensor assembly |

| | | |
|---|---|---|
| | | assembly |

## WIRING DIAGRAM



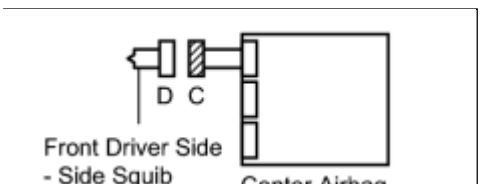

## INSPECTION PROCEDURE

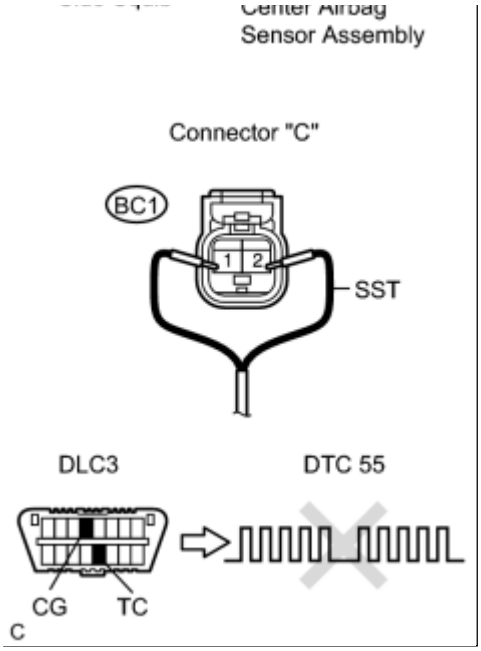
**HINT:**

- Perform the simulation method by selecting "check mode" (signal check) with the Techstream INFO .
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road INFO .

## PROCEDURE

| | |
|---|---|
| 1. | CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY LH (FRONT DRIVER SIDE - SIDE SQUIB) |






(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the connector from the front seat side airbag assembly LH.

(d) Connect SST (resistance 2.1 Ω) to connector C.

**CAUTION:**

**Never connect the tester to the front seat side airbag assembly LH (front driver side - side squib) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert the SST into the terminals of the connector when connecting.
- Insert straight the SST into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs stored in the memory INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1820, B1821, B1822, B1823, or 55 is not output.

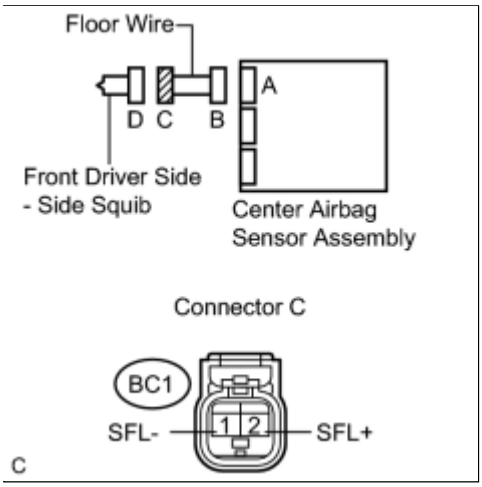
**HINT:**

**Codes other than DTC B1820, B1821, B1822, B1823, and 55 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE FRONT SEAT ASSEMBLY LH**

**NG** ▼

| 2. | CHECK FLOOR WIRE (FRONT DRIVER SIDE - SIDE SQUIB CIRCUIT) |
|---|---|




(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the SST from connector C.

(d) Disconnect the connectors from the center airbag sensor assembly.

(e) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch ON (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BC1-1 (SFL-) - Body ground | Power switch ON (IG) | Below 1 V |
| BC1-2 (SFL+) - Body ground | Power switch ON (IG) | Below 1 V |

(f) Check for an open in the circuit.

(1) Turn the power switch OFF.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BC1-1 (SFL-) - BC1-2 (SFL+) | Always | Below 1 Ω |

(g) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BC1-1 (SFL-) - Body ground | Always | 1 MΩ or higher |
| BC1-2 (SFL+) - Body ground | Always | 1 MΩ or higher |

(h) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B INFO .

(2) Measure the resistance according to the value(s) in the table below.

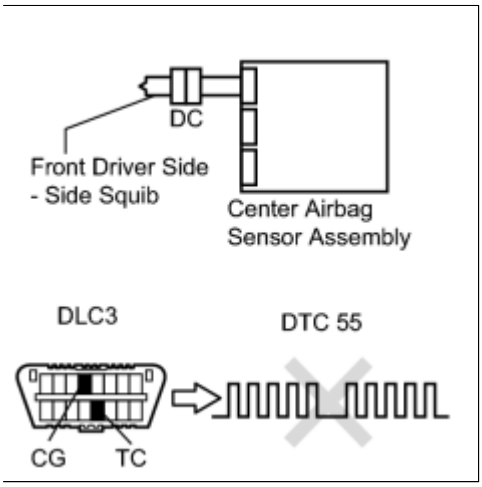
Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BC1-1 (SFL-) - BC1-2 (SFL+) | Always | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK CENTER AIRBAG SENSOR ASSEMBLY** |




(a) Connect the connectors to the front seat side airbag assembly LH and the center airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG), and wait for at least 60 seconds.

(d) Clear the DTCs stored in the memory INFO .

(e) Turn the power switch OFF.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Check the DTCs 

.

OK:

DTC B1820, B1821, B1822, B1823, or 55 is not output.

**HINT:**

**Codes other than DTC B1820, B1821, B1822, B1823, and 55 may be output at this time, but they are not related to this check.**

**NG** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| **DTC** | **B1825/56** | **Short in Front Passenger Side - Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1826/56** | **Open in Front Passenger Side - Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1827/56** | **Short to GND in Front Passenger Side - Side Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1828/56** | **Short to B+ in Front Passenger Side - Side Squib Circuit** |

## DESCRIPTION

The front passenger side - side squib circuit consists of the center airbag sensor assembly and the front seat side airbag assembly RH.

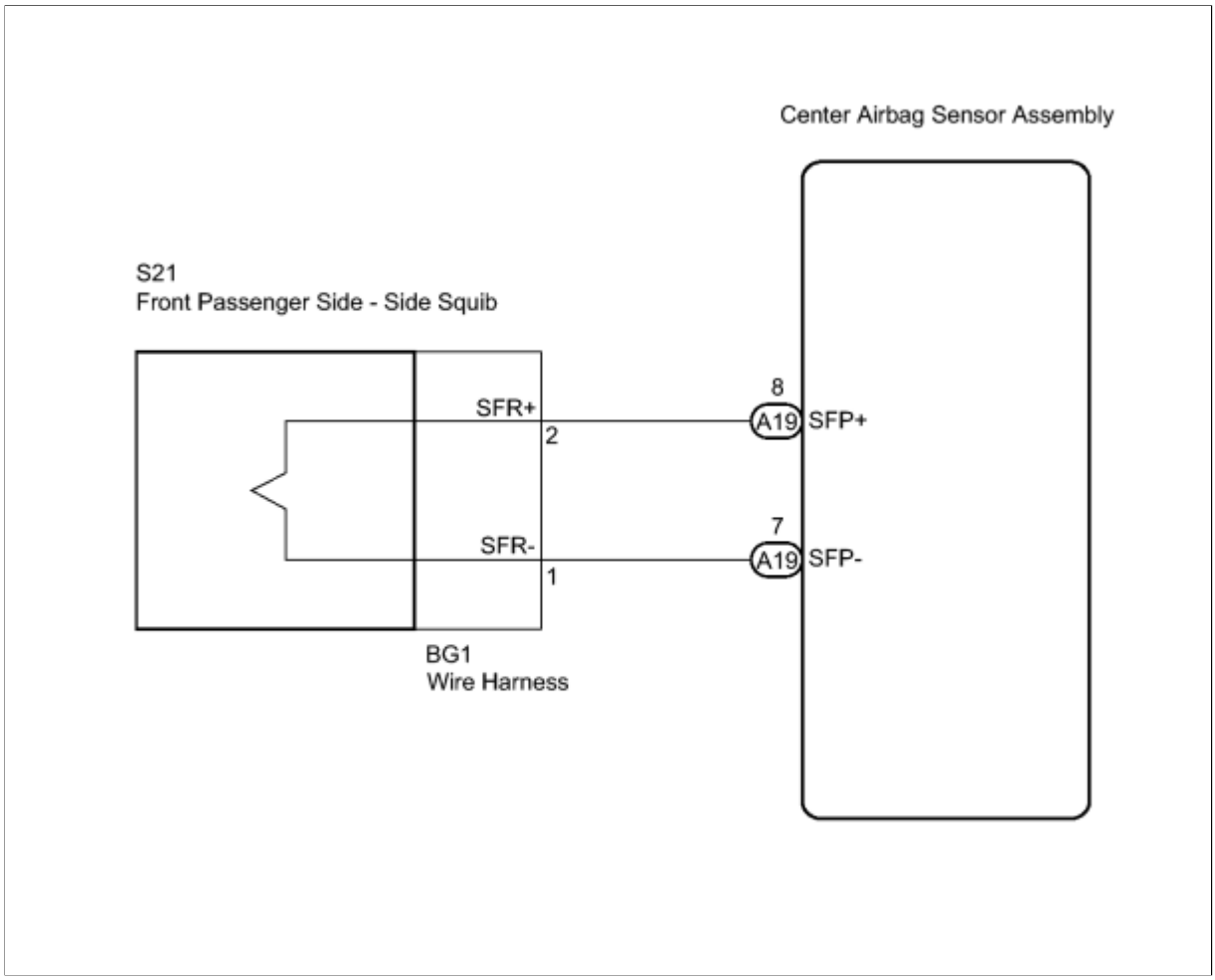
The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side - side squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1825/56 | • The center airbag sensor assembly receives a line short circuit signal 5 times in the front passenger side - side squib circuit during primary check.<br>• Front passenger side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire No. 2<br>• Front seat side airbag assembly RH (Front passenger side - side squib)<br>• Center airbag sensor assembly |
| B1826/56 | • The center airbag sensor assembly receives an open circuit signal in the front passenger side - side squib circuit for 2 seconds.<br>• Front passenger side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire No. 2<br>• Front seat side airbag assembly RH (Front passenger side - side squib)<br>• Center airbag sensor assembly |
| B1827/56 | • The center airbag sensor assembly receives a short circuit to ground signal in the front passenger side - side squib circuit for 0.5 seconds.<br>• Front passenger side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire No. 2<br>• Front seat side airbag assembly RH (Front passenger side - side squib)<br>• Center airbag sensor assembly |
| B1828/56 | • The center airbag sensor assembly receives a short circuit to B+ signal in the front passenger side - side squib circuit for 0.5 seconds.<br>• Front passenger side - side squib malfunction<br>• Center airbag sensor assembly malfunction | • Floor wire No. 2<br>• Front seat side airbag assembly RH (Front passenger side - side squib)<br>• Center airbag sensor assembly |

| | | |
|---|---|---|
| | | assembly |

## WIRING DIAGRAM



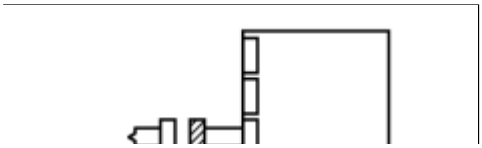

## INSPECTION PROCEDURE

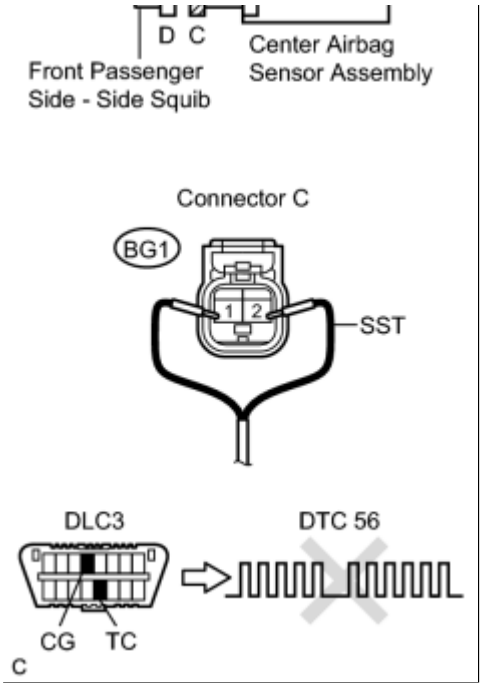
**HINT:**

- Perform the simulation method by selecting "check mode" (signal check) with the Techstream INFO .
- After selecting "check mode" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on a city or rough road INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK FRONT SEAT SIDE AIRBAG ASSEMBLY RH (FRONT PASSENGER SIDE - SIDE SQUIB)** |






(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the connector from the front seat side airbag assembly RH.

(d) Connect SST (resistance 2.1 Ω) to connector C.

**CAUTION:**

**Never connect the tester to the front seat side airbag assembly RH (front passenger side - side squib) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert the SST into the terminals of the connector when connecting.
- Insert straight the SST into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs stored in the memory INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1825, B1826, B1827, B1828, or 56 is not output.

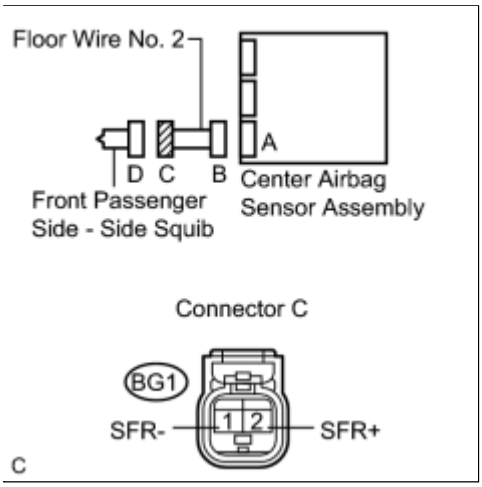
**HINT:**

**Codes other than DTC B1825, B1826, B1827, B1828, and 56 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE FRONT SEAT ASSEMBLY RH**

**NG**

| | |
|---|---|
| 2. | **CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE - SIDE SQUIB CIRCUIT)** |




(a) Turn the power switch OFF.

(b) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(c) Disconnect the SST from connector C.

(d) Disconnect the connectors from the center airbag sensor assembly.

(e) Check for a short to B+ in the circuit.

(1) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(2) Turn the power switch ON (IG).

(3) Measure the voltage according to the value(s) in the table below.

Standard voltage:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BG1-1 (SFR-) - Body ground | Power switch ON (IG) | Below 1 V |
| BG1-2 (SFR+) - Body ground | Power switch ON (IG) | Below 1 V |

(f) Check for an open in the circuit.

(1) Turn the power switch OFF.

(2) Disconnect the negative (-) terminal cable from the battery, and wait for at least 90 seconds.

(3) Measure the resistance according to the value(s) in the table below.

Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BG1-1 (SFR-) - BG1-2 (SFR+) | Always | Below 1 Ω |

(g) Check for a short to ground in the circuit.

(1) Measure the resistance according to the value(s) in the table below.

Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BG1-1 (SFR-) - Body ground | Always | 1 MΩ or higher |
| BG1-2 (SFR+) - Body ground | Always | 1 MΩ or higher |

(h) Check for a short in the circuit.

(1) Release the activation prevention mechanism built into connector B INFO .

(2) Measure the resistance according to the value(s) in the table below.

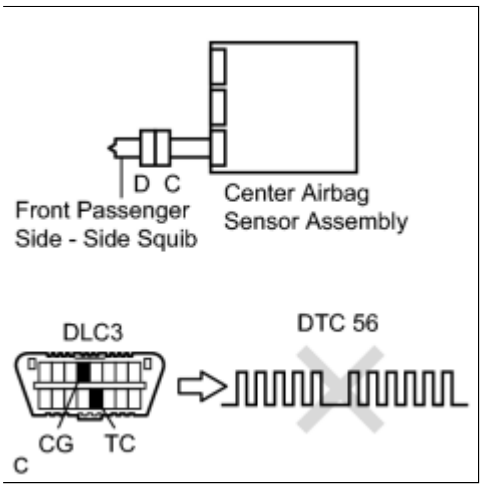
Standard resistance:

| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| BG1-1 (SFR-) - BG1-2 (SFR+) | Always | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK** ▼

| | |
|---|---|
| **3.** | **CHECK CENTER AIRBAG SENSOR ASSEMBLY** |




(a) Connect the connectors to the front seat side airbag assembly RH and the center airbag sensor assembly.

(b) Connect the negative (-) terminal cable to the battery, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG), and wait for at least 60 seconds.

(d) Clear the DTCs stored in the memory INFO .

(e) Turn the power switch OFF.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Check the DTCs INFO .

OK:

DTC B1825, B1826, B1827, B1828, or 56 is not output.

**HINT:**

**Codes other than DTC B1825, B1826, B1827, B1828, and 56 may be output at this time, but they are not related to this check.**

**NG** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

**OK** ▶ **USE SIMULATION METHOD TO CHECK**

| | | |
|---|---|---|
| **DTC** | **B1830/57** | **Short in Driver Side Curtain Shield Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1831/57** | **Open in Driver Side Curtain Shield Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1832/57** | **Short to GND in Driver Side Curtain Shield Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1833/57** | **Short to B+ in Driver Side Curtain Shield Squib Circuit** |

## DESCRIPTION

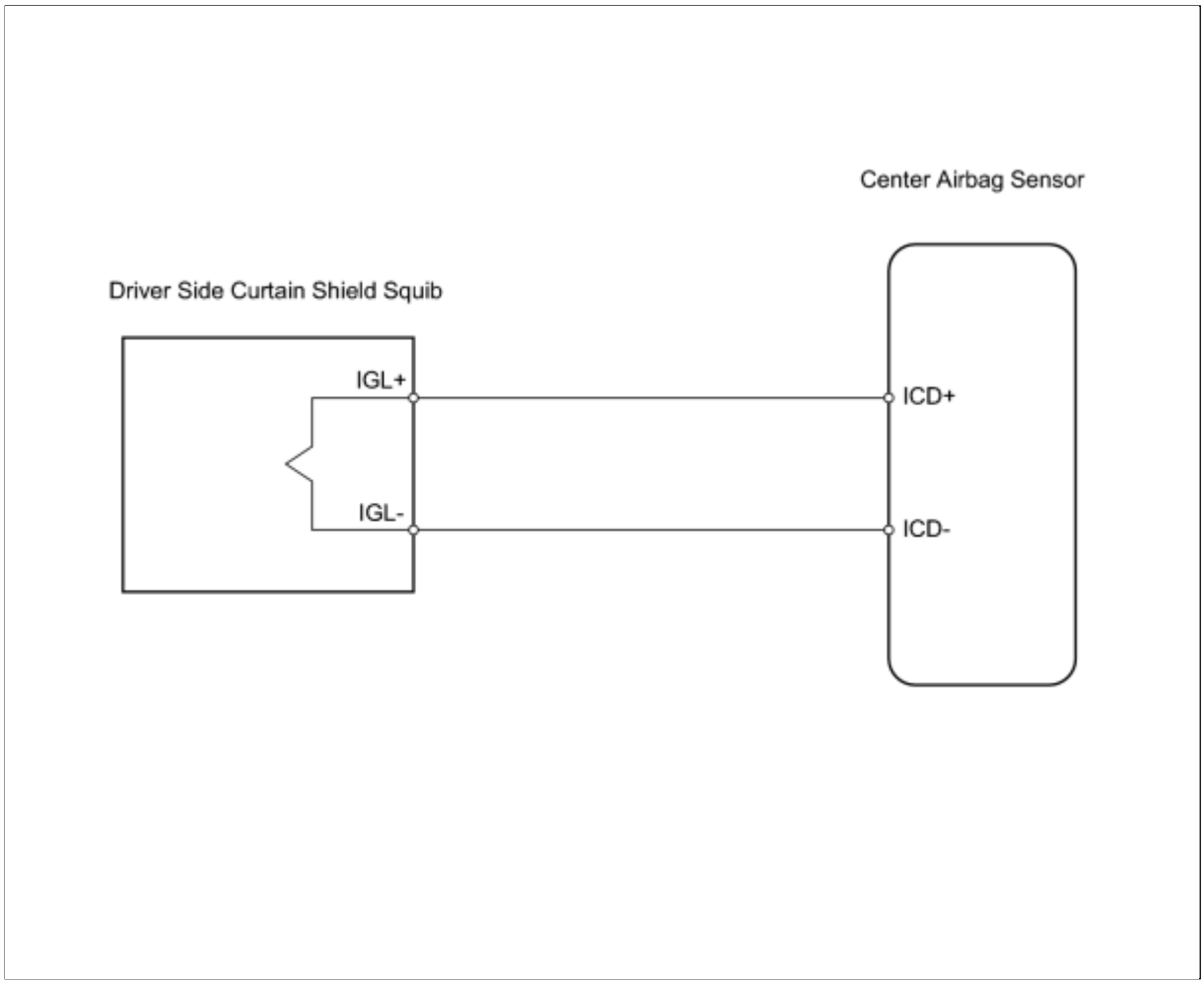
The driver side curtain shield squib circuit consists of the center airbag sensor and the curtain shield airbag LH.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the driver side curtain shield squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1830/57 | Center airbag sensor receives a line short signal 5 times from the driver side curtain shield squib circuit during primary check. | • Floor wire<br>• Curtain shield airbag LH (Driver side curtain shield squib)<br>• Center airbag sensor |
| B1831/57 | Center airbag sensor receives an open signal from the driver side curtain shield squib circuit for 2 seconds. | • Floor wire<br>• Curtain shield airbag LH (Driver side curtain shield squib)<br>• Center airbag sensor |
| B1832/57 | Center airbag sensor receives a short to ground signal from the driver side curtain shield squib circuit for 0.5 seconds. | • Floor wire<br>• Curtain shield airbag LH (Driver side curtain shield squib)<br>• Center airbag sensor |
| B1833/57 | Center airbag sensor receives a short to B+ signal from the driver side curtain shield squib circuit for 0.5 seconds. | • Floor wire<br>• Curtain shield airbag LH (Driver side curtain shield squib)<br>• Center airbag sensor |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**HINT:**

- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CURTAIN SHIELD AIRBAG ASSEMBLY LH (DRIVER SIDE CURTAIN SHIELD SQUIB)** |

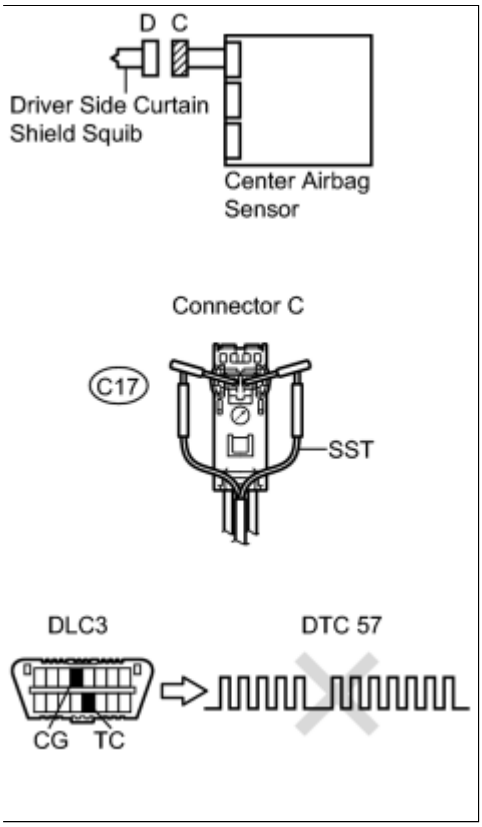
(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connector from the curtain shield airbag LH.

(d) Connect SST (resistance 2.1 Ω) to connector C.

CAUTION:




**CAUTION:**

**Never connect SST to the curtain shield airbag LH (driver side curtain shield squib) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1830, B1831, B1832, B1833 or 57 is not output.

**HINT:**

**DTCs other than DTC B1830, B1831, B1832, B1833 or 57 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY LH**

**NG** ▼

| | |
|---|---|
| **2.** | **CHECK CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the SST from connector C.

(d) Check that the floor wire connector (on the curtain shield LH side) is not damaged.

OK:

Lock button is not disengaged, and claw of lock is not deformed or damaged.

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK**

| 3. | CHECK FLOOR WIRE (DRIVER SIDE CURTAIN SHIELD SQUIB CIRCUIT) |
|---|---|

(a) Disconnect the connector from the center airbag sensor.

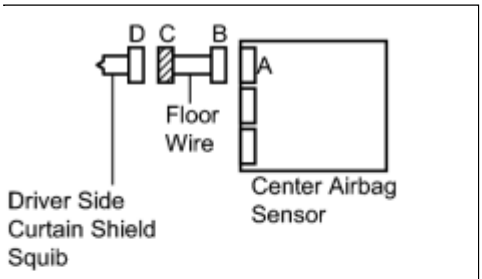
(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

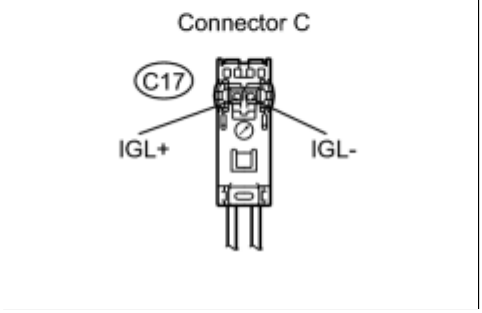
(c) Turn the power switch ON (IG).

(d) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C17-1 (IGL+) - Body ground | Below 1 V |
| C17-2 (IGL-) - Body ground | Below 1 V |




(e) Turn the power switch OFF.

(f) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(g) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C17-1 (IGL+) - C17-2 (IGL-) | Below 1 Ω |
| C17-1 (IGL+) - Body ground | 1 MΩ or higher |
| C17-2 (IGL-) - Body ground | 1 MΩ or higher |

(h) Release the activation prevention mechanism built into connector B INFO .

(i) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C17-1 (IGL+) - C17-2 (IGL-) | 1 MΩ or higher |

NG ▶ **REPAIR OR REPLACE FLOOR WIRE**

**REPLACE CENTER**

OK ▶ AIRBAG SENSOR ASSEMBLY

| | | |
|---|---|---|
| **DTC** | **B1835/58** | **Short in Front Passenger Side Curtain Shield Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1836/58** | **Open in Front Passenger Side Curtain Shield Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1837/58** | **Short to GND in Front Passenger Side Curtain Shield Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1838/58** | **Short to B+ in Front Passenger Side Curtain Shield Squib Circuit** |

## DESCRIPTION

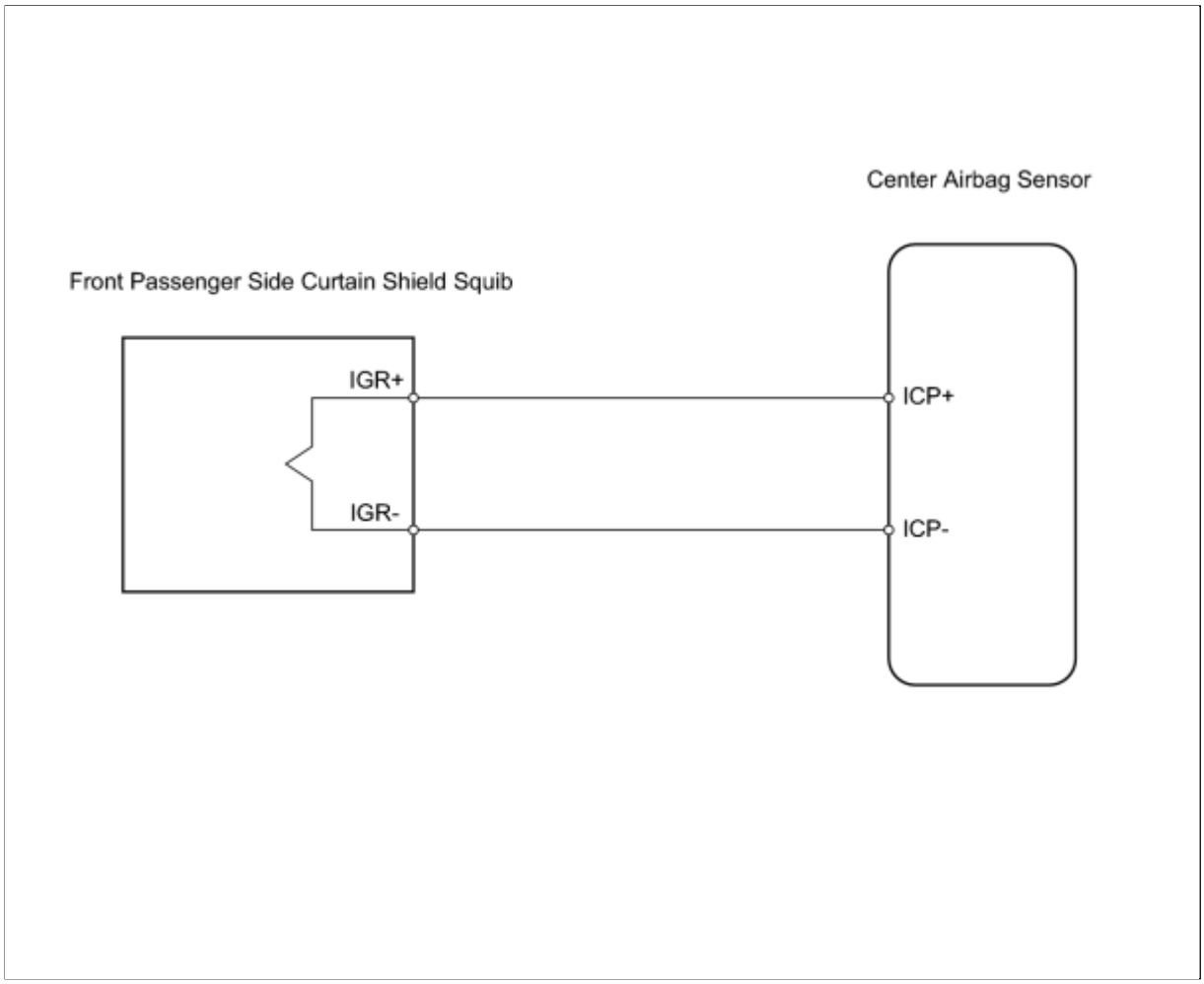
The front passenger side curtain shield squib circuit consists of the center airbag sensor and the curtain shield airbag RH.

The circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side curtain shield squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1835/58 | Center airbag sensor receives a line short circuit signal 5 times from the front passenger side curtain shield squib circuit during primary check. | • Floor wire No. 2<br>• Curtain shield airbag RH (Front passenger side curtain shield squib)<br>• Center airbag sensor |
| B1836/58 | Center airbag sensor receives an open signal from the front passenger side curtain shield squib circuit for 2 seconds. | • Floor wire No. 2<br>• Curtain shield airbag RH (Front passenger side curtain shield squib)<br>• Center airbag sensor |
| B1837/58 | Center airbag sensor receives a short to ground signal from the front passenger side curtain shield squib circuit for 0.5 seconds. | • Floor wire No. 2<br>• Curtain shield airbag RH (Front passenger side curtain shield squib)<br>• Center airbag sensor |
| B1838/58 | Center airbag sensor receives a short to B+ signal from the front passenger side curtain shield squib circuit for 0.5 seconds. | • Floor wire No. 2<br>• Curtain shield airbag RH (Front passenger side curtain shield squib)<br>• Center airbag sensor |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**HINT:**

- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CURTAIN SHIELD AIRBAG ASSEMBLY RH (FRONT PASSENGER SIDE CURTAIN SHIELD SQUIB)** |

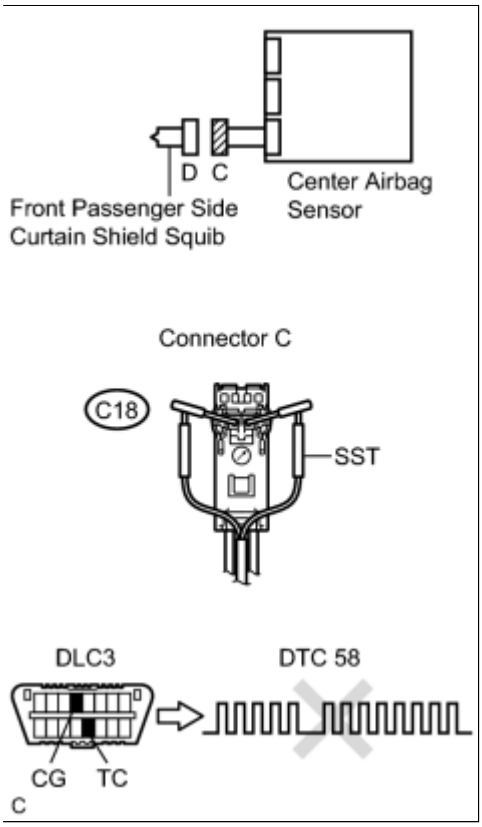
(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connectors from the curtain shield airbag RH.

(d) Connect SST (resistance 2.1 Ω) to connector C.

CAUTION:




**CAUTION:**

**Never connect SST to the curtain shield airbag RH (front passenger side curtain shield squib) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1835, B1836, B1837, B1838 or 58 is not output.

**HINT:**

**DTCs other than DTC B1835, B1836, B1837, B1838 or 58 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE CURTAIN SHIELD AIRBAG ASSEMBLY RH**

**NG** ▼

| | |
|---|---|
| **2.** | **CHECK CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the SST from connector C.

(d) Check that the floor wire No. 2 connector (on the curtain shield airbag RH side) are not damaged.

OK:

Lock button is not disengaged, and claw of lock is not deformed or damaged.

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK**

| 3. | CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE CURTAIN SHIELD SQUIB CIRCUIT) |
|---|---|

(a) Disconnect the connectors from the center airbag sensor.

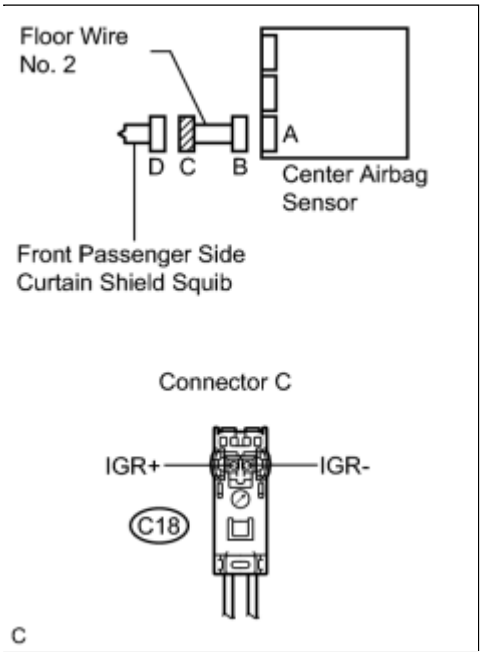
(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG).

(d) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C18-1 (IGR+) - Body ground | Below 1 V |
| C18-2 (IGR-) - Body ground | Below 1 V |




(e) Turn the power switch OFF.

(f) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(g) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C18-1 (IGR+) - C18-2 (IGR-) | Below 1 Ω |
| C18-1 (IGR+) - Body ground | 1 MΩ or higher |
| C18-2 (IGR-) - Body ground | 1 MΩ or higher |

(h) Release the activation prevention mechanism built into connector B INFO .

(i) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C18-1 (IGR+) - C18-2 (IGR-) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**REPLACE CENTER**

OK ▶ AIRBAG SENSOR ASSEMBLY

| | | |
|---|---|---|
| **DTC** | **B1900/73** | **Short in Front Driver Side Pretensioner Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1901/73** | **Open in Front Driver Side Pretensioner Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1902/73** | **Short to GND in Front Driver Side Pretensioner Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1903/73** | **Short to B+ in Front Driver Side Pretensioner Squib Circuit** |

## DESCRIPTION

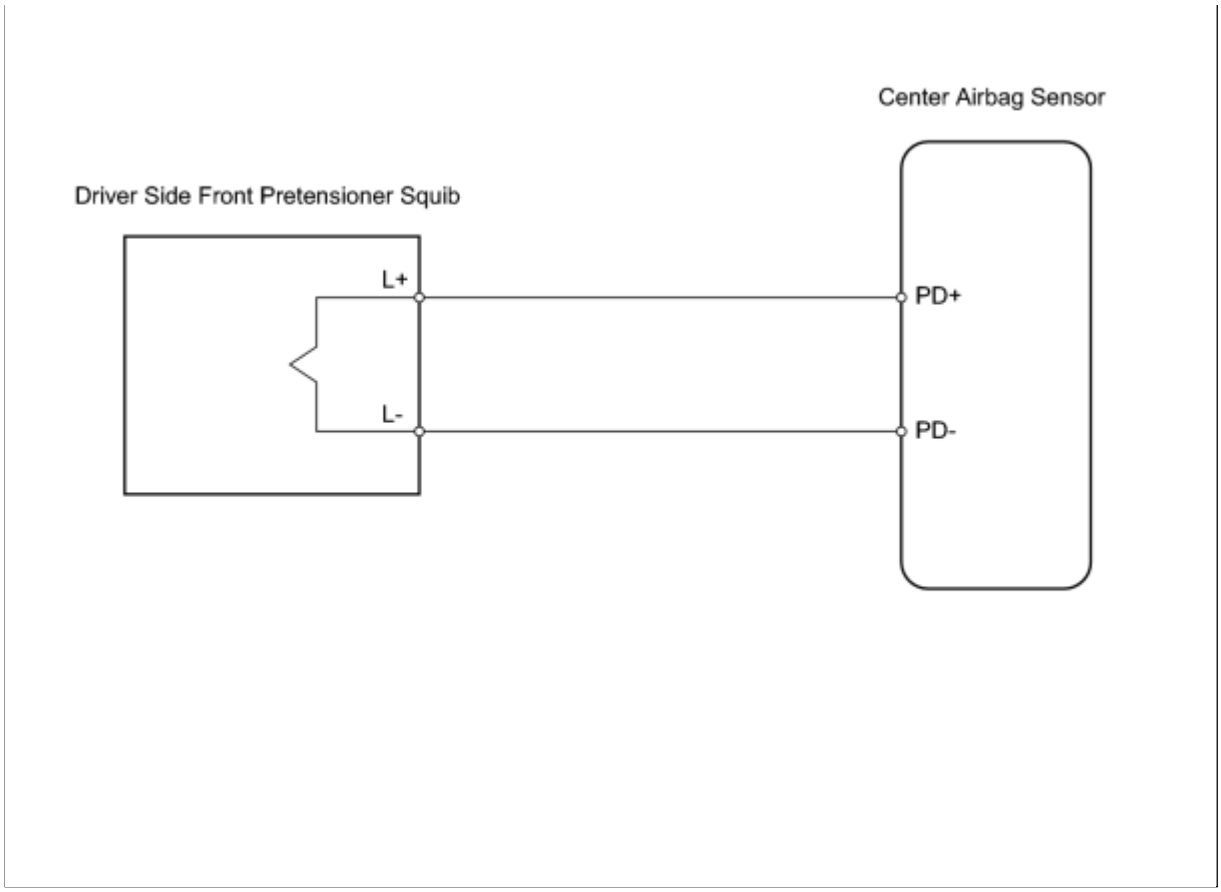
The driver side front pretensioner squib circuit consists of the center airbag sensor and the front seat outer belt LH.

This circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front pretensioner squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1900/73 | Center airbag sensor receives a line short signal 5 times from the driver side front pretensioner squib circuit during primary check. | • Floor wire<br>• Front seat outer belt LH (Driver side front pretensioner squib)<br>• Center airbag sensor |
| B1901/73 | Center airbag sensor receives an open signal from the driver side front pretensioner squib circuit for 2 seconds. | • Floor wire<br>• Front seat outer belt LH (Driver side front pretensioner squib)<br>• Center airbag sensor |
| B1902/73 | Center airbag sensor receives a short to ground signal from the driver side front pretensioner squib circuit for 0.5 seconds. | • Floor wire<br>• Front seat outer belt LH (Driver side front pretensioner squib)<br>• Center airbag sensor |
| B1903/73 | Center airbag sensor receives a short circuit to B+ signal from the driver side front pretensioner squib circuit for 0.5 seconds. | • Floor wire<br>• Front seat outer belt LH (Driver side front pretensioner squib)<br>• Center airbag sensor |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**HINT:**

- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK FRONT SEAT OUTER BELT ASSEMBLY LH (DRIVER SIDE FRONT PRETENSIONER SQUIB)** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connectors from the front seat outer belt LH.

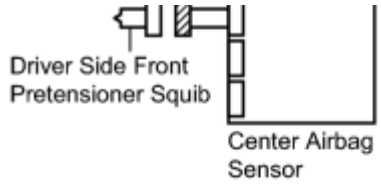
(d) Connect SST (resistance 2.1 Ω) to connector C.

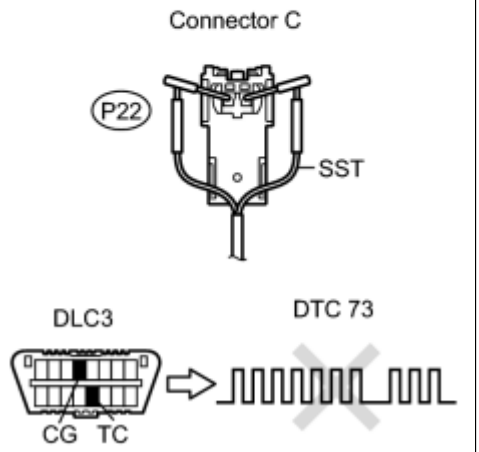
**CAUTION:**

**Never connect SST to the front seat outer belt LH (driver side front pretensioner squib) for measurement, as this may lead to a serious injury due to airbag deployment.**




**NOTICE:**




- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1900, B1901, B1902, B1903 or 73 is not output.

**HINT:**

**DTCs other than DTC B1900, B1901, B1902, B1903 or 73 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE FRONT SEAT OUTER BELT ASSEMBLY LH**

**NG** ▼

| | |
|---|---|
| **2.** | **CHECK CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the SST from connector C.

(d) Check that the floor wire connector (on the driver side front seat outer belt) is not damaged.

OK:

The lock button is not disengaged, or the claw of the lock is not deformed or damaged.

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▼

| 3. | CHECK FLOOR WIRE (DRIVER SIDE FRONT PRETENSIONER SQUIB CIRCUIT) |
|---|---|

(a) Disconnect the connector from the center airbag sensor.

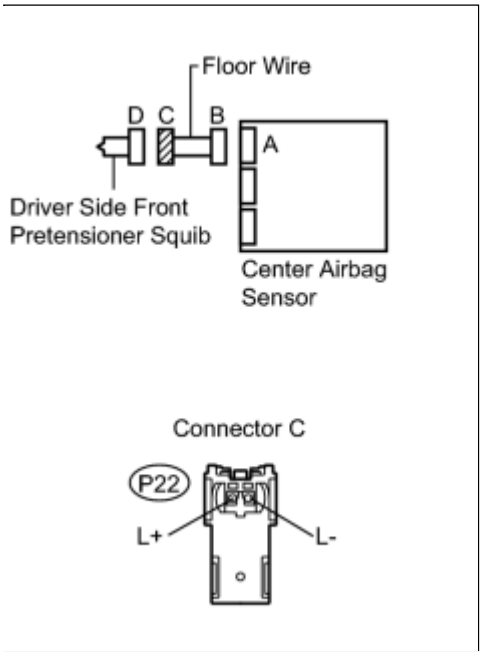
(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Turn the power switch ON (IG).

(d) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| P22-1 (L+) - Body ground | Below 1 V |
| P22-2 (L-) - Body ground | Below 1 V |




(e) Turn the power switch OFF.

(f) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(g) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| P22-1 (L+) - P22-2 (L-) | Below 1 Ω |
| P22-1 (L+) - Body ground | 1 MΩ or higher |
| P22-2 (L-) - Body ground | 1 MΩ or higher |

(h) Release the activation prevention mechanism built into connector B INFO .

(i) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| P22-1 (L+) - P22-2 (L-) | 1 MΩ or higher |

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE**

**OK** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

| | | |
|---|---|---|
| **DTC** | **B1905/74** | **Short in Front Passenger Side Pretensioner Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1906/74** | **Open in Front Passenger Side Pretensioner Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1907/74** | **Short to GND in Front Passenger Side Pretensioner Squib Circuit** |

| | | |
|---|---|---|
| **DTC** | **B1908/74** | **Short to B+ in Front Passenger Side Front Pretensioner Squib Circuit** |

## DESCRIPTION

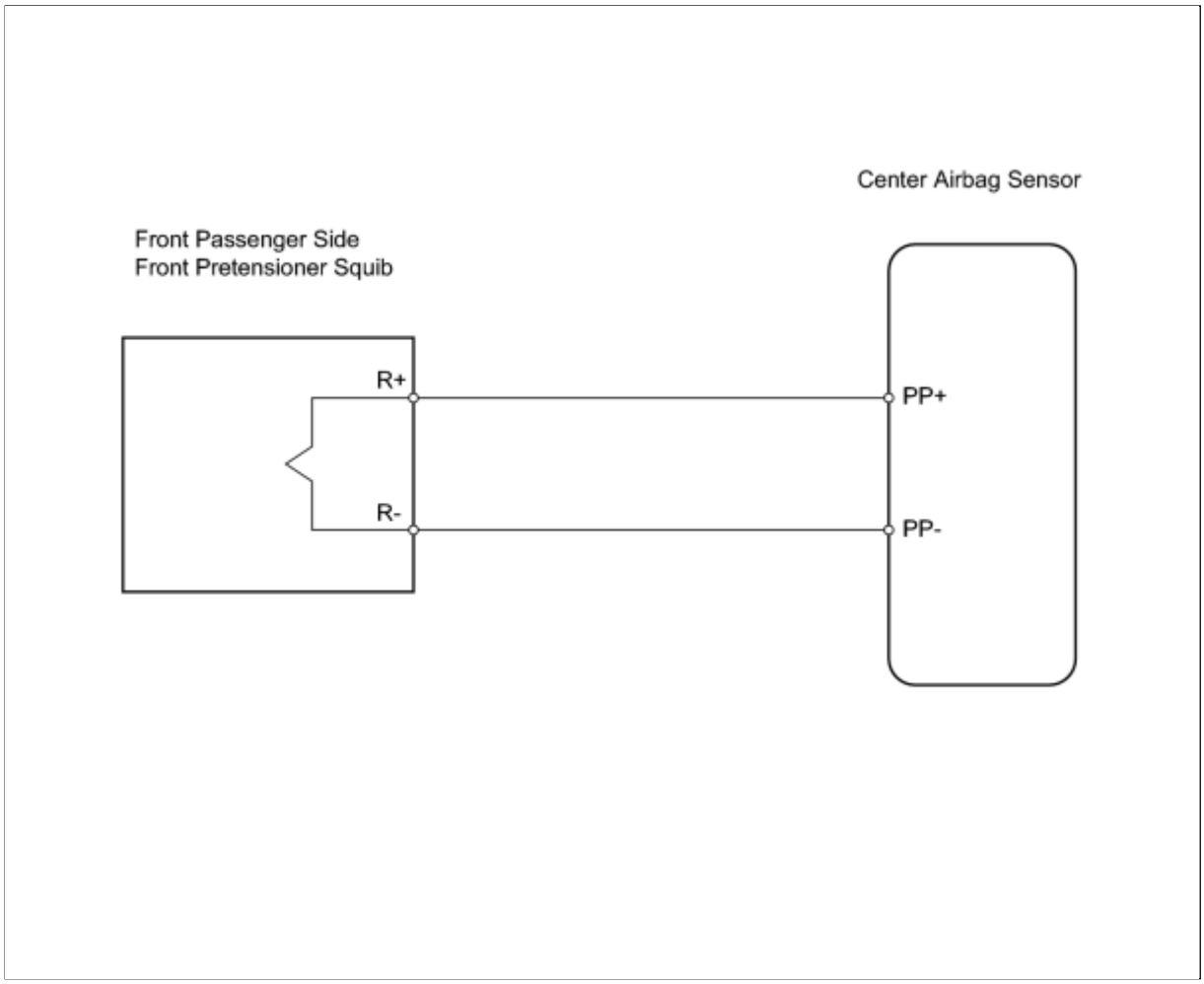
The front passenger side front pretensioner squib circuit consists of the center airbag sensor and the front seat outer belt RH.

This circuit instructs the SRS to deploy when deployment conditions are met.

These DTCs are recorded when a malfunction is detected in the front passenger side front pretensioner squib circuit.

| DTC NO. | DTC DETECTION CONDITION | TROUBLE AREA |
|---|---|---|
| B1905/74 | Center airbag sensor receives a line short signal 5 times from the front passenger side front pretensioner squib circuit during primary check. | • Floor wire No. 2<br>• Front seat outer belt RH (Front passenger side front pretensioner squib)<br>• Center airbag sensor |
| B1906/74 | Center airbag sensor receives an open signal from the front passenger side front pretensioner squib circuit for 2 seconds. | • Floor wire No. 2<br>• Front seat outer belt RH (Front passenger side front pretensioner squib)<br>• Center airbag sensor |
| B1907/74 | Center airbag sensor receives a short to ground signal from the front passenger side front pretensioner squib circuit for 0.5 seconds. | • Floor wire No. 2<br>• Front seat outer belt RH (Front passenger side front pretensioner squib)<br>• Center airbag sensor |
| B1908/74 | Center airbag sensor receives a short to B+ signal from the front passenger side front pretensioner squib circuit for 0.5 seconds. | • Floor wire No. 2<br>• Front seat outer belt RH (Front passenger side front pretensioner squib)<br>• Center airbag sensor |

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**HINT:**

- Perform the simulation method by selecting the "CHECK MODE" (signal check) with the Techstream INFO .
- After selecting the "CHECK MODE" (signal check), perform the simulation method by wiggling each connector of the airbag system or driving the vehicle on various types of roads INFO .

## PROCEDURE

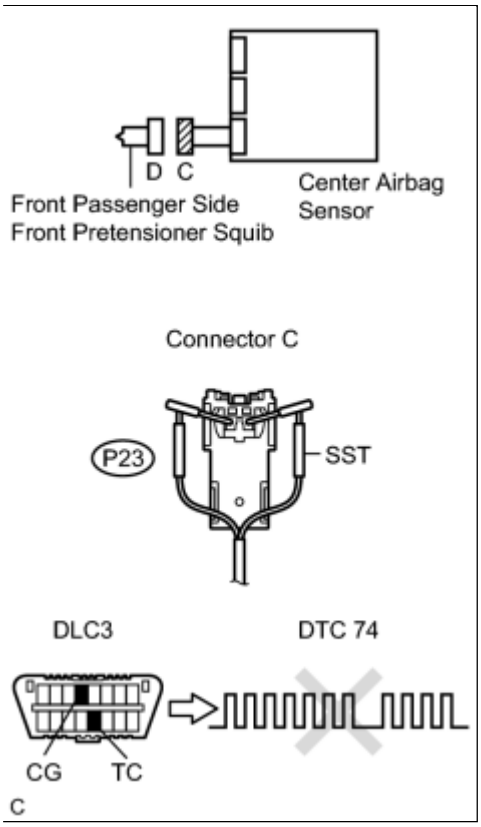
| | |
|---|---|
| 1. | **CHECK FRONT SEAT OUTER BELT ASSEMBLY RH (FRONT PASSENGER SIDE FRONT PRETENSIONER SQUIB)** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connectors from the front seat outer belt RH.

(d) Connect SST (resistance 2.1 Ω) to connector C.




**CAUTION:**

**Never connect SST to the front seat outer belt RH (front passenger side front pretensioner squib) for measurement, as this may lead to a serious injury due to airbag deployment.**

**NOTICE:**

- Do not forcibly insert SST into the terminals of the connector when connecting.
- Insert SST straight into the terminals of the connector.

**SST: 09843-18061**

(e) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(f) Turn the power switch ON (IG), and wait for at least 60 seconds.

(g) Clear the DTCs INFO .

(h) Turn the power switch OFF.

(i) Turn the power switch ON (IG), and wait for at least 60 seconds.

(j) Check the DTCs INFO .

OK:

DTC B1905, B1906, B1907, B1908 or 74 is not output.

**HINT:**

**DTCs other than DTC B1905, B1906, B1907, B1908 or 74 may be output at this time, but they are not related to this check.**

**OK** ▶ **REPLACE FRONT SEAT OUTER BELT ASSEMBLY RH**

**NG** ▼

| | |
|---|---|
| **2.** | **CHECK CONNECTOR** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the SST from connector C.

(d) Check that the floor wire No. 2 connector (on the front seat outer belt RH side) is not damaged.

OK:

Lock button is not disengaged, or the claw of the lock is not deformed or damaged.

**NG** ▶ **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**OK**

| | |
|---|---|
| **3.** | **CHECK FLOOR WIRE NO. 2 (FRONT PASSENGER SIDE FRONT PRETENSIONER SQUIB CIRCUIT)** |

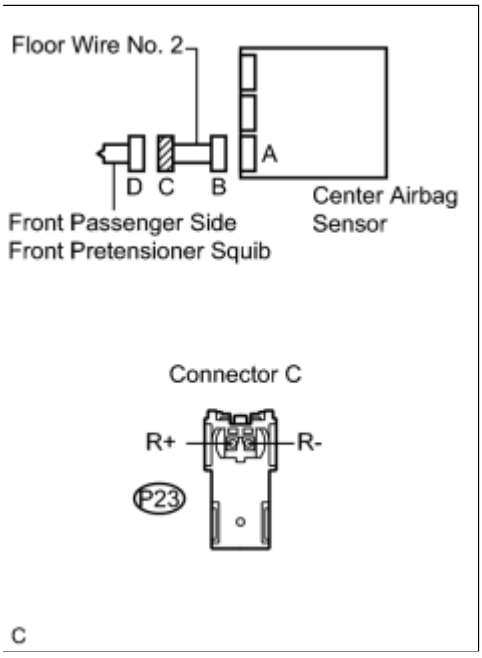
(a) Disconnect the connectors from the center airbag sensor.

(b) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(c) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| P23-1 (R+) - Body ground | Below 1 V |
| P23-2 (R-) - Body ground | Below 1 V |




(d) Turn the power switch OFF.

(e) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(f) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| P23-1 (R+) - P23-2 (R-) | Below 1 Ω |
| P23-1 (R+) - Body ground | 1 MΩ or higher |
| P23-2 (R-) - Body ground | 1 MΩ or higher |

(g) Release the activation prevention mechanism built into connector B INFO .

(h) Measure the resistance of the wire harness side connector.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| P23-1 (R+) - P23-2 (R-) | 1 MΩ or higher |

**NG** **REPAIR OR REPLACE FLOOR WIRE NO. 2**

**REPLACE CENTER**

OK ▶ AIRBAG SENSOR ASSEMBLY

**Source Voltage Drop**

## DESCRIPTION

The SRS is equipped with a voltage-increase circuit (DC-DC converter) in the center airbag sensor in case the source voltage drops.

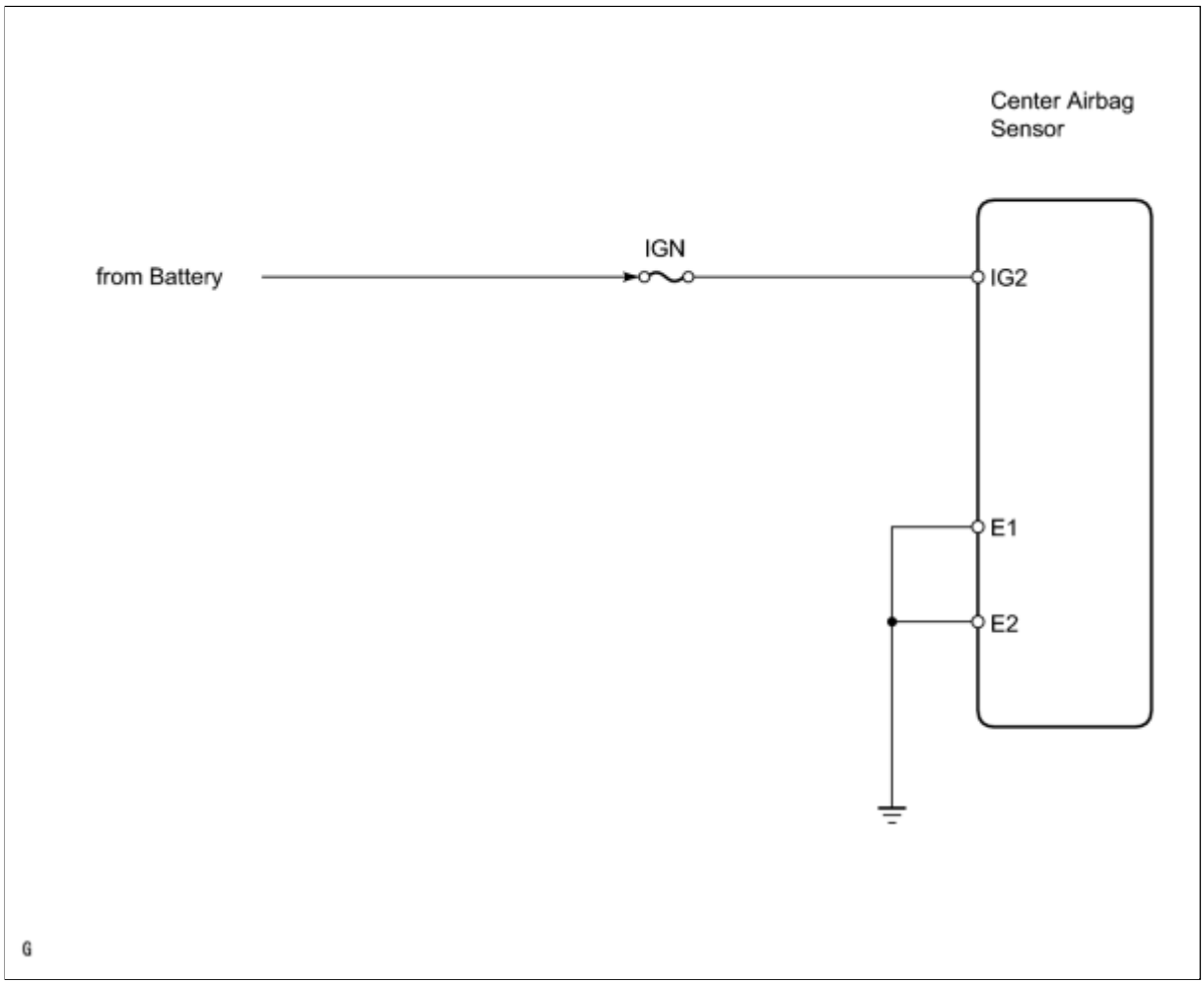
When the source voltage drops, the voltage-increase circuit (DC-DC converter) functions to increase the voltage of the SRS to a normal working level.

When a malfunction occurs in this circuit, no DTCs are output (a normal system code is output). If a source voltage drop occurs, the SRS warning light comes on.

A malfunction in this circuit is not recorded in the center airbag sensor.

The SRS warning light automatically goes off when the source voltage returns to normal.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1 | CHECK WIRE HARNESS (CENTER AIRBAG SENSOR - BATTERY) |

| | |
|---|---|
| 1. | CHECK WIRE HARNESS (CENTER AIRBAG SENSOR - BATTERY) |

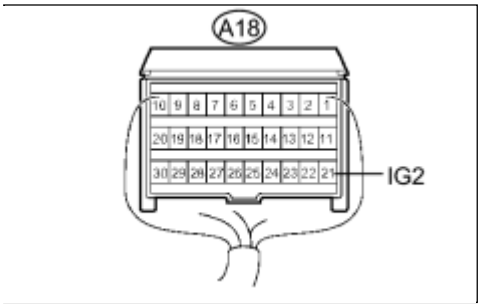
(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Disconnect the connectors from the center airbag sensor.

(d) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(e) Measure the voltage of the wire harness side connector.




Standard voltage:

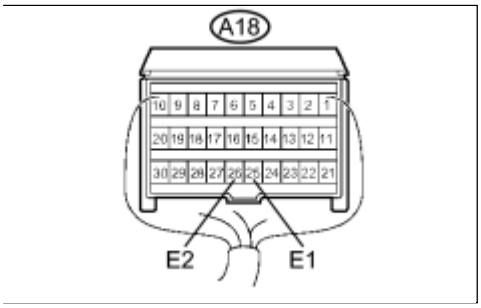
| TESTER CONNECTION | CONDITION | SPECIFIED CONDITION |
|---|---|---|
| A18-21 (IG2) - Body ground | Power switch ON (IG) | 11 to 14 V |

NG ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR, CHARGING SYSTEM AND BATTERY**

**OK** ▼

| | |
|---|---|
| 2. | CHECK WIRE HARNESS (CENTER AIRBAG SENSOR - BODY GROUND) |

(a) Measure the resistance of the wire harness side connector.




Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-25 (E1) - Body ground | Below 1 Ω |
| A18-26 (E2) - Body ground | Below 1 Ω |

NG ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK** ▼

| | |
|---|---|
| 3. | **CHECK SRS WARNING LIGHT** |

(a) Turn the power switch OFF.

(b) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(c) Connect the center airbag sensor connector.

(d) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.

(e) Turn the power switch ON (IG), and wait for at least 6 seconds.

(f) Operate all components of the electrical system (defogger, wiper, headlight, heater, blower, etc.) and check that the SRS warning light does not come on.

OK:

SRS warning light does not come on.

**NG** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

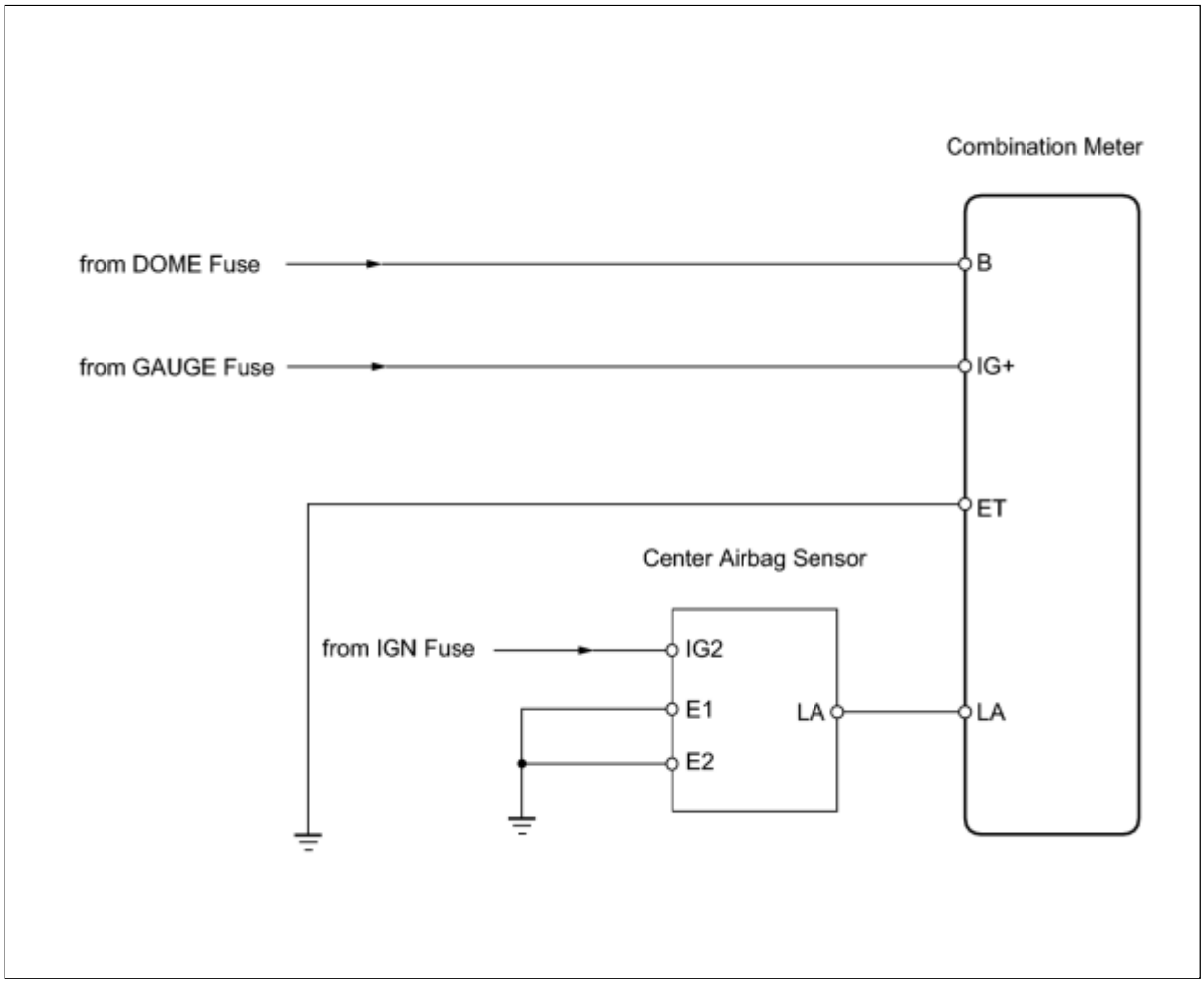
**OK** ▶ **END**

**SRS Warning Light Remains ON**

## DESCRIPTION

The SRS warning light is located on the combination meter. When the power switch is turned from OFF to ON (IG), the SRS warning light illuminates. If the SRS is normal, the SRS warning light turns off automatically after approximately 6 seconds. If there is a malfunction in the SRS, the SRS warning light remains illuminated even after approximately 6 seconds have passed. When terminals TC and CG of the DLC3 are connected, the DTCs are communicated through SRS warning light blinking patterns.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **INSPECT BATTERY** |

(a) Measure the voltage of the battery.

Standard voltage:

11 to 14 V

**NG** ▶ **RECHARGE OR REPLACE BATTERY**

**OK** ▼

| | |
|---|---|
| **2.** | **CHECK CONNECTION OF CONNECTOR** |

(a) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(b) Check that the connector is properly connected to the center airbag sensor.

OK:

Connector is connected.

**NG** ▶ **CONNECT CONNECTOR**

**OK** ▼

| | |
|---|---|
| **3.** | **PREPARE FOR INSPECTION** |

**CAUTION:**

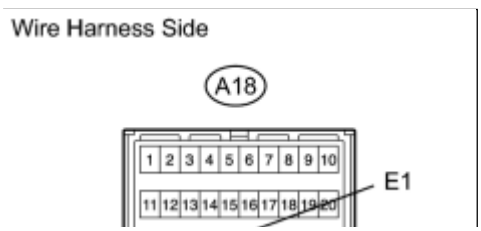
**Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.**

(a) Disconnect the connector from the center airbag sensor.

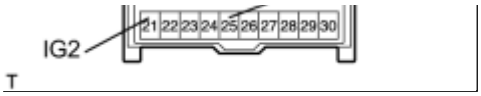
(b) Disconnect the connector from the steering pad connector.

**NEXT** ▼

| | |
|---|---|
| **4.** | **CHECK CENTER AIRBAG SENSOR ASSEMBLY** |




(a) Connect the cable to the negative (-) battery terminal, and wait for at least 2 seconds.




(b) Turn the power switch ON (IG).

(c) Measure the voltage and resistance of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-21 (IG2) - Body ground | 8 to 14 V |

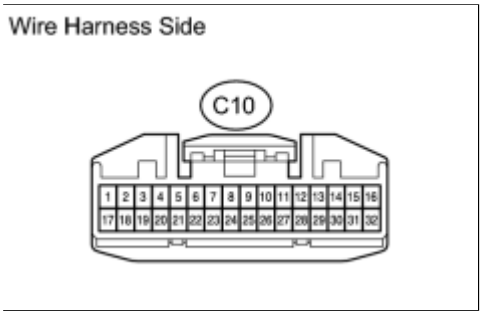
Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-25 (E1) - Body ground | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK** ▼

| 5. | CHECK COMBINATION METER ASSEMBLY (POWER SOURCE) |
|---|---|




(a) Disconnect the C10 meter connector.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

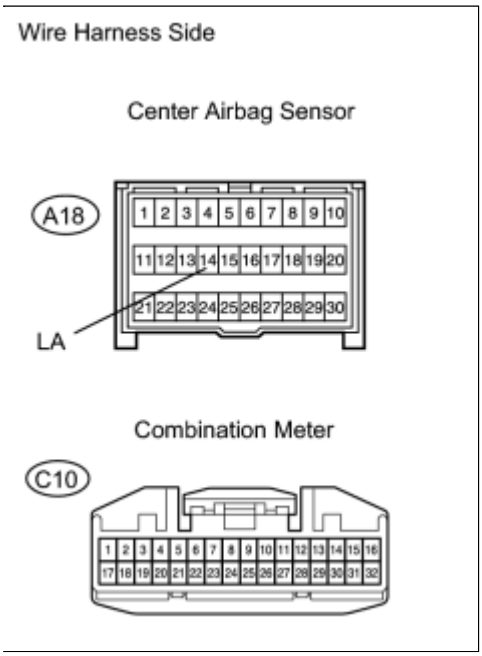
Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C10-21 - Body ground | 8 to 14 V |

**NG** ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK**

| | |
|---|---|
| 6. | CHECK WIRE HARNESS (CENTER AIRBAG SENSOR - COMBINATION METER) |




(a) Disconnect the A18 sensor connector.

(b) Disconnect the C10 meter connector.

(c) Measure the resistance of the wire harness side connectors.

Standard resistance:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-14 (LA) - C10-11 | Below 1 Ω |

**NG** ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK**

| | |
|---|---|
| 7. | CHECK SRS WARNING LIGHT (OPERATION) |

(a) Disconnect the A18 ECU connector with the C10 meter connector connected.

(b) Turn the power switch ON (IG).

(c) Check that the warning light illuminates for 6 seconds after turning the power switch ON (IG).

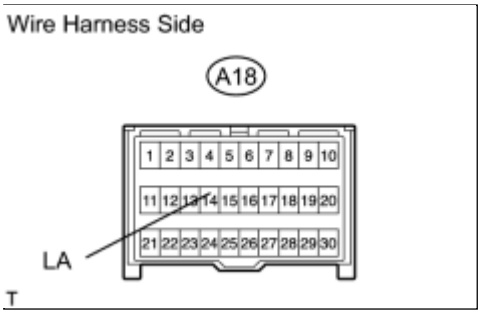
OK:

Warning light illuminates for 6 seconds after turning power switch ON (IG).

**NG** ▶ **REPLACE COMBINATION METER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **8.** | **CHECK CENTER AIRBAG SENSOR ASSEMBLY** |




(a) Disconnect the A18 sensor connector.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

Standard voltage:

| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| A18-14 (LA) - Body ground | 8 to 14 V |

**NG** ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK** ▼

| | |
|---|---|
| **9.** | **REPLACE CENTER AIRBAG SENSOR ASSEMBLY** |

(a) Replace the center airbag sensor.

(b) Check that the SRS warning light illuminates normally.

OK:

SRS warning light illuminates normally.

**NG** ▶ **REPLACE COMBINATION METER ASSEMBLY**

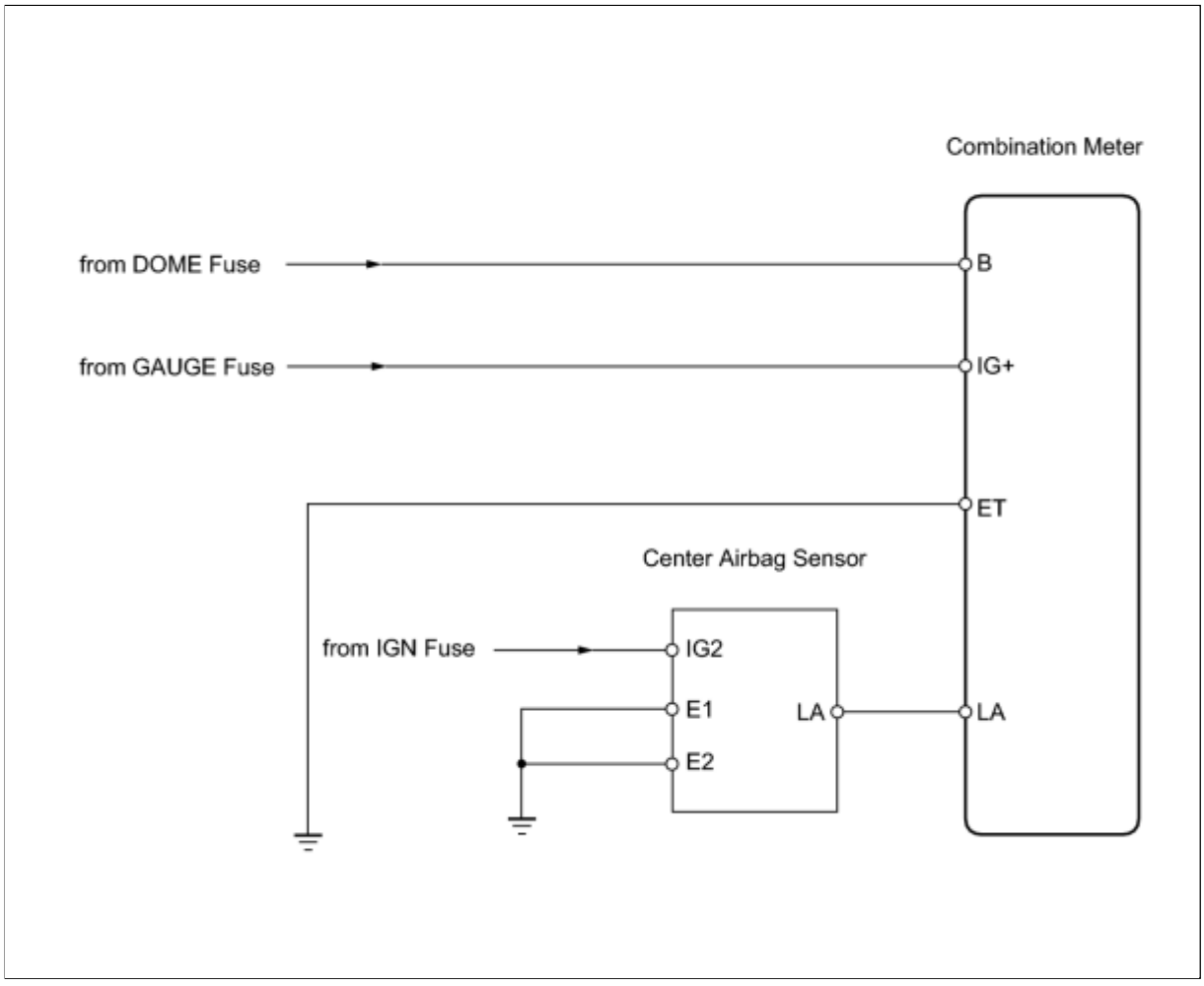
**OK** ▶ **END**

**SRS Warning Light does not Come ON**

## DESCRIPTION

The SRS warning light is located on the combination meter. When the power switch is turned from OFF to ON (IG), the SRS warning light illuminates. If the SRS is normal, the SRS warning light turns off automatically after approximately 6 seconds. If there is a malfunction in the SRS, the SRS warning light remains illuminated even after approximately 6 seconds have passed. When terminals TC and CG of the DLC3 are connected, the DTCs are communicated through SRS warning light blinking patterns.

## WIRING DIAGRAM




## INSPECTION PROCEDURE

## PROCEDURE

| | |
|---|---|
| 1. | **CHECK CONNECTION OF CONNECTORS** |

(a) Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

(b) Check that the connectors are properly connected to the center airbag sensor and combination meter.

OK:

Connectors are connected.

**NG** ▶ **CONNECT CONNECTORS**

**OK** ▼

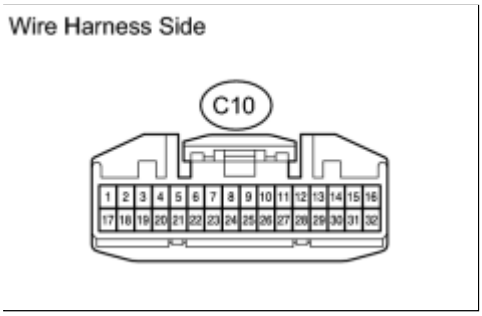
| 2. | CHECK COMBINATION METER ASSEMBLY |
|---|---|

(a) Disconnect the C10 meter connector.

(b) Turn the power switch ON (IG).

(c) Measure the voltage of the wire harness side connector.

Standard voltage:




| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| C10-21 - Body ground | 8 to 14 V |

**NG** ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK** ▼

| 3. | CHECK SRS WARNING LIGHT (OPERATION) |
|---|---|

(a) Disconnect the A18 sensor connector with the C10 meter connector connected.

(b) Turn the power switch ON (IG).

(c) Check that the warning light illuminates for 6 seconds after turning the power switch ON (IG).

OK:

Warning light illuminates for 6 seconds after turning power switch ON (IG).

**NG** ▶ **REPLACE COMBINATION METER ASSEMBLY**

**OK** ▼

| | |
|---|---|
| **4.** | **REPLACE CENTER AIRBAG SENSOR ASSEMBLY** |

(a) Replace the center airbag sensor.

(b) Check that the SRS warning light illuminates normally.

OK:

SRS warning light illuminates normally.

**NG** ▶ **REPLACE COMBINATION METER ASSEMBLY**

**OK** ▶ **END**

**TC and CG Terminal Circuit**

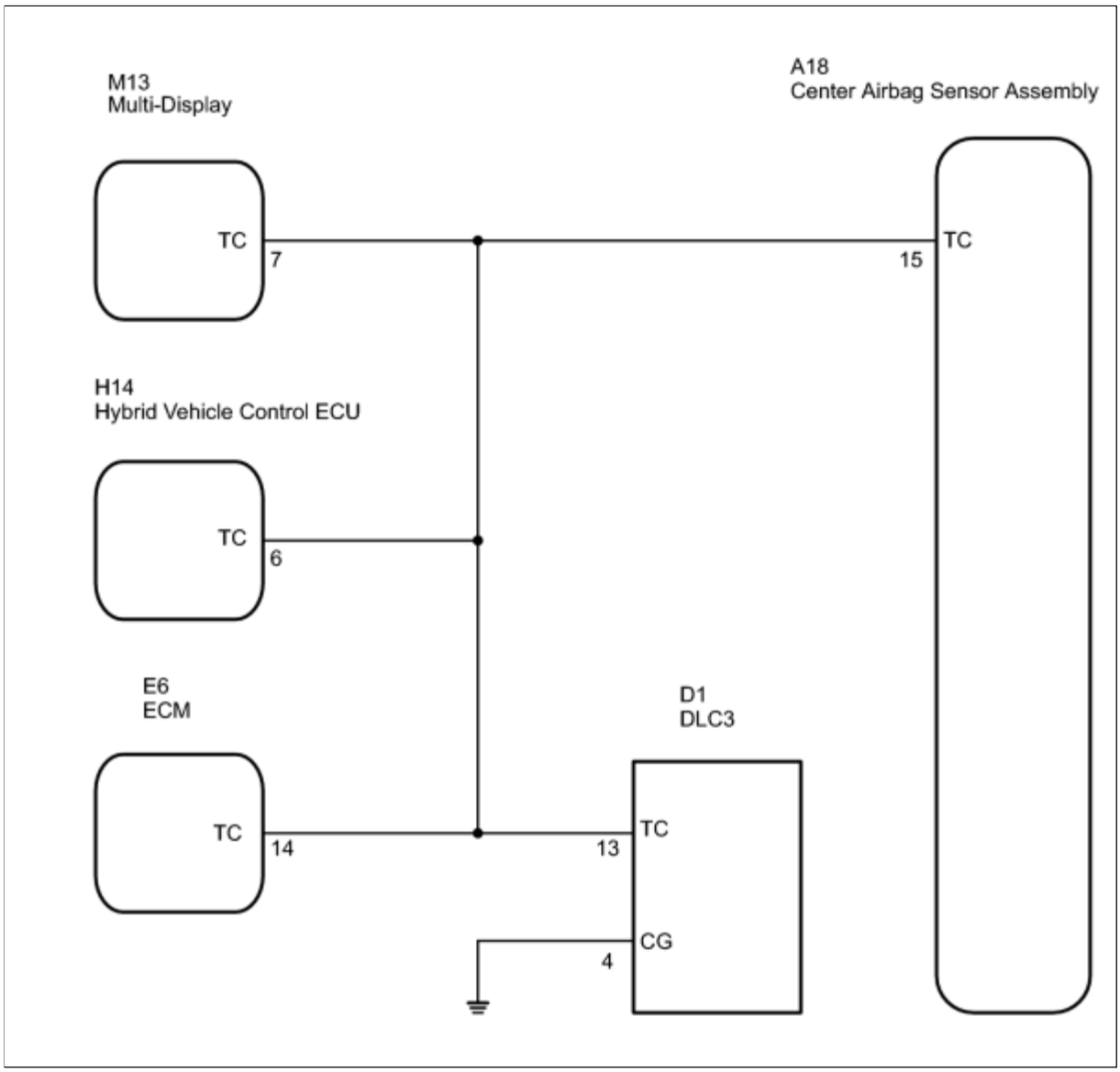
## DESCRIPTION

DTC output mode is set by connecting terminals TC and CG of the DLC3. The DTCs are communicated through SRS warning light blinking patterns.

**HINT:**

**When one or more of the warning lights blinks continuously, the cause may be a ground short in the wiring of terminal TC of the DLC3 or an internal ground short in each ECU.**

## WIRING DIAGRAM




## INSPECTION PROCEDURE

**CAUTION:**

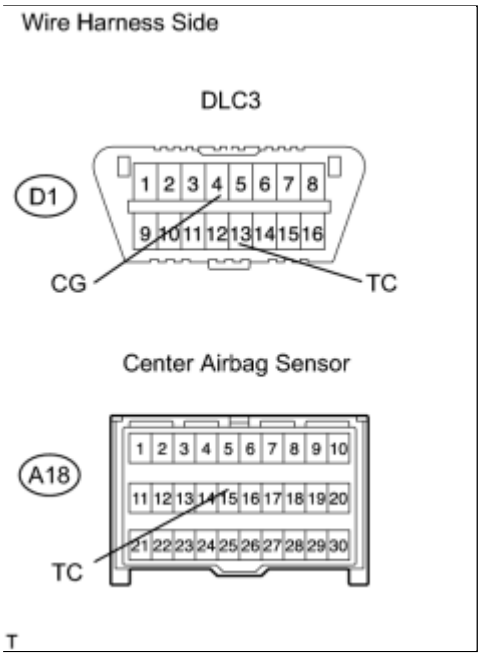
**Be sure to perform the following procedures before troubleshooting to avoid unexpected airbag deployment.**

1. Turn the power switch OFF.

2. Disconnect the cable from the negative (-) battery terminal, and wait for at least 90 seconds.

## PROCEDURE

| | |
|---|---|
| 1. | CHECK WIRE HARNESS (DLC3 - CENTER AIRBAG SENSOR AND BODY GROUND) |




(a) Disconnect the A18 sensor connector.

(b) Measure the resistance of the wire harness side connectors.

Standard resistance:

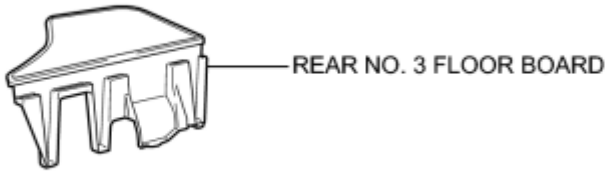
| TESTER CONNECTION | SPECIFIED CONDITION |
|---|---|
| D1-13 (TC) - A18-15 (TC) | Below 1 Ω |
| D1-4 (CG) - Body ground | Below 1 Ω |
| A18-15 (TC) - Body ground | 1 MΩ or higher |

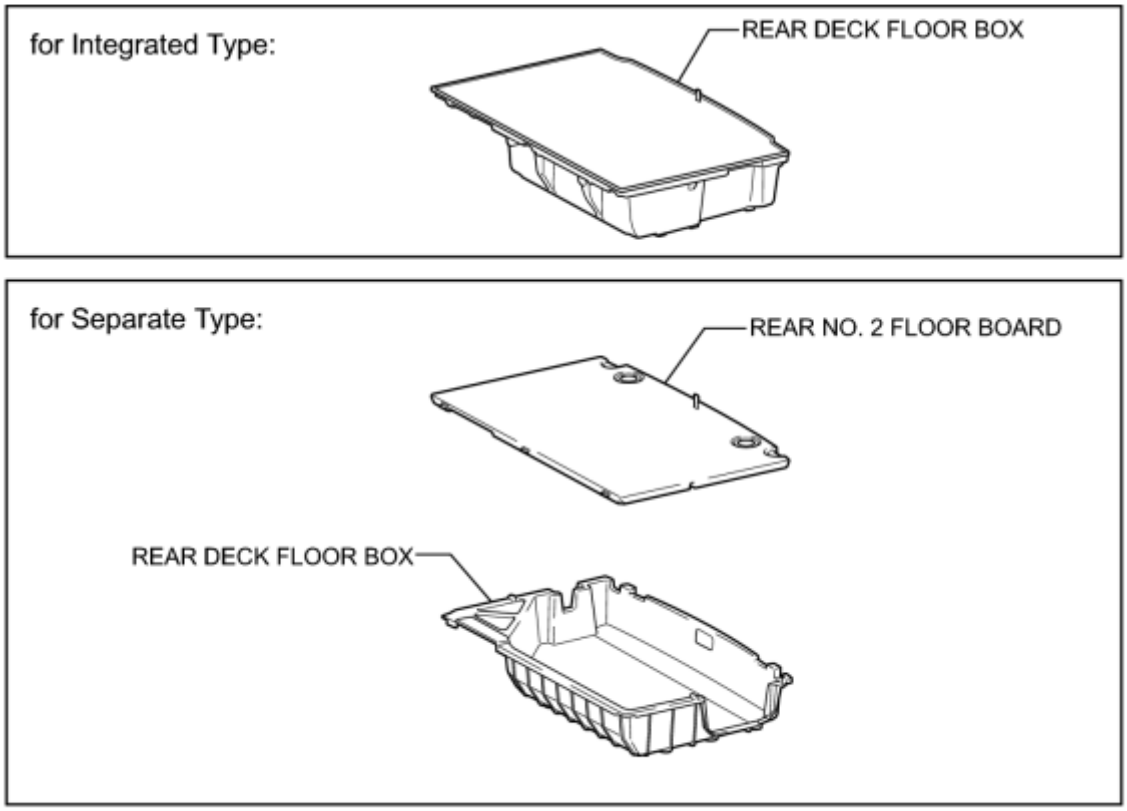
**NG** ▶ **REPAIR OR REPLACE HARNESS AND CONNECTOR**

**OK** ▶ **REPLACE CENTER AIRBAG SENSOR ASSEMBLY**

# COMPONENTS

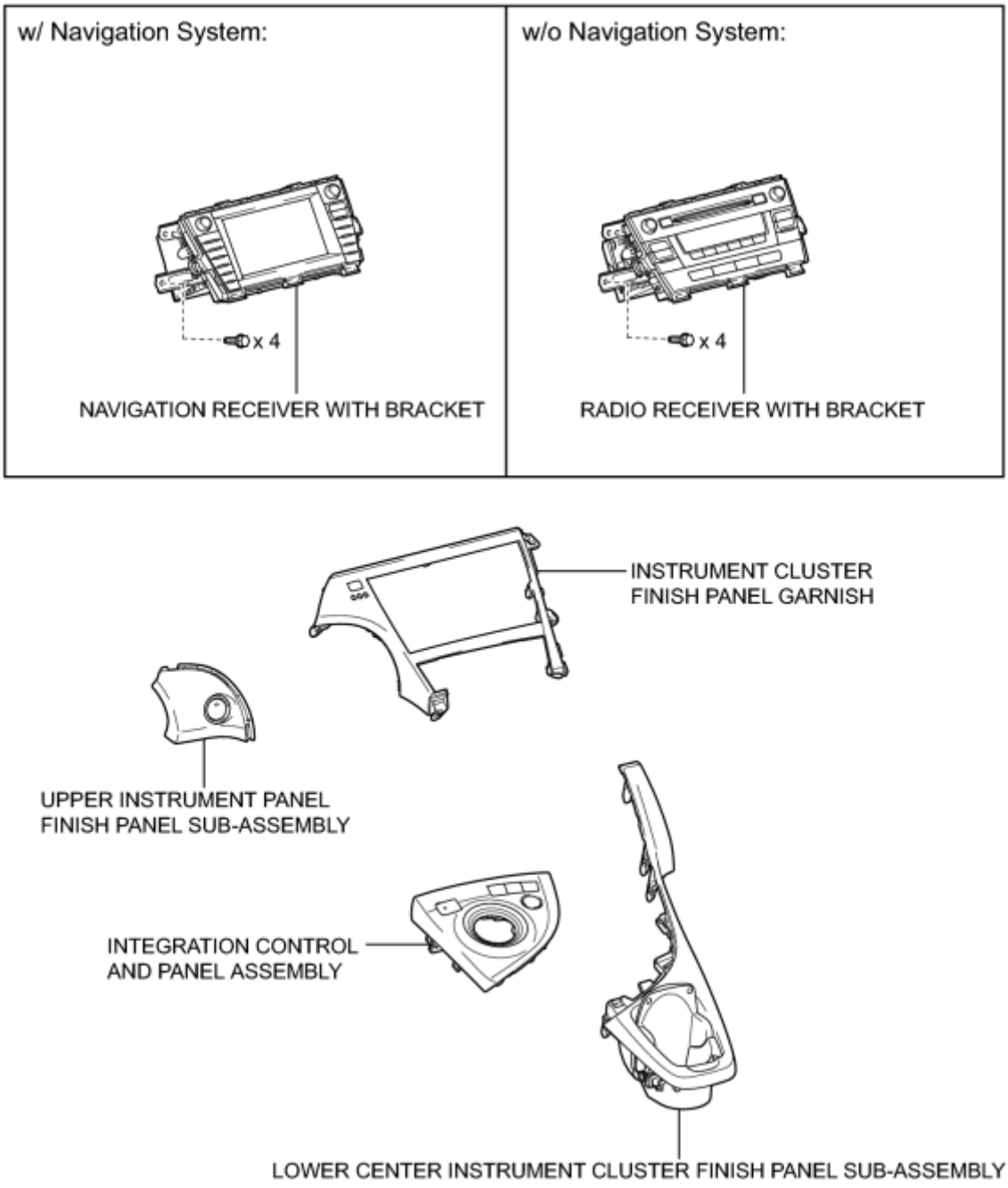
# ILLUSTRATION



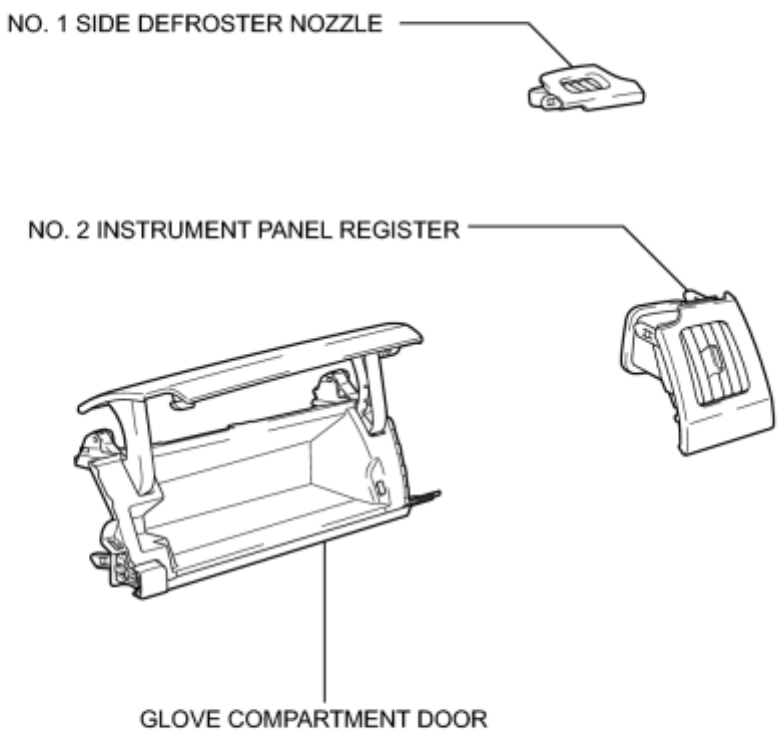

P

# ILLUSTRATION

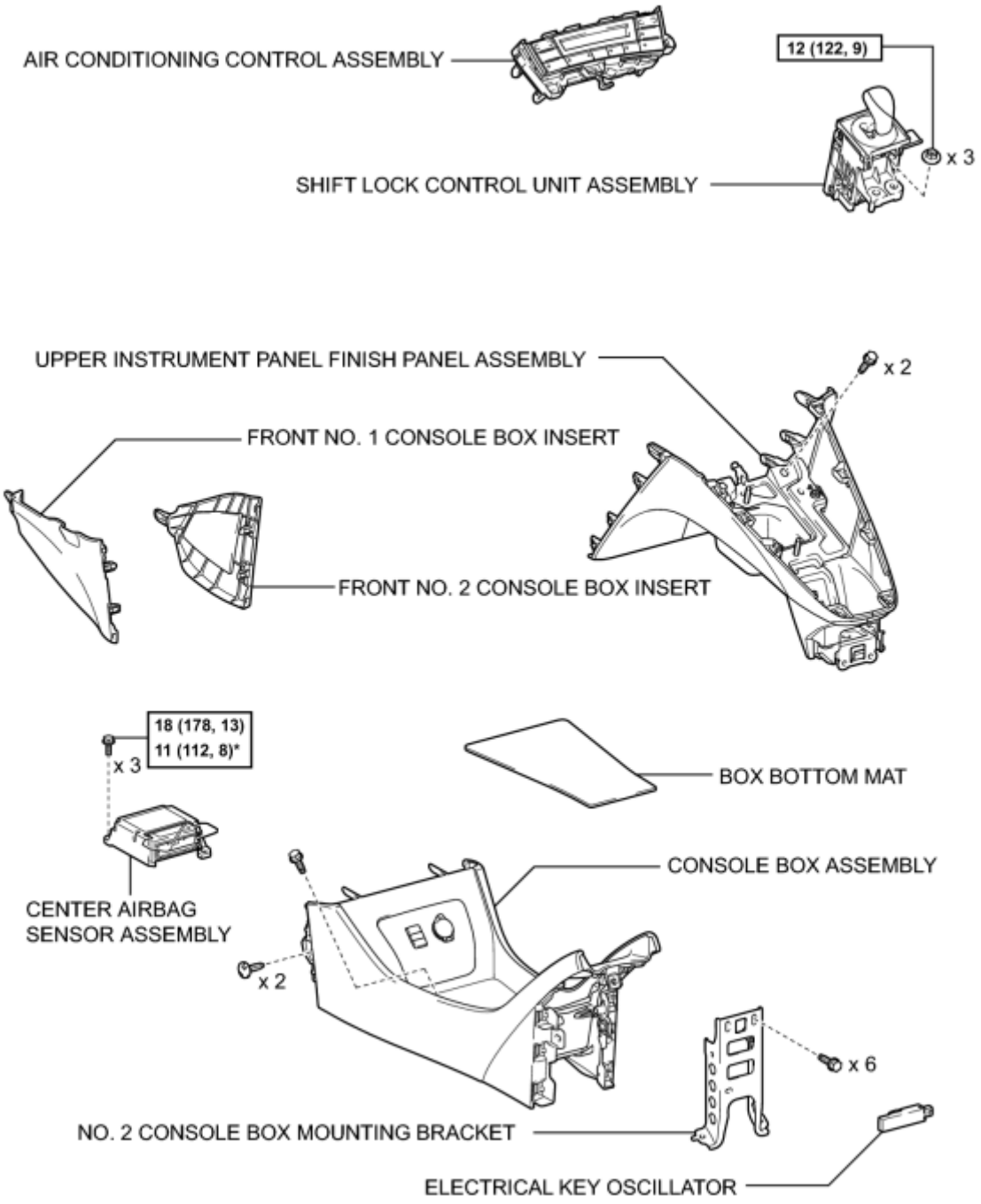



P

# ILLUSTRATION




# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

* For use with SST

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the center airbag sensor assembly.

1. INSPECT CENTER AIRBAG SENSOR ASSEMBLY (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

2. INSPECT CENTER AIRBAG SENSOR ASSEMBLY (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the center airbag sensor assembly installed on the vehicle.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector
- Peeling of the label

OK:

No defects are found.

HINT:

If any of the defects is found, replace the center airbag sensor assembly with a new one.

3. INSPECT CENTER AIRBAG SENSOR ASSEMBLY (for Vehicle Involved in Collision and Airbag is Deployed)

(a) Replace the center airbag sensor assembly.

HINT:

The center airbag sensor assembly should be replaced after any of the airbags has deployed, as it has been subjected to an impact.

# REMOVAL

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure up to Remove Rear Console Box Assembly INFO.

7. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

8. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

9. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

10. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

11. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

12. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

13. REMOVE NO. 1 SIDE DEFROSTER NOZZLE INFO

14. REMOVE NO. 2 INSTRUMENT PANEL REGISTER INFO

15. REMOVE GLOVE COMPARTMENT DOOR INFO

16. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO

17. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

18. REMOVE ELECTRICAL KEY OSCILLATOR INFO

19. REMOVE NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

20. REMOVE FRONT NO. 1 CONSOLE BOX INSERT INFO

21. REMOVE FRONT NO. 2 CONSOLE BOX INSERT INFO

22. REMOVE BOX BOTTOM MAT INFO

23. SEPARATE CONSOLE BOX ASSEMBLY INFO

24. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

25. REMOVE CONSOLE BOX ASSEMBLY INFO

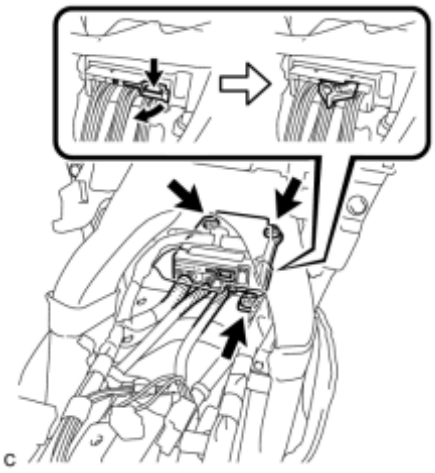
26. REMOVE CENTER AIRBAG SENSOR ASSEMBLY

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.




(c) Disconnect the connectors from the center airbag sensor assembly as shown in the illustration.

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(d) Remove the 3 bolts and center airbag sensor assembly.

# INSTALLATION

1. INSTALL CENTER AIRBAG SENSOR ASSEMBLY

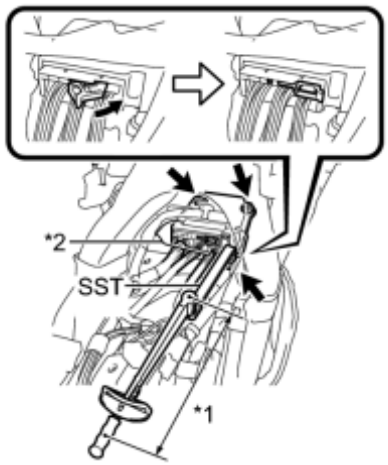
(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Using SST and a torque wrench, install the center airbag sensor assembly with the 3 bolts.




c

## Text in Illustration

| | |
|---|---|
| *1 | Fulcrum Length |
| *2 | Waterproof Sheet |

SST: 09961-00950

without SST - Torque: **18 N·m (178 kgf·cm, 13ft·lbf)**

with SST - Torque: **11 N·m (112 kgf·cm, 8ft·lbf)**

- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when SST is parallel to a torque wrench.
- If the center airbag sensor assembly has been dropped, or there are any cracks, dents or other defects in the case or connector, replace it with a new one.
- When installing the center airbag sensor assembly, be careful that the SRS wiring does not interfere with or is not pinched between other parts.
- When the power switch is first turned on (IG) after the center airbag sensor assembly has been replaced, make sure that no one is in the vehicle.

(d) Connect the connectors to the center airbag sensor assembly as shown in the illustration.

NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

(e) Check that the waterproof sheet is properly set.

(f) Check that there is no looseness in the installation parts of the center airbag sensor assembly.

2. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL CONSOLE BOX ASSEMBLY INFO

4. INSTALL BOX BOTTOM MAT INFO

5. INSTALL FRONT NO. 2 CONSOLE BOX INSERT INFO

6. INSTALL FRONT NO. 1 CONSOLE BOX INSERT INFO

7. INSTALL NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

8. INSTALL ELECTRICAL KEY OSCILLATOR INFO

9. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

10. INSTALL AIR CONDITIONING CONTROL ASSEMBLY INFO

11. INSTALL GLOVE COMPARTMENT DOOR INFO

12. INSTALL NO. 2 INSTRUMENT PANEL REGISTER INFO

13. INSTALL NO. 1 SIDE DEFROSTER NOZZLE INFO

14. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

15. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

16. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

17. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

18. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

19. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

20. INSTALL REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure from Install Rear Console Box Assembly INFO.

21. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

22. INSTALL REAR NO. 3 FLOOR BOARD INFO

23. INSTALL REAR DECK FLOOR BOX INFO

24. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

25. PERFORM DIAGNOSTIC SYSTEM CHECK

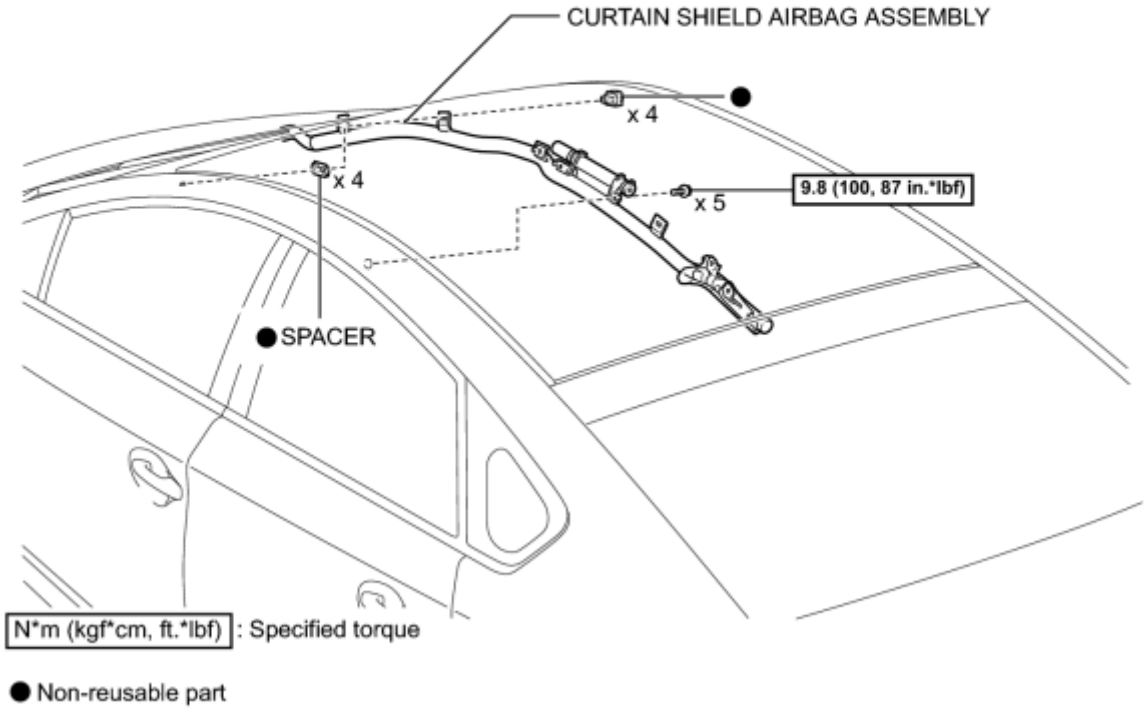
(a) Perform a diagnostic system check INFO.

26. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# COMPONENTS

# ILLUSTRATION




c

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the curtain shield airbag assemblies.

1. INSPECT CURTAIN SHIELD AIRBAG ASSEMBLY (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the curtain shield airbag assemblies installed on the vehicle.

(1) The defects are as follows:

- Cuts on each pillar garnish or the roof headlining assembly around the curtain shield airbag assemblies
- Small cracks on each pillar garnish or the roof headlining assembly around the curtain shield airbag assemblies
- Significant discoloration on each pillar garnish or the roof headlining assembly around the curtain shield airbag assemblies

OK:

No defects are found.

HINT:

If any of the defects is found, replace each pillar garnish or the roof headlining assembly with a new one.

2. INSPECT CURTAIN SHIELD AIRBAG ASSEMBLY (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the curtain shield airbag assemblies removed from the vehicle.

(1) The defects are as follows:

- Cuts on the curtain shield airbag assemblies
- Small cracks on the curtain shield airbag assemblies
- Significant discoloration on the curtain shield airbag assemblies
- Cracks or other damage to the connector

OK:

No defects are found.

HINT:

If any of the defects is found, replace the curtain shield airbag assembly with a new one.

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

3. REMOVE ROOF HEADLINING ASSEMBLY

HINT:

Refer to the procedure up to Remove Roof Headlining Assembly INFO.

4. REMOVE CURTAIN SHIELD AIRBAG ASSEMBLY

CAUTION:

When storing the curtain shield airbag assembly, keep the airbag deployment side facing upward.

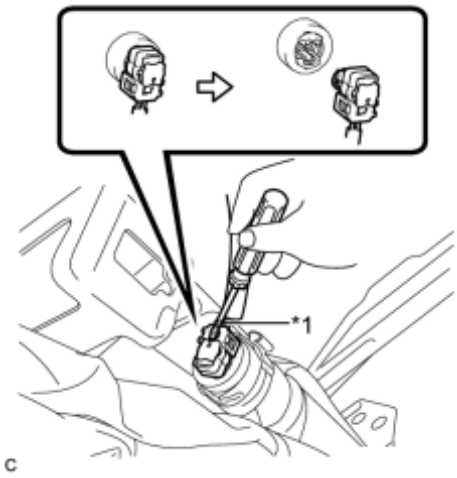
(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Using a screwdriver with the tip wrapped with protective tape, release the airbag connector lock and disconnect the curtain shield airbag connector.



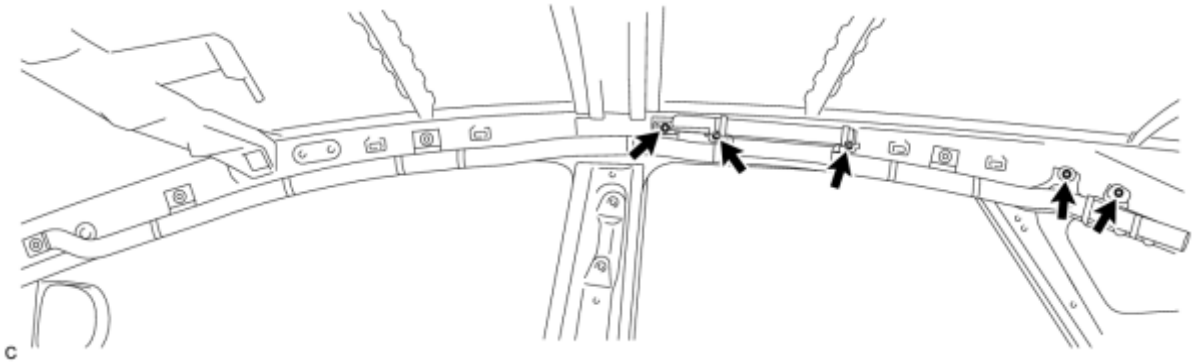

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |

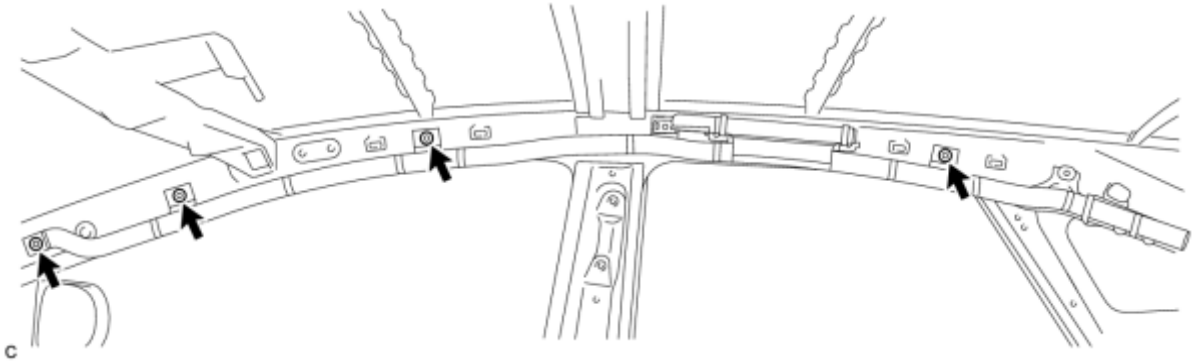
NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

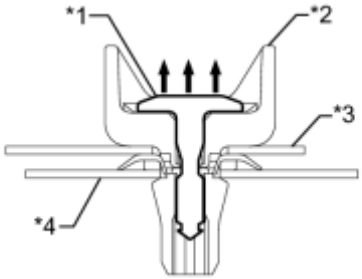
(d) Remove the 5 bolts.




(e) Remove the 4 clips.




(1) Using a clip remover, remove the 4 pins.

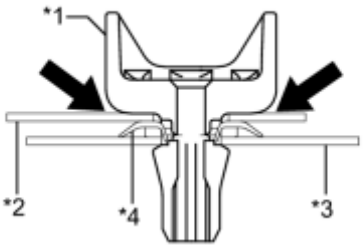



P

## Text in Illustration

| | |
|---|---|
| *1 | Pin |
| *2 | Clip |
| *3 | Airbag |
| *4 | Body |

(2) Using a screwdriver with the tip wrapped with protective tape, separate the 4 clips and curtain shield airbag assembly from the body as shown in the illustration.

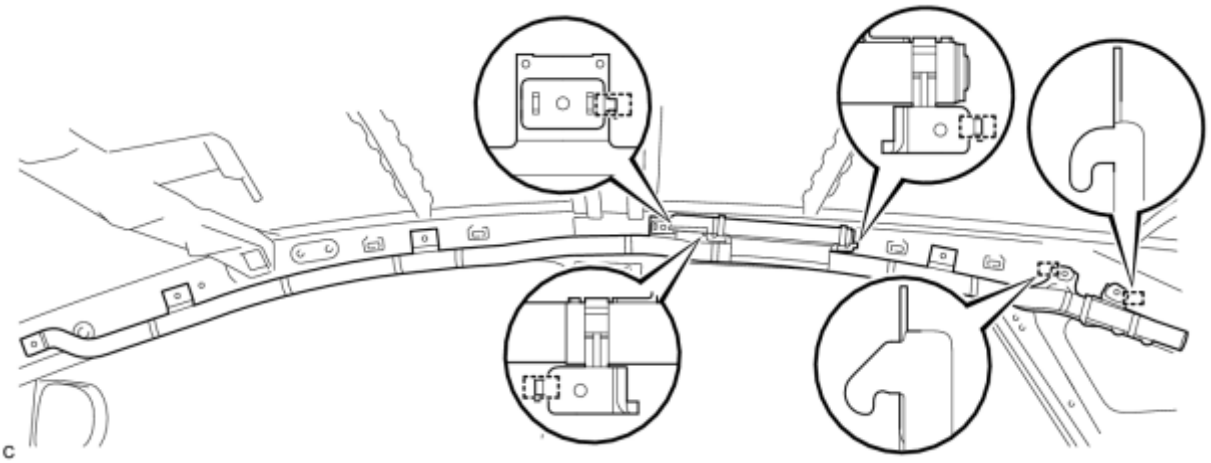



P

## Text in Illustration

| | |
|---|---|
| *1 | Clip |
| *2 | Airbag |
| *3 | Body |
| *4 | Spacer |

(f) Disengage the 5 hooks to remove the curtain shield airbag assembly.



C

(g) Remove the 4 clips and 4 spacers from the curtain shield airbag assembly.

# INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. INSTALL CURTAIN SHIELD AIRBAG ASSEMBLY

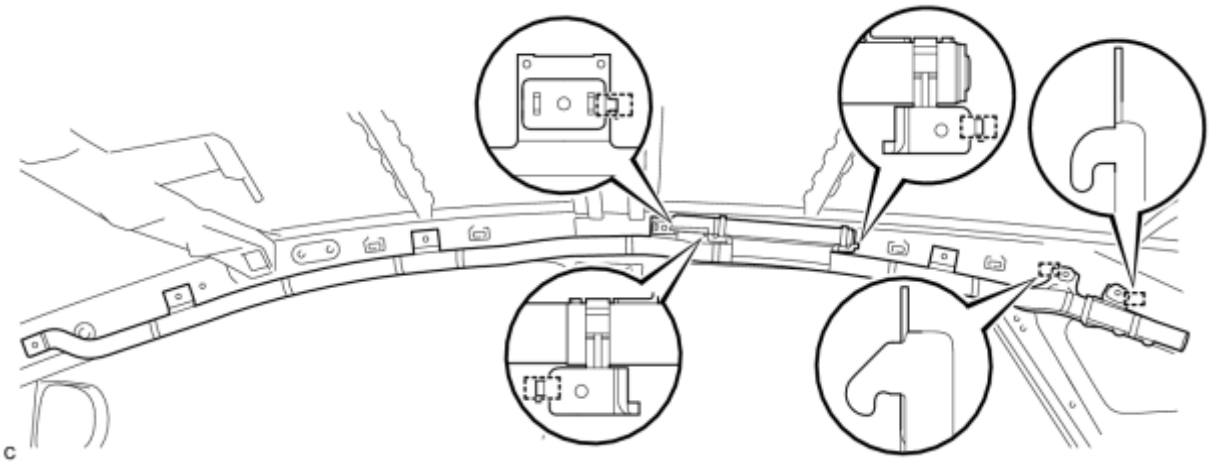
(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

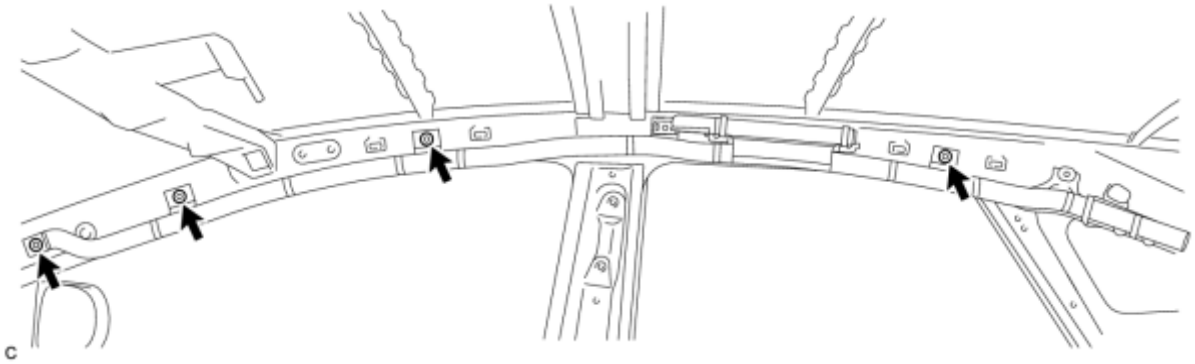
(c) Temporarily install the curtain shield airbag assembly with the 5 hooks.




NOTICE:

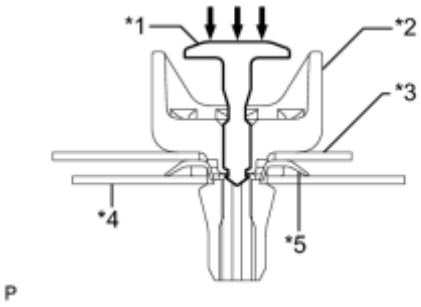
Do not twist the curtain shield airbag assembly when installing it.

(d) Install the curtain shield airbag assembly to the body panel with 4 new clips and 4 new spacers.




(1) Install 4 new pins as shown in the illustration.

## Text in Illustration

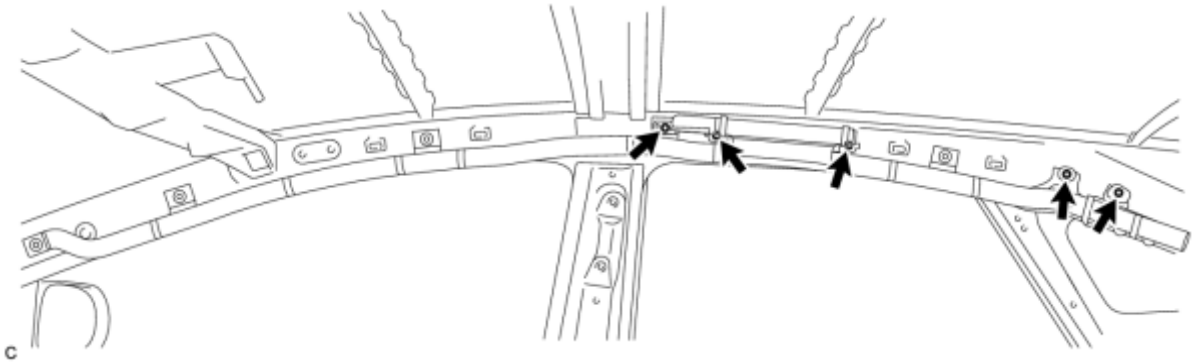



| | |
|---|---|
| *1 | Pin |
| *2 | Clip |
| *3 | Airbag |
| *4 | Body |
| *5 | Spacer |

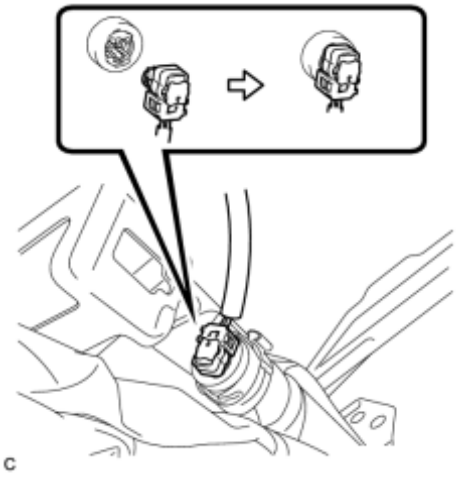
NOTICE:

Make sure that the pins of the clips are pushed in firmly.

(e) Install the 5 bolts.




Torque: **9.8 N·m (100 kgf·cm, 87in·lbf)**




(f) Connect the curtain shield airbag connector.

NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

(g) Push in the lock to install the airbag connector.

2. INSTALL ROOF HEADLINING ASSEMBLY

HINT:

Refer to the procedure from Install Roof Headlining Assembly INFO.

3. PERFORM DIAGNOSTIC SYSTEM CHECK

(a) Perform a diagnostic system check INFO.

# DISPOSAL

CAUTION:

Before performing pre-disposal deployment of any SRS part, review and closely follow all applicable environmental and hazardous material regulations. Pre-disposal deployment may be considered hazardous material treatment.

1. PRECAUTION

CAUTION:

- An airbag or pretensioner may be activated by static electricity. To prevent this, be sure to touch a metal surface with your bare hands to discharge static electricity before performing this procedure.
- Never dispose of a curtain shield airbag assembly with an undeployed airbag.
- The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.
- When deploying the airbag, perform the operation at least 10 m (32.8 ft.) away from the curtain shield airbag assembly.
- The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.
- Do not apply water etc. to a curtain shield airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

When scrapping a vehicle equipped with an SRS or disposing of the curtain shield airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the Service Dept. of TOYOTA MOTOR SALES, U.S.A., INC.

2. DISPOSE OF CURTAIN SHIELD AIRBAG ASSEMBLY (When Installed in Vehicle)

NOTICE:

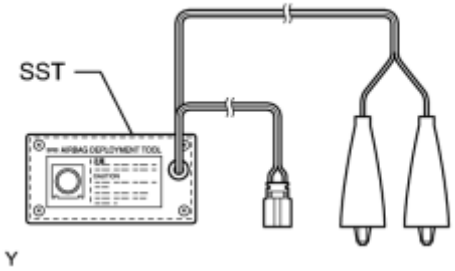
- When disposing of the curtain shield airbag assembly, never use the customer's vehicle to deploy the airbag.
- Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.

(a) Check the function of SST INFO.

SST: 09082-00700




(b) Refer to Precaution INFO.

(c) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(d) Remove the roof headlining assembly INFO.

(e) Install SST.

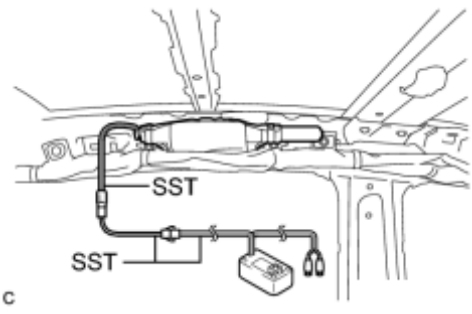
CAUTION:

Check that there is no looseness in the curtain shield airbag assembly.

(1) Disconnect the connector from the curtain shield airbag assembly.

NOTICE:

When disconnecting the airbag connector, take care not to damage the airbag wire harness.




(2) After connecting the following SST to each other, connect them to the curtain shield airbag assembly.

SST: 09082-00700

SST: 09082-00802

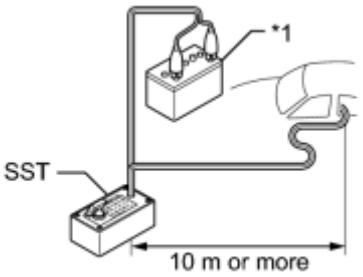
09082-10801

09082-20801

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock.

(3) Move SST at least 10 m (32.8 ft.) away from the rear side window.




# Text in Illustration

| | |
|---|---|
| *1 | Battery |

(4) Maintaining sufficient clearance for the SST wire harness in the rear side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(5) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (32.8 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- Before deployment, make sure that no one is near the vehicle.
- The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.
- Do not apply water etc. to a curtain shield airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.

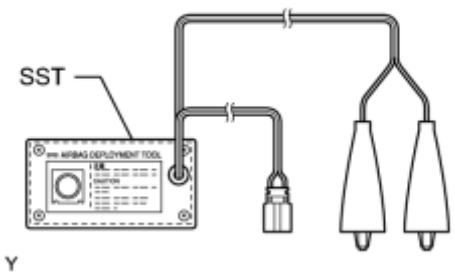
3. DISPOSE OF CURTAIN SHIELD AIRBAG ASSEMBLY (When Not Installed in Vehicle)

NOTICE:

Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.




Y

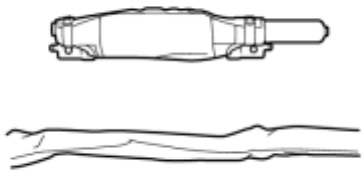
(a) Check the function of SST INFO.

SST: 09082-00700

(b) Remove the curtain shield airbag assembly INFO.

CAUTION:

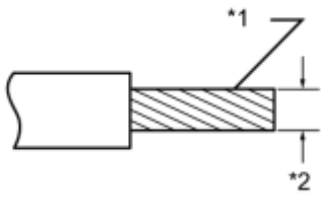
- Before removing the curtain shield airbag assembly, wait at least 90 seconds after turning the power switch off and disconnecting the cable from the negative (-) battery terminal.
- When storing the curtain shield airbag assembly, keep the airbag deployment side facing upward.



C

(c) Cut off the deployment section of the curtain shield airbag assembly.

(d) Using braided wire, tie down the curtain shield airbag assembly to an unneeded tire.




H

***Text in Illustration***

| | |
|---|---|
| *1 | Stripped Wire Section |
| *2 | Wire Diameter |

Wire:

Stripped wire section

1.25 $mm^2$ (0.0019 $in.^2$) or more

CAUTION:

If the wire is too thin or an alternative object is used to tie down the curtain shield airbag assembly, it may snap when the airbag is deployed. Always use a wire for vehicle use with an area of at least 1.25 $mm^2$ (0.0019 $in.^2$).

HINT:

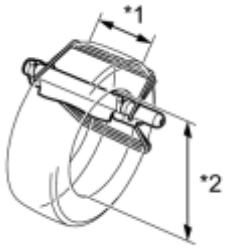
To calculate the area of the stripped wire section:

Area = 3.14 x $(Diameter)^2$ / 4

(1) Position the curtain shield airbag assembly inside the tire as shown in the illustration.

# Text in Illustration

| | |
|---|---|
| *1 | Width |
| *2 | Inner Diameter |




c

Minimum tire size:

Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

360 mm (1.18 ft.)

CAUTION:

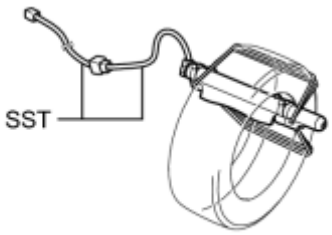
Make sure that the wires are tight. If there is slack in the wires, the curtain shield airbag assembly may break loose when the airbag is deployed.

NOTICE:

The tire may be marked by the airbag deployment, so use an unneeded tire.

(e) Install SST.

(1) After connecting the following SST to each other, connect them to the




curtain shield airbag assembly.

SST: 09082-00802

09082-10801

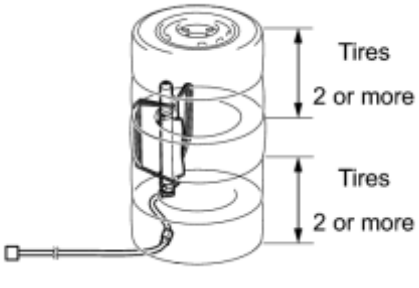
09082-20801

C

(f) Place the tires.

CAUTION:

Do not face the deployment side of the curtain shield airbag assembly toward the ground.



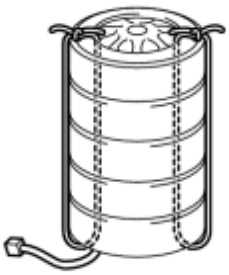

C

(1) Place at least 2 tires under the tire to which the curtain shield airbag assembly is tied.

(2) Place at least 2 tires onto the tire to which the curtain shield airbag assembly is tied. The top tire should have a wheel installed.

NOTICE:

Do not place the SST connector under the tire because it could be damaged.



H

(3) Tie the tires together with the 2 wires.

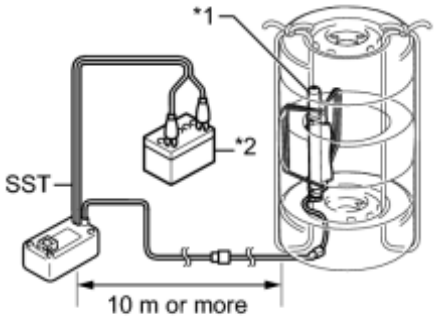
CAUTION:

Make sure that the wires are tight. Looseness in the wires results in the tires breaking loose when the airbag is deployed.

(g) Install SST.

(1) Connect the SST connector.

# Text in Illustration




c

| | |
|---|---|
| *1 | Curtain Shield Airbag Assembly |
| *2 | Battery |

SST: 09082-00700

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(2) Move SST at least 10 m (32.8 ft.) away from the airbag tied down to the tire.

(h) Deploy the airbag.

(1) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(2) Check that no one is within a 10 m (32.8 ft.) radius of the tire to which the curtain shield airbag assembly is tied.

(3) Press the SST activation switch and deploy the airbag.

CAUTION:

Before deployment, make sure that no one is near the airbag.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.



c

(i) Dispose of the curtain shield airbag assembly.

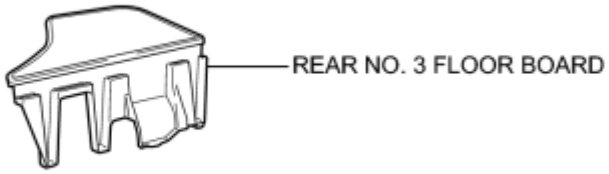
- The curtain shield airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a curtain shield airbag assembly with a deployed airbag.
- Do not apply water etc. to a curtain shield airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

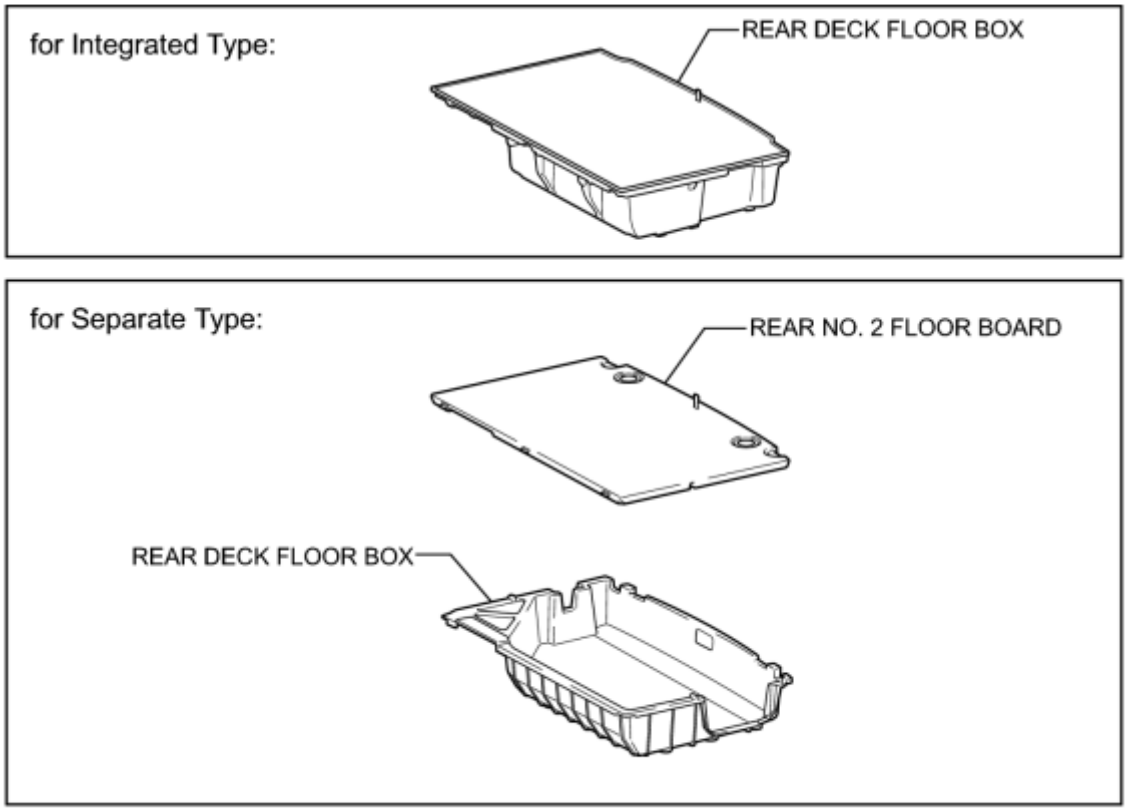
(1) Remove the curtain shield airbag assembly from the tire.

(2) Place the curtain shield airbag assembly in a plastic bag, tie it tightly, and dispose of it according to local regulations.

# COMPONENTS

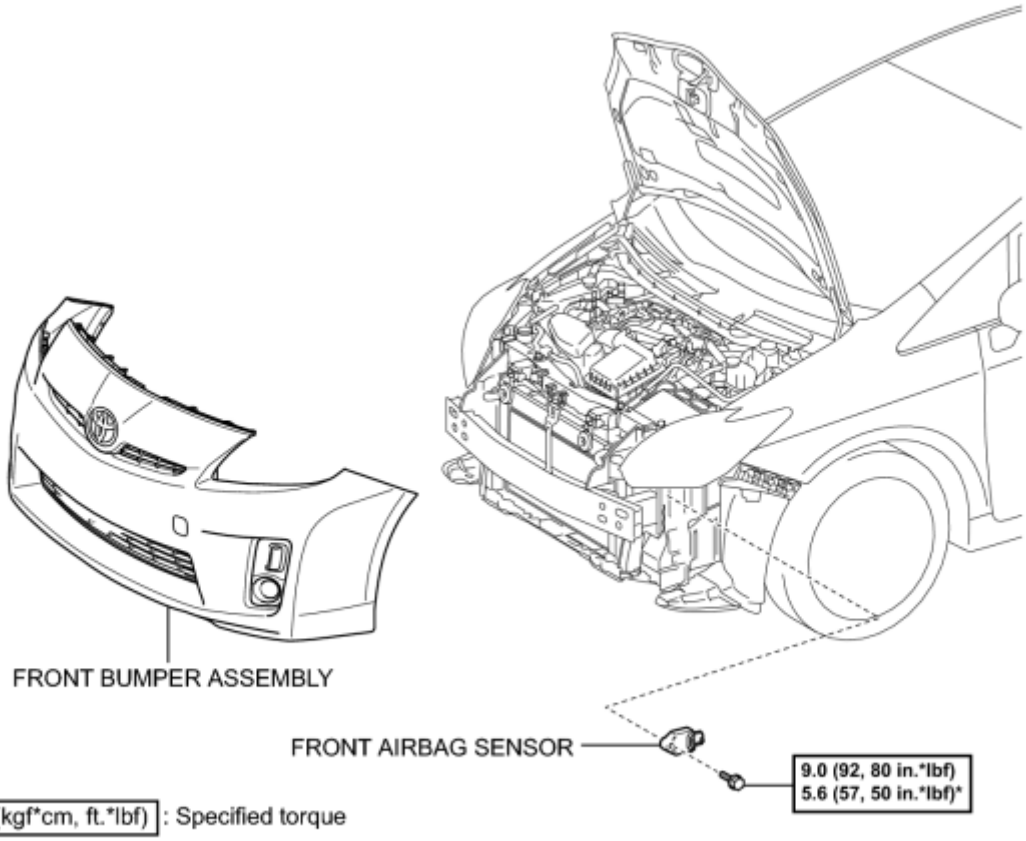
# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

* For use with SST

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the front airbag sensors.

1. INSPECT FRONT AIRBAG SENSOR (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

2. INSPECT FRONT AIRBAG SENSOR (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check the front airbag sensors for defects if the front bumper of the vehicle or the area around the bumper is damaged.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found, replace the front airbag sensor with a new one.

3. INSPECT FRONT AIRBAG SENSOR (for Vehicle Involved in Collision and Airbag is Deployed)

(a) When airbags have deployed as the result of a collision, be sure to replace all front airbag sensors in the damaged areas (anywhere in need of repair).

(b) Visually check the front airbag sensors in undamaged areas for defects.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found or a front airbag sensor has detected a major collision, replace the front airbag sensor with a new one.

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE FRONT BUMPER ASSEMBLY

HINT:

Refer to the procedure up to Remove Front Bumper Assembly INFO.

7. REMOVE FRONT AIRBAG SENSOR

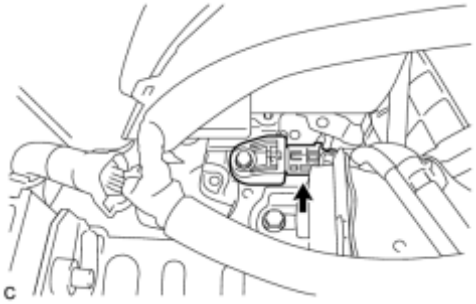
(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

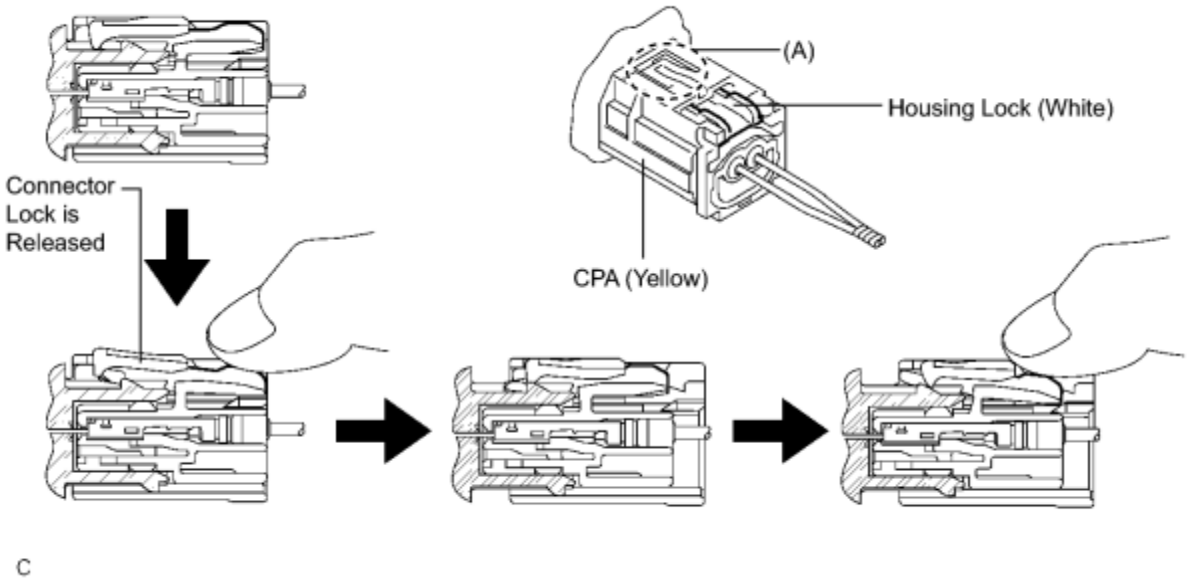
(c) Disconnect the connector from the front airbag sensor.



NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(1) Push down the white housing lock and slide the yellow CPA. (At this time, the connector cannot be disconnected yet.)

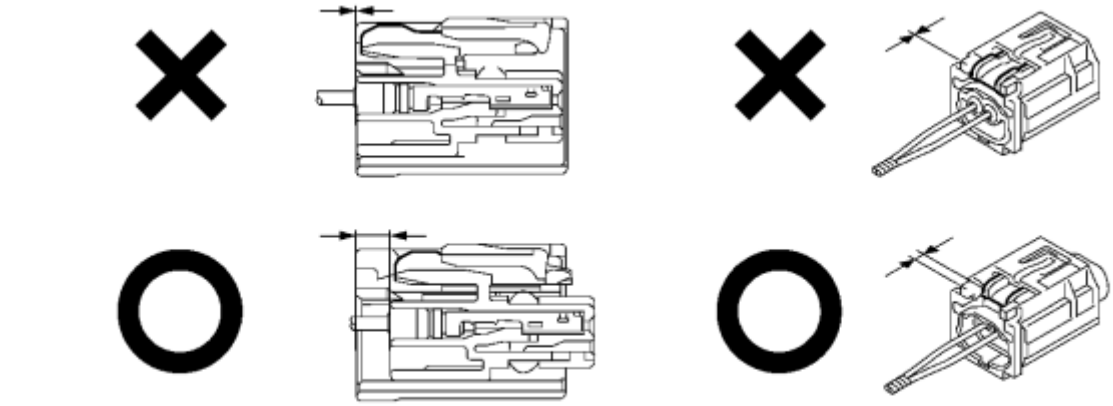



(2) Push down the white housing lock again and disconnect the connector.

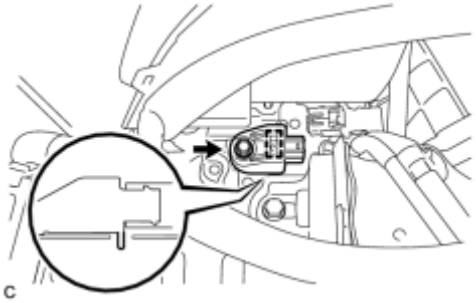
NOTICE:

Do not push down the part (A) shown in the illustration when disconnecting.

(3) After disconnecting the connector, check that the position of the white housing lock is correct as shown in the illustration.



C



c

(d) Remove the bolt and front airbag sensor.

NOTICE:

Loosen the bolt while holding the front airbag sensor because the front airbag sensor pin (stopper) is easily damaged.

# INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. INSTALL FRONT AIRBAG SENSOR

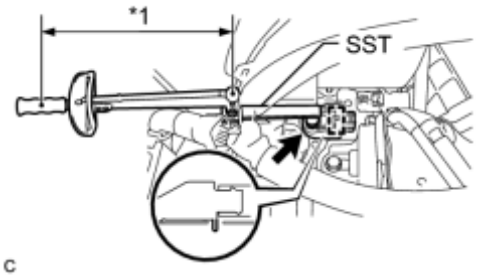
(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Using SST and a torque wrench, install the front airbag sensor with the bolt.




## Text in Illustration

| | |
|---|---|
| *1 | Fulcrum Length |

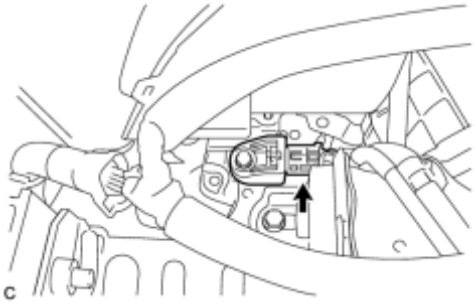
SST: 09961-00950

without SST - Torque: **9.0 N·m (92 kgf·cm, 80in·lbf)**

with SST - Torque: **5.6 N·m (57 kgf·cm, 50in·lbf)**

- Use a torque wrench with a fulcrum length of 250 mm (9.84 in.).
- This torque value is effective when SST is parallel to the torque wrench.
- If the front airbag sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace it with a new one.
- When installing the front airbag sensor, be careful that the SRS wiring does not interfere with or is not pinched between other parts.
- Make sure that the pin (stopper) is securely inserted into the body hole.
- Tighten the bolt while holding the front airbag sensor because the front airbag sensor pin (stopper) is easily damaged.

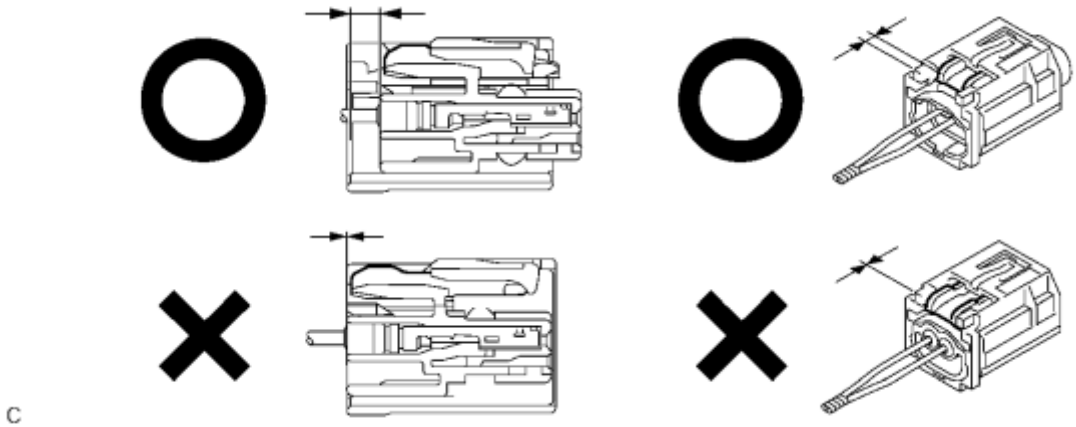
(d) Connect the connector to the front airbag sensor.



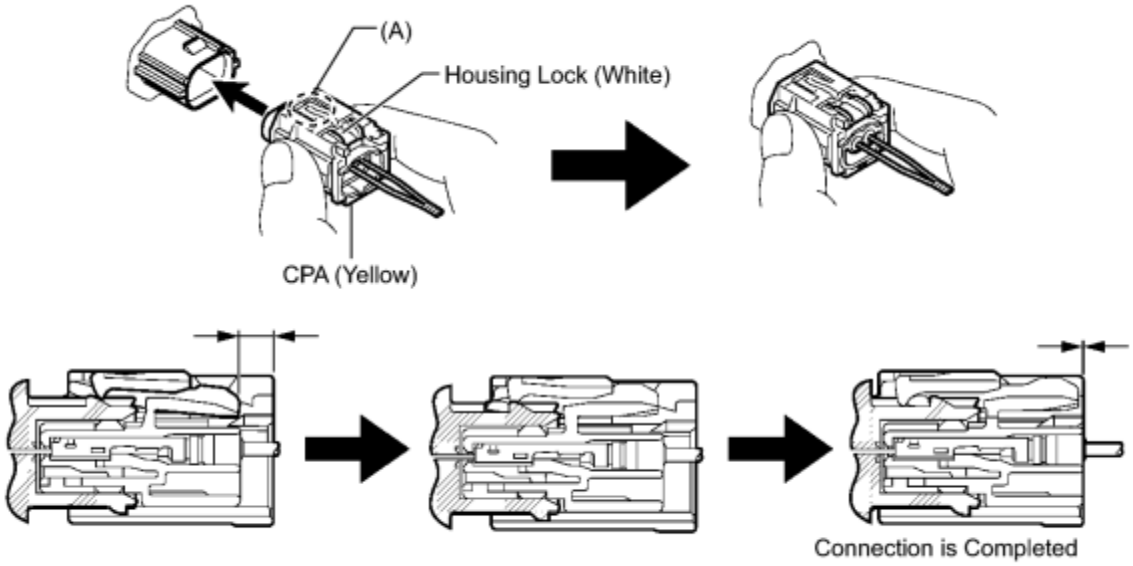
NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

(1) Before connecting the connector, check that the position of the white housing lock is correct as shown in the illustration.



(2) Be sure to engage the connectors until they are locked (when locking, make sure that a click sound can be heard).




C

HINT:

When engaged, the white housing lock will slide. Be sure not to hold the white housing lock and part (A), as it may result in an insecure fit.

(e) Check that there is no looseness in the installation parts of the front airbag sensor.

2. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

3. INSTALL REAR NO. 3 FLOOR BOARD INFO

4. INSTALL REAR DECK FLOOR BOX INFO

5. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

6. INSTALL FRONT BUMPER ASSEMBLY

HINT:

Refer to the procedure from Install Front Bumper Assembly INFO.

7. PERFORM DIAGNOSTIC SYSTEM CHECK

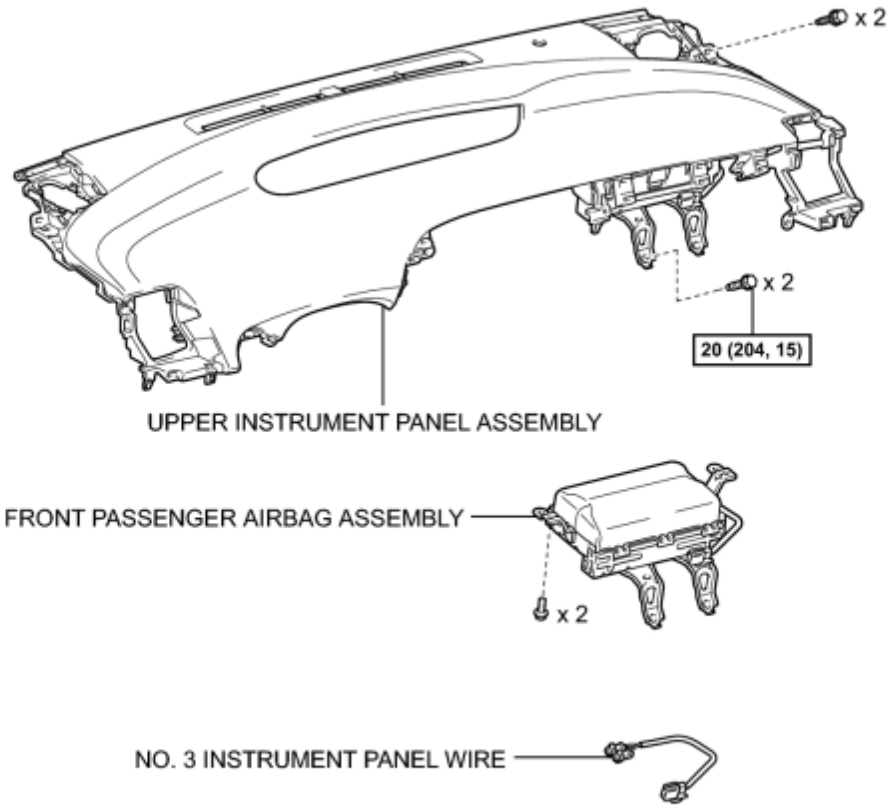
(a) Perform a diagnostic system check INFO.

8. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the front passenger airbag assembly.

1. INSPECT FRONT PASSENGER AIRBAG ASSEMBLY (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the front passenger airbag assembly installed on the vehicle.

(1) The defects are as follows:

- Cuts on the instrument panel around the front passenger airbag assembly
- Small cracks on the instrument panel around the front passenger airbag assembly
- Significant discoloration on the instrument panel around the front passenger airbag assembly

OK:

No defects are found.

HINT:

If any of the defects is found, replace the instrument panel with a new one.

2. INSPECT FRONT PASSENGER AIRBAG ASSEMBLY (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the front passenger airbag assembly removed from the vehicle.

(1) The defects are as follows:

- Cuts on the front passenger airbag assembly
- Small cracks on the front passenger airbag assembly
- Significant discoloration on the front passenger airbag assembly
- Cracks or other damage to the connector
- Deformation or cracks on the instrument panel or instrument panel reinforcement

OK:

No defects are found.

HINT:

If any of the defects is found, replace the front passenger airbag assembly, instrument panel or instrument panel reinforcement with a new one.

# REMOVAL

1. REMOVE CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH

HINT:

Refer to the procedure up to Remove Center Instrument Cluster Finish Panel Garnish INFO.

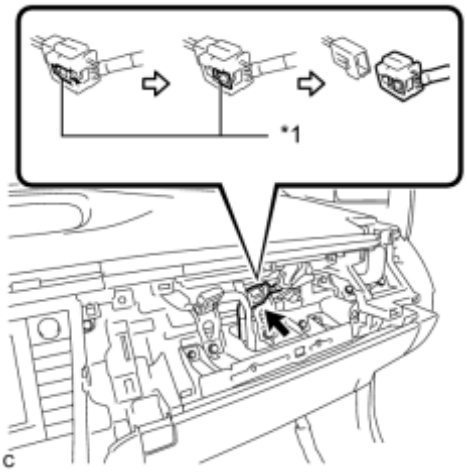
2. DISCONNECT NO. 3 INSTRUMENT PANEL WIRE

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.




(c) Slide the slider to release the lock, and then disconnect the connector.

## Text in Illustration

| | |
|---|---|
| *1 | Slider |

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

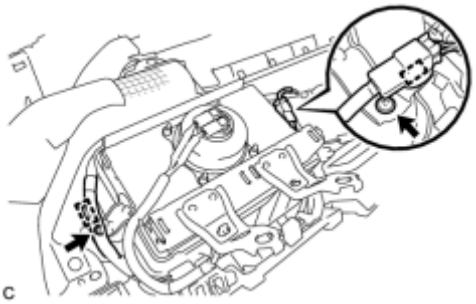
3. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY INFO

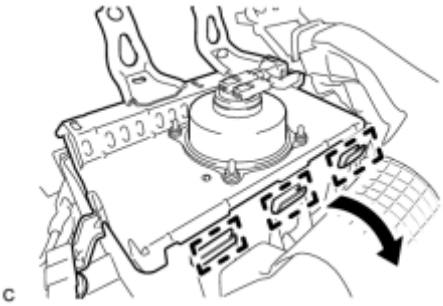
4. REMOVE FRONT PASSENGER AIRBAG ASSEMBLY

CAUTION:

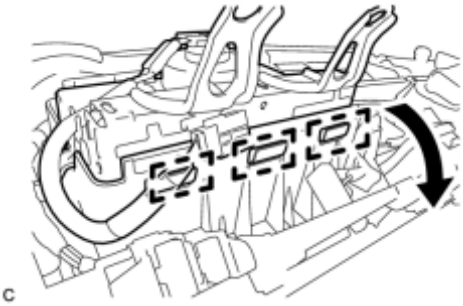
When storing the front passenger airbag assembly, keep the airbag deployment side facing upward.

(a) Remove the 2 screws and 2 clamps.



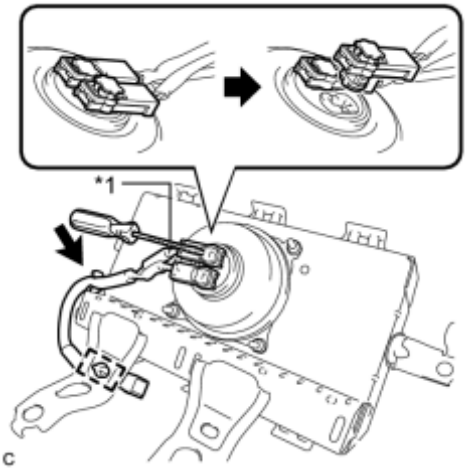


(b) Lean the instrument panel and disengage the 3 hooks as shown in the illustration.



(c) Disengage the 3 hooks to remove the front passenger airbag assembly from the instrument panel safety pad assembly as shown in the illustration.

5. REMOVE NO. 3 INSTRUMENT PANEL WIRE




(a) Disengage the clamp.

(b) Separate the No. 3 instrument panel wire from the front passenger airbag assembly clamp.

(c) Using a screwdriver with the tip wrapped with protective tape, release the 2 airbag connector locks.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

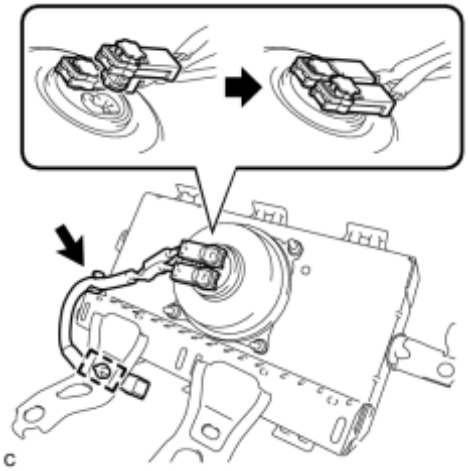
(d) Disconnect the 2 airbag connectors to remove the No. 3 instrument panel wire from the front passenger airbag assembly.

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

# INSTALLATION

1. INSTALL NO. 3 INSTRUMENT PANEL WIRE




(a) Connect the 2 airbag connectors to the front passenger airbag assembly.

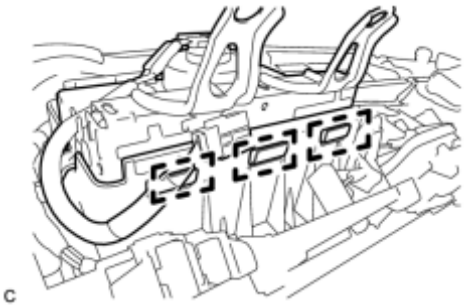
- When connecting any airbag connector, take care not to damage the airbag wire harness.
- Be sure to only connect the connectors to each corresponding color.

(b) Push in the 2 locks to install the 2 airbag connectors.

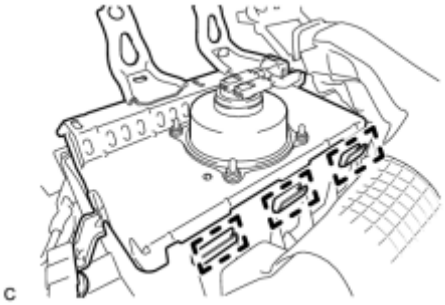
(c) Connect the No. 3 instrument panel wire to the front passenger airbag assembly clamp.

(d) Engage the clamp to install the No. 3 instrument panel wire to the front passenger airbag assembly.

2. INSTALL FRONT PASSENGER AIRBAG ASSEMBLY

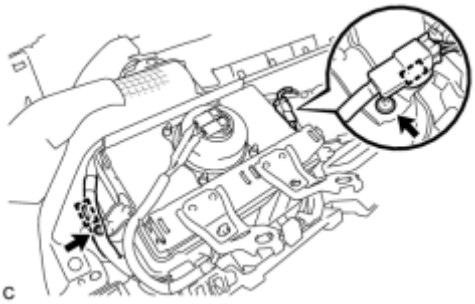



(a) Engage the 3 hooks.




(b) Push the front passenger airbag assembly to engage the 3 hooks.

(c) Install the 2 screws to install the front passenger airbag assembly.




(d) Install the 2 clamps to the front passenger airbag assembly.

3. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY INFO

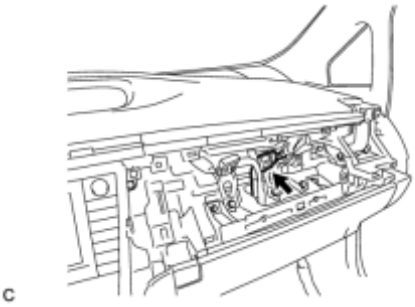
4. CONNECT NO. 3 INSTRUMENT PANEL WIRE

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.




(c) Connect the connector.

NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

5. INSTALL CENTER INSTRUMENT CLUSTER FINISH PANEL GARNISH

HINT:

Refer to the procedure from Install Center Instrument Cluster Finish Panel Garnish INFO.

6. PERFORM DIAGNOSTIC SYSTEM CHECK

(a) Perform a diagnostic system check INFO.

# DISPOSAL

CAUTION:

Before performing pre-disposal deployment of any SRS part, review and closely follow all applicable environmental and hazardous material regulations. Pre-disposal deployment may be considered hazardous material treatment.

1. PRECAUTION

CAUTION:

- An airbag or pretensioner may be activated by static electricity. To prevent this, be sure to touch a metal surface with bare hands to discharge static electricity before performing this procedure.
- Never dispose of a front passenger airbag assembly with an undeployed airbag.
- The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.
- When deploying the airbag, perform the operation at least 10 m (32.8 ft.) away from the front passenger airbag assembly.
- The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.
- Do not apply water etc. to a front passenger airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

When scrapping a vehicle equipped with an SRS or disposing of the front passenger airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the Service Dept. of TOYOTA MOTOR SALES, U.S.A., INC.

2. DISPOSE OF FRONT PASSENGER AIRBAG ASSEMBLY (When Installed in Vehicle)

NOTICE:

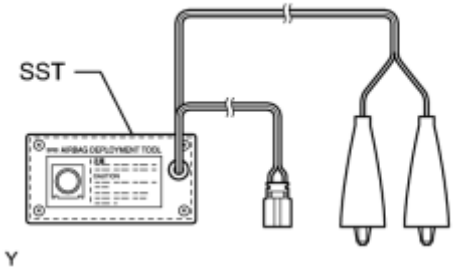
- When disposing of the front passenger airbag assembly, never use the customer's vehicle to deploy the airbag.
- Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.

(a) Check the function of SST INFO.

SST: 09082-00700




(b) Refer to Precaution INFO.

(c) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

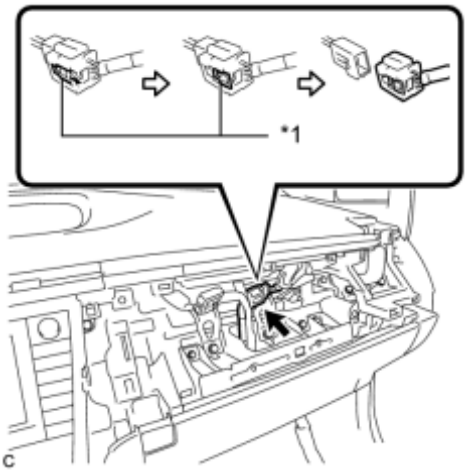
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(d) Remove the grove compartment door INFO.

(e) Disconnect the instrument panel wire assembly.

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.




(1) Slide the slider to release the lock, and then disconnect the connector.

## Text in Illustration

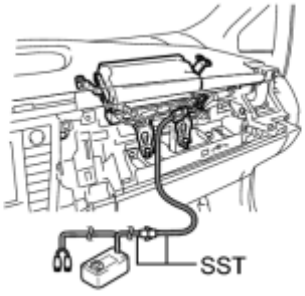
| | |
|---|---|
| *1 | Slider |

(f) Install SST.

CAUTION:

Check that there is no looseness in the front passenger airbag assembly and upper instrument panel assembly.

c



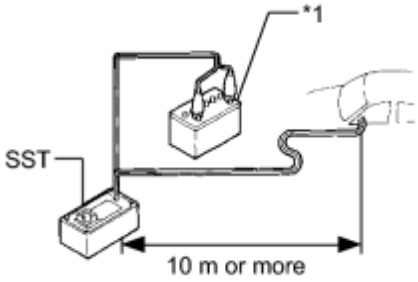

(1) Connect the SST connector to the instrument panel wire assembly.

SST: 09082-00700

SST: 09082-00780

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock.




(2) Move SST at least 10 m (32.8 ft.) away from the front side window of the vehicle.

## Text in Illustration

| | |
|---|---|
| *1 | Battery |

(3) Maintaining sufficient clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(g) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (32.8 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- Before deployment, make sure that no one is near the vehicle.
- The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.
- Do not apply water etc. to a front passenger airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.

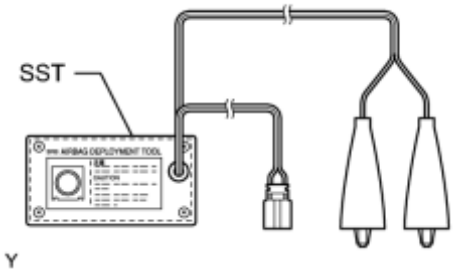
3. DISPOSE OF FRONT PASSENGER AIRBAG ASSEMBLY (When Not Installed in Vehicle)

NOTICE:

Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.




(a) Check the function of SST INFO.

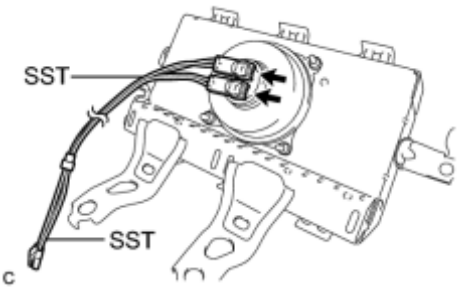
SST: 09082-00700

(b) Remove the front passenger airbag assembly INFO.

CAUTION:

- Before removing the front passenger airbag assembly, wait at least 90 seconds after turning the power switch off and disconnecting the cable from the negative (-) battery terminal.
- When storing the front passenger airbag assembly, keep the airbag deployment side facing upward.

(c) Install SST.



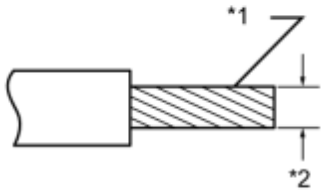

(1) After connecting the following SST to each other, connect them to the front passenger airbag assembly.

SST: 09082-00802

09082-10801

09082-30801

(d) Using braided wire, tie down the front passenger airbag assembly to an unneeded tire.




H

### *Text in Illustration*

| | |
|---|---|
| *1 | Stripped Wire Section |
| *2 | Wire Diameter |

Wire:

Stripped wire section

1.25 $mm^2$ (0.0019 $in.^2$) or more

CAUTION:

If the wire is too thin or an alternative object is used to tie down the front passenger airbag assembly, it may snap when the airbag is deployed. Always use a wire for vehicle use with an area of at least 1.25 $mm^2$ (0.0019 $in.^2$).

HINT:

To calculate the area of the stripped wire section:

Area = 3.14 x $(Diameter)^2$ / 4

(1) Position the front passenger airbag assembly inside the tire with the airbag deployment side facing inside.

Minimum tire size:

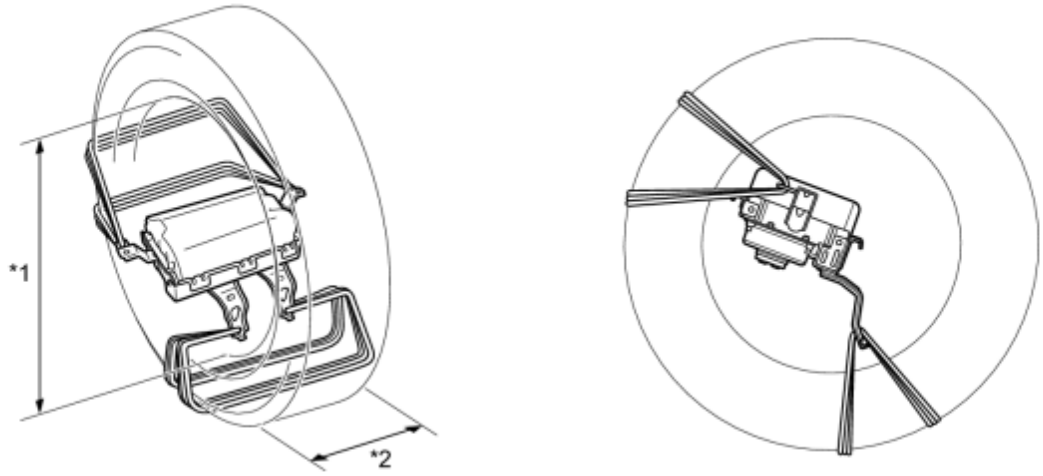
Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

360 mm (1.18 ft.)




c

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Inner Diameter | *2 | Width |

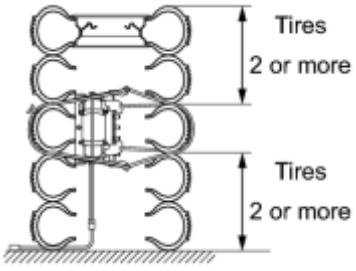
CAUTION:

- Make sure that the wires are tight. If there is slack in the wires, the front passenger airbag assembly may break loose when the airbag is deployed.
- Always tie down the front passenger airbag assembly with the airbag deployment side facing inside the tire as shown in the illustration.

NOTICE:

The tires may be damaged by the airbag deployment, so use an unneeded tire.

(e) Place the tires.



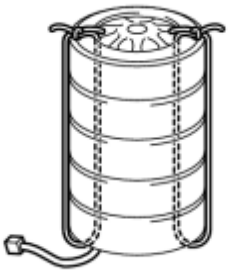

c

(1) Place at least 2 tires under the tire to which the front passenger airbag assembly is tied.

(2) Place at least 2 tires onto the tire to which the front passenger airbag assembly is tied. The top tire should have a wheel installed.

NOTICE:

Do not place the SST connector under the tire because it could be damaged.



H

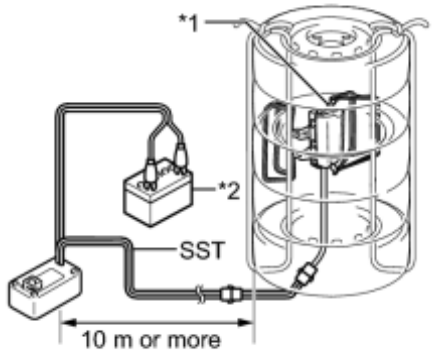
(3) Tie the tires together with the 2 wires.

CAUTION:

Make sure that the wires are tight. Looseness in the wires results in the tires breaking loose when the airbag is deployed.

(f) Install SST.

(1) Connect the SST connector.




C

## Text in Illustration

| | |
|---|---|
| *1 | Front Passenger Airbag Assembly |
| *2 | Battery |

SST: 09082-00700

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(2) Move SST at least 10 m (32.8 ft.) away from the airbag tied down to the tire.

(g) Deploy the airbag.

(1) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(2) Check that no one is within a 10 m (32.8 ft.) radius of the tire to which the front passenger airbag assembly is tied.

(3) Press the SST activation switch and deploy the airbag.

CAUTION:

Before deployment, make sure that no one is near the airbag.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.

(h) Dispose of the front passenger airbag assembly.

- The front passenger airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a front passenger airbag assembly with a deployed airbag.
- Do not apply water etc. to a front passenger airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.



H41436

(1) Remove the front passenger airbag assembly from the tire.

(2) Place the front passenger airbag assembly in a plastic bag, tie it tightly, and dispose of it according to local regulations.

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the front seat assemblies.

1. INSPECT FRONT SEAT SIDE AIRBAG ASSEMBLY (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the front seat side airbag assemblies installed on the vehicle.

(1) The defects are as follows:

- Cuts on the front seatback assembly around the front seat side airbag assemblies
- Small cracks on the front seatback assembly around the front seat side airbag assemblies
- Significant discoloration on the front seatback assembly around the front seat side airbag assemblies

OK:

No defects are found.

HINT:

If any of the defects is found, replace the front seat assembly with a new one.

2. INSPECT FRONT SEAT SIDE AIRBAG ASSEMBLY (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the front seat side airbag assemblies removed from the vehicle.

(1) The defects are as follows:

- Cuts on the surface of the front seat side airbag assemblies
- Small cracks on the surface of the front seat side airbag assemblies
- Marks from being dropped
- Deformation on the installation part of the front seat side airbag assemblies
- Cracks or other damage to the wire harness or connector

OK:

No defects are found.

HINT:

If any of the defects is found, replace the front seat assembly with a new one.

# DISPOSAL

CAUTION:

Before performing pre-disposal deployment of any SRS part, review and closely follow all applicable environmental and hazardous material regulations. Pre-disposal deployment may be considered hazardous material treatment.

1. PRECAUTION

CAUTION:

- An airbag or pretensioner may be activated by static electricity. To prevent this, be sure to touch a metal surface with your bare hands to discharge static electricity before performing this procedure.
- Never dispose of a front seat side airbag assembly with an undeployed airbag.
- The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.
- When deploying the airbag, perform the operation at least 10 m (32.8 ft.) away from the front seat side airbag assembly.
- The front seat side airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a front seat side airbag assembly with a deployed airbag.
- Do not apply water etc. to a front seat side airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

When scrapping a vehicle equipped with an SRS or disposing of the front seat side airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the Service Dept. of TOYOTA MOTOR SALES, U.S.A., INC.

2. DISPOSE OF FRONT SEAT SIDE AIRBAG ASSEMBLY (When Installed in Vehicle)

NOTICE:

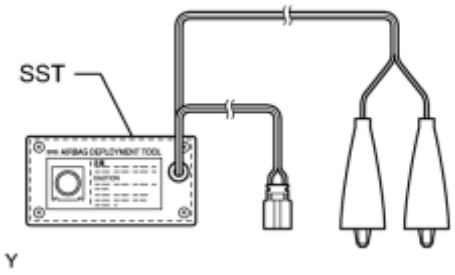
- When disposing of the front seat side airbag assembly, never use the customer's vehicle to deploy the airbag.
- Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.

(a) Check the function of SST INFO.

SST: 09082-00700




Y

(b) Refer to Precaution INFO.

(c) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

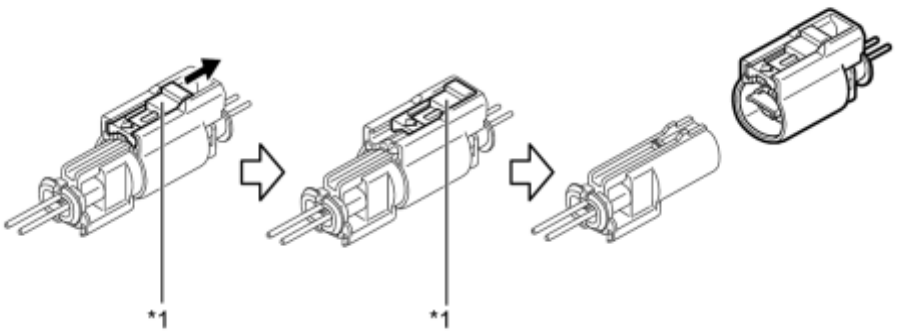
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(d) Disconnect the connector from the front seat side airbag assembly under the front seat assembly.

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(1) Slide the slider to release the lock, and then disconnect the yellow airbag connector under the front seat assembly.




C

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Slider | - | - |

(e) Install SST.

CAUTION:

Check that there is no looseness in the front seat assembly.



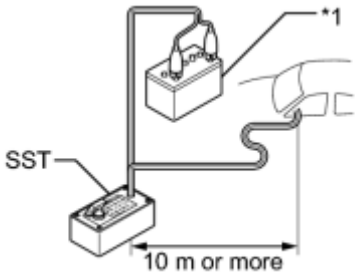

(1) Connect the SST connector to the front seat side airbag assembly connector.

SST: 09082-00700

SST: 09082-00820

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock.




c

(2) Move SST at least 10 m (32.8 ft.) away from the front side window.

## Text in Illustration

| | |
|---|---|
| *1 | Battery |

(3) Maintaining sufficient clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(f) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (32.8 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- Before deployment, make sure that no one is near the vehicle.
- The front seat side airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a front seat side airbag assembly with a deployed airbag.
- Do not apply water etc. to a front seat side airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.

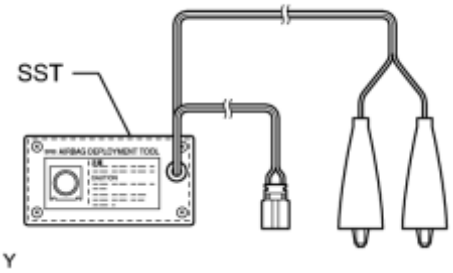
3. DISPOSE OF FRONT SEAT SIDE AIRBAG ASSEMBLY (When Not Installed in Vehicle)

NOTICE:

Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.




(a) Check the function of SST INFO.

SST: 09082-00700

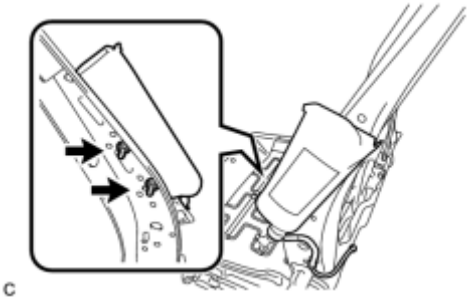
(b) Remove the front seat side airbag assembly.

(1) Remove the front seat assembly INFO.

CAUTION:

Before removing the front seat assembly, wait at least 90 seconds after turning the power switch off and disconnecting the cable from the negative (-) battery terminal.

(2) Disassemble the front seat assembly INFO.

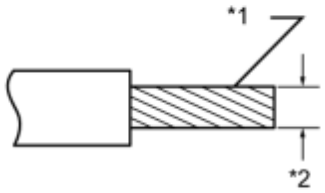



(3) Remove the 2 nuts, clamps and the front seat side airbag assembly from the front seatback assembly.

CAUTION:

When storing the front seat side airbag assembly, keep the airbag deployment side facing upward.

(c) Using braided wire, tie down the front seat side airbag assembly to an unneeded tire.




H

### *Text in Illustration*

| | |
|---|---|
| *1 | Stripped Wire Section |
| *2 | Wire Diameter |

Wire:

Stripped wire section

1.25 $mm^2$ (0.0019 $in.^2$) or more

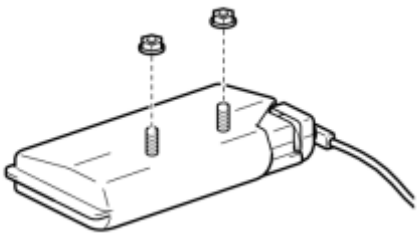
CAUTION:

If the wire is too thin or an alternative object is used to tie down the front seat side airbag assembly, it may snap when the airbag is deployed. Always use a wire for vehicle use with an area of at least 1.25 $mm^2$ (0.0019 $in.^2$).

HINT:

To calculate the area of the stripped wire section:

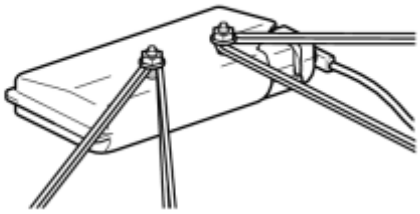
Area = 3.14 x $(Diameter)^2$ / 4



P

(1) Install the 2 nuts to the front seat side airbag assembly.

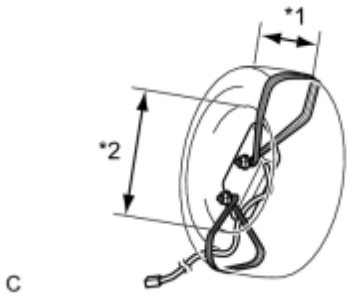
(2) Wind the wires around the stud bolts of the front seat side airbag assembly as shown in the illustration.




(3) Position the front seat side airbag assembly inside the tire.

## Text in Illustration

| | |
|---|---|
| *1 | Width |
| *2 | Inner Diameter |




Minimum tire size:

Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

360 mm (1.18 ft.)

- Make sure that the wires are tight. If there is slack in the wires, the front seat side airbag assembly may break loose when the airbag is deployed.
- Face the front seat side airbag assembly deployment surface toward the inside the tire to evenly distribute the force of deployment.

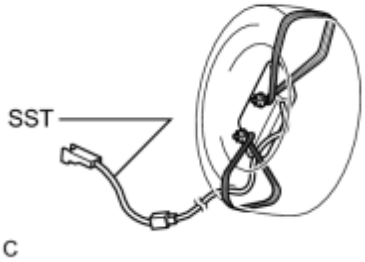
NOTICE:

The tire may be marked by the airbag deployment, so use an unneeded tire.

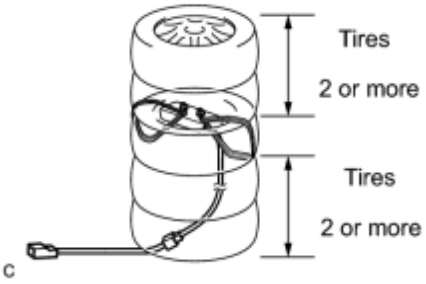
(d) Install SST.

(1) Connect the SST connector to the front seat side airbag assembly connector.

SST: 09082-00820




(e) Place the tires.

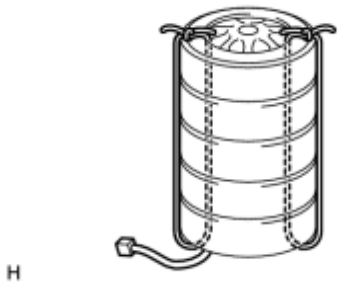



(1) Place at least 2 tires under the tire to which the front seat side airbag assembly is tied.

(2) Place at least 2 tires onto the tire to which the front seat side airbag assembly is tied. The top tire should have a wheel installed.

NOTICE:

Do not place the SST connector under the tire because it could be damaged.




(3) Tie the tires together with the 2 wires.

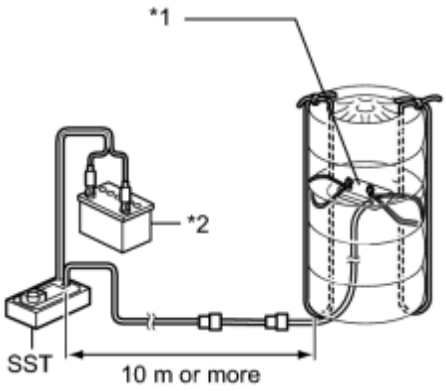
CAUTION:

Make sure that the wires are tight. Looseness in the wires results in the tires breaking loose when the airbag is deployed.

(f) Install SST.

(1) Connect the SST connector.

# Text in Illustration




| | |
|---|---|
| *1 | Front Seat Side Airbag Assembly |
| *2 | Battery |

SST: 09082-00700

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

C

(2) Move SST at least 10 m (32.8 ft.) away from the airbag tied down to the tire.

(g) Deploy the airbag.

(1) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(2) Check that no one is within a 10 m (32.8 ft.) radius of the tire to which the front seat side airbag assembly is tied.

(3) Press the SST activation switch and deploy the airbag.

CAUTION:

Before deployment, make sure that no one is near the airbag.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.

(h) Dispose of the front seat side airbag assembly.

- The front seat side airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a front seat side airbag assembly with a deployed airbag.
- Do not apply water etc. to a front seat side airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.



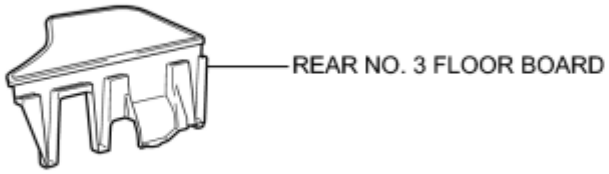
H00544

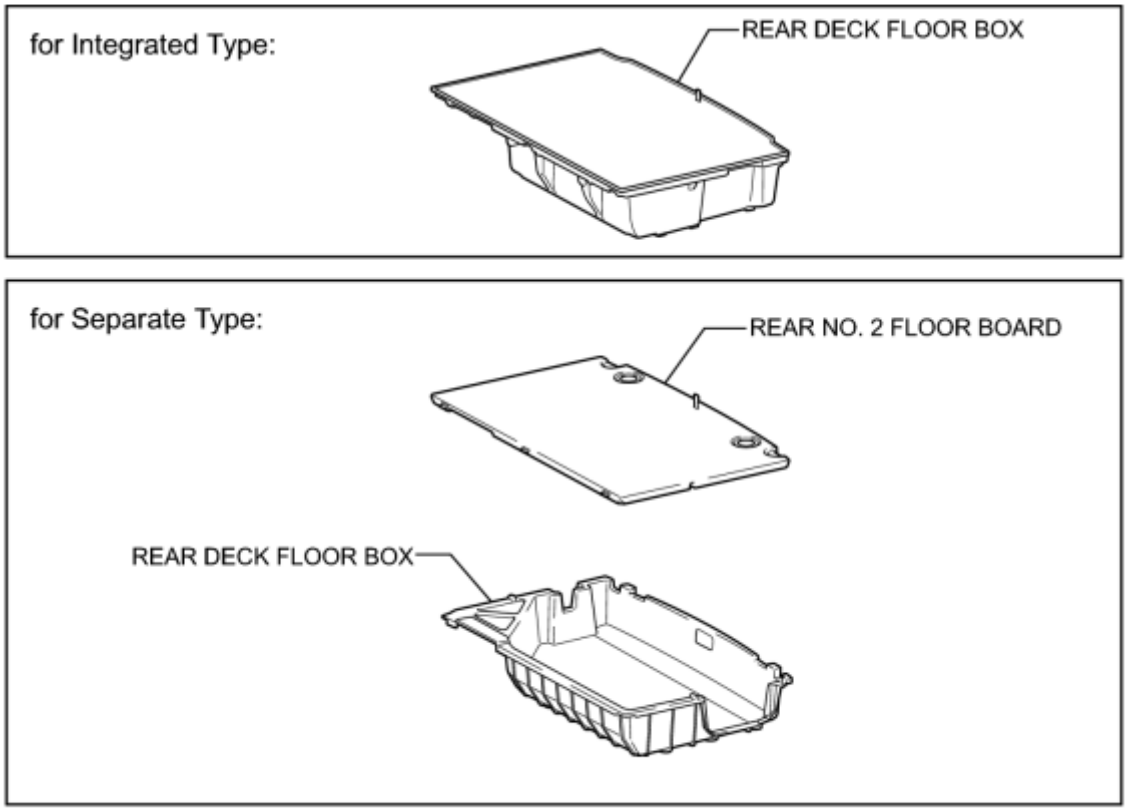
(1) Remove the front seat side airbag assembly from the tire.

(2) Place the front seat side airbag assembly in a plastic bag, tie it tightly, and dispose of it according to local regulations.

# COMPONENTS

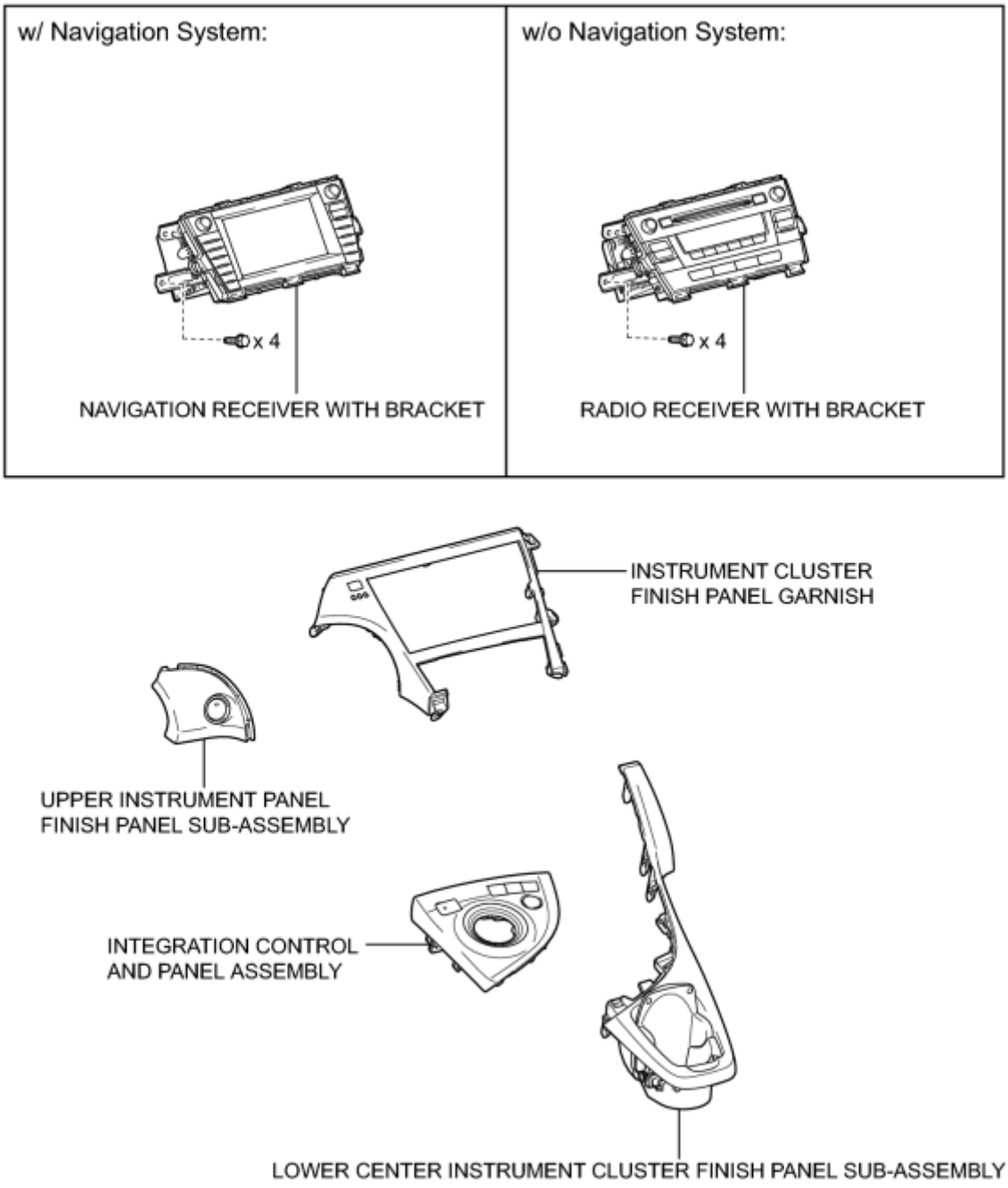
# ILLUSTRATION



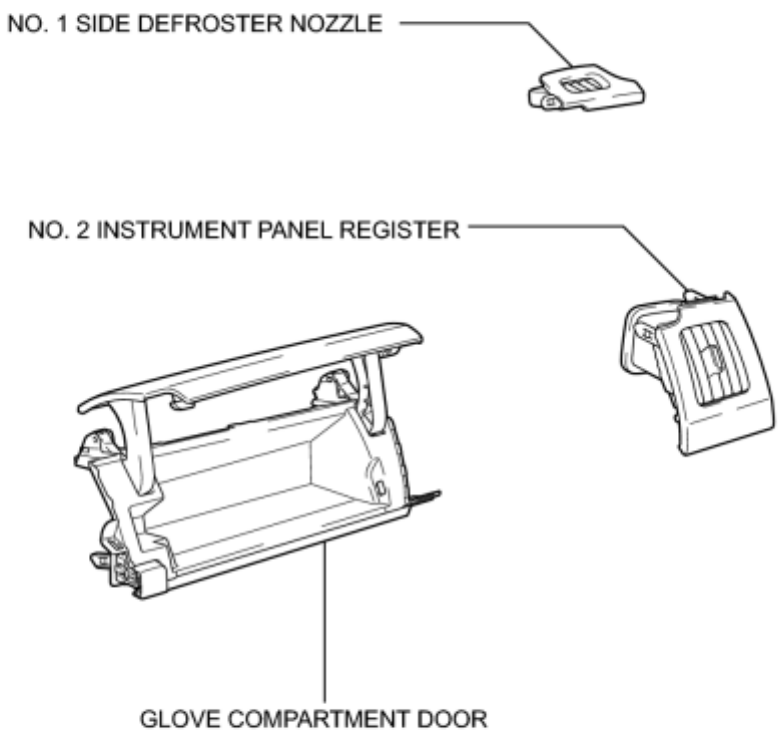

P

# ILLUSTRATION

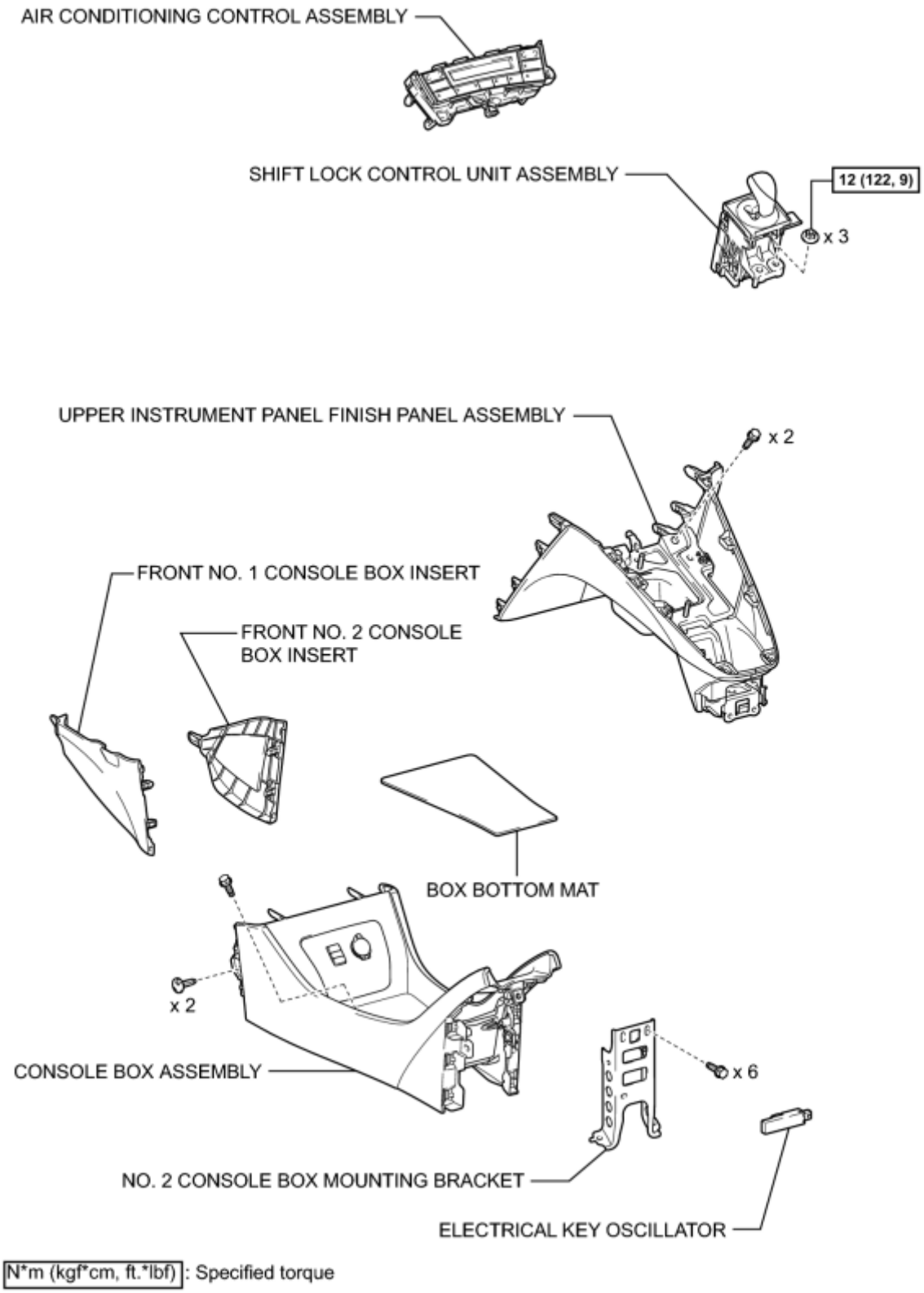



P

# ILLUSTRATION

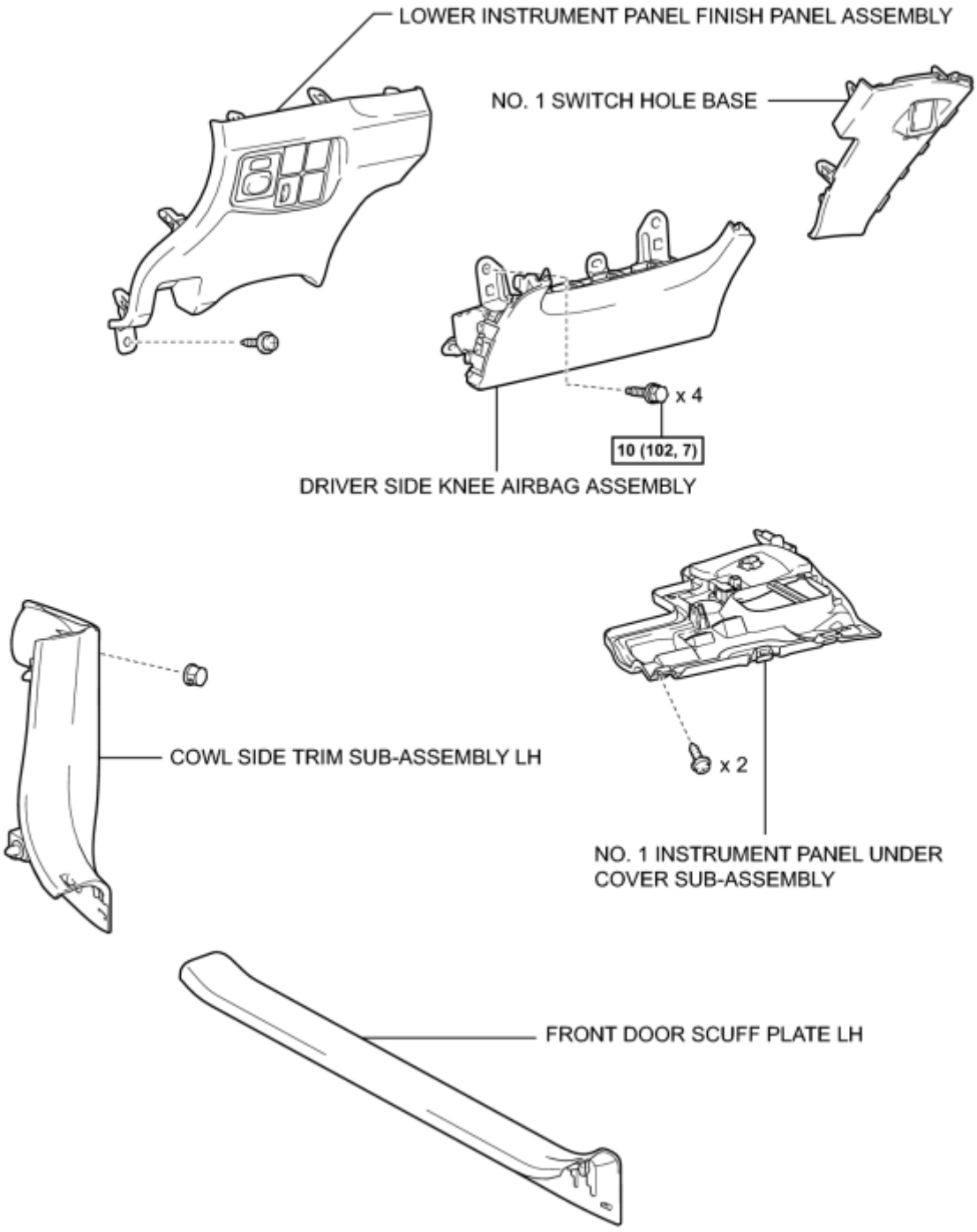



# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the driver side knee airbag assembly.

1. INSPECT DRIVER SIDE KNEE AIRBAG ASSEMBLY (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the driver side knee airbag assembly installed on the vehicle.

(1) The defects are as follows:

- Cuts on the driver side knee airbag assembly
- Small cracks on the driver side knee airbag assembly
- Significant discoloration on the driver side knee airbag assembly

OK:

No defects are found.

HINT:

If any of the defects is found, replace the driver side knee airbag assembly with a new one.

2. INSPECT DRIVER SIDE KNEE AIRBAG ASSEMBLY (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the driver side knee airbag assembly removed from the vehicle.

(1) The defects are as follows:

- Cuts on the driver side knee airbag assembly
- Small cracks on the driver side knee airbag assembly
- Significant discoloration on the driver side knee airbag assembly
- Cracks or other damage to the connector
- Deformation or cracks on the instrument panel or instrument panel reinforcement

OK:

No defects are found.

HINT:

If any of the defects is found, replace the driver side knee airbag assembly, instrument panel or instrument panel reinforcement with a new one.

# REMOVAL

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure up to Remove Rear Console Box Assembly INFO.

7. REMOVE INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

8. REMOVE LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

9. REMOVE INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

10. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

11. REMOVE RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

12. REMOVE NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

13. REMOVE NO. 1 SIDE DEFROSTER NOZZLE INFO

14. REMOVE NO. 2 INSTRUMENT PANEL REGISTER INFO

15. REMOVE GLOVE COMPARTMENT DOOR INFO

16. REMOVE AIR CONDITIONING CONTROL ASSEMBLY INFO

17. REMOVE SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

18. REMOVE ELECTRICAL KEY OSCILLATOR INFO

19. REMOVE NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

20. REMOVE FRONT NO. 1 CONSOLE BOX INSERT INFO

21. REMOVE FRONT NO. 2 CONSOLE BOX INSERT INFO

22. REMOVE BOX BOTTOM MAT INFO

23. SEPARATE CONSOLE BOX ASSEMBLY INFO

24. REMOVE UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

25. REMOVE CONSOLE BOX ASSEMBLY INFO

26. REMOVE NO. 1 SWITCH HOLE BASE INFO

27. REMOVE FRONT DOOR SCUFF PLATE LH INFO

28. REMOVE COWL SIDE TRIM SUB-ASSEMBLY LH INFO

29. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

30. REMOVE LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

31. REMOVE DRIVER SIDE KNEE AIRBAG ASSEMBLY

CAUTION:

When storing the driver side knee airbag assembly, keep the airbag deployment side facing upward.

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

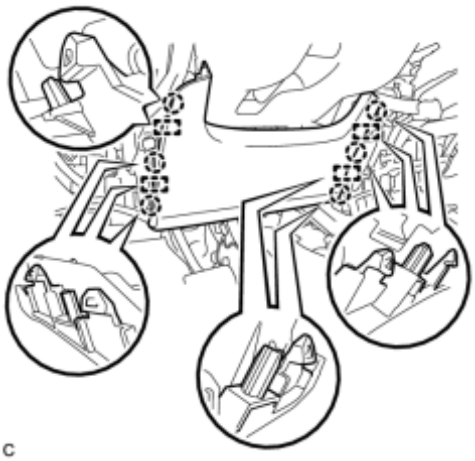
Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Remove the 4 bolts.



C

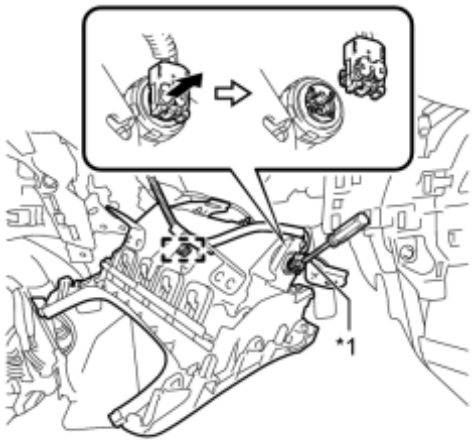
(d) Disengage the 2 claws to separate the DLC3.



C

(e) Disengage the 6 claws and 4 guides to separate the driver side knee airbag assembly.

(f) Disengage the clamp to separate the wire harness.




(g) Using a screwdriver with the tip wrapped with protective tape, release the airbag connector lock.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

(h) Disconnect the airbag connector to remove the driver side knee airbag assembly.

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

# INSTALLATION

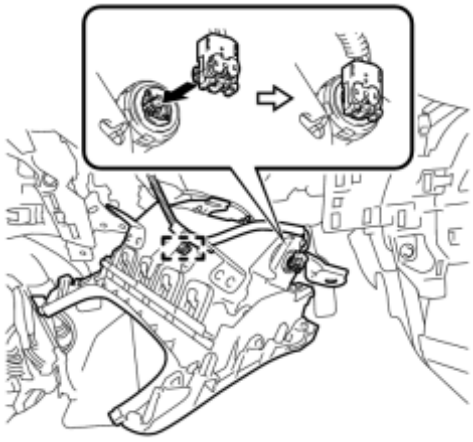
1. INSTALL DRIVER SIDE KNEE AIRBAG ASSEMBLY

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

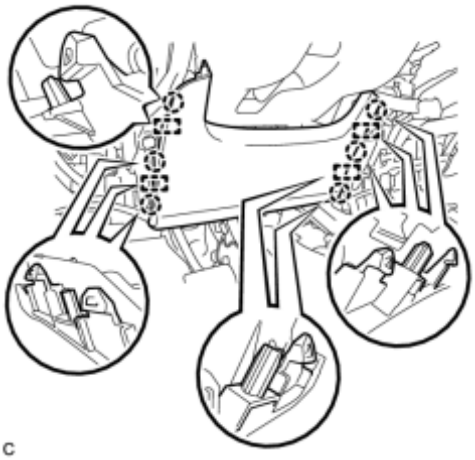



(c) Connect the airbag connector and install the clamp to the driver side knee airbag assembly.

NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

(d) Push in the lock to install the airbag connector.




(e) Temporarily install the driver side knee airbag assembly with the 6 claws and 4 guides.

(f) Install the driver side knee airbag assembly with the 4 bolts.

Torque: **10 N·m (102 kgf·cm, 7ft·lbf)**



C

NOTICE:

Confirm that the driver side knee airbag assembly is installed securely without any excessive gaps and is not protruding outward.

2. INSTALL LOWER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

3. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

4. INSTALL COWL SIDE TRIM SUB-ASSEMBLY LH INFO

5. INSTALL FRONT DOOR SCUFF PLATE LH INFO

6. INSTALL NO. 1 SWITCH HOLE BASE INFO

7. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL ASSEMBLY INFO

8. INSTALL CONSOLE BOX ASSEMBLY INFO

9. INSTALL BOX BOTTOM MAT INFO

10. INSTALL FRONT NO. 2 CONSOLE BOX INSERT INFO

11. INSTALL FRONT NO. 1 CONSOLE BOX INSERT INFO

12. INSTALL NO. 2 CONSOLE BOX MOUNTING BRACKET INFO

13. INSTALL ELECTRICAL KEY OSCILLATOR INFO

14. INSTALL SHIFT LOCK CONTROL UNIT ASSEMBLY INFO

15. INSTALL AIR CONDITIONING CONTROL ASSEMBLY INFO

16. INSTALL GLOVE COMPARTMENT DOOR INFO

17. INSTALL NO. 2 INSTRUMENT PANEL REGISTER INFO

18. INSTALL NO. 1 SIDE DEFROSTER NOZZLE INFO

19. INSTALL RADIO RECEIVER WITH BRACKET (w/o Navigation System) INFO

20. INSTALL NAVIGATION RECEIVER WITH BRACKET (w/ Navigation System) INFO

21. INSTALL UPPER INSTRUMENT PANEL FINISH PANEL SUB-ASSEMBLY INFO

22. INSTALL INSTRUMENT CLUSTER FINISH PANEL GARNISH INFO

23. INSTALL LOWER CENTER INSTRUMENT CLUSTER FINISH PANEL SUB-ASSEMBLY INFO

24. INSTALL INTEGRATION CONTROL AND PANEL ASSEMBLY INFO

25. INSTALL REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure from Install Rear Console Box Assembly INFO.

26. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

27. INSTALL REAR NO. 3 FLOOR BOARD INFO

28. INSTALL REAR DECK FLOOR BOX INFO

29. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

30. PERFORM DIAGNOSTIC SYSTEM CHECK

(a) Perform a diagnostic system check INFO.

31. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# DISPOSAL

CAUTION:

Before performing pre-disposal deployment of any SRS part, review and closely follow all applicable environmental and hazardous material regulations. Pre-disposal deployment may be considered hazardous material treatment.

1. PRECAUTION

CAUTION:

- An airbag or pretensioner may be activated by static electricity. To prevent this, be sure to touch a metal surface with your bare hands to discharge static electricity before performing this procedure.
- Never dispose of a driver side knee airbag assembly with an undeployed airbag.
- The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.
- When deploying the airbag, perform the operation at least 10 m (32.8 ft.) away from the driver side knee airbag assembly.
- The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.
- Do not apply water etc. to a driver side knee airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

When scrapping a vehicle equipped with an SRS or disposing of the driver side knee airbag assembly, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the Service Dept. of TOYOTA MOTOR SALES, U.S.A., INC.

2. DISPOSE OF DRIVER SIDE KNEE AIRBAG ASSEMBLY (When Installed in Vehicle)

NOTICE:

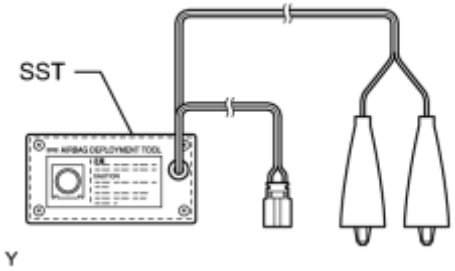
- When disposing of the driver side knee airbag assembly, never use the customer's vehicle to deploy the airbag.
- Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.

(a) Check the function of SST INFO.

SST: 09082-00700




(b) Refer to Precaution INFO.

(c) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(d) Remove the No. 1 instrument panel under cover sub-assembly INFO.

(e) Disconnect the driver side knee airbag connector.

(1) Using a screwdriver with the tip wrapped with protective tape, disconnect the airbag connector.

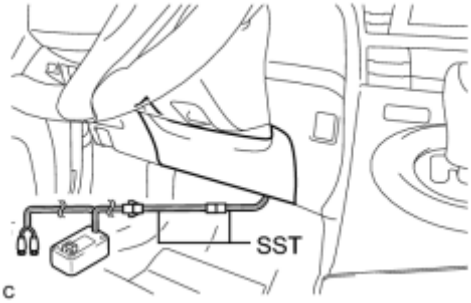
NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(f) Install SST.

CAUTION:

Check that there is no looseness in the driver side knee airbag assembly.




(1) Connect the SST connector to the driver side knee airbag assembly.

SST: 09082-00700

SST: 09082-00802

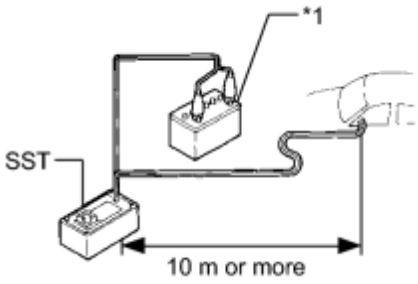
09082-10801

09082-20801

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock.

(2) Move SST at least 10 m (32.8 ft.) away from the side window of the




vehicle.

## Text in Illustration

| | |
|---|---|
| *1 | Battery |

(3) Maintaining sufficient clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(g) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (32.8 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- Before deployment, make sure that no one is near the vehicle.
- The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.
- Do not apply water etc. to a driver side knee airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.

3. DISPOSE OF DRIVER SIDE KNEE AIRBAG ASSEMBLY (When Not Installed in Vehicle)

NOTICE:

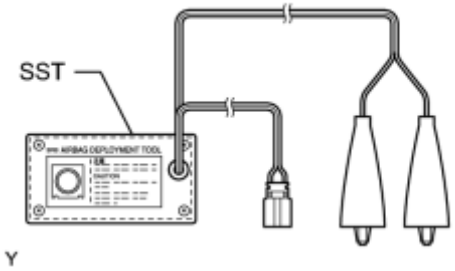
Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.

(a) Check the function of SST INFO.

SST: 09082-00700



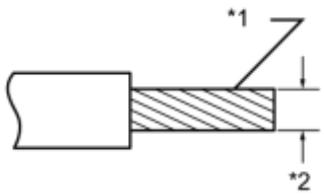

Y

(b) Remove the driver side knee airbag assembly INFO.

CAUTION:

- Before removing the driver side knee airbag assembly, wait at least 90 seconds after turning the power switch off and disconnecting the cable from the negative (-) battery terminal.
- When storing the driver side knee airbag assembly, keep the airbag deployment side facing upward.

(c) Using braided wire, tie down the driver side knee airbag assembly to an unneeded tire.




H

### *Text in Illustration*

| | |
|---|---|
| *1 | Stripped Wire Section |
| *2 | Wire Diameter |

Wire:

Stripped wire section

1.25 $mm^2$ (0.0019 $in.^2$) or more

CAUTION:

If the wire is too thin or an alternative object is used to tie down the driver side knee airbag assembly, it may snap when the airbag is deployed. Always use a wire for vehicle use with an area of at least 1.25 $mm^2$ (0.0019 $in.^2$).

HINT:

To calculate the area of the stripped wire section:

Area = 3.14 x $(Diameter)^2$ / 4

(1) Position the driver side knee airbag assembly inside the tire with the airbag deployment side facing inside.

Minimum tire size:

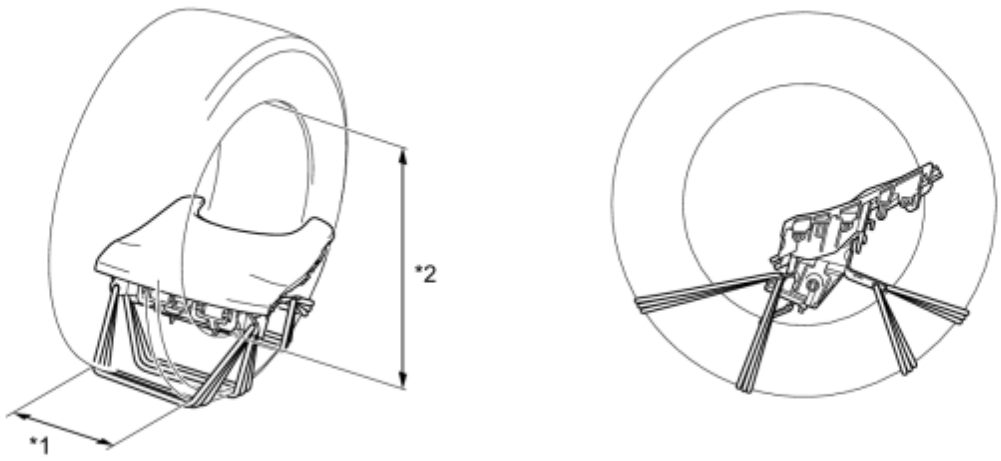
Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

360 mm (1.18 ft.)




c

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Width | *2 | Inner Diameter |

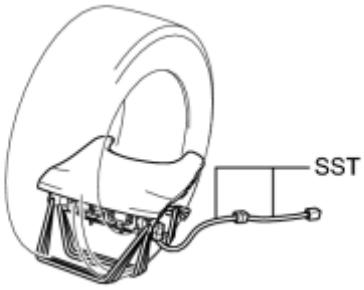
CAUTION:

- Make sure that the wires are tight. If there is slack in the wires, the driver side knee airbag assembly may break loose when the airbag is deployed.
- Always tie down the driver side knee airbag assembly with the airbag deployment side facing inside the tire as shown in the illustration.

NOTICE:

The tires may be marked by the airbag deployment, so use an unneeded tire.

(d) Install SST.




c

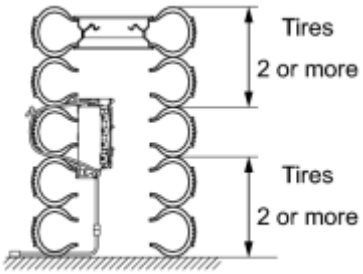
(1) After connecting the following SST to each other, connect them to the driver side knee airbag assembly.

SST: 09082-00802

09082-10801

09082-20801

(e) Place the tires.



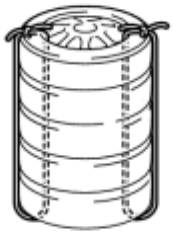

c

(1) Place at least 2 tires under the tire to which the driver side knee airbag assembly is tied.

(2) Place at least 2 tires onto the tire to which the driver side knee airbag assembly is tied. The top tire should have a wheel installed.

NOTICE:

Do not place the SST connector under the tire because it could be damaged.



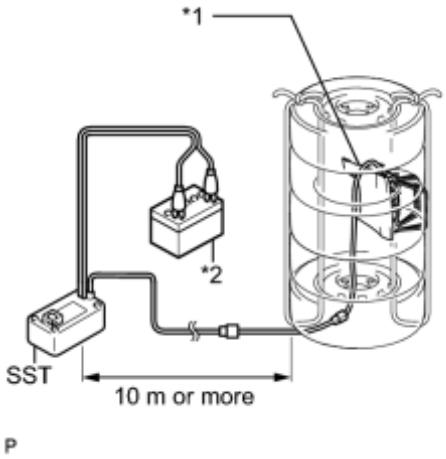
(3) Tie the tires together with the 2 wires.

CAUTION:

Make sure that the wires are tight. Looseness in the wires results in the tires breaking loose when the airbag is deployed.

(f) Install SST.

(1) Connect the SST connector.




P

## Text in Illustration

| | |
|---|---|
| *1 | Driver Side Knee Airbag Assembly |
| *2 | Battery |

SST: 09082-00700

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the tire.

(2) Move SST at least 10 m (32.8 ft.) away from the airbag tied down to the tire.

(g) Deploy the airbag.

(1) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(2) Check that no one is within a 10 m (32.8 ft.) radius of the tire to which the driver side knee airbag assembly is tied.

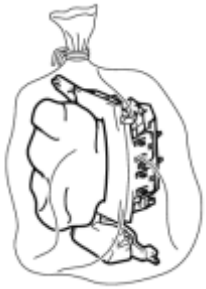
(3) Press the SST activation switch and deploy the airbag.

CAUTION:

Before deployment, make sure that no one is near the airbag.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.



P

(h) Dispose of the driver side knee airbag assembly.

- The driver side knee airbag assembly becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a driver side knee airbag assembly with a deployed airbag.
- Do not apply water etc. to a driver side knee airbag assembly with a deployed airbag.
- Always wash your hands with water after completing the operation.

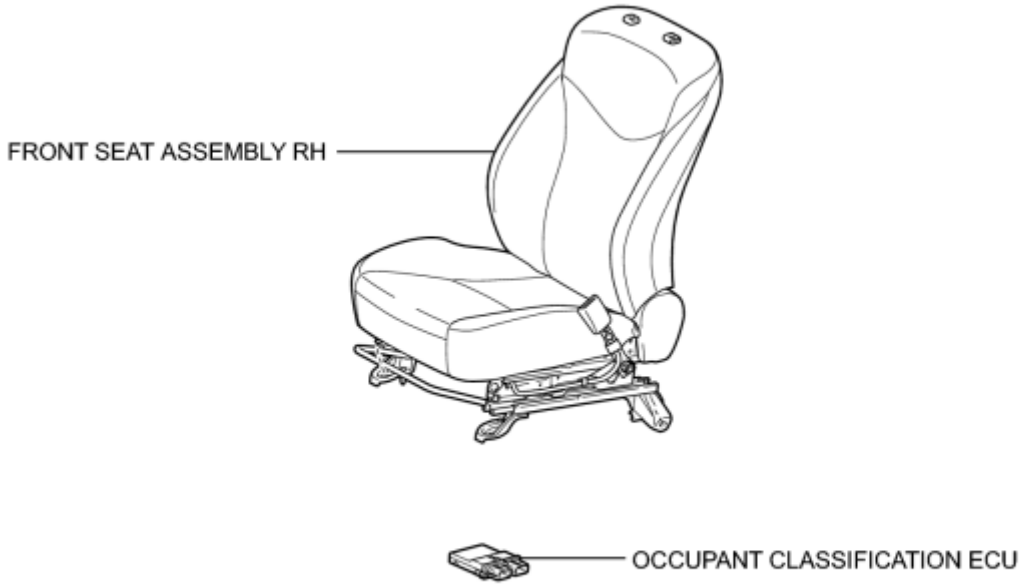
(1) Remove the driver side knee airbag assembly from the tire.

(2) Place the driver side knee airbag assembly in a plastic bag, tie it

tightly, and dispose of it according to local regulations.

# COMPONENTS

# ILLUSTRATION



# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the occupant classification ECU.

1. INSPECT OCCUPANT CLASSIFICATION ECU (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

2. INSPECT OCCUPANT CLASSIFICATION ECU (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the occupant classification ECU.

(1) The defects are as follows:

- Cracks on the ECU housing
- Dents on the ECU housing
- Chips on the ECU housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found, replace the occupant classification ECU with a new one.

3. INSPECT OCCUPANT CLASSIFICATION ECU (for Vehicle Involved in Collision and Airbag is Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the occupant classification ECU.

(1) The defects are as follows:

- Cracks on the ECU housing
- Dents on the ECU housing
- Chips on the ECU housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found, replace the occupant classification ECU with a new one.

# REMOVAL

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

NOTICE:

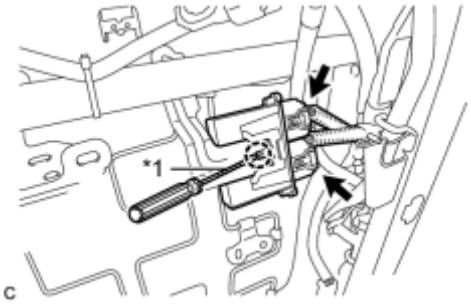
- When removing front seat assembly RH, perform zero point calibration and sensitivity check INFO.
- When replacing the occupant classification ECU, perform zero point calibration and sensitivity check INFO.

2. REMOVE FRONT SEAT ASSEMBLY RH

HINT:

- Use the same procedure for the RH side and LH side.
- Refer to the procedure up to Remove Front Seat Assembly INFO.

3. REMOVE OCCUPANT CLASSIFICATION ECU




(a) Disconnect the 2 connectors.

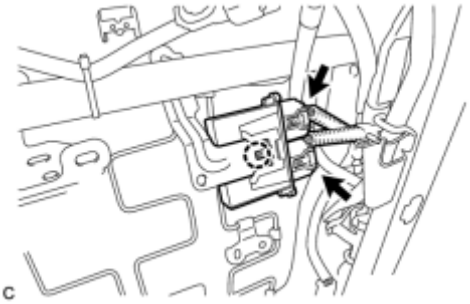
(b) Using a screwdriver with the tip wrapped with protective tape, disengage the claw and remove the occupant classification ECU.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

# INSTALLATION

1. INSTALL OCCUPANT CLASSIFICATION ECU




(a) Install the occupant classification ECU with the claw.

NOTICE:

If the occupant classification ECU has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the occupant classification ECU with a new one.

(b) Connect the 2 connectors.

NOTICE:

When installing the occupant classification ECU, be careful that the SRS wiring does not interfere with or is pinched between other parts.

2. INSTALL FRONT SEAT ASSEMBLY RH

HINT:

- Use the same procedure for the RH side and LH side.
- Refer to the procedure from Install Front Seat Assembly INFO.

3. ZERO POINT CALIBRATION AND SENSITIVITY CHECK

(a) Perform zero point calibration and sensitivity check INFO.

4. PERFORM DIAGNOSTIC SYSTEM CHECK

(a) Perform a diagnostic system check INFO.

5. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# PRECAUTION

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

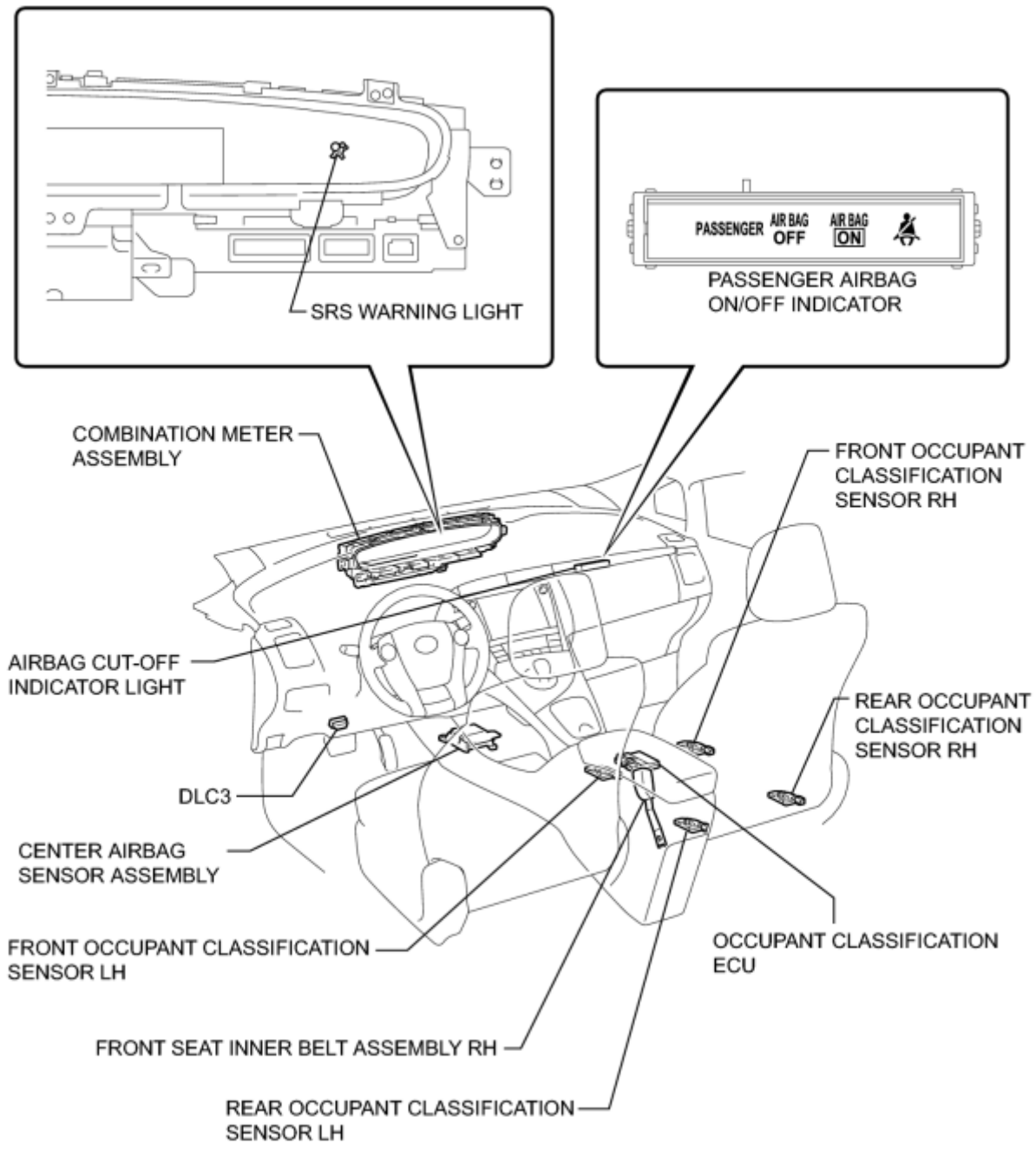
1. GENERAL PRECAUTION

(a) Perform zero point calibration and sensitivity check if any of the following conditions occur:

- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The front passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator ("OFF") comes on when the front passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

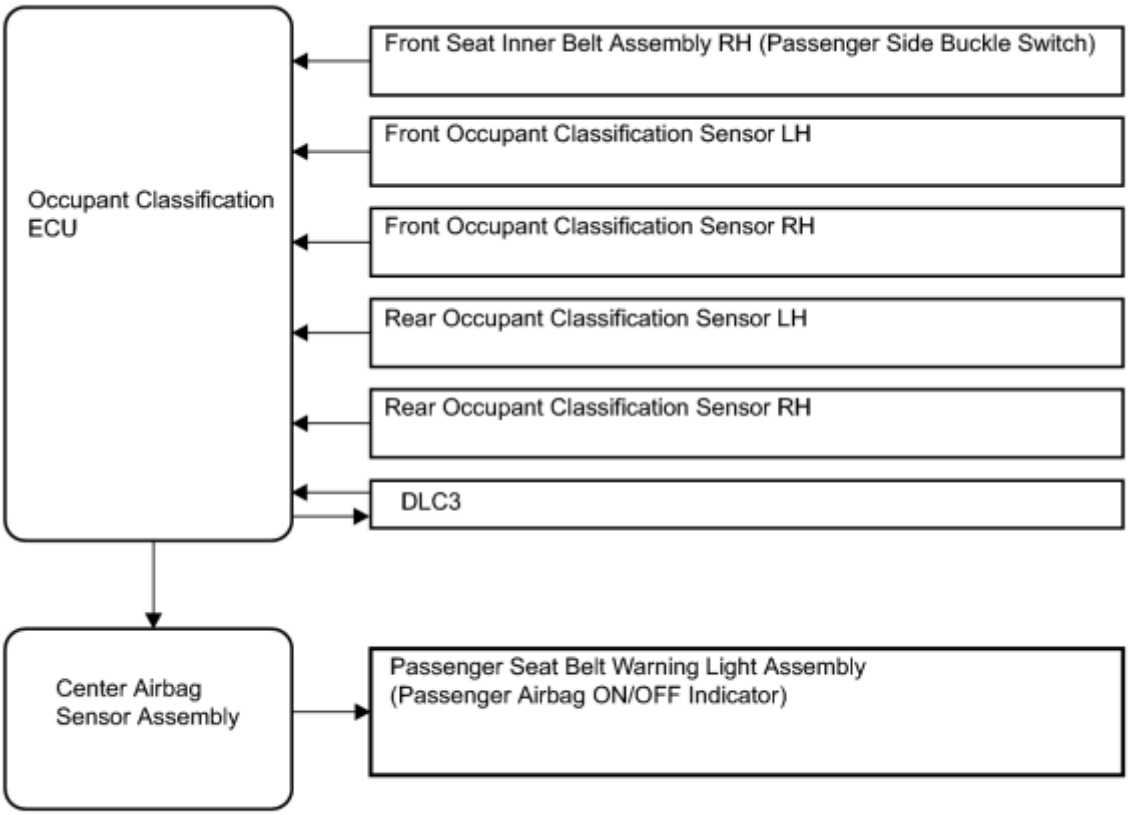
# PARTS LOCATION

# ILLUSTRATION




P

# SYSTEM DIAGRAM



# SYSTEM DESCRIPTION

1. GENERAL

(a) In the occupant classification system, the occupant classification ECU calculates the weight of the occupant based on signals from the occupant classification sensors. This system recognizes the occupant as a child if it detects a weight of less than 36 kg (79.3 lb), and disables the front passenger airbag and front seat belt pretensioner RH.

(b) This system is mainly comprised of 4 occupant classification sensors that detect the load on the front passenger seat. The occupant classification ECU controls the system, and the passenger airbag ON/OFF indicator indicates the ON/OFF condition of the front passenger airbag and front seat belt pretensioner RH.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshooting the occupant classification system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

(a) Confirm problem symptoms INFO.

NEXT

| | |
|---|---|
| 3. | PASSENGER AIRBAG ON/OFF INDICATOR CHECK |

NEXT

| | |
|---|---|
| 4. | DTC CHECK (Present and History DTCs) |

(a) Check for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is output. | A |
| DTC is not output. | B |

B GO TO PROBLEM SYMPTOMS TABLE

A

| | |
|---|---|
| 5. | DTC CHART |

NEXT

| | |
|---|---|
| 6. | CIRCUIT INSPECTION* |

NEXT

| | |
|---|---|
| 7. | REPAIR |

NEXT

| | |
|---|---|
| 8. | CLEAR DTCS (Present and History DTCs)* |

(a) Clear the DTCs.

NEXT

| | |
|---|---|
| 9. | DTC CHECK (Present and History DTCs)* |

(a) Check for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output. | A |
| DTC is output. | B |

B GO TO DIAGNOSTIC TROUBLE CODE CHART

A

| | |
|---|---|
| 10. | SYMPTOM SIMULATION |

(a) Check the passenger airbag ON/OFF indicator condition.

Result:

| Result | Proceed to |
|---|---|
| Passenger airbag ON/OFF indicator operates normally. | A |
| Passenger airbag ON/OFF indicator ("OFF") and SRS warning light come on. | B |

B GO TO DIAGNOSTIC TROUBLE CODE CHART

A

| | |
|---|---|
| 11. | CONFIRMATION TEST |

NEXT **END**

# INITIALIZATION

NOTICE:

Make sure that the front passenger seat is not occupied before performing the operation.

HINT:

Perform zero point calibration and sensitivity check if any of the following conditions occur:

- The occupant classification ECU is replaced.
- Accessories (seatback tray and seat cover, etc.) are installed.
- The front passenger seat is removed from the vehicle.
- The passenger airbag ON/OFF indicator ("OFF") comes on when the front passenger seat is not occupied.
- The vehicle is brought to the workshop for repair due to an accident or a collision.

1. ZERO POINT CALIBRATION

(a) Zero point calibration procedure

HINT:

Make sure that zero point calibration has finished normally, and then perform the sensitivity check.

(1) Check that all of the following conditions are met:

- The vehicle is parked on a level surface.
- No objects are placed on the front passenger seat.
- The front passenger seat belt buckle switch is off.

(2) Adjust the seat position according to the table below.

| Adjustment Item | Position |
|---|---|
| Slide Direction | Rearmost position |
| Reclining Angle | Upright position |
| Headrest Height | Lowest position |
| Lifter Height | Lowest position |

(3) Turn the power switch off.

(4) Connect the Techstream to the DLC3.

(5) Turn the power switch on (IG).

(6) Turn the Techstream on.

(7) Enter the following menus: Body Electrical / Occupant Detection / Utility / Zero Point Calibration.

(8) Perform zero point calibration by following the prompts on the Techstream screen.

HINT:

- Refer to the Techstream operator's manual for further details.
- If zero point calibration does not complete, replace the front seat cushion spring assembly.

OK:

"Zero Point Calibration is complete." is displayed.

2. SENSITIVITY CHECK

(a) Sensitivity check procedure

(1) Turn the power switch off.

(2) Connect the Techstream to the DLC3.

(3) Turn the power switch on (IG).

(4) Turn the Techstream on.

(5) Enter the following menus: Body Electrical / Occupant Detection / Utility / Sensitivity Check.

(6) Perform sensitivity check by following the prompts on the Techstream screen.

HINT:

Refer to the Techstream operator's manual for further details.

(7) Confirm that the initial sensor reading is within the specified range.

Standard:

-3.2 to 3.2 kg (-7.0 to 7.0 lb)

(8) Place a 30 kg (66.1 lb) weight (e.g. a 30 kg (66.1 lb) of lead mass) onto the front passenger seat.

(9) Confirm that sensitivity is within the specified range.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

HINT:

- When performing sensitivity check, use a solid metal weight (the check result may not appear properly if a liquid weight is used).

- If sensitivity deviates from the specified range, retighten the bolts of the front passenger seat without deforming the seat rail. After performing this procedure, if sensitivity is not within the specified range, replace the Front seat cushion spring assembly.

# PROBLEM SYMPTOMS TABLE

HINT:

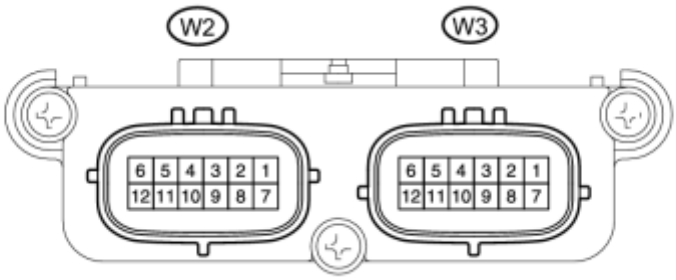
- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Occupant Classification System*

| Symptom | Suspected Area | See page |
|---|---|---|
| The front passenger seat condition differs from the indication by the passenger airbag ON/OFF indicator (DTC is not output). | Trouble in Passenger Airbag ON/OFF Indicator | INFO |

# TERMINALS OF ECU

1. OCCUPANT CLASSIFICATION ECU




P

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specification |
|---|---|---|---|---|
| W3-1 (+B) - W3-3 (GND) | W - W-B | Battery | Always | 11 to 14 V |
| W3-2 (DIA) - W3-3 (GND) | GR - W-B | Diagnosis (DLC3) | Power switch on (IG) | Pulse generation |
| W3-3 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 V |
| W3-4 (FSR-) - W3-3 (GND) | LG - W-B | Center airbag sensor assembly communication line | Always | Below 1 V |
| W3-5 (BGND) - W3-3 (GND) | P - W-B | Passenger side buckle switch ground line | Always | Below 1 V |
| W3-7 (IG) - W3-3 (GND) | B - W-B | Power source | Power switch on (IG) | 11 to 14 V |
| W3-8 (FSR+) - W3-4 (FSR-) | L - LG | Center airbag sensor assembly communication line | Power switch on (IG) | Pulse generation |
| W3-9 (BSW) - W3-5 (BGND) | G - P | Passenger side buckle switch line | Always | Pulse generation |
| W2-1 (SGD1) - W3-3 (GND) | G - W-B | Front occupant classification sensor LH ground line | Always | Below 1 V |
| W2-2 (SGD2) - W3-3 (GND) | LG - W-B | Front occupant classification sensor RH ground line | Always | Below 1 V |
| W2-3 (SGD3) - W3-3 (GND) | W - W-B | Rear occupant classification sensor LH ground line | Always | Below 1 V |
| W2-4 (SGD4) - W3-3 (GND) | BR - W-B | Rear occupant classification sensor RH ground line | Always | Below 1 V |
| W2-5 (SVC3) - W2-3 (SGD3) | GR - W | Rear occupant classification sensor LH power supply line | Power switch on (IG) | 4.9 to 5.1 V |
| W2-6 (SVC4) - | V - BR | Rear occupant classification | Power switch on (IG) | 4.9 to 5.1 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specification |
|---|---|---|---|---|
| W2-4 (SGD4) | | sensor RH power supply line | | |
| W2-7 (SIG1) - W2-1 (SGD1) | P - G | Front occupant classification sensor LH signal line | Power switch on (IG), a load applied to front occupant classification sensor LH | 0 to 5.1 V |
| W2-8 (SIG2) - W2-2 (SGD2) | L - LG | Front occupant classification sensor RH signal line | Power switch on (IG), a load applied to front occupant classification sensor RH | 0 to 5.1 V |
| W2-9 (SIG3) - W2-3 (SGD3) | SB - W | Rear occupant classification sensor LH signal line | Power switch on (IG), a load applied to rear occupant classification sensor LH | 0 to 5.1 V |
| W2-10 (SIG4) - W2-4 (SGD4) | B - BR | Rear occupant classification sensor RH signal line | Power switch on (IG), a load applied to rear occupant classification sensor RH | 0 to 5.1 V |
| W2-11 (SVC1) - W2-1 (SGD1) | R - G | Front occupant classification sensor LH power supply line | Power switch on (IG) | 4.9 to 5.1 V |
| W2-12 (SVC2) - W2-2 (SGD2) | W - LG | Front occupant classification sensor RH power supply line | Power switch on (IG) | 4.9 to 5.1 V |

# DIAGNOSIS SYSTEM

1. CHECK DLC3

(a) Check the DLC3 INFO.

2. FUNCTION OF PASSENGER AIRBAG ON/OFF INDICATOR

(a) Initial check

(1) Turn the power switch on (IG).

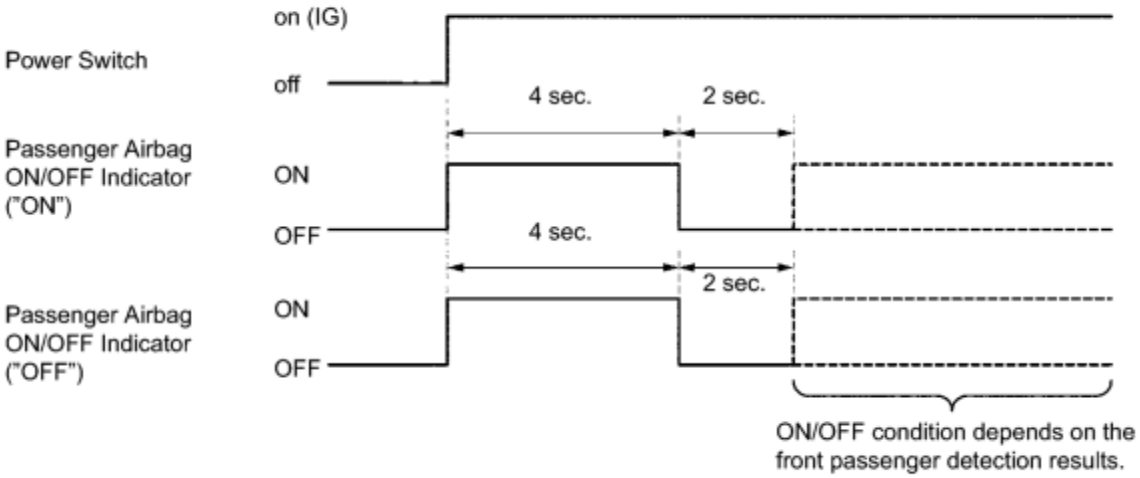
(2) The passenger airbag ON/OFF indicator ("ON" and "OFF") comes on for approximately 4 seconds, then goes off for approximately 2 seconds.

(3) Approximately 6 seconds after the power switch is turned on (IG), the passenger airbag ON/OFF indicator will indicate ON or OFF depending on the conditions listed below.

| Front Passenger Seat Condition | Passenger Airbag ON/OFF Indicator | | SRS Warning Light |
|---|---|---|---|
| | ON Indicator | OFF Indicator | |
| Vacant | OFF | OFF | OFF |
| Adult is seated. | ON | OFF | OFF |
| Child is seated. | OFF | ON | OFF |
| Child restraint system is set. | OFF | ON | OFF |
| Occupant classification system failure | OFF | ON | ON |

HINT:

- The passenger airbag ON/OFF indicator illuminates based on the timing chart below in order to check the indicator light circuit.
- When the occupant classification system has trouble, both the SRS warning light and passenger airbag ON/OFF indicator ("OFF") come on. In this case, check the DTCs in the airbag system first.




P

3. CHECK PASSENGER AIRBAG ON/OFF INDICATOR




(a) Turn the power switch on (IG).

P

(b) Check that the passenger airbag ON/OFF indicator ("ON" and "OFF") comes on for approximately 4 seconds, then goes off for approximately 2 seconds.

HINT:

Refer to the table in previous step regarding the passenger airbag ON/OFF indicator when the power switch is turned on (IG) and approximately 6 seconds elapse.

# DTC CHECK / CLEAR

1. DTC CHECK

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Occupant Detection / Trouble Codes.

(f) Check the DTCs by following the prompts on the Techstream screen.

HINT:

Refer to the Techstream operator's manual for further details.

2. DTC CLEAR

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Occupant Detection / Trouble Codes.

(f) Clear the DTCs by following the prompts on the Techstream screen.

HINT:

Refer to the Techstream operator's manual for further details.

# FAIL-SAFE CHART

1. FAIL SAFE FUNCTION

(a) The following chart shows the status of the controls when the system is normal and malfunctioning.

- The passenger airbag ON/OFF indicator ("ON" and "OFF") comes on for approximately 4 seconds, then goes off for approximately 2 seconds.
- Approximately 6 seconds after the power switch turned on (IG), the passenger airbag ON/OFF indicator will indicate ON or OFF depending on the conditions listed below.

| Condition | ON Indicator | OFF Indicator | Front Passenger Airbag | Front Seat Side Airbag RH | Front Seat Belt Pretensioner RH | Curtain Shield Airbag RH |
|---|---|---|---|---|---|---|
| Adult is seated | ON | OFF | ○ | ○ | ○ | ○ |
| Child is seated | OFF | ON | X | ○ | ○ | ○ |
| Vacant | OFF | OFF | X | ○ | X | ○ |
| Failure | OFF | ON | X | ○ | ○ | ○ |

HINT:

○: Deployable

X: Not deployable

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Body Electrical / Occupant Detection / Data List.

(f) Check the values by referring to the table below.

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| IG Switch | Power switch condition/<br>ON: Power switch on (IG)<br>OFF: Power switch off | ON/OFF | - |
| Passenger Buckle SW | Passenger side buckle switch/<br>Set: The seat belt is fastened<br>Unset: The seat belt is not fastened<br>NG: Data is not determined | Set/Unset | - |
| Passenger Classification | Passenger classification/<br>AM50: Adult (more than 54 kg (119.1 lb)) is seated<br>AF05: Adult (36 to 54 kg (79.4 to 119.1 lb)) is | AM50/AF05/Child/CRS/OFF | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | seated<br><br>Child: Child (less than 36 kg (79.3 lb)) is seated<br><br>CRS: Child restraint system is installed (less than 32kg (70.6 lb) and passenger side buckle switch is on)<br><br>OFF: Vacant | | |
| Sensor Range Info | Sensor range information/<br><br>OK: The value of a sensor is within the range<br><br>NG: The value of a sensor is over the range | OK | - |
| FL Sensor Range Info | Front left sensor range information/<br><br>OK: Sensor range is -17 to 27 kg (-37.5 to 59.5 lb)<br><br>Min.: Less than -17 kg (-37.5 lb)<br><br>Max.: More than 27 kg (59.5 lb) | OK | - |
| FR Sensor Range Info | Front right sensor range information/<br><br>OK: Sensor range is -17 to 27 kg (-37.5 to 59.5 lb)<br><br>Min.: Less than -17 kg (-37.5 lb)<br><br>Max.: More than 27 kg (59.5 lb) | OK | - |
| RL Sensor Range Info | Rear left sensor range information/<br><br>OK: Sensor range is -17 to 37 kg (-37.5 to 81.6 lb)<br><br>Min.: Less than -17 kg (-37.5 lb)<br><br>Max.: More than 37 kg (81.6 lb) | OK | - |
| RR Sensor Range Info | Rear right sensor range information/<br><br>OK: Sensor range is -17 to 37 kg (-37.5 to 81.6 lb)<br><br>Min.: Less than -17 kg (-37.5 lb)<br><br>Max.: More than 37 kg (81.6 lb) | OK | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| FL Sensor Voltage | Front left sensor voltage/<br>Min.: 0 V<br>Max.: 19.8 V | 0 to 5 V | - |
| FR Sensor Voltage | Front right sensor voltage/<br>Min.: 0 V<br>Max.: 19.8 V | 0 to 5 V | - |
| RL Sensor Voltage | Rear left sensor voltage/<br>Min.: 0 V<br>Max.: 19.8 V | 0 to 5 V | - |
| RR Sensor Voltage | Rear right sensor voltage/<br>Min.: 0 V<br>Max.: 19.8 V | 0 to 5 V | - |
| FL Sensor Weight Info | Front left sensor weight information/<br>Min.: -17 kg (-37.5 lb)<br>Max.: 27 kg (59.5 lb) | -17 to 27 kg<br>(-37.5 to 59.5 lb) | - |
| FR Sensor Weight Info | Front right sensor weight information/<br>Min.: -17 kg (-37.5 lb)<br>Max.: 27 kg (59.5 lb) | -17 to 27 kg<br>(-37.5 to 59.5 lb) | - |
| RL Sensor Weight Info | Rear left sensor weight information/<br>Min.: -17 kg (-37.5 lb)<br>Max.: 37 kg (81.6 lb) | -17 to 37 kg<br>(-37.5 to 81.6 lb) | - |
| RR Sensor Weight Info | Rear right sensor weight information/<br>Min.: -17 kg (-37.5 lb)<br>Max.: 37 kg (81.6 lb) | -17 to 37 kg<br>(-37.5 to 81.6 lb) | - |
| Total Weight Information | Total weight information/<br>Min.: -68 kg (-149.9 lb)<br>Max.: 128 kg (282.2 lb) | -68 to 128 kg<br>(-149.9 to 282.2 lb) | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Number of Present DTC | Number of present DTC recorded/<br><br>Min.: 0, Max.: 255 | 0 | - |
| Number of Past DTC | Number of past DTC recorded/<br><br>Min.: 0, Max.: 255 | 0 | - |

# DIAGNOSTIC TROUBLE CODE CHART

If a trouble code is displayed during the DTC check, check the circuit listed for the code in the table below (proceed to the page listed for that circuit).

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, perform troubleshooting for the occupant classification system as shown in the chart below.

### *Occupant Classification System*

| DTC Code | Detection Item | Trouble Area | Passenger Airbag ON/OFF Indicator (OFF indicator) | See page |
|---|---|---|---|---|
| B1771 | Passenger Side Buckle Switch Circuit Malfunction | 1. Front seat wire RH<br><br>2. Front seat inner belt assembly RH (Passenger side buckle switch)<br><br>3. Occupant classification ECU | ON | INFO |
| B1780 | Front Occupant Classification Sensor LH Circuit Malfunction | 1. Front seat wire RH<br><br>2. Front seat cushion spring assembly (Front occupant classification sensor LH) | ON | INFO |
| B1781 | Front Occupant Classification Sensor RH Circuit Malfunction | 1. Front seat wire RH<br><br>2. Front seat cushion spring assembly (Front occupant classification sensor RH) | ON | INFO |
| B1782 | Rear Occupant Classification Sensor LH Circuit Malfunction | 1. Front seat wire RH<br><br>2. Front seat cushion spring assembly (Rear occupant classification sensor LH) | ON | INFO |
| B1783 | Rear Occupant Classification Sensor RH Circuit Malfunction | 1. Front seat wire RH<br><br>2. Front seat cushion spring assembly (Rear occupant classification sensor RH) | ON | INFO |
| B1785 | Front Occupant Classification Sensor LH Collision Detection | Front seat cushion spring assembly (Front occupant classification sensor LH) | ON | INFO |
| B1786 | Front Occupant Classification Sensor RH Collision Detection | Front seat cushion spring assembly (Front occupant classification sensor RH) | ON | INFO |
| B1787 | Rear Occupant Classification | Front seat cushion spring | ON | INFO |

| DTC Code | Detection Item | Trouble Area | Passenger Airbag ON/OFF Indicator (OFF indicator) | See page |
|---|---|---|---|---|
| | Sensor LH Collision Detection | assembly (Rear occupant classification sensor LH) | | |
| B1788 | Rear Occupant Classification Sensor RH Collision Detection | Front seat cushion spring assembly (Rear occupant classification sensor RH) | ON | INFO |
| B1790 | Center Airbag Sensor Assembly Communication Circuit Malfunction | 1. No. 2 floor wire<br>2. Front seat wire RH<br>3. Occupant classification ECU<br>4. Center airbag sensor assembly | ON | INFO |
| B1793 | Occupant Classification Sensor Power Supply Circuit Malfunction | 1. Front seat wire RH<br>2. Front seat cushion spring assembly (Occupant classification sensors) | ON | INFO |
| B1794 | Open in Occupant Classification ECU Battery Positive Line | 1. Auxiliary battery<br>2. ECU-B fuse<br>3. Wire harness<br>4. Occupant classification ECU | ON | INFO |
| B1795 | Occupant Classification ECU Malfunction | Occupant classification ECU | ON | INFO |
| B1796 | Sleep Operation Failure of Occupant Classification ECU | Occupant classification ECU | ON | INFO |

| DTC | B1771 | Passenger Side Buckle Switch Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The passenger side buckle switch circuit consists of the occupant classification ECU and front seat inner belt assembly RH.

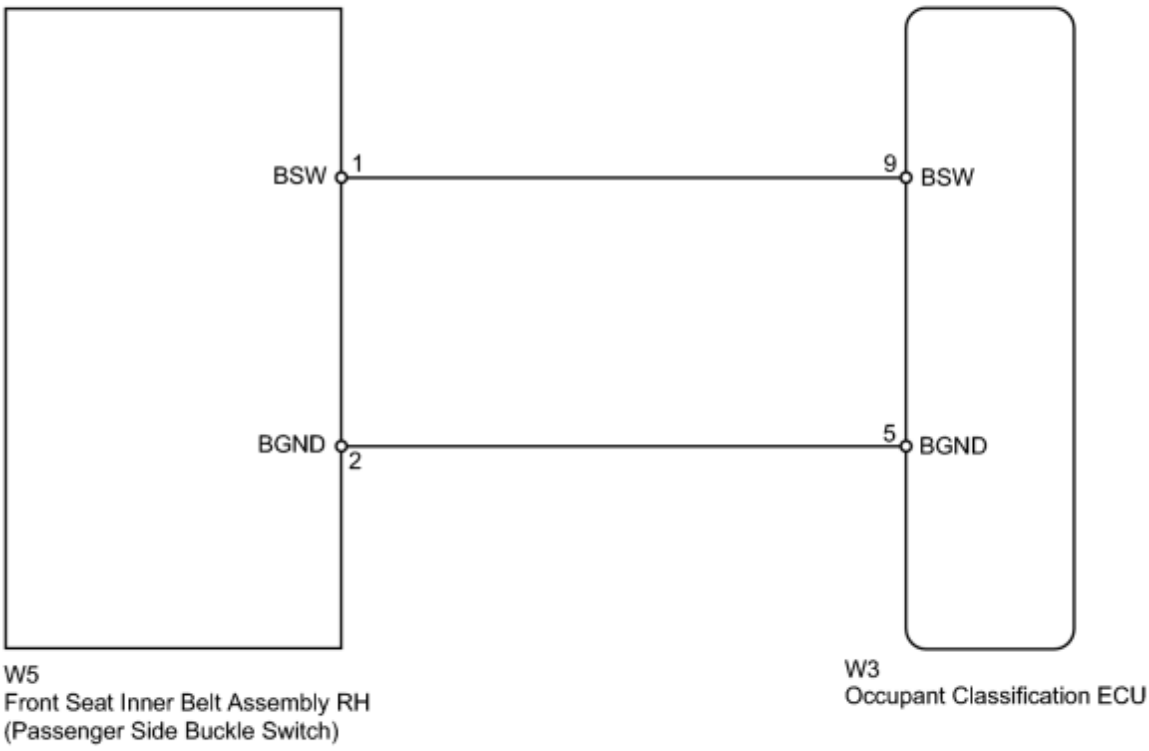
DTC B1771 is stored when a malfunction is detected in the passenger side buckle switch circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1771 | • The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the passenger side buckle switch circuit.<br>• Passenger side buckle switch malfunction<br>• Occupant classification ECU malfunction | • Front seat wire RH<br>• Front seat inner belt assembly RH (Passenger side buckle switch)<br>• Occupant classification ECU |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1771 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see under the seat cushion.
- In the above case, hold the seat so that it does not fall down. Hold the seat only as necessary because holding the seat for a long period of time may cause seat rail deformation.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Check that the connectors are properly connected to the occupant classification ECU and front seat inner belt assembly RH.

OK:

The connectors are properly connected.

HINT:

If the connectors are not connected securely, reconnect the connectors and proceed to the next inspection.

(d) Disconnect the connectors from the occupant classification ECU and front seat inner belt assembly RH.

(e) Check that the terminals of connectors are not damaged.

OK:

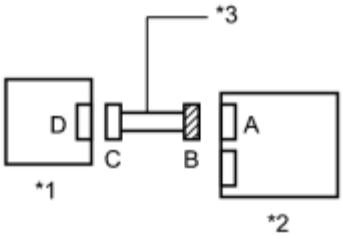
The terminals are not deformed or damaged.

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

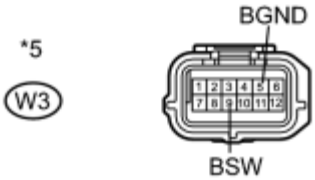
▼

| | |
|---|---|
| 2. | CHECK FRONT SEAT WIRE RH (SHORT TO B+) |




(a) Connect the cable to the negative (-) battery terminal.

*4




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-9 (BSW) - Body ground | Power switch on (IG) | Below 1 V |
| W3-5 (BGND) - Body ground | Power switch on (IG) | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Front Seat Inner Belt Assembly RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

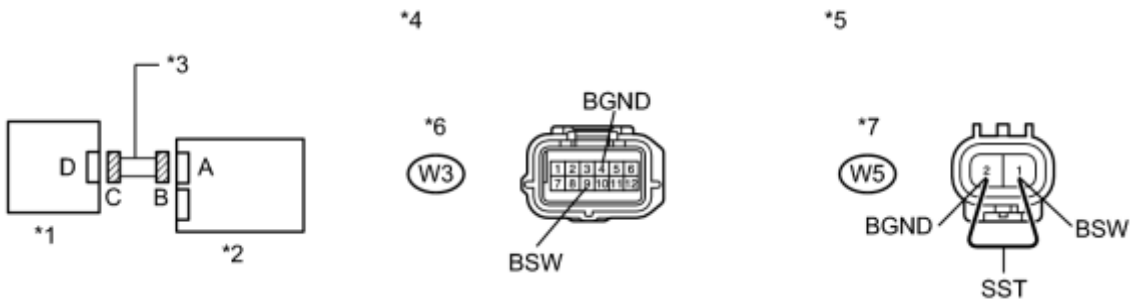
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 3. | CHECK FRONT SEAT WIRE RH (OPEN) |

(a) Turn the power switch off.




P

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Using SST, connect terminals 1 (BSW) and 2 (BGND) of connector C.

NOTICE:

Do not forcibly insert SST into the terminals of the connector when connecting.

SST: 09843-18040

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-9 (BSW) - W3-5 (BGND) | Always | Below 1 Ω |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Front Seat Inner Belt Assembly RH | *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH | *4 | Front view of wire harness connector<br>(to Occupant Classification ECU) |
| *5 | Front view of wire harness connector<br>(to Front Seat Inner Belt Assembly RH) | *6 | Connector B |
| *7 | Connector C | - | - |

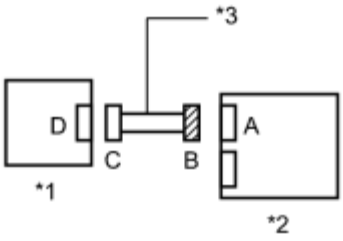
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

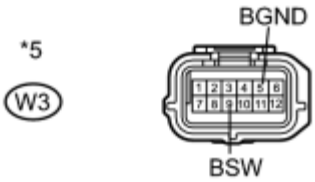
▼

| | |
|---|---|
| 4. | CHECK FRONT SEAT WIRE RH (SHORT) |

(a) Disconnect SST from connector C.




*4




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-9 (BSW) - W3-5 (BGND) | Always | 1 MΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front Seat Inner Belt Assembly RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

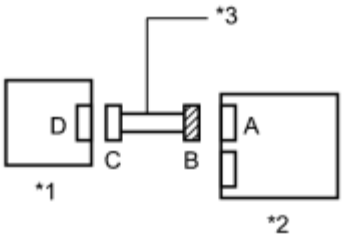
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

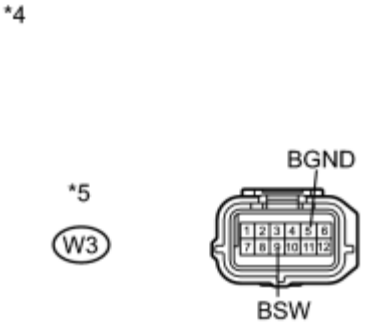
| | |
|---|---|
| 5. | CHECK FRONT SEAT WIRE RH (SHORT TO GROUND) |

(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-9 (BSW) - Body ground | Always | 1 MΩ or higher |
| W3-5 (BGND) - Body ground | Always | 1 MΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front Seat Inner Belt Assembly RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

NG REPLACE FRONT SEAT WIRE RH

OK

| | |
|---|---|
| 6. | CHECK DTC |

(a) Connect the connectors to the occupant classification ECU and front seat inner belt assembly RH.

(b) Connect the cable to the negative (-) battery terminal.

(c) Turn the power switch on (IG).

(d) Clear the DTCs stored in the occupant classification ECU INFO.

(e) Clear the DTCs stored in the center airbag sensor assembly INFO.

(f) Turn the power switch off.

(g) Turn the power switch on (IG).

(h) Check for DTCs INFO.

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

NG REPLACE FRONT SEAT INNER BELT ASSEMBLY RH

OK **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 7. | REPLACE FRONT SEAT INNER BELT ASSEMBLY RH |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat inner belt assembly RH INFO.

HINT:

Perform the inspection using parts from a normal vehicle if possible.

(d) Connect the cable to the negative (-) battery terminal.

(e) Turn the power switch on (IG).

(f) Clear the DTCs stored in the occupant classification ECU INFO.

(g) Clear the DTCs stored in the center airbag sensor assembly INFO.

(h) Turn the power switch off.

(i) Turn the power switch on (IG).

(j) Check for DTCs INFO.

OK:

DTC B1771 is not output.

HINT:

Codes other than DTC B1771 may be output at this time, but they are not related to this check.

NG REPLACE OCCUPANT CLASSIFICATION ECU

OK **END**

| | |
|---|---|
| 8. | REPLACE OCCUPANT CLASSIFICATION ECU |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the occupant classification ECU INFO.

NEXT

| | |
|---|---|
| 9. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

| | |
|---|---|
| 10. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

| DTC | B1780 | Front Occupant Classification Sensor LH Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The front occupant classification sensor LH circuit consists of the occupant classification ECU and front occupant classification sensor LH.

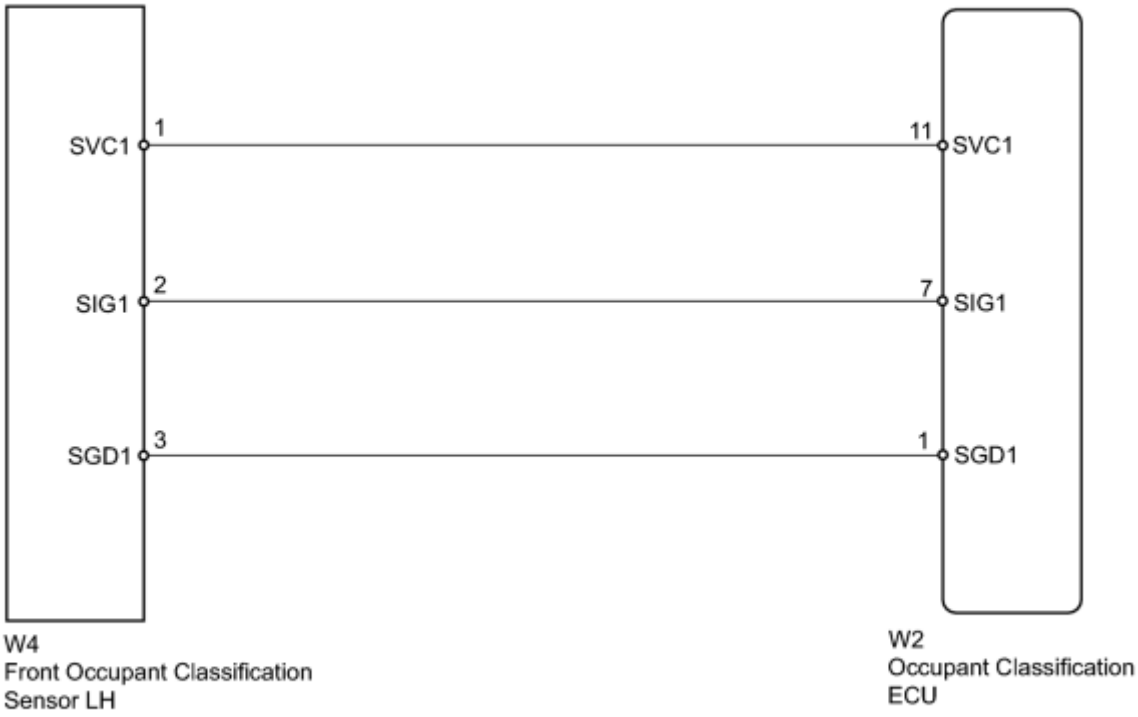
DTC B1780 is stored when a malfunction is detected in the front occupant classification sensor LH circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1780 | • The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front occupant classification sensor LH circuit.<br>• Front occupant classification sensor LH malfunction | • Front seat wire RH<br>• Front seat cushion spring assembly (Front occupant classification sensor LH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1780 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see under the seat cushion.
- In the above case, hold the seat so that it does not fall down. Hold the seat only as necessary because holding the seat for a long period of time may cause seat rail deformation.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Check that the connectors are properly connected to the occupant classification ECU and front occupant classification sensor LH.

OK:

The connectors are properly connected.

HINT:

If the connectors are not connected securely, reconnect the connectors and proceed to the next inspection.

(d) Disconnect the connectors from the occupant classification ECU and front occupant classification sensor LH.

(e) Check that the terminals of connectors are not damaged.

OK:

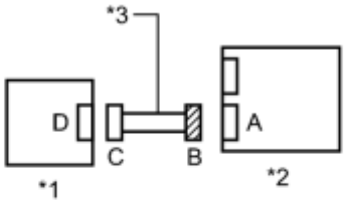
The terminals are not deformed or damaged.

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

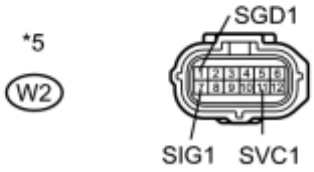
▼

| | |
|---|---|
| 2. | CHECK FRONT SEAT WIRE RH (SHORT TO B+) |




(a) Connect the cable to the negative (-) battery terminal.

*4




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-1 (SGD1) - Body ground | Power switch on (IG) | Below 1 V |
| W2-7 (SIG1) - Body ground | Power switch on (IG) | Below 1 V |
| W2-11 (SVC1) - Body ground | Power switch on (IG) | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front Occupant Classification Sensor LH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

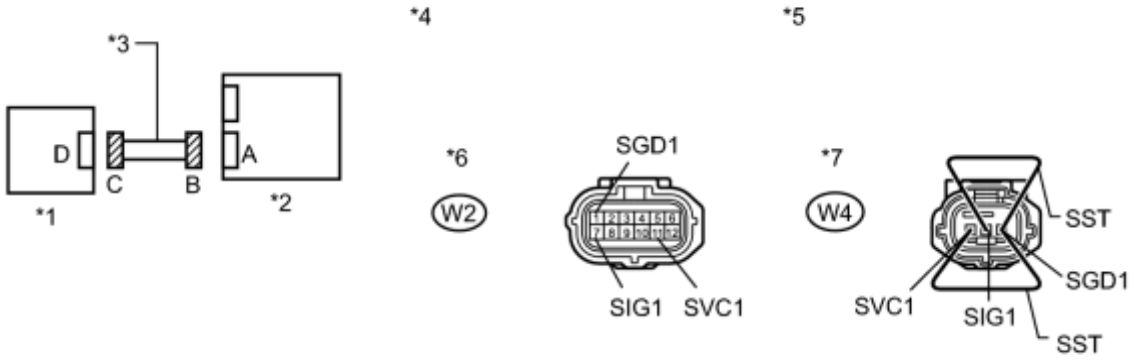
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 3. | CHECK FRONT SEAT WIRE RH (OPEN) |

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

(c) Using SST, connect terminals 1 (SVC1) and 3 (SGD1), and connect terminals 2 (SIG1) and 3 (SGD1) of connector C.

NOTICE:

Do not forcibly insert SST into the terminals of the connector when connecting.

SST: 09843-18040

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-7 (SIG1) - W2-1 (SGD1) | Always | Below 1 Ω |
| W2-11 (SVC1) - W2-1 (SGD1) | Always | Below 1 Ω |

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front Occupant Classification Sensor LH | *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH | *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Front view of wire harness connector<br><br>(to Front Occupant Classification Sensor LH) | *6 | Connector B |
| *7 | Connector C | - | - |

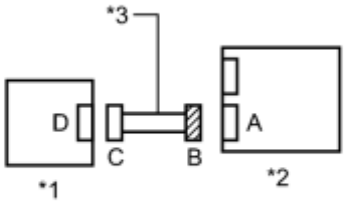
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

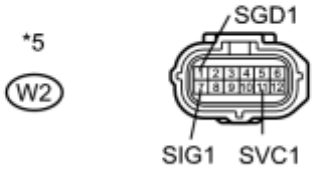
▼

| | |
|---|---|
| 4. | CHECK FRONT SEAT WIRE RH (SHORT) |

(a) Disconnect SST from connector C.




*4




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-7 (SIG1) - W2-1 (SGD1) | Always | 1 MΩ or higher |
| W2-11 (SVC1) - W2-1 (SGD1) | Always | 1 MΩ or higher |
| W2-7 (SIG1) - W2-11 (SVC1) | Always | 1 MΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front Occupant Classification Sensor LH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

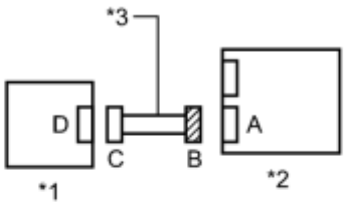
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 5. | CHECK FRONT SEAT WIRE RH (SHORT TO GROUND) |

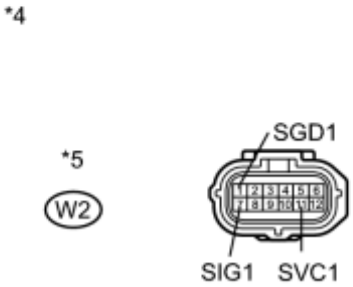
(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-1 (SGD1) - Body ground | Always | 1 MΩ or higher |
| W2-7 (SIG1) - Body ground | Always | 1 MΩ or higher |
| W2-11 (SVC1) - Body ground | Always | 1 MΩ or higher |

## Text in Illustration




| | |
|---|---|
| *1 | Front Occupant Classification Sensor LH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 6. | CHECK DTC |

(a) Connect the connectors to the occupant classification ECU and front occupant classification sensor LH.

(b) Connect the cable to the negative (-) battery terminal.

(c) Turn the power switch on (IG).

(d) Clear the DTCs stored in the occupant classification ECU INFO.

(e) Clear the DTCs stored in the center airbag sensor assembly INFO.

(f) Turn the power switch off.

(g) Turn the power switch on (IG).

(h) Check for DTCs INFO.

OK:

DTC B1780 is not output.

HINT:

Codes other than DTC B1780 may be output at this time, but they are not related to this check.

NG ▶ REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 7. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

▼

| | |
|---|---|
| 8. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

▼

| | |
|---|---|
| 9. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT ▶ **END**

| DTC | B1781 | Front Occupant Classification Sensor RH Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The front occupant classification sensor RH circuit consists of the occupant classification ECU and front occupant classification sensor RH.

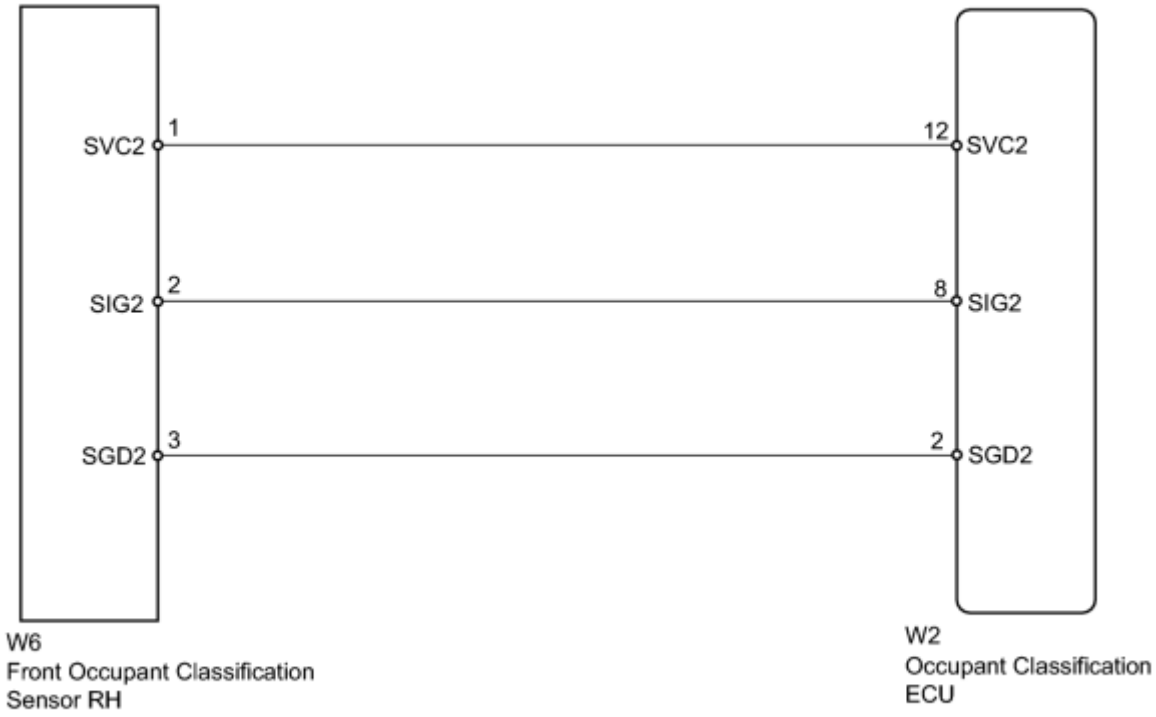
DTC B1781 is stored when a malfunction is detected in the front occupant classification sensor RH circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1781 | • The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the front occupant classification sensor RH circuit.<br>• Front occupant classification sensor RH malfunction | • Front seat wire RH<br>• Front seat cushion spring assembly (Front occupant classification sensor RH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1781 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see under the seat cushion.
- In the above case, hold the seat so that it does not fall down. Hold the seat only as necessary because holding the seat for a long period of time may cause seat rail deformation.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Check that the connectors are properly connected to the occupant classification ECU and front occupant classification sensor RH.

OK:

The connectors are properly connected.

HINT:

If the connectors are not connected securely, reconnect the connectors and proceed to the next inspection.

(d) Disconnect the connectors from the occupant classification ECU and front occupant classification sensor RH.

(e) Check that the terminals of connectors are not damaged.

OK:

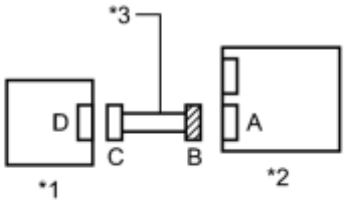
The terminals are not deformed or damaged.

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 2. | CHECK FRONT SEAT WIRE RH (SHORT TO B+) |




(a) Connect the cable to the negative (-) battery terminal.

*4




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-2 (SGD2) - Body ground | Power switch on (IG) | Below 1 V |
| W2-8 (SIG2) - Body ground | Power switch on (IG) | Below 1 V |
| W2-12 (SVC2) - Body ground | Power switch on (IG) | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front Occupant Classification Sensor RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

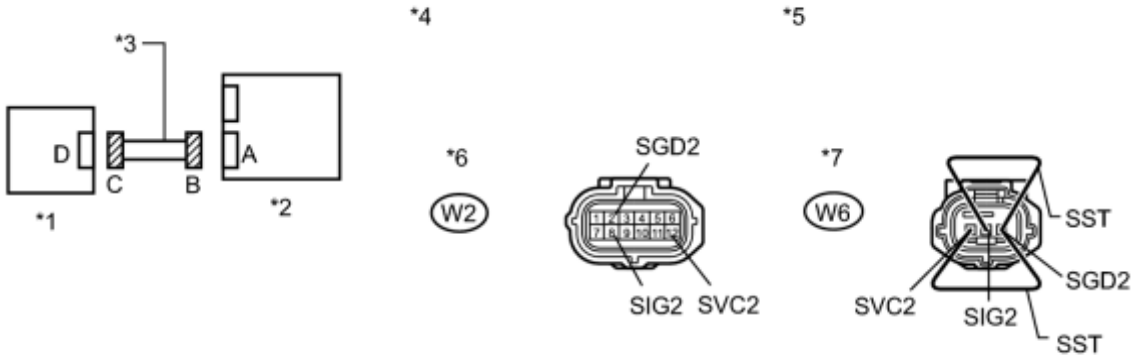
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 3. | CHECK FRONT SEAT WIRE RH (OPEN) |

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

(c) Using SST, connect terminals 1 (SVC2) and 3 (SGD2), and connect terminals 2 (SIG2) and 3 (SGD2) of connector C.

NOTICE:

Do not forcibly insert SST into the terminals of the connector when connecting.

SST: 09843-18040

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-8 (SIG2) - W2-2 (SGD2) | Always | Below 1 Ω |
| W2-12 (SVC2) - W2-2 (SGD2) | Always | Below 1 Ω |

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Front Occupant Classification Sensor RH | *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH | *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Front view of wire harness connector<br><br>(to Front Occupant Classification Sensor RH) | *6 | Connector B |
| *7 | Connector C | - | - |

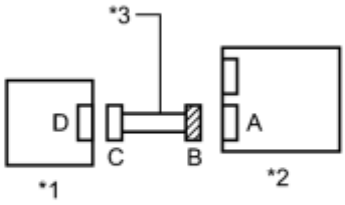
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 4. | CHECK FRONT SEAT WIRE RH (SHORT) |

(a) Disconnect SST from connector C.




*4




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-8 (SIG2) - W2-2 (SGD2) | Always | 1 MΩ or higher |
| W2-12 (SVC2) - W2-2 (SGD2) | Always | 1 MΩ or higher |
| W2-8 (SIG2) - W2-12 (SVC2) | Always | 1 MΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front Occupant Classification Sensor RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

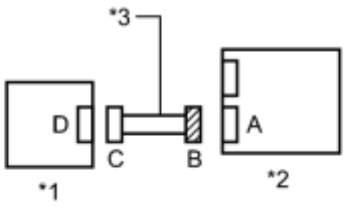
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

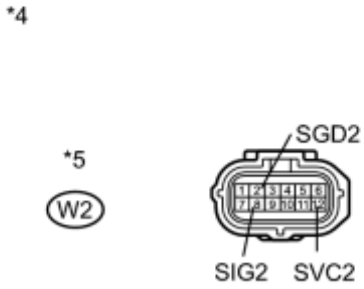
| | |
|---|---|
| 5. | CHECK FRONT SEAT WIRE RH (SHORT TO GROUND) |

(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-2 (SGD2) - Body ground | Always | 1 MΩ or higher |
| W2-8 (SIG2) - Body ground | Always | 1 MΩ or higher |
| W2-12 (SVC2) - Body ground | Always | 1 MΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Front Occupant Classification Sensor RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 6. | CHECK DTC |

(a) Connect the connectors to the occupant classification ECU and front occupant classification sensor RH.

(b) Connect the cable to the negative (-) battery terminal.

(c) Turn the power switch on (IG).

(d) Clear the DTCs stored in the occupant classification ECU INFO.

(e) Clear the DTCs stored in the center airbag sensor assembly INFO.

(f) Turn the power switch off.

(g) Turn the power switch on (IG).

(h) Check for DTCs INFO.

OK:

DTC B1781 is not output.

HINT:

Codes other than DTC B1781 may be output at this time, but they are not related to this check.

NG ▶ REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 7. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

▼

| | |
|---|---|
| 8. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

▼

| | |
|---|---|
| 9. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT ▶ **END**

| DTC | B1782 | Rear Occupant Classification Sensor LH Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The rear occupant classification sensor LH circuit consists of the occupant classification ECU and rear occupant classification sensor LH.

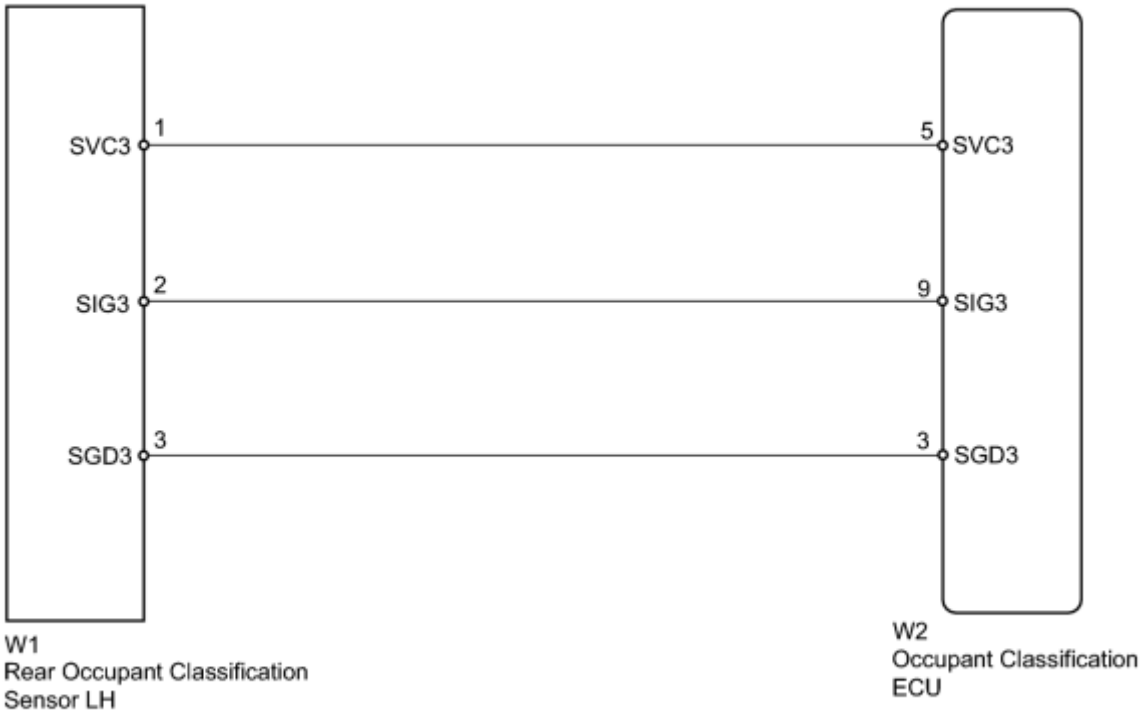
DTC B1782 is stored when a malfunction is detected in the rear occupant classification sensor LH circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1782 | • The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the rear occupant classification sensor LH circuit.<br>• Rear occupant classification sensor LH malfunction | • Front seat wire RH<br>• Front seat cushion spring assembly (Rear occupant classification sensor LH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1782 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see under the seat cushion.
- In the above case, hold the seat so that it does not fall down. Hold the seat only as necessary because holding the seat for a long period of time may cause seat rail deformation.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Check that the connectors are properly connected to the occupant classification ECU and rear occupant classification sensor LH.

OK:

The connectors are properly connected.

HINT:

If the connectors are not connected securely, reconnect the connectors and proceed to the next inspection.

(d) Disconnect the connectors from the occupant classification ECU and rear occupant classification sensor LH.

(e) Check that the terminals of connectors are not damaged.

OK:

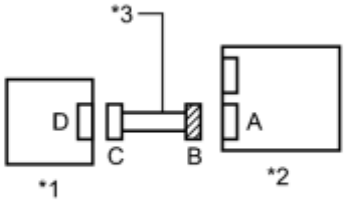
The terminals are not deformed or damaged.

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 2. | CHECK FRONT SEAT WIRE RH (SHORT TO B+) |




(a) Connect the cable to the negative (-) battery terminal.

*4




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-3 (SGD3) - Body ground | Power switch on (IG) | Below 1 V |
| W2-5 (SVC3) - Body ground | Power switch on (IG) | Below 1 V |
| W2-9 (SIG3) - Body ground | Power switch on (IG) | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Rear Occupant Classification Sensor LH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

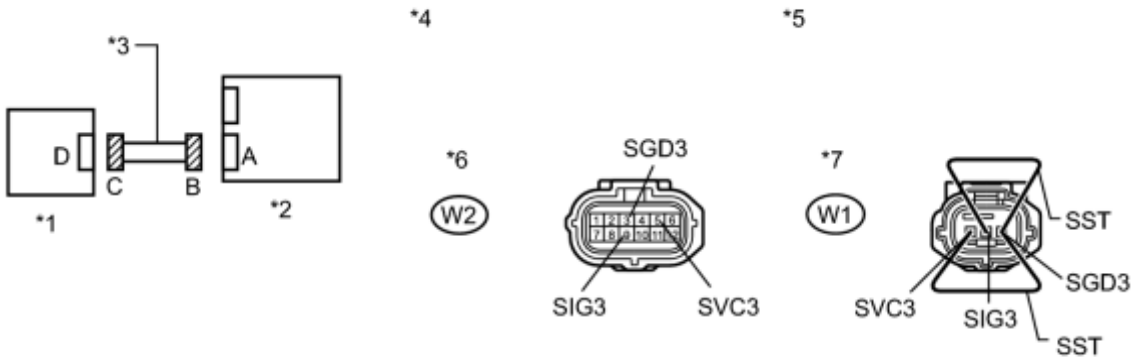
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 3. | CHECK FRONT SEAT WIRE RH (OPEN) |

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

(c) Using SST, connect terminals 1 (SVC3) and 3 (SGD3), and connect terminals 2 (SIG3) and 3 (SGD3) of connector C.

NOTICE:

Do not forcibly insert SST into the terminals of the connector when connecting.

SST: 09843-18040

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-5 (SVC3) - W2-3 (SGD3) | Always | Below 1 Ω |
| W2-9 (SIG3) - W2-3 (SGD3) | Always | Below 1 Ω |

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Rear Occupant Classification Sensor LH | *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH | *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Front view of wire harness connector<br><br>(to Rear Occupant Classification Sensor LH) | *6 | Connector B |
| *7 | Connector C | - | - |

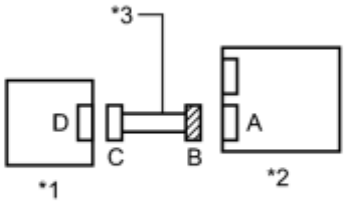
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

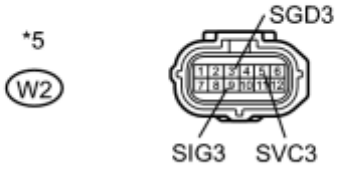
▼

| | |
|---|---|
| 4. | CHECK FRONT SEAT WIRE RH (SHORT) |

(a) Disconnect SST from connector C.




*4




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-5 (SVC3) - W2-3 (SGD3) | Always | 1 MΩ or higher |
| W2-9 (SIG3) - W2-3 (SGD3) | Always | 1 MΩ or higher |
| W2-5 (SVC3) - W2-9 (SIG3) | Always | 1 MΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Rear Occupant Classification Sensor LH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

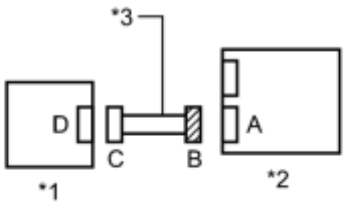
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 5. | CHECK FRONT SEAT WIRE RH (SHORT TO GROUND) |

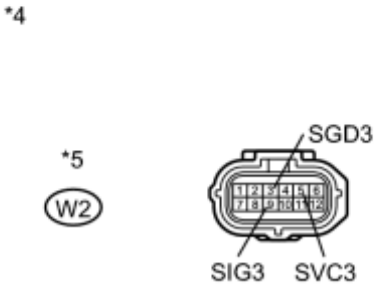
(a) Measure the resistance according to value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-3 (SGD3) - Body ground | Always | 1 MΩ or higher |
| W2-5 (SVC3) - Body ground | Always | 1 MΩ or higher |
| W2-9 (SIG3) - Body ground | Always | 1 MΩ or higher |

## Text in Illustration




| | |
|---|---|
| *1 | Rear Occupant Classification Sensor LH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 6. | CHECK DTC |

(a) Connect the connectors to the occupant classification ECU and rear occupant classification sensor LH.

(b) Connect the cable to the negative (-) battery terminal.

(c) Turn the power switch on (IG).

(d) Clear the DTCs stored in the occupant classification ECU INFO.

(e) Clear the DTCs stored in the center airbag sensor assembly INFO.

(f) Turn the power switch off.

(g) Turn the power switch on (IG).

(h) Check for DTCs INFO.

OK:

DTC B1782 is not output.

HINT:

Codes other than DTC B1782 may be output at this time, but they are not related to this check.

NG ▶ REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 7. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

▼

| | |
|---|---|
| 8. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

▼

| | |
|---|---|
| 9. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT ▶ **END**

| DTC | B1783 | Rear Occupant Classification Sensor RH Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The rear occupant classification sensor RH circuit consists of the occupant classification ECU and rear occupant classification sensor RH.

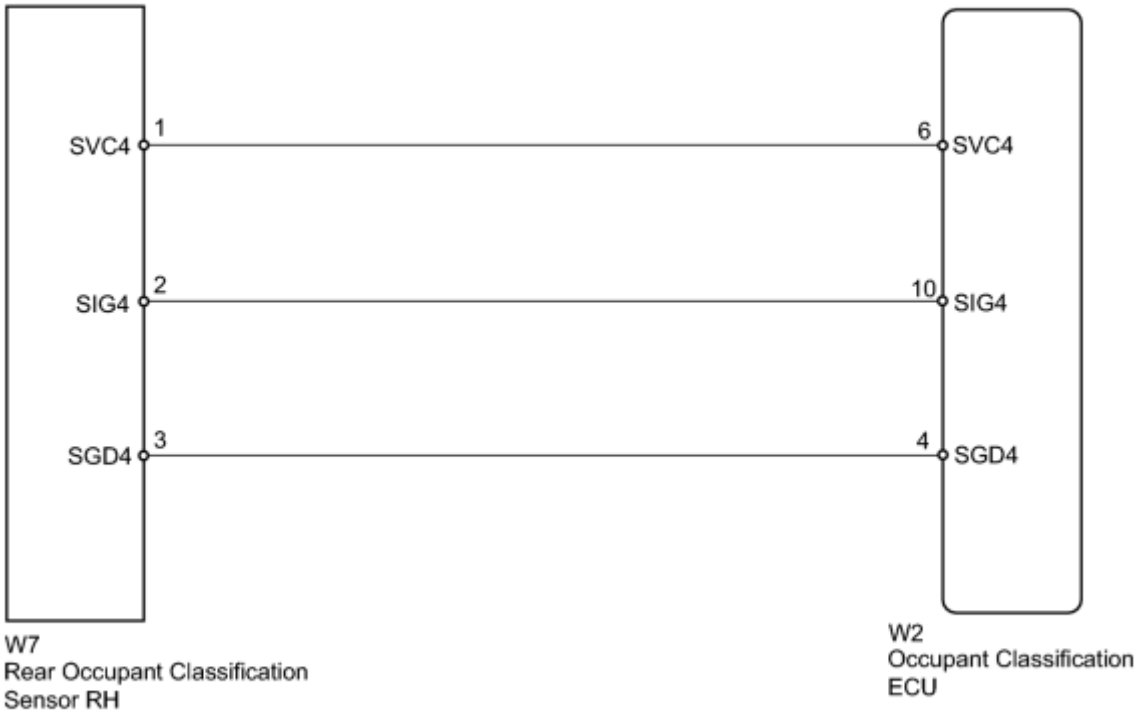
DTC B1783 is stored when a malfunction is detected in the rear occupant classification sensor RH circuit.

| DTC No. | DTC Detecting Condition | Trouble Area |
|---|---|---|
| B1783 | • The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the rear occupant classification sensor RH circuit.<br>• Rear occupant classification sensor RH malfunction | • Front seat wire RH<br>• Front seat cushion spring assembly (Rear occupant classification sensor RH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1783 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see under the seat cushion.
- In the above case, hold the seat so that it does not fall down. Hold the seat only as necessary because holding the seat for a long period of time may cause seat rail deformation.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Check that the connectors are properly connected to the occupant classification ECU and rear occupant classification sensor RH.

OK:

The connectors are properly connected.

HINT:

If the connectors are not connected securely, reconnect the connectors and proceed to the next inspection.

(d) Disconnect the connectors from the occupant classification ECU and rear occupant classification sensor RH.

(e) Check that the terminals of connectors are not damaged.

OK:

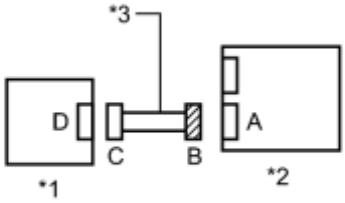
The terminals are not deformed or damaged.

NG ▶ REPLACE FRONT SEAT WIRE RH

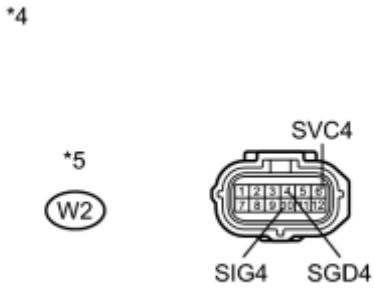
OK

▼

| | |
|---|---|
| 2. | CHECK FRONT SEAT WIRE RH (SHORT TO B+) |




(a) Connect the cable to the negative (-) battery terminal.




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-4 (SGD4) - Body ground | Power switch on (IG) | Below 1 V |
| W2-6 (SVC4) - Body ground | Power switch on (IG) | Below 1 V |
| W2-10 (SIG4) - Body ground | Power switch on (IG) | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Rear Occupant Classification Sensor RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

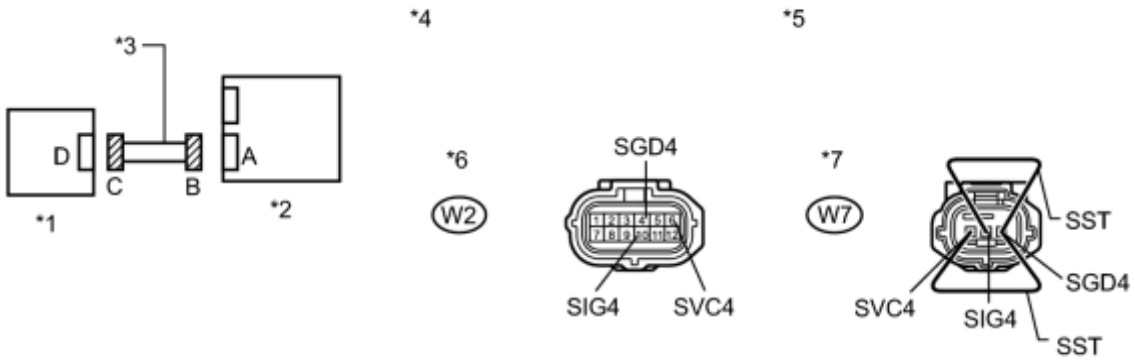
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 3. | CHECK FRONT SEAT WIRE RH (OPEN) |

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

(c) Using SST, connect terminals 1 (SVC4) and 3 (SGD4), and connect terminals 2 (SIG4) and 3 (SGD4) of connector C.

NOTICE:

Do not forcibly insert SST into the terminals of the connector when connecting.

SST: 09843-18040

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-6 (SVC4) - W2-4 (SGD4) | Always | Below 1 Ω |
| W2-10 (SIG4) - W2-4 (SGD4) | Always | Below 1 Ω |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Rear Occupant Classification Sensor RH | *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH | *4 | Front view of wire harness connector<br>(to Occupant Classification ECU) |
| *5 | Front view of wire harness connector<br>(to Rear Occupant Classification Sensor RH) | *6 | Connector B |
| *7 | Connector C | - | - |

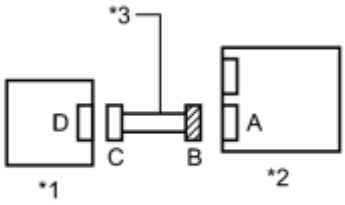
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

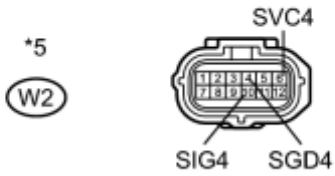
▼

| | |
|---|---|
| 4. | CHECK FRONT SEAT WIRE RH (SHORT) |

(a) Disconnect SST from connector C.




*4




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-6 (SVC4) - W2-4 (SGD4) | Always | 1 MΩ or higher |
| W2-10 (SIG4) - W2-4 (SGD4) | Always | 1 MΩ or higher |
| W2-6 (SVC4) - W2-10 (SIG4) | Always | 1 MΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Rear Occupant Classification Sensor RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

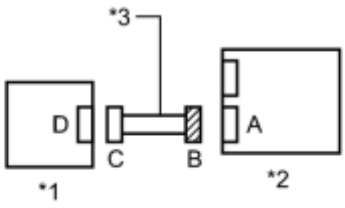
NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

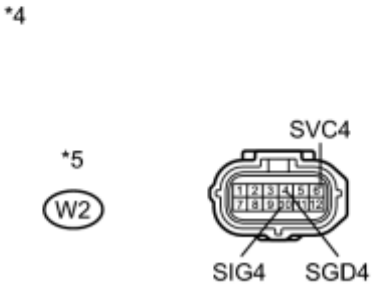
| | |
|---|---|
| 5. | CHECK FRONT SEAT WIRE RH (SHORT TO GROUND) |

(a) Measure the resistance according to the value(s) in the table below.




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-4 (SGD4) - Body ground | Always | 1 MΩ or higher |
| W2-6 (SVC4) - Body ground | Always | 1 MΩ or higher |
| W2-10 (SIG4) - Body ground | Always | 1 MΩ or higher |




## Text in Illustration

| | |
|---|---|
| *1 | Rear Occupant Classification Sensor RH |
| *2 | Occupant Classification ECU |
| *3 | Front Seat Wire RH |
| *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B |

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 6. | CHECK DTC |

(a) Connect the connectors to the occupant classification ECU and rear occupant classification sensor RH.

(b) Connect the cable to the negative (-) battery terminal.

(c) Turn the power switch on (IG).

(d) Clear the DTCs stored in the occupant classification ECU INFO.

(e) Clear the DTCs stored in the center airbag sensor assembly INFO.

(f) Turn the power switch off.

(g) Turn the power switch on (IG).

(h) Check for DTCs INFO.

OK:

DTC B1783 is not output.

HINT:

Codes other than DTC B1783 may be output at this time, but they are not related to this check.

NG REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 7. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

| | |
|---|---|
| 8. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

| | |
|---|---|
| 9. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

| DTC | B1785 | Front Occupant Classification Sensor LH Collision Detection |
|---|---|---|

# DESCRIPTION

DTC B1785 is stored when the occupant classification ECU receives a collision detection signal sent by the front occupant classification sensor LH if an accident occurs.

DTC B1785 is also stored when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.

If the vehicle is not in a collision, but the occupant classification ECU outputs a collision detection signal and sets DTC B1785, the DTC can be cleared by performing Zero Point Calibration and Sensitivity Check.

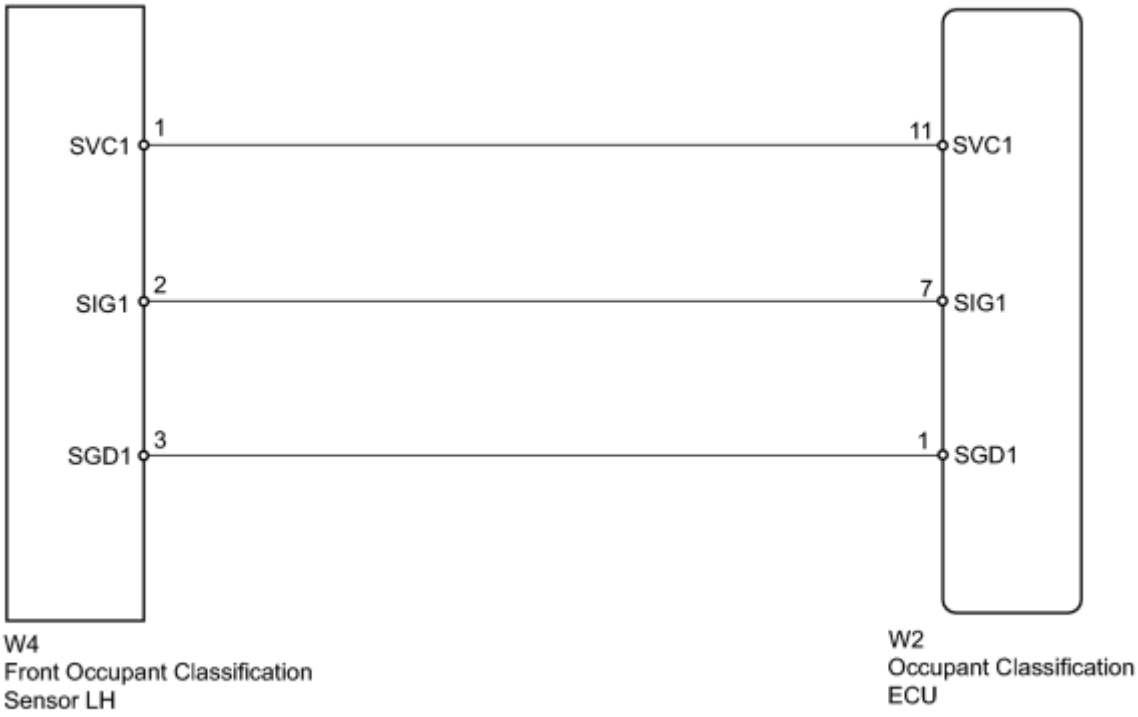
Therefore, if DTC B1785 is output, first perform Zero Point Calibration and Sensitivity Check.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1785 | • Front occupant classification sensor LH sensed large load<br>• Front seat cushion spring assembly malfunction | • Front seat cushion spring assembly (Front occupant classification sensor LH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1785 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NG ▶ REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK

| | |
|---|---|
| 2. | CHECK DTC |

(a) Turn the power switch on (IG).

(b) Clear the DTCs stored in the occupant classification ECU INFO.

(c) Clear the DTCs stored in the center airbag sensor assembly INFO.

(d) Turn the power switch off.

(e) Turn the power switch on (IG).

(f) Check for DTCs INFO.

OK:

DTC B1785 is not output.

HINT:

Codes other than DTC B1785 may be output at this time, but they are not related to this check.

***Result***

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B PERFORM SENSITIVITY CHECK

A

| | |
|---|---|
| 3. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

| | |
|---|---|
| 4. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT



| | |
|---|---|
| 5. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT  **END**

| DTC | B1786 | Front Occupant Classification Sensor RH Collision Detection |
|---|---|---|

# DESCRIPTION

DTC B1786 is stored when the occupant classification ECU receives a collision detection signal sent by the front occupant classification sensor RH if an accident occurs.

DTC B1786 is also stored when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.

If the vehicle is not in a collision, but the occupant classification ECU outputs a collision detection signal and sets DTC B1786, the DTC can be cleared by performing Zero Point Calibration and Sensitivity Check.

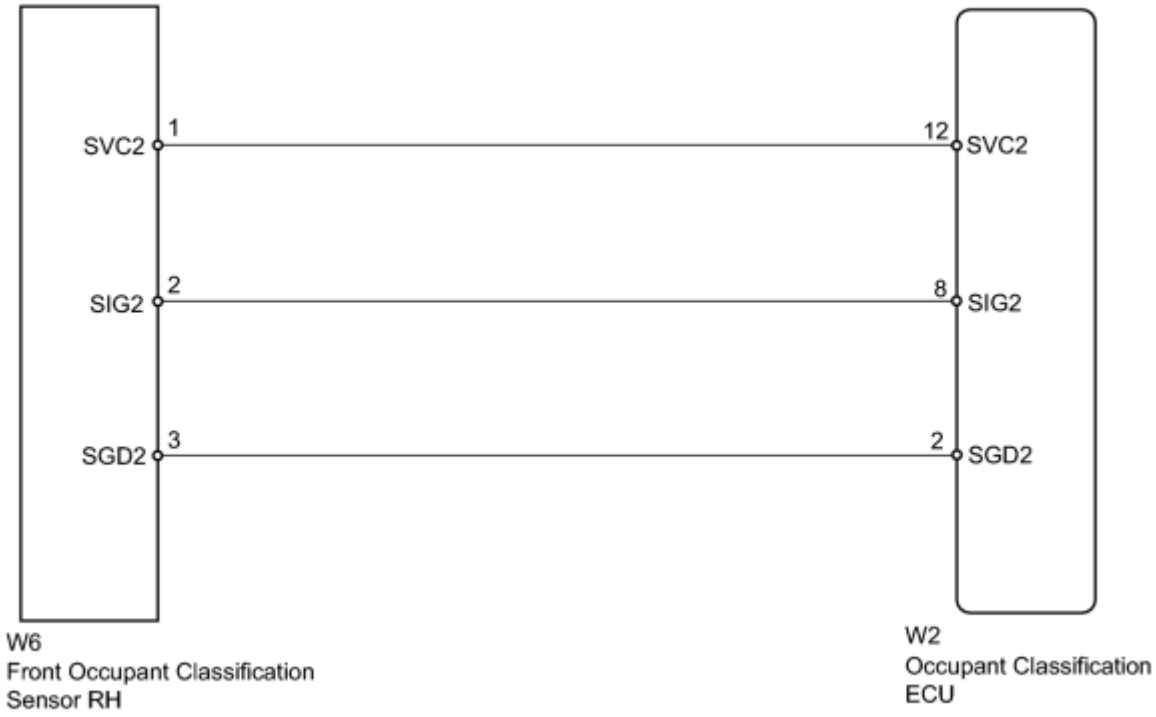
Therefore, if DTC B1786 is output, first perform Zero Point Calibration and Sensitivity Check.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1786 | • Front occupant classification sensor RH sensed large load<br>• Front seat cushion spring assembly malfunction | • Front seat cushion spring assembly (Front occupant classification sensor RH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1786 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NG REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK

| | |
|---|---|
| 2. | CHECK DTC |

(a) Turn the power switch on (IG).

(b) Clear the DTCs stored in the occupant classification ECU INFO.

(c) Clear the DTCs stored in the center airbag sensor assembly INFO.

(d) Turn the power switch off.

(e) Turn the power switch on (IG).

(f) Check for DTCs INFO.

OK:

DTC B1786 is not output.

HINT:

Codes other than DTC B1786 may be output at this time, but they are not related to this check.

***Result***

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B PERFORM SENSITIVITY CHECK

A

| | |
|---|---|
| 3. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

| | |
|---|---|
| 4. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT



| | |
|---|---|
| 5. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT  **END**

| DTC | B1787 | Rear Occupant Classification Sensor LH Collision Detection |
|---|---|---|

# DESCRIPTION

DTC B1787 is stored when the occupant classification ECU receives a collision detection signal sent by the rear occupant classification sensor LH if an accident occurs.

DTC B1787 is also stored when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.

If the vehicle is not in a collision, but the occupant classification ECU outputs a collision detection signal and sets DTC B1787, the DTC can be cleared by performing Zero Point Calibration and Sensitivity Check.

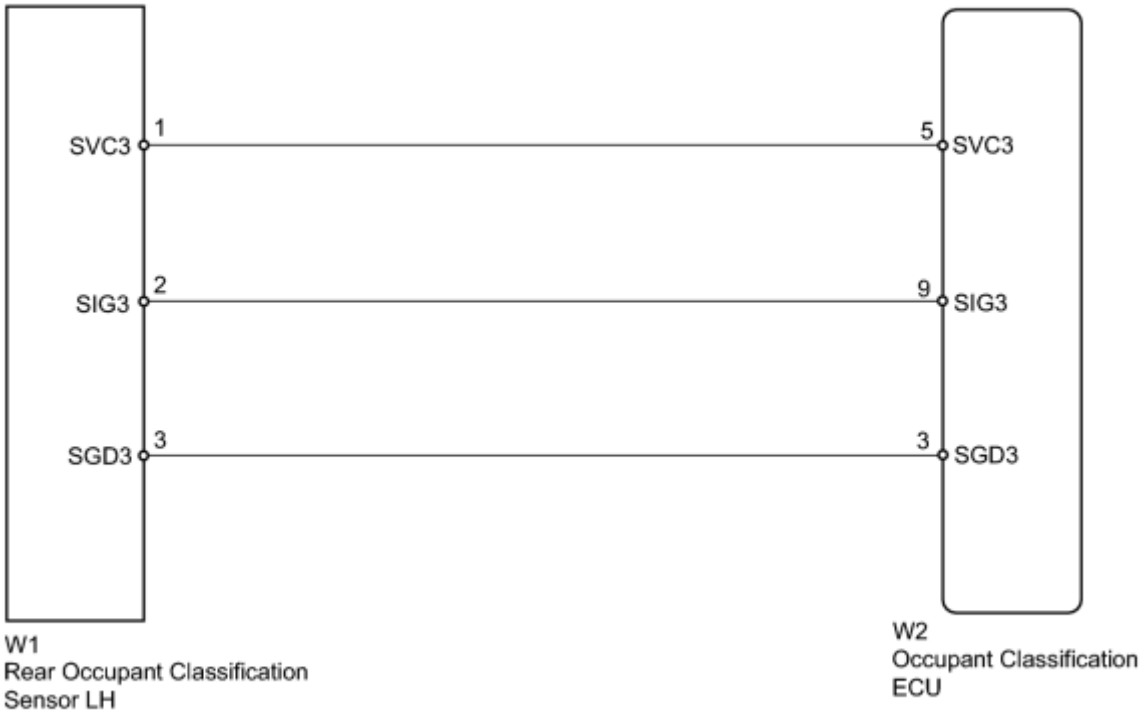
Therefore, if DTC B1787 is output, first perform Zero Point Calibration and Sensitivity Check.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1787 | • Rear occupant classification sensor LH sensed large load<br>• Front seat cushion spring assembly malfunction | • Front seat cushion spring assembly (Rear occupant classification sensor LH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1787 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NG REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK

| | |
|---|---|
| 2. | CHECK DTC |

(a) Turn the power switch on (IG).

(b) Clear the DTCs stored in the occupant classification ECU INFO.

(c) Clear the DTCs stored in the center airbag sensor assembly INFO.

(d) Turn the power switch off.

(e) Turn the power switch on (IG).

(f) Check for DTCs INFO.

OK:

DTC B1787 is not output.

HINT:

Codes other than DTC B1787 may be output at this time, but they are not related to this check.

***Result***

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B PERFORM SENSITIVITY CHECK

A

| | |
|---|---|
| 3. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

| | |
|---|---|
| 4. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT



| | |
|---|---|
| 5. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT  **END**

| DTC | B1788 | Rear Occupant Classification Sensor RH Collision Detection |
|---|---|---|

# DESCRIPTION

DTC B1788 is stored when the occupant classification ECU receives a collision detection signal sent by the rear occupant classification sensor RH if an accident occurs.

DTC B1788 is also stored when the front seat assembly RH is subjected to a strong impact, even if an actual accident does not occur.

If the vehicle is not in a collision, but the occupant classification ECU outputs a collision detection signal and sets DTC B1788, the DTC can be cleared by performing the Zero Point Calibration and Sensitivity Check.

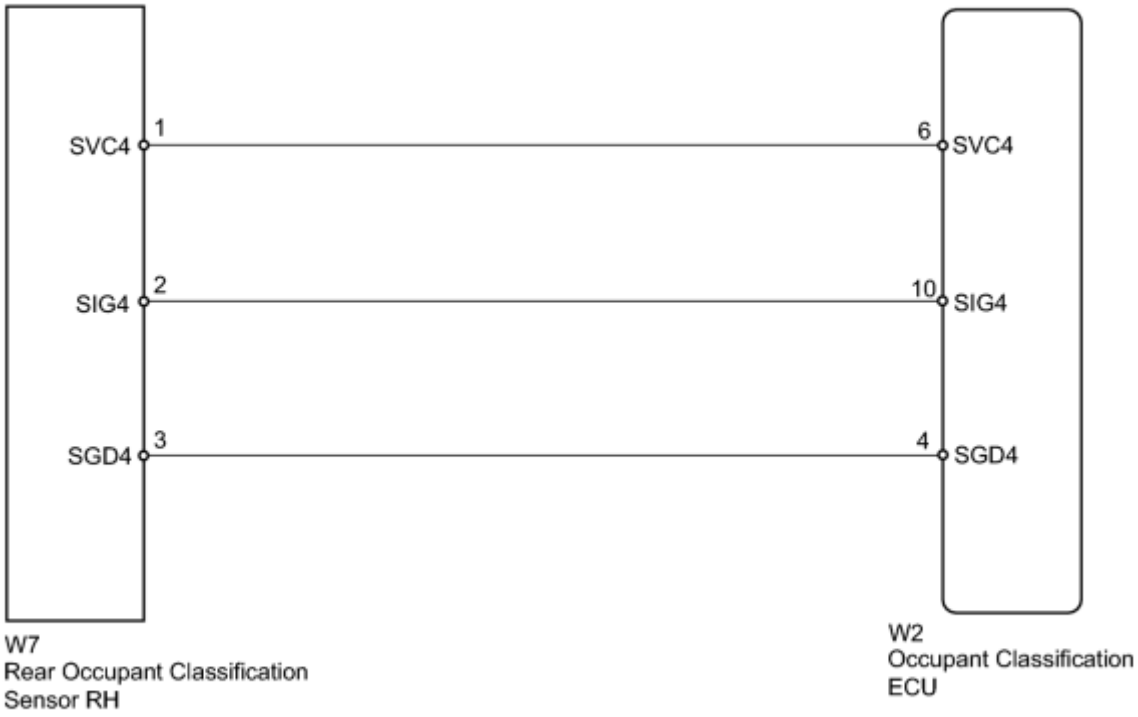
Therefore, if DTC B1788 is output, first perform Zero Point Calibration and Sensitivity Check.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1788 | • Rear occupant classification sensor RH sensed large load<br>• Front seat cushion spring assembly malfunction | • Front seat cushion spring assembly (Rear occupant classification sensor RH) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1788 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NG REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK

| | |
|---|---|
| 2. | CHECK DTC |

(a) Turn the power switch on (IG).

(b) Clear the DTCs stored in the occupant classification ECU INFO.

(c) Clear the DTCs stored in the center airbag sensor assembly INFO.

(d) Turn the power switch off.

(e) Turn the power switch on (IG).

(f) Check for DTCs INFO.

OK:

DTC B1788 is not output.

HINT:

Codes other than DTC B1788 may be output at this time, but they are not related to this check.

***Result***

| Result | Proceed to |
|---|---|
| NG | A |
| OK | B |

B PERFORM SENSITIVITY CHECK

A

| | |
|---|---|
| 3. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

| | |
|---|---|
| 4. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

OK



| | |
|---|---|
| 5. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT  **END**

| DTC | B1790 | Center Airbag Sensor Assembly Communication Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The center airbag sensor assembly communication circuit consists of the occupant classification ECU and center airbag sensor assembly.

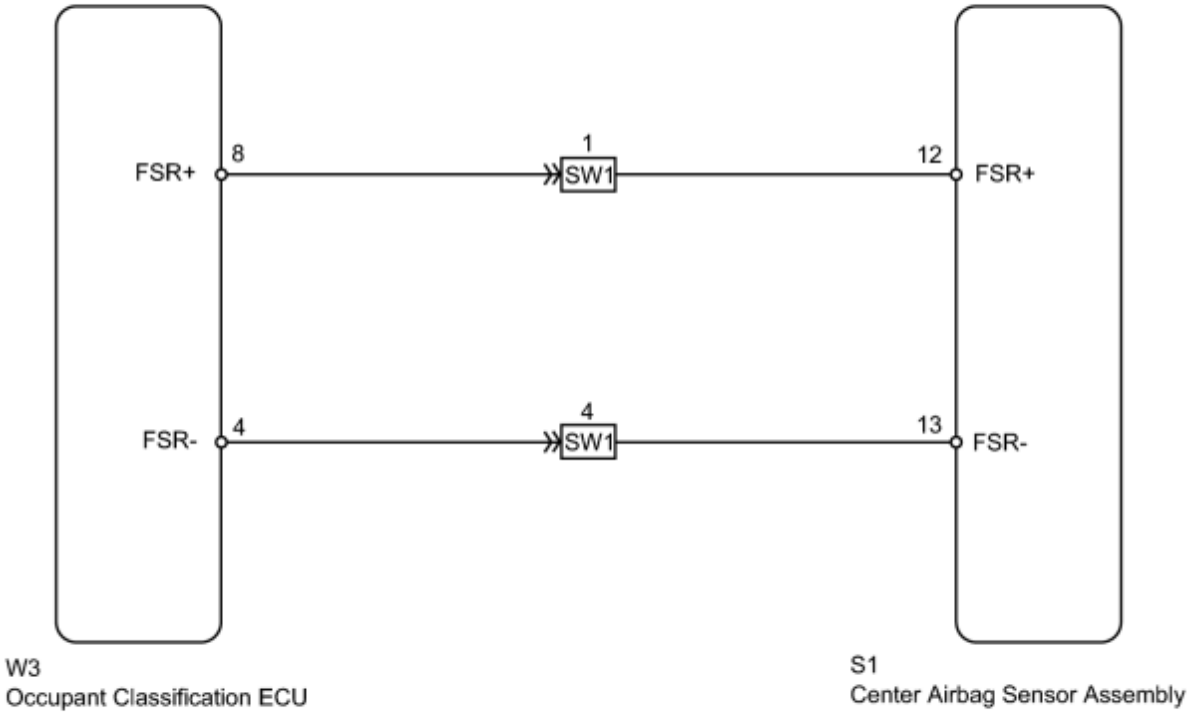
DTC B1790 is stored when a malfunction is detected in the center airbag sensor assembly communication circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1790 | • The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the center airbag sensor assembly communication circuit.<br>• Occupant classification ECU malfunction<br>• Center airbag sensor assembly malfunction | • No. 2 floor wire<br>• Front seat wire RH<br>• Occupant classification ECU<br>• Center airbag sensor assembly |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1790 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see under the seat cushion.
- In the above case, hold the seat so that it does not fall down. Hold the seat only as necessary because holding the seat for a long period of time may cause seat rail deformation.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Check that the connectors are properly connected to the center airbag sensor assembly and occupant classification ECU. Also check that the connectors that link the front seat wire RH and No. 2 floor wire are properly connected.

OK:

The connectors are properly connected.

HINT:

If the connectors are not connected securely, reconnect the connectors and proceed to the next inspection.

(d) Disconnect the connectors from the center airbag sensor assembly and occupant classification ECU. Also disconnect the connectors that link the front seat wire RH and No. 2 floor wire.

(e) Check that the terminals of connectors are not damaged.

OK:

The terminals are not deformed or damaged.

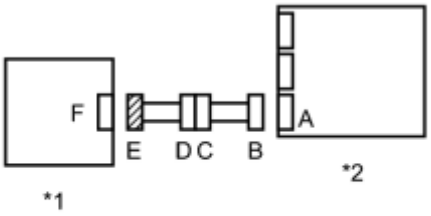
NG ▶ REPLACE WIRE HARNESS

OK

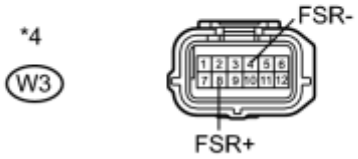
▼

| | |
|---|---|
| 2. | CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT TO B+) |

(a) Connect the cable to the negative (-) battery terminal.




*3




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-8 (FSR+) - Body ground | Power switch on (IG) | Below 1 V |
| W3-4 (FSR-) - Body ground | Power switch on (IG) | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Occupant Classification ECU |
| *2 | Center Airbag Sensor Assembly |
| *3 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *4 | Connector E |

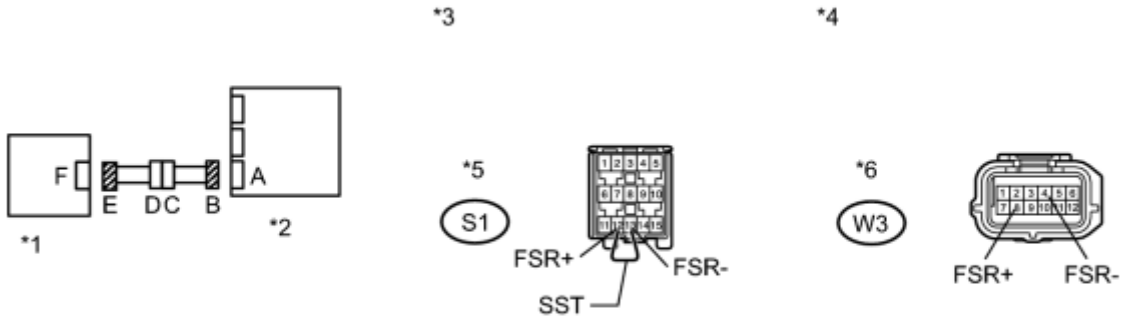
NG ▶ CHECK NO. 2 FLOOR WIRE (SHORT TO B+)

OK

▼

| | |
|---|---|
| 3. | CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (OPEN) |

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Using SST, connect terminals 12 (FSR+) and 13 (FSR-) of connector B.

NOTICE:

Do not forcibly insert SST into the terminals of the connector when connecting.

SST: 09843-18040

(d) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-8 (FSR+) - W3-4 (FSR-) | Always | Below 1 Ω |

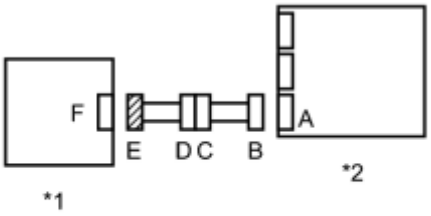
***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Occupant Classification ECU | *2 | Center Airbag Sensor Assembly |
| *3 | Front view of wire harness connector<br><br>(to Center Airbag Sensor Assembly) | *4 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *5 | Connector B | *6 | Connector E |

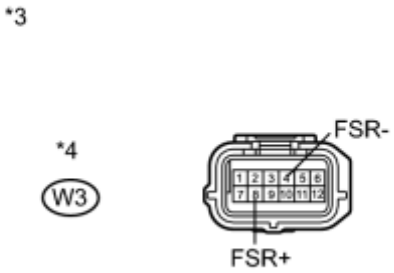
NG CHECK NO. 2 FLOOR WIRE (OPEN)

OK

| | |
|---|---|
| 4. | CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT) |




(a) Disconnect SST from connector B.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-8 (FSR+) - W3-4 (FSR-) | Always | 1 MΩ or higher |

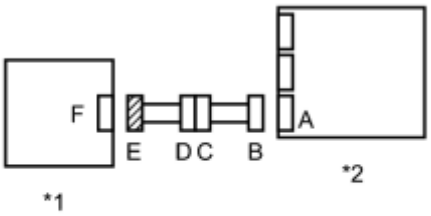
***Text in Illustration***

| | |
|---|---|
| *1 | Occupant Classification ECU |
| *2 | Center Airbag Sensor Assembly |
| *3 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *4 | Connector E |

NG CHECK NO. 2 FLOOR WIRE (SHORT)

OK

| | |
|---|---|
| 5. | CHECK OCCUPANT CLASSIFICATION SYSTEM CIRCUIT (SHORT TO GROUND) |

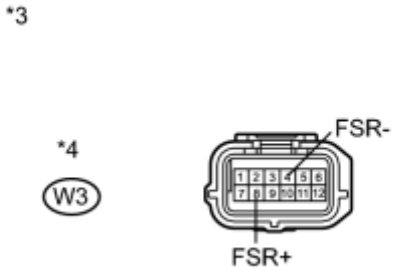



(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-8 (FSR+) - Body ground | Always | 1 MΩ or higher |
| W3-4 (FSR-) - Body ground | Always | 1 MΩ or higher |

## Text in Illustration




| | |
|---|---|
| *1 | Occupant Classification ECU |
| *2 | Center Airbag Sensor Assembly |
| *3 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |
| *4 | Connector E |

NG CHECK NO. 2 FLOOR WIRE (SHORT TO GROUND)

OK

| | |
|---|---|
| 6. | CHECK DTC |

(a) Connect the connectors to the occupant classification ECU and center airbag sensor assembly.

(b) Connect the Techstream to the DLC3.

(c) Connect the cable to the negative (-) battery terminal.

(d) Turn the power switch on (IG).

(e) Clear the DTCs stored in the occupant classification ECU INFO.

(f) Clear the DTCs stored in the center airbag sensor assembly INFO.

(g) Turn the power switch off.

(h) Turn the power switch on (IG).

(i) Using the Techstream, check for DTCs of the occupant classification ECU INFO.

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG REPLACE OCCUPANT CLASSIFICATION ECU

OK **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 7. | REPLACE OCCUPANT CLASSIFICATION ECU |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminals.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Replace the occupant classification ECU INFO.

HINT:

Perform the inspection using parts from a normal vehicle if possible.

NEXT

| | |
|---|---|
| 8. | RECHECK DTC |

(a) Turn the power switch on (IG).

(b) Clear the DTCs stored in the occupant classification ECU INFO.

(c) Clear the DTCs stored in the center airbag sensor assembly INFO.

(d) Turn the power switch off.

(e) Turn the power switch on (IG).

(f) Using the Techstream, check for DTCs of the occupant classification ECU INFO.

OK:

DTC B1790 is not output.

HINT:

Codes other than DTC B1790 may be output at this time, but they are not related to this check.

NG ▶ REPLACE CENTER AIRBAG SENSOR ASSEMBLY

OK

▼

| | |
|---|---|
| 9. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

▼

| | |
|---|---|
| 10. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

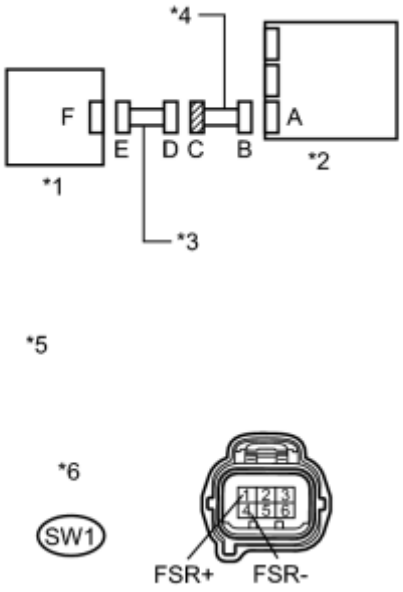
Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT ▶ **END**

| | |
|---|---|
| 11. | CHECK NO. 2 FLOOR WIRE (SHORT TO B+) |

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Disconnect the front seat wire RH connector from the No. 2 floor wire.

(d) Connect the cable to the negative (-) battery terminal.

(e) Turn the power switch on (IG).

(f) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| SW1-1 (FSR+) - Body ground | Power switch on (IG) | Below 1 V |
| SW1-4 (FSR-) - Body ground | Power switch on (IG) | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Occupant Classification ECU |
| *2 | Center Airbag Sensor Assembly |
| *3 | Front Seat Wire RH |
| *4 | No. 2 Floor Wire |
| *5 | Front view of wire harness connector<br><br>(to Front Seat Wire RH) |

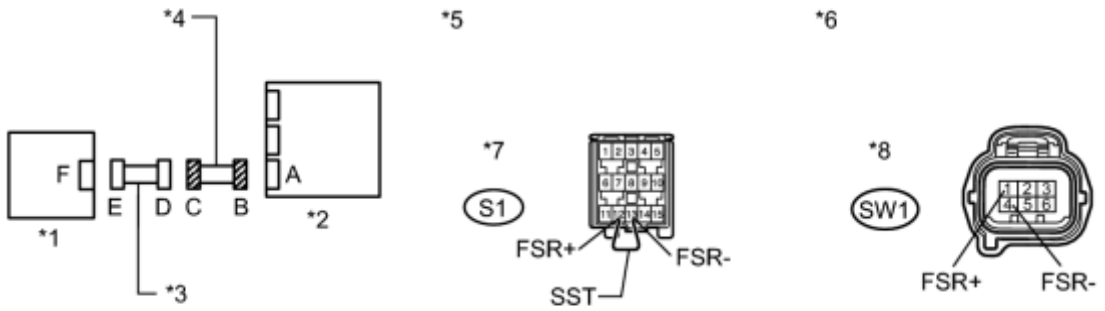
| | |
|---|---|
| *6 | Connector C |

NG REPLACE NO. 2 FLOOR WIRE

OK **REPLACE FRONT SEAT WIRE RH**

| | |
|---|---|
| 12. | CHECK NO. 2 FLOOR WIRE (OPEN) |

(a) Disconnect the front seat wire RH connector from the No. 2 floor wire.




HINT:

SST has already been inserted into connector B.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| SW1-1 (FSR+) - SW1-4 (FSR-) | Always | Below 1 Ω |

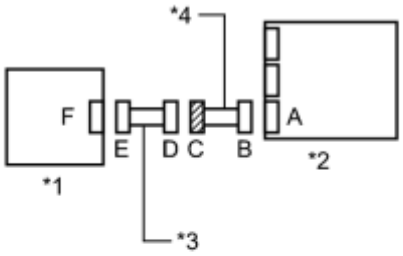
***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Occupant Classification ECU | *2 | Center Airbag Sensor Assembly |
| *3 | Front Seat Wire RH | *4 | No. 2 Floor Wire |
| *5 | Front view of wire harness connector<br><br>(to Center Airbag Sensor Assembly) | *6 | Front view of wire harness connector<br><br>(to Front Seat Wire RH) |
| *7 | Connector B | *8 | Connector C |

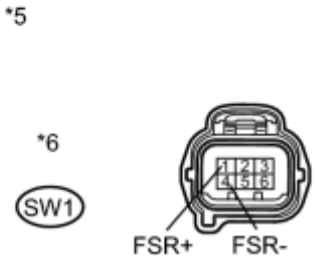
NG REPLACE NO. 2 FLOOR WIRE

OK **REPLACE FRONT SEAT WIRE RH**

| | |
|---|---|
| 13. | CHECK NO. 2 FLOOR WIRE (SHORT) |




(a) Disconnect the front seat wire RH connector from the No. 2 floor wire.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| SW1-1 (FSR+) - SW1-4 (FSR-) | Always | 1 MΩ or higher |

***Text in Illustration***

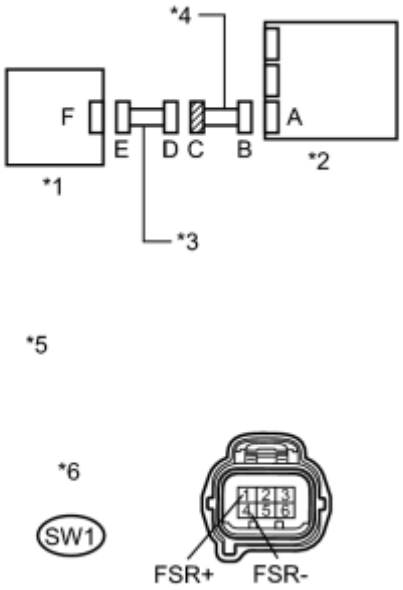
| | |
|---|---|
| *1 | Occupant Classification ECU |
| *2 | Center Airbag Sensor Assembly |
| *3 | Front Seat Wire RH |
| *4 | No. 2 Floor Wire |
| *5 | Front view of wire harness connector<br><br>(to Front Seat Wire RH) |
| *6 | Connector C |

NG ▶ REPLACE NO. 2 FLOOR WIRE

OK ▶ **REPLACE FRONT SEAT WIRE RH**

| | |
|---|---|
| 14. | CHECK NO. 2 FLOOR WIRE (SHORT TO GROUND) |

(a) Disconnect the front seat wire RH connector from the No. 2 floor wire.




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| SW1-1 (FSR+) - Body ground | Always | 1 MΩ or higher |
| SW1-4 (FSR-) - Body ground | Always | 1 MΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Occupant Classification ECU |
| *2 | Center Airbag Sensor Assembly |
| *3 | Front Seat Wire RH |
| *4 | No. 2 Floor Wire |
| *5 | Front view of wire harness connector<br><br>(to Front Seat Wire RH) |
| *6 | Connector C |

NG ▶ REPLACE NO. 2 FLOOR WIRE

OK ▶ **REPLACE FRONT SEAT WIRE RH**

| DTC | B1793 | Occupant Classification Sensor Power Supply Circuit Malfunction |
|---|---|---|

# DESCRIPTION

The occupant classification sensor power supply circuit consists of the occupant classification ECU and occupant classification sensors.

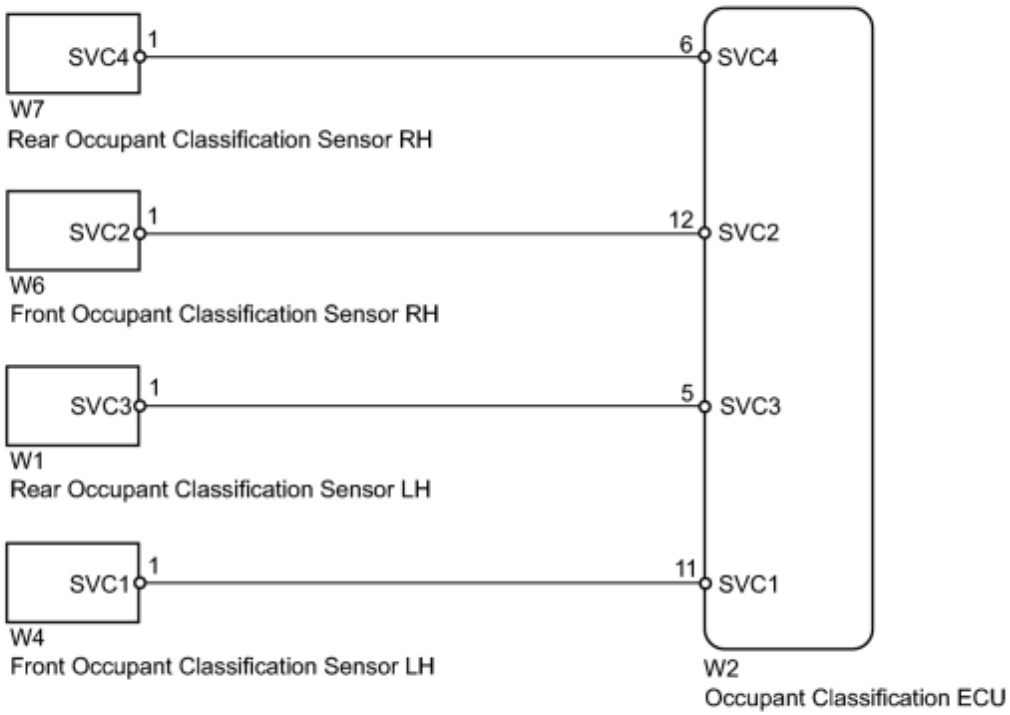
DTC B1793 is stored when a malfunction is detected in the occupant classification sensor power supply circuit.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1793 | • The occupant classification ECU receives a line short circuit signal, an open circuit signal, a short circuit to ground signal or a short circuit to B+ signal in the occupant classification sensor power supply circuit.<br>• Occupant classification sensors malfunction | • Front seat wire RH<br>• Front seat cushion spring assembly (Occupant classification sensors) |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1793 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

HINT:

- If troubleshooting (wire harness inspection) is difficult to perform, remove the front passenger seat installation bolts to see under the seat cushion.
- In the above case, hold the seat so that it does not fall down. Hold the seat only as necessary because holding the seat for a long period of time may cause seat rail deformation.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Check that the connectors are properly connected to the 4 occupant classification sensors and occupant classification ECU.

OK:

The connectors are properly connected.

HINT:

If the connectors are not connected securely, reconnect the connectors and proceed to the next inspection.

(d) Disconnect the connectors from the 4 occupant classification sensors and occupant classification ECU.

(e) Check that the terminals of connectors are not damaged.

OK:

The terminals are not deformed or damaged.

NG ▶ REPLACE FRONT SEAT WIRE RH

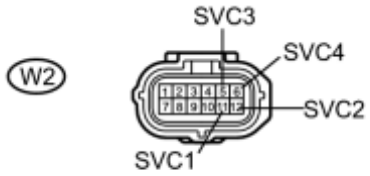
OK

▼

| | |
|---|---|
| 2. | CHECK FRONT SEAT WIRE RH (SHORT TO B+) |

*1

(a) Connect the cable to the negative (-) battery terminal.




(b) Turn the power switch on (IG).

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-5 (SVC3) - Body ground | Power switch on (IG) | Below 1 V |
| W2-6 (SVC4) - Body ground | Power switch on (IG) | Below 1 V |
| W2-11 (SVC1) - Body ground | Power switch on (IG) | Below 1 V |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-12 (SVC2) - Body ground | Power switch on (IG) | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |

NG ▶ REPLACE FRONT SEAT WIRE RH

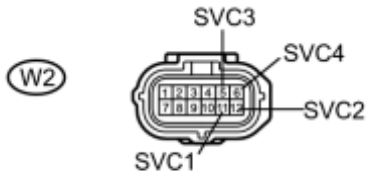
OK

▼

| | |
|---|---|
| 3. | CHECK FRONT SEAT WIRE RH (SHORT TO GROUND) |

*1

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-5 (SVC3) - Body ground | Always | 1 MΩ or higher |
| W2-6 (SVC4) - Body ground | Always | 1 MΩ or higher |
| W2-11 (SVC1) - Body ground | Always | 1 MΩ or higher |
| W2-12 (SVC2) - Body ground | Always | 1 MΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |

NG ▶ REPLACE FRONT SEAT WIRE RH

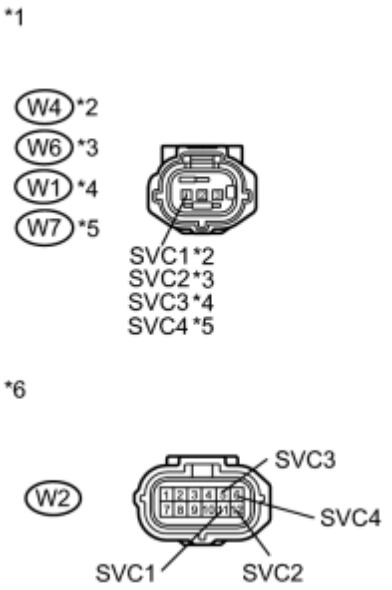
OK

| | |
|---|---|
| 4. | CHECK FRONT SEAT WIRE RH (OPEN) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-5 (SVC3) - W1-1 (SVC3) | Always | Below 1 Ω |
| W2-6 (SVC4) - W7-1 (SVC4) | Always | Below 1 Ω |
| W2-11 (SVC1) - W4-1 (SVC1) | Always | Below 1 Ω |
| W2-12 (SVC2) - W6-1 (SVC2) | Always | Below 1 Ω |




## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Occupant Classification Sensor) |
| *2 | Front LH |
| *3 | Front RH |
| *4 | Rear LH |
| *5 | Rear RH |
| *6 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |

NG REPLACE FRONT SEAT WIRE RH

OK

| | |
|---|---|
| 5. | CHECK FRONT SEAT WIRE RH (SHORT) |

(a) Measure the resistance according to the value(s) in the table below.

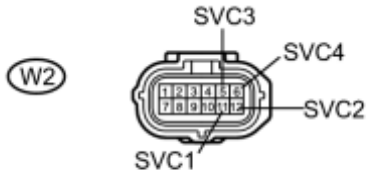
Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W2-5 (SVC3) - W2-6 (SVC4) | Always | 1 MΩ or higher |
| W2-5 (SVC3) - W2-11 (SVC1) | Always | 1 MΩ or higher |
| W2-5 (SVC3) - W2-12 (SVC2) | Always | 1 MΩ or higher |
| W2-6 (SVC4) - W2-11 (SVC1) | Always | 1 MΩ or higher |

*1

| | | |
|---|---|---|
| W2-6 (SVC4) - W2-12 (SVC2) | Always | 1 MΩ or higher |
| W2-11 (SVC1) - W2-12 (SVC2) | Always | 1 MΩ or higher |

## Text in Illustration




| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |

NG ▶ REPLACE FRONT SEAT WIRE RH

OK

▼

| | |
|---|---|
| 6. | CHECK DTC |

(a) Connect the connectors to the occupant classification ECU and 4 occupant classification sensors.

(b) Connect the cable to the negative (-) battery terminal.

(c) Turn the power switch on (IG).

(d) Clear the DTCs stored in the occupant classification ECU INFO.

(e) Clear the DTCs stored in the center airbag sensor assembly INFO.

(f) Turn the power switch off.

(g) Turn the power switch on (IG).

(h) Check for DTCs INFO.

OK:

DTC B1793 is not output.

HINT:

Codes other than DTC B1793 may be output at this time, but they are not related to this check.

NG ▶ REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY

OK ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 7. | REPLACE FRONT SEAT CUSHION SPRING ASSEMBLY |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the front seat cushion spring assembly INFO.

NEXT

| | |
|---|---|
| 8. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

| | |
|---|---|
| 9. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

| DTC | B1794 | Open in Occupant Classification ECU Battery Positive Line |
|---|---|---|

# DESCRIPTION

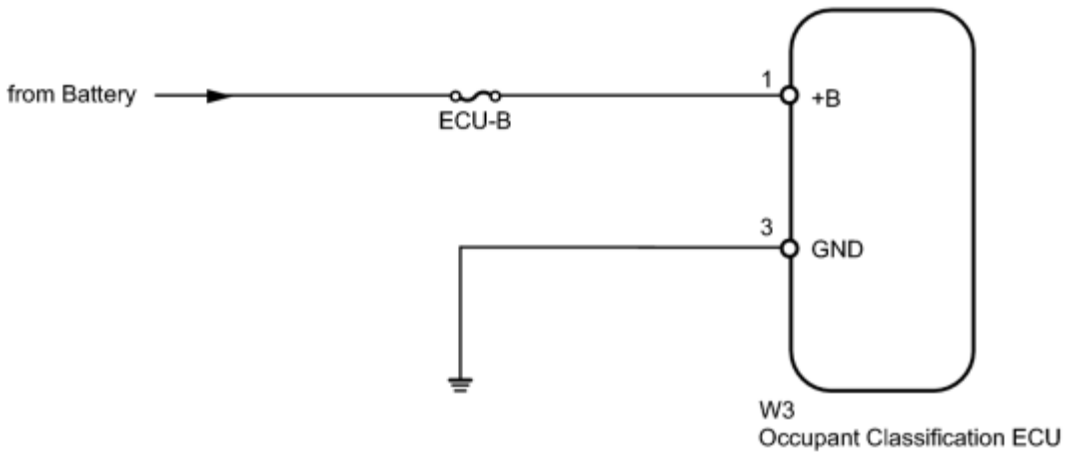
DTC B1794 is stored when a malfunction is detected in the occupant classification ECU battery positive line.

| DTC No. | DTC Detections Conditions | Trouble Areas |
|---|---|---|
| B1794 | • The occupant classification ECU receives an open circuit signal in the occupant classification ECU battery positive line.<br>• Occupant classification ECU malfunction | • Auxiliary battery<br>• ECU-B fuse<br>• Wire harness<br>• Occupant classification ECU |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1794 is output, perform troubleshooting for the DTC.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK AUXILIARY BATTERY VOLTAGE |

(a) Measure the voltage of the auxiliary battery.

Standard Voltage:

11 to 14 V

NG ▶ INSPECT AUXILIARY BATTERY

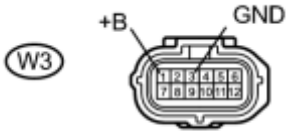
OK

▼

| | |
|---|---|
| 2. | CHECK WIRE HARNESS (SOURCE VOLTAGE) |

*1

(a) Turn the power switch off.




(b) Disconnect the cable from the negative (-) battery terminal.

(c) Disconnect the connector from the occupant classification ECU.

(d) Connect the cable to the negative (-) battery terminal.

(e) Turn the power switch on (IG).

(f) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-1 (+B) - Body ground | Always | 11 to 14 V |

(g) Turn the power switch off.

(h) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| W3-3 (GND) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Occupant Classification ECU) |

NG ▶ REPLACE WIRE HARNESS

OK

▼

| | |
|---|---|
| 3. | CHECK DTC |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Connect the connector to the occupant classification ECU.

(d) Connect the Techstream to the DLC3.

(e) Connect the cable to the negative (-) battery terminal.

(f) Turn the power switch on (IG).

(g) Clear the DTCs stored in the occupant classification ECU INFO.

(h) Clear the DTCs stored in the center airbag sensor assembly INFO.

(i) Turn the power switch off.

(j) Turn the power switch on (IG), and wait for at least 10 seconds.

(k) Using the Techstream, check for DTCs of the occupant classification ECU INFO.

OK:

DTC B1794 is not output.

HINT:

Codes other than DTC B1794 may be output at this time, but they are not related to this check.

NG REPLACE OCCUPANT CLASSIFICATION ECU

OK **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 4. | REPLACE OCCUPANT CLASSIFICATION ECU |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the occupant classification ECU INFO.

NEXT

| | |
|---|---|
| 5. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

| | |
|---|---|
| 6. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

| DTC | B1795 | Occupant Classification ECU Malfunction |
|---|---|---|

# DESCRIPTION

DTC B1795 is stored when a malfunction is detected in the occupant classification ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1795 | Occupant classification ECU malfunction | Occupant classification ECU |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1795 is output, perform troubleshooting for the DTC.

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | REPLACE OCCUPANT CLASSIFICATION ECU |
|---|---|

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the occupant classification ECU INFO.

NEXT



| 2. | PERFORM ZERO POINT CALIBRATION |
|---|---|

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

| | |
|---|---|
| 3. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

| DTC | B1796 | Sleep Operation Failure of Occupant Classification ECU |
|---|---|---|

# DESCRIPTION

In sleep mode, the occupant classification ECU reads the condition of each sensor while the power switch is off.

In this mode, if occupant classification ECU detects an internal malfunction, DTC B1796 is stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B1796 | • Occupant classification ECU malfunction | • Occupant classification ECU |

HINT:

When DTC B1650/32 is detected as a result of troubleshooting for the airbag system, check the DTCs stored in the occupant classification ECU. When DTC B1796 is output, perform troubleshooting for the DTC.

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | REPLACE OCCUPANT CLASSIFICATION ECU |
|---|---|

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Replace the occupant classification ECU INFO.

NEXT



| 2. | PERFORM ZERO POINT CALIBRATION |
|---|---|

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

| | |
|---|---|
| 3. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

| Trouble in Passenger Airbag ON/OFF Indicator |
|---|

# DESCRIPTION

The occupant classification system detects the front passenger seat condition. It then informs the front passenger airbag and front seat belt pretensioner RH condition (activated/not activated) with the passenger airbag ON/OFF indicator.

HINT:

Approximately 6 seconds after the power switch is turned on (IG), the passenger airbag ON/OFF indicator will indicate ON/OFF depending on the conditions listed below.

| Front Passenger Seat Condition | Passenger Airbag ON/OFF Indicator | | SRS Warning Light |
|---|---|---|---|
| | ON Indicator | OFF Indicator | |
| Vacant | OFF | OFF | OFF |
| Adult is seated. | ON | OFF | OFF |
| Child is seated. | OFF | ON | OFF |
| Child restraint system is set. | OFF | ON | OFF |
| Occupant classification system failure | OFF | ON | ON |

# INSPECTION PROCEDURE

# PROCEDURE

| 1. | CHECK SRS WARNING LIGHT |
|---|---|

(a) Turn the power switch on (IG), and check the SRS warning light condition.

HINT:

If this trouble occurs, the SRS warning light is off. If the light is on, a DTC is output. Troubleshoot for the output DTC.

OK:

After the primary check period, the SRS warning light goes off.

HINT:

The primary check is performed for approximately 6 seconds after the power switch is turned on (IG).

NG ▶ GO TO DTC CHART

OK

| | |
|---|---|
| 2. | PERFORM ZERO POINT CALIBRATION |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NG RETIGHTEN FRONT SEAT ASSEMBLY RH BOLT

OK

| | |
|---|---|
| 3. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NG RETIGHTEN FRONT SEAT ASSEMBLY RH BOLT

OK **END**

| | |
|---|---|
| 4. | RETIGHTEN FRONT SEAT ASSEMBLY RH BOLT |

(a) Turn the power switch off.

(b) Loosen the 4 installation bolts of the front seat assembly RH.

(c) Tighten the 4 installation bolts of the front seat assembly RH to the specified torque.

Torque: **37 N·m (374 kgf·cm, 27ft·lbf)**

NEXT

| | |
|---|---|
| 5. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NG READ VALUE USING PASSENGER SIDE BUCKLE SWITCH

OK

▼

| | |
|---|---|
| 6. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NG READ VALUE USING PASSENGER SIDE BUCKLE SWITCH

OK **END**

| | |
|---|---|
| 7. | READ VALUE USING PASSENGER SIDE BUCKLE SWITCH |

(a) Turn the power switch on (IG).

(b) Using the Techstream, read Data List INFO.

(1) Read the display when the passenger side buckle switch is operated.

***Occupant Detection***

| Tester Display | Measurement Item / Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Passenger Buckle SW | Passenger side buckle switch/<br>Set: The seat belt is fastened<br>Unset: The seat belt is not fastened<br>NG: Data is not determined | Unset/Set | - |

OK:

The Techstream display changes correctly in accordance with the operation of the buckle switch.

NG CHECK CONNECTORS

OK

| 8. | CHECK CONNECTORS |
|---|---|

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Disconnect the connectors from the occupant classification ECU and 4 occupant classification sensors.

(d) Check that the terminals of connectors are not damaged.

OK:

The terminals are not deformed or damaged.

NG REPLACE FRONT SEAT WIRE RH

OK

| 9. | REPLACE OCCUPANT CLASSIFICATION ECU |
|---|---|

(a) Connect the connectors to the 4 occupant classification sensors.

(b) Replace the occupant classification ECU INFO.

NEXT

| 10. | PERFORM ZERO POINT CALIBRATION |
|---|---|

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT

| | |
|---|---|
| 11. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

| | |
|---|---|
| 12. | CHECK CONNECTORS |

(a) Turn the power switch off.

(b) Disconnect the cable from the negative (-) battery terminal.

(c) Disconnect the connectors from the occupant classification ECU and front seat inner belt assembly RH.

(d) Check that the terminals of connectors are not damaged.

OK:

The terminals are not deformed or damaged.

NG REPLACE FRONT SEAT WIRE RH

OK

| | |
|---|---|
| 13. | REPLACE FRONT SEAT INNER BELT ASSEMBLY RH |

(a) Connect the connector to the occupant classification ECU.

(b) Replace the front seat inner belt assembly RH INFO.

NEXT

| | |
|---|---|
| 14. | PERFORM ZERO POINT CALIBRATION |

(a) Connect the cable to the negative (-) battery terminal.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Using the Techstream, perform Zero Point Calibration INFO.

OK:

"Zero Point Calibration is complete." is displayed.

NEXT



| | |
|---|---|
| 15. | PERFORM SENSITIVITY CHECK |

(a) Using the Techstream, perform Sensitivity Check INFO.

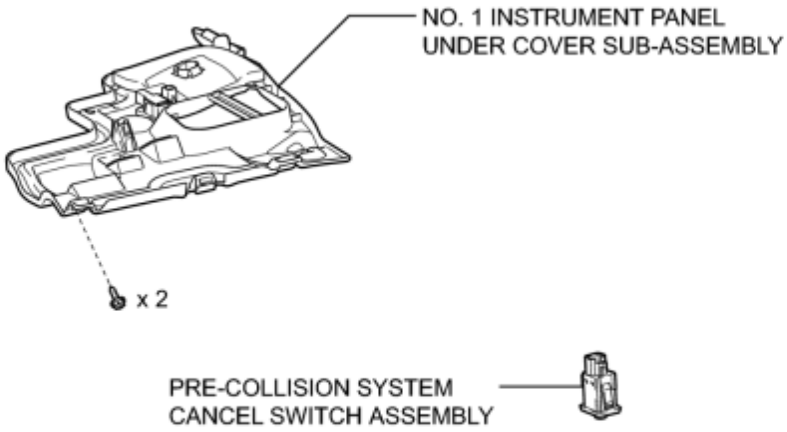
Standard:

27 to 33 kg (59.5 to 72.8 lb)

NEXT **END**

# COMPONENTS

# ILLUSTRATION

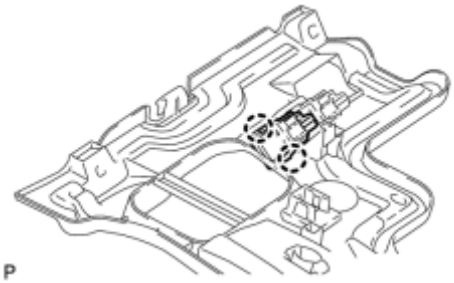



P

# REMOVAL

1. REMOVE NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

2. REMOVE PRE-COLLISION SYSTEM CANCEL SWITCH ASSEMBLY




(a) Disengage the 2 claws and remove the pre-collision system cancel switch assembly.

# INSPECTION

1. INSPECT PRE-COLLISION BRAKE CANCEL SWITCH ASSEMBLY




*1




(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

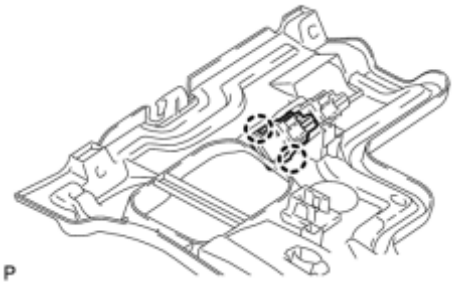
| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Pressed | Below 1 Ω |
| | Not pressed | 10 kΩ or higher |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Pre-collision Brake Cancel Switch Assembly) |

# INSTALLATION

1. INSTALL PRE-COLLISION SYSTEM CANCEL SWITCH ASSEMBLY

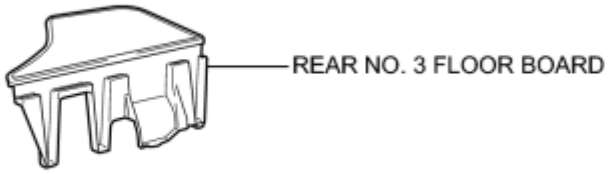


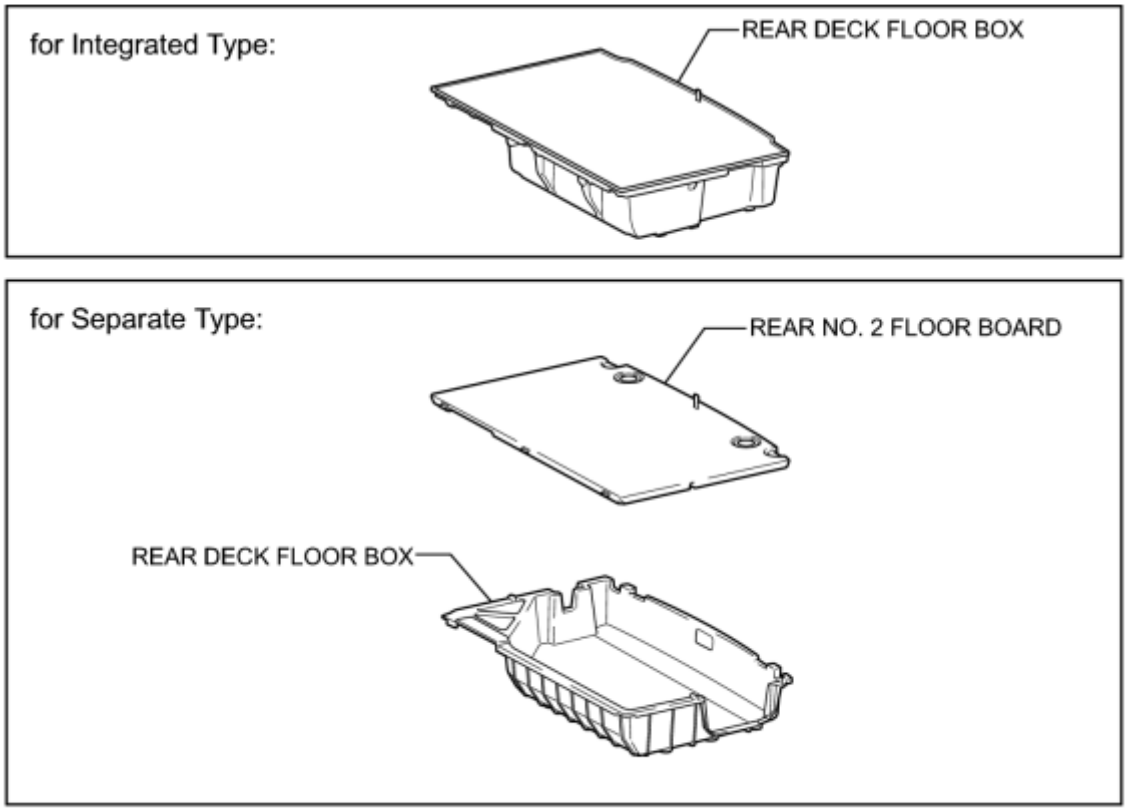

(a) Engage the 2 claws to install the pre-collision system cancel switch assembly.

2. INSTALL NO. 1 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION

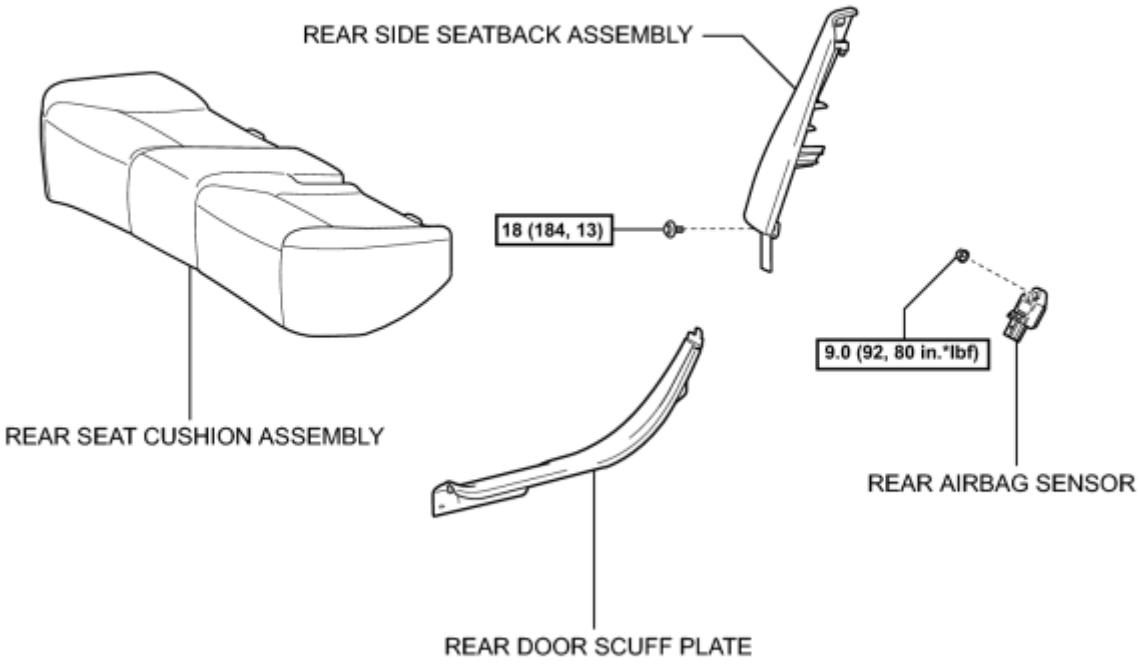



P

# ILLUSTRATION

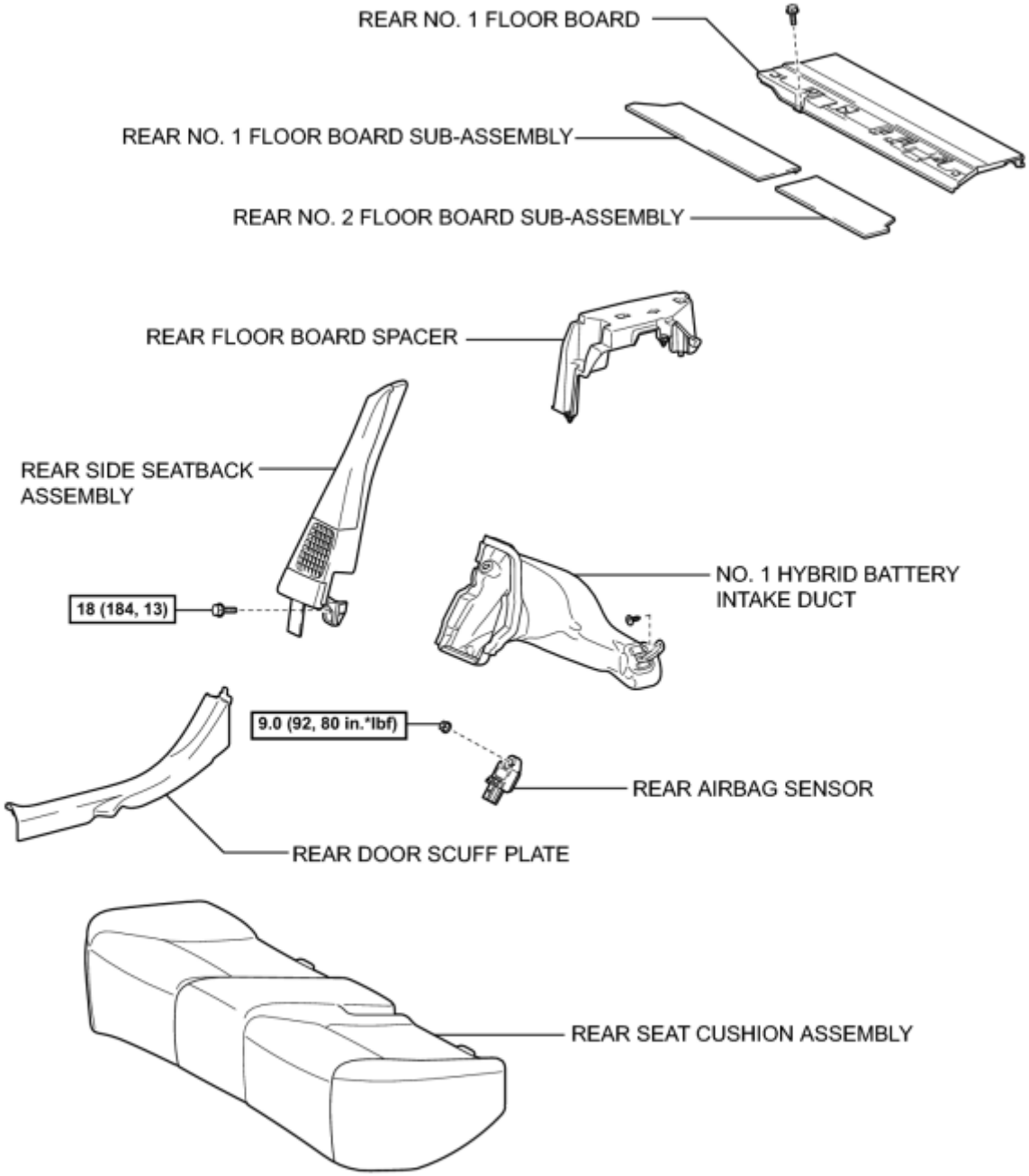
for LH Side:




N*m (kgf*cm, ft.*lbf) : Specified torque

# ILLUSTRATION

for RH Side:




N*m (kgf*cm, ft.*lbf) : Specified torque

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the rear airbag sensors.

1. INSPECT REAR AIRBAG SENSOR (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

2. INSPECT REAR AIRBAG SENSOR (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check the rear airbag sensors for defects if a quarter panel of the vehicle or the area around a quarter panel is damaged.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found, replace the rear airbag sensor with a new one.

3. INSPECT REAR AIRBAG SENSOR (for Vehicle Involved in Collision and Airbag is Deployed)

(a) When airbags have deployed as the result of a collision, be sure to replace all rear airbag sensors in the damaged areas (anywhere in need of repair).

(b) Visually check the rear airbag sensors in undamaged areas for defects.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found or a rear airbag sensor has detected a major collision, replace the rear airbag sensor with a new one.

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

7. REMOVE REAR DOOR SCUFF PLATE INFO

8. REMOVE REAR SIDE SEATBACK ASSEMBLY

for LH Side: INFO

for RH Side: INFO

9. REMOVE REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY (for RH Side) INFO

10. REMOVE REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY (for RH Side) INFO

11. REMOVE REAR NO. 1 FLOOR BOARD (for RH Side) INFO

12. REMOVE REAR FLOOR BOARD SPACER (for RH Side) INFO

13. REMOVE NO. 1 HYBRID BATTERY INTAKE DUCT (for RH Side) INFO

14. REMOVE REAR AIRBAG SENSOR

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Disconnect the connector.

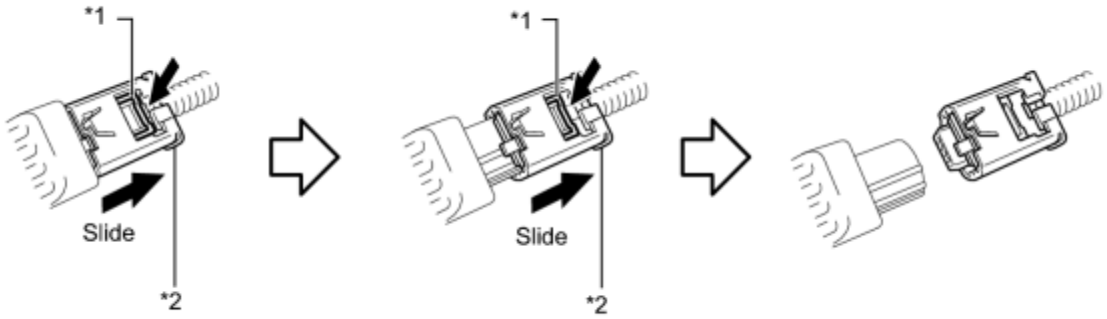


c

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(1) Push and hold the white housing lock, and slide the yellow outer connector locking sleeve.

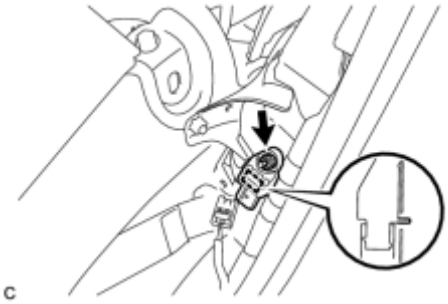



c

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Housing Lock | *2 | Outer Connector Locking Sleeve |

(2) Push and hold the white housing lock again, and slide the yellow outer connector locking sleeve to disconnect the connector.




(d) Remove the nut and rear airbag sensor.

NOTICE:

Loosen the nut while holding the rear airbag sensor because the rear airbag sensor pin (stopper) is easily damaged.

# INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

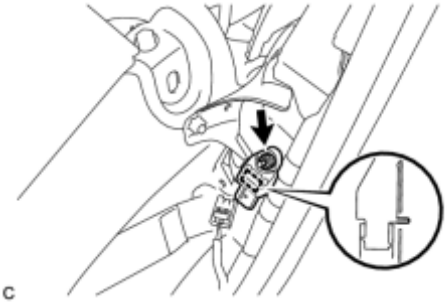
1. INSTALL REAR AIRBAG SENSOR

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.




(c) Insert the pin (stopper) into the body hole to install the rear airbag sensor to the vehicle with the nut.

Torque: **9.0 N·m (92 kgf·cm, 80in·lbf)**

- If the rear airbag sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace it with a new one.
- When installing the rear airbag sensor, be careful that the SRS wiring does not interfere with or is not pinched between other parts.
- Make sure that the pin (stopper) is securely inserted into the body hole.
- Tighten the nut while holding the rear airbag sensor because the rear airbag sensor pin (stopper) is easily damaged.

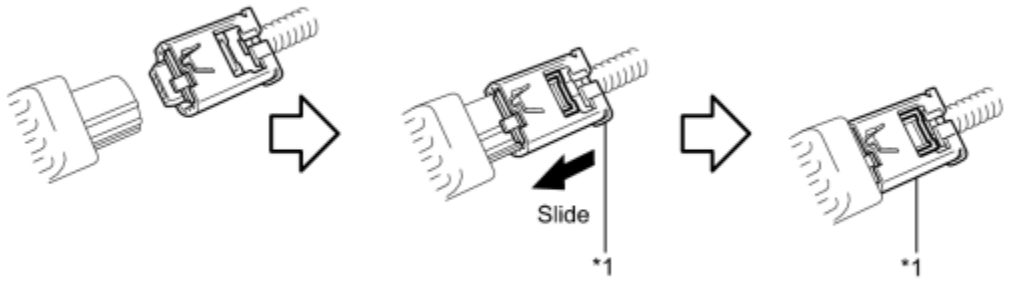
(d) Connect the connector to the rear airbag sensor.




NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

(1) Connect the connector as shown in the illustration (when locking, make sure that the outer connector locking sleeve returns to its original position and a click sound can be heard).




c

### *Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Outer Connector Locking Sleeve | - | - |

HINT:

When connected, the outer connector locking sleeve will slide. Be sure not to hold the outer connector locking sleeve while connecting, as it may result in an insecure fit.

(e) Check that there is no looseness in the installation parts of the rear airbag sensor.

2. INSTALL NO. 1 HYBRID BATTERY INTAKE DUCT (for RH Side) INFO

3. INSTALL REAR FLOOR BOARD SPACER (for RH Side) INFO

4. INSTALL REAR NO. 1 FLOOR BOARD (for RH Side) INFO

5. INSTALL REAR NO. 2 FLOOR BOARD SUB-ASSEMBLY (for RH Side) INFO

6. INSTALL REAR NO. 1 FLOOR BOARD SUB-ASSEMBLY (for RH Side) INFO

7. INSTALL REAR SIDE SEATBACK ASSEMBLY

for LH Side: INFO

for RH Side: INFO

8. INSTALL REAR DOOR SCUFF PLATE INFO

9. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

11. INSTALL REAR NO. 3 FLOOR BOARD INFO

12. INSTALL REAR DECK FLOOR BOX INFO

13. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

14. PERFORM DIAGNOSTIC SYSTEM CHECK

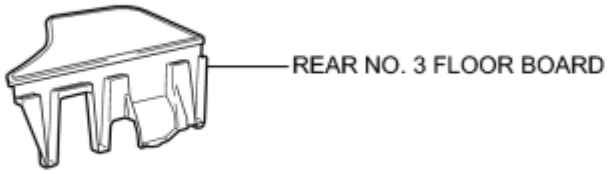
(a) Perform a diagnostic system check INFO.

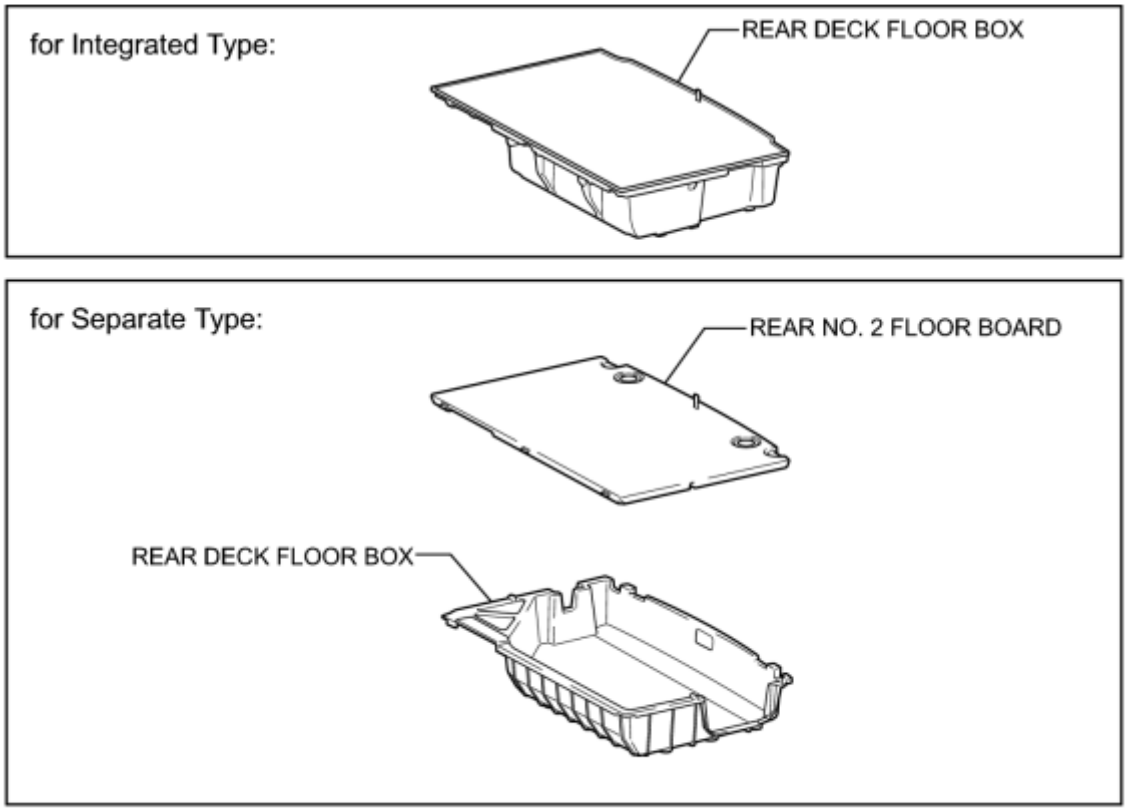
15. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# COMPONENTS

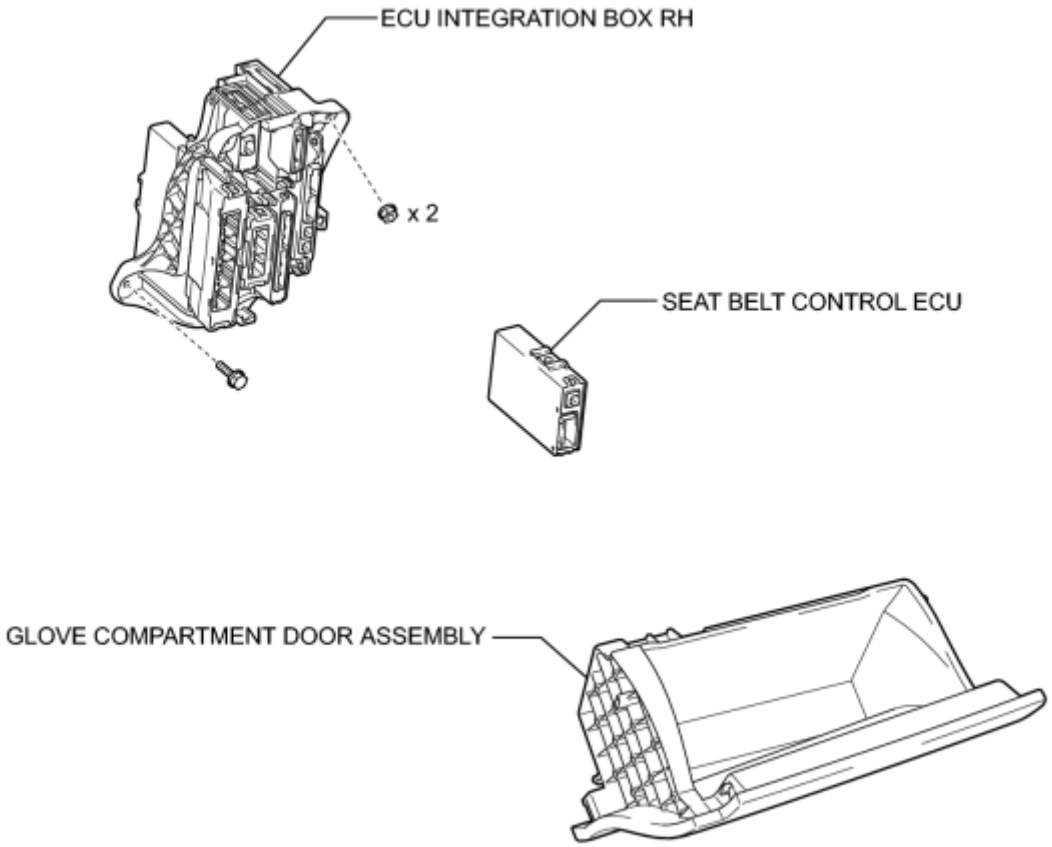
# ILLUSTRATION




P

# ILLUSTRATION


ECU INTEGRATION BOX RH
x 2
SEAT BELT CONTROL ECU
GLOVE COMPARTMENT DOOR ASSEMBLY

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO

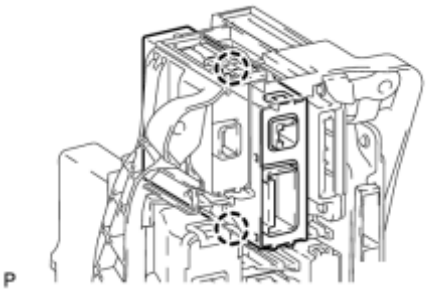
6. REMOVE ECU INTEGRATION BOX RH




(a) Remove the bolt and 2 nuts.

(b) Disconnect each connector and remove the ECU integration box RH.

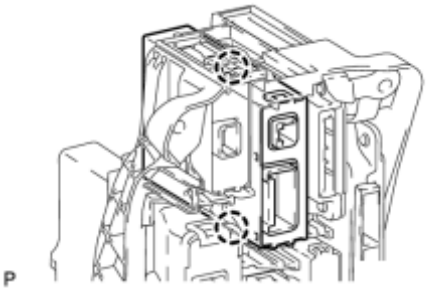
7. REMOVE SEAT BELT CONTROL ECU




(a) Disengage the 2 claws and remove the seat belt control ECU.

# INSTALLATION

1. INSTALL SEAT BELT CONTROL ECU



(a) Engage the 2 claws to install the seat belt control ECU.

2. INSTALL ECU INTEGRATION BOX RH

(a) Connect each connector.



(b) Install the ECU integration box RH with the bolt and 2 nuts.

3. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. INSTALL REAR NO. 3 FLOOR BOARD INFO

6. INSTALL REAR DECK FLOOR BOX INFO

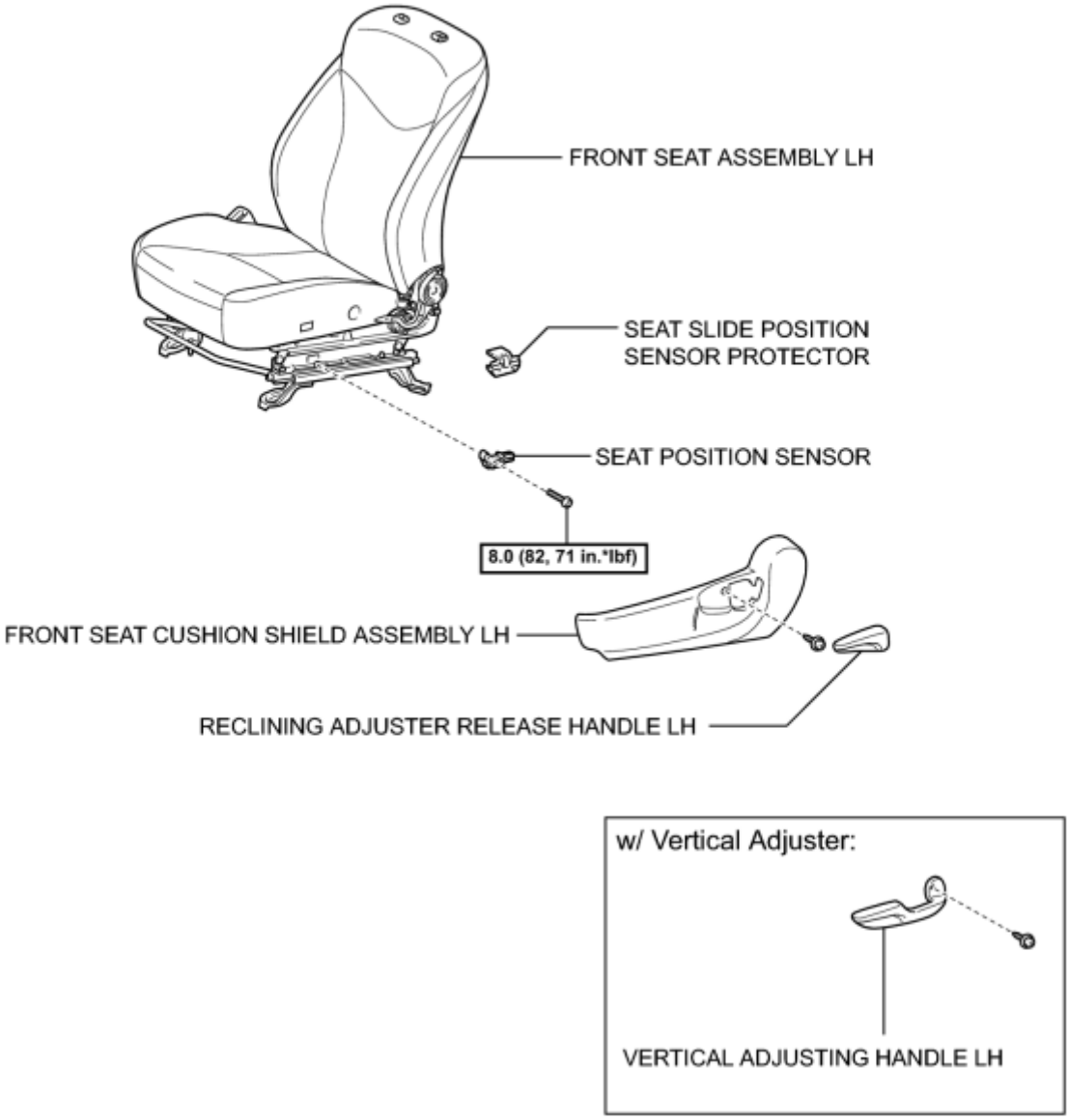
7. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

8. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# COMPONENTS

# ILLUSTRATION



# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the seat position sensor.

1. INSPECT SEAT POSITION SENSOR (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

2. INSPECT SEAT POSITION SENSOR (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the seat position sensor removed from the vehicle.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector

OK:

No defects are found.

HINT:

If any of the defects is found, replace the seat position sensor with a new one.

# REMOVAL

1. REMOVE FRONT SEAT ASSEMBLY LH

HINT:

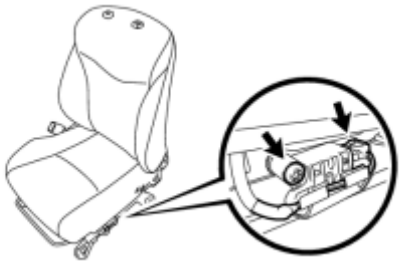
Refer to the procedure up to Remove Front Seat Assembly LH INFO.

2. REMOVE RECLINING ADJUSTER RELEASE HANDLE LH INFO

3. REMOVE VERTICAL ADJUSTING HANDLE LH (w/ Vertical Adjuster) INFO

4. REMOVE FRONT SEAT CUSHION SHIELD ASSEMBLY LH INFO

5. REMOVE SEAT POSITION SENSOR

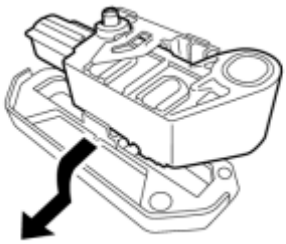


C

(a) Disconnect the connector.

(b) Separate the wire harness from the seat slide position sensor protector.

(c) Using a T30 "TORX" socket wrench, remove the "TORX" screw and seat position sensor with the seat slide position sensor protector.

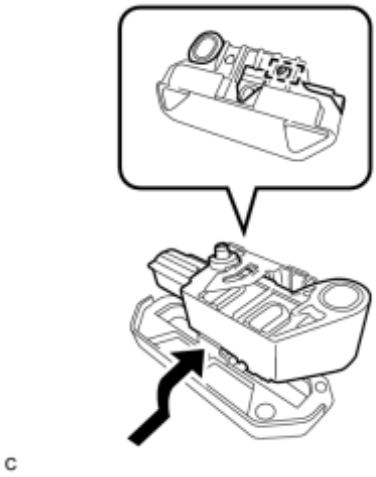


C

(d) Remove the seat position sensor from the seat slide position sensor protector as shown in the illustration.

# INSTALLATION

1. INSTALL SEAT POSITION SENSOR



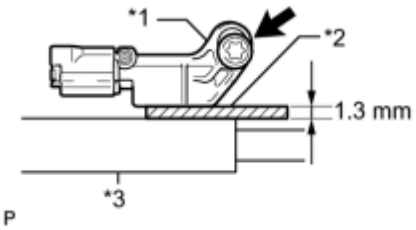
C

(a) Install the seat position sensor to the seat slide position sensor protector with the pin as shown in the illustration.

(b) Using a 1.3 mm (0.0512 in.) feeler gauge, temporarily install the seat position sensor.

## Text in Illustration

| | |
|---|---|
| *1 | Seat Position Sensor |
| *2 | Feeler Gauge |
| *3 | Seat Rail |

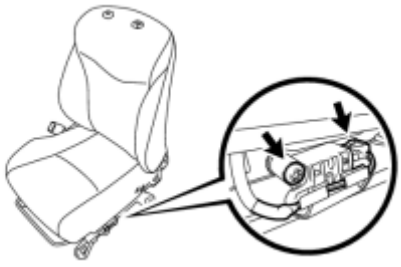



P

- If the seat position sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace the seat position sensor with a new one.
- When installing the seat position sensor, be careful that the SRS wiring does not interfere with or is pinched between other parts.

HINT:

Be sure that the clearance between the seat position sensor and seat rail is between 0.6 mm (0.0236 in.) and 2.0 mm (0.0787 in.).



C

(c) Using a T30 "TORX" socket wrench, tighten the "TORX" screw to install the seat position sensor.

Torque: **8.0 N·m (82 kgf·cm, 71in·lbf)**

(d) Make sure that the clearance between the seat position sensor and seat rail is between 0.6 mm (0.0236 in.) and 2.0 mm (0.0787 in.).

(e) Install the wire harness to the seat slide position sensor protector.

(f) Connect the connector.

(g) Check that there is no looseness in the installation parts of the seat position sensor.

2. INSTALL FRONT SEAT CUSHION SHIELD ASSEMBLY LH INFO

3. INSTALL VERTICAL ADJUSTING HANDLE LH (w/ Vertical Adjuster) INFO

4. INSTALL RECLINING ADJUSTER RELEASE HANDLE LH INFO

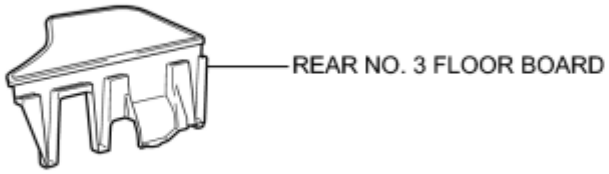
5. INSTALL FRONT SEAT ASSEMBLY LH

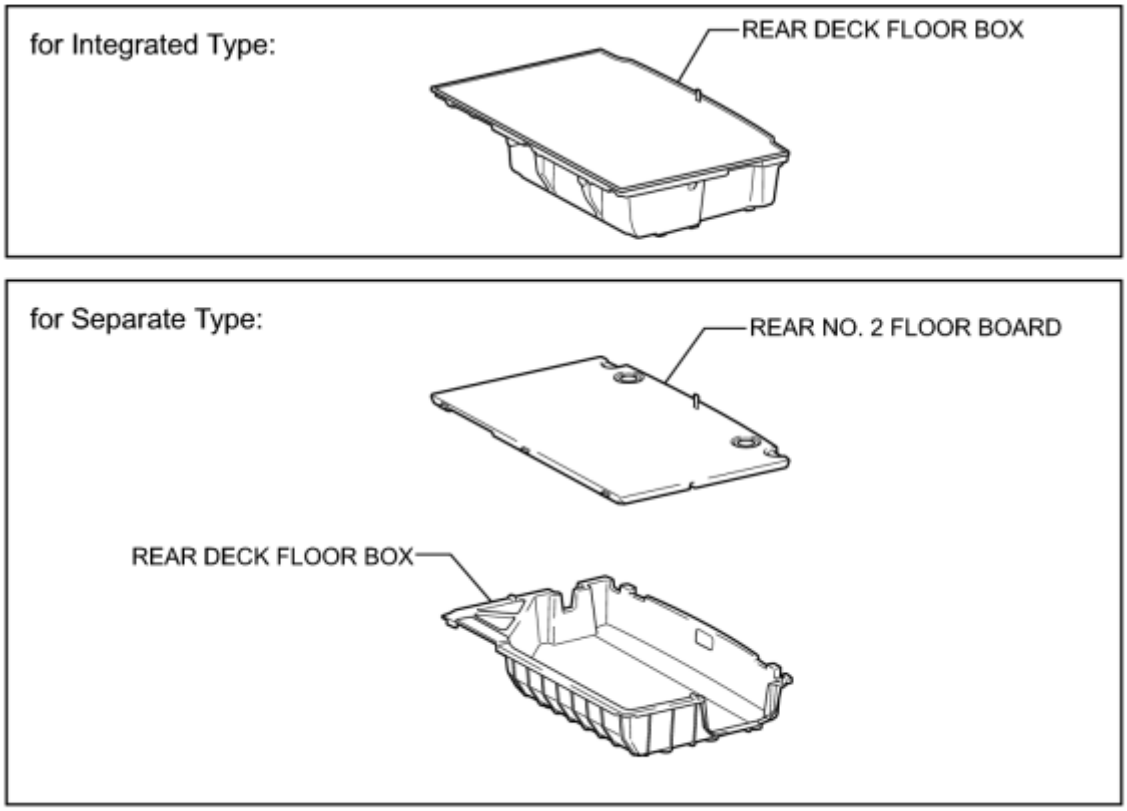
HINT:

Refer to the procedure from Install Front Seat Assembly INFO.

# COMPONENTS

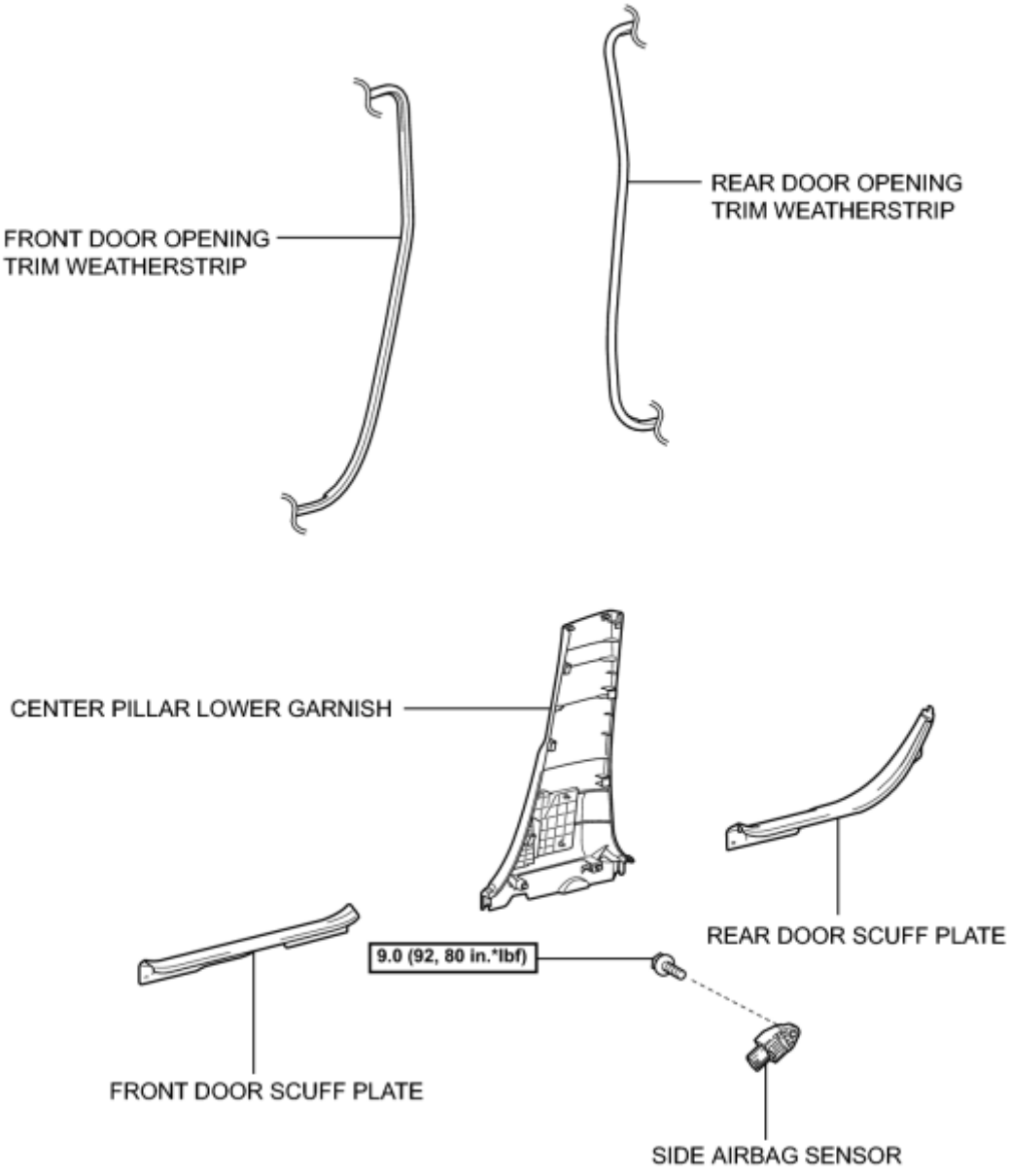
# ILLUSTRATION




P

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf) : Specified torque

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the side airbag sensors.

1. INSPECT SIDE AIRBAG SENSOR (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

2. INSPECT SIDE AIRBAG SENSOR (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check the side airbag sensors for defects if a center pillar of the vehicle or the area around a center pillar is damaged.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found, replace the side airbag sensor with a new one.

3. INSPECT SIDE AIRBAG SENSOR (for Vehicle Involved in Collision and Airbag is Deployed)

(a) When airbags have deployed as the result of a collision, be sure to replace all side airbag sensors in the damaged areas (anywhere in need of repair).

(b) Visually check the side airbag sensors in undamaged areas for defects.

(1) The defects are as follows:

- Cracks on the sensor housing
- Dents on the sensor housing
- Chips on the sensor housing
- Cracks or other damage to the connector
- Damage to the serial number

OK:

No defects are found.

HINT:

If any of the defects is found or a side airbag sensor has detected a major collision, replace the side airbag sensor with a new one.

# REMOVAL

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE FRONT DOOR SCUFF PLATE INFO

7. DISCONNECT FRONT DOOR OPENING TRIM WEATHERSTRIP

8. REMOVE REAR DOOR SCUFF PLATE INFO

9. DISCONNECT REAR DOOR OPENING TRIM WEATHERSTRIP

10. REMOVE CENTER PILLAR LOWER GARNISH INFO

11. REMOVE SIDE AIRBAG SENSOR

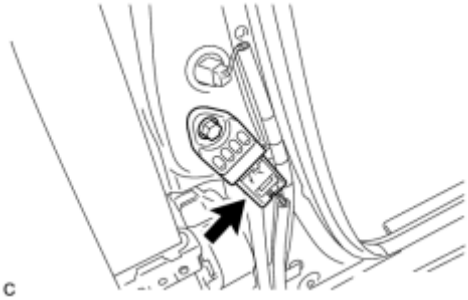
(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(c) Disconnect the connector.

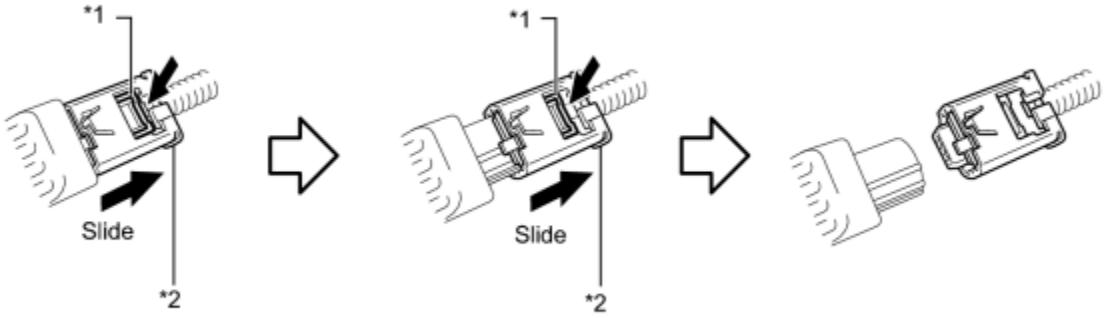


c

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(1) Push and hold the white housing lock, and slide the yellow outer connector locking sleeve.




c

***Text in Illustration***

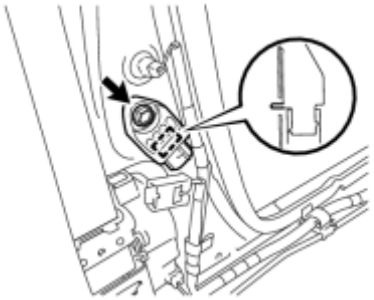
| | | | |
|---|---|---|---|
| *1 | Housing Lock | *2 | Outer Connector Locking Sleeve |

(2) Push and hold the white housing lock again, and slide the yellow outer connector locking sleeve to disconnect the connector.

(d) Remove the bolt and side airbag sensor.

NOTICE:

Loosen the bolt while holding the side airbag sensor because the side airbag sensor pin (stopper) is easily damaged.


C

# INSTALLATION

HINT:

- Use the same procedure for the RH side and LH side.
- The procedure listed below is for the LH side.

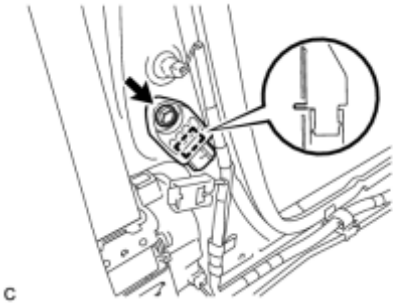
1. INSTALL SIDE AIRBAG SENSOR

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

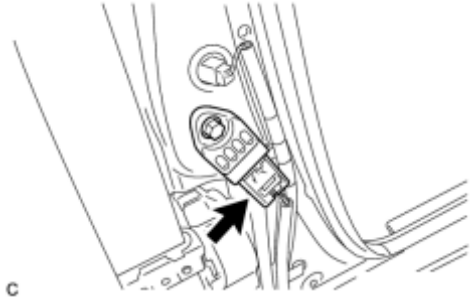



(c) Insert the pin (stopper) into the body hole to install the side airbag sensor to the vehicle with the bolt.

Torque: **9.0 N·m (92 kgf·cm, 80in·lbf)**

- If the side airbag sensor has been dropped, or there are any cracks, dents or other defects in the case or connector, replace it with a new one.
- When installing the side airbag sensor, be careful that the SRS wiring does not interfere with or is not pinched between other parts.
- Make sure that the pin (stopper) is securely inserted into the body hole.
- Tighten the bolt while holding the side airbag sensor because the side airbag sensor pin (stopper) is easily damaged.

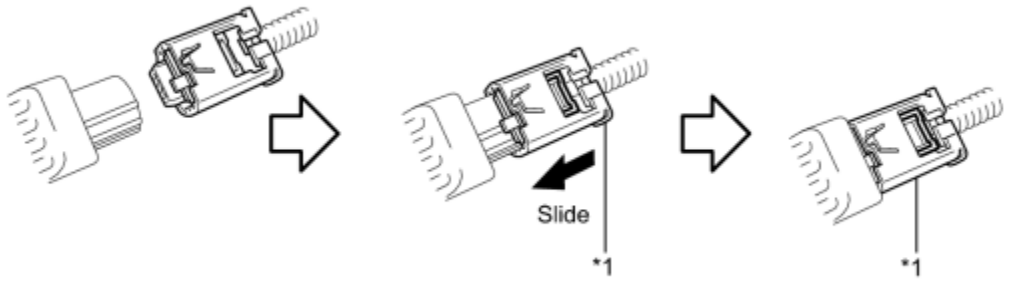
(d) Connect the connector to the side airbag sensor.




NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

(1) Connect the connector as shown in the illustration (when locking, make sure that the outer connector locking sleeve returns to its original position and a click sound can be heard).




c

***Text in Illustration***

| | | | |
|---|---|---|---|
| *1 | Outer Connector Locking Sleeve | - | - |

HINT:

When connected, the outer connector locking sleeve will slide. Be sure not to hold the outer connector locking sleeve while connecting, as it may result in an insecure fit.

(e) Check that there is no looseness in the installation parts of the side airbag sensor.

2. INSTALL CENTER PILLAR LOWER GARNISH INFO

3. INSTALL REAR DOOR OPENING TRIM WEATHERSTRIP

4. INSTALL REAR DOOR SCUFF PLATE INFO

5. INSTALL FRONT DOOR OPENING TRIM WEATHERSTRIP

6. INSTALL FRONT DOOR SCUFF PLATE INFO

7. INSTALL REAR NO. 3 FLOOR BOARD INFO

8. INSTALL REAR DECK FLOOR BOX INFO

9. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

10. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

11. PERFORM DIAGNOSTIC SYSTEM CHECK

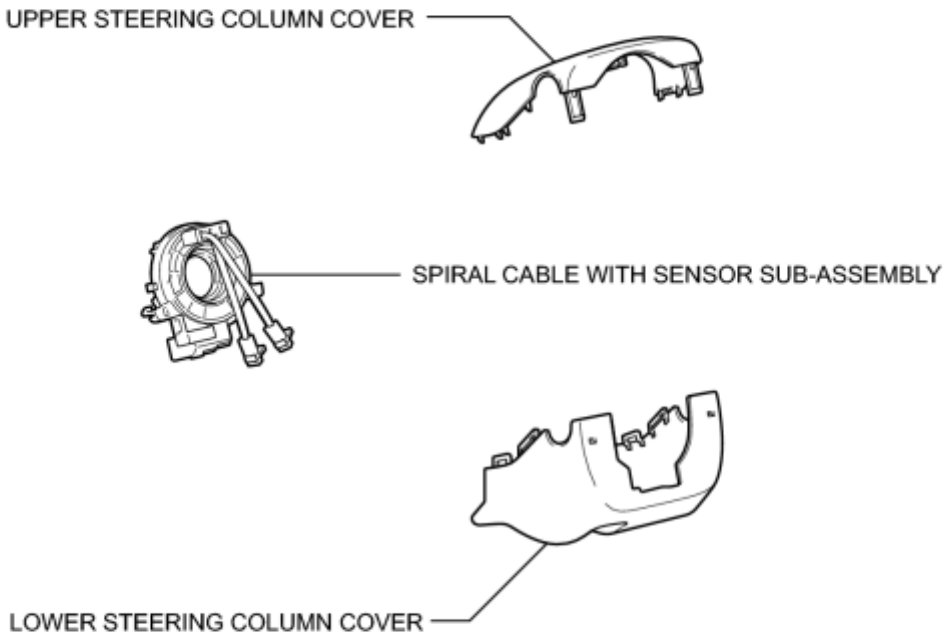
(a) Perform a diagnostic system check INFO.

12. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# COMPONENTS

# ILLUSTRATION



# REMOVAL

1. REMOVE STEERING WHEEL ASSEMBLY

HINT:

Refer to the procedure up to Remove Steering Wheel Assembly INFO.

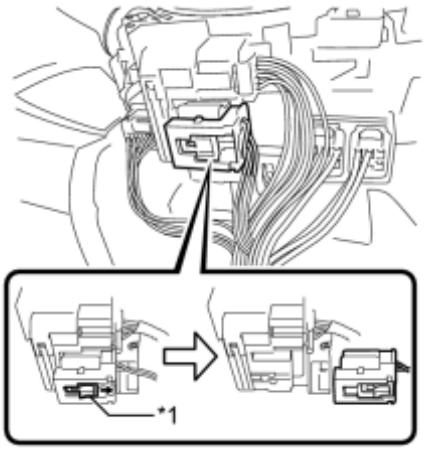
2. REMOVE LOWER STEERING COLUMN COVER INFO

3. REMOVE UPPER STEERING COLUMN COVER INFO

4. REMOVE SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

NOTICE:

- Do not replace the spiral cable with the battery connected and the power switch on (IG).
- Do not rotate the spiral cable with the battery connected and the power switch on (IG).
- Ensure that the steering wheel is installed and aligned straight when inspecting the steering sensor.
- Do not remove the steering sensor from the spiral cable.




c

(a) Slide the slider to release the lock, and then disconnect the yellow airbag connector from the spiral cable with sensor sub-assembly.

## Text in Illustration

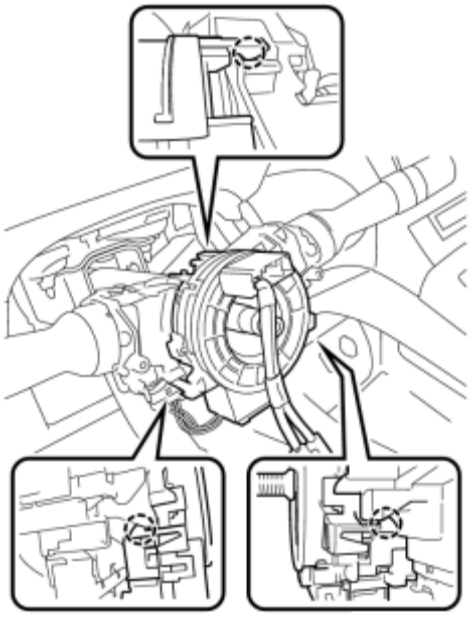
| | |
|---|---|
| *1 | Slider |

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(b) Disconnect the other connector from the spiral cable with sensor sub-assembly.

(c) Disengage the 3 claws to remove the spiral cable with sensor sub-assembly.



C

# INSPECTION

1. INSPECT SPIRAL CABLE

(a) Visually check for defects with the spiral cable removed from the vehicle.

(1) The defects are as follows:

- Scratches on the spiral cable
- Small cracks the spiral cable
- Dents on the spiral cable
- Chips on the spiral cable
- Cracks or other damage to the connector

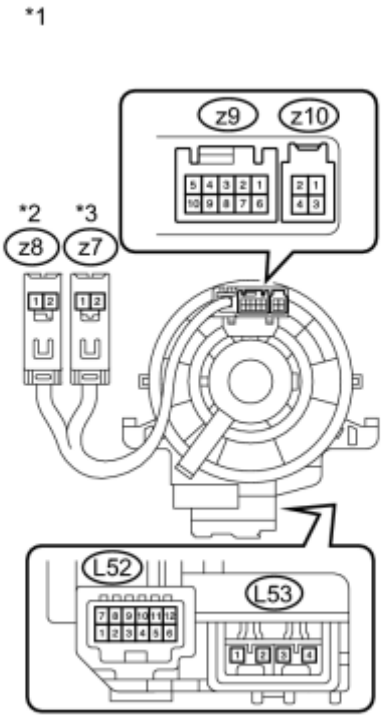
OK:

No defects are found.

HINT:

If any of the defects is found, replace the spiral cable with a new one.

(b) Inspect the spiral cable.




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Spiral Cable) |
| *2 | Color: Orange |
| *3 | Color: Black |

(1) Measure the resistance according to the value(s) in the table below.

NOTICE:

To avoid breakage of the spiral cable, do not turn the spiral cable more than necessary.

## Standard Resistance

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z9-1 - L52-8 (HO) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-2 - L52-9 (IG) | Center | Below 1 Ω |

| | | |
|---|---|---|
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-3 - L52-10 (AC1) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-4 - L52-11 (DIST) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-5 - L52-12 (IL+2) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-6 - L52-2 (ECC) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-7 - L52-3 (TX1) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-8 - L52-4 (EAU) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-9 - L52-5 (AU2) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z9-10 - L52-6 (AU1) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z10-1 - L52-7 (R/N) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z10-3 - L52-1 (CCS) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z10-4 - L52-2 (ECC) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z8-1 - L53-2 (D-) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |

| | | |
|---|---|---|
| z8-2 - L53-1 (D+) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z7-1 - L53-3 (D2-) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |
| z7-2 - L53-4 (D2+) | Center | Below 1 Ω |
| | 2.5 rotations to the left | |
| | 2.5 rotations to the right | |

If the value is not within the specified range, replace the spiral cable.

# INSTALLATION

1. INSTALL SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

NOTICE:

- Do not replace the spiral cable with the battery connected and the power switch on (IG).
- Do not rotate the spiral cable with the battery connected and the power switch on (IG).
- Ensure that the steering wheel is installed and aligned straight when inspecting the steering sensor.
- Do not remove the steering sensor from the spiral cable.

(a) Check that the power switch is off.

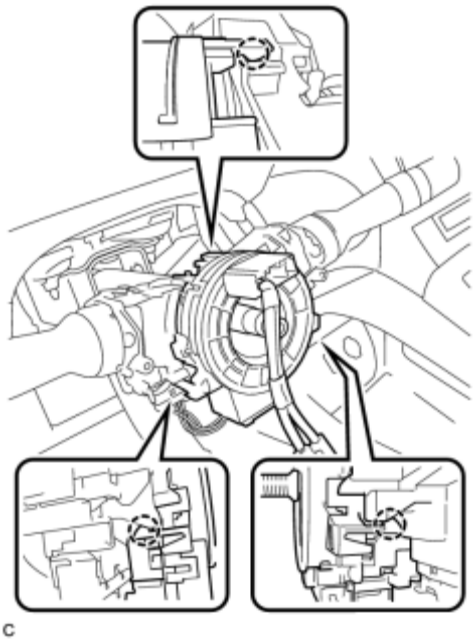
(b) Check that the cable is disconnected from the negative (-) battery terminal.

(c) Check that the front wheels are facing straight ahead.

(d) Set the turn signal switch to the neutral position.

NOTICE:

If it is not in the neutral position, the turn signal switch pin may snap.




(e) Install the spiral cable with sensor sub-assembly with the 3 claws.

NOTICE:

When replacing the spiral cable with sensor sub-assembly with a new one, remove the lock pin before installing the steering wheel assembly.

(f) Connect the connectors to the spiral cable with sensor sub-assembly.

NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

2. INSTALL UPPER STEERING COLUMN COVER INFO

3. INSTALL LOWER STEERING COLUMN COVER INFO

4. TURN FRONT WHEELS TO FACE STRAIGHT AHEAD

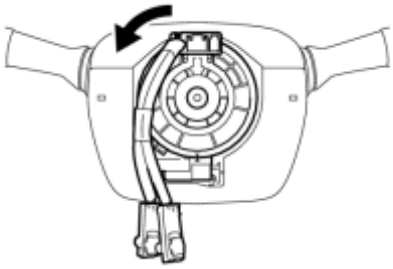
5. ADJUST SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

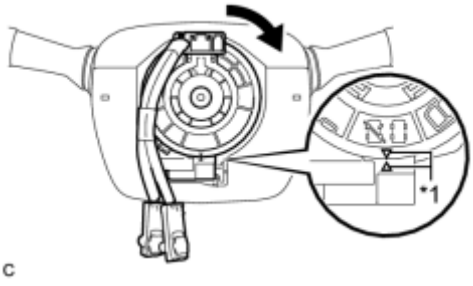



(c) Rotate the spiral cable counterclockwise slowly by hand until it stops.

NOTICE:

Do not turn the spiral cable using the airbag wire harness.

(d) Rotate the spiral cable clockwise approximately 2.5 turns to align the marks.




## Text in Illustration

| | |
|---|---|
| *1 | Alignment Mark |

NOTICE:

Do not turn the spiral cable using the airbag wire harness.

HINT:

The spiral cable will rotate approximately 2.5 turns to both the left and right from the center.

6. INSTALL STEERING WHEEL ASSEMBLY

HINT:

Refer to the procedure from Install Steering Wheel Assembly INFO.

# INSTALLATION

1. INSTALL SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

NOTICE:

- Do not replace the spiral cable with the battery connected and the power switch on (IG).
- Do not rotate the spiral cable with the battery connected and the power switch on (IG).
- Ensure that the steering wheel is installed and aligned straight when inspecting the steering sensor.
- Do not remove the steering sensor from the spiral cable.

(a) Check that the power switch is off.

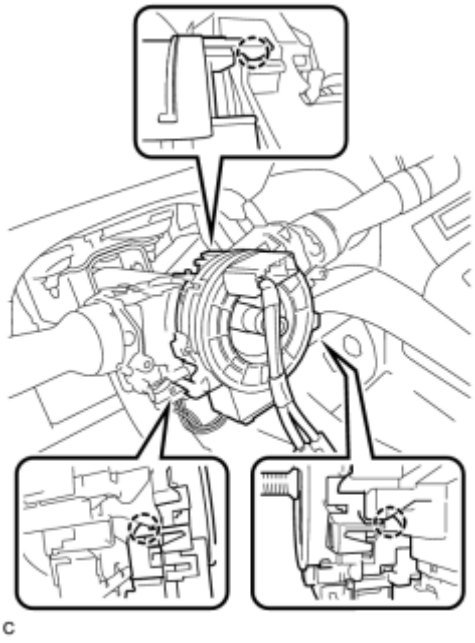
(b) Check that the cable is disconnected from the negative (-) battery terminal.

(c) Check that the front wheels are facing straight ahead.

(d) Set the turn signal switch to the neutral position.

NOTICE:

If it is not in the neutral position, the turn signal switch pin may snap.




(e) Install the spiral cable with sensor sub-assembly with the 3 claws.

NOTICE:

When replacing the spiral cable with sensor sub-assembly with a new one, remove the lock pin before installing the steering wheel assembly.

(f) Connect the connectors to the spiral cable with sensor sub-assembly.

NOTICE:

When connecting any airbag connector, take care not to damage the airbag wire harness.

2. INSTALL UPPER STEERING COLUMN COVER INFO

3. INSTALL LOWER STEERING COLUMN COVER INFO

4. TURN FRONT WHEELS TO FACE STRAIGHT AHEAD

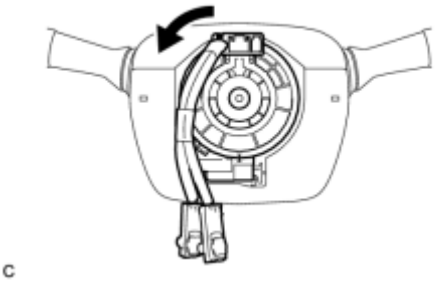
5. ADJUST SPIRAL CABLE WITH SENSOR SUB-ASSEMBLY

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

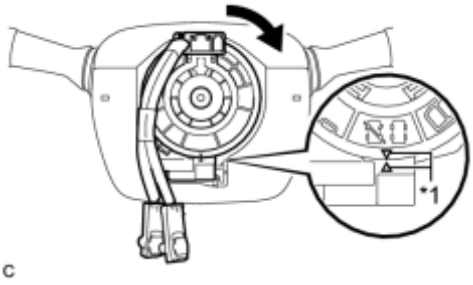



(c) Rotate the spiral cable counterclockwise slowly by hand until it stops.

NOTICE:

Do not turn the spiral cable using the airbag wire harness.

(d) Rotate the spiral cable clockwise approximately 2.5 turns to align the marks.




## Text in Illustration

| | |
|---|---|
| *1 | Alignment Mark |

NOTICE:

Do not turn the spiral cable using the airbag wire harness.

HINT:

The spiral cable will rotate approximately 2.5 turns to both the left and right from the center.

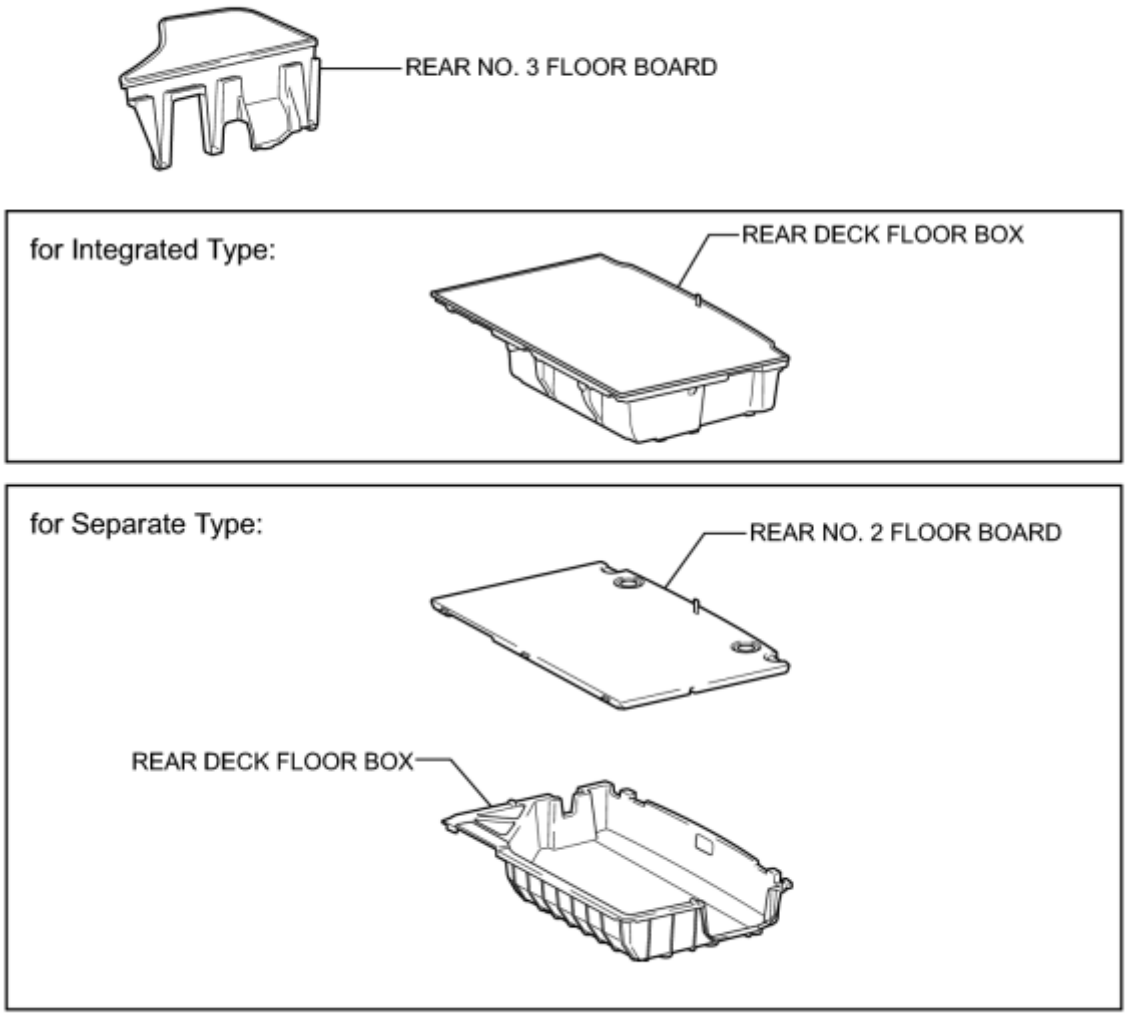
6. INSTALL STEERING WHEEL ASSEMBLY

HINT:

Refer to the procedure from Install Steering Wheel Assembly INFO.

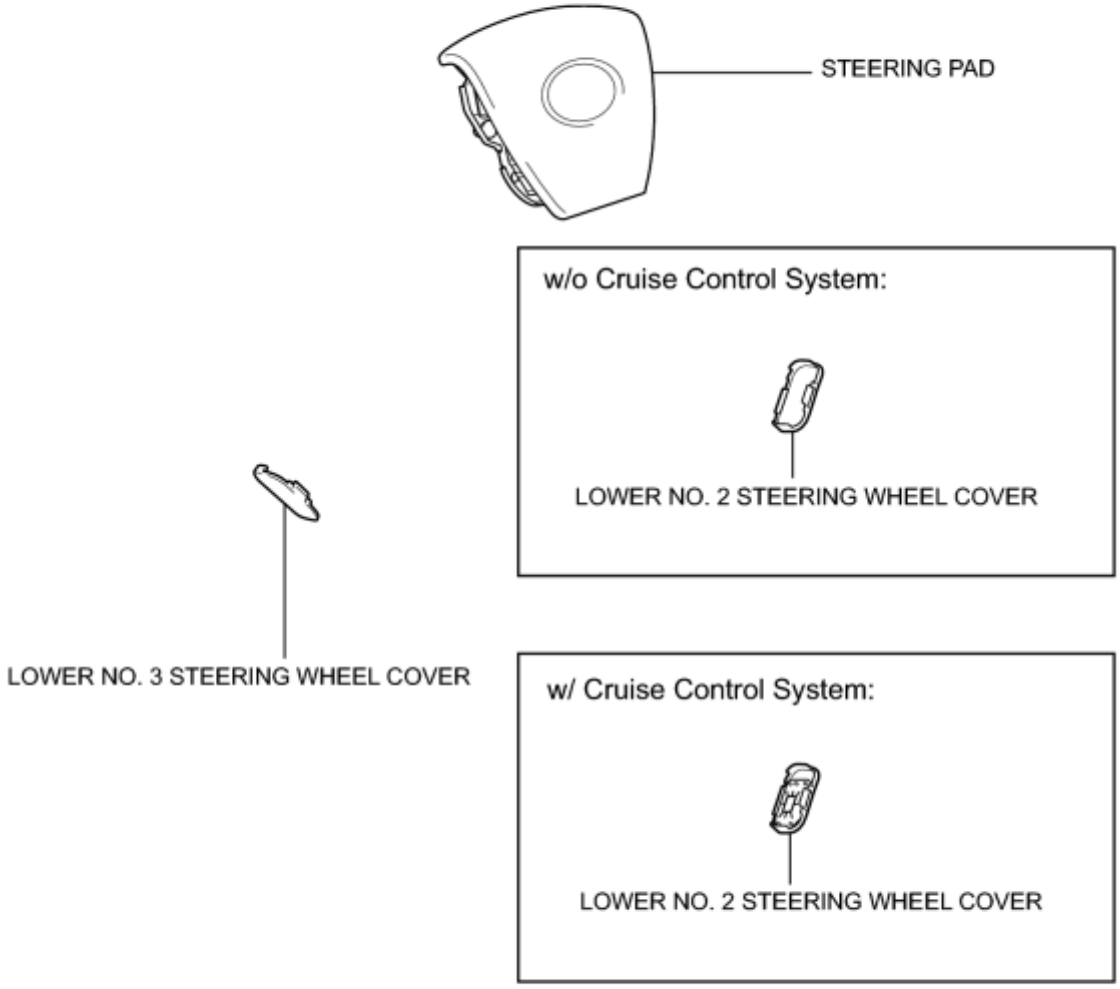
# COMPONENTS

# ILLUSTRATION




P

# ILLUSTRATION


STEERING PAD
w/o Cruise Control System:
LOWER NO. 2 STEERING WHEEL COVER
LOWER NO. 3 STEERING WHEEL COVER
w/ Cruise Control System:
LOWER NO. 2 STEERING WHEEL COVER

# ON-VEHICLE INSPECTION

CAUTION:

Be sure to follow the correct removal and installation procedures of the steering pad.

1. INSPECT STEERING PAD (for Vehicle not Involved in Collision)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the steering pad installed on the vehicle.

(1) The defects are as follows:

- Cuts on the surface and in the grooves of the steering pad
- Small cracks on the surface and in the grooves of the steering pad
- Significant discoloration on the surface and in the grooves of the steering pad

OK:

No defects are found.

HINT:

If any of the defects is found, replace the steering pad with a new one.

2. INSPECT STEERING PAD (for Vehicle Involved in Collision and Airbag not Deployed)

(a) Perform a diagnostic system check INFO.

(b) Visually check for defects with the steering pad removed from the vehicle.

(1) The defects are as follows:

- Cuts on the surface and in the grooves of the steering pad
- Small cracks on the surface and in the grooves of the steering pad
- Significant discoloration on the surface and in the grooves of the steering pad
- Cracks or other damage to the connector
- Deformation of the steering wheel assembly
- Deformation of the horn button contact plate of the steering pad
- Interference or uneven clearance between the steering pad and steering wheel assembly when the new steering pad is installed on the steering wheel assembly

OK:

No defects are found.

HINT:

If any of the defects is found, replace the steering pad or steering wheel assembly with a new one.

# REMOVAL

1. PRECAUTION

CAUTION:

Be sure to read Precaution thoroughly before servicing INFO.

2. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

3. REMOVE REAR DECK FLOOR BOX INFO

4. REMOVE REAR NO. 3 FLOOR BOARD INFO

5. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

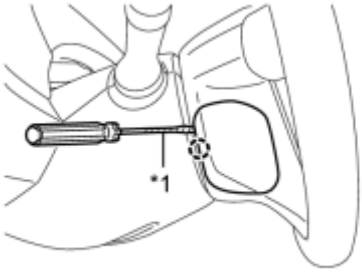
CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. REMOVE LOWER NO. 3 STEERING WHEEL COVER




C

(a) Using a screwdriver with its tip wrapped with protective tape, disengage the claw to remove the lower No. 3 steering wheel cover.

## Text in Illustration

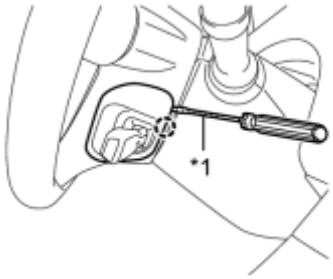
| | |
|---|---|
| *1 | Protective Tape |

7. REMOVE LOWER NO. 2 STEERING WHEEL COVER

(a) Using a screwdriver with its tip wrapped with protective tape, disengage the claw to remove the lower No. 2 steering wheel cover.

## Text in Illustration

| | |
|---|---|
| *1 | Protective Tape |




C

8. REMOVE STEERING PAD

CAUTION:

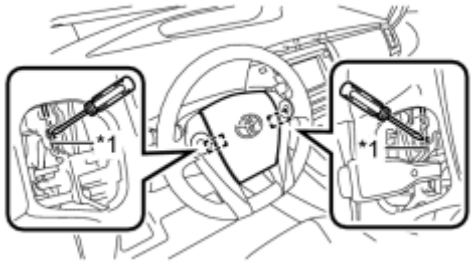
When storing the steering pad, keep the airbag deployment side facing upward.

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

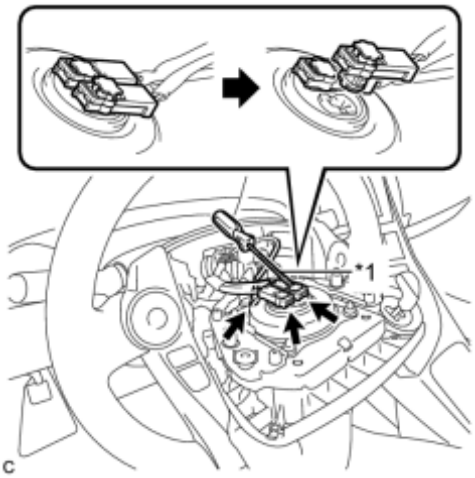



C

(c) Using a screwdriver, push the torsional spring to disengage the 2 pins.

## Text in Illustration

| | |
|---|---|
| *1 | Torsional Spring |




C

(d) Pull out the steering pad from the steering wheel assembly and support the steering pad with one hand.

NOTICE:

When removing the steering pad, do not pull the airbag wire harness.

(e) Disconnect the horn connector from the steering pad.

(f) Using a screwdriver with its tip wrapped with protective tape, release the 2 airbag connector locks.

***Text in Illustration***

| | |
|---|---|
| *1 | Protective Tape |

(g) Disconnect the 2 airbag connectors to remove the steering pad.

NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

# INSTALLATION

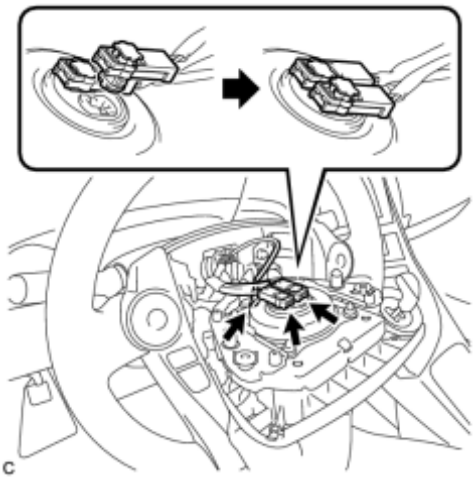
1. INSTALL STEERING PAD

(a) Check that the power switch is off.

(b) Check that the cable is disconnected from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

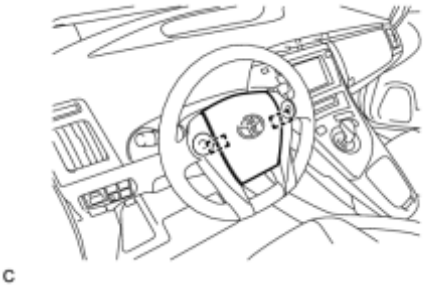



(c) Connect the 2 airbag connectors to the steering pad.

- When connecting any airbag connector, take care not to damage the airbag wire harness.
- Be sure to only connect the connectors to each corresponding color.

(d) Push in the 2 locks to install the 2 airbag connectors.

(e) Connect the horn connector to the steering pad.



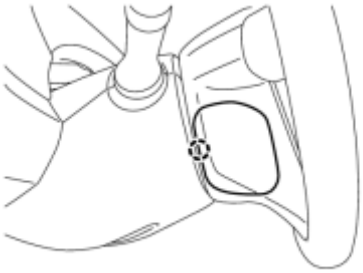

(f) Push the steering pad to engage the 2 pins.

NOTICE:

Make sure that the pins are securely inserted into the steering holes.

2. INSTALL LOWER NO. 3 STEERING WHEEL COVER

(a) Engage the claw to install the lower No. 3 steering wheel cover.



C

3. INSTALL LOWER NO. 2 STEERING WHEEL COVER



C

(a) Engage the claw to install the lower No. 2 steering wheel cover.

4. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

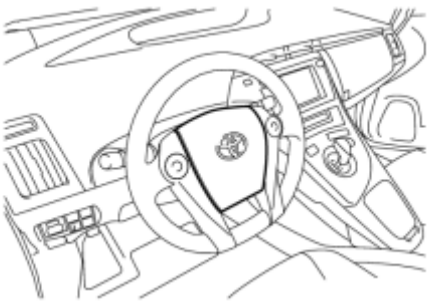
When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

5. INSTALL REAR NO. 3 FLOOR BOARD INFO

6. INSTALL REAR DECK FLOOR BOX INFO

7. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

8. INSPECT STEERING PAD



C

(a) Visually check for defects with the steering pad installed on the vehicle.

(1) The defects are as follows:

- Cuts on the surface and in the grooves of the steering pad
- Small cracks on the surface and in the grooves of the steering pad
- Significant discoloration on the surface and in the grooves of the steering pad

OK:

No defects are found.

HINT:

If any of the defects is found, replace the steering pad with a new one.

(b) Make sure that the horn sounds.

HINT:

If the horn does not sound, inspect the horn system INFO.

9. PERFORM DIAGNOSTIC SYSTEM CHECK

(a) Perform a diagnostic system check INFO.

10. INSPECT SRS WARNING LIGHT

(a) Inspect the SRS warning light INFO.

# DISPOSAL

CAUTION:

Before performing pre-disposal deployment of any SRS part, review and closely follow all applicable environmental and hazardous material regulations. Pre-disposal deployment may be considered hazardous material treatment.

1. PRECAUTION

CAUTION:

- An airbag or pretensioner may be activated by static electricity. To prevent this, be sure to touch a metal surface with your bare hands to discharge static electricity before performing this procedure.
- Never dispose of a steering pad with an undeployed airbag.
- The airbag produces an exploding sound when it is deployed, so perform the operation outdoors and where it will not create a nuisance to nearby residents.
- When deploying the airbag, always use the specified SST (SRS Airbag Deployment Tool). Perform the operation in a place away from electrical noise.
- When deploying the airbag, perform the operation at least 10 m (32.8 ft.) away from the steering pad.
- The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a steering pad with a deployed airbag.
- Do not apply water etc. to a steering pad with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

When scrapping a vehicle equipped with an SRS or disposing of the steering pad, be sure to deploy the airbag first in accordance with the procedure described below. If any abnormality occurs with the airbag deployment, contact the Service Dept. of TOYOTA MOTOR SALES, U.S.A., INC.

2. DISPOSE OF STEERING PAD (When Installed in Vehicle)

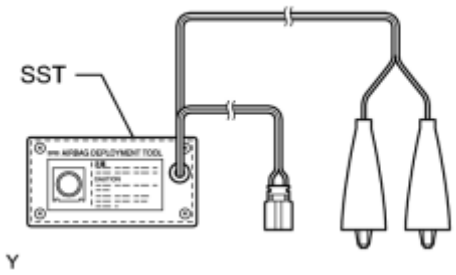
NOTICE:

- When disposing of the steering pad, never use the customer's vehicle to deploy the airbag.
- Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.

(a) Check the function of SST.

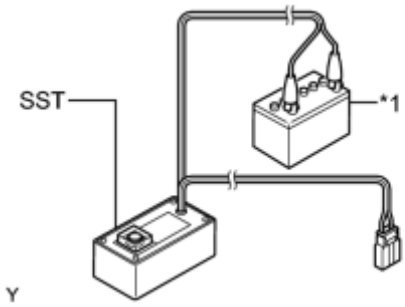



SST: 09082-00700

CAUTION:

When deploying the airbag, always use the specified SST:

SRS Airbag Deployment Tool

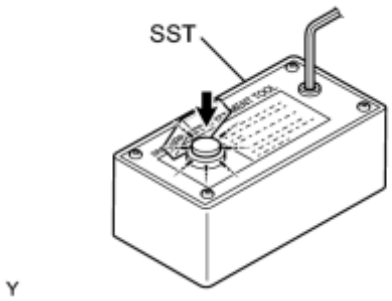



(1) Connect SST to the battery.

Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

## Text in Illustration

| | |
|---|---|
| *1 | Battery |




(2) Check the function of SST.

Press the SST activation switch and check that the LED of the SST activation switch comes on.

- Do not connect the yellow SST connector to the airbag.
- If the LED comes on when the activation switch is not being pressed, SST is malfunctioning. Replace SST.

(3) Disconnect SST from the battery.

(b) Refer to Precaution INFO.

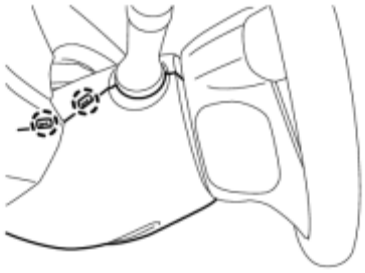
(c) Remove the lower steering column cover.

(1) While turning the steering wheel assembly to the right and left, disengage the 2 claws.

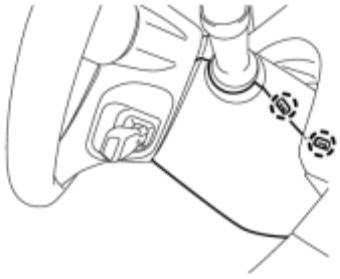




c



(2) Disengage the 4 claws to remove the lower steering column cover.



c

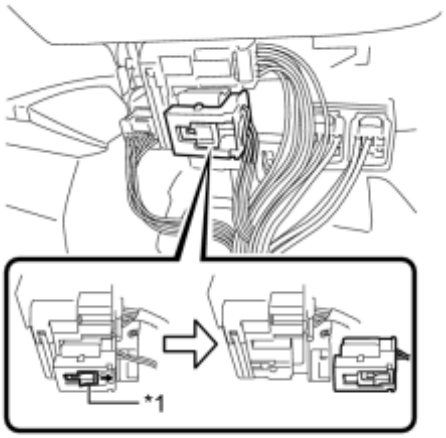
(d) Disconnect the cable from the negative (-) battery terminal.

CAUTION:

Wait at least 90 seconds after disconnecting the cable from the negative (-) battery terminal to disable the SRS system.

(e) Disconnect the yellow airbag connector from the spiral cable.

(1) Slide the slider to release the lock, and then disconnect the connector.




c

## Text in Illustration

| | |
|---|---|
| *1 | Slider |

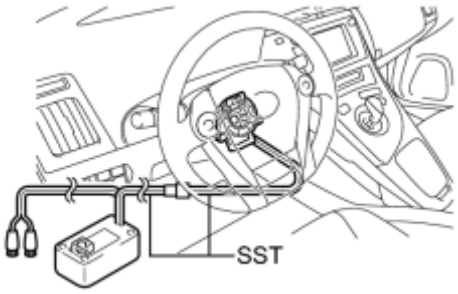
NOTICE:

When disconnecting any airbag connector, take care not to damage the airbag wire harness.

(f) Install SST.

CAUTION:

Check that there is no looseness in the steering wheel assembly and steering pad.




c

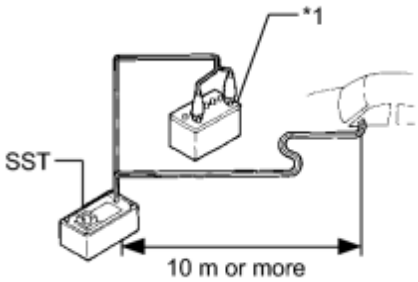
(1) Connect the SST connector to the airbag connector of the spiral cable.

SST: 09082-00700

SST: 09082-00780

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock.




(2) Move SST at least 10 m (32.8 ft.) away from the front side window of the vehicle.

## Text in Illustration

| | |
|---|---|
| *1 | Battery |

(3) Maintaining sufficient clearance for the SST wire harness in the front side window, close all doors and windows of the vehicle.

NOTICE:

Take care not to damage the SST wire harness.

(4) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

(g) Deploy the airbag.

(1) Check that no one is inside the vehicle or within a 10 m (32.8 ft.) radius of the vehicle.

(2) Press the SST activation switch and deploy the airbag.

CAUTION:

- Before deployment, make sure that no one is near the vehicle.
- The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a steering pad with a deployed airbag.
- Do not apply water etc. to a steering pad with a deployed airbag.
- Always wash your hands with water after completing the operation.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.

3. DISPOSE OF STEERING PAD (When Not Installed in Vehicle)

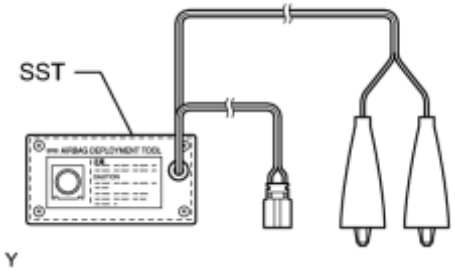
NOTICE:

Be sure to observe the following procedure when deploying the airbag.

HINT:

Prepare a battery as the power source to deploy the airbag.

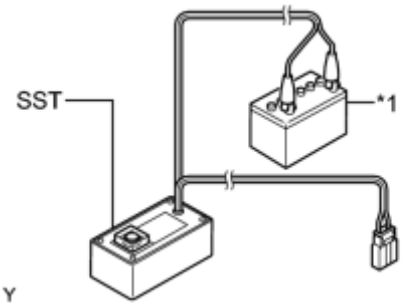
(a) Check the function of SST.




SST: 09082-00700

CAUTION:

When deploying the airbag, always use the specified SST:

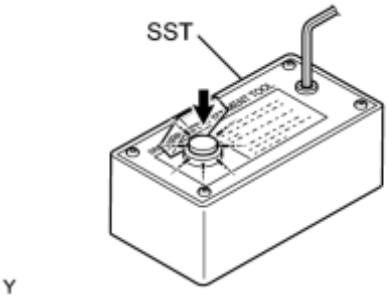



(1) Connect SST to the battery.

Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

## Text in Illustration

| | |
|---|---|
| *1 | Battery |




(2) Check the function of SST.

Press the SST activation switch and check that the LED of the SST activation switch comes on.

- Do not connect the yellow SST connector to the airbag.
- If the LED comes on when the activation switch is not being pressed, SST is malfunctioning. Replace SST.

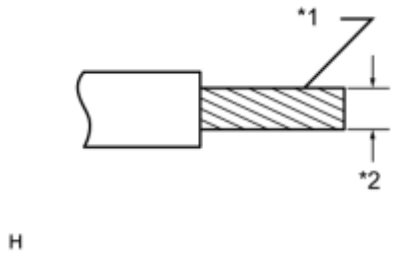
(3) Disconnect SST from the battery.

(b) Remove the steering pad INFO.

CAUTION:

- Before removing the steering pad, wait at least 90 seconds after turning the power switch off and disconnecting the cable from the negative (-) battery terminal.
- When storing the steering pad, keep the airbag deployment side facing upward.

(c) Using braided wire, tie down the steering pad to an unneeded wheel.




### *Text in Illustration*

| | |
|---|---|
| *1 | Stripped Wire Section |
| *2 | Wire Diameter |

Wire:

Stripped wire section

1.25 $mm^2$ (0.0019 $in.^2$) or more

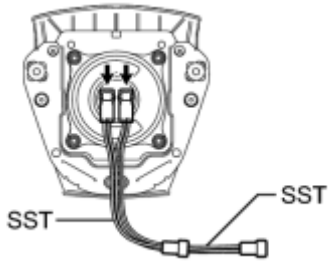
CAUTION:

If the wire harness is too thin or an alternative object is used to tie down the steering pad, it may snap when the airbag is deployed. Always use a wire for vehicle use with an area of at least 1.25 $mm^2$ (0.0019 $in.^2$).

HINT:

To calculate the area of the stripped wire section:

Area = 3.14 x $(Diameter)^2$ / 4



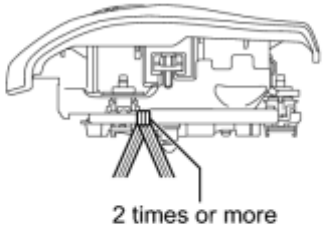

c

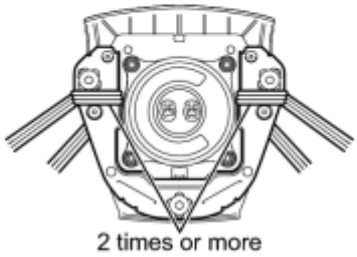
(1) After connecting the following SST to each other, connect them to the steering pad.

SST: 09082-00802

09082-10801

09082-30801



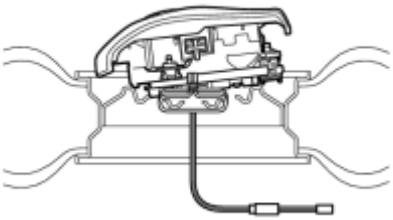

c

(2) Wind 3 wires at least 2 times around the horn button contact prate.

- Tightly wind the wires around the horn button contact prate without any slack.
- Make sure that the wires are tight. If there is slack in the wires, the steering pad may break loose when the airbag is deployed.

(3) Face the airbag deployment side of the steering pad upward on top of an unneeded tire and wheel set. Separately tie the left and right sides of the steering pad to the wheel through the hub nut holes. Position the SST

connector so that it hangs downward through the hub hole of the wheel.



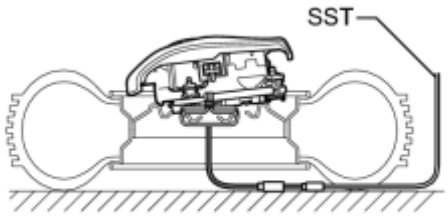
c

- Make sure that the wires are tight. If there is slack in the wires, the steering pad may break loose when the airbag is deployed.
- Always tie down the steering pad with the airbag deployment side facing upward.

NOTICE:

The wheel will be damaged by the airbag deployment, so use an unneeded wheel.

(d) Install SST.




c

CAUTION:

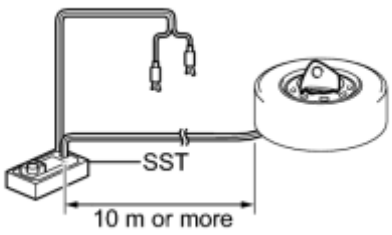
Place the wheel on level ground.

(1) Connect the SST connector.

SST: 09082-00700

NOTICE:

To avoid damaging the SST connector or wire harness, do not lock the secondary lock of the twin lock. Also, secure some slack for the SST wire harness inside the disc wheel.




c

(2) Move SST at least 10 m (32.8 ft.) away from the airbag tied down to the wheel.

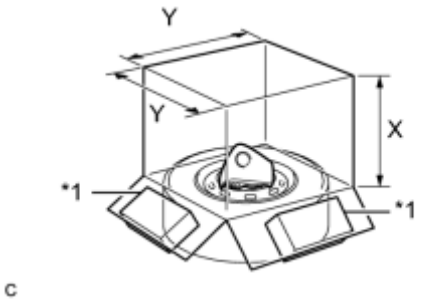
(e) Cover the steering pad (using a cardboard box).

## Text in Illustration

| | |
|---|---|
| *1 | Weight |

(1) Cover the steering pad with a cardboard box.

(2) Place weights on the cardboard box in 4 places totalling at least 190 N (19 kg, 42.7 lb).




c

Minimum cardboard box size:

Must exceed the following dimensions

X

460 mm (1.51 ft.)

Y

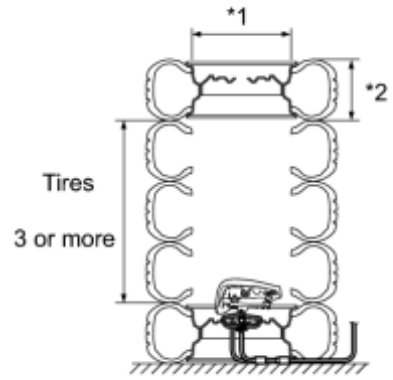
650 mm (2.13 ft.)

- When dimension Y of the cardboard box exceeds the diameter of the wheel and tire to which the steering pad is tied, X should be the following size.

  X = 460 mm (1.51 ft.) + width of tire

- If a cardboard box smaller than the specified size is used, it may be broken by the shock from the airbag deployment.

(f) Cover the steering pad (using tires).




c

(1) Place at least 3 tires without wheels onto the wheel and tire to which the steering pad is tied.

## Text in Illustration

| | |
|---|---|
| *1 | Inner Diameter |
| *2 | Width |

(2) Place a wheel and tire on top.

Minimum tire size:

Must exceed the following dimensions

Width:

185 mm (7.28 in.)

Inner diameter:

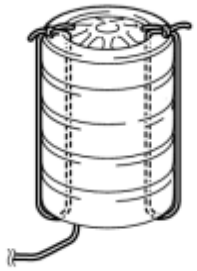
360 mm (1.18 ft.)

CAUTION:

Do not use tires with wheels except for on the top and bottom.

NOTICE:

- The tires may be damaged by the airbag deployment, so use unneeded tires.
- Do not place the SST connector under the tire because it could be damaged.



(3) Tie the tires together with the 2 wires.

CAUTION:

Make sure that the wires are tight. Looseness in the wires results in the tires breaking loose when the airbag is deployed.

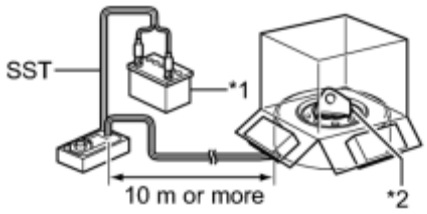
(g) Deploy the airbag.

(1) Connect the red clip of SST to the positive (+) battery terminal and the black clip of SST to the negative (-) battery terminal.

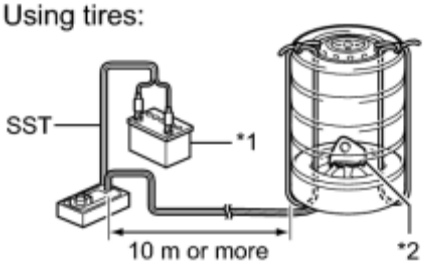
# Text in Illustration

| | |
|---|---|
| *1 | Battery |
| *2 | Steering Pad |

Using a cardboard box:




Using tires:




c

(2) Check that no one is within a 10 m (32.8 ft.) radius of the wheel to which the steering pad is tied.

(3) Press the SST activation switch and deploy the airbag.

CAUTION:

Before deployment, make sure that no one is near the airbag.

HINT:

The airbag is deployed as the LED of the SST activation switch comes on.



(h) Dispose of the steering pad.

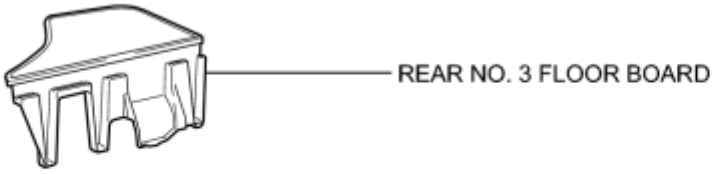
- The steering pad becomes extremely hot when the airbag is deployed, so do not touch it for at least 30 minutes after deployment.
- Use gloves and safety glasses when handling a steering pad with a deployed airbag.
- Do not apply water etc. to a steering pad with a deployed airbag.
- Always wash your hands with water after completing the operation.

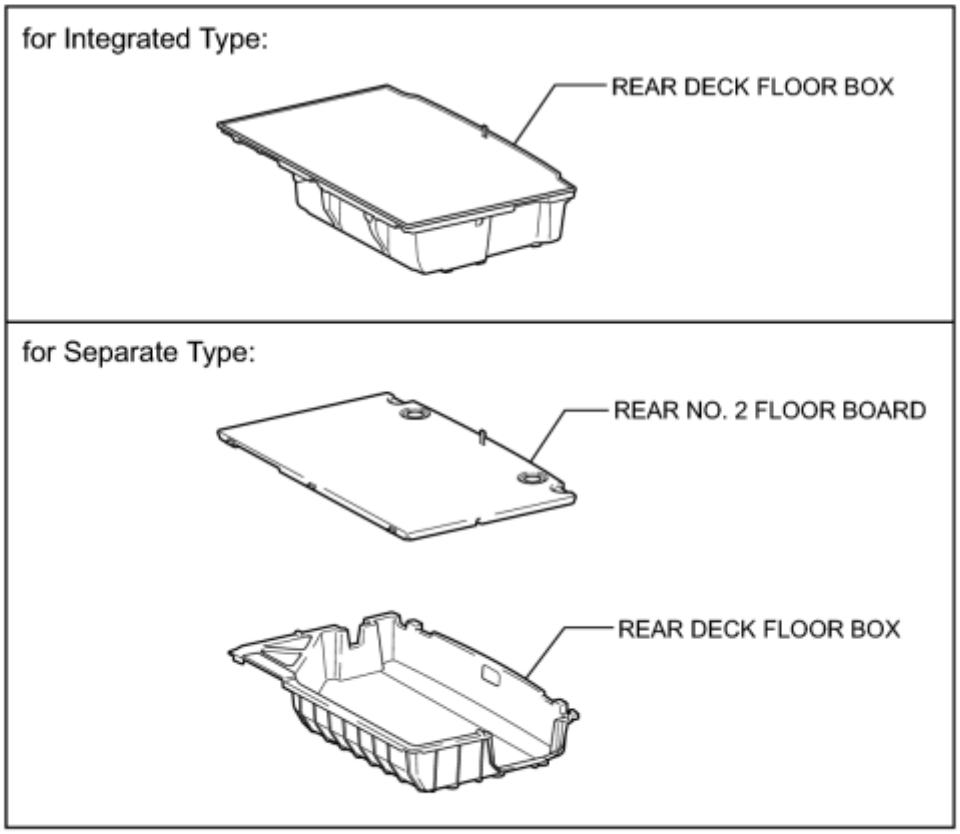
(1) Remove the steering pad from the wheel.

(2) Place the steering pad in a plastic bag, tie it tightly and dispose of it according to local regulations.

# COMPONENTS

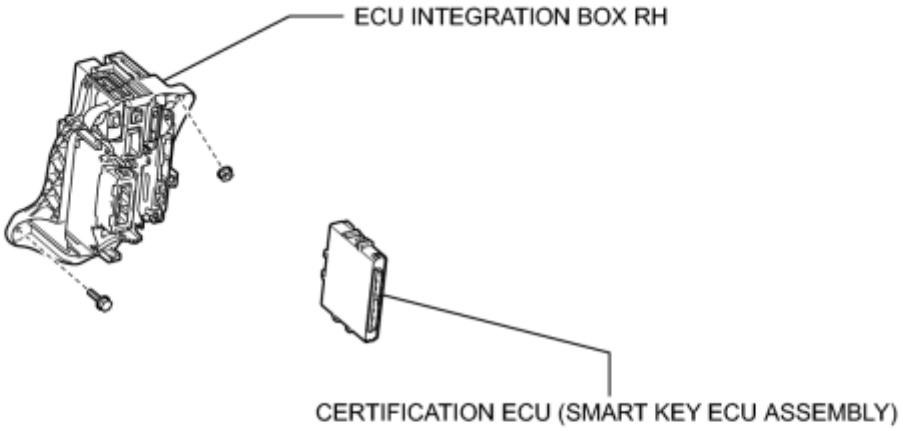
# ILLUSTRATION

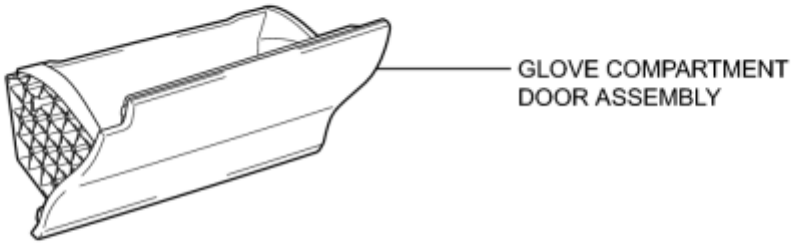



P

# ILLUSTRATION


ECU INTEGRATION BOX RH
CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)


GLOVE COMPARTMENT
DOOR ASSEMBLY


NO. 2 INSTRUMENT PANEL
UNDER COVER SUB-ASSEMBLY

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. DISCONNECT CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

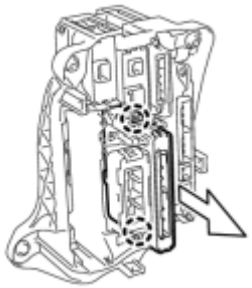
5. REMOVE NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

6. REMOVE GLOVE COMPARTMENT DOOR ASSEMBLY INFO

7. REMOVE ECU INTEGRATION BOX RH INFO

8. REMOVE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

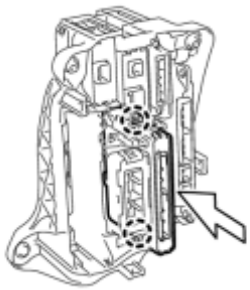
P



(a) Disengage the 2 craws and remove the certification ECU (smart key ECU assembly).

# INSTALLATION

1. INSTALL CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)



P

(a) Engage the 2 craws and install the certification ECU (smart key ECU assembly).

2. INSTALL ECU INTEGRATION BOX RH INFO

3. INSTALL GLOVE COMPARTMENT DOOR ASSEMBLY INFO

4. INSTALL NO. 2 INSTRUMENT PANEL UNDER COVER SUB-ASSEMBLY INFO

5. CONNECT CABLE TO NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable, some systems need to be initialized after the cable is reconnected INFO.

6. INSTALL REAR NO. 3 FLOOR BOARD INFO

7. INSTALL REAR DECK FLOOR BOX INFO

8. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

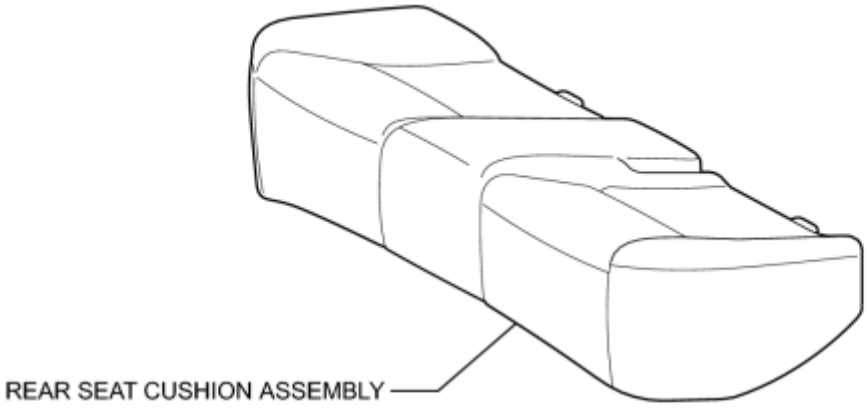
9. REGISTER KEY

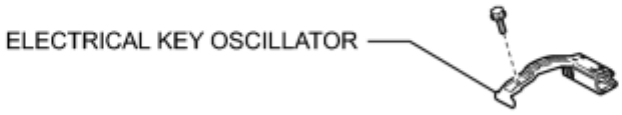
NOTICE:

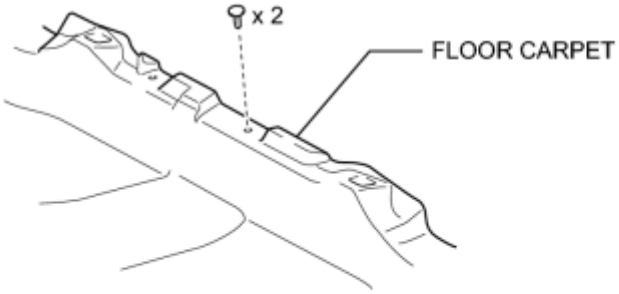
If the certification ECU (smart key ECU assembly) is replaced, register the key INFO.

# COMPONENTS

# ILLUSTRATION



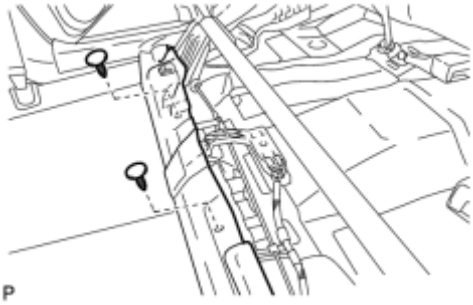




P

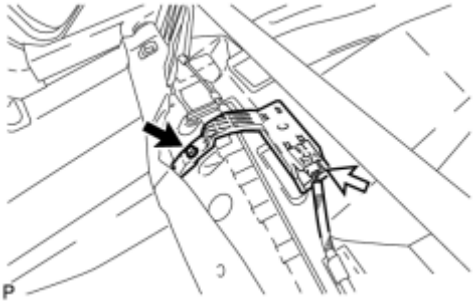
# REMOVAL

1. REMOVE REAR SEAT CUSHION ASSEMBLY INFO

2. REMOVE ELECTRICAL KEY OSCILLATOR



(a) Remove the 2 clips from the floor carpet.



(b) Remove the bolt.

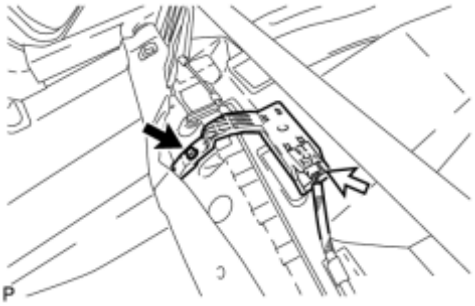
(c) Disconnect the connector and remove the electrical key oscillator.

NOTICE:

Be careful when removing the electrical key oscillator. If the oscillator is dropped, replace it with a new one.

# INSTALLATION

1. INSTALL ELECTRICAL KEY OSCILLATOR

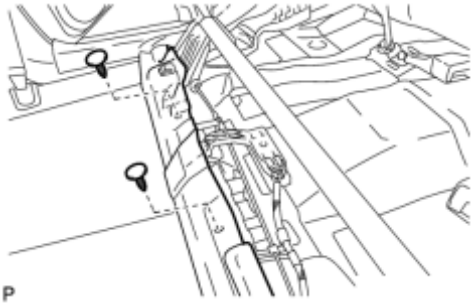


(a) Connect the connector.

(b) Install the electrical key oscillator with the bolt.

NOTICE:

Be careful when installing the electrical key oscillator. If the oscillator is dropped, replace it with a new one.

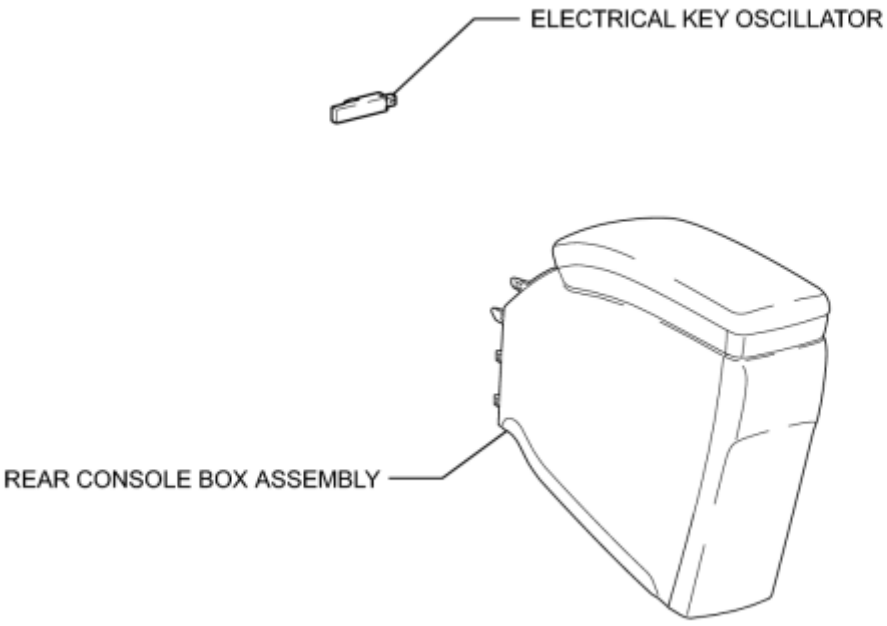


(c) Install the 2 clips to the floor carpet.

2. INSTALL REAR SEAT CUSHION ASSEMBLY INFO

# COMPONENTS

# ILLUSTRATION




P

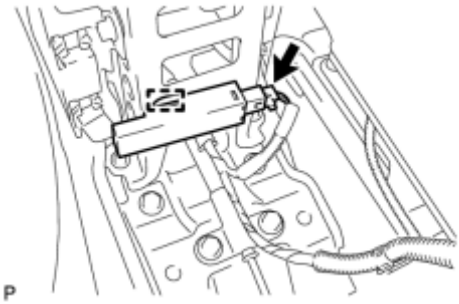
# REMOVAL

1. REMOVE REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure up to Remove Rear Console Box Assembly INFO.

2. REMOVE ELECTRICAL KEY OSCILLATOR




(a) Disconnect the connector.

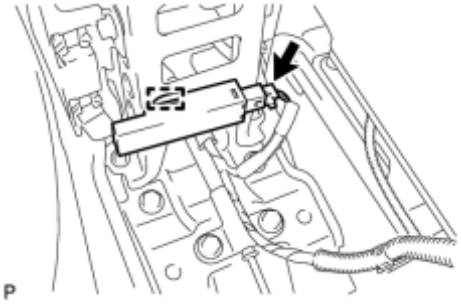
(b) Disengage the clamp and remove the electrical key oscillator.

NOTICE:

Be careful when removing the electrical key oscillator. If the oscillator is dropped, replace it with a new one.

# INSTALLATION

1. INSTALL ELECTRICAL KEY OSCILLATOR




(a) Engage the clamp and install the electrical key oscillator.

NOTICE:

Be careful when installing the electrical key oscillator. If the oscillator is dropped, replace it with a new one.

(b) Connect the connector.

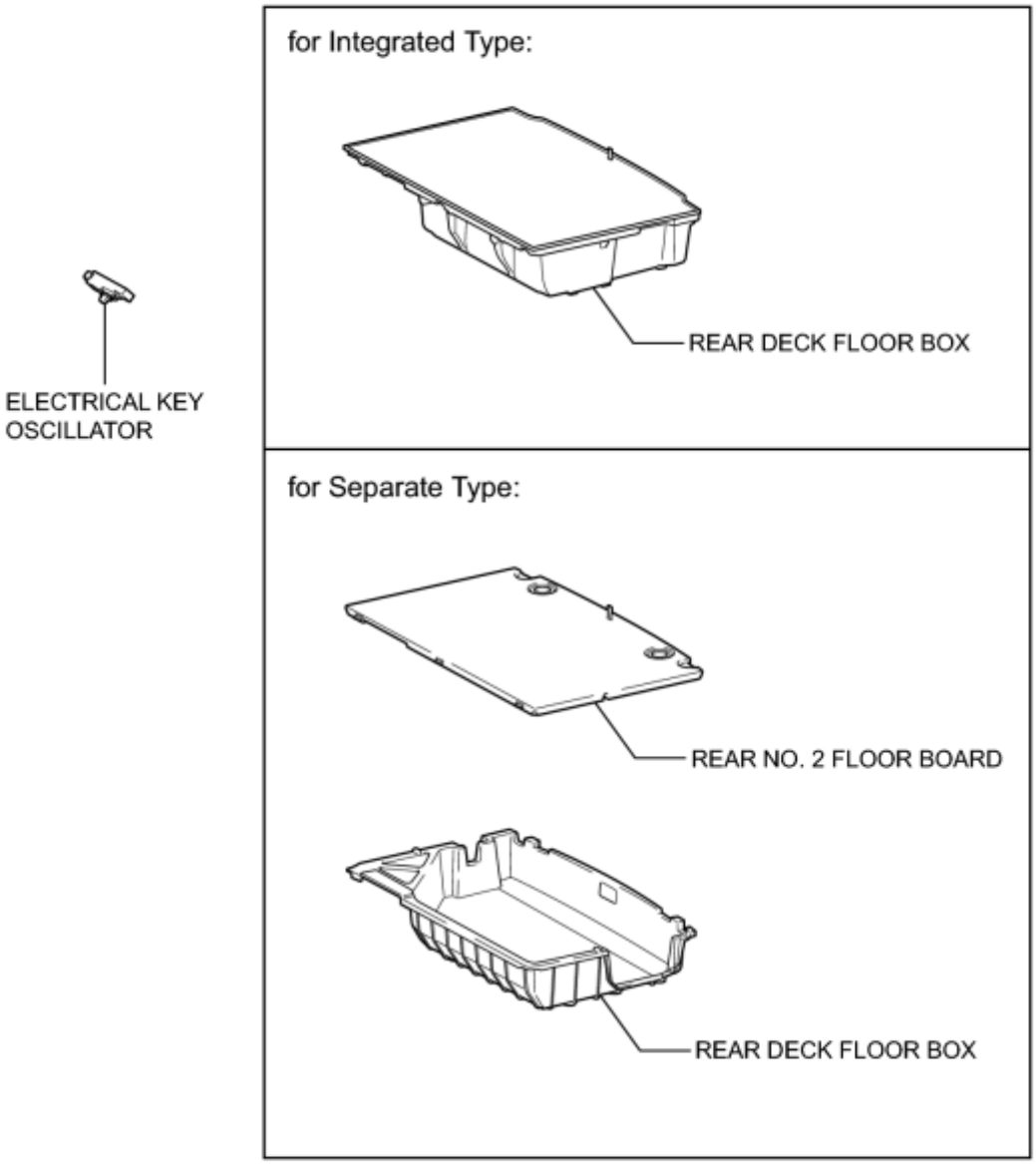
2. INSTALL REAR CONSOLE BOX ASSEMBLY

HINT:

Refer to the procedure from Install Rear Console Box Assembly INFO.

# COMPONENTS

# ILLUSTRATION



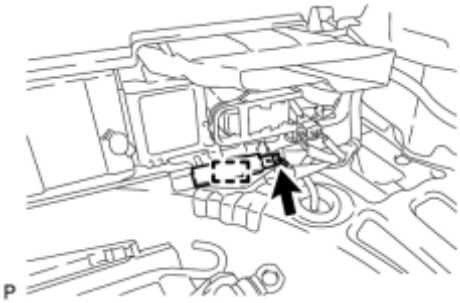

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE ELECTRICAL KEY OSCILLATOR




(a) Disconnect the connector.

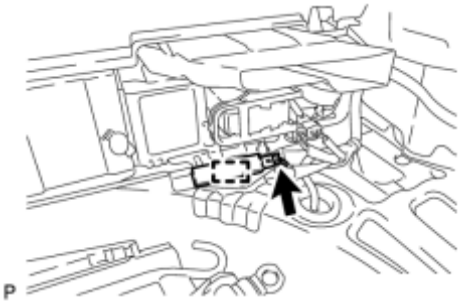
(b) Disengage the clamp and remove the electrical key oscillator.

NOTICE:

Be careful when removing the electrical key oscillator. If the oscillator is dropped, replace it with a new one.

# INSTALLATION

1. INSTALL ELECTRICAL KEY OSCILLATOR




(a) Engage the clamp and install the electrical key oscillator.

NOTICE:

Be careful when installing the electrical key oscillator. If the oscillator is dropped, replace it with a new one.

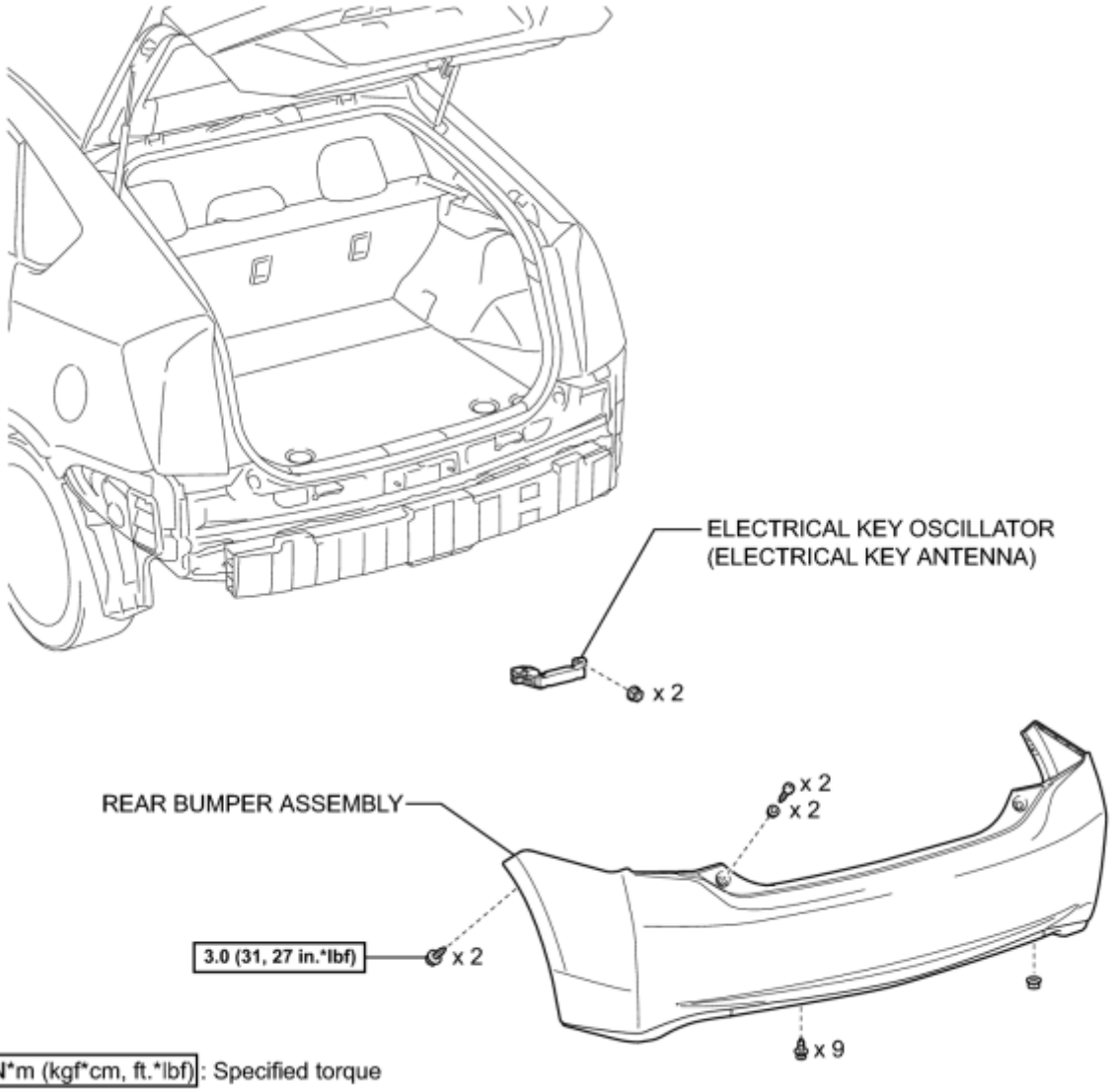
(b) Connect the connector.

2. INSTALL REAR DECK FLOOR BOX INFO

3. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

# COMPONENTS

# ILLUSTRATION

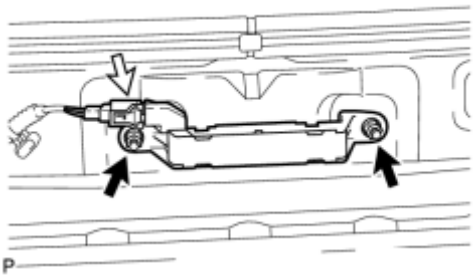



P

# REMOVAL

1. REMOVE REAR BUMPER ASSEMBLY INFO

2. REMOVE ELECTRICAL KEY OSCILLATOR (ELECTRICAL KEY ANTENNA)



(a) Disconnect the connector.

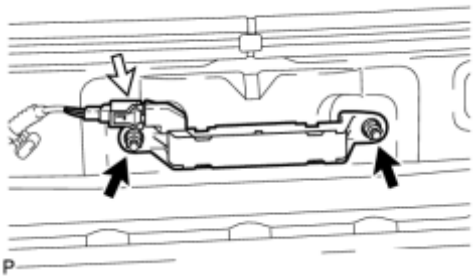
(b) Remove the 2 nuts and electrical key oscillator (electrical key antenna).

NOTICE:

Be careful when removing the electrical key oscillator (electrical key antenna). If the oscillator is dropped, replace it with a new one.

# INSTALLATION

1. INSTALL ELECTRICAL KEY OSCILLATOR (ELECTRICAL KEY ANTENNA)




(a) Install the electrical key oscillator (electrical key antenna) with the 2 nuts.

NOTICE:

Be careful when installing the electrical key oscillator (electrical key antenna). If the oscillator is dropped, replace it with a new one.

(b) Connect the connector.

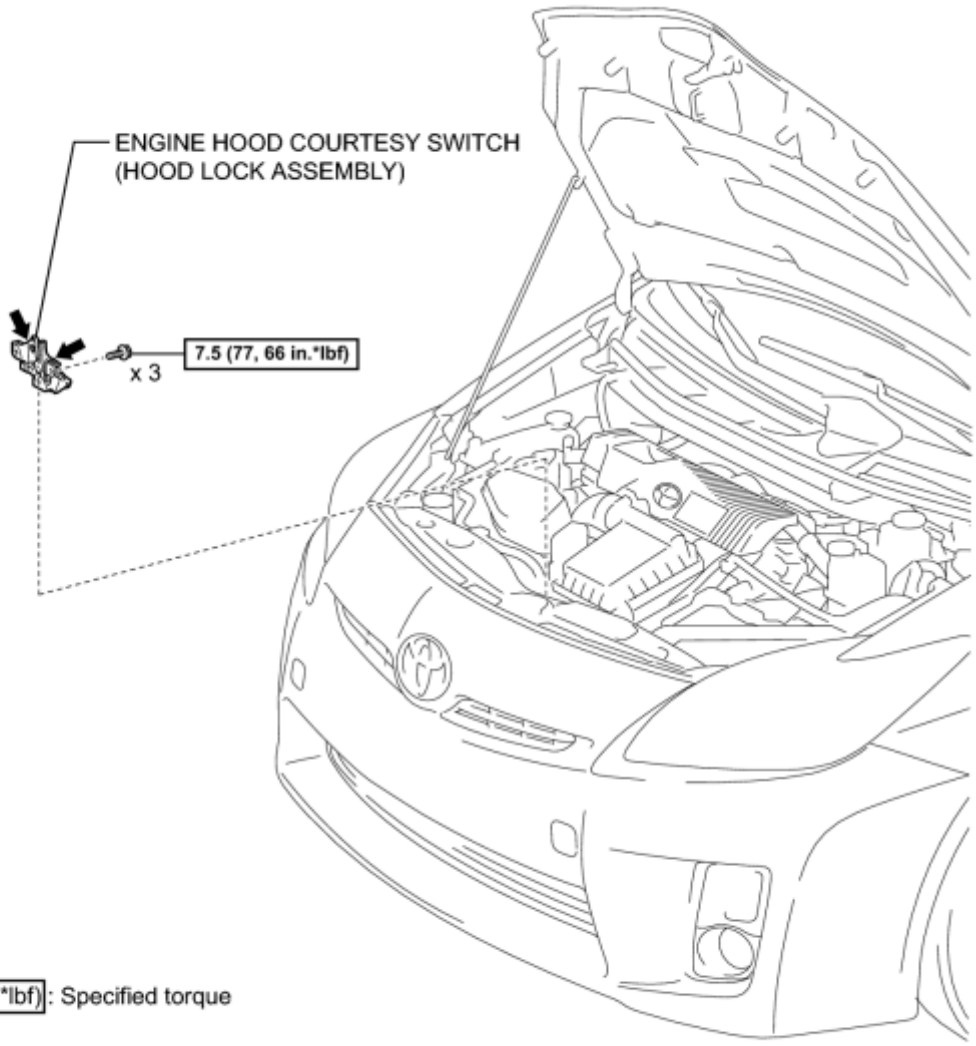
2. INSTALL REAR BUMPER ASSEMBLY INFO

3. BUMPER POSITION SETTING (w/ Advanced Parking Guidance System)

INFO

# COMPONENTS

# ILLUSTRATION




N*m (kgf*cm, ft.*lbf): Specified torque

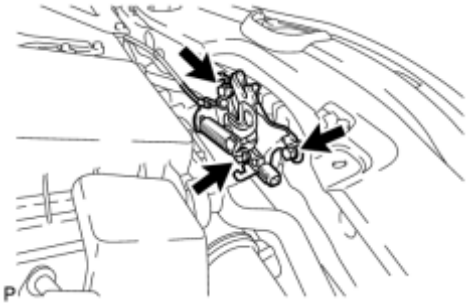
MP Grease

P

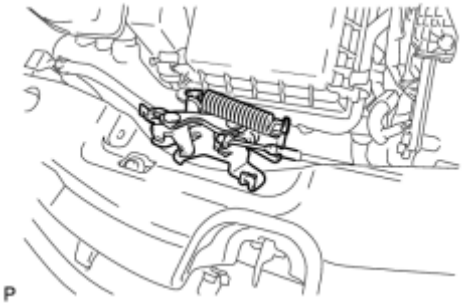
# REMOVAL

1. REMOVE ENGINE HOOD COURTESY SWITCH (HOOD LOCK ASSEMBLY)

(a) Disconnect the connector.



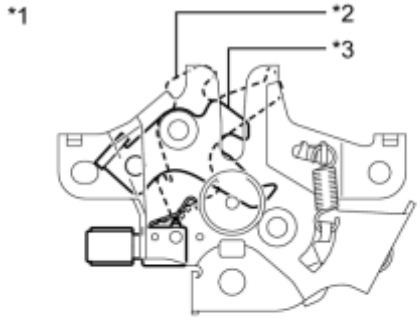
(b) Remove the 3 bolts.



(c) Disconnect the hood lock control cable and remove the hood lock assembly.

# INSPECTION

1. INSPECT ENGINE HOOD COURTESY SWITCH







P

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Locked | Below 1 Ω |
| 1 - 2 | Unlocked | 10 kΩ or higher |

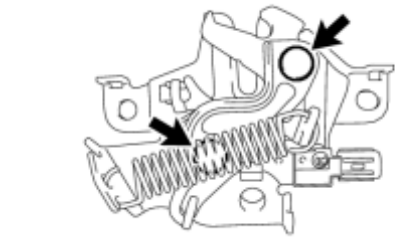
## Text in illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Hood Lock Assembly (Engine Hood Courtesy Switch)) |
| *2 | Unlock |
| *3 | Lock |

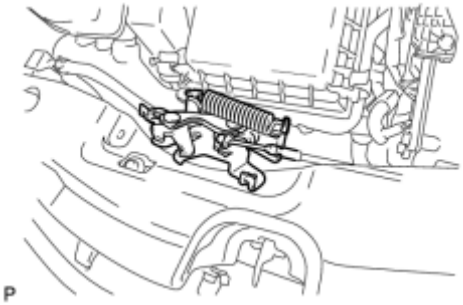
If the result is not as specified, replace the hood lock assembly.

# INSTALLATION

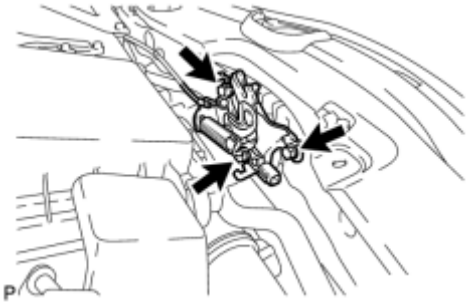
1. INSTALL ENGINE HOOD COURTESY SWITCH (HOOD LOCK ASSEMBLY)




(a) Apply MP grease to the sliding areas of the hood lock assembly.




(b) Connect the hood lock control cable assembly.




(c) Install the hood lock assembly with the 3 bolts.

Torque: **7.5 N·m (77 kgf·cm, 66in·lbf)**

(d) Connect the connector.

2. INSPECT HOOD SUB-ASSEMBLY INFO

3. ADJUST HOOD SUB-ASSEMBLY INFO

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected:

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. PRECAUTIONS WHEN USING TECHSTREAM

(a) When using the Techstream to troubleshoot the engine immobiliser system:

Connect the Techstream to the DLC3 while the power switch is off, and turn a door courtesy light switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

3. PRECAUTIONS FOR EACH FUNCTION

(a) Precautions for the key:

The key is a precision instrument. Be sure to observe the following:

(1) Do not drop the key, subject it to strong shocks or bend it.

(2) Do not keep the key in a high temperature area for a long time.

(3) Do not get the key wet or wash it in an ultrasonic washer etc.

(4) Keep the key away from magnets or magnetized items during use.

(5) Do not disassemble the key except when replacing the battery.

(6) Do not place the key near objects that produce magnetic fields such as TVs, audio systems and electrical ranges, or electrical medical equipment such as low-frequency therapy instruments.

(b) Precautions for the engine immobiliser system inspection:

(1) Make sure to carry the key.

(2) All registered keys for the vehicle should be available when repairing or diagnosing the engine immobiliser system.

4. PRECAUTIONS FOR BATTERY

(a) Immediately after removing and reinstalling the battery, doors may not be unlocked by the smart key system. In this case, lock and unlock the doors using the door control transmitter. Then, it will be possible to unlock doors using the smart key system.

(b) When the battery is fully depleted and it is recharged using another vehicle battery, start the hybrid vehicle control system by performing the following:

(1) Push the P position switch.

(2) Turn the power switch off, open and close the driver door once.

(3) Start the hybrid vehicle control system (turn the power switch on (READY)).

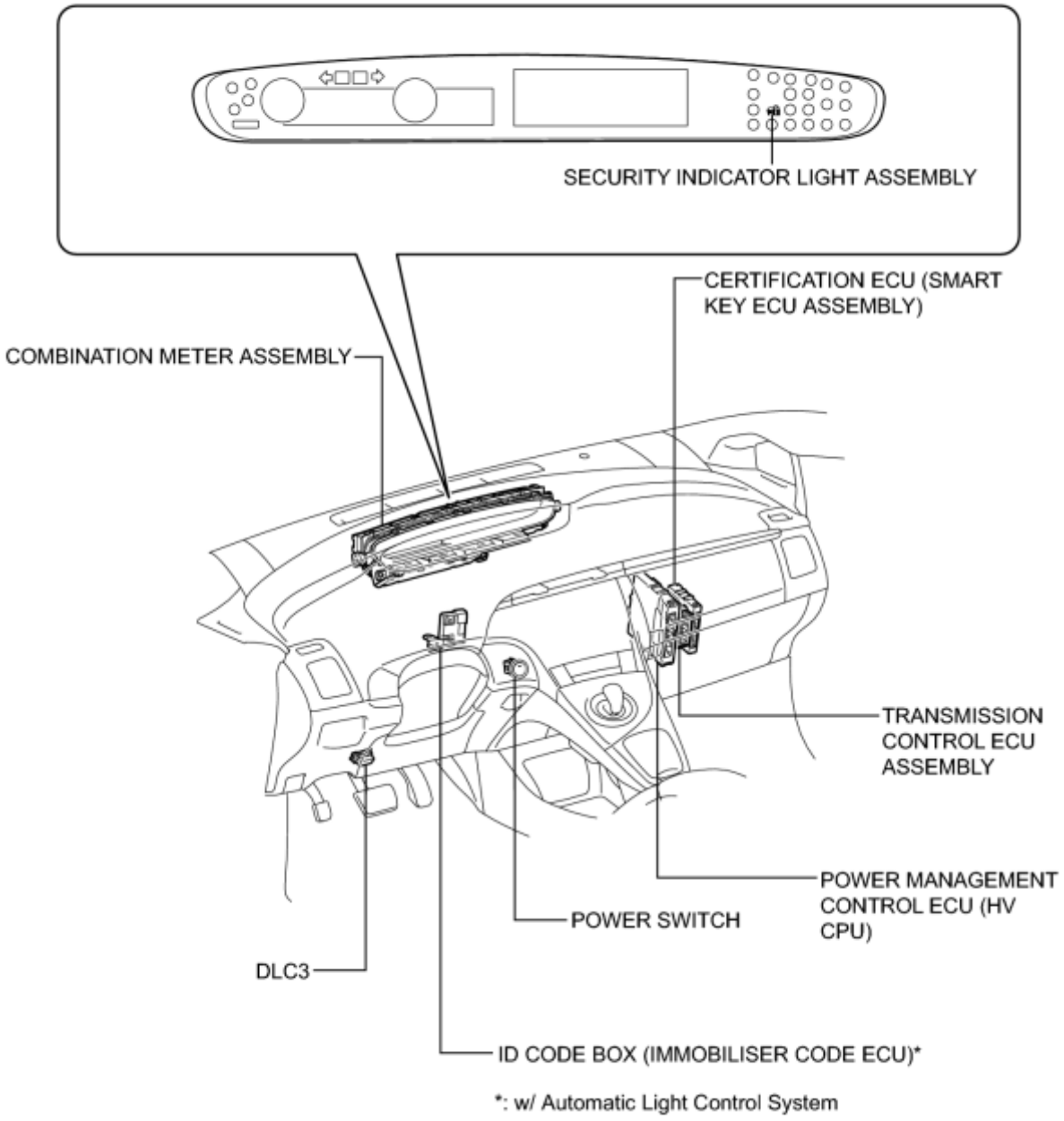
(c) When starting the hybrid vehicle control system after removing and installing the battery, open and close the driver door and wait 10 seconds before starting the system.

HINT:

If the hybrid vehicle control system does not start the first time after removing and installing the battery, the hybrid vehicle control system will start normally from the second time onward.

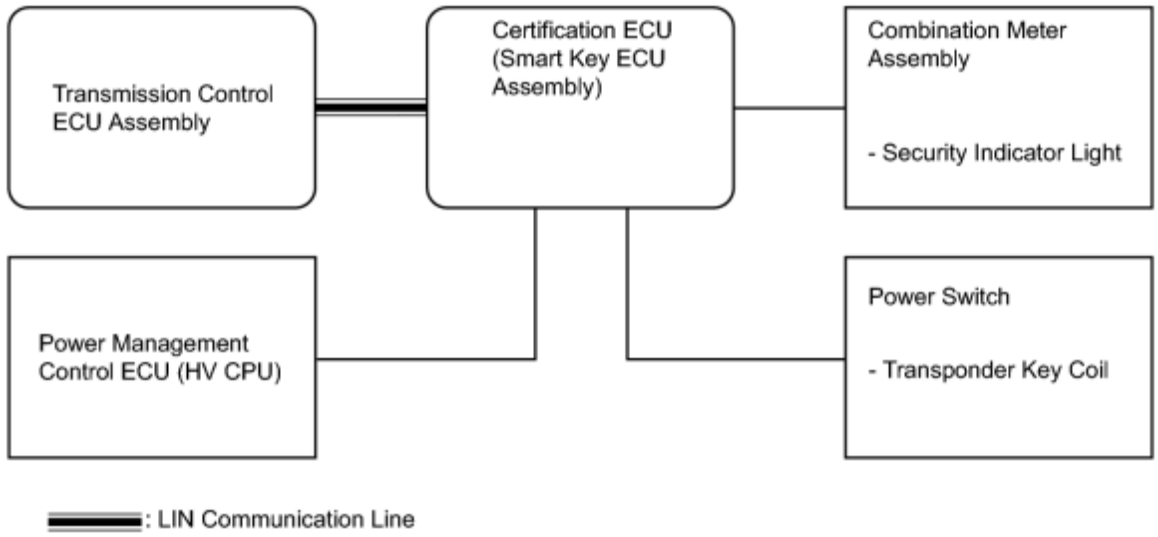
# PARTS LOCATION

# ILLUSTRATION



# SYSTEM DIAGRAM

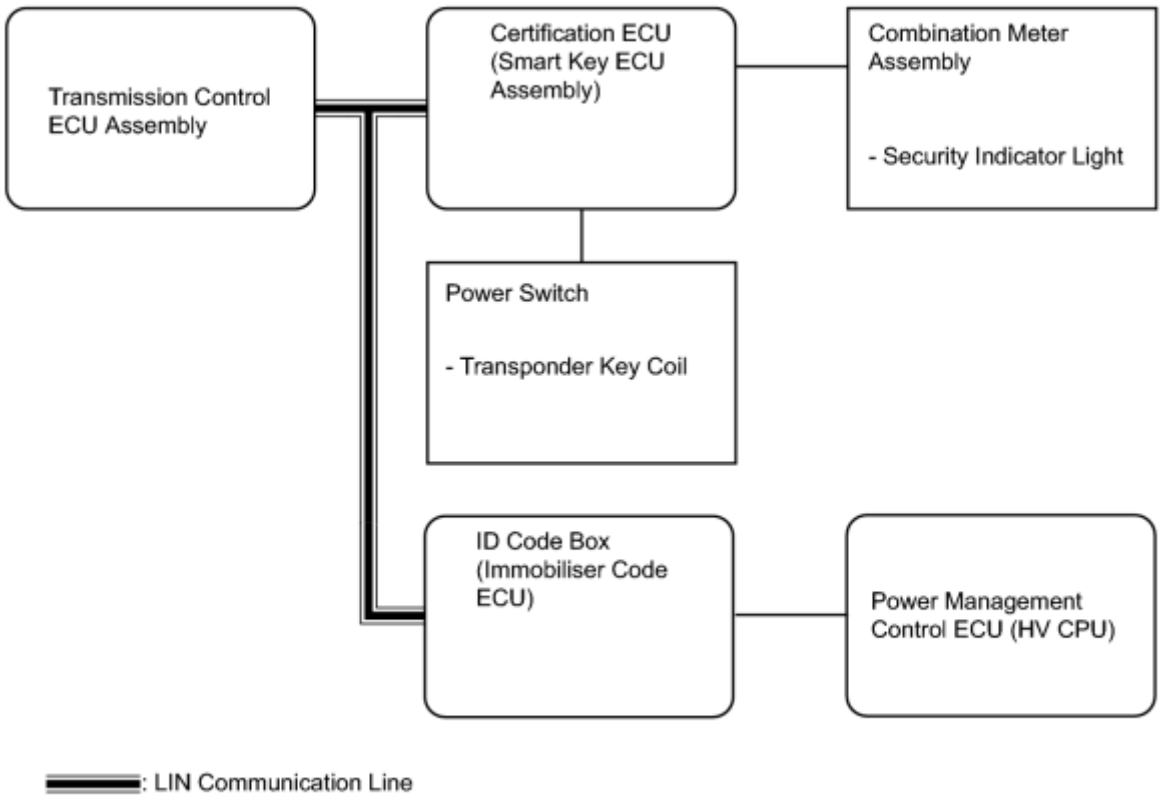
1. w/o Automatic Light Control System




***Communication Table***

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Communication Method |
|---|---|---|---|
| Certification ECU (Smart key ECU assembly) | Transmission control ECU assembly | L code registration mode signal | LIN |
| Transmission control ECU assembly | Certification ECU (Smart key ECU assembly) | L code registration condition signal | LIN |
| | | L code certification condition signal | |
| | | Engine start condition signal | |

2. w/ Automatic Light Control System




### *Communication Table*

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Communication Method |
|---|---|---|---|
| Certification ECU (Smart key ECU assembly) | ID code box (Immobiliser code ECU) | 3 bit code transmit request signal | LIN |
| | | S code registration mode signal | |
| | | S code certification condition signal | |
| | Transmission control ECU assembly | L code registration mode signal | LIN |
| ID code box (Immobiliser code ECU) | Certification ECU (Smart key ECU assembly) | Engine start permission receive condition signal | LIN |
| | | 3 bit code transmit request receive condition signal | |
| | | S code certification result signal | |
| | | L code certification result | |

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Communication Method |
|---|---|---|---|
| | | signal | |
| | | S code registration mode signal | |
| | | S code registration condition signal | |
| | Transmission control ECU assembly | L code registration condition signal | LIN |
| | • Certification ECU (Smart key ECU assembly)<br>• Transmission control ECU assembly | L code registration mode signal | LIN |
| Transmission control ECU assembly | Certification ECU (Smart key ECU assembly) | L code registration condition signal | LIN |
| | | Engine start condition signal | |
| | ID code box (Immobiliser code ECU) | L code certification condition signal | LIN |

# SYSTEM DESCRIPTION

1. ENGINE IMMOBILISER SYSTEM DESCRIPTION

The immobiliser system is a theft deterrent system that determines whether to disable starting of the hybrid vehicle control system based on a comparison of the key ID code and vehicle pre-registered code. The immobiliser system compares the certification ECU (smart key ECU assembly) preregistered ID code with the ID of the key-embedded transponder chip. If the ID codes do not match, the immobiliser system is activated and the hybrid vehicle control system cannot be started.

2. FUNCTION OF MAIN COMPONENTS

| Component | Outline |
|---|---|
| Power switch | Informs the driver of any power source or system abnormality through the illumination stage of the indicator light. |
| Transponder key coil (built into the power switch) | Receives the ID code and transmits it to the certification ECU (smart key ECU assembly) when the key battery is too weak to respond to the tuner based on signals from the room oscillators. |
| Key | Receives the signals from the oscillators and returns the ID code to the door control receiver. |
| Certification ECU (smart key ECU assembly) | • Certifies the ID code received from the door control receiver.<br>• Transmits the engine immobiliser set/unset request signals.<br>• Certifies immobiliser disengage signals, and transmits each disengage signal to the hybrid vehicle control system.*1 |
| ID code box (immobiliser code ECU)*2 | Receives the immobiliser disengage signals from the certification ECU (smart key ECU assembly), certifies them, and transmits each disengage signal to the hybrid vehicle control system. |
| Power management control ECU (HV CPU) | Receives the signal from the certification ECU (smart key ECU assembly), and performs hybrid vehicle control system. |
| Transmission control ECU Assembly | Registers the ID verification code.<br><br>Outputs the P position signal or Not P position signal to the power management control ECU. |
| Indoor electrical key oscillator<br><br>• Front, Center, Rear | Transmits key detection signals within the detection area in the cabin upon receiving a transmission request signal from the certification ECU (smart key ECU assembly).<br><br>A certification ECU (smart key ECU assembly) request signal is activated when the key is brought into the cabin and the power switch is pushed or brake pedal is depressed. |
| Door control receiver | Receives an ID code from the key in the detection area and transmits it to the certification ECU (smart key ECU assembly). |
| Combination meter assembly<br><br>• Security indicator | Illuminates or flashes.<br><br>Illumination is controlled by the certification ECU (smart key ECU assembly). |

| Component | Outline |
| --- | --- |
| light | |

- *1: w/o Automatic Light Control System
- *2 w/ Automatic Light Control System

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the engine immobiliser system.
- *: Using the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

HINT:

- When troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | POWER SWITCH ON (IG) |

NEXT

| | |
|---|---|
| 5. | INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| ECU is connected, communication is normal | A |
| ECU is connected, communication is abnormal | B |

B INFO GO TO CAN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 6. | INSPECT COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the LIN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| No DTC is output | A |
| DTC is output<br><br>(DTC B2287, B2785, B2786, B2789 or B278C) | B |

B INFO GO TO LIN COMMUNICATION SYSTEM

A

| | |
|---|---|
| 7. | CHECK FOR DTCS (ENGINE IMMOBILISER SYSTEM)* |

(a) Check for DTCs and note any codes that are output.

(b) Clear the DTCs INFO.

(c) Recheck for DTCs. Based on the DTCs output above, try to duplicate the engine immobiliser system DTC by simulating the symptoms indicated by the DTCs.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output | A |
| Engine immobiliser system DTC is output | B |

B INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

A

| | |
|---|---|
| 8. | CHECK FOR DTCS (HYBRID VEHICLE CONTROL SYSTEM)* |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

HINT:

The DTCs for the engine immobiliser system are specified above. If other codes are output, check the DTC chart for the hybrid vehicle control system.

Result:

| Result | Proceed to |
|---|---|
| No DTCs are output | A |
| Engine immobiliser system DTC is output (DTC B2799, B279A or B279C) | B |
| Hybrid vehicle control system DTC is output (except DTC B2799, B279A and B279C) | C |

B ▶ INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

C ▶ INFO GO TO HYBRID VEHICLE CONTROL SYSTEM

A ▼

| | |
|---|---|
| 9. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B ▶ Go to step 11

A ▼

| | |
|---|---|
| 10. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Data List / Active Test INFO

(b) Terminals of ECU INFO

NEXT ▼

| | |
|---|---|
| 11. | REPAIR OR REPLACE |

NEXT ▼

| | |
|---|---|
| 12. | CONFIRMATION TEST |

NEXT ▶ **END**

# REGISTRATION

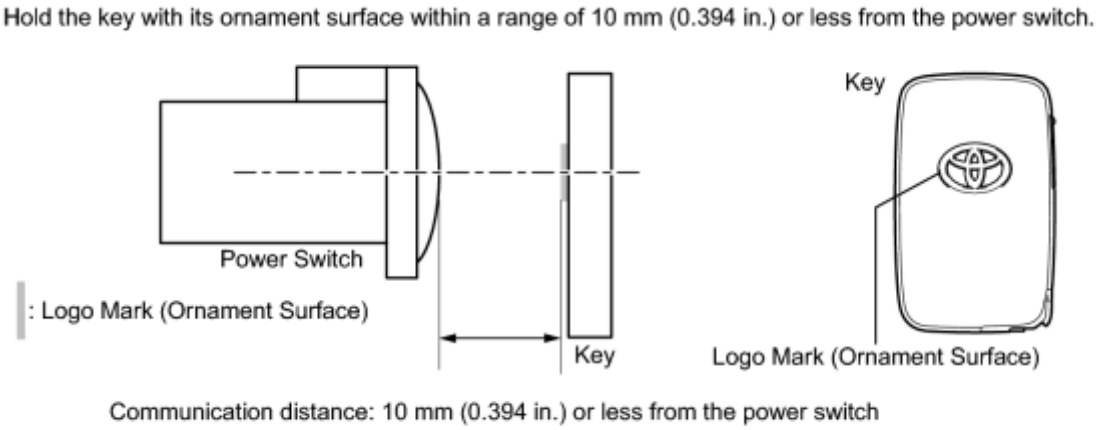
1. DESCRIPTION OF CODE REGISTRATION

HINT:

- The ID codes are the same as recognition codes for the wireless transmitter and engine immobiliser function. Registering an ID code enables the smart key system, the wireless door lock control function and the engine immobiliser function to be operated.
- Code registration is necessary when the certification ECU (smart key ECU assembly), ID code box (immobiliser code ECU)*, transmission control ECU assembly or key is replaced with a new one.

  *: w/ Automatic Light Control System

(a) When registering a key, bring the key close to the power switch as shown in the illustration.




2. KEY REGISTRATION PROCEDURES WHEN ADDING OR REPLACING KEY OR WHEN KEY IS LOST

HINT:

- The following procedures require the use of the Techstream:

  - New key ID registration

- A maximum of 7 keys can be registered.

| | Registration Procedure Condition | Procedure | Refer to |
|---|---|---|---|
| Registering an additional key | Customer must bring at least 1 key | 1. Register additional keys as necessary (additional key ID registration) | PROCEDURE "C" |

| | Registration Procedure Condition | Procedure | Refer to |
|---|---|---|---|
| • Replacing a key<br>• Making a lost key unable<br><br>HINT:<br><br>After key ID erasure, any remaining keys that are not registered at this time cannot be used. Therefore, after key ID erasure, register all remaining keys. | Customer must bring at least 1 key | 1. Using remaining keys, clear all registered keys except one (key ID erasure) | PROCEDURE "D" |
| | | 2. Register additional keys as necessary (additional key ID registration) | PROCEDURE "C" |
| All keys are lost | - | 1. Reset all keys (all keys ID erasure (key code reset)) | PROCEDURE "E" |
| | | 2. Register all keys (new key ID registration) | PROCEDURE "A" |

3. PART REPLACEMENT AND KEY REGISTRATION PROCEDURES

(a) The following table shows ECU replacement and key registration procedures for cases in which a malfunctioning ECU has been identified through the troubleshooting of the smart key system.

HINT:

- The following procedures can be performed:
  - New key ID registration
  - Additional key ID registration
  - Key ID erasure
  - All key ID erasure
  - ECU code registration
- If the customer has not brought all the registered keys, replacement of the transmission control ECU assembly*1 or ID code box (immobiliser code ECU)*2 is also required.
  - *1: w/o Automatic Light Control System
  - *2: w/ Automatic Light Control System
- A maximum of 7 keys can be registered.

***w/o Automatic Light Control System***

| Malfunctioning ECU | Condition | | Procedure | Reference |
|---|---|---|---|---|
| Certification ECU (Smart key ECU assembly) | Customer has brought all keys | | 1. Replace certification ECU (smart key ECU assembly) | - |
| | | | 2. Reregister all keys (new key ID registration) | PROCEDURE "B" |
| | | | 3. Register ECU communication ID | PROCEDURE "G" |
| | Some keys are lost | Key ID codes can be registered and erased | 1. Erase key codes (key ID erasure) | PROCEDURE "D" |
| | | | 2. Perform additional key registration | PROCEDURE |

| Malfunctioning ECU | Condition | | Procedure | Reference |
|---|---|---|---|---|
| | | | procedure (additional key ID registration) | "C" |
| | | | 3. Replace certification ECU (smart key ECU assembly) | - |
| | | | 4. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "B" |
| | | | 5. Register ECU communication ID | PROCEDURE "G" |
| | | Key ID codes cannot be either registered or erased | 1. Replace certification ECU (smart key ECU assembly) | - |
| | | | 2. Replace transmission control ECU assembly | - |
| | | | 3. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "A" |
| | | | 4. Register ECU communication ID | PROCEDURE "G" |
| Certification ECU (Smart key ECU assembly) | All keys are lost | | 1. Replace certification ECU (smart key ECU assembly) | - |
| | | | 2. Replace transmission control ECU assembly | - |
| | | | 3. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "A" |
| | | | 4. Register ECU communication ID | PROCEDURE "G" |
| Transmission control ECU assembly | Customer has brought at least 1 key | | 1. Replace transmission control ECU assembly | - |
| | | | 2. Register additional keys as necessary | PROCEDURE |

| Malfunctioning ECU | Condition | Procedure | Reference |
|---|---|---|---|
| | | (additional key ID registration) | "C" |
| | All keys are lost | 1. Replace transmission control ECU assembly | - |
| | | 2. Replace certification ECU (smart key ECU assembly) | - |
| | | 3. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "A" |
| | | 4. Register ECU communication ID | PROCEDURE "G" |
| Power management control ECU | No condition required | Replace power management control ECU | - |

*w/ Automatic Light Control System*

| Malfunctioning ECU | Condition | | Procedure | Reference |
|---|---|---|---|---|
| Certification ECU (Smart key ECU assembly) | Customer has brought all keys | | 1. Replace certification ECU (smart key ECU assembly) | - |
| | | | 2. Reregister all keys (new key ID registration) | PROCEDURE "B" |
| | Some keys are lost | Key ID codes can be registered and erased | 1. Erase key codes (key ID erasure) | PROCEDURE "D" |
| | | | 2. Perform additional key registration procedure (additional key ID registration) | PROCEDURE "C" |
| | | | 3. Replace certification ECU (smart key ECU assembly) | - |
| | | | 4. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "B" |
| | | Key ID codes cannot be either registered or erased | 1. Replace certification ECU (smart key ECU assembly) | - |
| | | | 2. Replace ID code box (immobiliser code ECU) | - |
| | | | 3. Reregister all keys (new key ID | PROCEDURE "A" |

| Malfunctioning ECU | Condition | Procedure | Reference |
|---|---|---|---|
| | | registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | |
| | | 4. Register ECU communication ID | PROCEDURE "G" |
| Certification ECU (Smart key ECU assembly) | All keys are lost | 1. Replace certification ECU (smart key ECU assembly) | - |
| | | 2. Replace ID code box (immobiliser code ECU) | - |
| | | 3. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "A" |
| | | 4. Register ECU communication ID | PROCEDURE "G" |
| ID code box (Immobiliser code ECU) | Customer has brought at least 1 key | 1. Replace ID code box (immobiliser code ECU) | - |
| | | 2. Register recognition codes in ECUs (ECU code registration) | PROCEDURE "F" |
| | | 3. Register ECU communication ID | PROCEDURE "G" |
| | All keys are lost | 1. Replace ID code box (immobiliser code ECU) | - |
| | | 2. Replace certification ECU (smart key ECU assembly) | - |
| | | 3. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "A" |
| | | 4. Register ECU communication ID | PROCEDURE "G" |
| Transmission control ECU assembly | Customer has brought at least 1 key | 1. Replace transmission control ECU assembly | - |

| Malfunctioning ECU | Condition | Procedure | Reference |
|---|---|---|---|
| | | 2. Register recognition codes in ECUs (ECU code registration) | PROCEDURE "F" |
| | All keys are lost | 1. Replace transmission control ECU assembly | - |
| | | 2. Replace certification ECU (smart key ECU assembly) | - |
| | | 3. Replace ID code box (immobiliser code ECU) | - |
| | | 4. Reregister all keys (new key ID registration)<br><br>HINT:<br><br>If some keys are not registered during the above steps, they will be disabled because they cannot be registered later. | PROCEDURE "A" |
| | | 4. Register ECU communication ID | PROCEDURE "G" |
| Power management control ECU | No condition required | Replace power management control ECU | - |

4. KEY REGISTRATION

(a) PROCEDURE "A"

New key ID registration (when replacing the certification ECU (smart key ECU assembly) and transmission control ECU assembly*1, or certification ECU (smart key ECU assembly) and ID code box (immobiliser code ECU)*2, or when replacing the certification ECU (smart key ECU assembly), ID code box (immobiliser code ECU) and transmission control ECU assembly*2)

- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System

| Process | Procedure |
|---|---|
| 1. Start of registration | 1. Connect the Techstream to DLC3<br>2. Turn the power switch on (IG)<br>3. Enter the following menus: Body Electrical / Smart Key / Utility / Smart Code Registration<br><br>HINT:<br><br>The power switch cannot be turned on (IG) more than 10 times. After connecting the Techstream, turn the Techstream on while turning the driver door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure. |
| 2. Confirmation of ECU code | • Perform operation according to prompts on the Techstream screen |

| Process | Procedure |
|---|---|
| | HINT:<br><br>Mode is automatically selected by the Techstream (new registration mode or add mode). |
| 3. Verification of unregistered key*1 | 1. Hold the unregistered key close to the power switch (for details, refer to Description of Code Registration)<br>2. Confirm that the wireless door lock buzzer sounds once (short beep)<br>3. Place the unregistered key on the driver seat<br>4. Confirm that the wireless door lock buzzer sounds once (short beep) |
| 4. Registration of ID code | • Perform operation according to prompts on the Techstream screen |
| 5. End of registration | • Finish new key ID code registration |

- *1: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform the registration procedures again from process 1. Make sure that only 1 key is in the cabin during the registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(b) PROCEDURE "B"

New key ID registration (when replacing the certification ECU (smart key ECU assembly))

| Process | Procedure |
|---|---|
| 1. Start of registration | 1. Connect the Techstream to DLC3<br>2. Turn the power switch on (IG)<br>3. Enter the following menus: Body Electrical / Smart Key / Utility / Smart Code Registration<br><br>HINT:<br><br>The power switch cannot be turned on (IG) more than 10 times. After connecting the Techstream, turn the Techstream on while turning the driver door courtesy light switch on and off repeatedly at 1.5-second intervals or less to continue key registration procedure. |
| 2. Confirmation of ECU code | • Perform operation according to prompts on the Techstream screen<br><br>HINT:<br><br>Mode is automatically selected by the Techstream (new registration mode or add mode). |
| 3. Confirmation of all registered keys*1 | 1. Hold the registered key close to the power switch (for details, refer to Description of Code Registration)<br>2. Confirm that wireless door lock buzzer sounds once (short beep) |
| 4. Confirmation of ECU code | • Perform operation according to prompts on the Techstream screen |
| 5. Verification of unregistered key*2 | 1. Hold the unregistered key close to the power switch (for details, refer to Description of Code Registration)<br>2. Confirm that the wireless door lock buzzer sounds once (short beep) |

| Process | Procedure |
|---|---|
| | 3. Place the unregistered key on the driver seat<br>4. Confirm that the wireless door lock buzzer sounds once (short beep) |
| 6. Registration of ID code | • Perform operation according to prompts on the Techstream screen |
| 7. End of registration | • Finish new key ID code registration |

- *1: Repeat this process for each key which is not to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform the registration procedures again from process 1. If the key confirmation procedure for a key is performed, the security indicator light comes on and remains on until all the keys are confirmed.

- *2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform the registration procedures again from process 1. Make sure that only 1 key is in the cabin during the registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(c) PROCEDURE "C"

Additional key ID registration

| Process | Procedure |
|---|---|
| 1. Start of registration | 1. Connect the Techstream to DLC3<br>2. Turn the power switch on (IG)<br>3. Enter the following menus: Body Electrical / Smart Key / Utility / Smart Code Registration |
| 2. Confirmation of registered key*1 | 1. Perform operation according to prompts on the Techstream screen<br><br>HINT:<br><br>Mode is automatically selected by the Techstream (new registration mode or add mode)<br><br>2. Hold the registered key close to the power switch (for details, refer to Description of Code Registration)<br>3. Confirm that the wireless door lock buzzer sounds once (short beep) |
| 3. Confirmation of ECU code | • Perform operation according to prompts on the Techstream screen |
| 4. Verification of unregistered key*2 | 1. Hold the unregistered key close to the power switch (for details, refer to Description of Code Registration)<br>2. Confirm that the wireless door lock buzzer sounds once (short beep)<br>3. Place the unregistered key on driver seat<br>4. Confirm that the wireless door lock buzzer sounds once (short beep) |

| Process | Procedure |
|---|---|
| 5. Registration of ID code | • Perform operation according to prompts on the Techstream screen |
| 6. End of registration | • Finish additional key ID code registration |

• *1: Perform this process for one of the keys which are to be registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform the registration procedures again from process 1.

• *2: Repeat this process for each key which is to be registered for the vehicle. Finish the procedure for each key within 30 seconds. If the procedure for any of the keys has not been finished within the specified time, perform the registration procedures again from process 1. Make sure that only 1 key is in the cabin during the registration procedures. If 2 or more keys are in the cabin simultaneously, electric waves will interfere with each other, preventing normal registration.

(d) PROCEDURE "D"

Key ID erasure

HINT:

Procedure "D" erases all registered key codes except one.

| Process | Procedure |
|---|---|
| 1. Start of erasure | 1. Connect the Techstream to DLC3<br>2. Turn the power switch on (IG)<br>3. Enter the following menus: Body Electrical / Smart Key / Utility / Smart Code Erasure |
| 2. Confirmation of registered key*1<br><br>HINT:<br><br>Select the key that will not be erased. | 1. Perform operation according to prompts on the Techstream screen<br>2. Hold the registered key close to the power switch (for details, refer to Description of Code Registration)<br>3. Confirm that the wireless door lock buzzer sounds once (short beep) |
| 3. Confirmation of ECU code | • Perform operation according to prompts on the Techstream screen |
| 4. Erasure of ID code | • Perform operation according to prompts on the Techstream screen |
| 5. End of erasure | • Finish key ID code erasure |

• *1: Perform this process for one of the keys which are to be registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform the erasure procedure again from process 1.

(e) PROCEDURE "E"

All key ID erasure

HINT:

Procedure "E" erases all the key codes registered in the vehicle.

| Process | Procedure |
|---|---|
| 1. Start of erasure | 1. Connect the Techstream to DLC3<br>2. Turn the power switch on (IG)<br>3. Turn the Techstream on while turning driver door courtesy light switch on and off repeatedly at 1.5-second intervals or less<br>4. Enter the following menus: Body Electrical / Smart Key / Utility / Smart Code Rest<br>5. Read the "Seed Number" of the Techstream screen and input into TIS<br>6. Input the "Pass-Code Number" sent from TIS according to the Techstream screen |
| 2. Confirmation of ECU code | • Perform operation according to prompts on the Techstream screen |
| 3. Erasure of ID code | • Perform operation according to prompts on the Techstream screen Wait for 15 minutes |
| 4. End of erasure | • Finish key ID code erasure |

(f) PROCEDURE "F"

ECU code registration

| Process | Procedure |
|---|---|
| 1. Start of registration | 1. Connect the Techstream to DLC3<br>2. Turn the power switch on (IG)<br>3. Enter the following menus: Body Electrical / Smart Key / Utility / ECU Communication ID Registration / ID Code Box and Steering Lock |
| 2. Confirmation of registered key*1 | 1. Hold the registered key close to the power switch (for details, refer to Description of Code Registration)<br>2. Confirm that the wireless door lock buzzer sounds once (short beep) |
| 3. Registration of ECU code | • Perform operation according to prompts on the Techstream screen |
| 4. End of registration | • Finish ECU code registration |

• *1: Perform this process for one of the keys which are to be registered for the vehicle. Finish the procedure within 30 seconds. If the procedure has not been finished within the specified time, perform the erasure procedures again from process 1.

(g) PROCEDURE "G"

ECU communication ID registration

NOTICE:

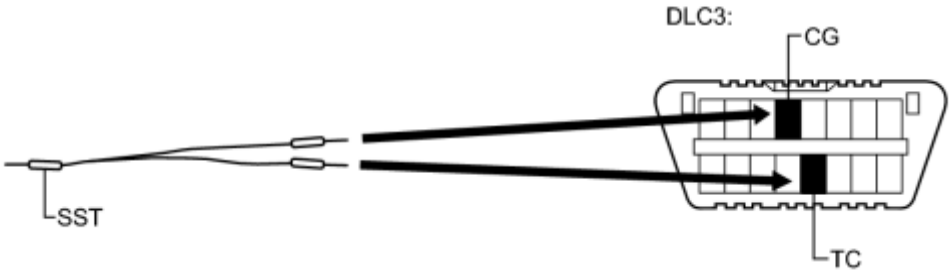
- The ECU communication ID should be registered when the certification ECU (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 is replaced in order to match these ECU communication IDs.
    - *1: w/o Automatic Light Control System
    - *2: w/ Automatic Light Control System
- The hybrid vehicle control system cannot be started unless the ECU communication IDs match.
- After the registration, pressing the power switch may not start the hybrid vehicle control system on the first try. If so, press the power switch again.
- Clear DTC B2799 (code for power management control ECU (HV CPU) immobiliser communication error) by either of the following:

  - Use the Techstream.

  - Disconnect the cable from the negative (-) battery terminal for 30 seconds.

(1) Using SST, connect terminals TC and CG of the DLC3.

SST: 09843-18040




(2) Turn the power switch on (IG) and leave it as is for 30 minutes.

HINT:

Do not start the hybrid vehicle control system.

(3) Turn the power switch off and disconnect terminals TC and CG.

(4) Check that the hybrid vehicle control system starts and remains READY for more than 3 seconds.

# PROBLEM SYMPTOMS TABLE

HINT:

- Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.
- Inspect the fuses and relays related to this system before inspecting the suspected areas below.

### *Engine Immobiliser System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Engine does not start. | Key | INFO |
| | Smart key system (for start function) | INFO |
| | Hybrid vehicle control system | INFO |
| Security indicator light does not blinking. | Certification ECU (smart key ECU assembly) | INFO |
| | Wire harness or connector | - |
| | No. 3 meter circuit plate | - |

# TERMINALS OF ECU

1. CHECK POWER SWITCH

(a) Disconnect the L43 power switch connector.




(b) Measure the resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L43-8 (AGND) - Body ground | P - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L43 power switch connector.

(d) Measure the voltage according to the value(s) in the table below.

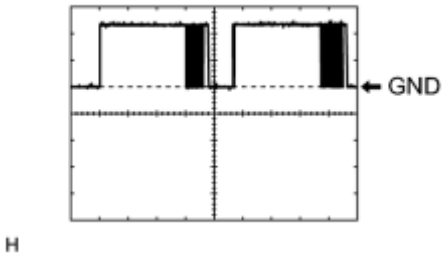
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L43-9 (TXCT) - L43-8 (AGND) | V - P | Key code output signal | • Power switch off<br>• 30 seconds after door opened and closed<br>• Brake pedal not depressed | Below 1 V |
| L43-9 (TXCT) - L43-8 (AGND) | V - P | Key code output signal | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds | Pulse generation<br><br>(See waveform 1) |
| L43-10 (CODE) - L43-8 (AGND) | L - P | Demodulated signal of key code data | • Power switch off<br>• 30 seconds after door opened and closed | Below 1 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | • Brake pedal not depressed | |
| L43-10 (CODE) - L43-8 (AGND) | L - P | Demodulated signal of key code data | • Power switch off<br>• Key battery removed<br>• Power switch touched with key and pressed | Pulse generation<br><br>(See waveform 2) |
| L43-14 (VC5) - L43-8 (AGND) | Y - P | Power supply | • Power switch off<br>• 30 seconds after door opened and closed<br>• Brake pedal not depressed | Below 1 V |
| L43-14 (VC5) - L43-8 (AGND) | Y - P | Power supply | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds | Pulse generation<br><br>(See waveform 3) |

If the result is not as specified, the power switch may have a malfunction.

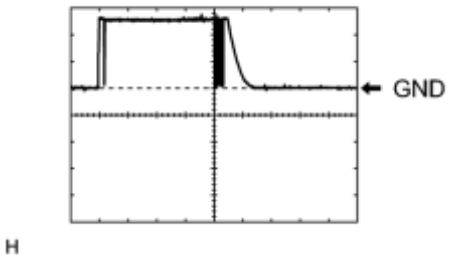
(e) Inspect using an oscilloscope.

(1) Waveform 1 (Reference)



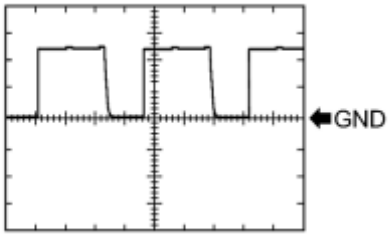

| Item | Content |
|---|---|
| Tester Connection | L43-9 (TXCT) - L43-8 (AGND) |
| Tool Setting | 2 V/DIV., 50 ms./DIV. |
| Condition | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds |

(2) Waveform 2 (Reference)




| Item | Content |
|---|---|
| Tester Connection | L43-10 (CODE) - L43-8 (AGND) |
| Tool Setting | 2 V/DIV., 50 ms./DIV. |
| Condition | • Power switch off<br>• Key battery removed<br>• Power switch touched with key and pressed |

(3) Waveform 3 (Reference)




| Item | Content |
|---|---|
| Tester Connection | L43-14 (VC5) - L43-8 (AGND) |
| Tool Setting | 2 V/DIV., 200 ms./DIV. |
| Condition | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds |

2. CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

(a) Disconnect the L62 certification ECU (smart key ECU assembly) connector.




(b) Measure the resistance and voltage according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-1 (+B) - L62-15 (E) | B - W-B | +B power supply | Power switch off | 11 to 14 V |
| L62-15 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| L62-17 (CUTB) - L62-15 (E) | Y - W-B | Dark current cut fuse pin input signal | Power switch off | 11 to 14 V |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L62 certification ECU (smart key ECU assembly) connector.

(d) Measure the resistance and voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-2 (IND) - | B - Body | Security indicator | • Power switch on (IG) | Below 2 V |

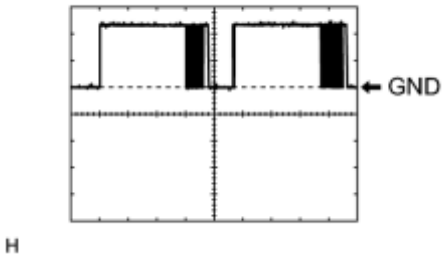
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Body ground | ground | light signal | • Security indicator light off | |
| L62-2 (IND) - Body ground | B - Body ground | Security indicator light signal | • Power switch off<br>• Security indicator light blinks | Pulse generation |
| L62-12 (TXCT) - L62-36 (AGND) | V - P | Power switch TXCT output | • Power switch off<br>• 30 seconds after door opened and closed<br>• Brake pedal not depressed | Below 1 V |
| L62-12 (TXCT) - L62-36 (AGND) | V - P | Power switch TXCT output | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds | Pulse generation (See waveform 1) |
| L62-13 (CODE) - L62-36 (AGND) | L - P | Power switch CODE input | • Power switch off<br>• 30 seconds after door opened and closed<br>• Brake pedal not depressed | Below 1 V |
| L62-13 (CODE) - L62-36 (AGND) | L - P | Power switch CODE input | • Power switch off<br>• Key battery removed<br>• Power switch touched with key and pressed | Pulse generation (See waveform 2) |
| L62-16 (IG) - L62-15 (E) | BE - W-B | IG power supply | Power switch off | Below 1 V |
| L62-16 (IG) - L62-15 (E) | BE - W-B | IG power supply | Power switch on (IG) | 11 to 14 V |
| L62-28 (VC5) - L62-36 (AGND) | Y - P | Power switch power supply | • Power switch off<br>• 30 seconds after door opened and closed<br>• Brake pedal not depressed | Below 1 V |
| L62-28 (VC5) - L62-36 (AGND) | Y - P | Power switch power supply | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds | Pulse generation (See waveform 3) |
| L62-34 (EFII) - L62-15 (E)* | L - W-B | Power management control ECU (HV CPU) output signal | Power switch off | 11 to 14 V |
| L62-34 (EFII) - L62-15 (E)* | L - W-B | Power management control ECU (HV CPU) output signal | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery | Pulse generation (See waveform |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | disconnected and connected | 4) |
| L62-35 (EFIO) - L62-15 (E)* | R - W-B | Power management control ECU (HV CPU) input signal | Power switch off | Below 1 V |
| L62-35 (EFIO) - L62-15 (E)* | R - W-B | Power management control ECU (HV CPU) input signal | Power switch on (IG) | Pulse generation (See waveform 5) |
| L62-36 (AGND) - Body ground | P - Body ground | Power switch ground | Always | Below 1 Ω |

- *: w/o Automatic Light Control System
- If the result is not as specified, the certification ECU (smart key ECU assembly) may have a malfunction.

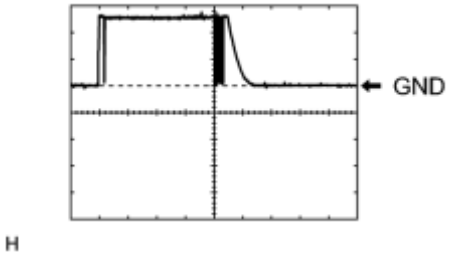
(e) Inspect using an oscilloscope.

(1) Waveform 1 (Reference)




| Item | Content |
|---|---|
| Tester Connection | L62-12 (TXCT) - L62-36 (AGND) |
| Tool Setting | 2 V/DIV., 50 ms./DIV. |
| Condition | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds |

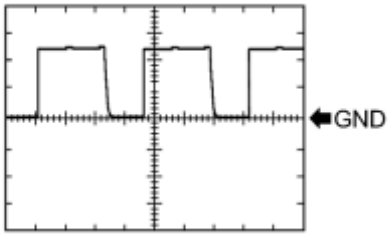
(2) Waveform 2 (Reference)




| Item | Content |
|---|---|
| Tester Connection | L62-13 (CODE) - L62-36 (AGND) |
| Tool Setting | 2 V/DIV., 50 ms./DIV. |
| Condition | • Power switch off<br>• Key battery removed<br>• Power switch touched with key and pressed |

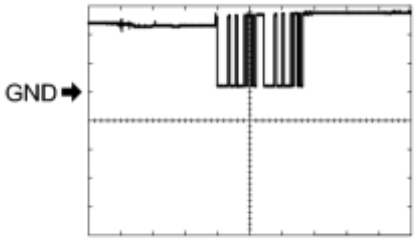
(3) Waveform 3 (Reference)

| Item | Content |
|---|---|
| Tester Connection | L62-28 (VC5) - L62-36 (AGND) |
| Tool Setting | 2 V/DIV., 200 ms./DIV. |




| | |
|---|---|
| Condition | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds |

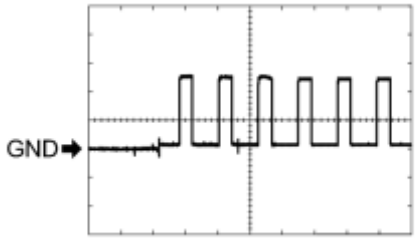
(4) Waveform 4 (Reference)




H

| Item | Content |
|---|---|
| Tester Connection | L62-34 (EFII) - L62-15 (E) |
| Tool Setting | 5 V/DIV., 500 ms./DIV. |
| Condition | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery disconnected and connected |

(5) Waveform 5 (Reference)

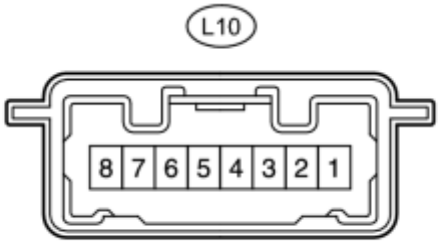



H

| Item | Content |
|---|---|
| Tester Connection | L62-35 (EFIO) - L62-15 (E) |
| Tool Setting | 5 V/DIV., 50 ms./DIV. |
| Condition | Power switch on (IG) |

3. CHECK ID CODE BOX (IMMOBILISER CODE ECU) (w/ Automatic Light Control System)

(a) Disconnect the L10 ID code box (immobiliser code ECU) connector.




P

(b) Measure the resistance and voltage according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L10-1 (+B) - L10-8 (GND) | B - W-B | +B power supply | Power switch off | 11 to 14 V |
| L10-8 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

- If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L10 ID code box (immobiliser code ECU) connector.

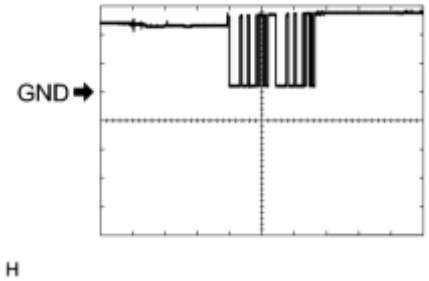
(d) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L10-5 (EFII) - L10-8 (GND) | L - W-B | Power management control ECU (HV CPU) output signal | Power switch off | 11 to 14 V |
| L10-5 (EFII) - L10-8 (GND) | L - W-B | Power management control ECU (HV CPU) output signal | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery disconnected and connected | Pulse generation<br><br>(See waveform 1) |
| L10-6 (EFIO) - L10-8 (GND) | R - W-B | Power management control ECU (HV CPU) input signal | Power switch off | Below 1 V |
| L10-6 (EFIO) - L10-8 (GND) | R - W-B | Power management control ECU (HV CPU) input signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 2) |

- If the result is not as specified, the ID code box (immobiliser code ECU) may have a malfunction.

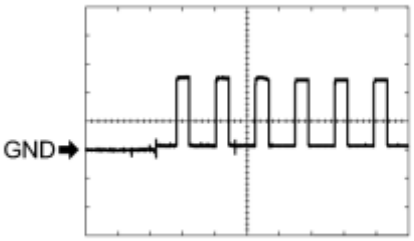
(e) Inspect using an oscilloscope.

(1) Waveform 1 (Reference)




| Item | Content |
|---|---|
| Tester Connection | L10-5 (EFII) - L10-8 (GND) |
| Tool Setting | 5 V/DIV., 500 ms./DIV. |
| Condition | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery disconnected and connected |

(2) Waveform 2 (Reference)

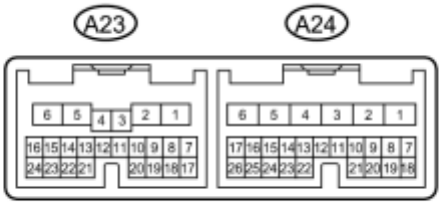



| Item | Content |
|---|---|
| Tester Connection | L10-6 (EFIO) - L10-8 (GND) |
| Tool Setting | 5 V/DIV., 50 ms./DIV. |
| Condition | Power switch on (IG) |

H

4. CHECK TRANSMISSION CONTROL ECU ASSEMBLY

(a) Disconnect the A23 and A24 transmission control ECU assembly connectors.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

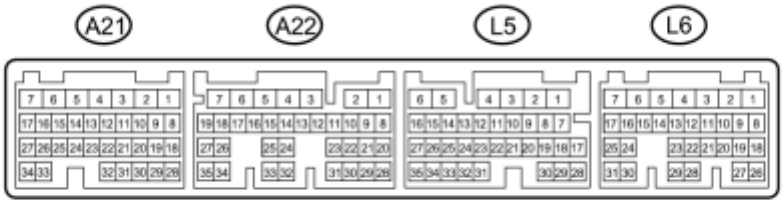
Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A23-15 (BATT) - Body ground | SB - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| A24-1 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| A24-5 (E02) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| A24-6 (E01) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

5. CHECK POWER MANAGEMENT CONTROL ECU (HV CPU)

(a) Disconnect the L5 power management control ECU (HV CPU) connector.




H

(b) Measure the resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-6 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L5 power management control ECU (HV CPU) connector.

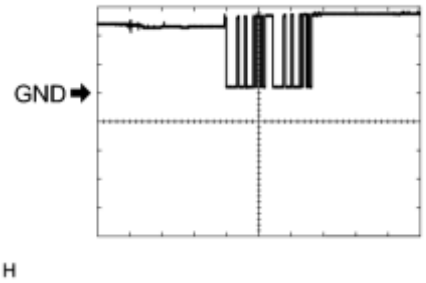
(d) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L6-20 (IMO) - L5-6 (E1) | L - BR | Certification ECU (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 input signal | Power switch off | 11 to 14 V |
| L6-20 (IMO) - L5-6 (E1) | L - BR | Certification ECU (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 input signal | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery disconnected and connected | Pulse generation<br><br>(See waveform 1) |
| L6-21 (IMI) - L5-6 (E1) | R - BR | Certification ECU (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 output signal | Power switch off | Below 1 V |
| L6-21 (IMI) - L5-6 (E1) | R - BR | Certification ECU (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 output signal | Power switch on (IG) | Pulse generation<br><br>(See waveform 2) |

- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System
- If the result is not as specified, the power management control ECU (HV CPU) may have a malfunction.

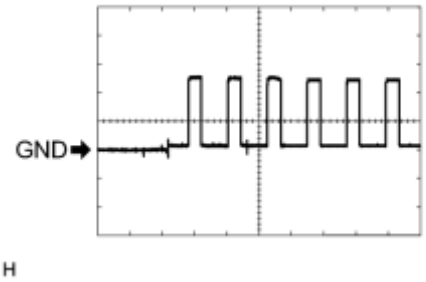
(e) Waveform:

(1) Waveform 1 (Reference)




| Item | Content |
|---|---|
| Tester Connection | L6-20 (IMO) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 500 ms./DIV. |
| Condition | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery disconnected and connected |

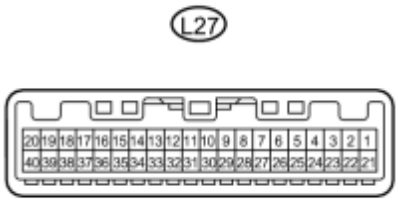
(2) Waveform 2 (Reference)




| Item | Content |
|---|---|
| Tester Connection | L6-21 (IMI) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 50 ms./DIV. |
| Condition | Power switch on (IG) |

6. COMBINATION METER ASSEMBLY

(a) Disconnect the L27 combination meter assembly connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-18 (B) - Body ground | R - Body ground | Battery | Power switch off | 11 to 14 V |

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-30 (ES) - Body ground | BR - Body ground | Ground (Signal ground) | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L27 combination meter assembly connector.

(d) Measure the voltage according to the value(s) in the table below.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-19 (IG+) - Body ground | L - Body ground | Power switch signal | Power switch off | Below 1 V |
| L27-19 (IG+) - Body ground | L - Body ground | Power switch signal | Power switch on (IG) | 11 to 14 V |
| L27-22 (LP) - Body ground | B - Body ground | Security indicator light signal | • Power switch on (IG)<br>• Security indicator light off | Below 2 V |
| L27-22 (LP) - Body ground | B - Body ground | Security indicator light signal | • Power switch off<br>• Security indicator light blinks | Pulse generation |

If the result is not as specified, the combination meter assembly may have a malfunction.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The certification ECU (smart key ECU assembly) and power management control ECU (HV CPU) control the vehicle engine immobiliser system functions. Engine immobiliser system data and Diagnostic Trouble Codes (DTCs) can be read through the vehicle Data Link Connector 3 (DLC3).

In some cases, a malfunction may be occurring in the engine immobiliser system even though the security indicator light is not illuminated.

When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) Check the DLC3 INFO.

3. INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery.

# DTC CHECK / CLEAR

1. CHECK FOR CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Trouble Codes.

(e) Check the details of the DTC(s) INFO.

2. CHECK FOR POWER MANAGEMENT CONTROL ECU (HV CPU) DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / HV Control / Trouble Codes.

(e) Check the details of the DTC(s).

INFO for engine immobiliser system)

INFO for hybrid vehicle control system)

3. CLEAR CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Trouble Codes.

(e) Clear the DTCs.

4. CLEAR POWER MANAGEMENT CONTROL ECU (HV CPU) DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Powertrain / HV Control / Trouble Codes.

(e) Clear the DTCs.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Ignition Switch | Power switch on (IG) signal/ON or OFF | ON: Power switch on (IG) or hybrid vehicle control system started<br><br>OFF: Power switch off | - |
| Immobilizer when IG=ON | Immobiliser system status when power switch on (IG)l/UNSET or SET | SET: Power switch off<br><br>UNSET: Power switch on (IG) or hybrid vehicle control system started | - |
| Immobiliser | Immobiliser system status/Set or Unset | Set: Power switch off<br><br>Unset: Power switch on (IG) or hybrid vehicle control system started | - |
| Master Key | Master key code signal/Match or NoMatch | Match: Master key code sent<br><br>NoMatch: Unmatched master key code sent | - |
| Sub Key | Sub-key (master key) code | Match: Sub-key (master key) code | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | signal/Match or NoMatch | sent<br><br>NoMatch: Unmatched sub-key (master key) code sent | |
| BCC Malfunction | Transponder chip signal/OK or NG | OK: Correct data sent<br><br>NG: Incorrect data sent | - |
| Abnormal Status | Transponder chip data/OK or NG | OK: Data OK<br><br>NG: Data error | - |
| Different Encrypt Code | Transponder chip signal/OK or NG | OK: Correct data sent<br><br>NG: Incorrect data sent | - |
| Different Serial Number | Transponder chip signal/OK or NG | OK: Correct data sent<br><br>NG: Incorrect data sent | - |
| Frame Error | Transponder chip signal/OK or NG | OK: Correct data sent<br><br>NG: Incorrect data sent | - |
| Response | Transponder chip signal/OK or NG | OK: Correct data sent<br><br>NG: Incorrect data sent | - |
| Wireless C Code | Wireless C Code/No Regd or Regd | No Regd: Wireless C Code not registered<br><br>Regd: Wireless C Code registered | - |
| ID-BOX Sleep Condition | ID code box (immobiliser code ECU) condition/Yes or No | Yes: ID code box (immobiliser code ECU) in sleep condition<br><br>No: ID code box (immobiliser code ECU) not in sleep condition | - |
| ID-BOX Start Condition | ID code box (immobiliser code ECU) condition/Yes or No | Yes: ID code box (immobiliser code ECU) sends wake up signal<br><br>No: ID code box (immobiliser code ECU) not send wake up signal | - |
| Engine Start Request | ID code box (immobiliser code ECU) start request condition/OK or NG | OK: Start request condition signal received<br><br>NG: Start request condition signal not received | - |
| 3bit Code Request | 3bit code reception status/OK or NG | OK: 3bit code received<br><br>NG: 3bit code not received | |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| S Code Check | S code verification result/OK or NG | OK: Verification confirmed<br><br>NG: Verification not confirmed | - |
| L Code Check | L code verification result/OK or NG | OK: Verification confirmed<br><br>NG: Verification not confirmed | - |
| Unlock Request Receive | Unlock command reception status/OK or NG | OK: Unlock request received<br><br>NG: Unlock request not received | - |
| Lock Request Receive | Lock command reception status/OK or NG | OK: Lock request received<br><br>NG: Lock request not received | - |
| S Code Check (Past) | S code verification result (past)/OK or NG(Past) | OK: Verification confirmed (past)<br><br>NG(Past): Verification not confirmed (past) | - |
| L Code Check (Past) | L code verification result (past)/OK or NG(Past) | OK: Verification confirmed (past)<br><br>NG(Past): Verification not confirmed (past) | - |
| EFI Code Receive | HV code receive (when DTC stored)/OK or NG | OK: HV code received<br><br>NG: HV code not received | - |
| EFI Communication | HV communication/OK or NG | OK: HV communication normal<br><br>NG: HV communication abnormal | - |
| # Codes | Number of trouble codes/Min.: 0 or Max.: 255 | Number of DTCs will be displayed | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

*Smart Key (Certification ECU (Smart Key ECU Assembly))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Immobiliser Indicator | Security indicator light | ON or OFF | - |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is stored during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

1. CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) DIAGNOSTIC TROUBLE CODE CHART

***Certification ECU (Smart Key ECU Assembly)***

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B2784 | Antenna Coil Open / Short | 1. Wire harness or connector<br>2. Power switch<br>3. Certification ECU (Smart key ECU assembly) | INFO |
| B278A | Short to GND in Immobiliser System Power Source Circuit | 1. Wire harness or connector<br>2. Power switch<br>3. Certification ECU (Smart key ECU assembly) | INFO |
| B2790<br>*2 | ID BOX EEPROM Malfunction | 1. ID code box (Immobiliser code ECU)<br>2. Certification ECU (Smart key ECU assembly) | INFO |

*2: w/ Automatic Light Control System

2. POWER MANAGEMENT CONTROL ECU (HV CPU) DIAGNOSTIC TROUBLE CODE CHART

HINT:

The DTCs for the engine immobiliser system are specified above. If the other codes are output, check the DTC chart for the hybrid vehicle control system.

***Power Management Control ECU (HV CPU)***

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B2799 | Engine Immobiliser System Malfunction | 1. Wire harness or connector<br>2. Power management control ECU (HV CPU)<br>3. Certification ECU (Smart key ECU | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | assembly)*1<br><br>4. ID code box (Immobiliser code ECU)*2 | |
| B279A | Theft Deterrent System Communication Line High Fixation | 1. Wire harness or connector<br><br>2. Power management control ECU (HV CPU)<br><br>3. Certification ECU (Smart key ECU assembly)*1<br><br>4. ID code box (Immobiliser code ECU)*2 | INFO |
| B279C | Theft Deterrent System Presence Detection | Power management control ECU (HV CPU) | INFO |

- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System

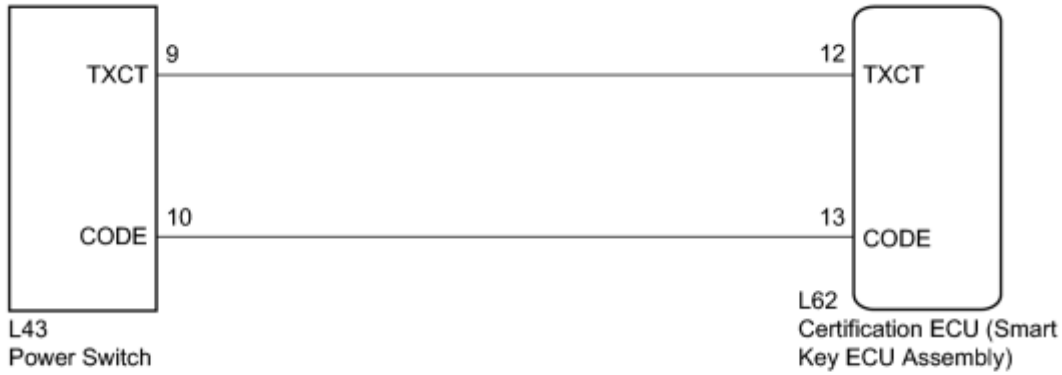
| DTC | B2784 | Antenna Coil Open / Short |
|---|---|---|

# DESCRIPTION

This DTC is stored when there is an open or short in the transponder key coil (built into the power switch).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2784 | Transponder key coil is open or shorted. | • Wire harness or connector<br>• Power switch<br>• Certification ECU (Smart key ECU assembly) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register all the keys and ECU communication ID INFO.*1
- If the certification ECU (smart key ECU assembly) is replaced, register all the keys INFO.*2
  - *1: w/o Automatic Light Control System
  - *2: w/ Automatic Light Control System

# PROCEDURE

| 1. | CHECK DTC OUTPUT |
|---|---|

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

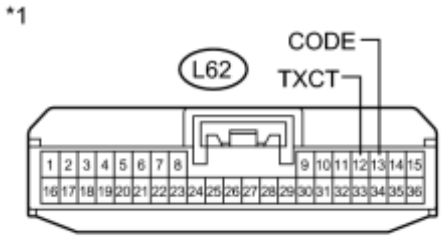
DTC B2784 is not output.

NG CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER SWITCH)

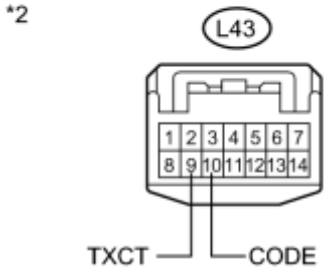
OK **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER SWITCH) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the power switch connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-12 (TXCT) - L43-9 (TXCT) | Always | Below 1 Ω |
| L62-13 (CODE) - L43-10 (CODE) | Always | Below 1 Ω |
| L62-12 (TXCT) - Body ground | Always | 10 kΩ or higher |
| L62-13 (CODE) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector |

| | |
|---|---|
| | (to Power Switch) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 3. | REPLACE POWER SWITCH |

(a) Replace the power switch INFO.

NEXT

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

DTC B2784 is not output.

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK **END (POWER SWITCH WAS DEFECTIVE)**

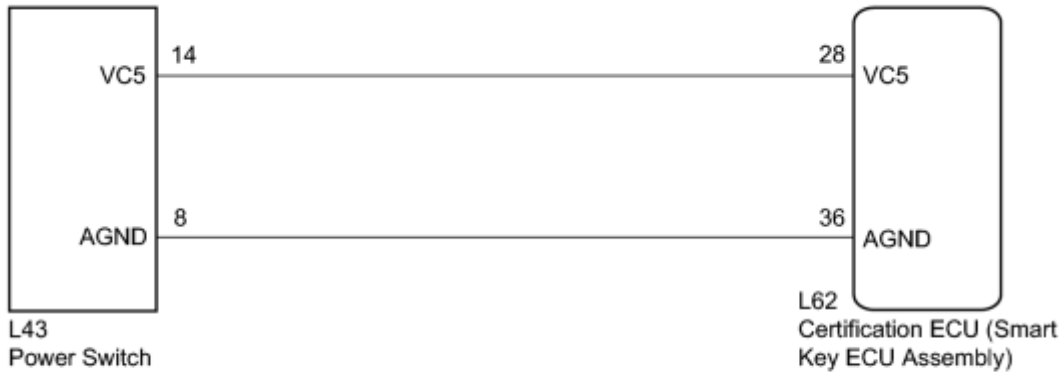
| DTC | B278A | Short to GND in Immobiliser System Power Source Circuit |
|---|---|---|

# DESCRIPTION

This DTC is stored when the power switch power source supply line is open or shorted.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B278A | Power switch power source supply line is open or shorted. | • Wire harness or connector<br>• Power switch<br>• Certification ECU (Smart key ECU assembly) |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register all the keys and ECU communication ID INFO.*1
- If the certification ECU (smart key ECU assembly) is replaced, register all the keys INFO.*2
  - *1: w/o Automatic Light Control System
  - *2: w/ Automatic Light Control System

# PROCEDURE

| 1. | CHECK DTC OUTPUT |
|---|---|

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

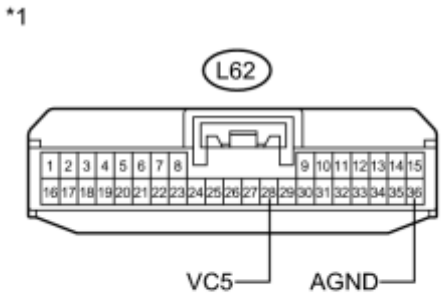
DTC B278A is not output.

NG ▶ CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER SWITCH)

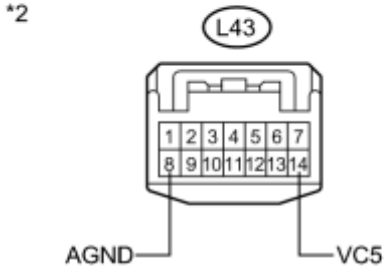
OK ▶ **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER SWITCH) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the power switch connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-28 (VC5) - L43-14 (VC5) | Always | Below 1 Ω |
| L62-36 (AGND) - L43-8 (AGND) | Always | Below 1 Ω |
| L62-28 (VC5) - Body ground | Always | 10 kΩ or higher |
| L62-36 (AGND) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Power Switch) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) |

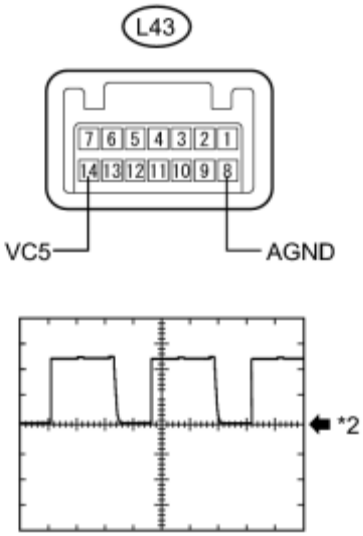
(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Reconnect the power switch connector.

(c) Using an oscilloscope, check the waveform.

Waveform (Reference):

*1




| Item | Content |
|---|---|
| Tester Connection | L43-14 (VC5) - L43-8 (AGND) |
| Tool Setting | 2 V/DIV., 200 ms./DIV. |
| Condition | • Power switch off<br>• Key not in cabin<br>• Power switch pressed within 30 seconds |

OK:

Waveform is output normally (see illustration)

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Switch) |
| *2 | GND |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **REPLACE POWER SWITCH**

| | | |
|---|---|---|
| DTC | B2790 | ID BOX EEPROM Malfunction |

# DESCRIPTION

This DTC is stored when the ID code box (immobiliser code ECU) detects an internal malfunction.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2790 | ID code box (immobiliser code ECU) detects internal malfunction | • ID code box (Immobiliser code ECU)<br>• Certification ECU (Smart key ECU assembly) |

# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register all the keys INFO.
- If the ID code box (immobiliser code ECU) is replaced, register the ECU code and ECU communication ID INFO.

# PROCEDURE

| | |
|---|---|
| 1. | REPLACE ID CODE BOX (IMMOBILISER CODE ECU) |

(a) Replace the ID code box (immobiliser code ECU) INFO.

NEXT

| | |
|---|---|
| 2. | ECU CODE REGISTRATION |

(a) Register the ECU code INFO.

NEXT

| | |
|---|---|
| 3. | ECU COMMUNICATION ID REGISTRATION |

(a) Register the ECU communication ID INFO.

NEXT

| | |
|---|---|
| 4. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

DTC B2790 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)
OK ▶ **END (ID CODE BOX (IMMOBILISER CODE ECU) WAS DEFECTIVE)**

| DTC | B2799 | Engine Immobiliser System Malfunction |
|---|---|---|

# DESCRIPTION

This DTC is stored when one of the following occurs: 1) the power management control ECU (HV CPU) detects an error in its own communication with the certification ECU assembly (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2; 2) the power management control ECU (HV CPU) detects an error in the communication lines; or 3) the ECU communication ID between the certification ECU assembly (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 and power management control ECU (HV CPU) is different and a hybrid vehicle control system start is attempted.

- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System

HINT:

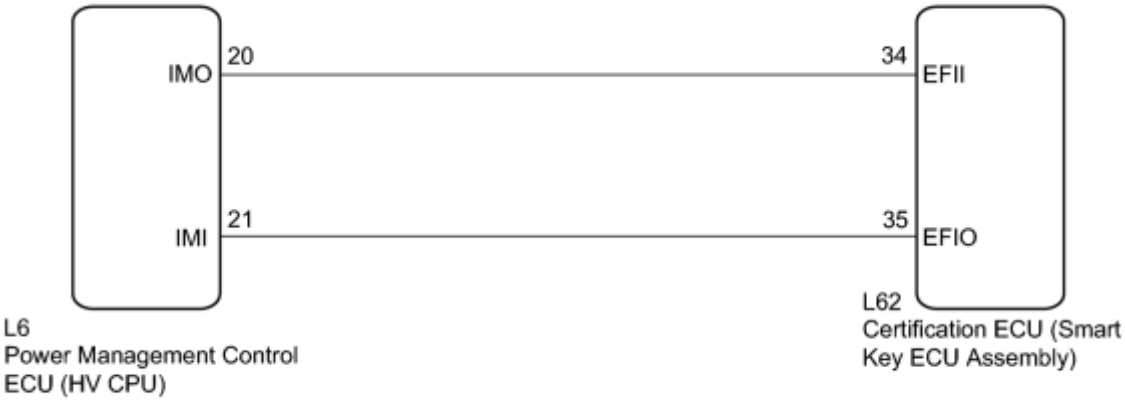
Before troubleshooting this DTC, make sure that no certification ECU (smart key ECU assembly) DTCs are present. If present, troubleshoot the certification ECU (smart key ECU assembly) DTCs first.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2799 | One of the following conditions is met:<br>• Error in communication between power management control ECU (HV CPU) and certification ECU assembly (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2<br>• Error in communication lines<br>• Communication ID is different between certification ECU assembly (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 and power management control ECU (HV CPU) during communication | • Wire harness or connector<br>• Power management control ECU (HV CPU)<br>• Certification ECU (Smart key ECU assembly)*1<br>• ID code box (Immobiliser code ECU)*2 |

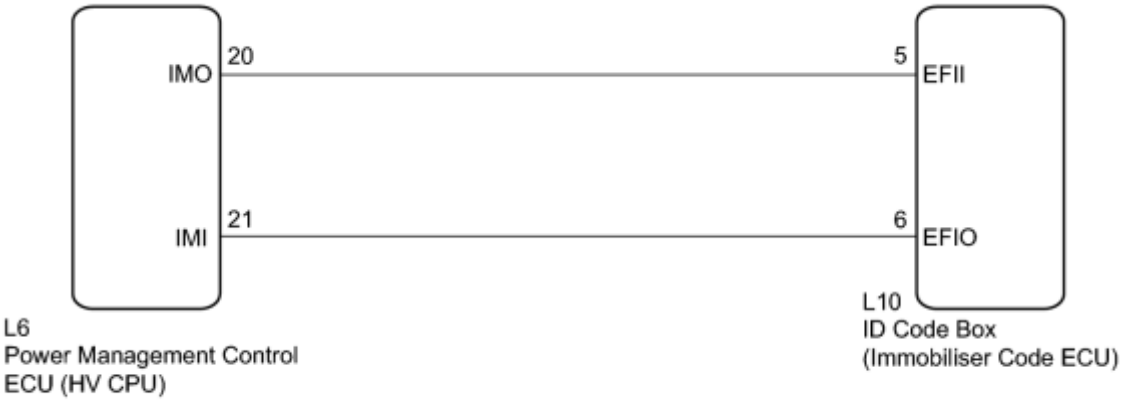
- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System

# WIRING DIAGRAM

1. w/o Automatic Light Control System




2. w/ Automatic Light Control System




# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register all the keys and ECU communication ID INFO .*1
- If the ID code box (immobiliser code ECU) is replaced, register the ECU code and ECU communication ID INFO .*2
    - *1: w/o Automatic Light Control System
    - *2: w/ Automatic Light Control System

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

DTC B2799 is not output.

NG RE-REGISTER ECU COMMUNICATION ID

OK **USE SIMULATION METHOD TO CHECK**

| | |
|---|---|
| 2. | RE-REGISTER ECU COMMUNICATION ID |

(a) Re-register the ECU communication ID INFO.

NEXT

| | |
|---|---|
| 3. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

DTC B2799 is not output.

NG CHECK CONNECTOR CONNECTION CONDITION

OK **END (ECU COMMUNICATION ID WAS NOT REGISTERED CORRECTLY)**

| | |
|---|---|
| 4. | CHECK CONNECTOR CONNECTION CONDITION |

(a) Turn the power switch off.

(b) Check that the connectors are properly connected to the power management control ECU (HV CPU) and certification ECU (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2.

- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System

OK:

Connectors are properly connected.

NG CONNECT CONNECTORS PROPERLY

OK

| | |
|---|---|
| 5. | SYSTEM CHECK |

(a) Check the vehicle specification.

Result:

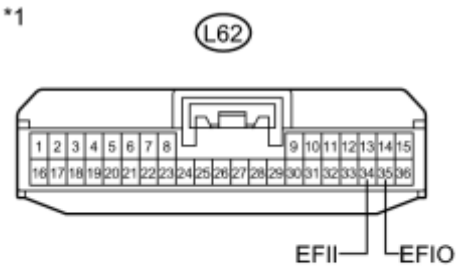
| Result | Proceed to |
|---|---|
| w/o Automatic Light Control System | A |
| w/ Automatic Light Control System | B |

B CHECK HARNESS AND CONNECTOR (ID CODE BOX - POWER MANAGEMENT CONTROL ECU (HV CPU))

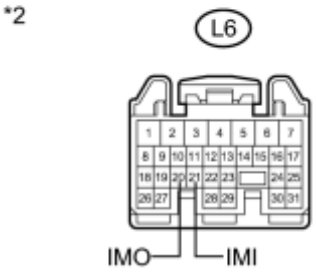
A

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER MANAGEMENT CONTROL ECU (HV CPU)) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the power management control ECU (HV CPU) connector.




(c) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-34 (EFII) - L6-20 (IMO) | Always | Below 1 Ω |
| L62-35 (EFIO) - L6-21 (IMI) | Always | Below 1 Ω |
| L6-20 (IMO) - Body ground | Always | 10 kΩ or higher |
| L6-21 (IMI) - Body ground | Always | 10 kΩ or higher |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-20 (IMO) - Body ground | Always | Below 1 V |
| L6-21 (IMI) - Body ground | Always | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU (HV CPU)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 7. | REPLACE POWER MANAGEMENT CONTROL ECU (HV CPU) |

(a) Replace the power management control ECU (HV CPU) INFO.

NEXT

▼

| | |
|---|---|
| 8. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

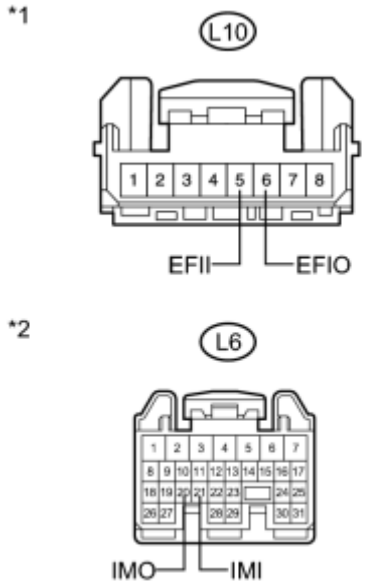
DTC B2799 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (POWER MANAGEMENT CONTROL ECU (HV CPU) WAS DEFECTIVE)**

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (ID CODE BOX - POWER MANAGEMENT CONTROL ECU (HV CPU)) |

(a) Disconnect the ID code box (immobiliser code ECU) connector.




(b) Disconnect the power management control ECU (HV CPU) connector.

(c) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L10-5 (EFII) - L6-20 (IMO) | Always | Below 1 Ω |
| L10-6 (EFIO) - L6-21 (IMI) | Always | Below 1 Ω |
| L6-20 (IMO) - Body ground | Always | 10 kΩ or higher |
| L6-21 (IMI) - Body ground | Always | 10 kΩ or higher |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-20 (IMO) - Body ground | Always | Below 1 V |
| L6-21 (IMI) - Body ground | Always | Below 1 V |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ID Code Box (Immobiliser Code ECU)) |

| | |
|---|---|
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU (HV CPU)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 10. | REPLACE POWER MANAGEMENT CONTROL ECU (HV CPU) |

(a) Replace the power management control ECU (HV CPU) INFO.

NEXT

▼

| | |
|---|---|
| 11. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

DTC B2799 is not output.

NG ▶ REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

OK ▶ **END (POWER MANAGEMENT CONTROL ECU (HV CPU) WAS DEFECTIVE)**

| DTC | B279A | Theft Deterrent System Communication Line High Fixation |
|---|---|---|

# DESCRIPTION

If the communication line (EFIO - IMI) to the certification ECU assembly (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 is stuck high output (e. g. shorted to +B), the power management control ECU (HV CPU) stores this DTC.

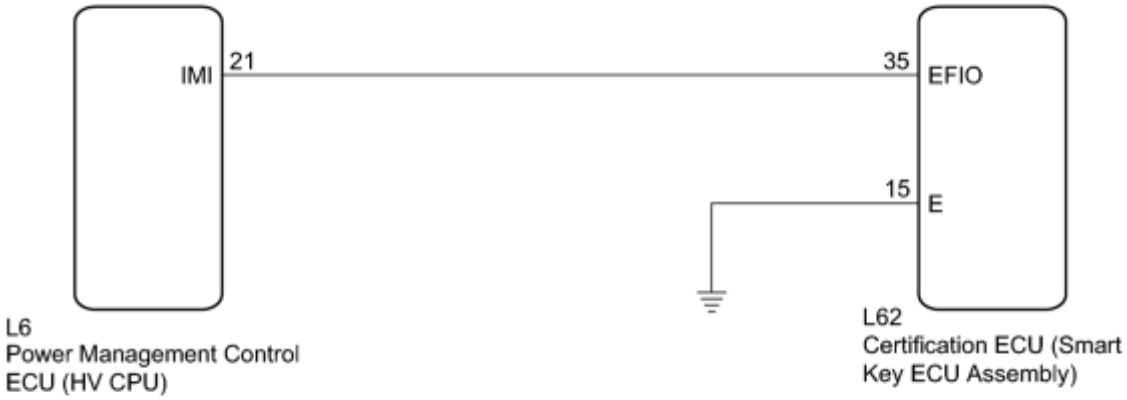
- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B279A | When the communication line (EFIO - IMI) between power management control ECU (HV CPU) and certification ECU assembly (smart key ECU assembly)*1 or ID code box (immobiliser code ECU)*2 is stuck high output. | • Wire harness or connector<br>• Power management control ECU (HV CPU)<br>• Certification ECU (Smart key ECU assembly)*1<br>• ID code box (Immobiliser code ECU)*2 |

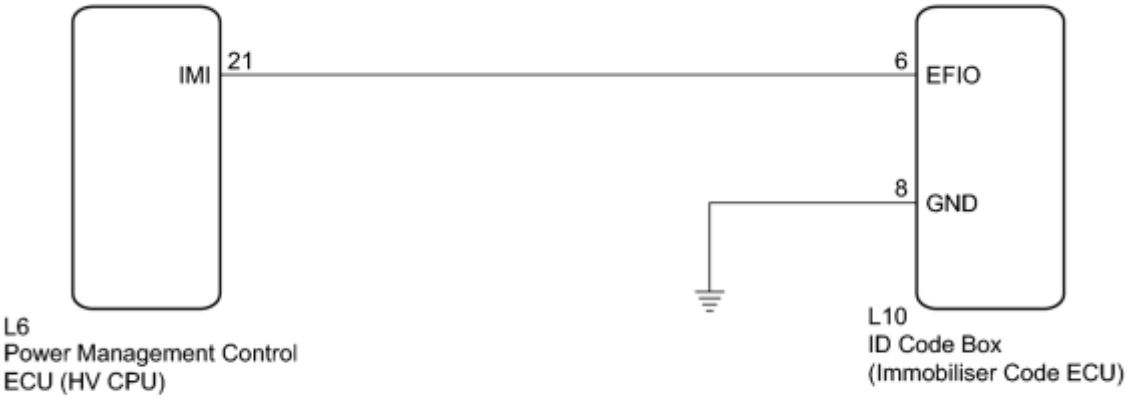

- *1: w/o Automatic Light Control System
- *2: w/ Automatic Light Control System


# WIRING DIAGRAM

1. w/o Automatic Light Control System




2. w/ Automatic Light Control System




# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register all the keys and ECU communication ID INFO.*1
- If the ID code box (immobiliser code ECU) is replaced, register the ECU code and ECU communication ID INFO .*2
  - *1: w/o Automatic Light Control System
  - *2: w/ Automatic Light Control System

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

HINT:

If any DTCs other than DTC B279A are output, troubleshoot those DTCs first.

Result:

| Result | Proceed to |
|---|---|
| DTC B279A is output | A |
| DTC B279A and other DTCs are output | B |

B GO TO DIAGNOSTIC TROUBLE CODE CHART

A

| | |
|---|---|
| 2. | SYSTEM CHECK |

(a) Check the vehicle specification.

Result:

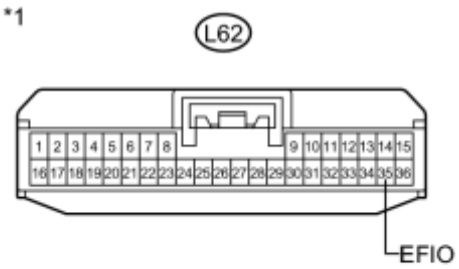
| Result | Proceed to |
|---|---|
| w/o Automatic Light Control System | A |
| w/ Automatic Light Control System | B |

B CHECK HARNESS AND CONNECTOR (ID CODE BOX - POWER MANAGEMENT CONTROL ECU (HV CPU))

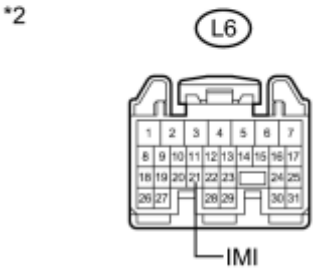
A

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - POWER MANAGEMENT CONTROL ECU (HV CPU)) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the power management control ECU (HV CPU) connector.




(c) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-35 (EFIO) - L6-21 (IMI) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-21 (IMI) - Body ground | Always | 10 kΩ or higher |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-21 (IMI) - Body ground | Always | Below 1 V |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU (HV CPU)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

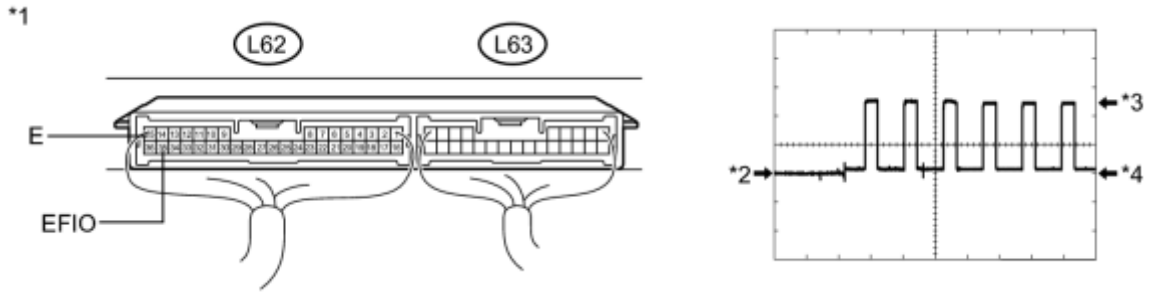
OK

▼

| | |
|---|---|
| 4. | CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (WAVEFORM) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Reconnect the power management control ECU (HV CPU) connector.




(c) Using an oscilloscope, check the waveform.

Waveform (Reference):

| Item | Content |
|---|---|
| Terminal No. (Symbol) | L62-35 (EFIO) - L62-15 (E) |
| Tool Setting | 5 V/DIV., 50 msec./DIV. |
| Condition | Power switch on (IG) |

OK:

Waveform is output normally (see illustration).

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) | *2 | GND |
| *3 | HIGH | *4 | LOW |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU (HV CPU)**

| | |
|---|---|
| 5. | REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) |

(a) Replace the certification ECU (smart key ECU assembly) INFO.

NEXT

▼

| | |
|---|---|
| 6. | KEY REGISTRATION |

(a) Register the key INFO.

NEXT

▼

| | |
|---|---|
| 7. | ECU COMMUNICATION ID REGISTRATION |

(a) Register the ECU communication ID INFO.

NEXT

▼

| | |
|---|---|
| 8. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

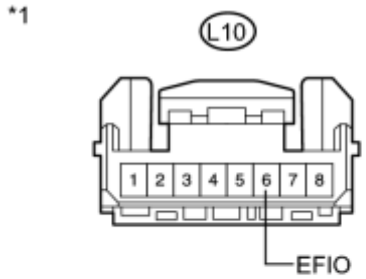
DTC B279A is not output.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU (HV CPU)

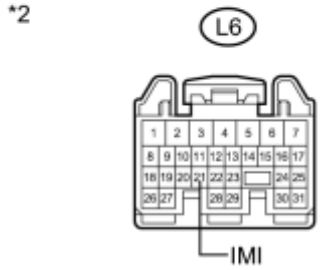
OK **END (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) WAS DEFECTIVE)**

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (ID CODE BOX - POWER MANAGEMENT CONTROL ECU (HV CPU)) |

(a) Disconnect the ID code box (immobiliser code ECU) connector.




(b) Disconnect the power management control ECU (HV CPU) connector.




(c) Measure the resistance and voltage according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L10-6 (EFIO) - L6-21 (IMI) | Always | Below 1 Ω |
| L6-21 (IMI) - Body ground | Always | 10 kΩ or higher |

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-21 (IMI) - Body ground | Always | Below 1 V |

***Text in Illustration***

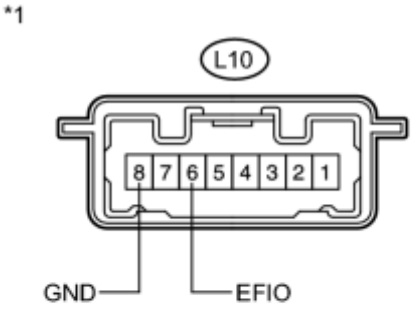
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to ID Code Box (Immobiliser Code ECU)) |
| *2 | Front view of wire harness connector<br><br>(to Power Management Control ECU (HV CPU)) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

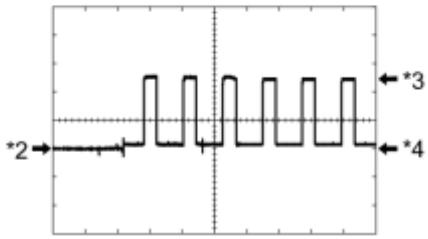
OK

| | |
|---|---|
| 10. | CHECK ID CODE BOX (IMMOBILISER CODE ECU) (WAVEFORM) |

(a) Reconnect the ID code box (immobiliser code ECU) connector.




(b) Reconnect the power management control ECU (HV CPU) connector.




(c) Using an oscilloscope, check the waveform.

Waveform (Reference):

| Item | Content |
|---|---|
| Terminal No. (Symbol) | L10-6 (EFIO) - L10-8 (GND) |
| Tool Setting | 5 V/DIV., 50 msec./DIV. |
| Condition | Power switch on (IG) |

OK:

Waveform is output normally (see illustration).

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(ID Code Box (Immobiliser Code ECU)) |
| *2 | GND |

| | |
|---|---|
| *3 | HIGH |
| *4 | LOW |

NG ▶ REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU (HV CPU)**

| | |
|---|---|
| 11. | REPLACE ID CODE BOX (IMMOBILISER CODE ECU) |

(a) Replace the ID code box (immobiliser code ECU) INFO.

NEXT

▼

| | |
|---|---|
| 12. | ECU CODE REGISTRATION |

(a) Register the ECU code INFO.

NEXT

▼

| | |
|---|---|
| 13. | ECU COMMUNICATION ID REGISTRATION |

(a) Register the ECU communication ID INFO.

NEXT

▼

| | |
|---|---|
| 14. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

DTC B279A is not output.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU (HV CPU)

OK ▶ **END (ID CODE BOX (IMMOBILISER CODE ECU) WAS DEFECTIVE)**

| | | |
|---|---|---|
| DTC | B279C | Theft Deterrent System Presence Detection |

# DESCRIPTION

If a power management control ECU (HV CPU) that is incompatible with the engine immobiliser system is installed, the power management control ECU (HV CPU) stores this DTC.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B279C | When a power management control ECU (HV CPU) that is incompatible with engine immobiliser system is installed. | Power management control ECU (HV CPU) |

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs INFO.

OK:

DTC B279C is not output.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU (HV CPU)

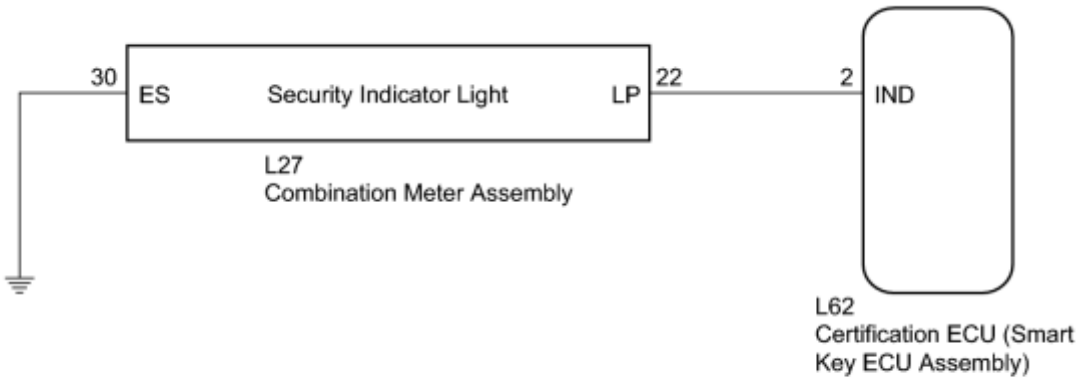
OK ▶ **USE SIMULATION METHOD TO CHECK**

Security Indicator Light Does not Blinking

# DESCRIPTION

The security indicator light blinks continuously due to a continuous signal received from the certification ECU (smart key ECU assembly) while the engine immobiliser is set.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- If the certification ECU (smart key ECU assembly) is replaced, register all the keys and ECU communication ID INFO.*1
- If the certification ECU (smart key ECU assembly) is replaced, register all the keys INFO.*2
  - *1: w/o Automatic Light Control System
  - *2: w/ Automatic Light Control System

# PROCEDURE

| | |
|---|---|
| 1. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

*Smart Key (Certification ECU (Smart Key ECU Assembly))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Immobiliser Indicator | Security indicator light | ON or OFF | - |

OK:

The security indicator light turns on and off according to operation via the Techstream.

NG ▶ INSPECT COMBINATION METER ASSEMBLY

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

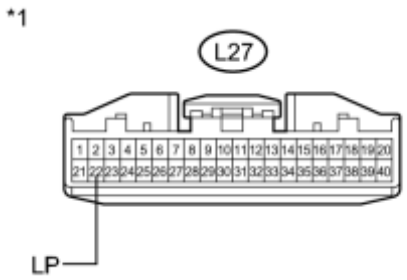
| | |
|---|---|
| 2. | INSPECT COMBINATION METER ASSEMBLY |

(a) Disconnect the combination meter assembly connector.

(b) Measure the voltage according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-22 (LP) - Body ground | • Power switch on (IG)<br>• Security indicator light off | Below 2 V |
| L27-22 (LP) - Body ground | • Power switch off<br>• Security indicator light blinks | Pulse generation |




# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter Assembly) |

NG ▶ CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - COMBINATION METER ASSEMBLY)

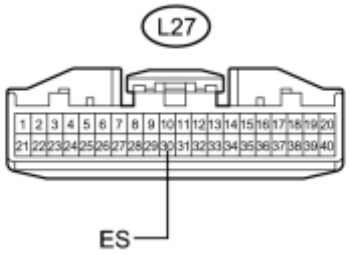
OK

▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

*1




Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-30 (ES) - Body ground | Always | Below 1 Ω |

# Text in Illustration

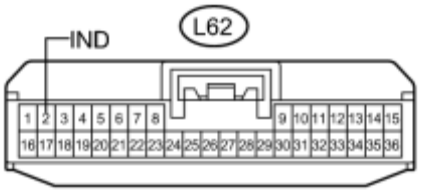
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Combination Meter Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE NO. 3 METER CIRCUIT PLATE**

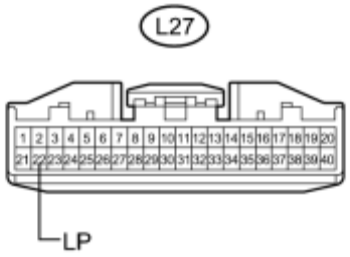
| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - COMBINATION METER ASSEMBLY) |

*1




(a) Disconnect the certification ECU (smart key ECU assembly) connector.

*2




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-2 (IND) - L27-22 (LP) | Always | Below 1 Ω |
| L62-2 (IND) - Body ground | Always | 10 kΩ or higher |
| L27-22 (LP) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

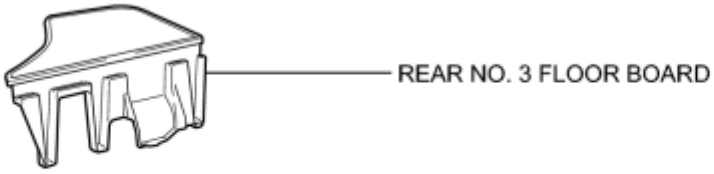
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Combination Meter Assembly) |

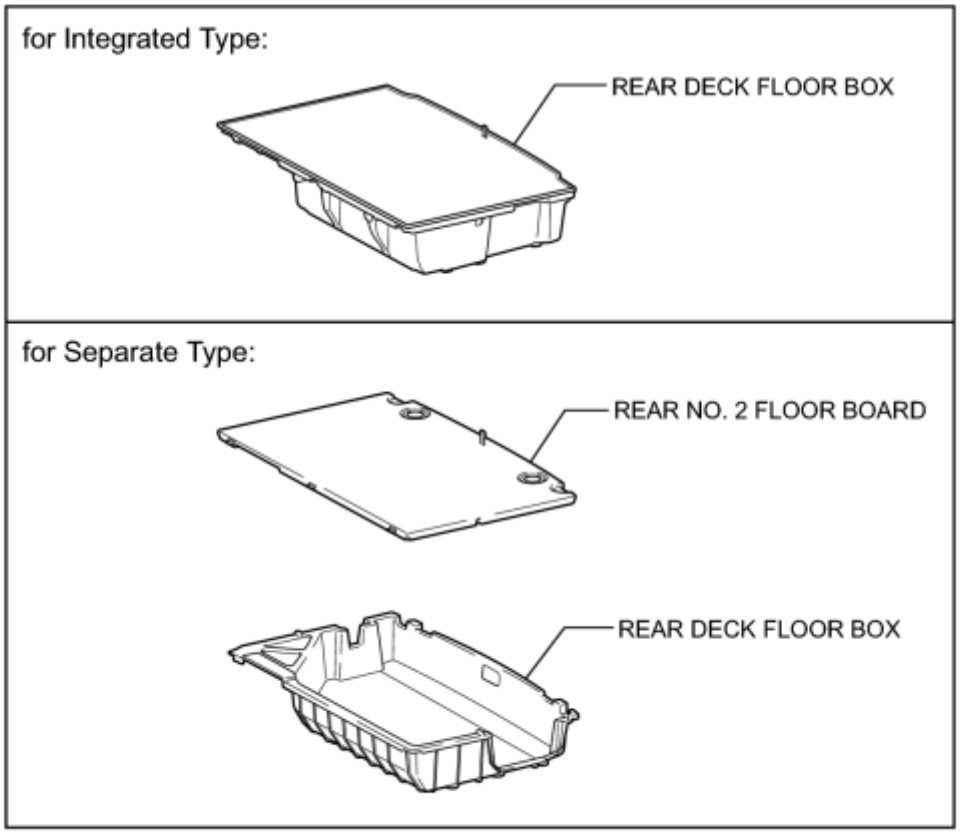
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

# COMPONENTS

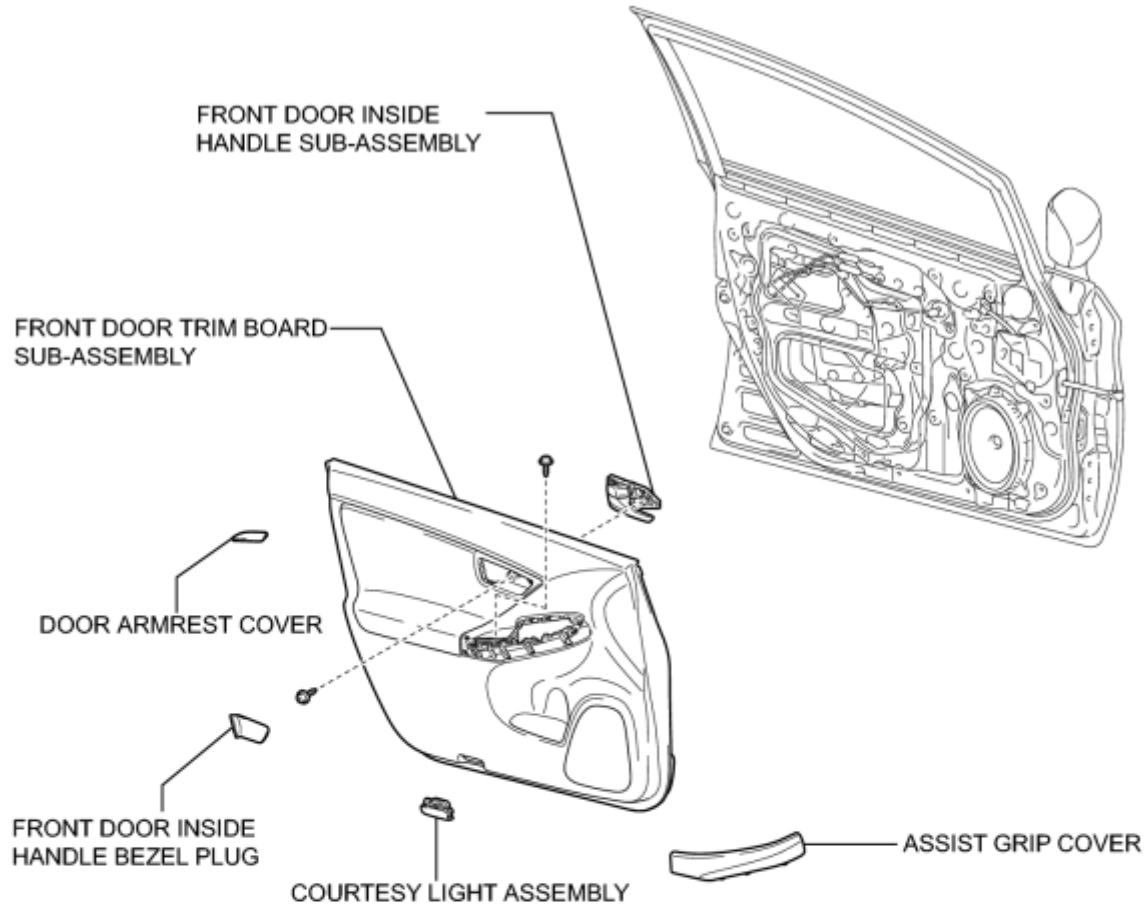
# ILLUSTRATION

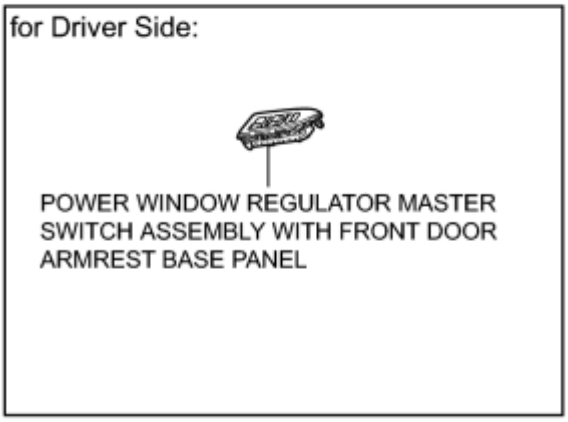


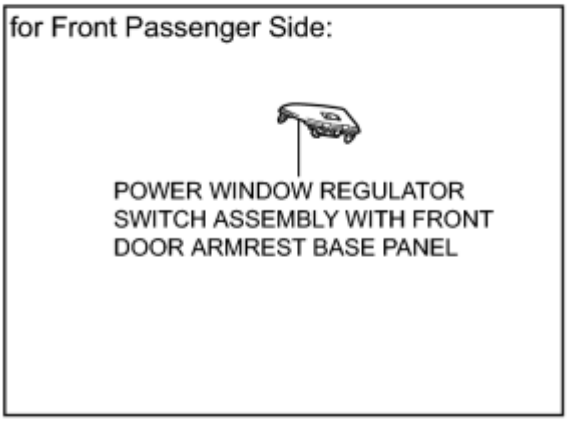




P

# ILLUSTRATION

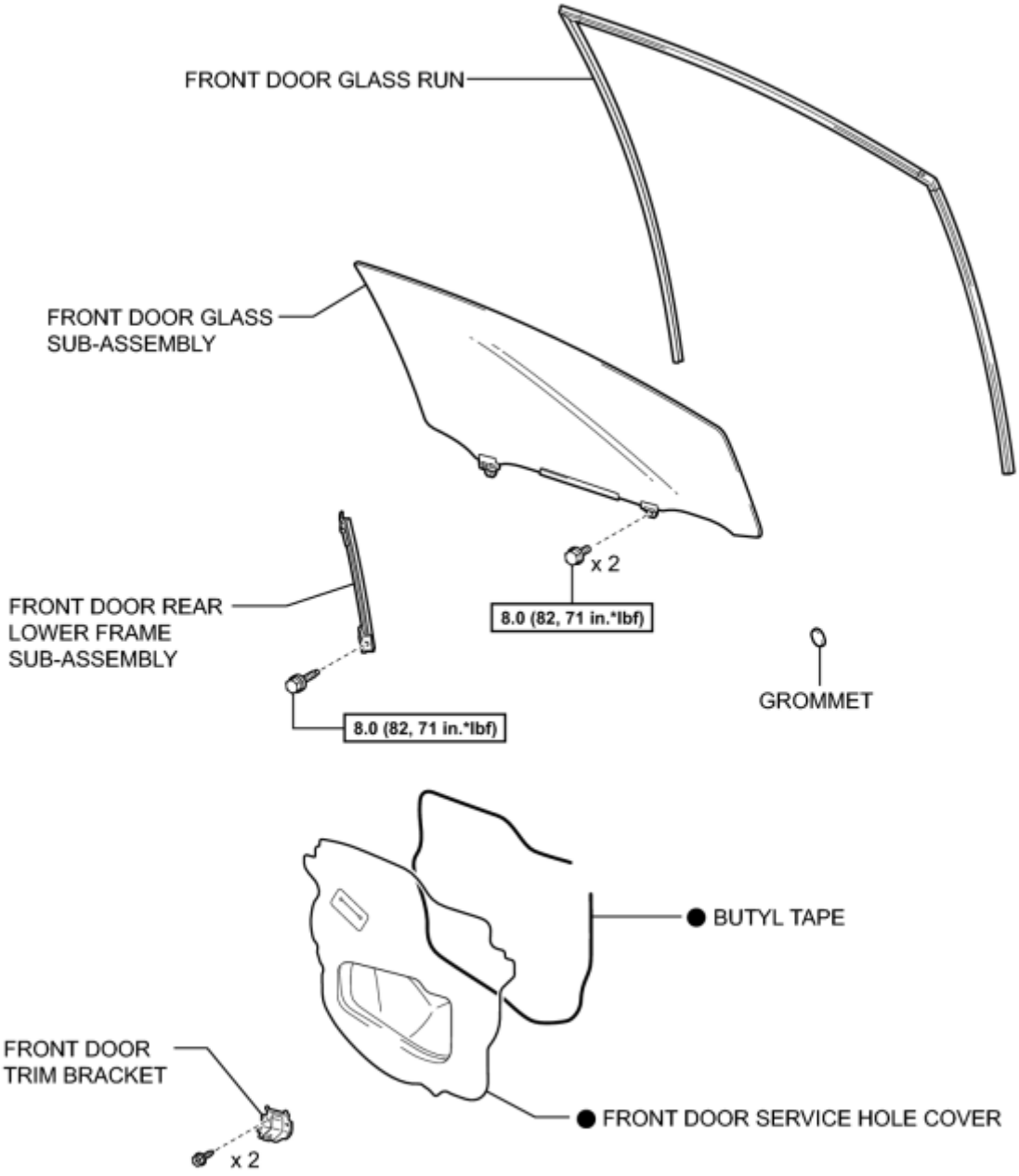



P

# ILLUSTRATION

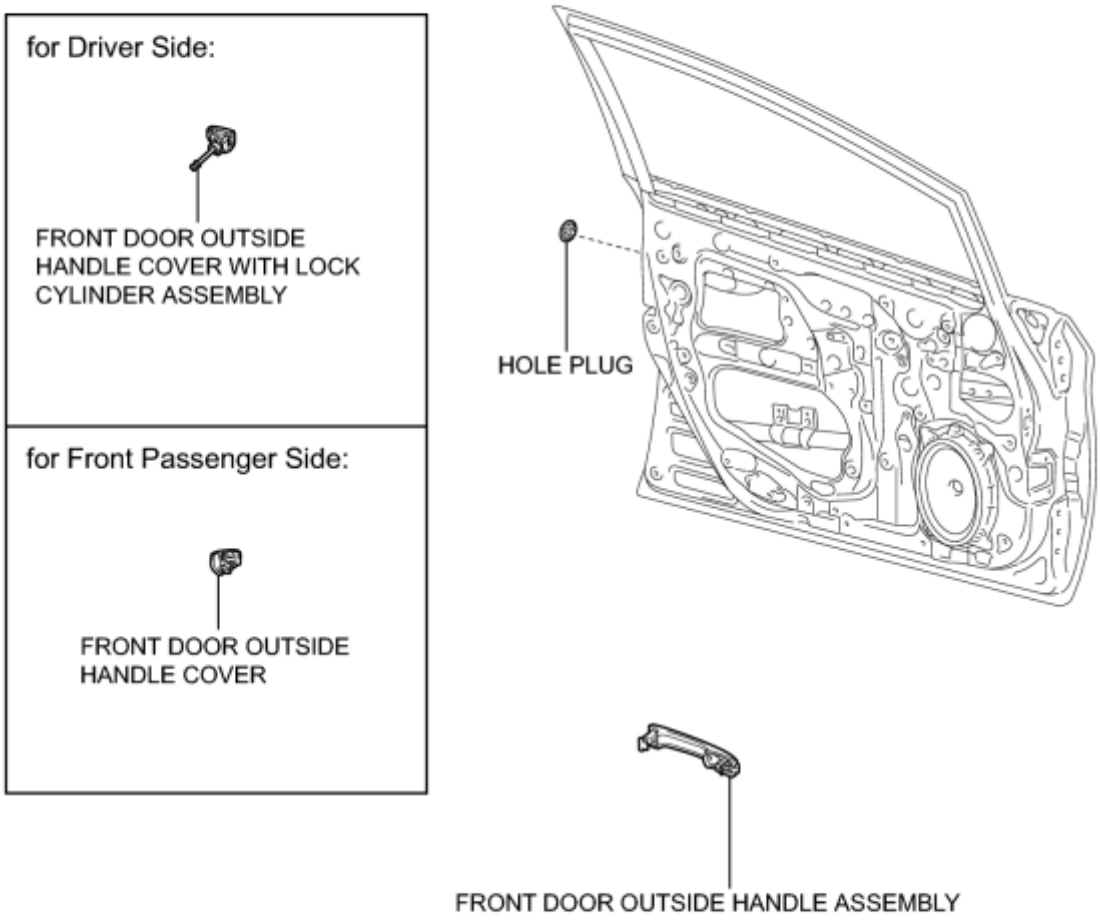



N*m (kgf*cm, ft.*lbf): Specified torque

● Non-reusable part

P

# ILLUSTRATION


for Driver Side:
FRONT DOOR OUTSIDE HANDLE COVER WITH LOCK CYLINDER ASSEMBLY
for Front Passenger Side:
FRONT DOOR OUTSIDE HANDLE COVER
HOLE PLUG
FRONT DOOR OUTSIDE HANDLE ASSEMBLY

P

# REMOVAL

1. REMOVE REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

2. REMOVE REAR DECK FLOOR BOX INFO

3. REMOVE REAR NO. 3 FLOOR BOARD INFO

4. REMOVE FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

5. REMOVE ASSIST GRIP COVER INFO

6. REMOVE POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

7. REMOVE POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

8. REMOVE DOOR ARMREST COVER INFO

9. REMOVE COURTESY LIGHT ASSEMBLY INFO

10. REMOVE FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. REMOVE FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

12. REMOVE FRONT DOOR TRIM BRACKET INFO

13. REMOVE FRONT DOOR SERVICE HOLE COVER INFO

14. REMOVE FRONT DOOR GLASS SUB-ASSEMBLY INFO

15. REMOVE FRONT DOOR GLASS RUN INFO

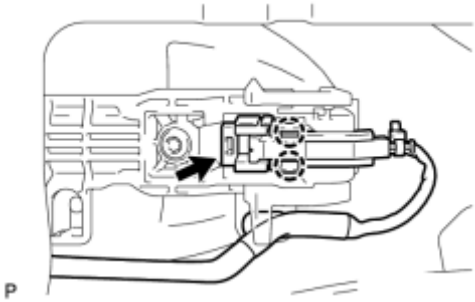
16. REMOVE FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY INFO

17. REMOVE FRONT DOOR OUTSIDE HANDLE COVER WITH LOCK CYLINDER ASSEMBLY (for Driver Side) INFO

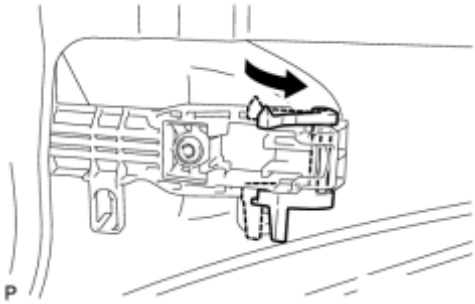
18. REMOVE FRONT DOOR OUTSIDE HANDLE COVER (for Front Passenger Side) INFO

19. REMOVE FRONT DOOR OUTSIDE HANDLE ASSEMBLY

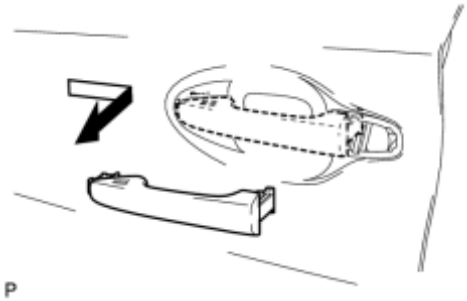
(a) Disengage the 2 claws.



(b) Disconnect the connector.



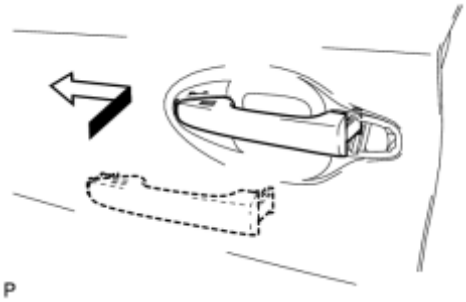
(c) Move the lever in the direction indicated by the arrow in the illustration.



(d) Remove the front door outside handle assembly as shown in the illustration.

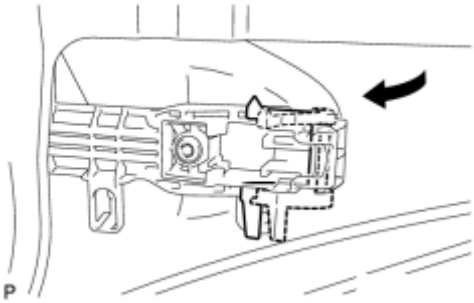
# INSTALLATION

1. INSTALL FRONT DOOR OUTSIDE HANDLE ASSEMBLY

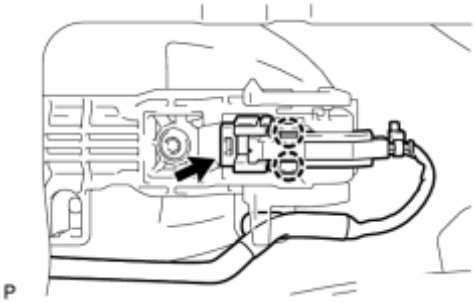


(a) Insert the front end of the front door outside handle assembly into the front door outside handle frame.

(b) Insert the rear end of the front door outside handle assembly into the front door outside handle frame, then slide the front door outside handle assembly toward the front of the vehicle to install it.



(c) Move the lever back in the direction indicated by the arrow in the illustration to lock the door outside handle assembly.



(d) Connect the connector.

(e) Engage the 2 claws.

2. INSTALL FRONT DOOR OUTSIDE HANDLE COVER (for Front Passenger Side) INFO

3. INSTALL FRONT DOOR OUTSIDE HANDLE COVER WITH LOCK CYLINDER ASSEMBLY (for Driver Side) INFO

4. INSTALL FRONT DOOR REAR LOWER FRAME SUB-ASSEMBLY INFO

5. INSTALL FRONT DOOR GLASS RUN INFO

6. INSTALL FRONT DOOR GLASS SUB-ASSEMBLY INFO

7. INSTALL FRONT DOOR SERVICE HOLE COVER INFO

8. INSTALL FRONT DOOR TRIM BRACKET INFO

9. INSTALL FRONT DOOR INSIDE HANDLE SUB-ASSEMBLY INFO

10. INSTALL FRONT DOOR TRIM BOARD SUB-ASSEMBLY INFO

11. INSTALL COURTESY LIGHT ASSEMBLY INFO

12. INSTALL DOOR ARMREST COVER INFO

13. INSTALL POWER WINDOW REGULATOR MASTER SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Driver Side) INFO

14. INSTALL POWER WINDOW REGULATOR SWITCH ASSEMBLY WITH FRONT DOOR ARMREST BASE PANEL (for Front Passenger Side) INFO

15. INSTALL ASSIST GRIP COVER INFO

16. INSTALL FRONT DOOR INSIDE HANDLE BEZEL PLUG INFO

17. INSTALL REAR NO. 3 FLOOR BOARD INFO

18. INSTALL REAR DECK FLOOR BOX INFO

19. INSTALL REAR NO. 2 FLOOR BOARD (for Separate Type) INFO

20. INITIALIZE POWER WINDOW CONTROL SYSTEM

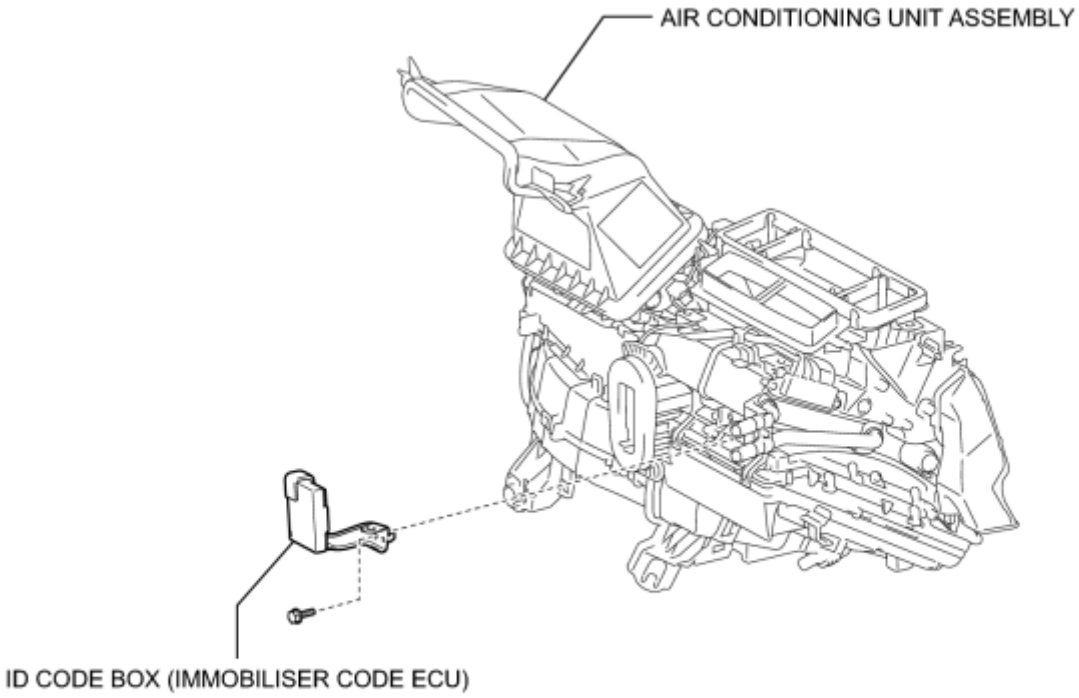
INFO

21. CHECK POWER WINDOW CONTROL SYSTEM

INFO

# COMPONENTS

# ILLUSTRATION




P

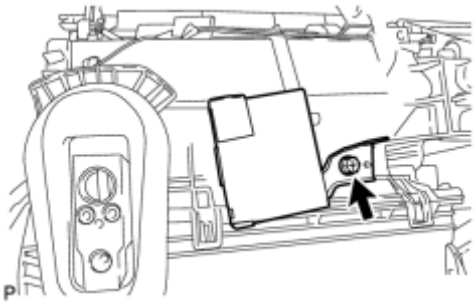
# REMOVAL

1. REMOVE AIR CONDITIONING UNIT ASSEMBLY

HINT:

Refer to the procedure up to Remove Air Conditioning Unit Assembly INFO.

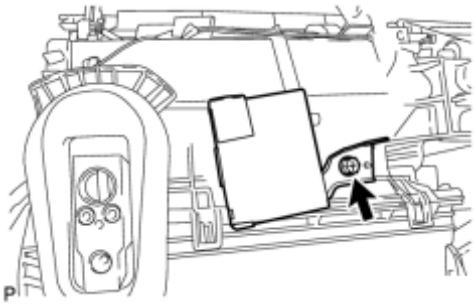
2. REMOVE ID CODE BOX (IMMOBILISER CODE ECU)



(a) Remove the bolt and ID code box (immobiliser code ECU).

# INSTALLATION

1. INSTALL ID CODE BOX (IMMOBILISER CODE ECU)



(a) Install the ID code box (immobiliser code ECU) with the bolt.

2. INSTALL AIR CONDITIONING UNIT ASSEMBLY

HINT:

Refer to the procedure from Install Air Conditioning Unit Assembly INFO.

3. REGISTER ECU CODE

NOTICE:

If the ID code box (immobiliser code ECU) is replaced, register the ECU code and ECU communication ID INFO.

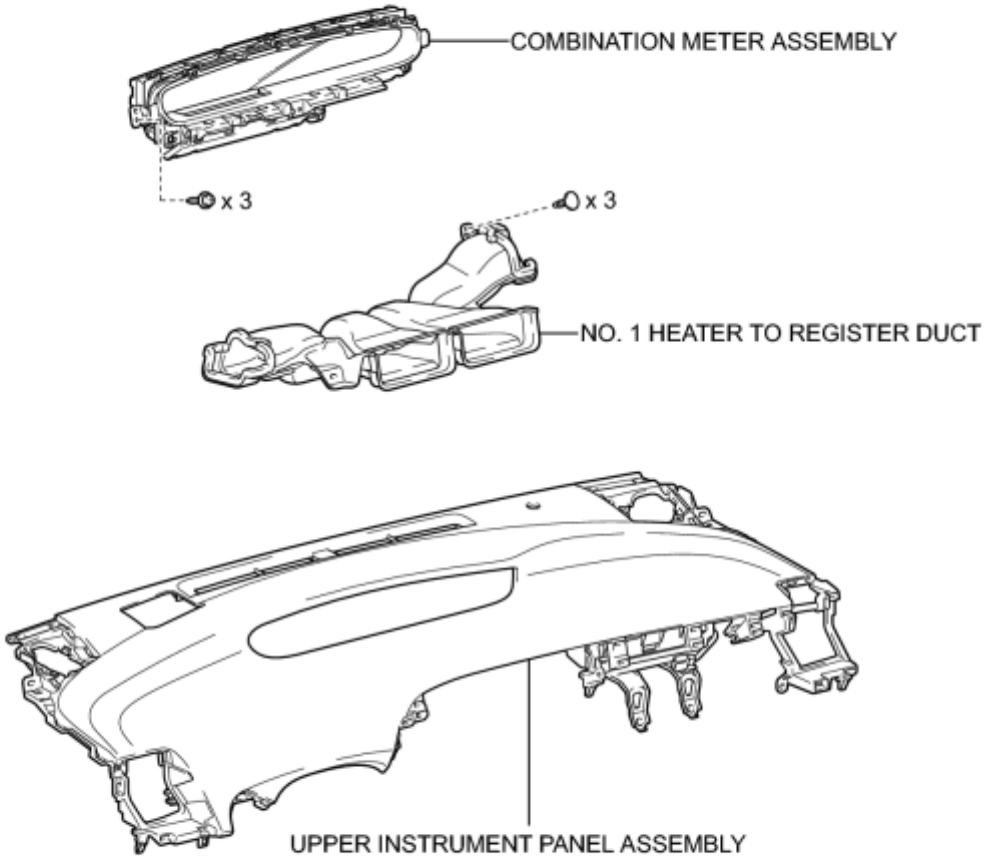
4. REGISTER ECU COMMUNICATION ID

NOTICE:

If the ID code box (immobiliser code ECU) is replaced, register the ECU code and ECU communication ID INFO.

# COMPONENTS

# ILLUSTRATION




P

# REMOVAL

1. REMOVE UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

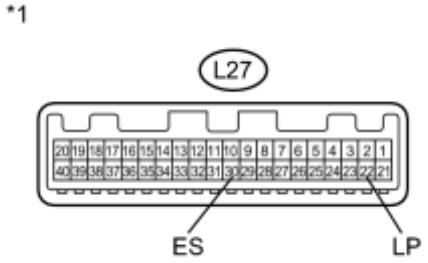
Refer to the procedure up to Remove Upper Instrument Panel Assembly INFO.

2. REMOVE NO. 1 HEATER TO REGISTER DUCT INFO

3. REMOVE COMBINATION METER ASSEMBLY INFO

# INSPECTION

1. INSPECT SECURITY INDICATOR LIGHT




(a) Apply battery voltage from the wire harness back side between the specified terminals of the indicator, and check the lighting condition of the security indicator.

## Standard

| Measurement Condition | Specified Condition |
|---|---|
| Battery positive (+) → Terminals L27-22 (LP)<br><br>Battery negative (-) → Terminals L27-30 (ES) | Security indicator comes on |

## Text in illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Combination Meter Assembly) |

If the result is not as specified, replace the No. 3 meter circuit plate.

# INSTALLATION

1. INSTALL COMBINATION METER ASSEMBLY INFO

2. INSTALL NO. 1 HEATER TO REGISTER DUCT INFO

3. INSTALL UPPER INSTRUMENT PANEL ASSEMBLY

HINT:

Refer to the procedure from Install Upper Instrument Panel Assembly INFO.

# PRECAUTION

1. PRECAUTION FOR DISCONNECTING CABLE FROM NEGATIVE BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) battery terminal, initialize the following systems after the cable is reconnected:

| System Name | See Procedure |
|---|---|
| Advanced Parking Guidance System | INFO |

2. PRECAUTIONS WHEN USING TECHSTREAM

(a) When using the Techstream to troubleshoot the smart key system:

Connect the Techstream to the DLC3 while the power switch is off, and turn a door courtesy light switch on and off at intervals of 1.5 seconds until communication between the Techstream and vehicle begins.

(b) After all DTCs are cleared, check if the malfunction occurs again 6 seconds after the power switch is turned on (IG).

3. PRECAUTION FOR DISCONNECTING AND CONNECTING CABLE OF NEGATIVE BATTERY TERMINAL

(a) Immediately after disconnecting or connecting the cable of the negative (-) battery terminal, the doors may not be unlocked by the smart key system. In this situation, lock and unlock the doors using the wireless function. Then, it will be possible to unlock doors using the smart key system.

4. PRECAUTIONS FOR KEY BATTERY AND VEHICLE BATTERY

(a) When the doors are locked, the vehicle battery is used to transmit radio waves. The battery may discharge if the vehicle remains stopped for a long time. If the vehicle is not to be used for a long time, remove the battery from the vehicle or cancel the smart key system.

(b) When the doors are locked and the key is in the detection area of a door electrical key oscillator, the key battery will be depleted due to regular communication between the key and vehicle. If the vehicle is not to be used, keep the key away from the vehicle (more than 2 m (6.56 ft.)).

5. PRECAUTION FOR KEY

(a) The key is a precision instrument. Be sure to observe the following:

(1) Do not drop the key, subject it to strong shocks or bend it.

(2) Do not keep the key in a high temperature area for a long time.

(3) Do not get the key wet or wash it in an ultrasonic washer etc.

(4) Keep the key away from magnets or magnetized items during use.

(5) Do not disassemble the key except when replacing the battery.

(6) Do not place the key near objects that produce magnetic fields such as TVs, audio systems and electrical ranges, or electrical medical equipment such as low-frequency therapy instruments.

6. PRECAUTIONS FOR SMART KEY SYSTEM (for Entry Function) INSPECTION

(a) Overall smart key system (for entry function):

(1) Make sure to carry the key.

(2) All registered keys for the vehicle should be available when repairing or diagnosing the smart key system (for entry function).

(b) The smart key system, wireless door lock control system and engine immobiliser system may not operate normally, or the size of the operation area may decrease in the following situations:

HINT:

This is because faint radio waves are used for key detection.

(1) When the key battery is depleted.

(2) When any facilities that generate strong radio waves or electrical noise such as a TV tower, power plant, gas station, broadcast station, video billboard or airport are located near the inspection site.

(3) When the key is located near a wireless device such as a radio, cellular phone or cordless telephone.

(4) When the key is in contact with or covered with a metal object similar to the following:

- Metal or aluminum plated card
- Aluminum film from a cigarette box
- Metallic wallet or bag
- Coins
- Heating pad
- Media such as CDs or DVDs

(5) When a wireless remote is operated near the vehicle.

(6) When the key is carried with following items:

- Electrical key or wireless remote from another vehicle
- PC or similar handheld device (PDA etc.)
- Digital audio player
- Portable game device

(7) When a metallic film is applied to the back window glass.

(c) Precautions for key detection

(1) When using the key outside the vehicle, do not keep it too close to the vehicle. Depending on the way the key is held, the key may not be detected properly and the system will not operate normally.

HINT:

In this situation, warning buzzer may sound accidentally or key confinement prevention function may not operate.

(2) Even the key is in a detection area, it may not function normally in the following situations:

- When the doors are locked or unlocked with the key too close to a window or door outside handle, near the ground or in a high place
- When the key is on the instrument panel, floor, rear package tray, a door pocket or in the glove box

(d) Precautions specific to the smart key system

(1) If the key is within the vehicle exterior detection area, the doors can be locked or unlocked even when a person other than the person carrying the key holds the door outside handle. However, doors other than the door that detects the key cannot be unlocked.

(2) If a large amount of water is applied to the door outside handle due to a car wash or heavy rain, and the key is within the vehicle exterior detection area, the doors may be locked or unlocked. However, even when the doors are unlocked, the doors will be locked again after approximately 30 seconds if a door is not opened.

(3) If the doors are locked using the wireless remote transmitter when the key is in the cabin or near the vehicle, it may not be possible to unlock the doors using the smart key system. In this situation, use the wireless function of the key to unlock the doors.

HINT:

If the doors are locked from inside the vehicle using the wireless transmitter, it would not be desirable for it to be possible to unlock the vehicle via the touch sensors on the front outside door handles. Thus, unlocking via the touch sensors is disabled because radio waves from the door electrical key oscillator might otherwise leak into the cabin, detect the key, and enable the front door outside handle touch sensors.

7. PRECAUTIONS FOR SMART DOOR UNLOCK FUNCTION

(a) When unlocking the doors, make sure to grasp the door outside handle, ensuring contact with the sensor on the inner part of the handle. Pull the handle after confirming that the door has unlocked.

(b) When attempting to open a door suddenly or immediately after entering the vehicle exterior antenna detection area, the doors may not be unlocked. If the doors are not unlocked, return the door outside handle to its original position. Pull the handle after confirming that the door has unlocked.

HINT:

Due to mechanical reasons the door cannot be unlocked when the handle is being pulled.

(c) If the door outside handle is grasped with gloved hands, unlocking may be delayed or may not occur.

(d) If another key is in the detection area, the unlocking time may be delayed.

(e) The doors cannot be unlocked within 3 seconds after the door lock operation.

8. PRECAUTIONS FOR SMART DOOR LOCK FUNCTION

(a) Be sure to touch the lock sensor on the door outside handle (depressed portion on the handle) to lock the doors.

(b) If the doors are not locked even when the lock sensor on the door outside handle is touched, touch the both upper and lower lock sensors simultaneously.

(c) If the lock sensor is touched with gloved hands, locking may be delayed or may not occur.

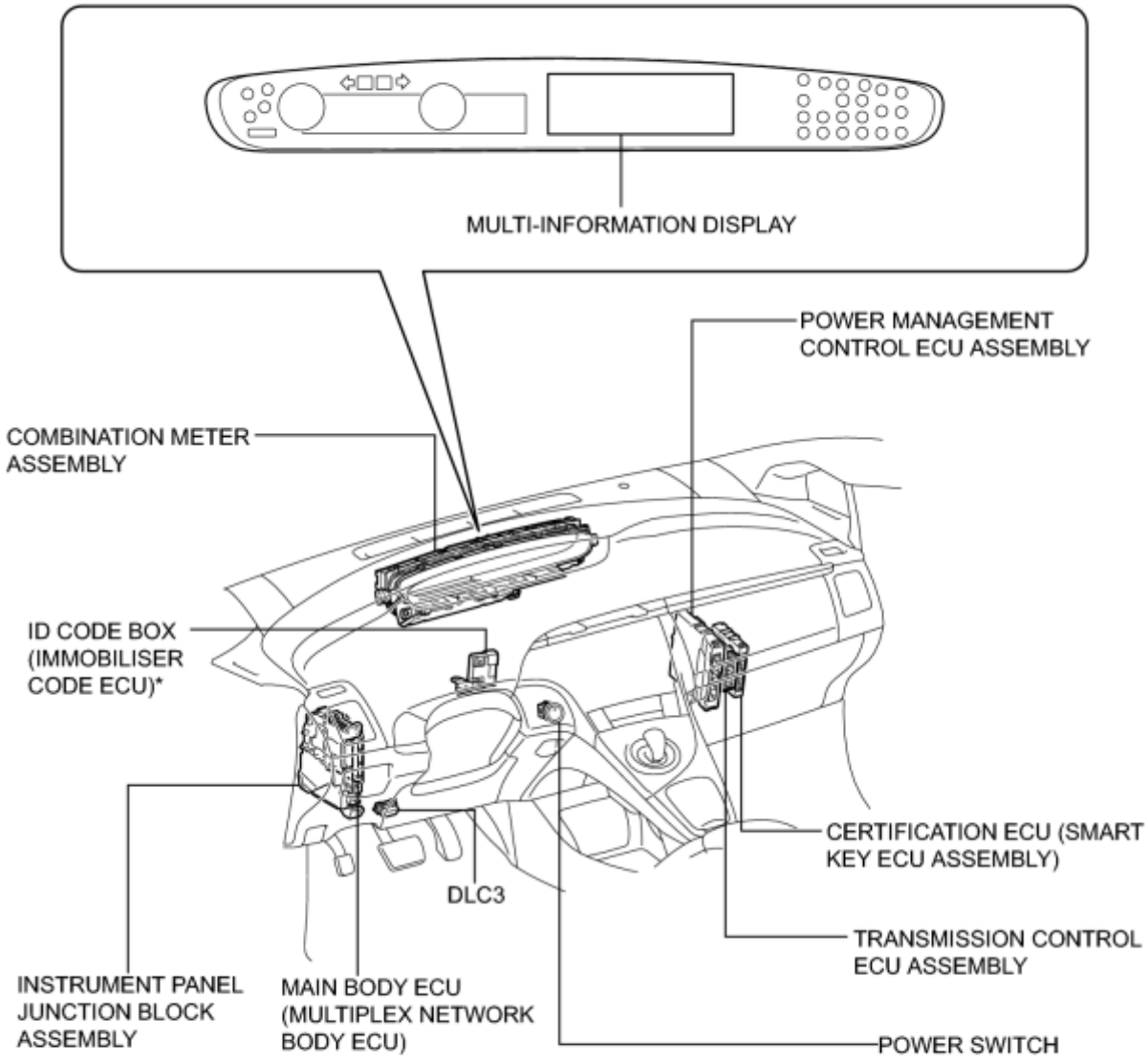
(d) If water is applied to the door outside handle when washing the vehicle and carrying a key, lock and unlock operations may repeat. In this situation, keep the key more than 2 m (6.56 ft.) away from the vehicle and wash the vehicle (be aware of the potential for key theft).

(e) If water is applied to the door outside handle due to a car wash or heavy rain with a key inside the cabin, a warning message "Key not detected" may be displayed and buzzer may sound outside the vehicle. In this situation, the warning message will disappear and buzzer will stop when all the doors are locked.

(f) If ice, snow or dirt adheres to a lock sensor surface, the sensor may not react. In this situation, remove the ice, snow or dirt and touch the sensor again or touch the lock sensor on the lower part of the handle.

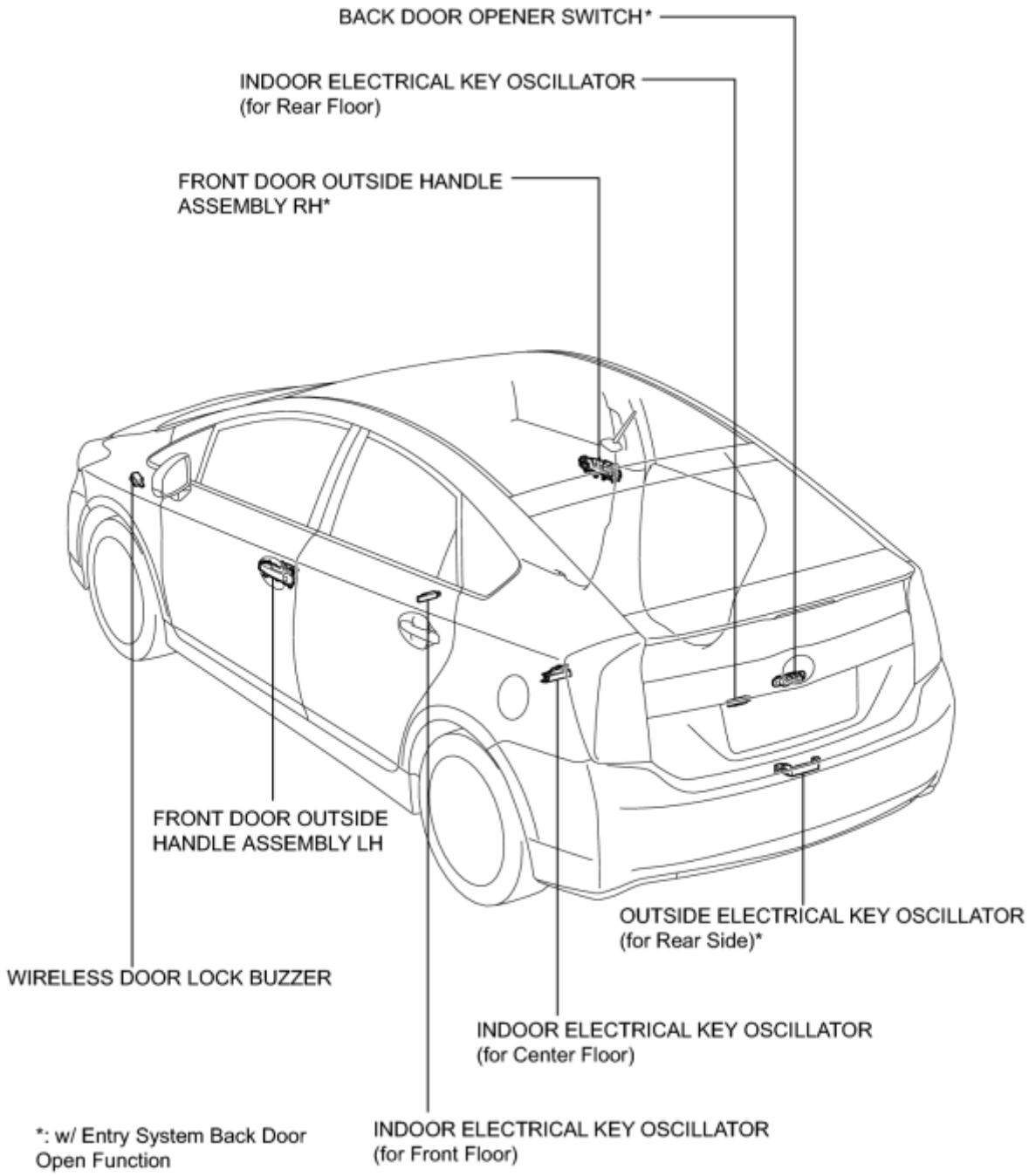
# PARTS LOCATION

# ILLUSTRATION

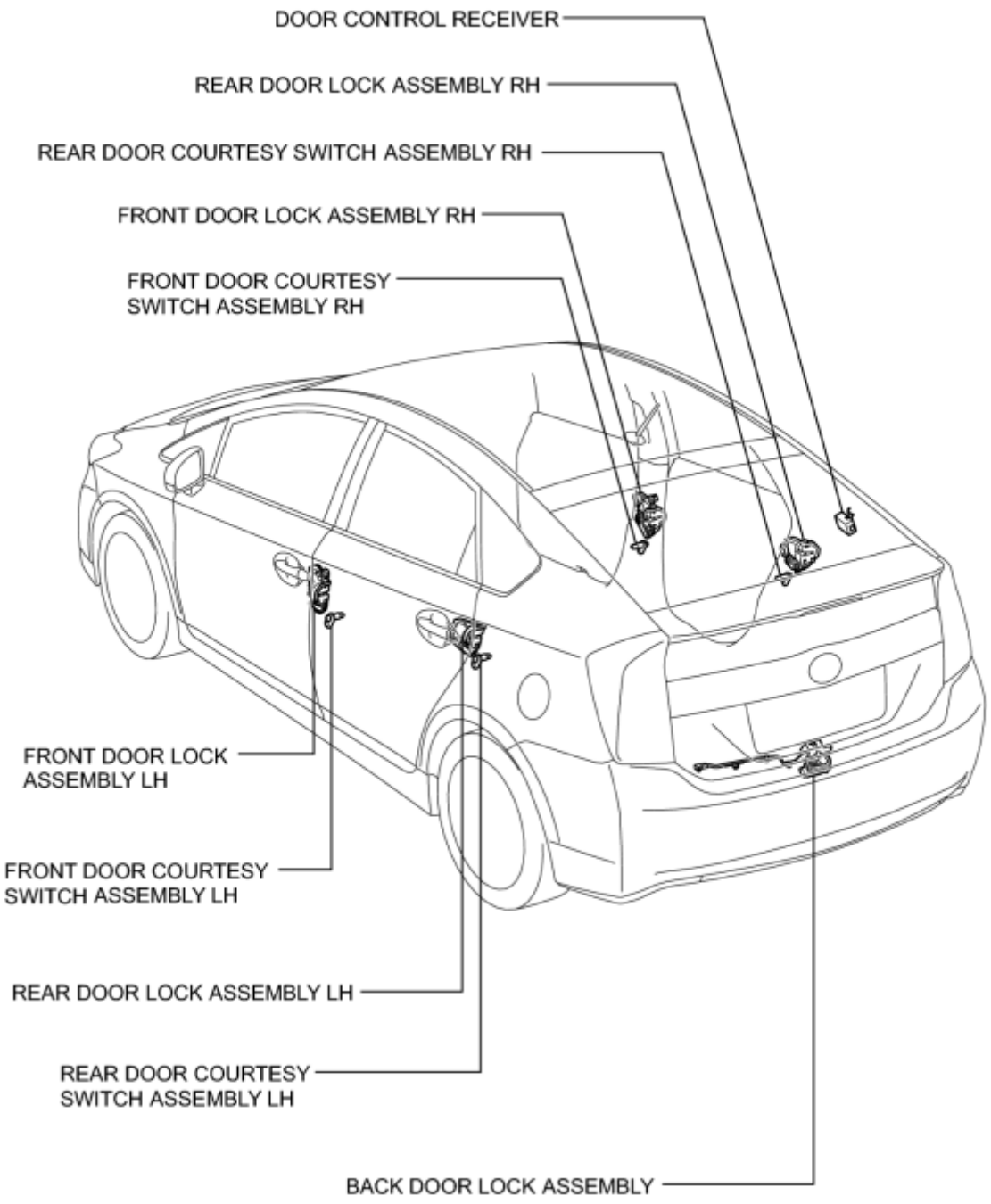



*: w/ Automatic Light Control System

# ILLUSTRATION

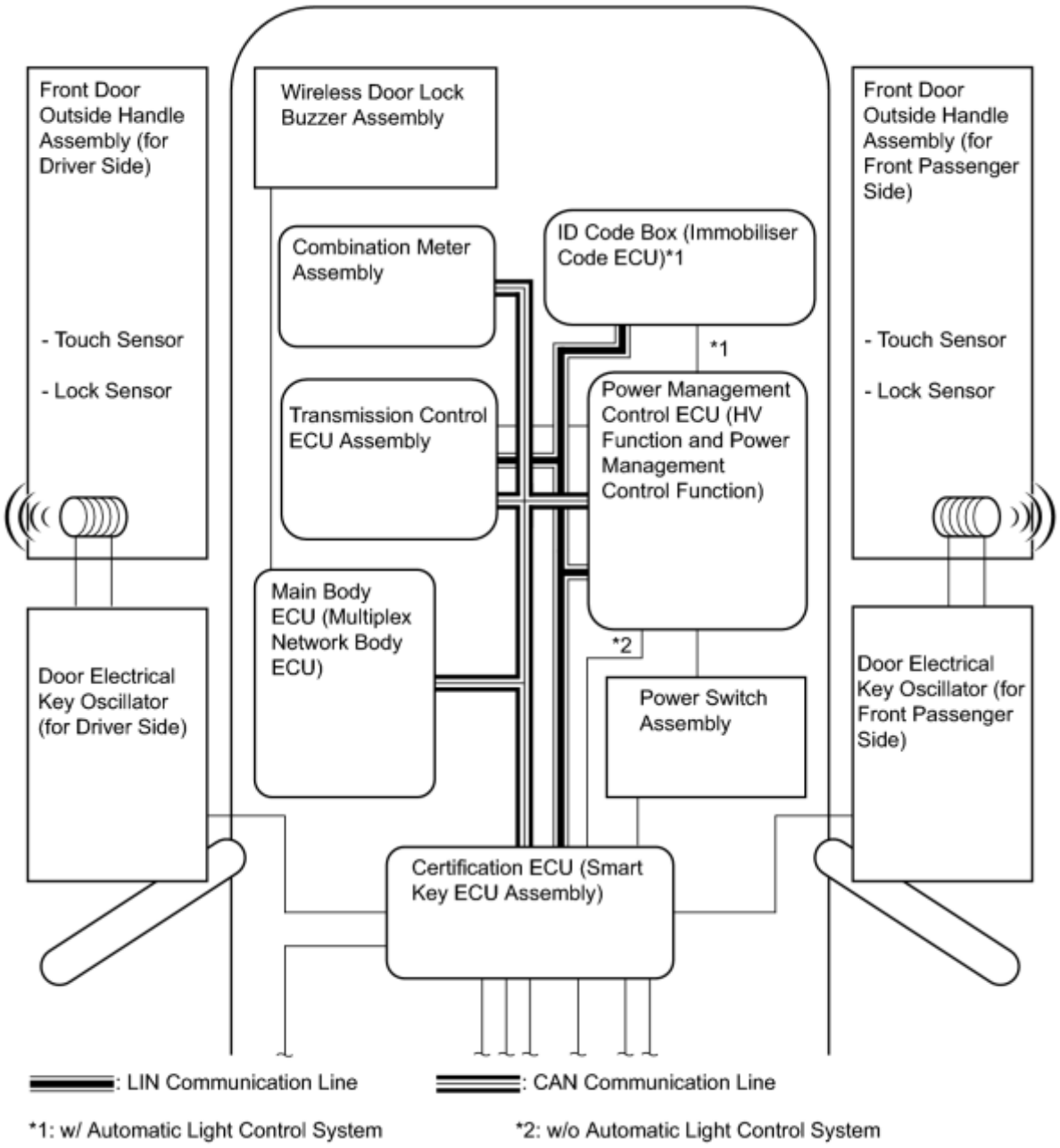


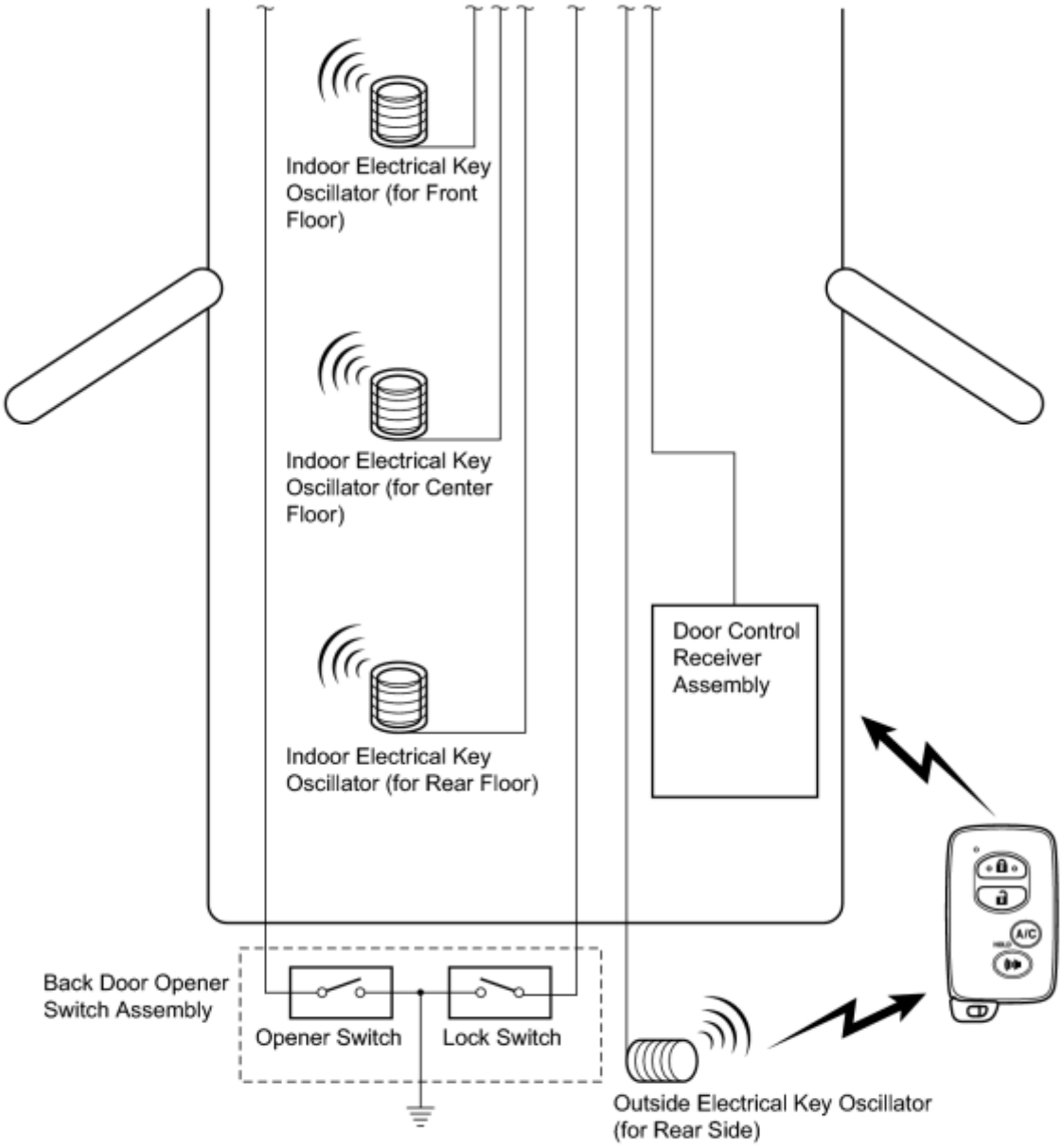

# ILLUSTRATION


DOOR CONTROL RECEIVER
REAR DOOR LOCK ASSEMBLY RH
REAR DOOR COURTESY SWITCH ASSEMBLY RH
FRONT DOOR LOCK ASSEMBLY RH
FRONT DOOR COURTESY SWITCH ASSEMBLY RH
FRONT DOOR LOCK ASSEMBLY LH
FRONT DOOR COURTESY SWITCH ASSEMBLY LH
REAR DOOR LOCK ASSEMBLY LH
REAR DOOR COURTESY SWITCH ASSEMBLY LH
BACK DOOR LOCK ASSEMBLY

# SYSTEM DIAGRAM

1. w/ Entry System Back Door Open Function:



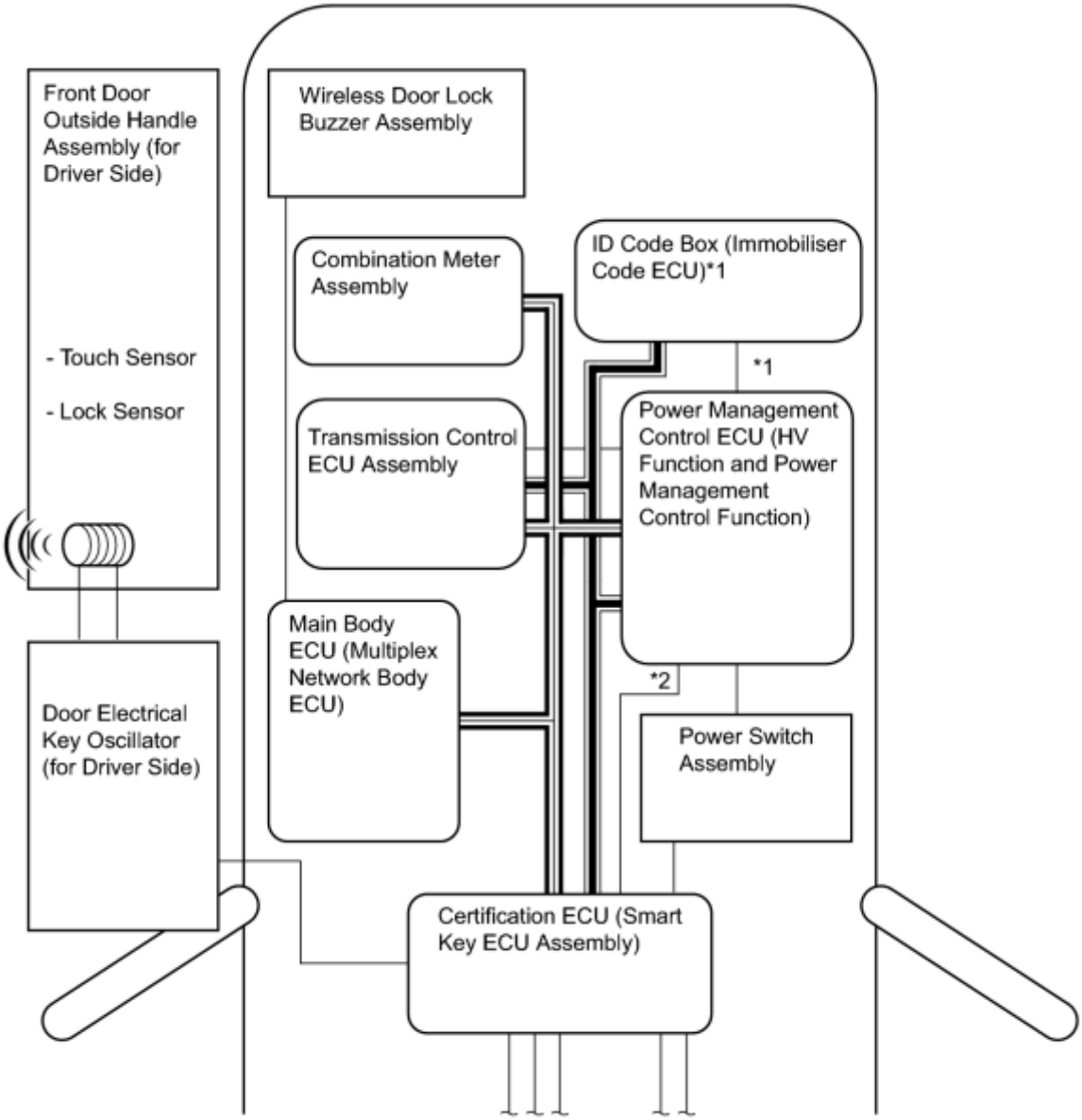


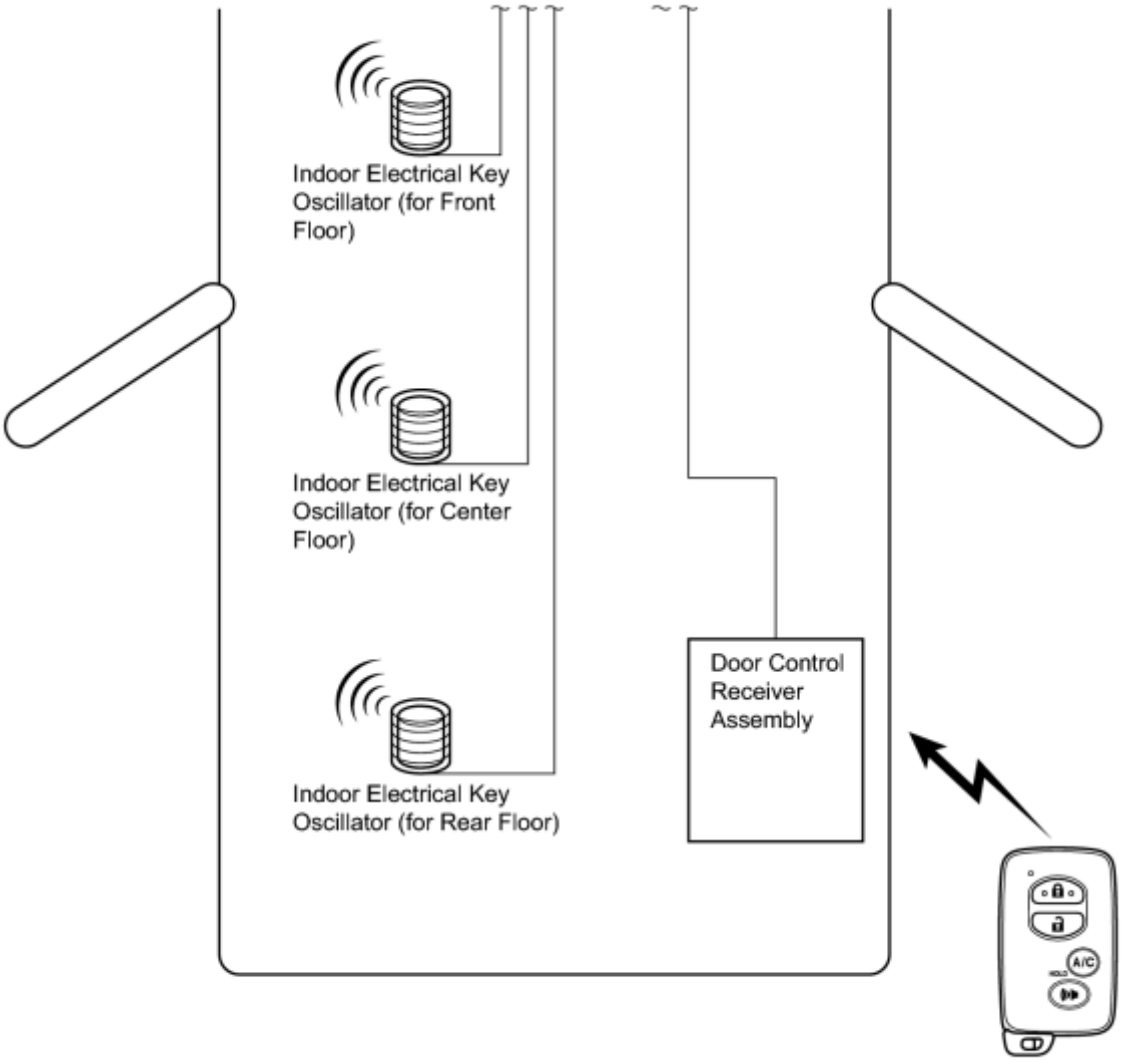

### *Communication Table*

| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Main body ECU (multiplex network body ECU) | Certification ECU (smart key ECU assembly) | Courtesy light switch signal | CAN |
| | | Door lock output signal | |
| | | Door lock position switch signal | |
| | | Driver door key operated switch signal | |
| | | IG signal | |
| | | ACC switch signal | |

| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Certification ECU (smart key ECU assembly) | Main body ECU (multiplex network body ECU) | Illumination light request signal | CAN |
| | | Light answer back signal | |
| | | Door lock/unlock request signal | |
| | | Back door output request signal | |
| | | Wireless door lock buzzer request signal | |
| Certification ECU (smart key ECU assembly) | Combination meter assembly | Meter buzzer single tone request signal | CAN |
| | | Meter buzzer intermittent tone request signal | |
| | | Meter buzzer continuous tone request signal | |
| | | Key loss warning signal | |
| | | Auto power off operation request signal | |
| | | Key not detected warning signal | |
| | | Low key battery warning signal | |
| | | Shift position warning signal | |
| | | Immobiliser system certification completion signal | |
| | | Emergency operation support display request signal | |
| | | Hybrid vehicle control system start method display request signal | |
| Combination meter assembly | • Certification ECU (smart key ECU assembly)<br>• Main body ECU (multiplex network body ECU) | Vehicle speed signal | CAN |

2. w/o Entry System Back Door Open Function:


Front Door Outside Handle Assembly (for Driver Side)
- Touch Sensor
- Lock Sensor
Door Electrical Key Oscillator (for Driver Side)
Wireless Door Lock Buzzer Assembly
Combination Meter Assembly
ID Code Box (Immobiliser Code ECU)*1
*1
Transmission Control ECU Assembly
Power Management Control ECU (HV Function and Power Management Control Function)
Main Body ECU (Multiplex Network Body ECU)
*2
Power Switch Assembly
Certification ECU (Smart Key ECU Assembly)
: LIN Communication Line
: CAN Communication Line
*1: w/ Automatic Light Control System
*2: w/o Automatic Light Control System




### *Communication Table*

| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| Main body ECU (multiplex network body ECU) | Certification ECU (smart key ECU assembly) | Courtesy light switch signal | CAN |
| | | Door lock output signal | |
| | | Door lock position switch signal | |
| | | Driver door key operated switch signal | |
| | | IG signal | |
| | | ACC switch signal | |
| Certification ECU (smart key ECU assembly) | Main body ECU (multiplex network body ECU) | Illumination light request signal | CAN |
| | | Light answer back signal | |

| Transmitting ECU (Transmitter) | Receiving ECU | Signal | Communication Method |
|---|---|---|---|
| | | Door lock/unlock request signal | |
| | | Back door output request signal | |
| | | Wireless door lock buzzer request signal | |
| Certification ECU (smart key ECU assembly) | Combination meter assembly | Meter buzzer single tone request signal | CAN |
| | | Meter buzzer intermittent tone request signal | |
| | | Meter buzzer continuous tone request signal | |
| | | Key loss warning signal | |
| | | Auto power off operation request signal | |
| | | Key not detected warning signal | |
| | | Low key battery warning signal | |
| | | Shift position warning signal | |
| | | Immobiliser system certification completion signal | |
| | | Emergency operation support display request signal | |
| | | Hybrid vehicle control system start method display request signal | |
| Combination meter assembly | • Certification ECU (smart key ECU assembly)<br>• Main body ECU (multiplex network body ECU) | Vehicle speed signal | CAN |

# SYSTEM DESCRIPTION

CAUTION:

If using a pacemaker, be sure to read the manual of the pacemaker before using the key, as the radio waves of the key may affect the pacemaker.

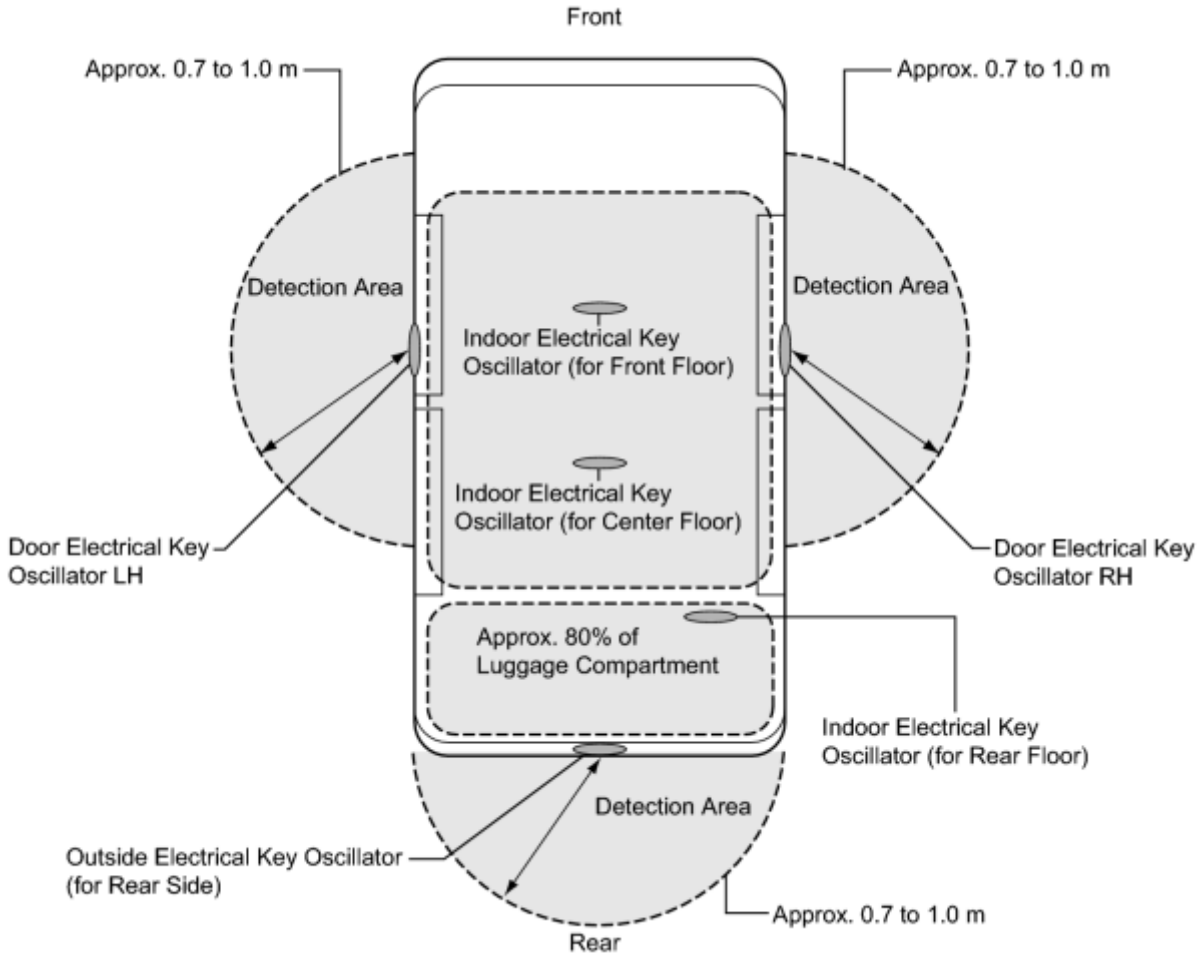
1. SMART KEY SYSTEM DESCRIPTION

(a) In addition to conventional mechanical key and wireless door lock control functions, the smart key system enables door locking/unlocking and hybrid vehicle control system starting without operating the key. The only requirement is that the key is in the user's possession.

- This system is controlled by the certification ECU (smart key ECU assembly). When the certification ECU (smart key ECU assembly) detects the presence of the smart key system in one of the detection areas, it identifies and checks the ID code, and outputs operation signals to the related ECU in accordance with their functions.
- The detection areas are formed by 6 oscillators (2 door oscillators, 1 outside oscillator and 3 indoor oscillators).

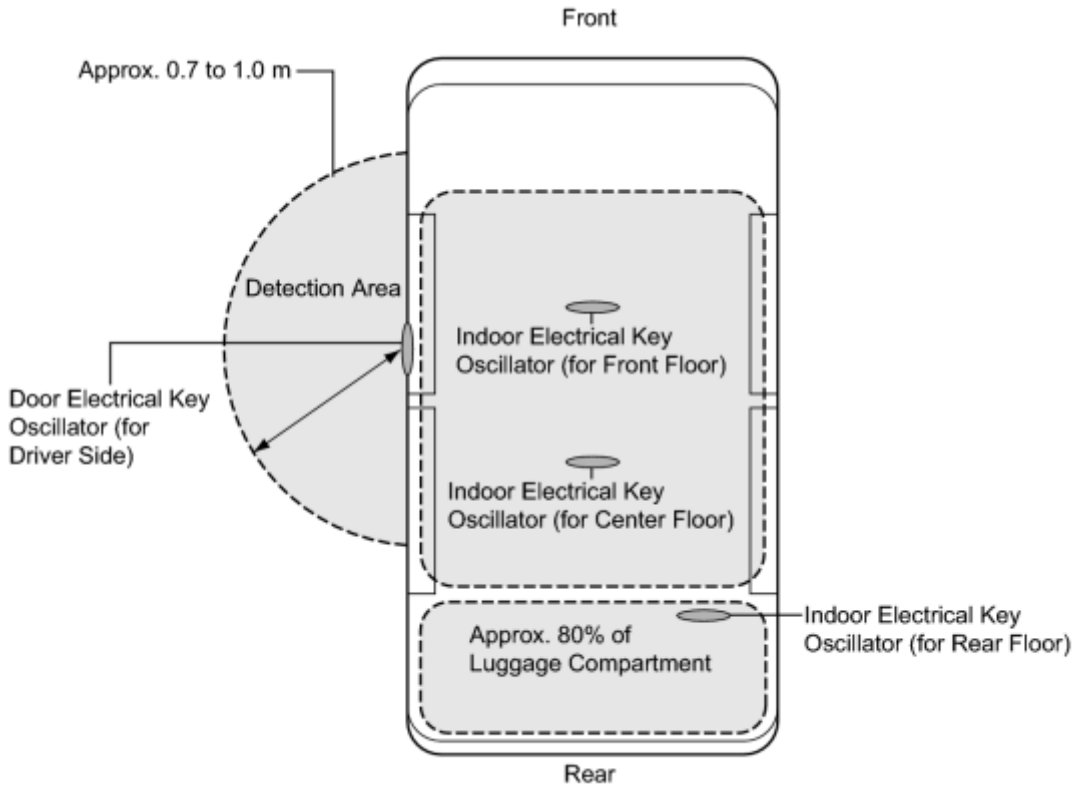
2. DETECTION AREA

(a) w/ Entry System Back Door Open Function




| Actuation Area | Detail |
|---|---|
| Interior | The interior detection area of the indoor electrical key oscillators (for front, center and rear floor) is formed when the driver door is opened or closed, when the power switch is pushed, when a warning is activated, or when the lock sensor on the door outside handle assembly or lock switch on the back door opener switch assembly is on. |
| Exterior | The exterior detection area formed by the door electrical key oscillators (for driver side and front passenger side) and outside electrical key oscillator (for rear side) is approximately 0.7 to 1.0 m (2.30 to 3.28 ft.) from the door outside handle assembly of the front doors, or the center of the rear bumper. |
| Around Front Door | The exterior detection area of the door electrical key oscillator (for driver side or front passenger side) is formed by transmitting a request signal every 0.25 seconds while the power switch is off and each door is locked. In this way it detects the proximity of a key. When locking the door using the lock sensor on the door outside handle assembly, the detection area is formed when the lock sensor is touched. |
| Around Back Door | The exterior detection area of the outside electrical key oscillator (for rear side) is formed by when the back door opener switch assembly (opener or lock switch) is on. |

(b) w/o Entry System Back Door Open Function




| Actuation Area | Detail |
|---|---|
| Interior | The interior detection area of the indoor electrical key oscillators (for front, center and rear floor) is formed when the driver door is opened or closed, when the power switch is pushed, when a warning is activated, or when the lock sensor on the door outside handle assembly or lock switch on the back door opener switch assembly is on. |
| Exterior | The exterior detection area formed by the door electrical key oscillators (for driver side) is approximately 0.7 to 1.0 m (2.30 to 3.28 ft.) from the door outside handle assembly of the front doors, or the center of the rear bumper. |
| Around Front Door | The exterior detection area of the door electrical key oscillator (for driver side) is formed by transmitting a request signal every 0.25 seconds while the power switch is off and each door is locked. In this way it detects the proximity of a key. When locking the door using the lock sensor on the door outside handle assembly, the detection area is formed when the lock sensor is touched. |

3. FUNCTION OF MAIN COMPONENTS

| Component | Function |
|---|---|
| Key | • Outputs information such as the key ID and vehicle ID when request signals that are output by the indoor, outside and door oscillators are received.<br>• Outputs a request signal when the lock, unlock, panic or remote A/C*1 button on the key is pushed.<br>• Outputs information such as the key ID and vehicle ID when the radio wave that is output by the transponder key amplifier in the power switch is received.<br>• Has an integrated mechanical key that can be used to |

| Component | | Function |
|---|---|---|
| | | unlock the doors when the key battery is weak. |
| Certification ECU (Smart Key ECU Assembly) | | • Certifies the ID code received from the door control receiver and transmits the certification results to the steering lock ECU (steering lock actuator assembly).<br>• Controls the oscillators and touch sensors.<br>• Transmits the door lock/unlock request signals during the entry function. |
| Main Body ECU (Multiplex Network Body ECU) | | • Receives the request signal from the certification ECU (smart key ECU assembly) and actuates the door lock motors to unlock or lock all the doors.<br>• Transmits the condition of each door and, the back door to the certification ECU (smart key ECU assembly). |
| Front Door Outside Handle Assembly (for Driver Side, Front Passenger Side*2) (touch sensor) | | Sends a door unlock request signal to the certification ECU (smart key ECU assembly) when the touch sensor on the inner side of the front door outside handle assembly is touched. |
| Front Door Outside Handle Assembly (for Driver Side, Front Passenger Side*2) (lock sensor) | | Sends a door lock request signal to the certification ECU (smart key ECU assembly) when the lock sensor on the front door outside handle assembly is touched. |
| Door Electrical Key Oscillator (for Driver Side, Front Passenger Side*2) | | Receives the request signal from the certification ECU (smart key ECU assembly), and creates an detection area around the front doors. |
| Indoor Electrical Key Oscillator (for Front, Center and Rear Floor) | | Receives a request signal from the certification ECU (smart key ECU assembly) and forms the interior detection area. |
| Outside Electrical Key Oscillator (for Rear Side)*2 | | Receives the request signal from the certification ECU (smart key ECU assembly), and forms an detection area around the back door. |
| Door Control Receiver Assembly | | Receives the ID code from the key and transmits it to the certification ECU (smart key ECU assembly). |
| Back Door Opener Switch Assembly*2<br>• Opener Switch | | Transmits a back door open request signal to the certification ECU (smart key ECU assembly). |
| Back Door Opener Switch Assembly*2<br>• Lock Switch | | Transmits a back door lock request signal to the certification ECU (smart key ECU assembly). |
| Stop Light Switch | | Outputs state of the brake pedal to the power management control ECU. |
| Combination Meter Assembly | Buzzer | Sounds to inform the driver of malfunctions in the smart key system. |
| | Multi-information Display | The following warning messages appear to alert the driver: |

| Component | | Function |
|---|---|---|
| | | • Shift to P Position<br>• Shift to P Position and Push Power Switch Turn Power Off<br>• Key not Detected<br>• Turn Power Off<br>• Key Detected in Vehicle<br>• Key Battery Low<br>• Depress Brake Pedal and Push Power Switch to Start<br>• Depress Brake Pedal, Touch Power Switch with Key<br>• Auto Power Off to Conserve Battery<br>• Shift to P Position to Start |
| Wireless Door Lock Buzzer Assembly | | Sounds to inform the driver of malfunctions in the smart key system. |

- *1: w/ Remote Air Conditioning System
- *2: w/ Entry System Back Door Open Function

4. CONSTRUCTION AND OPERATION

(a) Key

The key consists of a mechanical key, transmitter for wireless door lock control and transceiver for the smart key system.

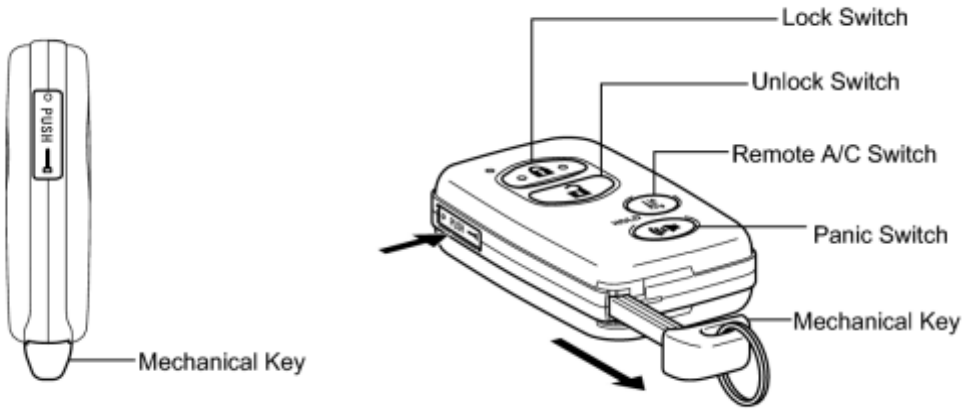
- The transceiver function for the smart key system receives the signals from the oscillators and sends the ID code to the tuner.
- The transmitter function for the wireless door lock control has a lock switch, unlock switch, panic switch and remote A/C switch*.

  *: w/ Remote Air Conditioning System

- This mechanical key works for the driver door and glove box, but cannot start the hybrid vehicle control system.

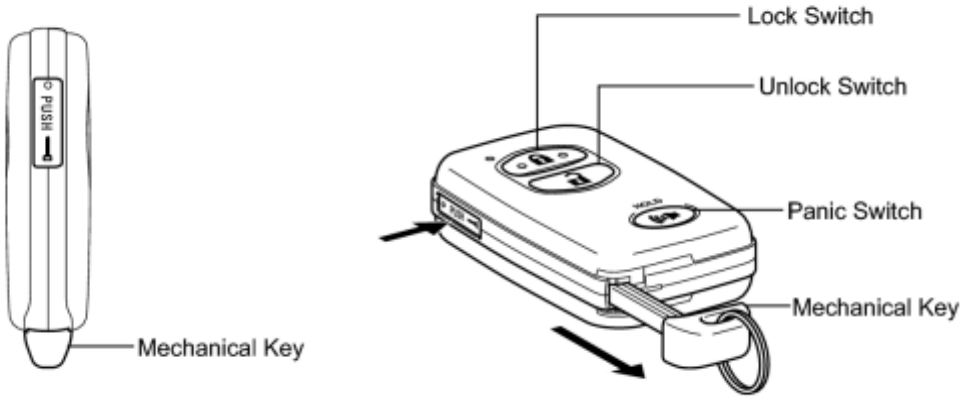
A total of 7 keys can be registered.

(1) Key (w/ Remote Air Conditioning System):




H

(2) Key (w/o Remote Air Conditioning System):




H

(b) Oscillator (door electrical key oscillator (for driver side and front passenger side*), indoor electrical key oscillator (for front, center and rear floors) and outside electrical key oscillator (for rear side)*)

Each oscillator transmits the request signal received from the certification ECU (smart key ECU assembly), and forms a key detection area to detect the presence of a key. The detection area formed by door electrical key oscillator (for driver side and front passenger side*) and outside electrical key oscillator (for rear side)* is approximately 0.7 to 1.0 m (2.30 to 3.28 ft.) from the door outside handle assembly of door (for driver side, front passenger side*) or the center of the rear bumper.

*: w/ Entry System Back Door Open Function

- The detection area of the door electrical key oscillators (for driver side and front passenger side*) is formed by transmitting a request signal periodically while the power switch is off and the doors (for driver side and front passenger side*) are locked. In this way, the oscillator detects the proximity of a key. During entry lock, the detection area is formed with the lock sensor on.

  *: w/ Entry System Back Door Open Function

- The detection area of the outside electrical key oscillator (for rear side)* is formed when the back door opener switch assembly (opener or lock switch) is on.

  *: w/ Entry System Back Door Open Function

- The detection area of the indoor electrical key oscillators (for front, center and rear floor) is formed when any door is opened or closed, during hybrid vehicle control system start, when a warning is activated, or when the lock sensor on the door outside handle assembly or lock switch on the back door opener switch assembly is on.

5. ENTRY FUNCTION OPERATION

(a) The smart key system has the following functions:

| Function | Outline |
|---|---|
| Wireless Door Lock Control | This function is a convenient system for locking and unlocking all the doors and back door at a distance. The operation of this function is the same as that in the wireless door lock control system. |
| Entry Unlock | When a key is in the exterior detection area of any door electrical key oscillator, the door will unlock after the inner side of either front door outside handle assembly (for driver side or front passenger side*) is touched.<br>• The front door outside handle assembly (for driver side) unlocks the driver door.<br>• The front door outside handle assembly (for front passenger side) unlocks all doors and the back door. |
| Entry Unlock Mode Switching | This function allows switching between 2 modes that can be operated with the entry unlock function.<br>• Driver Door Mode (Default Setting)<br>• All Door Mode |
| Entry Lock | • When a key is in the exterior detection area of a door electrical key oscillator (driver side or front passenger side*) and the power switch is off, all doors can be locked by simply touching the lock sensor on the door outside handle assembly.<br>• When a key is in the exterior detection area of the outside electrical key oscillator (for rear side) and the power switch is off, all doors can be locked by simply pressing the lock switch on the back door opener switch assembly.* |
| Entry System Back Door Open Function* | When a key is in the exterior detection area of the outside electrical key oscillator (for rear side), the back door opens manually by simply pressing the back door opener switch assembly (opener switch). |
| Prevention of Key Confinement | The key confinement prevention function prevents the vehicle from being locked with a key left inside. |
| Warning | When any of the situations below occur, the smart key system causes the certification ECU (smart key ECU assembly) to sound the buzzer in the combination meter assembly and wireless door lock buzzer assembly, and indicate a warning on the multi-information |

| Function | Outline |
|---|---|
| | display in order to alert the driver:<br><br>• The hybrid vehicle control system is left running and the shift lever is in R, N, D or B when the driver gets out of the vehicle.<br>• The key reminder sounds.<br>• The hybrid vehicle control system is left running and park (P) is selected when the driver gets out of the vehicle.<br>• A door is ajar.<br>• The hybrid vehicle control system is left running when a passenger gets out of the vehicle while holding the key.<br>• The key is not in the detection areas.<br>• The key is left in the vehicle.<br>• The key battery is weak.<br>• The power management control ECU is malfunctioning.<br>• The hybrid vehicle control system cannot be started (driver error).<br>• The hybrid vehicle control system cannot be started (system error).<br>• An attempt is made to turn off the vehicle with the shift lever in a R, D or B.<br>• Auto power off operation occurs.<br>• Immobiliser system certification completion occurs.<br>• The vehicle is driven without a key. |
| Battery Saving | If the key remains within the exterior detection area of any electrical key oscillator (for driver, front passenger or rear side), the system maintains periodic communication with the key. Therefore, if the vehicle remains parked in that state for a long time, the key battery and the vehicle battery could be drained. |
| Key Cancel INFO | The following key functions can be cancelled by following certain procedures:<br><br>• Entry Unlock/Lock<br>• Entry Hybrid Vehicle Control System Start<br>• Entry System Back Door Open Function*<br>• Key Lock-in Prevention<br>• Warning |
| Key Code Registration | A total of 7 keys can be registered.<br><br>This function enables the registration (writing and storing) of transmitter recognition codes in the EEPROM that is contained in the certification ECU (smart key ECU assembly). |

*: w/ Entry System Back Door Open Function

6. WIRELESS DOOR LOCK CONTROL SYSTEM FUNCTION

Push the lock/unlock/panic/remote A/C* switch on the key to operate each function. For details, INFO.

*: w/ Remote Air Conditioning System

7. ENTRY UNLOCK FUNCTION

(a) When the key enters any exterior detection area of a front door, the certification ECU (smart key ECU assembly) judges and certifies the key ID code received from the door control receiver assembly.

(b) After the key certification OK is confirmed, the certification ECU (smart key ECU assembly) transmits an unlock stand-by signal to the touch sensor of the relevant door.

(c) If a touch sensor is touched in this condition, the certification ECU (smart key ECU assembly) transmits a door unlock request signal to the main body ECU (multiplex network body ECU), and unlocks either the driver door or all doors.

- The front door outside handle assembly (for driver side) unlocks the driver door.*

  *: except for Korea and Mexico

- The front door outside handle assembly (for front passenger side) unlocks all doors.*

  *: w/ Entry System Back Door Open Function and for Korea and Mexico

(d) The main body ECU (multiplex network body ECU) sounds the wireless door lock buzzer twice, and the main body ECU (multiplex network body ECU) flashes the hazard warning lights twice, as an answer back for entry unlock.

8. ENTRY LOCK FUNCTION

(a) The entry lock signal is transmitted to the certification ECU (smart key ECU assembly) when the user (who has the key in their possession) exits the vehicle and touches the lock senor on the door outside handle assembly or presses the lock switch on the back door opener switch assembly*.

*: w/ Entry System Back Door Open Function

(b) The certification ECU (smart key ECU assembly) transmits a request signal for the indoor electrical key oscillators (for front, center and rear floor), door electrical key oscillators (for driver side and front passenger side*) and outside electrical key oscillator (for rear side)* to form detection areas.

*: w/ Entry System Back Door Open Function

(c) The certification ECU (smart key ECU assembly) judges and certifies the ID code. It then checks the location of the key, and if all doors are closed, the ECU transmits a door lock signal to the main body ECU (multiplex network body ECU).

(d) The main body ECU (multiplex network body ECU) receives this signal and actuates the lock motors.

(e) The main body ECU (multiplex network body ECU) blinks the hazard warning lights once and the main body ECU (multiplex network body ECU) sounds the wireless door lock buzzer once as an answerback for the entry lock function.

9. ENTRY SYSTEM BACK DOOR OPEN FUNCTION*

*: w/ Entry System Back Door Open Function

(a) The unlock signal is transmitted to the certification ECU (smart key ECU assembly) from the back door opener switch assembly.

(b) The certification ECU (smart key ECU assembly) transmits a request signal for the outside electrical key oscillator (for rear side) to form a detection area.

(c) The key receives this signal and returns the ID code to the door control receiver assembly.

(d) The certification ECU (smart key ECU assembly) judges and certifies the ID code, and check the location of the key. The ECU transmits a back door open signal to the main body ECU (multiplex network body ECU).

(e) Any ECU receives this signal and actuates the motor to open manually the back door.

10. PREVENTION OF KEY CONFINEMENT FUNCTION

(a) The key confinement prevention function prevents the key from being locked in the vehicle.

(1) When the door is locked by the lock knob in the inside door handle while the key is still in the vehicle interior, the main body ECU (multiplex network body ECU) receives this signal and transmits the door condition signal to the certification ECU (smart key ECU assembly).

(2) The certification ECU (smart key ECU assembly) transmits a request signal for the indoor electrical key oscillators (for front, center and rear floor) to form detection areas.

(3) The key receives this signal and returns the ID code to the door control receiver assembly.

(4) The certification ECU (smart key ECU assembly) judges and certifies the ID code, and check the location of the key. The ECU transmits a door unlock signal to the main body ECU (multiplex network body ECU).

(5) The main body ECU (multiplex network body ECU) receives this signal and actuates the all door lock assemblies to unlock.

(6) The certification ECU (smart key ECU assembly) sounds the wireless door lock buzzer and buzzer in the combination meter as an answer back for unlock.

11. WARNING FUNCTION

(a) Warning

(1) When any of the situations below occur, the smart key system causes the certification ECU (smart key ECU assembly) to sound a buzzer in the combination meter assembly and the wireless door lock buzzer assembly, a message to appear on the multi-information display, and the power switch illumination to operate in order to alert the driver.

| Situation | Condition |
|---|---|
| A | The hybrid vehicle control system is left running and the shift lever is in R, N, D or B when the driver gets out of the vehicle. |
| B | The key reminder sounds. |
| C | The hybrid vehicle control system is left running and park (P) is selected when the driver gets out of the vehicle. |

| Situation | Condition |
|---|---|
| D | A door is ajar. |
| E | The hybrid vehicle control system is left running when a passenger gets out of the vehicle while holding the key. |
| F | The key is not in the detection areas. |
| G | The key is left in the vehicle. |
| H | The key battery is weak. |
| I | The power management ECU is malfunctioning. |
| J | The hybrid vehicle control system cannot be started (driver error). |
| K | The hybrid vehicle control system cannot be started (system error). |
| L | An attempt is made to turn off the vehicle with the shift lever in a R, D or B. |
| M | Auto power off operation occurs. |
| N | Immobiliser system certification completion occurs. |
| O | The vehicle is driven without a key. |

(2) Situation A

- There are 2 patterns for situation A.
  - Pattern 1:

    When the hybrid vehicle control system is left running and the shift lever is in R, N, D or B, the driver opens the door and attempts to get out of the vehicle.

    In this situation, the following control is performed:

<table>
<tr><td>Possible Effects without Warning</td><td colspan="3">Sudden vehicle start, vehicle theft, vehicle roll-away</td></tr>
<tr><td>Warning Active Condition</td><td colspan="3">The warning is activated when all of the following conditions are met:<br><br>o The power switch is in a mode other than off.<br>o The shift lever is in R, N, D or B.<br>o The vehicle speed is less than 5 km/h (3.1 mph).<br>o The driver door is opened.</td></tr>
<tr><td rowspan="3">Warning Method</td><td rowspan="2">Combination Meter Assembly</td><td>Buzzer</td><td>Sounds continuously</td></tr>
<tr><td>Multi-information Display</td><td>The following warning message is displayed:<br><br>o Shift to P Position</td></tr>
<tr><td colspan="2">Wireless Door Lock Buzzer Assembly</td><td>-</td></tr>
<tr><td colspan="2">Power Switch Illumination</td><td>-</td></tr>
</table>

| | |
|---|---|
| Warning Stop Condition | The warning is stopped when one of the following conditions is met:<br>o The power switch is turned off.<br>o The P position switch is pushed.<br>o The vehicle speed is above 5 km/h (3.1 mph).<br>o The driver door is closed. |

(3) Situation B

- There are two patterns for situation B.
  - Pattern 1:

    When the driver door is open, the driver turns the power switch on (ACC) and attempts to leave the vehicle.
  - Pattern 2:

    When the driver door is open, the driver turns the power switch from on (IG) to off and attempts to leave the vehicle.

    In these situations, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effects without Warning | Vehicle theft | | |
| Warning Active Condition | The warning is activated when either of the following patterns is met:<br>o Pattern 1:<br>▪ The power switch is on (ACC).<br>▪ The driver door is opened.<br>▪ The remote air conditioning system is off.<br>o Pattern 2:<br>▪ The power switch is off.<br>▪ The shift control is unlocked.<br>▪ The driver door is opened. | | |
| Waning Method | Combination Meter Assembly | Buzzer | Sounds continuously at short and even intervals |
| | | Multi-information Display | - |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when one of the following conditions is met:<br>o The power switch is turned on (IG).<br>o The driver door is closed.<br>o The power switch is turned off and the shift control is locked. | | |

| | |
|---|---|
| | ○ The remote air conditioning system is turned on. |

(4) Situation C

- There are 2 patterns for situation C.
  - Pattern 1:

    When the hybrid vehicle control system is left running and park (P) is selected, the driver closes the driver door and attempts to leave the vehicle while holding the key.

    In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effects without Warning | Vehicle theft, hybrid vehicle control system cannot be restarted, discharged battery | | |
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br>○ Park (P) is selected.<br>○ The power switch is in a mode other than off.<br>○ The key is not in the vehicle.<br>○ The driver door is opened → closed.<br>○ The vehicle speed is 0 km/h (0 mph). | | |
| Warning Method | Combination Meter Assembly | Buzzer | Sounds once |
| | | Multi-information Display | The following warning message is displayed:<br>○ Key not Detected |
| | Wireless Door Lock Buzzer Assembly | | Sounds 3 times |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when either of the following conditions is met:<br>○ The power switch is turned off.<br>○ The key is returned to the vehicle. | | |

(5) Situation D

- The lock sensor on the door outside handle assembly is touched to perform entry lock with a door open.

In this situation, the following control is performed:

| | |
|---|---|
| Possible Effects without Warning | Vehicle theft |

| | | | |
|---|---|---|---|
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br>• The power switch is off.<br>• Any door is opened.<br>• The lock sensor on the door outside handle assembly is on (touched). | | |
| Warning Method | Combination Meter Assembly | Buzzer | - |
| | | Multi-information Display | - |
| | Wireless Door Lock Buzzer Assembly | | Sounds continuously |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when one of the following conditions is met:<br>• The power switch is turned to a mode other than off.<br>• All doors are closed.<br>• An unlock operation is performed using the wireless door lock remote function.<br>• The touch sensor on the inner side of a door outside handle assembly is used to perform entry unlock.<br>• 10 seconds have elapsed after the wireless door lock buzzer assembly is activated. | | |

(6) Situation E

- When the hybrid vehicle control system is left running, a passenger leaves the vehicle while holding the key.

In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effect without Warning | Hybrid vehicle control system cannot be restarted | | |
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br>• The power switch is in a mode other than off.<br>• A door other than the driver door is opened → closed.<br>• The vehicle speed is 0 mph (0 km/h).<br>• The key is not in the vehicle. | | |
| Warning Method | Combination Meter Assembly | Buzzer | Sounds once |
| | | Multi-information Display | The following warning message is displayed:<br>• Key not Detected |
| | Wireless Door Lock Buzzer Assembly | | Sounds 3 times |
| | Power Switch Illumination | | - |

| | |
|---|---|
| Warning Stop Condition | The warning is stopped when either of the following conditions is met:<br>• The power switch is turned off.<br>• The key is returned to the vehicle. |

(7) Situation F

• When the key is not in the vehicle or the key battery is dead, the driver attempts to start the hybrid vehicle control system or turn the power switch on (IG).

In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effects without Warning | Confuses the user | | |
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br>• The power switch is pushed.<br>• The key is not in the vehicle.<br>• The immobiliser system is set. | | |
| Warning Method | Combination Meter Assembly | Buzzer | Sounds once |
| | | Multi-information Display | The following warning message is displayed for 15 seconds (and then automatically turned off).<br>• Key not Detected |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | Check if the key is in the detection area.<br>If the key is in the detection area, press the wireless door lock switch and confirm that the indicator comes on. If the indicator does not come on, replace the key battery with a new one. | | |

(8) Situation G

• There are two patterns for situation G.

- Pattern 1:

  The lock sensor on a door outside handle assembly is touched to perform entry lock with the key left in the vehicle.

  In this situation, the following control is performed:

| | |
|---|---|
| Possible Effect without Warning | Vehicle theft |

| | | | |
|---|---|---|---|
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br>o The power switch is off.<br>o All doors are closed.<br>o The key is in the vehicle.<br>o The lock sensor on the door outside handle assembly is on (touched).<br>o Any door is unlocked. | | |
| Warning Method | Combination Meter Assembly | Buzzer | - |
| | | Multi-information Display | The following warning message is displayed for 60 seconds (and then automatically turned off).<br>o Key Detected in Vehicle |
| | Wireless Door Lock Buzzer Assembly | | Sounds continuously |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when one of the following conditions is met: | | |
| | Combination Meter Assembly | Multi-information Display | o The power switch is turned to a mode other than off.<br>o Lock operation is detected. |
| | Wireless Door Lock Buzzer Assembly | | o 10 seconds have elapsed after the wireless door lock buzzer assembly is activated.<br>o Any door is opened.<br>o The power switch is turned to a mode other than off.<br>o Lock operation is detected. |

(9) Situation H

- The vehicle is driven using a key that has a low battery.

In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effect without Warning | Smart key system does not function | | |
| Warning Active Condition | The warning is activated when both of the following conditions are met:<br>• The power switch is turned off after being left on (IG) for more than 20 minutes.<br>• The key battery voltage is low. | | |
| Warning Method | Combination Meter Assembly | Buzzer | - |
| | | Multi-information Display | The following warning message is displayed for 15 seconds (and then automatically turned off). |

| | | | |
|---|---|---|---|
| | | | • Key Battery Low |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The key battery is replaced with a new one. | | |

(10) Situation I

- A malfunction of the power management control ECU is detected.

In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effect without Warning | Malfunction detection | | |
| Warning Active Condition | A malfunction of the power management ECU is detected. | | |
| Warning Method | Combination Meter Assembly | Buzzer | - |
| | | Multi-information Display | - |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | The amber indicator blinks at 2-second intervals (goes off automatically after 15 seconds). |
| Warning Stop Condition | The power management control ECU returns to normal. | | |

(11) Situation J

- There are two patterns for situation J.
  - Pattern 1:

    A warning message appears on the multi-information display when the driver does not follow the proper procedure to start the vehicle.

    In this situation, the following control is performed:

| | |
|---|---|
| Possible Effects without Warning | Usability function |
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br>○ The power switch is turned off.<br>○ Driver door is closed → opened.<br>○ The power switch is turned from off to on (ACC) more than twice with the hybrid vehicle control system off and brake pedal not depressed. |

| | | | |
|---|---|---|---|
| Warning Method | Combination Meter Assembly | Buzzer | - |
| | | Multi-information Display | The following warning message is displayed for 10 seconds (and then automatically turned off).<br>o Depress Brake Pedal and Push Power Switch to Start |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The power switch is pushed with the brake pedal depressed. | | |

- Pattern 2:

  A message indicating how to start the hybrid vehicle control system appears on the multi-information display when the shift lever is in a position in which the hybrid vehicle control system cannot be started.

  In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effects without Warning | Usability function | | |
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br>o The hybrid vehicle control system is stopped.<br>o The vehicle speed is 0 km/h (0 mph).<br>o More than 0.5 seconds have elapsed after the power switch is turned on (IG).<br>o The shift lever is R, N, D or B. | | |
| Warning Method | Combination Meter Assembly | Buzzer | - |
| | | Multi-information Display | The following warning message is displayed:<br>o Shift to P Position to Start |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when one of the following conditions is met:<br>o The P position switch is pushed.<br>o The shift lever is moved to N.<br>o The vehicle speed is above 0 km/h (0 mph).<br>o The power switch is turned off or on (ACC).<br>o The hybrid vehicle control system is started. | | |

(12) Situation K

- There are two patterns for situation K.
  - Pattern 1:

    When the power switch is pushed, the key cannot be detected in the vehicle two times in a row.

    In this situation, the following control is performed:

<table>
<tr><td>Possible Effects without Warning</td><td colspan="3">Usability function</td></tr>
<tr><td>Warning Active Condition</td><td colspan="3">The warning is activated when all of the following conditions are met:<br><br>o The immobiliser system is set.<br>o The key is not in the vehicle.<br>o When the power switch is turned on (ACC) or on (IG) , a certification error occurs two times in a row.</td></tr>
<tr><td rowspan="3">Warning Method</td><td rowspan="2">Combination Meter Assembly</td><td>Buzzer</td><td>Sounds once</td></tr>
<tr><td>Multi-information Display</td><td>The following warning message is displayed for 60 seconds (and then automatically turned off).<br><br>o Depress Brake Pedal, Touch Power Switch with Key</td></tr>
<tr><td colspan="2">Wireless Door Lock Buzzer Assembly</td><td>-</td></tr>
<tr><td colspan="2">Power Switch Illumination</td><td>-</td></tr>
<tr><td>Warning Stop Condition</td><td colspan="3">The warning is stopped when either of the following conditions is met:<br><br>o The immobiliser system certification result is OK.<br>o Key certification in the vehicle has stopped either because 30 seconds have elapsed after any of the doors is opened and closed, or because the brake pedal is depressed.</td></tr>
</table>

  - Pattern 2:

    The driver attempts to start the hybrid vehicle control system after performing a driver door key linked unlock operation.

    In this situation, the following control is performed:

| | |
|---|---|
| Possible Effects without Warning | Usability function |
| Warning Active Condition | The warning is activated when all of the following conditions are met:<br><br>o A driver door key linked unlock operation is performed.<br>o The immobiliser system is set.<br>o The power switch is pushed. |

| | | | |
|---|---|---|---|
| | ○ The key is not in the vehicle. | | |
| Warning Method | Combination Meter Assembly | Buzzer | Sounds once |
| | | Multi-information Display | The following warning message is displayed for 60 seconds (and then automatically turned off).<br>○ Depress Brake Pedal, Touch Power Switch with Key |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when either of the following conditions is met:<br>○ The immobiliser system certification result is OK.<br>○ The Key is returned to the vehicle. | | |

(13) Situation L

• A warning message appears on the multi-information display when the driver attempts to turn the power switch off with the shift lever in R, N, D or B.

In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effects without Warning | Usability function | | |
| Warning Active Condition | The warning is activated when both of the following conditions are met:<br>• The shift lever in R, N, D or B.<br>• The power switch is turned from on (IG) to on (ACC). | | |
| Warning Method | Combination Meter Assembly | Buzzer | - |
| | | Multi-information Display | The following warning message is displayed:<br>• Shift to P Position and Push Power Switch Turn Power Off |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when either of the following conditions is met:<br>• The P position switch is pushed.<br>• The power switch is turned to a mode other than on (ACC). | | |

(14) Situation M

- A warning message appears on the multi-information display when automatic power off operation occurs.

In this situation, the following control is performed:

<table>
<tr><td>Possible Effects without Warning</td><td colspan="3">Battery Saving function</td></tr>
<tr><td>Warning Active Condition</td><td colspan="3">The warning is activated when all of the following conditions are met:<br><br>• Park (P) is selected.<br>• The power switch is on (ACC) or on (IG).<br>• The vehicle speed is 0 km/h (0 mph).<br>• The hybrid vehicle control system is stopped.<br>• The power source control system is turned off by automatic power off function.</td></tr>
<tr><td rowspan="3">Warning Method</td><td rowspan="2">Combination Meter Assembly</td><td>Buzzer</td><td>-</td></tr>
<tr><td>Multi-information Display</td><td>The following warning message is displayed for 10 seconds (and then automatically turned off).<br><br>• Auto Power Off to Conserve Battery</td></tr>
<tr><td colspan="2">Wireless Door Lock Buzzer Assembly</td><td>-</td></tr>
<tr><td colspan="2">Power Switch Illumination</td><td>-</td></tr>
<tr><td>Warning Stop Condition</td><td colspan="3">The power switch is turned to a mode other than off.</td></tr>
</table>

(15) Situation N

- A warning message appears on the multi-information display when a key with a depleted battery is touched to the power switch while depressing the brake.

In this situation, the following control is performed:

<table>
<tr><td>Possible Effects without Warning</td><td colspan="3">Malfunction detection</td></tr>
<tr><td>Warning Active Condition</td><td colspan="3">Key certification result is OK.*</td></tr>
<tr><td rowspan="3">Warning Method</td><td rowspan="2">Combination Meter Assembly</td><td>Buzzer</td><td>Sounds once</td></tr>
<tr><td>Multi-information Display</td><td>The following warning message is displayed for 10 seconds (and then automatically turned off).<br><br>• Depress Brake Pedal and Push Power Switch to Start</td></tr>
<tr><td colspan="2">Wireless Door Lock Buzzer Assembly</td><td>-</td></tr>
</table>

| | | |
|---|---|---|
| | Power Switch Illumination | The amber indicator blinks |
| Warning Stop Condition | The warning is stopped when either of the following conditions is met:<br>• The hybrid vehicle control system is started.<br>• The key is returned to the vehicle. | |

*: This situation occurs following situation M.

(16) Situation O

• A warning message appears on the multi-information display when the vehicle starts moving without the registered key in the vehicle interior.

In this situation, the following control is performed:

| | | | |
|---|---|---|---|
| Possible Effects without Warning | Hybrid vehicle control system cannot be restarted | | |
| Warning Active Condition | When vehicle speed is detected after the key is removed from the vehicle, the warning is activated (only for first time). | | |
| Warning Method | Combination Meter Assembly | Buzzer | Sounds once |
| | | Multi-information Display | The following warning message is displayed:<br>• Key not Detected |
| | Wireless Door Lock Buzzer Assembly | | - |
| | Power Switch Illumination | | - |
| Warning Stop Condition | The warning is stopped when either of the following conditions is met:<br>• The power switch is turned off.<br>• The key is returned the vehicle. | | |

12. BATTERY SAVING

(a) Vehicle Battery Saving Function

In the smart key system, signals are emitted outside the vehicle at a prescribed interval (0.25 seconds) when the doors are locked. Therefore, the vehicle battery could be drained if the vehicle remains parked for a long time. For this reason, the controls listed below are affected:

| Condition | Control |
|---|---|
| Both conditions below are met for 5 days:<br>• Key is not in detection area<br>• Touch sensor or lock switch operation is not | Signal transmission interval is extended from 0.25 to 0.75 seconds |

| Condition | Control |
| --- | --- |
| performed | |
| Both conditions below are met for 14 days:<br>• Key is not in detection area<br>• Touch sensor or lock switch operation is not performed | The smart key system is automatically deactivates |

Reinstatement Conditions

- A wireless door lock control signal (lock, unlock) is input and the ID code matches.
- A user carries the key and touches a lock sensor on a door outside handle assembly.
- The driver door is locked or unlocked by the mechanical key.

(b) Key Battery and Vehicle Battery Saving Function

In the smart key system, if the key is constantly in the exterior detection area of the doors, the system maintains periodic communication with the key. Therefore, if the vehicle remains parked in that state for a long time, the key battery and vehicle battery could be drained. For this reason, if this state continues longer than 10 minutes, the smart key system automatically becomes deactivated.

Reinstatement Conditions

- A wireless door lock control signal (lock, unlock) is input and the ID code matches.
- A user carries the key and touches a lock sensor on a door outside handle assembly.
- A door is locked or unlocked by the mechanical key.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the smart key system.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS |

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.
- The following 5 items are important points in the problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Running conditions, driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | INSPECT BATTERY VOLTAGE |

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | INSPECT COMMUNICATION FUNCTION OF CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN communication system is functioning normally.

Result:

| Result | Proceed to |
|---|---|
| ECU connected, communication line is normal. | A |
| ECU connected, communication line is malfunctioning. | B |

B → INFO GO TO CAN COMMUNICATION SYSTEM

A ↓

| | |
|---|---|
| 5. | INSPECT COMMUNICATION FUNCTION OF LIN COMMUNICATION SYSTEM (LIN)* |

(a) Use the Techstream to check if the LIN communication system (LIN) is functioning normally INFO.

Result:

| Result | Proceed to |
|---|---|
| LIN DTC is not output. | A |
| LIN DTC is output. | B |

B → INFO GO TO LIN COMMUNICATION SYSTEM

A ↓

| | |
|---|---|
| 6. | CHECK FOR DTC* |

(a) Check for DTCs and note any codes that are output.

(b) Clear the DTCs.

(c) Recheck for DTCs. Based on the DTCs output, try to cause the same engine immobiliser system DTC, wireless door lock control system DTC or smart key system (for start function) DTC to be output by simulating the symptoms indicated by the DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output. | A |
| Engine immobiliser system DTC is output. | B |
| Wireless door lock control system DTC is output. | C |
| Smart key system (for start function) DTC is output. | D |

B → INFO GO TO ENGINE IMMOBILISER SYSTEM
C → INFO GO TO WIRELESS DOOR LOCK CONTROL SYSTEM SYSTEM
D → INFO GO TO SMART KEY SYSTEM (for Start Function)

A ↓

| | |
|---|---|
| 7. | PROBLEM SYMPTOMS TABLE |

(a) Refer to Problem Symptoms Table INFO.

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table. | A |
| Fault is listed in Problem Symptoms Table. | B |

B ▶ Go to step 9

A

▼

| | |
|---|---|
| 8. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Operation Check INFO

(b) Data List / Active Test INFO

(c) Terminals of ECU INFO

NEXT

▼

| | |
|---|---|
| 9. | REPAIR OR REPLACEMENT |

NEXT

▼

| | |
|---|---|
| 10. | CONFIRMATION TEST |

NEXT ▶ **END**

# OPERATION CHECK

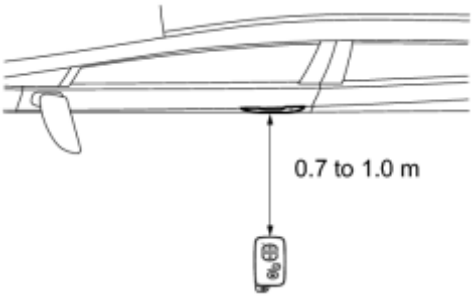
1. SMART KEY SYSTEM OPERATION INSPECTION

(a) Check the entry unlock function.

(1) Use the wireless lock operation to lock the doors. With the key outside the vehicle, touch a front door outside handle assembly (touch sensor) and check that the door unlocks.

(b) Check the entry unlock operation detection area.

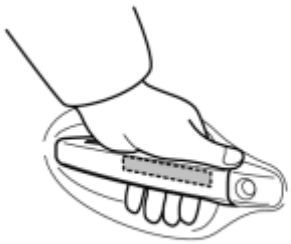
(1) Step 1: Hold the key at the same height as the door outside handle assembly (approximately 0.8 m (2.62 ft.)). Make sure that the direction of the key is as shown in the illustration.




(2) Step 2: Check that when the key is brought within 0.7 to 1.0 m (2.30 to 3.28 ft.) of the vehicle, the system enters unlock standby mode.

HINT:

When the system enters unlock standby mode, the key LED illuminates.

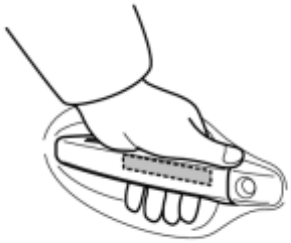


(3) Step 3: After the system enters unlock standby mode, touch the door outside handle assembly (touch sensor) within 3 seconds. Check that the door unlocks.

NOTICE:

The key may not be able to communicate with the system within a 0.2 m (0.656 ft.) radius of each door outside handle assembly.

(4) Step 4: Repeat step 2 and 3 for the remaining front door.



(5) Step 5: Inspect the door outside handle assembly (touch sensor) response sensitivity. When the system is in unlock standby mode, check that touching the area shown in the illustration causes the door to unlock.

NOTICE:

When touching the highlighted area, touching too quickly or having extended contact may not trigger the sensor. In such a case, the door will not unlock.

(6) Step 6: Repeat step 5 for the remaining front door.

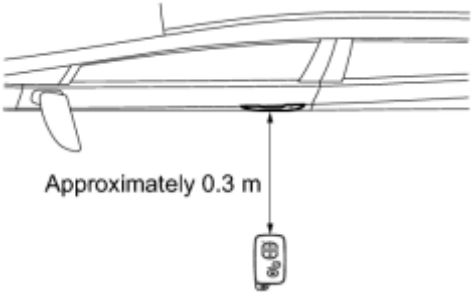
(c) Check the entry lock function.

NOTICE:

If the key is in the cabin , but is not in a detection area (on the instrument panel, rear tray, in the glove box, or on the floor), the key confinement function may not operate. This can result in the key confinement.



(1) Step 1: Confirm that all the doors lock when a lock sensor on a front door outside handle is touched with all the doors closed and unlocked while the key is outside the vehicle.




(2) Step 2: Inspect the smart door lock detection area. Hold the key 0.1 m (0.328 ft.) below the window (about 1 m (3.28 ft.) above the ground). Move the key about 0.3 m (0.984 ft.) away from the vehicle and touch the lock sensor as shown in the illustration to check that the all doors lock.

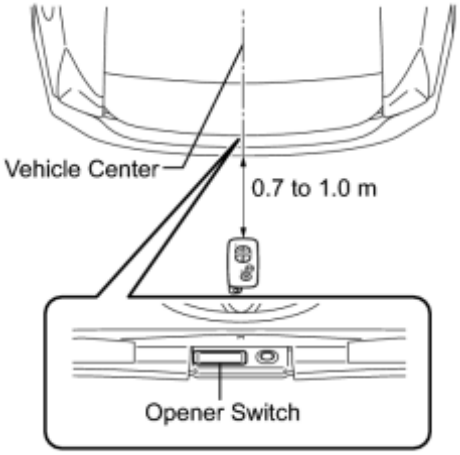
- Due to the key being unable to communicate with the system from within 0.2 m (0.656 ft.) of the door handle, the lock sensor may not operate when the lock sensor is touched by the same hand that is holding the key.
- If the key confinement prevention function buzzer sounds, radio waves from the indoor electrical oscillator may be leaking from the vehicle.

(d) Check the entry system back door open function.*

*: w/ Entry System Back Door Open Function

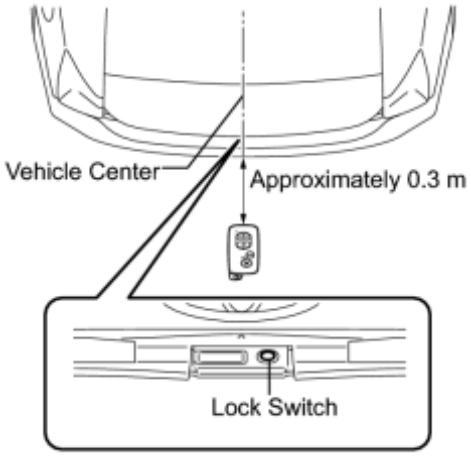
(1) Close the back door. With the key outside the vehicle, check that pushing the back door opener switch assembly opens the back door.

(2) Inspect the entry back door open operation detection area. Hold the key at the same height as the back door opener switch assembly (approximately 0.8 m (2.62 ft.)) aligning it with the center of the rear of the vehicle. Make sure that the direction of the key is as shown in the illustration. Check that when the key is brought within 0.7 to 1.0 m (2.30 to 3.28 ft.) of the vehicle, pushing the back door opener switch assembly (opener switch) opens the back door.




(e) Check the entry back door lock function.*

*: w/ Entry System Back Door Open Function




(1) Close all of the vehicle doors. With the key in your possession outside the vehicle, check that pushing the back door opener switch assembly (lock switch) locks all the doors.

- When pressing the lock switch, hold the key about 1 m (3.28 ft.) above the ground and about 0.3 m (0.984 ft.) away from the vehicle as shown in the illustration.
- Due to the key being unable to communicate with the system from within 0.2 m (0.656 ft.) of the door handle, the lock sensor may not operate when the lock sensor is touched by the same hand that is holding the key.
- If the key confinement prevention function buzzer sounds, radio waves from the indoor electrical oscillator may be leaking from the vehicle.

(f) Check the entry hybrid vehicle control system start function.

(1) While holding the key, confirm that the power switch indicator light illuminates green when the power switch is off, park (P) is selected and the brake pedal is depressed. With the power switch indicator illuminates green, confirm that the hybrid vehicle control system starts when the power switch is pressed.

(2) While holding the key, confirm that the power switch turns off → on (ACC) → on (IG) → off every time the power switch is pressed when the brake pedal is not depressed.

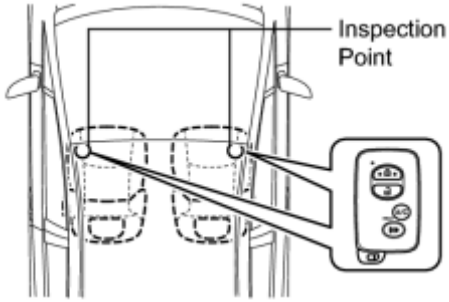
HINT:

When the power switch is pressed with the power switch on (IG) and the shift lever is in R, N, D or B, the power switch will not turn off but remain on (ACC).

(3) With the hybrid vehicle control system running, vehicle stopped and park (P) selected, confirm that pressing the power switch turns the hybrid vehicle control system off, and opening the driver door.

HINT:

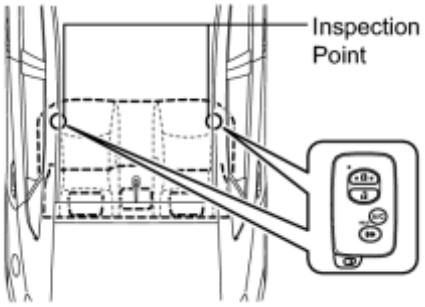
When the power switch is pressed with the power switch on (IG) and wthe shift lever is in R, N, D or B, the power switch will not turn off but remain on (ACC).




(4) Inspect the detection area for the entry hybrid vehicle control system start function (for front floor). Make sure that the direction of the key is as shown in the illustration. When the key is in either of the 2 inspection points shown in the illustration, check that the hybrid vehicle control system can start.

NOTICE:

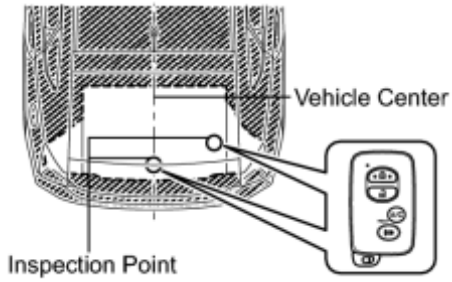
The hybrid vehicle control system may not start when the key is on the instrument panel, rear package tray or in the glove box.




(5) Inspect the detection area for the entry hybrid vehicle control system start function (for center floor). Make sure that the direction of the key is as shown in the illustration. When the key is in either of the 2 inspection points shown in the illustration, check that the hybrid vehicle control system can start.

NOTICE:

The hybrid vehicle control system may not start when the key is on the instrument panel, rear package tray or in the glove box.




(6) Inspect the detection area for the entry hybrid vehicle control system start function (for rear floor). Make sure that the direction of the key is as shown in the illustration. When the key is in either of the 2 inspection points shown in the illustration, check that the hybrid vehicle control system can start.

NOTICE:

The hybrid vehicle control system may not start when the key is on the instrument panel, rear package tray or in the glove box.

(g) Check the key confinement prevention function (in cabin)

NOTICE:

Perform this check with a window open to prevent key confinement.

(1) Turn the power switch off.

(2) Put the key on a front seat or a rear seat.

(3) Close all the doors (all doors are in unlocked state).

(4) Confirm that the door lock does not operate but the wireless door lock buzzer sounds for 10 seconds when a front door lock sensor is touched.

(h) Check the key cancel function.

(1) While the power switch is on (IG), check that the back door opener switch assembly (opener switch) is the only switch that can be operated in the smart key system.

(2) While the key cancel function (smart key system cancel function) is on, check that all functions of the smart key system cannot be operated.

(i) Check the answer-back function (hazard warning light flashing and buzzer sounding).

| Entry Operation | Hazard Warning Light | Buzzer |
|---|---|---|
| Entry Door Lock | Flashes once | Sounds once |
| Entry Door Unlock | Flashes twice | Sounds twice |
| Entry System Back Door Open Function | Does not flash | Does not sound |

(j) Check that the key reminder warning buzzer sounds.

(1) With the key inside the vehicle, close the driver door. Then turn the power switch off or on (ACC).

(2) Open the driver door and check that the buzzer sounds intermittently.

(k) Check that the key reminder warning buzzer stops.

(1) When the buzzer is sounding, check that the buzzer stops sounding if either of the following is performed:

- Close the driver door (front door courtesy light switch is off).
- Turn the power switch on (IG).

2. KEY DIAGNOSTIC MODE

HINT:

Key diagnostic mode checks if the key within a selected oscillator detection area is operating normally. The results are output through the wireless door lock buzzer assembly.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check.

(e) Check the values by referring to the table below.

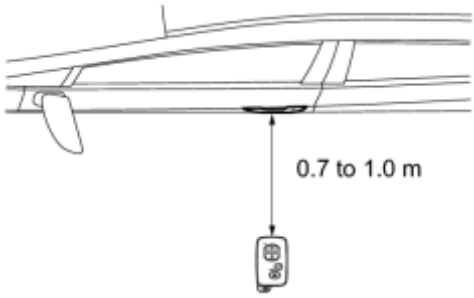
***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Inspection Range |
|---|---|
| Overhead + Driver Side*1 | Door electrical key oscillator (for driver side) |

| Tester Display | Inspection Range |
|---|---|
| Overhead + Passenger Side*2 | Door electrical key oscillator (for front passenger side)* |
| Overhead + Front Room*3 | Indoor electrical key oscillator (for front floor) |
| Overhead + Rear Room*4 | Indoor electrical key oscillator (for center floor) |
| Overhead + Back Door (inside)*5 | Indoor electrical key oscillator (for rear floor) |
| Overhead + Back Door*6 | Outside electrical key oscillator (for rear side)* |

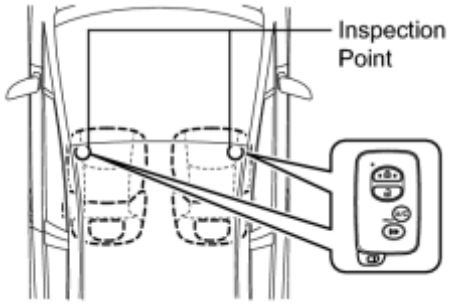
*: w/ Entry System Back Door Open Function

(f) When the key is brought near the selected oscillator, check that the wireless door lock buzzer sounds.




(1) *1: Door electrical key oscillator (for driver side)

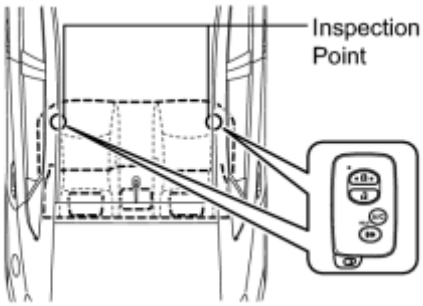
- Hold the key at the same height as the door outside handle assembly (0.7 to 1.0 m (2.30 to 3.28 ft.)). Make sure that the direction of the key is as shown in the illustration.
- *2: Perform the same inspection above for the door electrical key oscillator (for front passenger side).




(2) *3: Indoor electrical key oscillator (for front floor)

HINT:

Place the key on the driver or front passenger seat cushion.




(3) *4: Indoor electrical key oscillator (for center floor)

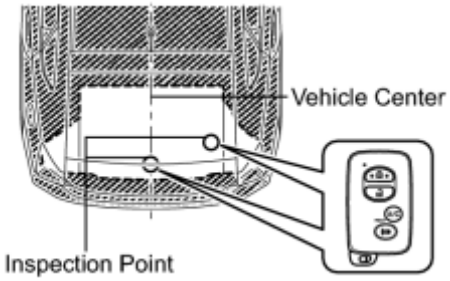
HINT:

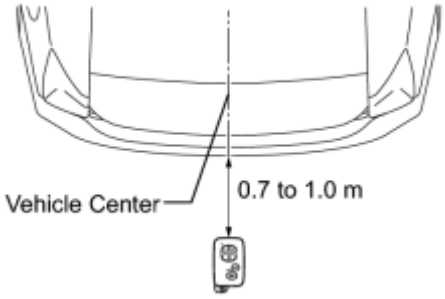
Place the key on the rear seat cushion.

(4) *5: Indoor electrical key oscillator (for rear floor)

HINT:

Place the key on the luggage area.




(5) *6: Outside electrical key oscillator (for rear side)

HINT:

Hold the key at the same height as the rear bumper upper surface and align with the center of the rear of the vehicle (0.7 to 1.0 m (2.30 to 3.28 ft.)). Make sure that the direction of the key is as shown in the illustration.

# CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH TECHSTREAM

HINT:

The items in the table below can be customized.

NOTICE:

- When the customer requests a change in a function, first make sure that the function can be customized.
- Be sure to make a note of the current setting before customizing.
- When troubleshooting a function, first make sure that the function is set to the default setting.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Customize Setting.

(e) Select the setting by referring to the table below.

***Smart Key / Access***

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Park Wait Time | 2.5 s | Function that sets waiting time to permit opening door after door is locked with entry lock function | 0.5 s, 1.5 s, 2.5 s or 5 s |
| Ignition Available Area | All | Function that switches the entry hybrid vehicle control system start detection area | Front or All*1 |
| Back Door Opening Operation*2 | Long | Function that opens the back door when the driver has the key and presses back door opener switch assembly (opener switch) | Long, Twice or OFF |

- *1: Weak radio waves will still be emitted from oscillators other than the front oscillator even when the "Front" customize setting is selected.
- *2: w/ Entry System Back Door Open Function

***Warning***

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Key Low Battery Warning | ON | Function that warns driver that the key battery is weak | ON or OFF |

2. ENTRY UNLOCK MODE SWITCHING*

*: except for Korea and Mexico

(a) To change the vehicle entry unlock mode, make sure that the vehicle power is off and simultaneously push and hold the lock switch and another switch on the key for 5 seconds.

Driver door unlock default setting:

When the switches are pressed and held for 5 seconds, the entry door unlock mode changes to the mode that is not currently selected.

NOTICE:

After pressing and holding the switches for 5 seconds, wait 5 seconds before performing the same procedure again.

- Driver door unlock mode:

  When the driver door touch sensor is touched, only the driver door unlocks. When another touch sensor is touched, all doors unlock.*

  *: w/ Entry System Back Door Open Function

- All door unlock mode:

  When any touch sensor is touched, all doors unlock.

(b) The certification ECU (smart key ECU assembly) receives this signal from the door control receiver assembly and changes the smart key system to entry unlock mode.

(c) The certification ECU (smart key ECU assembly) sounds the buzzers of the wireless door lock buzzer assembly.

| Mode | Wireless Door Lock Buzzer Assembly |
|---|---|
| Driver Door<br><br>(Default) | Sounds 3 times |
| All Doors<br><br>(Customized) | Sounds 2 times |

HINT:

The procedure only changes entry unlock mode of the smart key system. It does not switch the unlocking of the wireless door lock control.

3. ELECTRICAL KEY CANCEL

The electrical key cancel operation disables the following functions:

- Entry Unlock/Lock
- Entry Hybrid Vehicle Control System Start
- Entry System Back Door Open Function*

  *: w/ Entry System Back Door Open Function

- Electrical Key Lock-in Prevention
- Warning

(a) The operation procedure is as follows:

Precondition:

Power switch off, driver door closed and unlocked.

(1) Push the unlock switch of the key once.

(2) Open the driver door within 5 seconds.

(3) Push the unlock switch of the key twice within 5 seconds.

(4) Close and open the driver door twice within 30 seconds.

(Driver door: Close → Open → Close → Open)

(5) Push the unlock switch of the key twice within 5 seconds.

(6) Close and open the driver door within 30 seconds.

(Driver door: Close → Open)

(7) Close the driver door within 5 seconds.

When electrical key cancel is activated, the wireless door lock buzzer sounds twice.

To return to the original condition, perform the procedure again. When the original condition is returned, the wireless door lock buzzer sounds once.

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

### *Smart Key System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Entry answer-back buzzer does not sound | Wireless door lock control system | INFO |
| | Certification ECU (smart key ECU assembly) | - |
| All door entry lock/unlock functions and wireless functions do not operate | Power door lock control system | INFO |
| | Key (for Standard) | - |
| | Key battery | - |
| | Fuse (ECU-B, ECU-B2) | - |
| | Wire harness or connector | - |
| | Door control receiver assembly | - |
| | Certification ECU (Smart key ECU assembly) | - |
| All door entry lock/unlock functions do not operate, but wireless functions operate*1 | Power door lock control system | INFO |
| | Key | - |
| | Certification ECU (Smart key ECU assembly) | - |
| Door entry lock/unlock functions do not operate, but wireless functions operate*2 | Power door lock control system | INFO |
| | Key | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Front door outside handle assembly (for driver side) | INFO |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Driver side door entry unlock function does not operate | Power door lock control system | INFO |
| | Front door outside handle assembly (for driver side) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Front passenger side door entry unlock function does not | Power door lock control system | INFO |

| Symptom | Suspected Area | See page |
|---|---|---|
| operate*1 | Front door outside handle assembly (for front passenger side) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Driver side door entry lock and unlock functions do not operate*1 | Power door lock control system | INFO |
| | Front door outside handle assembly (for driver side) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Front passenger side door entry lock and unlock functions do not operate*1 | Power door lock control system | INFO |
| | Front door outside handle assembly (for front passenger side) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Driver side door entry lock function does not operate | Power door lock control system | INFO |
| | Front door outside handle assembly (for driver side) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Front passenger side door entry lock function does not operate*1 | Power door lock control system | INFO |
| | Front door outside handle assembly (for front passenger side) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Room oscillator does not recognize key | Indoor electrical key oscillator (for front floor) | INFO |
| | Indoor electrical key oscillator (for center floor) | - |
| | Indoor electrical key oscillator (for rear floor) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Entry interior alarm does not sound | Meter/gauge system | INFO |
| | Certification ECU (Smart key ECU | - |

| Symptom | Suspected Area | See page |
|---|---|---|
| | assembly) | |
| Back door entry unlock function does not operate*1 | Power door lock control system | INFO |
| | Back door opener switch assembly | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |
| Back door entry lock and unlock functions do not operate*1 | Power door lock control system | INFO |
| | Outside electrical key oscillator (for rear side) | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Back door opener switch assembly | - |
| | Wire harness or connector | - |
| Back door entry lock function does not operate*1 | Power door lock control system | INFO |
| | Back door opener switch assembly | - |
| | Certification ECU (Smart key ECU assembly) | - |
| | Wire harness or connector | - |

- *1: w/ Entry System Back Door Open Function
- *2 w/o Entry System Back Door Open Function

# TERMINALS OF ECU

1. CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

(a) Disconnect the L62 certification ECU (smart key ECU assembly) connector.




(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-1 (+B) - Body ground | B - Body ground | +B power supply | Always | 11 to 14 V |
| L62-15 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| L62-17 (CUTB) - Body ground | Y - Body ground | Dark current cut fuse pin input signal | Always | 11 to 14 V |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L62 certification ECU (smart key ECU assembly) connector.

(d) Measure the voltage and check for pulses according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-3 (CLG1) - L62-15 (E) | G - W-B | Door electrical key oscillator (for driver side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-3 (CLG1) - L62-15 (E) | G - W-B | Door electrical key oscillator (for driver side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by | Pulse generation |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | wireless lock function | |
| L62-4 (CG1B) - L62-15 (E) | R - W-B | Door electrical key oscillator (for driver side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-4 (CG1B) - L62-15 (E) | R - W-B | Door electrical key oscillator (for driver side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |
| L62-5 (CLG2) - L62-15 (E)* | G - W-B | Door electrical key oscillator (for front passenger side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-5 (CLG2) - L62-15 (E)* | G - W-B | Door electrical key oscillator (for front passenger side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |
| L62-6 (CG2B) - L62-15 (E)* | R - W-B | Door electrical key oscillator (for front passenger side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-6 (CG2B) - L62-15 (E)* | R - W-B | Door electrical key oscillator (for front passenger side) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |
| L62-7 (CLG5) - L62-15 (E) | G - W-B | Indoor electrical key oscillator (for front floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-7 (CLG5) - L62-15 (E) | G - W-B | Indoor electrical key oscillator (for front floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-8 (CG5B) - L62-15 (E) | R - W-B | Indoor electrical key oscillator (for front floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-8 (CG5B) - L62-15 (E) | R - W-B | Indoor electrical key oscillator (for front floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |
| L62-16 (IG) - Body ground | BE - Body ground | IG power supply | Power switch off | Below 1 V |
| L62-16 (IG) - Body ground | BE - Body ground | IG power supply | Power switch on (IG) | 11 to 14 V |
| L62-18 (TSW1) - L62-15 (E) | B - W-B | Lock sensor (for driver side) detection signal | • Power switch off<br>• All doors closed<br>• Lock sensor (for driver side) not touched | Pulse generation |
| L62-18 (TSW1) - L62-15 (E) | B - W-B | Lock sensor (for driver side) detection signal | • Power switch off<br>• All doors closed<br>• Lock sensor (for driver side) touched | Below 2 V |
| L62-19 (TSW2) - L62-15 (E)* | B - W-B | Lock sensor (for front passenger side) detection signal | • Power switch off<br>• All doors closed<br>• Lock sensor (for front passenger side) not touched | Pulse generation |
| L62-19 (TSW2) - L62-15 (E)* | B - W-B | Lock sensor (for front passenger side) detection signal | • Power switch off<br>• All doors closed<br>• Lock sensor (for front passenger side) touched | Below 2 V |
| L62-20 (SEN1) - L62-15 (E) | Y - W-B | Touch sensor (for driver side) detection signal | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for driver side) not touched | Pulse generation |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-20 (SEN1) - L62-15 (E) | Y - W-B | Touch sensor (for driver side) detection signal | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for driver side) touched | Below 2 V |
| L62-21 (SEN2) - L62-15 (E)* | Y - W-B | Touch sensor (for front passenger side) detection signal | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for front passenger side) not touched | Pulse generation |
| L62-21 (SEN2) - L62-15 (E)* | Y - W-B | Touch sensor (for front passenger side) detection signal | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for front passenger side) touched | Below 2 V |
| L62-22 (TSW5) - L62-15 (E)* | GR - W-B | Back door opener switch assembly (opener switch) signal | Back door opener switch assembly (opener switch) not pushed | Pulse generation |
| L62-22 (TSW5) - L62-15 (E)* | GR - W-B | Back door opener switch assembly (opener switch) signal | Back door opener switch assembly (opener switch) pushed | Below 1 V |
| L62-23 (TSW6) - L62-15 (E)* | LG - W-B | Back door opener switch assembly (lock switch) signal | Back door opener switch assembly (lock switch) not pushed | Pulse generation |
| L62-23 (TSW6) - L62-15 (E)* | LG - W-B | Back door opener switch assembly (lock switch) signal | Back door opener switch assembly (lock switch) pushed | Below 1 V |
| L62-24 (CLG6) - L62-15 (E) | GR - W-B | Indoor electrical key oscillator (for center floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-24 (CLG6) - L62-15 (E) | GR - W-B | Indoor electrical key oscillator (for center floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) | Pulse generation |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| | | | touched | |
| L62-25 (CG6B) - L62-15 (E) | BR - W-B | Indoor electrical key oscillator (for center floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-25 (CG6B) - L62-15 (E) | BR - W-B | Indoor electrical key oscillator (for center floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |
| L62-26 (CLG7) - L62-15 (E) | G - W-B | Indoor electrical key oscillator (for rear floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-26 (CLG7) - L62-15 (E) | G - W-B | Indoor electrical key oscillator (for rear floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |
| L62-27 (CG7B) - L62-15 (E) | R - W-B | Indoor electrical key oscillator (for rear floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-27 (CG7B) - L62-15 (E) | R - W-B | Indoor electrical key oscillator (for rear floor) sensor signal | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |
| L62-32 (POS1) - L62-15 (E) | L - W-B | Lock or unlock sensor (for driver side) output signal | Power switch off | 9 to 14 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-32 (POS1) - L62-15 (E) | L - W-B | Lock or unlock sensor (for driver side) output signal | Power switch on (IG) | Below 2 V |
| L62-33 (POS2) - L62-15 (E)* | L - W-B | Lock or unlock sensor (for front passenger side) output signal | Power switch off | 9 to 14 V |
| L62-33 (POS2) - L62-15 (E)* | L - W-B | Lock or unlock sensor (for front passenger side) output signal | Power switch on (IG) | Below 2 V |
| L63-5 (RC0) - L62-15 (E) | R - W-B | Door control receiver power source | • Power switch off<br>• Lock or unlock switch on key not pushed | Below 1 V |
| L63-5 (RC0) - L62-15 (E) | R - W-B | Door control receiver power source | • Power switch off<br>• Lock or unlock switch on key pushed | 4.5 to 5.5 V |
| L63-15 (RDA) - L62-15 (E) | Y - W-B | Door control receiver data input signal | Power switch off | Pulse between 11 to 14 V occurs regularly |
| L63-16 (RSSI) - L62-15 (E) | V - W-B | Door control receiver electric wave existence signal | • Power switch off<br>• All doors locked<br>• Lock or unlock switch on key not pushed | 11 to 14 V |
| L63-16 (RSSI) - L62-15 (E) | V - W-B | Door control receiver electric wave existence signal | • Power switch off<br>• All doors locked<br>• Lock or unlock switch on key pushed | Below 2 V |
| L63-19 (CLG8) - L62-15 (E)* | G - W-B | Outside electrical key oscillator (for rear side) sensor signal | • Power switch off<br>• All doors closed<br>• Back door opener switch assembly off | No pulse generation |
| L63-19 (CLG8) - L62-15 (E)* | G - W-B | Outside electrical key oscillator (for rear side) sensor signal | • Power switch off<br>• All doors closed<br>• Back door opener switch assembly on | Pulse generation |
| L63-20 (CG8B) - L62-15 (E)* | R - W-B | Outside electrical key oscillator (for rear side) sensor signal | • Power switch off<br>• All doors closed<br>• Back door opener switch assembly off | No pulse generation |
| L63-20 (CG8B) - | R - W-B | Outside electrical key | • Power switch off | Pulse generation |

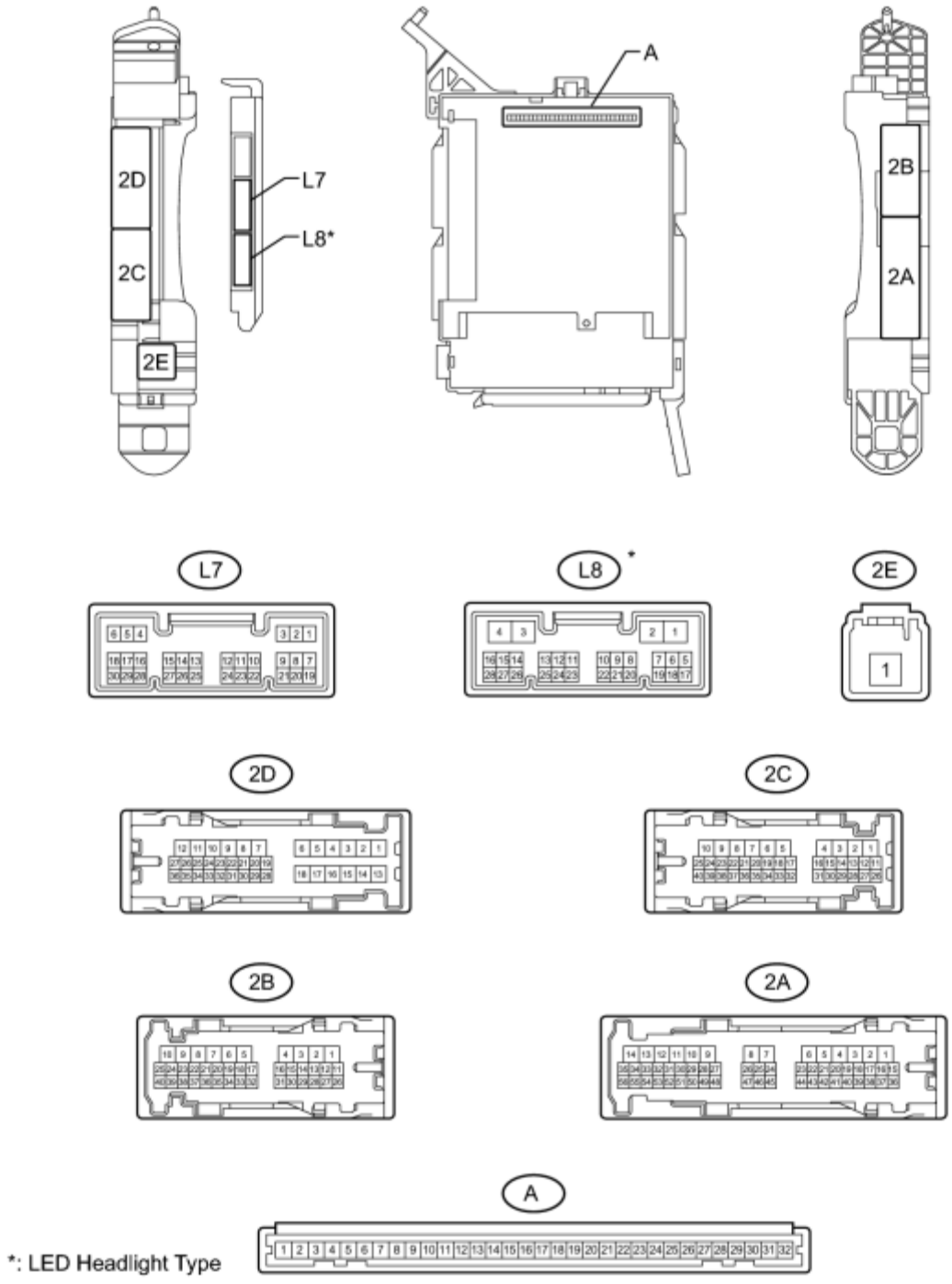
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-15 (E)* | | oscillator (for rear side) sensor signal | • All doors closed<br>• Back door opener switch assembly on | |

- *: w/ Entry System Back Door Open Function

If the result is not as specified, the certification ECU (smart key ECU assembly) may have a malfunction.

2. CHECK INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY AND MAIN BODY ECU (MULTIPLEX NETWORK BODY ECU)

(a) Disconnect the 2B and 2C junction block connectors.




(b) Disconnect the A main body ECU connector.

(c) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connectors disconnected.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2B-6 (GND1) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| 2C-18 (BECU) - Body ground | Y - Body ground | Battery power supply | Power switch off | 11 to 14 V |
| L8-3 (GND2) - Body ground* | W-B - Body ground | Ground | Always | Below 1 Ω |
| A-29 (ACC) - Body ground | - | ACC power supply | Power switch on (ACC) | 11 to 14 V |
| A-29 (ACC) - Body ground | - | ACC power supply | Power switch off | Below 1 V |
| A-31 (ALTB) - Body ground | - | Battery power supply | Power switch off | 11 to 14 V |
| A-32 (IG) - Body ground | - | Power switch power supply | Power switch on (IG) | 11 to 14 V |
| A-32 (IG) - Body ground | - | Power switch power supply | Power switch off | Below 1 V |

*: LED Headlight Type

If the result is not as specified, there may be a malfunction in the wire harness.

(d) Reconnect the 2B and 2C junction block connectors.

(e) Reconnect the A main body ECU connector.

(f) Measure the voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2B-1 (ACT-) - Body ground | B - Body ground | Door lock motor unlock drive output (except driver side) | Driver or front passenger side door control switch off | Below 1 V |
| 2B-1 (ACT-) - Body ground | B - Body ground | Door lock motor unlock drive output (except driver side) | Driver or front passenger side door control switch unlocked | 11 to 14 V |
| 2B-8 (ACT+) - Body ground | LG - Body ground | Door lock motor lock drive output (all doors) | Driver or front passenger side door control switch off | Below 1 V |
| 2B-8 (ACT+) - Body ground | LG - Body ground | Door lock motor lock drive output (all doors) | Driver or front passenger side door control switch locked | 11 to 14 V |
| 2B-5 (ACTD) - Body ground | B - Body ground | Driver side door lock motor unlock drive output | Driver or front passenger side door control switch off | Below 1 V |
| 2B-5 (ACTD) - Body ground | B - Body ground | Driver side door lock motor unlock drive output | Driver or front passenger side door control switch unlocked | 11 to 14 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front passenger side door courtesy switch input | Front passenger side door open | Below 1 V |
| 2D-36 (FRCY) - Body ground | BR - Body ground | Front passenger side door courtesy switch input | Front passenger side door closed | 11 to 14 V |
| 2D-35 (FLCY) - Body ground | V - Body ground | Driver side door courtesy switch input | Driver door open | Below 1 V |
| 2D-35 (FLCY) - Body ground | V - Body ground | Driver side door courtesy switch input | Driver door closed | 11 to 14 V |
| 2D-25 (LSR) - Body ground | GR - Body ground | Rear door LH lock position switch input | Rear door LH unlocked | Below 1 V |
| 2D-25 (LSR) - Body ground | GR - Body ground | Rear door LH lock position switch input | Power switch off, all doors closed and rear door LH locked | 11 to 14 V |
| 2B-29 (LSR) - Body ground | GR - Body ground | Rear door RH lock position switch input | Rear door RH unlocked | Below 1 V |
| 2B-29 (LSR) - Body ground | GR - Body ground | Rear door RH lock position switch input | Power switch off, all doors closed and rear door RH locked | 11 to 14 V |
| L7-6 (LRCY) - Body ground | G - Body ground | Rear door courtesy light switch input | Rear door open | Below 1 V |
| L7-6 (LRCY) - Body ground | G - Body ground | Rear door courtesy light switch input | Rear door closed | 11 to 14 V |
| L7-7 (LSFL) - Body ground | GR - Body ground | Driver door lock position switch input | Driver door unlocked | Below 1 V |
| L7-7 (LSFL) - Body ground | GR - Body ground | Driver door lock position switch input | Power switch off, all doors closed and driver door locked | 11 to 14 V |
| L7-9 (L1) - Body ground | LG - Body ground | Front passenger side door control switch input | Front passenger side door control switch locked | Below 1 V |
| L7-9 (L1) - Body ground | LG - Body ground | Front passenger side door control switch input | Front passenger side door control switch off | 11 to 14 V |
| L7-10 (UL1) - Body ground | BR - Body ground | Front passenger side door control switch input | Front passenger side door control switch unlocked | Below 1 V |
| L7-10 (UL1) - Body ground | BR - Body ground | Front passenger side door control switch input | Front passenger side door control switch off | 11 to 14 V |
| L7-11 (L2) - Body ground | G - Body ground | Driver door key-linked lock input | Driver door key cylinder turned to lock | Below 1 V |
| L7-11 (L2) - Body ground | G - Body ground | Driver door key-linked lock input | Driver door key cylinder off | 11 to 14 V |
| L7-18 (LSFR) - Body ground | LG - Body ground | Front passenger side door lock position switch input | Front passenger side door unlocked | Below 1 V |
| L7-18 (LSFR) - Body ground | LG - Body ground | Front passenger side door lock position switch input | Power switch off, all doors closed and front passenger side door locked | 11 to 14 V |
| L7-19 (BCTY) - | L - Body | Back door courtesy light | Back door open | Below 1 V |

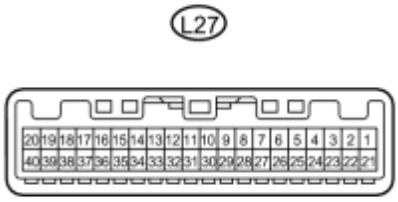
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| Body ground | ground | switch input | | |
| L7-19 (BCTY) - Body ground | L - Body ground | Back door courtesy light switch input | Back door closed | 11 to 14 V |
| L7-23 (BDSU) - Body ground*1 | GR - Body ground | Back door opener switch input | Back door opener switch pushed | Below 1 V |
| L7-23 (BDSU) - Body ground*1 | GR - Body ground | Back door opener switch input | Back door opener switch not pushed | 11 to 14 V |
| L7-24 (UL3) - Body ground | GR - Body ground | Driver door key-linked unlock input | Driver door key cylinder turned to unlock | Below 1 V |
| L7-24 (UL3) - Body ground | GR - Body ground | Driver door key-linked unlock input | Driver door key cylinder off | 11 to 14 V |

- *1: w/o Entry System Back Door Open Function

If the result is not as specified, the main body ECU (multiplex network body ECU) may have a malfunction.

3. COMBINATION METER ASSEMBLY

(a) Disconnect the L27 combination meter assembly connector.




H

(b) Measure the voltage and resistance according to the value(s) in the table below.

HINT:

Measure the values on the wire harness side with the connector disconnected.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-18 (B) - Body ground | R - Body ground | Battery | Power switch off | 11 to 14 V |
| L27-30 (ES) - Body ground | BR - Body ground | Ground (Signal ground) | Always | Below 1 Ω |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L27 combination meter assembly connector.

(d) Measure the voltage according to the value(s) in the table below.

| Terminal No. (Symbol) | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L27-19 (IG+) - Body ground | L - Body ground | Power switch signal | Power switch off | Below 1 V |
| L27-19 (IG+) - Body ground | L - Body ground | Power switch signal | Power switch on (IG) | 11 to 14 V |

If the result is not as specified, the combination meter assembly may have a malfunction.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) The certification ECU (smart key ECU assembly) control the vehicle smart key system functions. Smart key system data and Diagnostic Trouble Codes (DTCs) can be read through the vehicle Data Link Connector 3 (DLC3). In some cases, a malfunction may be occurring in the smart key system. When the system seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) Check the DLC3 

.

3. INSPECT BATTERY VOLTAGE

(a) Measure the battery voltage with the power switch off.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the battery.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Trouble Codes.

(e) Check the details of the DTC(s) INFO.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Trouble Codes.

(e) Clear the DTCs.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key or Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D-Door Touch Sensor | Driver side door touch sensor / ON or OFF | ON: Sensor touched<br><br>OFF: Sensor not touched | - |
| P-Door Touch Sensor*1 | Front passenger side door touch sensor / ON or OFF | ON: Sensor touched<br><br>OFF: Sensor not touched | - |
| D-Door Trigger Switch | Driver side door lock sensor / ON or OFF | ON: Sensor touched<br><br>OFF: Sensor not touched | - |
| P-Door Trigger Switch*1 | Front passenger side door lock sensor / ON or OFF | ON: Sensor touched<br><br>OFF: Sensor not touched | - |
| Tr/B-Door Lock SW*1 | Back door opener switch assembly (lock switch) / ON or OFF | ON: Back door opener switch assembly (lock switch) pushed<br><br>OFF: Back door opener switch assembly (lock switch) not pushed | - |
| Tr/B-Door Unlock | Back door opener switch assembly | ON: Back door opener switch | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| SW*1 | (opener switch) / ON or OFF | assembly (opener switch) pushed<br><br>OFF: Back door opener switch assembly (opener switch) not pushed | |
| Ignition Switch | Power switch on (IG) / ON or OFF | ON: Power switch on (IG) or hybrid vehicle control system started<br><br>OFF: Power switch off | - |
| Unmatched Vehicle-ID | No communication condition between vehicle and key (vehicle-ID) / Yes or No | Yes: Key ID code not matched to vehicle<br><br>No: Key ID code matched to vehicle | - |
| No Response | No communication condition between vehicle and key (response) / Yes or No | Yes: Key ID code not matched to vehicle<br><br>No: Key ID code matched to vehicle | - |
| Unmatch Code or Form | No communication condition between vehicle and key (response code and format) / Yes or No | Yes: Key ID code not matched to vehicle<br><br>No: Key ID code matched to vehicle | - |
| Key Low Battery | Low key battery / Yes or No | Yes: Key battery voltage low<br><br>No: Key battery voltage normal | - |
| Power Save Cnt 10 Min | Power save counter - 10 minutes / Min: 0; Max: 255 | Within range from 0 to 255 | - |
| Power Save Cnt 5 Day | Power save counter - 5 days / Min: 0; Max: 255 | Within range from 0 to 255 | - |
| Power Save Cnt 14 Day | Power save counter - 14 days / Min: 0; Max: 255 | Within range from 0 to 255 | - |
| ID Code Difference(Resp) | No communication condition between vehicle and key (ID code) / Yes or No | Yes: Key ID code not matched to vehicle<br><br>No: Key ID code matched to vehicle | - |
| C Code Difference | No communication condition between vehicle and key (challenge code) / Yes or No | Yes: Key ID code not matched to vehicle<br><br>No: Key ID code matched to vehicle | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Auto Entry Cancel SW | Entry function cancel / ON or OFF | Mode status displayed | - |
| Door Unlock Mode2*2 | Door Unlock Mode / All or Driver | Mode status displayed | - |
| Ignition Available Area | Ignition available area / Front or All | Customization status displayed | - |
| Parking Wait Time | Parking wait time / 0.5s, 1.5s, 2.5s or 5s | Customization status displayed | - |
| B-Dr Opening Operation*1 | Back door opening operation / Long, Twice or OFF | Customization status displayed | - |
| Key Low Battery Warning | Low key battery warning / ON or OFF | Customization status displayed | - |

- *1: w/ Entry System Back Door Open Function
- *: except for Korea and Mexico

### *Main Body (Main Body ECU (Multiplex Network Body ECU))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| ACC SW | Power switch on (ACC) / ON or OFF | ON: Power switch on (ACC)<br><br>OFF: Power switch off | - |
| IG SW | Power switch on (IG) / ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |
| RR Door Courtesy SW | Rear door courtesy light switch signal/ON or OFF | ON: Rear door RH or LH open<br><br>OFF: Rear door RH and LH closed | - |
| RL Door Courtesy SW | Rear door courtesy light switch signal/ON or OFF | ON: Rear door RH or LH open<br><br>OFF: Rear door RH and LH closed | - |
| Back Door Courtesy SW | Back door courtesy switch signal/ON or OFF | ON: Back door open<br><br>OFF: Back door closed | - |
| Back Door Open | Back door lock/Permit or Prohibit | Permit: Back door unlocked<br><br>Prohibit: Back door locked | - |
| Door Lock SW-Lock | Front passenger side door control switch lock signal/ON or OFF | ON: Lock side of front passenger side door control switch pushed<br><br>OFF: Lock side of front passenger side door control switch not pushed | - |
| Door Lock SW-Unlock | Front passenger side door control switch unlock signal/ON or OFF | ON: Unlock side of front passenger side door control switch pushed | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | OFF: Unlock side of front passenger side door control switch not pushed | |
| Door Key SW-Lock | Driver door key-linked lock/unlock switch lock signal/ON or OFF | ON: Driver door key cylinder turned to lock position<br><br>OFF: Driver door key cylinder not turned to lock position | - |
| D Door Key SW-UL | Driver door key-linked lock/unlock switch unlock signal/ON or OFF | ON: Driver door key cylinder turned to unlock position<br><br>OFF: Driver door key cylinder not turned to unlock position | - |
| FR Door Lock Pos | Front passenger side door lock position switch signal/LOCK or UNLOCK | LOCK: Front passenger side door locked<br><br>UNLOCK: Front passenger side door unlocked | - |
| FR Door Courtesy | Front passenger side door courtesy light switch signal/ON or OFF | ON: Front passenger side door open<br><br>OFF: Front passenger side door closed | - |
| FL Door Lock Pos | Driver door lock position switch signal/LOCK or UNLOCK | LOCK: Driver door locked<br><br>UNLOCK: Driver door unlocked | - |
| FL Door Courtesy | Driver door courtesy light switch signal/ON or OFF | ON: Driver door open<br><br>OFF: Driver door closed | - |
| Back Door Open Handle SW | Back door opener switch signal/ON or OFF | ON: Back door opener switch pushed<br><br>OFF: Back door opener switch not pushed | - |
| RR-Door Lock Pos SW | Rear door lock position switch signal/LOCK or UNLOCK | LOCK: Rear door RH or LH locked<br><br>UNLOCK: Rear door RH and LH unlocked | - |
| RL-Door Lock Pos SW | Rear door lock position switch signal/LOCK or UNLOCK | LOCK: Rear door RH or LH locked<br><br>UNLOCK: Rear door RH and LH unlocked | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relays, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key or Main Body / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Overhead Tuner Power Supply ON | Door control receiver assembly | ON/OFF | - |

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Trunk and Back-door Open | Back door lock motor | ON/OFF | - |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is stored during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

### *Certification ECU (Smart Key ECU Assembly)*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B27A1 | Open in Driver Side Electrical Antenna Circuit | 1. Front door outside handle assembly (for driver side)<br><br>2. Certification ECU (smart key ECU assembly)<br><br>3. Wire harness or connector | INFO |
| B27A2<br><br>* | Open in Front Passenger Side Electrical Antenna Circuit | 1. Front door outside handle assembly (for front passenger side)<br><br>2. Certification ECU (smart key ECU assembly)<br><br>3. Wire harness or connector | INFO |
| B27A5 | Open in Front Floor Electrical Key Oscillator Circuit | 1. Indoor electrical key oscillator (for front floor)<br><br>2. Certification ECU (smart key ECU assembly)<br><br>3. Wire harness or connector | INFO |
| B27A6 | Open in Rear Floor Electrical Key Oscillator Circuit | 1. Indoor electrical key oscillator (for center floor)<br><br>2. Certification ECU (smart key ECU assembly)<br><br>3. Wire harness or connector | INFO |
| B27A7 | Open in Inside Luggage Compartment Electrical Key Oscillator Circuit | 1. Indoor electrical key oscillator (for rear floor)<br><br>2. Certification ECU (smart key ECU assembly)<br><br>3. Wire harness or connector | INFO |
| B27A8<br><br>* | Open in Outside Luggage Compartment Electrical Key Antenna Circuit | 1. Outside electrical key oscillator (for rear side) | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | 2. Certification ECU (smart key ECU assembly)<br><br>3. Wire harness or connector | |

*: w/ Entry System Back Door Open Function

| DTC | B27A1 | Open in Driver Side Electrical Antenna Circuit |
|---|---|---|

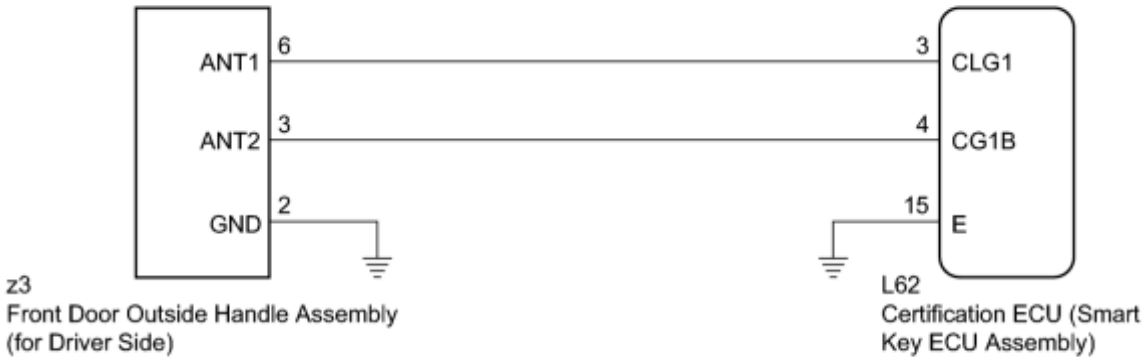
# DESCRIPTION

The certification ECU (smart key ECU assembly) generates a request signal and sends it to the electrical key oscillator built into the front door outside handle assembly (for driver side) at 0.25-second intervals. To detect a key near the driver door, the front door outside handle assembly (for driver side) creates a detection area with a radius of approximately 1.0 m (3.28 ft.) from the driver door at 0.25-second intervals.

DTC B27A1 is detected by the certification ECU (smart key ECU assembly) if an open circuit is detected between the certification ECU (smart key ECU assembly) and front door outside handle assembly (for driver side) terminals (between CLG1 and ANT1, or CG1B and ANT2).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B27A1 | Open circuit detected between the certification ECU (smart key ECU assembly) and front door outside handle assembly (for driver side) terminals (between CLG1 and ANT1, or CG1B and ANT2). | • Front door outside handle assembly (for driver side)<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR (CONNECTOR CONNECTION CONDITION) |

(a) Turn the power switch off.

(b) Check that the connectors are properly connected to the certification ECU (smart key ECU assembly) and the front door outside handle assembly (for driver side).

OK:

Connectors are properly connected.

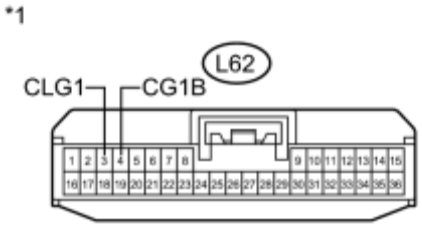
NG ▶ CONNECT CONNECTORS PROPERLY

OK

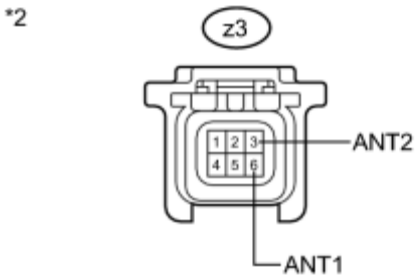
▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the front door outside handle assembly (for driver side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-3 (CLG1) - z3-6 (ANT1) | Always | Below 1 Ω |
| L62-4 (CG1B) - z3-3 (ANT2) | Always | Below 1 Ω |
| L62-3 (CLG1) - Body ground | Always | 10 kΩ or higher |
| L62-4 (CG1B) - Body ground | Always | 10 kΩ or higher |
| z3-6 (ANT1) - Body ground | Always | 10 kΩ or higher |
| z3-3 (ANT2) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

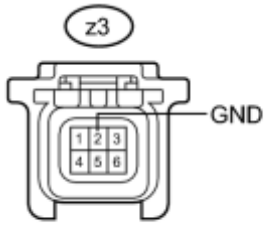
▼

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (FRONT DOOR OUTSIDE HANDLE - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z3-2 (GND) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Driver Side)) |

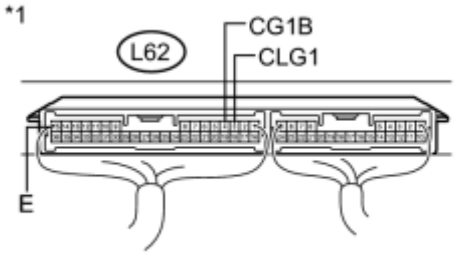
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (INDOOR ELECTRICAL KEY OSCILLATOR SIGNAL OUTPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.




(b) Measure the resistance and check for pulses according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-15 (E) - Body ground | Always | Below 1 Ω |

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-3 (CLG1) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-3 (CLG1) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |
| L62-4 (CG1B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-4 (CG1B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

| | |
|---|---|
| 5. | REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Driver Side) |

(a) Replace the front door outside handle assembly (for driver side) INFO.

NEXT

| | |
|---|---|
| 6. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

OK:

DTC B27A1 is not output.

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK **END (FRONT DOOR OUTSIDE HANDLE ASSEMBLY WAS DEFECTIVE)**

| DTC | B27A2 | Open in Front Passenger Side Electrical Antenna Circuit |
|---|---|---|

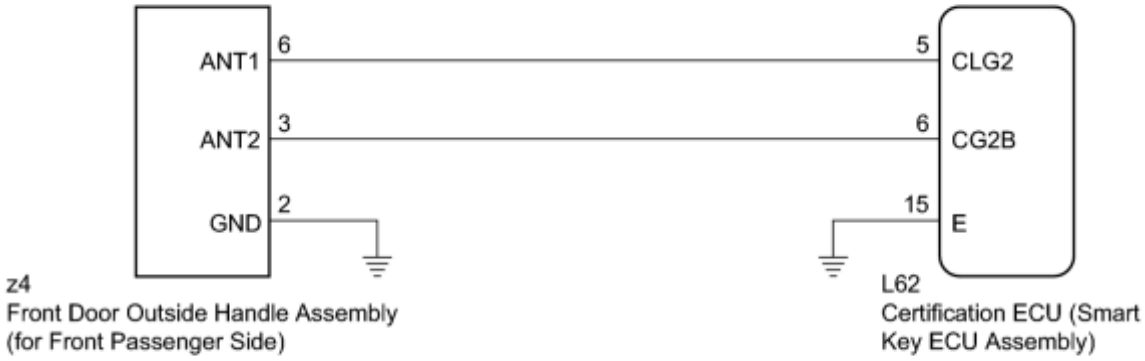
# DESCRIPTION

The certification ECU (smart key ECU assembly) generates a request signal and sends it to the door electrical key oscillator built into the front door outside handle assembly (for front passenger side) at 0.25-second intervals. To detect a key near the front passenger door, the front door outside handle assembly (for front passenger side) creates a detection area with a radius of approximately 1.0 m (3.28 ft.) from the front passenger door at 0.25-second intervals.

DTC B27A2 is detected by the certification ECU (smart key ECU assembly) if an open circuit is detected between the certification ECU (smart key ECU assembly) and front door outside handle assembly (for front passenger side) terminals (between CLG2 and ANT1, or CG2B and ANT2).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B27A2 | Open circuit detected between the certification ECU (smart key ECU assembly) and front door outside handle assembly (for front passenger side) terminals (between CLG2 and ANT1, or CG2B and ANT2). | • Front door outside handle assembly (for front passenger side)<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot

the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION |

(a) Turn the power switch off.

(b) Check that the connectors are properly connected to the certification ECU (smart key ECU assembly) and the front door outside handle assembly (for front passenger side).

OK:

Connectors are properly connected.

NG ▶ CONNECT CONNECTORS PROPERLY

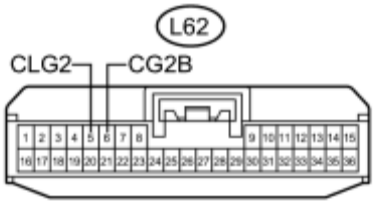
OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE) |

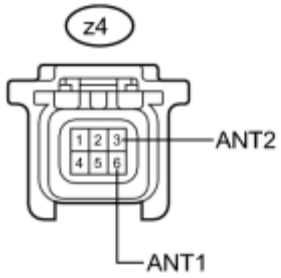
(a) Disconnect the certification ECU (smart key ECU assembly) connector.

*1




(b) Disconnect the front door outside handle assembly (for front passenger side) connector.

*2




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-5 (CLG2) - z4-6 (ANT1) | Always | Below 1 Ω |
| L62-6 (CG2B) - z4-3 (ANT2) | Always | Below 1 Ω |
| L62-5 (CLG2) - Body ground | Always | 10 kΩ or higher |
| L62-6 (CG2B) - Body ground | Always | 10 kΩ or higher |
| z4-6 (ANT1) - Body ground | Always | 10 kΩ or higher |
| z4-3 (ANT2) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

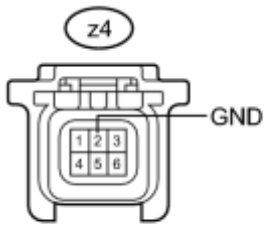
| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (FRONT DOOR OUTSIDE HANDLE - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z4-2 (GND) - Body ground | Always | Below 1 Ω |

*1




H

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Front Passenger Side)) |

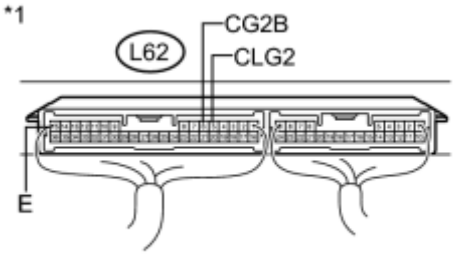
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 4. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (DOOR ELECTRICAL KEY OSCILLATOR SIGNAL OUTPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly)




connector.

(b) Measure the resistance and check for pulses according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-15 (E) - Body ground | Always | Below 1 Ω |

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-5 (CLG2) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-5 (CLG2) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |
| L62-6 (CG2B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| L62-6 (CG2B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

| | |
|---|---|
| 5. | REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Front Passenger Side) |

(a) Replace the front door outside handle assembly (for front passenger side) INFO.

NEXT

| | |
|---|---|
| 6. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

OK:

DTC B27A2 is not output.

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK **END (FRONT DOOR OUTSIDE HANDLE ASSEMBLY WAS DEFECTIVE)**

| DTC | B27A5 | Open in Front Floor Electrical Key Oscillator Circuit |
|---|---|---|

# DESCRIPTION

The certification ECU (smart key ECU assembly) generates a request signal and sends it to the indoor electrical key oscillator (for front floor). To detect the key inside the cabin, the indoor electrical key oscillator (for front floor) creates a detection area in the cabin.

DTC B27A5 is detected by the certification ECU (smart key ECU assembly) when an open circuit occurs between the certification ECU (smart key ECU assembly) and indoor electrical key oscillator (for front floor) terminals (between CLG5 and CLG3, or CG5B and CLGB).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B27A5 | Open circuit detected between the certification ECU (smart key ECU assembly) and indoor electrical key oscillator (for front floor) terminals (between CLG5 and CLG3, or CG5B and CLGB). | • Indoor electrical key oscillator (for front floor)<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION |

(a) Turn the power switch off.

(b) Check that the connectors are properly connected to the certification ECU (smart key ECU assembly) and the indoor electrical key oscillator (for front floor).

OK:

Connectors are properly connected.

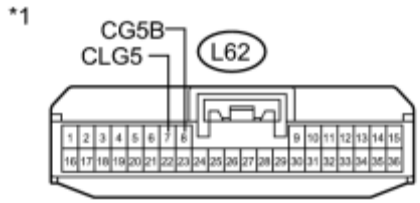
NG ▶ CONNECT CONNECTORS PROPERLY

OK

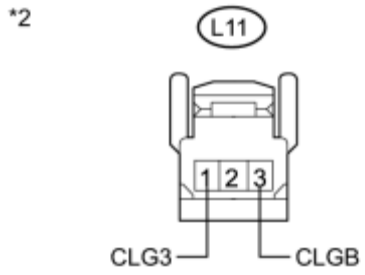
▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the indoor electrical key oscillator (for front floor) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-7 (CLG5) - L11-1 (CLG3) | Always | Below 1 Ω |
| L62-8 (CG5B) - L11-3 (CLGB) | Always | Below 1 Ω |
| L62-7 (CLG5) - Body ground | Always | 10 kΩ or higher |
| L62-8 (CG5B) - Body ground | Always | 10 kΩ or higher |
| L11-1 (CLG3) - Body ground | Always | 10 kΩ or higher |
| L11-3 (CLGB) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

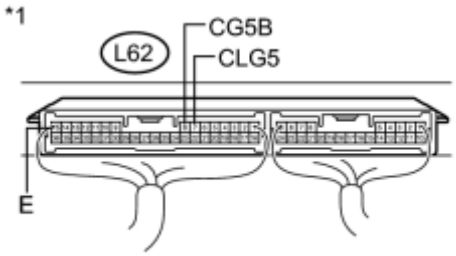
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Front Floor)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (INDOOR ELECTRICAL KEY OSCILLATOR SIGNAL OUTPUT) |




(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Measure the resistance and check for pulses according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-15 (E) - Body ground | Always | Below 1 Ω |

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-7 (CLG5) - L62-15 | • Power switch off | No pulse generation |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (E) | • All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | |
| L62-7 (CLG5) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |
| L62-8 (CG5B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-8 (CG5B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

▼

| | |
|---|---|
| 4. | REPLACE INDOOR ELECTRICAL KEY OSCILLATOR (for Front Floor) |

(a) Replace the indoor electrical key oscillator (for front floor) INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

OK:

DTC B27A5 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (INDOOR ELECTRICAL KEY OSCILLATOR WAS DEFECTIVE)**

| DTC | B27A6 | Open in Rear Floor Electrical Key Oscillator Circuit |
|---|---|---|

# DESCRIPTION

The certification ECU (smart key ECU assembly) generates a request signal and sends it to the indoor electrical key oscillator (for center floor). To detect the key inside the cabin, the indoor electrical key oscillator (for center floor) creates a detection area in the cabin.

DTC B27A6 is detected by the certification ECU (smart key ECU assembly) when an open circuit occurs between the certification ECU (smart key ECU assembly) and indoor electrical key oscillator (for center floor) terminals (between CLG6 and CLG4, or CG6B and CLGB).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B27A6 | Open circuit detected between the certification ECU (smart key ECU assembly) and indoor electrical key oscillator (for center floor) terminals (between CLG6 and CLG4, or CG6B and CLGB). | • Indoor electrical key oscillator (for center floor)<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION |

(a) Turn the power switch off.

(b) Check that the connectors are properly connected to the certification ECU (smart key ECU assembly) and the indoor electrical key oscillator (for center floor).

OK:

Connectors are properly connected.

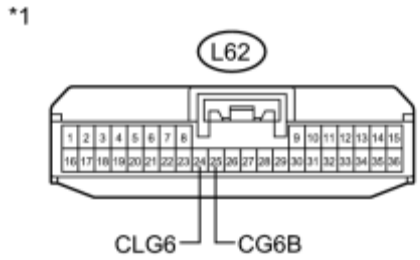
NG ▶ CONNECT CONNECTORS PROPERLY

OK

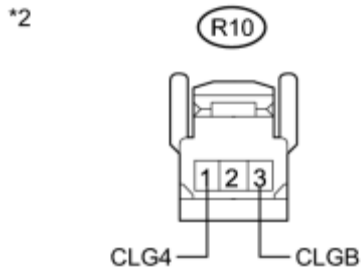
▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the indoor electrical key oscillator (for center floor) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-24 (CLG6) - R10-1 (CLG4) | Always | Below 1 Ω |
| L62-25 (CG6B) - R10-3 (CLGB) | Always | Below 1 Ω |
| L62-24 (CLG6) - Body ground | Always | 10 kΩ or higher |
| L62-25 (CG6B) - Body ground | Always | 10 kΩ or higher |
| R10-1 (CLG4) - Body ground | Always | 10 kΩ or higher |
| R10-3 (CLGB) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Center Floor)) |

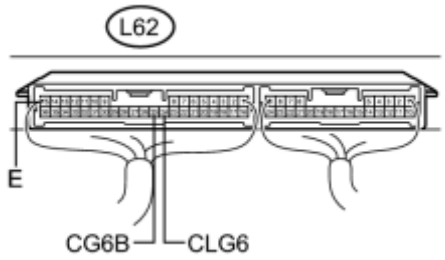
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (INDOOR ELECTRICAL KEY OSCILLATOR SIGNAL OUTPUT) |

*1




(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Measure the resistance and check for pulses according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-15 (E) - Body ground | Always | Below 1 Ω |

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-24 (CLG6) - L62-15 | • Power switch off | No pulse generation |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (E) | • All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | |
| L62-24 (CLG6) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |
| L62-25 (CG6B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-25 (CG6B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

▼

| | |
|---|---|
| 4. | REPLACE INDOOR ELECTRICAL KEY OSCILLATOR (for Center Floor) |

(a) Replace the indoor electrical key oscillator (for center floor) INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

OK:

DTC B27A6 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (INDOOR ELECTRICAL KEY OSCILLATOR WAS DEFECTIVE)**

| DTC | B27A7 | Open in Inside Luggage Compartment Electrical Key Oscillator Circuit |
|---|---|---|

# DESCRIPTION

The certification ECU (smart key ECU assembly) generates a request signal and sends it to the indoor electrical key oscillator (for rear floor). To detect the key inside the cabin, the indoor electrical key oscillator (for rear floor) creates a detection area in the cabin.

DTC B27A7 is detected by the certification ECU (smart key ECU assembly) when an open circuit occurs between the certification ECU (smart key ECU assembly) and indoor electrical key oscillator (for rear floor) terminals (between CLG7 and CLG6, or CG7B and CLGB).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B27A7 | Open circuit detected between the certification ECU (smart key ECU assembly) and indoor electrical key oscillator (for rear floor) terminals (between CLG7 and CLG6, or CG7B and CLGB). | • Indoor electrical key oscillator (for rear floor)<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION |

(a) Turn the power switch off.

(b) Check that the connectors are properly connected to the certification ECU (smart key ECU assembly) and the indoor electrical key oscillator (for rear floor).

OK:

Connectors are properly connected.

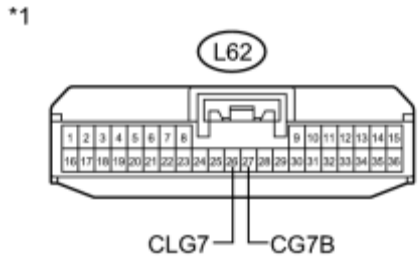
NG ▶ CONNECT CONNECTORS PROPERLY

OK

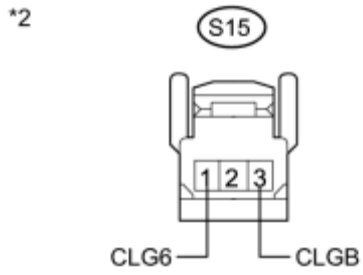
▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the indoor electrical key oscillator (for rear floor) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-26 (CLG7) - S15-1 (CLG6) | Always | Below 1 Ω |
| L62-27 (CG7B) - S15-3 (CLGB) | Always | Below 1 Ω |
| L62-26 (CLG7) - Body ground | Always | 10 kΩ or higher |
| L62-27 (CG7B) - Body ground | Always | 10 kΩ or higher |
| S15-1 (CLG6) - Body ground | Always | 10 kΩ or higher |
| S15-3 (CLGB) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

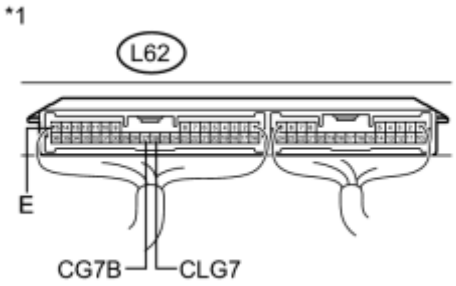
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Rear Floor)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 3. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (INDOOR ELECTRICAL KEY OSCILLATOR SIGNAL OUTPUT) |




(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Measure the resistance and check for pulses according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-15 (E) - Body ground | Always | Below 1 Ω |

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-26 (CLG7) - L62-15 | • Power switch off | No pulse generation |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| (E) | • All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | |
| L62-26 (CLG7) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |
| L62-27 (CG7B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L62-27 (CG7B) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

▼

| | |
|---|---|
| 4. | REPLACE INDOOR ELECTRICAL KEY OSCILLATOR (for Rear Floor) |

(a) Replace the indoor electrical key oscillator (for rear floor) INFO.

NEXT

▼

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

OK:

DTC B27A7 is not output.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (INDOOR ELECTRICAL KEY OSCILLATOR WAS DEFECTIVE)**

| DTC | B27A8 | Open in Outside Luggage Compartment Electrical Key Antenna Circuit |
|---|---|---|

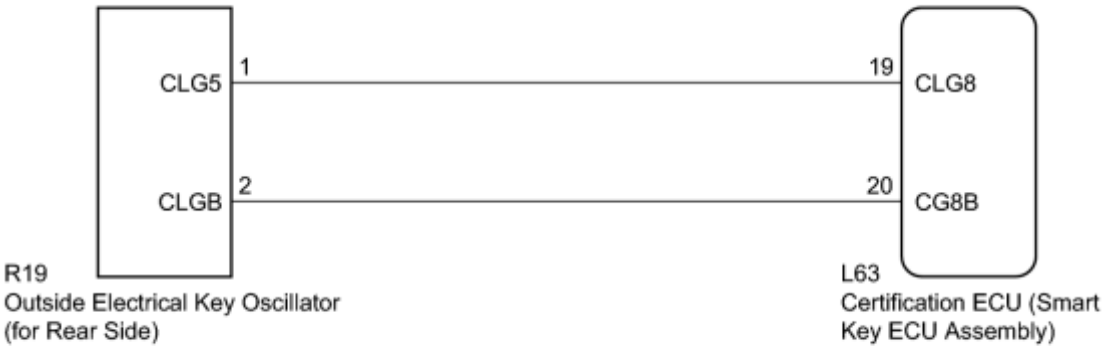
# DESCRIPTION

The certification ECU (smart key ECU assembly) generates a request signal and sends it to the outside electrical key oscillator (for rear side). To detect the key near the driver door, the outside electrical key oscillator (for rear side) creates a detection area towards the area approximately 1.0 m (3.28 ft.) from the back door.

DTC B27A8 is detected by the certification ECU (smart key ECU assembly) when an open circuit occurs between the certification ECU (smart key ECU assembly) and outside electrical key oscillator (for rear side) terminals (between CLG8 and CLG5, or CG8B and CLGB).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B27A8 | Open circuit detected between the certification ECU (smart key ECU assembly and outside electrical key oscillator (for rear side) terminals (between CLG8 and CLG5, or CG8B and CLGB). | • Outside electrical key oscillator (for rear side)<br>• Certification ECU (smart key ECU assembly)<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CONNECTOR CONNECTION CONDITION |

(a) Turn the power switch off.

(b) Check that the connectors are properly connected to the certification ECU (smart key ECU assembly) and the outside electrical key oscillator (for rear side).

OK:

Connectors are properly connected.

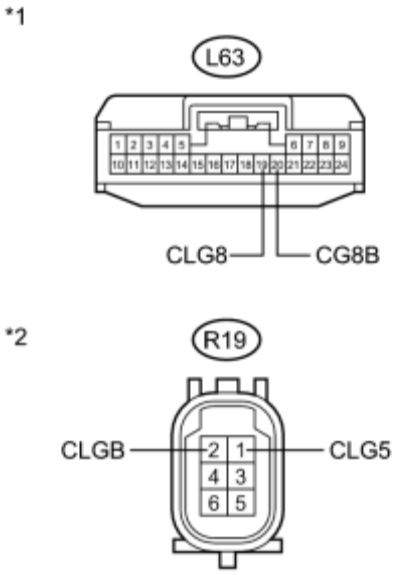
NG ▶ CONNECT CONNECTORS PROPERLY

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - OUTSIDE ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the outside electrical key oscillator (for rear side) connector.

(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L63-19 (CLG8) - R19-1 (CLG5) | Always | Below 1 Ω |
| L63-20 (CG8B) - R19-2 (CLGB) | Always | Below 1 Ω |
| L63-19 (CLG8) - Body ground | Always | 10 kΩ or higher |
| L63-20 (CG8B) - Body ground | Always | 10 kΩ or higher |
| R19-1 (CLG5) - Body ground | Always | 10 kΩ or higher |
| R19-2 (CLGB) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Outside Electrical Key Oscillator (for Rear Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

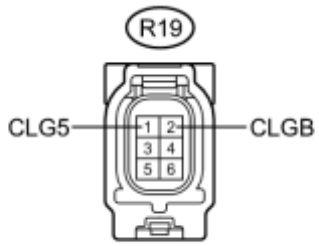
| | |
|---|---|
| 3. | INSPECT OUTSIDE ELECTRICAL KEY OSCILLATOR |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R19-1 (CLG5) - R19-2 (CLGB) | Always | Below 1 Ω |

*1




## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Outside Electrical Key Oscillator (for Rear Side)) |

NG ▶ REPLACE OUTSIDE ELECTRICAL KEY OSCILLATOR

OK

▼

| | |
|---|---|
| 4. | REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) |

(a) Replace the certification ECU (smart key ECU assembly) INFO.

NEXT

| | |
|---|---|
| 5. | CHECK DTC OUTPUT |

(a) Clear the DTCs INFO.

(b) Recheck for DTCs.

OK:

DTC B27A8 is not output.

NG REPLACE OUTSIDE ELECTRICAL KEY OSCILLATOR

OK **END (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) WAS DEFECTIVE)**

| |
|---|
| Entry Answer-back Buzzer does not Sound |

# DESCRIPTION

The smart key system uses the wireless door lock buzzer assembly to perform various vehicle exterior warnings. When the conditions for each warning are met, the certification ECU (smart key ECU assembly) sends a buzzer request signal to the main body ECU (multiplex network body ECU) via CAN communication. The wireless door lock assembly sounds the buzzer according to the signal from the main body ECU (multiplex network body ECU).

# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (ANSWER-BACK BUZZER FUNCTION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Main Body / Data List.

(e) Read the Data List according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Wireless Buzzer Resp | Answer-back buzzer operation / ON or OFF | Customization status displayed | - |

Result:

| Result | Proceed to |
|---|---|
| Customize setting is ON. | A |
| Customize setting is OFF. | B |

B PERFORM CUSTOMIZE SETTING (Proceed to Customize Parameters)

A

| | |
|---|---|
| 2. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Enter the following menus: Body Electrical / Main Body / Active Test.

(b) Perform the Active Test according to the display on the Techstream.

***Main Body (Main Body ECU (Multiplex Network Body ECU))***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Wireless Buzzer | Wireless door lock buzzer assembly | ON/OFF | - |

OK:

Wireless door lock buzzer sounds.

NG GO TO WIRELESS DOOR LOCK CONTROL SYSTEM (Proceed to No Answer-Back)

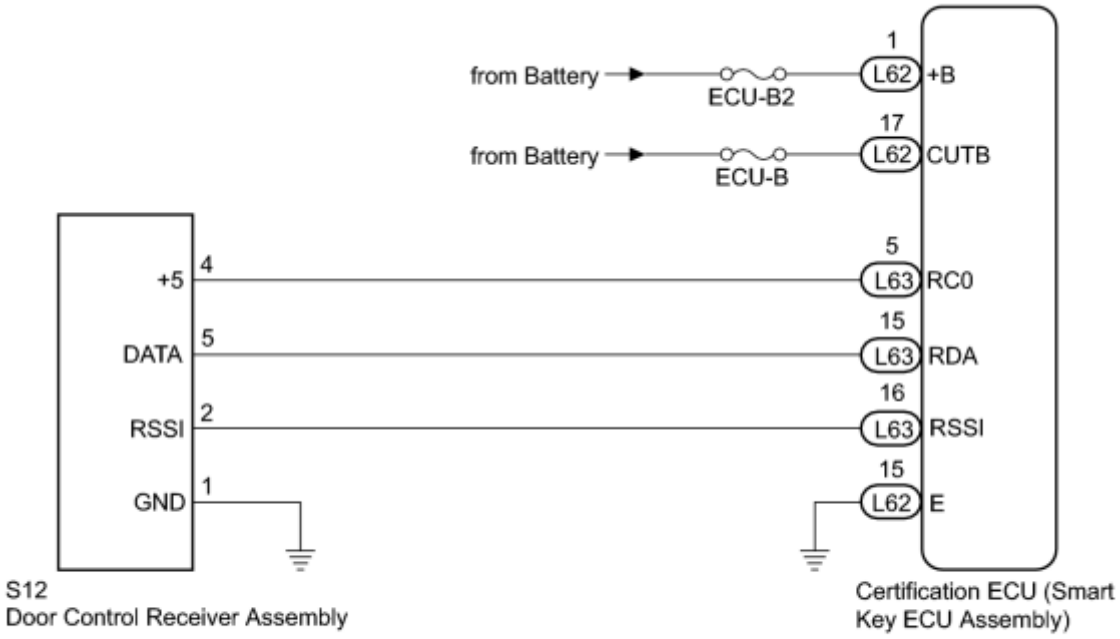
OK **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

All Door Entry Lock/Unlock Functions and Wireless Functions do not Operate

# DESCRIPTION

When the entry door lock and unlock functions and wireless door lock and unlock functions do not operate, radio wave interference, or a malfunction in the key or signal circuit between the door control receiver assembly and certification ECU (smart key ECU assembly) is suspected. The signal circuit is shared by the entry function and wireless door lock function.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Before performing the inspection, check that DTC B1242 (wireless door lock control) is not output INFO.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | CHECK ELECTRICAL KEY TRANSMITTER |

(a) Check if another registered key is available.

Result:

| Result | Proceed to |
|---|---|
| Another registered key is not available. | A |
| Another registered key is available. | B |

B CHECK ELECTRICAL KEY TRANSMITTER (OPERATION)

A

| | |
|---|---|
| 3. | REGISTER ELECTRICAL KEY TRANSMITTER |

(a) Register a new key INFO.

NEXT

| | |
|---|---|
| 4. | CHECK ELECTRICAL KEY TRANSMITTER (OPERATION) |

(a) Using the key registered in the previous step or another registered key, check that the entry function operates normally INFO.

OK:

Entry function operates normally.

NG CHECK WAVE ENVIRONMENT

OK

| | |
|---|---|
| 5. | CHECK ELECTRICAL KEY TRANSMITTER (LED) |

(a) Check that the transmitter LED illuminates each time when the switch is pushed 3 times.

Result:

| Result | Proceed to |
|---|---|
| Transmitter LED does not illuminate at all when switch is pushed 3 times. | A |
| Transmitter LED illuminates each time when switch is pushed 3 times. | B |
| Transmitter LED does not illuminate the second or third time. | C |

HINT:

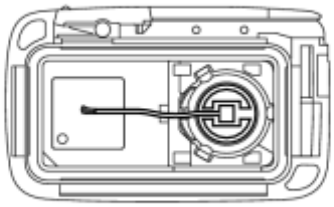
If the transmitter LED does not illuminate the second or third time, replace the transmitter battery as it is depleted.

C REPLACE TRANSMITTER BATTERY

B REPLACE ELECTRICAL KEY TRANSMITTER

A

| | |
|---|---|
| 6. | INSPECT TRANSMITTER BATTERY (VOLTAGE) |



(a) Remove the battery from the key that does not operate. Attach a lead wire (0.6 mm (0.0236 in.) or less in diameter including wire sheath) with tape or equivalent to the negative (-) terminal INFO.

NOTICE:

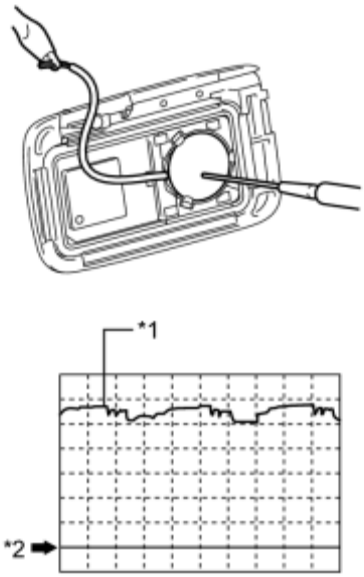
Do not wrap the wire around the terminal, wedge it between the terminals, or solder it. A terminal may be deformed or damaged, and the battery will not be able to be installed correctly.

(b) Carefully pull the lead wire out from the position shown in the illustration and install the previously removed transmitter battery.

(c) Using an oscilloscope, check the transmitter battery voltage waveform.

HINT:

When measuring the battery voltage, while operating the lock switch of a




door outside handle assembly, bring the key within the entry operating range to perform the measurement. For the entry operating range, refer to System Description INFO.

Standard Voltage:

| Item | Content |
|---|---|
| Tester Connection | Battery positive (+) - Battery negative (-) |
| Tool Setting | 0.5 V/DIV., 100 ms/DIV. |
| Condition | Power switch off, all doors closed and lock switch pushed |
| Specified Condition | 2.2 to 3.2 V (Refer to the waveform) |

## Text in Illustration

| | |
|---|---|
| *1 | Measurement Position |
| *2 | GND |

NG REPLACE TRANSMITTER BATTERY

OK **REPLACE ELECTRICAL KEY TRANSMITTER**

| | |
|---|---|
| 7. | CHECK WAVE ENVIRONMENT |

(a) Bring the key near the door control receiver, and check the wireless function.

HINT:

- When the key is brought near the door control receiver, the possibility of wave interference decreases, and it can be determined if wave interference is causing the problem symptom.
- If the inspection result indicates that the problem only occurs in certain locations or times of day, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation check.

OK:

Wireless function operates normally.

NG CHECK POWER SOURCE

OK **AFFECTED BY WAVE INTERFERENCE**

| | |
|---|---|
| 8. | CHECK POWER SOURCE |

(a) Check if functions other than the entry function operate when the power switch is off.

Result:

| Result | Proceed to |
|---|---|
| Other functions do not operate. | A |
| Other functions operate. | B |

HINT:

Perform this check using functions that do not require the power switch to be on (ACC or IG) in order to operate.

B GO TO SMART KEY SYSTEM (for Start Function) (Proceed to How to Proceed with Troubleshooting)

A

| | |
|---|---|
| 9. | INSPECT FUSES (ECU-B2, ECU-B) |

(a) Remove the ECU-B2 and ECU-B fuses from the engine room relay block and junction block.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

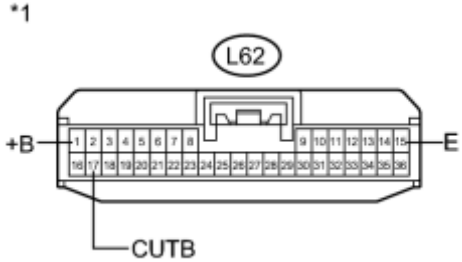
| Tester Connection | Condition | Specified Condition |
|---|---|---|
| ECU-B2 fuse | Always | Below 1 Ω |
| ECU-B fuse | Always | Below 1 Ω |

NG REPLACE FUSE (ECU-B2, ECU-B)

OK

| | |
|---|---|
| 10. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BATTERY AND BODY GROUND) |

(a) Install the ECU-B2 and ECU-B fuses to the engine room relay block and junction block.




(b) Disconnect the certification ECU (smart key ECU assembly) connector.

(c) Measure the voltage and resistance according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-1 (+B) - Body ground | Except power switch on (READY) | 11 to 14 V |
| L62-1 (+B) - Body ground | Power switch on (READY) | 11 to 15.5 V |
| L62-17 (CUTB) - Body ground | Except power switch on (READY) | 11 to 14 V |
| L62-17 (CUTB) - Body ground | Power switch on (READY) | 11 to 15.5 V |

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-15 (E) - Body ground | Always | Below 1 Ω |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |

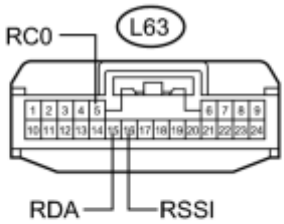
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

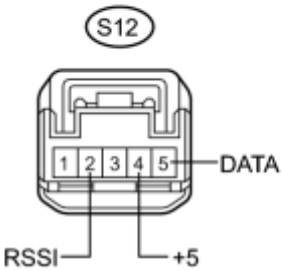
▼

| | |
|---|---|
| 11. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - DOOR CONTROL RECEIVER) |

*1




*2




(a) Disconnect the door control receiver assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L63-5 (RC0) - S12-4 (+5) | Always | Below 1 Ω |
| L63-15 (RDA) - S12-5 (DATA) | Always | Below 1 Ω |
| L63-16 (RSSI) - S12-2 (RSSI) | Always | Below 1 Ω |
| L63-5 (RC0) - Body ground | Always | 10 kΩ or higher |
| L63-15 (RDA) - Body ground | Always | 10 kΩ or higher |
| L63-16 (RSSI) - Body ground | Always | 10 kΩ or higher |
| S12-4 (+5) - Body ground | Always | 10 kΩ or higher |
| S12-5 (DATA) - Body ground | Always | 10 kΩ or higher |
| S12-2 (RSSI) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Door Control Receiver Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (DOOR CONTROL RECEIVER - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S12-1 (GND) - Body ground | Always | Below 1 Ω |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Door Control Receiver Assembly) |

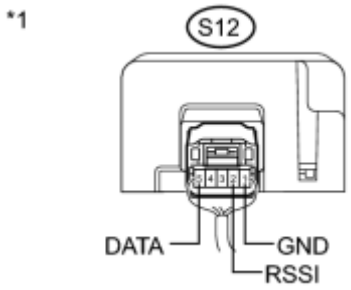
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 13. | INSPECT DOOR CONTROL RECEIVER ASSEMBLY (POWER SOURCE) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.




(b) Reconnect the door control receiver assembly connector.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S12-2 (RSSI) - S12-1 (GND) | • Power switch off<br>• All doors locked<br>• Lock or unlock switch on key not pushed | 11 to 14 V |
| S12-2 (RSSI) - S12-1 (GND) | • Power switch off<br>• All doors locked<br>• Lock or unlock switch on key pushed | Below 2 V |
| S12-5 (DATA) - S12-1 (GND) | Power switch off | Pulse between 11 to 14 V occurs regularly |

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Door Control Receiver Assembly) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

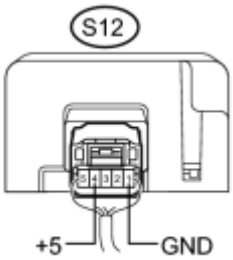
▼

| | |
|---|---|
| 14. | INSPECT DOOR CONTROL RECEIVER ASSEMBLY (DOOR CONTROL RECEIVER SIGNAL OUTPUT) |

(a) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S12-4 (+5) - S12-1 (GND) | • Power switch off<br>• Lock or unlock switch on key not pushed | Below 1 V |
| S12-4 (+5) - S12-1 (GND) | • Power switch off<br>• Lock or unlock switch on key pushed | 4.5 to 5.5 V |

# Text in Illustration

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Door Control Receiver Assembly) |

NG ▶ REPLACE DOOR CONTROL RECEIVER ASSEMBLY

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

All Door Entry Lock/Unlock Functions do not Operate, but Wireless Functions Operate

# DESCRIPTION

When the wireless door lock and unlock functions operate, the communication circuit between the door lock receiver assembly and certification ECU (smart key ECU assembly) is normal. When the entry lock and unlock functions do not operate, radio wave interference, a customized entry cancel function, or a communication error between the key and vehicle in the smart communication circuit, is suspected.

# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG ▶ GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

▼

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (ENTRY CANCEL FUNCTION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

*Smart Key (Certification ECU (Smart Key ECU Assembly))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Auto Entry Cancel SW | Entry function cancel / ON or OFF | Mode status displayed | - |

Result:

| Result | Proceed to |
|---|---|
| Entry function cancel is OFF. | A |
| Entry function cancel is ON. | B |

B ▶ PERFORM CANCELLATION OF ENTRY KEY CANCEL FUNCTION (Proceed to Customize Parameters)

A

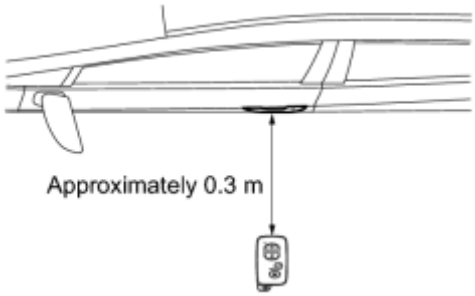
▼

| | |
|---|---|
| 3. | CHECK WAVE ENVIRONMENT |

(a) Move the key as described below and perform the operation inspection.

HINT:

- When the key is brought near the door outside handle assembly or outside electrical key oscillator, the possibility of wave interference decreases, and it can be determined if wave interference is causing the problem symptom.
- The transmitting waves of the wireless functions and entry functions are the same, but the wave logic is different. Therefore, it is possible that only the wireless functions or only the entry functions are affected by wave interference.




(b) Bring the key near the driver door outside handle assembly, and perform a front driver door entry lock and unlock operation check.

HINT:

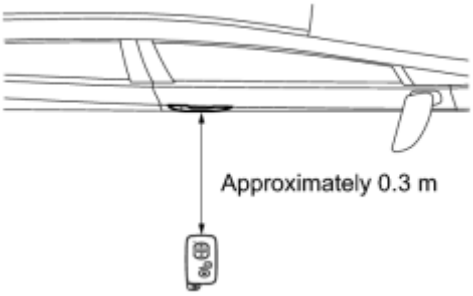
When pressing the lock switch, hold the electrical key transmitter about 1 m (3.28 ft.) above the ground and about 0.3 m (0.984 ft.) away from the vehicle as shown in the illustration.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the door outside handle assembly, communication is not possible.

(c) Bring the key near the front passenger door outside handle assembly, and perform a front passenger door entry lock and unlock operation check.*

*: w/ Entry System Back Door Open Function




HINT:

When pressing the lock switch, hold the electrical key transmitter about 1 m (3.28 ft.) above the ground and about 0.3 m (0.984 ft.) away from the vehicle as shown in the illustration.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the door outside handle assembly, communication is not possible.

(d) Bring the key near the outside electrical key oscillator (for rear side), and perform an entry back door open function check.*

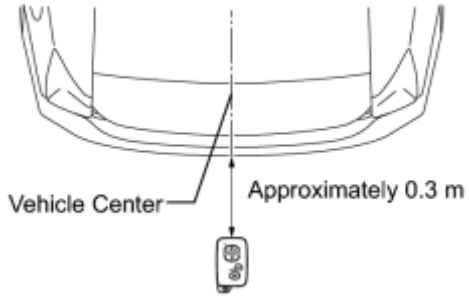
*: w/ Entry System Back Door Open Function

HINT:

When pressing the lock switch, hold the electrical key transmitter about 1 m (3.28 ft.) above the ground and about 0.3 m (0.984 ft.) away from the vehicle as shown in the illustration.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the rear bumper, communication is not possible.




HINT:

If the inspection result indicates that the problem only occurs in certain locations or times of day, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation check.

Result:

## w/ Entry System Back Door Open Function

| Result | Proceed to |
|---|---|
| Entry function does not operate for all doors. | A |
| Entry function operates for all doors. | B |
| Entry function operates for an individual door. | C |

## w/o Entry System Back Door Open Function

| Result | Proceed to |
|---|---|
| Entry function does not operate for driver door. | A |
| Entry function operates for driver door. | B |

C GO TO OTHER PROBLEM (Proceed to Problem Symptoms Table)

B AFFECTED BY WAVE INTERFERENCE

A

| | |
|---|---|
| 4. | SYSTEM CHECK |

(a) Check the vehicle specification.

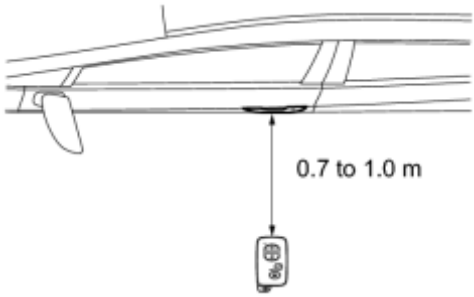
Result:

| Result | Proceed to |
|---|---|
| w/ Entry System Back Door Open Function | A |
| w/o Entry System Back Door Open Function | B |

B PERFORM KEY DIAGNOSTIC MODE INSPECTION

A

| | |
|---|---|
| 5. | PERFORM KEY DIAGNOSTIC MODE INSPECTION |




(a) Diagnostic mode inspection (door electrical key oscillator (for driver side))

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Driver Side.

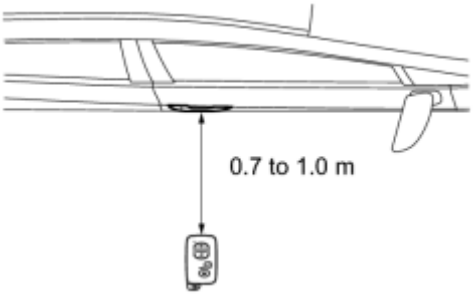
(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Hold the electrical key transmitter at the same height as the door outside handle (0.7 to 1.0 m (2.30 to 3.28 ft.)). Make sure that the direction of the key is as shown in the illustration.

(b) Diagnostic mode inspection (door electrical key oscillator (for front passenger side))

(1) Connect the Techstream to the DLC3.




(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Passenger Side.

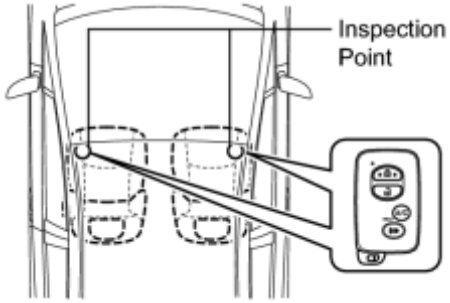
(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Hold the electrical key transmitter at the same height as the door outside handle (0.7 to 1.0 m (2.30 to 3.28 ft.)). Make sure that the direction of the key is as shown in the illustration.

(c) Diagnostic mode inspection (indoor electrical key oscillator (for front floor))

(1) Connect the Techstream to the DLC3.




(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Front Room.

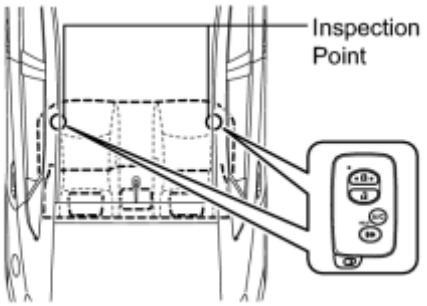
(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Place the key on the driver or front passenger seat cushion.

(d) Diagnostic mode inspection (indoor electrical key oscillator (for center floor))

(1) Connect the Techstream to the DLC3.




(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Rear Room.

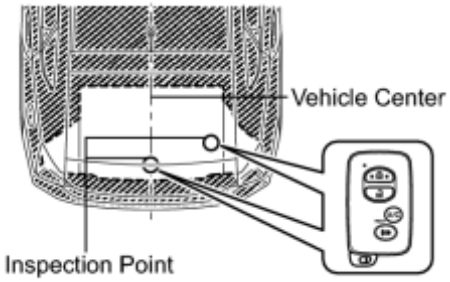
(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Place the key on the rear seat cushion.

(e) Diagnostic mode inspection (indoor electrical key oscillator (for rear floor))

(1) Connect the Techstream to the DLC3.




(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Back Door (inside).

(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Place the key on the luggage area.

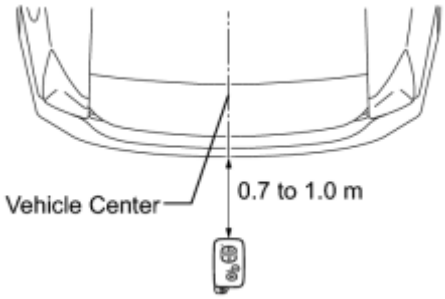
(f) Diagnostic mode inspection (outside electrical key oscillator (for rear side))

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Back Door (outside).




(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Hold the electrical key transmitter at the same height as the rear bumper upper surface and align with the center of the rear of the vehicle (0.7 to 1.0 m (2.30 to 3.28 ft.)). Make sure that the direction of the key is as shown in the illustration.

Result:

| Result | Proceed to |
|---|---|
| Wireless door lock buzzer does not sound for all electrical key oscillators. | A |
| Wireless door lock buzzer does not sound only for either door electrical key oscillator. | B |

| | |
|---|---|
| Wireless door lock buzzer does not sound only for one indoor electrical key oscillator. | C |
| Wireless door lock buzzer does not sound only for outside electrical key oscillator (for rear side). | D |
| Wireless door lock buzzer sounds for all electrical key oscillators. | E |

E REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

D GO TO OTHER PROBLEM (Proceed to Back Door Entry Lock and Unlock Functions do not Operate)

C GO TO OTHER PROBLEM (Proceed to Room Oscillator does not Recognize Key)

B GO TO OTHER PROBLEM (Proceed to Problem Symptoms Table for Each Door)

A

| | |
|---|---|
| 6. | CHECK ELECTRICAL KEY TRANSMITTER |

(a) Check if another registered key is available.

Result:

| Result | Proceed to |
|---|---|
| Another registered key is not available. | A |
| Another registered key is available. | B |

B CHECK ELECTRICAL KEY TRANSMITTER (OPERATION)

A

| | |
|---|---|
| 7. | REGISTER ELECTRICAL KEY TRANSMITTER |

(a) Register a new key INFO.

NEXT

| | |
|---|---|
| 8. | CHECK ELECTRICAL KEY TRANSMITTER (OPERATION) |

(a) Using the key registered in the previous step or another registered key, check that the entry function operates normally INFO.

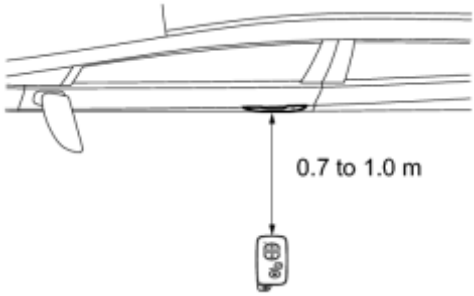
OK:

Entry function operates normally.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **REPLACE ELECTRICAL KEY TRANSMITTER (REPLACE MALFUNCTIONING KEY)**

| | |
|---|---|
| 9. | PERFORM KEY DIAGNOSTIC MODE INSPECTION |




(a) Diagnostic mode inspection (door electrical key oscillator (for driver side))

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

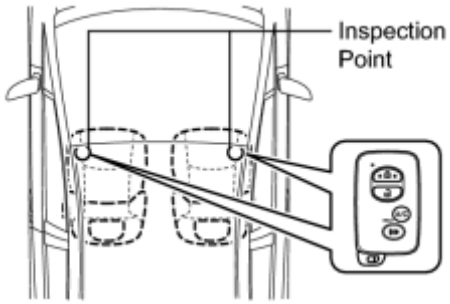
(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Driver Side.

(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Hold the electrical key transmitter at the same height as the door outside handle (0.7 to 1.0 m (2.30 to 3.28 ft.)). Make sure that the direction of the key is as shown in the illustration.

(b) Diagnostic mode inspection (indoor electrical key oscillator (for front floor))




(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Front Room.

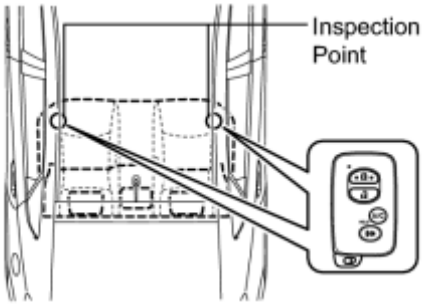
(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Place the key on the driver or front passenger seat cushion.

(c) Diagnostic mode inspection (indoor electrical key oscillator (for center floor))

(1) Connect the Techstream to the DLC3.




(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Rear Room.

(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Place the key on the rear seat cushion.

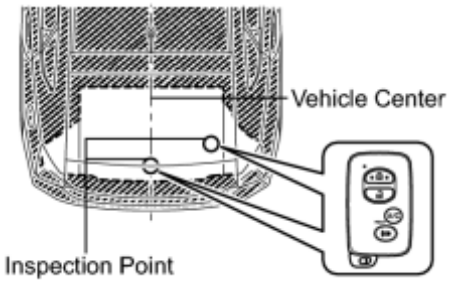
(d) Diagnostic mode inspection (indoor electrical key oscillator (for rear floor))

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Back Door (inside).




(5) When the key is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

HINT:

Place the key on the luggage area.

Result:

| Result | Proceed to |
|---|---|
| Wireless door lock buzzer does not sound for all electrical key oscillators. | A |
| Wireless door lock buzzer does not sound only for driver door electrical key oscillator. | B |
| Wireless door lock buzzer does not sound only for one indoor electrical key oscillator. | C |
| Wireless door lock buzzer sounds for all electrical key oscillators. | D |

D ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

C ▶ GO TO OTHER PROBLEM (Proceed to Room Oscillator does not Recognize Key)

B GO TO OTHER PROBLEM (Proceed to Driver Side Door Entry Lock and Unlock Functions do not Operate)

A

| | |
|---|---|
| 10. | CHECK ELECTRICAL KEY TRANSMITTER |

(a) Check if another registered key is available.

Result:

| Result | Proceed to |
|---|---|
| Another registered key is not available. | A |
| Another registered key is available. | B |

B CHECK ELECTRICAL KEY TRANSMITTER (OPERATION)

A

| | |
|---|---|
| 11. | REGISTER ELECTRICAL KEY TRANSMITTER |

(a) Register a new key INFO.

NEXT

| | |
|---|---|
| 12. | CHECK ELECTRICAL KEY TRANSMITTER (OPERATION) |

(a) Using the key registered in the previous step or another registered key, check that the entry function operates normally INFO.

OK:

Entry function operates normally.

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK **REPLACE ELECTRICAL KEY TRANSMITTER (REPLACE MALFUNCTIONING KEY)**

Driver Side Door Entry Unlock Function does not Operate

# DESCRIPTION

If the driver door entry lock function operates normally, but its entry unlock function does not, this means that the request code from the driver door is being output normally. In this case, a malfunction in the touch sensor circuit (from the certification ECU (smart key ECU assembly) to the front door outside handle assembly (touch sensor)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (DOOR OUTSIDE HANDLE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D-Door Touch Sensor | Status of touch sensor (for driver side) / ON or OFF | ON: Touch sensor touched<br><br>OFF: Touch sensor not touched | - |

OK:

On the Techstream screen, the display changes between ON and OFF as shown in the chart above.

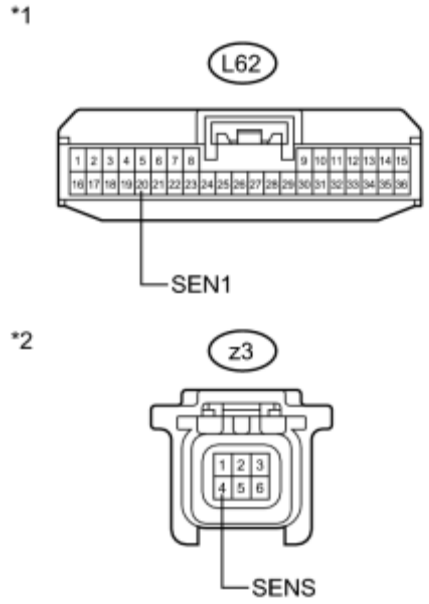
NG CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE)

OK **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Disconnect the front door outside handle assembly (for driver side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-20 (SEN1) - z3-4 (SENS) | Always | Below 1 Ω |
| L62-20 (SEN1) - Body ground | Always | 10 kΩ or higher |
| z3-4 (SENS) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

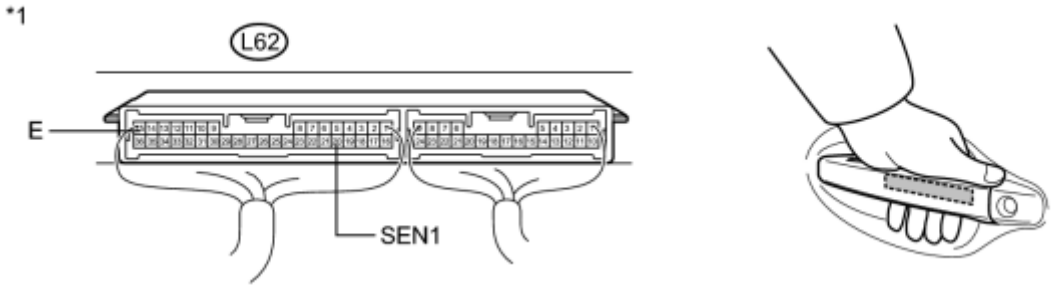
OK

▼

| | |
|---|---|
| 4. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (TOUCH SENSOR SIGNAL INPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Reconnect the front door outside handle assembly (for driver side) connector.




(c) Measure the voltage and check for pulses according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-20 (SEN1) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for driver side) not touched | Pulse generation |
| L62-20 (SEN1) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for driver side) touched | Below 2 V |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) | - | - |

NG ▶ REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Driver Side)

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

Front Passenger Side Door Entry Unlock Function does not Operate

# DESCRIPTION

If the front passenger door entry lock function operates normally, but its entry unlock function does not, this means that the request code from the front passenger door is being output normally. In this case, a malfunction in the touch sensor circuit (from the certification ECU (smart key ECU assembly) to the front door outside handle assembly (touch sensor)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (DOOR OUTSIDE HANDLE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| P-Door Touch Sensor | Status of touch sensor (for front passenger side) / ON or OFF | ON: Touch sensor touched<br><br>OFF: Touch sensor not touched | - |

OK:

On the Techstream screen, the display changes between ON and OFF as shown in the chart above.

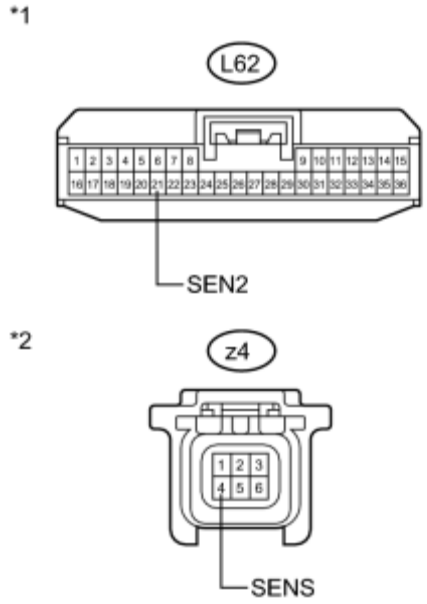
NG CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE)

OK **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Disconnect the front door outside handle assembly (for front passenger side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-21 (SEN2) - z4-4 (SENS) | Always | Below 1 Ω |
| L62-21 (SEN2) - Body ground | Always | 10 kΩ or higher |
| z4-4 (SENS) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

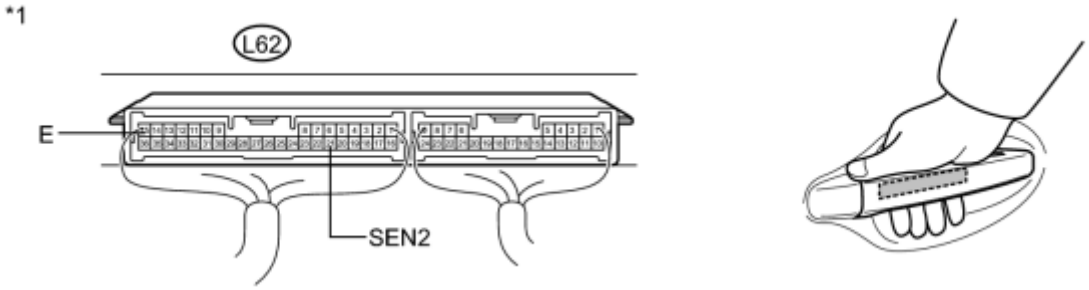
OK

▼

| | |
|---|---|
| 4. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (TOUCH SENSOR SIGNAL INPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Reconnect the front door outside handle assembly (for front passenger side) connector.




(c) Measure the voltage and check for pulses according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-21 (SEN2) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for front passenger side) not touched | Pulse generation |
| L62-21 (SEN2) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Key not in detection area<br>• Touch sensor (for front passenger side) touched | Below 2 V |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) | - | - |

NG ▶ REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Front Passenger Side)

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

# DESCRIPTION

When the entry lock and unlock functions do not operate only for the driver door, an error in output request codes from the driver door or malfunction in the front door outside handle assembly is suspected. If the entry functions for the other doors operate normally, then the communication circuit between the key and door control receiver assembly is functioning normally. In this case, radio wave interference or a malfunction in the request code sending circuit (from the certification ECU (smart key ECU assembly) to the front door outside handle assembly (for driver side)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

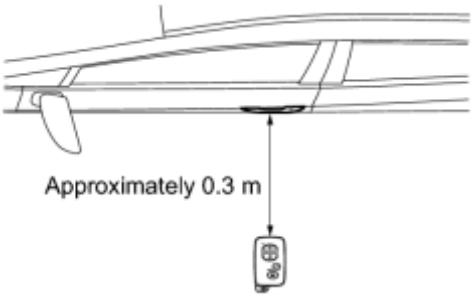
OK

| | |
|---|---|
| 2. | CHECK WAVE ENVIRONMENT |

(a) Bring the key near the front door outside handle assembly (for driver side), and perform a driver door entry lock and unlock operation check.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the door outside handle assembly, communication is not possible.




- When pressing the lock switch and touching the touch sensor, hold the electrical key transmitter about 1 m (3.28 ft.) above the ground and about 0.3 m (0.984 ft.) away from the vehicle as shown in the illustration.
- When the key is brought near the front door outside handle assembly (for driver side), the possibility of wave interference decreases, and it can be determined if wave interference is causing the problem symptom.
- If the operation is normal, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation check.

OK:

Entry functions operate normally.

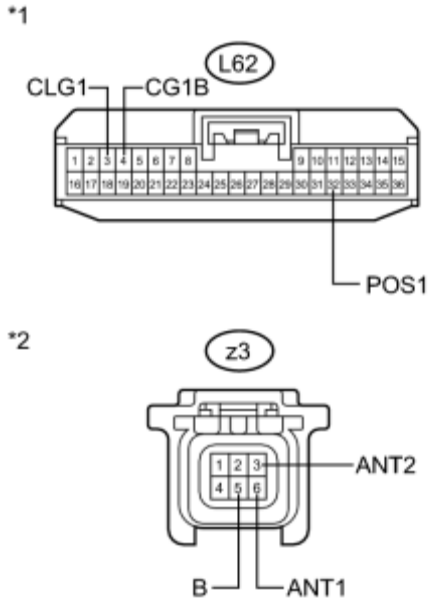
NG CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE)

OK **AFFECTED BY WAVE INTERFERENCE**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Disconnect the front door outside handle assembly (for driver side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-3 (CLG1) - z3-6 (ANT1) | Always | Below 1 Ω |
| L62-4 (CG1B) - z3-3 (ANT2) | Always | Below 1 Ω |
| L62-32 (POS1) - z3-5 (B) | Always | Below 1 Ω |
| L62-3 (CLG1) - Body ground | Always | 10 kΩ or higher |
| L62-4 (CG1B) - Body ground | Always | 10 kΩ or higher |
| L62-32 (POS1) - Body ground | Always | 10 kΩ or higher |
| z3-6 (ANT1) - Body ground | Always | 10 kΩ or higher |
| z3-3 (ANT2) - Body ground | Always | 10 kΩ or higher |
| z3-5 (B) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

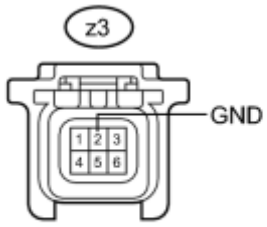
▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (FRONT DOOR OUTSIDE HANDLE - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z3-2 (GND) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

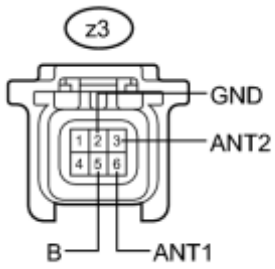
| | |
|---|---|
| 5. | INSPECT FRONT DOOR OUTSIDE HANDLE ASSEMBLY (DOOR OSCILLATOR, LOCK/UNLOCK SENSOR SIGNAL INPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Measure the voltage and check for pulses according to the value(s) in the table below.

Standard:

*1




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z3-6 (ANT1) - z3-3 (ANT2) | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| z3-6 (ANT1) - z3-3 (ANT2) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |
| z3-5 (B) - z3-2 (GND) | Power switch off | 9 to 14 V |
| z3-5 (B) - z3-2 (GND) | Power switch on (IG) | Below 2 V |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Driver Side)) |

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

| | |
|---|---|
| 6. | REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Driver Side) |

(a) Replace the front door outside handle assembly (for driver side) INFO.

NEXT

| | |
|---|---|
| 7. | CHECK FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Driver Side) |

(a) Check that the entry functions operate normally INFO.

OK:

Entry functions operate normally.

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK **END (FRONT DOOR OUTSIDE HANDLE ASSEMBLY WAS DEFECTIVE)**

# DESCRIPTION

When the entry lock and unlock functions do not operate only for the front passenger door, an error in output request codes from the front passenger door or malfunction in the front door outside handle assembly is suspected. If the entry functions for the other doors operate normally, then the communication circuit between the key and door control receiver assembly is functioning normally. In this case, radio wave interference or a malfunction in the request code sending circuit (from the certification ECU (smart key ECU assembly) to the front door outside handle assembly (for driver side)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

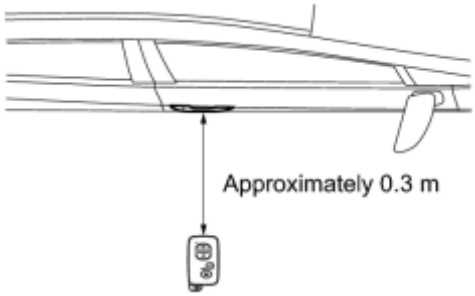
OK

| | |
|---|---|
| 2. | CHECK WAVE ENVIRONMENT |

(a) Bring the key near the front door outside handle assembly (for front passenger side), and perform a front passenger door entry lock and unlock operation check.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the door outside handle assembly, communication is not possible.




- When pressing the lock switch and touching the touch sensor, hold the electrical key transmitter about 1 m (3.28 ft.) above the ground and about 0.3 m (0.984 ft.) away from the vehicle as shown in the illustration.
- When the key is brought near the front door outside handle assembly (for front passenger side), the possibility of wave interference decreases, and it can be determined if wave interference is causing the problem symptom.
- If the operation is normal, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation check.

OK:

Entry functions operate normally.

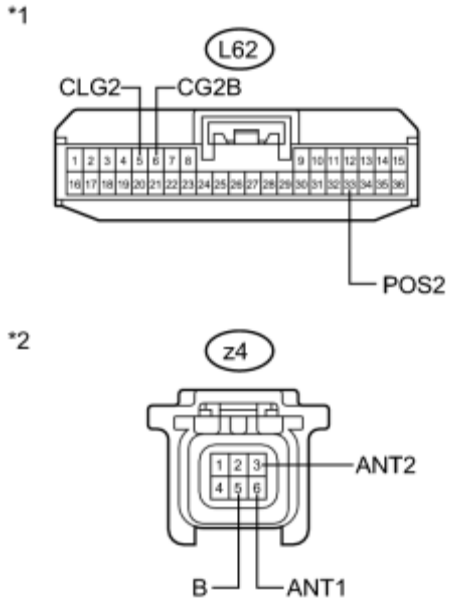
NG CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE)

OK **AFFECTED BY WAVE INTERFERENCE**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Disconnect the front door outside handle assembly (for front passenger side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-5 (CLG2) - z4-6 (ANT1) | Always | Below 1 Ω |
| L62-6 (CG2B) - z4-3 (ANT2) | Always | Below 1 Ω |
| L62-33 (POS2) - z4-5 (B) | Always | Below 1 Ω |
| L62-5 (CLG2) - Body ground | Always | 10 kΩ or higher |
| L62-6 (CG2B) - Body ground | Always | 10 kΩ or higher |
| L62-33 (POS2) - Body ground | Always | 10 kΩ or higher |
| z4-6 (ANT1) - Body ground | Always | 10 kΩ or higher |
| z4-3 (ANT2) - Body ground | Always | 10 kΩ or higher |
| z4-5 (B) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

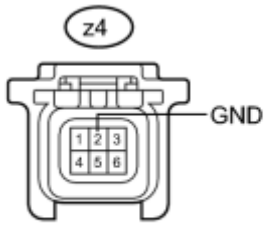
▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (FRONT DOOR OUTSIDE HANDLE - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z4-2 (GND) - Body ground | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

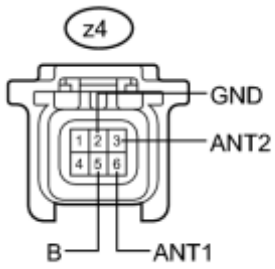
| | |
|---|---|
| 5. | INSPECT FRONT DOOR OUTSIDE HANDLE ASSEMBLY (DOOR OSCILLATOR, LOCK/UNLOCK SENSOR SIGNAL INPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Measure the voltage and check for pulses according to the value(s) in the table below.

Standard:

*1




H

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| z4-6 (ANT1) - z4-3 (ANT2) | • Power switch off<br>• All doors closed<br>• Key not in cabin | No pulse generation |
| z4-6 (ANT1) - z4-3 (ANT2) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• All doors locked by wireless lock function | Pulse generation |
| z4-5 (B) - z4-2 (GND) | Power switch off | 9 to 14 V |
| z4-5 (B) - z4-2 (GND) | Power switch on (IG) | Below 2 V |

# Text in Illustration

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Front Passenger Side)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

▼

| | |
|---|---|
| 6. | REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Front Passenger Side) |

(a) Replace the front door outside handle assembly (for front passenger side) INFO.

NEXT

▼

| | |
|---|---|
| 7. | CHECK FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Front Passenger Side) |

(a) Check that the entry functions operate normally INFO.

OK:

Entry functions operate normally.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (FRONT DOOR OUTSIDE HANDLE ASSEMBLY WAS DEFECTIVE)**

| Driver Side Door Entry Lock Function does not Operate |
|---|

# DESCRIPTION

If the driver door entry unlock function operates normally, but its entry lock function does not, this means that the request code from the driver door is being output normally. In this case, a malfunction in the lock sensor circuit (from the certification ECU (smart key ECU assembly) to the front door outside handle assembly (lock sensor)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| 1. | CHECK POWER DOOR LOCK OPERATION |
|---|---|

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (DOOR OUTSIDE HANDLE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| D-Door Trigger SW | Driver side door lock switch / ON or OFF | ON: Entry lock switch pressed<br><br>OFF: Entry lock switch not pressed | - |

OK:

On the Techstream screen, the display changes between ON and OFF as shown in the chart above.

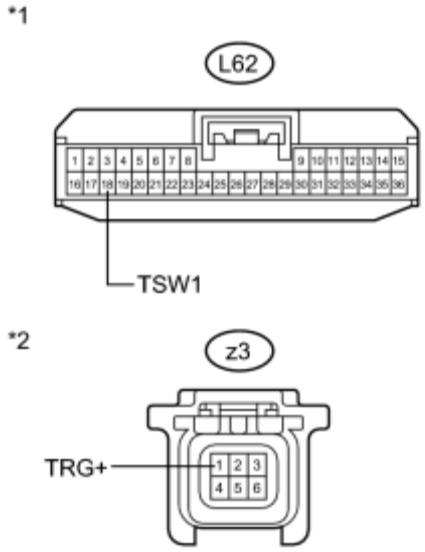
NG CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE)

OK **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - FRONT DOOR OUTSIDE HANDLE) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Disconnect the front door outside handle assembly (for driver side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-18 (TSW1) - z3-1 (TRG+) | Always | Below 1 Ω |
| L62-18 (TSW1) - Body ground | Always | 10 kΩ or higher |
| z3-1 (TRG+) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Driver Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

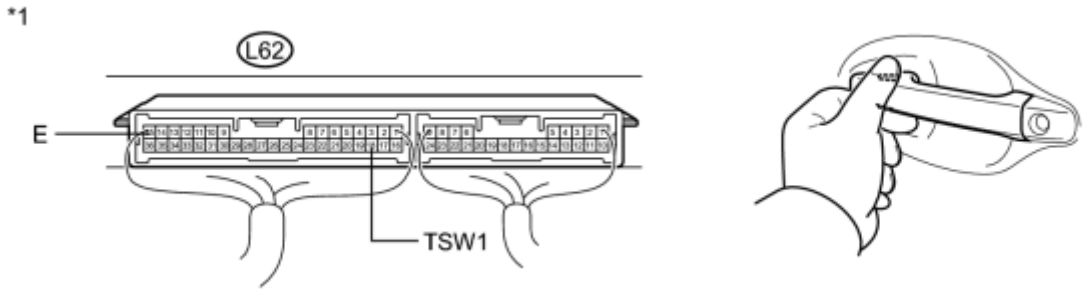
OK

▼

| | |
|---|---|
| 4. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (LOCK SENSOR SIGNAL INPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Reconnect the front door outside handle assembly (for driver side) connector.




(c) Measure the voltage and check for pulses according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-18 (TSW1) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Lock sensor (for driver side) not touched | Pulse generation |
| L62-18 (TSW1) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Lock sensor (for driver side) touched | Below 2 V |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) | - | - |

NG ▶ REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Driver Side)

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

Front Passenger Side Door Entry Lock Function does not Operate

# DESCRIPTION

If the front passenger door entry unlock function operates normally, but its entry lock function does not, this means that the request code from the front passenger door is being output normally. In this case, a malfunction in the lock sensor circuit (from the certification ECU (smart key ECU assembly) to the front door outside handle assembly (lock sensor)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (DOOR OUTSIDE HANDLE) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| P-Door Trigger SW | Front passenger side door lock switch / ON or OFF | ON: Entry lock switch pressed<br><br>OFF: Entry lock switch not pressed | - |

OK:

On the Techstream screen, the display changes between ON and OFF as shown in the chart above.

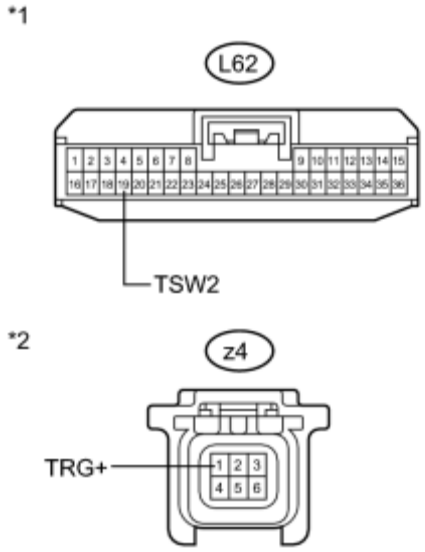
NG CHECK HARNESS AND CONNECTOR (FRONT DOOR OUTSIDE HANDLE - CERTIFICATION ECU)

OK **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 3. | CHECK HARNESS AND CONNECTOR (FRONT DOOR OUTSIDE HANDLE - CERTIFICATION ECU) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Disconnect the front door outside handle assembly (for front passenger side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-19 (TSW2) - z4-1 (TRG+) | Always | Below 1 Ω |
| L62-19 (TSW2) - Body ground | Always | 10 kΩ or higher |
| z4-1 (TRG+) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Front Door Outside Handle Assembly (for Front Passenger Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

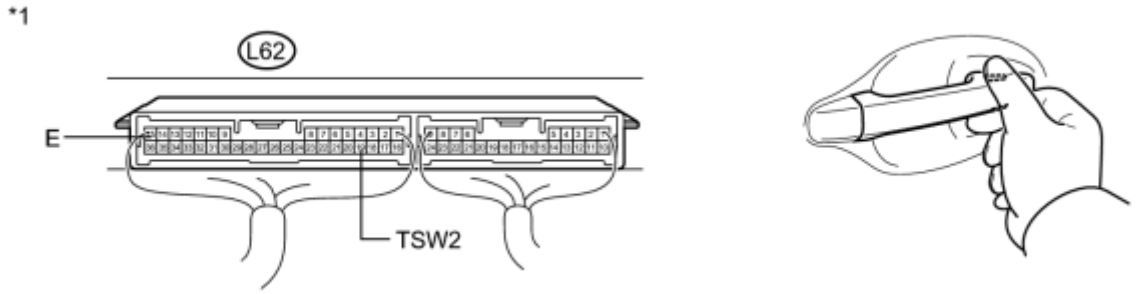
OK

▼

| | |
|---|---|
| 4. | INSPECT CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) (LOCK SENSOR SIGNAL INPUT) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Reconnect the front door outside handle assembly (for front passenger side) connector.




(c) Measure the voltage and check for pulses according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-19 (TSW2) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Lock sensor (for front passenger side) not touched | Pulse generation |
| L62-19 (TSW2) - L62-15 (E) | • Power switch off<br>• All doors closed<br>• Lock sensor (for front passenger side) touched | Below 2 V |

*Text in Illustration*

| | | | |
|---|---|---|---|
| *1 | Component with harness connected<br><br>(Certification ECU (Smart Key ECU Assembly)) | - | - |

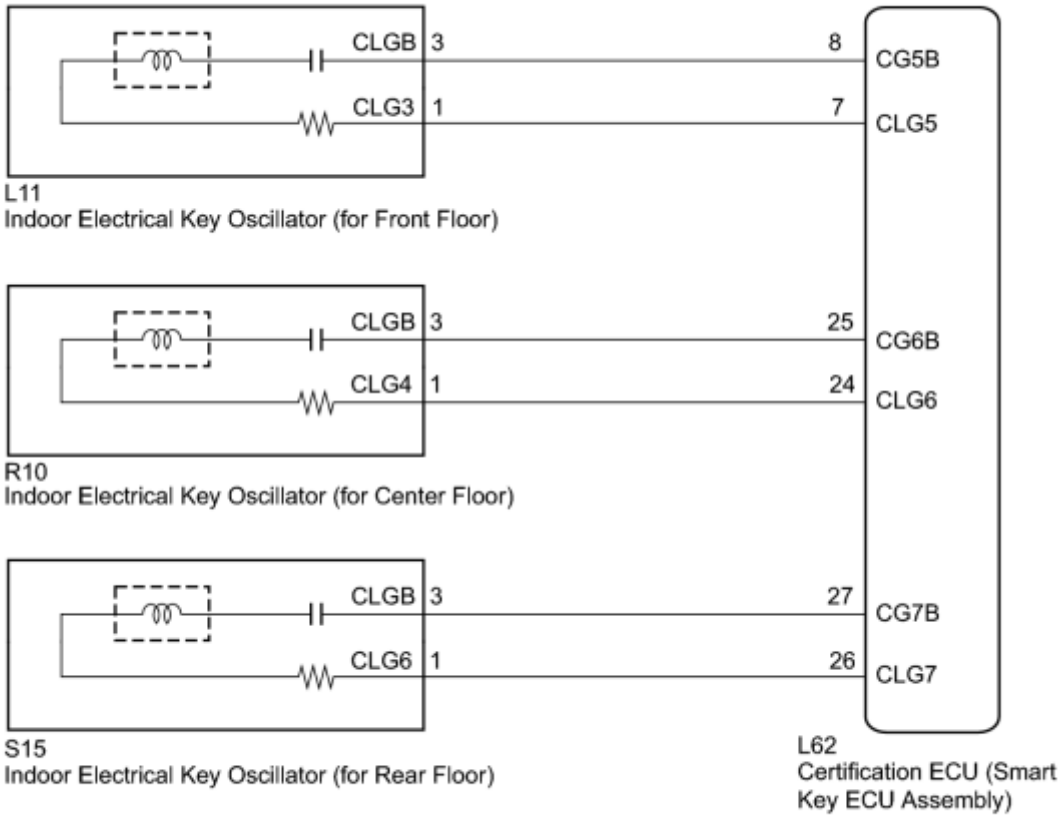
NG ▶ REPLACE FRONT DOOR OUTSIDE HANDLE ASSEMBLY (for Front Passenger Side)

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

# DESCRIPTION

If the room oscillator does not recognize a key, one of the following may be the cause: 1) communication between the indoor electrical key oscillator (for front floor) and key cannot be performed; 2) communication between the indoor electrical key oscillator (for center floor) and key cannot be performed; or 3) communication between the indoor electrical key oscillator (for rear floor) and key cannot be performed.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- When using the Techstream with the power switch off to troubleshoot:

Connect the Techstream to the DLC3, and turn a courtesy light switch on and off at 1.5-second intervals until communication between the Techstream and vehicle begins.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK SMART KEY SYSTEM (for Entry Function) |

(a) Check that entry lock and unlock functions can be operated at each door INFO.

OK:

Entry lock and unlock functions operate normally.

NG GO TO OTHER PROBLEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | CHECK SMART KEY SYSTEM (for Start Function) |

(a) Remove the battery of the key INFO.



(b) With the brake pedal depressed, touch the power switch while facing the logo side of the key to the power switch.

(c) When operating the power switch, check whether the power source mode changes.

OK:

Power source mode changes.

HINT:

- When the key cannot be verified even though it is within the specified range, the hybrid vehicle control system start check can be performed by removing the transmitter battery from the key and holding the transmitter close to the power switch.
- When performing the check, if the power source mode changes, there is a problem with key certification inside the cabin.

NG ▶ GO TO SMART KEY SYSTEM (for Start Function) (Proceed to Power Source Mode does not Change to ON)

OK

▼

| 3. | CHECK WAVE ENVIRONMENT |
|---|---|

(a) Install the battery to the key INFO.

(b) Bring the key near the indoor electrical key oscillator (for front floor), and check that the hybrid vehicle control system can be started.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the indoor electrical key oscillator (for front floor), communication is not possible.

(c) Bring the key near the indoor electrical key oscillator (for center floor), and check that the hybrid vehicle control system can be started.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the indoor electrical key oscillator (for center floor), communication is not possible.

(d) Bring the key near the indoor electrical key oscillator (for rear floor), and check that the hybrid vehicle control system can be started*.

*: If the customize setting for Ignition Available Area is not set All, the hybrid vehicle control system will not start. Before performing this inspection, check that All has been selected INFO.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the indoor electrical key oscillator (for rear floor), communication is not possible.

HINT:

- When the key is brought near the indoor electrical key oscillator, the possibility of wave interference decreases, and it can be determined if wave interference is causing the problem symptom.
- If the operation is normal, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation check.

OK:

The hybrid vehicle control system starts.

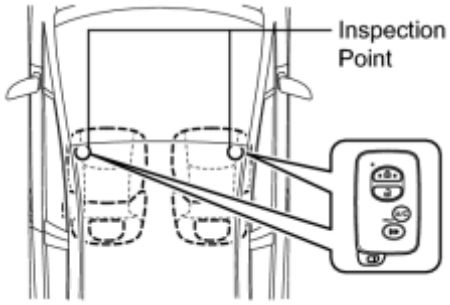
NG ▶ PERFORM KEY DIAGNOSTIC MODE INSPECTION

OK **AFFECTED BY WAVE INTERFERENCE**

| | |
|---|---|
| 4. | PERFORM KEY DIAGNOSTIC MODE INSPECTION |

(a) Diagnostic mode inspection (indoor electrical key oscillator (for front floor))

(1) Connect the Techstream to the DLC3.




(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

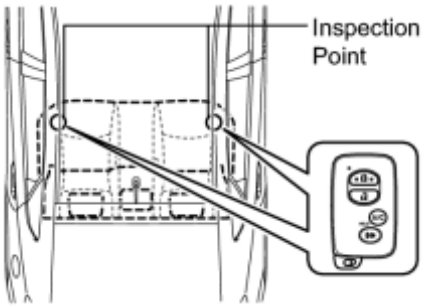
(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Front Room.

(5) When the electrical key transmitter is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

- Place the key on the driver or front passenger seat cushion.
- If the buzzer sounds, it can be determined that the indoor electrical key oscillators are operating normally.

(b) Diagnostic mode inspection (indoor electrical key oscillator (for center floor))

(1) Connect the Techstream to the DLC3.




(2) Turn the power switch on (IG).

(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Rear Room.

(5) When the electrical key transmitter is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

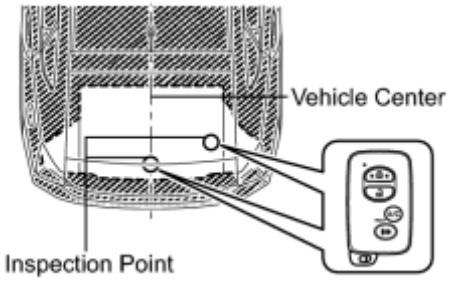
- Place the key on the rear seat cushion.
- If the buzzer sounds, it can be determined that the indoor electrical key oscillators are operating normally.

(c) Diagnostic mode inspection (indoor electrical key oscillator (for rear floor))

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).

(3) Turn the Techstream on.




(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Back Door (inside).

(5) When the electrical key transmitter is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

- Place the key on the luggage area.
- If the buzzer sounds, it can be determined that the indoor electrical key oscillators are operating normally.

Result:

| Result | Proceed to |
|---|---|
| Wireless door lock buzzer does not sound only for indoor electrical key oscillator (for front floor). | A |
| Wireless door lock buzzer does not sound only for indoor electrical key oscillator (for center floor). | B |
| Wireless door lock buzzer does not sound only for indoor electrical key oscillator (for rear floor). | C |
| Wireless door lock buzzer sounds for all indoor electrical key oscillators. | D |

D ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

C ▶ CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR)

B ▶ CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR)

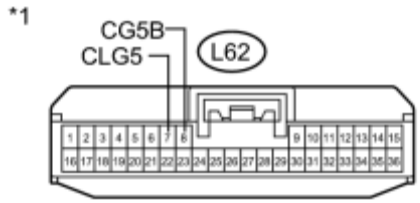
A

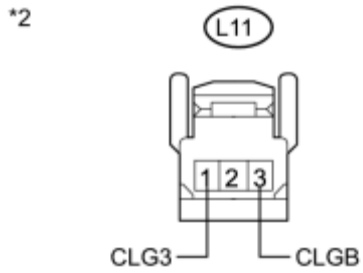
▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Disconnect the indoor electrical key oscillator (for front floor) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-7 (CLG5) - L11-1 (CLG3) | Always | Below 1 Ω |
| L62-8 (CG5B) - L11-3 (CLGB) | Always | Below 1 Ω |
| L62-7 (CLG5) - Body ground | Always | 10 kΩ or higher |
| L62-8 (CG5B) - Body ground | Always | 10 kΩ or higher |
| L11-1 (CLG3) - Body ground | Always | 10 kΩ or higher |
| L11-3 (CLGB) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Front Floor)) |

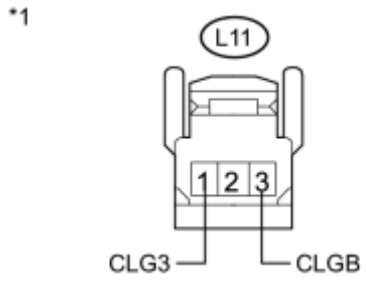
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | INSPECT INDOOR ELECTRICAL KEY OSCILLATOR (for Front Floor (INPUT)) |

(a) Reconnect the certification ECU (smart key ECU assembly) connector.




(b) Check for pulses according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L11-1 (CLG3) - L11-3 (CLGB) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| L11-1 (CLG3) - L11-3 (CLGB) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Front Floor)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

▼

| | |
|---|---|
| 7. | REPLACE INDOOR ELECTRICAL KEY OSCILLATOR (for Front Floor) |

(a) Replace the indoor electrical key oscillator (for front floor INFO.

NEXT

▼

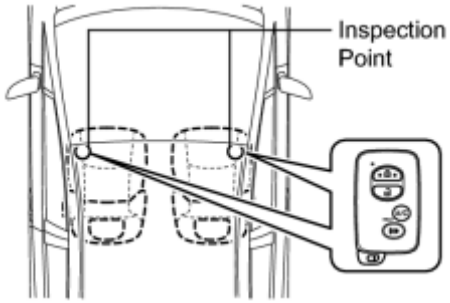
| | |
|---|---|
| 8. | PERFORM KEY DIAGNOSTIC MODE INSPECTION (for Front Floor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Front Room.




(e) When the electrical key transmitter is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

OK:

Wireless door lock buzzer sounds.

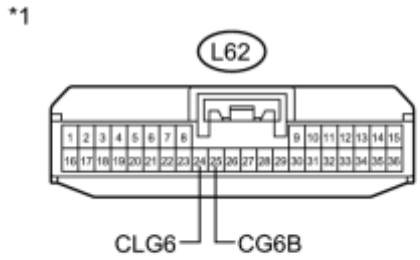
- Place the key on the driver or front passenger seat cushion.
- If the buzzer sounds, it can be determined that the indoor electrical key oscillators are operating normally.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

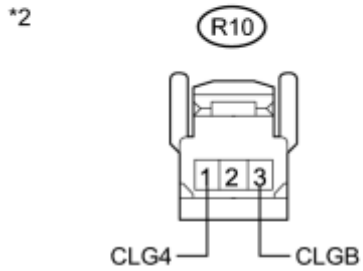
OK ▶ **END (INDOOR ELECTRICAL KEY OSCILLATOR WAS DEFECTIVE)**

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the indoor electrical key oscillator (for center floor) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-24 (CLG6) - R10-1 (CLG4) | Always | Below 1 Ω |
| L62-25 (CG6B) - R10-3 (CLGB) | Always | Below 1 Ω |
| L62-24 (CLG6) - Body ground | Always | 10 kΩ or higher |
| L62-25 (CG6B) - Body ground | Always | 10 kΩ or higher |
| R10-1 (CLG4) - Body ground | Always | 10 kΩ or higher |
| R10-3 (CLGB) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Center Floor)) |

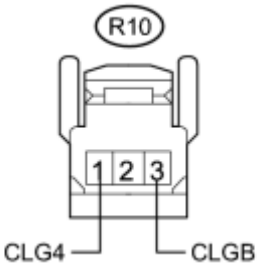
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 10. | INSPECT INDOOR ELECTRICAL KEY OSCILLATOR (for Center Floor (INPUT)) |

*1




(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Check for pulses according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R10-1 (CLG4) - R10-3 (CLGB) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| R10-1 (CLG4) - R10-3 (CLGB) | • Power switch off<br>• All doors closed | Pulse generation |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| | • Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Center Floor)) |

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

▼

| 11. | REPLACE INDOOR ELECTRICAL KEY OSCILLATOR (for Center Floor) |
|---|---|

(a) Replace the indoor electrical key oscillator (for center floor) INFO.

NEXT

▼

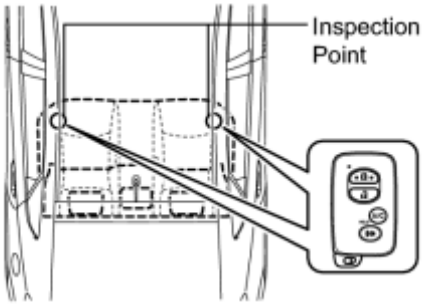
| 12. | PERFORM KEY DIAGNOSTIC MODE INSPECTION (for Center Floor) |
|---|---|

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Rear Room.




(e) When the electrical key transmitter is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

OK:

Wireless door lock buzzer sounds.

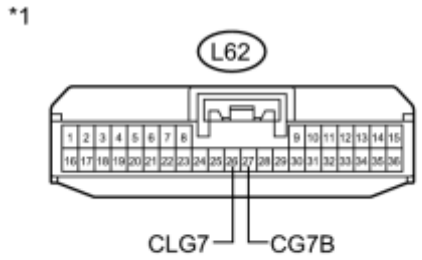
- Place the key on the driver or front passenger seat cushion.
- If the buzzer sounds, it can be determined that the indoor electrical key oscillators are operating normally.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

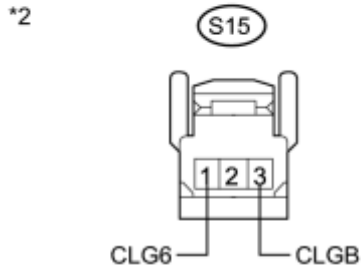
OK **END (INDOOR ELECTRICAL KEY OSCILLATOR WAS DEFECTIVE)**

| | |
|---|---|
| 13. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - INDOOR ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the indoor electrical key oscillator (for rear floor) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-26 (CLG7) - S15-1 (CLG6) | Always | Below 1 Ω |
| L62-27 (CG7B) - S15-3 (CLGB) | Always | Below 1 Ω |
| L62-26 (CLG7) - Body ground | Always | 10 kΩ or higher |
| L62-27 (CG7B) - Body ground | Always | 10 kΩ or higher |
| S15-1 (CLG6) - Body ground | Always | 10 kΩ or higher |
| S15-3 (CLGB) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

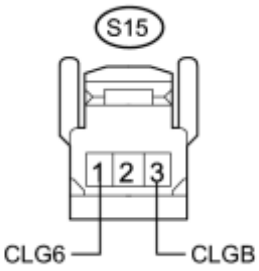
| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Rear Floor)) |

NG REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

| | |
|---|---|
| 14. | INSPECT INDOOR ELECTRICAL KEY OSCILLATOR (for Rear Floor (INPUT)) |

*1




(a) Reconnect the certification ECU (smart key ECU assembly) connector.

(b) Check for pulses according to the value(s) in the table below.

Standard:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| S15-1 (CLG6) - S15-3 (CLGB) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) not touched | No pulse generation |
| S15-1 (CLG6) - S15-3 (CLGB) | • Power switch off<br>• All doors closed<br>• Key not in cabin<br>• Door outside handle assembly (lock sensor) touched | Pulse generation |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Indoor Electrical Key Oscillator (for Rear Floor)) |

NG REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK

| | |
|---|---|
| 15. | REPLACE INDOOR ELECTRICAL KEY OSCILLATOR (for Rear Floor) |

(a) Replace the indoor electrical key oscillator (for rear floor) INFO.

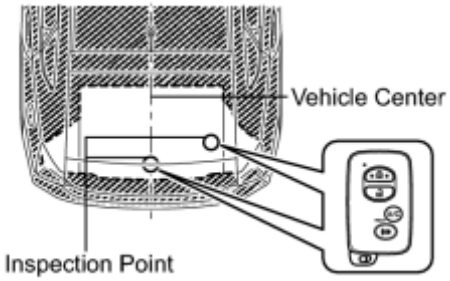
| | |
|---|---|
| 16. | PERFORM KEY DIAGNOSTIC MODE INSPECTION (for Rear Floor) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Back Door (inside).




(e) When the electrical key transmitter is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

OK:

Wireless door lock buzzer sounds.

- Place the key on the driver or front passenger seat cushion.
- If the buzzer sounds, it can be determined that the indoor electrical key oscillators are operating normally.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

OK ▶ **END (INDOOR ELECTRICAL KEY OSCILLATOR WAS DEFECTIVE)**

| Entry Interior Alarm does not Sound |
|---|

# DESCRIPTION

The smart key system uses the combination meter buzzer to perform various vehicle interior warnings. When the conditions for each warning are met, the certification ECU (smart key ECU assembly) sends a buzzer signal to the combination meter assembly, and the combination meter buzzer sounds.

# INSPECTION PROCEDURE

NOTICE:

The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK COMBINATION METER ASSEMBLY (OPERATION) |

(a) When the power switch is on (IG) and the shift lever is in R, check that the combination meter buzzer sounds.

OK:

Combination meter buzzer sounds.

NG ▶ GO TO METER / GAUGE SYSTEM (Proceed to Problem Symptoms Table)

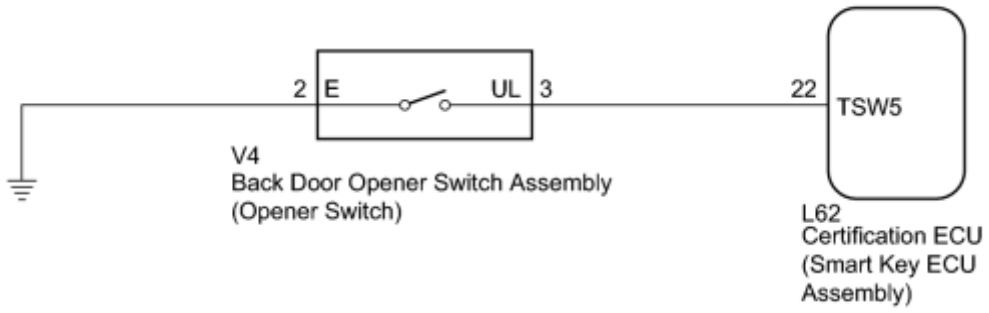
OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

Back Door Entry Unlock Function does not Operate

# DESCRIPTION

If the entry back door open function does not operate but the back door entry lock function operates, the communication between the vehicle and key is normal. As a faulty part, the back door open switch circuit (from the back door opener switch assembly (opener switch) to the certification ECU (smart key ECU assembly)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | READ VALUE USING TECHSTREAM (ENTRY BACK DOOR OPEN FUNCTION) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

*Smart Key (Certification ECU (Smart Key ECU Assembly))*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| B-Dr Opening Operation | Back door opening Operation / Long, Twice, OFF | Customization status displayed | - |

Result:

| Result | Proceed to |
|---|---|
| Customize setting is Long or Twice. | A |
| Customize setting is OFF. | B |

B → PERFORM CUSTOMIZE SETTING (Proceed to Customize Parameters)

A

▼

| | |
|---|---|
| 2. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG → GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

▼

| | |
|---|---|
| 3. | PERFORM ACTIVE TEST USING TECHSTREAM |

(a) Enter the following menus: Body Electrical / Main Body / Active Test.

(b) Perform the Active Test according to the display on the Techstream.

*Main Body (Main Body ECU (Multiplex Network Body ECU))*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Trunk and Back-Door Open | Operate back door lock motor | ON or OFF | - |

OK:

The back door lock assembly unlatches when ON is selected.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM (BACK DOOR OPENER SWITCH) |

(a) Enter the following menus: Body Electrical / Smart Key / Data List.

(b) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Tr/B-Door Unlock SW | Back door opener switch assembly (opener switch) / ON or OFF | ON: Back door opener switch assembly (opener switch) pushed<br><br>OFF: Back door opener switch assembly (opener switch) not pushed | - |

OK:

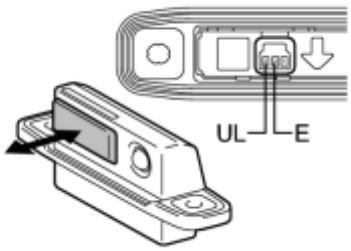
On the Techstream screen, the display changes between ON and OFF as shown in the chart above.

NG INSPECT BACK DOOR OPENER SWITCH ASSEMBLY

OK **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 5. | INSPECT BACK DOOR OPENER SWITCH ASSEMBLY |

*1




(a) Remove the back door opener switch assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Position | Specified Condition |
|---|---|---|
| 2 (E) - 3 (UL) | Back door opener switch assembly (opener switch) not pushed (OFF) | 10 kΩ or higher |
| 2 (E) - 3 (UL) | Back door opener switch assembly (opener switch) pushed (ON) | Below 1 Ω |

*Text in Illustration*

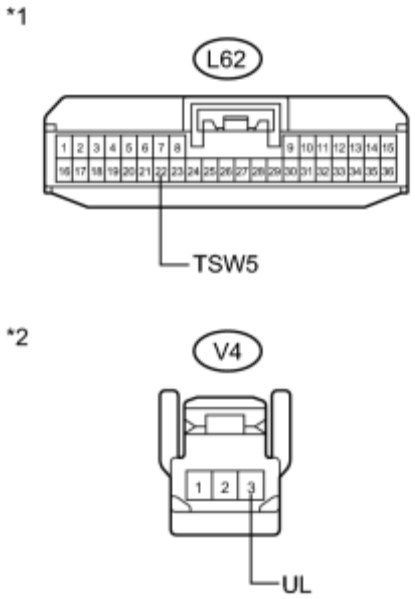
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Back Door Opener Switch Assembly) |

NG ▶ REPLACE BACK DOOR OPENER SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BACK DOOR OPENER SWITCH) |




(a) Disconnect the certification ECU (smart key ECU Assembly) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-22 (TSW5) - V4-3 (UL) | Always | Below 1 Ω |
| L62-22 (TSW5) - Body ground | Always | 10 kΩ or higher |
| V4-3 (UL) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector |

| | |
|---|---|
| | (to Back Door Opener Switch Assembly) |

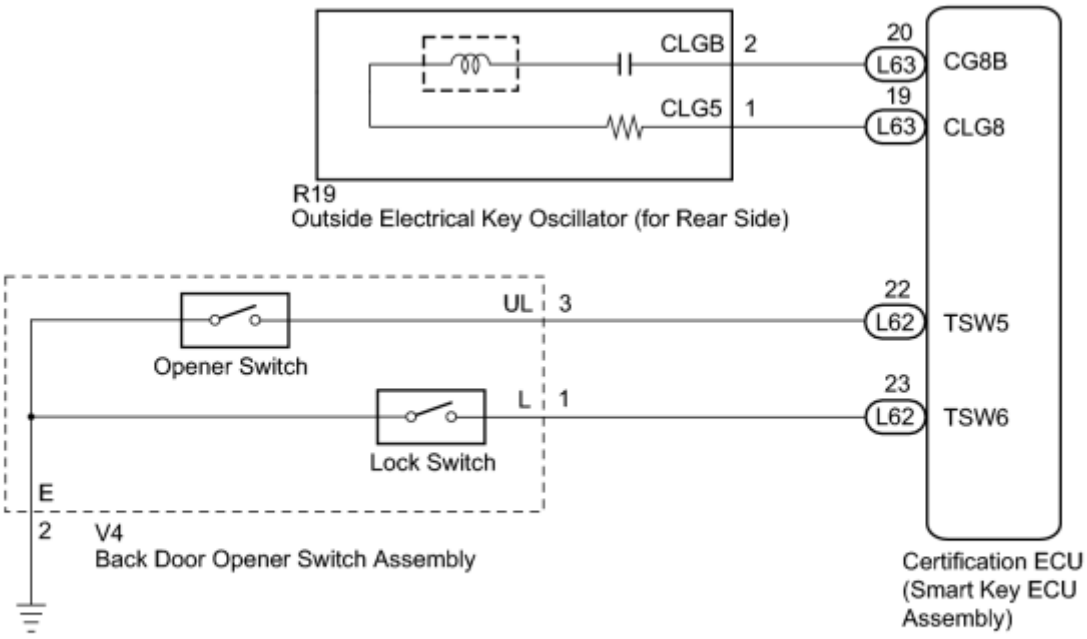
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

# DESCRIPTION

When the back door entry lock and unlock functions do not operate, one of the following may be malfunctioning: 1) power door lock control system; 2) outside electrical key oscillator (for rear side); 3) certification ECU (smart key ECU assembly), or 4) back door opener switch assembly.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK POWER DOOR LOCK OPERATION |

(a) When the door control switch o[INFO]master switch assembly is operated, check that the doors unlock and lock according to switch operation .

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (BACK DOOR OPENER SWITCH) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Display | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Tr/B-Door Lock SW | Back door opener switch assembly (lock switch) / ON or OFF | ON: Back door opener switch assembly (lock switch) pushed<br><br>OFF: Back door opener switch assembly (lock switch) not pushed | - |
| Tr/B-Door Unlock SW | Back door opener switch assembly (opener switch) / ON or OFF | ON: Back door opener switch assembly (opener switch) pushed<br><br>OFF: Back door opener switch assembly (opener switch) not pushed | - |

OK:

On the Techstream screen, the display changes between ON and OFF as shown in the chart above.

NG CHECK HARNESS AND CONNECTOR (BACK DOOR OPENER SWITCH - BODY GROUND)

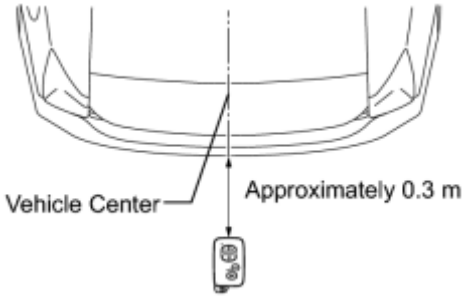
OK

| | |
|---|---|
| 3. | CHECK WAVE ENVIRONMENT |

(a) Bring the key near the outside electrical key oscillator (for rear side), and perform an entry back door open and entry lock functions check.

NOTICE:

If the key is brought within 0.2 m (0.656 ft.) of the rear bumper, communication is not possible.




- When pressing the lock switch and pressing the opener switch, hold the electrical key transmitter about 1 m (3.28 ft.) above the ground and about 0.3 m (0.984 ft.) away from the vehicle as shown in the illustration.
- When the key is brought near the outside electrical key oscillator (for rear side), the possibility of wave interference decreases, and it can be determined if wave interference is causing the problem symptom.
- If the operation is normal, the possibility of wave interference is high. Also, added vehicle components may cause wave interference. If installed, remove them and perform the operation.

OK:

Entry functions operate normally.

NG ▶ PERFORM KEY DIAGNOSTIC MODE INSPECTION

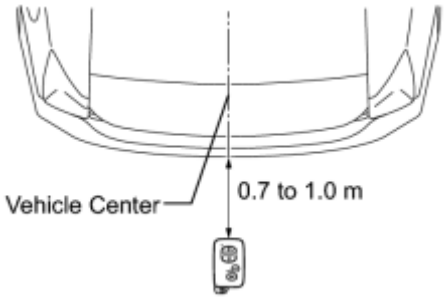
OK ▶ **AFFECTED BY WAVE INTERFERENCE**

| | |
|---|---|
| 4. | PERFORM KEY DIAGNOSTIC MODE INSPECTION |

(a) Diagnostic mode inspection (outside electrical key oscillator (for rear side))

(1) Connect the Techstream to the DLC3.

(2) Turn the power switch on (IG).




(3) Turn the Techstream on.

(4) Enter the following menus: Body Electrical / Smart Key / Utility / Key Communication Check / Overhead + Back Door.

(5) When the electrical key transmitter is in the position shown in the illustration, check that the wireless door lock buzzer sounds.

- Hold the electrical key transmitter at the same height as the rear bumper upper surface and align with the center of the rear of the vehicle (0.7 to 1.0 m (2.30 to 3.28 ft.)). Make sure that the direction of the key is as shown in the illustration.
- If the buzzer sounds, it can be determined that the outside electrical key oscillator (for rear side) is operating normally.

OK:

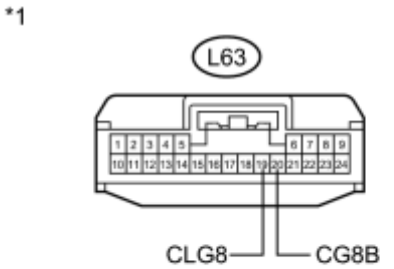
Wireless door lock buzzer sounds.

NG ▶ CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - OUTSIDE ELECTRICAL KEY OSCILLATOR)

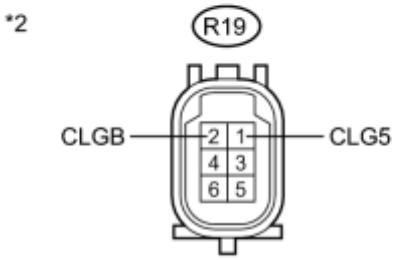
OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - OUTSIDE ELECTRICAL KEY OSCILLATOR) |

(a) Disconnect the certification ECU (smart key ECU assembly) connector.




(b) Disconnect the outside electrical key oscillator (for rear side) connector.




(c) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L63-19 (CLG8) - R19-1 (CLG5) | Always | Below 1 Ω |
| L63-20 (CG8B) - R19-2 (CLGB) | Always | Below 1 Ω |
| L63-19 (CLG8) - Body ground | Always | 10 kΩ or higher |
| L63-20 (CG8B) - Body ground | Always | 10 kΩ or higher |
| R19-1 (CLG5) - Body ground | Always | 10 kΩ or higher |
| R19-2 (CLGB) - Body ground | Always | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Front view of wire harness connector |

| | |
|---|---|
| | (to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Outside Electrical Key Oscillator (for Rear Side)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

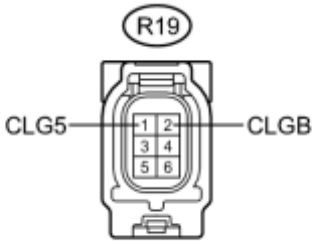
▼

| | |
|---|---|
| 6. | INSPECT OUTSIDE ELECTRICAL KEY OSCILLATOR (for Rear Side) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

*1




| Tester Connection | Condition | Specified Condition |
|---|---|---|
| R19-1 (CLG5) - R19-2 (CLGB) | Always | Below 1 Ω |

## Text in Illustration

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Outside Electrical Key Oscillator (for Rear Side)) |

NG ▶ REPLACE OUTSIDE ELECTRICAL KEY OSCILLATOR (for Rear Side)

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (BACK DOOR OPENER SWITCH - BODY GROUND) |

*1




(a) Disconnect the back door opener switch assembly connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| V4-2 (E) - Body ground | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Back Door Opener Switch Assembly)) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

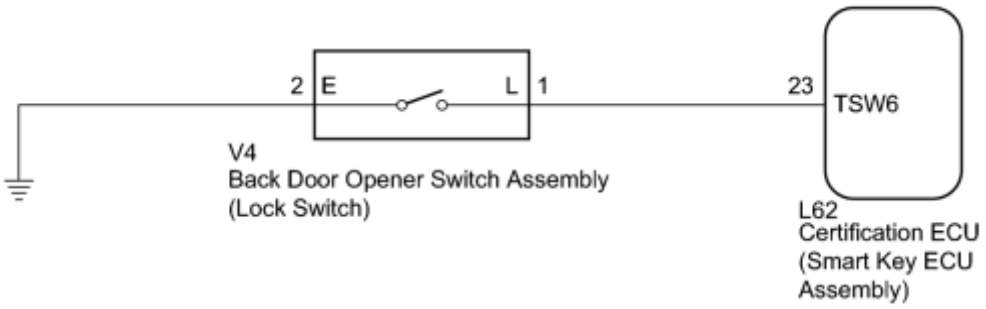
OK ▶ **REPLACE BACK DOOR OPENER SWITCH ASSEMBLY**

| Back Door Entry Lock Function does not Operate |
|---|

# DESCRIPTION

If the back door entry lock function does not operate but the back door open function operates, the communication between the vehicle and key is normal. As a faulty part, the entry lock switch circuit (from the back door opener switch assembly (lock switch) to the certification ECU (smart key ECU assembly)) is suspected.

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- The smart key system (for entry function) uses a LIN communication system and CAN communication system. Inspect the communication function by following How to Proceed with Troubleshooting INFO. Troubleshoot the smart key system (for entry function) after confirming that the communication system is functioning properly.
- Confirm that another key is not in the cabin.

# PROCEDURE

| 1. | CHECK POWER DOOR LOCK OPERATION |
|---|---|

(a) When the door control switch on the master switch assembly is operated, check that the doors unlock and lock according to switch operation INFO.

OK:

Door locks operate normally.

NG GO TO POWER DOOR LOCK CONTROL SYSTEM (Proceed to Problem Symptoms Table)

OK

| | |
|---|---|
| 2. | READ VALUE USING TECHSTREAM (BACK DOOR OPENER SWITCH) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Smart Key / Data List.

(e) Read the Data List according to the display on the Techstream.

***Smart Key (Certification ECU (Smart Key ECU Assembly))***

| Tester Display | Measurement Item/Display | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Tr/B-Door Lock SW | Back door opener switch assembly (lock switch) / ON or OFF | ON: Back door opener switch assembly (lock switch) pushed<br><br>OFF: Back door opener switch assembly (lock switch) not pushed | - |

OK:

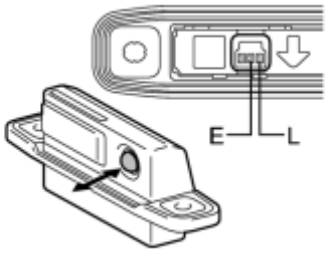
On the Techstream screen, the display changes between ON and OFF as shown in the chart above.

NG INSPECT BACK DOOR OPENER SWITCH ASSEMBLY

OK **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

| | |
|---|---|
| 3. | INSPECT BACK DOOR OPENER SWITCH ASSEMBLY |

*1




(a) Remove the back door opener switch assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Switch Position | Specified Condition |
|---|---|---|
| 1 (L) - 2 (E) | Back door opener switch assembly (lock switch) not pushed (OFF) | 10 kΩ or higher |
| 1 (L) - 2 (E) | Back door opener switch assembly (lock switch) pushed (ON) | Below 1 Ω |

***Text in Illustration***

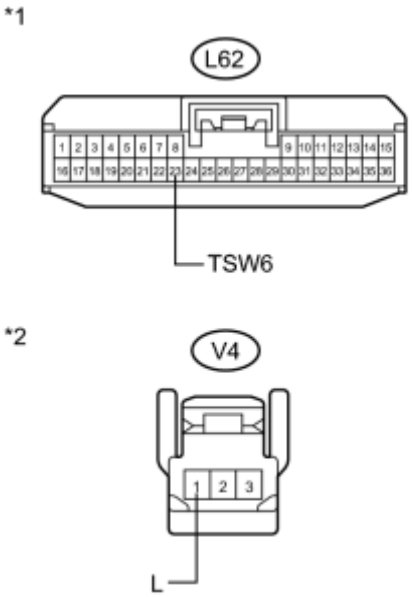
| | |
|---|---|
| *1 | Component without harness connected<br><br>(Back Door Opener Switch Assembly) |

NG ▶ REPLACE BACK DOOR OPENER SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (CERTIFICATION ECU - BACK DOOR OPENER SWITCH) |




(a) Disconnect the certification ECU (smart key ECU assembly) connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L62-23 (TSW6) - V4-1 (L) | Always | Below 1 Ω |
| L62-23 (TSW6) - Body ground | Always | 10 kΩ or higher |
| V4-1 (L) - Body ground | Always | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Front view of wire harness connector<br><br>(to Certification ECU (Smart Key ECU Assembly)) |
| *2 | Front view of wire harness connector<br><br>(to Back Door Opener Switch Assembly) |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK ▶ **REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)**

# PRECAUTION

1. WHEN DISCONNECTING CABLE FROM NEGATIVE AUXILIARY BATTERY TERMINAL

NOTICE:

When disconnecting the cable from the negative (-) auxiliary battery terminal, initialize the following system after the cable is reconnected.

| System Name | See Procedure |
|---|---|
| Advanced Parking Guide System | INFO |

(a) The power source mode (off, on (ACC), on (IG)) is always retained in memory by the vehicle. If the auxiliary battery is disconnected, the power source mode that was present before disconnection will be restored after the auxiliary battery is reconnected. Be sure to turn the power switch off (change the power source mode to off) before disconnecting the cable from the negative (-) auxiliary battery terminal. Be careful if the power source mode of a vehicle with a discharged auxiliary battery is not known.

(b) After the cable is reconnected to the negative (-) auxiliary battery terminal, the hybrid control system may not start on the first attempt. This is not a malfunction. The hybrid control system will start normally for subsequent attempts.

HINT:

In this chapter, the expression "power source" has been used in some locations to allow precise explanations. The power source mode is also expressed using conventional expressions such as "power switch off", "power switch on (ACC)" and "power switch on (IG)".

2. PRECAUTIONS FOR PUSH-BUTTON START FUNCTION

(a) Before starting hybrid control system, firmly depress the brake pedal until the indicator in the power switch turns green.

(b) The smart key system, wireless door lock control system and engine immobiliser system may not operate normally, or the size of the operation area may decrease in the following situations:

(1) When the smart key battery is depleted.

(2) When any facility that generates strong radio waves or electrical noise such as a TV tower, power plant, gas station, broadcast station, large video-billboard or airport are located near the inspection site.

(3) When the key is located near a wireless device such as a radio, cellular phone or cordless telephone.

(4) When the smart key is in contact with or covered with a metal object similar to the following:

- Metal or aluminum plated card
- Aluminum film from a cigarette box
- Metallic wallet or bag
- Coins
- Heating pad

- Media such as CDs or DVDs

(5) When a wireless remote is operated near the vehicle.

(6) When the key is carried with following items:

- Electronic key or wireless remote from another vehicle
- PC or similar handheld device
- Digital audio player
- Portable game device

(7) When a metallic film is applied to the rear glass.

3. WHEN KEY BATTERY IS LOW

(a) When the key battery is depleted, the hybrid control system cannot be started using the smart function. For how to start the hybrid control system when the key battery is depleted, see Description INFO.

(b) If the electrical key is held near the power switch to start the hybrid control system when the electrical key battery is depleted, the following warnings will sound:

(1) Driver door open → closed

- An exit warning will sound if R, N, D or B is selected and the power source (power switch) is in a mode other than off.

- An exit warning will sound if park (P) is selected and the power source is in a mode other than off.

(2) Doors other than the driver door open → closed

- A warning will sound to indicate that the electrical key has been taken out of the vehicle.

These warnings will sound because it is not possible for the vehicle to determine if the key is present in the vehicle (due to the depleted key battery). These warnings do not indicate system malfunctions.

4. EMERGENCY HYBRID CONTROL SYSTEM STOP CONTROL

(a) If it is necessary to stop the hybrid control system in an emergency while driving the vehicle, push and hold the power switch for more than 3 seconds.

While driving, the power switch should only be operated in the event of on emergency.

NOTICE:

If the hybrid control system stops while the vehicle is being driven, this could lead to an accident.

5. EMERGENCY HYBRID CONTROL SYSTEM START CONTROL

(a) If there is a malfunction in the stop light switch or STOP fuse, their signals may not be correctly transmitted to the power management control ECU. This may result in the hybrid control system not starting even if the power switch is pressed while the brake pedal is depressed and park (P) is selected.

To activate the hybrid control system:

(1) Push the P position switch.

(2) Parking brake pedal is depressed.

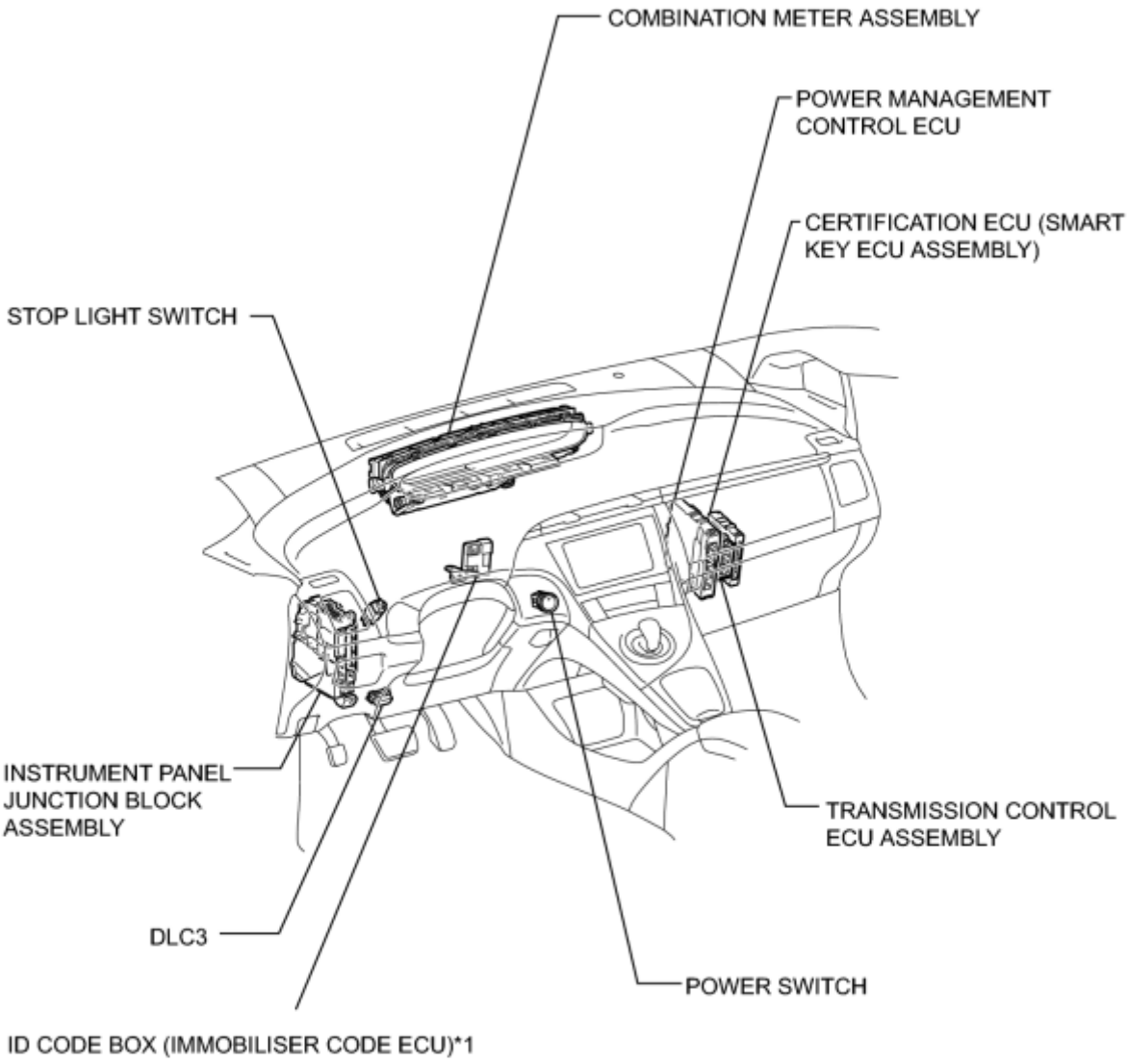
(3) Turn the power switch from off to on (ACC).

(4) Brake pedal is depressed.

(5) Press and hold the power switch for 15 seconds or more.

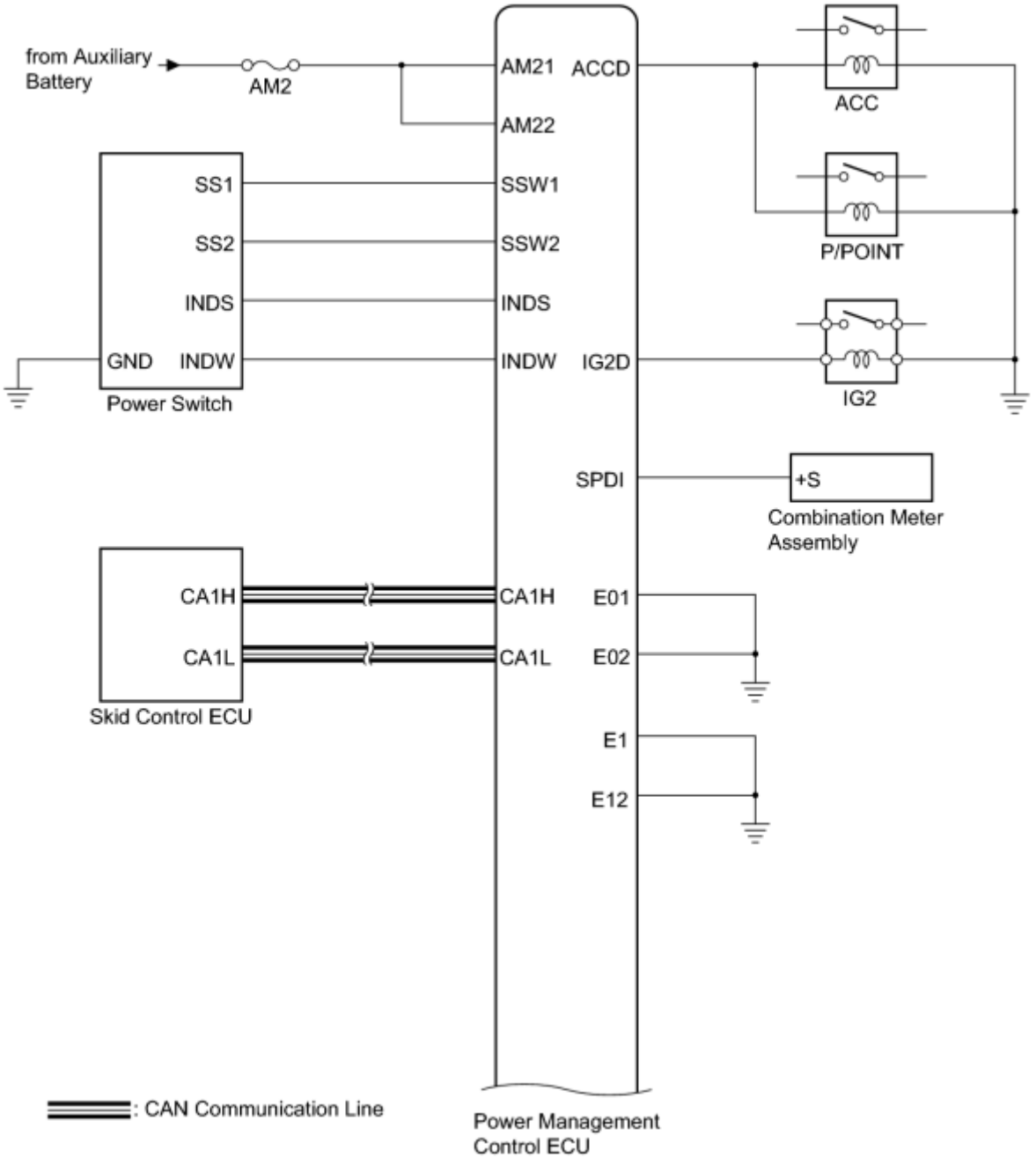
# PARTS LOCATION

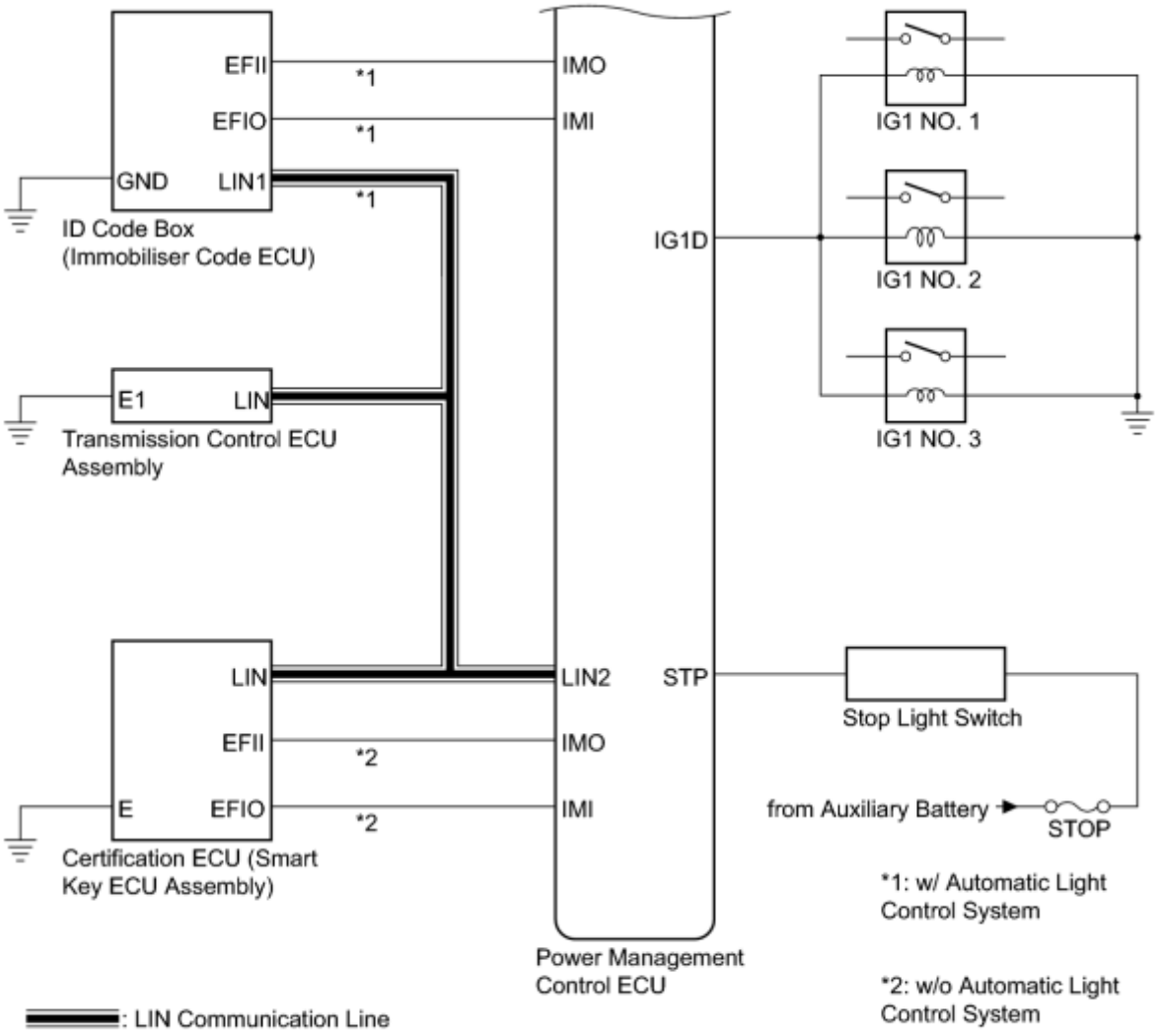
# ILLUSTRATION



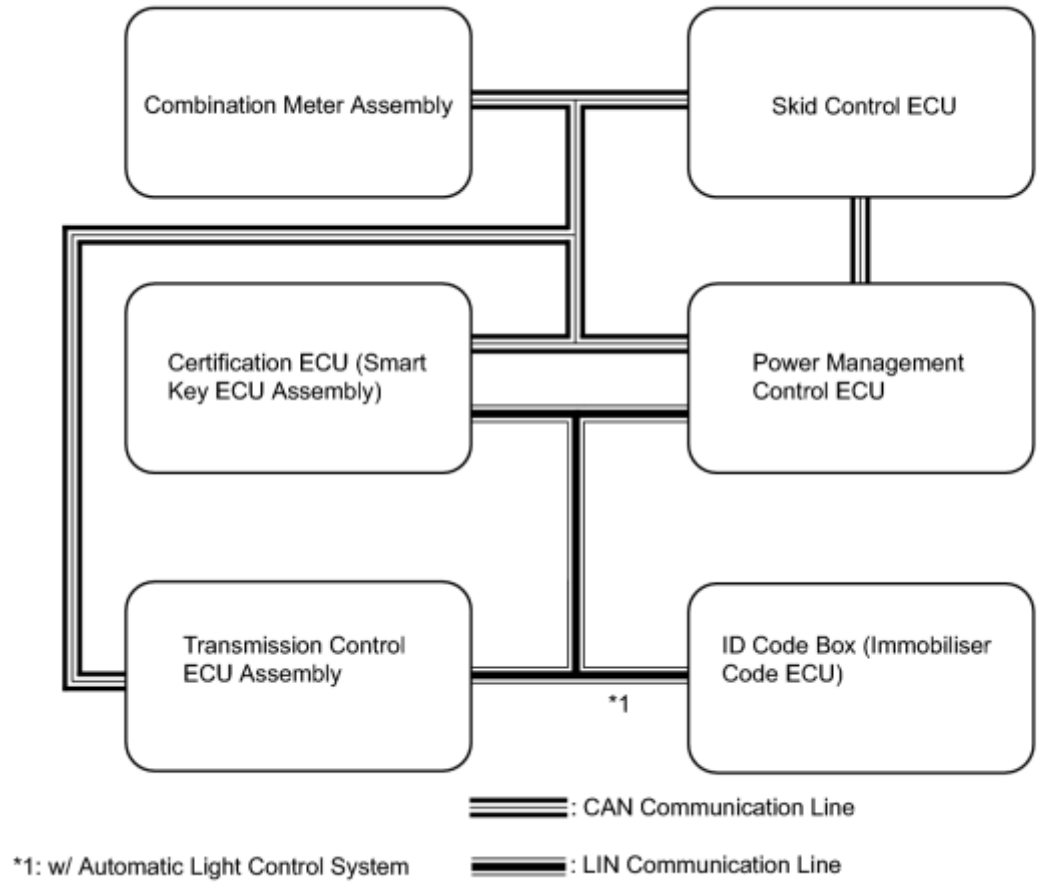

*1: w/ Automatic Light Control System

# SYSTEM DIAGRAM




EFII
EFIO
GND
LIN1
ID Code Box
(Immobiliser Code ECU)
*1
*1
*1
IMO
IMI
IG1D
IG1 NO. 1
IG1 NO. 2
IG1 NO. 3
E1
LIN
Transmission Control ECU
Assembly
LIN
EFII
E
EFIO
Certification ECU (Smart
Key ECU Assembly)
*2
*2
LIN2
STP
Stop Light Switch
from Auxiliary Battery
STOP
Power Management
Control ECU
*1: w/ Automatic Light
Control System
*2: w/o Automatic Light
Control System
: LIN Communication Line

H




### *Communication Table*

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Communication Method |
|---|---|---|---|
| Combination meter assembly | Power management control ECU | Vehicle speed signal | Local communication |
| Skid control ECU | Power management control ECU | Stop light switch signal | CAN/Local communication |
| Main body ECU | Power management control ECU | Driver seat courtesy switch signal | CAN |
| Main body ECU | Power management control ECU | Parking brake switch signal | CAN |
| Skid control ECU | Power management control ECU | Vehicle speed signal | CAN |
| Transmission control ECU | Power management control ECU | Transmission control ECU trouble condition signal | CAN/Local communication |
| Transmission control ECU | Power management control ECU | P position state signal | CAN/Local communication |
| Power management control | Combination meter | Message request signal for push | CAN |

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Communication Method |
|---|---|---|---|
| ECU | assembly | start | |
| Power management control ECU | Certification ECU (smart key ECU assembly) | P position state signal | LIN |
| Power management control ECU | Certification ECU (smart key ECU assembly) | Shift position P signal | LIN |
| Power management control ECU | Certification ECU (smart key ECU assembly) | ID code certification result request signal | LIN |
| Power management control ECU | Certification ECU (smart key ECU assembly) | Power supply ON operation condition signal | LIN |
| Power management control ECU | Certification ECU (smart key ECU assembly) | Hybrid control system start operation condition signal*2 | LIN |
| Power management control ECU | Certification ECU (smart key ECU assembly) | ACC relay drive condition signal | LIN |
| Power management control ECU | Certification ECU (smart key ECU assembly) | IG relay drive condition signal | LIN |
| Transmission control ECU | Certification ECU (smart key ECU assembly) | Lock determination signal | LIN |
| Transmission control ECU | Certification ECU (smart key ECU assembly) | Unlock determination signal | LIN |
| Transmission control ECU | Certification ECU (smart key ECU assembly) | L code certification condition signal | LIN |
| Certification ECU (smart key ECU assembly) | ID code box (immobiliser code ECU) | Hybrid control system start operation condition signal*1 | LIN |
| Certification ECU (smart key ECU assembly) | ID code box (immobiliser code ECU) | 3-bit code transmission request signal*1 | LIN |
| Certification ECU (smart key ECU assembly) | ID code box (immobiliser code ECU) | S code certification condition signal*1 | LIN |
| Certification ECU (smart key ECU assembly) | Power management control ECU | Smart key system effective state signal | LIN |
| Certification ECU (smart key ECU assembly) | Power management control ECU | Key certification effective state signal | LIN |
| Certification ECU (smart key ECU assembly) | Power management control ECU | Engine immobiliser unset signal | LIN |
| ID code Box (immobiliser code ECU) | Certification ECU (smart key ECU assembly) | 3-bit code transmission request reception condition signal | LIN |
| ID code Box (immobiliser code ECU) | Certification ECU (smart key ECU assembly) | S code certification result signal | LIN |
| ID code Box (immobiliser code ECU) | Certification ECU (smart key ECU assembly) | L code certification result signal | LIN |
| ID code Box (immobiliser code ECU) | Certification ECU (smart key ECU assembly) | S code registration condition signal | LIN |

| Transmitting ECU (Transmitter) | Receiving ECU (Receiver) | Signal | Communication Method |
|---|---|---|---|
| ID code Box (immobiliser code ECU) | Certification ECU (smart key ECU assembly) | L code registration condition signal | LIN |

- *1: w/ Automatic Light Control System
- *2: w/o Automatic Light Control System

# SYSTEM DESCRIPTION

1. PUSH-BUTTON START DESCRIPTION

(a) The push-button start uses a push-type power switch, which the driver can operate by merely carrying the electrical key. This system consists primarily of the power management control ECU, power switch, transmission control ECU assembly, electrical key, ACC relay, P/POINT relay, IG1 NO. 1 relay, IG1 NO. 2 relay, IG1 NO. 3 relay, IG2 relay, ID code box (immobiliser code ECU) and certification ECU (smart key ECU assembly). The power management control ECU controls the system. This function operates in cooperation with the smart key system.

HINT:

In this chapter, the expression "power source" has been used in some locations to allow precise explanations. The power source mode is also expressed using conventional expressions such as "power switch off", "power switch on (ACC)" and "power switch on (IG)".

2. FUNCTION OF MAIN COMPONENTS

| Component | Function |
|---|---|
| Power Switch<br>• Transponder Key Amplifier | • Transmits power switch signal to power management control ECU.<br>• Informs driver of power source mode or system abnormality with illumination stage of indicator light.<br>• Receives ID code and transmits it to certification ECU (smart key ECU assembly) when key battery is low. |
| Electrical Key | Receives signals from oscillators and returns ID code to entry door control receiver. |
| Electrical Key Oscillator<br>• Console and Rear Seat | Receives request signals from certification ECU (smart key ECU assembly) and forms detection area in vehicle. |
| Power Management Control ECU | • Changes power source mode in 4 stages (off, on (ACC), on (IG), on (READY) in accordance with shift position and state of stop light switch.<br>• Controls push-button start function in accordance with signals received from switches and each ECU.<br>• Power management control ECU and certification ECU (smart key ECU assembly) permit starting of hybrid control system after receiving unlock signal from transmission control ECU. |
| Certification ECU (Smart Key ECU Assembly) | Certifies ID code received from entry door control receiver and transmits the certification results to the ID code box (immobiliser code ECU) and transmission control ECU assembly. |
| Stop Light Switch | Outputs state of brake pedal to power management control ECU. |
| ID Code Box (Immobiliser Code ECU) | Receives gearshift control unlock or engine immobiliser unset signals from the certification ECU (smart key ECU assembly), certifies them, and transmits each unset signal to transmission control ECU assembly or power management |

| Component | Function |
|---|---|
| | control ECU. |
| Transmission Control ECU Assembly | • Transmission control ECU locks/unlocks gearshift control based on lock/unlock request signals from certification ECU (smart key ECU assembly).<br>• Detects gearshift control lock/unlock status and transmits to other ECUs.<br>• Transmission control ECU activates the shift control actuator based on signals from the power management control ECU when gearshift control is unlocked.<br>• Transmission control ECU controls the application timing of current to the parking lock motor based on signals from the rotation angle sensor. |

3. SYSTEM FUNCTION

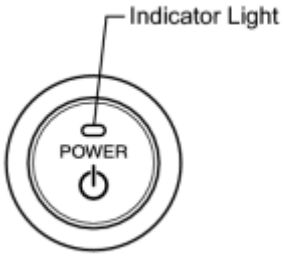
The electric controls of the push-button start function are described below:

| Control | Outline |
|---|---|
| Power switch control | When the person carrying the key enters the vehicle and the brake pedal is depressed, the power management control ECU sends the key certification request signal to the certification ECU (smart key ECU assembly).<br><br>On receiving the key certification request signal, the certification ECU (smart key ECU assembly) generates a request signal and sends it to the indoor electrical key oscillator. The indoor electrical key oscillator transmits the request signal in order to detect that the key is in the cabin.<br><br>When the key receives the request signal, it sends back the response code and ID code.<br><br>When the door control receiver assembly receives the signal from the key, it sends the ID code to the certification ECU (smart key ECU assembly). The ID code box verifies check results received from the certification ECU via LIN and sends them to the power management control ECU. Based on these results, the power management control ECU authorizes the operation of the power switch.<br><br>If the ID codes match, the certification ECU (smart key ECU assembly) sends the certification OK signal to the power management control ECU.<br><br>Upon receiving the certification OK signal, the power management control ECU illuminates the power switch indicator light, changes the power source mode and starts the hybrid control system depending on how the power switch is operated. |
| Diagnosis | When the power management control ECU detects a malfunction, the power management control ECU diagnoses and memorizes information related to the fault. |

4. CONSTRUCTION AND OPERATION

(a) Power Switch

The power switch consists of a momentary type switch, 3 color (amber,




N

green, greenish white) LEDs, and a transponder key amplifier.

- The greenish white LED is for illumination.
- The amber and green LEDs are for the indicator lights. The driver can check the present power source mode and whether the hybrid control system can start in accordance with the illumination state of the indicator light.
- When the power management control ECU detects an abnormality in the push-button start system, it makes the amber indicator light flash. If the hybrid control system stopped in this state, it may not be possible to restart it.

(b) Indicator Light Condition

# Power Switch Indicator Light Condition

| Power Source Mode/Condition | Indicator Light Condition | |
|---|---|---|
| | Brake Pedal Released | Brake Pedal Depressed, Park (P) selected |
| off | off | Turns on (Green) |
| on (ACC, IG) | Turns on (Amber) | Turns on (Green) |
| on (READY) | off | off |
| System malfunction | Flashes (Amber) for 15 sec. | Flashes (Amber) for 15 sec. |

(c) Power Management Control ECU

The power management control ECU consists of the IG1 NO. 1, IG1 NO. 2, IG1 NO. 3, IG2, ACC, P/POINT relay actuation circuits and CPU.

HINT:

Before removing the auxiliary battery, make sure to turn the power switch off. The power management control ECU constantly stores the present power source mode in its memory. Therefore, if the power supply for the power management control ECU is interrupted by disconnecting the auxiliary battery, the power management control ECU restores the power source mode after the auxiliary battery is reconnected. For this reason, if the auxiliary battery is disconnected when the power switch is other than off, the power source mode will be restored to the vehicle at the same time the power source mode is restored to the power management control ECU (by reconnecting the auxiliary battery).

5. PUSH-BUTTON START FUNCTION OPERATION

(a) This system has different power source mode patterns depending on the brake pedal condition and shift lever position.

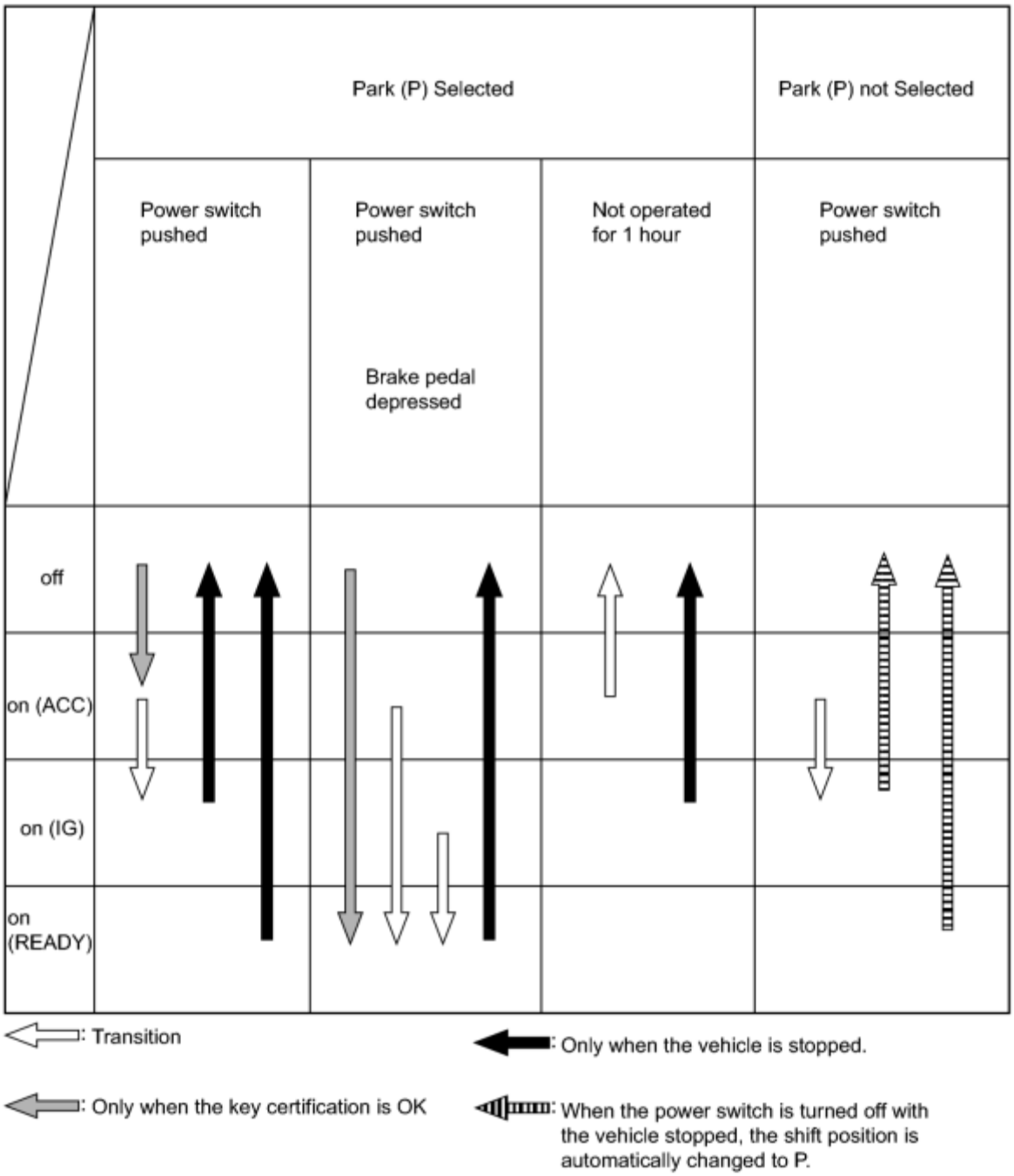
| Brake Pedal | Shift Lever | Power Source Mode Pattern |
|---|---|---|
| Depressed | P | When the power switch is pushed once.<br>• off → on (READY) |
| Not depressed | P | Each time the power switch is pushed.<br>• off → on (ACC) → on (IG) → off |
| | Except P | Each time the power switch is pushed.<br>• on (ACC) → on (IG) → off |
| - | P | When the power switch is pushed in the on (READY) condition.<br>• on (READY) → off |
| - | Except P | When the power switch is pushed in the on (READY) condition.<br>• on (READY) → off |

When the key battery is low, the push-button start function can be operated by holding the key against the power switch.

- After approximately 1 hour has elapsed with the power switch on (ACC) or on (IG) and park (P) selected, the power management control ECU will automatically cut the power supply (the power source mode will change to off).
- The illustration below shows the transition of power source modes.

  Transition of power source modes:

Transition of Power Source Modes:




HINT:

While the vehicle is being driven normally, operation of the power switch is disabled. However, if the hybrid control system must be stopped in an emergency while the vehicle is being driven, pressing the power switch for 3 seconds or more stops the hybrid control system. The power source mode will change from on (READY) to on (ACC).

6. WHEN KEY BATTERY IS LOW



(a) To operate the push-button start function when the key battery is low, hold the key close to the power switch with the brake pedal depressed.

(b) The power management control ECU transmits a key verification request signal to the certification ECU (smart key ECU assembly) when it receives the stop light switch signal.

(c) The certification ECU (smart key ECU assembly) does not receive an ID code response from the entry door control receiver, so it actuates the transponder key amplifier built into the power switch.

(d) The transponder key amplifier outputs an engine immobiliser radio wave to the key.

(e) The key receives the radio wave, and returns a radio wave response to the transponder key amplifier.

(f) The transponder key amplifier combines the key ID codes with the radio wave response, and transmits it to the certification ECU (smart key ECU assembly).

(g) The certification ECU (smart key ECU assembly) judges and verifies the ID code, and transmits a key verification OK signal to the power management control ECU. The buzzer in the combination meter sounds at the same time.

(h) After the buzzer sounds, if the power switch is pressed within 10 seconds with the brake pedal not depressed, the power source mode changes to on (ACC) or on (IG), the same as in the normal condition.

HINT:

The key (for card type) operation inspection can performed using the same procedure as for the key (for standard type).

7. DIAGNOSIS

The power management control ECU can detect malfunctions in the push-button start function when the power source mode is on (IG).

When the ECU detects a malfunction, the amber indicator light of the power switch flashes to warn the driver. At the same time, the ECU stores a 5-digit Diagnostic Trouble Code (DTC) in its memory.

- The indicator light warning continues for 15 seconds even after the power source mode is changed to off.
- The DTC can be read by connecting the Techstream to the DLC3.
- The push-button start function cannot be operated if a malfunction occurs.

# HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use the following procedure to troubleshoot the start function.
- *: Use the Techstream.

| | |
|---|---|
| 1. | VEHICLE BROUGHT TO WORKSHOP |

NEXT

| | |
|---|---|
| 2. | CUSTOMER PROBLEM ANALYSIS CHECK |

HINT:

- In troubleshooting, confirm that the problem symptoms have been accurately identified. Preconceptions should be discarded in order to make an accurate judgment. To clearly understand what the problem symptoms are, it is extremely important to ask the customer about the problem and the conditions at the time the malfunction occurred.
- Gather as much information as possible for reference. Past problems that seem unrelated may also help in some cases.

- The following 5 items are important points in problem analysis:

| | |
|---|---|
| What | Vehicle model, system name |
| When | Date, time, occurrence frequency |
| Where | Road conditions |
| Under what conditions? | Running conditions, driving conditions, weather conditions |
| How did it happen? | Problem symptoms |

NEXT

| | |
|---|---|
| 3. | INSPECT AUXILIARY BATTERY VOLTAGE |

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the auxiliary battery before proceeding to the next step.

NEXT

| | |
|---|---|
| 4. | CHECK CAN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the CAN communication system is functioning normally INFO.

Result:

| Result | Proceed to |
|---|---|
| CAN communication DTC is not output | A |
| CAN communication DTC is output | B |

B ▶ INFO GO TO CAN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 5. | CHECK LIN COMMUNICATION SYSTEM* |

(a) Use the Techstream to check if the LIN communication system (LIN) is functioning normally INFO.

Result:

| Result | Proceed to |
|---|---|
| LIN communication DTC is not output | A |
| LIN communication DTC is output | B |

B ▶ INFO GO TO LIN COMMUNICATION SYSTEM

A ▼

| | |
|---|---|
| 6. | CHECK FOR DTC (for Entry Function)* |

(a) Check for DTC and note any codes that are output INFO.

(b) Clear the DTC.

(c) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

A ▼

| | |
|---|---|
| 7. | CHECK FOR DTC (for Start Function)* |

(a) Check for DTC and note any codes that are output INFO.

(b) Clear the DTC.

(c) Recheck for DTCs.

Result:

| Result | Proceed to |
|---|---|
| DTC is not output | A |
| DTC is output | B |

B ▶ INFO GO TO DIAGNOSTIC TROUBLE CODE CHART

A ▼

| | |
|---|---|
| 8. | INSPECT BASIC OPERATION |

(a) Check that the hybrid control system starts normally when the power switch is pushed while the brake pedal is depressed and park (P) is selected.

(b) Check that the power source mode can be changed by pushing the power switch.

HINT:

Without depressing the brake pedal, push the power switch repeatedly. The power source mode should change from off to on (ACC), to on (IG) and back to off.

With the brake pedal depressed, push the power switch. The hybrid control system should start regardless of the original power source mode.

OK:

Hybrid control system can start normally.

NEXT ▼

| | |
|---|---|
| 9. | PROBLEM SYMPTOMS TABLE |

Result:

| Result | Proceed to |
|---|---|
| Fault is not listed in Problem Symptoms Table | A |
| Fault is listed in Problem Symptoms Table | B |

B ▶ Go to step 11

A ▼

| | |
|---|---|
| 10. | OVERALL ANALYSIS AND TROUBLESHOOTING* |

(a) Terminals of ECU INFO

(b) Data List / Active Test INFO

NEXT ▼

| | |
|---|---|
| 11. | REPAIR OR REPLACE |

NEXT

| | |
|---|---|
| 12. | CONFIRMATION TEST |

NEXT **END**

# CUSTOMIZE PARAMETERS

1. CUSTOMIZING FUNCTION WITH TECHSTREAM

HINT:

The items in the table below can be customized.

NOTICE:

- When the customer requests a change in a function, first make sure that the function can be customized.
- Be sure to make a note of the current setting before customizing.
- When troubleshooting a function, first make sure that the function is set to the default setting.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Utility / Customize Setting.

(e) Select the setting by referring to the table below.

***Smart Key / Access***

| Tester Display | Default | Content | Setting |
|---|---|---|---|
| Ignition Available Area (Entry ignition available area) | All | Function to choose the available area for electrical key to start the hybrid control system. | Front or All* |

- *: Weak radio waves will still be emitted from oscillators other than the front oscillator even when the "Front" customize setting is selected.

2. CUSTOMIZING FUNCTION WITHOUT TECHSTREAM

Performing the following procedure disables the smart key system.

HINT:

To start the hybrid control system while the smart key system is disabled, follow the procedure for when the key battery is low INFO.

(a) The procedure to disable the smart key system is as follows:

HINT:

Repeating the following steps switches the smart key system status between activated and disabled.

Preconditions:

Power switch off, driver door closed and unlocked.

(1) Press the unlock switch of the key once.

(2) Open the driver door within 5 seconds after pressing the unlock switch of the key in the previous step.

(3) Repeat closing and opening of the driver door twice within 30 seconds after opening the driver door in the previous step.

(4) Press the unlock switch of the key twice within 30 seconds after the last closing of the driver door in the previous step.

(5) Close and then open the driver door within 30 seconds after pressing the unlock switch of the key twice in the previous step.

(6) Close the driver door within 5 seconds after opening the driver door in the previous step.

(7) Check that the wireless buzzer sounds once*1 or twice*2.

- *1: When the smart key system status is changed from activated to disabled.
- *2: When the smart key system status is changed from disabled to activated.

# PROBLEM SYMPTOMS TABLE

HINT:

Use the table below to help determine the cause of problem symptoms. If multiple suspected areas are listed, the potential causes of the symptoms are listed in order of probability in the "Suspected Area" column of the table. Check each symptom by checking the suspected areas in the order they are listed. Replace parts as necessary.

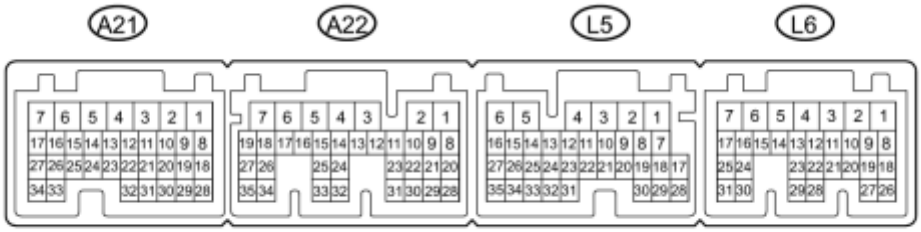
### *Smart Key System*

| Symptom | Suspected Area | See page |
|---|---|---|
| Power Source Mode does not Change to ON (IG and ACC) | Indoor electrical key oscillator*1 | INFO |
| | Smart key system (for Entry function) | INFO |
| | AM2 fuse | - |
| | Power management control ECU | - |
| | Power switch | - |
| | Wire harness or connector | - |
| Power Source Mode does not Change to ON (IG) | Indoor electrical key oscillator*1 | INFO |
| | AM2 fuse | INFO |
| | IG1 relay | - |
| | IG2 relay | - |
| | Instrument panel junction block assembly | - |
| | Engine room relay block | - |
| | Power management control ECU | - |
| | Wire harness or connector | - |
| Power Source Mode does not Change to ON (ACC) | Indoor electrical key oscillator*1 | INFO |
| | AM2 fuse | INFO |
| | ACC relay | - |
| | Instrument panel junction block assembly | - |
| | Power management control ECU | - |
| | Wire harness or connector | - |
| Power Source Mode does not Change to ON (Ready) | Indoor electrical key oscillator*1 | INFO |
| | Smart key system (for Entry function) | INFO |
| | Stop light switch | - |
| | Engine room relay block | - |
| | Engine immobiliser system | - |
| | Hybrid control system | - |
| | Transmission control ECU assembly | - |
| | Power management control ECU | - |
| | Wire harness or connector | - |

- *1: w/o Entry Function

# TERMINALS OF ECU

1. CHECK POWER MANAGEMENT CONTROL ECU




Y

(a) Disconnect the A22, L5 and L6 connectors.

(b) Measure the voltage and resistance according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A22-2 (IG2D) - Body ground | V - Body ground | IG2 relay operation signal | Always | 131 to 230 Ω |
| A22-23 (STP) - Body ground | L - Body ground | Stop light switch signal | Brake pedal depressed | 11 to 14 V |
| A22-23 (STP) - Body ground | L - Body ground | Stop light switch signal | Brake pedal released | Below 1 V |
| L5-1 (AM22) - Body ground | W - Body ground | +B power supply | Always | 9.5 to 16 V |
| L6-7 (AM21) - Body ground | W - Body ground | +B power supply | Always | 9.5 to 16 V |
| L5-6 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| L6-4 (E12) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| L6-24 (CA1L) - Body ground | W - Body ground | CAN communication line | Always | 10 kΩ or higher |
| L6-25 (CA1H) - Body ground | B - Body ground | CAN communication line | Always | 10 kΩ or higher |
| L6-17 (SSW2) - Body ground | Y - Body ground | Power switch signal | Power switch pushed | Below 1 Ω |
| L6-17 (SSW2) - Body ground | Y - Body ground | Power switch signal | Power switch not pushed | 10 kΩ or higher |
| L5-7 (SSW1) - Body ground | B - Body ground | Power switch signal | Power switch pushed | Below 1 Ω |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L5-7 (SSW1) - Body ground | B - Body ground | Power switch signal | Power switch not pushed | 10 kΩ or higher |
| L6-1 (ACCD) - Body ground | G - Body ground | ACC relay operation signal | Always | 50.625 to 61.875 Ω |
| L6-2 (IG1D) - Body ground | B - Body ground | IG1 relay operation signal | Always | 50.625 to 61.875 Ω |
| L6-11 (LIN2) - Body ground | L - Body ground | LIN communication line | Always | 10 kΩ or higher |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the A22, L5 and L6 connectors.

(d) Measure the voltage and check for pulses according to the value(s) in the table below.

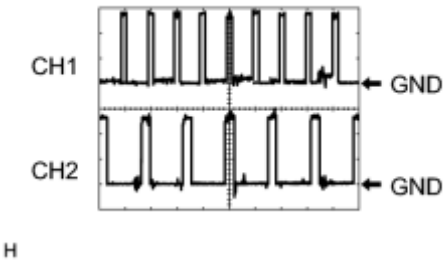
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A22-2 (IG2D) - L5-6 (E1) | V - BR | IG2 signal | Power switch on (IG) | Output voltage at terminal AM21 or AM22 is -2 V or more |
| A22-2 (IG2D) - L5-6 (E1) | V - BR | IG2 signal | Power switch on (ACC) | Below 1 V |
| L5-9 (INDW) - L5-6 (E1) | G - BR | Warning signal | Brake pedal depressed, park (P) selected, power switch on (ACC, IG) | 8 to 14 V |
| A22-22 (PCON) - L5-6 (E1) | LG - BR | P position signal | Park (P) selected | Pulse generation<br><br>(See waveform 1) |
| A22-28 (PPOS) - L5-6 (E1) | W - BR | P position signal | Park (P) selected | Pulse generation<br><br>(See waveform 1) |
| L6-17 (SSW2) - L5-6 (E1) | Y - BR | Power switch signal | Power switch not pushed | Output voltage at terminal AM21 or AM22 is -2 V or more |
| L6-17 (SSW2) - L5-6 (E1) | Y - BR | Power switch signal | Power switch pushed | Below 1 V |
| L5-7 (SSW1) - L5-6 (E1) | B - BR | Power switch signal | Power switch not pushed | Output voltage at terminal AM21 or AM22 is -2 V or more |
| L5-7 (SSW1) - L5-6 (E1) | B - BR | Power switch signal | Power switch pushed | Below 1 V |
| L6-1 (ACCD) - L5-6 (E1) | G - BR | ACC signal | Power switch on (ACC) | Output voltage at terminal AM21 or AM22 is -2 V or more |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L6-1 (ACCD) - L5-6 (E1) | G - BR | ACC signal | Power switch off | Below 1 V |
| L6-2 (IG1D) - L5-6 (E1) | B - BR | IG1 signal | Power switch on (IG) | Output voltage at terminal AM21 or AM22 is -2 V or more |
| L6-2 (IG1D) - L5-6 (E1) | B - BR | IG1 signal | Power switch on (ACC) | Below 1 V |
| L5-8 (INDS) - L5-6 (E1) | R - BR | Vehicle condition signal | Brake pedal depressed, park (P) selected | 8 to 14 V |
| L5-14 (SPDI) - L5-6 (E1) | V - BR | Vehicle speed signal | Power switch on (IG), wheel rotated slowly | Pulse generation<br><br>(See waveform 2) |
| L6-20 (IMO) - L5-6 (E1) | L - BR | Immobiliser communication status | Immobiliser communicating | Pulse generation<br><br>(See waveform 3) |
| L6-21 (IMI) - L5-6 (E1) | R - BR | Immobiliser communication status | Immobiliser communicating | Pulse generation<br><br>(See waveform 4) |

If the result is not as specified, the ECU may have a malfunction.

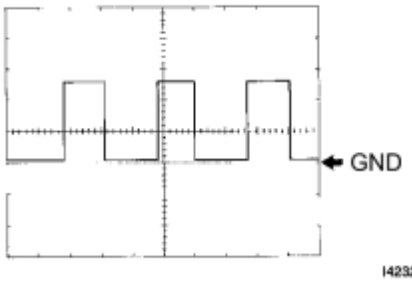
(e) Using an oscilloscope, check the signal waveform of the ECU.

(1) Waveform 1




| | |
|---|---|
| Tester Connection | CH1: A22-22 (PCON) - L5-6 (E1)<br><br>CH2: A22-28 (PPOS) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 20 ms./DIV. |
| Vehicle Condition | Power switch on (IG) |

(2) Waveform 2

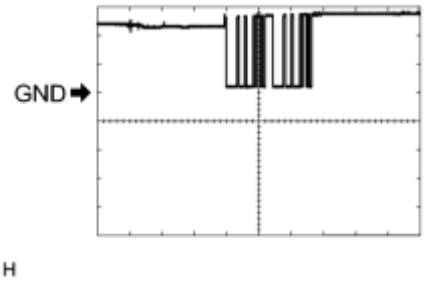



| | |
|---|---|
| Tester Connection | L5-14 (SPDI) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 10 ms./DIV. |
| Vehicle Condition | Driving at approx. 20 km/h (12 mph) |

HINT:

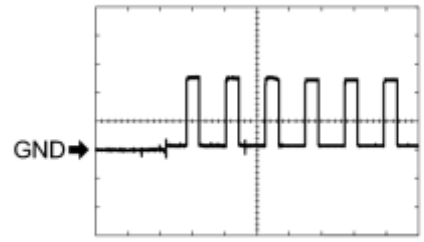
The wavelength becomes shorter as the vehicle speed increases.

(3) Waveform 3




H

| | |
|---|---|
| Tester Connection | L6-20 (IMO) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 500 ms./DIV. |
| Vehicle Condition | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery disconnected and connected |




H

(4) Waveform 4

| | |
|---|---|
| Tester Connection | L6-21 (IMI) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 50 ms./DIV. |
| Vehicle Condition | Power switch on (IG) |

2. CHECK CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)




(a) Disconnect the L62 connector.

(b) Measure the voltage and resistance according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-1 (+B) - Body ground | B - Body ground | +B power supply | Always | 11 to 14 V |
| L62-9 (CANH) - Body ground | BE - Body ground | CAN communication line | Always | 10 kΩ or higher |
| L62-10 (CANL) - Body ground | P - Body ground | CAN communication line | Always | 10 kΩ or higher |
| L62-15 (E) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| L62-16 (IG) - Body ground | BE - Body ground | IG power supply | Power switch on (IG) | 11 to 14 V |

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-29 (LIN) - Body ground | L - Body ground | LIN communication line | Always | 10 kΩ or higher |

If the result is not as specified, there may be a malfunction in the wire harness.

(c) Reconnect the L62 connector.

(d) Check for pulses according to the value(s) in the table below.

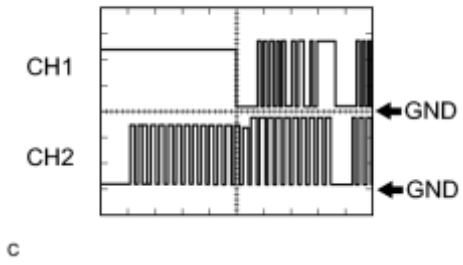
| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L62-34 (EFII) - L62-15 (E)*1 | L - W-B | Immobiliser communication status | Immobiliser communicating | Pulse generation<br><br>(See waveform 1) |
| L62-35 (EFIO) - L62-15 (E)*1 | R - W-B | Immobiliser communication status | Immobiliser communicating | Pulse generation<br><br>(See waveform 1) |

- *1: w/ Automatic Light Control System

If the result is not as specified, the ECU may have a malfunction.

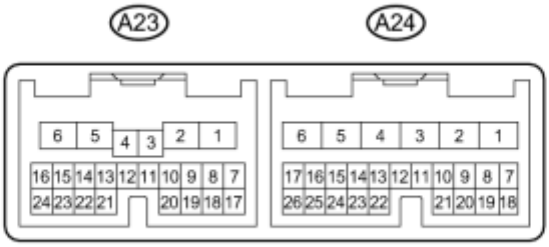
(e) Using an oscilloscope, check the signal waveform of the ECU.

(1) Waveform 1




| | |
|---|---|
| Tester Connection | CH1: L62-34 (EFII) - L62-15 (E)<br><br>CH2: L62-35 (EFIO) - L62-15 (E) |
| Tool Setting | 5 V/DIV., 200 ms./DIV. |
| Vehicle Condition | Power switch off → Power switch on (IG) → Power switch on (READY) |

3. CHECK TRANSMISSION CONTROL ECU ASSEMBLY



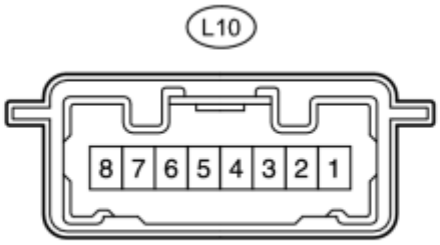

(a) Disconnect the A23 and A24 connectors.

(b) Measure the voltage and resistance according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| A24-1 (E1) - Body ground | BR - Body ground | Ground | Always | Below 1 Ω |
| A24-5 (E02) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| A24-6 (E01) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| A23-16 (+B) - Body ground | L - Body ground | Ignition power supply | Power switch on (IG) | 11 to 14 V |
| A23-16 (+B) - Body ground | L - Body ground | Ignition power supply | Power switch off | Below 1 V |
| A23-15 (BATT) - Body ground | SB - Body ground | +B power supply | Except power switch on (READY) | 11 to 14 V |
| A23-15 (BATT) - Body ground | SB - Body ground | +B power supply | Power switch on (READY) | 11 to 15.5 V |
| A24-15 (CA1L) - Body ground | BR - Body ground | CAN communication line | Always | 10 kΩ or higher |
| A24-16 (CA1H) - Body ground | Y - Body ground | CAN communication line | Always | 10 kΩ or higher |
| A24-24 (LIN) - Body ground | L - Body ground | LIN communication line | Always | 10 kΩ or higher |

- If the result is not as specified, there may be a malfunction in the wire harness.

4. CHECK ID CODE BOX (IMMOBILISER CODE ECU)




P

(a) Disconnect the L10 connector.

(b) Measure the resistance and voltage according to the value(s) in the table below.

| Tester Connection | Wiring Color | Terminal Description | Condition | Specified Condition |
|---|---|---|---|---|
| L10-1 (+B) - L10-8 (GND) | B - W-B | +B power supply | Always | 11 to 14 V |
| L10-8 (GND) - Body ground | W-B - Body ground | Ground | Always | Below 1 Ω |
| L10-3 (LIN1) - Body ground | L - Body ground | LIN communication line | Always | 10 kΩ or higher |

If the result is not as specified, there may be a malfunction in the wire harness.

# DIAGNOSIS SYSTEM

1. DESCRIPTION

(a) Push-button start function data and the Diagnostic Trouble Codes (DTCs) can be read through the Data Link Connector 3 (DLC3) of the vehicle. When the function seems to be malfunctioning, use the Techstream to check for malfunctions and perform repairs.

2. CHECK DLC3

(a) Check the DLC3 INFO.

3. INSPECT AUXILIARY BATTERY VOLTAGE

(a) Measure the auxiliary battery voltage.

Standard Voltage:

11 to 14 V

If the voltage is below 11 V, recharge or replace the auxiliary battery.

# DTC CHECK / CLEAR

1. CHECK DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Power Source Control / Trouble Codes.

(e) Read the DTC by following the prompts on the Techstream screen.

HINT:

Refer to the Techstream operator's manual for further details.

2. CLEAR DTC

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Power Source Control / Trouble Codes.

(e) Clear the DTC by following the directions on the Techstream screen.

HINT:

Refer to the Techstream operator's manual for further details.

# DATA LIST / ACTIVE TEST

1. DATA LIST

HINT:

Using the Techstream to read the Data List allows the values or states of switches, sensors, actuators and other items to be read without removing any parts. This non-intrusive inspection can be very useful because intermittent conditions or signals may be discovered before parts or wiring is disturbed. Reading the Data List information early in troubleshooting is one way to save diagnostic time.

NOTICE:

In the table below, the values listed under "Normal Condition" are reference values. Do not depend solely on these reference values when deciding whether a part is faulty or not.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Power Source Control / Data List.

(e) Read the Data List according to the display on the Techstream.

***Power Source Control***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stop Light Switch1 | Stop light switch 1/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |
| Start Switch1 | Start switch 1/ON or OFF | ON: Power switch pushed<br><br>OFF: Power switch not pushed | - |
| Start Switch2 | Start switch 2/ON or OFF | ON: Power switch pushed<br><br>OFF: Power switch not pushed | - |
| Latch Circuit | Latch circuit/ON or OFF | ON: Power switch on (IG) or on (READY)<br><br>OFF: Power switch off or on (ACC) | - |
| IG1 Relay Monitor (Outside) | IG1 outer relay monitor/ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| IG1 Relay Monitor (Inside) | IG1 inner relay monitor/ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |
| IG2 Relay Monitor (Outside) | IG2 outer relay monitor/ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |
| IG2 Relay Monitor (Inside) | IG2 inner relay monitor/ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |
| Starter Request Signal | Starter request signal monitor/ON or OFF | ON: ST relay on<br><br>OFF: ST relay off | - |
| ACC Relay Monitor | ACC relay monitor/ON or OFF | ON: Power switch on (ACC)<br><br>OFF: Power switch off | - |
| Ready Signal | Status of the ready signal/ON or OFF | ON: Hybrid control system on (on (READY))<br><br>OFF: Hybrid control system off | - |
| Vehicle Speed Signal | Vehicle speed signal/Stop or Run | Stop: Vehicle stopped<br><br>Run: Vehicle running | - |
| Shift P Signal Pulse | Status of the shift P signal pulse/Unknown, Error2, Normal2, Error1, Normal3, Error3 or Normal1 | Unknown: Other<br><br>Error2: Signal abnormal and park (P) selected<br><br>Normal2: Signal normal and park (P) selected<br><br>Error1: Signal abnormal and park (P) state cannot be determined<br><br>Normal3: Signal normal and R, N, D or B selected<br><br>Error3: Signal abnormal and R, N, D or B selected<br><br>Normal1: Signal normal and park (P) state cannot be determined | - |
| Power Supply Condition | Power supply condition/All OFF, ACC ON, IG1 ON, IG2 ON, ST ON | All OFF: All relays off | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| | | ACC ON: ACC relay on<br><br>IG1 ON: IG1 relay on<br><br>IG2 ON: IG2 relay on<br><br>ST ON: ST request signal on | |
| Powertrain Type | Status of the powertrain type/HV-AT, Conventional-AT, Conventional-MT, Conventional-MMT | HV-AT | - |
| IG1 Circuit | Status of the IG1 relay activation circuit/OK or NG | OK: IG1 relay activation circuit normal<br><br>NG: IG1 relay activation circuit abnormal | - |
| IG2 Circuit | Status of the IG2 relay activation circuit/OK or NG | OK: IG2 relay activation circuit normal<br><br>NG: IG2 relay activation circuit abnormal | - |
| Starter Switch Signal Mismatch | Power switch error detection/No or Yes | No: Power switch error not detected<br><br>Yes: Power switch error detected | - |
| Park Signal Mismatch | Status of the park signal mismatch/No or Yes | No: Park signal mismatch no detected<br><br>Yes: Park signal mismatch detected | - |
| Key Certification Waiting Timed Out | Key certification error detection/No or Yes | No: Key certification error not detected<br><br>Yes: Key certification error detected | - |
| Number of Diagnosis Code | Number of diagnosis code/Min.: 0, MAX.: 255 | Number of DTCs will be displayed | - |

(f) Enter the following menus: Body Electrical / Smart Key / Data List.

(g) Read the Data List according to the display on the Techstream.

***Smart Key***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Ignition Switch | Power switch/ON or OFF | ON: Power switch on (IG)<br><br>OFF: Power switch off | - |
| Key Low Battery | Low key battery/Yes or No | Yes: Key battery voltage low<br><br>No: Key battery voltage normal | - |
| # Code | Number of DTC recorded/Min.: 0, Max.: 225 | Number of DTCs displayed | - |
| Steering Lock Sleep Cond | Transmission control ECU sleep condition/Yes or No | Yes: Transmission control ECU sleep mode can be entered<br><br>No: Transmission control ECU sleep mode cannot be entered | - |
| Steering Lock Start Cond | Transmission control ECU start signal/Yes or No | Yes: Transmission control ECU sent a start signal<br><br>No: Transmission control ECU did not send a start signal | - |
| Engine Start Condition | Hybrid control system start condition/OK or NG | OK: Hybrid control system allowed to start<br><br>NG: Hybrid control system not allowed to start | - |
| Engine Start Request | Start request condition signal/OK or NG | OK: Start request condition signal received<br><br>NG: Start request condition signal not received | - |
| 3bit Code Request | Status of the 3-bit code request/OK or NG | OK: 3-bit code request signal received<br><br>NG: 3-bit code request signal not received | - |
| S Code Check | S code certification result/OK or NG | OK: Certification confirmed<br><br>NG: Certification not confirmed | - |
| L Code Check | L code certification result/OK or NG | OK: Certification confirmed<br><br>NG: Certification not confirmed | - |
| Unlock Request Receive | Status of the gearshift control unlock request receive/OK or NG | OK: Gearshift control unlock request signal received<br><br>NG: Gearshift control unlock request signal not received | - |
| Lock Request | Status of the gearshift control lock | OK: Gearshift control lock request | - |

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Receive | request receive/OK or NG | signal received<br><br>NG: Gearshift control lock request signal not received | |
| S Code Check (Past) | S code certification result (Past)/OK or NG | OK: Certification confirmed (past)<br><br>NG: Certification not confirmed (past) | - |
| L Code Check (Past) | L code verification result (Past)/OK or NG | OK: Certification confirmed (past)<br><br>NG: Certification not confirmed (past) | - |
| EFI Code Receive | SFI communication (when DTC stored)/OK or NG | OK: SFI code received<br><br>NG: SFI code not received | - |
| EFI Communication | SFI communication /OK or NG | OK: SFI communication normal<br><br>NG: SFI communication abnormal | - |
| Ignition Available Area | Ignition available area/Front or All | Customization status displayed | - |

2. ACTIVE TEST

HINT:

Using the Techstream to perform Active Tests allows relay, VSVs, actuators and other items to be operated without removing any parts. This non-intrusive functional inspection can be very useful because intermittent operation may be discovered before parts or wiring is disturbed. Performing Active Tests early in troubleshooting is one way to save diagnostic time. Data List information can be displayed while performing Active Tests.

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Power Source Control / Active Test.

(e) Perform the Active Test according to the display on the Techstream.

***Power Source Control***

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Indicator Condition | Power switch indicator | Green/Red/No Sig | Power switch on (READY) |

(f) Enter the following menus: Body Electrical / Smart Key/ Active Test.

(g) Perform the Active Test according to the display on the Techstream.

*Smart Key*

| Tester Display | Test Part | Control Range | Diagnostic Note |
|---|---|---|---|
| Power / Engine SW Light | Power switch illumination | ON/OFF | Operate with power switch on (IG) and the vehicle stopped. |

# DIAGNOSTIC TROUBLE CODE CHART

HINT:

If a trouble code is stored during the DTC check, inspect the trouble areas listed for that code. For details of the code, refer to the "See page" below.

### *Power Management Control ECU*

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| B2271 | Ignition Hold Monitor Malfunction | 1. AM2 fuse<br>2. IG1 relays<br>3. IG2 relay<br>4. Power management control ECU<br>5. Instrument panel junction block assembly<br>6. Wire harness or connector | INFO |
| B2274 | ACC Monitor Malfunction | 1. AM2 fuse<br>2. ACC relay<br>3. Power management control ECU<br>4. Instrument panel junction block assembly<br>5. Wire harness or connector | INFO |
| B2275 | STSW Monitor Malfunction | 1. AM2 fuse<br>2. Power management Control ECU<br>3. Wire harness or connector | INFO |
| B2277 | Detecting Vehicle Submersion | Power management control ECU | INFO |
| B2282 | Vehicle Speed Signal Malfunction | 1. CAN communication system<br>2. Combination meter system<br>3. Power management control ECU<br>4. Wire harness or connector | INFO |
| B2284 | Brake Signal Malfunction | 1. STOP fuse<br>2. Stop light switch assembly<br>3. CAN communication system | INFO |

| DTC Code | Detection Item | Trouble Area | See page |
|---|---|---|---|
| | | 4. Skid control ECU assembly<br>5. Power management control ECU<br>6. Wire harness or connector | |
| B2286 | Runnable Signal Malfunction | 1. AM2 fuse<br>2. Power management control ECU<br>3. Wire harness or connector | INFO |
| U0293 | Lost Communication with HV ECU | Power management control ECU | INFO |

# ON-VEHICLE INSPECTION

1. CHECK POWER SOURCE MODE CHANGE FUNCTION

(a) Check the function of the power switch.

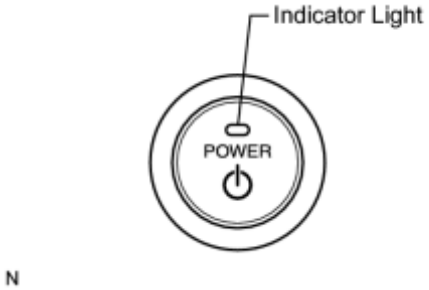
(1) Check that power source mode changes in accordance with the conditions of the shift position and brake pedal.

| Brake Pedal | Shift Lever | Power Source Mode Pattern |
|---|---|---|
| Depressed | P | When the power switch is pushed once.<br>• off → on (READY) |
| Not depressed | P | Each time the power switch is pushed.<br>• off → on (ACC) → on (IG) → off |
| | Except P | Each time the power switch is pushed.<br>• on (ACC) → on (IG) → off |
| - | P | When the power switch is pushed in the on (READY) condition.<br>• on (READY) → off |
| - | Except P | When the power switch is pushed in the on (READY) condition.<br>• on (READY) → off |

(b) Check that the power source mode changes without pressing the power switch.

(1) With power source mode on (ACC) or on (IG) and with park (P) selected, wait for at least 1 hour. Check that the power source mode changes from on (ACC) or on (IG) to off automatically.

2. CHECK INDICATOR CONDITION




N

(a) Check the indicator light on the power switch.

(1) Check that the power switch indicator turns on and changes color according to the table below.

| Power Source Mode/Condition | Indicator Light Condition | |
|---|---|---|
| | Brake Pedal Released | Brake Pedal Depressed, Park (P) selected |
| off | off | Turns on (Green) |

| | | |
|---|---|---|
| on (ACC, IG) | Turns on (Amber) | Turns on (Green) |
| on (READY) | off | off |
| System malfunction | Flashes (Amber) for 15 sec. | Flashes (Amber) for 15 sec. |

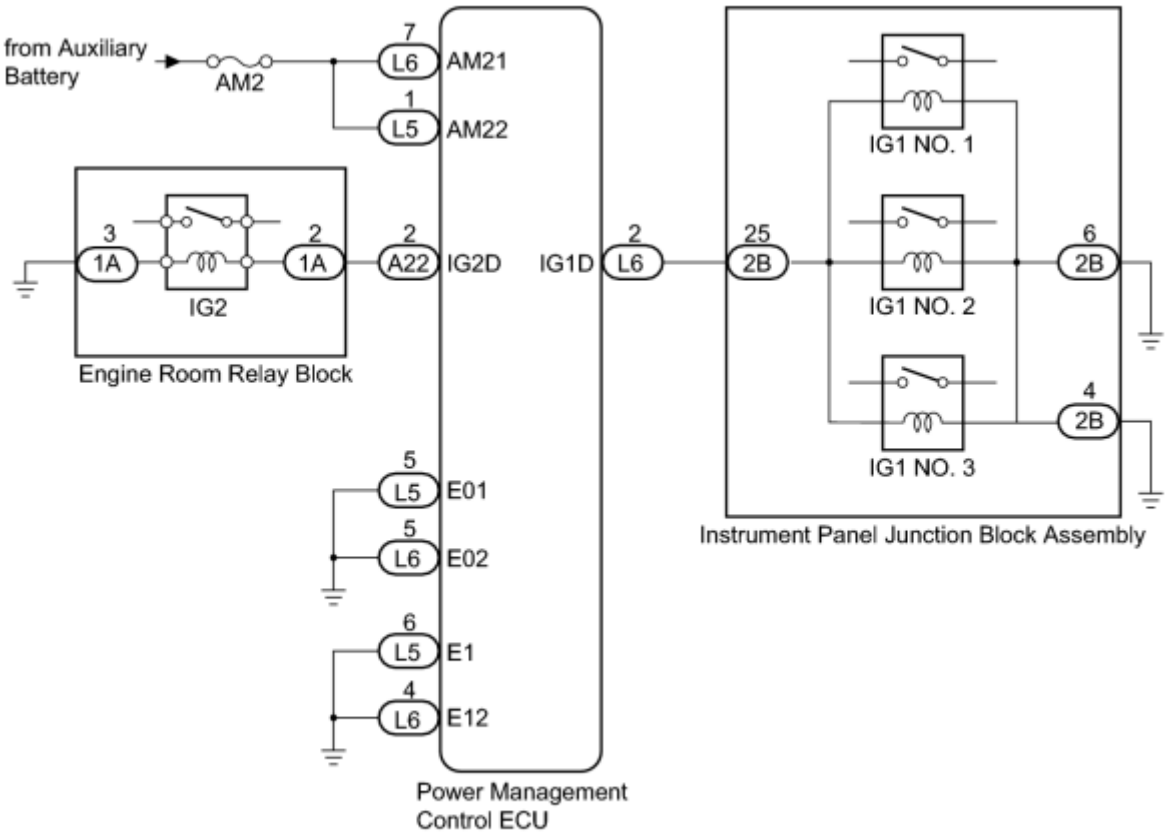
| DTC | B2271 | Ignition Hold Monitor Malfunction |
|---|---|---|

# DESCRIPTION

This DTC is stored when a problem such as an open in the AM2 fuse, an open or short in the wire harness between the fuse and power management control ECU, a short in the IG output circuit inside the power management control ECU, a short between the power management control ECU and relay, or a short in the relay is detected.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2271 | The hold circuit, IG1 relay actuation circuit or IG2 relay actuation circuit inside the power management control ECU is open or shorted. | • AM2 fuse<br>• IG1 relays<br>• IG2 relay<br>• Power management control ECU<br>• Instrument panel junction block assembly<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is restored.
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the L5 and L6 connectors from the power management control ECU.

(b) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-1 (AM22) - Body ground | Always | 9.5 to 16 V |
| L6-7 (AM21) - Body ground | Always | 9.5 to 16 V |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-5 (E01) - Body ground | Always | Below 1 Ω |
| L5-6 (E1) - Body ground | Always | Below 1 Ω |
| L6-4 (E12) - Body ground | Always | Below 1 Ω |
| L6-5 (E02) - Body ground | Always | Below 1 Ω |

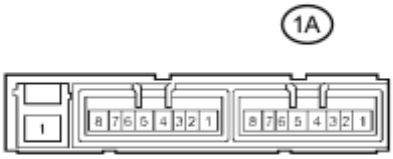
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

▼

| | |
|---|---|
| 3. | INSPECT IG2 RELAY |

*1




(a) Remove the engine room relay block assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1A-2 - 1A-3 | 20°C (68°F) | 130 to 230 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Engine Room Relay Block) |

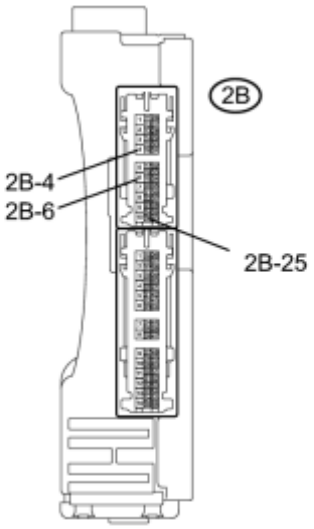
NG ▶ REPLACE IG2 RELAY

OK

▼

| | |
|---|---|
| 4. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY (IG1 NO. 1, IG1 NO. 2 AND IG1 NO. 3 RELAYS) |

*1




(a) Remove the instrument panel junction block assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-25 - 2B-4 | 20°C (68°F) | 101.25 to 123.75 Ω |
| 2B-25 - 2B-6 | 20°C (68°F) | 101.25 to 123.75 Ω |
| 2B-4 - 2B-6 | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected |

| | |
|---|---|
| | (Instrument Panel Junction Block Assembly) |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INSTRUMENT PANEL J/B) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-2 (IG1D) - 2B-25 | Always | Below 1 Ω |
| L6-2 (IG1D) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-4 - Body ground | Always | Below 1 Ω |
| 2B-6 - Body ground | Always | Below 1 Ω |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND)

OK

▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - IG2 RELAY) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A22-2 (IG2D) - 1A-2 | Always | Below 1 Ω |
| A22-2 (IG2D) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - IG2 RELAY)

OK

▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (ENGINE ROOM RELAY BLOCK ASSEMBLY - BODY GROUND) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1A-3 - Body ground | Always | Below 1 Ω |

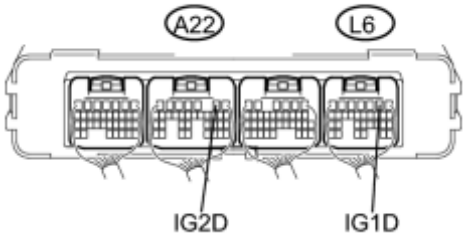
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM RELAY BLOCK ASSEMBLY - BODY GROUND)

OK

▼

| | |
|---|---|
| 9. | CHECK POWER MANAGEMENT CONTROL ECU |

*1




(a) Install the instrument panel junction block assembly.

(b) Install the engine room relay block.

(c) Reconnect the A22 and L6 connectors.

(d) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A22-2 (IG2D) - Body ground | Power switch on (IG) | Output voltage at terminal AM21 or AM22 is -2.5 V or more |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-2 (IG1D) - Body ground | Power switch on (IG) | Output voltage at terminal AM21 or AM22 is -2.5 V or more |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▶ **USE SIMULATION METHOD TO CHECK**

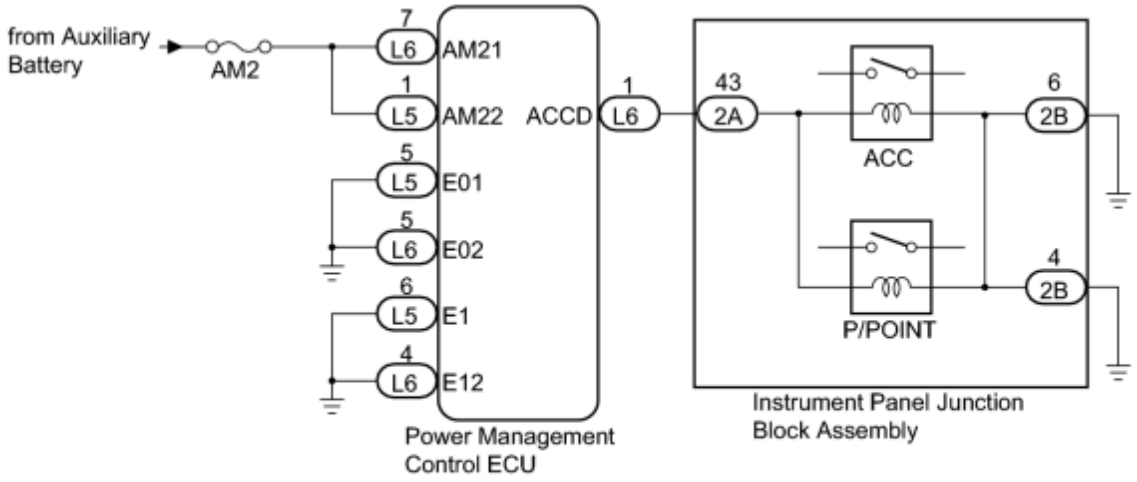
| DTC | B2274 | ACC Monitor Malfunction |
|---|---|---|

# DESCRIPTION

This DTC is stored when there is a problem in the ACC output circuit. The ACC circuit is the circuit that goes from inside the power management control ECU to the ACC relay.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2274 | The ACC relay actuation circuit inside the power management control ECU or other related circuit is malfunctioning. | • AM2 fuse<br>• ACC relay<br>• Power management control ECU<br>• Instrument panel junction block assembly<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is restored.

- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

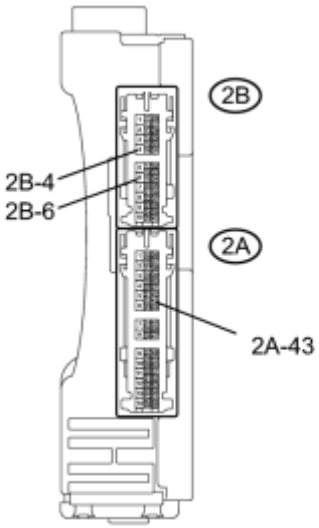
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

▼

| | |
|---|---|
| 3. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY |

*1




(a) Remove the instrument panel junction block assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-43 - 2B-4 | 20°C (68°F) | 101.25 to 123.75 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2A-43 - 2B-6 | 20°C (68°F) | 101.25 to 123.75 Ω |
| 2B-4 - 2B-6 | Always | Below 1 Ω |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Instrument Panel Junction Block Assembly) |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INSTRUMENT PANEL J/B) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-1 (ACCD) - 2A-43 | Always | Below 1 Ω |
| L6-1 (ACCD) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND) |

(a) Measure the resistance according to the value(s) the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 2B-4 - Body ground | Always | Below 1 Ω |
| 2B-6 - Body ground | Always | Below 1 Ω |

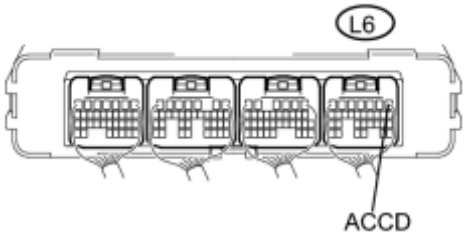
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND)

OK

▼

| | |
|---|---|
| 6. | INSPECT POWER MANAGEMENT CONTROL ECU |

*1




(a) Reinstall the instrument panel junction block assembly.

(b) Reconnect the L5 and L6 connectors.

(c) Measure the voltage according to the value(s) in the table below.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-1 (ACCD) - Body ground | Power switch on (ACC) | Output voltage at terminal AM21 or AM22 is -2.5 V or more |

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▶ **USE SIMULATION METHOD TO CHECK**

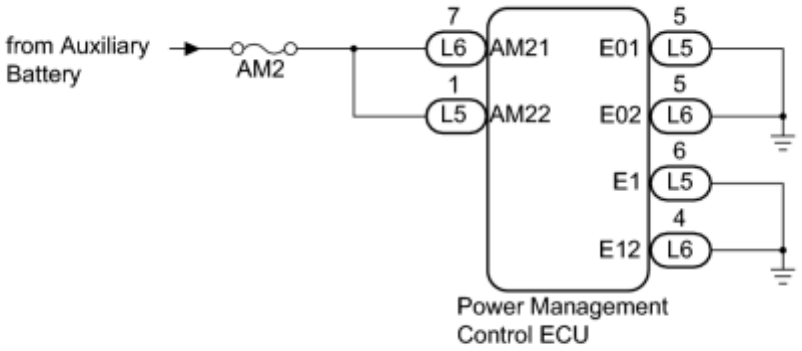
| DTC | B2275 | STSW Monitor Malfunction |
|---|---|---|

# DESCRIPTION

This DTC is stored when a malfunction is detected in the starter circuit inside the power management control ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2275 | Power management control ECU internal HV activation request output circuit malfunction or external circuit malfunction. | • AM2 fuse<br>• Power management control ECU<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes the on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is restored.
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK ▼

| | |
|---|---|
| 3. | CHECK FOR DTC |

(a) Clear the DTC INFO.

(b) Turn the power switch on (IG).

(c) After 25 seconds have elapsed, check if the DTC has been set again.

OK:

DTC B2275 is not output.

NG ▶ USE SIMULATION METHOD TO CHECK

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| DTC | B2277 | Detecting Vehicle Submersion |
|---|---|---|

# DESCRIPTION

This DTC is stored when the submersion circuit monitor inside the power management control ECU detects a large amount of water.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2277 | The submersion circuit monitor inside the power management control ECU detects a large amount of water. | Power management control ECU |

# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is restored.

# PROCEDURE

| 1. | CHECK FOR DTC |
|---|---|

(a) Clear the DTC INFO.

(b) Turn the power switch on (IG).

(c) After 330 seconds have elapsed, check if the DTC has been set again.

OK:

DTC B2277 is not output

HINT:

If there are any signs that water was present, before replacing the power management control ECU, take measures to prevent any further water entry.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU
OK ▶ **USE SIMULATION METHOD TO CHECK**

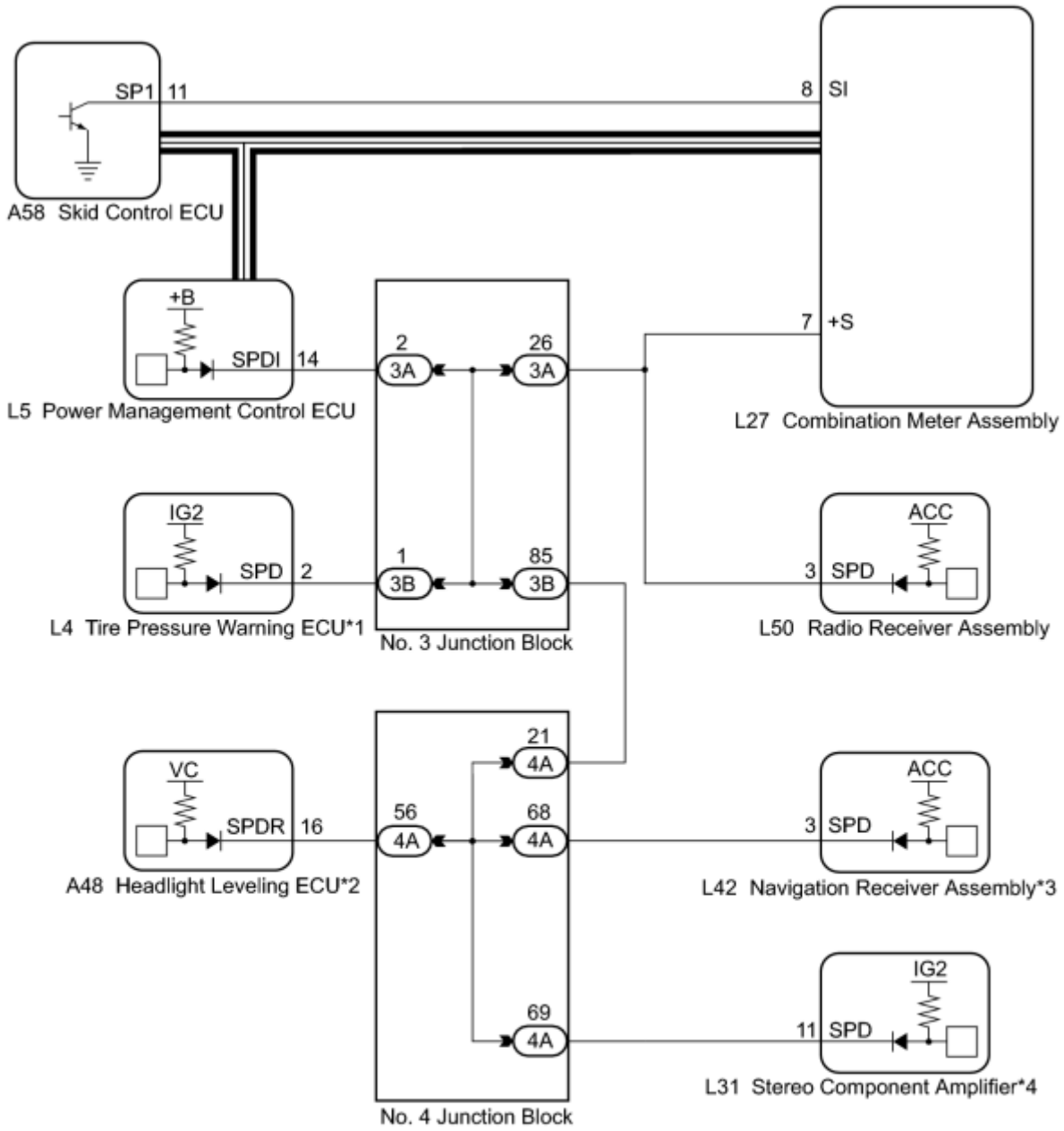
| DTC | B2282 | Vehicle Speed Signal Malfunction |
|---|---|---|

# DESCRIPTION

The power management control ECU receives vehicle speed information using 2 methods. It receives a speed signal from the meter ECU via a direct line, and a from the skid control ECU via CAN. If the information sent using these 2 methods is inconsistent, this DTC will be stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2282 | Speed information received by the power management control ECU via direct line and via CAN is inconsistent. | • CAN communication system<br>• Combination meter assembly<br>• Power management control ECU<br>• No.3 junction block<br>• Wire harness or connector |

# WIRING DIAGRAM




*1: w/ Tire Pressure Warning System

*2: w/ Automatic Type Headlight Beam Level Control

*3: w/ Navigation System

*4: for Separate Type Amplifier System

HINT:

- A voltage of 12 V or 5 V is output from each ECU and then input to the combination meter. The signal is changed to a pulse signal at the transistor in the combination meter. Each ECU controls the respective system based on the pulse signal.
- If a short occurs in an ECU, all systems in the diagram above will not operate normally.

# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is restored.
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK CAN COMMUNICATION SYSTEM |

(a) Check if CAN communication DTCs are output.

HINT:

If any DTCs for CAN communication system malfunction are output, inspect those DTCs first.

OK:

CAN communication DTC is not output.

NG ▶ GO TO CAN COMMUNICATION SYSTEM (DIAGNOSTIC TROUBLE CODE CHART)

OK

▼

| | |
|---|---|
| 2. | CHECK SPEEDOMETER OPERATION |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Combination Meter / Data List.

(e) Check the Data List for proper functioning of the vehicle speed signal.

***Combination Meter***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle Speed Meter | Vehicle speed/Min.: 0, Max.: 255 | Almost same as actual speed (When driving) | - |

OK:

Vehicle speed displayed on the Techstream is almost the same as the actual vehicle speed measured using a speedometer tester (calibrated chassis dynamometer).

NG ▶ GO TO METER / GAUGE SYSTEM (Speedometer Malfunction)

OK

▼

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM |

(a) Enter the following menus: Body Electrical / Power Source Control / Data List.

(b) Read the Data List according to the display on the Techstream.

***Power Source Control***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Vehicle speed signal | Vehicle speed signal/Stop or Run | Stop: Vehicle stopped<br><br>Run: Vehicle running | - |

OK:

Stop (vehicle is stopped) and Run (vehicle is running) appear on the screen.

NG ▶ CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the L27 connector from the combination meter assembly.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-14 (SPDI) - L27-7 (+S) | Always | Below 1 Ω |
| L5-14 (SPDI) - Body ground | Always | 10 kΩ or higher |

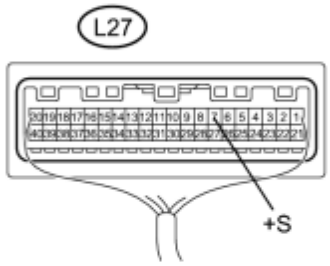
NG ▶ CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - NO. 3 JUNCTION BLOCK)

OK

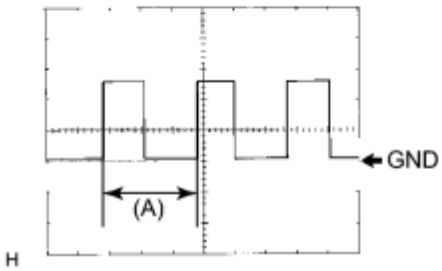
▼

| | |
|---|---|
| 7. | INSPECT COMBINATION METER ASSEMBLY |

*1




(a) Remove the combination meter INFO.




H

(b) Reconnect the L27 connector to the combination meter assembly.

(c) Reconnect the L5 connector to the power management control ECU.

(d) Connect an oscilloscope to terminal L27-7 (+S) and body ground.

(e) Turn the power switch on (IG).

(f) Turn the wheel slowly.

(g) Check the signal waveform according to the condition(s) in the table below.

| Item | Condition |
|---|---|
| Tool setting | 5 V/DIV., 20 ms./DIV. |
| Vehicle condition | Driving at approx. 20 km/h (12 mph) |

OK:

The waveform is displayed as shown in the illustration.

*Text in Illustration*

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Combination Meter Assembly) |

HINT:

When the system is functioning normally, one wheel revolution generates 4 pulses. As the vehicle speed increases, the width indicated by (A) in the illustration narrows.

NG ▶ GO TO METER / GAUGE SYSTEM (Speed Signal Circuit)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (COMBINATION METER ASSEMBLY - NO. 3 JUNCTION BLOCK) |

(a) Disconnect the 3A connector.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L27-7 (+S) - 3A-26 | Always | Below 1 Ω |
| L27-7 (+S) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (COMBINATION METER - NO. 3 JUNCTION BLOCK)

OK

▼

| | |
|---|---|
| 9. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - JUNCTION BLOCK) |

(a) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L5-14 (SPDI) - 3A-2 | Always | Below 1 Ω |
| L5-14 (SPDI) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - NO. 3 JUNCTION BLOCK)

OK ▶ **REPLACE NO. 3 JUNCTION BLOCK**

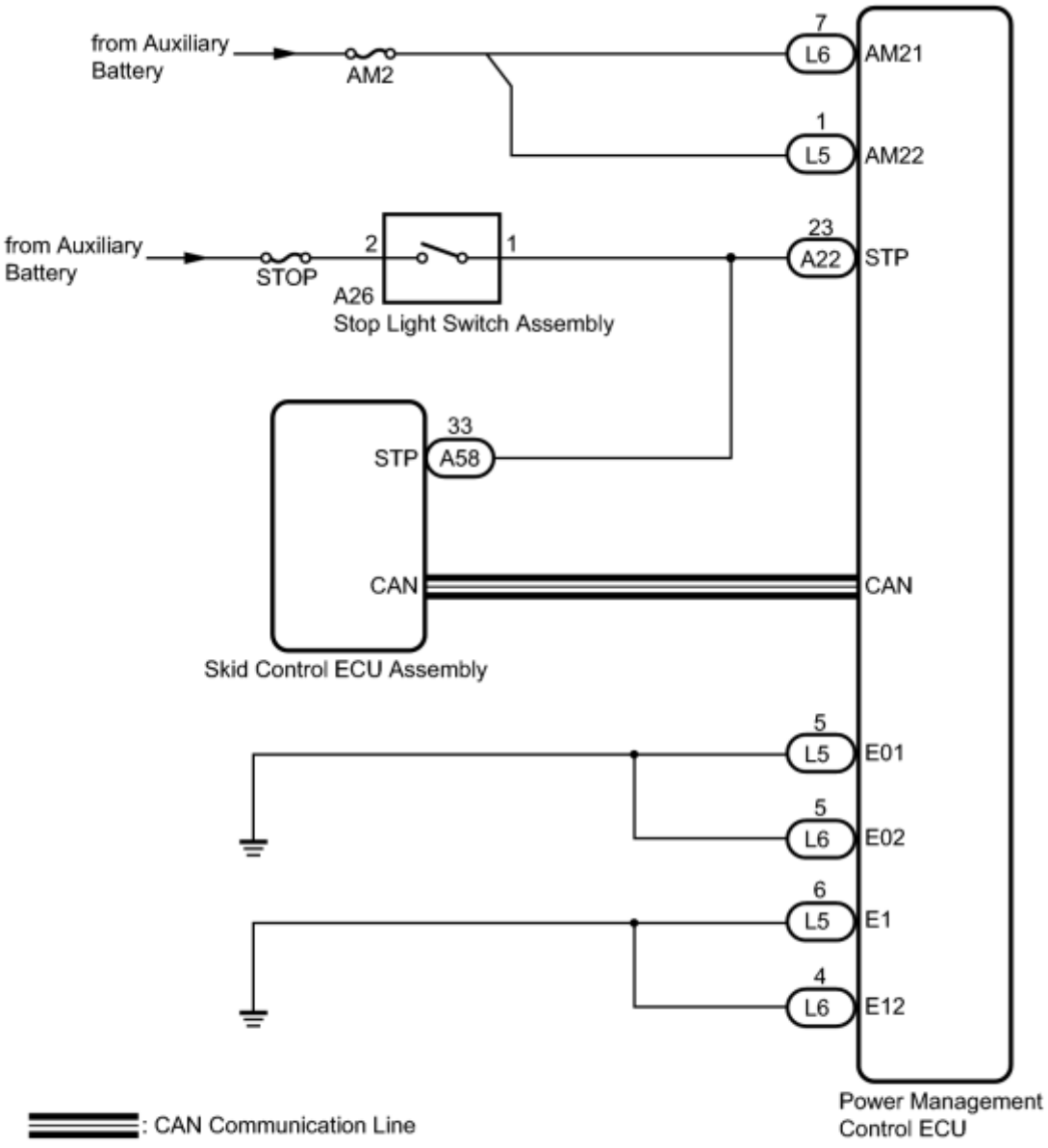
| DTC | B2284 | Brake Signal Malfunction |
|---|---|---|

# DESCRIPTION

The power management control ECU receives brake signal information from 2 sources. It receives a signal from the stop light switch assembly via a direct line, and a signal from the skid control ECU assembly via CAN. If the information from these 2 sources is inconsistent, this DTC will be stored.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2284 | Stop light switch assembly operation information received by the power management control ECU from the stop light switch assembly via a direct line and stop light switch assembly information from the skid control ECU assembly via CAN are inconsistent. | • STOP fuse<br>• Stop light switch assembly<br>• CAN communication system<br>• Skid control ECU assembly<br>• Power management control ECU<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is restored.
- Inspect the fuse for circuits related to this system before performing the following inspection procedure.

HINT:

Check the connector connection to the terminal to make sure that there is no abnormality such as a loose connection, deformation, etc.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

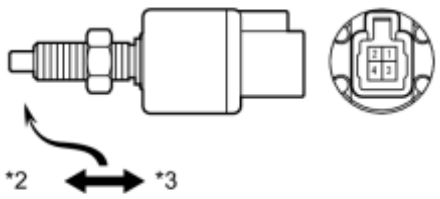
NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

▼

| | |
|---|---|
| 3. | INSPECT STOP LIGHT SWITCH ASSEMBLY |

*1




(a) Remove the stop light switch assembly INFO.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| 1 - 2 | Pushed | 10 kΩ or higher |
| 3 - 4 | Pushed | Below 1 Ω |
| 1 - 2 | Not pushed | Below 1 Ω |
| 3 - 4 | Not pushed | 10 kΩ or higher |

*Text in Illustration*

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Stop Light Switch Assembly) |
| *2 | Free |
| *3 | Pushed in |

NG ▶ REPLACE STOP LIGHT SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - POWER MANAGEMENT CONTROL ECU) |

(a) Disconnect the A22 connector from the power management control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A22-23 (STP) - A26-1 | Always | Below 1 Ω |
| A22-23 (STP) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (STOP LIGHT SWITCH ASSEMBLY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (STOP LIGHT SWITCH ASSEMBLY) |

(a) Connect the Techstream to the DLC3.

(b) Turn the power switch on (IG).

(c) Turn the Techstream on.

(d) Enter the following menus: Body Electrical / Power Source Control / Data List.

(e) Read the Data List according to the display on the Techstream.

*Power Source Control*

| Tester Display | Measurement Item/Range | Normal Condition | Specified Condition |
|---|---|---|---|
| Stop Light Switch1 | Stop light switch1/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |

OK:

ON (brake pedal is depressed) and OFF (brake pedal is released) appear on the screen.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▶ **GO TO ELECTRONICALLY CONTROLLED BRAKE SYSTEM (DTC C1249/49)**

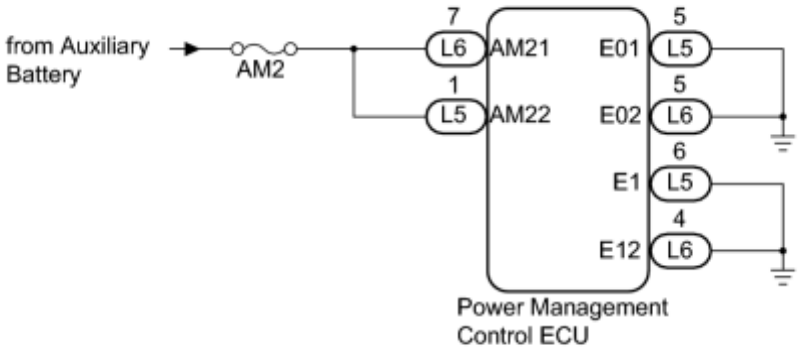
| DTC | B2286 | Runnable Signal Malfunction |
|---|---|---|

# DESCRIPTION

This DTC is stored when a malfunction is detected in the READY signal circuit inside the power management control ECU.

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| B2286 | READY signal error inside the power management control ECU. | • AM2 fuse<br>• Power management control ECU<br>• Wire harness or connector |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is restored.
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

HINT:

Check the connector connection to the terminal to make sure that there is no abnormality such as a loose connection, deformation, etc.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK ▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK ▼

| | |
|---|---|
| 3. | CHECK FOR DTC |

(a) Clear the DTC INFO.

(b) Turn the power switch on (READY).

(c) After 25 seconds have elapsed, check if the DTC has been set again.

OK:

DTC B2286 is not output

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▶ **USE SIMULATION METHOD TO CHECK**

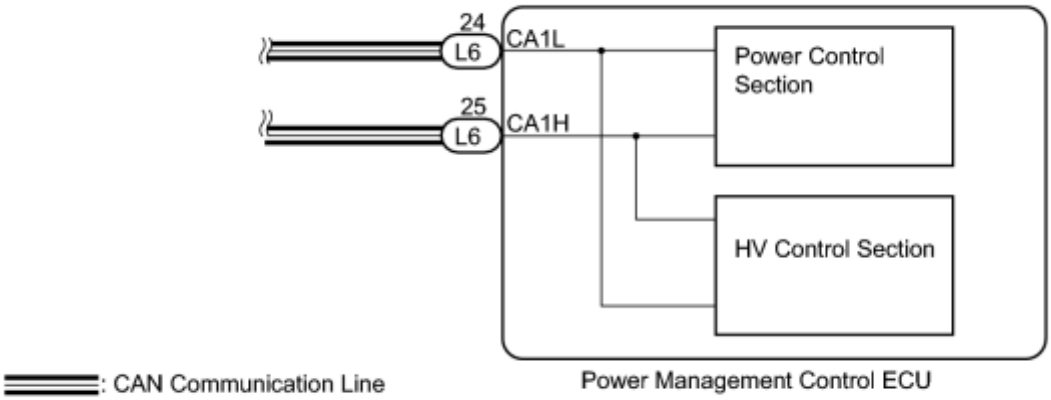
| DTC | U0293 | Lost Communication with HV ECU |
|---|---|---|

# DESCRIPTION

This DTC is stored when the power management control ECU detects a CAN communication error inside the power management control ECU (power control section - HV control section).

| DTC No. | DTC Detection Condition | Trouble Area |
|---|---|---|
| U0293 | CAN communication signal error inside the power management control ECU (power control section - HV control section). | • Power management control ECU |

# WIRING DIAGRAM




# INSPECTION PROCEDURE

NOTICE:

When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, the power source mode that was selected when the auxiliary battery was removed is reinstalled.

# PROCEDURE

| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |
|---|---|

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

| | |
|---|---|
| 3. | CHECK FOR DTC |

(a) Clear the DTC INFO.

(b) Check for DTC again.

OK:

DTC U0293 is not output

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▶ **USE SIMULATION METHOD TO CHECK**

Power Source Mode does not Change to ON (IG and ACC)

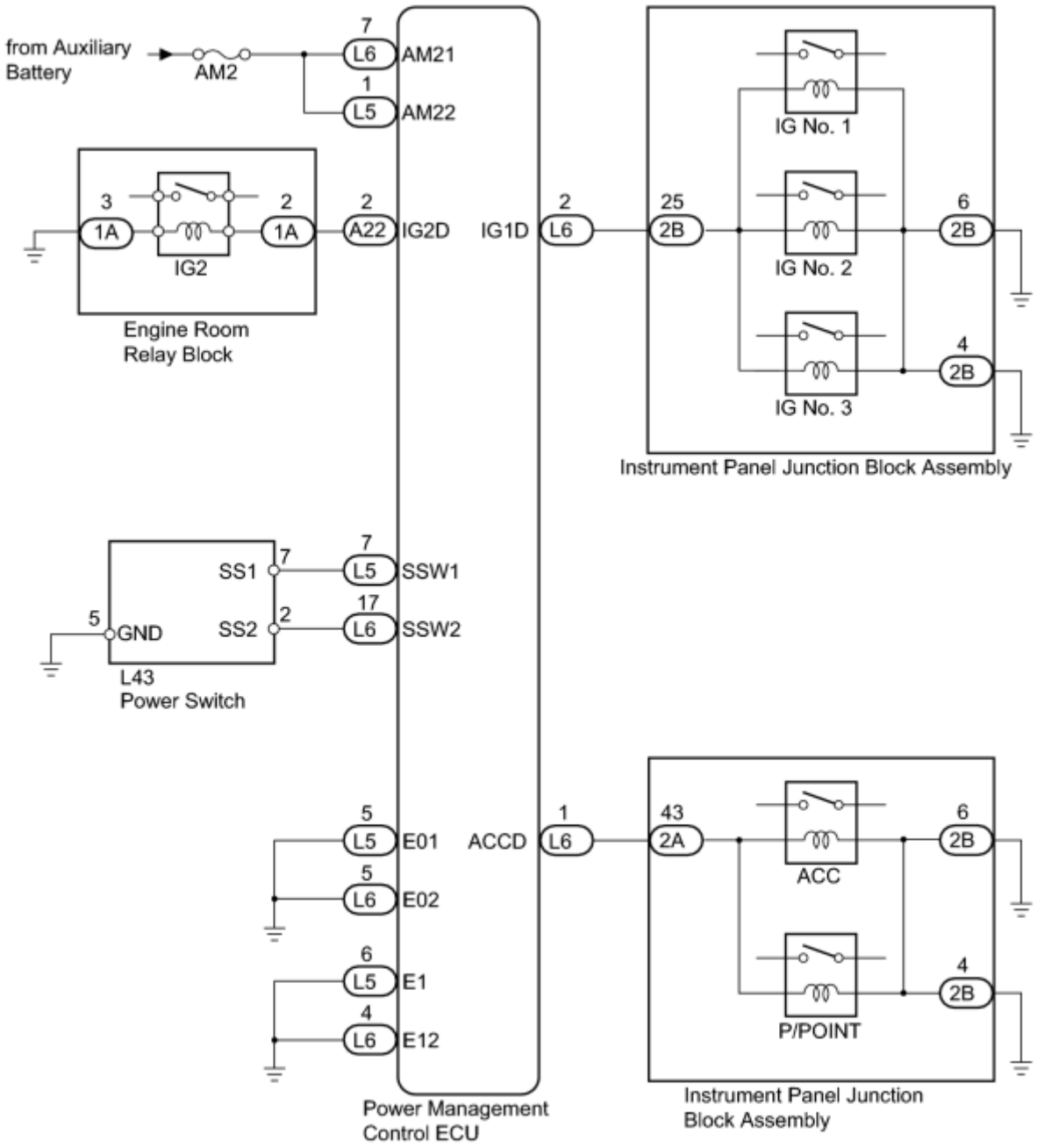
# DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the power management control ECU receives signals to change the power source mode.

HINT:

To allow use of the Techstream to inspect the push-button start function when the power source mode is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the Techstream and the power management control ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

# WIRING DIAGRAM




# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

▼

| | |
|---|---|
| 3. | READ VALUE USING TECHSTREAM |

(a) Reconnect the L5 and L6 connectors to the power management control ECU.

(b) Turn the power switch off.

(c) Connect the Techstream to the DLC3.

(d) Turn the power switch on (IG).

(e) Turn the Techstream on.

(f) Enter the following menus: Body Electrical / Power Source Control / Data List.

(g) Read the Data List according to the display on the Techstream.

***Power Source Control***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Key Certification Waiting Timed Out | Key certification error detection/ No or Yes | No: Key certification error not detected<br><br>Yes: Key certification error detected | - |

OK:

When more than 1 second elapses after the power switch is turned from off to on (IG), No is displayed in the Data List.

NG ▶ CHECK FOR DTC

OK

▼

| | |
|---|---|
| 4. | READ VALUE USING TECHSTREAM |

(a) Read the Data List according to the display on the Techstream.

***Power Source Control***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Start Switch1 | Start switch 1/ON or OFF | ON: Power switch pushed<br><br>OFF: Power switch not pushed | - |
| Start Switch2 | Start switch 2/ON or OFF | ON: Power switch pushed<br><br>OFF: Power switch not pushed | - |

OK:

ON (power switch is pushed) and OFF (power switch is not pushed) appear on the screen.

NG ▶ CHECK POWER SWITCH

OK

▼

| | |
|---|---|
| 5. | CHECK POWER MANAGEMENT CONTROL ECU |

(a) Read the Data List according to the display on the Techstream.

***Power Source Control***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Power Supply Condition | Power supply condition/All OFF, ACC ON, IG1 ON, IG2 ON, ST ON | ALL OFF: All relays off<br><br>ACC ON: ACC relay on<br><br>IG1 ON: IG1 relay on<br><br>IG2 ON: IG2 relay on<br><br>ST ON: ST request signal on | - |

(b) Measure the voltage while checking the Data List on the Techstream.

Standard Voltage:

| Tester Connection | Condition | Specified Condition |
|---|---|---|

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-2 (IG1D) - Body ground | Power switch off | Below 1 V |
| L6-2 (IG1D) - Body ground | Power switch on (ACC) | Below 1 V |
| L6-2 (IG1D) - Body ground | Power switch on (IG) | Output voltage at terminal AM21 or AM22 is -2.5 V or more |
| A22-2 (IG2D) - Body ground | Power switch off | Below 1 V |
| A22-2 (IG2D) - Body ground | Power switch on (ACC) | Below 1 V |
| A22-2 (IG2D) - Body ground | Power switch on (IG) | Output voltage at terminal AM21 or AM22 is -2.5 V or more |
| L6-1 (ACCD) - Body ground | Power switch off | Below 1 V |
| L6-1 (ACCD) - Body ground | Power switch on (IG) | Output voltage at terminal AM21 or AM22 is -2.5 V or more |
| L6-1 (ACCD) - Body ground | Power switch on (ACC) | Output voltage at terminal AM21 or AM22 is -2.5 V or more |

NG REPLACE POWER MANAGEMENT CONTROL ECU

OK

| 6. | CONFIRMATION TEST |
|---|---|

(a) Check that the power source mode becomes on (ACC) and on (IG) when the power switch is operated.

OK:

Power source mode becomes on (ACC) and on (IG) when the power switch is operated.

NG CHECK RELAY CONTACT SIDE CIRCUIT

OK **USE SIMULATION METHOD TO CHECK**

| 7. | CHECK POWER SWITCH |
|---|---|

(a) Remove the power switch INFO.

*1




(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L43-7 (SS1) - L43-5 (GND) | Pushed | Below 1 Ω |
| L43-7 (SS1) - L43-5 (GND) | Not pushed | 10 kΩ or higher |
| L43-2 (SS2) - L43-5 (GND) | Pushed | Below 1 Ω |
| L43-2 (SS2) - L43-5 (GND) | Not pushed | 10 kΩ or higher |

***Text in Illustration***

| | |
|---|---|
| *1 | Component without harness connected<br><br>(Power Switch) |

NG ▶ REPLACE POWER SWITCH

OK

▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (POWER SWITCH - POWER MANAGEMENT CONTROL ECU AND BODY GROUND) |

(a) Disconnect the L5 and L6 connectors from the power management control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-17 (SSW2) - L43-2 (SS2) | Always | Below 1 Ω |
| L5-7 (SSW1) - L43-7 (SS1) | Always | Below 1 Ω |

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| L6-17 (SSW2) - Body ground | Always | 10 kΩ or higher |
| L5-7 (SSW1) - Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER SWITCH - POWER MANAGEMENT CONTROL ECU OR BODY GROUND)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 9. | CHECK FOR DTC |

(a) Enter the following menus: Body Electrical / Power Source Control and Smart Key / DTC.

(b) Check for DTCs.

Result:

| Result | Proceed to |
|---|---|
| The following DTCs are not output:<br>• B2785<br>• B2287<br>• B2784 | A |
| DTC B2785 is not output but DTC B2287 is output. | B |
| DTCs other than B2287 are output. | C |

B ▶ GO TO OTHER FLOW CHART (DTC B2287)

A ▶ GO TO OTHER FLOW CHART (Room Oscillator does not Recognize Key)

C ▶ **GO TO DIAGNOSTIC TROUBLE CODE CHART**

| Power Source Mode does not Change to ON (IG) |
|---|

# DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the power management control ECU receives signals to change the power source mode.

HINT:

To allow use of the Techstream to inspect the push-button start function when the power source mode is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the Techstream and power management control ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

# WIRING DIAGRAM

Refer to DTC B2271 INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS AND CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

▼

| | |
|---|---|
| 3. | INSPECT IG2 RELAY INFO |

NG ▶ REPLACE IG2 RELAY

OK

▼

| | |
|---|---|
| 4. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY (IG1 NO. 1, IG1 NO. 2 AND IG1 NO. 3 RELAY) INFO |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INSTRUMENT PANEL J/B) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 6. | CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND)

OK

▼

| | |
|---|---|
| 7. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - IG2 RELAY) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - IG2 RELAY)

OK

▼

| | |
|---|---|
| 8. | CHECK HARNESS AND CONNECTOR (ENGINE ROOM RELAY BLOCK ASSEMBLY - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (ENGINE ROOM RELAY BLOCK ASSEMBLY - BODY GROUND)

OK

▼

| | |
|---|---|
| 9. | CHECK POWER MANAGEMENT CONTROL ECU INFO |

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▶ **USE SIMULATION METHOD TO CHECK**

Power Source Mode does not Change to ON (ACC)

# DESCRIPTION

When the power switch is pushed with the electrical key in the cabin, the power management control ECU receives signals to change the power source mode.

HINT:

To allow use of the Techstream to inspect the push-button start function when the power source mode is off, repeat opening and closing any of the doors. Opening and closing a door establishes communication between the Techstream and power management control ECU. (Opening and closing a door can also be simulated by operating a door courtesy light switch.)

# WIRING DIAGRAM

Refer to DTC B2274 INFO.

# INSPECTION PROCEDURE

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (AUXILIARY BATTERY - POWER MANAGEMENT CONTROL ECU)

OK

▼

| | |
|---|---|
| 2. | CHECK HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND) INFO |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - BODY GROUND)

OK

▼

| | |
|---|---|
| 3. | INSPECT INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY INFO |

NG ▶ REPLACE INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY

OK

▼

| | |
|---|---|
| 4. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - INSTRUMENT PANEL J/B) INFO |

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR

OK

▼

| | |
|---|---|
| 5. | CHECK HARNESS AND CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND) INFO |

NG → REPAIR OR REPLACE HARNESS OR CONNECTOR (INSTRUMENT PANEL JUNCTION BLOCK ASSEMBLY - BODY GROUND)

OK

▼

| | |
|---|---|
| 6. | INSPECT POWER MANAGEMENT CONTROL ECU INFO |

NG → REPLACE POWER MANAGEMENT CONTROL ECU

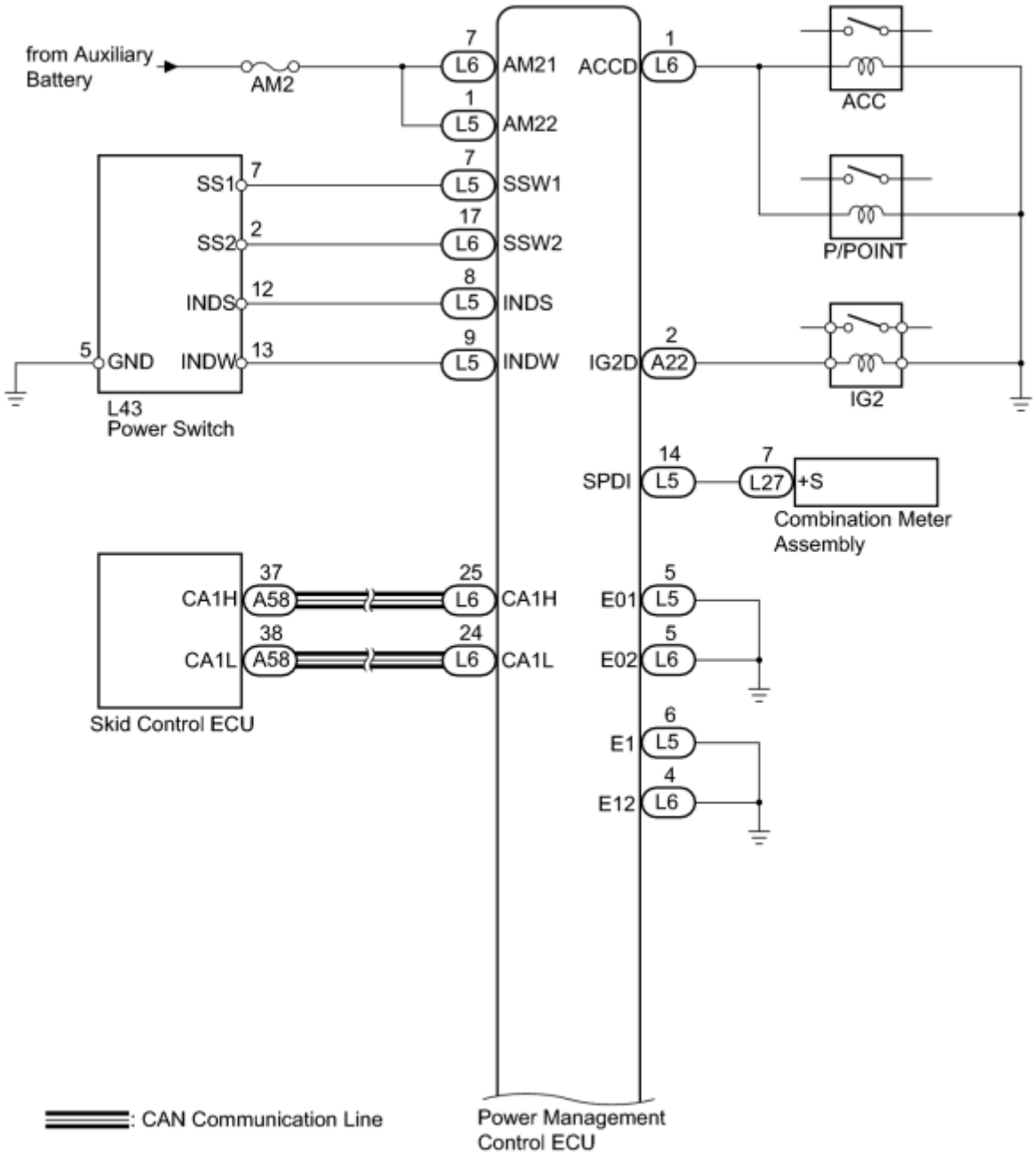
OK → **USE SIMULATION METHOD TO CHECK**

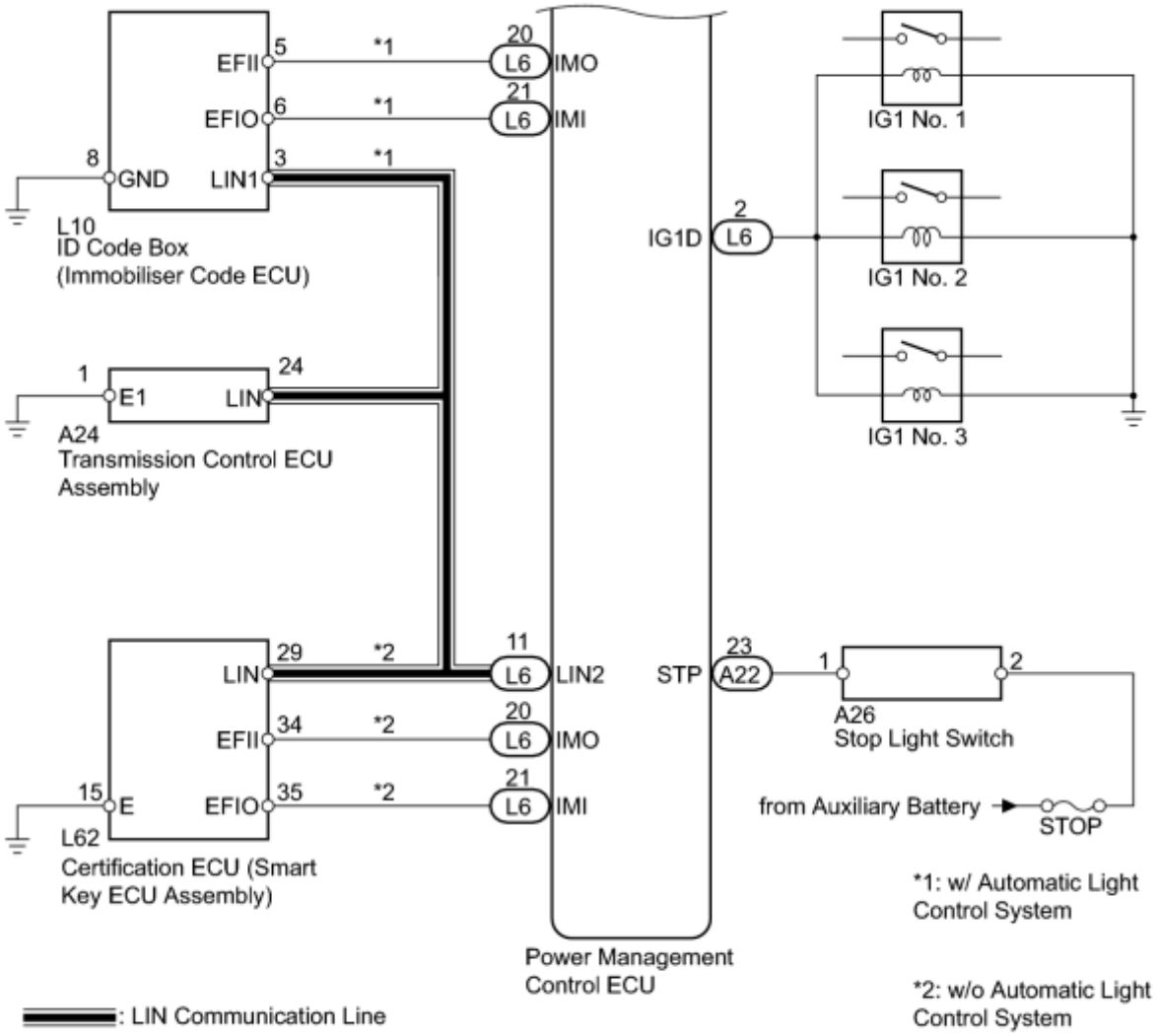
Power Source Mode does not Change to ON (READY)

# DESCRIPTION

When the electronic key is in the cabin and the power switch is pressed, the power management control ECU receives a signal and changes the power source mode. In addition, when the power switch is pressed with park (P) selected and the brake pedal depressed, the hybrid system turns on (READY).

# WIRING DIAGRAM


from Auxiliary Battery
AM2
7
L6
AM21
1
L5
AM22
ACCD
1
L6
ACC
P/POINT
SS1
7
SS2
2
INDS
12
5
GND
INDW
13
L43
Power Switch
7
L5
SSW1
17
L6
SSW2
8
L5
INDS
9
L5
INDW
IG2D
2
A22
IG2
SPDI
14
L5
7
L27
+S
Combination Meter Assembly
CA1H
37
A58
CA1L
38
A58
Skid Control ECU
25
L6
CA1H
24
L6
CA1L
E01
5
L5
E02
5
L6
E1
6
L5
E12
4
L6
: CAN Communication Line
Power Management Control ECU




# INSPECTION PROCEDURE

NOTICE:

- When the power management control ECU is replaced with a new one and the cable from the negative (-) auxiliary battery terminal is connected, the power source mode becomes on (IG) mode. When the auxiliary battery is removed and reinstalled, power source mode that was selected when the auxiliary battery was removed is restored.
- Inspect the fuses for circuits related to this system before performing the following inspection procedure.

# PROCEDURE

| | |
|---|---|
| 1. | CHECK HYBRID SYSTEM READY ON |

(a) Place the electrical key on the driver seat.

(b) Depress the brake pedal.

(c) Check that the power switch indicator light is green. Then press the power switch to check if the hybrid system turns on (READY).

OK:

Power source mode becomes on (READY).

NG ▶ CHECK FOR DTC

OK ▶ **END (HYBRID SYSTEM PERMISSION CONDITIONS WERE NOT SATISFIED)**

| | |
|---|---|
| 2. | CHECK FOR DTC |

(a) Turn the power switch off.

(b) Connect the Techstream to the DLC3.

(c) Turn the power switch on (IG).

(d) Turn the Techstream on.

(e) Enter the following menus: Powertrain / Hybrid Control / DTC.

(f) Check for DTCs.

OK:

DTC is not output.

NG ▶ GO TO HYBRID CONTROL SYSTEM (DIAGNOSTIC TROUBLE CODE CHART)

OK

▼

| | |
|---|---|
| 3. | CHECK FOR DTC |

(a) Enter the following menus: Body Electrical / Power Source Control / Data List.

(b) Check for DTCs.

OK:

DTC is not output.

NG ▶ GO TO DIAGNOSTIC TROUBLE CODE CHART

OK

| | |
|---|---|
| 4. | CHECK POWER SOURCE CONDITION |

(a) Check the power source mode change.

(1) When the key is inside the vehicle and the park (P) is selected, check that pressing the power switch causes the power source mode to change.

Result:

| Result | Proceed to |
|---|---|
| off → on (ACC) → on (IG) → off | A |
| Power source mode does not change to on (IG and ACC) | B |
| Power source mode does not change to on (IG) | C |
| Power source mode does not change to on (ACC) | D |

D GO TO OTHER FLOW CHART (Power Source Mode does not Change to ON (ACC))

C GO TO OTHER FLOW CHART (Power Source Mode does not Change to ON (IG))

B GO TO OTHER FLOW CHART (Power Source Mode does not Change to ON (IG and ACC))

A

| | |
|---|---|
| 5. | READ VALUE USING TECHSTREAM (STOP LIGHT SWITCH ASSEMBLY) |

(a) Read the Data List according to the display on the Techstream.

***Power Source Control***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Stop Light Switch1 | Stop light switch 1/ON or OFF | ON: Brake pedal depressed<br><br>OFF: Brake pedal released | - |

OK:

ON (brake pedal is depressed) and OFF (brake pedal is released) appear on the screen.

NG INSPECT STOP LIGHT SWITCH ASSEMBLY

OK

| | |
|---|---|
| 6. | READ VALUE USING TECHSTREAM (L CODE) |

(a) Enter the following menus: Body Electrical / Smart Key / Data List.

(b) Read the Data List according to the display on the Techstream.

*Smart Key*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| L Code Check | L code certification result/OK or NG | OK: L code certification result normal<br><br>NG: L code certification result abnormal | - |

OK:

OK appears on the screen.

NG ▶ REPLACE TRANSMISSION CONTROL ECU ASSEMBLY

OK

▼

| | |
|---|---|
| 7. | READ VALUE USING TECHSTREAM (ENGINE START REQUEST) |

(a) Read the Data List according to the display on the Techstream.

*Smart Key*

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Engine Start Request | Start request signal response/OK or NG | OK: Start request condition signal received<br><br>NG: Start request condition signal not received | - |

OK:

OK appears on the screen.

Result:

| Result | Proceed to |
|---|---|
| OK (w/ Automatic Light Control System) | A |
| OK (w/o Automatic Light Control System) | B |
| NG | B |

B ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

A

▼

| | |
|---|---|
| 8. | READ VALUE USING TECHSTREAM (S CODE) |

(a) Read the Data List according to the display on the Techstream.

***Smart Key***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| S Code Check | S code certification result/OK or NG | OK: S code certification result normal<br><br>NG: S code certification result abnormal | - |

OK:

OK appears on the screen.

NG ▶ REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

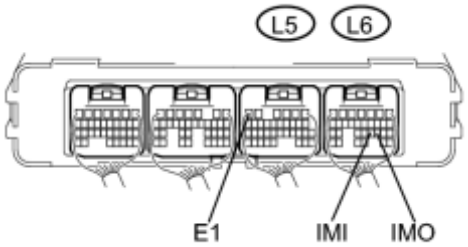
OK

▼

| | |
|---|---|
| 9. | CHECK ID CODE BOX (IMMOBILISER CODE ECU) |

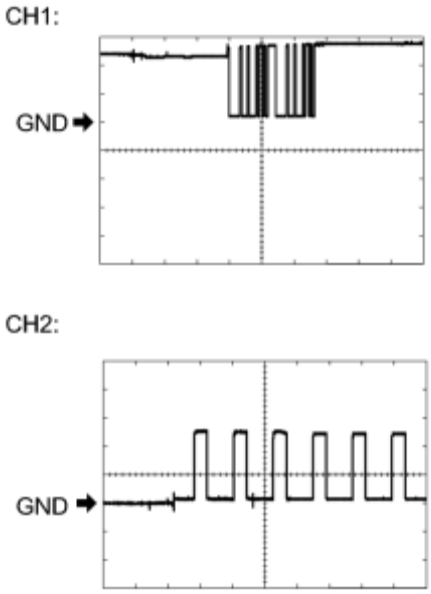
(a) Measure the voltage according to the value(s) in the table below.

*1




(1) Waveform 1

| | |
|---|---|
| Tester Connection | L6-20 (IMO) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 500 ms/DIV |
| Vehicle Condition | Within 3 seconds after power switch on (READY), or within 3 seconds after power switch first turned on (IG) after battery disconnected and connected |




(2) Waveform 2

| | |
|---|---|
| Tester Connection | L6-21 (IMI) - L5-6 (E1) |
| Tool Setting | 5 V/DIV., 50 ms/DIV |
| Vehicle Condition | Power switch on (IG) |

OK:

The waveform is displayed as shown in illustration.

***Text in Illustration***

| | |
|---|---|
| *1 | Component with harness connected<br><br>(Power Management Control ECU) |

NG REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

OK

▼

| | |
|---|---|
| 10. | READ VALUE USING TECHSTREAM |

(a) Enter the following menus: Body Electrical / Power Source Control / Data List.

(b) Read the Data List according to the display on the Techstream.

***Power Source Control***

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|

| Tester Display | Measurement Item/Range | Normal Condition | Diagnostic Note |
|---|---|---|---|
| Starter Request Signal | Hybrid control system start request signal / ON or OFF | ON: STSW signal is on<br><br>OFF: STSW signal is off | - |

OK:

Data List display changes when the power switch is operated.

NG ▶ REPLACE POWER MANAGEMENT CONTROL ECU

OK ▶ **GO TO HYBRID CONTROL SYSTEM**

| | |
|---|---|
| 11. | INSPECT STOP LIGHT SWITCH ASSEMBLY INFO |

NG ▶ REPLACE STOP LIGHT SWITCH ASSEMBLY

OK

▼

| | |
|---|---|
| 12. | CHECK HARNESS AND CONNECTOR (POWER MANAGEMENT CONTROL ECU - STOP LIGHT SWITCH ASSEMBLY) |

(a) Disconnect the A22 connector from the power management control ECU.

(b) Measure the resistance according to the value(s) in the table below.

Standard Resistance:

| Tester Connection | Condition | Specified Condition |
|---|---|---|
| A22-23 (STP) - A26-1 | Always | Below 1 Ω |
| A22-23 (STP)- Body ground | Always | 10 kΩ or higher |

NG ▶ REPAIR OR REPLACE HARNESS OR CONNECTOR (POWER MANAGEMENT CONTROL ECU - STOP LIGHT SWITCH ASSEMBLY)

OK ▶ **REPLACE POWER MANAGEMENT CONTROL ECU**

| | |
|---|---|
| 13. | REPLACE TRANSMISSION CONTROL ECU ASSEMBLY |

(a) Replace transmission control ECU assembly INFO.

NEXT

▼

| | |
|---|---|
| 14. | CHECK HYBRID SYSTEM READY ON |

(a) Place the electrical key on the driver seat.

(b) Depress the brake pedal.

(c) Check that the power switch indicator light is green. Then press the power switch to check if the hybrid system turns on (READY).

OK:

Power source mode becomes on (READY).

Result:

| Result | Proceed to |
|---|---|
| OK | A |
| NG (w/ Automatic Light Control System) | B |
| NG (w/o Automatic Light Control System) | C |

C REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY)

B REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

A **END (TRANSMISSION CONTROL ECU WAS DEFECTIVE)**

| | |
|---|---|
| 15. | REPLACE CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) |

(a) Replace certification ECU (smart key ECU assembly).

NEXT

| | |
|---|---|
| 16. | CHECK HYBRID SYSTEM READY ON |

(a) Place the electrical key on the driver seat.

(b) Depress the brake pedal.

(c) Check that the power switch indicator light is green. Then press the power switch to check if the hybrid system turns on (READY).

OK:

Power source mode becomes on (READY).

NG REPLACE ID CODE BOX (IMMOBILISER CODE ECU)

OK **END (CERTIFICATION ECU (SMART KEY ECU ASSEMBLY) WAS DEFECTIVE)**